Traffic Impact Analysis Capital Sportsplex Wake Forest, NC

Inai



# TRAFFIC IMPACT ANALYSIS

FOR

# **CAPITAL SPORTSPLEX**

#### LOCATED

IN

# WAKE FOREST, NORTH CAROLINA

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RKA Project No. 17295

# TRAFFIC IMPACT ANALYSIS CAPITAL SPORTSPLEX WAKE FOREST, NORTH CAROLINA

# **EXECUTIVE SUMMARY**

# 1. Development Overview

A Traffic Impact Analysis (TIA) was conducted for the proposed Capital Sportsplex in accordance with the Town of Wake Forest (Town) Unified Development Ordinance (UDO) and North Carolina Department of Transportation (NCDOT) capacity analysis guidelines. The development is proposed to be located in the northeast quadrant of the intersection of Star Road and Height Lane, east of US 1, in Wake Forest, North Carolina. Access to the proposed development will be provided via two (2) full movement driveways on Star Road. For the purposes of this study, the site is assumed to have a build-out year of 2018.

# 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:

- US 1 and New Falls of Neuse Road / South Main Street
- Star Road and South Main Street
- US 1 and Ponderosa Service Road
- Star Road and Ponderosa Service Road
- US 1 and Height Lane / Montys Lane
- Star Road and Height Lane

# 3. Site Trip Generation

The proposed development is assumed to consist of approximately 5 soccer fields, 4 baseball fields, 8 sand volleyball courts, a 400m outdoor track, a 96,300 s.f. athletic club, 170 kid daycare, and a 3,200 s.f. physical therapy office. Average weekday daily, PM peak hour, and Saturday Midday peak hour trips for the proposed development were estimated using methodology contained within the ITE Trip Generation Manual, 9th Edition. Table E-1 provides a summary of the trip generation potential for the site.



Land Use (ITE Code)	Size	Daily Traffic (ypd)	Weekd Peak Ho (vj	ay PM ur Trips oh)	Saturday Midday Peak Hour Trips (vph)	
		(()pu)	Enter	Exit	Enter	Exit
Soccer Complex (488)	12 fields	900 <sup>1</sup>	92 <sup>1</sup>	128 <sup>1</sup>	175 <sup>1</sup>	189 <sup>1</sup>
Athletic Club (493)	96,300 s.f.	4,200 <sup>1</sup>	354 <sup>1</sup>	208 <sup>1</sup>	315 <sup>1</sup>	327 <sup>1</sup>
Day Care Center (565)	170 kids	700	65	73		
Medical/Dental Office (720)	3,200 s.f.	100 <sup>1</sup>	$5^1$	9 <sup>1</sup>	$7^1$	$5^1$
Total Site Trips		5,900	516	418	497	521

 Table E-1: Site Trip Generation

1. Due to limitations in the ITE Trip Generation Manual, rates were used instead of local data.

# 4. Capacity Analysis Summary

This study analyzes weekday PM and Saturday Midday peak hour traffic for existing (2017), background (2018), and combined (2018) conditions. Refer to Table E-2 for the capacity analysis summary performed at each study intersection.

# 5. **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.

#### **Recommended Improvements by Developer**

US 1 and New Falls of Neuse Road / South Main Street

• Develop a signal timing modification plan to accommodate traffic volumes expected under future traffic conditions.

#### US 1 and Ponderosa Service Road

- Extend the exclusive southbound left-turn lane storage to 350' with appropriate taper.
- Convert the intersection to a superstreet and install a traffic signal at each left-over intersection.



#### US 1 and Northbound U-Turn Location (approximately 800' north of superstreet left-overs)

- Provide an exclusive northbound U-turn lane with 200 feet of storage and appropriate taper.
- Provide stop control for U-turn movement.

#### Star Road and Ponderosa Service Road

- Restrict the eastbound (inbound) approach to right-turns only.
- Remove stop control for eastbound approach.
- Provide stop control for southbound approach.

#### US 1 and Height Lane / Montys Lane

- Restrict the westbound approach to a right-in / right-out.
- Stripe out the exclusive southbound left-turn lane and restrict the southbound leftturn movement.
- Construct a channelized free-flow receiving lane on US 1, north of the intersection, for at least 800' before tapering.

#### Star Road and Northern Site Drive

• Construct a single-lane urban compact roundabout with yield control on all approaches.

#### Star Road and Southern Site Drive

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

NCDOT TIP project U-5307C is planned to convert US 1 into a freeway facility with backage roads and a Diverging Diamond Interchange (DDI) at US 1 and South Main Street. This project is scheduled for construction in 2021 and will significantly impact traffic patterns in the study area.



Intersection	Approach	Existin <sub>4</sub> Cond	g (2017) itions	Backgrou Cond	ınd (2018) litions	Combine Cond	ed (2018) itions	Combine Conditions	ed (2018) - Improved
		PM	SAT	PM	SAT	PM	SAT	PM	SAT
	EB	Е	F	Е	Е	F	Е	Е	Е
US 1 and New Falls of Neuse Poad /	WB	Е	Е	Е	F	F	F	F	Е
South Main Street	NB	D	D	D	D	D	D	D	D
South Main Street	SB	D	D	D	D	D	D	D	E
	Overall	D (52)	E (55)	D (53)	E (57)	E (60)	E (65)	E (58)	E (63)
	EB	-	-	-	-	-	-	-	-
Star Road and South Main Street	WB	-	-	-	-	-	-	-	-
	NB	B <sup>1</sup>	B <sup>1</sup>	B <sup>1</sup>	B <sup>1</sup>	$\mathbf{B}^{1}$	B <sup>1</sup>	-	-
	EB	$F^2$	F <sup>2</sup>	$F^2$	$F^2$	-	-	-	-
US 1 and Dondorosa Service Road	WB	$F^2$	$F^2$	$F^2$	$F^2$	-	-	-	-
US 1 and Ponderosa Service Road	NB	C1	C <sup>1</sup>	C1	C1	-	-	-	-
	SB	$C^1$	$B^1$	$C^1$	$C^1$	-	-	-	-
	EB	-	-	-	-	D	С	-	-
US 1 and Ponderosa Service Road	NB	-	-	-	-	С	D	-	-
(Northbound Left-Over)	SB	-	-	-	-	В	В	-	-
	Overall	-	-	-	-	B (15)	B (18)	-	-
	WB	-	-	-	-	D	С	-	-
US 1 and Ponderosa Service Road	NB	-	-	-	-	D	D	-	-
(Southbound Left-Over)	SB	-	-	-	-	D	С	-	-
	Overall	-	-	-	-	D (42)	C (27)	-	-
US 1 and Northbound U-Turn Location	NB	-	-	-	-	E	F	-	-
	SB	-	-	-	-	-	-	-	-
	EB	A <sup>2</sup>	A <sup>2</sup>	A <sup>2</sup>	A <sup>2</sup>	-	-	-	-
Star Road and Ponderosa Service Road	NB	A	A	A	A	-	-	-	-
	SB	-	-	-	-	A <sup>3</sup>	A <sup>3</sup>	-	-
	EB	$D^2$	E <sup>2</sup>	E <sup>2</sup>	E <sup>2</sup>	F <sup>2</sup>	F <sup>2</sup>	-	-
US 1 and Unicht Long / Montus Long	WB	$F^2$	$F^2$	$F^2$	$F^2$	$A^2$	$A^2$	-	-
US I and Height Lane / Montys Lane	NB	$C^1$	C <sup>1</sup>	$C^1$	C <sup>1</sup>	$D^1$	$D^1$	-	-
	SB	$C^1$	C <sup>1</sup>	$C^1$	C1	-	-	-	-
	EB	A <sup>1</sup>	A <sup>1</sup>	A <sup>1</sup>	A <sup>1</sup>	$A^1$	$\mathbf{A}^{1}$	-	-
	WB				$\Delta^1$		Δ <sup>1</sup>	_	-
Star Road and Height Lane	NB	A 2	A 2	A <sup>2</sup>	A <sup>2</sup>	P <sup>2</sup>	P <sup>2</sup>	_	
	SD SD	A	A	A	A	<u>Б</u>	<u>Б</u>	-	-
	SD WD	A	A	A	A	A	A	-	-
	NB	-	-	-	-	A	A	-	-
Star Road and Northern Site Drive	IND SB	-	-	-	-	A	A	-	-
	Overall	-	-	-	-	B (10)	A (10)	-	-
	WB	-	-	-	_	$B^2$	R <sup>2</sup>	_	-
Star Road and Southern Site Drive	NB	-	-	-	-	-	-	-	-
	SB	-	-	-	-	A <sup>3</sup>	A <sup>3</sup>	-	-

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1. Level of service for major-street left-turn movement. 2. Level of service for minor-street approach.

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# TRAFFIC IMPACT ANALYSIS CAPITAL SPORTSPLEX WAKE FOREST, NORTH CAROLINA

# 1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Capital Sportsplex development to be located in the northeast quadrant of the intersection of Star Road and Height Lane, east of US 1, in Wake Forest, North Carolina. The purpose of this study is to determine the potential impacts to the surrounding transportation system created by traffic generated from the proposed development, as well as recommend improvements to mitigate the impacts.

The proposed development, anticipated to be completed in 2018, is assumed to consist of the following uses:

- 96,300 s.f. Athletic Club
- 170 kid Daycare
- 3,200 s.f. Physical Therapy
- 5 Soccer Fields
- 4 Baseball Fields
- 8 Sand Volleyball Courts
- 400m Outdoor Track

It should be noted that two soccer fields are anticipated to operate indoors and add to the square footage of the athletic club.

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

- Existing (2017) Traffic Conditions
- Background (2018) Traffic Conditions
- Combined (2018) Traffic Conditions
- Future (2030) Traffic Conditions US 1 as a Freeway



The scope of work for this study was developed based on coordination with the North Carolina Department of Transportation (NCDOT) and the Town of Wake Forest (Town). Refer to Appendix A for scoping information.

# 1.1. Site Location and Study Area

The development is proposed to be located in the northeast quadrant of the intersection Star Road and Height Lane in Wake Forest, North Carolina. Refer to Figure 1 for the site location map. The study area for the TIA was determined through coordination with NCDOT and the Town and consists of the following existing intersections:

- US 1 and New Falls of Neuse Road / South Main Street
- Star Road and South Main Street
- US 1 and Ponderosa Service Road
- Star Road and Ponderosa Service Road
- US 1 and Height Lane / Montys Lane
- Star Road and Height Lane

# 1.2. Proposed Land Use and Site Access

The proposed development, anticipated to be completed in 2018, is assumed to consist of the following uses:

- 96,300 s.f. Athletic Club
- 170 kid Daycare
- 3,200 s.f. Physical Therapy
- 5 Soccer Fields
- 4 Baseball Fields
- 8 Sand Volleyball Courts
- 400m Outdoor Track

It should be noted that two soccer fields are anticipated to operate indoors and add to the square footage of the athletic club.



Site access is proposed via two full movement driveways on Star Road. It should be noted the site plan allows for additional connections to the existing Living World Church adjacent to the site and the proposed La Scala apartments to the north of the site. Refer to Figure 2 for a copy of the preliminary site plan.

# 1.3. Adjacent Land Uses

The proposed development is located in an area consisting primarily of commercial and residential development.

# **1.4.** Existing Roadways

US 1 (Capital Boulevard) is a four-lane roadway running in a north-south direction with a posted speed limit of 55 miles per hour (mph) within the study area. Based on the most recent data (2015) from the NCDOT, US 1 had an average annual daily traffic (AADT) volume of approximately 48,000 vehicles per day (vpd) south of its intersection with New Falls of Neuse Road.

South Main Street is a four-lane roadway running in an east-west direction with a posted speed limit of 35 mph within the study area. Based on the most recent data (2015) from the NCDOT, South Main Street had an average AADT volume of approximately 28,000 vpd east of its intersection with US 1.

New Falls of Neuse Road is a four-lane roadway running in a east-west direction with a posted speed limit of 45 mph within the study area. Based on the traffic counts from 2017, and assuming that the weekday PM peak hour volume is 10% of the average daily traffic, New Falls of Neuse Road has an ADT volume of approximately 22,000 vpd west of its intersection with US 1.

Star Road is a two-lane roadway running in a north-south direction with no posted speed limit within the study area. For the purpose of this study, a speed limit of 35 mph was assumed. Based on the traffic counts from 2017, and assuming that the weekday PM peak hour volume is 10% of the average daily traffic, Star Road has an ADT volume of approximately 400 vpd north of its intersection with Height Lane. Star Road functions as a parallel service road to US 1.



Ponderosa Service Road is a two-lane roadway running in an east-west direction with no posted speed limit within the study area. For the purpose of this study, a speed limit of 35 mph was assumed. Based on the traffic counts from 2017, and assuming that the weekday PM peak hour volume is 10% of the average daily traffic, Ponderosa Service Road has an ADT volume of approximately 340 vpd east of its intersection with US 1. Ponderosa Service Road provides acces to US 1 from adjacent service roads.

Height Lane is a two-lane roadway running in an east-west direction with no posted speed limit in the study area. For the purpose of this study, a speed limit of 35 mph was assumed. Based on the traffic counts from 2017, and assuming that the weekday PM peak hour volume is 10% of the average daily traffic, Height Lane has an ADT volume of approximately 250 vpd east of its intersection with US 1.

Montys Lane is a two-lane roadway running in an east-west direction with no posted speed limit in the study area. For the purpose of this study, a speed limit of 35 mph was assumed. Based on the traffic counts from 2017, and assuming that the weekday PM peak hour volume is 10% of the average daily traffic, Montys Lane has an ADT volume of approximately 1,300 vpd west of its intersection with US 1. Montys Lane provides access to the Hanson Aggregates Quarry.

Existing lane configurations (number of traffic lanes on each intersection approach), lane widths, storage capacities, and other intersection and roadway information was collected through field reconnaissance by Ramey Kemp & Associates, Inc. (RKA). Refer to Figure 3 for an illustration of the existing lane configurations within the study area.









# 2. EXISTING (2017) PEAK HOUR CONDITIONS

# 2.1. Existing (2017) Peak Hour Traffic

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in November of 2017 by RKA during typical weekday PM (4:00 PM - 6:00 PM) and Saturday Midday (11:00 AM - 1:00 PM) peak periods:

- US 1 and New Falls of Neuse Road / South Main Street
- Star Road and South Main Street
- US 1 and Ponderosa Service Road
- Star Road and Ponderosa Service Road
- US 1 and Height Lane / Montys Lane
- Star Road and Height Lane

Traffic volumes were balanced between study intersections, where appropriate. Refer to Figure 4 for existing (2017) weekday PM and Saturday Midday peak hour traffic volumes. A copy of the count data is located in Appendix B of this report.

# 2.2. Analysis of Existing (2017) Peak Hour Traffic

The existing (2017) weekday PM and Saturday Midday peak hour traffic volumes were analyzed to determine the current levels of service at the study intersections under existing roadway conditions. Signal information was obtained from NCDOT and is included in Appendix C. Through coordination with NCDOT it was determined the intersection of US 1 and New Falls of Neuse Road / South Main Street is currently operating under free-run timings. The results of the analysis are presented in Section 7 of this report.





# **3.** BACKGROUND (2018) PEAK HOUR CONDITIONS

In order to account for growth of traffic and subsequent traffic conditions at a future year, background traffic projections are needed. Background traffic is the component of traffic due to the growth of the community and surrounding area that is anticipated to occur regardless of whether or not the proposed development is constructed. Background traffic is comprised of existing traffic growth within the study area and additional traffic created as a result of adjacent approved developments.

# 3.1. Ambient Traffic Growth

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 2% would be used to generate projected (2018) weekday PM and Saturday Midday peak hour traffic volumes. Refer to Figure 5 for projected (2018) peak hour traffic.

# 3.2. Adjacent Development Traffic

Through coordination with the NCDOT and Town, the La Scala apartments were identified to be included as an adjacent development in this study. The La Scala apartments are expected to consist of 248 units and be located along Star Road and north of the Capital Sportsplex development. It should be noted that the approved TIA for this development was requested, but not received; therefore, the trip generation was calculated by RKA and the trip distribution was determined based on existing traffic patterns, population centers adjacent to the study area, and engineering judgment. Adjacent development trips are shown in Figure 6. Available adjacent development information can be found in Appendix D.

#### 3.3. Future Roadway Improvements

Based on discussions with NCDOT and the Capital Area Metropolitan Planning Organization (CAMPO), US 1 is planned to be upgraded to a controlled access facility between I-540 and NC 98 Bypass in the future as part of TIP Project U-5307. The project is currently scheduled for right-of-way in 2021 and construction beginning in 2023. US 1 is planned to be an eight-lane divided facility with a Diverging Diamond Interchange (DDI) at US 1 and New Falls of Neuse Road / South Main Street. At the time of this study, design plans were not available. Refer to Section 7.10 and Appendix E for more information related to this project.



# 3.4. Background (2018) Peak Hour Traffic Volumes

The background (2018) traffic volumes were determined by projecting the existing (2017) peak hour traffic to the year 2018, and adding the adjacent development trips. Refer to Figure 7 for an illustration of the background (2018) peak hour traffic volumes at the study intersections.

# 3.5. Analysis of Background (2018) Peak Hour Traffic Conditions

The background (2018) weekday PM and Saturday Midday peak hour traffic volumes at the study intersections were analyzed with future geometric roadway conditions and traffic control. The analysis results are presented in Section 7 of this report.









#### 4. SITE TRIP GENERATION AND DISTRIBUTION

#### 4.1. Trip Generation

The proposed development is assumed to consist of approximately 5 soccer fields, 4 baseball fields, 8 sand volleyball courts, a 400m outdoor track, a 96,300 s.f. athletic club, 170 kid daycare, and a 3,200 s.f. physical therapy office. For trip generation purposes, the outdoor fields were assumed to be soccer fields. It should be noted that several assumptions were made to determine the trip generation. The assumptions and trip generation were approved by NCDOT and can be found in Appendix A. Average weekday daily, PM peak hour, and Saturday Midday peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 9th Edition. Table 1 provides a summary of the trip generation potential for the site.

Land Use (ITE Code)	Size	Daily Traffic	Weekd Peak Ho (vj	ay PM ur Trips oh)	Saturday Midday Peak Hour Trips (vph)	
		(vpa)	Enter	Exit	Enter	Exit
Soccer Complex (488)	12 fields	900 <sup>1</sup>	92 <sup>1</sup>	128 <sup>1</sup>	175 <sup>1</sup>	189 <sup>1</sup>
Athletic Club (493)	96,300 s.f.	$4,200^{1}$	354 <sup>1</sup>	208 <sup>1</sup>	315 <sup>1</sup>	327 <sup>1</sup>
Day Care Center (565)	170 kids	700	65	73		
Medical/Dental Office (720)	3,200 s.f.	$100^{1}$	5 <sup>1</sup>	9 <sup>1</sup>	$7^1$	$5^1$
Total Site Trips		5,900	516	418	497	521

**Table 1: Trip Generation Summary** 

1. Due to limitations in the ITE Trip Generation Manual, rates were used instead of local data.

It is estimated that the proposed development will generate approximately 5,900 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 934 trips (516 entering and 418 exiting) will occur during the PM peak hour and 1018 (497 entering and 521 exiting) will occur during the Saturday Midday peak hour.



### 4.2. Site Trip Distribution and Assignment

Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, and engineering judgment. It is estimated that trips will be distributed as follows:

- 30% to/from the south via US 1
- 25% to/from the north via US 1
- 30% to/from the west via New Falls of Neuse Road
- 15% to/from the east via South Main Street

The site trip distribution is shown in Figure 9. Refer to Figure 10 for the site trip assignment.







# 5. COMBINED (2018) TRAFFIC CONDITIONS

# 5.1. Superstreet Diverted Traffic at Full Build-Out of Development

Through coordination with the NCDOT and Town, it was determined that the development would be required to construct a superstreet configuration at the intersection of US 1 and Ponderosa Service Road, and a U-turn location approximately 800 feet north of the superstreet. Additionally, it was determined that the addition of site traffic to the roadway network will require several access restrictions to maintain acceptable levels-of-service at the study intersections. The removal of several existing turning movements will require background traffic volumes to be diverted. The following background traffic volumes were removed and balanced through the appropriate study intersections based on existing traffic patterns and engineering judgement:

#### US 1 and Ponderosa Service Road

- Eastbound through and left-turn volumes
- Westbound through and left-turn volumes

# Star Road and Ponderosa Service Road

• Eastbound left-turn volumes

# US 1 and Height Lane / Montys Lane

- Southbound left-turn volumes
- Westbound through and left-turn volumes

Refer to Figure 10 for the proposed superstreet diverted traffic volumes.

# 5.2. Combined (2018) Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the background (2018) traffic volumes that have been diverted due to the superstreet to determine the combined (2018) traffic volumes. Refer to Figure 11 for an illustration of the combined (2018) peak hour traffic volumes with the proposed site fully developed.



# 5.3. Analysis of Combined (2018) Peak Hour Traffic

Study intersections were analyzed with the combined (2018) traffic volumes using the same methodology previously discussed for existing and background traffic conditions. Intersections were analyzed with improvements necessary to accommodate future traffic volumes. The results of the capacity analysis for each intersection are presented in Section 7 of this report.







#### 6. TRAFFIC ANALYSIS PROCEDURE

Study intersections were analyzed using the methodology outlined in the 2010 Highway Capacity Manual (HCM) published by the Transportation Research Board. Capacity and level of service are the design criteria for this traffic study. A computer software package, Synchro (Version 9.2), was used to complete the analyses for most of the study area intersections. Please note that the unsignalized capacity analysis does not provide an overall level of service for an intersection; only delay for an approach with a conflicting movement.

The HCM defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." Level of service (LOS) is a term used to represent different driving conditions, and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers." Level of service varies from Level "A" representing free flow, to Level "F" where breakdown conditions are evident. Refer to Table 2 for HCM levels of service and related average control delay per vehicle for both signalized and unsignalized intersections. Control delay as defined by the HCM includes "initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay". An average control delay of 50 seconds at a signalized intersection results in LOS "D" operation at the intersection.

UNSIGN	ALIZED INTERSECTION	SIGNALIZED INTERSECTION			
LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)		
А	0-10	А	0-10		
В	10-15	В	10-20		
С	15-25	С	20-35		
D	25-35	D	35-55		
Е	35-50	E	55-80		
F	>50	F	>80		

 Table 2: Highway Capacity Manual – Levels-of-Service and Delay

Roundabout intersections were analyzed utilizing a computer software package, Sidra Intersections (Version 6.1), which is an NCDOT approved analysis software. Sidra Intersections provides a level of service for each approach and the overall intersection.



# 6.1. Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the Town's Unified Development Ordinance (UDO) and the NCDOT Congestions Management Guidelines.



# 7. CAPACITY ANALYSIS

# 7.1. US 1 and New Falls of Neuse Road / South Main Street

The existing signalized intersection of US 1 and New Falls of Neuse Road / South Main Street was analyzed under existing (2017), background (2018), and combined (2018) traffic conditions with existing lane configurations and traffic control. Refer to Table 3 for a summary of the analysis results. Refer to Appendix F for the Synchro capacity analysis reports.

ANALYSIS	A P P R	LANE	WEEKI PEAK LEVEL OF	DAY PM HOUR S SERVICE	SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
SCENARIO	O A C H	CONFIGURATIONS	Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2017) Conditions	EB WB NB SB	2 LT, 2 TH, 1 RT 2 LT, 1 TH, 1 TH-RT 2 LT, 3 TH, 1 RT 2 LT, 3 TH, 1 RT	E E D D	D (52)	F E D D	E (55)
Background (2018) Conditions	EB WB NB SB	2 LT, 2 TH, 1 RT 2 LT, 1 TH, 1 TH-RT 2 LT, 3 TH, 1 RT 2 LT, 3 TH, 1 RT	E E D D	D (53)	E F D D	E (57)
Combined (2018) Conditions	EB WB NB SB	2 LT, 2 TH, 1 RT 2 LT, 1 TH, 1 TH-RT 2 LT, 3 TH, 1 RT 2 LT, 3 TH, 1 RT	F F D D	E (60)	E F D D	E (65)
Combined (2018) Conditions – with Signal Timing Modifications	EB WB NB SB	2 LT, 2 TH, 1 RT 2 LT, 1 TH, 1 TH-RT 2 LT, 3 TH, 1 RT 2 LT, 3 TH, 1 RT	E F D D	E (58)	E E D E	E (63)

Table 3: Analysis Summary of US 1 and New Falls of Neuse Road / South Main Street

Capacity analysis of existing (2017) and background (2018) traffic conditions indicates the intersection of US 1 and New Falls of Neuse Road / South Main Street is expected to operate at an overall LOS D during weekday PM peak hour and overall LOS E during the Saturday peak hour. Under combined (2018) traffic conditions, the intersection is expected to operate at an overall LOS E during the weekday PM and Saturday peak hours.



It should be noted that this intersection operates with signalized control as part of a coordinated signal system (Raleigh Signal System); however, through coordination with NCDOT, it was determined the intersection is currently operating under free-run timings. The intersection was analyzed as an actuated-uncoordinated signal because it is not expected to be coordinated with any other signals studied in this report.

The Town's UDO requires improvements to be recommended to ensure an intersection operates at an overall LOS D or better. Additional laneage was considered; however, these improvements are not expected to reduce the overall delay for the intersection to LOS D. To improve the overall delay of the intersection, the cycle length was shortened from 220 seconds to 180 seconds and the splits were optimized. With signal timing modifications, the intersection is expected to operate at an overall LOS E during the weekday PM and Saturday peak hours under combined (2018) traffic conditions. It should be noted that with signal timing modifications the addition of site traffic only adds 5 seconds and 6 seconds of overall delay to the intersection during the weekday PM and Saturday peak hour. Major geometric improvements, such as additional through lanes to increase capacity along US 1 or New Falls of Neuse Road, would be required to mitigate the increase in overall delay.

This intersection is planned to be converted to a Diverging Diamond Interchange (DDI) as part of the US 1 Corridor conversion (NCDOT TIP project U-5307C). This section of the project is slated for construction in 2021. Due to the marginal increase in overall delay at this intersection and the near-term schedule of the TIP project, geometric improvements are not recommended at this intersection. Refer to Section 7.10 for more information on the DDI analysis for this intersection.



#### 7.2. Star Road and South Main Street

The existing unsignalized intersection of Star Road and South Main Street was analyzed under existing (2017), background (2018), and combined (2018) traffic conditions with existing lane configurations and traffic control. Refer to Table 4 for a summary of the analysis results. Refer to Appendix G for the Synchro capacity analysis reports.

ANALYSIS	A P P R	LANE	WEEKI PEAK LEVEL OF	DAY PM HOUR F SERVICE	SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
SCENARIO	O A C H	CONFIGURATIONS	Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2017) Conditions	EB WB NB	1 TH, 1 TH-RT 4 TH 1 RT	  B <sup>1</sup>	N/A	  B <sup>1</sup>	N/A
Background (2018) Conditions	EB WB SB	1 TH, 1 TH-RT 4 TH 1 RT	  B <sup>1</sup>	N/A	  B <sup>1</sup>	N/A
Combined (2018) Conditions	EB WB SB	1 TH, 1 TH-RT 4 TH 1 RT	  B <sup>1</sup>	N/A	  B <sup>1</sup>	N/A

# Table 4: Analysis Summary of Star Road and South Main Street

1. Level of service for minor-street approach.

Capacity analysis of existing (2017), background (2018), and combined (2018) traffic conditions indicates the minor-street approach at the intersection of Star Road and South Main Street is expected to operate at LOS B during the weekday PM and Saturday peak hours.



#### 7.3. US 1 and Ponderosa Service Road

The existing unsignalized intersection of US 1 and Ponderosa Service Road was analyzed under existing (2017) and background (2018) traffic conditions with existing lane configurations and traffic control. It should be noted that during data collection, the eastbound and westbound minor-street approaches were observed to operate as two-lane approaches with enough right-turn storage for one vehicle, and the approach was analyzed as such. The existing unsignalized intersection will be converted to a signalized intersection as part of the proposed development. Refer to Table 5 for a summary of the analysis results. Refer to Appendix H for the Synchro capacity analysis reports.

ANALYSIS	A P P R	LANE	WEEKI PEAK LEVEL OF	DAY PM HOUR F SERVICE	SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
SCENARIO	O A C H	CONFIGURATIONS	Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2017) Conditions	EB WB NB SB	1 LT-TH, 1 RT 1 LT-TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT	$\begin{array}{c} *F^2\\ *F^2\\ C^1\\ C^1\end{array}$	N/A	$F^2 \\ F^2 \\ C^1 \\ B^1$	N/A
Background (2018) Conditions	EB WB NB SB	1 LT-TH, 1 RT 1 LT-TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT	$F^{2} = F^{2} = F^{2$	N/A	$F^{2}$ $F^{2}$ $*C^{1}$ $*C^{1}$	N/A
Combined (2018) Conditions – <b>Superstreet</b> <b>Left-Overs</b>	EB NB SB	1 RT 1 LT 2 TH, 1 RT	D C B	B (15)	C D B	B (18)
	WB NB SB	1 RT 2 TH, 1 RT 1 LT	D D D	D (42)	C D C	C (27)

Table 5: Analysis Summary of US 1 and Ponderosa Service Road

1. Level of service for major-street left-turn movement.

2. Level of service for minor-street approach.

\* HCM 2000 was utilized to report the unsignalized levels of service.

Capacity analysis of existing (2017) and background (2018) traffic conditions indicates the minor-street approaches are expected to operate at LOS F and the major-street left-turn movements are expected to operate at LOS C or better during the weekday PM and Saturday peak hours.



The cycle length and splits were optimized in the analysis for the proposed signalized left-over intersections, with preference given to maintaining acceptable levels-of-service for the northbound and southbound through movements on US 1. Under combined (2018) traffic conditions, the northbound left-over intersection is expected to operate at an overall LOS B during the weekday PM and Saturday peak hours. The southbound left-over intersection is expected to operate at an overall LOS D during the weekday PM peak hour and an overall LOS C during the Saturday peak hour, under combined (2018) traffic conditions.



### 7.4. Star Road and Ponderosa Service Road

The existing unsignalized intersection of Star Road and Ponderosa Service Road was analyzed under existing (2017) and background (2018) traffic conditions with existing lane configurations and traffic control. It should be noted the eastbound approach will be restricted to right-turns only and stop control will be moved to the southbound approach. Refer to Table 6 for a summary of the analysis results. Refer to Appendix I for the Synchro capacity analysis reports.

ANALYSIS	A P P R	LANE CONFIGURATIONS	WEEKDAY PM PEAK HOUR LEVEL OF SERVICE		SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
SCENARIO	O A C H		Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2017) Conditions	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A <sup>2</sup> A <sup>1</sup>	N/A	A <sup>2</sup> A <sup>1</sup>	N/A
Background (2018) Conditions	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A <sup>2</sup> A <sup>1</sup>	N/A	A <sup>2</sup> A <sup>1</sup>	N/A
Combined (2018) Conditions	EB NB SB	1 RT 1 LT-TH 1 TH-RT	  A <sup>3</sup>	N/A	  A <sup>3</sup>	N/A

Table 6: Analysis Summary of Star Road and Ponderosa Service Road

1. Level of service for major-street left-turn movement.

2. Level of service for minor-street approach.

3. Level of service for major-street stop controlled approach.

Capacity analysis of existing (2017) and background (2018) traffic conditions indicates all minor-street approaches and major-street left-turn movements at the intersection of Star Road and Ponderosa Service Road are expected to operate at LOS A during the weekday PM and Saturday peak hours. Under combined (2018) traffic conditions, the major-street stop controlled approach is expected to operate at LOS A during the weekday PM and Saturday peak hours.

The restricted movements at this intersection are needed to allow the northbound traffic (mostly traffic exiting the site) to run unimpeded at the same time as the southbound left-turns from US 1 onto Ponderosa Service Road, as if in a right-turn overlap phase.



# 7.5. US 1 and Height Lane / Montys Lane

The existing unsignalized intersection of US 1 and Height Lane / Montys Lane was analyzed under existing (2017) and background (2018) traffic conditions with existing lane configurations and traffic control. It should be noted that during data collection, the eastbound and westbound minor-street approaches were observed to operate as two-lane approaches with enough right-turn storage for one vehicle, and the approach was analyzed as such. Under combined conditions, the westbound approach will be restricted to right-in / right-out turning movements as part of the proposed development. Refer to Table 7 for a summary of the analysis results. Refer to Appendix J for the Synchro capacity analysis reports.

ANALYSIS	A P P R	LANE	WEEKDAY PM PEAK HOUR LEVEL OF SERVICE		SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
SCENARIO	O A C H	CONFIGURATIONS	Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2017) Conditions	EB WB NB SB	1 LT-TH, 1 RT 1 LT-TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT	$\begin{array}{c} *\mathbf{D}^2\\ *\mathbf{F}^2\\ \mathbf{C}^1\\ \mathbf{C}^1\end{array}$	N/A	${*E^2} {*F^2} C^1 C^1$	N/A
Background (2018) Conditions	EB WB NB SB	1 LT-TH, 1 RT 1 LT-TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT	$\begin{array}{c} *E^2\\ *F^2\\ C^1\\ C^1\end{array}$	N/A	$*E^{2}$ $*F^{2}$ $C^{1}$ $C^{1}$	N/A
Combined (2018) Conditions	EB WB NB SB	1 LT-RT 1 RT 1 LT, 2 TH, 1 RT 2 TH, 1 RT	$ \begin{array}{c} F^2 \\ A^2 \\ D^1 \\ \hline \end{array} $	N/A	$ \begin{array}{c} F^2 \\ A^2 \\ D^1 \\ - \end{array} $	N/A

 Table 7: Analysis Summary of US 1 and Height Lane / Montys Lane

1. Level of service for major-street left-turn movement.

2. Level of service for minor-street approach.

\* HCM 2000 was utilized to report the unsignalized levels of service.

Capacity analysis of existing (2017) and background (2018) traffic conditions indicates the eastbound minor-street approach is expected to operate at LOS E or better and the westbound minor-street approach is expected to operate as LOS F during the weekday PM and Saturday peak hours. Additionally, the major-street left-turn movements are expected to operate at LOS C during the weekday PM and Saturday peak hours. Under combined (2018) traffic conditions,



the eastbound minor-street approach is expected to operate at LOS F and the westbound minor-street approach is expected to operate at LOS A during the weekday PM and Saturday peak hours. Additionally, the northbound major-street left-turn movement is expected to operate at LOS D during the weekday PM and Saturday peak hours.

The poor level-of-service experienced at this intersection is not uncommon for unsignalized minor-street approaches at a mainline with heavy volumes. It should be noted that with the right-in / right-out restriction, the westbound approach is expected to operate with less delay under combined (2018) traffic conditions when compared to background (2018) traffic conditions. Through coordination with NCDOT, it was determined that Montys Lane must maintain full-access at its intersection with US 1, as it provides direct access for the Hanson Aggregates Quarry.

To meet Congestion Management Guidelines, a traffic signal was considered at this intersection and combined peak hour traffic volumes were analyzed utilizing the criteria contained in the *Manual on Uniform Traffic Control Devices (MUTCD)*. This intersection did not meet the peak hour warrant for either the weekday PM or Saturday peak hours under combined traffic volumes and it is unlikely traffic volumes will satisfy the MUTCD 8-hour and 4-hour signal warrants, which NCDOT favors for the installation of a traffic signal. Also, the addition of a signalized intersection to the roadway network would likely increase delays for the mainline (US 1) which is not recommended.

With the restriction of outbound traffic on the westbound approach to right-turns only, and traffic volumes on US 1, a dedicated receiving lane on US 1 would likely be needed to keep traffic from queuing extensively on the minor-street due to the lack of gaps for turning vehicles.



#### 7.6. Star Road and Height Lane

The existing unsignalized intersection of Star Road and Height Lane was analyzed under existing (2017), background (2018), and combined (2018) traffic conditions with existing lane configurations and traffic control. Refer to Table 8 for a summary of the analysis results. Refer to Appendix K for the Synchro capacity analysis reports.

ANALYSIS	A P P R	LANE	WEEKDAY PM PEAK HOUR LEVEL OF SERVICE		SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
SCENARIO	O A C H	CONFIGURATIONS	Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2017) Conditions	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	$\begin{array}{c} A^1 \\ A^1 \\ A^2 \\ A^2 \end{array}$	N/A	$\begin{array}{c} A^1 \\ A^1 \\ A^2 \\ A^2 \end{array}$	N/A
Background (2018) Conditions	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	$\begin{array}{c} A^1\\ A^1\\ A^2\\ A^2\end{array}$	N/A	$\begin{array}{c} A^1 \\ A^1 \\ A^2 \\ A^2 \end{array}$	N/A
Combined (2018) Conditions	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	$\begin{array}{c} \mathbf{A}^1\\ \mathbf{A}^1\\ \mathbf{B}^2\\ \mathbf{A}^2 \end{array}$	N/A	$ \begin{array}{c} \mathbf{A}^1 \\ \mathbf{A}^1 \\ \mathbf{B}^2 \\ \mathbf{A}^2 \end{array} $	N/A

 Table 8: Analysis Summary of Star Road and Height Lane

1. Level of service for major-street left-turn movement.

2. Level of service for minor-street approach.

Capacity analysis of existing (2017), background (2018), and combined (2018) traffic conditions indicates all minor-street approaches and major-street left-turn movements at the intersection of Star Road and Height Lane are expected to operate at LOS B or better during both weekday PM and Saturday peak hours.



#### 7.7. Star Road and Northern Site Drive

The proposed roundabout intersection of Star Road and Northern Site Drive was analyzed under combined (2018) traffic conditions with proposed lane configurations and traffic control shown in Table 9. Refer to Table 9 for a summary of the analysis results. Refer to Appendix L for the Sidra capacity analysis reports.

 Table 9: Analysis Summary of Star Road and Northern Site Drive

ANALYSIS SCENARIO	A P P R	LANE CONFIGURATIONS	WEEKDAY PM PEAK HOUR LEVEL OF SERVICE		SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
	O A C H		Approach	Overall (seconds)	Approach	Overall (seconds)
Combined (2018) Conditions	WB NB SB	<b>1 LT-RT</b> 1 TH <b>-RT</b> 1 <b>LT</b> -TH	A A B	B (10)	A A A	A (10)

Recommended developer improvements shown in **BOLD**.

Capacity analysis of combined (2018) traffic conditions indicates the roundabout at the intersection of Star Road and Northern Site Drive is expected to operate at LOS B or better during the weekday PM and Saturday peak hours.

A traditional stop-controlled intersection was considered for this intersection; however, with the turning movement restrictions at US 1 / Ponderosa Service Road / Star Road, traffic wanting to originally travel northbound on Star Road from US 1 will need a location to complete a U-turn and head north. While a roundabout provides a functional solution, there are constructability issues due to right-of-way and the future conversion of US 1, with additional lanes. The design specifics of providing a U-turn capability will need to be further explored during the roadway design phase.



#### 7.8. Star Road and Southern Site Drive

The proposed unsignalized intersection of Star Road and Southern Site Drive was analyzed under combined (2018) traffic conditions with the proposed lane configurations and traffic control shown in Table 10. Refer to Table 10 for a summary of the analysis results. Refer to Appendix M for the Synchro capacity analysis reports.

 Table 10: Analysis Summary of Star Road and Southern Site Drive

ANALYSIS	A P P R	LANE CONFIGURATIONS	WEEKDAY PM PEAK HOUR LEVEL OF SERVICE		SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
SCENARIO	O A C H		Approach	Overall (seconds)	Approach	Overall (seconds)
Combined (2018) Conditions	WB NB SB	<b>1 LT-RT</b> 1 TH <b>-RT</b> 1 <b>LT</b> -TH	$B^2$  $A^1$	N/A		N/A

1. Level of service for major-street left-turn movement.

2. Level of service for minor-street approach.

Recommended developer improvements shown in **BOLD**.

Capacity analysis of combined (2018) traffic conditions indicates all minor-street approaches and major-street left-turn movements at the intersection of Star Road and Southern Site Drive are expected to operate at LOS B or better during the weekday PM and Saturday peak hours.



# 7.9. US 1 and Northbound U-Turn Location

The proposed unsignalized intersection of US 1 and Northbound U-Turn Location was analyzed under combined (2018) traffic conditions with proposed lane configurations and traffic control. Refer to Table 11 for a summary of the analysis results. Refer to Appendix N for the Synchro capacity analysis reports.

Table 11: Analysis Summary of US 1 and Northbound U-Turn Location

A P P R	A       P       P       R     LANE       O     CONFIGURATIONS       A       C       H	WEEKDAY PM PEAK HOUR LEVEL OF SERVICE		SATURDAY MIDDAY PEAK HOUR LEVEL OF SERVICE	
O A C H		Approach	Overall (seconds)	Approach	Overall (seconds)
NB SB	1 UT, 2 TH 2 TH	$E^1$	N/A	$F^1$	N/A
	A P P R O A C H NB SB	A P PLANE CONFIGURATIONSA C HNB1 UT, 2 TH SB2 TH	A     WEEKI       P     WEEKI       P     LANE     PEAK       O     CONFIGURATIONS     Approach       A     C     Approach       H     E1     C1       NB     1 UT, 2 TH     E1       SB     2 TH	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $

1. Level of service for major-street U-turn movement.

Capacity analysis of combined (2018) traffic conditions indicates the northbound U-turn movement at the intersection of US 1 and Northbound U-turn location is expected to operate at LOS E during the weekday PM peak hour and LOS F during the weekday Saturday peak hour.

The poor level-of-service experienced at this intersection is not uncommon for unsignalized Uturn movements on a mainline with heavy volumes. Utilizing SimTraffic simulation software, a maximum queue of 179 feet was observed for the northbound U-turn movement on US 1 during the weekday PM and Saturday peak hours, which is approximately 7 vehicles. To meet Congestion Management Guidelines, a traffic signal was considered at this intersection and combined peak hour traffic volumes were analyzed utilizing the criteria contained in the *MUTCD*. This intersection meets the peak hour warrant for both the weekday PM and Saturday peak hours under combined traffic volumes; however, it is unlikely traffic volumes will satisfy the MUTCD 8-hour and 4-hour signal warrants, which NCDOT favors for the installation of a traffic signal. Also, the addition of a signalized intersection to the roadway network would likely increase delays for the mainline (US 1) which is not recommended.



#### 7.10. Future (2030) Traffic Conditions

Through coordination with the NCDOT, it was determined that US 1 is planned to be converted to an eight-lane divided freeway and a diverging diamond interchange at US 1 and New Falls of Neuse Road / South Main Street. The existing intersection of Star Road and South Main Street will be removed from the roadway network and a proposed "new" Star Road will connect to existing Wake Drive. For purposes of this analysis, it was assumed the full movement intersection of Wake Drive and South Main Street will be signalized upon full-build out of the "new" Star Road. The intersection of US 1 and Height Lane / Montys Lane will be removed from the roadway network and a proposed overpass will connect Height Lane and Montys Lane. Additionally, a backage road is proposed to be constructed adjacent to the site that will connect Height Lane and Forest Road. It was assumed additional full movement site access could be provided along the proposed backage road.

For purposes of this analysis, the project is assumed to be completed by the future year 2030. Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 2% would be applied to the background (2018) traffic volumes to generate background (2030) traffic volumes. Due to the reconfiguration of roadways and intersections in the study area, the background (2030) traffic volumes were diverted based on existing traffic patterns and engineering judgement. Refer to Appendix E for a copy of the future diverted traffic volumes figure.

Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, and engineering judgment. The regional trip distribution was maintained. Refer to Appendix E for a copy of the future site trip distribution and future site trip assignment figures.

To estimate traffic conditions with the site fully built-out, the total site trips were added to the background (2030) traffic volumes that have been diverted to determine the combined (2030) traffic volumes. Refer to Appendix E for a copy of the combined (2030) peak hour traffic volumes with the proposed site fully developed and US 1 as a divided freeway.



The future proposed intersections were analyzed with combined (2030) traffic volumes to determine the current levels of service at the study intersections under proposed roadway conditions. Intersections were analyzed with improvements necessary to accommodate future traffic volumes and site traffic. Refer to Appendix E for the Synchro capacity analysis reports. All intersections were developed to operate at LOS D or better. Exclusive storage lane lengths were determined utilizing maximum queue lengths observed in the SimTraffic simulation.



# 8. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the proposed Capital Sportsplex to be located in the northeast quadrant of the intersection of Star Road and Height Lane, east of US 1, in Wake Forest, North Carolina. The proposed development is expected to be a sports facility development and be built out in 2018. Site access is proposed via two full movement intersections on Star Road.

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

- Existing (2017) Traffic Conditions
- Background (2018) Traffic Conditions
- Combined (2018) Traffic Conditions
- Future (2030) Traffic Conditions US 1 as a Freeway

# Trip Generation

It is estimated that the proposed development will generate approximately 5,900 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 934 trips (516 entering and 418 exiting) will occur during the PM peak hour and 1018 (497 entering and 521 exiting) will occur during the Saturday Midday peak hour.

#### Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the Town's UDO and NCDOT Congestion Management Guidelines. Refer to section 6.1 of this report for a detailed description of any adjustments to these guidelines made throughout the analysis.

#### Intersection Capacity Analysis Summary

All the study area intersections (including the proposed site driveways) are expected to operate at acceptable levels-of-service under existing and future year conditions with the exception of the intersections listed below. A summary of the study area intersections that are expected to need improvements are as follows:



#### US 1 and New Falls of Neuse Road / South Main Street

Additional laneage was considered at this intersection; however, these improvements are not expected to reduce the overall delay for the intersection to LOS D. Signal timing modifications were considered to help reduce the overall delay.

This intersection is planned to be converted to a Diverging Diamond Interchange (DDI) as part of the US 1 Corridor conversion (NCDOT TIP project U-5307C). This section of the project is slated for construction in 2021. Due to the marginal increase in overall delay at this intersection and the near-term schedule of the TIP project, geometric improvements are not recommended at this intersection. Refer to Section 7.10 for more information on the DDI analysis for this intersection.

Significant modifications are needed at several study area intersections to improve the flow of traffic into and out of the site onto Star Road and ultimately US 1. The existing median break at US 1 and Ponderosa Service Road is to be converted to a signalized left-over with a U-turn location approximately 800 feet north on US 1. Turning movement restrictions are needed on Star Road at the access points to US 1 to prevent extensive queuing and delays.

Additionally, the NCDOT TIP project U-5307C is slated to convert US 1 to a divided freeway facility with backage roads through the study area and convert the New Falls of Neuse Road / US 1 intersection to a DDI. The project is currently scheduled for construction in 2021 and will have significant impacts to overall traffic patterns in the area.



#### 9. **RECOMMENDATIONS**

Based on the findings of this study, specific geometric improvements have been identified and are recommended to accommodate future traffic conditions. See a more detailed description of the recommended improvements below. Refer to Figure 12 for an illustration of the recommended lane configuration for the proposed development.

#### **Recommended Improvements by Developer**

#### US 1 and New Falls of Neuse Road / South Main Street

• Develop a signal timing modification plan to accommodate traffic volumes expected under future traffic conditions.

#### US 1 and Ponderosa Service Road

- Extend the exclusive southbound left-turn lane storage to 350' with appropriate taper.
- Convert the intersection to a superstreet and install a traffic signal at each left-over intersection.

#### US 1 and Northbound U-Turn Location (approximately 800' north of superstreet left-overs)

- Provide an exclusive northbound U-turn lane with 200 feet of storage and appropriate taper.
- Provide stop control for U-turn movement.

#### Star Road and Ponderosa Service Road

- Restrict the eastbound (inbound) approach to right-turns only.
- Remove stop control for eastbound approach.
- Provide stop control for southbound approach.

#### US 1 and Height Lane / Montys Lane

- Restrict the westbound approach to a right-in / right-out.
- Stripe out the exclusive southbound left-turn lane and restrict the southbound leftturn movement.



• Construct a channelized free-flow receiving lane on US 1, north of the intersection, for at least 800' before tapering.

# Star Road and Northern Site Drive

• Construct a single-lane urban compact roundabout with yield control on all approaches.

#### Star Road and Southern Site Drive

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







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