Youngsville Bypass Hotspot Analysis

Existing Conditions and Trends

NC Capital Area Metropolitan Planning Organization

May 3, 2024

Prepared For:

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Study Introduction

The Capital Area Metropolitan Planning Organization (CAMPO), in partnership with the Town of Youngsville and Bolton & Menk, has initiated a hot spot study aimed at evaluating and determining feasible alignments for the southeastern segment of the anticipated Youngsville Bypass, connecting Main Street/Tarboro Road to NC 96.

Figure 1 shows an overview of the study area, including analyzed intersections, previously-identified segments of the bypass, and the primary study area, which is the expected range of the bypass segment that is the primary focus of this study.

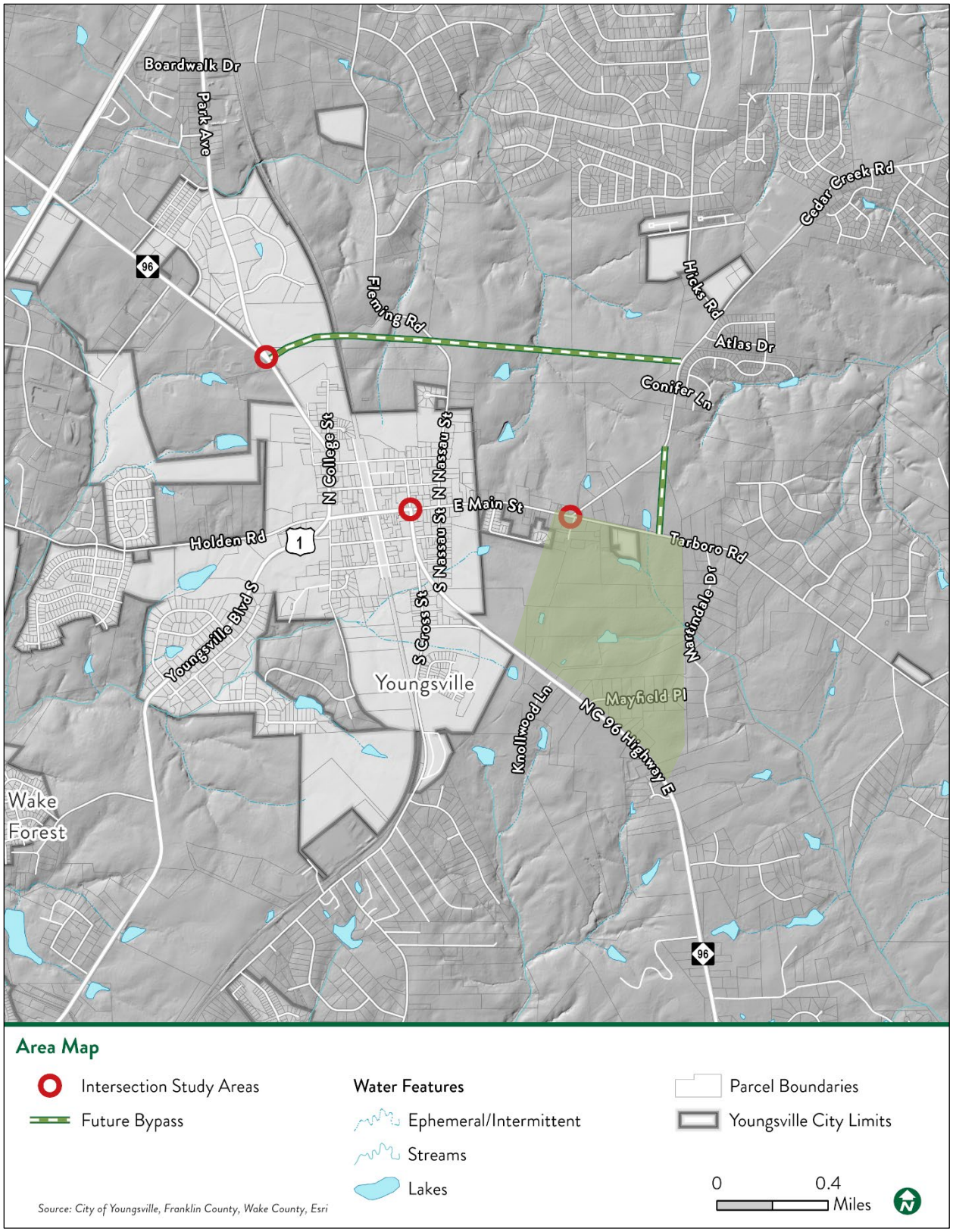
This study includes three phases of analysis:

- During the **Existing Conditions and Trends** phase, an understanding of the needs and potential impacts of the project has been completed. The results of this phase are compiled in this memo document.
- During the **Identification and Evaluation of Transportation Improvements** phase, three potential alignments will be identified. A functional design will be developed for each alignment and the benefits, impacts, and costs of each will be estimated.
- During the **Preferred Alternative** phase, a preferred alignment of the three will be selected based on the review in the previous phase. This alternative (including the new roadway and needed accompanying improvements) will be broken down into subcomponents that can be programmed by the appropriate agencies.

The Existing Conditions and Trends phase of the project includes the following sub tasks, which are described in this memo:

- **Traffic analysis** of key intersections within Youngsville that will likely be affected by the bypass, including existing conditions and forecast no-build future conditions;
- **Safety analysis** of major corridors within the Youngsville area that will likely be affected by the bypass; and
- A **socioeconomic analysis** of the Youngsville area.

Figure 1: Project Area Map



Socioeconomic Analysis

The Town of Youngsville has a population of roughly 2,020 (approximately 1,080 households) as of the 2020 Decennial Census. Of that population:

- Approximately 31% are under 18 years old
- Approximately 11% are over 60 years old,
- The unemployment rate for 18- to 60-year-olds is around 8%

According to the Youngsville 2050 Comprehensive Land Use and Transportation Plan (CLUTP) Volume 2: Community Profile (2023), of employed residents,

- Approximately 89% took a car, truck, or van to work
- Commuters had an average travel time of just under 30 minutes
- Approximately 76% of employed residents work outside of Franklin County and Youngsville

The table below shows the Race and Ethnicity breakdown for the Town as reported by the 2020 Decennial Census. The Town is not within a USDOT Designated Persistent Poverty Census Tract or in a Historically Disadvantaged Census Tract.

Table 1: Race and Ethnicity

Race and Ethnicity	Total	Percentage
White (Not Hispanic or Latino)	1,190	59%
Black or African American (Not Hispanic or Latino)	490	24%
Hispanic or Latino (all races)	192	10%
Two or More Races (Not Hispanic or Latino)	116	6%
Some Other Race (Not Hispanic or Latino)	28	1%

Based on information from the EPA's EJScreen Community Report, the per capita income of Youngsville is $36,837 and 17% of the population is designated as Low-Income. Of Environmental Indicators, the Town is below state averages in all categories except for 'Risk Management Program Facility Proximity' where it is within the 84th percentile. The EJScreen Community Report also reports on 'Languages Spoken at Home'. The following chart was provided.

Table 2: Languages Spoken at Home

Language	Percent
English	88%
Spanish	9%
Russian, Polish, or Other Slavic	1%
Other Indo-European	2%
Total Non-English	12%

Communities of Concern

CAMPO has also calculated their own Communities of Concern, as shown in **Figure 2**, based on 2022 ACS 5-Year data for numerous environmental justice variables including: zero car households, percent of population that is Non-White, percent of population that is Hispanic, linguistic isolation, age, and the percent of the population living below 150% of the poverty line. Based on this analysis, the block group north of Main Street highlights one variable, Hispanic/Latino Population, while the block group south of Main Street does not highlight any variable. The block group west of NC 96 highlights two variables, Hispanic/Latino Population and Minority Race Population.

Population Projections

In Youngsville, the population has seen a 74% increase between 2010 and 2020 while being significantly younger than North Carolina as a state and peer communities, China Grove, Creedmoor, Franklinton, and Warrenton. The average age is 30 in Youngsville, compared to 39 years North Carolina and 47 years for the listed peer communities.

Historic population data was gathered in the Youngsville 2050 CLUTP Volume 2: Community Profile (2023). Below is a summary of that data.

Table 3: Town of Youngsville Historical Population

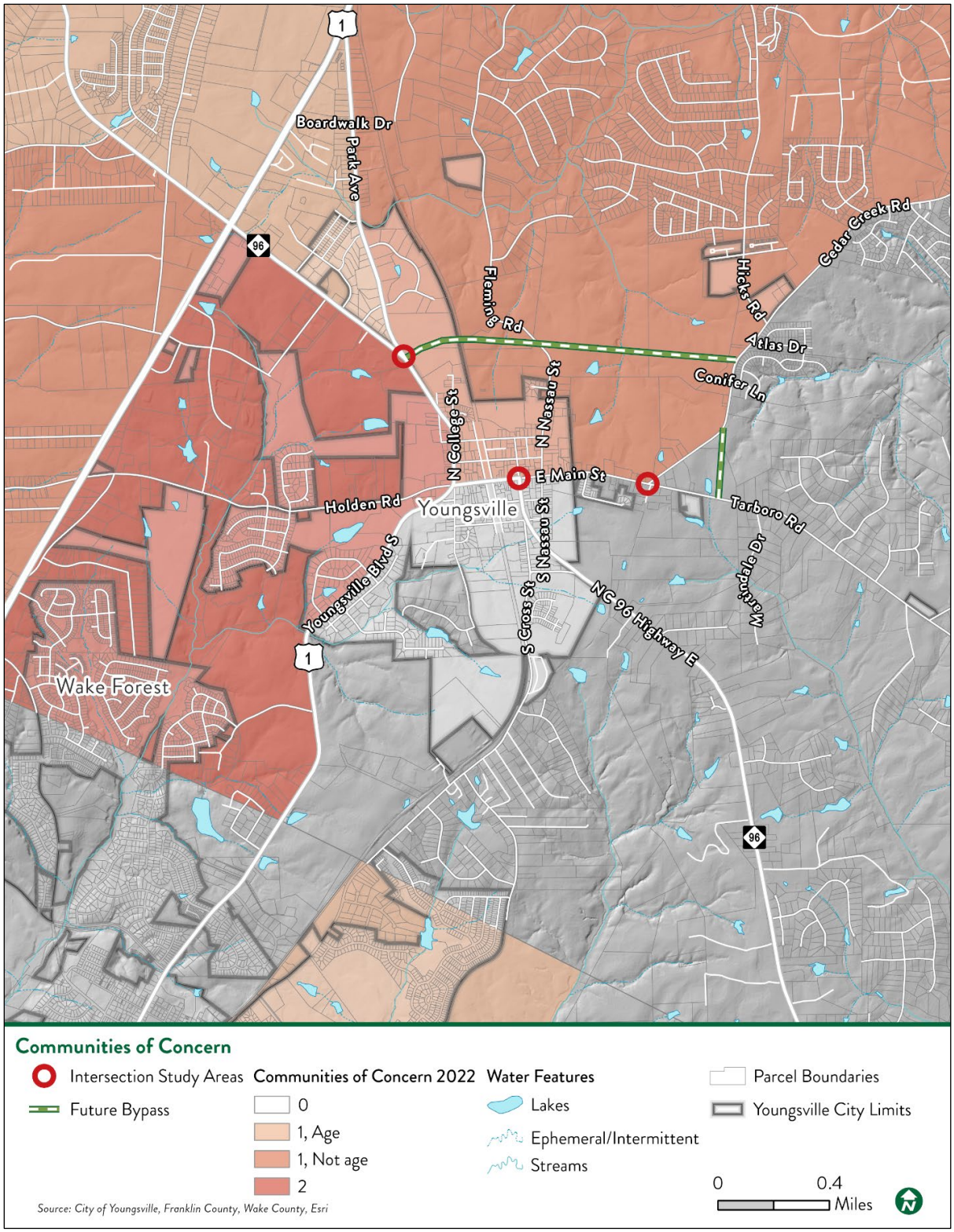
Year	2000	2010	2012	2014	2016	2018	2020
Population	651	1,147	1,155	1,236	1,314	1,393	2,026

According to the North Carolina Office of State Budget and Management, Franklin County is predicted to see considerable growth occurring between now and 2050. The below table shows these projections.

Table 4: Franklin County Populations Projections

Year	2020	2025	2030	2035	2040	2045	2050
Population	69,097	83,560	95,631	106,275	116,044	125,131	134,008
% Change from Previous Projection	-	20.9%	14.5%	11.1%	9.2%	7.8%	7.1%

Figure 2: CAMPO Communities of Concern



Plan Review

Four plans were reviewed to understand prior planning efforts and transportation priorities of the Town of Youngsville, Franklin County, and the broader Metropolitan Planning Region.

2014 Franklin County & Louisburg Comprehensive Transportation Plan

The CTP identifies the NC 96 Youngsville Bypass as a way to relieve traffic along NC 96, which is projected to be over capacity throughout Franklin County by 2035. The proposed project will provide a four lane, boulevard facility at a new location north and east of Youngsville. The bypass is proposed to connect to NC 96 at Knollwood Lane and at the intersection NC 96 and US 1 Alternative. The Triangle Regional Model was used to determine Vehicles Per Day (VPD) and in the 2035 model network, the NC 96 Youngsville Bypass would draw 8,000 to 17,000 vehicles so a minimum of LOS D can be achieved on NC 96.

Youngsville, NC Bicycle & Pedestrian Plan (2015)

The bicycle and pedestrian plan analyzed Current Conditions and highlighted Opportunities and Challenges the Town of Youngsville has been presented with. The plan highlights heavy truck traffic and high speeds on Main Street (NC 96) that limit the flow of bicycle and pedestrian users through downtown.

CAMPO 2050 Metropolitan Transportation Plan (2022)

The 2050 MTP identifies the NC 96 Bypass in three sections. The MTP suggests that these two-lane sections could be constructed independently of each other if needed but would provide the most utility if constructed together. The combined distance of these improvements is approximately 2.50 miles.

- The first section is a new east/west connection from NC 96 to Cedar Creek Road which would be grade separated at the Future S-Line crossing.
- The second section is a new north/south connection from the bend in Cedar Creek Road to Tarboro Road.
- The third section is a new two-lane connection from the intersection Cedar Creek Road / Tarboro Road to NC 96.

The 2050 MTP also includes an intersection realignment at E Main Street and Cross Street with a grade separation of E Main Street and the future S-Line crossing.

Youngsville 2050 Volume 1: Comprehensive Land Use and Transportation Plan (2023)

The proposed bypass east and north of Downtown will connect S. Cross Street, Tarboro Road, Cedar Creek Road Fleming Road, and NC 96. Within the plan, it is listed as a ‘Highest Priority’ project and meets three of the plan’s five Vision Elements: Connected Places, Thriving Communities, and Planned Infrastructure. In tandem with the completion

of the project, the Truck Designation route will be removed from Main Street and transfer to the new route.

Plan Review Summary

The four plans support the bypass project and provide a consistent vision for the new facility. The bypass is present in all four plans and is shown as a valuable way to provide more vehicular, freight, bicycle, and pedestrian connections around Youngsville.

Bicycle and Pedestrian Analysis

Exisiting Facility Conditions

Few dedicated facilities exist within the study area for pedestrians and bicyclists. The notable exception is Main Street between Cross Street and a location approximately 300 feet east of College Street/US 1 Alt, where a recently-completed streetscape project has provided continuous sidewalks as well as crosswalks along and across NC 96. A sidewalk on the north side of East Main Street continues further east from this section but ends at Youngsville Baptist Church. No sidewalks exist on Cedar Creek Road, the remainder of NC 96 within the study area, or Park Avenue/US 1 Alt.

While no dedicated bicycle facilities exist, NC State Bike Route 2 passes through downtown Youngsville. The route enters the town on Holden Road, travels along Main Street, and leaves town on Tarboro Road.

Crash Analysis

According to NCDOT crash data, no pedestrian or bicyclist crashes have occurred on the primary study corridors between 2020 and 2023. Previous data shows one pedestrian crash on Main Street in January 2008 that did not result in any injuries.

Traffic Operations Analysis

Traffic data, inclusive of NCDOT traffic counts from February 14, 2024, along with supplemental streetlight data, underpins this analysis. Existing conditions were modeled in Synchro using current traffic counts, assessing the operational state via Level of Service metrics. The streetlight data provided insights into prevalent travel paths within the study area. Additionally, historical NCDOT AADT data over two decades was used to facilitate a growth factor, which, when applied to current counts, estimated future traffic volumes. These projections were then used to evaluate potential future traffic operations without any "build" interventions in Synchro.

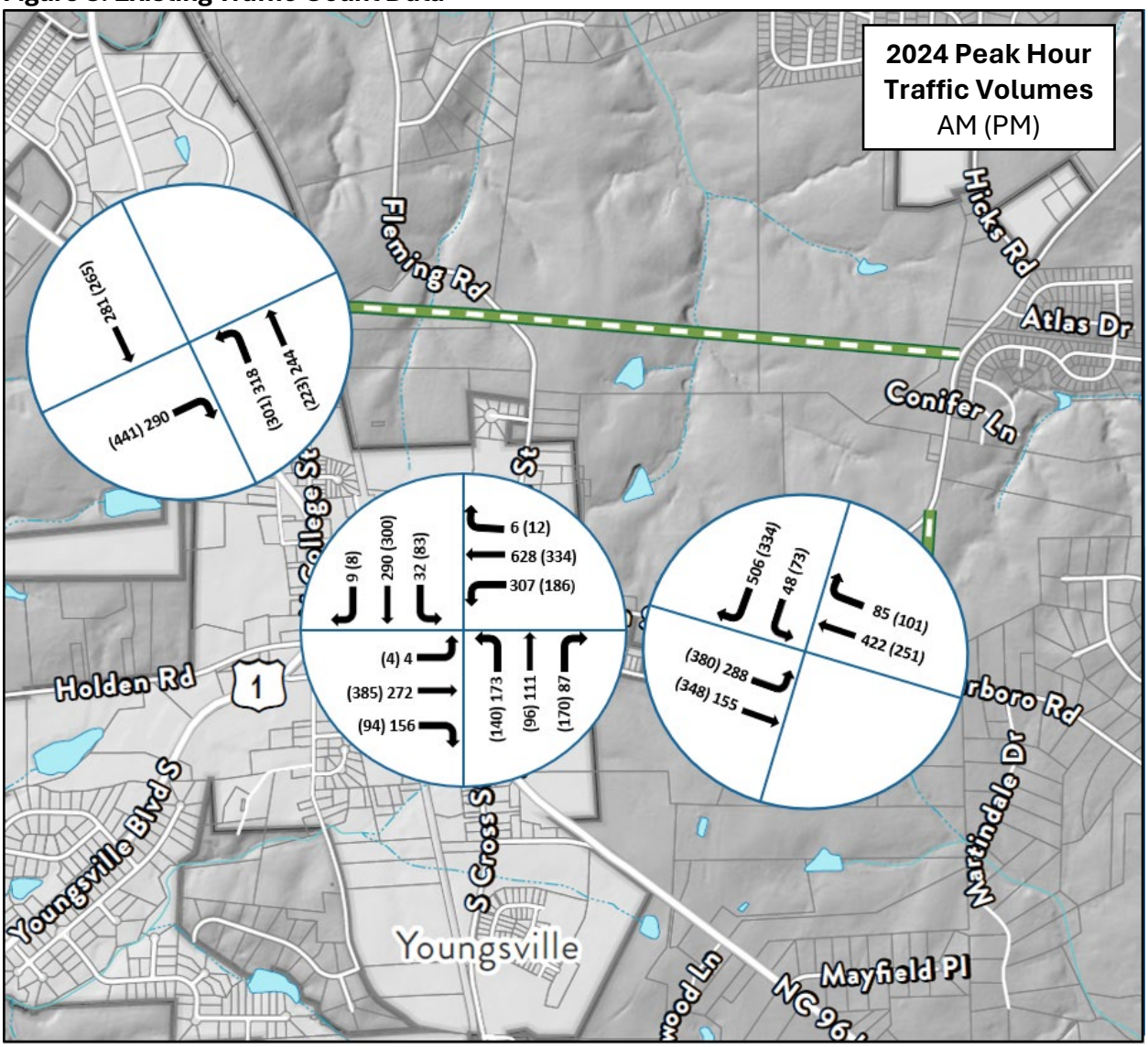
Data Collection

Sixteen-hour turning movement counts were conducted on Wednesday, February 14, 2024, from 6:00 AM to 10:00 PM, at three critical study intersections:

- NC 96 at US 1 Alt/Park Avenue
- NC 96/Main Street at NC 96/Cross Street
- Main Street/Tarboro Road at Cedar Creek Road

Detailed turning movement counts are provided in Appendix A, and a summary of peak hour volumes is shown in **Figure 3.** The AM and PM peak hour counts are shown below in the format AM (PM).

Figure 3: Existing Traffic Count Data



An origin-destination analysis was also conducted using Streetlight data. **Figure 4** below shows the analysis geographies used which include two kinds of zones:

- **Pass-through Zones** capture all traffic crossing them, regardless of where the trip begins or ends.
- **Non-pass-through Zones** capture only trips that begin or end within their boundaries.

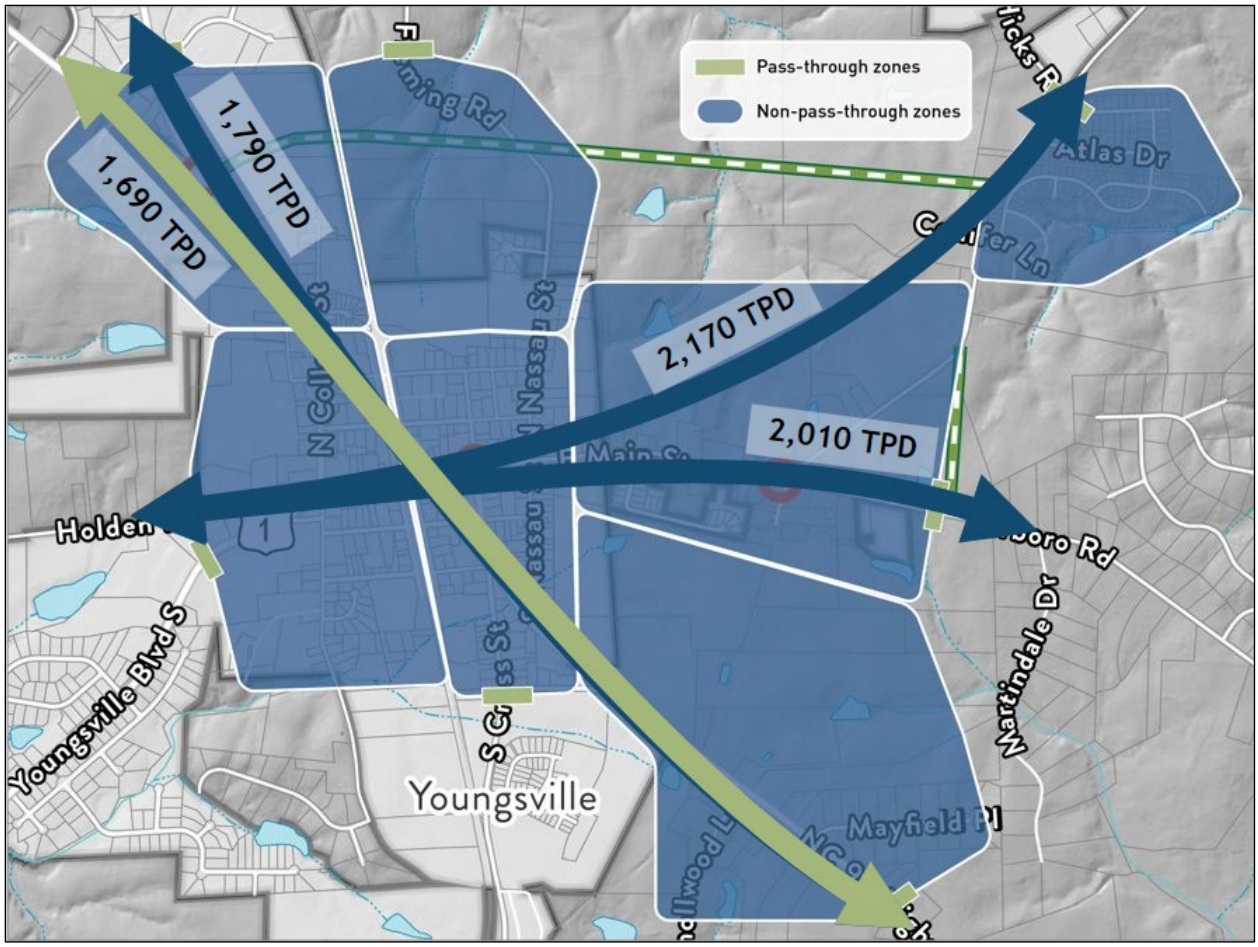
Based on this data, on a typical weekday:

- **69% of trips are pass-through**, meaning they both start and end outside the delineated non-pass-through zones, underscoring the transitory nature of much of the traffic through Youngsville.
- **31% of trips are either entering or exiting the area,** with at least one trip ending within these blue zones.
- **Less than 1% of trips are local**, starting and ending within different non-pass-through areas, which suggests that minimal traffic in the area is simply moving between different parts of Youngsville.

The travel path analysis within Youngsville as shown in the figure below, highlights the **most frequented routes**, emphasizing the importance of these routes in the local traffic network and potential areas for improvement to support the flow of commuters and reduce congestion:

- Cedar Creek Road to/from Holden Road topping the list at 2,170 trips per day (TPD).
- Holden Road to/from Tarboro Road follows closely with 2,010 TPD.
- NC 96 southbound sees significant travel to and from US 1A northbound with 1,790 TDP and NC 96 northbound with 1,690 TPD.

Figure 4: Origin-Destination Analysis (Streetlight Data)



Existing Traffic Operations Analysis

Intersection operations were analyzed at the three locations where turning movement counts were taken. These operational analyses were performed using the Synchro software package.

The operational analysis results are described as a Level-of-Service (LOS) ranging from A to F as shown in **Table 5**. These letters serve to describe a range of operating conditions for different types of facilities. Levels of service are calculated based on the Highway Capacity Manual 6th edition, which bases the level of service on control delay, or the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection, and the time for the vehicle to speed up through the intersection and enter the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches for signalized and roundabout intersections.

Level of Service D is commonly taken as an acceptable design year LOS. The level of service and its associated intersection delay for a signalized and unsignalized intersection

is presented below. The delay threshold for unsignalized intersections is lower for each LOS compared to signalized intersections, which accounts for the fact that people expect a higher level of service when at a stop-controlled intersection.

Unsignalized intersections with predominant mainline movements and limited side street traffic will typically be shown to perform well overall while side street through and left turning movements typically perform at a worse LOS. This occurs because mainline traffic is not required to yield and little to no delay occurs for most of the traffic seen at the intersection. Overall intersection LOS is the weighted average delay for each movement dependent on volumes of each movement. **Table 6** details the existing peak hour traffic operation results for the study area, and detailed traffic analysis results are included in **Appendix C**.

Table 5: Level of Service Criteria

	Signalized Intersection	Unsignalized Intersection
LOS	**Control Delay per Vehicle (sec.)**	**Control Delay per Vehicle (sec.)**
A	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 15
C	>20 and ≤ 35	>15 and ≤ 25
D	>35 and ≤ 55	>25 and ≤ 35
E	>55 and ≤ 80	>35 and ≤ 50
F	>80	>50

Table 6: Existing 2024 Traffic Operations Results

Intersection	Control	Approach	Level of Service (Delay, seconds/vehicle)			
			AM 2024 Peak Hour		PM 2024 Peak Hour	
			Approach	Overall	Approach	Overall
Park Avenue and NC 96	Stop	NB	B (14)	B (13)	B (13)	B (13)
		SB	B (12)		B (12)	
Cross Street and Main Street	Signalized	EB	B (18)	D (48)	B (19)	**E (55)**
		WB	B (13)		A (10)	
		NB	**F (174)**		**E (83)**	
		SB	D (47)		**F (131)**	
Main Street and Cedar Creek Road	Signalized	EB	**E (63)**	**F (98)**	**F (185)**	**F (115)**
		WB	B (12)		B (19)	
		SB	**F (204)**		C (74)	

During both the AM and PM peak, the stop-controlled side streets at the intersection of Park Avenue and NC 96 maintain a satisfactory LOS B. The intersection of Cross Street and Main Street operates with LOS D during both the morning and afternoon peak periods.

Main Street & Cedar Creek Road also experiences poor performance in both the morning and afternoon periods, operating at LOS F during both periods. The eastbound approach experiences the highest delay during afternoon peak, likely because of the challenges presented by the shared through-left lane with protected-permissive phasing.

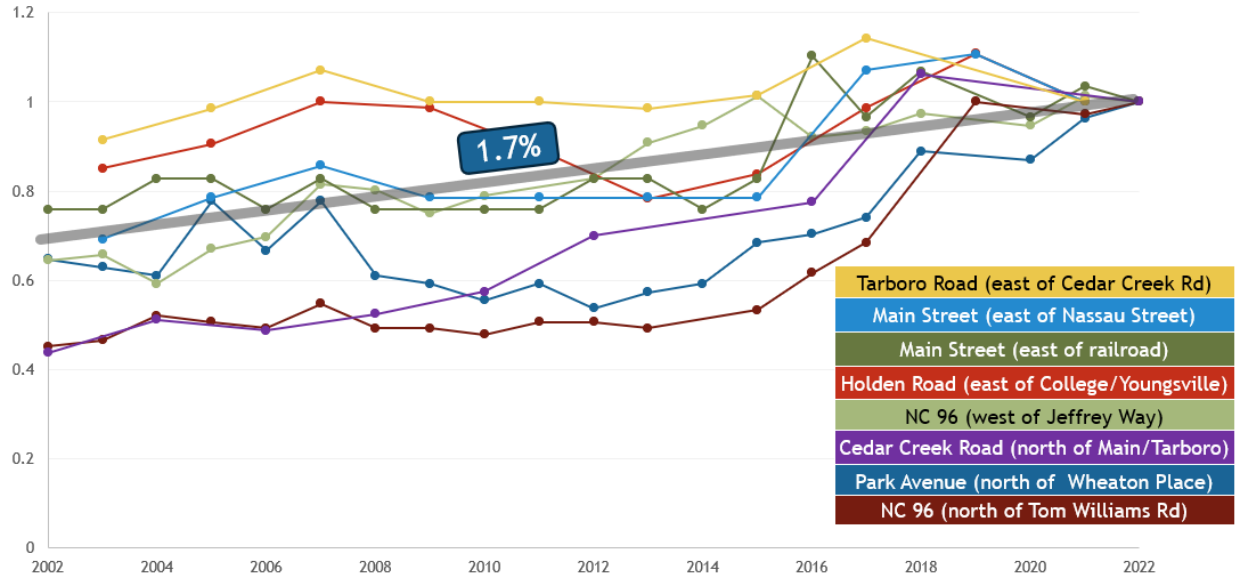
Traffic Forecasting

To estimate traffic conditions in the future, historic traffic volumes and outputs from the Triangle Regional Model (TRM) were used to identify a forecasting methodology.

Historic Data

Historic AADT information for NC 96 and other significant roads around Youngsville was collected from NCDOT. **Figure 5** illustrates the indexed traffic volumes for these roadways, including Tarboro Road, Main Street, and NC 96. Linear historic growth rates were calculated for each location. These locations have an average growth rate, weighted by the most recent AADT of each location, of 1.7% per year.

Figure 5: Historic Growth Rates (Indexed to 2022/2023)



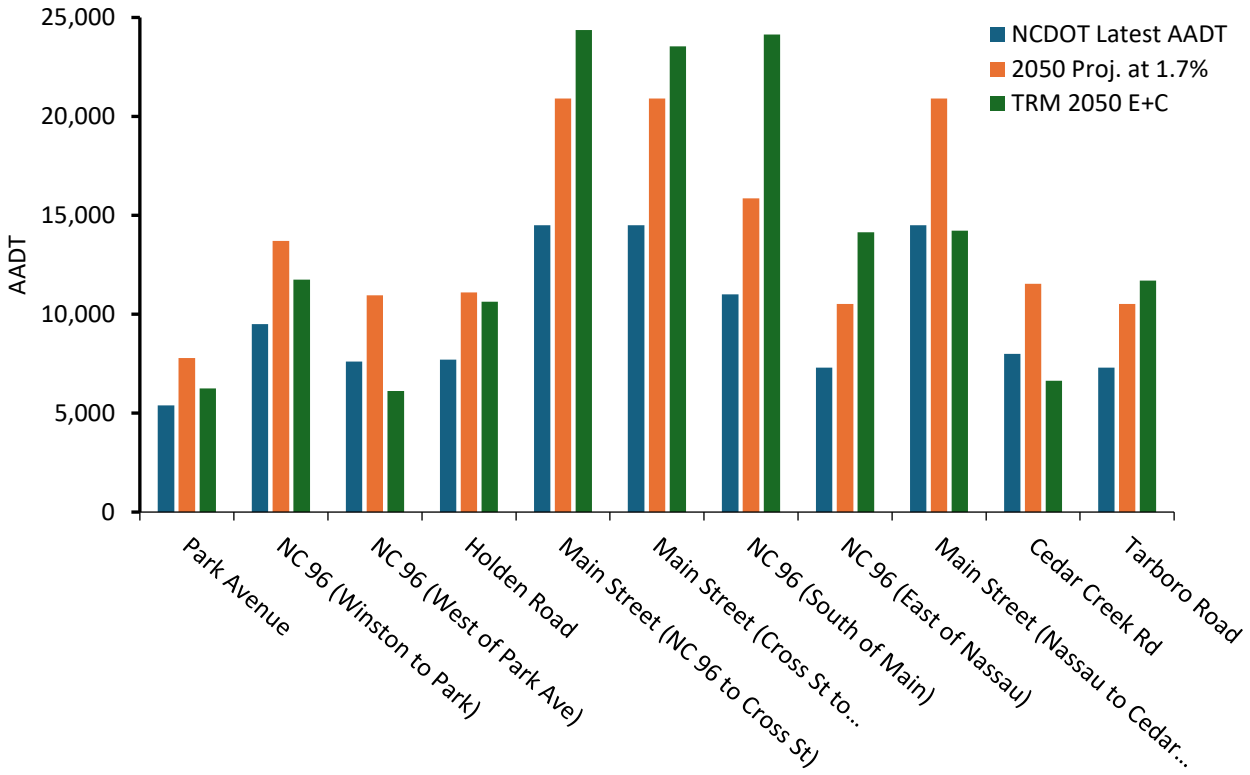
Travel Demand Model

The Triangle Regional Model features two primary simulation runs: the 2020 base, which reflects the existing network conditions, and the 2050 Existing and Committed (E+C) scenario that incorporates only those projects with committed funding. The 2020 base volumes serve as a benchmark, revealing that traffic volumes are significantly lower than recent NCDOT AADTs, while the 2050 E+C run provides a forward-looking assessment, considering the growth and changes anticipated over the next 30 years.

The projected volumes indicate considerable increases across various locations when comparing the 2020 base to the 2050 E+C model, with an annual growth rate of 4.5%. In contrast, **when comparing the latest NCDOT figures to the 2050 E+C model, the growth rate is a more moderate 1.7% per year**.

Figure 6 below illustrates a comparison of the NCDOT's Latest AADT figures against the volumes predicted by the traffic demand model.

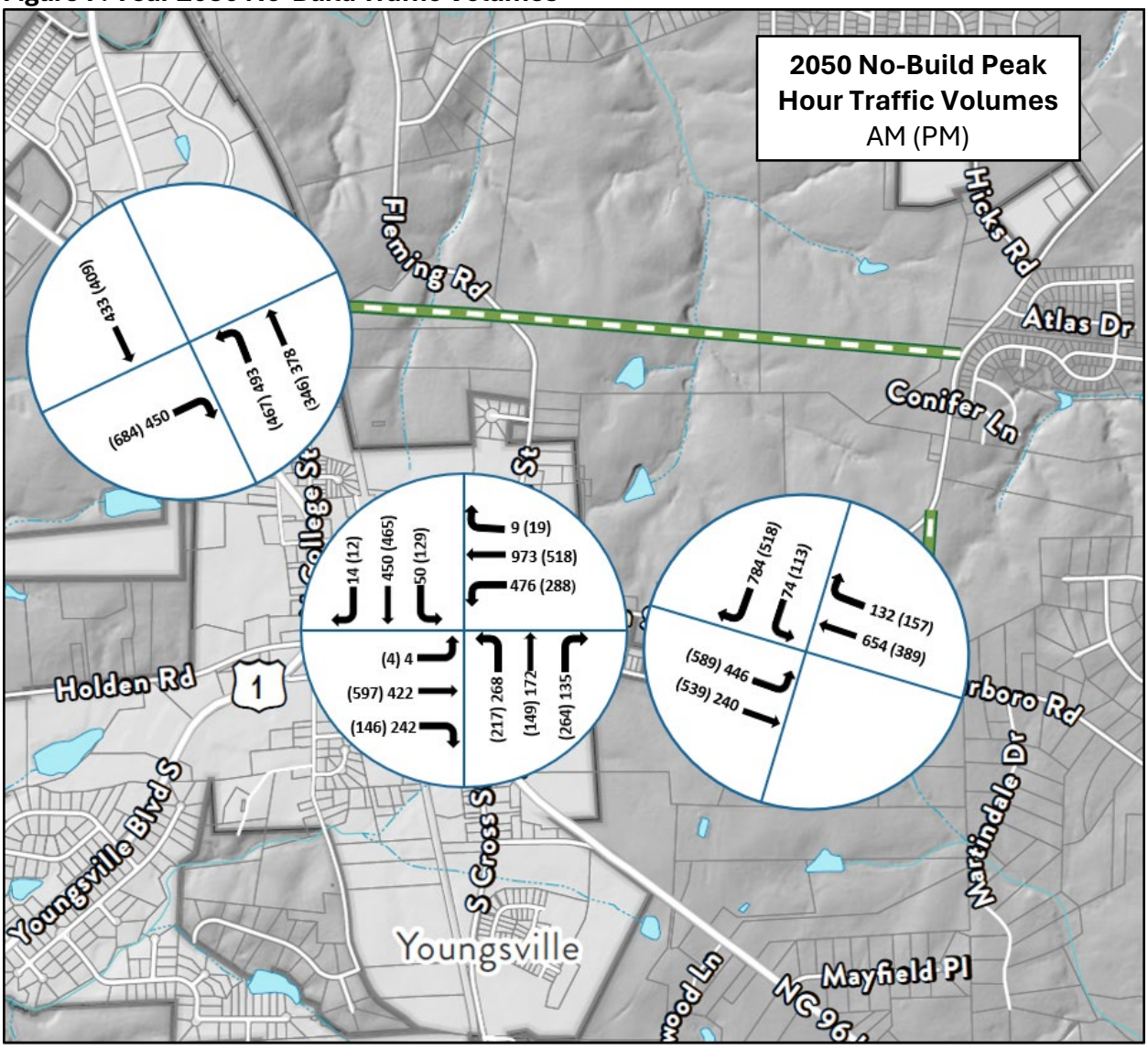
Figure 6: Comparative Volume Analysis of NCDOT's AADT with Traffic Demand Model Estimates



Forecasting Methodology

Based on historic traffic volume growth and outputs from the Triangle Regional Model, **future year volumes were estimated by applying a 1.7% per year linear growth factor** to year 2024 turning movement counts. The volumes used to model 2050 no-build intersection congestion are shown in **Figure 7**.

Figure 7: Year 2050 No-Build Traffic Volumes



2050 No Build Operations Analysis

Table 7 details the future 2050 peak hour traffic operation results for the corridor under the existing geometry and traffic control configurations. Detailed analysis outputs can be found in **Appendix C**. Note that while year 2024 analysis was conducted using existing signal timing (per NCDOT signal plans), year 2050 analysis was conducted using revised, optimized timing.

Table 7: 2050 No Build Traffic Operations Results

Intersection	Control	Approach	Level of Service (Delay, seconds/vehicle)			
			AM 2050 Peak Hour		PM 2050 Peak Hour	
			Approach	Overall	Approach	Overall
Park Avenue & NC 96	Stop	NB	C (19)	C (18)	C (18)	C (17)
		SB	C (16)		C (15)	
Cross Street & Main Street	Signalized	EB	**F (122)**	**F (145)**	**F (95)**	**F (100)**
		WB	**F (173)**		**F (89)**	
		NB	**F (179)**		**E (69)**	
		SB	**E (61)**		**F (152)**	
E Main Street & Cedar Creek Road	Signalized	EB	**F (1271)**	**F (522)**	**F (671)**	**F (419)**
		WB	C (27)		C (23)	
		SB	**F (375)**		**F (310)**	

The 2050 No-Build scenario analysis suggests that:

- The intersection of Park Avenue and NC 96 will sustain a steady LOS C.
- Significant congestion is anticipated to continue at the intersection of Cross Street and Main Street and the intersection of Main Street and Cedar Creek Road, with both intersections expected to operate at LOS F in both the morning and afternoon periods.

Historic Safety Analysis

The NCDOT Traffic Engineering Accident Analysis System's detailed crash data for three significant corridors from December 2020 to November 2023 were reviewed. The crash rate is calculated based on crashes per hundred million entering vehicles (MEV) for the intersection or segment. The statewide average crash rate is the average crash rate for similar types of locations statewide. **Table 8** shows the crash rate analysis for all corridors in the study area.

The first corridor, NC 96 between SR 1921 (Mayfield Place) and Wheaton Avenue, experienced a total of one hundred twenty-two crashes, including one fatality, twenty-three non-fatal injuries, and ninety-eight incidents of property damage. This included twenty night crashes, ten wet-condition crashes, and one involving alcohol or drugs.

The second corridor, SR 1100 (Tarboro Rd), from SR 1960 (Martindale Drive) to NC 96 (Cross St/Main St), reported forty-six crashes. Ten crashes involved injuries and thirty-six involved property damage only. Nine crashes were at night, three were during wet conditions, and one involved alcohol or drugs.

The third, SR 1116 (Cedar Creek Rd), from 500 ft north of SR 1125 (Hicks Rd) to SR 1100 (E Main St/Tarboro Rd), had the fewest with eighteen crashes. Five resulted in injuries and thirteen resulted in property damage only. Six were during the night, three during wet weather, and one involved alcohol or drugs.

Truck-related crashes accounted for a significant percentage of accidents. On the NC 96 corridor, 9.2% of crashes involved a truck, while approximately 11.7% of all vehicles are trucks according to NCDOT estimates. On the Tarboro Road corridor, 22.6% of crashes involved a truck while only 2.2% of vehicles observed on this segment in the traffic counts performed for this study were trucks. On the Cedar Creek Road corridor, 8.8% of crashes involved trucks while only 1.1% of vehicles observed on this segment in the traffic counts performed for this study were trucks.

Table 8: Crash Rate Analysis

Location	Crashes		Fatality Crash Rate		Total Crash Rate	
	Fatal	Total	Corridor	NCDOT Average	Corridor	NCDOT Average
NC 96 from SR 1921 (Mayfield Pl) to Wheaton Ave	1	122	4.55	2.06	554.76	169.16
SR 1100 (Tarboro Rd) from SR 1960 (Martindale Dr) to the stop bar at NC 96 (Cross St/Main St)	0	46	0	2.75	351.73	240.25
SR 1116 (Cedar Creek Rd) from 500 ft N of SR 1125 (Hicks Rd) to stop bar at SR 1100 (E Main St/Tarboro Rd)	0	18	0	2.75	198.53	240.25