Youngsville Bypass Hot Spot Analysis

Alternatives Analysis and Recommendations

NC Capital Area Metropolitan Planning Organization

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Prepared For:

CAMPO
NC Capital Area Metropolitan Planning Organization

1 Fenton Main St., Suite 201
Cary, NC 27511

Submitted by:

BOLTON & MENK
Real People. Real Solutions.

418 S. Dawson Street
Raleigh, NC 27601

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Attachments:

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 **Attachment A**.
- During the **Identification and Evaluation of Transportation Improvements** phase, three potential alignments were identified. A functional design was developed for each alignment and the benefits, impacts, and costs of each were estimated. The results of this phase are included in this document.
- During the **Preferred Alternative** phase, a preferred alignment was chosen by the plan's stakeholder committee.

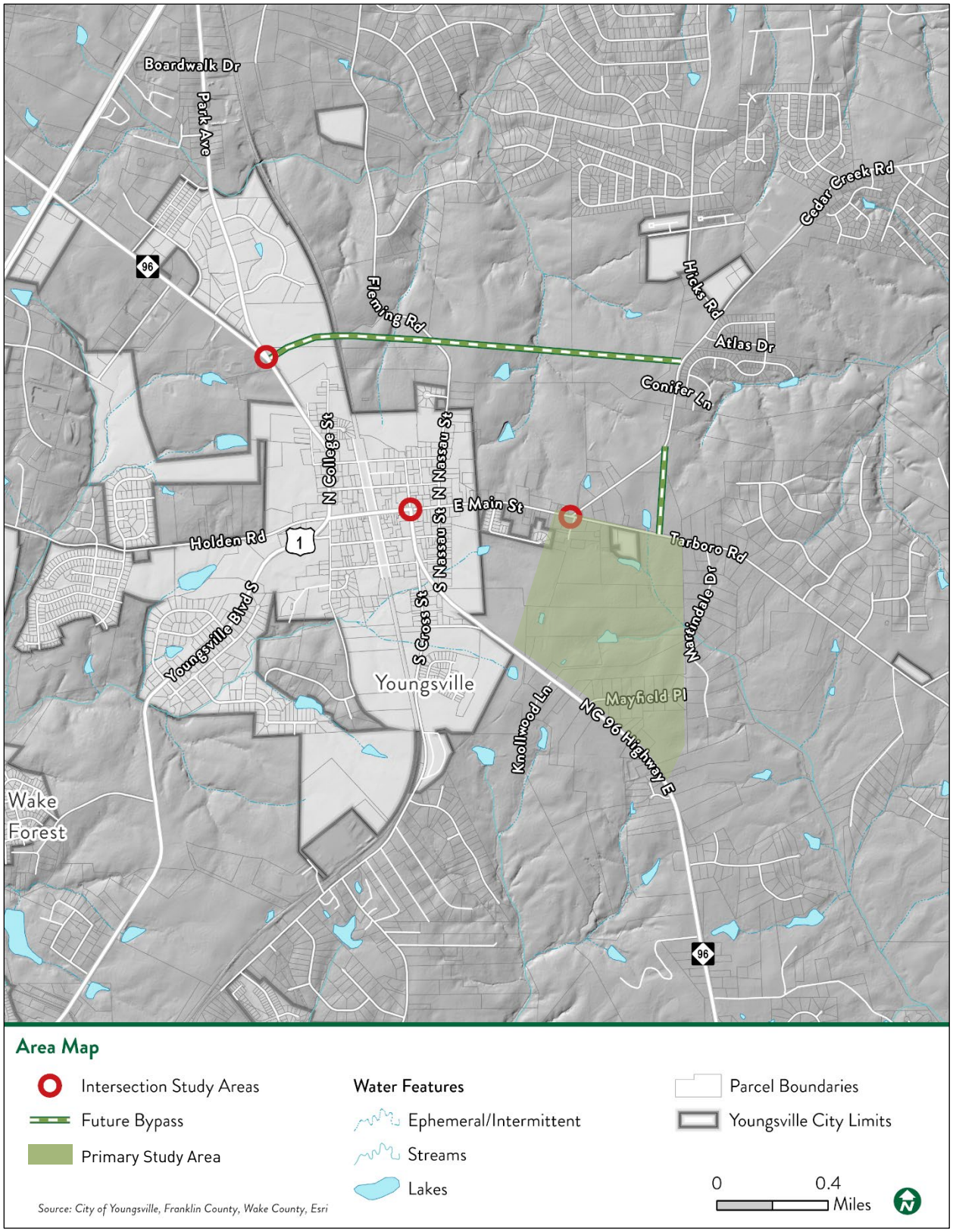
This hot spot analysis was completed between February and June 2024. Each of the phases above included a meeting with the stakeholder committee which included representatives from NCDOT, the Town of Youngsville, Franklin County, and CAMPO.

The first meeting was held in February at CAMPO's office in Cary and gave attendees an overview of the process ahead.

The second meeting was held in March at the Town of Youngsville's offices. At this meeting, attendees were presented with the results of the existing conditions assessments, including travel patterns, socioeconomic considerations, historic and projected traffic growth, and historic safety concerns. The committee was also presented with four initial alignments and worked to refine these to the three alternatives that were ultimately analyzed.

The final meeting was held in late May at Bolton & Menk's office in Raleigh. At this meeting, design considerations for each of the three alternatives as well as the results of the benefits and impacts analysis were presented. The committee considered each alternative and ultimately selected the preferred alternative. Notably, at this meeting, the stakeholder committee was told that many of the intersections considered would not operate well as roundabouts due to forecast traffic demand. However, this was based on inaccurate traffic analysis that has since been corrected. This report includes more accurate information, including potential roundabout configurations at a number of intersections.

Figure 1: Project Area Map



Preliminary Concepts

At the second meeting of the stakeholder committee, a number of potential alignments for the southeast segment of the Youngsville Bypass were considered. After discussion with the committee, three alignments were chosen for further analysis. These alignments are shown in **Figure 2**, and are as follows:

- **Alternative 1** (westernmost, shown in green): This alternative is similar to what was included in the Connect 2050 MTP for the Research Triangle Region. This would serve as a southern extension of the existing alignment of Cedar Creek Road, connecting with NC 96 southeast of Tom Williams Road.
- **Alternative 2** (central, shown in purple): This alternative would connect to the planned realignment of Cedar Creek Road to the east, and would connect to NC 96 near Knollwood Lane, the approximate connection point of the proposed Youngsville southern bypass.
- **Alternative 3** (easternmost, shown in orange): This alternative is most similar to what is included in the Town of Youngsville's Comprehensive Land Use and Transportation Plan. This would extend the planned realignment of Cedar Creek Road almost due south, passing between Mayfield Place and Martindale Drive.

Each alternative was developed with some common assumptions, including design speeds, cross sections, and traffic volumes/patterns.

Design speeds for all three alternatives were determined by understanding the existing conditions of the area and evaluating adjacent roadways in the network. The Youngsville Bypass was identified as an arterial route early in the evaluation process, which allowed the design to be held to a predetermined set of design standards set forth by NCDOT. For Alternatives 1 and 2, a design speed of 50 miles per hour (mph) was used to develop the proposed horizontal and vertical alignments. For Alternative 3, a design speed of 60 mph was used for the free-flowing northbound movement from NC 96 onto the proposed Youngsville Bypass in the southeastern portion of the project study area. A greater design speed was used for Alternative 3 to allow the existing design speed on NC 96 northbound to remain in place for vehicles continuing onto the Bypass.

On April 24, 2024, a meeting was held to determine a typical cross section to be used on all conceptual design alternatives. This meeting included representatives from NCDOT Division 5, the Town of Youngsville, CAMPO, and Bolton & Menk. During this meeting, several typical cross section alternatives were discussed. The ultimate vision for the bypass is a four-lane roadway. The bypass is expected to be implemented in phases, with an interim condition that will provide two lanes of travel (one in each direction) while being designed so that the additional lanes can be added later with minimal traffic disruption to roadway users. The cross-section alternatives for the bypass' ultimate condition that were discussed included:

- Urban four-lane divided section with 115’ Right-of-way, NCDOT SPOT Typical Section No. 4L
- Rural four-lane divided section with 195’ Right-of-way, NCDOT SPOT Typical Section No. 4H

During this meeting, the Youngsville Town Manager, Nathan Page, confirmed that the town had acquired 120’ of right-of-way for the future portion of the Youngsville Bypass between Cedar Creek Road and Tarboro Road, based on an expected urban section. To provide a continuous, consistent facility, NCDOT SPOT Typical Section No. 4L was used for the conceptual design of the segment of the bypass south of Main Street/Tarboro Road.

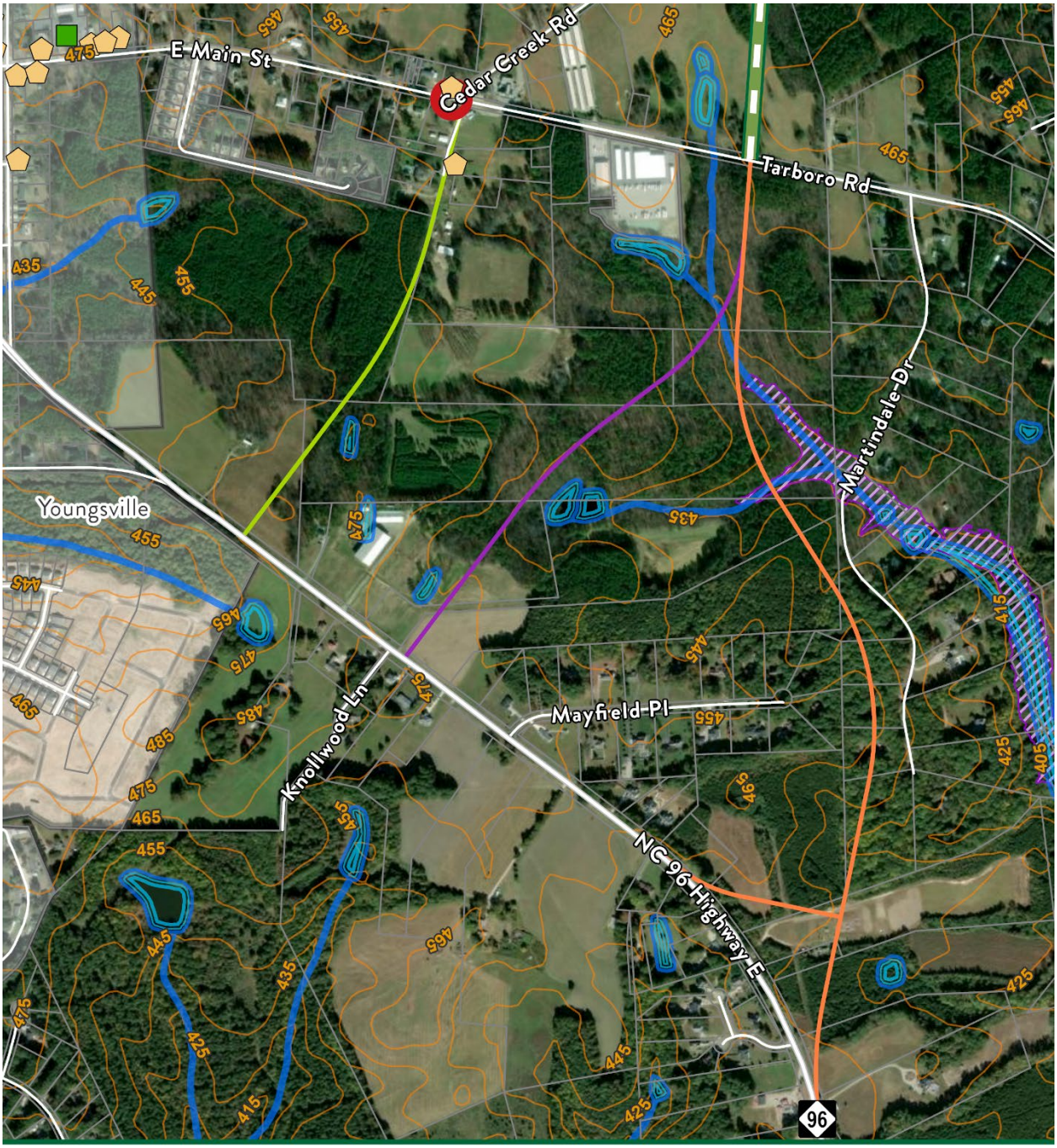
Due to the rural nature of the area, it is possible that the future design could move forward with NCDOT SPOT Typical Section No. 4H, which requires 195’ of right-of-way. Therefore, the right-of-way necessary to construct this rural section is displayed on all conceptual designs of the portion of the proposed Youngsville Bypass south of Main Street/Tarboro Road.

Though the long-term vision for the Youngsville Bypass includes a four-lane section, the traffic forecast on the roadway network in year 2050 does not indicate a need for four lanes of travel. In the meeting on April 24, 2024, it was agreed that this study would include a partial build of the long-term cross section, a two-lane undivided section. Therefore, an interim condition of the urban section was established depicting only one side of the cross section to be conceptually designed and for the two travel lanes to function as a two-lane undivided roadway condition.

The interim typical section was used to conceptually design each alignment alternative. The typical sections include two-lane two-way undivided road, 12’ lanes, curb and gutter on the west side, a 9’ planting strip and 10’ multi-use path on the west side, and an interim shoulder condition on the east side. These sections can been seen in more detail in the roadway exhibits, included in **Attachments B, C, and D**.

Intersection control types and configurations were developed based on traffic analysis of projected build-scenario traffic volumes. These analyses and the potential configurations at each intersection are discussed in more detail in the Intersection Analysis section, starting on page 17.

Figure 2: Alternatives Analyzed



Evaluation Criteria and Methodology

To provide a standardized evaluation of these three alternatives, the following evaluation criteria were identified by the stakeholder committee and methodologies developed.

Traffic Reduction

The primary anticipated benefit of the bypass is a reduction in traffic volumes on other nearby streets, and thus a reduction in travel times for those travelling within and across Youngsville. To capture and compare the different alternatives' abilities to provide an attractive route for traffic, the change in daily volume on Main Street in Downtown Youngsville, at the location of the railroad crossing, between the No Bypass scenario and the alternatives scenario were captured.

The Triangle Regional Model (TRM) was used to estimate future traffic volume shifts due to the construction of the bypass. Multiple model runs were used to understand potential travel shifts under different bypass conditions. All model runs were conducted using the existing year 2050 model including all MTP projects.

A base run was conducted that removed all segments of the planned Youngsville Bypass. The daily volume results of this model run are shown in **Figure 3**. Figures showing daily volumes for Alternatives 1 and 3 are included in the Design Alternative and Evaluation Results section of this report, starting on page 11.

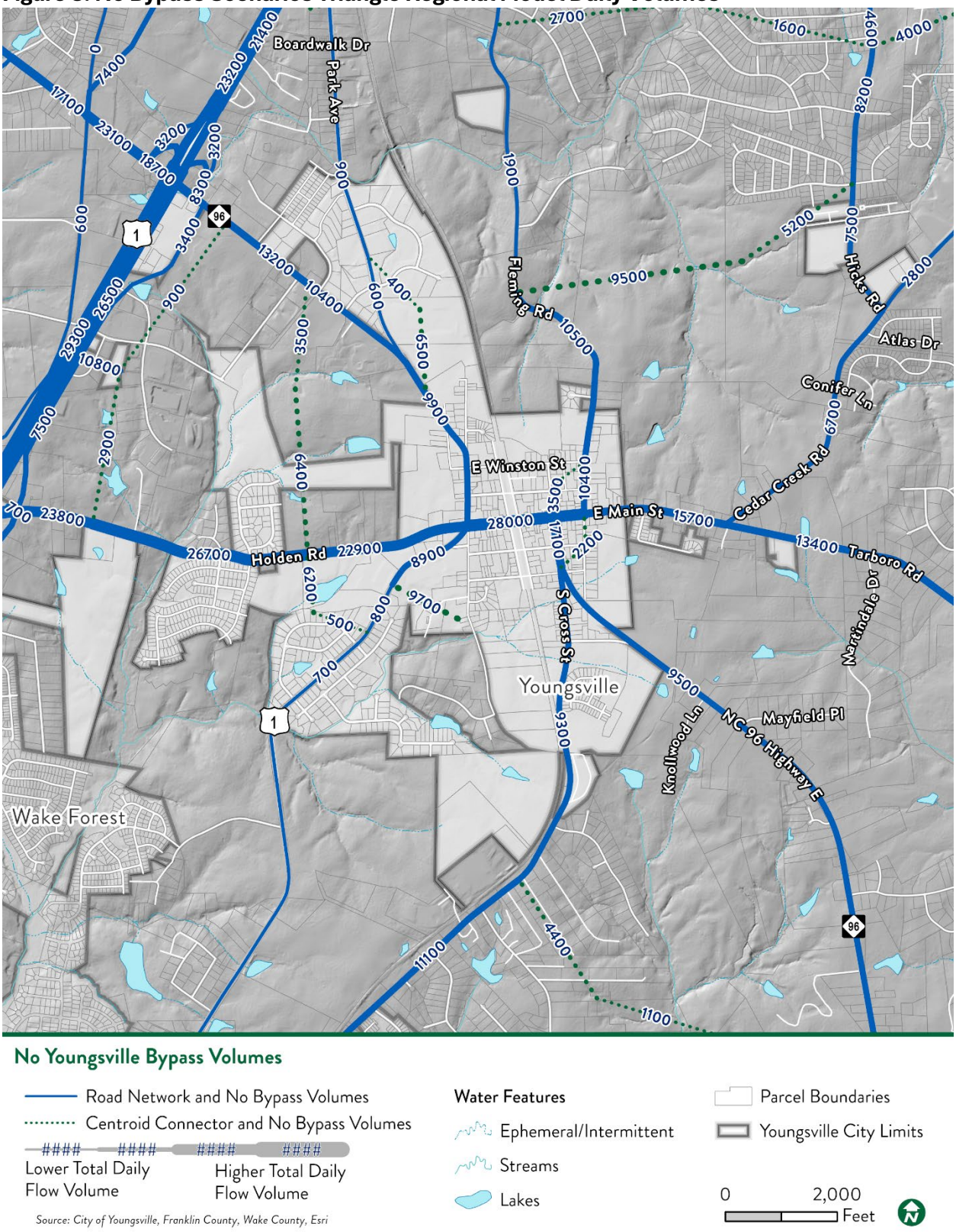
Traffic diversion for Alternative 2 was estimated by interpolating between the Alternative 1 and Alternative 3 model results based on the change in travel length from the location on NC 96 where the different alternatives diverge to where they converge on Cedar Creek Road.

Based on specific sensitivity to the impact of trucks on Downtown Youngsville, change in the volume of commercial vehicles from the TRM scenarios is also presented in this document. This information was prepared after the final stakeholder committee meeting.

Safety

Each alternative will also inherently change intersection configurations, conflict points, and the overall incidence of crashes in the future. Changes in travel volumes along NC 96 from Mayfield Place to Main Street, Main Street from Cedar Creek Road to College Street, College Street from Main Street to US 1A, and Cedar Creek Road from Main Street/Tarboro Street to the site of the proposed bypass were assumed to create proportional changes in crashes as a secondary effect. Future no-build crash rates were forecast based on historic crashes and forecast traffic volumes. Changes in traffic volumes from the model runs were then used to estimate changes in crashes on these other roadways. New roadways were expected to have the statewide average crash rate for two-lane, undivided NC highway routes in rural areas (182 crashes per 100 million vehicle miles travelled). Intersection changes are expected to be very similar between alternatives and as such were not included in this analysis.

Figure 3: No Bypass Scenarios Triangle Regional Model Daily Volumes



Impacts to Property and Structures

A primary concern about construction of each alternative is the impact it may have on private property. Private property impacts and specifically impacts to existing structures are undesirable due to additional cost and political challenges associated with the purchase of private property.

Once roadway alignments were laid out and right of way limits identified, GIS information detailing parcel boundaries and assessed values were used to estimate the total area of impact on each parcel. The cost of each impact was assumed to be proportional to the area of impact on each parcel. The alignments were visually inspected over aerial imagery to identify potential structural impacts. An administration fee of $10,000 per parcel was also added to the expected right of way costs.

Impacts to Natural Resources

An additional concern related to the new roadway is potential impacts to natural resources. A desktop-level review of the area was conducted and is presented in the Existing Conditions and Trends memo included in Attachment A. The only significant natural resources identified in the study area are two tributaries to a small creek in the area. After these tributaries join, they are currently crossed by a modest culvert under Martindale Drive.

Construction Cost

Cost estimates of each alternative were created and compared from their connection point to NC 96 to their connection point to Cedar Creek Road. To determine construction cost estimates for each alternative, several design and construction pay items were considered and quantified. Roadway quantities were calculated based on each alternative's specific layout and NCDOT standard drawings for each specific pay item. The estimates reflect impacts and quantities from the interim condition typical section that was agreed upon for general design purposes for this study. Drainage and culvert lengths were based off the specific roadway layout and the impact area over the stream and wetlands. Traffic and erosion control quantities, as well as the general utility construction, are based on the overall length of the specific design. While traffic signals and roundabout could provide acceptable traffic operations on each alternative, initial cost estimates were prepared assuming signals. A cost estimate of the preferred alternative including roundabouts is included as well. Right-of-way areas were based on the interim condition typical section which would require at least 115' right of way widths. In specific cases, entire properties were considered as total parcel acquisition due to the location of structures and buildings on the property and the layout of the specific alternative. Detailed cost estimates can be found in **Attachment E**.

Design Alternatives and Evaluation Results

The sections below detail each alternative and show how they scored in each evaluation criterion.

Alternative 1

Alternative 1 begins at the intersection of Tarboro Road and Cedar Creek Road and proceeds south until tying back into NC 96 just east of Tom Williams Road. This is the shortest alternative of the three, at approximately 2,800 linear feet (0.53 miles). This alternative presents some environmental advantages in that no major wetlands or stream crossings are affected by the alignment. However, this alternative poses disadvantages as it heavily impacts the properties and existing structures near Main Street and Tarboro Road. Functional design exhibits showing this alternative are included in **Attachment B**.

Traffic Reduction

When modeled in the TRM, this alternative was estimated to reduce daily traffic on Main Street by approximately 6,000 vehicles per day, from 28,000 to 22,000 vehicles per day. This is the lowest traffic reduction of the alternatives, due to this alternative's less direct routing. TRM outputs predict that this would include a reduction in trucks along this segment of approximately 500 commercial vehicles per day, from 2,050 to 1,550.

Safety Improvements

Based on the changes in traffic volumes on the major roadway network, it's estimated that this alternative could reduce approximately 5.6 crashes on major roadways per year in year 2050. This would include a reduction on the existing roadway network of approximately 7.1 crashes per year with 1.5 new crashes per year on the new roadway.

Impacts to Property and Structures

This alternative is expected to impact 13.1 acres across 16 parcels, totaling $902,000 in right of way costs. The interim, two-lane alignment is likely to have impacts on at least one residential structure and one secondary structure along the west side of the alignment south of Main Street/Tarboro Road. The ultimate, four-lane section would likely have additional impacts on the east side of the road, including one commercial structure and a potentially historic structure that once served as the stagecoach stop for the Town of Youngsville.

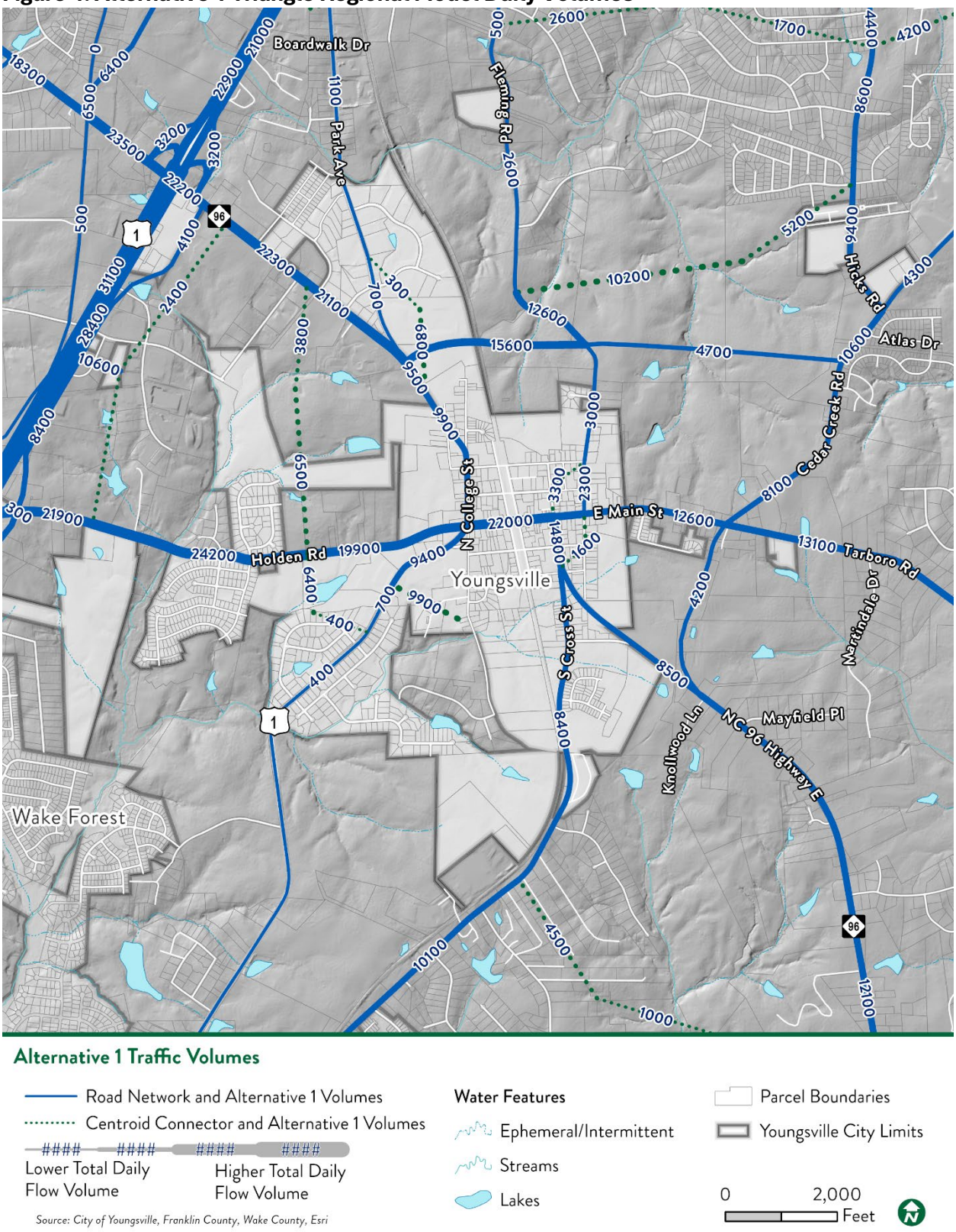
Impacts to Natural Resources

Alternative 1 would not impact any known waterways or other major natural resources.

Overall Cost

The overall cost of this alternative is estimated at $13.8 million.

Figure 4: Alternative 1 Triangle Regional Model Daily Volumes



Alternative 2

Alternative 2 utilizes the existing 120' right of way north of Tarboro Road that has been acquired by the Town. This layout proposes a realignment of Cedar Creek Road southbound to NC 96. A proposed 4-legged at grade intersection would be implemented at Tarboro Road just east of the existing Dollar General. The alignment will continue south, crossing two streams and meanders to avoid existing ponds before tying back into NC 96. The total length of Alternative 2 including the section north of Tarboro Road is approximately 5,500 feet (1.04 miles) This alignment has the least amount of property and right-of-way impacts. Functional design exhibits showing this alternative are included in **Attachment C**.

During the final stakeholder meeting, the stakeholder group asked if this alternative could be designed in a way that would realign NC 96 from the south to continue directly onto the Bypass. A series of alignments were later explored and are included in Attachment C. Ultimately, the design team felt that these alternatives are likely too impactful and/or create a route that is less safe and more circuitous and as such are not likely worth the small benefit the realignment provides.

Traffic Reduction

Based on TRM results of other estimates, it was estimated that this alternative could reduce daily traffic on Main Street in 2050 by 7,300 vehicles per day. This would include a reduction in commercial vehicle trips of approximately 600 per day, from 2,050 commercial vehicle trips to 1,450 on Main Street. In addition, this alignment most closely aligns with the proposed southern Youngsville bypass, potentially providing for more network connectivity in the future.

Safety Improvements

Based on the changes in traffic volumes on the major roadway network, it's estimated that this alternative could reduce approximately 5.9 crashes on major roadways per year in year 2050. This would include a reduction on the existing roadway network of approximately 8.1 crashes per year with 2.2 new crashes per year on the new roadway.

Impacts to Property and Structures

Alternative 2 would travel through a less developed area, with larger parcels. Due to this, this alternative is expected to require approximately 9.7 acres of right of way across 8 parcels, costing approximately $321,000. No structures would need to be impacted today to accommodate this alignment.

Impacts to Natural Resources

This alternative would cross a single creek, likely necessitating a culvert or other crossing. This creek may or may not be part of a local watershed, potentially requiring mitigation measures beyond the typical.

Overall Cost

The overall cost of this alternative is estimated at $21.4 million.

Alternative 3

Alternative 3 utilizes the 120' exiting Right of Way north of Tarboro Rd. It is the longest alternative of the three at approximately 7,700 feet (1.45 miles). It consists of having one proposed 4-legged at grade intersection at Tarboro Road. This layout allows vehicles that are traveling southbound on Cedar Creek Road to freely transition onto the bypass. It also accommodates vehicles traveling northbound from NC 96 to merge freely onto the bypass minimizing traffic congestion. Just south of Tarboro Road the alignment meanders eastwards to avoid properties and houses along Mayfield Place. This alternative poses the greatest right of way and property impacts out of the three alternatives. Functional design exhibits showing this alternative are included in **Attachment D**.

Traffic Reduction

When modeled in the TRM, this alternative was estimated to reduce daily traffic on Main Street by approximately 8,200 vehicles per day. Daily traffic volumes from this model run are shown in **Figure 5**. This volume change is forecast to include a reduction of approximately 650 commercial vehicles per day, from 2,050 to 1,400 on Main Street.

This alternative also includes a reconfiguration at the southern connection to NC 96 that would put through travelers coming from the south on the bypass rather than continuing through town. This may contribute to even higher diversion of travelers as drivers take the simpler route via the bypass rather than turning to continue along the exiting NC 96 alignment.

Safety Improvements

Based on the changes in traffic volumes on the major roadway network, it's estimated that this alternative could reduce approximately 4.9 crashes on major roadways per year in year 2050. This would include a reduction on the existing roadway network of approximately 8.7 crashes per year with 3.8 new crashes per year on the new roadway.

Impacts to Property and Structures

Alternative 3 is the longest of the three alternatives and would travel through the developed area between Mayfield Place and Martindale Drive. Due to this, this alternative is expected to require approximately 21.1 acres of right of way across 22 parcels, costing approximately $1.02 million. This alternative would also likely require the removal of 2-3 residential structures on Martindale Drive.

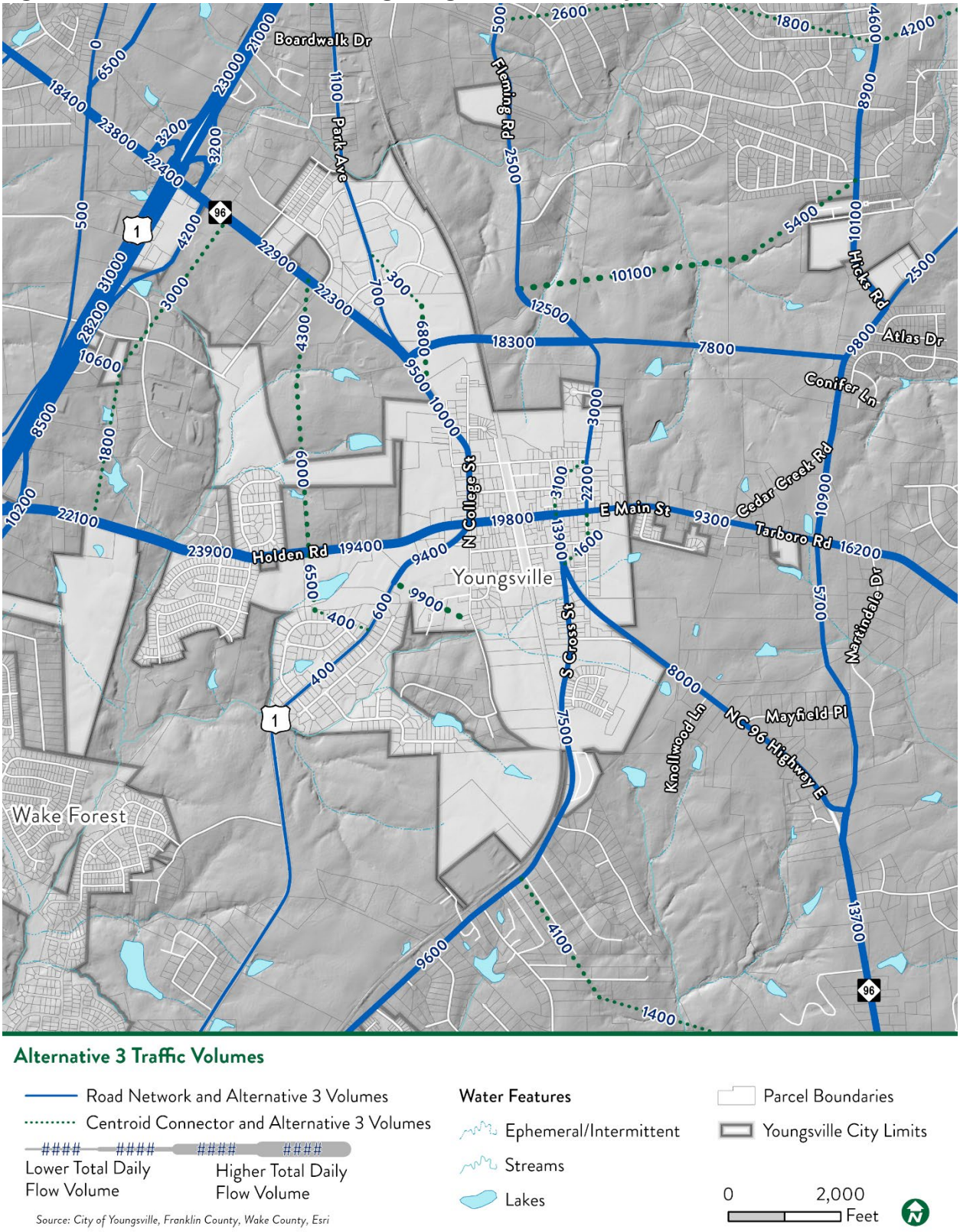
Impacts to Natural Resources

This alternative would cross a single creek, likely necessitating a culvert or other crossing.

Overall Cost

Overall cost of this alternative is estimated at $31.9 million.

Figure 5: Alternative 3 Scenario Triangle Regional Model Daily Volumes



Evaluation Results Summary

A summary of the evaluation results is shown below in **Table 1**.

Table 1: Evaluation Results

	Alternative 1 (Green)	Alternative 2 (Purple)	Alternative 3 (Orange)
Traffic Reduction on Main Street	6,000 vpd, including 500 commercial vehicles	7,300 vpd, including 600 commercial vehicles	8,200 vpd, including 650 commercial vehicles
Safety Improvements	5.6 crashes/year reduced	5.9 crashes/year reduced	4.9 crashes/year reduced
Impacts to Property and Structures	16 parcels, 2 structures, $902k	8 parcels, no structures, $321k	22 parcels, 2-3 structures, $1.0M
Impacts to Natural Resources	Minor	One stream	Two streams
Overall Cost	$13.8M	$21.4M	$31.9M

Preferred Alternative

An earlier version of the above evaluation was presented to the stakeholder committee at an in-person meeting held on Thursday, May 30, 2024. After discussion about the pros and cons of each alternative, Alternative 2 was selected as the preferred alternative.

Intersection Analyses

Traffic analyses were conducted at major intersections on the new bypass route, including those that are not part of the southeastern segment. In addition, analysis was conducted at the intersection of NC 96 and Main Street in central Youngsville. These analyses are an extension of the analyses conducted in the Existing Conditions and Trends memo, which is included in Attachment A. Detailed analysis reports from each intersection and scenario are included in **Attachment F**.

Traffic Forecasting

Year 2050 no-build scenario turning movement volumes at existing intersections were developed by applying a 1.7% per year growth rate to previously-conducted turning movement counts. Build scenario turning movement volumes were estimated by reviewing the differences in travel volumes between the TRM outputs with and without the bypass. These differences were used to add or remove volume to each leg of each intersection. Turning movement volumes were estimated based on new expected total entering and exiting traffic on each leg. These estimated volumes were used to anticipate needed intersection configurations and control types. Because of the high variability in these kinds of forecasts, analysis results are only shown at the intersection LOS level.

Cross Street and Main Street

The intersection of NC 96 and Main Street in central Youngsville would see a decrease in overall traffic volumes with the addition of the bypass. **Table 2** below shows anticipated intersection-level level of service. Without the bypass, the intersection is expected to operate at LOS F in both the morning and afternoon peak periods in year 2050. While the bypass will bring some traffic volume relief to this location, it is not expected to be enough to improve the LOS to LOS D or better. Due to right of way constraints around the intersection and emerging pedestrian focus of the area, adding additional lanes to the intersection is not considered a realistic possibility.

Table 2: Cross Street and Main Street Intersection Analysis Results

	Level of Service	
	AM Peak Hour	PM Peak Hour
2024 Existing Conditions	D	E
2050 No Build Scenario	F	F
2050 Build Scenario	F	E

NC 96 and Youngsville Bypass (East)

The southern terminus of the bypass was analyzed in a variety of configurations. These included:

1. A side-street stop-controlled intersection where the new bypass is stop-controlled at the existing alignment of NC 96 (similar to the configuration in Alternatives 1 and 2).
2. A side-street stop-controlled intersection where the western leg of NC 96 is stop-controlled at a continuous alignment of NC 96 and the new bypass (similar to the configuration in Alternative 3).
3. A signalized intersection where the existing alignment of NC 96 is maintained (similar to the configuration in Alternatives 1 and 2).
4. A signalized intersection where NC 96 is realigned to continue onto the bypass (similar to the configuration in Alternative 3).
5. A single-lane roundabout, which could be applied to any of the alternatives.

Results of these analyses are shown in **Table 3** below. Based on these results, the intersection could function well as a signal with or without the realignment of the mainline traffic movement but would perform best as a single-lane roundabout.

Table 3: NC 96 and Youngsville Bypass (East) Intersection Analysis Results

	Level of Service	
	AM Peak Hour	PM Peak Hour
Bypass Stop-Controlled at NC 96	F*	C*
NC 96 Eastbound Stop-Controlled at Bypass	C*	E*
Signalized Along Existing NC 96 Alignment	B	B
Signalized Along Realigned NC 96/Bypass	D	C
Single-Lane Roundabout	A	A

**Stop-controlled results represent the stop-controlled approach. All other results are intersection averages.*

Main Street/Tarboro Road and Cedar Creek Road/Youngsville Bypass

Currently, Cedar Creek Road intersects Main Street/Tarboro Road at a three-legged intersection east of Downtown Youngsville. Alternative 1 would add a southern leg to this intersection, while Alternatives 2 and 3 would move this intersection east, reducing or removing the skew of the norther leg, in addition to adding the southern leg. In Alternatives 2 and 3, it was assumed that the current alignment of Cedar Creek Road would still be open to traffic, but would likely be converted to right-in/right-out operations at Main Street/Tarboro Road.

This intersection was analyzed as an improved/expanded signal, a single-lane roundabout, and as a multi-lane roundabout. The approach configuration used for the signal can be seen in **Attachment C**, and the layout for the multi-lane roundabout can be seen in **Attachment G**, which shows Alternative 2 with roundabouts. The results of this analysis are shown below in **Table 4**. While a single-lane roundabout is not likely to provide

sufficient capacity at this intersection, either an improved signal or a multi-lane roundabout could.

Table 4: Main Street/Tarboro Road and Cedar Creek Road/Youngsville Bypass Intersection Analysis Results

	Level of Service	
	AM Peak Hour	PM Peak Hour
Improved Signal	D	D
Single-lane Roundabout	F	F
Multi-lane Roundabout	B	A

Cedar Creek Road and Youngsville Bypass (North)

While not a part of the primary study area, the eastern and western intersections of the northern leg of the Youngsville Bypass were also considered. In the northeast, the Bypass is expected to form a new intersection with Cedar Creek Road just south of the existing gas easement. A stop-controlled intersection, a traffic signal, and single-lane roundabouts with and without a southbound right-turn bypass lane were considered. Functional designs of these alternatives can be seen in **Attachment H**.

A signal or a single-lane roundabout are both expected to provide sufficient overall levels of service during both the morning and afternoon peak periods as shown in **Table 5** below. The southbound approach of the single-lane roundabout is expected to experience LOS E in the morning period, so a roundabout with a southbound right-turn bypass lane was analyzed. This improved roundabout is expected to provide the best overall level of service at this location.

Table 5: Cedar Creek Road and Youngsville Bypass (North) Intersection Analysis Results

	Level of Service	
	AM Peak Hour	PM Peak Hour
Bypass Stop-Controlled at Cedar Creek Road	F*	F*
Signal	C	B
Single-lane Roundabout	D	C
Single-lane Roundabout with Southbound Right Turn Bypass	B	B

**Stop-controlled results represent the stop-controlled approach. All other results are intersection averages.*

NC 96, US 1A, and Youngsville Bypass (North)

The northwestern intersection of the overall bypass concept may prove to be the most challenging. In addition to the Bypass, NC 96 is planned to be widened to four lanes as part of the Capital Boulevard freeway conversion project from this intersection to the

northwest. Multiple potential intersections for a future intersection of NC 96, Park Avenue, US 1A, and the new Bypass were analyzed. The results of these analyses can be seen in **Table 6**. A traffic signal was considered both with protected-only left-turn phasing (i.e. left turn on green arrow only) and with protected and permissive left-turn phasing (i.e. left turn on green arrow and flashing yellow arrow). While the protected and permissive phasing operates better, only the multi-lane roundabout could provide sufficient operational capacity for the forecasted volumes at this intersection. However, as shown in **Attachment I**, this intersection would have substantial property impacts to the property northwest of the current intersection of NC 96 and US 1A. Because of the operational limitations of these intersections, and the physical constraints of the roundabout, additional possibilities for the area were considered.

Table 6: Cedar Creek Road and Youngsville Bypass (North) Intersection Analysis Results

	Level of Service	
	AM Peak Hour	PM Peak Hour
Two-way Stop Control (US 1A and Park Avenue Stop-Controlled)	F*	F*
Signalized (protected-only left turn phasing)	F	F
Signalized (protected + permissive left turn phasing)**	D	F
Multi-lane Roundabout	C	D

**Stop-controlled results represent the stop-controlled approach. All other results are intersection averages.*

***These results presume protected-permissive phasing on all approaches, which is a deviation from NCDOT Congestion Management's Capacity Analysis Guidelines.*

Figure 6 shows one idea for the area that would realign NC 96 so that it connected directly across the new Bypass. This would improve the ability to build the multi-lane roundabout but would also have substantial impacts on nearby properties. During the final stakeholder meeting, this alternative was generally considered infeasible due to these impacts and the high amount of roadway realignment needed.

Figure 7 shows a broader alternative for the area. This concept would realign NC 96 and connect it to a new roadway that would connect Mosswood Boulevard to the new Bypass. Notably, Mosswood Boulevard is expected to have a bridge over Capital Boulevard but not to provide access directly to Capital Boulevard once Capital Boulevard is converted to a freeway. During the final stakeholder meeting, this alternative was considered, but ultimately eliminated due to a development that had already been submitted to the Town for consideration. This development is planned to occur near the intersection of Mosswood Boulevard and NC 96 in the alternative. However, this idea led to the potential configuration shown in **Figure 8**.

Figure 6: NC 96 Realignment Conceptual Alignment

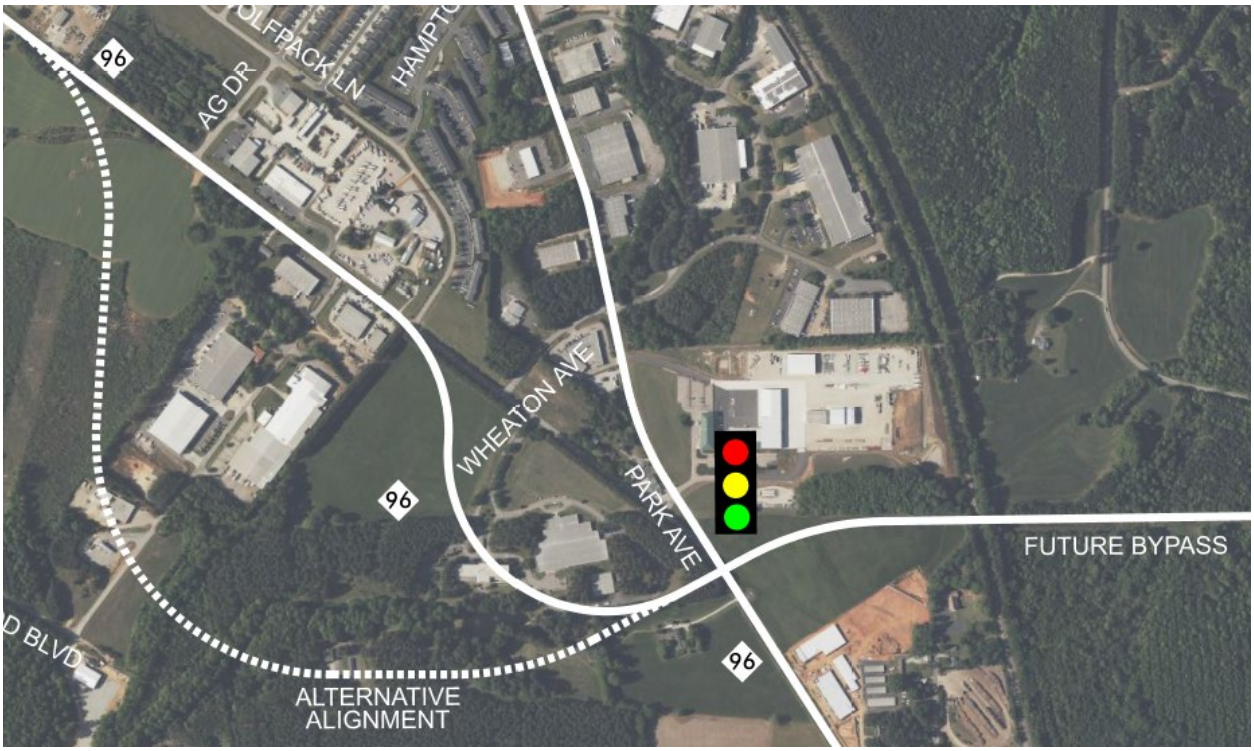
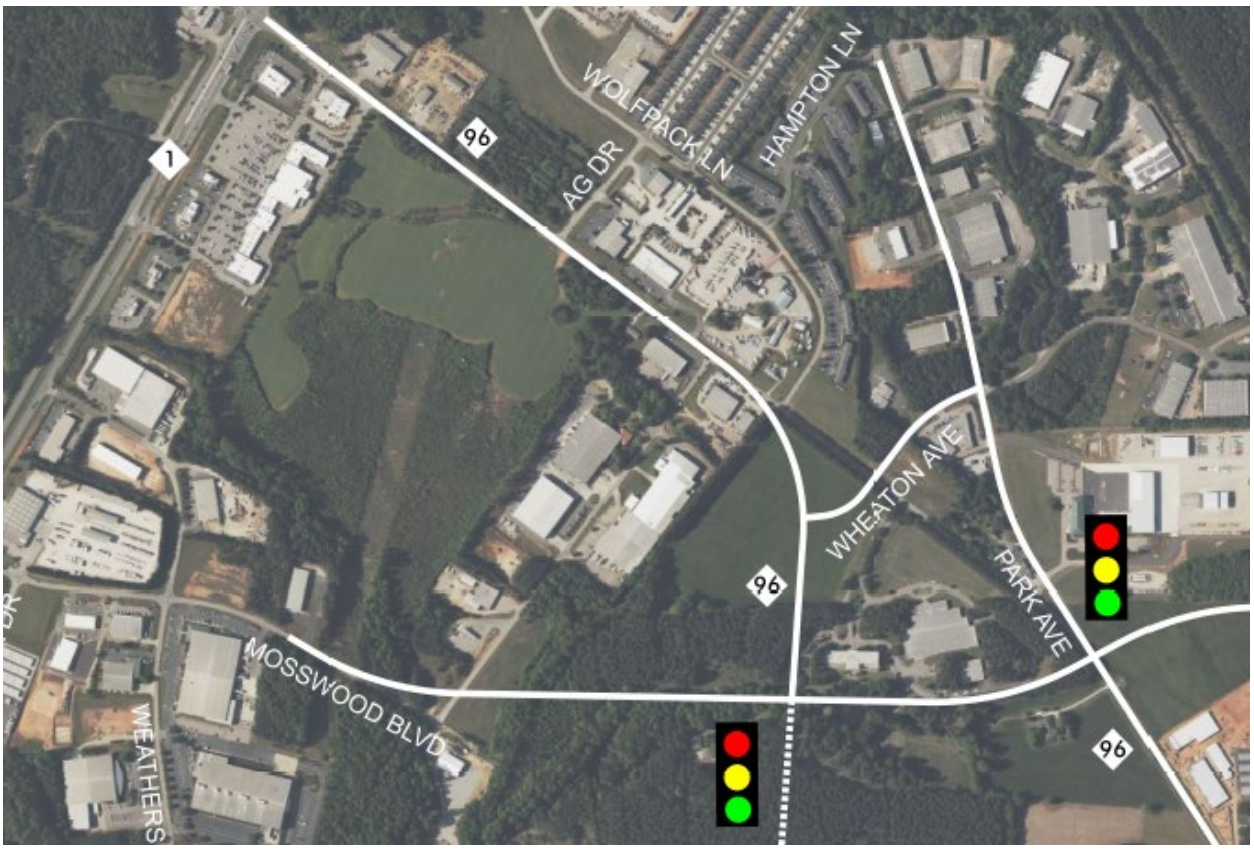
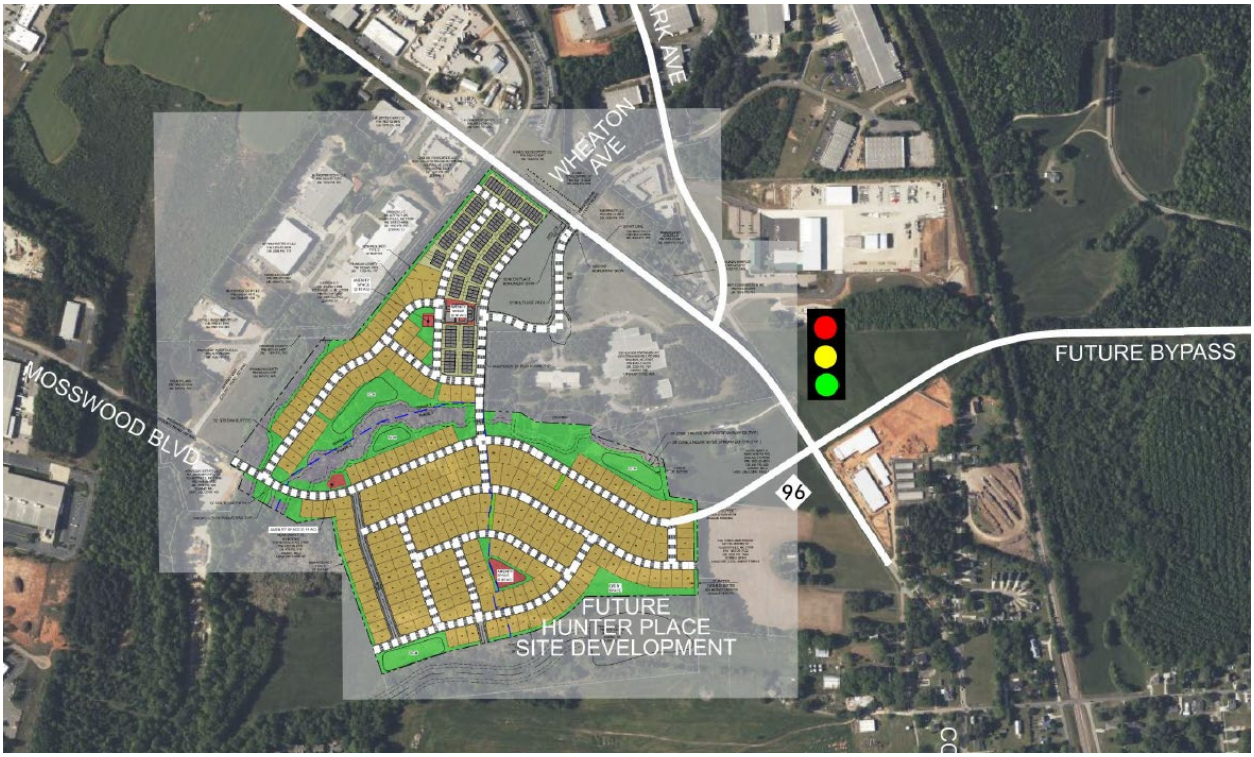


Figure 7: Mosswood Boulevard Extension Conceptual Alignment



The alternative shown in Figure 8 would separate the intersection of NC 96 with US 1A from its intersection with the Youngsville Bypass and would still connect the Bypass to Mosswood Boulevard through the proposed development. The proposed development also includes a potential realignment of Wheaton Avenue to a realigned intersection. This would create three separate intersections along NC 96: one with Wheaton Avenue, another with US 1A (realigned slightly to remove the current skew), and a third with the Bypass and Mosswood Boulevard. This could distribute traffic demands and may open up opportunities to use innovative intersections like a continuous green “T” at US 1A to spread traffic demand across multiple intersections.

Figure 8: Multiple Intersections along NC 96 Conceptual Alignment



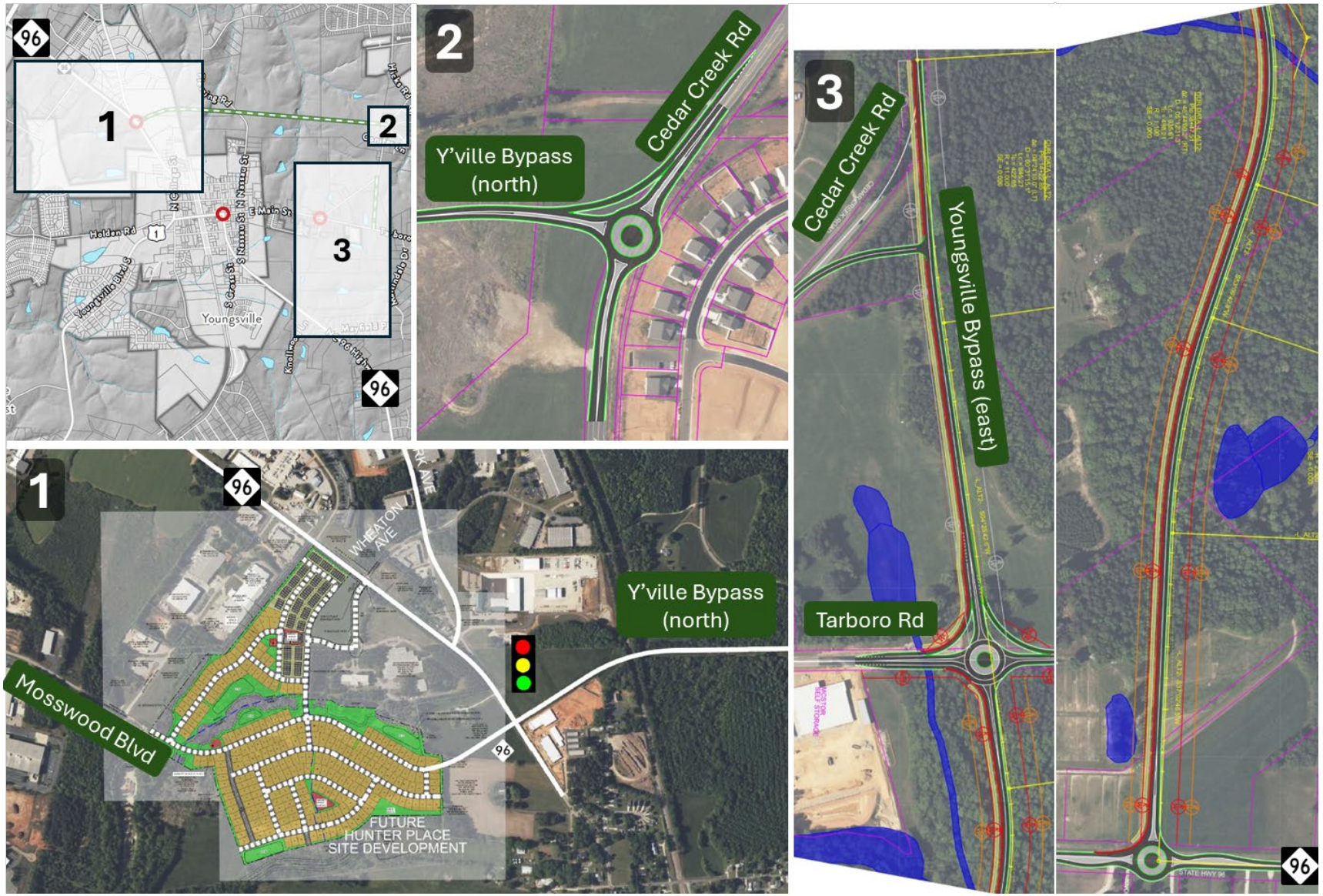
Summary of Recommendations

The planning process and analyses contained in this document can be summarized as follows:

- Recommend **Alternative 2** which would connect the southern end of a realigned Cedar Creek Road (approximately one thousand feet west of Martindale Drive) to NC 96 just south of Knollwood Lane. (See **Attachments C and F** for functional designs of this alignment with signals and roundabouts at major intersections, respectively).
- Update the CAMPO MTP budget to show one of the following two amounts for this segment of the bypass:
    - $15.60 million for the corridor from Tarboro Road to NC 96 using signals
    - $16.03 million for the corridor from Tarboro Road to NC 96 using roundabouts
- Plan to construct a single-lane roundabout with a southbound right turn lane at the intersection of Cedar Creek Road and Youngsville Bypass (north). This is shown in **Attachment H**.
- Continue to monitor new developments and traffic demand at the intersection of NC 96 and US 1A to the northwest of Youngsville. Work to proactively acquire right of way for the roadways shown in **Figure 8**.

In addition to the attachments referenced above, a summary of the recommended configurations of each major segment is shown below in **Figure 9**.

Figure 9: Summary of Recommended Configurations



More detail for Area 2 in this figure can be found in Attachment H. More detail for Area 3 can be found in Attachment G.