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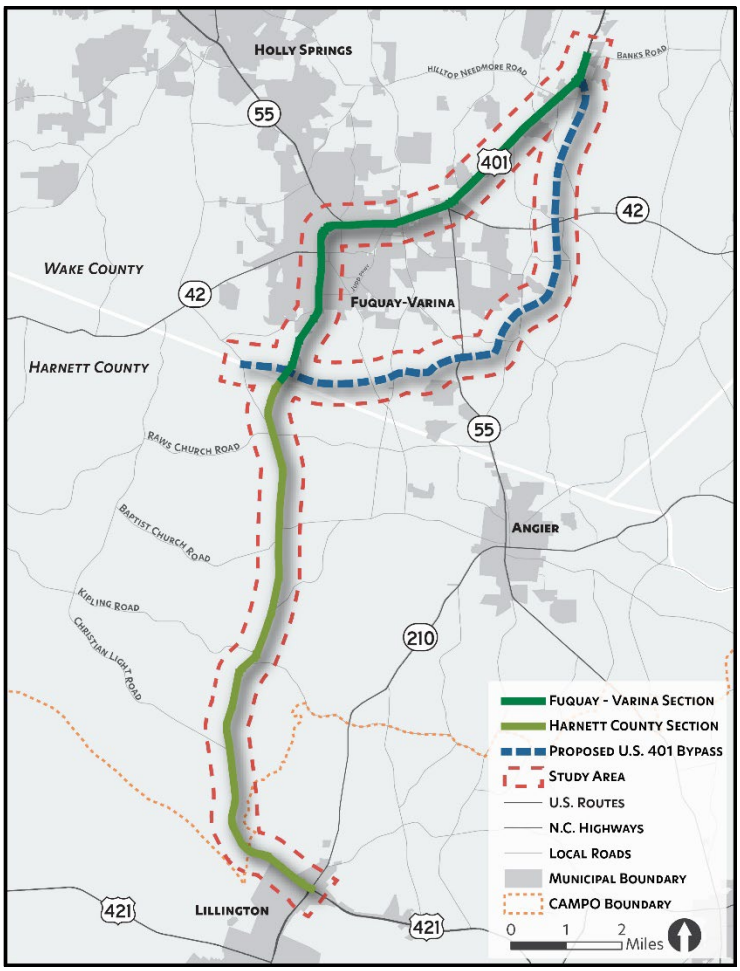
Executive Summary

The Capital Area Metropolitan Planning Organization (CAMPO) undertook the U.S. 401 Corridor Study to determine the proposed alignment and roadway type of future U.S. 401 as well as identify improvements to existing U.S. 401 and other study area roadways and intersections by developing a vision for the study area, analyzing short- and long-term solutions, developing several realistic, implementable, and prioritized projects that can be programmed into the appropriate Metropolitan Transportation Plan (MTP) time horizon, and administering an effective and meaningful stakeholder and public engagement process. This report outlines the process and results of the U.S. 401 Corridor Study and offers a recommendation for a future U.S. 401 alignment and other roadway improvements. Figure ES1 shows the U.S. 401 Corridor Study Area.

Figure ES1: U.S. 401 Corridor Study Area



The main vision of the U.S. 401 Corridor Study is to develop appropriate solutions for current and future growth in southwestern Wake County and Harnett County, providing a multimodal framework to accommodate growth and development through improved travel conditions that are safe and accessible while reflecting the diversity of communities, land uses, and transportation aspects within the study area and beyond, supporting economic development, and maintaining the character and livability in the area. The below goals were developed to guide the study.

- Reduce congestion and increase transportation capacity and safety
- Incorporate public and stakeholder input
- Encourage economic development
- Accommodate appropriate modes of travel (transit, bicycle, pedestrian, freight)

Public Engagement

Community engagement for the U.S. 401 Corridor Study included three phases of engagement. The following graphic shows how the public will be involved based on the IAP2 spectrum of public participation, which defines the public's role within the public engagement process[1].

The U.S. 401 Corridor Study website was developed to provide project information and contact information, using the ESRI StoryMaps platform to relay project information. Public surveys were used during the first two phases of public engagement to solicit public input. CAMPO's subscription to PublicInput.com was used to host surveys and links to the surveys were available from the project website while the survey was open.

U.S. 401 Design Alternatives

At the onset of the study, development of the future U.S. 401 alternatives revolved around the original study area, which somewhat mirrored the alignment in the MTP 2050. Four key parameters were chosen to evaluate impacts for each alternative: (1) Property impacts, (2) Agricultural impacts, (3) Environmental impacts, and (4) Project cost.

Future U.S. 401 alternatives were divided into three sections for the purpose of alignment evaluation. Five to six alternatives were created for each section based on different parameters. Contiguity was ensured by creating common end points for each section. At this stage, all alignments are 4-Lanes at 55mph. The alignments are shown in Figure ES2.

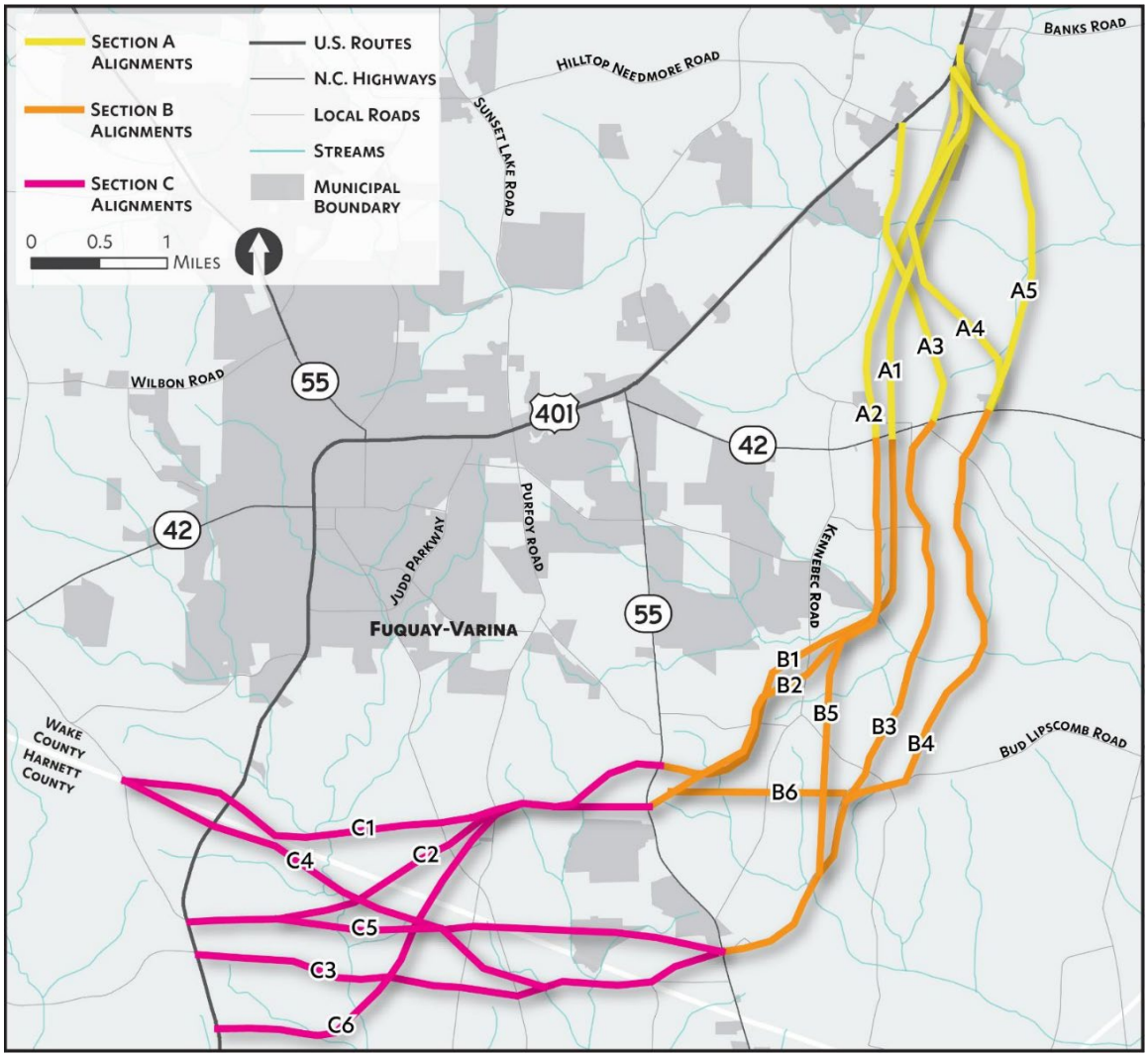
- **Section A** goes from U.S. 401 to N.C. 42.
- **Section B** goes from N.C. 42 to N.C. 55.
- **Section C** goes from N.C. 55 to U.S. 401 with an optional extension to Piney-Grove Rawls Road depending on the alternative.

Each section also had a suffix affiliated with it, as follows:

- **Suffix of 1** denotes that the alignment follows the same path as in the Triangle Regional Model.
- **Suffix of 2** denotes that the alignment is a slight variation of '1' minimizing the impact on land parcels by aligning it through parcel boundaries.
- **Suffix of 3** denotes that the alignment maximizes the use of existing roads.
- **Suffixes of 4, 5 and 6** follow newly created alignments minimizing the constraints mentioned previously.

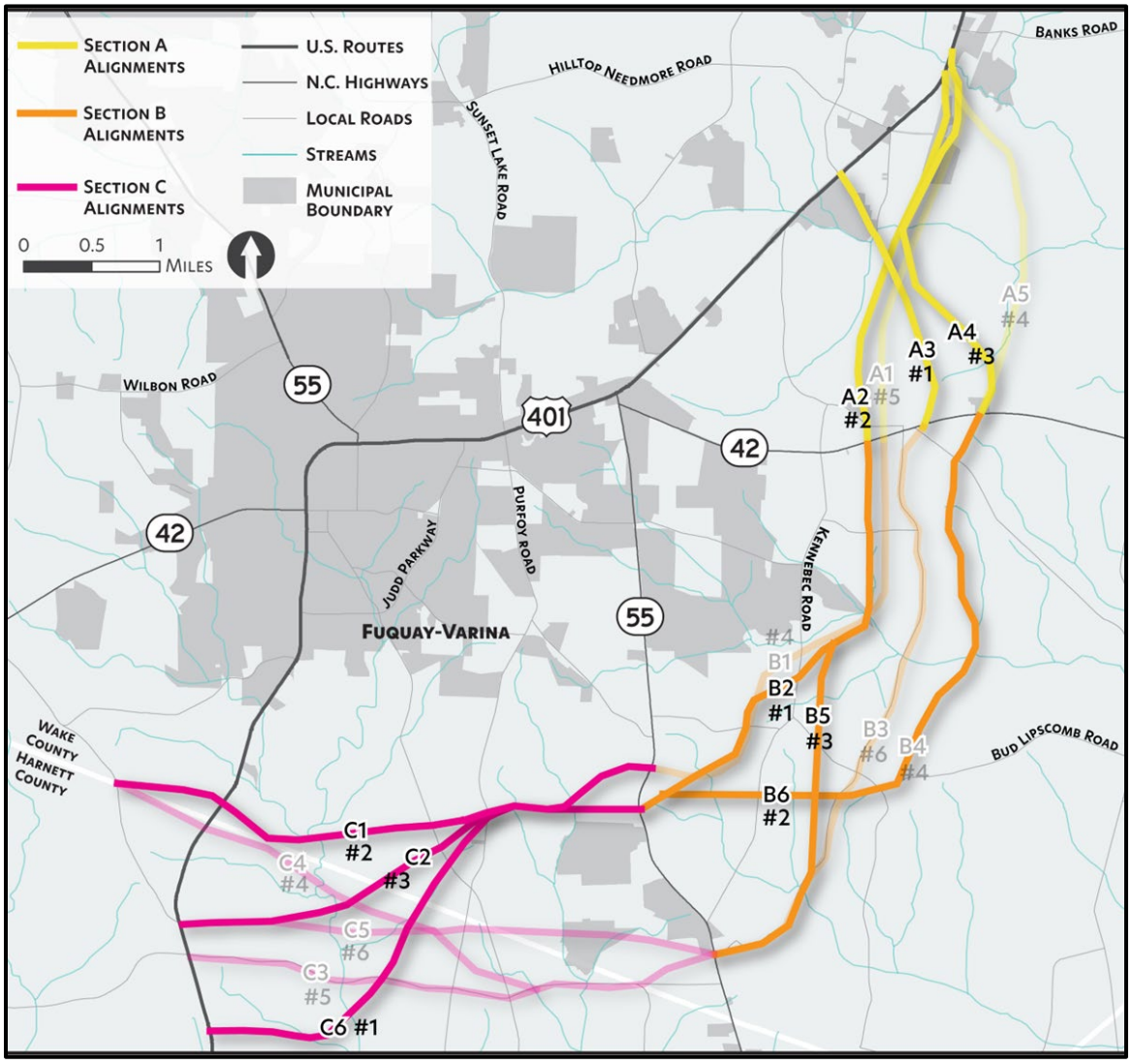
[1] https://www.iap2.org/page/pillars

Figure ES2: Future U.S. 401 Alignment Segments



The analysis combining public engagement results with parameters based on GIS data resulted in filtering out the most impactful alignment alternatives. In Section A, alternatives A2, A3 and A4 ranked the highest. Similarly, alternatives B2, B5 and B6 ranked the highest among section B, and C1, C2 and C6 ranked highest among section C. The high-ranking alternatives along with the ranks of the alternatives are shown in Figure ES3.

Figure ES3: High-Ranking U.S. 401 Alternatives



Three alignment alternatives were created by combining the high-ranking segments.

- Segments A4, B6 and C1 were combined to form Alternative X.
- Segments A2, B2 and C2 were combined to form Alternative Y.
- Segments A2 and B5 were combined to form Alternative Z. For this alternative, segment C1 to would remain as Southern Parkway, while N.C. 210 will be upgraded and connected to section B5 using N.C. 55 and Angier Bypass.

Based on CAMPO's directions, Alternatives X and Z were selected to advance to further evaluation. Alternative Y was not selected because it was very similar to the original alignment in the MTP. At this stage of the project, the two alternatives under consideration were X and Z, both at 4-lanes at 55 mph speed. Alternative X is highlighted in Figure ES4 and Alternative Z is highlighted in Figure ES5.

Figure ES4: Alternative X

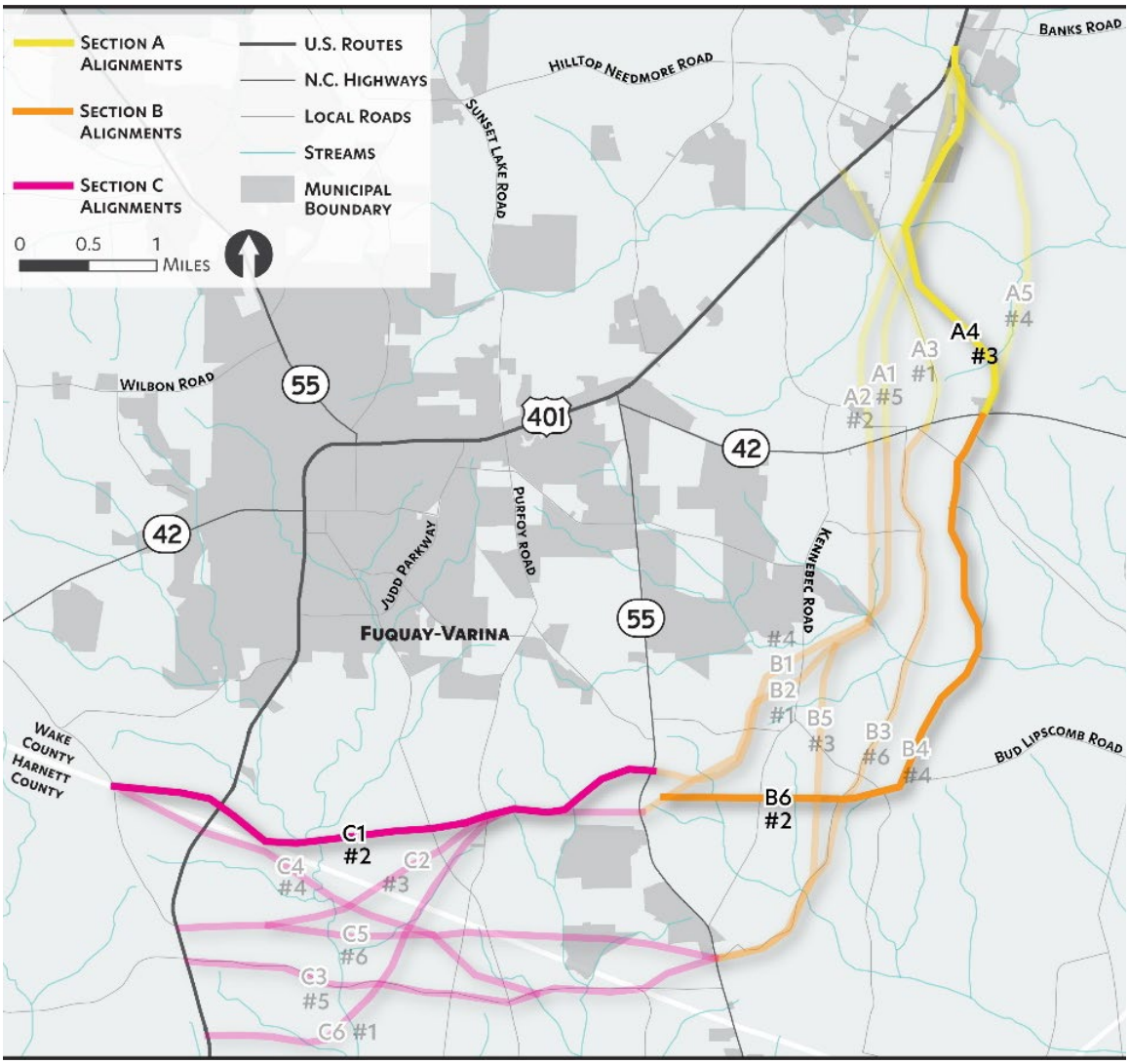
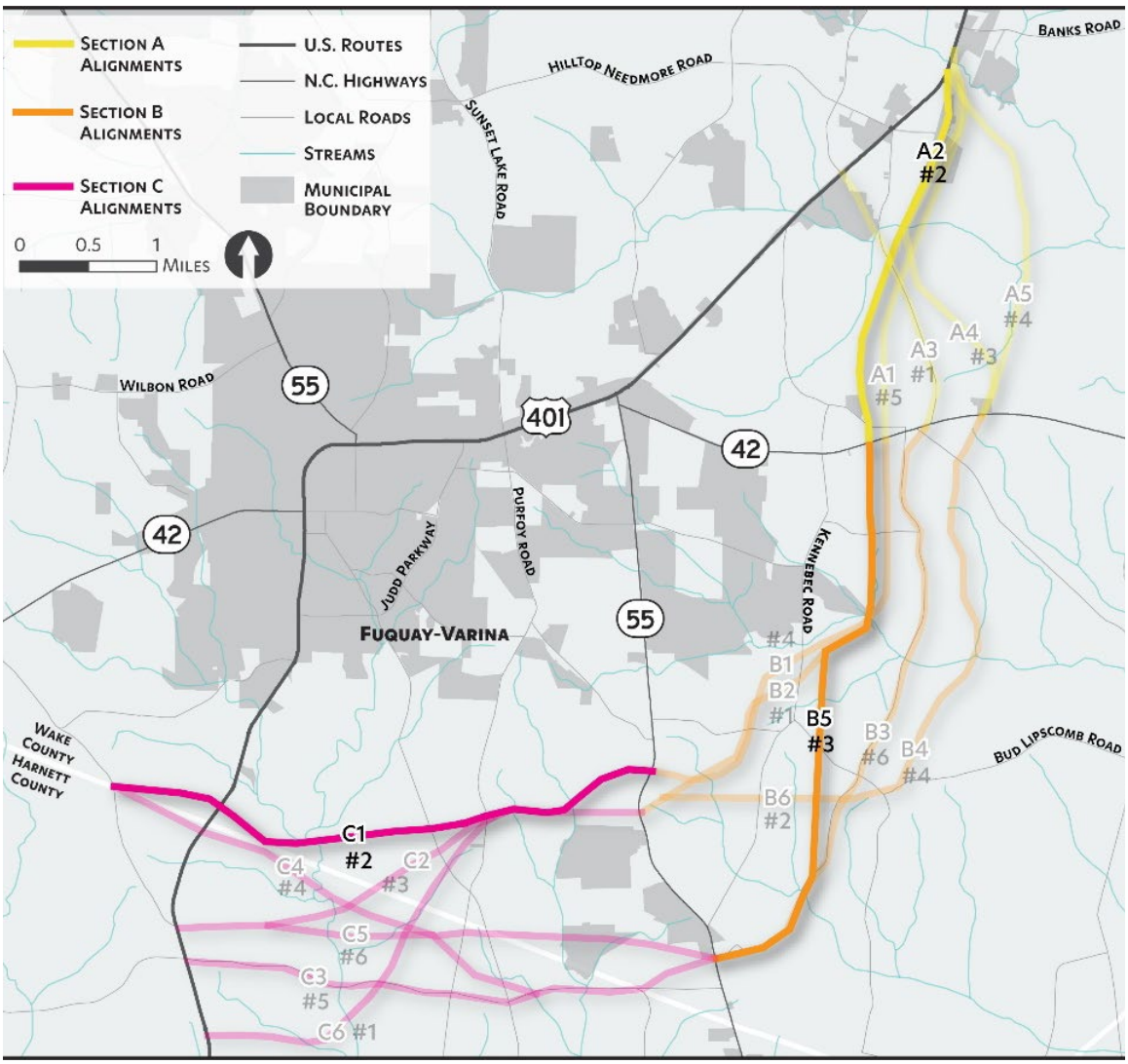


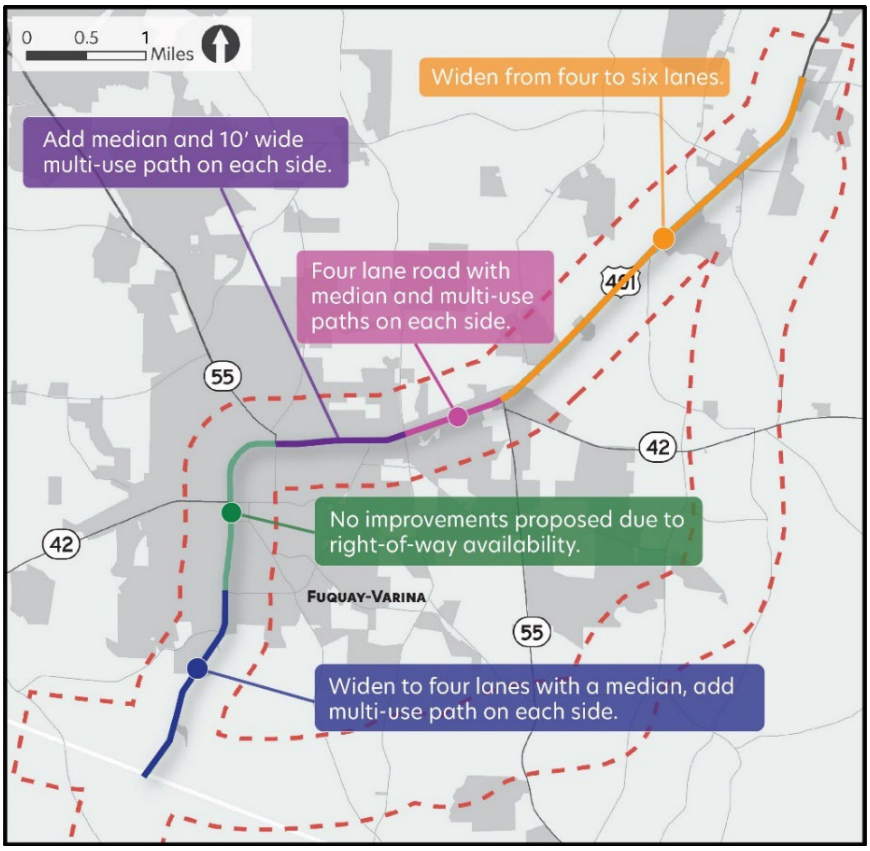
Figure ES5: Alternative Z



Improvements to existing U.S. 401 between Banks Road and the Wake/Harnett County line are also recommended as part of this study and are summarized in Figure ES6.

Improvements to existing U.S. 401 in Harnett County between the Wake/Harnett County line and U.S. 421 near Lillington are recommended as part of this study. After evaluating several new alignments for U.S. 401 in Harnett County, it was determined that maintaining the current alignment of U.S. 401 (Alternative D1) was the best option. The reasoning being is that by the time a new alignment would be finalized and incorporated in the Comprehensive Transportation Plan, many more developments would have occurred along that alignment, rendering other alignments unfeasible for long-term planning purposes.

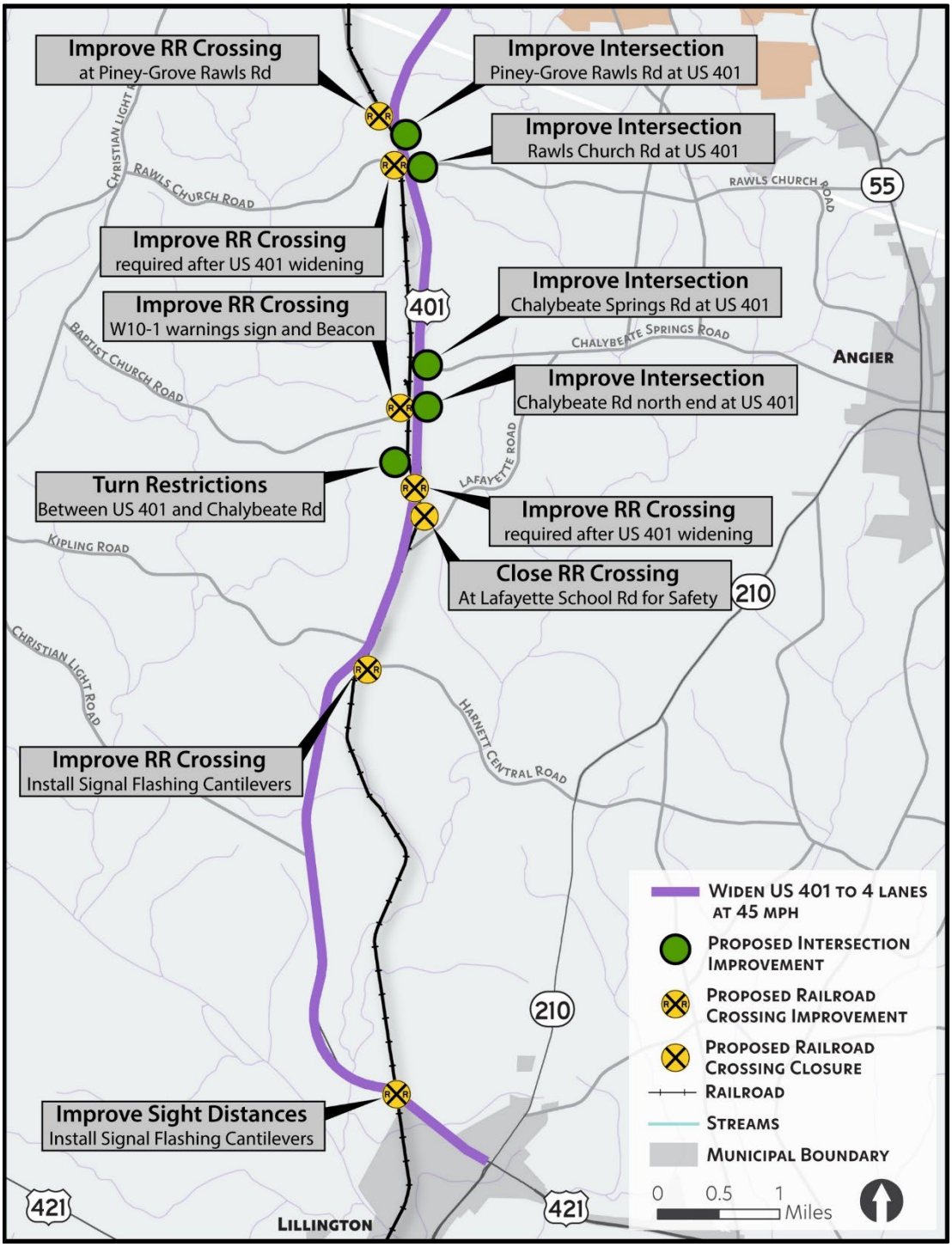
Figure ES6: Existing U.S. 401 Recommended Improvements



To mitigate the potential impacts to property and sensitive resources, two alternative concepts were developed and recommended for this section of U.S. 401 that would result in widening from two lanes to four lanes: a standard 150' right-of-way to be used where sufficient right-of-way can be obtained and a narrow cross-section of 120' to be used where right-of-way constraints due to the railroad or cultural resources exist.

There were a number of shorter-term improvements that were identified for the U.S. 401 segment in Harnett County that would address several congestion and safety concerns, outlined in Figure ES7.

Figure ES7: U.S. 401 Recommended Intersection Improvements



U.S. 401 design alternatives and proposed improvements also factor in transit, bicycle, and pedestrian facilities to facilitate multimodal mobility in the area.

Development of New Alignments for Future U.S. 401

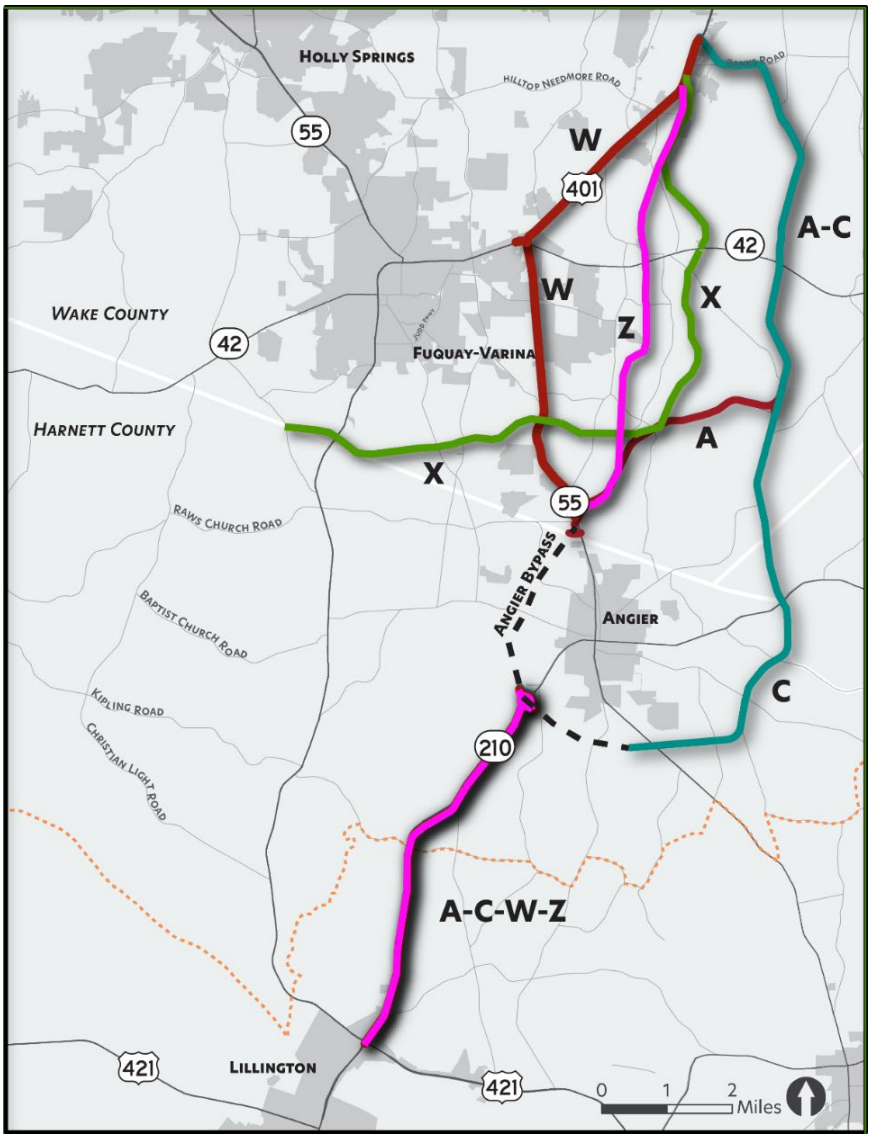
On December 7, 2021, North Carolina House Representative Erin P. Pare representing District 37 (Southern Wake County) wrote a letter to CAMPO asking them to delay the approval of 2050 MTP until the completion of this study, and make the study include alternative routes in addition to the ones being considered at the time.

Based on this letter, the CAMPO Executive Board passed a resolution on December 8, 2021, directing CAMPO staff to review alternative ideas. These alignments should consider options of widening existing roadways as well as alternatives further east of the alignments under consideration at the time of the resolution. Five new alternative alignments were created as a result.

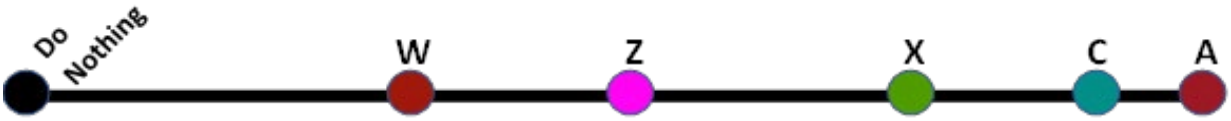
The travel demand modeling analysis was conducted for the new alternatives and suggested that two of the alternatives, B and D, do not serve the goals of this study and do not meet the requirements of serving the traffic needs of the study area. Alternatives A, C, W, X, and Z were advanced to the next round of analysis, shown in Figure ES8.

These alternatives were run through another round of analysis based on the same parameters that were considered during the original alignment selection (1) Property impact, (2) Agricultural impact, (3) Environmental impact, and (4) Project cost.

Figure ES8: New Design Alignments for Future U.S. 401

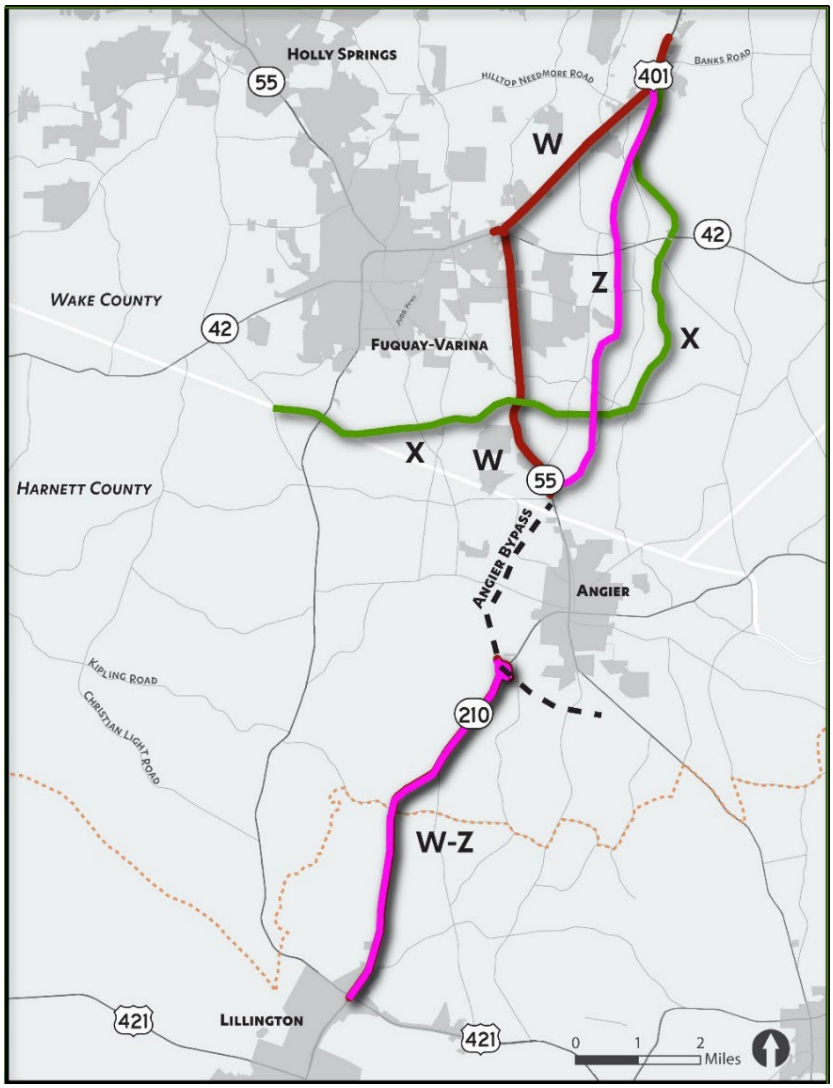


The below figure shows a graphical representation of the relative intensities of the combined impacts of each alternative. The scale ranges from doing nothing to the most impactful alternative A and the location of the other alternatives shows their impact relative to Alternative A.



The analysis of Alternatives A, C, W, X, and Z and its findings were presented to the CAMPO Executive Board on March 16, 2022. In this presentation, an explanation of the development of new alignments and how it relates to the Board directive in December 2021 was shown. New alignments, their model results, and the conclusions based on those results were explained to the Board. The model results showed that in general, the further east the alignment is located, the less relief it would provide to the existing U.S. 401 corridor. It was explained that based on the analysis, Alternatives W, X and Z performed best, which reiterated the analysis findings that the alignments will need to be in the vicinity of the original alignment.

Figure ES9: Advanced U.S. 401 Alternatives



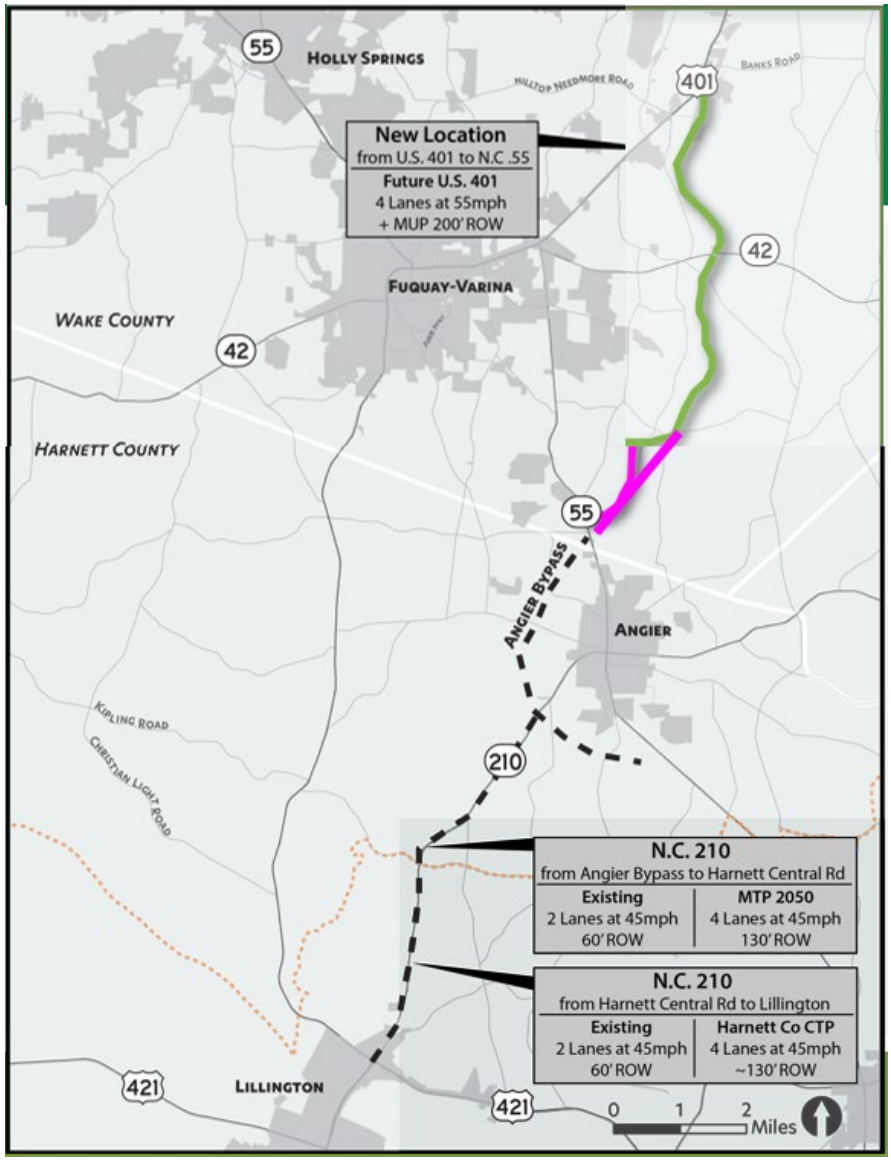
Based on this presentation, a motion was made by Vice Chair Jones, seconded by Board Member Massengill, to revise the scope and schedule of the U.S. 401 Corridor Study based on staff's findings and include the additional route of **Alternative W**, along with the original **Alternative X,** and **Alternative Z** in the study's findings. These three alternatives are shown in Figure ES9.

After examining the impact and benefit scores of the four alternatives, the CTT decided to explore the potential to combine alternatives X and Z to form a hybrid alternative.

The original corridor analysis for the Future U.S. 401 project looked at a 55mph, limited access roadway for all alignments. Alternative W along U.S. 401 and N.C. 55 would need to be a 55mph roadway to address the increase in traffic. This would increase necessary right-of-way impacts and require limiting access at some interchanges, intersections, driveways or median openings to the roadway. Alt. X and Z are better suited for 45mph roadways. This would allow for a smaller right-of-way and provide more access to nearby roadways and adjacent commercial/residential properties.

Alternative XZ – This alternative was created by combining the eastern part of Alternative X with the southern part of Alternative Z, the conceptual alignment of which is shown in Figure X. The resulting Alternative XZ alignment starts at U.S. 401 near Banks Road, follows alignment X (green corridor) until it crosses over to alignment Z (purple corridor) and connecting to the Angier Bypass. The Alternative XZ alignment is shown in figure ES10, with the connection between the Alternative X and Alternative Z segments smoothed out.

Figure ES10: Alternative XZ Alignment



The CTT met on June 7, 2023 to review, assess, and discuss all the technical information prepared for the project, review comments provided by the public and stakeholders on the alternatives shown at the December 2022 public meetings, and determine a path forward a U.S. 401 alternative. At that meeting, the CTT recommended the following:

Advance Alternative XZ as the new future U.S. 401 alignment to be included in the MTP, replacing the existing U.S. 401 Bypass alignment included in the MTP 2050.

In its recommendation, the CTT acknowledged that:

- The project is still in the planning phase and isn't planned for construction until 2050, but the need to start planning for and reserving right-of-way sooner rather than later is essential to the success of the project.
- Alternative XZ provides a better alignment than the U.S. 401 Bypass alignment currently in the MTP 2050.

The CTT provided the following items to be included as part of the recommendation:

- Projects identified in the MTP 2050 for U.S. 401 between Banks Road and N.C. 55, N.C. 55 between U.S. 401 and Angier Bypass, and N.C. 210 between Angier Bypass and U.S. 401/ U.S. 421 should be elevated in priority and given a construction horizon year that completes these projects before Alternative XZ is built.
- There should be a continued effort to prioritize other roadway and intersection improvement projects in the study area that can provide more near-term benefit.

The SOT met on June 21, 2023 to review, assess, and discuss the CTT's recommendations. At that meeting, Wake County SOT members provided the following input to be considered in a recommendation:

- Wake County has heard the concern of the agricultural businesses in this area and will use tools available to support them.
- The County's Comprehensive Plan will be updated to show this area as Rural on the Development Framework Map.
- The County can support Alternative XZ as a long-term corridor over that U.S. 401 Bypass alignment currently shown in the adopted MTP.
- The County feels that the section of N.C. 55 between Five Points in Fuquay-Varina and the Angier Bypass should be prioritized in the MTP.
- The County requests that CAMPO look at and determine the cost of a variety of small intersection projects on area roadways and consider these for inclusion into the MTP. The inclusion of projects will provide better context on the timing of the Alternative XZ development.

At that meeting, the SOT agreed to the CTT's recommendation to advance Alternative XZ and recommend to the CAMP Executive Board the following:

- **To advance Alternative XZ as the new future U.S. 401 alignment to be included in the MTP, replacing the existing U.S. 401 Bypass alignment included in the MTP 2050.**
- **That CAMPO work to prioritize projects identified in the MTP 2050 for U.S. 401 between Banks Road and N.C. 55, N.C. 55 between U.S. 401 and Angier Bypass, and N.C. 210 between Angier Bypass and U.S. 401/ U.S. 421 should be elevated in priority and given a construction horizon year that completes these projects before Alternative XZ is built.**
- **That CAMPO look at and determine the cost of a variety of small intersection projects on study area roadways and consider these for inclusion into the MTP. The inclusion of projects will provide better context on the timing of the Alternative XZ development.**

The recommended Alternative XZ is shown in Figure ES11 with the recommended cross-section shown in Figure ES12.

Figure ES11: Recommended Alternative XZ Alignment

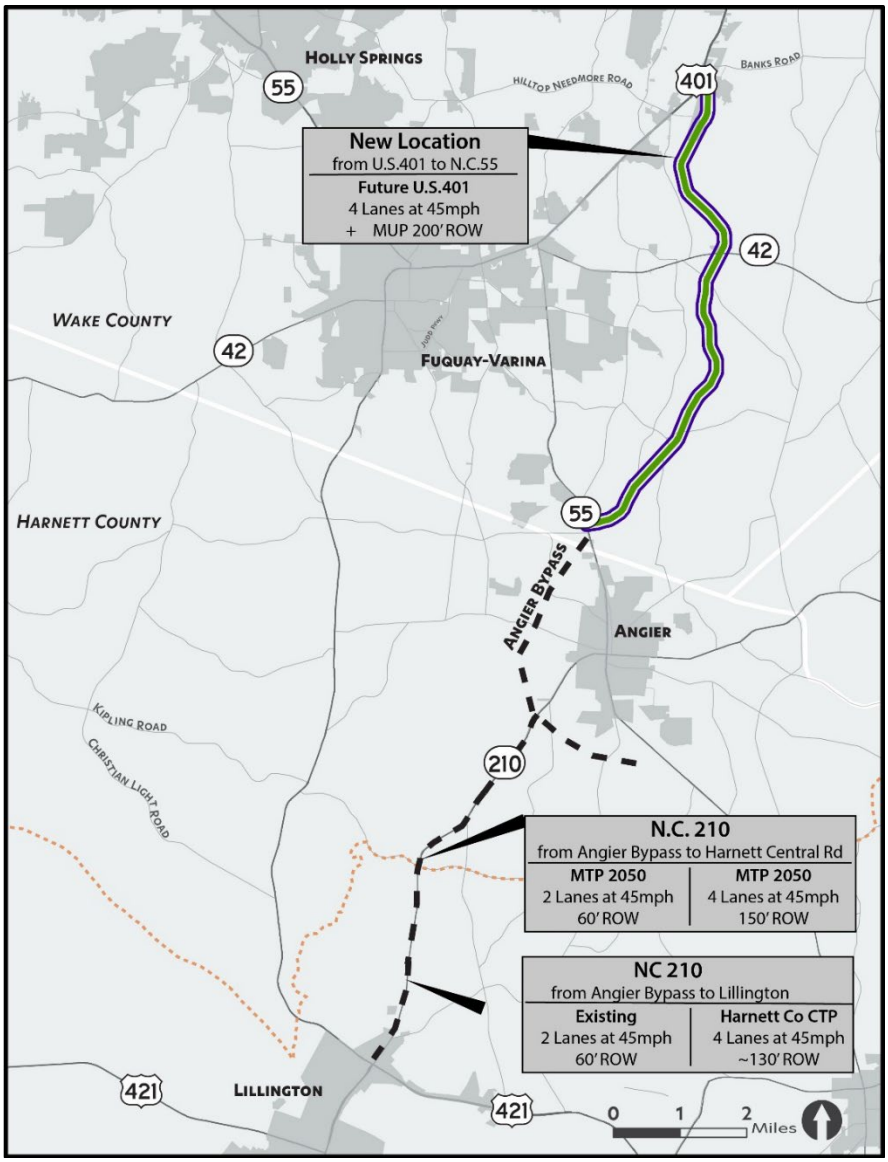
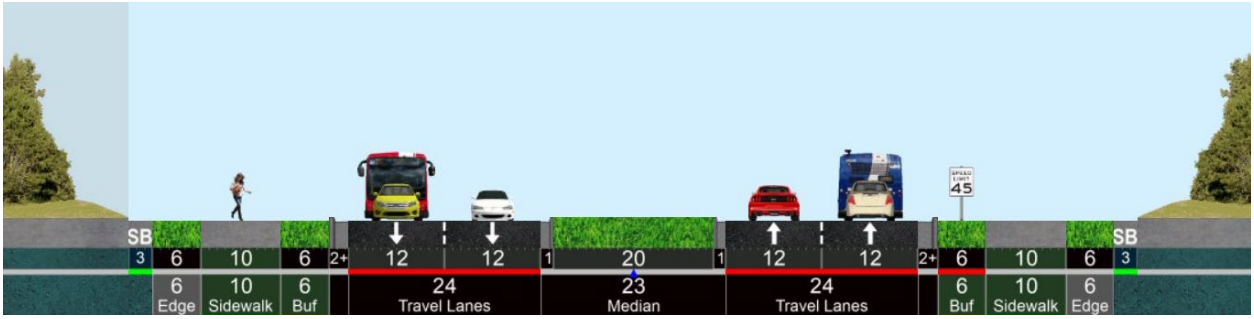


Figure ES12: Recommended Alternative XZ Cross-Section



Chapter 1: Introduction

The Capital Area Metropolitan Planning Organization (CAMPO) undertook the U.S. 401 Corridor Study to determine the proposed alignment and roadway type of future U.S. 401 as well as identify improvements to existing U.S. 401 and other study area roadways and intersections by developing a vision for the study area, analyzing short- and long-term solutions, developing several realistic, implementable, and prioritized projects that can be programmed into the appropriate Metropolitan Transportation Plan (MTP) time horizon, and administering an effective and meaningful stakeholder and public engagement process. This report outlines the process and results of the U.S. 401 Corridor Study and offers a recommendation for a future U.S. 401 alignment and other roadway improvements along existing U.S. 401.

1.1 Project History

The concept of looking into U.S. 401 corridor improvements and exploring alternative alignments for a future U.S. 401 has been around since the 1990's. The initial alignment of the Future U.S. 401 was adopted by the state's Board of Transportation on March 10, 1997, with a revised alignment approved on May 7, 1999. The Town of Fuquay-Varina approved the alignment on July 21, 1998. Following these approvals, the Future U.S. 401 project was included in subsequent MTP's, as follows:

- MTP 2025 – Adopted by CAMPO on April 17, 2002.
- MTP 2030 - Adopted by CAMPO on September 14, 2004, shows an alignment identified as Eastern Parkway (A157).
- MTP 2035 – Adopted by CAMPO on May 20, 2009, shows an alignment identified as Eastern Parkway (Segments A157a, A157b, and A302d).
- MTP 2040 – Adopted by CAMPO on May 8, 2013. Alignment identified as Eastern Parkway (A157a) from Piney Grove Wilbon Road to N.C. 55. U.S. 401 Bypass is initially identified as terminal points for Projects A619a (U.S. 401 widening from N.C. 540 to U.S. 401 Bypass) and A619b (U.S. 401 widening from U.S. 401 Bypass to N.C. 55/42).
- MTP 2045 – Adopted by CAMPO on December 13, 2017. U.S. 401 Bypass officially listed as A617a from U.S. 401 (east of Fuquay-Varina) to N.C. 55. The previous highway projects for U.S. 401 (A619a and A619b) are listed as well. Also, Eastern Parkway (Project A157a) is also listed. Additional projects include – Project A157a1 (Eastern Parkway / U.S. 401 Interchange) and Project A157a2 (Eastern Parkway / Angier Road Interchange).

Figure 1.2 shows the proposed U.S. 401 Bypass that is currently in the MTP 2050 along with the general study area for this U.S. 401 Corridor Study.

A future U.S. 401 alignment east of Fuquay-Varina and west of Angier through Harnett County is also included in the Southwest Area Study completed in 2012. The alignment was under study by NCDOT as part of an Environmental Impact Study (EIS). The EIS was not completed as NCDOT repealed the funding for the project. This corridor was part of a larger US 401 study from the NC 540 in Southern Wake County to Fayetteville.

CAMPO endorsed the findings of the second edition for the Southwest Area Study for use in further long range planning at their August 21, 2019 meeting. The findings included a future U.S. 401 alignment from the Banks Road area in the north to the current U.S. 401 segment south of the existing Fuquay-Varina corporate limits.

The future U.S. 401 is needed to serve the Triangle Region's transportation system based on the projected growth of population and employment in the area. The future U.S. 401 also has significant statewide benefits; particularly for citizens and services traveling to the Triangle area from the Cumberland County/Fayetteville area and other locations further south.

In more recent years, the Town of Fuquay-Varina has continued to develop along with much of the rest of southern Wake County. This growth has continued to put pressure on the existing transportation network in the area. In response, a number of transportation improvements have been undertaken, including the Town of Fuquay-Varina's development of the Fuquay-Varina Parkway. In discussions with the Town and NCDOT, a need to coordinate how both the Fuquay-Varina Parkway and the U.S. 401 corridors would function and fit into the future transportation network was identified. Based on this and feedback from the public, as well as a request for a corridor study from the Town of Fuquay-Varina, the U.S. 401 Corridor Study was commissioned by CAMPO to further review and study the alignment of the corridor.

A Corridor Study focuses attention on a single corridor in the transportation network in order to resolve issues dealing with all or a portion of that corridor. It identifies preferred improvements to a corridor and, where recommended, a preferred generalized alignment for a new roadway. This is the initial step of planning for corridor improvements. Once a Corridor Study is completed, there are still many steps to be undertaken before construction begins, including getting the project funded and designing the project. These additional steps are shown in the Project Lifecycle graphic here. Improvements or new alignments recommended for a Corridor Study often still require additional refinement during the later stages of the project development. Figure 1-1 portrays that planning for a corridor study is the first step of a seven-step transportation improvement project process.

Figure 1-1: Transportation Improvement Project Process

Planning	Programming /Funding	Project Development	Design	Property Acquisition	Construction	Maintenance

Establishing funding for major projects, such as this project, with state and federal sources is a competitive process that occurs every two years. Currently, the Future U.S. 401 is not funded, but since it is included in the 2050 MTP and the area continues to grow, CAMPO will look at opportunities to fund and build the project based off the alignment recommendations of this current study.

1.2 Project Purpose

The U.S. 401 Corridor Study encompasses approximately 19 miles of the U.S. 401 Corridor from Banks Road in Wake County through the Town of Fuquay-Varina to the N.C. 210 and U.S. 421 intersection near

the Town of Lillington in Harnett County; and about 7 miles for the proposed U.S. 401 Bypass. The Corridor Study will:

1. Develop a vision for the U.S. 401 Corridor Study area;
2. Explore alternatives for a future U.S. 401 alignment and roadway type;
3. Analyze short- and long-term solutions for a future U.S. 401 alignment as well as existing U.S. 401 and other roadways and intersections in the study area;
4. Develop several realistic, implementable, and prioritized projects that can be programmed into the appropriate Metropolitan Transportation Plan (MTP); and,
5. Administer an effective and meaningful stakeholder and public engagement process.

1.3 Study Area

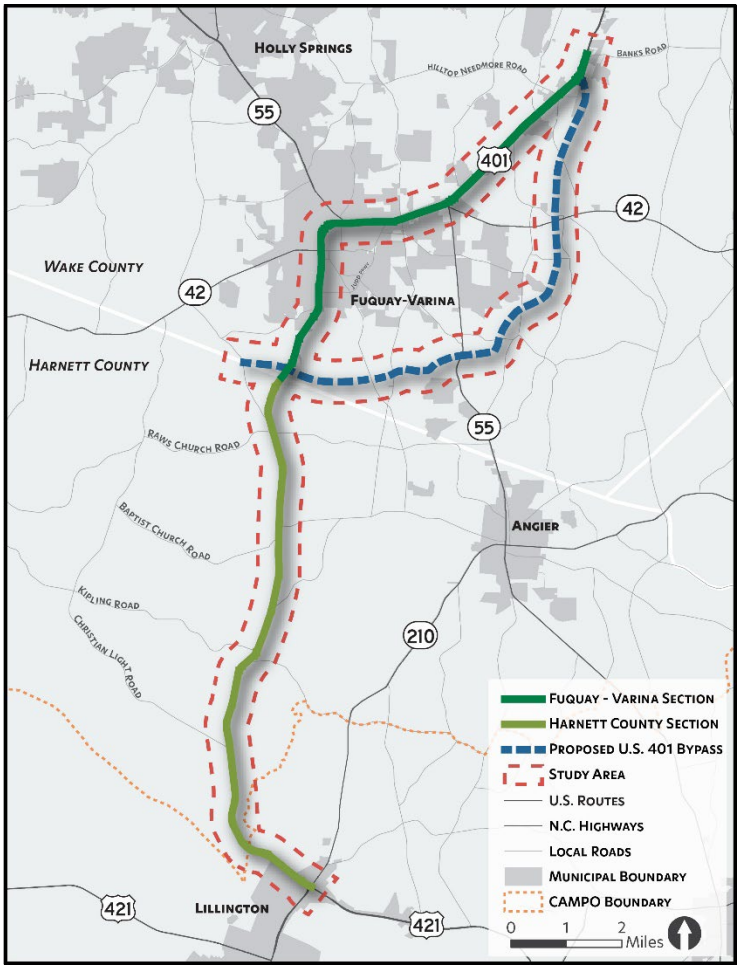
This U.S. 401 Corridor Study includes all of existing U.S. 401 between the intersection of Banks Road in the Hilltop area and N.C. 210 in Lillington. It also includes areas east of Fuquay-Varina and north of Angier that are being considered for new U.S. 401 alignments.

The U.S. 401 Corridor Study consists of three segments:

1. Segment 1 – Future U.S. 401.
2. Segment 2 – U.S. 401 in Fuquay-Varina.
3. Segment 3 – U.S. 401 in Harnett County.

Figure 1-2 shows the U.S. 401 study area and study segments. As outlined later in Chapter 4, midway through the U.S. 401 Corridor Study, the CAMPO Executive Board directed CAMPO staff to expand the study area to include additional alignments that encompassed existing roadways and a further east and south alignment.

Figure 1-2: U.S. 401 Corridor Study Area and MTP 2050 Alignment for Future U.S. 401



Segment 1 – Future U.S. 401 looks at new alignments for U.S. 401 that include the general U.S. 401 alignment from the MTP 2050 or other similar alignments that connect U.S. 401 near Banks Road with U.S. 401 south of Fuquay-Varina. This segment includes determining the intersection and interchange configurations, verifying the type of roadway

access, determining the alignment considering existing and future land uses, and environmental constraints.

Segment 2 – Fuquay-Varina section covers existing U.S. 401 from Banks Road to approximately the Wake/Harnett County line, passing through Fuquay-Varina. This segment focuses on improving safety, implementing NCDOT's complete Street guidelines to improve bicycle, pedestrian, and transit-based mobility, and including intersection improvements at key locations.

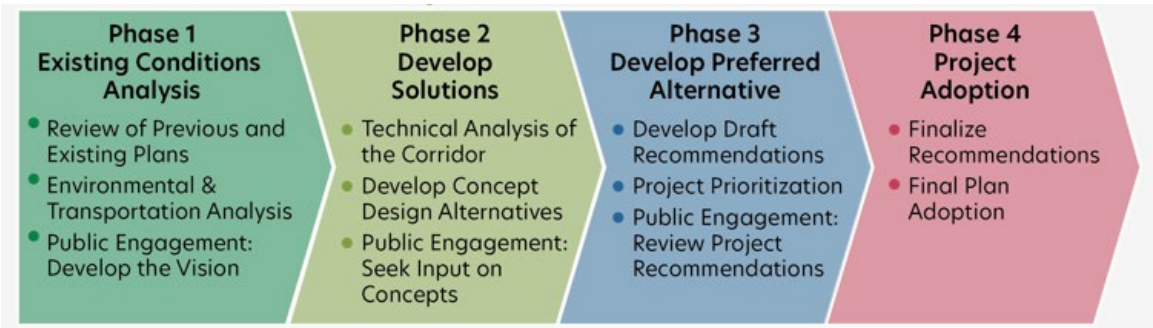
Section 3 – Harnett County section covers existing U.S. 401 from the Wake/Harnett County line to the intersection of N.C. 210 (N. Main Street) in Lillington. This section focuses on regional connectivity, improving safety around railroad crossings, and preparing for future growth.

1.4 Study Vision and Goals

The main vision of the U.S. 401 Corridor Study is to develop appropriate solutions for current and future growth in southwestern Wake County and Harnett County, providing a multimodal framework to accommodate growth and development through improved travel conditions that are safe and accessible while reflecting the diversity of communities, land uses, and transportation aspects within the study area and beyond, supporting economic development, and maintaining the character and livability in the area. The following goals were developed to guide the study.

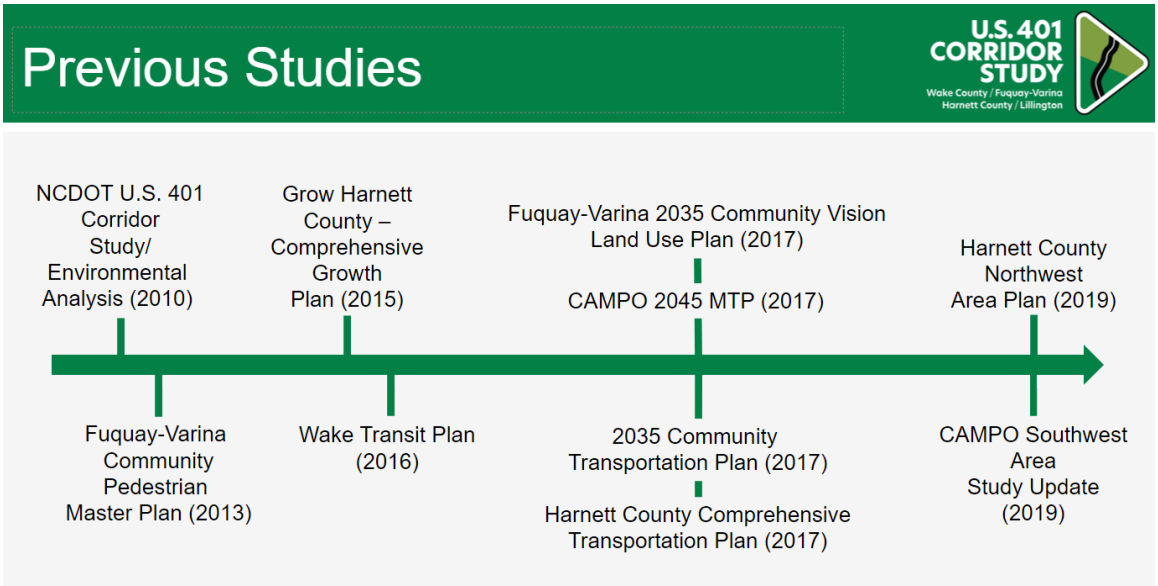
1.5 Study Schedule

The study schedule was broken into four phases. The first phase consisted of analyzing existing conditions and existing plans and engaging with the public to develop a project vision. The second phase involved developing transportation solutions by performing a technical analysis of the corridor and developing concept design alternatives. These concepts were presented to the public for input. In phase three a preferred alternative and draft recommendations were developed. Phase four involved finalizing recommendations for final plan adoption. The following depicts the project phases.



1.6 Previous Studies

There have been several planning studies and projects that have occurred in the past throughout the U.S. 401 corridor, and each has provided unique recommendations. The recommendations from these projects were used to develop an updated vision for the corridor. Several previous studies and plans have been done throughout the years which focused on the U.S. 401 corridor, or sections of it. The information from this review provided a clear picture of how the communities along the corridor have been engaged over the past ten years and helps to develop the vision of the U.S. 401 Corridor Study utilizing the feedback collected previously.



Harnett County Northwest Area Plan (2019)

Access to U.S. 401 is identified as a significant cause of growth. Travel along the corridor is anticipated to increase. The plan recommends protecting the rural character, working agriculture, and water quality in rural areas. Recommendations along U.S. 401 include supporting incremental improvements along U.S. 401, widening U.S. 401 north of Chalybeate Springs, and implementing intersection improvements at Piney Grove Wilbon Road, Rawls Church Road, and Chalybeate Springs Road.

CAMPO/NCDOT Southwest Area Plan (2019)

This Southwest Area Study was done by CAMPO in cooperation with NCDOT to provide an update to a previous study published in 2012. This study reflects the growth of regional transportation needs and demands in southwestern Wake County and northern Harnett County. The recommended transportation projects and improvements presented in this study will be prioritized in the next update of the MTP for the horizon year of 2050. The study area includes U.S. 401 from TenTen Road to Lillington. Roadway recommendations included (1) Widening U.S. 401 between future interchange with N.C. 540 and N.C. 55/ N.C. 42 to 6 lanes with bicycle and pedestrian facilities; (2) Constructing a median on U.S. 401 between N.C. 55/N.C. 42 and Judd Parkway NE; (3) Widening U.S. 401 between Judd Parkway SE and Lillington to 4 lanes; and (4) Excluding the U.S. 401 Bypass from the CAMPO MTP. Transit recommendations include (1) Continuing the Fuquay-Varina Express bus service and expanding the service with a third evening run and (2) Adding a stop at Judd Parkway NE and U.S. 401. The long-term transit goal is to replace the Fuquay-Varina Express with a Bus Rapid Transit service.

NCDOT U.S. 401 Corridor Study (2010-2014)

This study's purpose was to identify deficiencies in the existing corridor and to develop alternatives for accommodating future growth in traffic volumes. To provide information and solicit general comments, NCDOT sent several fliers to property owners along the corridor in both English and Spanish. Preliminary designs and environmental surveys were underway for the detailed study corridors before losing funding.

Other previous studies include the Fuquay-Varina 2035 Community Vision Land Use Plan (2017) and CAMPO 2045 MTP (2017). Roadway recommendations included in the Fuquay-Varina 2035 Community Transportation Plan include widening U.S. 401 between northern Fuquay-Varina municipal limit and N.C. 55/ N.C. 42 with bicycle and pedestrian facilities, constructing a median on U.S. 401 between N.C. 44/ N.C. 42 and Wake Chapel Road, widening U.S. 401 from Judd Parkway SE to southern Fuquay-Varina municipal limit, and constructing a U.S. 401 Bypass. The plan also identifies U.S. 401 between N.C. 55/ N.C. 42 to Judd Parkway SW as a potential local transit service corridor.

1.7 Stakeholder and Public Engagement

Dedicated stakeholder outreach occurred throughout the study to ensure a wide range of audiences were represented. There were two key stakeholder groups, the Stakeholder Oversight Team (SOT) and the Core Technical Team (CTT). The SOT includes community leaders and representatives from target audiences. The purpose of the SOT is to share project updates, seek input, and provide information about upcoming outreach and engagement to seek the SOT's help in distributing information to their communities and organizations. Representatives from the target audiences were invited to participate on the SOT to assist guiding the U.S. 401 Corridor Study during the project. The CTT includes staff from CAMPO, NCDOT, and the municipalities/counties along the U.S. 401 corridor and project partners. The CTT met regularly to provide input and additional guidance. The CTT members helped promote public participation opportunities within their communities and networks to increase public engagement.

Public awareness, education, and communication are three key components for a successful public engagement program. This section outlines the public outreach tools and process to be implemented throughout the project timeline to promote the study and encourage stakeholders and the public to engage.

Phase I: Envision – This phase will educate the public on the study's purpose, present findings from a review of previous studies and data collection, and seek input on the vision, goals, and corridor challenges.

Phase II: Evaluate – This phase will share the results from Phase 1, present the alternative options developed and the recommended options, and seek input on the final recommended alternatives.

Phase III: Confirm – This final phase will present the final recommendations to the public and share the final report document.

Additional information on stakeholder and public engagement is provided in Chapter 3.

Chapter 2: Existing Conditions

This chapter provides an overview of the findings from the existing conditions analysis and covers demographics, traffic congestion and safety, proposed projects in the vicinity, bicycle and pedestrian facilities, environmental features, community resources, and land use.

2.1 Demographics

Population Growth

Presently, the neighborhoods around downtown Fuquay-Varina exhibit the highest population density within the study area. This area is expected to experience high growth based on the number of ongoing and planned residential developments and additional development potential. Future projections show the population will increase 300% between now and 2045.

All demographic analyses in this segment are conducted using Traffic Analysis Zones (TAZs). TAZs are the smallest geographical area used by modeling programs to predict future travel demand. Figures 2-1 and 2-2 show the 2016 Population Density and 2045 Population Density respectively for TAZs in the study area.

Figure 2-1: 2016 Population Density

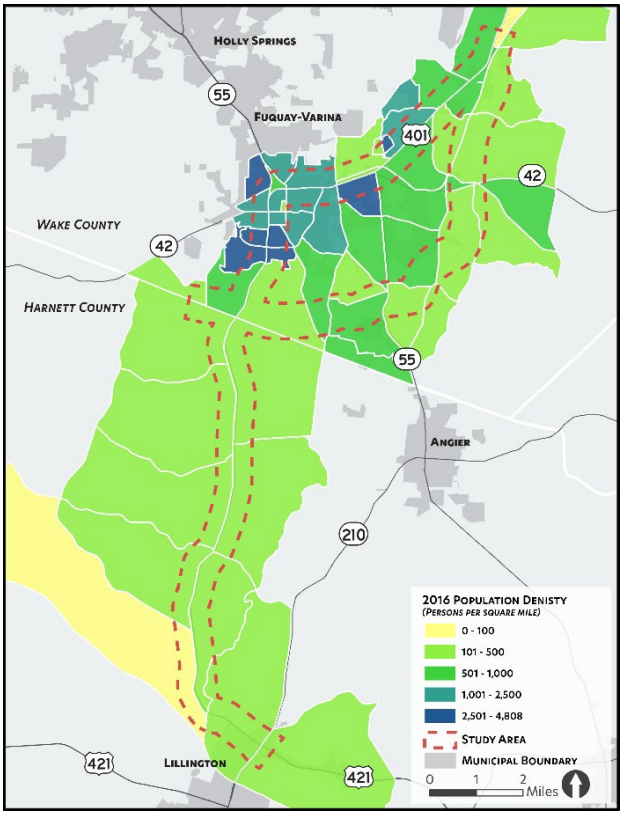
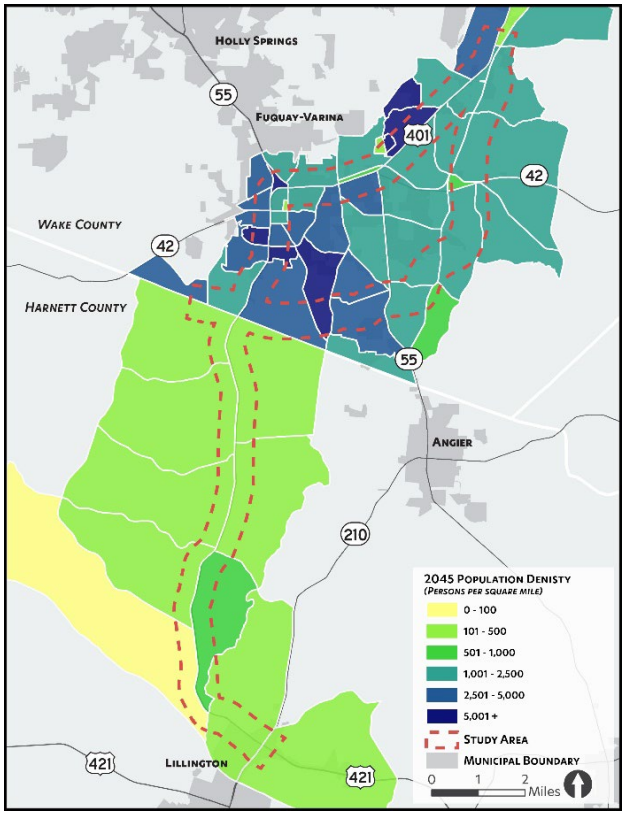


Figure 2-2: 2045 Population Density



The population within the TAZs in Wake County is expected to increase from 30,132 in 2016 to 93,988 in 2045. The population density in the study area within Harnett County is expected to double between now and 2045; however, it should be noted that there is less population density in Harnett County. The population within the TAZs in Harnett County is expected to increase from 7,450 in 2016 to 13,208 in 2045.

Employment Growth

Similar to population, most employment in the study area is also concentrated within Fuquay-Varina. U.S. 401 is called Main Street within Fuquay-Varina and is the address of many small and large commercial establishments. Other major employment locations in Wake County include Wake Technical Community College, a few establishments near Fuquay-Varina Elementary School and on N.C. 55. Future projections show that employment in this area is expected to grow significantly between now and 2045.

Figures 2-3 and 2-4 show the 2016 Employment Density and 2045 Employment Density respectively for TAZs in the study area. Employment within the TAZs in Wake County is expected to increase from 12,012 in 2016 to 21,968 in 2045. In the Harnett County portion of the study area, almost all employment is concentrated around the intersection of U.S. 401, N.C. 210 and U.S. 421 where most commercial establishments are located. This area is expected to see some growth between now and 2045. The employment within the TAZs in Harnett County is expected to increase from 2,998 in 2016 to 3,639 in 2045.

Figure 2-3: 2016 Employment Density

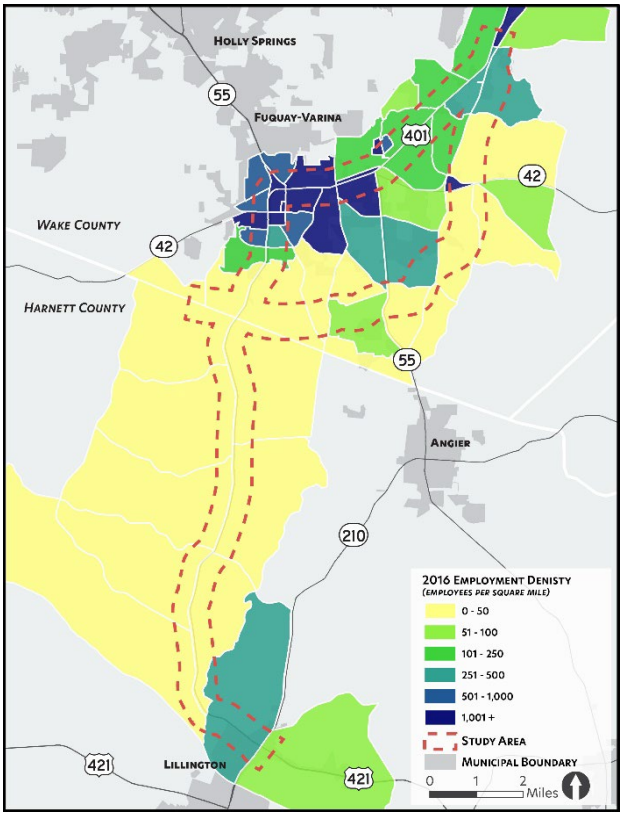
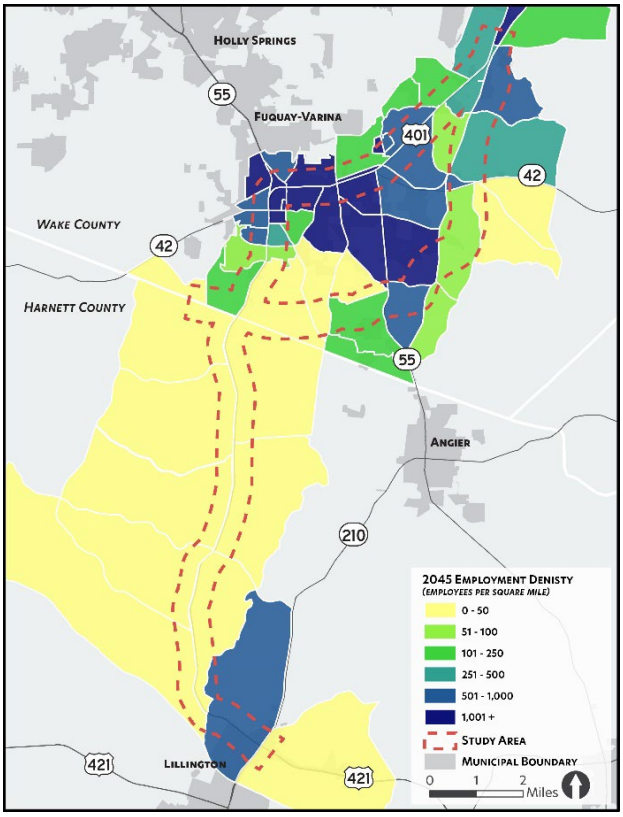


Figure 2-4: 2045 Employment Density



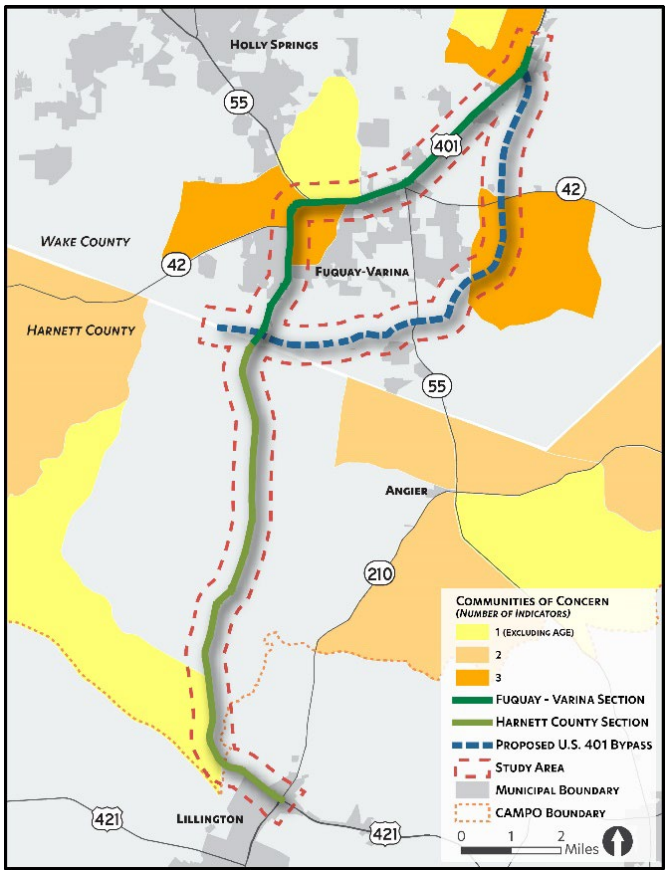
Major employers in and near the Fuquay-Varina section include Wake County Public School System (17,000 employees), Wal-Mart (16,800 employees), and Wake Technical Community College (2,500+ employees).[2]

Major employers in and near the Harnett County section include Food Lion (1,000+ employees), Harnett County Schools (1,000+ employees), Harnett County (1,000+ employees), Harnett Health (500-999 employees), and BoonEdam (100-249 employees). Campbell University (1,000+ employees) is located approximately 3 miles east of the project.[3]

Communities of Concern

Communities of Concern are those exhibiting specific demographic indicators which may increase the population's vulnerability to infrastructure improvements. These specific indicators may include minority populations, low-income populations, households with Limited English Proficiency, zero-vehicle households, seniors aged 75 and above, individuals with a disability, single parent families, and rent-burdened households. As Figure 2-5 shows, there is one Census Tract Block Group within the Harnett County section of the project that indicates a presence of Communities of Concern. There are three Block Groups within the Fuquay-Varina section of the project that indicate a presence of Communities of Concern. There is one Block Group within the proposed US 401 Bypass section that indicates a presence of Communities of Concern.

Figure 2-5: Communities of Concern



2.2 Traffic Congestion and Safety

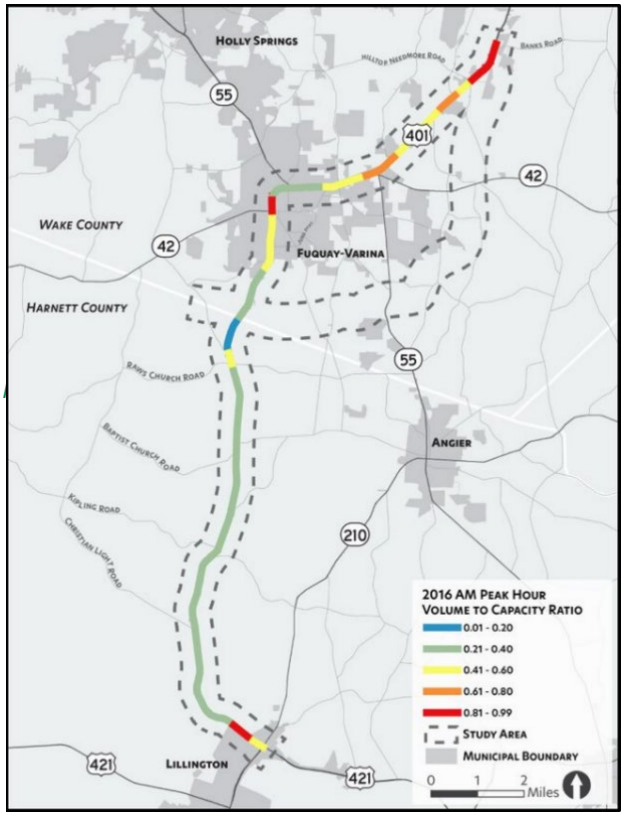
[2] Wake County Economic Development. Major Employers. https://raleigh-wake.org/business-advantages/data-demographics/major-employers

[3] Harnett County Economic Development. Major Employers. https://harnettedc.org/major-employers.asp

The population and employment growth anticipated in the study area is generally expected to have an adverse impact on congestion. The Triangle Regional Model (TRM) is a data tool used to calculate current and future traffic congestion on all major roadways in the Triangle. To determine the level of congestion, The TRM compares the traffic capacity of a road to the traffic volumes expected on that road. This is called the Volume to Capacity (V/C) ratio. V/C ratio values are defined as:

- V/C ratio less than 0.8: The road has free-flowing movement and does not exhibit congestion.
- V/C ratio between 0.8 and 1: The road is experiencing traffic congestion and is approaching its capacity.
- V/C ratio greater than 1: The road is extremely congested and is exceeding capacity.

Figure 2-6: 2016 AM Peak Hour V/C Ratio



In reality, the traffic volume on a road can never exceed its capacity. A V/C ratio greater than 1 would mean that the traffic on that segment would be forced to use alternate routes.

Figure 2-6 shows V/C ratios of segments along the corridor during morning peak travel times (6 a.m. to 10 a.m.) in 2016. According to the model, with the exception of three locations, most segments along the corridor do not exhibit significant traffic congestion during morning peak times.

The segments that show significant congestion are:

- The northern end of the corridor between Banks Road and Hilltop Needmore Road.
- Downtown Fuquay-Varina between Church Street and Academy Street.
- The southern end of the corridor between McKinney Parkway and Pine State Street

Figure 2-7 shows the traffic volume of cars for segments along the corridor during morning peak travel times (6 a.m. to 10 a.m.) in 2016. Most segments along the corridor do not exhibit significant car traffic volume during this time. The segments between Judd Parkway and Banks Road exhibit moderate to significant traffic volume, with the segment between Banks Road and Hilltop Needmore Road exhibiting the highest car traffic volume.

Figure 2-8 shows the traffic volume of trucks for segments along the corridor during morning peak travel times (6 a.m. to 10 a.m.) in 2016. Most segments along the corridor do not exhibit significant truck traffic volume during this time, with the exception of the southernmost end of the corridor between McKinney Parkway and N.C. 210.

Figure 2-7: 2016 AM Peak Hour Automobile Traffic

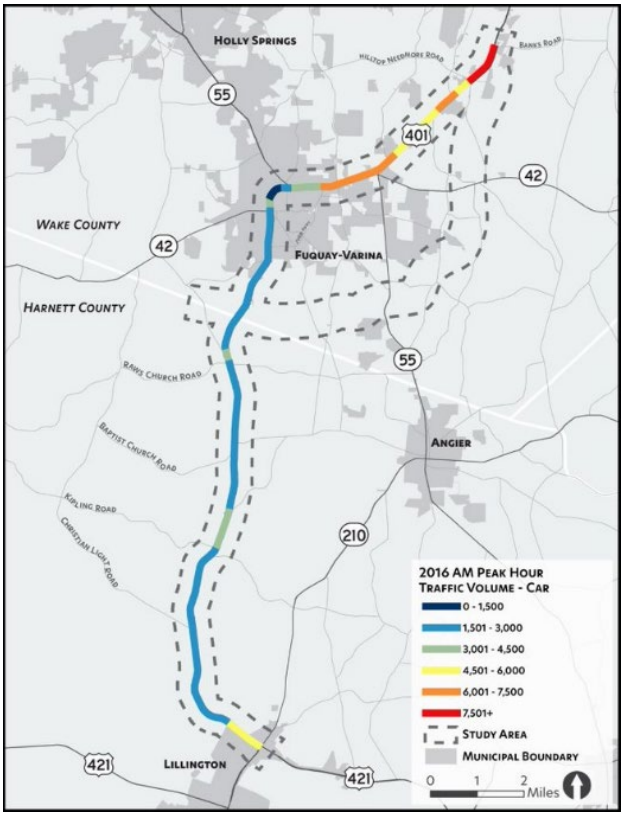


Figure 2-8: 2016 AM Peak Hour Truck Traffic

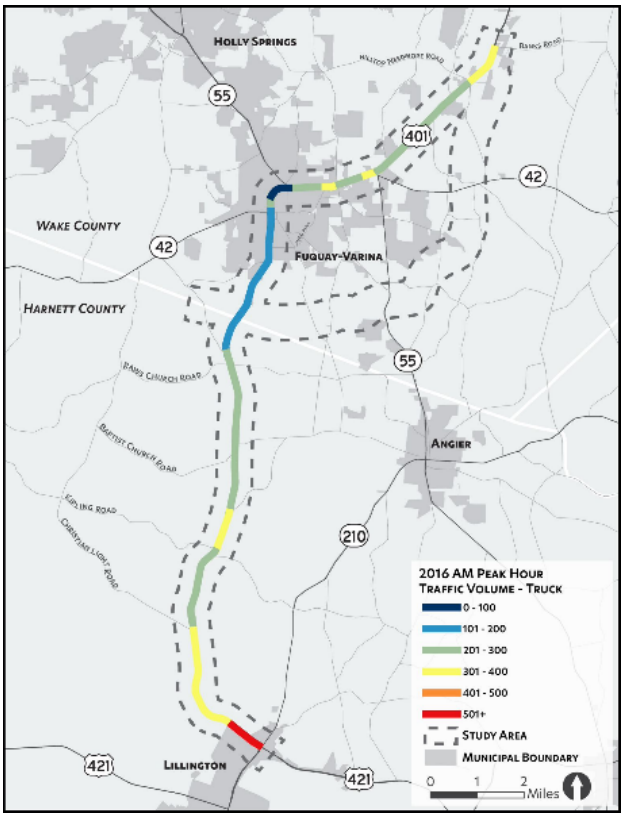


Figure 2-9 shows V/C ratios of segments along the corridor during morning peak travel times (6 a.m. to 10 a.m.) projected for 2045. The TRM assumes that in 2045, a future U.S. 401 alignment based on the current and previously adopted MTPs will have been constructed. In 2045, congestion levels of the segments along U.S. 401 that were already experiencing high congestion in 2016 may increase further. South Main Street in Fuquay-Varina between Vance Street and Judd Parkway may also experience significant traffic congestion. Additionally, the commercial corridor on U.S. 401 between Lake Wheeler Road and Judd Parkway may intermittently experience slight congestion during the morning peak period.

Figure 2-9: 2045 AM Peak Hour V/C Ratio

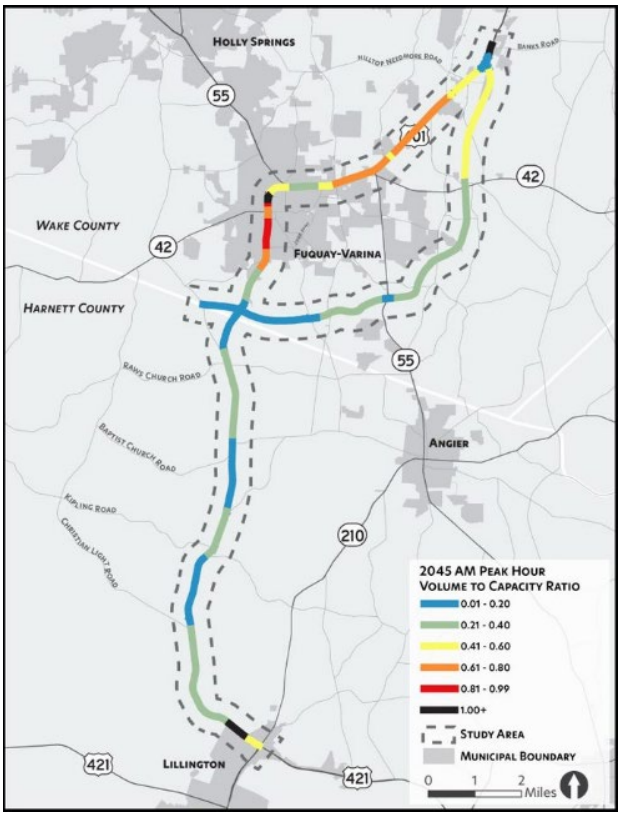


Figure 2-10: 2016 PM Peak Hour V/C Ratio

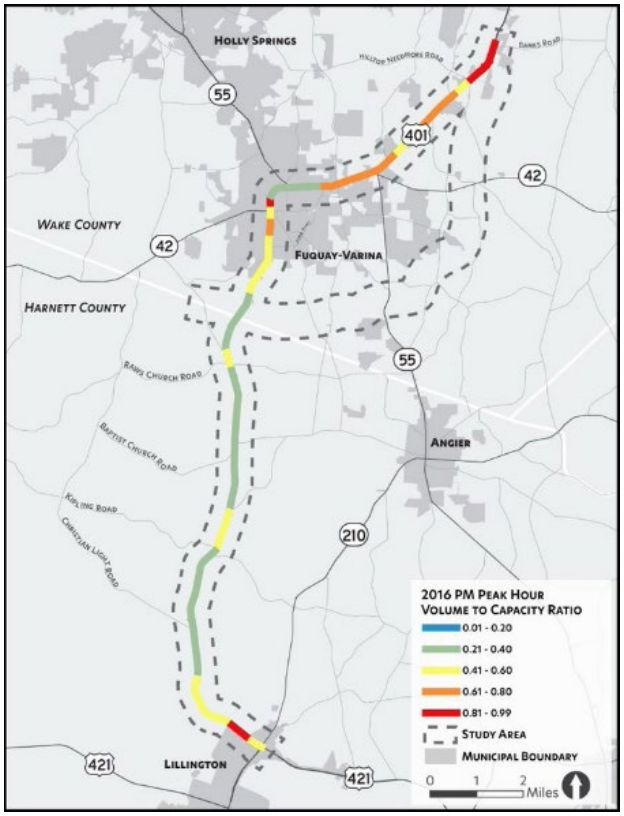


Figure 2-10 shows V/C ratios of segments along the corridor during evening peak travel times (3:30 p.m. to 7:30 p.m.) in 2016. According to the TRM, there is a higher level of traffic along the corridor in the evening than during morning peak travel times, but most segments along the corridor do not exhibit significant traffic congestion during the evening peak travel period with the exception of two locations:

- The northern end of the corridor between Banks Road and Hilltop Needmore Road.
- The southern end of the corridor between McKinney Parkway and Pine State Street.

Additionally, the commercial corridor on U.S. 401 between Lake Wheeler Road and Judd Parkway may intermittently experience slight congestion during the evening peak period.

Figure 2-11 shows the traffic volume of cars for segments along the corridor during evening peak travel times (3:30 p.m. to 7:30 p.m.) in 2016. Most segments along the corridor do not exhibit significant car traffic volume during this time. The segments between Judd Parkway and Banks Road exhibit moderate to significant traffic volume, with the segments from Judd Parkway to Marquee Lane and from Banks Road to Hilltop Needmore Road exhibiting the highest car traffic volume. The southernmost end of the corridor between McKinney Parkway and N.C. 210 also experiences high car traffic volume.

Figure 2-12 shows the traffic volume of trucks for segments along the corridor during evening peak travel times (3:30 p.m. to 7:30 p.m.) in 2016. Most segments along the corridor do not exhibit significant truck traffic volume during this time. The southernmost end of the corridor between McKinney Parkway and N.C. 210 exhibits moderate to high truck volume. All other segments exhibit relatively low truck traffic during this time.

Figure 2-11: 2016 PM Peak Hour Automobile Traffic

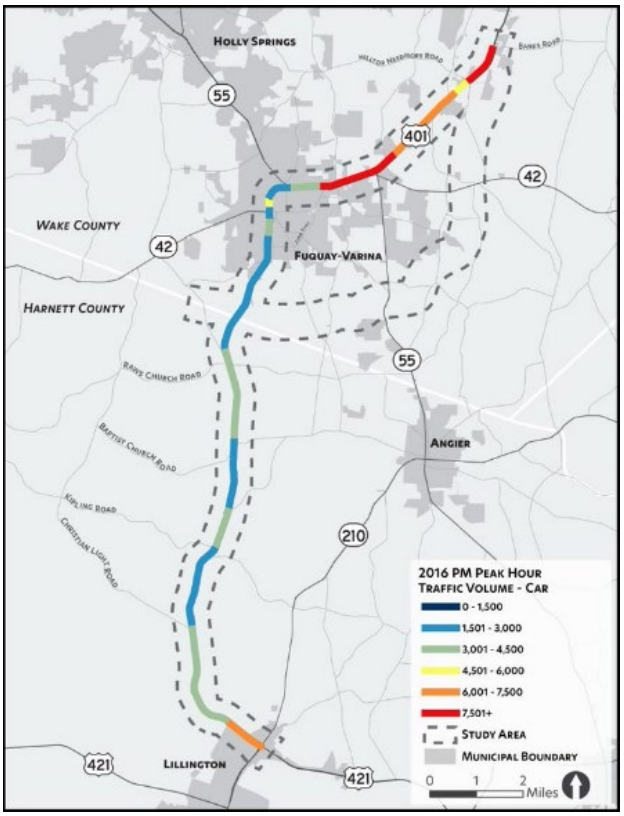


Figure 2-12: 2016 AM Peak Hour Truck Traffic

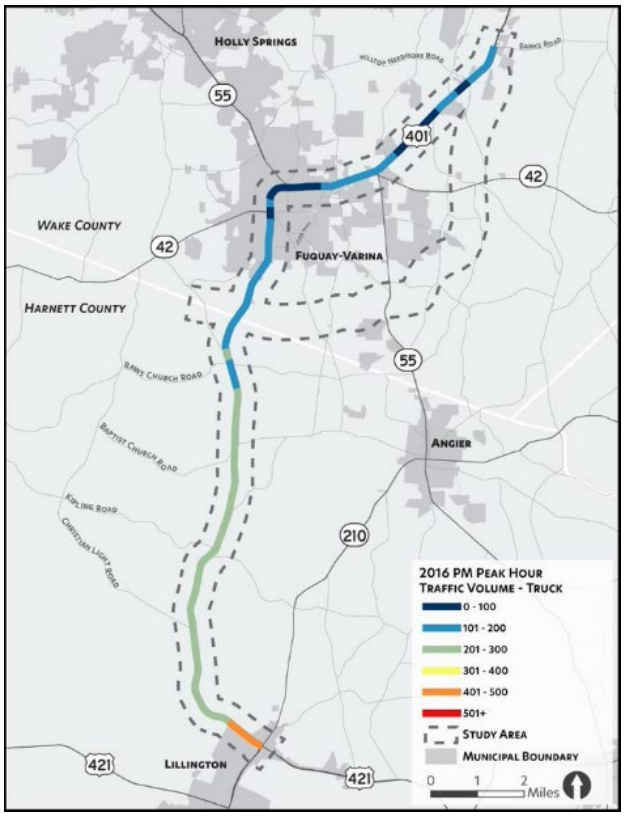


Figure 2-13 shows V/C ratios of segments along the corridor during evening peak travel times (3:30 p.m. to 7:30 p.m.) projected for 2045. The TRM assumes that in 2045, a future U.S. 401 alignment based on the

current and previously adopted MTPs will have been constructed. In 2045, congestion levels of the segments that were already experiencing high congestion in 2016 may increase further. The segments that show significant evening congestion are similar to the ones that are congested during morning peak travel times. The traffic coming from the north is distributed between existing U.S. 401 and the future U.S. 401 alignment, which may slightly reduce the impact of congestion at the northern end of the corridor. South Main Street in Fuquay-Varina between Vance Street and Judd Parkway may experience significant traffic congestion. Additionally, the commercial corridor on U.S. 401 between Lake Wheeler Road and Judd Parkway may experience intermittent congestion during the evening peak period.

Figure 2-14 shows NCDOT Planning Level Section Safety (PLSS) scores (2015-2019) for U.S. 401 Corridor. NCDOT collects crash data for all state-maintained roadways and generates PLSS scores for each segment based on three components:

- **Crash Density Ratio** – The crash density of the study area versus the average crash density of similar facilities
- **Severity Index -** Crash severity is reported based on the most severe injury to a person involved in the crash.
- **Critical Crash Rate Ratio** – The actual crash rate for the study area versus the critical crash rate.

Figure 2-13: 2045 AM Peak Hour V/C Ratio

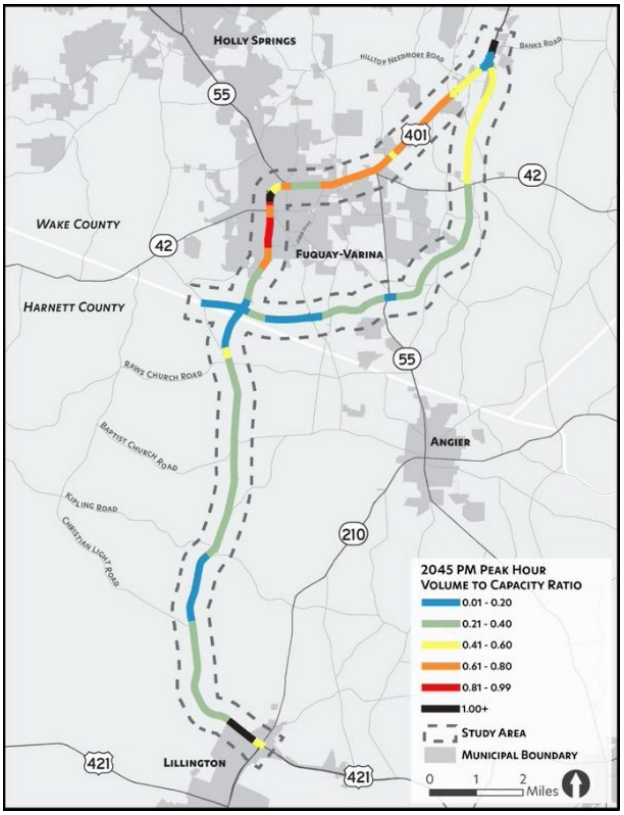
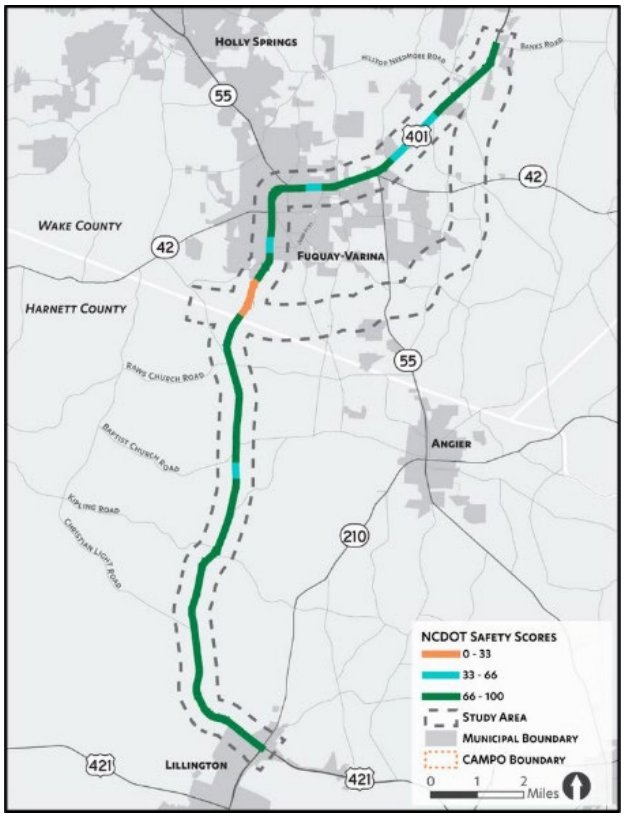


Figure 2-14: NCDOT Safety Scores



The sections with the higher scores are considered to have the poorer safety performance. Most segments of the U.S. 401 corridor have high PLSS scores, meaning that safety is a major issue at these segments.

2.3 Proposed Projects in the Vicinity

Figure 2-15 shows select proposed NCDOT, CAMPO, and local roadway projects in the project vicinity that are included in the MTP that will have the greatest relationship to U.S. 401 improvements. A full list of proposed projects can be found in the MTP.

Figure 2-15: Proposed MTP Roadway Projects

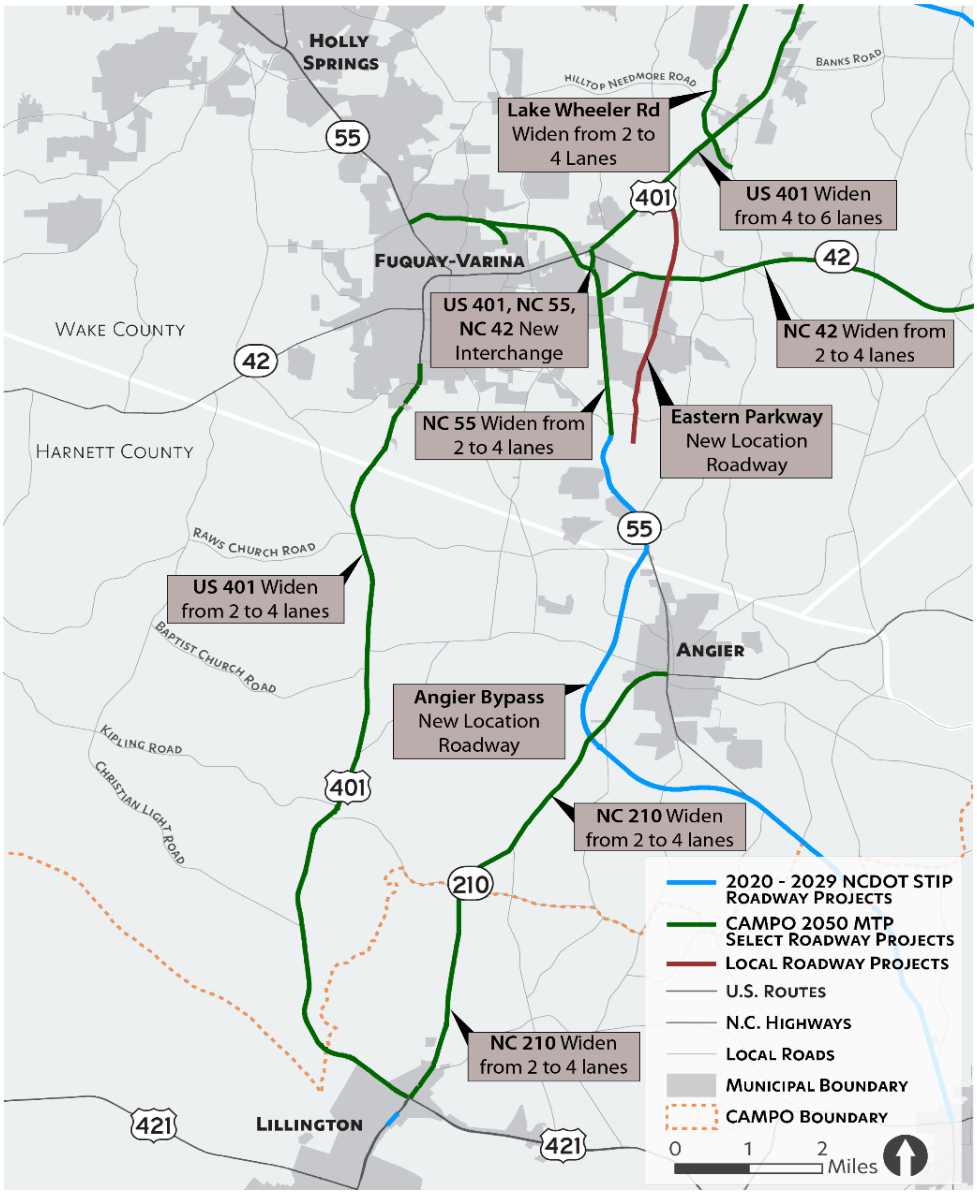


Table 2-1 provides a list of proposed roadway projects within the study area.

Table 2-1: Proposed Roadway Projects within the Study Area

Project	Description
2020-2029 NCDOT State Transportation Improvement Projects	
R-5705B	Widen N.C. 55 from 2 to 4 lanes from Jicarilla Road to Kennebec Church Road
R-5705C	Widen N.C. 55 from 2 to 4 lanes from Old Honeycutt Road to Jicarilla Road
2045 CAMPO Metropolitan Transportation Plan[4]	
A136c	Widen Lake Wheeler Road from 2 to 4 lanes from Ten Ten Road to Hilltop-Needmore Road
A136d	Widen Lake Wheeler Road from 2 to 4 lanes from Hilltop-Needmoer Road to U.S. 401
A193a	Widen Sunset Lake Road from 2 to 4 lanes from U.S. 401 to Hilltop-Needmore Road.
A207a2	Widen Judd Parkway NE from 2 to 4 lanes from N.C. 55 to Products Road (future ext.)
A207d	Add a turning lane to Judd Parkway SE at U.S. 401
A224b	Add a turning lane to Johnson Pond Road from Hilltop-Needmore Road to U.S. 401 North
A203c	Widen Rawls Church Road from U.S. 401 to Rawls Church Road extension
A407a	Widen N.C. 42 from 2 to 4 lanes from N.C. 401 to Old Stage Road
A511	Widen Piney Grove Wilbon Road from 2 to 4 lanes from Brayton Park Road to Southern Fuquay Varina bypass
A531a	Widen Purfoy Road from 2 to 4 lanes from U.S. 401 to Holland Road
A531b	Widen Purfoy Road from 2 to 4 lanes from Holland Road to Chalybeate Springs Road
A532a	Widen Holland Road from 2 to 4 lanes from Purfoy Road to N.C. 55
A532b	Add a turning lane to Holland Road from N.C. 55 to Kennebec Road
A533	Add a turning lane to Old Honeycutt from Judd Parkway to Kennebec Road
A534b	Widen U.S. 401 from 2 to 4 lanes from Judd Parkway to Eastern Parkway
A539	Add a turning lane to Banks Road from U.S. 401 to Fanny Brown Road
A619a	Widen U.S. 401 from 4 to 6 lanes from N.C. 540 to US 401 Bypass
A619b	Widen U.S. 401 from US 401 Bypass to N.C. 55/42
A628	Widen Piney Grove Rawls Road from 2 to 4 lanes from Piney Grove Wilbon to U.S. 401
A631	Widen Chalybeate Springs from 2 to 4 lanes from Future U.S. 401 Bypass to Future Western Angier Bypass
A633	Widen Angier Road from 2 to 4 lanes from Purfoy Road to Rogers Road
A664	Relocate Hilltop Road on new relocation
A679b	Widen Northern Judd Parkway from N.C. 55/Broad Street to Old Honeycutt Road
2035 Fuquay Varina Community Transportation Plan[5]	
FT2a	Construction of the Fuquay-Varina Parkway on new location from U.S. 401 to N.C. 42
FT2b	Construction of the Fuquay-Varina Parkway on new location from N.C. 42 to N.C. 55

[4] Capital Area Metropolitan Planning Organization & Durham-Chapel Hill-Carrboro Metropolitan Planning Organization. Connect 2045. July 2019. https://nmcdn.io/e186d21f8c7946a19faed23c3da2f0da/8bfec28a290449a7b10eb1fee3a0e264/files/2045-Joint-MTP-v2-Full-Report-01-16-2019-update.pdf

[5] Fuquay Varina. 2035 Community Transportation Plan. Volume 2: Technical Documentation. July 2017. https://online.flippingbook.com/view/880239558/

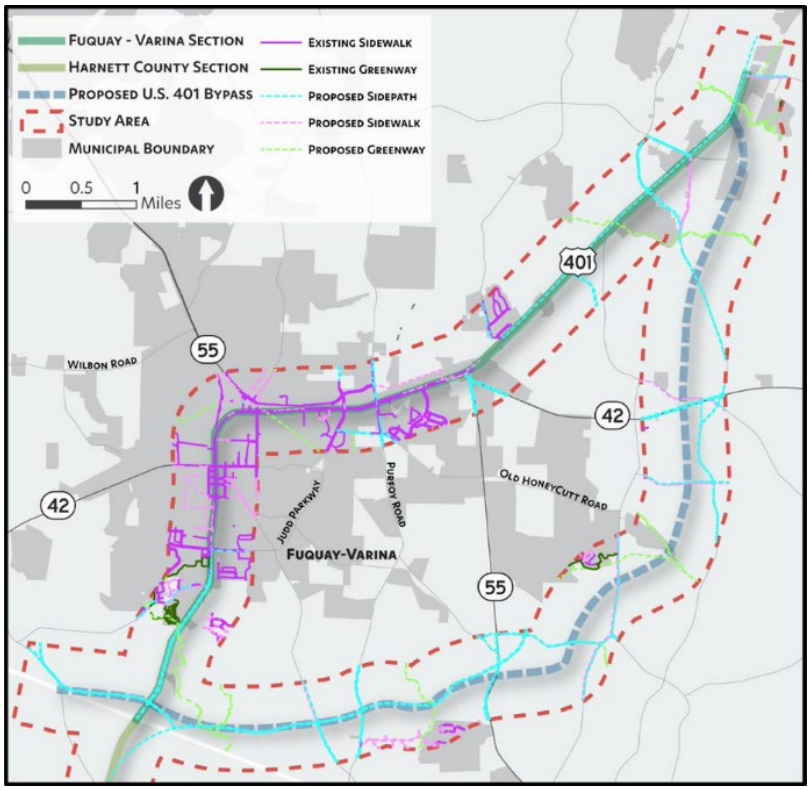
FT4a	Construction of the Fuquay-Varina Parkway on new location from U.S. 401 to Wilbon Road
FT4b	Construction of the Fuquay-Varina Parkway on new location from Wilbon Road to N.C. 55

2.4 Bicycle and Pedestrian Facilities

Existing and Proposed Facilities

Figures 2-16 and 2-17 show existing and proposed bicycle and pedestrian facilities within the project area. Existing sidewalk facilities within the study area are concentrated in Fuquay-Varina and along the commercial corridor in Lillington. Existing greenways and trails near the study area located in Fuquay-Varina and in Lillington at the Harnett County Cape Fear Shiner Park and at Raven Rock State Park just outside of the study area. A state bike route bisects the study area and connects Cary to Angier. Several multi-use paths, greenways, and additional sidewalks have been proposed in the study area.

Figure 2-16: Existing and Proposed Bicycle and Pedestrian Facilities in the Fuquay-Varina Section



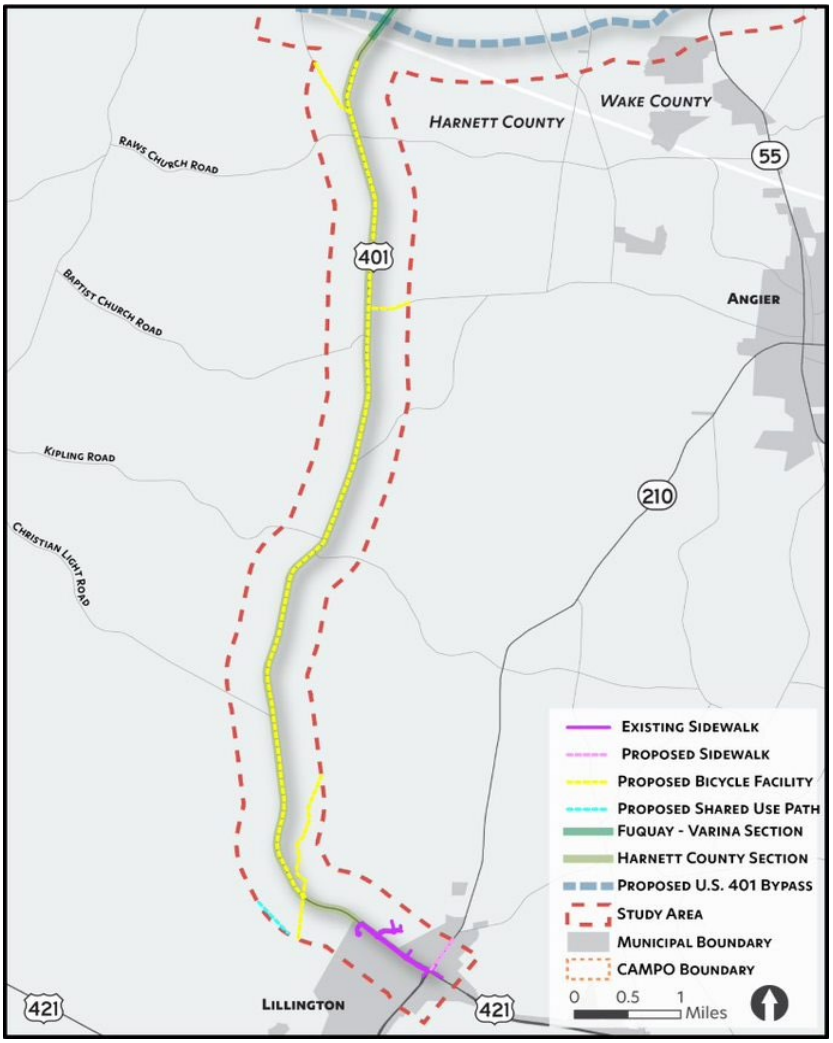
With the exception of sidewalks along U.S. 401 and a few intersecting roads in Lillington, there are no other bicycle or pedestrian facilities located in the Harnett County section of the project area. Sidewalks are along both sides of U.S. 401 from Matthews Road to N.C. 210. A sidewalk continues along the north side of U.S. 421 for approximately 600 feet before dropping off. Sidewalks are also scattered along roads intersecting U.S. 401, including Autumn Fern Trail, Brightwater Drive, McKinney Parkway, Pine State Street, and N.C. 210.

Bicycle and pedestrian facilities have been planned along most of the existing U.S. 401 route by previous studies. There are also three cross-county greenways planned. These greenways extend south from Fuquay-Varina along Neills Creek, Kenneth Creek and Hector Creek.

Proposed facilities along the Fuquay-Varina section include sidepaths along existing U.S. 401 and portions of the proposed U.S. 401 Bypass, N.C. 42, N.C. 55, Purefoy Road, and various other intersecting roads. Sidewalks are proposed along additional roads in downtown Fuquay-Varina. Multiple greenways are proposed that intersect existing U.S. 401 and a proposed bypass.

Proposed facilities along the Harnett County section include a bicycle facility along U.S. 401 from Devoroah Lane to Neills Creek, as well as bicycle facilities along Piney-Grove Rawls Road, Chalybeate Springs Road, and Neills Creek. A shared use path is proposed along the Cape Fear River, which would intersect the outside edge of the study area. These facilities are outlined in Figure 2-17.

Figure 2-17: Existing and Proposed Bicycle and Pedestrian Facilities in the Harnett County Section



Crashes

Figures 2-18 and 2-19 show pedestrian and bicycle crashes within the project study area from 2007 to 2020. Most pedestrian and bicycle crashes occurred along the Fuquay-Varina section of the corridor, with crashes concentrated along existing U.S. 401 in downtown Fuquay Varina. A fewer number of crashes occurred on intersecting roads, like N.C. 42 and N.C. 55. The Harnett County section did not have any bicycle crashes and had four pedestrian crashes during this period. This can likely be attributed to a lack of bicycle and pedestrian activity, rather than safe facilities, in this section.

Figure 2-18: Pedestrian and Bicycle Crashes in the Fuquay-Varina Section

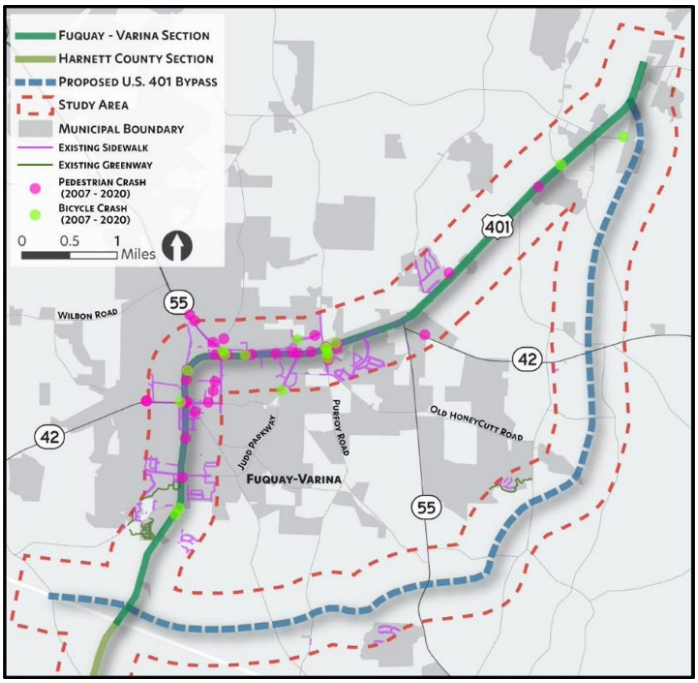
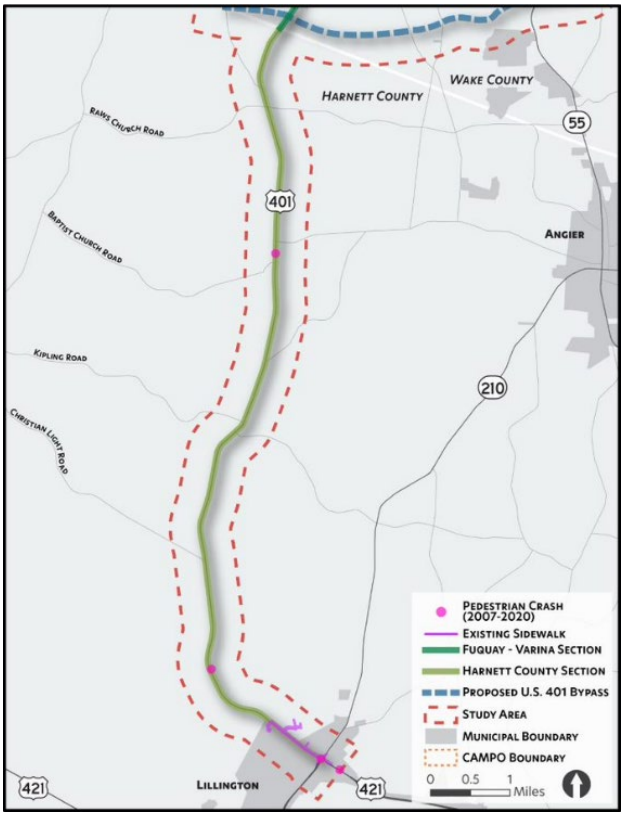


Figure 2-19: Pedestrian and Bicycle Crashes in the Harnett County Section

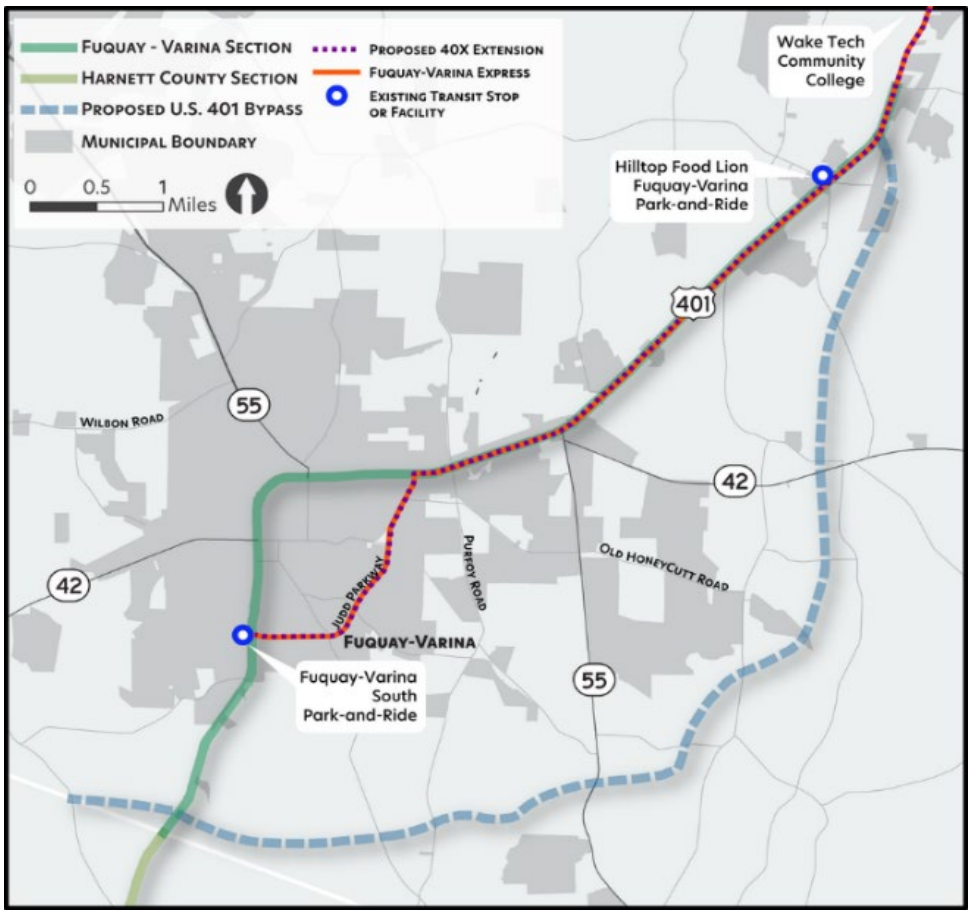


2.5 Transit

Transit services for Wake County are served by GoTriangle and GoRaleigh. Go Raleigh offers the Fuquay-Varina – Raleigh Express (FRX) route which provides weekday trips to and from Raleigh and Fuquay-Varina. This express bus service has two park-and-ride facilities: one near South Park and another at Wake Tech South Campus.[6] Figure 2-20 shows transit services in the project.

Transit services for Harnett County are served by the Harnett Area Rural Transit System (HARTS). HARTS operates on weekdays from 8:00 am to 5:00 pm and provides transit to medical, personal, educational, and employment destinations, as well as daily routes to Senior Citizen Centers and Central Carolina Community College. HARTS transports to surrounding counties, including Wake County. HARTS operates by reservation using subscription, Dial-A-Ride, and demand services.[7]

Figure 2-20: Transit Services in the Fuquay-Varina Section



[6] Fuquay-Varina. Express Bus Service. https://www.fuquay-varina.org/379/Express-Bus-Service.
[7] Harnett County. Harnett Area Rural Transit System. https://www.harnett.org/harts/default.asp

2.6 Environmental Features

There are several stream crossings within project limits on U.S. 401 with notable crossings at Middle Creek, Terrible Creek and Neills Creek. Any future improvements to U.S. 401 at these streams would likely require improvements to the bridges or culverts at crossings. Impacts to these streams, and any wetland impacts, would require permits from environmental regulatory agencies prior to construction.

U.S. 401 in Harnett County is within a WS-IV (Water Supply Watershed Class 4); a water supply that has a watershed protection designation. WS-IV waters may be used for drinking, culinary, or food processing and are located in moderately to highly developed areas.[8] In Harnett County, Hector Creek, Avents Creek and Parkers Creek basins are classified as High Quality Waters. As a result, additional water quality control measures such as storm water and permeability requirements may restrict high density development in this area.

FEMA 100-Year floodplains are located along major streams within and near the project. Development in these floodplains would require specific standards to minimize impacts. Figures 2-21 and 2-22 show environmental features in the project area.

Figure 2-21: Environmental Features in the Fuquay-Varina Section

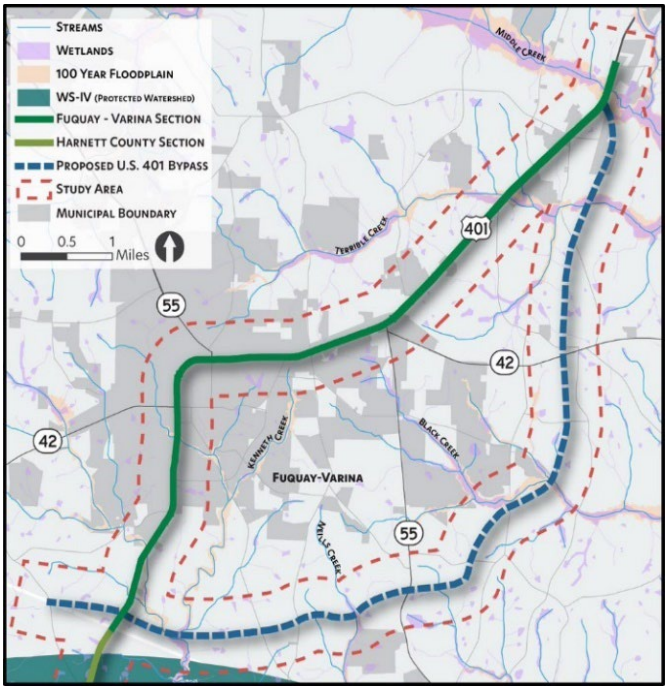
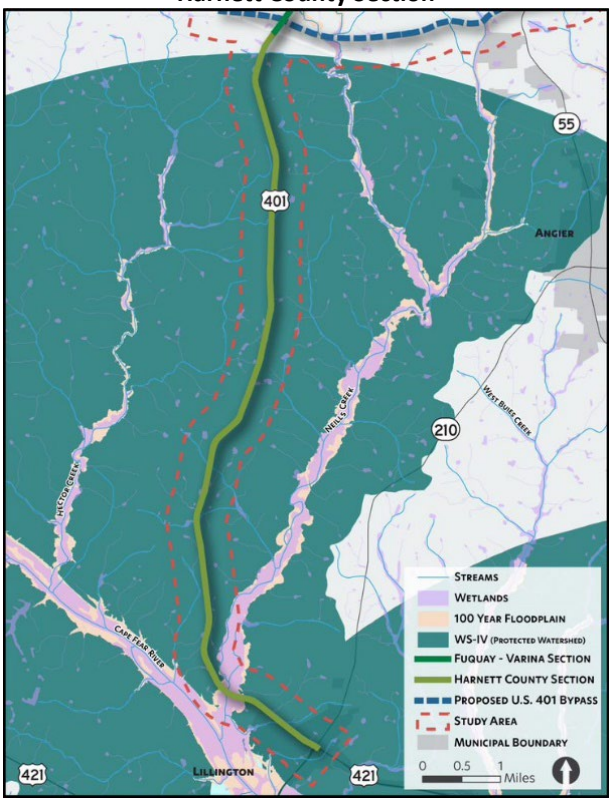


Figure 2-22: Environmental Features in the Harnett County Section

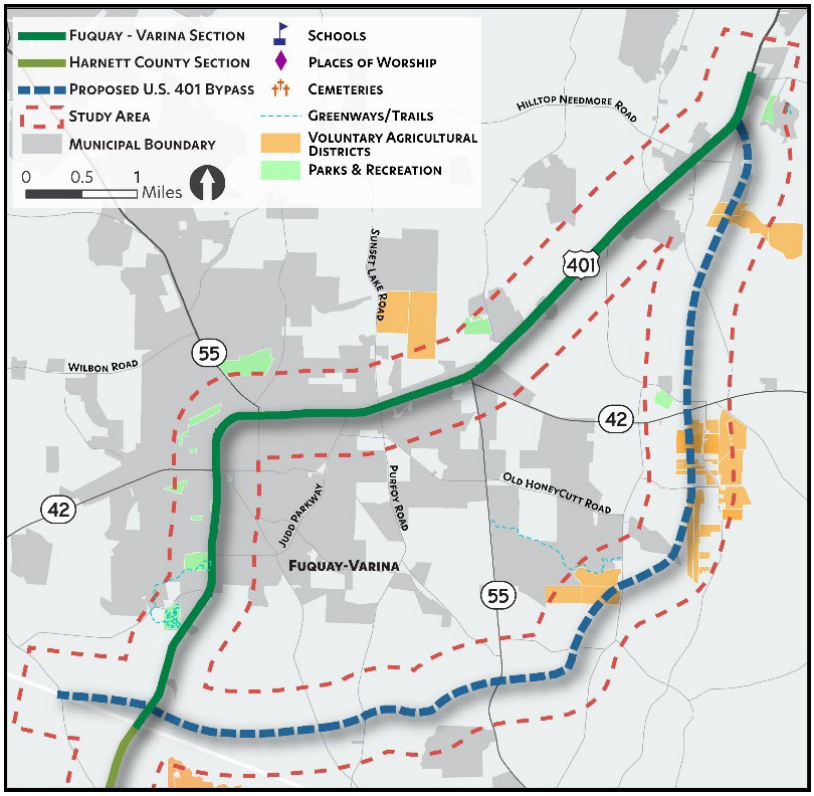


[8] North Carolina Department of Environmental Quality. Water Resources. Classifications. https://www.deq.nc.gov/about/divisions/water-resources/water-planning/classification-standards/classifications

2.7 Community Resources

Schools, places of worship, cemeteries, and parks are directly accessed from U.S. 401. Any future transportation improvements would look to minimize impacts to these resources as much as feasibly possible. Voluntary Agricultural Districts, property with protections from conversion to non-agricultural uses, are located throughout the project corridor. Figures 2-23 and 2-24 show community resources in the project area.

Figure 2-23: Community Resources in the Fuquay-Varina Section



Any potential impacts to natural and community resources would be formally analyzed and documented in accordance with the National Environmental Policy Act (NEPA).

The following list of parks and recreational resources are found in the Fuquay-Varina section of the project area[9]:

- Action Park: 4 tennis courts, 3 baseball fields with lighting, batting cage, and playground
- Banks Road Fields: Elementary school park with open space, basketball court, playground equipment, community garden beds, and soccer fields
- Carroll Howard Johnson Environmental Education Park: 28-acre park with a trail, picnic shelters, and amphitheater
- Fuquay-Varina Downtown Dog Park: 8-acre off-leash dog park
- Fuquay-Varina Elementary School Park: Elementary school park with open space, playground equipment, sand volleyball court, and basketball court
- Fuquay-Varina High School Park: High school park with 6 tennis courts, 2 baseball fields, track field, and soccer fields
- Fuquay-Varina Museums at Ashworth Park: Historic structures including a two-room schoolhouse, the first post office, and Centennial Museum and a walking trail
- Fuquay Mineral Spring Park: Open space, picnic tables, and a walking trail on the site of a historic mineral spring

[9] Fuquay-Varina. Facilities. https://www.fuquay-varina.org/Facilities?clear=True

- James A. Campbell Park: Picnic shelters and a playground
- Kinton Field: Open field near residential development
- Library Park: Picnic shelters and playground adjacent to the old Fuquay Varina library
- Ransdell Soccer Fields: 2 soccer fields
- South Park: 25-acre park with 3 baseball fields with lighting, basketball court, greenway trail, multipurpose field, picnic shelter, playground, and walking track
- William Freeman Park: 2-acre park with a multipurpose field
- Willow Springs Elementary School Park: Elementary school park with community garden beds, playground, and walking track

The Harnett County section includes one recreational resource: Cape Fear Shiner County Park. This park includes a 3.25-mile natural trail, paved walking trail, wildlife observation deck, multi-purpose field, and softball fields.[10]

Table 2-2 lists school, places of worship, and cemeteries located in the Fuquay-Varina section of the project.

Figure 2-24: Community Resources in the Harnett County Section

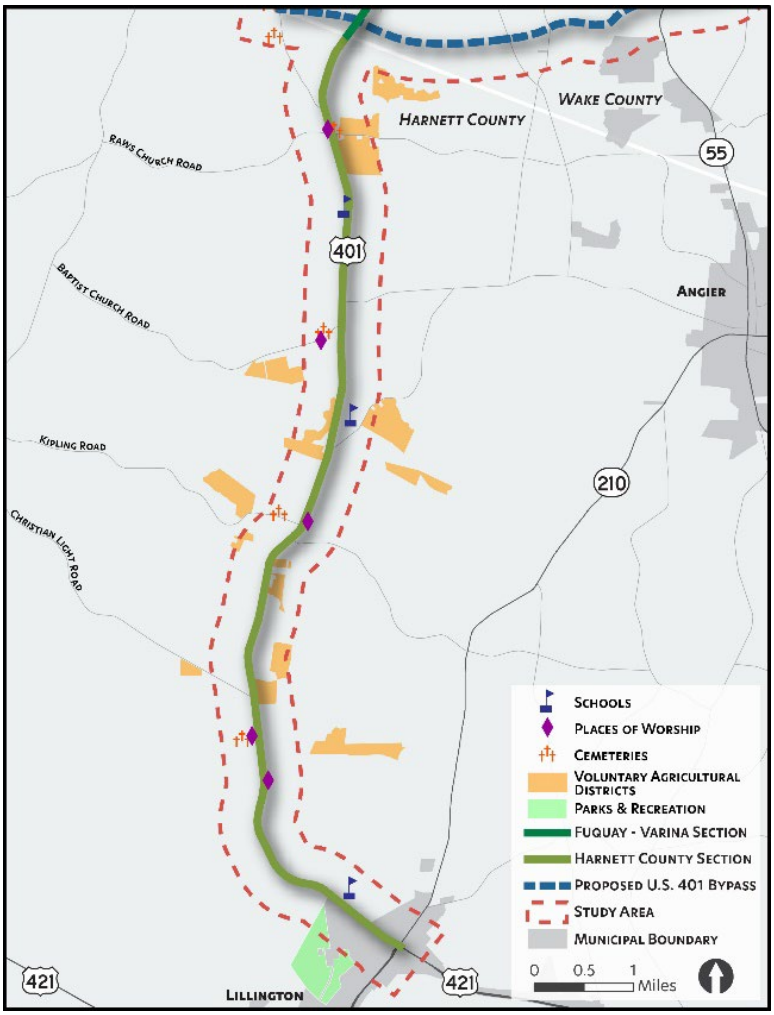


Table 2-2: Community Resources in the Fuquay-Varina Section

[10] Harnett County. Parks & Recreation. Cape Fear Shiner Park. https://www.harnett.org/parkrec/government-complex-park.asp

Schools	Places of Worship	Cemeteries
Fuquay-Varina Elementary	Faith Missionary Baptist Church	Bass-Sneed-Robinson Cemetery
Fuquay-Varina Middle	Thrive Community Church	Bobby Thomas Cemetery
Fuquay-Varina High	Trinity Episcopal Church	Burton Family Cemetery
Banks Road Elementary	Emmanuel Holiness Church	Fish Family Cemetery
Hilltop Christian School	Fellowship Bible Church	Johnson, William J., Family Cemetery
Lincoln Heights Elementary	Full Gospel Church	Rachels Family Funeral Home Cemetery
Willow Springs Elementary	Grace Presbyterian Church	Sexton-Smith Cemetery
Willow Springs High	Iglesia Christana Candelero de Oro	Stephens Cemetery
	Redeemer Community Church	Wake Chapel Christian Church Cemetery
	First Baptist Church of Fuquay Varina	2 Unnamed Cemeteries
	The Gathering Community Church	
	First United Methodist Church	
	Fuquay Varina Baptist Church	
	Fuquay Varina Presbyterian Church	
	Destination Community Church	
	The Church of Jesus Christ of Latter-Day Saints	
	Evangel Church	
	Hilltop Church	
	Point Church	
	International Love Baptist Church	
	Cornerstone Church	
	Freedom Worship Church	
	Asamblea Apostolica	
	Explore Church	

Table 2-3 lists school, places of worship, and cemeteries located in the Harnett County section of the project.

Table 2-3: Community Resources in the Harnett County Section

Schools	Places of Worship	Cemeteries
Achievement Charter Academy	New Breed Baptist Church	Chalybeate Springs Baptist Church Cemetery
Central Carolina Community College	McKoy Grove Holliness Church	McKoy Grove Church Cemetery
Lafayette Elementary School	Kipling United Methodist Church	Mission Church Temple Cemetery
	Chalybeate Springs Baptist Church	Rawls Baptist Church Cemetery
	Mission Temple Community Church	Smith Family Cemetery
	Rawls Baptist Church	

Historic Resources

Historic resource listing is determined by the North Carolina State of Historic Preservation Office. Figures 2-25 and 2-26 show known and potential historic resources within the study area.

Figure 2-25: Historic Resources in the Fuquay-Varina

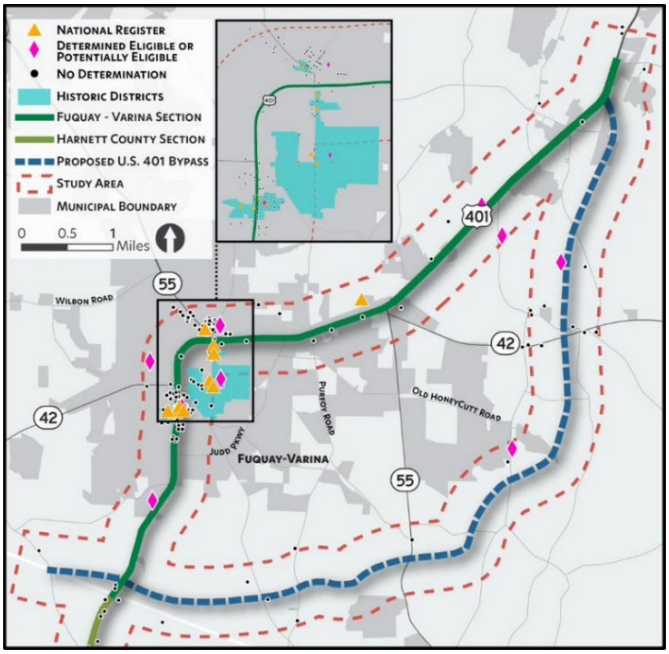
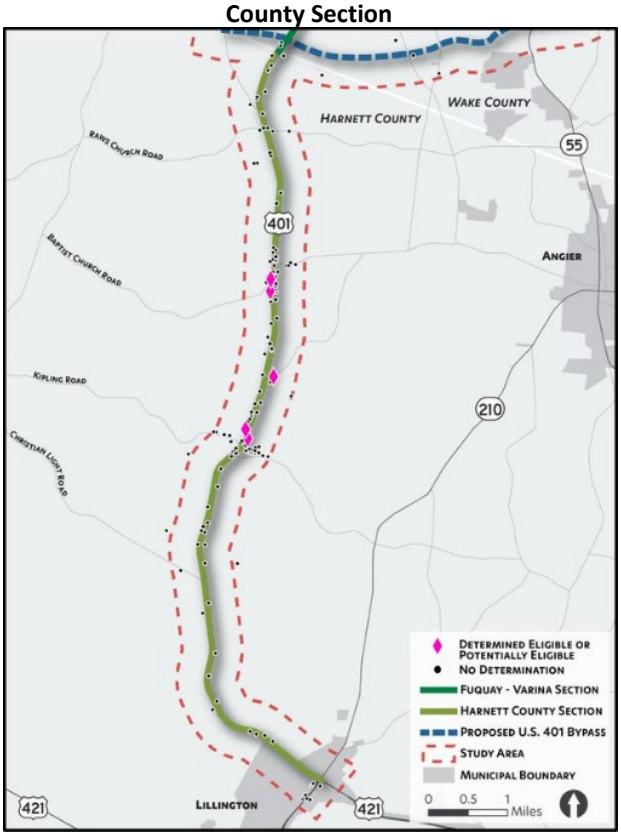


Figure 2-26: Historic Resources in the Harnett County Section



The Fuquay-Varina section has ten sites on the National Register, nine determined eligible or potentially eligible historic sites, and numerous other sites that are ineligible or do not have a determination. The Harnett County section has five Determined Eligible or potentially eligible historic sites and numerous other sites that are ineligible or do not have a determination. Table 2-4 provides a listing of National Register, Determined Eligible, or potentially eligible historic sites.

Table 2-4: Historic Resources

Site ID	Site Name	Description	Status
Fuquay-Varina Section			
WA1118	Daniel Farm	c. 1930 2-story hip roof frame house	Study List
WA1119	Rowland Farm	c. 1900 1-story side gable frame house	Study List
WA1126	Grady Rowland House	c. 1921 1-story pyramidal roof frame cottage	Determined Eligible
WA0567	Kemp B. Johnson House	1896, 1905 Queen Anne house	National Register
WA1131	Marshall Partin House	1905 1-story hip roof frame Queen Anne house	Study List
WA5053	Gold Leaf Warehouse	c. 1951 1-story parapet roof commercial brick building	Study List
WA1195	Varina Commercial Historic District	Late 19th-early 20th C. commercial district	National Register
WA7766	East Fuquay Springs Historic District	--	Study List
WA4420	Fuquay-Varina Woman's Club Clubhouse	1937 clubhouse	National Register
WA6549	Wayland H. and Mamie Burt Stevens House	c. 1935 brick 2-story Colonial Revival house	National Register
WA0485	Fuquay Springs High School	1925 brick school	National Register
WA4422	Fuquay Springs Teacherage	1945 brick teacherage	National Register
WA0590	Fuquay Springs Consolidated School	c. 1937, 1940 1-story hip roof brick school	Study List
WA4076	Fuquay Springs Historic District	Late 19th-early 20th c. residential	National Register
WA0505	Ben-Wiley Hotel	1925 2-story Craftsman style	National Register
WA7248	Fuquay Springs Historic District Boundary Increase	residential buildings	National Register
WA0488	Ballentine-Spence House	1910 Colonial Revival house	Study List
WA0200	Fuquay Mineral Spring	1850s mineral spring	National Register

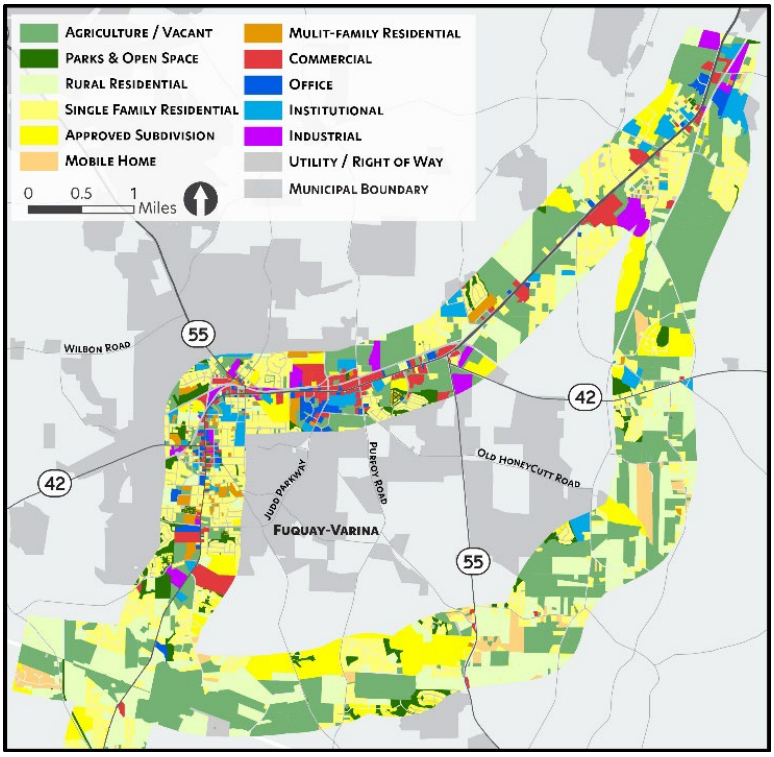
Site ID	Site Name	Description	Status
WA7557	New Deal Warehouse	c. 1961 1-story front gable commercial brick building	Study List
Harnett County Section			
HT0174	David Henry Senter House	c. 1910 2-story side gable 19th-20th c. trad/vern house	Determined Eligible
HT0818	A. A. Johnson House	c. 1900 2-story hip roof 19th-20th c. trad/vern house	Determined Eligible
HT0807	Farmstead	c. 1900 1-story Triple A 19th-20th c. trad/vern house	Determined Eligible
HT0796	Johnson House and Store	c. 1900 1-story 19th-20th c. trad/vern house	Determined Eligible
HT0791	Kipling United Methodist Church and Parsonage	c. 1935 1-story front gable Colonial Revival church	Determined Eligible

2.8 Land Use

Existing Land Use

An existing land use inventory was conducted to determine land use and development trends along the U.S. 401 Corridor between Wake County north of Fuquay-Varina and Lillington. Figures 2-27 and 2-28 show the existing land use. Tax parcel data was collected from Wake and Harnett counties and land use by parcel was summarized within one mile of each section of the corridor. Below are some highlights by corridor segment:

Figure 2-27: Existing Land Use in the Fuquay-Varina Section



Future U.S. 401 Alignment in Wake County as Currently Identified in the MTP

- Existing residential land use trends include many areas of homes on larger properties as well as a growing number of single-family neighborhoods.
- Approved residential subdivisions make up 1,544 acres or 12% of the area.
- Non-residential uses, including commercial, office, institutional and industrial land uses make up 5% of the land area.

- Agricultural or vacant land makes up 24% of the area.

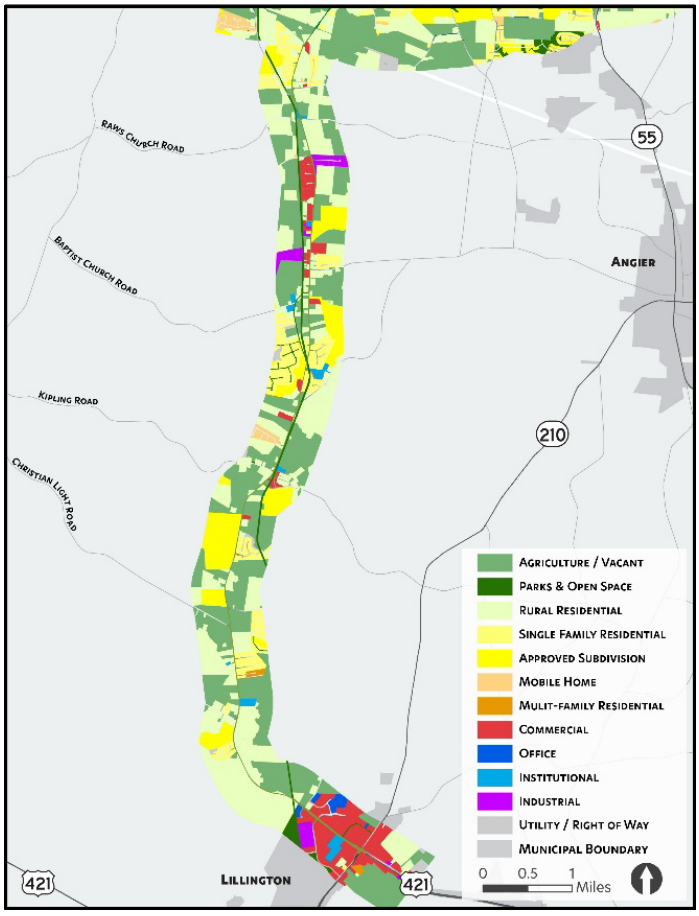
Existing U.S. 401 in Wake County

- Existing single-family neighborhoods make up 30% of the area and are the most prevalent land use type along the segment.
- Approved residential subdivisions make up 720 acres or 7% of the area.
- Non-residential land uses, including commercial, office, institutional and industrial uses are more prevalent along this segment of the corridor than along the bypass and in Harnett County. These land uses make up 13% of the land area along this segment.
- Agricultural or vacant land makes up 26% of the area. The majority of undeveloped land and agricultural land is located north of Fuquay-Varina in a few large tracts of land.

Existing U.S. 401 in Harnett County

- Agricultural land is the most prevalent land use along this corridor segment comprising 50% of total land area within one mile of U.S. 401.
- The predominant residential type in this area is homes on larger lots (>3 acres). There is a growing number of single family homes, these currently make up 8% of the land area. Approved residential development, that is not built yet covers 1,248 acres in this area.
- Non-residential land uses make up 6% of the land area along this segment. Concentrations of commercial and office uses occur in Lillington at the intersection of U.S. 401 and N.C. 210 as well as in the communities of Chalybeate Springs and Kipling.
- Industrial land uses are concentrated along the railroad between Chalybeate Springs and Rawls Church Road.

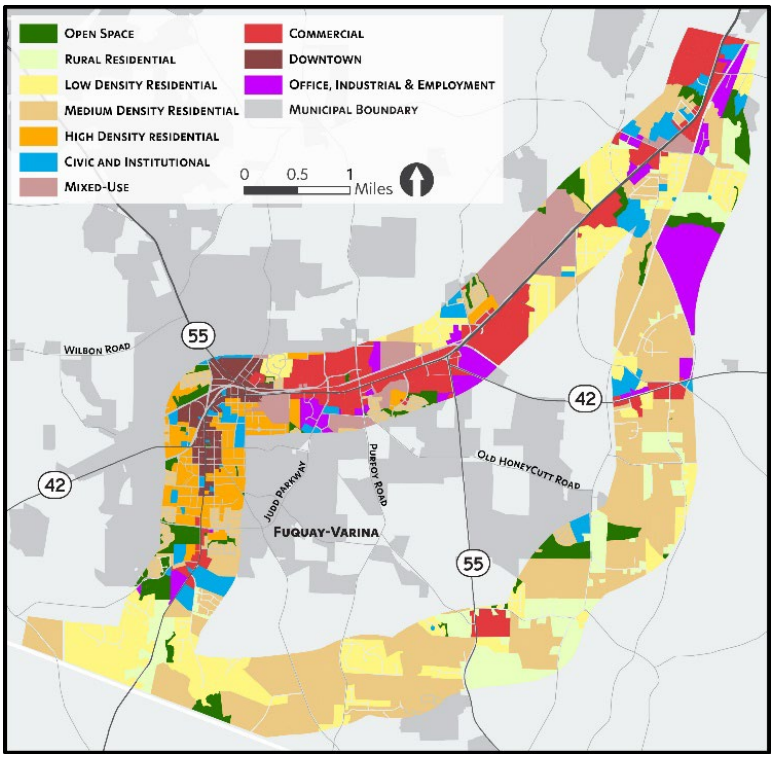
Figure 2-28: Existing Land Use in Harnett County Section



Future Land Use

Figure 2-29: Future Land Use in the Fuquay-Varina Section

Future land use was examined to evaluate the area's predicted growth and development. Figures 2-29 and 2-30 show the future land use. Below are some highlights by corridor segment:



Future U.S. 401 in Wake County as Currently Identified in the MTP

- Existing agricultural land will be converted to residential, primarily low density and medium density residential.
- Commercial uses will be concentrated near N.C. 55 and N.C. 42.
- Office, industrial, and employment uses will develop north of N.C. 42.

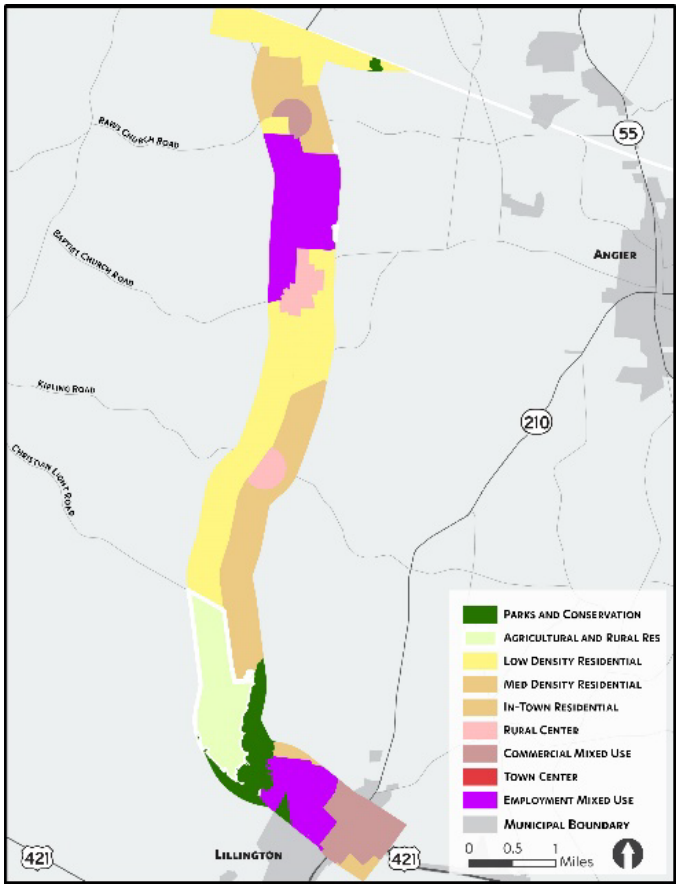
Existing U.S. 401 in Wake County

- Existing agricultural land will be converted to commercial, mixed-use, and residential uses.
- Downtown Fuquay-Varina will see an increase in high density residential, commercial, and downtown uses.

Existing U.S. 401 in Harnett County

- Existing agricultural land will be converted to residential, primarily low density and medium density residential.
- Low density residential and medium density residential will be the predominant use type between Baptist Church Road and Christian Light Road.
- Mixed use employment centers will expand and will be the predominant use type between Rawls Church Road and Baptist Church Road.
- Remaining agricultural and conservation uses will be concentrated north of Lillington.

Figure 2-30: Future Land Use in Harnett County Section



Chapter 3: Stakeholder and Public Engagement

A Public Engagement Plan (PEP) was prepared for the U.S. 401 Corridor Study to detail how the public and stakeholders will be engaged throughout the corridor study efforts in order to develop a shared vision, seek input on recommended alternatives, and present the study findings and final recommendations upon study completion. Public engagement efforts allow the project team to share study updates with the public and collect their input through various promotional and outreach techniques designed to reach the diverse community that lives, works, and travels through the study area. The PEP was prepared in alignment with the CAMPO Public Involvement Plan to ensure collaboration between the two plans throughout engagement.

To ensure a successful public engagement process, it is necessary to set goals to measure the success of engagement efforts throughout the project. The goals for public engagement during the U.S. 401 Corridor Study include:

- Educate stakeholders and the public about the U.S. 401 Corridor Study
- Build upon previous public engagement efforts to develop shared vision and goals for the study.
- Proactively provide updates and information through various methods to increase reach
- Offer convenient opportunities to provide input through both virtual and in-person means (if possible)
- Establish strong relationships with stakeholders through open and responsive communication

3.1 Target Audiences

There are several different audiences that were reached as part of this study, as study recommendations will impact not only the immediate property owners along the corridor, but also those that travel to and through the project area. The identified audiences are as follows:

- Residents along the study area
- Business owners and employees along the project area
- Travelers passing through the study area
- Town, city, and county elected officials
- Chambers of Commerce
- Transit agencies
- Colleges, universities, and local school systems
- Community services such as, religious institutions

- Health and human service providers
- Utility companies
- Environmental agencies
- Spanish speaking organizations and communities
- Media

Stakeholder Oversight Team

Representatives from the target audiences were invited to participate on the Stakeholder Oversight Team (SOT) to assist guiding the U.S. 401 Corridor Study during the project. This list was developed from the stakeholders listed in the previous study report documents and feedback from the U.S. 401 Corridor Core Technical Team. This list was updated throughout the study as needed.

SOT meetings were held throughout the study period. The purpose of these meetings was to provide regular coordination between the study team and the SOT throughout the project, collect input, and provide information about upcoming outreach and engagement to seek the SOT's help in distributing information to their networks.

Core Technical Team

The Core Technical Team (CTT) is a subset of the members in the SOT including staff from the municipalities along the project corridor and project partners. The CTT met on a regular basis to provide input and additional guidance during the study. The CTT members helped promote the public participation opportunities within their communities and networks and provided technical reviews and recommendations.

CAMPO Executive Board and Technical Coordinating Committee

The study team presented study updates to the CAMPO Technical Coordinating Committee (TCC) and the Executive Board at key milestones of the study. The TCC is comprised of staff from member and stakeholder agencies and provides technical recommendations to the CAMPO Executive Board.

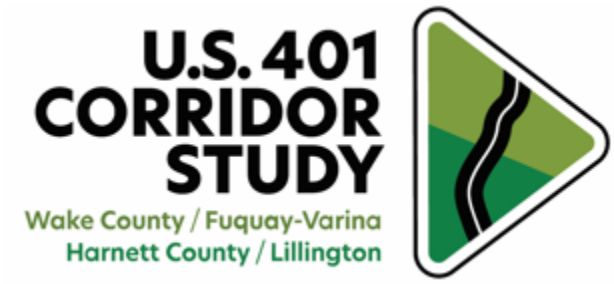
Targeted Outreach to Limited English Proficiency Communities

Limited English proficiency (LEP) refers to persons who are not fluent in the English language, often because it is not their native language, as well as individuals with literacy or vision challenges. These individuals are entitled to, under Title VI of the Civil Rights Act of 1964, reasonable actions to be provided accessible programs, services, and activities. To address the existence of significant barriers facing populations who typically do not attend public meetings, such as the Spanish-language community, targeted outreach was performed throughout the study period to engage with populations. The demographic study area (DSA) covering the project area includes 4.1%, or 1,441 persons, who's primary language is Spanish, according to the N.C. Department of Transportation's Demographic Snapshot Tool. Less than 1% of other language groups including Indo-Euro, Asian/Pacific, and Other, are present in the DSA.

In addition to providing meeting study materials in Spanish to allow participants the option to receive information in the language they are most comfortable with, further engagement efforts were made to include Spanish participants in the study. Opportunities such as pop-up events were utilized in key locations where Spanish-speaking communities are present.

3.2 U.S. 401 Corridor Study Branding

Unique branding standards, including a logo and a visual guide, were developed for project materials for the public to easily identify project-related information. The U.S. 401 Corridor Study logo and branding were used on all materials throughout the project to make materials easily recognizable. The following logo was developed for U.S. 401 Corridor Study branded materials.



3.3 Community Engagement

Community engagement for the U.S. 401 Corridor Study included three phases of engagement. The following phases include how the public will be involved based on the IAP2 spectrum of public participation, which defines the public's role within the public engagement process[11].

Phase I: Develop the Vision (IAP2: Involve) – This phase educated the public on the study's purpose, presented findings from a review of previous studies and study data collection, and sought input on the vision, goals, and corridor challenges. This phase provided opportunities for community to have the most influence as they weigh in on vision and goals that will guide the study moving forward.

Phase II: Seek Input on Concepts (IAP2: Consult) – This phase shared the results from Phase I, presented the alternative options developed and the recommended options, and sought input on the final recommended alternatives. With the addition of new alternatives, this phase of engagement consisted of two rounds in order to allow the public an opportunity to review and comment on the original alternatives and the new alternatives developed.

Phase III: Confirm Recommendations (IAP2: Inform) – This final phase presented the final recommendations to the public and shared the final report document. The purpose of this phase is to

[11] https://www.iap2.org/page/pillars

provide information regarding the final recommendations and confirm with the community that nothing has been missed, that there aren't any large concerns with recommendations, and includes the CAMPO public comment activities leading up to Executive Board endorsement.

The U.S. 401 Corridor Study website was developed to provide project information and contact information, using the ESRI StoryMaps platform to relay project information. The format of the StoryMaps website allows participants to scroll through information including text and graphics, view and interact with maps, and provide feedback.

Public surveys were used during the first two phases of public engagement to solicit public input. CAMPO's subscription to PublicInput.com was used to host surveys and links to the surveys were available from the project website while the survey was open.

The first phase of engagement was conducted in March and April 2021 and was conducted through virtual means due to restrictions around the COVID-19 pandemic. Two engagement rounds were conducted as part of the second phase of public engagement. The first round was conducted in the fall of 2021 and the second round was conducted in the fall of 2022.

Additional stakeholder and community engagement content and input summaries are provided in the following chapters as well as in Appendix A.

Chapter 4: Development of Design Concepts and Alignment Alternatives

This chapter details the process behind the development of improvements for existing U.S. 401, and alignment alternatives for the future U.S. 401. These improvements and alternatives, with their pros, cons, and trade-offs were presented to the members of the CTT, the SOT, and the public. Their inputs formed the basis on which design concepts were chosen and alignments were ranked.

This chapter is further divided into three sub-chapters, one for each segment.

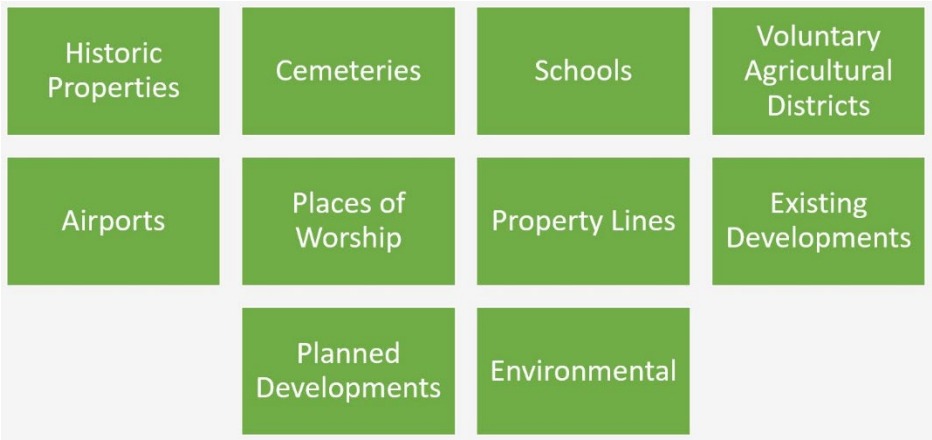
1. **Future U.S. 401 -** This is a planned roadway facility which requires evaluation of multiple alternative alignments. The evaluation is based on several constraints present in the study area.
2. **U.S. 401 in Wake County** - This is the existing portion of U.S. 401 in Wake County from Banks Road to the Harnett County line. Improvements along this area do not require a new alignment.
3. **U.S. 401 in Harnett County** - This is the existing portion of U.S. 401 in Harnett County from the Wake County line to the N.C. 210 and U.S. 421 intersection near the Town of Lillington. Improvements along this area may require realigning the roadway at certain locations. The alternative alignments evaluated are based on several constraints present in the study area.

4.1 Future U.S. 401

At the onset, development of the future U.S. 401 alternatives revolved around the original study area, which somewhat mirrored the alignment in the MTP 2050.

Constraints and Trade-offs

The constraints shown below were considered during the development of the U.S. 401 alignment alternatives. Each alternative has trade-offs and is not able to fully avoid and/or mitigate all constraints in each area; however, these alternatives are meant to provide the public with options. Public input was critical to helping decide project recommendations.



Parameter Formulation

Four key parameters were chosen to evaluate impacts for each alternative. Each parameter contains three or four factors which were calculated using GIS and other tools. These factors were developed in coordination with the CTT and were combined using different relative weights, developed by the SOT and CTT based on importance, to determine how each alternative alignment performs within each parameter. The four parameters and their factors are shown in the table below.

Table 4-1: Parameter Formulation

Parameter	Factor	Multiplier
Property Impact	Number of Parcels with **Full Residential** Take	6x
	Number of Parcels with **Partial Residential** take	2x
	Number of Parcels with **Full Non-residential** take	3x
	Number of Parcels with **Partial Non-residential** take	1x
Agricultural Impact	Total **Acres under Agriculture**	1x
	Number of **VADs bisected** by the alignment alternative	20x
	Number of V**ADs marginally impacted** by the alternative	4x
Environmental Impact	Number of Schools, Worship Houses, Cemeteries, and Historic Buildings	10x
	Acres of **Floodplains**	1x
	Acres of **Wetlands**	1x
Project Cost	Length of **Ground Segment** in miles	2x
	Length of **Bridge Segment** in miles	24x
	ROW acquisition cost (in Million $)	1x

Alignment Alternatives

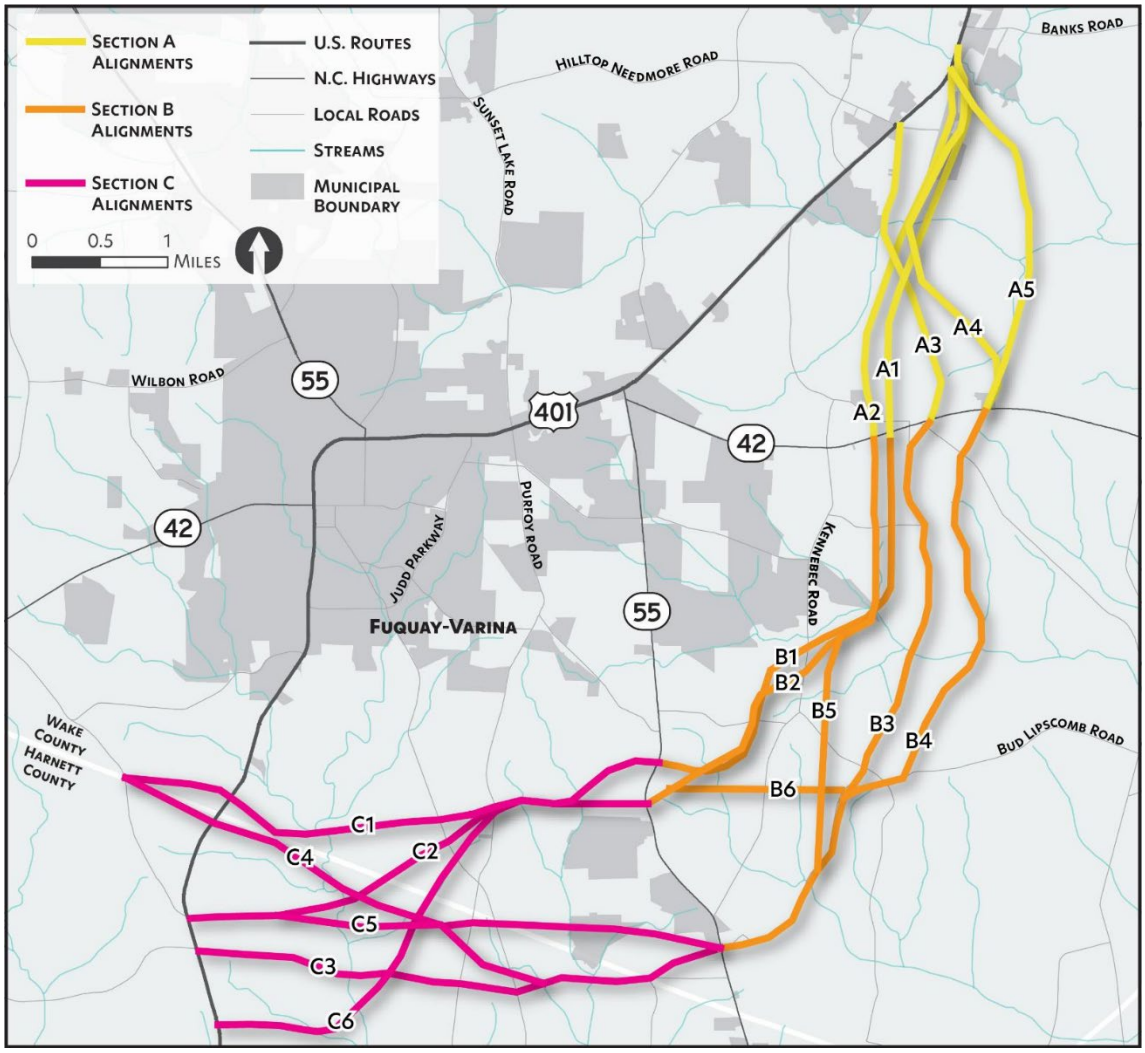
Future U.S. 401 alternatives were divided into three sections for the purpose of alignment evaluation. Five to six alternatives were created for each section based on different parameters. Contiguity was ensured by creating common end points for each section. At this stage, all alignments are 4-Lanes at 55mph. The alignments are shown in Figure 4-1.

- **Section A** goes from U.S. 401 to N.C. 42
- **Section B** goes from N.C. 42 to N.C. 55
- **Section C** goes from N.C. 55 to U.S. 401 with an optional extension to Piney-Grove Rawls Road depending on the alternative.

Three alternatives were created based on a specific set of parameters.

- **Suffix of 1** denotes that the alignment follows the same path as in the Triangle Regional Model.
- **Suffix of 2** denotes that the alignment is a slight variation of '1' minimizing the impact on land parcels by aligning it through parcel boundaries.
- **Suffix of 3** denotes that the alignment maximizes the use of existing roads.
- **Suffixes of 4, 5 and 6** follow newly created alignments minimizing the constraints mentioned previously.

Figure 4-1: Future U.S. 401 Alignment Segments

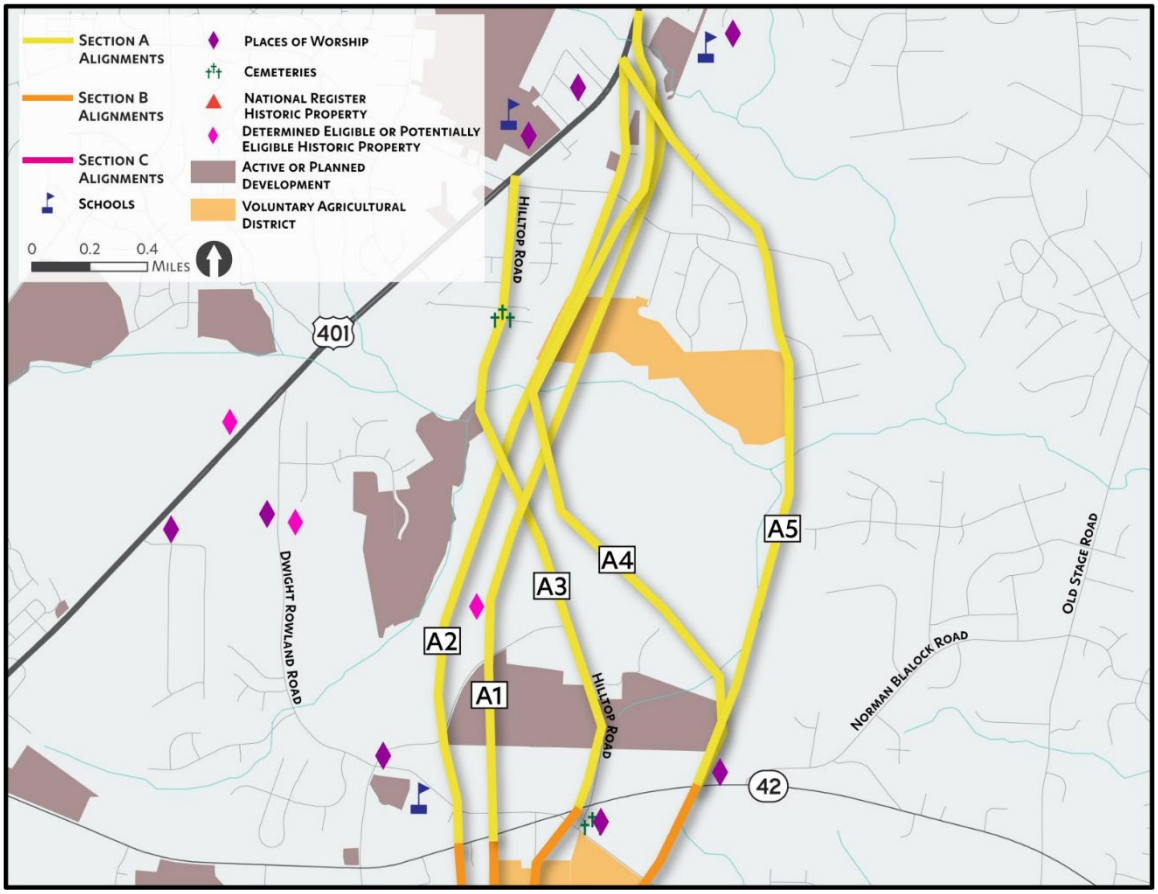


Section A Alternatives

Section A starts at U.S. 401 near Banks Road and ends at N.C. 42. Five alignment alternatives were created for this section, as shown in Figure 4-2:

- **A1** follows the alignment in the current Metropolitan Transportation Plan (MTP).
- **A2** is a slight modification to the MTP alignment to reduce property impacts.
- **A3** follows the existing Hilltop Road.
- **A4** is routed along A2 until halfway, from where it veers eastwards to avoid existing and upcoming developments.
- **A5** is routed to avoid most existing and upcoming developments and Voluntary Agricultural Districts.

Figure 4-2: Future U.S. 401 Section A Alternatives



The relative impacts of each alternative in Segment A for each parameter are shown in the chart below.

Section A	Least		Most
Properties Impacted	A2, A4	A1, A3	A5
Agricultural Land Impacted	A3, A5	A2	A1, A4
Environmental Impacts	A3	A2	A1, A4, A5
Project Cost	A2, A3		A1, A4, A5

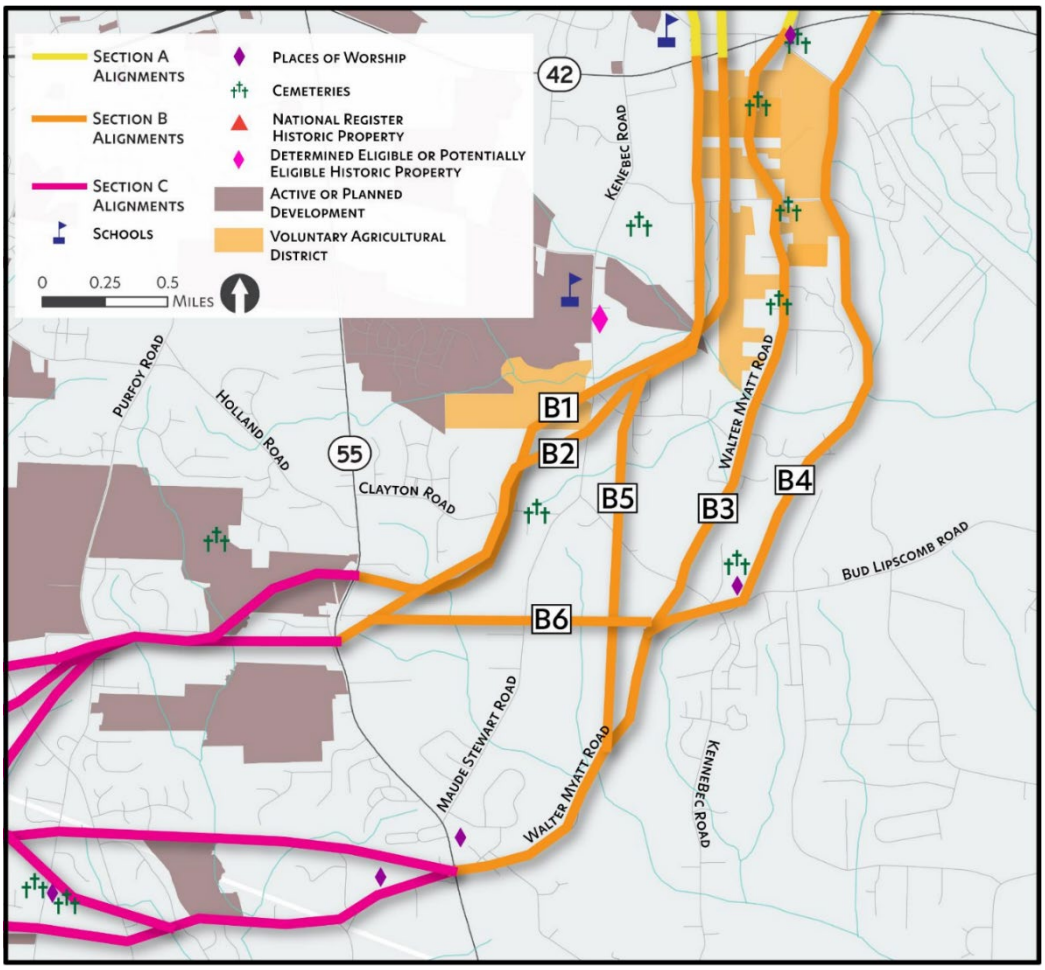
Section B Alternatives

Section B starts at N.C 42 and ends at N.C. 55. Six alignment alternatives were created for this section, as shown in Figure 4-3:

- **B1** follows the alignment in the current MTP.
- **B2** is a slight modification to the MTP alignment to reduce property impacts.
- **B3** follows the existing Walter Myatt Road.
- **B4** is aligned away from Voluntary Agricultural Districts until Bud Lipscomb Road, from where it continues south as B3 alignment along Walter Myatt Road.

- **B5** alignment follows B2 in the northern section. Midway, it turns southward to connect to B3 along Walter Myatt Road.
- **B6** follows B4 up to Walter Myatt Road from where it turns westward to join B2 near N.C. 55.

Figure 4-3: Future U.S. 401 Section B Alternatives



Alternatives B3, B4 and B5 can potentially be combined with the western segment of the Angier Bypass to provide a direct connection to U.S. 401 in Lillington via N.C. 210. The relative impacts of each alternative in Segment B for each parameter are shown in the chart below.

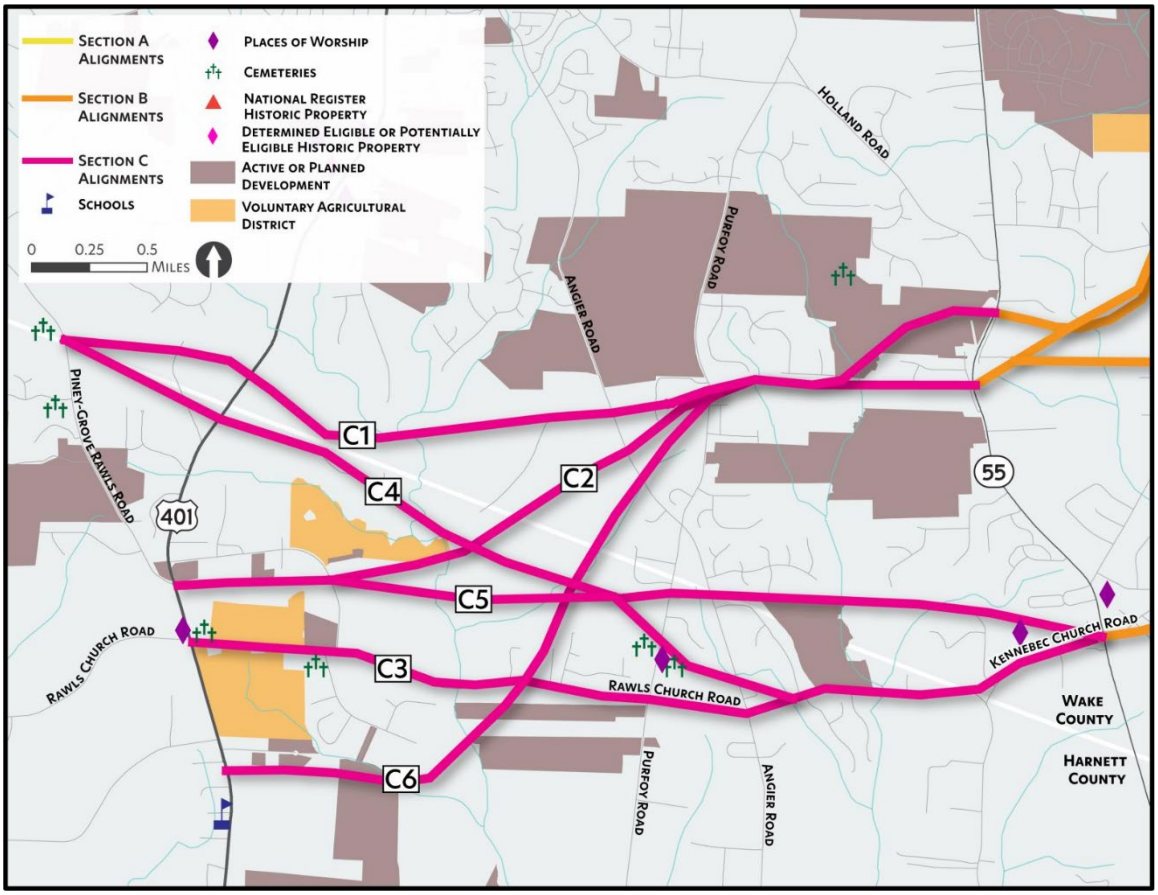
Section B	Least		Most
Properties Impacted	B1, B6	B2, B4	B3, B5
Agricultural Land Impacted	B2, B4, B5, B6	B3	B1
Environmental Impacts	B2, B3	B1, B5	B4, B6
Project Cost	B1, B2, B3	B5	B4, B6

Section C Alternatives

Section C starts at N.C 55 and ends at U.S. 401 south of Fuquay-Varina. Six alignment alternatives were created for this section, as shown in Figure 4-4:

- **C1** follows the current MTP alignment. This is also the portion that is planned as Southern Parkway in the Fuquay-Varina Comprehensive Transportation Plan (CTP).
- **C2** is a slight variation to C1 east of Purfoy Road. West of Purfoy Road, C2 veers slightly south of C1, avoids by Voluntary Agricultural Districts, and intersects U.S. 401 at Piney Grove - Rawls Road.
- **C3** follows existing Rawls Church Road and Kennebec Church Road.
- **C4** partially follows C3 until Angier Road, from where it is routed slightly south of and parallel to Wake-Harnett County line to Piney Grove-Rawls Road through U.S. 401 to avoid all Voluntary Agricultural Districts and planned developments.
- **C5** begins at Kennebec Church Road and runs westward to Piney Grove- Rawls Road while avoiding new developments and Voluntary Agricultural Districts.
- **C6** overlaps with C2 up to Purfoy Road from where it turns southward to meet U.S. 401 at Spence Mill Road.

Figure 4-4: Future U.S. 401 Section C Alternatives



The relative impacts of each alternative in Segment C for each parameter are shown in the chart below.

Section C	Least		Most
Properties Impacted	C1, C2, C6		C3, C4, C5
Agricultural Land Impacted	C6	C4, C5	C1, C2, C3
Environmental Impacts	C2, C3	C5	C1, C4, C6
Project Cost	C2	C1, C3, C6	C4, C5

Results of Public and Stakeholder Engagement Round 2

The second round of public engagement and survey was conducted between August 31 and October 1, 2021. The survey included questions regarding trade-offs between each parameter. A similar survey was also conducted for the members of the CTT, with an additional question asking the weight between the CTT and the public scores.

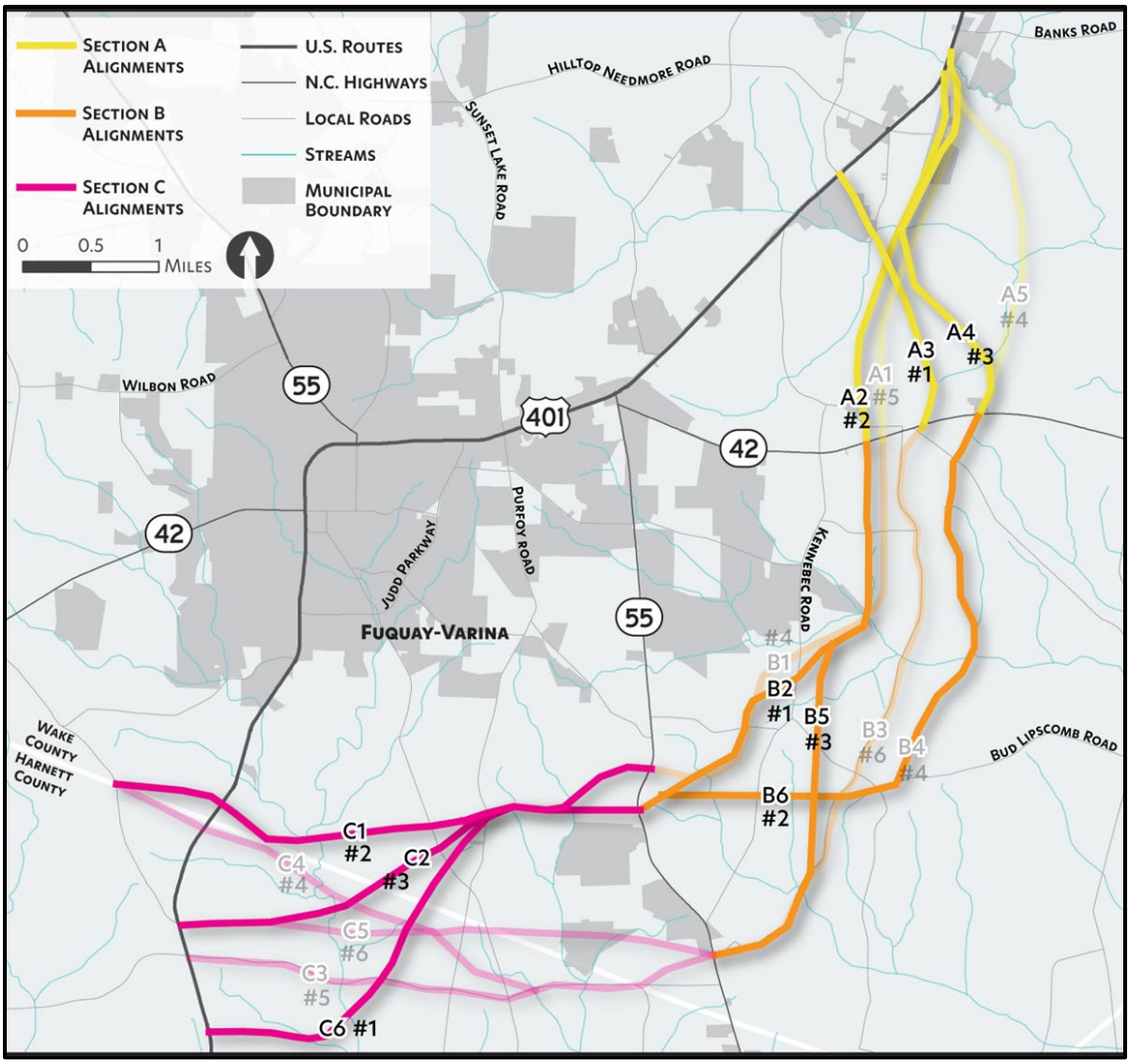
Relative weights for each parameter were calculated based on the survey responses. These weights were then used to determine the scores and ranks of alignment alternatives within each section. The table below shows the relative weights of each parameter using property impacts as the basis. The table clearly denotes that the CTT gives environmental, and cost impacts more weight than agricultural impacts, contrary to the opinions of the public. In depth data, calculations, and results are detailed in Appendix B.

Table 4-2: Relative Weights for Each Parameter

Parameter	Public Engagement Relative Weights	CTT Survey Relative Weights
FINAL COMPOSITION	**42.6%**	**57.4%**
Agriculture	1.47	0.83
Property	1.00	1.00
Environment	0.73	1.18
Cost	0.27	1.26

The analysis combining public engagement results with parameters based on GIS data resulted in filtering out the most impactful alignment alternatives. In Section A, alternatives A2, A3 and A4 rank as least impactful alternatives. Similarly, alternatives B2, B5 and B6 ranked the highest among section B, and C1, C2 and C6 rank highest among section C. The high-ranking alternatives along with the ranks of the alternatives are shown in Figure 4-5.

Figure 4-5: High-Ranking U.S. 401 Alternatives



Three alignment alternatives were created by combining the high-ranking segments.

- Segments A4, B6 and C1 were combined to form alternative X
- Segments A2, B2 and C2 were combined to form alternative Y
- Segments A2 and B5 were combined to form alternative Z. For this alternative, segment C1 to would remain as Southern Parkway, while N.C. 210 will be upgraded and connected to section B5 using the N.C. 55 Angier Bypass.

Based on CAMPO's directions, alternatives X and Z were selected to advance to further evaluation. Alternative Y was not selected because it was very similar to the original alignment in the MTP. At this stage of the project, the two alternatives under consideration were X and Z, both at 4-lanes at 55 mph speed. Alternative X is highlighted in Figure 4-6 and Alternative Z is highlighted in Figure 4-7.

Figure 4-6: Alternative X

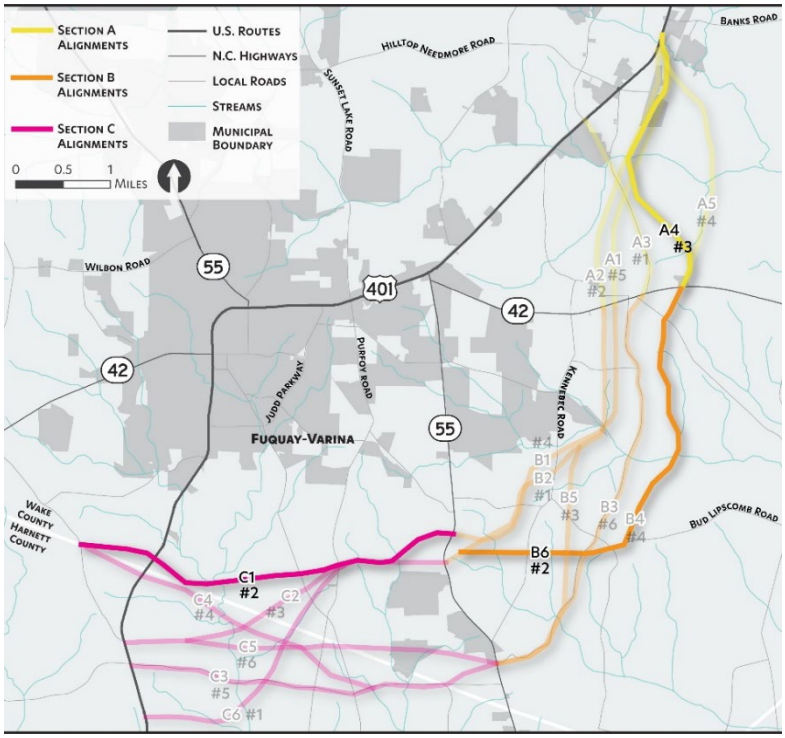
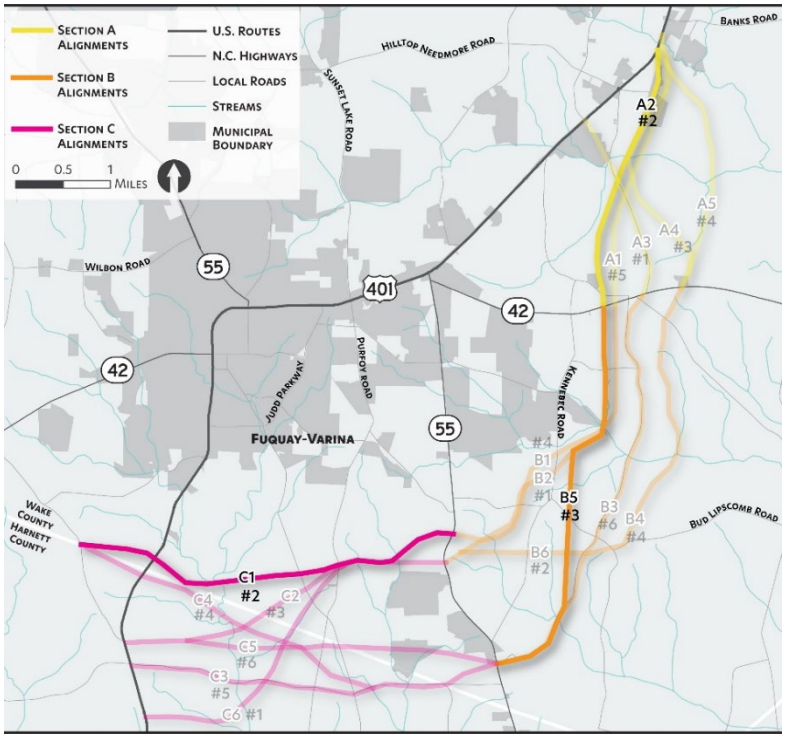


Figure 4-7: Alternative Z



4.2 U.S. 401 in Wake County

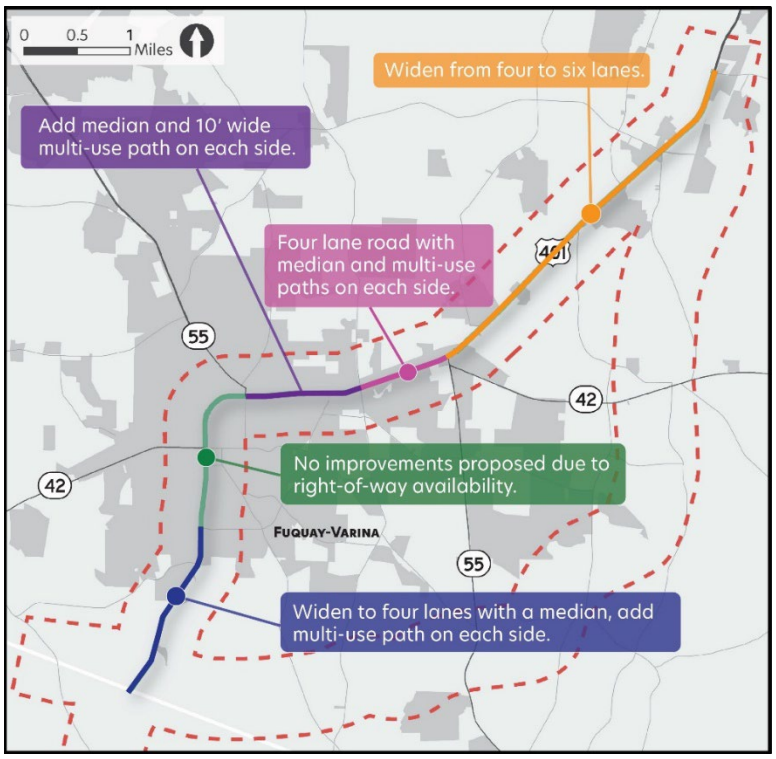
Design Alternatives and Recommendations

The section of U.S. 401 in Wake County starts at Banks Road, passes through the five-point intersection with N.C. 55 and N.C. 42, enters the urban area of Fuquay-Varina with highway commercial land use on either side, passes through downtown Fuquay-Varina, and continues south ending at the Wake/ Harnett County line. This section was divided into four segments based on their characteristics, traffic volumes, and future development potential. The existing configuration of these segments is shown in Table 4-3 and Figure 4-8.

Table 4-3: Existing Wake County U.S. 401 Segments

Segment No.	From	To	Lanes	Speed	Land Use
1	Banks Road	N.C. 55	4	55	Suburban Low Density
2	N.C. 55	Judd Parkway NE	5	35	Highway Commercial
3	Judd Parkway NE	Ennis Street	5	35	Highway Commercial
4	Ennis Street	Judd Pkwy SW	3/2	35/25	Downtown Core
5	Judd Pkwy SW	County line	2	35	Suburban Low Density

Figure 4-8: Existing Wake County U.S. 401 Segments



To influence the development of design alternatives, the second round of public engagement and survey conducted as part of the U.S. 401 Corridor Study between August 31 and October 1, 2021 included

questions regarding trade-offs of different corridor design treatments. A similar survey was also conducted for the members of the CTT, with an additional question asking the weight that should be given to each treatment between the CTT and the public scores.

This survey included three tradeoff questions pertaining to this section of U.S. 401, one comparing walkability with road widths, a second comparing property impacts and travel time, and a third comparing travel time with driveway access. These tradeoff questions are shown in segment discussion, with the preference highlighted in green. Tradeoff questions were not conducted for segment 1 since it was determined to keep the MTP project as is. Additional details regarding this round of public engagement and the survey results are available in Appendix B.

Segment 1 (Banks Road to N.C. 55) – This 4-lane segment of U.S. 401 traverses through areas that are currently low-density suburban but are designated as highway commercial overlay in the Fuquay-Varina Future Land Use Plan. Hence the preservation of access to adjacent properties is significant. This is the key portion of the highway that connects the towns of Fuquay-Varina, Angier, and Lillington to Raleigh.

In terms of existing plans along this section, the CAMPO MTP 2050 includes several projects. The section between Currin Drive and Dwight Rowland Road is planned to be converted to reduced conflict intersections (RCIs) by 2030 with a few turn restrictions at Hilltop Needmore Road and Lake Wheeler Road. Moreover, the section between Banks Road and N.C. 55 is planned to be widened to 6-lane road by 2050. NCDOT project U-5751, which is the realignment of N.C. 42 and N.C. 55 and the overpass to Judd Parkway, will also impact this section of U.S. 401.

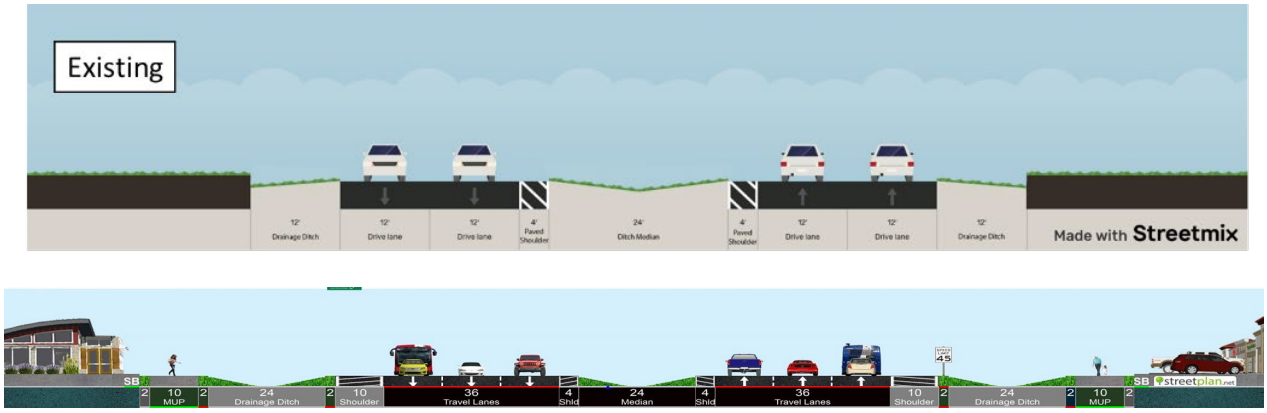
For this segment, the projects already included in the MTP were recommended to be carried forward. These include:

- Convert the portion between Lake Wheeler Road and Hilltop Needmore Road to reduced conflict intersections (Project ID A664a). The horizon year of this project is 2030.
- Widen this segment from 4 to 6 lanes (Project ID A619b). The horizon year of this project is 2050.

The figure below shows the existing cross section and the proposed cross section as mentioned in the MTP project with the addition of multi-use paths on each side of the road.

Segment 2 (N.C. 55 to Judd Parkway NE) – This is a 4-lane section with a center 2-way left turn lane traversing through a highway commercial zone before entering the core of Fuquay-Varina. Access

Figure 4-9: Existing and Proposed U.S. 401 Segment 1 Cross-Section



management and traffic flow are some of the prime concerns in this segment as there is significant, slow-moving traffic accessing the businesses on both sides of the street.

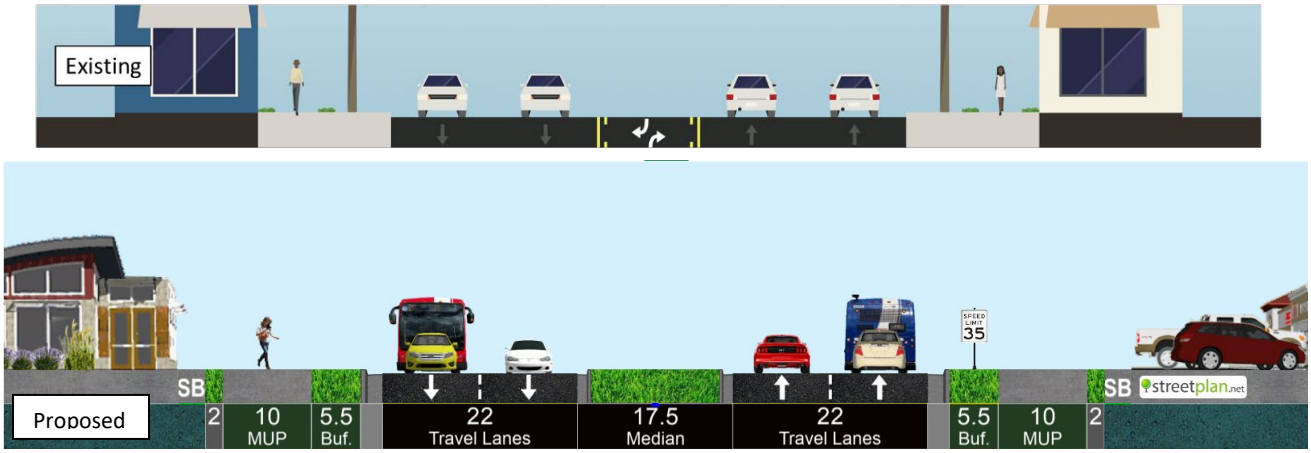
The public and CTT survey results favored faster travel times over maintaining full driveway access for this segment of U.S. 401. This translated to an alternative that maintains the number of travel lanes, provides some access control in the form of a median, and provides multi-use paths to enhance bicycle and pedestrian mobility. This recommendation reflects a project in the MTP 2050.

Maintain access to driveways on U.S. 401 but have slower travel time	**55.60**	**Have faster travel time on U.S. 401 but limit access to driveways**

There was no absolute consensus on the question of improvement of walkability when public and CTT survey results were combined, thus it was determined that 10’ multi-use paths on both sides of U.S. 401 would sufficiently enhance bicycle and pedestrian mobility.

Improve walkability on less congested roads but reduce the number of vehicle lanes	**50.18**	**Maintain the number of vehicle lanes but do not improve walkability**

Figure 4-10: Existing and Proposed U.S. 401 Segment 2 Cross-Section



The MTP contains a project targeting adding a median between N.C. 55 and Judd Parkway NE with a horizon year of 2050. The CTT and SOT settled on a preferred alternative for this segment that is a slight modification of the MTP project and includes adding multi-use paths on both sides of the road.

Segment 3 (Judd Parkway NE to Ennis Street) – Between Judd Parkway NE and Ennis Street, the daily traffic drops from 30,000 vehicles per day to 10,000 vehicles per day. Early discussions centered on whether a 4-lane roadway is necessary in this section and if a road diet could be implemented.

The public and CTT survey results favored faster travel times over reducing travel lanes for this segment of U.S. 401.

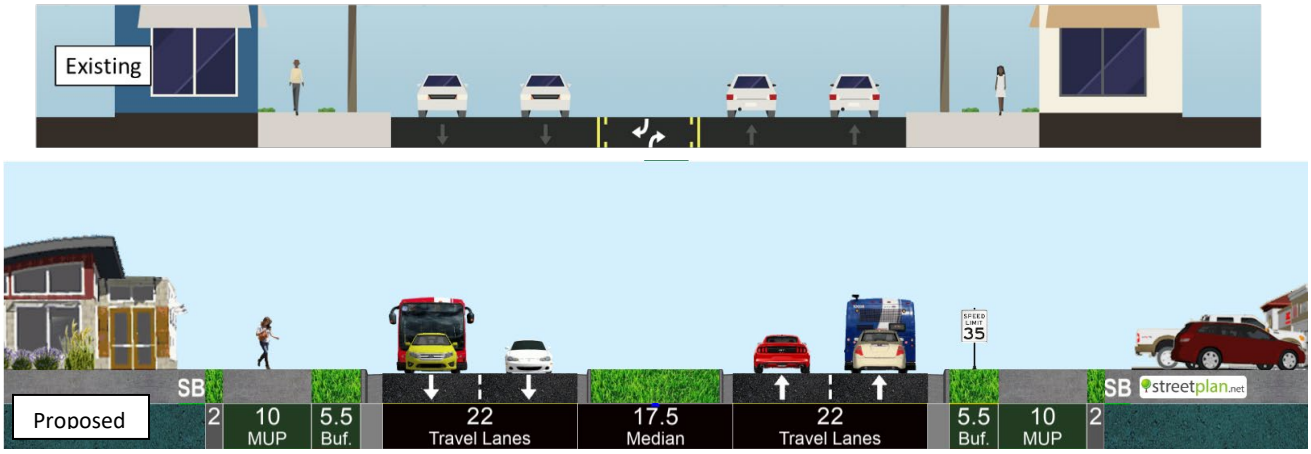
Maintain access to driveways on U.S. 401 but have slower travel time	**55.60**	**Have faster travel time on U.S. 401 but limit access to driveways**

There was no absolute consensus on the question of improvement of walkability when public and CTT survey results were combined, thus it was determined that 10' multi-use paths on both sides of U.S. 401 would sufficiently enhance bicycle and pedestrian mobility.

Improve walkability on less congested roads but reduce the number of vehicle lanes	**50.18**	**Maintain the number of vehicle lanes but do not improve walkability**

Ultimately, the CTT and SOT decided on retaining the same cross-section as is proposed in Segment 2, keeping the 4-lane section, providing a median, and adding multi-use paths so that the roadway can handle future traffic volumes.

Figure 4-11: Existing and Proposed U.S. 401 Segment 3 Cross-Section



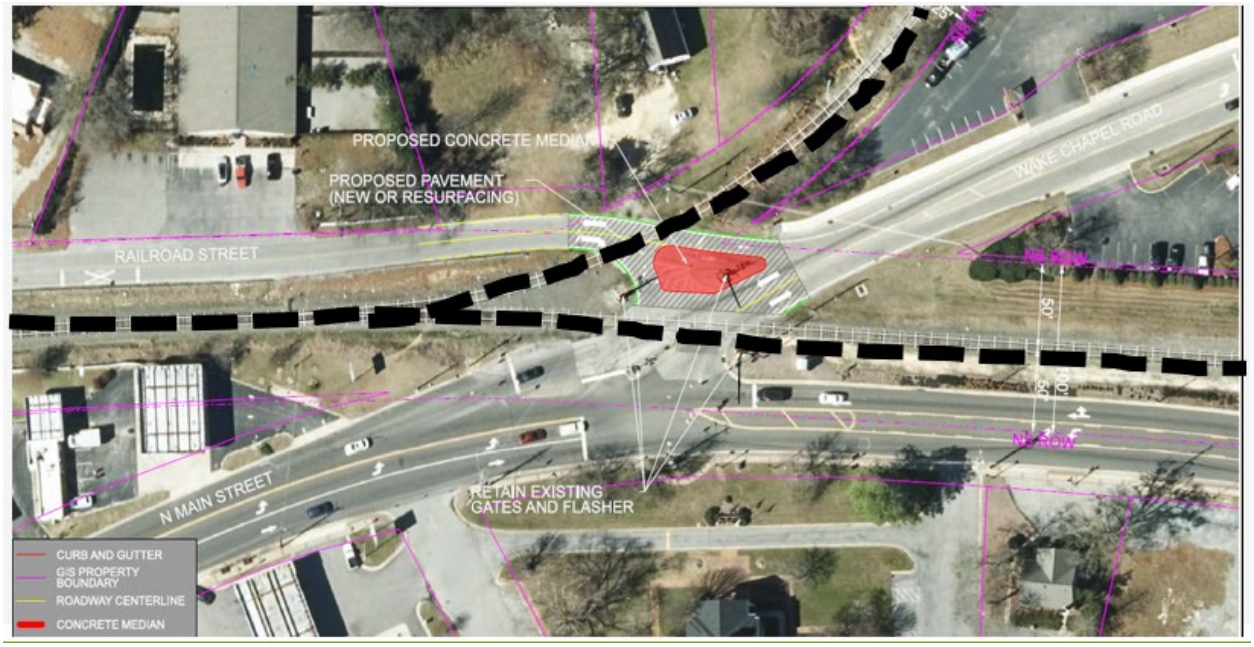
Segment 4 (Ennis Street to Judd Parkway SW) – This is generally a 3-lane road (2 travel lanes in each direction with a center left-turn lane) passing through downtown Fuquay. Due to right-of-way constraints associated with the downtown buildings being up to the road, it was determined that no roadway improvements would be recommended in this segment.

Potential solutions for the complex intersection between Main Street, Wake Chapel Road, and Railroad Street across a branching railroad track were explored as a part of this study. Six potential solutions were explored for this location.

1) Creating a roundabout on U.S. 401 with full movements possible in all directions except the left turn from Railroad Street to Wake Chapel Road;
2) Creating two roundabouts, one each at U.S. 401 and Wake Chapel Road and at Wake Chapel Road and Railroad Street to ensure full movements;
3) Creating a roundabout straddling the railroad making a combined intersection of U.S. 401/ Wake Chapel Road/ Railroad Street that allows full movements;
4) Restrict all access to Wake Chapel Road from U.S. 401, with all movements to be made possible through Railroad Street;
5) Restrict all left turns between Railroad Street and Wake Chapel Road making Railroad Street a right-in, right-out, reflecting a recommendation from a previous study;
6) Terminate Railroad Street before the Norfolk Southern railroad, making it a cul-de-sac.

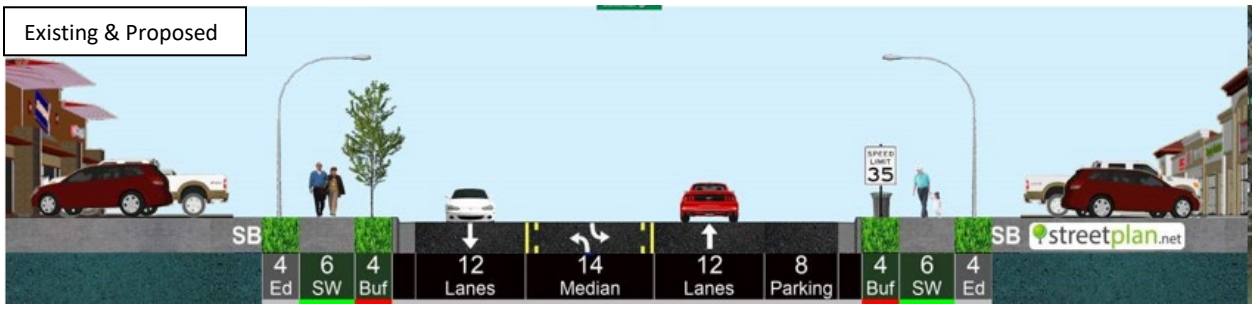
Survey questions on different design treatments were not included as part of this segment due to the right-of-way constraints. Discussion around the intersection of U.S. 401, Wake Chapel Road, and Railroad Street did occur, and ultimately, the CTT and SOT settled on recommending solution 5, restricting all left turns between Railroad Street and Wake Chapel Road, and making Railroad Street a right-in, right-out.

Figure 4-12: Recommended Improvements to Railroad Street



The CTT and SOT agreed that no other improvements to U.S. 401 in this segment should be made due to right-of-way constraints and will retain the cross-section show below.

Figure 4-13: Existing and Proposed U.S. 401 Segment 4 Cross-Section



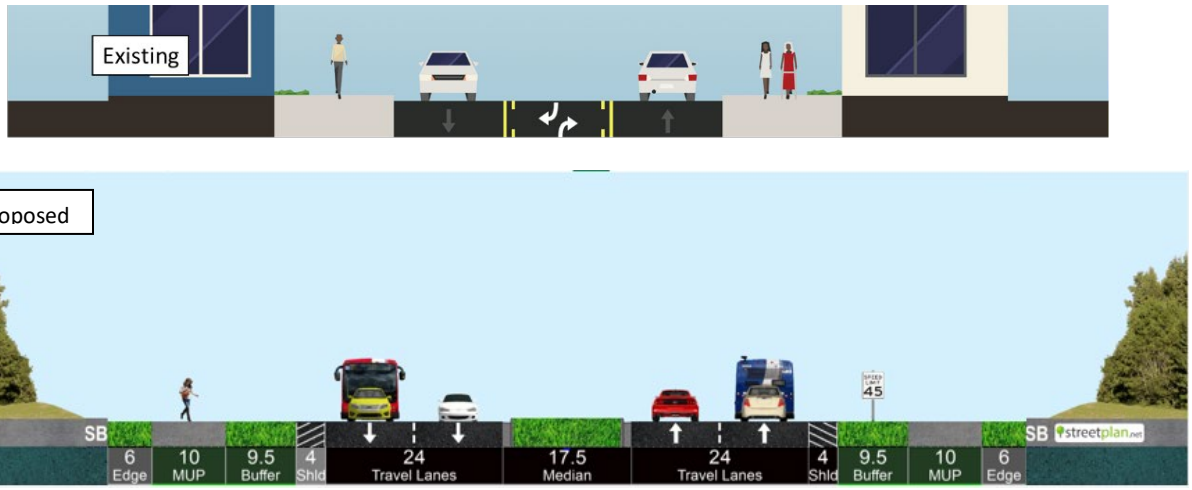
Segment 5 (Judd Parkway SW to Wake/Harnett County Line) – This segment of U.S. 401 is a 2-lane road with certain portions containing a center two-way left turn lane. The MTP calls for widening this section to 150’ right-of-way to accommodate a 4-lane roadway, concrete median, and sidewalks. The undulating terrain and presence of environmental constraints may pose challenges to widening this segment of U.S. 401.

The two alternatives developed for this segment included keeping a two-lane roadway to limit potential impacts to the surrounding area or keep the MTP project and proposed widening to a 4-lane roadway. The survey results marginally favored reduction of property impacts when compared against travel time.

Reduce property impacts but have slower travel time	**47.45**	Increase property impacts but have faster travel time

The CTT and SOT ultimately settled on recommending revising the MTP project to propose widening U.S. 401 to a 4-lane road, but with multi-use paths on each side. When the time comes for designing the roadway, using a smaller cross-section can mitigate many potential impacts to surrounding areas.

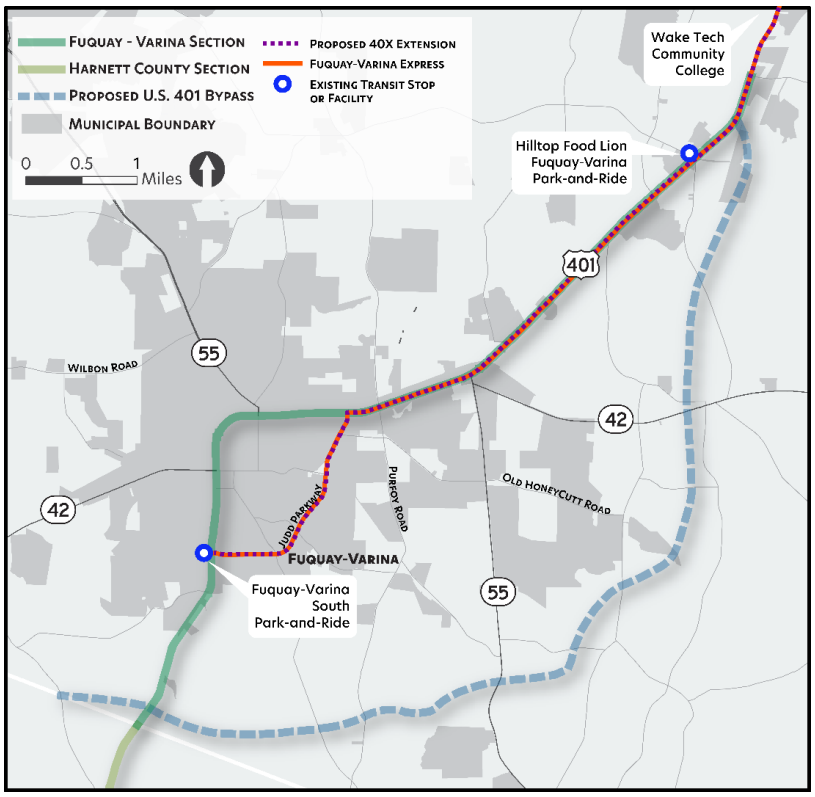
Figure 4-14: Existing and Proposed U.S. 401 Segment 5 Cross-Section



Transit Recommendations

Transit in the area consists of the 40X route between Wake Teach Community College and the GoRaleigh Station in Downtown Raleigh. The route is planned to be extended to Fuquay Varina South Park and Ride with an intermediate stop at Hilltop Food Lion. The extended route was put into service as FRX without the intermediate stop. The evaluation through this study suggests considering adding intermediate stops in Fuquay Varina, especially along the businesses on U.S. 401, to maximize the benefits of this route.

Figure 4-15: Existing and Recommended Transit Improvements



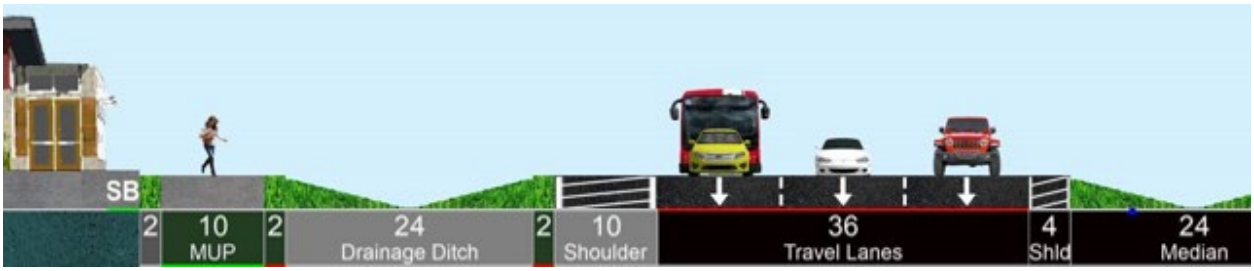
Another key direction of travel for this region is northwest, towards Holly Springs and Apex. Transit connections between Fuquay Varina and Apex should be explored in the future as that market develops. These connections could serve as transfer points for further destinations such as Cary and Southwest Raleigh. Additional studies are required to evaluate the potential for these connections.

Bicycle and Pedestrian Infrastructure

Multi-modal transportation options were one of the key goals of this study. Bicycle and pedestrian infrastructure design alternatives were considered and included for each segment of U.S. 401 throughout the study area.

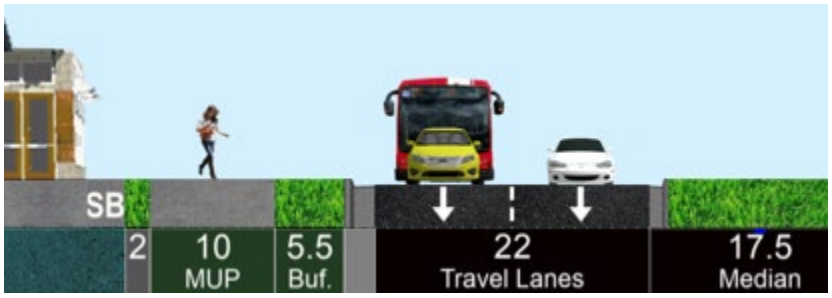
Segment 1 (Banks Road to N.C. 55) – No bicycle and pedestrian infrastructure exists on this segment. The projects planned as per the CAMPO 2050 MTP do not include bicycle and pedestrian infrastructure on this segment. The preliminary recommendation as a part of this study is to add multi-use paths on both sides of the road, a snapshot of which is offered in Figure 4-16 which shows one side of the proposed U.S. 401 cross-section.

Figure 4-16: Proposed U.S. 401 Segment 1 Pedestrian and Bicycle Improvements



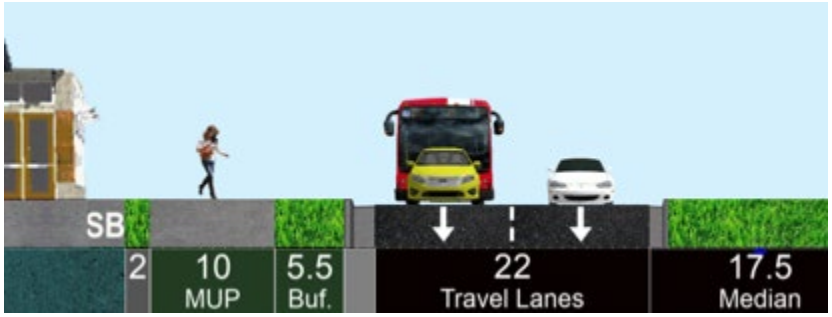
Segment 2 (N.C. 55 to Judd Parkway NE) – This segment of U.S. 401 has sidewalks on both sides along most of its length, with some breaks in continuity in some sections where sidewalks don't exist. The recommended alternative developed as a part of this study is to add multi-use paths on both sides of the road. A snapshot of one side of the proposed U.S. 401 cross-section is shown in Figure 4-17.

Figure 4-17: Proposed U.S. 401 Segment 2 Pedestrian and Bicycle Improvements



Segment 3 (Judd Parkway NE to Ennis Street) – This segment of U.S. 401 has sidewalks on both sides along most of its length, with some breaks in continuity in some sections where sidewalks don't exist. The recommended alternative developed as a part of this study is to add multi-use paths on both sides of the road. A snapshot of one side of the proposed U.S. 401 cross-section is shown in Figure 4-18.

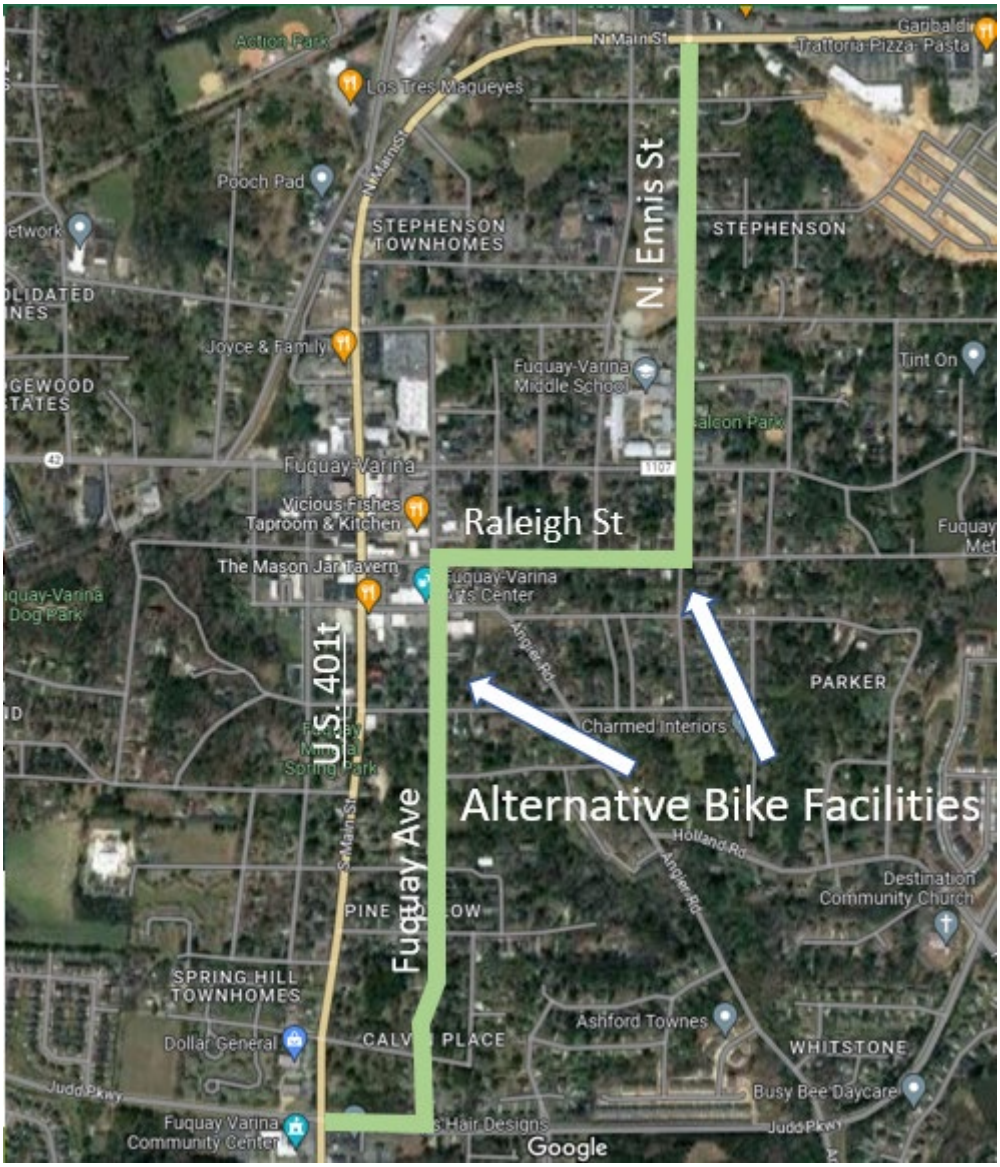
Figure 4-18: Proposed U.S. 401 Segment 3 Pedestrian and Bicycle Improvements



Segment 4 (Ennis Street to Judd Parkway SW) – This segment of U.S. 401 passes through downtown Fuquay and has sidewalks on both sides for a major part of this segment. However, there are major breaks in the sidewalk to the west of the roadway alongside the railroad. The roadway character limits widening of sidewalks and adding bicycle lanes along this segment. The recommendations developed as a part of

this study look to enhance bicycle mobility by using alternative bike routes along lesser traveled parallel streets. A bike route alternative that uses N. Ennis Street, Raleigh Street, and Fuquay Avenue is recommended, shown in Figure 4-19, and could consist of bike lanes, shared lane makings, and/or bicycle boulevards.

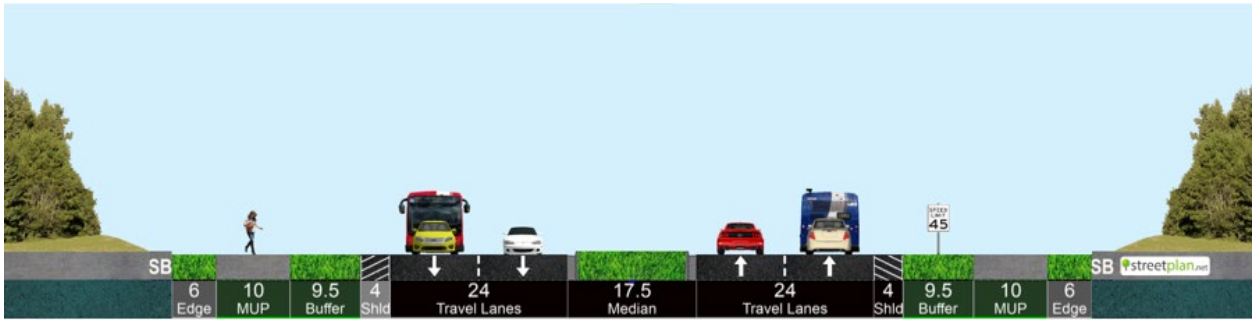
Figure 4-19: Proposed U.S. 401 Segment 4 Pedestrian and Bicycle Improvements



Segment 5 (Judd Parkway SW to Wake/Harnett County Line) – This segment of U.S. 401 does not have existing bicycle and pedestrian infrastructure. The recommendation for this segment involves revising the

MTP project and replacing the proposed sidewalks with multi-use paths on each side, as shown in figure 4-20.

Figure 4-20: Proposed U.S. 401 Segment 5 Pedestrian and Bicycle Improvements



4.3 U.S. 401 in Harnett County

Design and Alignment Alternatives and Recommendations

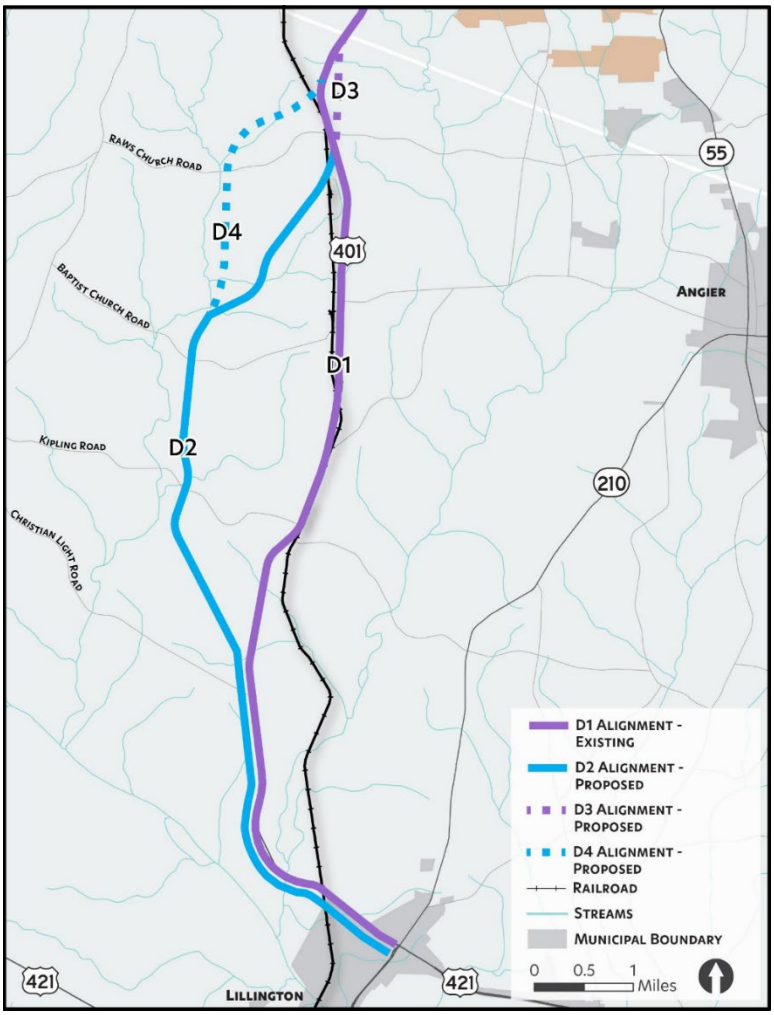
This section of U.S. 401 starts at the Wake/Harnett County line, continues southward parallel to the Norfolk Southern railroad for approximately 10 miles, and ends at the intersection with N.C. 210 and U.S. 421. Currently, a major portion of this section is a 2-lane road, as shown in the photo, except for a ¾ mile section at the southern end which is a 4-lane section with landscaped median.

Figure 4-21: Existing U.S. 401 in Harnett County

The official forecasts from the CAMPO 2050 MTP suggest that the daily volume of traffic on this section is expected to range between 10,000 and 38,000 vehicles per day, which would require widening from the current two-lane configuration to four lanes in order to handle forecasted traffic volumes. Alternative alignments were developed for this segment to minimize impacts on existing properties along the road. Thus, the MTP 2050 includes a project to widen existing U.S. 401 in this segment from two to four lanes.

The map in Figure 4-22 shows the existing alignment of the road along this section, and the potential localized deviations from the existing alignment. These alignments were developed with consideration for land parcel boundaries, natural and built environmental features, and voluntary agricultural districts.

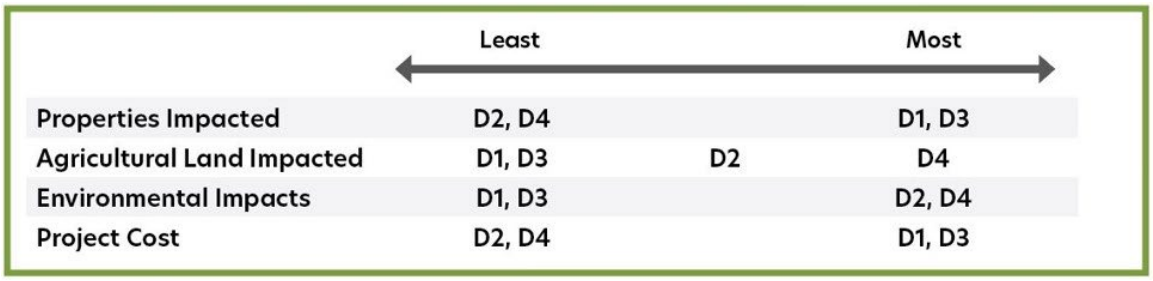
Figure 4-22: U.S. 401 Harnett County Alternative Alignments



The four alignment alternatives are as follows:

- **D1** - This alternative proposes widening of U.S. 401 along its current alignment.
- **D2** follows D1 between the Wake/Harnett County line and Spence Mill Road and between Christian Light Road and N.C. 210. Between Christian Light Road and Spence Mill Road, D2 is realigned west to run parallel to Hector Creek.
- **D3** is a minor variation to D1, where the only portion realigned is between Spence Mill Road and Devoroah Lane to increase distance from the railroad and to make the railroad crossing on Piney-Grove Rawls Road safer.
- **D4** is a variation to D2 where it continues further north, crosses Rawls Church Road, Piney-Grove Rawls Road, and the railroad to merge back to the existing U.S. 401.

The relative impacts of each alternative for each parameter are shown in the chart below.



To influence the development of design alternatives, the second round of public engagement and survey conducted as part of the U.S. 401 Corridor Study between August 31 and October 1, 2021 included questions regarding trade-offs of different corridor design treatments. A similar survey was also conducted for the members of the CTT, with an additional question asking the weight that should be given to each treatment between the CTT and the public scores.

This survey included three tradeoff questions pertaining to this section of U.S. 401, one comparing project cost with property impacts, a second comparing property and environmental impacts, and a third comparing property with agricultural land impacts. Additional details regarding this round of public engagement and the survey results are available in Appendix A. The table below shows combined public and CTT tradeoff scores for each question.

Reduce property impacts but have a higher project cost	40.28	Have a lower project cost but higher property impacts
Reduce property impacts but have higher environmental impacts	49.73	Reduce environmental impacts but have higher property impacts
Reduce property impacts but have higher agricultural land impacts	52.85	**Reduce impacts to agricultural lands but more properties would need to be acquired**

As per the table, only the first question had a well-defined lean towards favoring lower property impacts rather than lower costs. For the second and third questions, there wasn't a clear result as the scores were very close to the center of 50.

The CTT and public engagement results along with the alignment alternatives ranking were presented to the CTT and Harnett County, who were in favor of maintaining the current alignment of U.S. 401 (Alternative D1) despite it scoring as a higher impact alternative. The reasoning being is that the CTT and Harnett County officials felt that by the time the new alignment would be finalized and incorporated in the CTP, many more developments would have occurred along that alignment, rendering other alignments unfeasible for li. For this reason, Alternative D1 was selected as the preliminary recommendation for this section of U.S. 401.

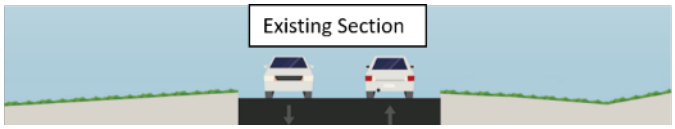
To mitigate the potential impacts to property and sensitive resources, two alternative concepts were developed and recommended for the U.S. 401 roadway section that would result in widening from two

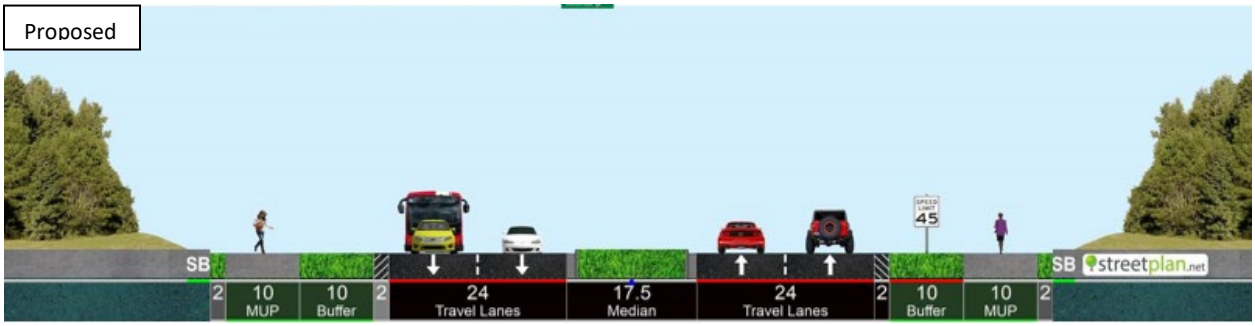
lanes to four lanes under part of Alternative D1. These cross-sections can be applied throughout this segment of U.S. 401 where conditions warrant.

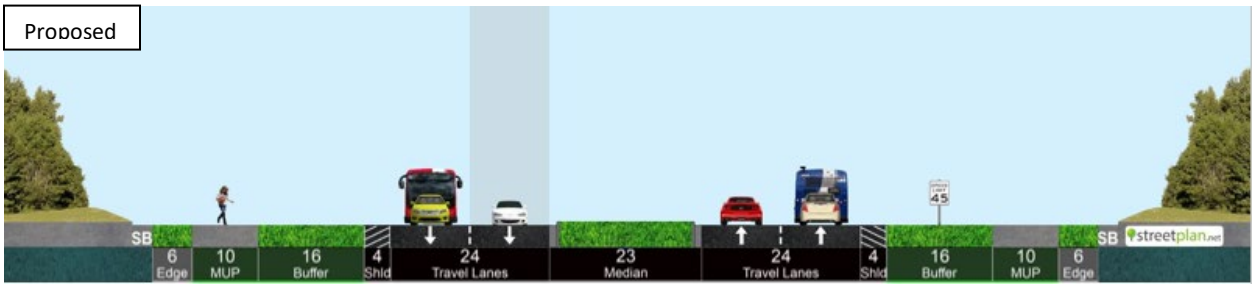
Narrow Cross-Section – Includes widening U.S. 401 to four lanes within a 120' right-of-way to accommodate curb and gutter on both sides, a raised median, and multi-use path on both sides of the road. This configuration requires a narrower right-of-way and is shown in Figure X.

Standard Cross-Section – Includes widening U.S. 401 to four lanes within a 150' right-of-way to accommodate wide paved shoulders, clear zones on both sides of the roadway, a ditch median, and multi-use paths on both sides of the road. This configuration requires a wider right-of-way and is shown in Figure 4-23.

Figure 4-23: Existing and Proposed U.S. 401 Harnett County Segment Cross-Section







Intersection Improvements

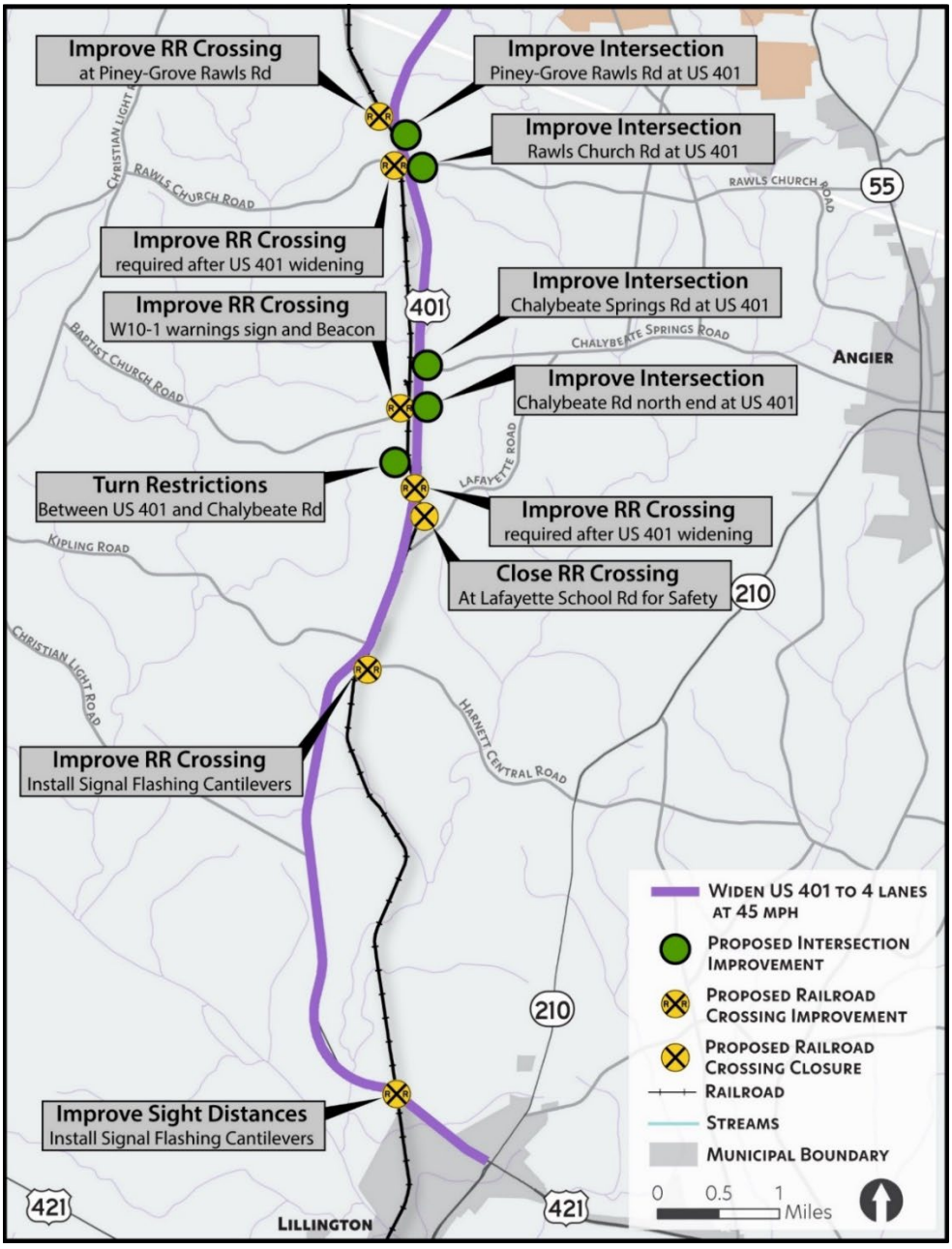
There were a number of shorter-term improvements that were identified for the U.S. 401 segment in Harnett County that would address several congestion and safety concerns. Following an analysis of intersection operations, the intersection improvements identified in Table 4-4 are recommended.

Table 4-4: Existing and Proposed U.S. 401 Harnett County Segment Cross-Section

Intersection	Timeframe	Recommended Improvement
U.S. 401 and Piney Grove Rawls Road	Mid	Signalize the intersection. Current MTP project A628 proposes to widen Piney Grove Rawls Road from 2 to 4 lanes between U.S. 401 and Piney Grove Wilbon Road. The project is programmed with a 2050 horizon year. Another MTP project, Hrnt5, proposes to widen U.S 401 from 2 to 4 lanes with a 2050 horizon year. Signalization will provide a more shorter-term solution to improving congestion and safety.
U.S 401 and Rawls Church Road	Mid	Signalize the intersection. Current MTP project A302c proposes to widen Rawls Church Road from 2 to 4 lanes between U.S. 401 and Rawls Church Road Extension. The project is programmed with a 2050 horizon year. Another MTP project, Hrnt5, proposes to widen U.S. 401 from 2 to 4 lanes with a 2050 horizon year. Signalization will provide a more shorter-term solution to improving congestion and safety.
U.S. 401 and Chalybeate Springs Road (Sr 1441)	Mid	Signalize the intersection. Current MTP project A631 proposes to widen Chalybeate Springs Road from 2 to 4 lanes between U.S. 401 and Future Angier Bypass. The project is programmed with a 2050 horizon year. Another MTP project, Hrnt5, proposes to widen U.S. 401 from 2 to 4 lanes with a 2050 horizon year. Signalization will provide a more shorter-term solution to improving congestion and safety.
U.S. 401 and Chalybeate Road N.	Mid	Signalize the intersection. If the southern section to U.S. 401 is to be closed, reevaluate the traffic impacts. Current MTP project, Hrnt5, proposes to widen U.S. 401 from 2 to 4 lanes with a 2050 horizon year. Signalization will provide a more shorter-term solution to improving congestion and safety.
U.S 401 and Chalybeate Road S.	Long	Restrict turns at this intersection and consider removing this intersection connection to/from U.S. 401 all together to improve operations and safety.
U.S. 401 and Lafayette School Road	Long	Close the connection to/from U.S. 401and, look at possible alternative access routes to Lafayette Elementary School to/from US 401.
U.S. 401 and Lafayette Road	Long	If the Lafayette School Road connection to/from U.S. 401 is removed, reevaluate the traffic impacts at this intersection.

Figure 4-24 portrays the locations and descriptions of these proposed intersection improvements.

Figure 4-24: Proposed U.S. 401 Intersection Improvements

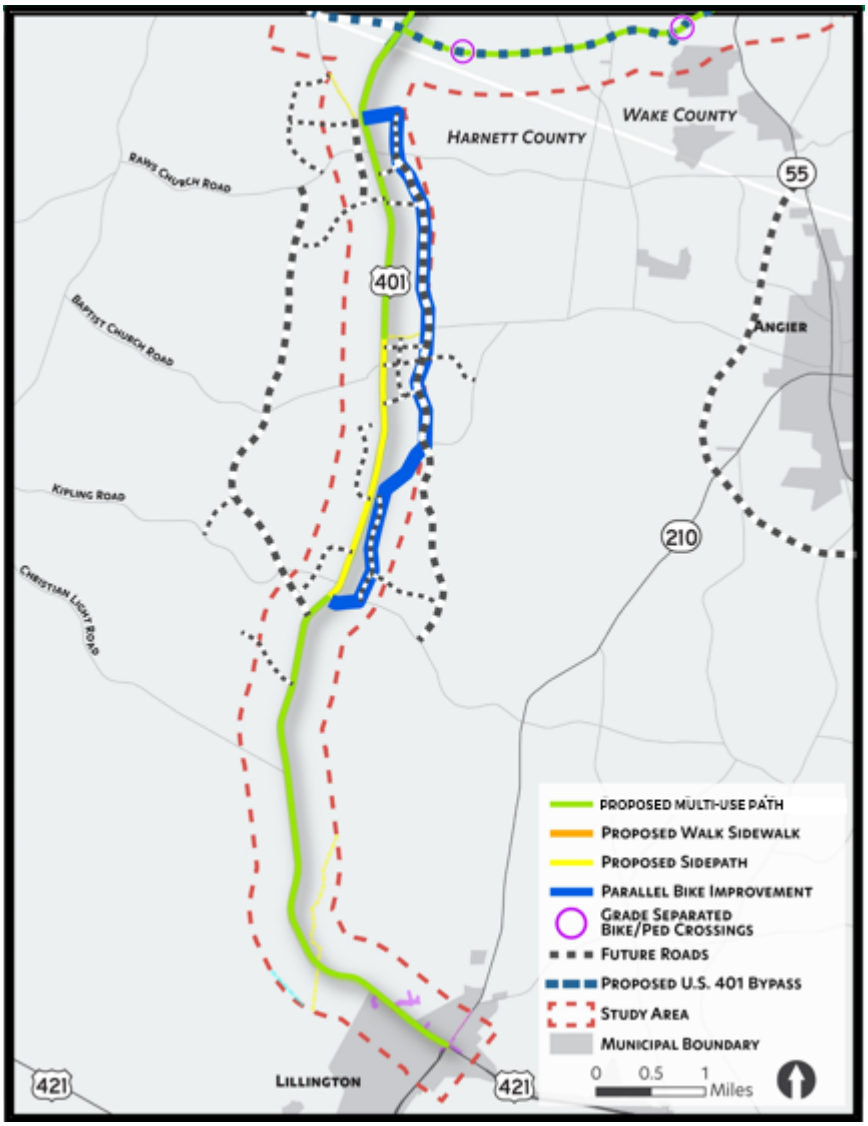


CAMPO has begun the process of submitting several of the intersection improvements for funding. For Chalybeate (southern), Lafayette School Roads and railroad crossing recommendations (5 projects together) a smaller "hot spot" study is the updated recommendation. Such a study would look at all five projects together to better identify how railroad improvements, widening of U.S. 401, and the roadway intersections can be designed and coordinated.

Bicycle and Pedestrian Infrastructure

For this segment of U.S. 401, the CTT and Harnett County determined that the best approach would be to propose multi-use paths as part of a U.S. 401 project but to also get bicycle and pedestrian improvements constructed as part of development projects as they are built along the corridor. This would provide an opportunity to get bicycle and pedestrian improvements built sooner and ultimately result in a system of alternative routes to U.S. 401, as shown in Figure 4-25.

Figure 4-25: Proposed U.S. 401 Harnett County Segment Bicycle and Pedestrian Improvements



Chapter 5: Development of New Alignment Alternatives for Future U.S. 401

This chapter includes the details of the development and evaluation of new alignments for future U.S. 401 based on direction from the CAMPO Executive Board to identify and evaluate alternative alignments that differ from those outlined in Chapter 4.

This Chapter is divided into three sections, each grouped based on the level of detail of the analyses and the subsequent elimination of alternatives, and include:

- Round 1 – CAMPO Board Resolution from December 2021, development of new alternative alignments, Travel Demand Modeling analysis, and first round of alignment elimination.
- Round 2 – Phase 2 level analyses on alternatives in consideration and second round of alignment elimination that resulted in the CAMPO Board Resolution in March 2022.
- Round 3 – Changes made to selected alternatives, additional analyses on parameters not included in previous analyses, combined alternatives, and final recommendation.

5.1 Round 1

CAMPO Board Resolution in December 2021

On December 7, 2021, North Carolina House Representative Erin P. Pare representing District 37 (Southern Wake County) wrote a letter to CAMPO (Appendix X) asking them to delay the approval of 2050 MTP until the completion of this study, and make the study include alternative routes in addition to the ones being considered at the time. The exact contents of the letter are shown below.

> Dear Capital Area Metropolitan Planning Organization (CAMPO):
>
> It is my understanding that the CAMPO Executive Board is set to hold a vote on the 2050 Metropolitan Transportation Plan tomorrow evening December 8, 2021.
>
> The 401 Bypass Corridor Study is still open and ongoing, as is the public comment period on the 2050 MTP. To ensure the utmost in due diligence, ensure that input of impacted property owners is given careful and serious consideration, and all other viable alternatives are properly examined as part of the ongoing process, it is prudent and proper for the CAMPO Executive Board to take one of the following two actions at the December 8 meeting:
>
> Number One: Delay the vote to approve the 2050 MTP until after the complete conclusion of the 401 Bypass Corridor Study and public input opportunities, or
>
> Number Two: Approve a motion to consider viable suggested alternative routes received through public input in place of the currently planned routes for the 401 Bypass Corridor as they appear in the 2050 MTP.
>
> Thank you for your continued service to the public and I look forward to your prompt attention to this request.
>
> Regards,
> Representative Erin P. Paré
> NC House of Representatives
> District 37 (Southern Wake County)

Based on this letter, the CAMPO Executive Board passed a resolution on December 8, 2021, directing CAMPO staff to review alternative ideas and report back to the Board no later than their regular March meeting (March 16, 2022). These alignments should consider options of widening existing roadways as well as alternatives further east of the alignments under consideration at the time of the resolution.

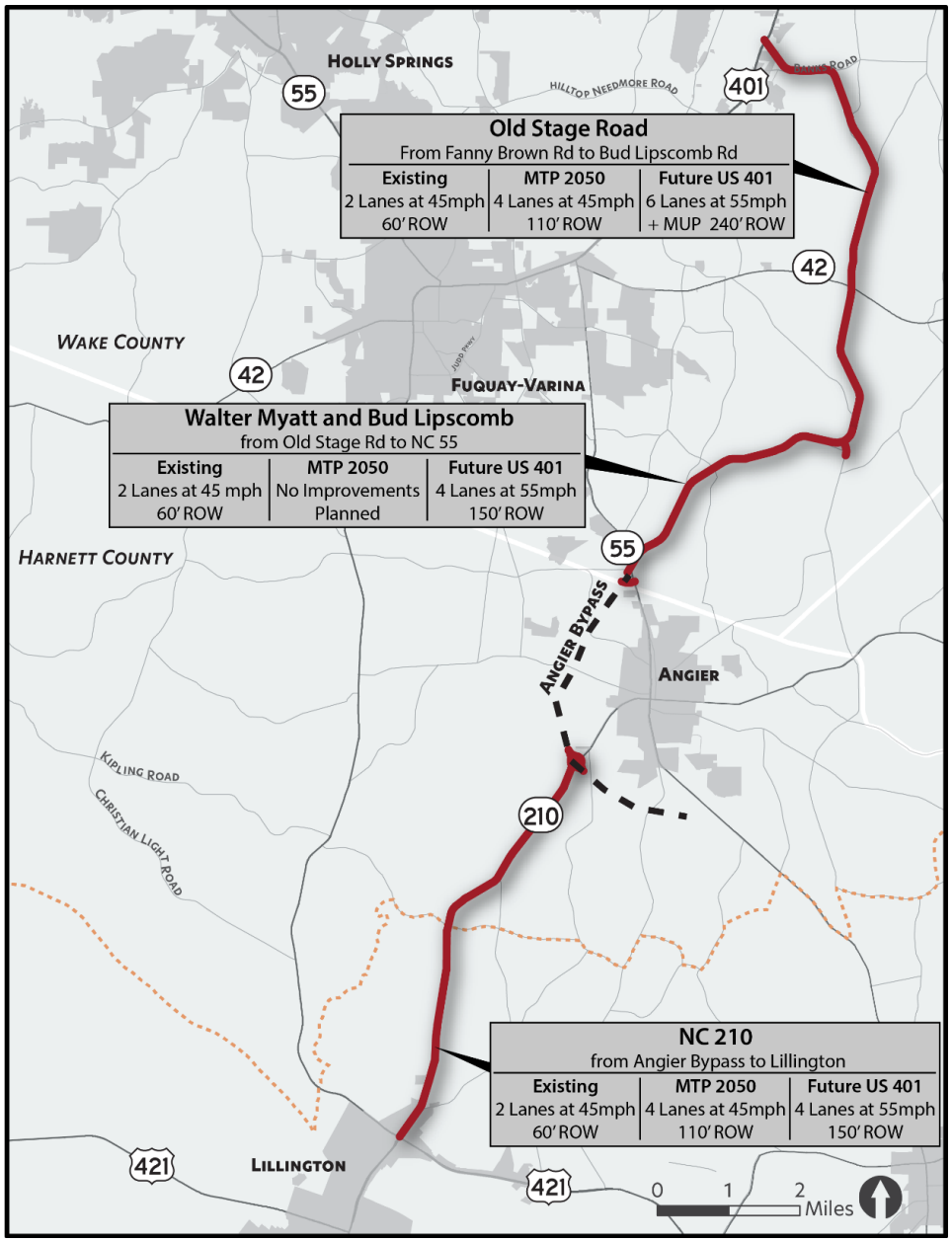
Development of New Alternative Alignments

Five new alternative alignments were created as a part of Round 1. The key focus in formulating these alignments was to maximize the use of existing roads while connecting the northern and southern ends of U.S. 401. Detailed descriptions of each new alignment alternative are included in this section of the report, adding these alignments to the originally developed alignments in Chapter 4.

Alternative A

Alternative A would start at the intersection of U.S. 401 and Banks Road. From this point, it would use Banks Road and Fanny Brown Road to reach Old Stage Road. The alignment would then use Old Stage Road, Bud Lipscomb Road, and Walter Myatt Roads to then merge on to the northern end of the planned N.C. 55 Angier Bypass. The alignment would exit the bypass at N.C. 210 and use N.C. 210 for the rest of the alignment until the intersection with U.S. 401 and U.S. 421 north of Lillington. Figure 5-1 shows the proposed alignment for Alternative A.

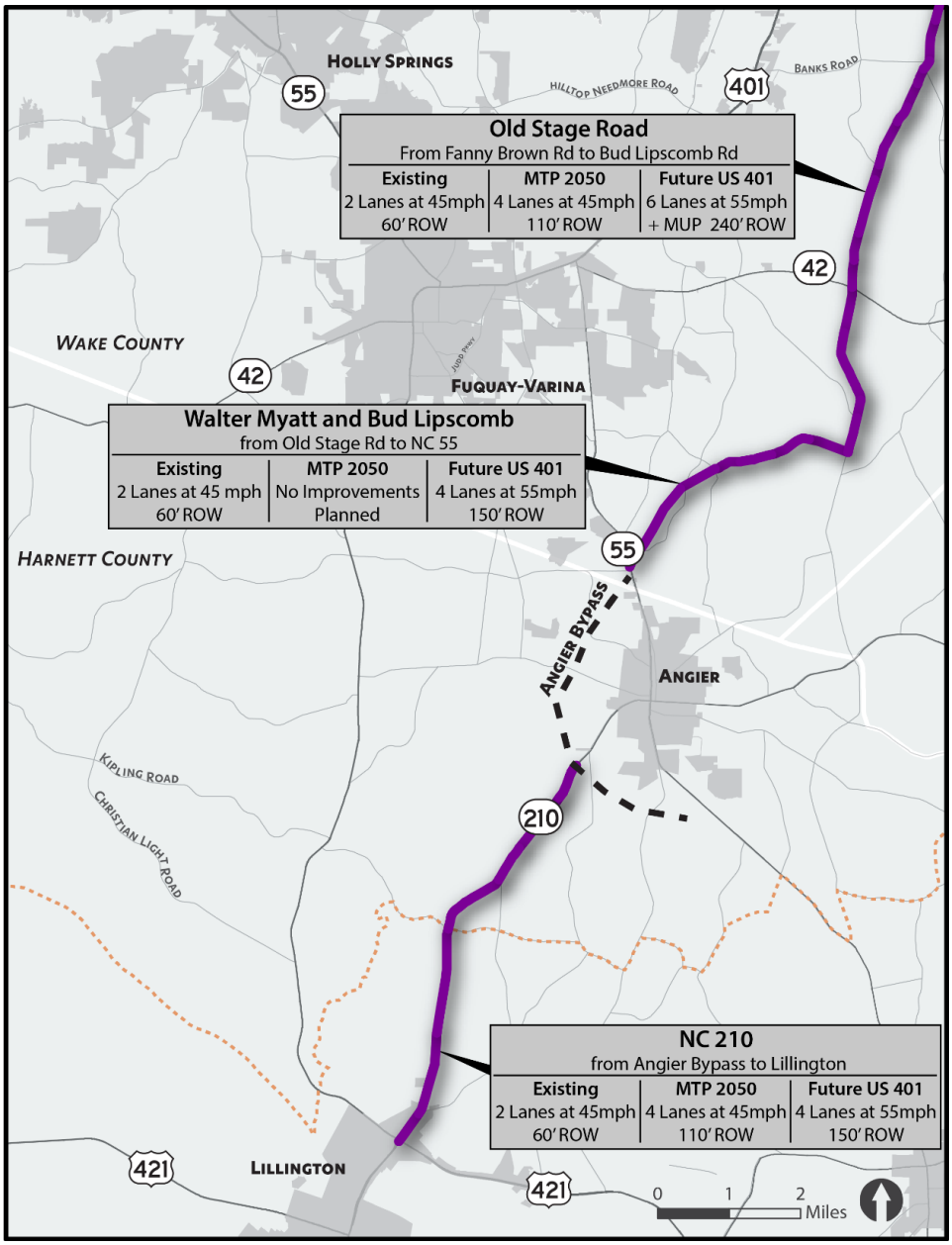
Figure 5-1: Alternative A Alignment



Alternative B

This alignment would start on U.S. 401 north of Ten-Ten Road and run east up to Old Stage Road from where the alignment will run south. The alignment then crosses N.C. 540 and uses Old Stage Road, Bud Lipscomb Road, and Walter Myatt Roads to then merge on to the northern end of the planned N.C. 55 Angier Bypass. The alignment would exit the bypass at N.C. 210 and use N.C. 210 for the rest of the alignment until the intersection with U.S. 401 and U.S. 421 north of Lillington. Figure 5-2 shows the proposed alignment for Alternative B.

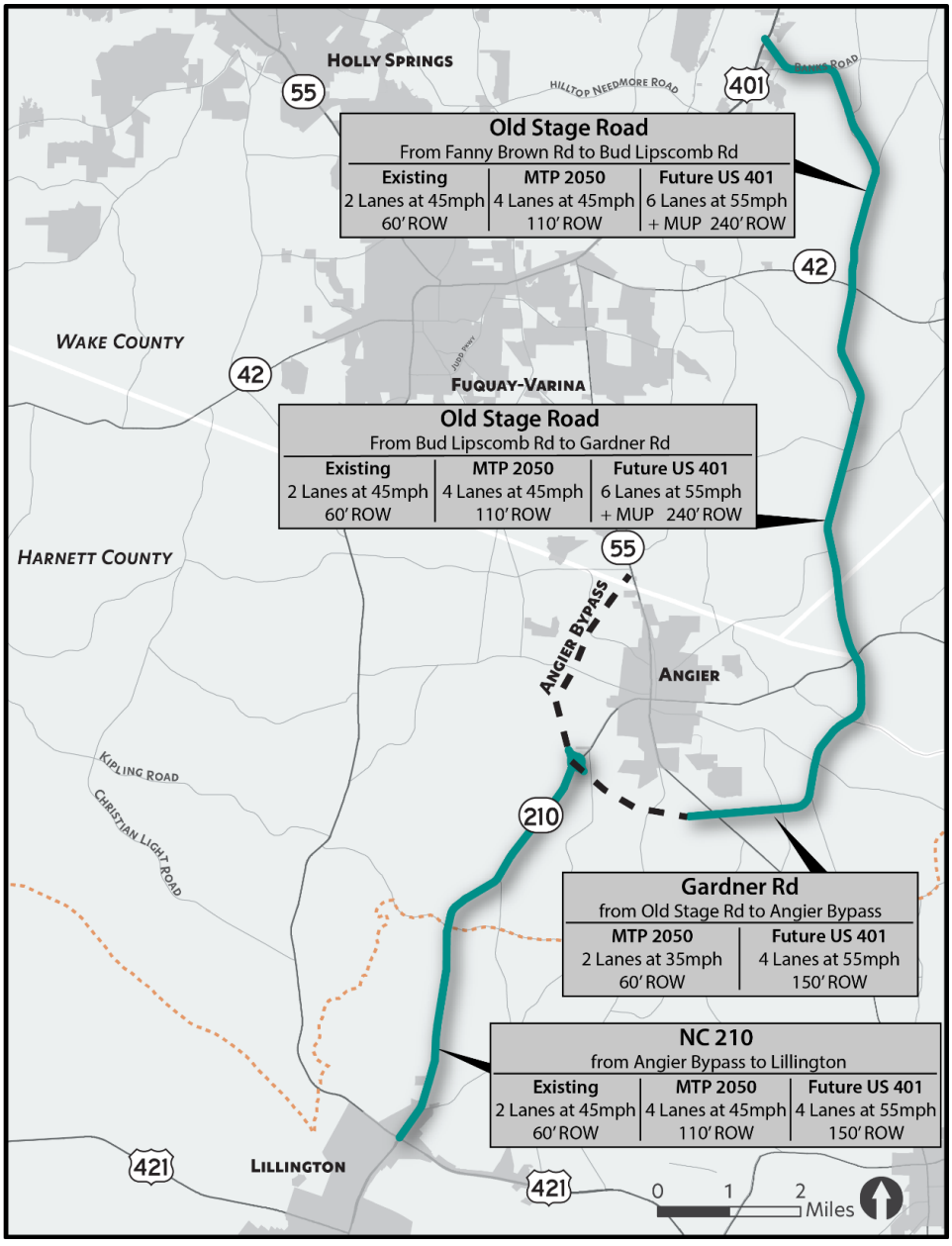
Figure 5-2: Alternative B Alignment



Alternative C

This alignment would start at the intersection of U.S 401 and Banks Road. From this point, it would use Banks Road and Fanny Brown Road to reach Old Stage Road. The alignment then uses Old Stage Road all the way to the planned Gardiner Road from where it would merge into the southern end of the planned N.C. 55 Angier Bypass. The alignment would exit the bypass at N.C. 210 and use N.C. 210 for the rest of the alignment until the intersection with U.S. 401 and U.S. 421 north of Lillington. Figure 5-3 shows the proposed alignment for Alternative C.

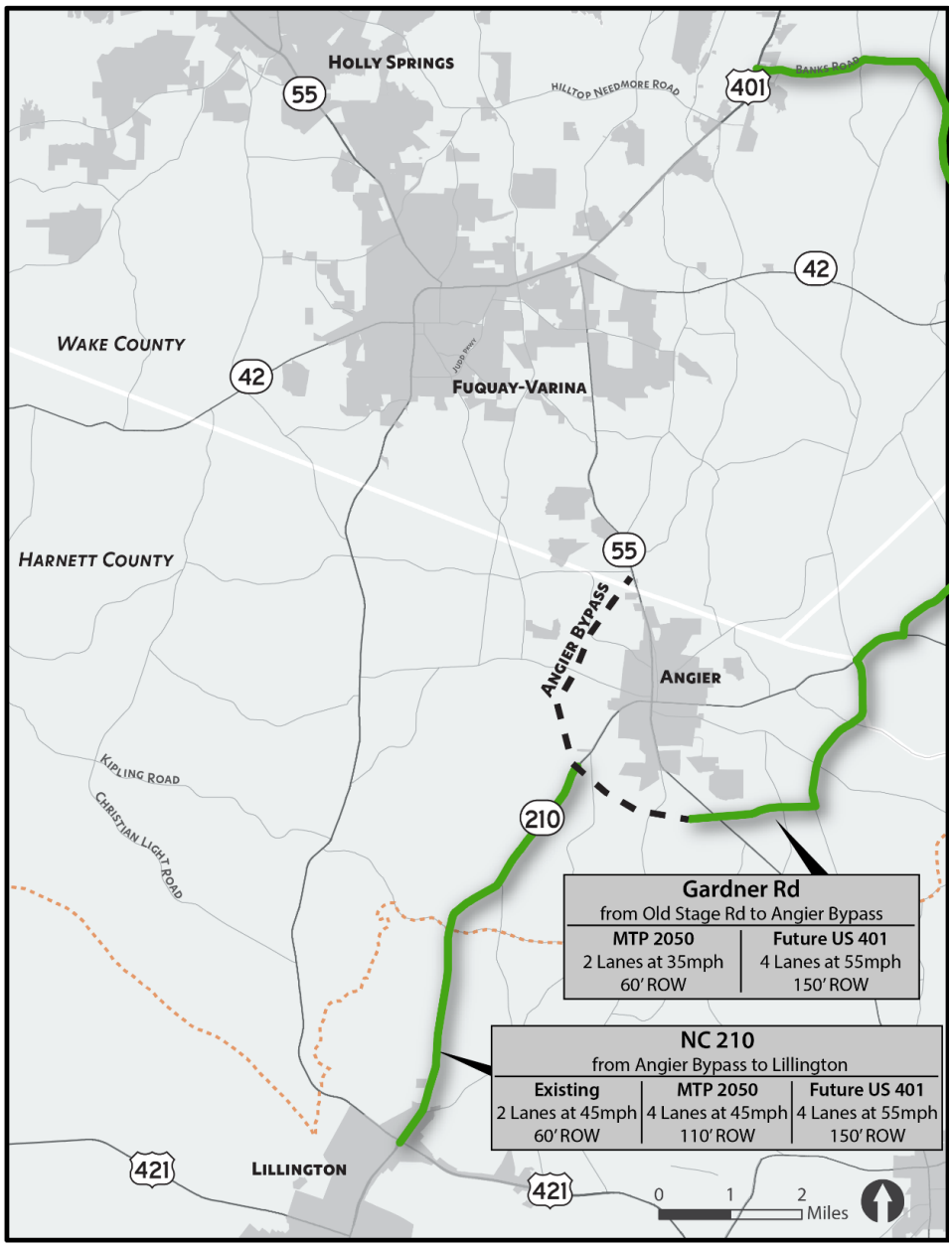
Figure 5-3: Alternative C Alignment



Alternative D

This alignment would start at the intersection of U.S 401 and Banks Road. From this point, it would use Banks Road, cross Old Stage Road, and use Rock Service Station Road all the way to N.C. 210 east of Angier. From this point, the road would use N.C. 210 to ply on to a short section of Old Stage Road before using planned Gardiner Road. This alignment would use the Angier bypass and use N.C. 210 for the rest of the alignment until the intersection with U.S. 401 and U.S. 421 north of Lillington. Figure 5-4 shows the proposed alignment for Alternative D.

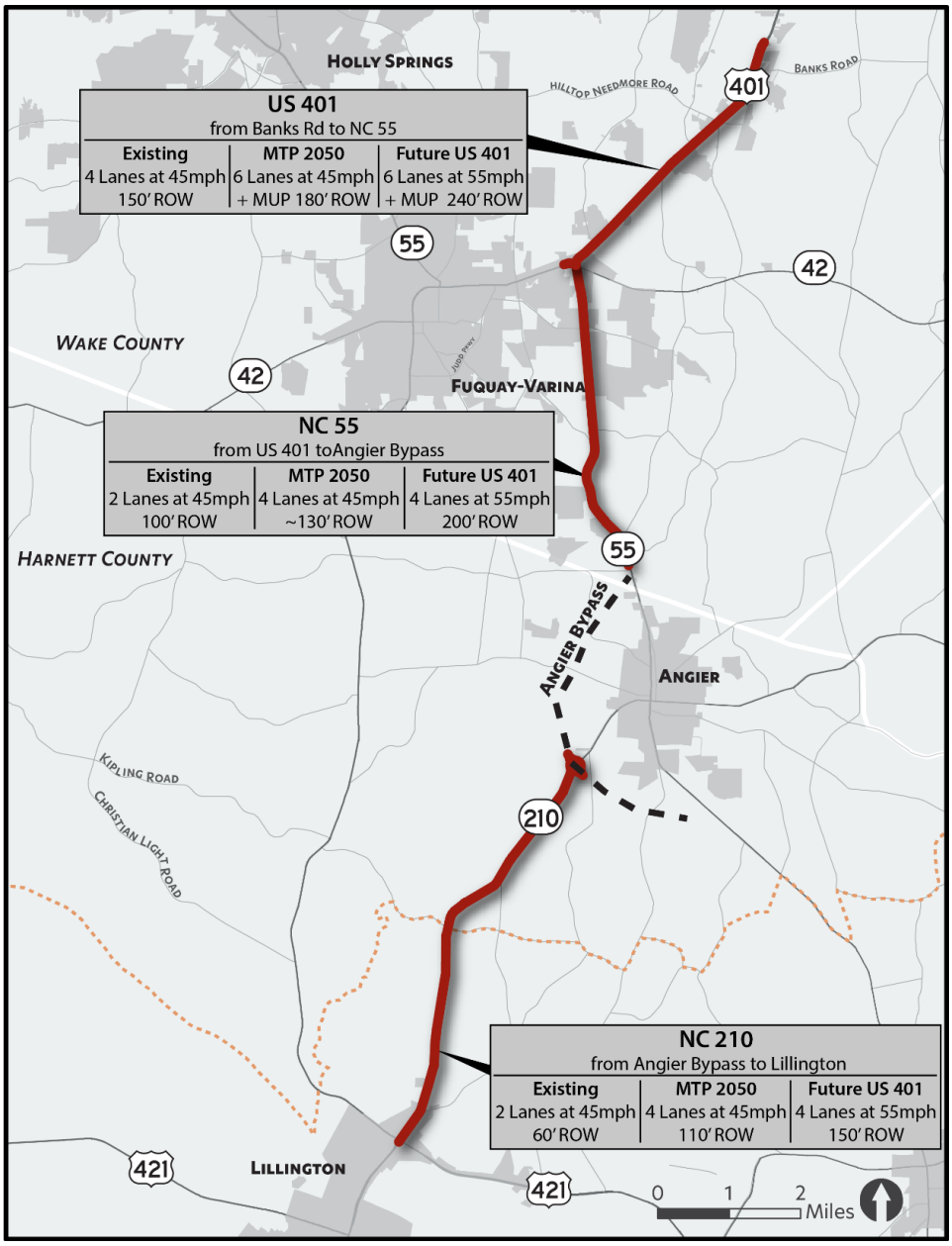
Figure 5-4: Alternative D Alignment



Alternative W

This is the only alternative proposed west of the original alignments. The alignment would use the existing and planned sections of U.S. 401, N.C. 55, Angier Bypass, and NC 210, as shown in Figure 5-5. The key to the formulation of this alternative is a constant further widening and speed increase on all of the above-mentioned roads (except Angier Bypass) beyond the widening planned or programmed in the 2050 CAMPO MTP. For U.S. 401 and N.C. 55, the speeds are proposed to be increased from 45 mph to 55 mph, which necessitate a wider right-of-way and further access control.

Figure 5-5: Alternative W Alignment



Travel Demand Modeling Results

Impacts of each alternative alignment for future U.S. 401 on the traffic volumes of other roads in the study area was key in determining which of the alternatives would prove most beneficial in terms of traffic. For this purpose, travel demand forecasts were developed of each alternative using Triangle Regional Model (TRM) V6. The forecasts were created for the horizon year of the model 2045. A no-build scenario was also created in which there were no improvements planned between N.C. 55 and U.S. 401 on the southeast and eastern side of Fuquay-Varina. Detailed results including model volumes at different locations and the comparison of their daily volumes with the no-build model are in the Appendix B. This section explains key takeaways for each alternative.

Alternative A – Traffic volumes increased on parts of Old Stage Road corresponding directly to its widening. Some increase in the volumes on U.S. 401 at the northern end were observed, but no significant change was noticed all along the rest of the existing U.S. 401 corridor. Traffic increased on N.C. 210 south of Angier Bypass owing to its widening.

Alternative B – Traffic volumes increased on Old Stage Road north of Walter Myatt Road corresponding directly to its widening. Traffic volumes on U.S. 401 at the northern end of the corridor decreased marginally because of the diversion caused in the network by Alternative B, but this decrease was insignificant (3 to 5%). Some reduction in traffic was noticed on Southern and Eastern Parkways. Traffic increased on N.C. 210 south of Angier Bypass owing to its widening.

Alternative C – Traffic volumes increased on Old Stage Road south of Panther Lake Road corresponding directly to its widening. Some increase in the volumes on U.S. 401 at the northern end were observed, but no significant change was noticed along the rest of the existing U.S. 401 corridor. Traffic increased on N.C. 210 south of Angier Bypass owing to its widening. Traffic increased on Southern Parkway since this alternative did not serve that area.

Alternative D – This alternative had the least amount of impact on the roadways in the study area owing to its distance to the far east and resultant lack of network effects. The only traffic increases observed were on Old Stage Road and Banks Road because of the alignment of Alternative D.

Alternative W – Increasing the speeds on U.S. 401 did not lead to a significant corresponding increase in traffic, whereas the traffic increase on N.C. 55 corresponds to the increase in its speed. No change was noticed on the existing U.S. 401. Some reduction in traffic was noticed on Southern and Eastern Parkways. Traffic increased on N.C. 210 south of Angier Bypass owing to its widening.

The following discussion lends itself to the traffic volumes associated with the two alternatives advanced from the previous alignment development outlined in Chapter 4.

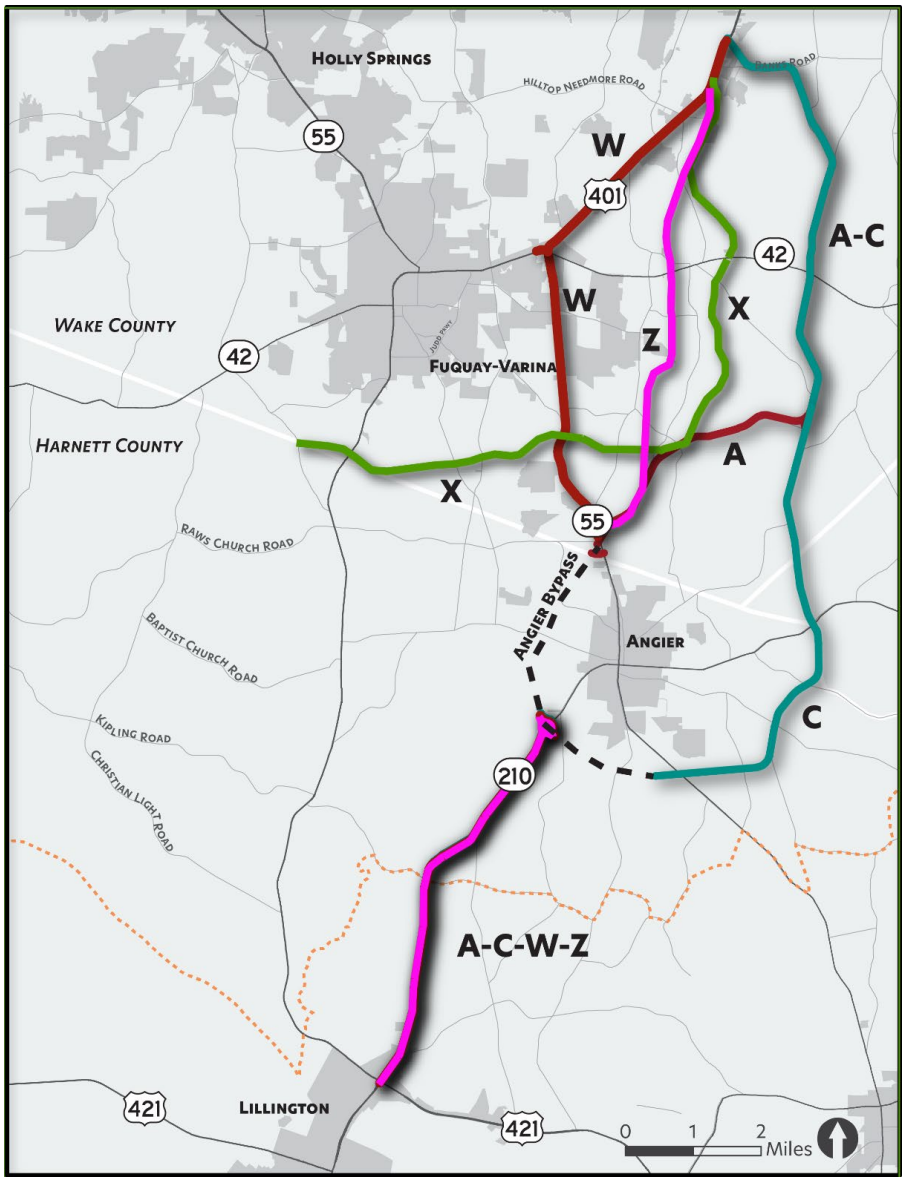
Alternative X – There is a significant variation between individual segments of Alternative X. North of N.C. 42, it carries 14,000 vehicles per day and south of N.C. 42, it drops to 3,000 vehicles per day. Traffic dropped on Kennebec Road and Hilltop Road Extension. Traffic slightly increased on the Southern Parkway due to network effects. Traffic increased on U.S. 401 north of its intersection with Alternative X at the northern end of the corridor but not as much as in Alternative Z.

Alternative Z – This alternative carries a consistent 17,000 to 20,000 vehicles per day. As a network effect, a reduction in traffic was noticed on Old Stage Road, Kennebec Road, Hilltop Road Extension, Southern Parkway, and Eastern Parkway. An insignificant decrease in traffic was also noticed on existing U.S. 401 in Harnett County. Traffic increased on U.S. 401 north of its intersection with Alternative Z at the northern end of the corridor, and on N.C. 210 south of Angier Bypass owing to its widening.

Elimination Round 1

The travel demand modeling analysis results suggest that alternatives B and D do not serve the goals of this study and do not meet the requirements of serving the traffic needs of the study area. In case of

Figure 5-6: Alternatives Shortlisted for Further Assessment



Alternative B, its northern end crossed N.C. 540, which would require a significant reengineering of an

ongoing project. Alternative D was too far east to serve the study area's needs. At the end of this round of the exercise, Alternatives A, C, W, X, and Z were advanced to the next round of analysis, with Alternatives B and D being eliminated from further consideration.

5.2 Round 2

Alternatives Impact Analysis

The main purpose of this analysis was to evaluate the new alternatives on the same parameters that were considered during the original alignment selection, discussed in Chapter 4. One large difference between the original alignments (X and Z) and the new alignments (A, C, and W) was that the former use new alignments, and the latter were created using existing roads. Additionally, the roads on which the new alignments have been planned are already slated for upgrades based on the CAMPO 2050 MTP. Even if the new alignments are not selected, the roads such as U.S. 401, Old Stage Road, and N.C. 210 are planned to be widened based on the projects included in the MTP. As a result, only the additional impact of widening beyond the already planned widening on these roads was considered for this evaluation.

For example, Old Stage Road is currently a 2-lane road at 45 or 55 miles per hour. CAMPO MTP proposes to widen this road to a 4-lane median divided road at 45 mph with sidewalks on both sides at 110' right-of-way. For Alternatives A and C, parts of Old Stage Road are planned to be widened to 6 lanes at 55 mph with multi-use paths on both sides at 240' right-of-way. For this analysis, only the incremental impact between the MTP right-of-way (110') and the right-of-way based on the alternatives A or C (240') was considered. This was determined to be the fairest way to compare new alignments and widening of existing alignments.

This section highlights the individual figures of key factors that contributed to the overall impact score of each alternative. The tables show the impacts that would be caused due to the MTP project, and the total impact caused if the alternative is chosen as future U.S. 401. The difference between these impacts will be the scores used in the overall calculations. In these tables, ROW stands for right-of-way, VADs stand for Voluntary Agricultural Districts, and Landmarks include schools, cemeteries, historic buildings, and places of worship.

Alternative A – Banks Road – Panther Lake Road - Old Stage Road – Bud Lipscomb Road – Walter Myatt Road – Angier Bypass – N.C. 210.

Table 5-1: Comparison of Impacts Between Alternative A and MTP Project

Metric	MTP 2050	U.S. 401	Additional impact due to U.S. 401
Number of Parcels Impacted	463	658	**195**
Estimated ROW Cost	$9.15 M	$53.43 M	**$44.28 M**
Agricultural ROW	47 acres	128 acres	**81 acres**
VADs Impacted	4	10	**6**
Landmarks Impacted	7	12	**5**
Acres of Wetland Impacted	1.3 acres	5.4 acres	**4.1 acres**

Alternative C – Banks Rd – Panther Lake Rd – Old Stage Rd – Gardner Rd – Angier Bypass – N.C. 210.

Table 5-2: Comparison of Impacts Between Alternative C and MTP Project

Metric	MTP 2050	U.S. 401	Additional impact due to U.S. 401
Number of Parcels Impacted	643	721	**78**
Estimated ROW Cost	$10.55 M	$56.53 M	**$45.98 M**
Agricultural ROW	107 acres	234 acres	**127 acres**
VADs Impacted	6	7	**1**
Landmarks Impacted	7	10	**3**
Acres of Wetland Impacted	3.9 acres	10.7 acres	**6.8 acres**

Alternative W – U.S. 401 – N.C. 55 – Angier Bypass – N.C. 210.

Table 5-3: Comparison of Impacts Between Alternative W and MTP Project

Metric	MTP 2050	U.S. 401	Additional impact due to U.S. 401
Number of Parcels Impacted	475	515	**40**
Estimated ROW Cost	$8.1 M	$36.0 M	**$27.9 M**
Agricultural ROW	44 acres	79 acres	**36 acres**
VADs Impacted	2	2	**0**
Landmarks Impacted	14	14	**0**
Acres of Wetland Impacted	1.83 acres	3.74 acres	**1.91 acres**

Alternative X – New Alignment – Ties into U.S. 401 near Harnett/ Wake County Line.

Table 5-4: Comparison of Impacts Between Alternative X and MTP Project

	MTP 2050	U.S. 401	Additional impact due to U.S. 401
Number of Parcels Impacted	-	115	**115**
Estimated ROW Cost	-	$16.7 M	**$16.7 M**
Agricultural ROW	-	150 acres	**150 acres**
VADs Impacted	-	5	**5**
Landmarks Impacted	-	2	**2**
Acres of Wetland Impacted	-	14.6 acres	**14.6 acres**

Alternative Z – New Alignment – Angier Bypass – N.C. 210.

Table 5-5: Comparison of Impacts Between Alternative Z and MTP Project

	MTP 2050	U.S. 401	Additional impact due to U.S. 401
Number of Parcels Impacted	221	375	**154**
Estimated ROW Cost	$2.4 M	$20.1 M	**$18.5 M**
Agricultural ROW	41 acres	131 acres	**90 acres**
VADs Impacted	2	9	**7**
Landmarks Impacted	3	3	**0**
Acres of Wetland Impacted	0.76 acres	8.92 acres	**8.16 acres**

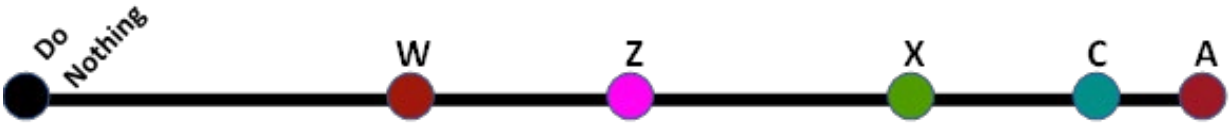
These tables only show a select set of metrics to provide a general idea on how the alternatives score against each other. Impact scores of all alternatives were calculated using 13 factors spread across four parameters – Property, Agriculture, Environment, and Cost. A table containing detailed metrics for all alternatives is included in Appendix B. These scores were calculated using both Public and CTT weights for each impact and then combined based on the same relative weights between Public and CTT weights that were established after the second round of public engagement.

Figure 5-7 below shows the alternatives ordered by their rank. Low combined scores mean that the alternatives have low overall negative impacts which yield a higher rank. Higher scores mean the alternatives have a higher overall negative impact which leads to a lower rank and less desirable alternative.

	Scoring and Weight	Public	CTT	Combined Weight	
	Alignment	42.60%	57.40%	100%	Rankings
W	401 / 55 / 210	0.31	0.32	0.32	1
Z	A2 B5 NC210	0.56	0.49	0.52	2
X	A4 B6 C1	0.76	0.73	0.75	3
C	Banks/OS/210	0.92	0.90	0.91	4
A	Banks/OS/WM/210	1.00	1.00	1.00	5

Figure 5-7: Order of Alternatives Based on Parameter Scoring

The below figure shows a graphical representation of the relative intensities of the combined impacts of



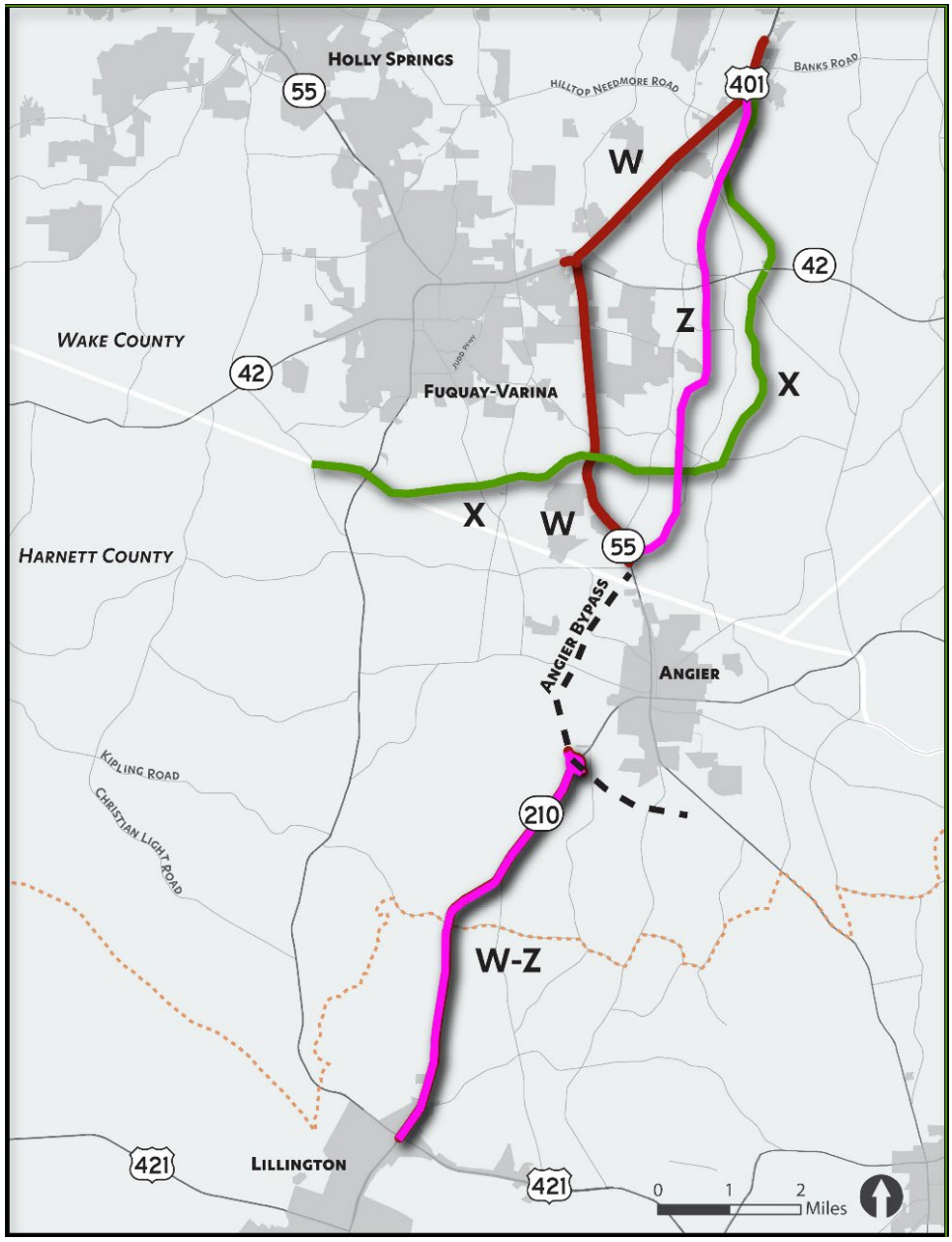
each alternative. The scale ranges from doing nothing to the most impactful alternative A and the location of the other alternatives shows their impact relative to Alternative A.

Elimination Round 2

The analysis of Alternatives A, C, W, X, and Z and its findings were presented to the CAMPO Executive Board on March 16, 2022. In this presentation, an explanation of the development of new alignments and how it relates to the Board directive in December 2021 was shown. New alignments, their model results, and the conclusions based on those results were explained to the Board. The model results showed that in general, the further east the alignment is located, the less relief it would provide to the existing corridor. Selection of the five alternatives, the additional analysis carried out on those alternatives, and the results of that analysis were also presented. It was explained that based on the analysis, Alternatives W, X and Z performed best, which reiterated the analysis findings that the alignments will need to be in the vicinity of the original alignment.

Based on this presentation, a motion was made by Vice Chair Jones, seconded by Board Member Massengill, to revise the scope and schedule of the U.S. 401 Corridor Study based on staff's findings and include the additional route of **Alternative W** (401/55/210), along with the original **Alternative X** (A4 B6 C1) and **Alternative Z** (A2/B5/210) in the study's findings.

Figure 5-8: Revised U.S. 401 Alternatives Advanced for Further Analysis



5.3 Round 3

Enhanced Travel Demand Modeling for Selected Alternatives

A cursory analysis of the travel demand model results suggested that Alternatives X and Z are primarily attracting local traffic instead of functioning as their original intended design as a bypass. If the alternatives were indeed functioning as a bypass, they would be expected to carry a generally consistent amount of traffic with incremental changes between each segment of the bypass. However, Alternatives X and Z exhibited a high degree of internal variation in daily traffic through the corridor. This was true, especially for Alternative X.

This understanding informed the next step of modeling where Alternatives W, X, and Z were downgraded to major arterials at 45mph so that their interaction with the local roads and the changes in the overall traffic patterns can be compared to their original counterparts. Using a 45mph design speed also allows for a smaller footprint, and thus the ability to minimize potential impacts.

Travel Time Comparison

A comparison of the free flow and congested travel times for No-Build (NB), 45 mph, and 55 mph versions of Alternatives W, X, and Z are shown in the tables below. The times are calculated for between the extreme ends of each alternative. Alternative W and Z have the same end points so their times are comparable, unlike X. Based on this data, Alternative Z at 45 mph in congested time is almost similar to the free flow time of Alternative W at 55 mph (difference of half a minute over almost 18 miles).

The differences between 45 and 55 mph congested times are between 1 and 2 minutes for all alternatives. This observation fed into the decision of proposing a 45 mph arterial roadway that would result in fewer impacts than a 55 mph access-controlled roadway while not sacrificing much in the way of travel time.

Table 5-6: Alternative W Travel Time Comparison Between 45mph and 55mph

W	Free Flow	Cong Time
NB	24.4	26.8
45 mph	26.1	28.6
55 mph	25.2	26.9

Table 5-7: Alternative X Travel Time Comparison Between 45mph and 55mph

X	Free Flow	Cong Time
NB	15.0	16.7
45 mph	18.0	18.4
55 mph	16.7	17.2

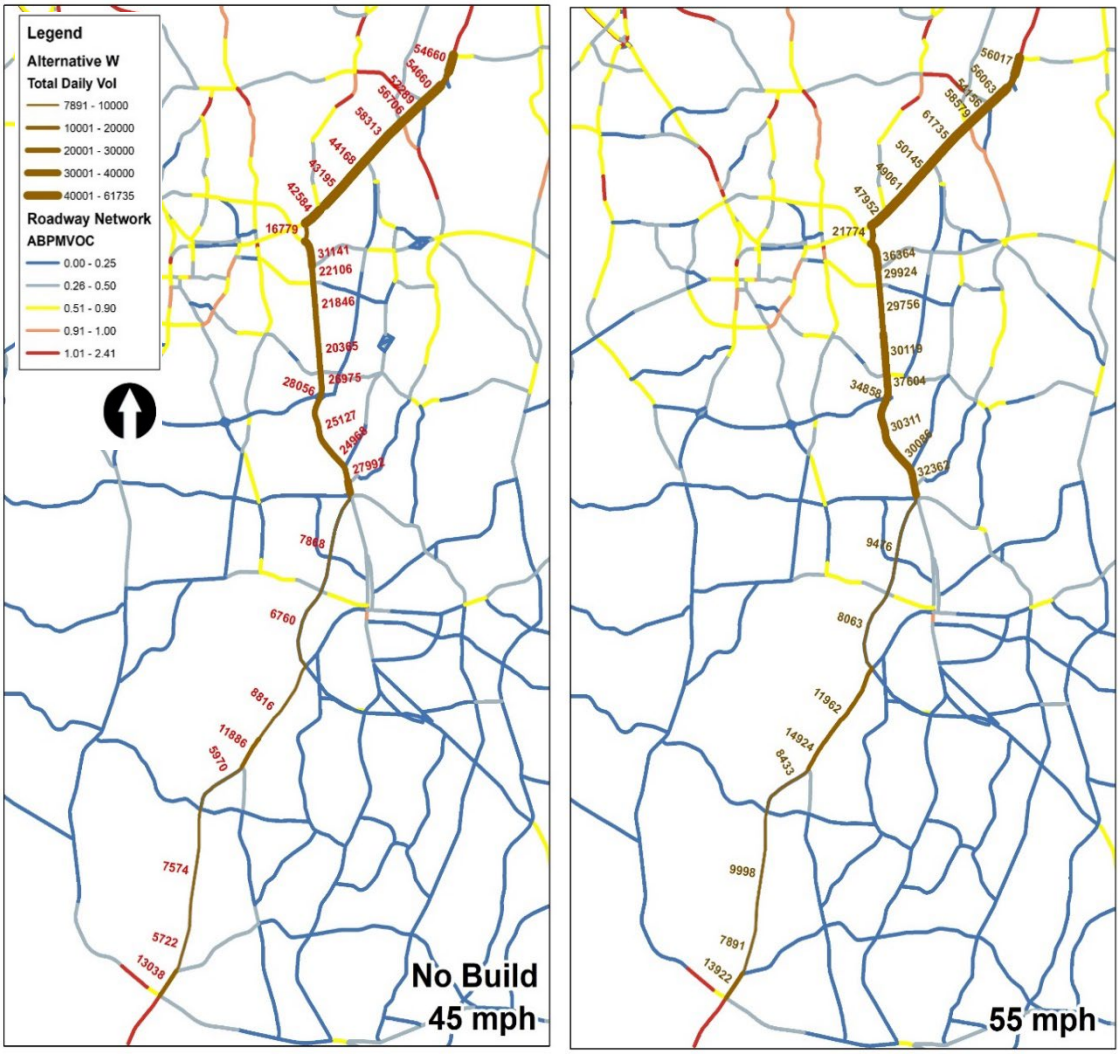
Table 5-8: Alternative Z Travel Time Comparison Between 45mph and 55mph

Z	Free Flow	Cong Time
NB	24.4	26.8
45 mph	24.7	25.7
55 mph	23.4	24.3

Alternative W

The maps in Figure 5-9 below show a comparison between two versions of Alternative W. The corridor in red corresponds to Alternative W and the numbers correspond to link-wise daily traffic volumes in both maps. The other colors in the maps correspond to the volume to capacity ratios of the other roads for the PM peak period. The map on the left shows U.S. 401, N.C. 55, and N.C. 210 downgraded to 45 mph, which in effect makes them correspond to projects already in CAMPO's MTP. As a result, downgrading these

Figure 5-9: Alternative W Comparison of Daily Traffic Volume Between 45mph and 55mph



corridors will create a true no-build scenario which will represent a network where all other MTP projects are built except the bypass link between N.C. 55 and U.S. 401 passing through southeast and east of Fuquay-Varina.

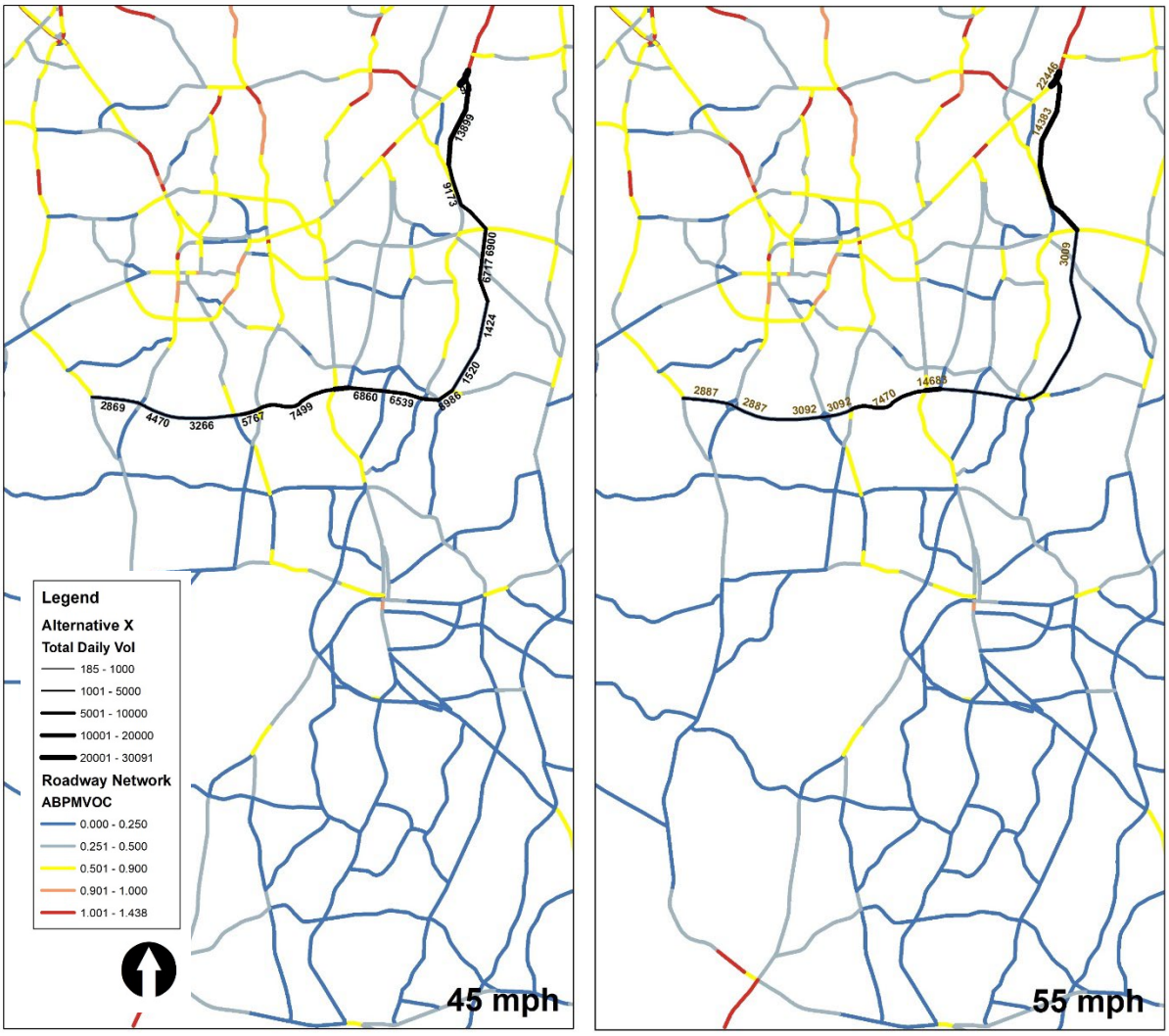
The reduction of speeds has led to reduction in volumes across all segments of the corridor, but the magnitude of the reduction varies. U.S. 401 experiences a traffic volume reduction of approximately 2,500 to 5,000 (5% to 10%), N.C. 55 experiences a reduction of 5,000 to 10,000 (20% to 35%), and N.C. 210 experiences a reduction of 2,000 to 3,000 (20%) daily traffic volumes. This reduction along the corridor results in the dispersal of traffic on to other roads in the network. There is a consistent drop of at least 2,000 vehicles which could be the true "bypass" traffic.

Alternative X

The maps in Figure 5-10 below show a comparison between two versions of Alternative X. The corridor in black corresponds to Alternative X and the numbers correspond to link-wise daily traffic volumes in both

Figure 5-10: Alternative X Comparison of Daily Traffic Volume Between 45mph and 55mph

maps. The other colors in the maps correspond to the volume to capacity ratios of the other roads for the PM peak period. The map on the left shows Alternative X at 45 miles per hour with intersections at every



major arterial and centroid connector in the vicinity, intending to maximize its access. The map on the right shows the original Alternative X, functioning as a freeway, with interchanges only with major roads.

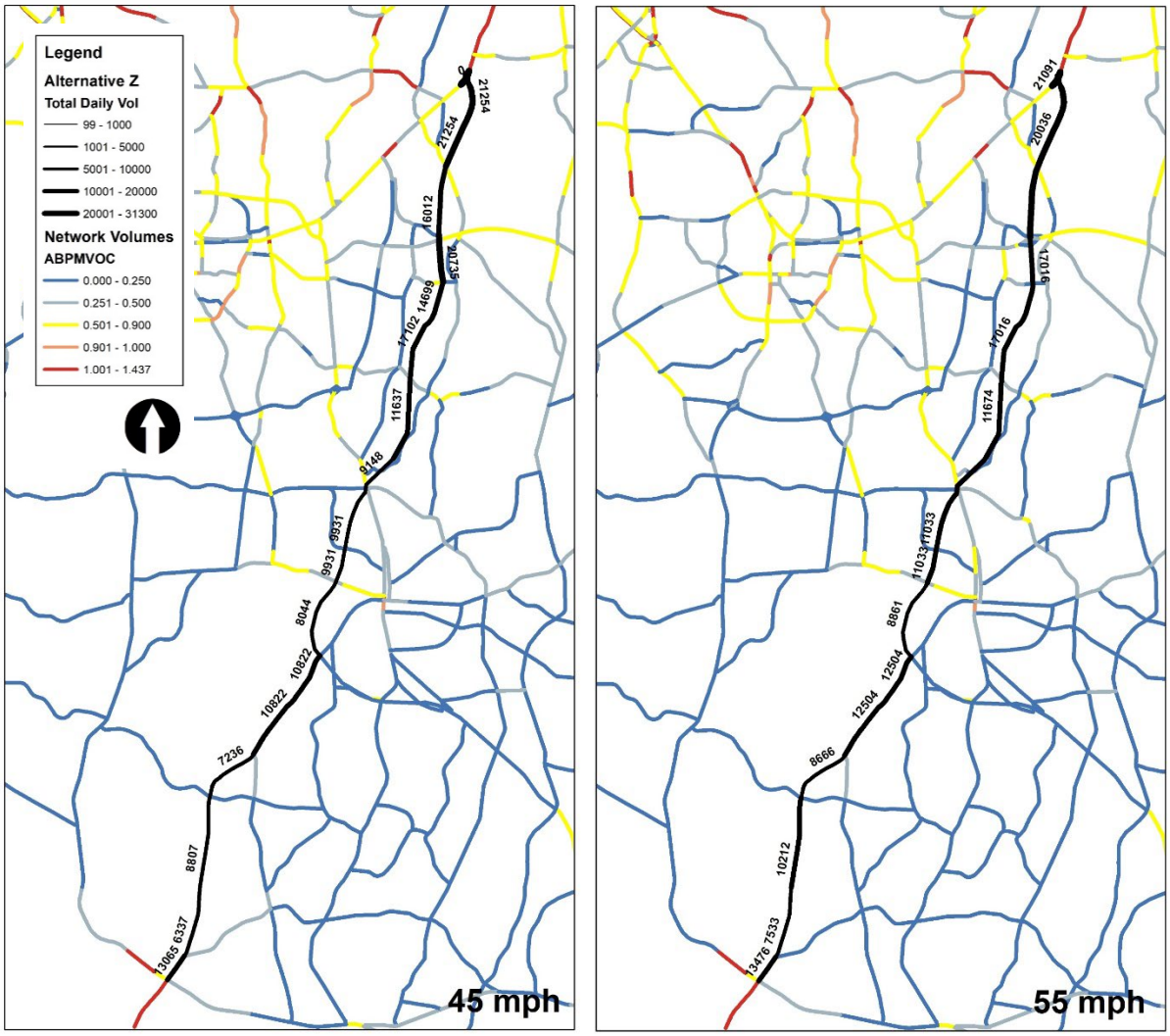
For the 45-mph option, higher interaction with the local roads, combined with slower speeds has introduced higher variation in the daily traffic volumes between each segment of the corridor. The 55-mph option on the other hand has more consistent, though lower overall volumes. Volumes on individual segments vary too much to be able to correctly assess a percentage change. This analysis suggests that increasing this alternative's interaction with local roads and downgrading it to 4-lanes at 45 miles per hour would prove more beneficial to the overall traffic flow along this corridor.

Alternative Z

The maps in Figure 5-11 show a comparison between two versions of Alternative Z. The corridor in black corresponds to Alternative Z and the numbers correspond to link-wise daily traffic volumes in both maps. The other colors in the maps correspond to the volume to capacity ratios of the other roads for the PM peak period. The map on the left shows Alternative Z at 45 miles per hour with intersections at every major arterial and centroid connector in the vicinity, intending to maximize its access. The map on the right shows the original Alternative Z, functioning as a freeway, with interchanges only with major roads.

Unlike Alternative X, the reduction of speeds and increasing interaction with local roads has led to insignificant changes in the volumes of Alternative Z north of Angier Bypass. The volumes on Angier Bypass and N.C. 210 decreased by approximately 2,000 vehicles per day due to the reduction in speeds, which translates to approximately 20% reduction. Similar to Alternative W, the network effect would help disperse the 2,000 vehicles to the other roads in the network with little change in their volume to capacity ratios. This analysis suggests that since both options carry similar volumes of traffic, it would be prudent to downgrade this alternative to 4-lanes at 45 miles per hour.

Figure 5-11: Alternative Z Comparison of Daily Traffic Volume Between 45mph and 55mph



Conclusion of Travel Demand Modeling Analysis

Based on the travel demand modeling analysis, the CTT concluded that Alternatives X and Z be redefined to incorporate the benefits of downgrading the corridor to 45 mph. This results in the removal of N.C. 210

and Angier Bypass from the alternatives since these roadway projects are already in the CAMPO MTP. Alternative W should be split into two separate alternatives - Alternative Wm and Alternative Wp, where Wm corresponds to only incorporating existing MTP projects and Wp corresponds to the MTP projects plus the improvements needed to upgrade the corridor to 55 mph.

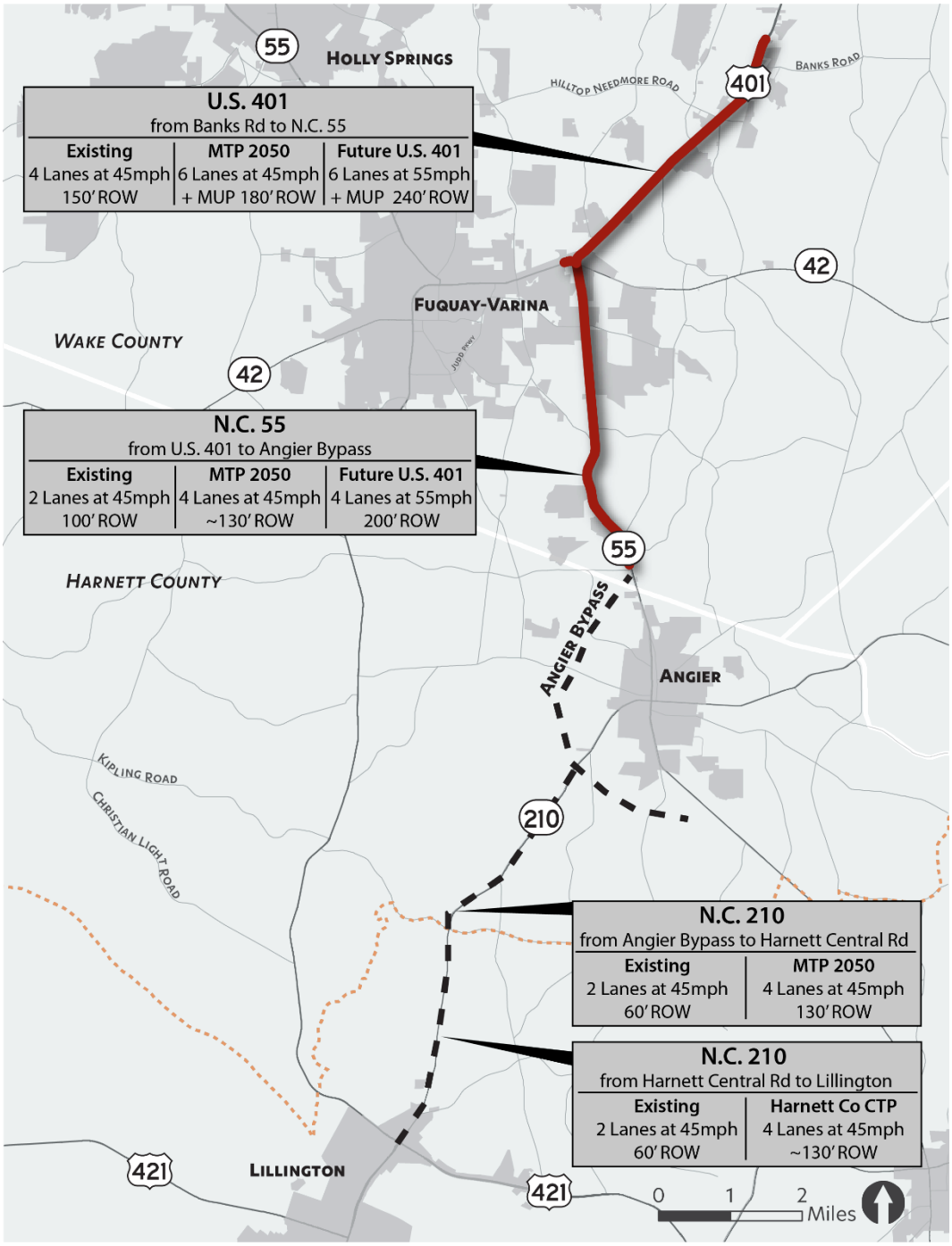
The following provides additional discussion of each of the alternatives advanced following revisions resulting from the travel demand modeling analysis.

Alternative Wm

Alternative Wm represents an alternative that captures the improvements undertaken as part of the CAMPO MTP 2050 only. This includes:

- Widen U.S. 401 from 4 lanes to 6 lanes at 45 mph.
- Widen N.C. 55 from 2 lanes to 4 lanes at 45 mph.
- Widen N.C. 210 from 2 lanes to 4 lanes at 45 mph.
- Use a portion of the Angier Bypass between N.C. 55 and N.C. 210.

Figure 5-12: Alternative Wm Alignment

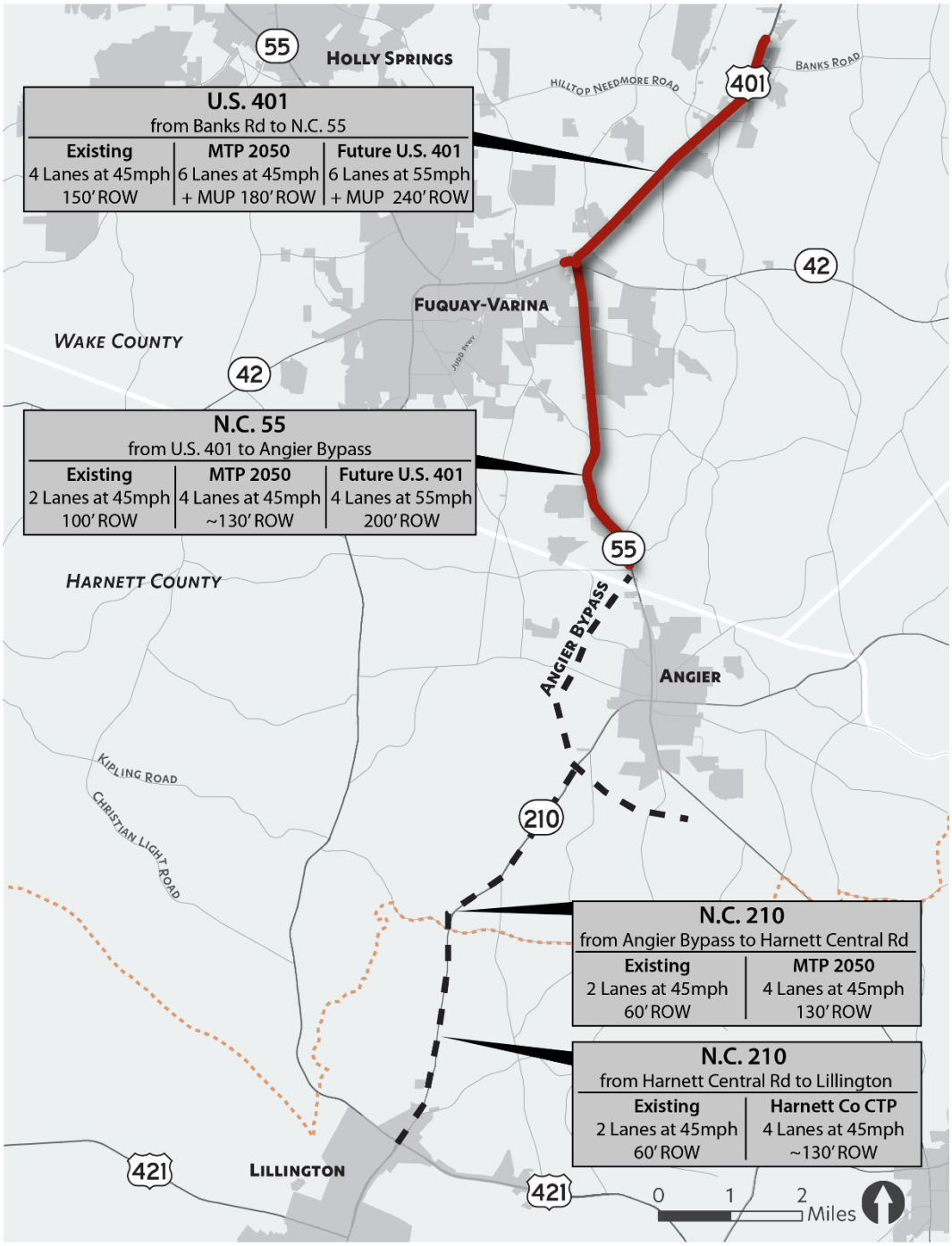


Alternative Wp

Alternative Wp represents an alternative that captures the improvements undertaken as part of the CAMPO MTP 2050 and additional improvements needed for the Alternative W U.S. 401 project. This includes:

- Widen U.S. 401 from 4 lanes to 6 lanes at 55 mph.
- Widen N.C. 55 from 2 lanes to 4 lanes at 55 mph.
- Widen N.C. 210 from 2 lanes to 4 lanes at 45 mph.
- Use a portion of the Angier Bypass between N.C. 55 and N.C. 210.
- Provide some level of access control on U.S. 401 and N.C. 55 within areas identified as economic development focus areas.
- 55mph design speed requires a larger footprint, resulting in greater impacts than a 45 mph roadway.

Figure 5-13: Alternative Wp Alignment



Benefits of Alternative Wp

The benefits of Alternative Wp, as generated through assessment of the technical data and input from the CTT and public include:

- The alternative builds upon a project already identified in the MTP.
- This alternative provides the greatest traffic benefit.

Challenges of Alternative Wp

The challenges of Alternative Wp, as generated through assessment of the technical data and input from the CTT and public include:

- This alternative requires widening and some level of access control of U.S. 401 and N.C. 55 beyond that of the MTP project, impacting approximately 288 properties, 53% of which are commercial and 35% of which are residential.
- This alternative would impact the viability of economic development expansion along U.S. 401 and N.C. 55, both identified as Highway Corridor Overlay Districts appropriate for regional-scale development.

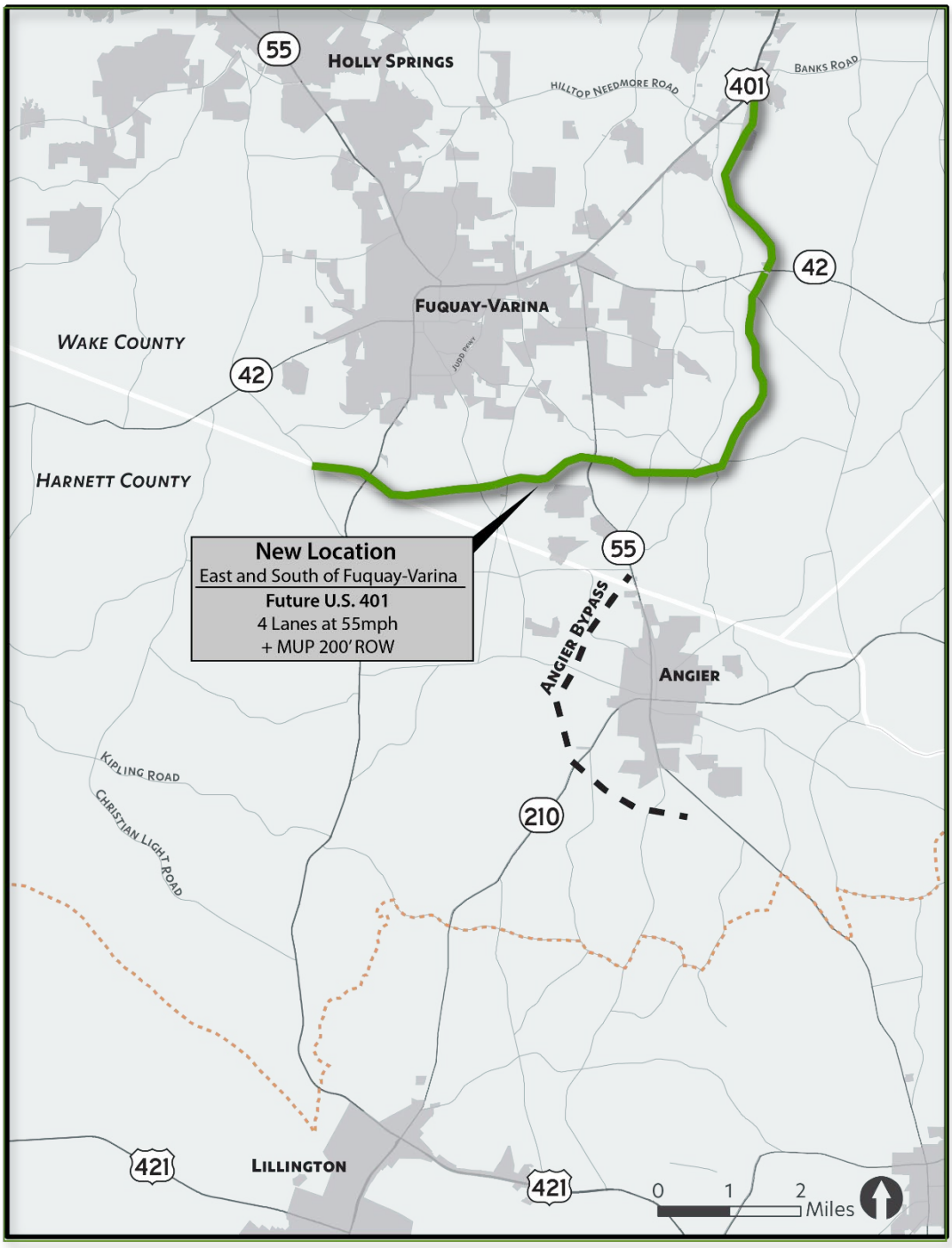
The original corridor analysis for the Future U.S. 401 project looked at a 55mph, limited access roadway for all alignments. Alternative W along U.S. 401 and N.C. 55 would need to be a 55mph roadway to address the increase in traffic. This would increase necessary right-of-way impacts and require limiting access at some interchanges, intersections, driveways or median openings to the roadway. Alt. X and Z are better suited for 45mph roadways. This would allow for a smaller right-of-way and provide more access to nearby roadways and adjacent commercial/residential properties.

Alternative X

Alternative X represents an alternative that was carried forward from the initial round of alternative development and closely resembles the U.S. 401 Bypass project that is currently in the MTP. This includes:

- Using new right-of-way to construct a new 4-lane, 45 mph roadway from U.S. 401 near Banks Road, crossing U.S. 401 near the Wake/Harnett County line, and terminating at Piney-Grove Rawls Road.
- A portion of this alignment would use the right-of-way being established for Southern Parkway.
- No direct connection to Angier Bypass.

Figure 5-14: Alternative X Alignment



Benefits of Alternative X

The benefits of Alternative X, as generated through assessment of the technical data and input from the CTT and public include:

- The alternative aligns with Southern Parkway, which is under development, reducing the amount of new right-of-way needed.

Challenges of Alternative X

The challenges of Alternative X, as generated through assessment of the technical data and input from the CTT and public include:

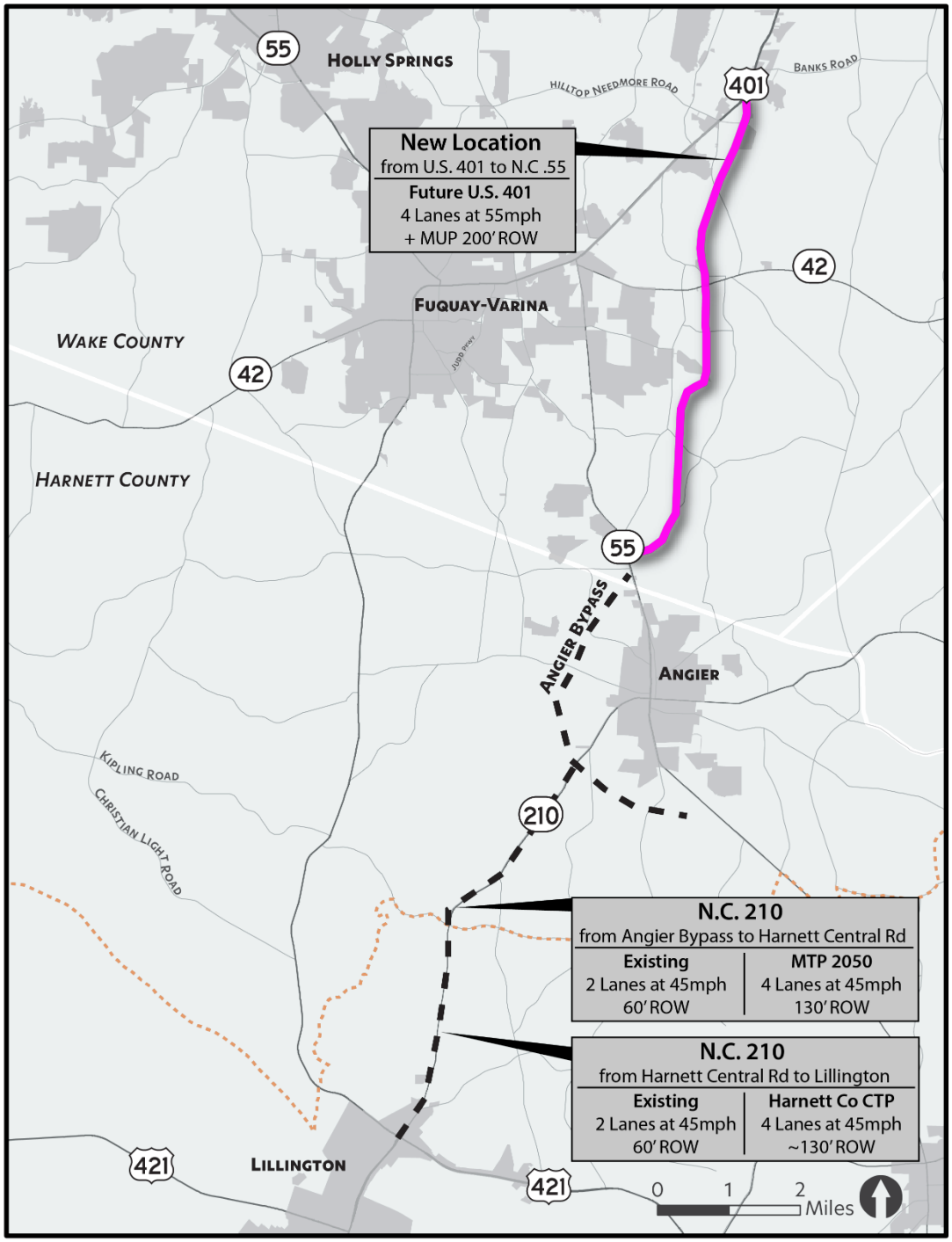
- This alternative does not provide a direct connection to the Angier Bypass.
- This alternative has the lowest project traffic volumes of the alternatives evaluated, thus making the feasibility of funding this project more difficult.
- This alternative requires mostly new right-of-way, impacting approximately 109 properties, 54% of which are residential and 19% of which are agricultural.

Alternative Z

Alternative Z represents an alternative that was carried forward from the initial round of alternative development and connects Angier Bypass with U.S. 401 near Banks Road. Combined with the projects already identified in the MTP 2050 for N.C. 210, this alternative provides a connection between U.S. 401 near Banks Road to U.S. 401 at U.S. 421 near Lillington. This includes:

- Using new right-of-way to construct a new 4-lane, 45 mph roadway.
- Provides direct connection to Angier Bypass and incorporates N.C. 210 widening identified in the MTP 2050.

Figure 5-15: Alternative Z Alignment



Benefits of Alternative Z

The benefits of Alternative Z, as generated through assessment of the technical data and input from the CTT and public include:

- The alternative connects directly to Angier Bypass and uses proposed N.C. 210 improvements identified in the MTP 2050 to accommodate a future U.S. 401 between Banks Road northeast of Fuquay-Varina and U.S. 421 near Lillington.
- The alternative allows for Southern Parkway to retain its proposed 35mph cross-section.
- The alternative provides a high traffic benefit, enhancing travel patterns between Lillington and Banks Road.
- This alternative serves high growth areas of Wake and Harnett Counties.

Challenges of Alternative Z

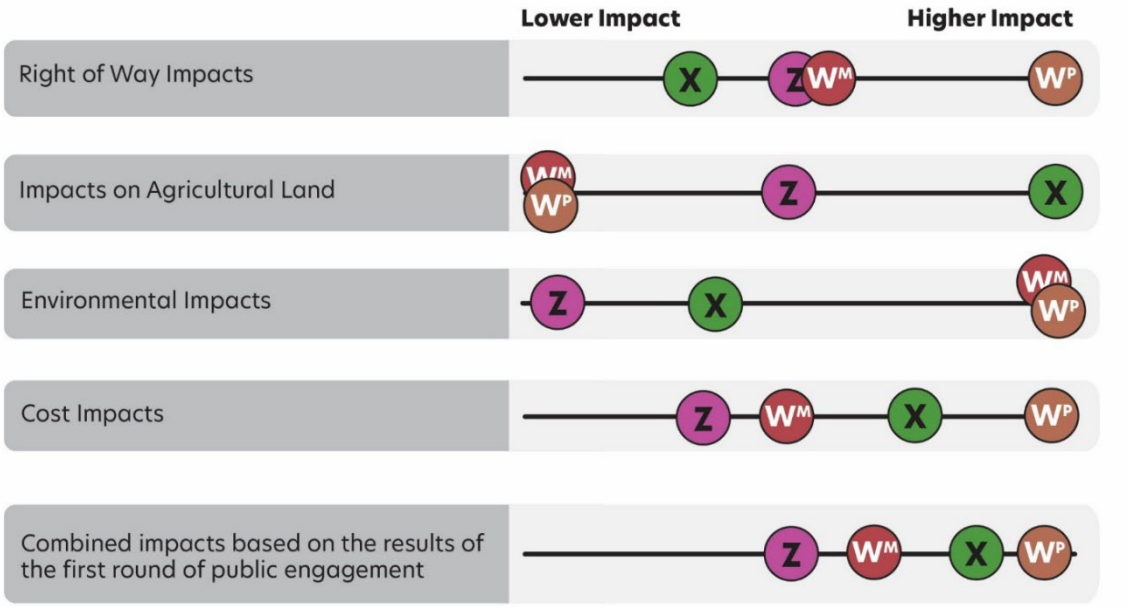
The challenges of Alternative Z, as generated through assessment of the technical data and input from the CTT and public include:

- This alternative would require modification to the intersection of Angier Bypass and N.C. 55 to accommodate a direct connection to the Angier Bypass.
- This alternative requires all new right-of-way to construct, impacting approximately 137 properties, 56% of which are residential and 11% of which are agricultural.

Analysis on Additional Parameters

The initial analysis of alignment alternatives was performed on four key parameters – Right of Way, Agricultural impacts, Environmental impacts, and Project Cost. The four alternatives (Wm, Wp, X, and Z) were analyzed on these parameters to determine their scores for each parameter, and their combined impact scores. Weighted impacts of the four selected alternatives are shows in Figure 5-16.

Figure 5-16: Analysis of Alternatives Wm, Wp, X, and Z



This analysis suggests that alternative Z is the least impactful alternative, followed by Wm, X, and then Wp being the most impactful based on these parameters. The CTT determined that more parameters were required for further analysis. New parameters were drawn from a combination of goals and objectives of the study to build on the original parameters. The new parameters were further subdivided into two groups, impacts and benefits, as follows:

Impacts

- Total number of properties impacted.
- Number of commercial and/or industrial properties impacted.
- Number of residential properties impacted.
- Number of agricultural and rural residential properties impacted.
- Number of buildings impacted.
- Impacts to properties identified for economic development.

Benefits

- Volume of traffic served by the alternative.
- Travel reliability during peak hours.
- Ability to provide multimodal connectivity.
- Ability to provide access to adjacent properties.

The following figures show the relative evaluation of each alternative for each impact and benefit parameter. These evaluations were presented at the third round of public engagement. The survey

questions and the final results of the survey are included in the public engagement summary in Appendix B. The final results were not used to calculate relative weights of the parameters.

Figure 5-17: Additional Analysis of Alternatives Wm, Wp, X, and Z

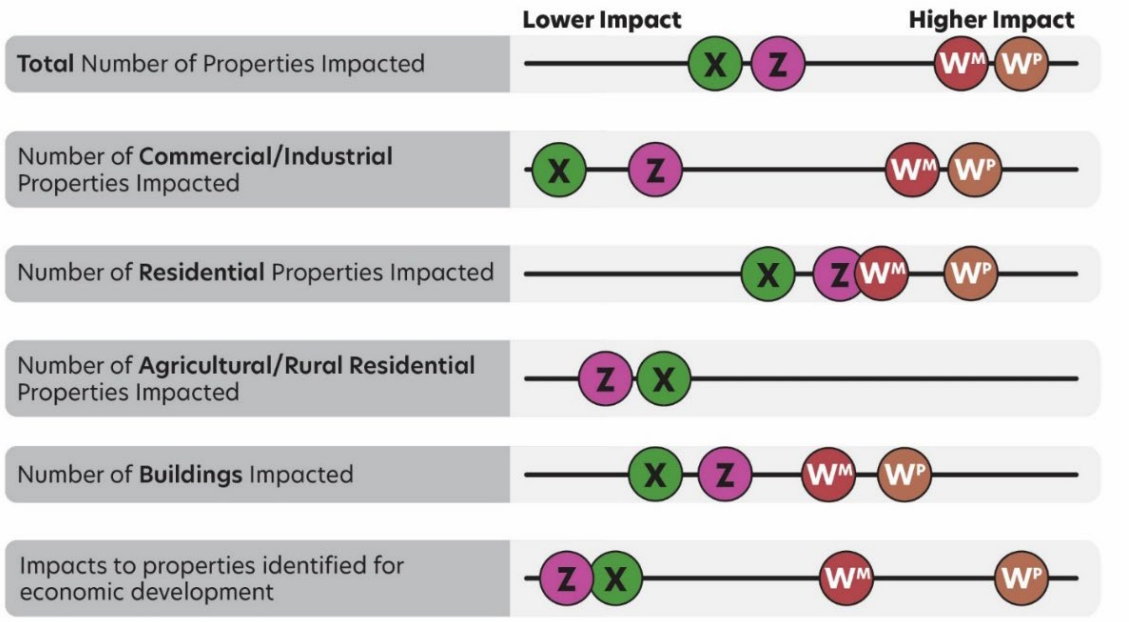


Figure 5-18: Analysis of Benefits of Alternatives Wm, Wp, X, and Z

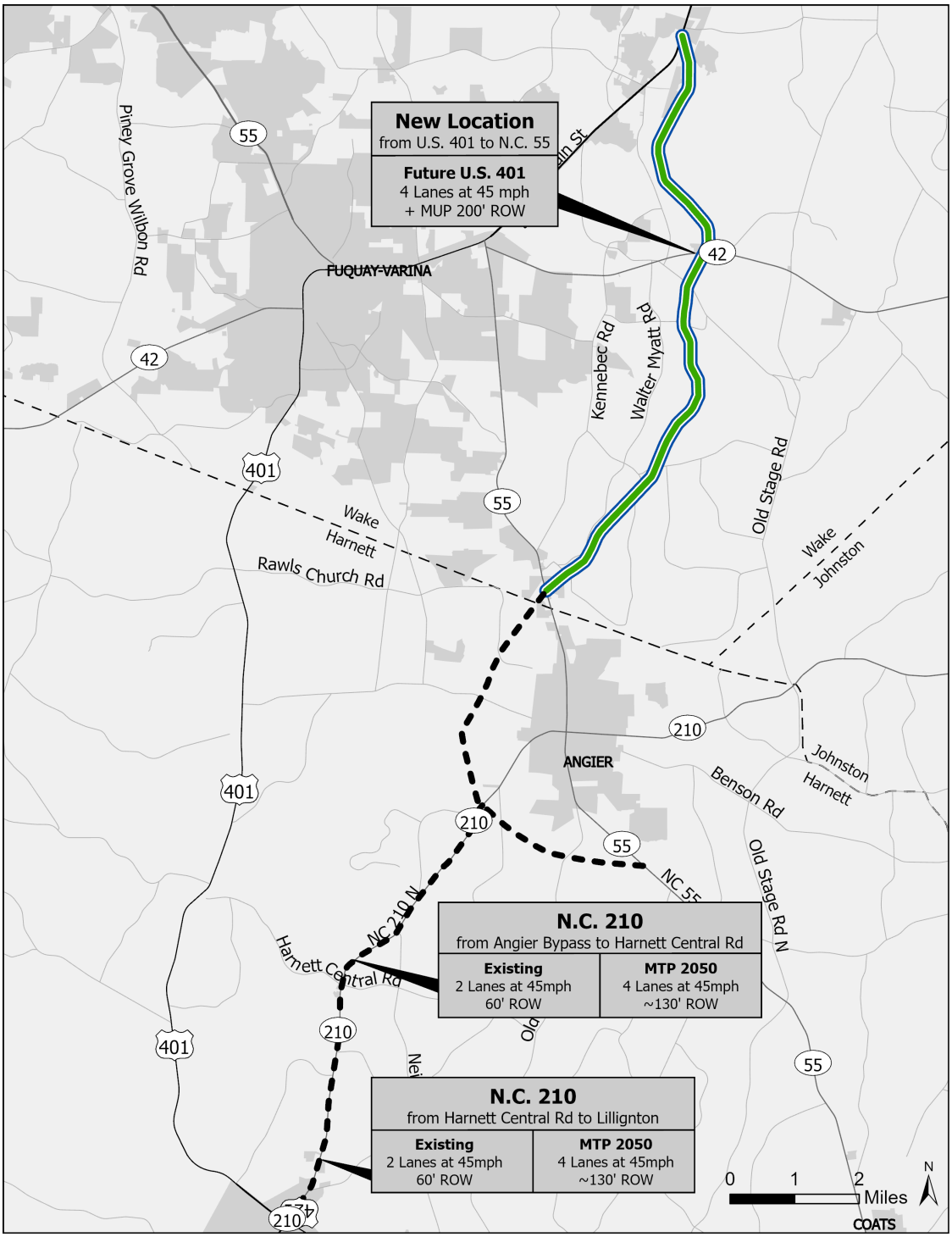
Combined Alternatives

After examining the impact and benefit scores of the four alternatives, the CTT decided to explore the potential to combine alternatives X and Z to form a hybrid alternative.

Alternative XZ – This alternative was created by combining the eastern part of Alternative X with the southern part of Alternative Z, the conceptual alignment of which is shown in Figure 5-19. The resulting

Alternative XZ alignment starts at U.S. 401 near Banks Road, follows Alternative X (green corridor) until it crosses over to Alternative Z (purple corridor) and connecting to the Angier Bypass.

Figure 5-19: Alternative XZ Conceptual Alignment



Benefits of Alternative XZ

The benefits of Alternative XZ, as generated through assessment of the technical data and input from the CTT and public include:

- The alternative connects directly to Angier Bypass and uses proposed N.C. 210 improvements identified in the MTP 2050 to accommodate a future U.S. 401 between Banks Road northeast of Fuquay-Varina and U.S. 421 near Lillington.
- The alternative allows for Southern Parkway to retain its proposed 35mph cross-section.
- The alternative enhances travel patterns between Lillington and Banks Road.
- While modeled to serve less future traffic than Alternative Z, development is quickly pushing east, and this alternative would serve these high growth areas and experience a similar high traffic benefit.

Challenges of Alternative XZ

The challenges of Alternative XZ, as generated through assessment of the technical data and input from the CTT and public include:

- This alternative would require modification to the intersection of Angier Bypass and N.C. 55 to accommodate a direct connection to the Angier Bypass.
- This alternative requires all new right-of-way to construct, impacting approximately 100 properties, 58% of which are residential and 25% of which are agricultural.

Chapter 6: Recommended Future U.S. 401 Alternative

The CTT met on June 7, 2023 to review, assess, and discuss all the technical information prepared for the project, review comments provided by the public and stakeholders on the alternatives shown at the December 2022 public meetings, and determine a path forward a U.S. 401 alternative. At that meeting, the CTT recommended the following:

Advance Alternative XZ as the new future U.S. 401 alignment to be included in the MTP, replacing the existing U.S. 401 Bypass alignment included in the MTP 2050.

The recommended Alternative XZ alignment is shown in figure 6-1, with the connection between the Alternative X and Alternative Z segments "smoothed" out.

In its recommendation, the CTT acknowledged that:

- The project is still in the planning phase and isn't planned for construction until 2050, but the need to start planning for and reserving right-of-way sooner rather than later is essential to the success of the project.
- Alternative XZ provide a better alignment that the U.S. 401 Bypass alignment currently in the MTP 2050.

The CTT provided the following items to be included as part of the recommendation:

- Projects identified in the MTP 2050 for U.S. 401 between Banks Road and N.C. 55, N.C. 55 between U.S. 401 and Angier Bypass, and N.C. 210 between Angier Bypass and U.S. 401/ U.S. 421 should be elevated in priority and given a construction horizon year that completes these projects before Alternative XZ is built.
- There should be a continued effort to prioritize other roadway and intersection improvement projects in the study area that can provide more near-term benefit.

The SOT met on June 21, 2023 to review, assess, and discuss the CTT's recommendations. At that meeting, Wake County SOT members provided the following input to be considered in a recommendation:

- Wake County has heard the concern of the agricultural businesses in this area and will use tools available to support them.
- The County's Comprehensive Plan will be updated to show this area as Rural on the Development Framework Map.
- The County can support Alternative XZ as a long-term corridor over that U.S. 401 Bypass alignment currently shown in the adopted MTP.
- The County feels that the section of N.C. 55 between Five Points in Fuquay-Varina and the Angier Bypass should be prioritized in the MTP.
- The County requests that CAMPO look at and determine the cost of a variety of small intersection projects on area roadways and consider these for inclusion into the MTP. The inclusion of projects will provide better context on the timing of the Alternative XZ development.

At that meeting, the SOT agreed to the CTT's recommendation to advance Alternative XZ and recommend to the CAMP Executive Board the following:

- **To advance Alternative XZ as the new future U.S. 401 alignment to be included in the MTP, replacing the existing U.S. 401 Bypass alignment included in the MTP 2050.**
- **That CAMPO work to prioritize projects identified in the MTP 2050 for U.S. 401 between Banks Road and N.C. 55, N.C. 55 between U.S. 401 and Angier Bypass, and N.C. 210 between Angier Bypass and U.S. 401/ U.S. 421 should be elevated in priority and given a construction horizon year that completes these projects before Alternative XZ is built.**
- **That CAMPO look at and determine the cost of a variety of small intersection projects on study area roadways and consider these for inclusion into the MTP. The inclusion of projects will provide better context on the timing of the Alternative XZ development.**

Figure 6-1: Alternative XZ Proposed Cross-Section

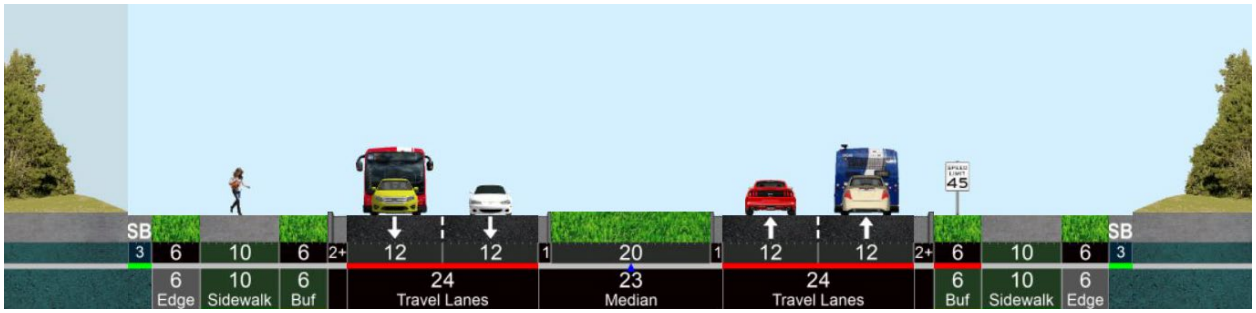
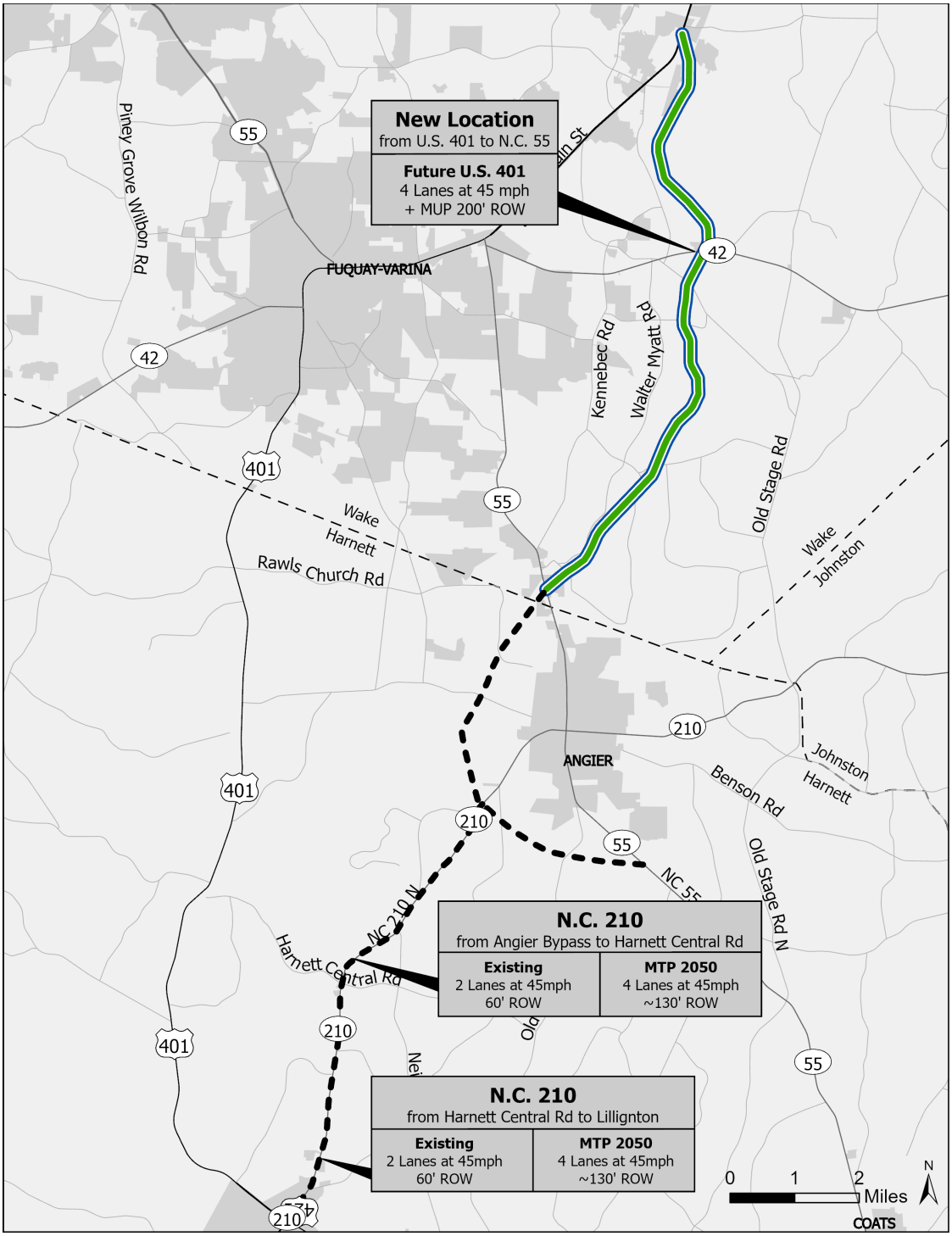


Figure 6-1: Alternative XZ Proposed Alignment



6.1 Complete List of Recommendations

Existing U.S. 401 in Wake County

- Banks Road to N.C. 55: Widen from 4 to 6 lanes. (MTP Project)
- N.C. 55 to Judd Parkway NE: Add raised median and Multi-Use Paths. (MTP Project)
- Judd Parkway NE to Ennis St.: Add raised median and Multi-Use Paths (no MTP project)
- Ennis St. to Judd Parkway SW: No roadway improvements
- Judd Parkway SW to Harnett Co.: Widen from 2 to 4 lanes with raised median and Multi-Use Paths

U.S. 401 in Wake County – Bicycle-Pedestrian Facilities

- Multi-use paths (MUP) or sidewalk and bicycle lanes throughout the corridor.
- Wide sidewalks or MUP through Downtown, parallel bike improvements.

U.S. 401 in Wake County – Transit

- Strengthen connections to Garner and Raleigh.
- Connections to Holly Springs and Apex may be possible in the future.

Existing U.S. 401 in Harnett County

- Utilize existing U.S. 401 alignment in Harnett County.
- Widen to 4 lanes at 45mph.

U.S. 401 in Harnett County – Bicycle-Pedestrian Facilities

- Pedestrian and bicycle facilities along U.S. 401
- Bicycle facilities along collector / local streets between Rawls Church Rd and Harnett Central Rd constructed as development occurs.

U.S. 401 in Harnett County – Bicycle-Pedestrian Facilities

- Redesign the railroad crossings along U.S. 401 and other roadways in the study area to accommodate future widening anticipated due to growth in the area.
- Specific improvements recommended for crossings at/near:
    - Matthews Rd
    - Lafayette School Rd
    - Chalybeate Rd – northern and southern ends

U.S. 401 in Harnett County – Intersection Improvements

- **Piney Grove Rawls Rd** Signalize the intersection.
- **Rawls Church Road** Signalize the intersection.
- **Chalybeate Springs Road** Signalize the intersection.
- **Chalybeate Road** Signalize the intersection.
  - **(Northern End)** Re-evaluate the traffic impacts if the southern section is disconnected.
  - **(Southern End)** Restrict turns at this intersection and, from operations and safety perspective, consider removing this intersection with U.S. 401 altogether.
- **Lafayette School Road** Close the connection to U.S. 401 and look at possible alternative access routes to Lafayette Elementary School to/from US 401.
- **Lafayette Road** Reevaluate the traffic impacts at this intersection.

Note - CAMPO has begun the process of submitting several of the intersection improvements for funding.

For Chalybeate (southern), Lafayette School Roads and railroad crossing recommendations (5 projects together) a smaller "hot spot" study is the updated recommendation. Such a study would look at all five projects together to better identify how railroad improvements, widening of U.S. 401, and the roadway intersections can be designed and coordinated.

NC 55, Angier Bypass, NC 210 Improvements

- Improve to Four-Lane, median divided facility at 45mph.

Future U.S. 401 Alignment

- Construct a four-Lane, median divided facility at 45mph on a new location.

Note - Improvements to Existing U.S. 401 and existing area roadways will be prioritized for short and mid-term implementation – to occur before the long-term recommendation for a new roadway, known as "Future U.S. 401".