1 CORRIDOR VISION, GOALS, AND EVALUATION CRITERIA

A critical early step in the US 15-501 Corridor Study was the development of an overarching vision to guide the study process and the recommendations that will be put forth for adoption and implementation. The vision statement generalizes the public's view on how the corridor should function, look, and interact with the surrounding community. It helps clarify the governing principles for the study. The goals for the corridor describe how the vision will be achieved.

1.1 VISIONING PROCESS

Stakeholders play a key role in identifying the vision and goals for the study. The stakeholders represent agency staff, elected officials, advocacy groups, key constituent groups, and the public. These groups were engaged in the visioning process in a variety of ways, including:

- Mobile Tour and Visioning Exercise
- Public Workshop
- Public Comment Map

1.1.1 Mobile Tour and Visioning Exercise

To lay the ground work for the visioning process and to facilitate discussion between various stakeholders about the existing conditions along US 15-501, a bus tour was conducted with agency staff, key stakeholders, and elected officials on April 18, 2018. The purpose of the tour was to lay the foundation for the development of the corridor vision and goals, and to provide an opportunity for the project team to listen to the people who live, work and play along the corridor.

Figure 1: Mobile Tour

The corridor tour had five stops along US 15-501, in which participants got off the bus and discussed various elements of that section of the corridor. The five stops were:

- Rams Plaza
- Patterson Place
- South Square
- US 15-501 Business at Foster's Market
- Bus Stop Along US 15-501 at Garrett Road

At each stop, participants alighted the bus to discuss existing conditions surrounding each stop and any plans for ongoing work by the local municipalities, GoTriangle, or NCDOT for those locations. This discussion and accompanying material laid the foundation of the corridor vision.

Following the tour, there was a short meeting to talk about what participants learned on the tour and what they felt was an important takeaway to inform the corridor study process. Participants completed a short questionnaire focused on the identification of key values, priorities, and concerns. One of the questions asked participants to write a news headline about the corridor for the year 2040. The responses were both creative and informative. A sample of the responses is provided in the Figure 3.

Figure 2: Post-tour discussion

Figure 3: Creative 'Headlines from the Future' about the 15-501 Corridor

1.1.2 Public Workshop

The first public workshop was designed as a two-part workshop, with the first part of the workshop conducted as an informal drop-in session where citizens could review graphical display boards summarizing the findings from the community and travel profile, converse with the team members, and provide comments related to issues and opportunities on printed maps of the corridor. The second part of the workshop included a formal presentation of the community and travel profiles along with a summary of existing

Figure 4: Project team engaging with citizens at the workshop

conditions. The presentation also provided clarity on the purpose of the study, and the intended outcome once the plan is finalized and implemented. Following the formal presentation, citizens were engaged in a visioning exercise. The purpose of the visioning exercise was to generate a common vision for the corridor that reflects the thinking of the diverse groups in the community, offers the possibility for fundamental change, and gives the study team a direction to work towards. Electronic polling was used to engage participants in a series of questions framed to assess their values, priorities, and concerns. Following each question, the group was engaged in a discussion to try and probe deeper into the question responses. Data from the polling questions was processed and analyzed to identify key themes that would inform the final vision for the corridor, in addition to providing insight into possible improvement strategies.

1.1.3 Public Comment Map

To engage the broader community and to capture feedback from citizens who are unable to attend the public workshop, an online public comment map was created and provided via the project website. The map encouraged people to identify:

- Areas that are challenging for you to navigate;
- Where you have major issues;
- Where you see opportunities;
- Your major destinations;
- Your environmental and safety concerns; and
- What frustrates you and/or what you think is working well.

Over 300 public comments were received through the public comment map. These responses were processed and analyzed and used both to inform the vision for the corridor, and possible improvement strategies.

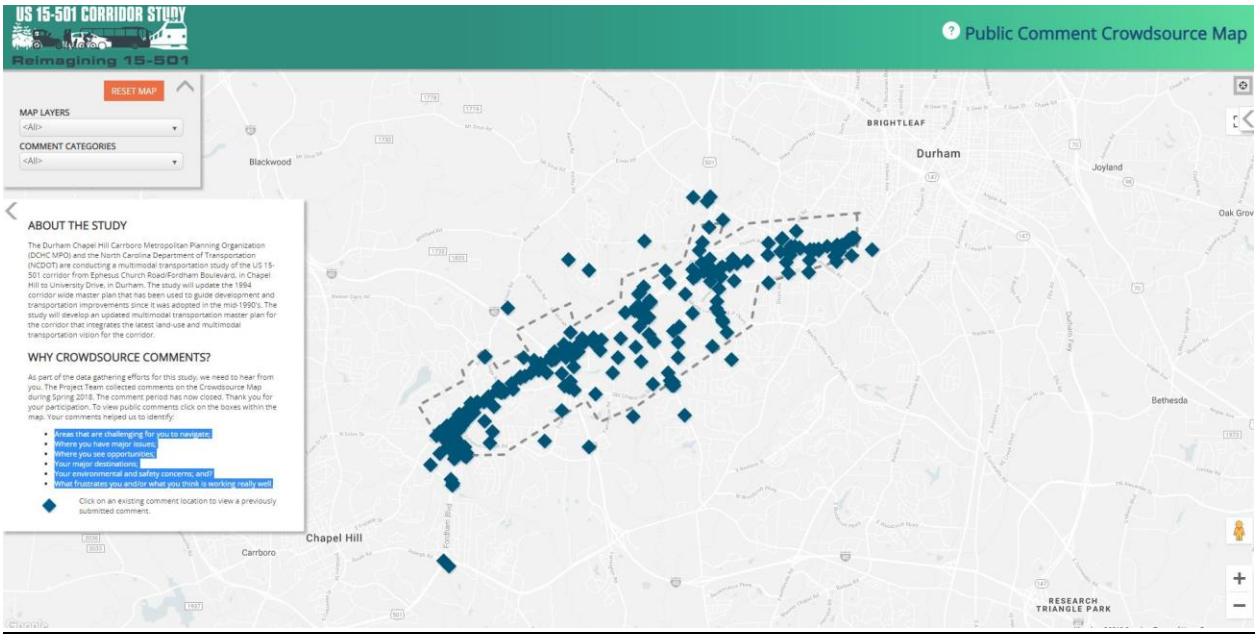

Figure 5: Public Comment Crowdsource Map

1.2 FINAL VISION

The data received from the visioning and outreach exercises was processed and analyzed to identify key themes that would be used to define the vision for the corridor. The key themes that emerged from this process are:

- Multimodal
- Connectivity
- Mobility

These key themes paired with the detailed responses, conversations with the Project Steering committee (PSC), and with the Durham-Chapel Hill-Carrboro (DCHC) Metropolitan Planning Organization (MPO) Board resulted in the following vision statement for the corridor:

By 2045, US 15-501 between Durham and Chapel Hill will be a key multimodal transportation corridor, that will complement and support [high capacity transit] and the adjacent, mixed use, and multimodal supportive development. The corridor will provide for the safety, mobility, and accessibility of all users, including motorists, pedestrians, bicyclists, and public transportation users; including connections across and through the corridor.[1]

1.3 CORRIDOR GOALS

With the corridor vision defined, goals and objectives for achieving the corridor vision were developed. The goals were developed using feedback from the visioning exercises and comments received from the public workshop and online crowdsourcing map. The objectives provide a framework for how a specific goal can be achieved.

The comments received during the public workshop and online crowdsourcing map were categorized into five major themes:

- Mobility/Traffic Flow
- Accessibility/Connectivity
- Land Use/Development
- Environmental Sensitivity
- Health/Safety

These themes led directly to the development of the US 15-501 Corridor Study goals and objectives summarized in Table 1. The goals for the US 15-501 Corridor Study were compared with the DCHC MPO's 2045 Metropolitan Transportation Plan (MTP) to confirm adequate linkages between the two plans. The MTP documents highway, public transportation, bicycle, pedestrian, and other transportation projects to be implemented over the next 25 years to address future travel demand and economic development. The multi-year process to arrive at an adopted MTP involved developing goals and objectives, alternatives, and a preferred set of options, all with numerous public involvement efforts. Any project that is to be submitted for potential state or federal funding, must be included in the MTP. The US 15-501 corridor study used the MTP to guide and inform the study process.

[1] Vision statement revised to reflect the recommended direction of the MPO Board following the discontinuation of the Durham-Orange Light Rail

Table 1: Goals and Objectives for the US 15-501 Corridor Study

Goals and Objectives	MTP Goal Linkage
Goal: Improve accessibility and connectivity for all modes ▪ Seek opportunities to improve and connect existing public transportation services ▪ Improve bicycle and pedestrian directness of routing ▪ Implement interconnected bicycle and pedestrian facilities ▪ Increase transit, bicycle, and pedestrian access to jobs and essential goods and services, particularly for disadvantaged populations ▪ Increase automobile connectivity ▪ Improve accessibility to bus stops, particularly for patrons with ADA needs	▪ Connect people ▪ Promote multimodal and affordable travel choices ▪ Protect environment and minimize climate change
Goal: Improve mobility for all users ▪ Manage peak-period congestion ▪ Increase system reliability ▪ Provide facilities that expand mobility options and that are user friendly ▪ Minimize physical and psychological barriers to non-motorized travel ▪ Identify and implement first/last mile connections for bicycle and pedestrian access to transit ▪ Create an intuitive multimodal network through design and wayfinding ▪ Reduce intermodal conflicts at intersections and driveways	▪ Manage congestion and system reliability
Goal: Enhance safety/health ▪ Identify and eliminate or mitigate locations and operations that pose hazards ▪ Develop transportation infrastructure that prioritizes people ▪ Design intersections for users of all ages and abilities ▪ Improve user comfort on bicycle and pedestrian facilities by increasing separation along corridors with high speed and volume ▪ Increase opportunities for exercise/recreation on non-motorized network ▪ Implement roadway cross-sections that balance modes and greenspace ▪ Improve connectivity, for all modes, to parks and open space ▪ Clear and consistent signing and pavement markings that enhance safety and awareness for all modes	▪ Promote safety and health
Goal: Stimulate Land use, community, and market performance vitality ▪ Create nodal land use patterns that promote multimodal travel ▪ Incorporate urban design and complete streets principles that create human-scale development. ▪ Provide focal points of community activity within designated areas, as appropriate. ▪ Foster a diverse mix of land uses and job types. ▪ Provide suitable housing options for a variety of household types and income levels, including affordable and workforce housing. ▪ Leverage increases in tax base to support community goals. ▪ Preserve essential goods and services and locally distinctive destinations. ▪ Add goods and services that are currently lacking in the corridor in appropriate locations.	▪ Stimulate economic vitality
Goal: Protect sensitive environmental lands within the study area ▪ Mitigate impacts of development on New Hope Creek and other environmentally sensitive areas ▪ Implement transportation infrastructure that is compatible with, and complementary of, the surrounding natural environment ▪ Reduce mobile emissions ▪ Mitigate storm water runoff ▪ Encourage replacement of short distance auto trips with walking or biking trips	▪ Protect environment and minimize climate change

1.4 EVALUATION CRITERIA

Following the visioning and goal setting process the study team worked with the PSC to identify specific measures that both track progress towards goals, and help screen potential strategies and alternatives for the corridor.

Table 2: Evaluation Criteria for US 15-501 Corridor Study

US 15-501 Evaluation Criteria				
Safety	**Multimodal**	**Network**	**Accessibility**	**Equity**
Reduce fatal, injury, and total crash rates	Improve quality of transportation options	Improve access by connecting disjointed portions of a network?	Improve access to and from residential / commercial areas?	Benefit socio-economically disadvantaged populations
Minimize friction between different modes	Reduce barriers to access alternative options	Strengthen existing network	Improve access to recreational / educational facilities	Improve access to lower income jobs / affordable housing
Reduce congestion	Make alternative modes more competitive	Maintain consistency with regional and local plans	Increase catchment area	Preserve community affordability (housing and transportation costs)
	Reduce Vehicle Miles Traveled (VMT)			
Environment	**Health**	**Community**	**Economy**	
Improve air quality	Improve health by providing active transport	Optimize total additional Right-of-Way (ROW) required	Explore potential to attract development	
Preserve Forest / wetlands / creek	Improve access to stores / parks / greenways	Mitigate temporary construction impacts	Improve access to jobs	
Improve Water / runoff quality		Balance community and stakeholder sentiment		
Conserve of existing built environment		Foster community cohesion		

2 IMPROVEMENT STRATEGIES

The screening of the multimodal alternatives was a multi-step process, as depicted in Figure 6. Feedback from the PSC, comments from the public workshop and crowdsourcing map, along with the initial corridor analysis were used to develop a comprehensive list of ideas and strategies by mode, including land use. All these strategies were compiled and mapped by segment for the entire corridor.

A qualitative screening process was applied using the evaluation criteria summarized in Table 2 to determine which strategies performed best. This was done with the understanding that these strategies would better support the overall goals for the corridor. The screening process resulted in a reduced number of multimodal strategies that were then combined into complementary packages of multimodal alternatives. The multimodal alternatives were further evaluated by the Project Team, PSC, and vetted by the public and MPO Policy Board, resulting in two final alternatives. These final alternatives, discussed in detail in the next section, were taken through a detailed evaluation and conceptual designs were developed. The final strategies and conceptual designs were shared with the public and the PSC to solicit feedback on the community's preference for the final recommendation[2].

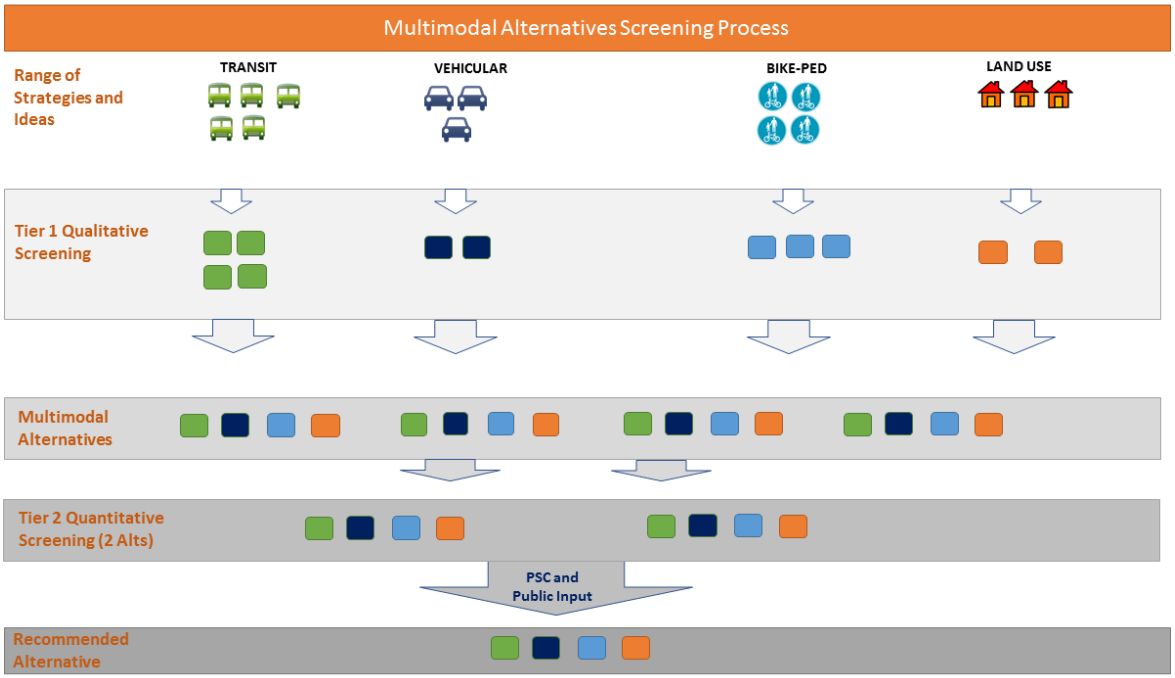

Figure 6: Multimodal Alternatives Screening Process

[2] The final designs presented to the public included a third alternative identified following the decision to discontinue work on the Durham-Orange Light Rail as discussed in Section 4.

3 EVALUATION OF ALTERNATIVES

For the purpose of this study, this corridor is divided into five segments. The segments are defined as:

- **Segment 1**: Ephesus Church Road to I-40 Interchange
- **I-40 Quadrant**: Includes I-40 Interchange and surrounding quadrants
- **Segment 2**: I-40 to US 15-501 Bypass
- **Segment 3**: US 15-501 Bypass to Chapel Hill Road
- **Segment 4**: Chapel Hill Road to University Drive

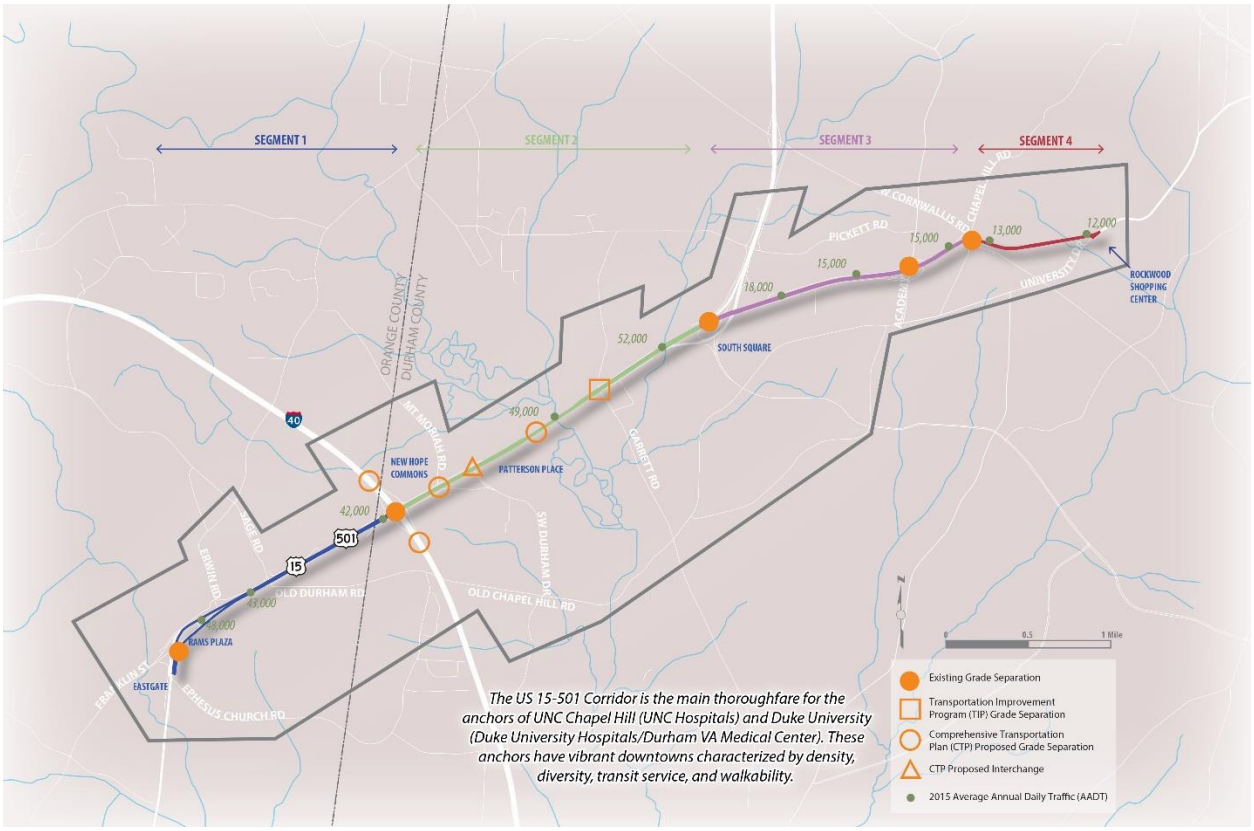

Figure 7: Segment Map

3.1 LAND USE

3.1.1 Introduction and Purpose

Capitalize on opportunities to create land use patterns that promote multimodal travel, and incorporate urban design and human-scale design

This document presents alternative local development and land use scenarios for the US 15-501 corridor in Durham and Orange Counties, relating alternative urban design and land use policy approaches to travel outcomes and facility design needs. This document is a part of the US 15-501 Master Plan update process and builds on the US 15-501 Market Analysis document developed at an earlier phase of the study. The Market Analysis examined growth potential in traffic analysis zones (TAZs) based on the Triangle Regional Model's (TRM) socio-economic and demographic forecasts for 2045, integrating transit station area forecasts based on findings of the GoTriangle Market Study (GTMS) completed in 2018. This accounted for potential displacement of existing uses and resulted in updated TAZ-level forecasts of residents and jobs by type for the study corridor. This Alternative Land Use Strategies document retains those TAZ-level forecasts, posing two potential frameworks for organizing new land uses within each TAZ.

- Alternative A follows the GTMS, using that study's "sketch development" building footprints and typologies to allocate jobs and residents to 100-foot grid cell areas within each TAZ. Excess TAZ growth not accounted for by the GTMS was allocated based on a land suitability analysis and generalized local zoning categories. Because of the heavy influence of the GTMS sketch development data, this alternative tends to focus growth around proposed transit stations, typically orienting buildings toward future transit infrastructure and away from the US 15-501 corridor.
- Alternative B relies on the land suitability analysis and an even coarser generalization of local zoning categories to allocate new jobs and residents within each TAZ, ignoring the GTMS sketch development building footprints. This alternative reflects a potential growth scenario oriented toward existing streets, including US 15-501, with less focus on development around potential transit stations.

The Alternative Land Use Strategies analysis presented below is organized into 3 sections. First, a summary of the allocation process is provided, identifying the key components of the analysis and comparing the steps in developing the alternatives described above. Then, a summary of the outcomes of the allocation process for each alternative is given. Finally, the implications of each scenario are described, focusing primarily on the appropriateness of each development alternative for different sections of the US 15-501 corridor in light of proposed highway design enhancements.

3.1.2 Growth Allocation Process

The allocation process begins with forecasts of housing and jobs by type at the TAZ level based on the US 15-501 Market Analysis document. The TAZ-level totals are distributed to specific locations within each TAZ (represented by 100-foot grid cells). This distribution accounted for forecasted declines in given activity types and/or potential displacement of activities within a TAZ due to redevelopment (based on the overlap of existing uses with GTMS sketch development polygons, e.g.). The activities to be allocated reflect those in the TRM forecasts: housing units and employment. Employment was subdivided into industry, office, service low, service high, and retail categories.

The distribution of growth by activity type is influenced by GTMS sketch development data for Alternative A. The sketch development building footprints and primary use categories are shown in Figure 8. These are focused at the Gateway station area (study segment 1), Patterson Place (segment 2), and South Square (segment 3). Many of the buildings are multi-family residential or mixed-use buildings, although the bulk of the square footage is for office and service employment. It is important to note that the building footprints only represent a hypothetical sketch of potential development based on market indicators. They are not based on approved or proposed developments. Their use in this analysis is to reflect growth potential around proposed station areas and assess how growth could be organized relative to the US 15-501 corridor.

For several TAZs, the total growth forecasted for one or more activity types exceeds the amount anticipated by the sketch development data. Additionally, for many TAZs, there is no sketch development from the GTMS. This remaining TAZ-level growth is allocated based on a land suitability analysis, whereby the most suitable areas within a TAZ are prioritized for growth. The suitability analysis was developed by overlaying several key factors affecting site development, as follows:

- Vacant parcels are generally most suitable for development;
- Underutilized parcels (based on the ratio of building value to land value) may be suitable for redevelopment;
- Parcels in wetlands and areas prone to flooding are not suitable for development; and
- Larger parcels are more suitable for development than smaller parcels, all else being equal.

Figure 9 shows the results of the land suitability analysis. It is important to note that the suitability scores are applied on a relative basis within each respective TAZ. For example, there are some high-growth TAZ's with limited vacant land available, but all of the TAZ's growth is still allocated. This effectively assumes intensification of activity within those TAZs. On the other hand, some of the most suitable areas are located in low-growth TAZs. Even though there are large vacant lots in these areas, only the growth expected for their respective TAZs will be allocated there.

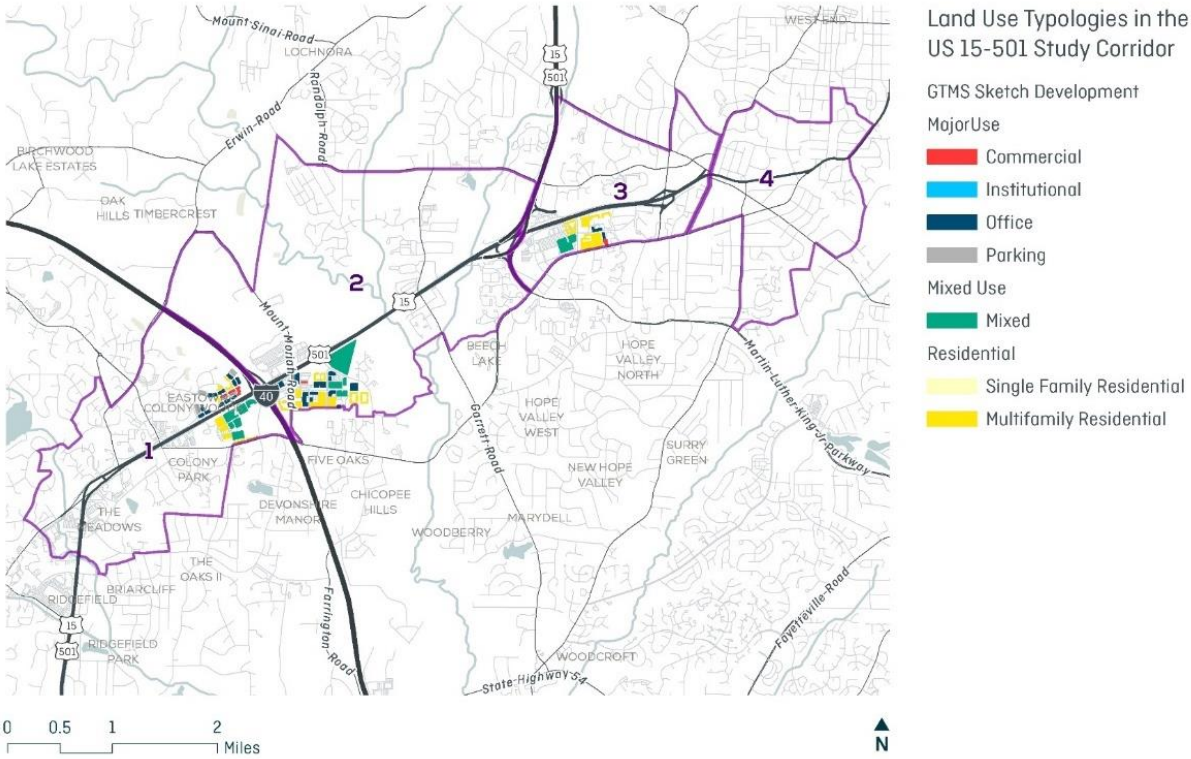

Figure 8: GTMS Sketch Development in the US 15-501 Corridor Study Area

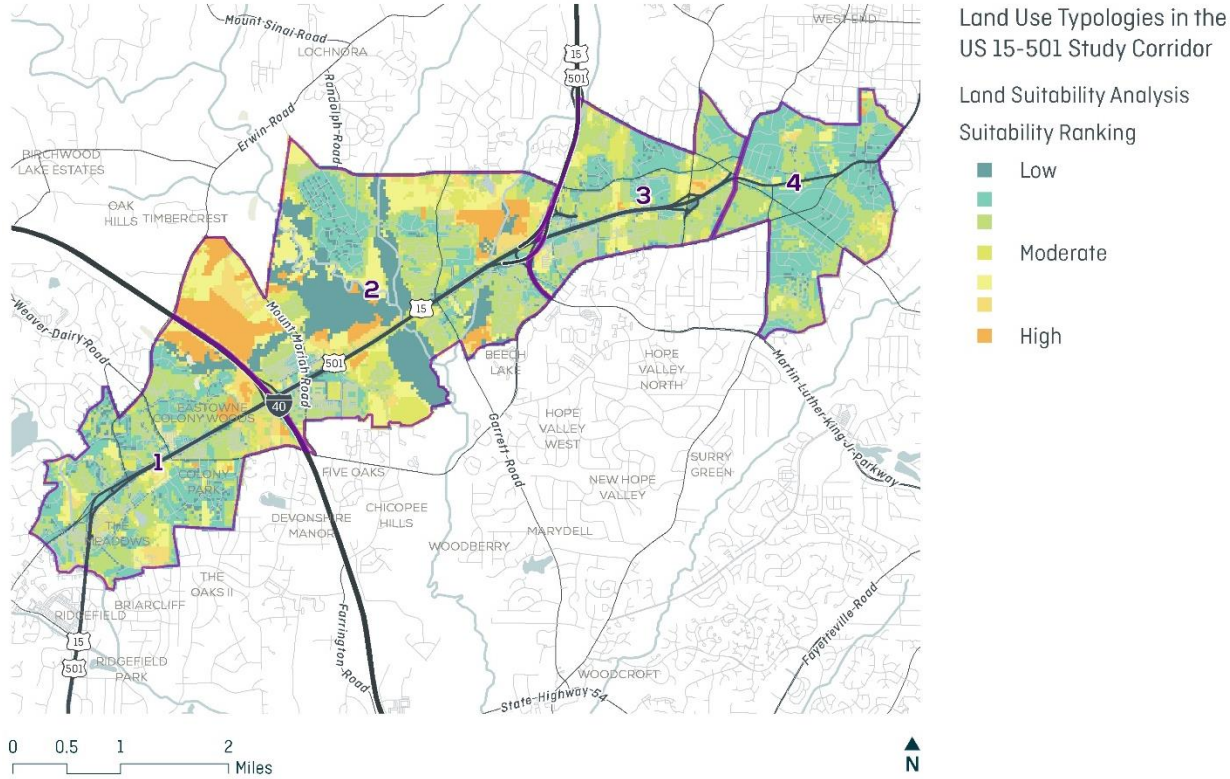

Figure 9: Land Development Suitability in the US 15-501 Corridor Study Area

The suitability analysis reflects the general suitability of a sub-TAZ location (grid cell) to accommodate future growth. It does not reflect different site location preferences or limitations for different land uses. As such, the allocation process is constrained by generalized zoning categories, where housing activity is guided into areas with residential zoning and commercial activities are guided into areas with non-residential zoning. The residential zoning group is stratified into low, medium, and high density areas, while the non-residential zoning group is further classified into commercial, office, and mixed use categories. The resulting classification of grid-cells is shown in Figure 10. The generalized zoning categories represented are distilled from detailed zoning classifications based on zoning data obtained from the City of Durham and the Town of Chapel Hill. They do not reflect the nuances of each jurisdiction's land development policies but are intended to ensure that the allocation of growth within each TAZ broadly reflects appropriate use types and development intensities. Additionally, for Alternative B, each non-residential zoning category was considered as a general "mixed use" category allowing residential development and all job types. This means that for Alternative B, existing zoning categories have less influence on the organization of existing growth compared to Alternative A. Residential zoning categories were retained to limit the potential for jobs clusters to be inappropriately allocated to residential neighborhoods.

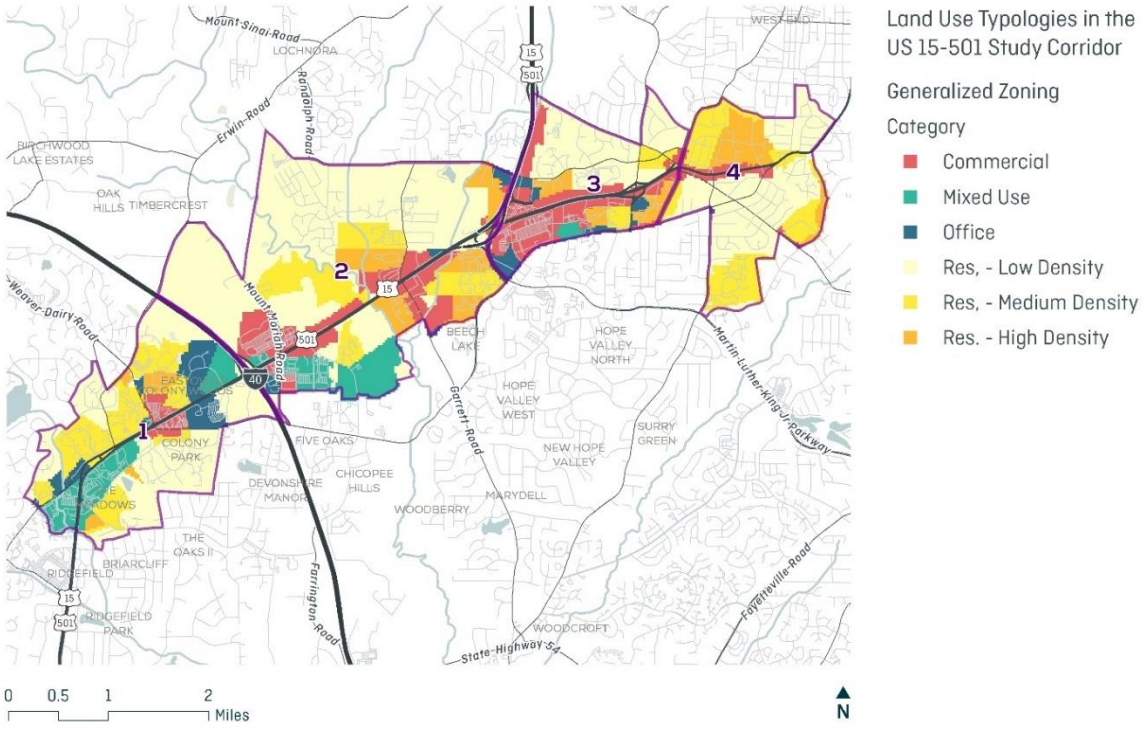

Figure 10: Generalized Zoning Categories in the US 15-501 Corridor Study Area

Having the three major components of the allocation process in place – sketch development, land suitability, and generalized zoning – the process uses development probabilities and zoning-based constraints to distribute changes in activities by type to each grid cell within a TAZ. The specific steps vary slightly for Alternative A versus Alternative B, based on the different assumptions about GTMS sketch development in each. It is helpful to organize the allocation steps into phases as shown in Table 3 below.

Table 3: Allocation Process Steps (Alterative A vs. Alternative B)

Steps of Allocation Process	Alternative A – Station-Area Development and Current Zoning	Alternative B – Corridor Development and Relaxed Non-Residential Zoning.
Existing activity	Allocate existing growth based on current building locations and existing land use data	
GTMS sketch development	Allocate sketch development growth based on GTMS sketch development building footprint and attribute data	NA
	Identify grid cells where existing activity is displaced by GTMS sketch development. Displaced activities may need to be allocated to other locations within the TAZ.	NA
Prepare final allocation	Summarize (non-GTMS) change to allocate by TAZ, incorporating displaced activities into the allocation totals as appropriate.	Summarize change to allocate by TAZ
Allocate decline	If any activity is expected to decline within a TAZ, allocate decline by proportionally reducing activities of that type at existing locations within the TAZ.	
Allocate growth	For all activities expected to grow within a TAZ, allocate growth based on land suitability and applicable zoning designations.	
Summarize total activity	Summarize existing activity and changes to determine total activity in 2045 at all grid cell locations.	

3.1.3 Results of the Allocation Process

The process described above results in the assignment of housing units and jobs (by type) to 100-foot grid cell areas throughout the corridor, accounting for displacement due to re-use and forecasted declines in specific activity types based on the TAZ-level forecasts. The changes allocated are applied to existing activity to develop a picture of what 2045 growth could look like at a fine-grained scale. The goal of this process is not to forecast where growth will occur on a site-by-site basis but rather to assess the potential mix, intensity, and orientation of land uses below the TAZ level. As such, the 100-foot grid cell areas were used to conduct a point density analysis (based on each grid cell's centroid location), summarizing each activity type within a 500-foot radius. This provided a means of classifying allocation results to aid in interpreting the differences between the two alternative land use approaches. The classification approach uses total activity (housing units + jobs) density and land use mix variables to define descriptive place types throughout the corridor as follows:

- Areas having fewer than 5 activities per acre are classified as "low-density development neighborhood" areas.
- Areas having more than 5 activities per acre and 80 percent or greater mix of residential units (as a total of all activities in the vicinity) are classified as "medium-to-high-density residential."
- Areas having fewer than 20 activities per acre and a mix of residential and employment activity are classified as "low-density development transitional" areas.
- The remaining areas were classified into non-residential groups based on dominant land use types, as follows:

- Areas where retail jobs made up 40 percent or more of all activity in the 500-foot vicinity were classified as “retail/commercial” areas.
- Areas where office jobs made up 40 percent or more of all activity in the 500-foot vicinity were classified as “office” areas.
- All others were classified as “mixed use” areas.

- Each grid cell in non-residential groups was then assigned to a “light”, “moderate”, or “heavy” tier based on density thresholds:
  - Areas having fewer than 50 activities per acre were classified as “light” intensity.
  - Areas having fewer than 100 activities per acre were classified as “moderate” intensity.
  - Areas having more than 100 activities per acres were classified as “heavy” intensity.

The existing place typology was created following the same parameters described above to provide reference for how land uses are expected to change in the corridor. This is displayed in Figure 11. Additionally, the results of the classification process are presented in Figure 12 (Alternative A) and Figure 13 (Alternative B).

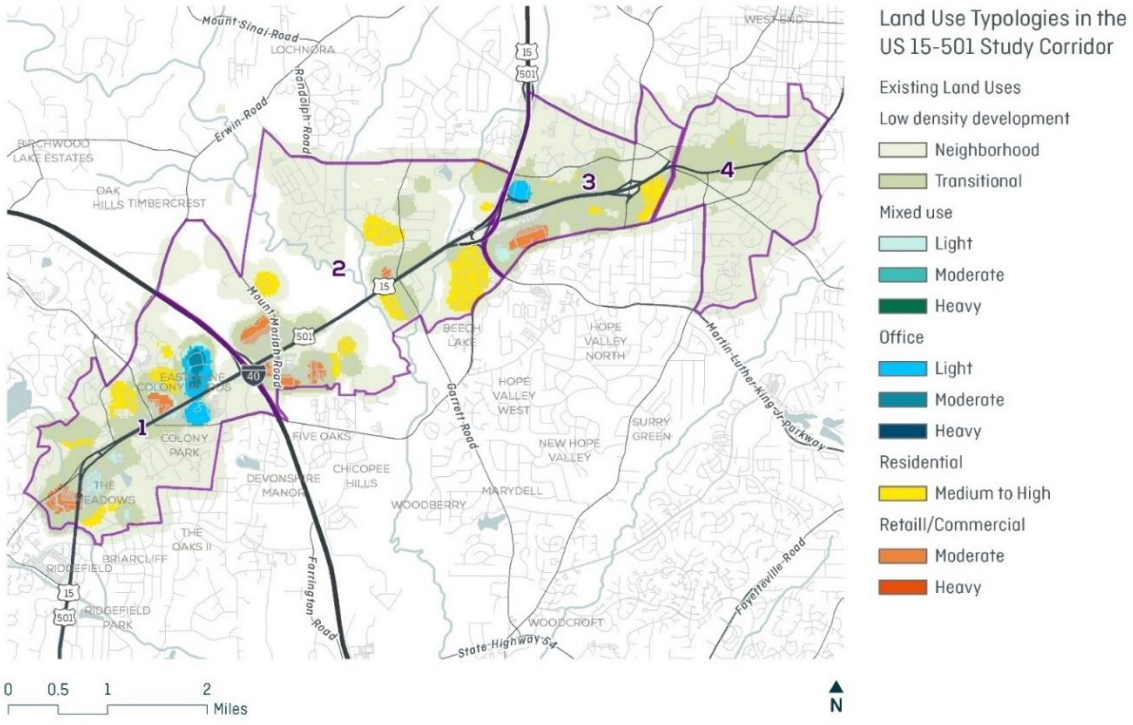

Figure 11: Existing Place Typology (2017)

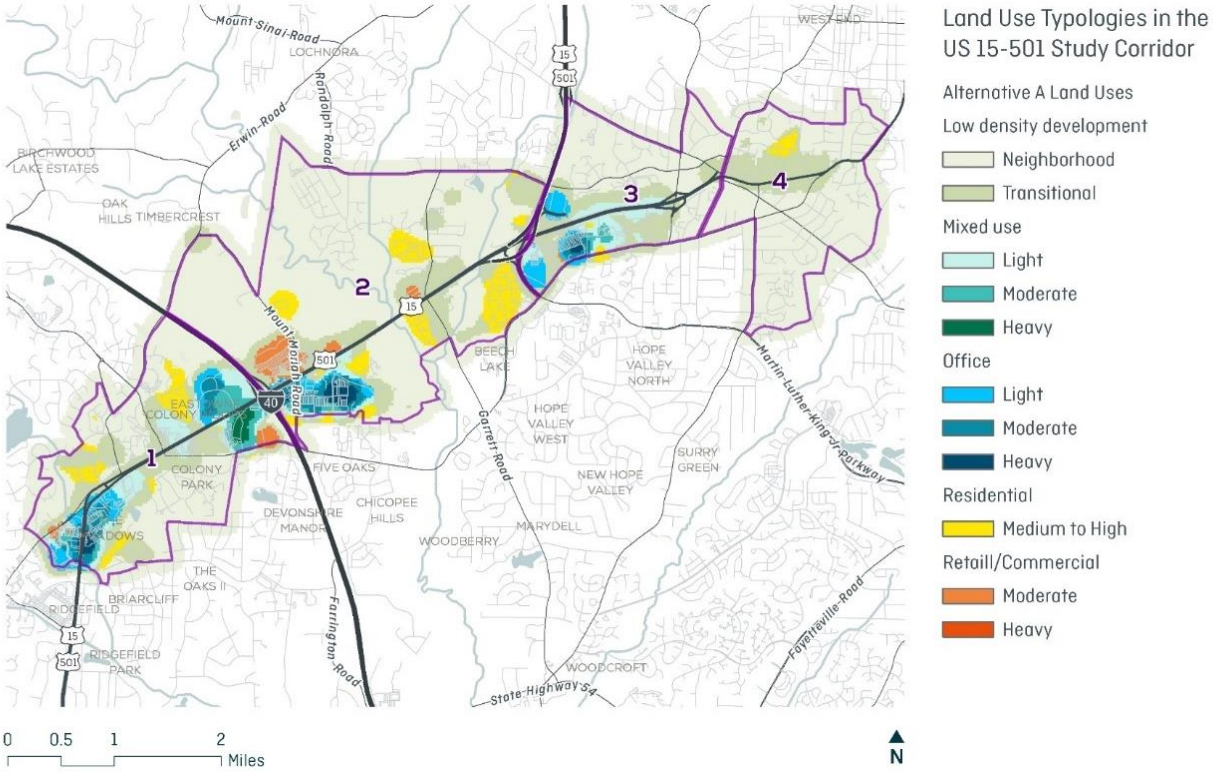

Figure 12: Future Place Typology (Alternative A, 2045)

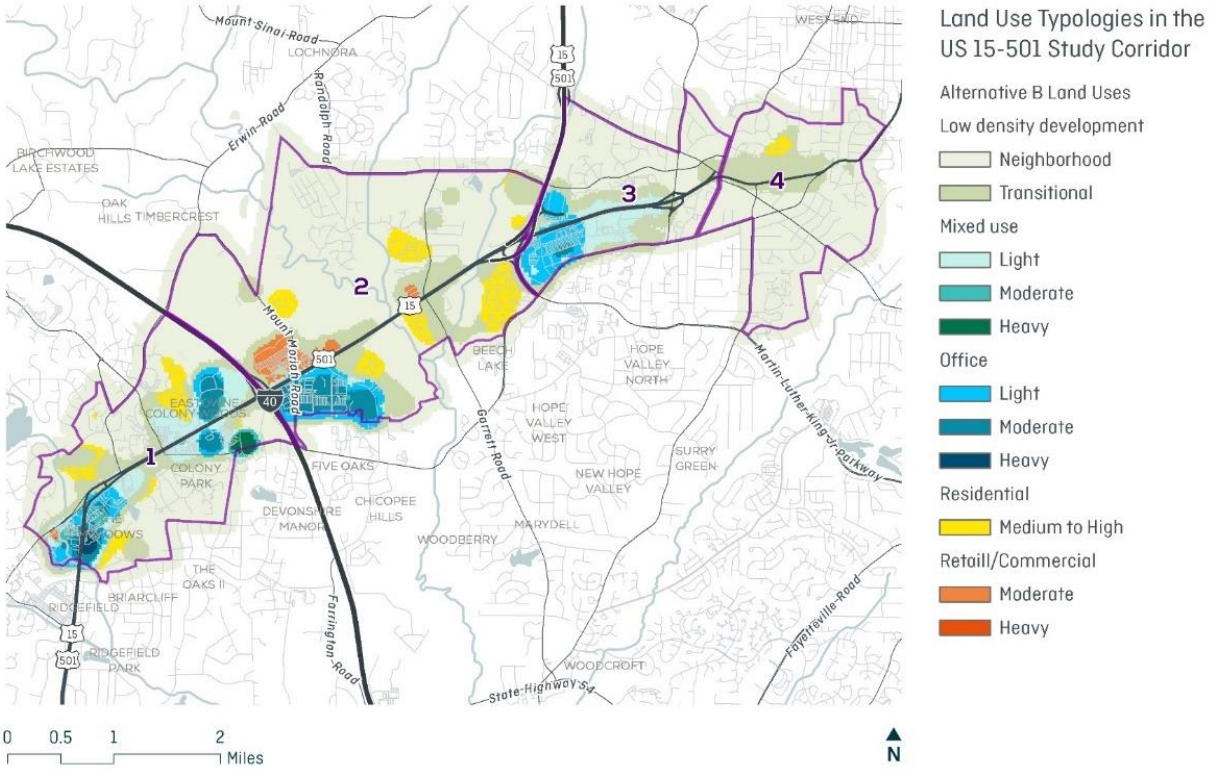

Figure 13: Future Place Typology (Alternative B, 2045)

In both alternative future place typology maps, the growth from the base condition (2017) to 2045 is notable. There is a substantial increase in activity density throughout the corridor, especially at established activity nodes, such as South Square, Patterson Place, and the Blue Hill District. Alternative A shows a nodal pattern of development focused around potential transit station locations. It suggests that many of the highest intensity future uses will be in clusters offset from the US 15-501 corridor. This pattern reflects the station area development modeled in the GTMS sketch development. Alternative B presents a more evenly-distributed growth pattern within the major growth zones. In this alternative, there is a greater number of uses straddling the corridor in high-intensity areas, such as the Blue Hill District and South Square. A rundown of the land use alternatives by each study area segment is provided below.

Segment 1 – Ephesus Church Road to I-40

In Segment 1 there are two prominent growth nodes: Blue Hill District in the south and Gateway/Eastowne in the north. In both alternatives, the Blue Hill district is expected to evolve from a retail and residential area in 2017 into a high intensity office and mixed use area by 2045. The organization of new activities within the district is similar in Alternatives A and B, with the most intense growth straddling the corridor and tapering down towards Franklin Street and Booker Creek.

In the northern portions of the segment, Eastowne is an existing moderate density office area in the southwest quadrant of the US 15-501/I-40 interchange. In both alternatives presented above, office and residential growth create a horizontally mixed use district in Eastowne. Alternative A forecasts higher intensity development than alternative B, with office growth along Eastowne Drive supported by residential and retail development. In Alternative B, growth is more focused within the existing developed portions of Eastowne, with modest residential and office growth in the currently vacant portions of the area. In Gateway – the southeast quadrant of the US 15-501/I-40 interchange – Alternative A envisions a high intensity mixed use district along Lakeview Drive with a cluster of retail uses off Old Chapel Hill Road. Alternative B shows a mixed use development focused along Lakeview and Old Chapel Hill Road, with office jobs expected at the former Blue Cross and Blue Shield of North Carolina headquarters building.

Segment 2 – I-40 to Martin Luther King Jr Pkwy

In Segment 2, there is a modest increase in overall activity near Garrett Road, but most growth is concentrated in Patterson Place with some additional retail coming to New Hope Commons in both alternatives. The growth of these areas complements the growth in the Gateway/Eastowne area, as the interchange I-40 evolves into a regional center.

In Alternative A, office growth is clustered around a proposed transit station and surrounded by medium to high residential. Some of the residential activity forecasted is located near 15-501 corridor, but units will likely be oriented to the interior of the district rather than toward the corridor. In Alternative B, Patterson Place evolves as a moderate intensity office district with activities focused on Mount Moriah Road, SW Durham Drive, and Old Chapel Hill Road. In both alternatives, the growth is offset from the corridor and oriented toward other transportation facilities.

Segment 3 – Martin Luther King Jr Pkwy to Chapel Hill Road

The differences between the two alternatives are most pronounced in Segment 3. In both alternatives, growth in the South Square area is predominantly in housing and the office jobs sector, and in both

alternatives housing units are expected to be incorporated into light-to-moderate mixed use areas. However, in Alternative A, the majority of this growth is clustered around a proposed transit station, resulting in a node of activity set back from US 15-501. Uses would likely be oriented toward new streets in a TOD and/or toward Shannon Road and University Drive. Additionally, Alternative A shows a mixed use cluster of activity along Mayfair Street with light-intensity portions abutting US 15-501. Meanwhile, Alternative B forecasts a more even distribution of office growth throughout South Square with a greater concentration of uses (office, housing, and retail) abutting the 15-501 corridor.

Segment 4 – Chapel Hill Road to University Drive

Segment 4 is built out as a low-to-moderate density residential area set back from the 15-501 corridor and storefront businesses along the corridor. Both Alternatives A and B resemble existing conditions, suggesting that incremental change may occur, but the character of the segment is unlikely to change significantly.

3.1.4 Implications of the Allocation Results

The fine-grained land use forecasts presented above represent two potential configurations of activities within the US 15-501 corridor and adjacent TAZs. Since the analysis assumes that TAZ totals of activity by type will remain constant across both scenarios, there is little to differentiate the two alternatives in terms of regional travel impacts. In other words, regardless of how the activities are organized at a site level, they are not re-arranging the organization of uses/activities at a regional level. Common transportation metrics, such as VMT generation, are most sensitive to changes at the regional scale. Therefore, no attempt is made here to quantify and compare the impacts of these alternative growth patterns. However, qualitative distinctions can readily be summarized, pointing to implications for facility design, intersection operations, and multimodal activity. These implications are reported on a segment-by-segment basis below.

Segment 1 – Ephesus Church Road to I-40

In Segment 1, both alternatives forecast the emergence of a mixed use/office district in the Gateway/Eastowne district. This is likely to increase activity at the US 15-501/I-40 interchange as workers throughout the region converge on the district. It also heightens the need for additional street connectivity connecting these areas to Patterson Place and New Hope Commons on the opposite side of I-40. It will also likely generate substantial demand for trips crossing US 15-501 at Eastowne Drive. Depending on the intensity and orientation of uses, pedestrian and bicycle crossing of US 15-501 may become more common. As such ensuring safe and efficient crossings of/access across US 15-501 for all users will be essential.

Given the current configuration of uses and the need to accommodate through traffic/commuters on US 15-501, it may be preferable to orient future uses away from the corridor and toward local streets such as Eastowne Drive, Lakeview Drive, and Old Chapel Hill Road. New connections across I-40 could be developed as “Market Streets” with light-to-moderate office and commercial use and nearby residential. This organization would have the benefit of funneling local travel by all modes away from US 15-501, though it would result in lower overall interaction among uses in all quadrants of the I-40 interchange and make it harder to efficiently serve the area with transit.

In the southern portion of the segment, both alternatives show the Blue Hill District stretching from Franklin Street east and across US 15-501, straddling the corridor with moderate-to-heavy intensity

office and mixed use development. This will create a built environment that is very different from today's contexts. Multimodal improvements will be needed to facilitate safe and efficient crossings of the corridor especially for cyclists and pedestrians. This may include operational and/or design improvements at Ephesus Church Road. Since most development will be between Franklin Street and US 15-501 (Fordham Boulevard), new uses should be oriented toward and internal network of cross streets, setting an effective edge at US 15-501.

Segment 2 – I-40 to Martin Luther King Jr Pkwy

In Segment 2, most changes are expected around Patterson Place, and in both alternatives, it appears that land uses will be offset from the corridor and oriented toward a future transit station or local streets, such as Southwest Durham Drive or Old Chapel Hill Road. As such, a corridor design focused on vehicle throughput seems appropriate for US 15-501 with high capacity access to and from Patterson Place via a new interchange or enhanced intersection(s). Land use policy should allow for a mixing uses and orient buildings away from the corridor. Consideration should be given to diversifying uses in the area around New Hope Commons, keeping in mind the potential for new connectivity across I-40 to Eastowne Drive.

A strategic plan for the entire US 15-501/I-40 interchange subarea may be appropriate to analyze detailed scenarios and better understand market demand, policy needs, and multimodal travel demand. The aim of such a study would be to establish a master planning framework to guide development appropriately in each quadrant, accounting for existing and future facilities and uses.

Segment 3 – Martin Luther King Jr Pkwy to Chapel Hill Road

In Segment 3, there is some potential for reuse and intensification along the US 15-501 corridor. This is especially noticeable in Alternative B, which has a more distributed pattern of growth than Alternative A. The Alternative B results suggest that if a variety of uses were permissible along the US 15-501 corridor, it could see substantial (re)development. However, the appropriate quantity and design of new development depends, in part, on the design of this portion of US 15-501.

- If the US 15-501 corridor is redesigned to a more urban cross-section, new developments fronting the corridor may be appropriate. In this scenario, consideration should also be given to redesigning Westgate Drive and encouraging uses to front it. This would help create a complete district bounded by Martin Luther King Jr Parkway, US 15-501 Business, Weymouth Street, and University Drive.
- In the absence of a corridor redesign, growth in the South Square are should be oriented toward University Drive, Mayfair Street, Shannon Road, and new local streets. Office uses should be emphasized in existing parking lots, with greater residential, retail, and services along Mayfair Street.

Segment 4 – Chapel Hill Road to University Drive

In Segment 4, minimal land use change is expected. Assuming facility design focuses on travel operations and multimodal enhancements, this corridor could support modest increases in residential density along the corridor as well as incremental additional retail and services. New uses should be oriented toward the corridor with activated street fronts. A study of parking needs may provide important insight into the segment's development capacity and design.

3.2 ROADWAY

The roadway strategies by segment and alternative are summarized in Table 4.

Table 4: Roadway Strategies by Segment and Alternative

Segment 1	
Alternative 1 • Widen US 15-501 to a 6-lane median divided synchronized street (including elimination of service roads and channelization • Synchronized street intersection at Ephesus Church Road • Connect Legion Road and Old Durham Road • Small footprint urban interchange at Eastowne Drive • Connector roads connecting all 4 quadrants of I-40 interchange • Implement local street network as proposed by Blue Hill District TIA	**Alternative 2** Same as Alternative 1, except: • Traditional intersection widening at Eastowne Drive
I-40 Quadrant	
Alternative 1 • Redesign I-40 interchange to improve safety and operations (diverging diamond) • Grade separated 2-lane roadway across I-40 connecting New Hope Commons to Eastowne Drive • Grade separated 2-lane roadway across I-40 connecting New Patterson Place to Gateway	**Alternative 2** • No change
Segment 2	
Alternative 1 • Implement Grade separation at Mt Moriah Road • Implement small footprint urban interchange at SW Durham Drive • Create grade separated access point east of SW Durham Drive to connect Patterson Place and New Hope Commons, footprint to follow road network recommended for Patterson Place • Extend SW Durham Drive to connect behind shopping center • Implement Patterson Place and New Hope Commons local street network • Build urban interchange at Garrett Road • Provide vehicle connectivity between Sandy Creek Drive, Chapel Hill Blvd Service Road, and Garrett Road	**Alternative 2** Same as Alternative 1, except: • Additional access points along US 15-501 east of SW Durham Drive, providing access to New Hope Commons and Patterson Place, but both restricted to right in/right out

Table 4 (continued): Roadway Strategies by Segment and Alternative

Segment 3	
Alternative 1 • Implement 2-lane roundabout to transition into a more urban street cross section • Reduce the footprint of the current cross-section to implement a fully multimodal 4-lane urban cross-section with landscaped median and roundabouts at key locations. Add additional intersections to improve connectivity and to further slow traffic and urbanize Segment 3. Full intersections at Mayfair, Weymouth, Shannon, Tower • Roundabouts at Tower, Shannon, and Weymouth • Other locations will be traditional intersections • Retain service roads, initially, to provide full access to adjacent land parcels. Long term removal of the service roads. Connect service road to Academy. • Implement better street connectivity (future focus on an urban grid system) to the north and south of US 15-501 Business • Redesign Academy Road interchange to better reflect urban design • Redesign Chapel Hill Road interchange to better reflect urban design	**Alternative 2** Same as Alternative 1, except: • Implement traffic calming measures to transition to a more urban street cross-section • Traditional intersections in place of roundabouts
Segment 4	
Alternative 1 • Implement 2-lane urban cross-section with roundabouts at key intersections, landscaped median, and consolidated driveways fronting US 15-501 Business. • Provide parking on both sides of the roadway • Redesign University Drive intersection as a roundabout	**Alternative 2** Same as Alternative 1, except: • Traditional intersections in place of roundabouts (except University Drive which remains a roundabout)

The roadway alternatives were evaluated considering systems level metrics, intersection operations, and corridor operations. The system level metrics include vehicle miles traveled (VMT), vehicle hours traveled (VHT), average daily speed, and delay. The Triangle Regional Model was used to evaluate these metrics, with results summarized in Table 5. Comparisons were made against the adopted 2045 MTP and Alternative 1 and 2.

Table 5: System Level Metrics

Performance Measure	Base	2045 MTP	2045 Alt 1	2045 Alt 2	% Change from Base		% Change from MTP	
					Alt 1	Alt 2	Alt 1	Alt 2
Total Daily VMT	249,111	359,595	365,525	365,725	47%	47%	2%	2%
Total Daily VHT	9,334	15,388	15,504	15,480	66%	66%	1%	1%
Average Daily Speed (mph)	26.69	23.37	23.58	23.63	-28%	-28%	1%	1%
Total Delay (mins)	130,648	339,989	330,590	330,813	153%	153%	-3%	-3%
Delay per Mile Traveled (min)	0.52	0.95	0.90	0.90	72%	72%	-4%	-4%

Looking at the system level metrics for the two alternatives, they appear very similar across the various metrics. The differences between the two alternatives are noticed more at the detailed operational level and are often focused on other modes of travel, like bicycles, pedestrians and transit. In Segment 4 for example, the differences are roundabouts in Alternative 1 versus traditional intersections in Alternative 2. Both treatments work for traffic at a system level, but the differences are often focused on the local land use treatments and how the roadway operates for bicycles and pedestrians.

Looking at the percent change from the bases, increases are seen in all categories, except average daily speed. This makes sense because with anticipated growth in the corridor and region, it is anticipated that more traffic volumes will increase, leading to increased VMT and VHT. Without major changes to the infrastructure within and adjacent to the study area, this increased traffic will contribute to increased delay. The decrease in average daily speed aligns with the increased traffic volumes and ties to the increased delay. Overall, the changes seen in Alternative 1 and 2 are similar to improvements documented in the MTP as these improvements were taken as project givens for this study.

Intersection operations were evaluated using Synchro, a specialty software for evaluating intersection operations. Intersection metrics include delay and Level of Service (LOS) as measured on a scale of A-very good to F-failing. The analysis was conducted on key intersections for the no-build condition which assumes the intersection looks the same as it does today, and for the build condition reflected by the specific alternative. The traffic volumes reflect 2025 conditions. The no-build analysis is summarized in Table 6, and the build analyses are summarized in Tables 7 to 14.

The No Build alternative for 2025 forecast traffic, Table 6, shows that overall intersections many intersections are operating at LOS D or better. However, a closer look at individual movements are failing with LOS E or worse. With the new land development patterns forecast for this corridor, traffic is expected to increase and operating conditions will further decline. Tables 7 to 14 document improvement alternatives that were considered for the intersections along the corridor. The LOS goal for the DCHC MPO is LOS D.

Table 6: No Build Analysis

Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
US 15-501 and Sage Road/Scarlett Drive	**EB**	31.7	C	99.4	F
	WB	136.6	F	31.9	C
	NB	162.5	F	105.9	F
	SB	73.9	E	71.3	E
	Overall	**96.2**	**F**	**75.4**	**E**
US 15-501 and Eastowne Drive/E Lakeview Drive	**EB**	26.4	C	28.7	C
	WB	51.0	D	27.6	C
	NB	73.5	E	45.6	D
	SB	87.7	F	81.9	F
	Overall	**44.3**	**D**	**32.3**	**C**
US 15-501 and I-40 EB Ramps	**EB**	47.2	D	37.1	D
	WB	14.7	B	15.4	B
	NB	--	--	--	--
	SB	62.7	E	66.8	E
	Overall	**30.5**	**C**	**31.6**	**C**
US 15-501 and I-40 WB Ramps	**EB**	7.2	A	22.7	C
	WB	41.9	D	45.5	D
	NB	76.2	E	45.0	D
	SB	--	--	--	--
	Overall	**39.7**	**D**	**36.3**	**D**
US 15-501 and SW Durham Drive	**EB**	33.9	C	38.9	D
	WB	13.3	B	15.6	B
	NB	71.2	E	92.5	F
	SB	61.8	E	65.7	E
	Overall	**28.2**	**C**	**33.9**	**C**
US 15-501 and Westgate Drive	**EB**	19.3	B	22.6	C
	WB	20.4	C	20.8	C
	NB	28.5	C	26.6	C
	SB	38.0	D	37.8	D
	Overall	**21.4**	**C**	**23.0**	**C**
US 15-501 and University Drive	**EB**	34.8	C	37.0	D
	WB	--	--	--	--
	NB	30.0	C	22.0	C
	SB	18.5	B	29.0	C
	Overall	**29.7**	**C**	**30.7**	**C**

3.2.1 Build Analysis

The sections and tables below highlight the build scenarios at key intersections along the corridor.

3.2.1.1 US 15-501 and Sage Road - Scarlett Drive

Table 7 below summarizes the operations analysis of the Reduced Conflict Intersection (RCI) design, also known as a Superstreet design, along Segment 1. Overall this strategy results in notable operational improvements at the key intersections. In addition to the operational benefits of the RCI, the greatest benefit of this strategy is the safety benefits for all modes of transportation. The RCI is named as such because it reduces the number of conflict points from 32 at a traditional intersection to 14 at the RCI intersection. Studies have shown a 15 to 46 percent reduction in total crashes, and 22 to 63 percent reduction in injury and fatal crashes from implementing this design. Another benefit of this design is the ability to using signal timing to moderate travel speeds, creating a safer and more efficient environment for all users.

Table 7: 2025 Build Alternative 1 - Synchronized Street

2025 Build Alternative 1 – Reduced Conflict Intersection Design					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
US 15-501 and Sage Road	EB (Left-over)	34.8	C	21.9	C
	WB	6.6	A	6.3	A
	SB	38.9	D	19.1	B
	Overall	12.7	B	10.0	A
US 15-501 and Scarlett Drive	EB	6.5	A	6.2	A
	WB (Left-over)	16.1	B	30.6	C
	NB	21.3	C	38.8	D
	Overall	9.2	A	10.1	B
U-Turn West of Sage Road/ Scarlett Drive	EB	6.7	A	7.5	A
	WB (U-Turn)	22.1	C	37.2	D
	Overall	8.7	A	10.1	B
U-Turn East of Sage Road/ Scarlett Drive	EB (U-Turn)	36.9	D	22.1	C
	WB	10.7	B	7.7	A
	Overall	13.7	B	9.6	A

3.2.1.2 US 15-501 and Eastowne Drive - Lakeview Drive

The two alternatives evaluated for the Eastowne Drive and Lakeview Drive intersection included traditional widening and the construction of a partial cloverleaf interchange. As shown in the tables below, the partial cloverleaf is clearly the winner considering only operations and LOS. However, this design requires significant right-of-way and is much more impactful to adjacent development. Modest improvements can be made to the intersection with traditional widening to include the addition of dedicated right turn lanes.

Table 8: 2025 Build Alternative 1 - Partial Clover

2025 Build Alternative 1 - Partial Clover					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
Eastowne Drive and US 15-501 WB Ramps	EBL	12.0	B	11.8	B
	EBR	10.6	B	10.2	B
	NBL	7.7	A	7.9	A
E Lakeview Drive and US 15-501 EB Ramps	EBL	15.6	C	21.7	C
	EBR	10.0	A	9.3	A
	NBL	8.3	A	8.5	A

Table 9: 2025 Build Alternative 2 - Traditional Intersection

2025 Build Alternative 2 - Traditional Intersection					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
US 15-501 and Eastowne Drive/E Lakeview Drive	EB	23.0	C	28.2	C
	WB	27.2	C	19.4	B
	NB	38.7	D	45.6	D
	SB	40.4	D	81.9	F
	Overall	26.5	C	29.0	C

3.2.1.3 I-40 - US 15-501 Interchange

The I-40 interchange is clearly a bottleneck within the US 15-501 corridor, creating a barrier for both motorized and non-motorized modes of transportation. The goal of the alternative proposed for this location was to maintain a small design footprint, reduce delay, and improve safety by minimizing the number of conflict points. The recommended design is the replacement of the conventional diamond interchange with a diverging diamond interchange (DDI). The DDI reduces the number of conflict points from 26 to 14, greatly improving the safety of the interchange. Several other designs were screened but ruled out from further consideration due to the larger footprint, lesser ability to process left turning vehicles, and greater impacts on non-motorized movements through the interchange. Operations analysis summarized in Table 10 below show reduced delays and improved LOS with the implementation of a DDI.

Table 10: 2025 Build Alternative 1 - Diverging Diamond Interchange

2025 Build Alternative 1 - Diverging Diamond Interchange					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
US 15-501 and I-40 EB Ramp Right-Turn	WB	--	--	--	--
	SB	25.0	C	11.5	B
	Overall	2.8	A	1.4	A
US 15-501 and I-40 EB Ramps Crossover	EB	33.4	C	23.9	C
	WB	13.4	B	35.7	D
	Overall	20.0	B	29.2	C
US 15-501 and I-40 EB Ramp Left-Turn	EB	--	--	--	--
	SB	9.9	A	18.8	B
	Overall	2.9	A	3.9	A
US 15-501 and I-40 WB Ramp Left-Turn	WB	--	--	--	--
	NB	28.3	C	14.1	B
	Overall	7.3	A	4.2	A
US 15-501 and I-40 WB Ramps Crossover	EB	48.6	D	23.4	C
	WB	53.8	D	31.5	C
	Overall	52.0	D	26.8	C
US 15-501 and I-40 WB Ramp Right-Turn	EB	--	--	--	--
	NB	12.9	B	52.3	D
	Overall	4.3	A	16.7	B

3.2.1.4 US 15-501 and SW Durham Drive

An interchange at SW Durham Drive was considered per project givens for the study. A tight diamond interchange was the only design evaluated due to a desire to minimize the impacts on adjacent land parcels and to provide a design that could more safely accommodate pedestrian movements than other designs that provide free-flowing ramp junctions. The grade separation of Mt Moriah Road results in higher volumes of traffic using this interchange to access adjacent developments, impacting the overall LOS, though the design does provide acceptable LOS for both the AM and PM peak hour.

While this design can accommodate sidewalks, no bike lanes are provided due the proximately of the grade separated Mt Moriah Road with full bicycle and pedestrian accommodations and no vehicle weaving movements to contend with. An extensive bicycle and pedestrian network is recommended both north and south of US 15-501 to encourage non-motorized travel along the corridor. In addition to a grade separated crossing at Mt Moriah Road, an additional grade separated roadway is recommended east of SW Durham Drive and will provide bicycle and pedestrian facilities.

Table 11: 2025 Build Alternative 1 - Tight Diamond Interchange

2025 Build Alternative 1 - Tight Diamond Interchange					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
SW Durham Drive and US 15-501 WB Ramps	EB	--	--	--	--
	WB	34.6	C	51.5	D
	NB	18.0	B	30.6	C
	SB	22.7	C	36.6	D
	Overall	25.1	C	39.6	D
SW Durham Drive and US 15-501 EB Ramps	EB	39.1	D	62.6	E
	WB	--	--	--	--
	NB	20.0	B	53.9	D
	SB	13.5	B	33.9	C
	Overall	23.6	C	49.9	D

3.2.1.5 US 15-501 Business (Durham – Chapel Hill Blvd) and Westgate Drive

Traffic volumes on US 15-501 Business drop off significantly after the US 15-501 Bypass. This reduction in traffic volumes and an existing cross-section that is not needed based on existing and forecast traffic volumes provides the opportunity to transition this segment of study corridor to a narrower urban cross section with lower speeds, appropriate landscaping and multimodal infrastructure. Transitioning from a higher speed section that prioritizes mobility to a lower speed section that prioritizes access requires appropriate infrastructure to physically slow traffic and visually indicate to drivers that they are entering a new environment. To accomplish this, two strategies were selected for Westgate Drive: 1) a 2-lane roundabout, and 2) channelization and lane reductions. Both alternatives provide acceptable LOS during the peak periods, but the roundabout design offers improved operations in addition to a more physical indication of change along this segment. Results are summarized in Tables 12 and 13.

Table 12: 2025 Build Alternative 1 - Roundabout

2025 Build Alternative 1 - Roundabout					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
US 15-501 and Westgate Drive	EB	8.2	A	10.3	B
	WB	5.4	A	8.8	A
	NB	8.7	A	14.1	B
	SB	5.9	A	8.8	A
	Overall	7.3	A	10.5	B

Table 13: 2025 Build Alternative - Lane Reduction

2025 Build Alternative 2 - Lane Reduction					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
US 15-501 and Westgate Drive	EB	21.9	C	26.9	C
	WB	20.5	C	20.9	C
	NB	28.5	C	26.6	C
	SB	38.0	D	37.8	D
	Overall	22.8	C	25.0	C

3.2.1.6 US 15-501 Business (Durham – Chapel Hill Blvd) and University Drive

Given the unique configuration at University Drive along with the desire to better integrate bicycle and pedestrian, and to improve safety at this location, a roundabout is recommended. To improve multimodal operations and safety, a roundabout is considered at University Drive. In addition to improving multimodal access and safety, the roundabout also reduces peak delay at this location.

Table 14: 2025 Build Alternative 1 - Roundabout

2025 Build Alternative 1 - Roundabout					
Intersection		AM Peak		PM Peak	
		Delay (sec)	LOS	Delay (sec)	LOS
US 15-501 and University Drive	EB	11.4	B	24.7	C
	WB	8.7	A	7.7	A
	NB	20.1	C	13.6	B
	SB	8.3	A	16.8	C
	Overall	12.6	B	18.7	C

3.2.2 Intelligent Transportation Systems and Connected and Autonomous Vehicles (C/AV)

To further improve operations within the corridor, Intelligent Transportation System (ITS) strategies were considered and recommended. The ITS technologies considered are the same for both alternatives, and are summarized by segment in Table 15.

Table 15: ITS Strategies

ITS Strategies
Segment 1 • Connected Vehicle (CV) based Virtual DMS, and Transit Signal Priority (TSP), Traveler Information System like 511 could be an effective ITS solution to the study corridor • Emergency Vehicle Pre-Emption (EVP) system and vehicle detection along the corridor can improve safety and mobility during an emergency event. • Four Closed Circuit Television (CCTV) cameras are proposed to monitor the activities at the intersections and along the study corridor.
Segment 2 • CV based technology like mobile accessible pedestrian signal system could help achieve the goal of a multimodal corridor. • Transit signal priority could help improve transit access and connectivity. • Emergency Vehicle Pre-Emption (EVP) system and vehicle detection along the corridor can improve safety and mobility during an emergency event. • Four Closed Circuit Television (CCTV) cameras are proposed to monitor the activities at the intersections and along the study corridor.
Segment 3 • CV based technology like mobile accessible pedestrian signal system could help achieve the goal of a multimodal corridor. • Emergency Vehicle Pre-Emption (EVP) system and vehicle detection along the corridor can improve safety and mobility during an emergency event. • One Closed Circuit Television (CCTV) camera is proposed to monitor the activities at the intersections and along the study corridor.
Segment 4 • Emergency Vehicle Pre-Emption (EVP) system and vehicle detection along the corridor can improve safety and mobility during an emergency event. • Four Closed Circuit Television (CCTV) cameras are proposed to monitor the activities at the intersections and along the study corridor. • A fiber communication system to connect the signals could help effectively mobilize travelers along the corridor. • With parking is provided on both sides of the roadway along with improving transit amenities, parking and transit information is recommended along with Transit Signal Priority.

More efficient network mobility is possible by taking advantage of the Connected Vehicle/Automated Vehicle (CV/AV) technology and communicating with infrastructure. Feeding vehicle information back to dynamic control systems can potentially mitigate both congestion and its environmental impacts. Technologies (like DSRC, Wireless 5G, etc.,) evolve and mature with time and the cost of implementing them reduces with time.

3.3 TRANSIT

A key assumption for the US 15-501 Corridor Study was the implementation of the Durham-Orange Light Rail Transit (D-O LRT). As a part of the development of the D-O LRT, GoTriangle and its partners conducted extensive travel market and transit ridership analysis for the US 15-501 Corridor. This effort confirms the role of the US 15-501 corridor as a key transit route that connects jobs, residents and students to major destinations including downtown Chapel Hill (including UNC Hospitals), the Duke University and Durham Veterans' Administration medical centers, and downtown Durham. Data from GoTriangle indicates that Route 400 provides all-day service with 30-minute frequencies and carries more than 900 passengers on an average weekday. Route 405 provides peak service on Weekdays at 30-minute frequencies, with an average of nearly 550 passengers per weekday. Finally, the GoTriangle Robertson Scholars Express (RSX), which has stops at Duke University's West Campus and UNC's Morehead Planetarium, carries more than 200 passengers each weekday. GoDurham also serves the corridor. Data from GoTriangle shows that Routes 10A and 10B provide weekday daytime service, and Route 10 provides weekday evening service, to destinations within the corridor including South Square area the New Hope Commons and Patterson Place shopping centers on Mt. Moriah Road. Together, these routes carry more than 2,250 passengers on an average weekday. GoDurham Route 20, which is a peak-time-only service that connects south Durham to the Duke and VA Medical Centers, via the South Square area, carries about 150 passengers each weekday.

Multiple studies have identified the US 15-501 corridor as a key priority for fixed-guideway transit service and extensive planning efforts have gone into the development of a comprehensive transit system to serve this corridor, anchored by D-O LRT. Due to the extensive nature of transit planning studies previously conducted, the US 15-501 Corridor Study did not attempt to replicate any of that technical analysis, but rather focused on the identification of areas where local bus connectivity, access and amenities could be provided to better enhance and support transit service in the corridor.

The transit strategies by segment and alternative are summarized in Table 16.

Table 16: Transit Strategies by Segment and Alternative

Segment 1	
Alternative 1 • Bus improvements as recommended by Blue Hill District TIA • Bus stop enhancements	**Alternative 2** • No change
I-40 Quad	
Alternative 1 • Extend GoDurham across I-40 to connect with a transfer point in Chapel Hill • Extend Chapel Hill transit across I-40 to connect with a transfer point in Durham • Implement connecting bus service to Eastowne Drive and New Hope Commons	**Alternative 2** • No change
Segment 2	
Alternative 1 • Improve transit access and connectivity to and through Segment 2	**Alternative 2** • No change

Table 16 (continued): Transit Strategies by Segment and Alternative

Segment 3	
Alternative 1 • Roadway improvements to provide better transit service and access.	**Alternative 2** • No change
Segment 4	
Alternative 1 • Improve transit amenities	**Alternative 2** • No change

3.4 BICYCLE AND PEDESTRIAN

The following strategies for active transportation considered the existing conditions for each segment (illustrated in Figure 14) as well as evaluation criteria. Although there are a variety of facilities that can provide designated space to bicycle users and pedestrians, vehicular traffic volume and speed primarily informed decisions about proposed facility types. Separating non-motorized users was considered throughout the corridor while also ensuring that access to destinations, safety through intersections, and overall connectivity were not sacrificed. The following recommendations utilize previous planning recommendations, like those made by the Durham Bike + Walk Implementation Plan and focus on the use of the US 15-501 corridor as the premier multimodal connection between Durham and Chapel Hill. The active transportation strategies by segment and alternatives are summarized in Table 17 and further explained with additional details in the subsequent sections.

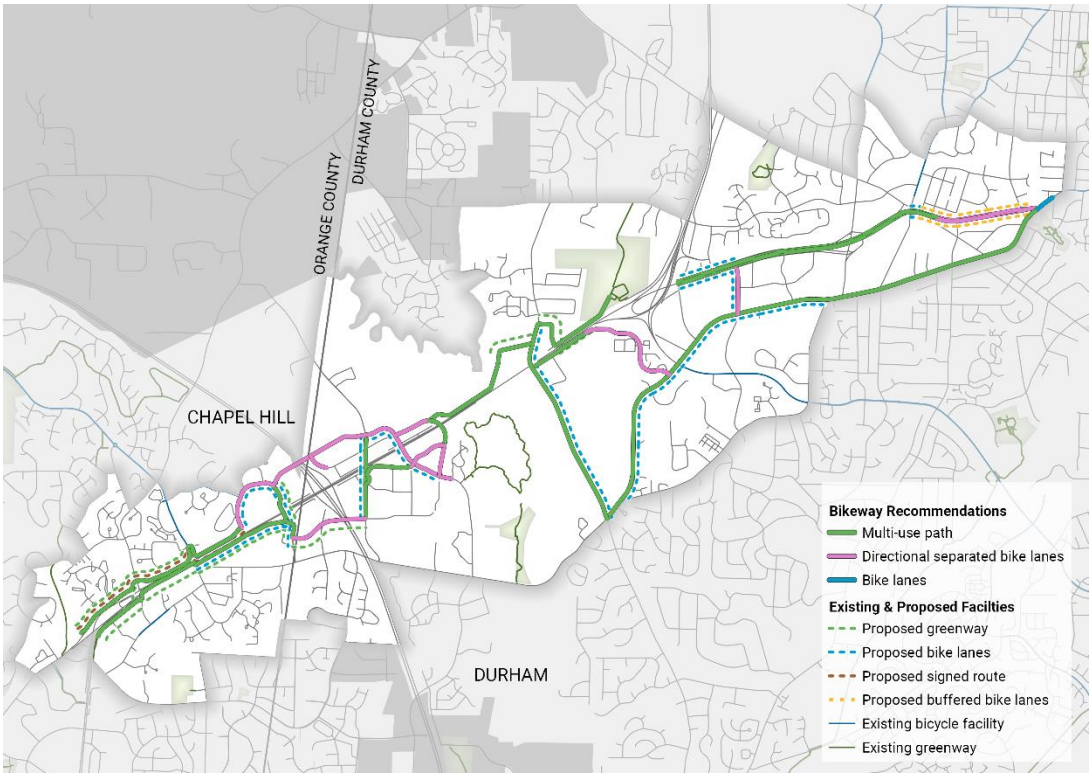

Figure 14: Bikeways and Multi-Use Path recommendations for US 15-501 Corridor Segments

Table 17: Active Transportation strategies by segment and alternative

Segment 1	
Alternative 1 • Provide painted pedestrian crosswalks at all intersections. • Provide bike and pedestrian facilities across proposed urban interchange. • Implement bike/pedestrian facilities for Segment 1 as shown in Chapel Hill Mobility Plan • Small footprint urban interchange with bicycle and pedestrian facilities.	**Alternative 2** • Traditional intersection widening with crosswalks and pedestrian signals. • Bicycle and pedestrian bridge over US 15-501.
I-40 Quad	
Alternative 1 • Provide bike and pedestrian facilities along proposed grade separated 2-lane roadway connecting New Hope Commons to Eastowne Drive • Provide bike and pedestrian facilities along proposed grade separated 2-lane roadway connecting New Patterson Place to Gateway • Provide bike and pedestrian facilities along connector roads connecting all 4 quadrants of the I-40 interchange.	**Alternative 2** • No change
Segment 2	
Alternative 1 • Provide bike and pedestrian facilities on grade separated Mt Moriah Road • Provide bike and pedestrian facilities on grade separated facility east of SW Durham Drive. • Provide off-road bike and pedestrian facilities connecting into New Hope Commons and Patterson Place • Provide bike and pedestrian connectivity between Patterson Place and Garrett Road utilizing Larchmont Drive versus off-road greenway due to wet and low-lying area. • Provide bike and pedestrian connections from Garrett Road to University Drive • Provide bike and pedestrian connectivity between Sandy Creek Drive, Chapel Hill Blvd Service Road, and Garrett Road • Provide bike and pedestrian facilities along University Drive	**Alternative 2** • Same as Alternative 1, except: • Grade separated bike and pedestrian only bridge within the vicinity of new right in/right out access point east of SW Durham Drive.
Segment 3	
Alternative 1 • Provide 4-lane urban cross-section, with better bike and pedestrian facilities. • Provide a shared use path for bikes and pedestrians protected by wide swath of landscaping using recaptured space from narrowing of the roadway. • Redesign Academy Road interchange to provide for safe bike and pedestrian movements • Redesign Chapel Hill Road interchange to provide for safe bike and pedestrian movements • Continue bike and pedestrian facilities along University Drive	**Alternative 2** • No change
Segment 4	
Alternative 1 • Provide parking on both sides of the roadway with a bike lane protected by the parking and sidewalks on both sides • Provide bike and pedestrian facilities at the proposed University Drive roundabout • Improve connectivity between adjoining neighborhoods and US 15-501 Businesses using sidewalks for greenways • Provide a pedestrian connection between Chapel Hill Road and US 15-501 Business	**Alternative 2** • No change

3.4.1 Segment 1 and I-40 Quad: Ephesus Church Road through I-40 interchange

3.4.1.1 Active Transportation Strategy:

A 12-foot-wide shared used path is recommended on both sides of US 15-501 to accommodate both bicycle and pedestrian traffic from Ephesus Church Road to the eastern intersection of Eastowne Drive/US 15-501. A new design for this intersection should include elements of a protected intersection to reduce turning speeds and transition shared use paths along Eastowne Drive before crossing I-40 on parallel routes. The Eastowne Drive intersection design changes should prioritize shared use path crossings and push button actuated pedestrian/ bicycle signals to increase crossing safety for a high-volume intersection.

Figure 15: Segment 1 - US 15-501 East of Sage Road

Two alternatives were considered for providing safe bicycle and pedestrian access across US 15-501 at Eastowne Drive. The first alternative recommends a small footprint urban interchange with bicycle and pedestrian facilities. The second alternative considers traditional intersection improvements to Eastowne Drive, and therefore a separate bridge for bicyclists and pedestrians to increase comfort and minimize conflicts near Eastowne Drive.

Evaluation Criteria Considered

- Safety
- Multimodal
- Network
- Health
- Accessibility

Shared use paths on both sides of the corridor align with the planned trails for the Town of Chapel Hill, and the paths improve connectivity to planned and existing bicycle facilities along Eastowne Drive, Sage Road, Erwin Road, and Ephesus Church Road. The shared use path on the north side of US 15-501 near the intersection of Sage Road should follow the parallel route along Dobbins Drive to E. Franklin Street and Eastgate Shopping Center Drive to connect with the Lower Booker Creek Trail and access to the shopping center and Ephesus Church Road.

To provide bicycle and pedestrian access between the land parcels to the east and west of I-40 along US 15-501, two new connector roads with bicycle and pedestrian facilities are recommended to connect the Eastowne Drive development to New Hope Commons, and the proposed Gateway development to Patterson Place. For more direct access across I-40, sidewalks are recommended for the proposed DDI interchange.

3.4.2 Segment 2: I-40 interchange to US 15-501 bypass

3.4.2.1 Active Transportation Strategy

The proposed 12-foot shared use path along the south side of US 15-501 is proposed to split at the western intersection of Eastowne Drive and US 15-501, following Eastowne Drive to the north and south. These shared use paths perpendicular to US 15-501 will transition to directional separated bike lanes with sidewalks and travel east towards Mt. Moriah Road, along Old Chapel Hill Road to the south and a proposed new roadway to the north. The Mt. Moriah Road intersection, which currently presents long crossings of US 15-501 and minimal protection for non-motorized users, is listed as a priority in the *Durham Bike + Walk Implementation* Plan. To safely facilitate multimodal access to businesses in Patterson Place and New Hope Commons, this intersection should be grade separated from US 15-501 and should include bicycle and pedestrian accommodations in the form of a shared use path. Connecting between Mt. Moriah and SW Durham Drive, separated bike lanes are proposed along the new proposed roadway to the north and a shared use path through the Patterson Place development south of US 15-501. In a first alternative, a similar grade separated crossing is recommended just east of SW Durham Drive to provide further access to New Hope Commons and Patterson Place for vehicles, transit, bicycles, and pedestrians.

Figure 16: Segment 2 - East of Garrett Road

Evaluation Criteria Considered

- Safety
- Multimodal
- Network
- Health
- Accessibility
- Environment
- Equity

A second alternative was considered that included additional access points along US 15-501 east of SW Durham Drive with the aim of providing access to New Hope Commons and Patterson Place. However, these access points would be restricted to right turns in or out. In this scenario, a separate bridge for bicycle and pedestrian access would be provided near the existing intersection.

Continuing the shared use path along the north side of the corridor may require specific attention at the bridge crossing New Hope Creek. A separate bicycle and pedestrian bridge would ensure separation for the shared use path but may be cost prohibitive in the short term. A short section of buffered on-street path may be provided within the existing conditions through a design exemption to reduce the width of shoulders on the bridge. Vertical and horizontal separation is recommended along this section of the path to ensure the continued comfort and safety for users who want to connect to nearby commercial uses or make longer trips between Durham and Chapel Hill. A better alternative would be to design the path on the south side of US 15-501 with access to the north side of US 15-501 under the current New Hope Creek bridge. The path could extend behind the current Oak Creek Village shopping center to connect with proposed side paths along Garrett Road.

The existing conditions of the US 15-501 Business interchange pose considerable challenges for safety and connectivity for active transportation/recreation infrastructure. Rather than continuing through the

interchange, an alternative route should be considered that aligns with the planned bicycle and trail facilities for the City of Durham. The proposed shared use path would intersect Garrett Road to allow users to travel north and south. While the proposed shared use path continues along Garrett Road to University, an alternative route along Larchmont with separated bike lanes is also recommended. Both the connection along Garrett Road and Larchmont provide bicycle and pedestrian facilities that circumvent the US 15-501 Business interchange. While a direct route through the bypass could be accomplished, a variety of treatments to prioritize the most vulnerable users would be necessary. Therefore, the proposed alignments were preferred to the direct route through the US 15-501 Business interchange.

Pedestrian crossing improvements should also be considered at the Garrett Road intersection due to long crossing distances and a lack of refuge presently. Residents near this intersection should have both bicycle and pedestrian infrastructure that provides short trip connections across the street or to transit stops with sidewalks and ADA compliant curb ramps, and they should also have longer trip connections through the proposed shared use path to University along Garrett Road or Larchmont and a connection to Chapel Hill to the West.

3.4.3 Segment 3: Durham-Chapel Hill Boulevard (US 15-501 Business) to Chapel Hill Road

3.4.3.1 Active Transportation Strategy

Traveling east from the intersection of US 15-501 with Westgate Drive, shared use paths protected by wide swaths of landscaping are recommended to support walking and bicycling along corridor. Separated bike lanes should be placed on Shannon Road to connect the shared use paths along Durham-Chapel Hill Boulevard (US 15-501 Business) with proposed bicycle facilities along University Drive. Additionally, redesign of the Academy Road and Chapel Hill Road interchanges as a single roundabout provide a safer environment for bicyclists and pedestrians and can reduce the number of conflict points and risk of severe or fatal crashes.

Figure 17: Segment 3 - US 15-501 near Tower Road

Building off the recommendations in the Durham Bike + Walk Implementation Plan, a connection from Garrett Road near Sandy Creek is recommended to link a proposed shared use path along the south side of University Drive. While sidewalks currently exist along University Drive, adding a shared use path would allow people to travel by bicycle along the corridor without mixing with vehicular traffic. A connected and safe path facility will attract users of all ages and abilities for both active transportation and recreation.

Evaluation Criteria Considered

- Safety
- Multimodal
- Network
- Accessibility

A key connection from University Drive to Tower Road along Shannon Road and Durham-Chapel Hill Boulevard provides access to a variety of businesses and nearby multifamily residential properties. This connection is proposed through separated bike lanes along Shannon Road south Durham-

Chapel Hill Boulevard and a shared use path that parallels the corridor that intersects with Tower Road. Additionally, intersection changes to increase safety and shorten crossing distances for non-motorized users are recommended at the following intersections:

- Tower Road and Durham-Chapel Hill Boulevard (listed as a priority in the *Durham Bike + Walk Implementation Plan*)
- Shannon Road and Durham-Chapel Hill Boulevard
- University Drive and Martin Luther King Jr Parkway
- University Drive and Westgate Drive

Chapel Hill Road is a narrow, two-lane road that is fronted by residential properties. Additional paving could be considered to add designated bike lanes along this half mile section between University Drive and W Cornwallis Road; however, lowering the speed limit from the current 35 MPH should be considered to encourage speeds that are more appropriate for a residential context. Additional traffic calming measures could accompany a lower speed limit to provide a bike boulevard rather than designated bike lanes to connect University Drive to Durham-Chapel Hill Boulevard via Chapel Hill Road.

3.4.4 Segment 4: Chapel Hill Road to University Drive

3.4.4.1 Active Transportation Strategy

Figure 18: Segment 4 – Chapel Hill Road to University Drive

Due to limited sidewalk along this segment, pedestrian activity is likely discouraged from adjoining local commercial uses and nearby residential neighborhoods. Adding sidewalks on both sides of the corridor would provide connectivity throughout this segment with less volume and speed than segments to the west. Although there is an existing buffered bike lane, on-street parking could be placed adjacent to the travel lanes to provide a parking protected bike lane with a painted door buffer zone. This would encourage even slower speeds than the existing road design, which is more appropriate for this context. Turning conflicts may be an issue along this segment, as many intersections have large radii and some properties have full frontage access. Managing access to individual properties with landscaping or curb and gutter may benefit all users and create a safer and more predictable environment. The current right-of-way of 100 feet is substantial and can accommodate the following improvements:

- 5-foot sidewalks (both sides)
- 2-foot grass buffer (both sides)
- 5-foot bike lane (both sides)
- 3-foot painted door buffer (both sides)
- 8-foot on-street parallel parking stalls (both sides)
- Two 11-foot travel lanes (one in each direction)
- One 11-foot center turn lane or landscaped median

Evaluation Criteria Considered

- Safety
- Multimodal
- Network
- Health
- Accessibility

The proposed cross section elements above total 79-feet in width. Designers should pay special attention to sight distances at intersections as well as business access to ensure that on-street parking is located appropriately. Bulb outs, either raised curb or painted, may be another effective treatment to protect sight distance triangles.

Bicycle and pedestrian facilities should be incorporated to the proposed roundabout at University Drive. The roundabout intersection design can reduce conflict points between travel modes and provide short crossing distances for bicyclists and pedestrians. A transition from the directional separated bike lanes (parking protected) in Segment 4 to the proposed shared use path on the south side of University Drive moving west is recommended. An additional transition from the shared use path to the conventional bike lanes that continue to the east along University Drive should be provided.

To further increase connectivity between neighborhoods and businesses adjoining US 15-501, sidewalks should be implemented. While providing sidewalk on both sides of the street would increase walkability, this type of infrastructure can be cost prohibitive. Additionally, neighborhood bikeways may be provided through traffic calming treatments that deter cut-through traffic and reduce vehicle speeds. Shared use paths should be considered as an alternative treatment to connect the surrounding neighborhoods to US 15-501 Business for both bicyclists and pedestrians.

4 DURHAM-ORANGE LIGHT RAIL TRANSIT

In April 2019, just a month before the third and final public workshop on the US 15-501 Corridor Study, a decision was made by the responsible governing bodies to discontinue work on the D-O LRT. At that time, work was also temporarily halted on the US 15-501 Corridor Study while the PSC worked to determine the best path forward. The ultimate decision of the PSC, supported by the MPO Board, was to develop a third alternative for the US 15-501 Corridor that could achieve the goal of linking Chapel Hill and Durham with fast, frequent, and reliable transit service.

The third alternative mirrors Alternative 2 in every way except for the addition of dedicated bus lanes within the study area between Ephesus Church Road, at the western edge of the study area, and the US 15-501 Bypass at the eastern portion of the study area. The dedicated bus lanes are accessed from the general-purpose lane allowing access from both US 15-501 Bypass and US 15-501 Business from the east, and the US 15-501 mainline from the west.

Eastwards from Ephesus Church Road to Eastowne Drive, the bus lane would be a Business Access and Transit (BAT) lane, which would allow right-turning vehicles to access the BAT lane to make right turns. This would mean that there would be no physical barrier between general purpose traffic and the BAT lane. Through the I-40 interchange, the buses would be in mixed traffic but could utilize Transit Signal Priority (TSP). TSP allows the buses to have priority at traffic signals and jump ahead of general purpose traffic. East of the I-40 interchange, the bus lanes would be center running, likely with some physical separation between general traffic and the bus only lane. This center running bus lane would continue to the US 15-501 Bypass. Future investigation, analysis and design will be needed to determine how the bus lane merges onto the US 15-501 Bypass for continued service to Duke University and beyond.

Table 18: Recommendations in Alternative 3

Segment 1
Alternative 3 • Same as Alternative 2, with addition of an outside running bus only lane
I-40 Quad
Alternative 3 • Same as Alternative 1 and 2, except with transit signal prioritization to merge buses into mixed traffic through the I-40 interchange
Segment 2
Alternative 3 • Same as Alternative 2, with addition of an inside running bus only lane
Segment 3
Alternative 3 • Same as Alternative 2
Segment 4
Alternative 3 • Same as Alternative 2

While not an ideal replacement for the D-O LRT, this dedicated bus lane will serve a mix of express service linking downtown Chapel Hill with Duke University and/or downtown Durham; local services that service destinations outside the corridor and use a portion of the dedicated busway; and perhaps an "LRT replacement" service that serves some of the same key destinations as the D-O LRT within and outside the US 15-501 corridor. The provision of dedicated bus lanes as a third alternative was deemed important to ensure that transit travel times remain reliable even as traffic congestion increases in the future, thereby supporting the goals for the corridor.

5 RECOMMENDED ALTERNATIVE AND IMPLEMENTATION PLAN

5.1 RECOMMENDED ALTERNATIVE

The recommended alternative aims to provide a comprehensive multimodal alternative for the entire corridor while also balancing the often-competing need for accessibility and mobility. In **Segment 1** the focus is on trying to find a balance between the conflicting priorities of accessibility and mobility with a design that improves the flow of through traffic, but also provides tools for creating a more urban environment including reduced travel speeds, increasing the number and safety of crossing locations for bicyclists and pedestrians, and streetscaping to provide a more urban context. In **Segment 2**, the focus is on mobility with a design that focuses on multimodal grade separations, while recommending local street networks within developments adjacent to the corridor for local traffic and bicycle and pedestrian movements along the corridor. High capacity transit service along **Segments 1 and 2** is prioritized with the inclusion of a bus only lane. In **Segments 3 and 4**, the recommended alternative aims to provide a more urban cross section that reduces the speed of vehicles and provides more pedestrian friendly environment with bicycle and pedestrian facilities and land use closer to the corridor. For the entire corridor, the focus is to capitalize on opportunities for creating land use patterns that promote multimodal travel, and incorporate urban design and human-scale design.

The sections below highlight the details of the recommended alternative for each segment along the corridor.

5.1.1 Segment 1

The primary challenge with Segment 1 is the competing interests between local and through traffic, and a desire to create a more urban multimodal environment in a corridor that has historically prioritized vehicle movements. The recommended 8-lane median divided Reduced Conflict Intersection (RCI), commonly referred to as a superstreet design, attempts to strike a balance between these competing needs without creating a larger footprint intersection or numerous interchanges. The RCI design is recommended between Erwin Road and Sage Road. The RCI design improves safety and balances accessibility and mobility. To accommodate the expected increase in bicycle and pedestrian trips, the recommendation includes timing the signals in the corridor to slow the progression of traffic, development of pedestrian crossing at main intersections and at midblock U-turns, and streetscaping both within the median and along the sides of the corridor. Given recent design changes to the intersection at Ephesus Church Road, the PSC elected not to recommend additional design modifications to that location for this study. The RCI design is not recommended for the Eastowne Drive (east) intersection given the proximity to the I-40 interchange. Traditional intersection widening is recommended for this location.

To accommodate the urban design vision for Segment 1, the recommended RCI must be designed as **an urban cross section with signal progression set to slow traffic** and pedestrian crossings at all main intersections and midblock U-turns.

Other improvements along this segment include support of the local street network proposed for the Blue District, and a recommendation to connect Legion Road to Old Durham to improve multimodal

connectivity within the corridor as well as a safer alternative to travel along US 15-501 for local traffic. The Blue Hill District bus recommendations are also endorsed by this study. Regional transit improvements for this segment include the provision of an outside running bus only lane.

To create a more multimodal corridor, the recommended alternative includes the provision of bicycle and pedestrian connections throughout Segment 1, both along and across US 15-501, including a grade separated pedestrian crossing near Eastowne Drive. Bicycle and pedestrian facilities are recommended on both sides of the corridor with connections to key development efforts. This study also endorses the bicycle and pedestrian facilities recommended in the Chapel Hill Mobility Plan.

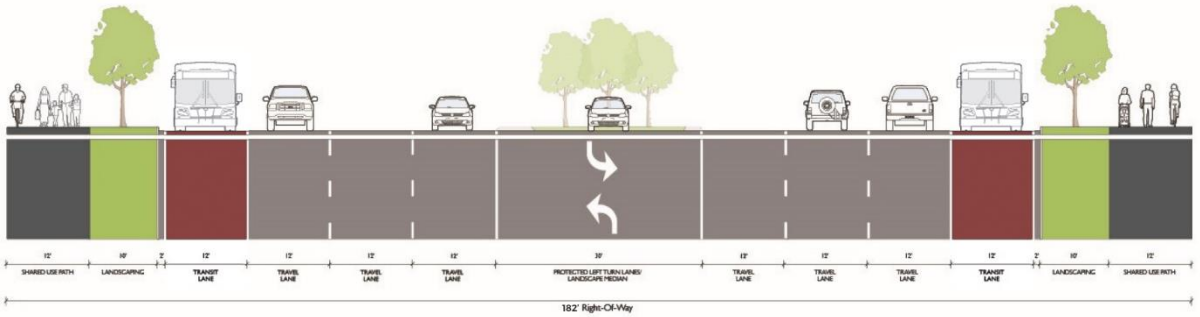

Figure 19: Recommended cross-section for Segment 1

5.1.2 I-40 Quadrant

The I-40 interchange is a regional access point, serving as a gateway to Chapel Hill and Durham from points east and west along I-40. It bisects the study area, providing many benefits related to economic development and regional connectivity for motorized travel, while at the same time being a barrier for non-motorized travel through the corridor. The goal for the I-40 Quadrant portion of the corridor is to allow high volumes of traffic to move efficiently through the interchange, while creating new, lower volume connections across I-40 to better serve pedestrians, bicyclists, transit and local traffic. The recommended design calls for replacing the existing diamond design interchange with a diverging diamond design. It is critical that the new design accommodate bicycle and pedestrian travel, and that signalization be provided at ramp junctures where pedestrian crossings are provided. To provide better multimodal accessibility between the quadrants of I-40 without the need to travel along US 15-501, or through the interchange, a grade separated 2-lane roadway with bicycle and pedestrian facilities is recommended to the south of the I-40 interchange connecting Patterson Place to Gateway. An additional bicycle and pedestrian bridge is recommended north of the I-40 interchange.

Good bicycle and pedestrian connectivity between Durham and Chapel Hill is critical. If the northern and southern connector roads cannot be built, then a separate bicycle and pedestrian bridge across I-40 will be necessary.

To provide better multimodal connectivity across I-40, improved local bus service should be provided across I-40 connecting with local bus service for both Chapel Hill and Durham. The dense, mixed-use development envisioned for the I-40 quadrants will also greatly benefit from local bus service that not only provides transit connectivity between the four quadrants, but also provides service connectivity to the broader region. As technology in automated transit service advances, consideration should be given to providing transit access between the quadrants with automated transit vehicles.

The outside running bus only lane recommended for Segment 1 will need to use the I-40 interchange area to transition to a median running bus only lane for Segment 2. This transition will be accommodated with transit signal prioritization for merging buses to or from the bus only lanes into mixed traffic, and then back to the bus only lanes.

5.1.3 Segment 2

Like Segment 1, Segment 2 has competing interests between local and through traffic, but local access is more focused at key locations along the corridor, and the primary goal of this segment is the efficient movement of traffic between I-40 and the US 15-501 Bypass. While the primary goal is the efficient movement of traffic along the corridor, multimodal connectivity and accessibility along and across the corridor is also important for the long term economic vitality of this segment. The recommended alternative attempts to accomplish this by providing connections to the key destinations on either side of US 15-501, while allowing higher volumes of traffic to efficiently move along the corridor. To create a development environment that supports shorter trips and multimodal travel, dense development patterns supported by the Patterson Place and New Hope Commons street network is recommended as redevelopment occurs. Bicycles and pedestrians were also an important consideration in this corridor, with the preferred alternative providing bicycle and pedestrian connections throughout Segment 2, both along and across US 15-501.

While this segment more than any other prioritizes the efficient movement of traffic through the corridor, the goals of providing **multimodal connectivity along and across the corridor** must not be overlooked.

The efficient movement of traffic will be accomplished through the separation of cross traffic via grade separation or small footprint urban interchanges. To improve safety and operations, Mt Moriah Road is recommended as a grade separated crossing of US 15-501 with bicycle and pedestrian facilities along Mt Moriah Road, including the bridge over US 15-501. Small footprint urban interchanges are recommended for SW Durham Drive and Garrett Road. These interchanges should be designed to safely accommodate bicycles and pedestrians. Access from the bus only lane will be provided to adjacent parcels via access to SW Durham Drive. To further enhance multimodal connectivity across US 15-501, a grade separated 2-lane roadway with bicycle and pedestrian facilities is recommended east of SW Durham Drive, and should follow the road network recommended for Patterson Place and any proposed development to the north of US 15-501. High capacity transit service will be accommodated with a

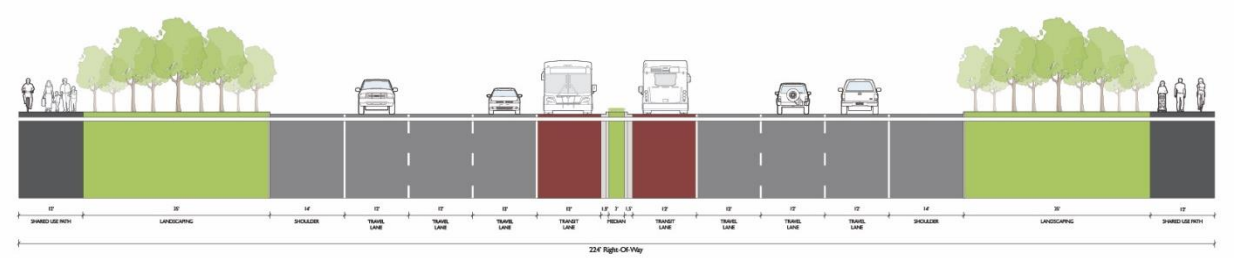

Figure 20: Recommended cross-section for Segment 2

recommended median running bus only lane between I-40 and the US 15-501 Bypass. Future studies should determine how this bus only lane transitions between US 15-501 and US 15-501 Bypass.

While not directly within the study area for this project, this study supports the provision of bicycle and pedestrian facilities along University Drive and Garrett Road to provide a more comprehensive network for non-motorized travel parallel to Segment 2. Other recommendations include the provision of multimodal connectivity between Sandy Creek Drive, Chapel Hill Boulevard Service Road, and Garrett Road; and bicycle and pedestrian facilities along Larchmont Drive.

5.1.4 Segment 3

Traffic volumes decrease considerably along Segment 3, moving east from the US 15-501 Bypass towards Chapel Hill Road, but the current roadway cross-section is configured to handle traffic volumes of a much higher magnitude, owing primarily to the days prior to the construction of US 15-501 Bypass when this segment served as US 15-501. With lower traffic volumes and a vision for a higher density, mixed-use, urban environment for this segment, the focus of Segment 3 was on creating a more fully multimodal 4-lane urban roadway with landscaped median, roundabouts at key locations, and bicycle and pedestrian facilities throughout. To create a physical transition from the more suburban, higher speed Segment 2 to a slower speed urban environment, a 2-lane roundabout is recommended at the intersection of Westgate Drive on the western edge of Segment 3. The conversion of traditional intersections to roundabouts at Tower Boulevard, Shannon Road and Weymouth Street will serve to further reduce traffic speeds and create a more urban feel. As the area redevelops, an urban grid system should be encouraged to the north and south of US 15-501 Business as recommended in the City of Durham's Street Plan for transit oriented developments, and per rezoning adopted for this area. Existing t-intersections should be converted to full intersections. As this segment transitions, the services roads will need to initially be maintained to provide access to adjacent land parcels. However, long term should include a more urban and dense development pattern that allows for the removal of the service roads

Transitioning this segment to **a more urban cross-section with no service roads** will need to be accomplished as the land use pattern becomes more urban in nature.

The higher speed ramp junctions from the Academy Road and Chapel Hill Road interchanges contrast with the multimodal urban environment envisioned for this segment. For this reason, recommendations include a redesign of the Academy Road interchange to remove the western most ramp junction, and to convert the eastern most ramp junction to a roundabout design. The slip ramp that provides access between Chapel Hill Road and US 15-501 business should be removed, and access to Chapel Hill Road provided via Cornwallis Road and a roundabout at Legion Avenue and US 15-501 Business. A side path for bicycles and pedestrians is recommended. This side path should be protected by a wide swath of landscaping using the recaptured space from narrowing the existing roadway cross-section.

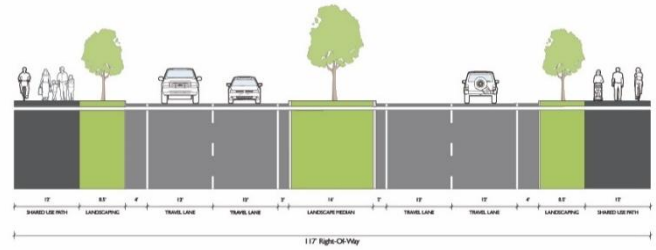

Figure 21: Recommended cross-section for Segment 3

5.1.5 Segment 4

Providing a landscaped median along this section will help **reduce neighborhood cut through traffic**.

At present, Segment 4 is a more urban street cross section, with on-street parking and bicycle facilities, and supports lower traffic volumes. The goal for Segment 4, was to provide improvements that would make the segment more pedestrian friendly and provide for safe movements across US 15-501 for all modes of travel, which can be accomplished using roundabouts. Recommendations include a 2-lane urban cross-section with landscaped median, consolidated driveways, and roundabouts at key intersections. Sidewalks, bike lanes, and parking are recommended for both sides of the roadway. The bike lanes are recommended between the parking and the sidewalk. To slow down travel speeds and help create a more urban feel, roundabouts are recommended at Legion Avenue, Hope Valley Road, and James Street. Recommendations also include redesigning the University Drive intersection as a roundabout with bicycle and pedestrian facilities, including a multiuse path that connects with the recommended multiuse path on University Drive. As this area continues to become more urban, and more bicycle and pedestrian friendly, it will be important to improve non-motorized connectivity to the adjoining neighborhoods, including Chapel Hill Road. Improved transit service and transit amenities, including bus pullouts at key locations, will be key to providing multimodal connections to other locations across the region.

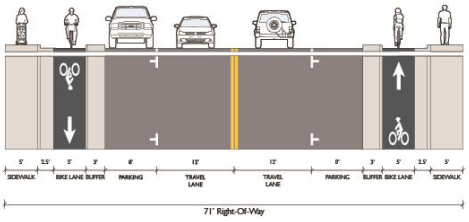

Figure 22: Recommended cross-section for Segment 4

5.2 Implementation Plan

The implementation of the recommendations along US 15-501 was divided into three time periods for implementation, along with a corresponding time frame for implementation:

- Short term – within 10 years
- Midterm – within 20 years
- Long-term – beyond 20 years

A brief description of all recommendations – grouped by mode - is provided in tables 19 to 22, along with their locations, phasing and tentative cost.

Table 19: Implementation Plan of Roadway Project Recommendations

Description	Location	Jurisdiction	Phase	Cost
Implement a 8-lane median divided Reduced Conflict Intersection (RCI) urban design with pedestrian crossings at intersections and midblock U-turn locations.	From Erwin Road to Eastowne Dr (west)	Chapel Hill	Mid	$20,000,000
Intersection widening to include an additional through lane on US 15-501 WB, and exclusive right turn lane on US 15-501 EB, and exclusive right turn lanes on both the NB and SB approaches of Eastowne Dr.	Eastowne Dr and US 15-501 (east)	Chapel Hill	Short	$400,000
Construct a new 2-lane connector road by extending Legion Rd.	Legion Rd from Scarlett Dr. to Old Durham Rd.	Chapel Hill	Long	$800,000
Construct a 2-lane connector road with sidewalks and bike lanes across I-40 north of the US 15-501 interchange.	From Eastowne Dr to Mt Moriah Rd.	Chapel Hill & Durham	Mid	$4,588,000
Construct a 2-lane connector road with sidewalks and bike lanes across I-40 south of the US 15-501 interchange.	From Lakeview Dr to Mt Moriah Rd.	Chapel Hill & Durham	Mid	$5,127,000
Construct diverging diamond redesign of US 15-501 interchange to include sidewalks from Eastowne Dr to Mt Moriah Rd. (Requires Bridge Replacement)	US 15-501 at I-40	Chapel Hill & Durham	Mid	$13,300,000
Implement transit signal prioritization to prioritize bus movements through the US 15-501 and I-40 interchange.	US 15-501 at I-40	Chapel Hill & Durham	Mid	$600,000
Upgrade US 15-501 by converting Mt Moriah Rd to an overpass over US 15-501 with bicycle and pedestrian facilities; and constructing a tight diamond interchange at US 15-501 and SW Durham Dr, with an extension of SW Durham Dr to New Hope Commons Dr. Provide sidewalks and bike lanes.	From existing intersection to SW Durham Dr	Durham	Mid	$135,800,000
Construct a 2-lane connector road with sidewalks and bike lanes across US 15-501 east of SW Durham Dr with a roundabout intersection at New Hope Commons Dr.	From Witherspoon Blvd to New Hope Commons Dr.	Durham	Long	$9,800,000
Construct tight diamond interchange at Garrett Rd with bicycle and pedestrian facilities.	US 15-501 at Garrett Rd.	Durham	Short	$32,000,000
Upgrade US 15-501 Business to a 4-lane divided urban cross section with landscaped median and sidewalks. Construct roundabouts at Westgate Dr, Tower Blvd, Shannon Rd and Weymouth St.	From Westgate Dr to Academy Rd	Durham	Long	$6,200,000
Connect Chapel Hill Blvd Service Rd (north side) to Academy Rd.	From 3308 Durham Chapel Hill Blvd to Academy Rd	Durham	Long	$1,700,000

Table 19 (continued): Implementation Plan of Roadway Project Recommendations

Description	Location	Jurisdiction	Phase	Cost
Redesign the US 15-501 Business and Academy Rd Interchange from the current diamond design to a single "bowtie" design with the roundabout at the western ramp termini for Academy Rd. Eastern ramps from Academy to US 15-501 Business will be removed.	Interchange between US 15-501 and Academy Rd.	Durham	Long	$800,000
Reduce the footprint of US 15-501 Business from 4-lane divided to 2-lane divided with 12-foot wide multiuse side paths on both sides of the road.	Academy Rd roundabout to Nation Ave	Durham	Long	$300,000
Modifications to US 15-501 Business and Chapel Hill Rd "interchange" to remove the ramp from W Cornwallis Rd to US 15-501 Business, construct roundabout at Legion Ave and provide signage to encourage all interchange movements to occur via the US 15-501 Business and Legion Ave roundabout.		Durham	Long	$800,000
Convert US 15-501 Business to 2-lane urban cross-section with landscaped median, consolidated driveways, and roundabouts at Hope Valley and James Street (in addition to the previously proposed roundabout at Legion Ave). Provide sidewalks and parking on both sides of the roadway with a bike lane protected by the parking.	From Nation Ave to University Dr	Durham	Long	$4,300,000
Construct a roundabout at University Dr and US 15-501 with Multi Use Paths connecting to the proposed multiuse path on the south side of University Dr.	University Dr at US 15-501	Durham	Long	$1,100,000

Table 20: Implementation Plan of Transit Project Recommendations

Description	Location	Jurisdiction	Phase	Cost
Construct an outside running bus lane along US 15-501 in both the eastbound and westbound directions, including reconfiguration of travel lanes between the US 15-501 and E Franklin St split. Construction of a new 4-lane bridge to accommodate the reconfiguration of travel lanes for E Franklin St.	US 15-501 from western study boundary to US 15-501 interchange.	Chapel Hill	Mid	$10,000,000
Construct an inside running bus lane along US 15-501 in both the eastbound and westbound directions with access to Southwest Durham Dr. via a bridged crossing.	US 15-501 interchange to US 15-501 Bypass.	Durham	Mid	$1,300,000

Table 20 (continued): Implementation Plan of Transit Project Recommendations

Description	Location	Jurisdiction	Phase	Cost
Expanded local bus service between Durham and Chapel Hill serving I-40/US 15-501 quadrant development and providing access to points beyond.	Various locations.	Chapel Hill and Durham.	Short	$4,000,000
Provide bus pullouts at designated locations along US 15-501 business.	Various locations.	Durham	Short	$250,000 per location

Table 21: Implementation Plan of Bicycle and Pedestrian Project Recommendations

Description	Location	Jurisdiction	Phase	Cost
Provide a minimum 12-foot wide multiuse side path on the north side of US 15-501.	From western study boundary to Eastowne Dr. (east)	Chapel Hill	Mid	$850,000
Provide a minimum 12-foot wide multiuse side path on the south side of US 15-501.	From western study boundary to Lakeview Dr multiuse side path.	Chapel Hill	Mid	$920,000
Construct a minimum 12-foot wide multiuse side path with a bridge over US 15-501 to provide a grade separated pedestrian and bicycle crossing.	From Old Chapel Hill Rd, across US 15-501 just west of Eastowne /Lakeview intersection, to northern connector road.	Chapel Hill	Mid	$1,090,000
Construct a multiuse Path from Eastowne Dr, over I-40 to Mt. Moriah Dr.	Eastowne Dr to Mt. Moriah Dr	Chapel Hill	Mid	$4,000,000
Provide a minimum 12-foot wide multiuse side path on Mt Moriah Rd.	From southern connector road to SW Durham Dr extension	Durham	Mid	$300,000
Provide a minimum 12-foot wide multiuse side path on the north side of US 15-501.	From new 2-lane connector road to Garrett Rd with access to southern multiuse path under New Hope Creek bridge.	Durham	Short	$1,920,000
Provide a minimum 12-foot wide multiuse side path on the south side of US 15-501.	From new 2-lane connector road to New Hope Creek bridge multiuse path.	Durham	Mid	$1,210,000
Provide a minimum 12-foot wide multiuse side path on both sides of Garrett Rd.	From Falls Mountain Way to Millennium Dr.	Durham	Short	$430,000

Provide a minimum 12-foot wide multiuse side path on the north side of US 15-501.	From Falls Mountain Way to Sandy Creek Trail.	Durham	Short	$280,000
Provide a minimum 12-foot wide multiuse side path on the south side of US 15-501.	From Garrett Rd to Lyckan Pkwy.	Durham	Mid	$280,000

Table 21 (continued): Implementation Plan of Bicycle and Pedestrian Project Recommendations

Description	Location	Jurisdiction	Phase	Cost
Provide sidewalks and separated bike lanes on Larchmont Rd.	From Lyckan Pkwy to University Drive.	Durham	Mid	$1,160,000
Provide a minimum 12-foot wide multiuse side path along University Drive.	From Garrett Rd to US 15-501 Business.	Durham	Short	$2,380,000
Provide a minimum 12-foot wide multiuse side path on the north side of US 15-501 Business, separated from roadway by landscaped buffer.	From Westgate Dr to Academy Rd	Durham	Long	$690,000
Provide a minimum 12-foot wide multiuse side path on the south side of US 15-501 Business, separated from roadway by landscaped buffer.	From Academy Rd to Westgate Dr.	Durham	Long	$700,000
Provide a pedestrian path between Nation Ave and Chapel Hill Rd between existing Hardee's and US 15-501 Business.	Nation Ave to Chapel Hill Rd.	Durham	Short	$20,000
Provide a minimum 12-foot wide multiuse side path on the south side of University Dr.	Hope Valley Rd to US 15-501 Business.	Durham	Short	$1,140,000

Table 22: Implementation Plan of Land Use Recommendations

Description	Location	Jurisdiction	Phase
Accommodate future growth along the corridor by following the framework strategies and recommendations established in the appropriate Comprehensive Plans.	General	Chapel Hill + Durham	n/a
Align land use and transportation planning by encouraging innovative design and architecture in the Design Districts, which are intended to provide high density infill, redevelopment and new development that integrates a mix of uses within an urban fabric supportive of multimodal transportation, with an enhanced street-level experience that promotes transit and pedestrian oriented activities.	As noted below	Durham	n/a
Recognize the Blue Hill District Design Guidelines, which identifies this area as a redevelopment priority with both residential and commercial uses, including a mixed-use core area with a new gridded street network, small blocks, public spaces, greenway connections and complete streets amenities. The related small area plan realigns Ephesus Church Road to meet S. Elliott Road at US 15-501.	US 15-501/Ephesus church Road area, generally from S. Elliott Road to just west of Europa Drive	Chapel Hill	short/ mid
Emphasize this part of the corridor as a transitional area between more intense catalyst development nodes by incorporating horizontal mixed uses, utilizing offices as a transition between commercial and residential areas.	West of Europa Drive to west of Eastowne Drive	Chapel Hill	short

Table 22 (continued): Implementation Plan of Land Use Recommendations

Utilize the flexibility offered by the **Design District** to redevelop the Patterson Place area, providing a mix of uses within gridded streets and small blocks that activate the street level and emphasize mobility choices. Take advantage of proposed bridges over I-40 to increase connectivity in this catalyst development node and provide opportunities for larger projects and a variety of commercial uses on vacant parcels or by the redevelopment of parcels such as the Blue Cross Blue Shield site.	west of Eastowne Drive to east of SW Durham Drive	Chapel Hill + Durham	mid/ long
Within the Patterson Place area, take development emphasis away from US 15-501 by fronting buildings on local roads such as Old Chapel Hill Road, Danziger Drive, SW Durham Drive, Eastowne Drive and other potential local roads. Prioritize an enhanced public realm and connections both internal and external.	west of Eastowne Drive to east of SW Durham Drive	Chapel Hill + Durham	mid/ long
Recognizing that this area is constrained by environmental boundaries, emphasize this part of the corridor as a transitional area between more intense catalyst development nodes by incorporating horizontal mixed uses, utilizing offices as a transition between commercial and residential areas. There may be opportunities for redevelopment and intensification of existing uses, including higher density residential development.	US 15-501/Garrett Road intersection area	Durham	short/ mid
Utilize the flexibility offered by the **Design District** to redevelop the South Square area, providing a mix of uses within gridded streets and small blocks that activate the street level and emphasize mobility choices.	east of Garrett Road to east of Weymouth Street	Durham	mid/ long
Within the South Square area, focus development towards the street, including local roads such as University Drive, Mayfair Street, Shannon Road, Westgate Drive and other potential local roads. Prioritize an enhanced public realm and connections both internal and external.	east of Garrett Road to east of Weymouth Street	Durham	mid/ long
As commercial parcels on the north side of US 15-501 (across from South Square) redevelop, encourage design that changes the form of the site, fronting buildings to the street with parking behind or to the side and sidewalk connections both along the parcel frontage and connecting to building entrances.	east of Garrett Road to east of Weymouth Street	Durham	short/ mid
A single row of commercial parcels is located on both sides of US 15-501 through this part of the corridor, with residential uses directly behind. As these commercial parcels redevelop, encourage design that changes the form of the site, fronting buildings to the street with parking behind or to the side and sidewalk connections both along the parcel frontage and connecting to building entrances.	east of Weymouth Street to the US 15-501/University Drive intersection	Durham	short/ mid
The character in this area is unlikely to change significantly due to the existing residential areas, but there will be opportunities for incremental redevelopment and intensification of commercial parcels, provided that adequate transitions and buffers are created to residential areas.	east of Weymouth Street to the US 15-501/University Drive intersection	Durham	short/ mid