Stantec

COMPREHENSIVE TRANSPORTATION PLAN

Town of Knightdale

Date: NOVEMBER 2022

Town of Knightdale, NC

SHIFT KNIGHTDALE

Acknowledgment

Thank you to all the organizations and individuals who committed their time, energy, and resources to this effort. This study would not have been possible without the support of many throughout the process. On behalf of the Town of Knightdale, thanks to the diverse group of participants whose collective efforts are reflected in the Knightdale Comprehensive Transportation Plan (CTP). These groups and individuals include the Advisory Committee, local staff and elected officials, the Capital Area MPO, North Carolina Department of Transportation, numerous stakeholders, and the dedicated citizenry of the Knightdale area.

Please also note that elements of the **Knightdale Transit Mobility Plan** have been incorporated into this Plan, and included in its entirety as an Appendix.

Thank you.

"The existing transportation condition in Knightdale is highly auto-centric."

- Attendee

"Bring desirable businesses and venues to Old Town area, increase walkability."

- Attendee

"Add sidewalks, crosswalks, with traffic signals."

- Attendee

Table of Contents

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CHAPTER 01

Introduction

Introduction

First Avenue, Town of Knightdale, North Carolina

Perched on the eastern edge of North Carolina's Research Triangle, **Knightdale is no stranger to growth** – for over a decade now, it has held its place as one of the fastest-growing communities in the state. **Growth in Knightdale is outpacing its existing infrastructure;** furthermore, both available land and funding for transportation improvements are finite resources.

Careful planning is needed for Town resources to be shared most effectively and meeting the needs of a burgeoning town.

The Comprehensive Transportation Plan (CTP for short) follows **the KnightdaleNext 2035 Comprehensive Plan,** adopted in 2018. The CTP functions as a guide for enhancement of the transportation system (all modes of travel), informing subsequent development, and critical for funding transportation improvements incrementally over time. Broadly speaking, the CTP **aligns Knightdale's vision for its future growth and development with phased transportation investments** and strategies needed to realize that vision.

This Chapter Covers:

- **Why this Plan?**
- **Planning Process and Timeline**
- **Guiding Principles**

Why this Plan?

This CTP builds on the efforts of Knightdale's previous planning efforts. At its best, **a multimodal transportation system supports broader community goals for its present and future growth,** facilitates a stronger economy and a greater quality of living through improved mobility, increasing access to jobs, community services, commercial destinations and natural resources.

This Plan is multimodal, **addressing all modes of transportation in Knightdale** including motor vehicles, walking, biking, and transit, and examines the impacts of development sites to transportation infrastructure. Evaluating all modes uniformly will establish a future transportation network that is more comprehensive and balanced.

Since funding is limited, Knightdale faces difficult choices among competing needs to prioritize among many needed improvements. Today, this means a heavy priority on **improving safety and connectivity,** boosting **transit** ridership and expansion of the **bicycle and pedestrian network.** In the future, priorities will likely shift to system maintenance and alternative modes of transportation as many widening projects are completed. Most importantly, this Plan will **assist in securing funding** for these transportation projects from federal, state and local transportation partners, like the North Carolina Department of Transportation (NCDOT), Capital Area Metropolitan Planning Organization (CAMPO), GoTriangle, and GoRaleigh.

KnightdaleNext Comp Plan Goals

UNIQUE ACTIVITY CENTERS
Encourage development that include a mix of uses and activities located close together.

COMPACT DEVELOPMENT PATTERNS
Guide future growth that will help manage infrastructure investments.

NATURAL ENVIRONMENT
Promote natural settings, increase people's proximity to recreational opportunities, and safeguard natural resources.

COMMUNITY DESIGN
Celebrate a distinct brand and sense of place while keeping things relevant and authentic for people.

INFILL DEVELOPMENT & REDEVELOPMENT
Promote activities for vacant and under-utilized areas.

ECONOMIC VITALITY
Promote a healthy and sustainable business environment.

PARKS & RECREATION
Promote and expand opportunities for lifestyle with parks and recreation facilities.

COMMUNITY FACILITIES & SERVICES
Continue to improve quality-of-life for all residents through facilities and services.

TRANSPORTATION
Provide a safe, reliable, and integrated system that balances all modes of transportation.

GREAT NEIGHBORHOODS & EXPANDED HOME CHOICES
Promote great neighborhoods for people's need at different stages of their life.

This CTP supports Knightdale's goals from KnightdaleNext.

Planning Process & Timeline

This CTP's development took place over twelve months, covering three broad phases described below. Public involvement was essential for a strong, thoughtful plan, with outreach events that took place throughout all three phases, highlighted in **Figure 1.1** below.

Figure 1.1: Generalized Project Timeline.

Phase 1: Investigation

The first phase focused on analysis. The project team reviewed previous plans, Town policies, data and qualitative feedback from online engagement (online survey and interactive map) to better understand the strengths, issues, opportunities and constraints in Knightdale's mobility network. The **Project Symposium was held virtually in February 2022,** the first major public outreach event, both to share some initial data observations and obtain direct feedback on issues from residents.

Phase 2: Design

The Design phase immediately followed the Project Symposium. The team synthesized the major findings from data analysis, public outreach, and background plans/policies to develop Guiding Principles that inform the first draft of a future mobility network. Pop-up events and focus group discussions provided nuance and depth to "test-fit" early recommendations. During this phase, the Public Urban Design Workshop was held, developing a vision for walkable, transit-supportive development within an 84-acre parcel near Old Town Knightdale.

Phase 3: Reporting

The final phase documented the whole of the planning process. Draft recommendations were vetted through the Advisory Committee and Public Open House, identifying opportunities for refinement. Feedback was synthesized and incorporated into the Final Plan, solidifying Knightdale's policy strategies and modal improvements through its adoption.

Guiding Principles

Guiding Principles express the core philosophy and vision for the Town of Knightdale's transportation system. They derive from key feedback received during the planning process: from discussions with the advisory committee and focus groups, public input received from pop-up events, the project symposium and design workshop, and the data received through the project website, interactive map, and the online survey. This information has been distilled into the following principles, which inform the remainder of this transportation plan:

Principle 1:

Improve multimodal connections over and through existing barriers.

Principle 2:

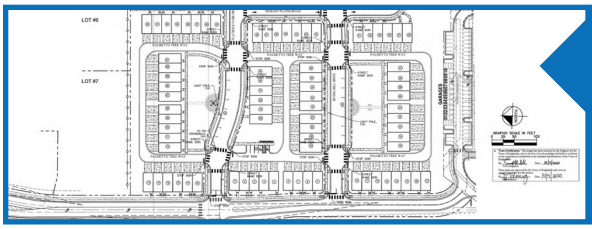
Identify transit-supportive, mixed-use redevelopment opportunities along Knightdale Boulevard.

Principle 3:

Improve roadway safety by reducing speeds and maintaining appropriate flow with coordinated signals.

Principle 4:

Fund multimodal improvement projects, especially intersection crossings along major corridors.



Principle 5:

Coordinate multi-jurisdictional development with Raleigh, Wendell & Wake County.

Principle 6:

Identify local street connections, and encourage private development to construct.

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CHAPTER 02

Planning Context & Investigation

Planning Context & Investigation

Public Design Workshop with residents in Knightdale, NC

While this Comprehensive Transportation Plan involves an understanding of Knightdale's mobility network, it's equally important to understand Knightdale as a community - the people, places and resources that make Knightdale the unique, attractive place to call home that it is. Recommendations are developed from a robust understanding of Knightdale's roadways, greenways and transit system, but also its vision for future growth, including community goals, values, and objectives for growth.

This chapter provides the background and context, beginning with a summary of the community's demographics and population changes. It also examines Knightdale's land use and natural resources in context, identifying the geographic barriers that limit mobility. Finally, it concludes with a review of previous planning efforts.

This Chapter Covers:

- **Community Context**
  - Demographics
  - Land Use & Natural Resources
- **Previous Plans & Policies**
- **Public Engagement**
- **Key Takeaways**

Community Context

DEMOGRAPHICS

Demographics reveal some *general trends* about community members, often in comparison with the county or state averages. First and foremost, it's no surprise that **Knightdale is growing quickly.** Knightdale's population has grown to over 19,400, up from 11,000 at the previous census. This kind of growth, over 2% per year, creates development pressure and challenges transportation networks.

A review of US Census data through the American Community Survey (ACS) suggests that Knightdale is **a great place to raise a family**, with a high percentage of youth under 18 years old (26%) and a lower median age than County or State measures. The low percentage of seniors aged 65 years and over (9%) suggests more about the number of families with children than an absence of elderly.

Home-ownership (70%) is between +4%-6% higher than County, State, and National rates, with a relatively high average home value of $385,000 (Zillow). Some could argue that the indicators of **gentrification**, *a process of displacing older (often poor) residents through redevelopment and attraction of new businesses, residents, and wealth*, are correlated with or often a result of these seemingly upward housing trends.

A large portion of residents are high school or college educated, with higher percentages than State or National rates, and equivalent rates to Wake County residents. Similarly, the **persons living below the poverty line is relatively low** for Knightdale (<5%), roughly 2-7% below the County and State average.

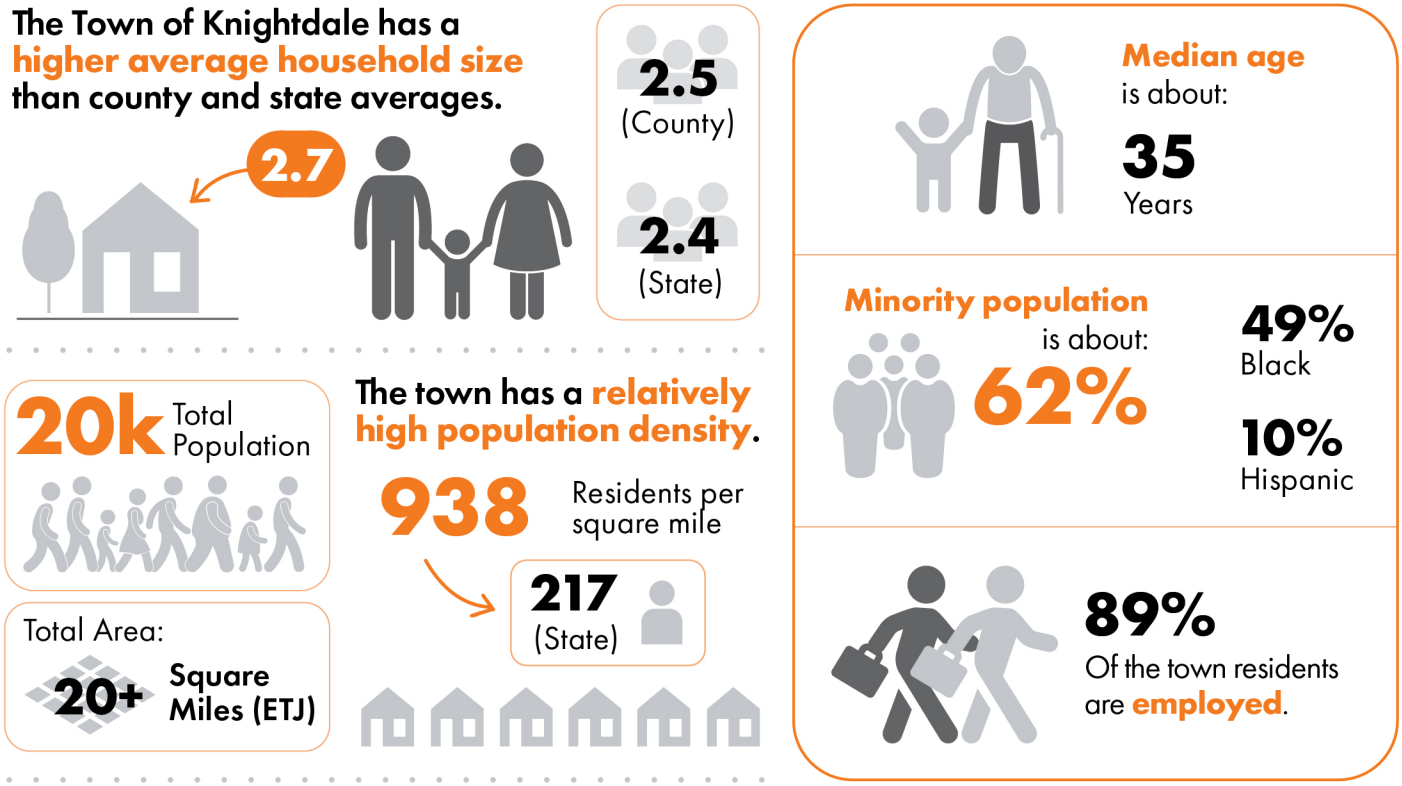


Figure 2.1: Visual summary of Knightdale's demographic profile. *Source: Esri Business Analyst - US Census ACS 5-year (2015-2019)*

Mode Splits

The personal **vehicle is the dominant mode** of travel for residents, and the 2.1 vehicles per household is relatively high by comparison. Typical commute time to work averages 27-minutes, outpacing the average for Wake County and North Carolina residents.

Flexibility to **work from home** is continuing to evolve nationwide, and will likely reduce the average commute time across the board. In the meantime, Town staff is actively working to increase the number of miles of sidewalks, greenways, and bikeways to connect residents with non-employment destinations within the Town for leisure, recreation, or household trip purposes.

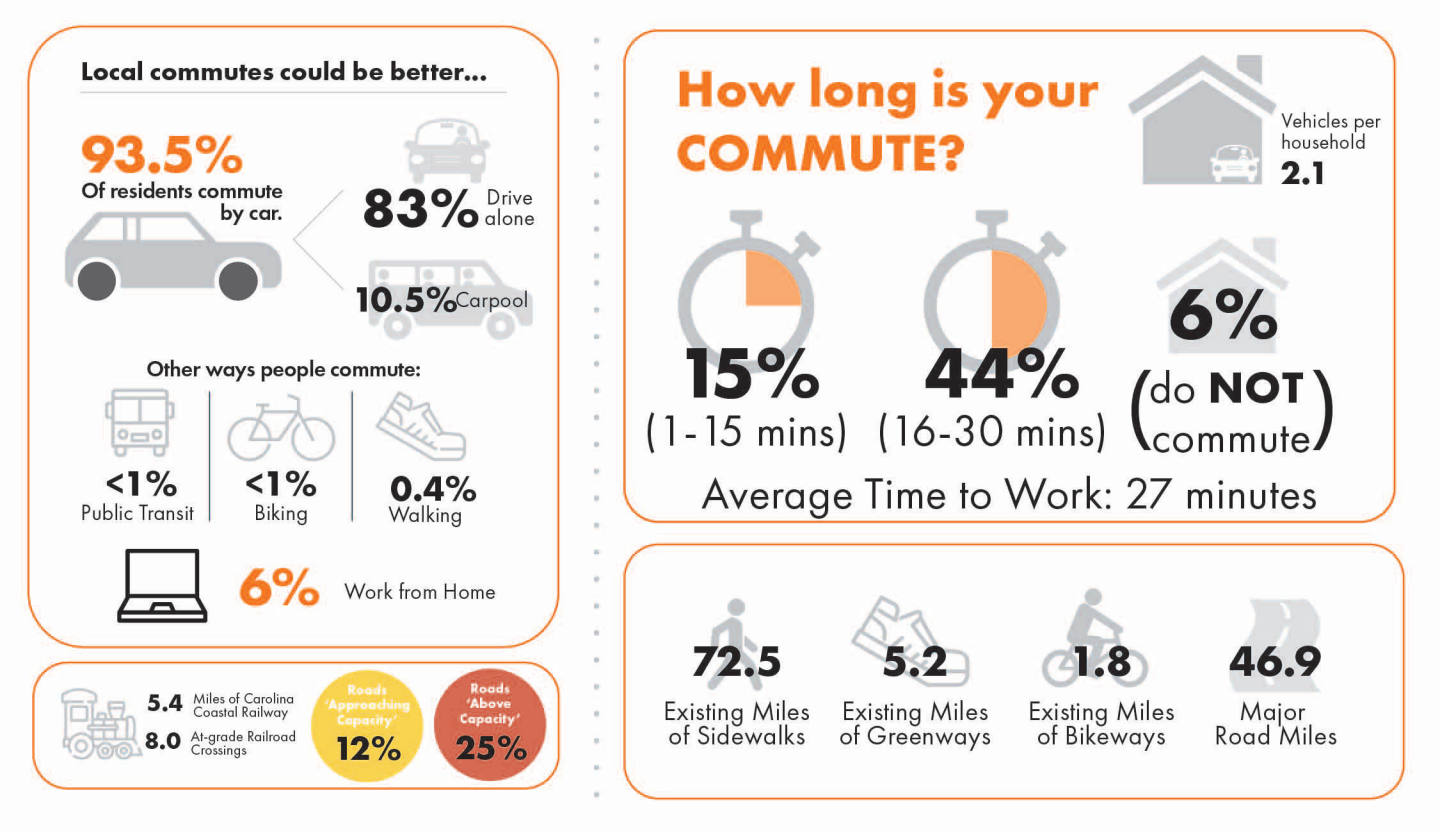


Figure 2.2: Visual summary of Knightdale's transportation mode profile.
Source: Esri Business Analyst - US Census ACS 5-year (2015-2019)

Communities of Concern

Planning for equitable outcomes has become a common element within local and regional planning efforts, and this often involves historically underserved populations and/or high concentrations of transportation disadvantaged, more generally referred to as **Communities of Concern (CofCs)**. An initial screening for CofCs utilizes socio-economic indicators from the American Community Survey (ACS) five-year estimates (2016-2020) at the block group level. The relevant data tables include: population below the poverty line, zero-vehicle households, seniors (age 65+), youth (age <18), and travel to work by modes other than motor vehicle. Census block groups with a greater proportion than the county average are considered indicators for CofCs, and the sum of these five categories identify areas to prioritize investment in transportation infrastructure.

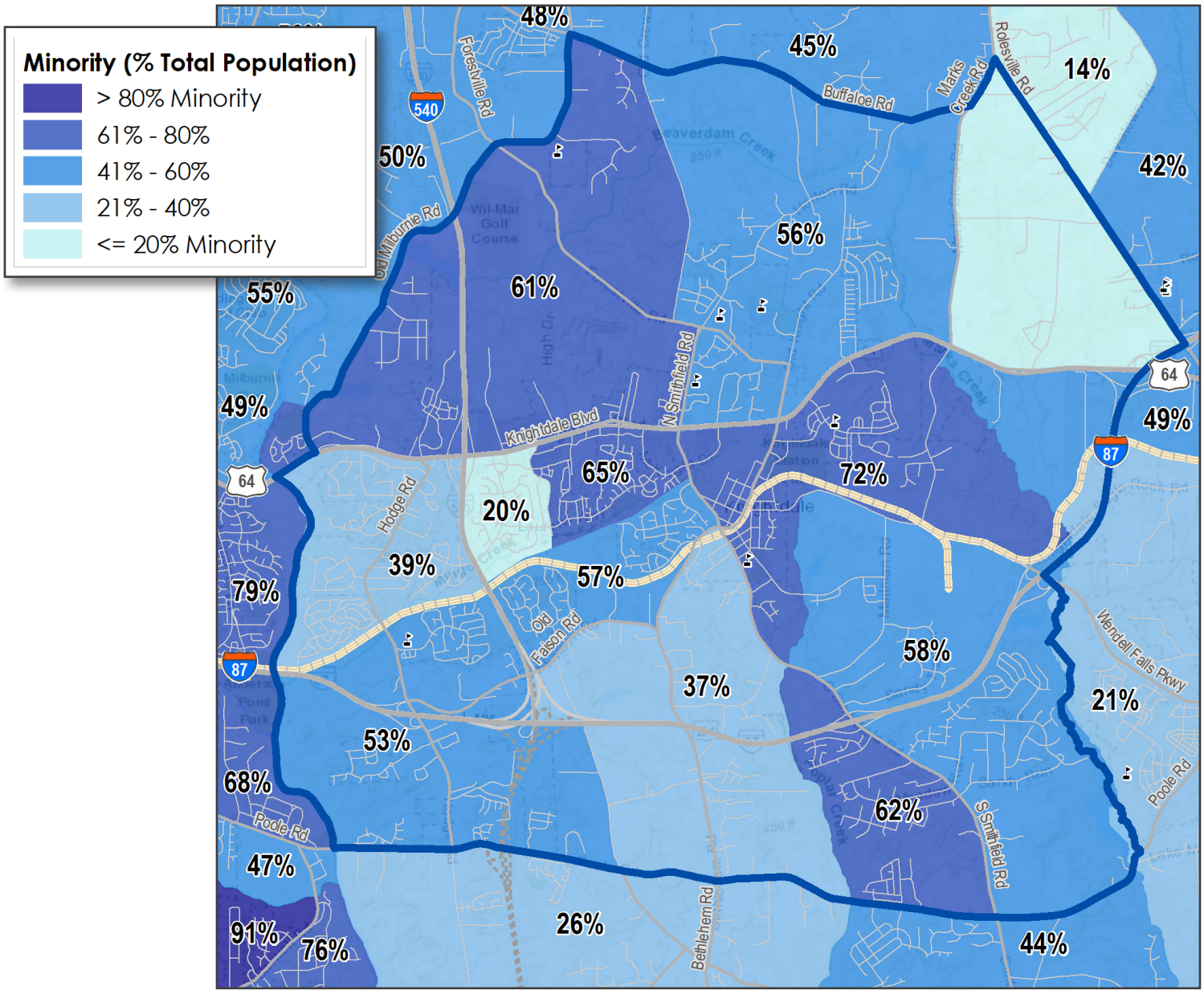
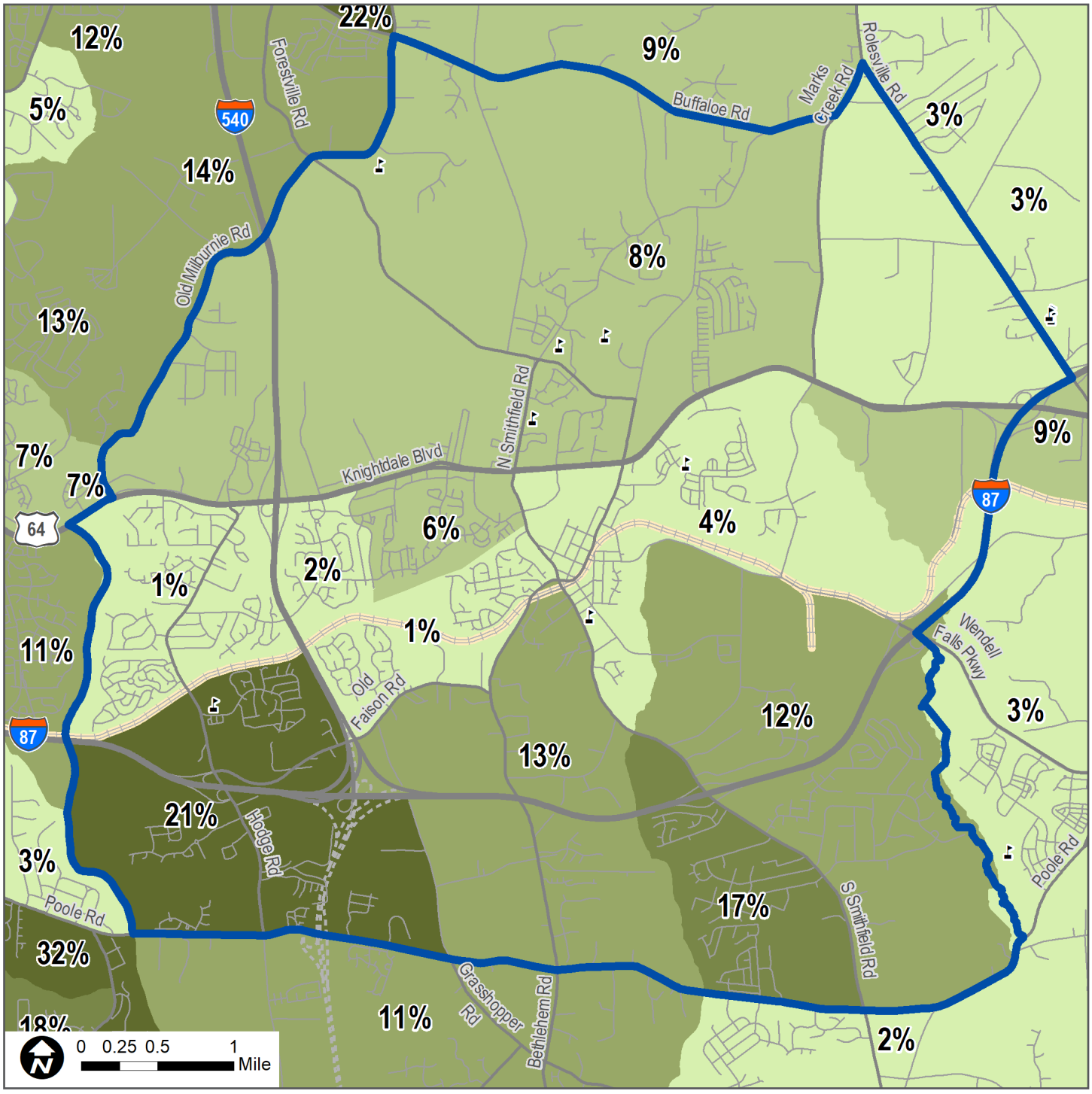


Figure 2.3: Minority population by census block group.

Source: Esri Business Analyst - US Census ACS 5-year (2015-2019)



Poverty (% Total Population)

- > 20% Persons Below Poverty
- 16% - 20%
- 11% - 15%
- 6% - 10%
- <= 5% Persons Below Poverty

Figure 2.4: Population below poverty line by census block group

Source: Esri Business Analyst - US Census ACS 5-year (2015-2019)

LAND USE & NATURAL RESOURCES

Environmental constraints and manmade physical barriers represent potential obstacles to the planning, design, and/or construction of transportation improvements in Knightdale's multimodal network. Understanding the location of these constraints and barriers early in the process allows us to tag potential recommendations with the need for additional environmental review, and therefore more accurately prioritize into mid-term or long-term categories for implementation.

Figure 2.5 depicts the hydrologic network, notably the **Neuse River and its tributary creeks**, that subdivides Knightdale's developable land between long and narrow floodplains. Crossing these flood prone areas by roadways can be expensive, which limits connectivity within this existing network. In many areas, particularly around Mingo Creek and west of I-540, development extends up to the limits of the floodplain. With **few collector streets and multimodal connections** in these areas, opportunities to further connect is limited as existing development will require use of eminent domain or construction through floodplain areas.

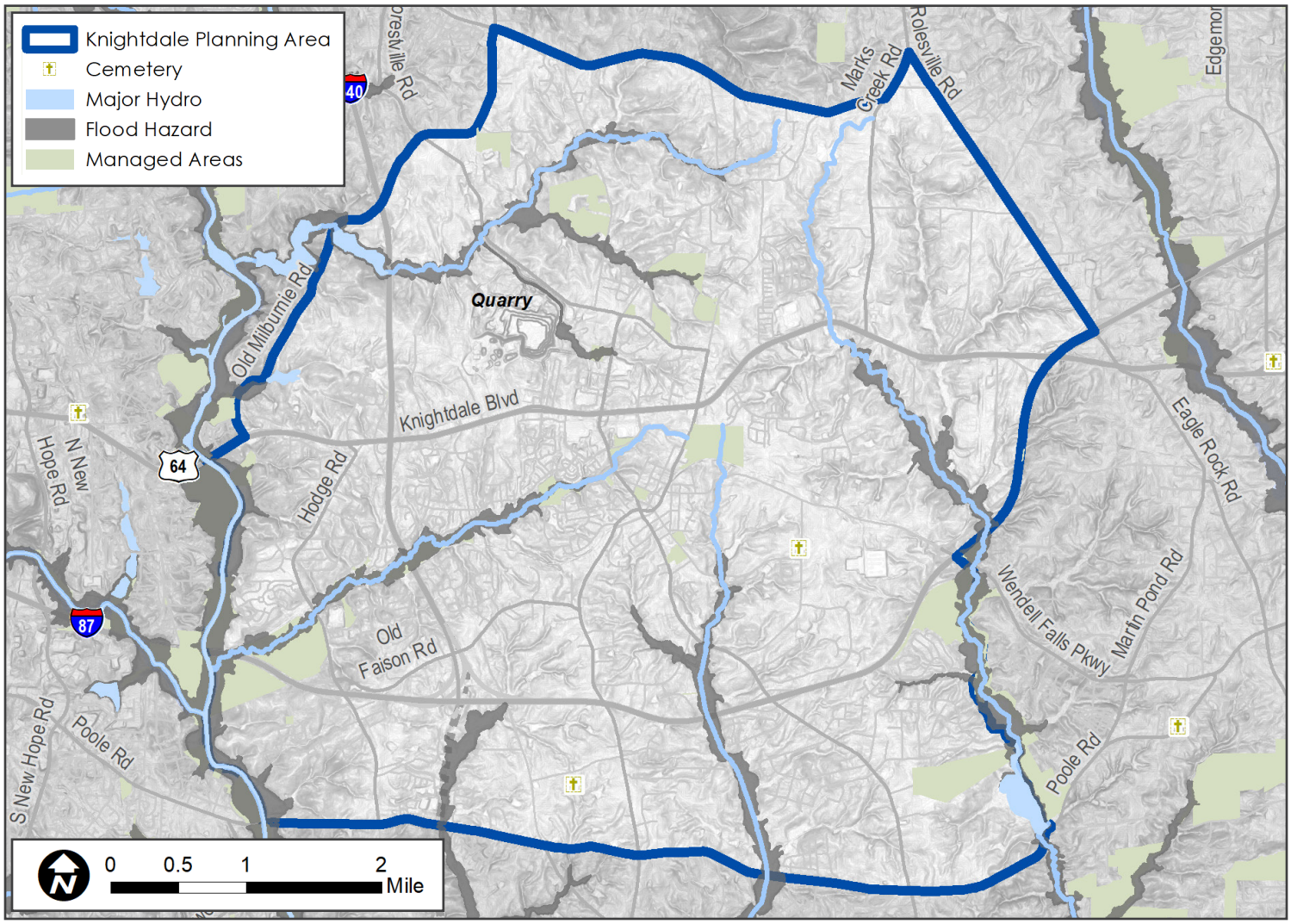


Figure 2.5: Hydrologic Network map.

Previous Plans & Policies

This Plan occurs in the context of Knightdale's previous planning efforts. These plans provide a guiding framework, revealing Knightdale's vision for itself and strategies to achieve that vision. With each plan, common themes emerge, which help to shape the recommendations.

In doing so, this Plan provides a vision that stands on the shoulders of these prior efforts, consistent with the Town's vision, **to increase the overall mobility, comfort, health, and quality of life of its residents.**

Traveling Roadshow with residents in Knightdale, NC

Wake County Transit

A 10-year transit plan updated periodically, its most recent version included BRT service to New Hope Commons (Route 33). The Plan's objectives of accessibility, frequent service, and urban mobility align with much of what Knightdale is trying to achieve.

MPO Plans & Programs

The Capital Area Metropolitan Planning Organization (CAMPO) updates the official metropolitan transportation plan (MTP) and administers other key, shorter-range funding opportunities (LAPP and CFA programs). The MPO is a vital project development partner.

Knightdale Next

The Town's comprehensive plan often uses transit and transit-oriented development to describe preferred land uses. Transit provisions are supported on "every non-access controlled street," as are emerging technologies and Bus Rapid Transit.

PLANWake 2021

Wake County's comprehensive plan shares similar goals with this effort: increasing non-automotive trips, creating areas of "intentional" development that support transit, and providing socially equitable, integrated housing and mobility choices.

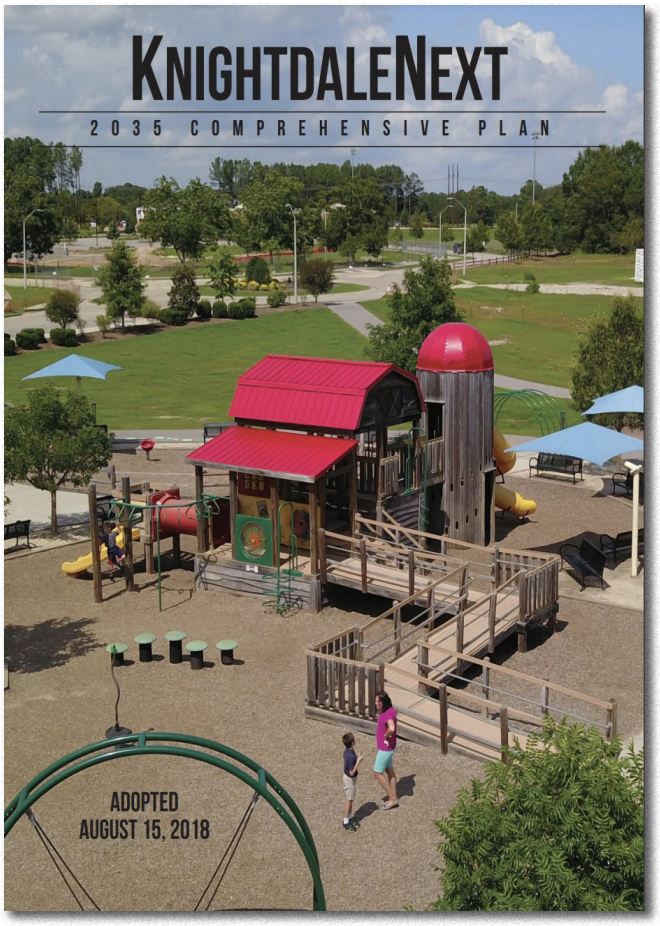
NE Microtransit Study

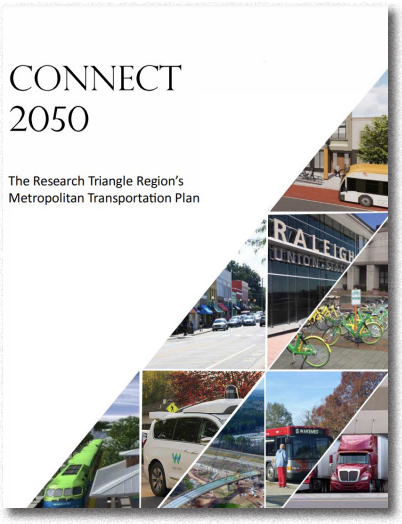
This study was completed in 2021 and led to a pilot implementation in 2022. The pilot has a limited connection to Knightdale's Route 33, but evaluating its success and potential expansion into more of Knightdale is an exciting proposition.

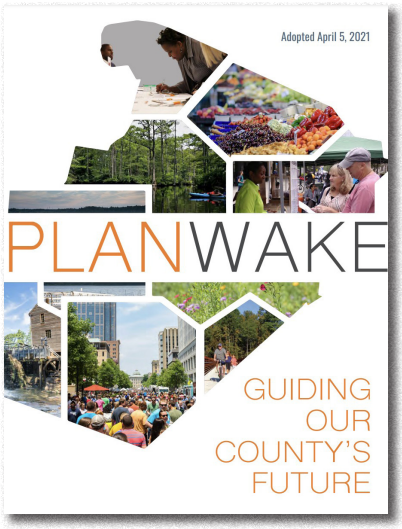
Unified Development Ordinance (UDO)

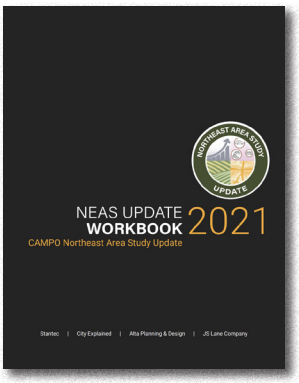
The UDO supports transit well, requiring connectivity and stop improvements especially on Avenues and Main Streets. Additional details for traffic studies or language adjustments might be considered to strengthen it even further.

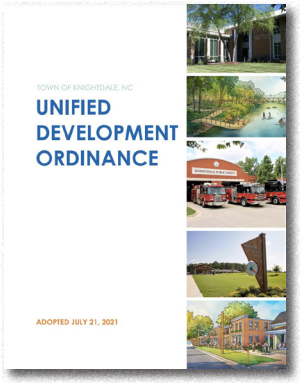
Figure 2.6: Summary of Transit **Plans** and **Implementation Policies**
Note: Headings are hyperlinked to these online resources.











KEY TAKEAWAYS

Knightdale's plans and policies are extensive and bear on many aspects of this CTP. From the plans reviewed, several themes emerged that will aid in developing recommendations for a multimodal transportation network:

- Prioritize **local roadway extension projects** and multimodal projects that **increase connectivity.**
- Prioritize **intersection crossing projects** to mitigate the impact to walking and biking.
- Explore **transit and bicycle/pedestrian projects** to **reduce overall demand** for single-occupancy vehicle travel on major arterials.
- Screen all CTP projects for those with the **potential to impact natural systems or features.**

Public Engagement

Public engagement plays an integral role in any design or study, as its results will impact the daily lives of community members and local businesses. Planning for a community of any size is more successful when we plan with the community. **Meaningful engagement means stronger results, tighter community bonds, and implementation becomes more likely.** Furthermore, engagement provides invaluable feedback to planners, engineers, and designers regarding current conditions and problems that might not be fully understood looking at data alone. The human element and a diversity of perspectives helps to reframe the project team's view of the issues and provide better suggestions for improvement.

A variety of strategies and activities were employed during the CTP's development to engage with the Knightdale community. These activities and their results are documented in the following pages, summarizing all the feedback received from the public, whether online, in-person, or through public meetings.

Residents at the Public Urban Design Workshop in March 2022.

A yard sign deployed along the Mingo Creek Greenway.

Knightdale's trails and greenways are a highlight for many.

OUTREACH PROCESS

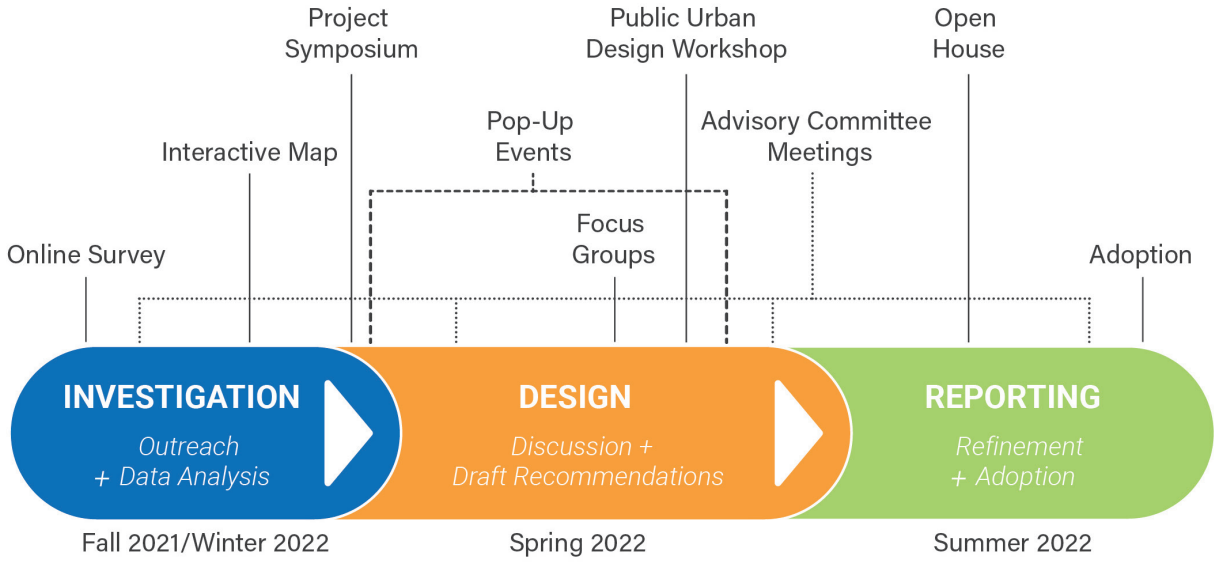


Figure 2.7: General process schedule with public outreach opportunities identified.

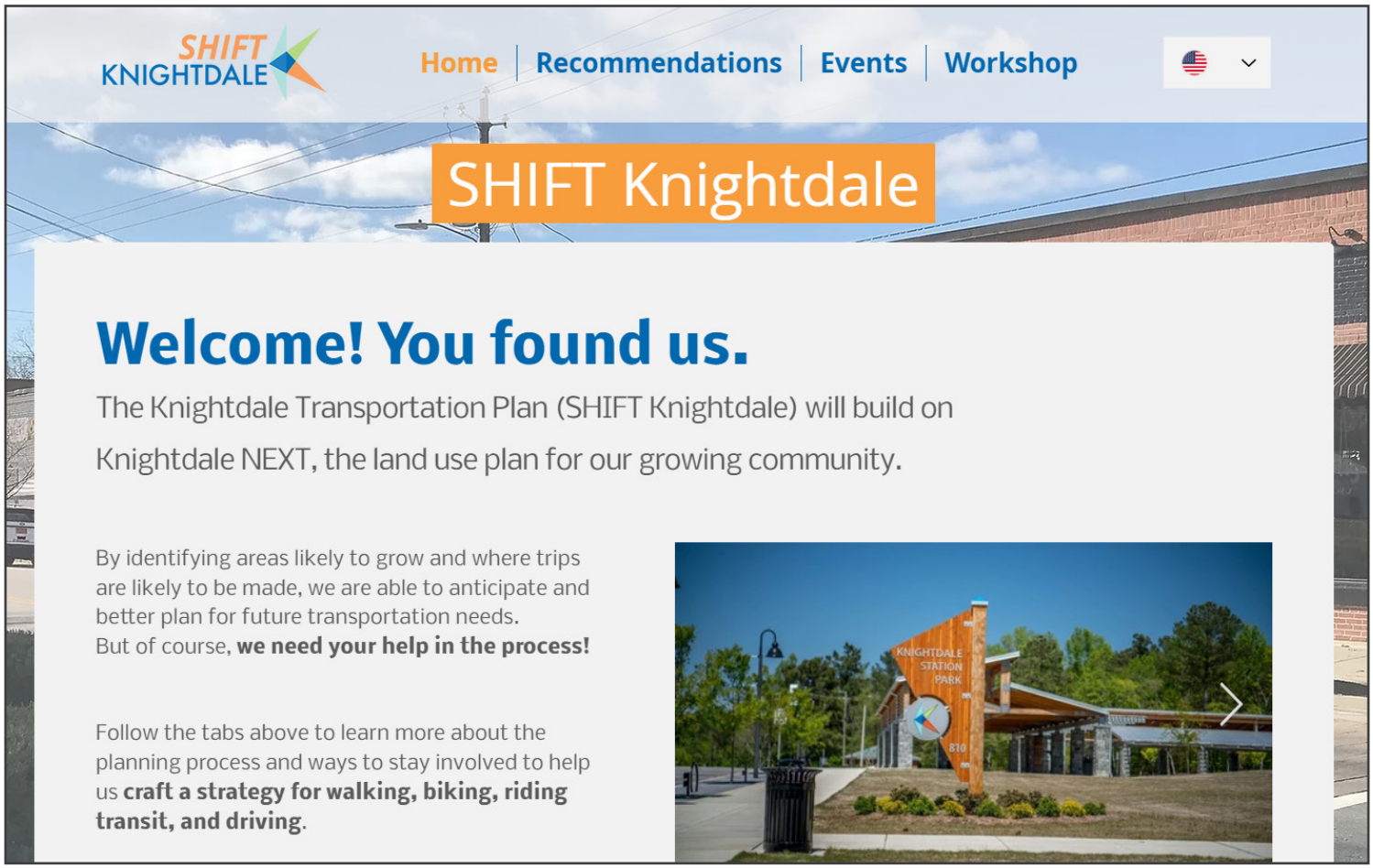
Beginning with the online survey and interactive map, which were launched concurrently with the ShiftKnightdale.com website during the Investigation phase, public engagement was a consistent and important aspect of all phases of the Plan's development. Major public meetings served as capstones to each broad phase of the project: the Project Symposium marked the beginning of the Design phase and ceremonial conclusion to investigation, while the Open House in September 2022, offering attendees the chance to review draft projects and provide input on implementation, marked the beginning of the Reporting phase. Targeted discussions and design workshops took place throughout the project, helping to inform recommendations and deepen context. Throughout the process, residents were informed of outreach opportunities in many fashions, including **social media posts** and advertising, **yard signs** posted in public settings (including parks and the Mingo Creek Greenway), **flyers posted at transit stops**, and **email blasts** to apartment complexes and homeowners' associations.

Discussing redevelopment during two-day workshop.

VIRTUAL ENGAGEMENT

ShiftKnightdale.com

The project website, www.ShiftKnightdale.com, we launched at the project's kickoff in late 2021 so that residents, property owners, business owners, and other stakeholders could access project information and updates, and provide input on the CTP's development. The website featured information on project purpose, dates and locations of upcoming meetings, meeting results, related documents, and ways to get involved with the project. Ahead of major public events, event notices were sent out by email and social media alerting the public and inviting them to attend.



The ShiftKnightdale.com website home page, June 2022.

1,250

Unique visitors

Online Survey

The online survey measured community sentiment regarding the transportation network's present, as well as their expectations for future growth. The survey featured a set of 15 questions related to transportation conditions and development. These responses complemented discussions with focus groups and the Advisory Committee to help complete the picture of the Knightdale area's challenges and opportunities. Major takeaways from the survey are summarized below.

317

Total Responses

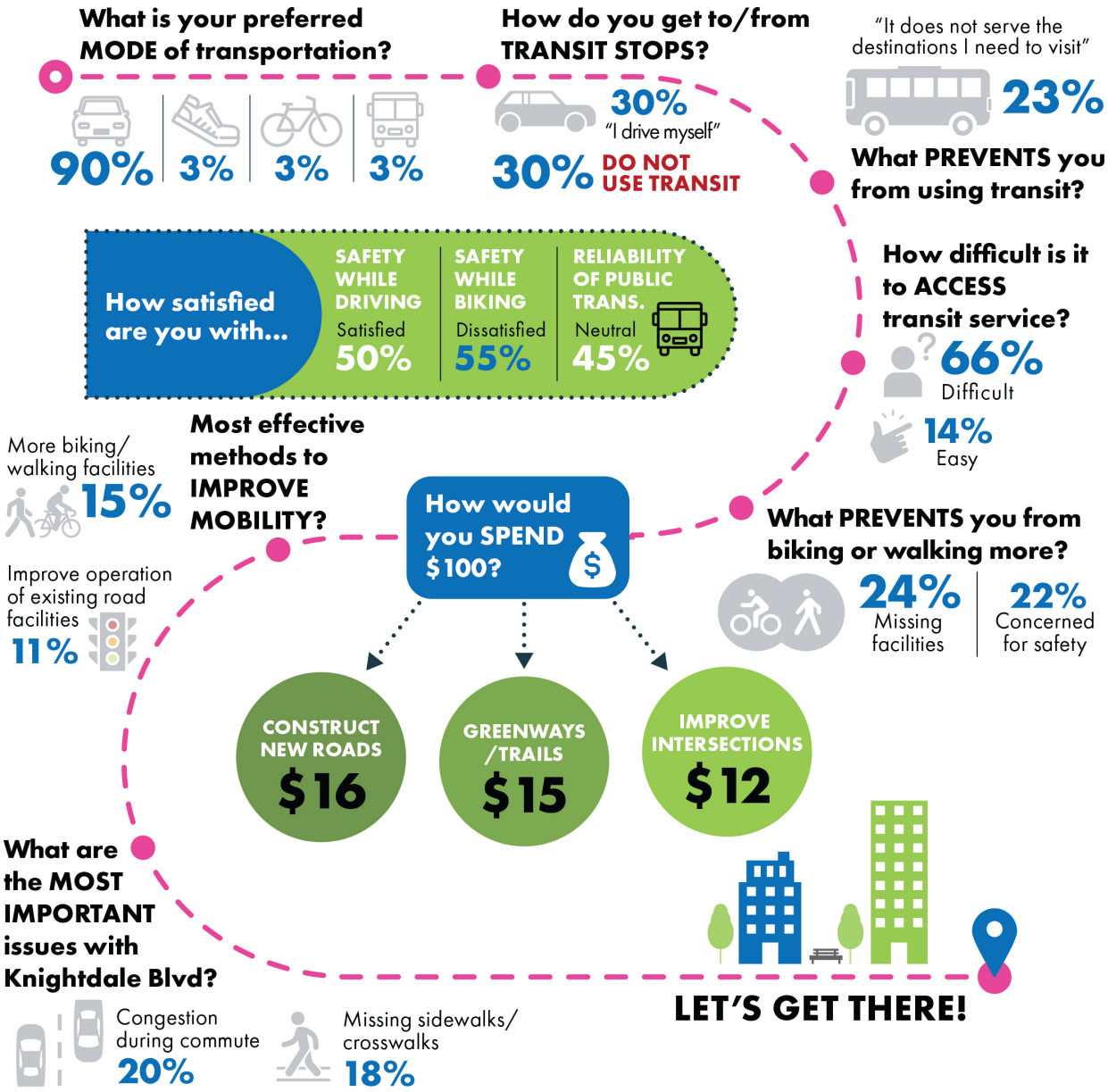


Figure 2.8: Survey responses.

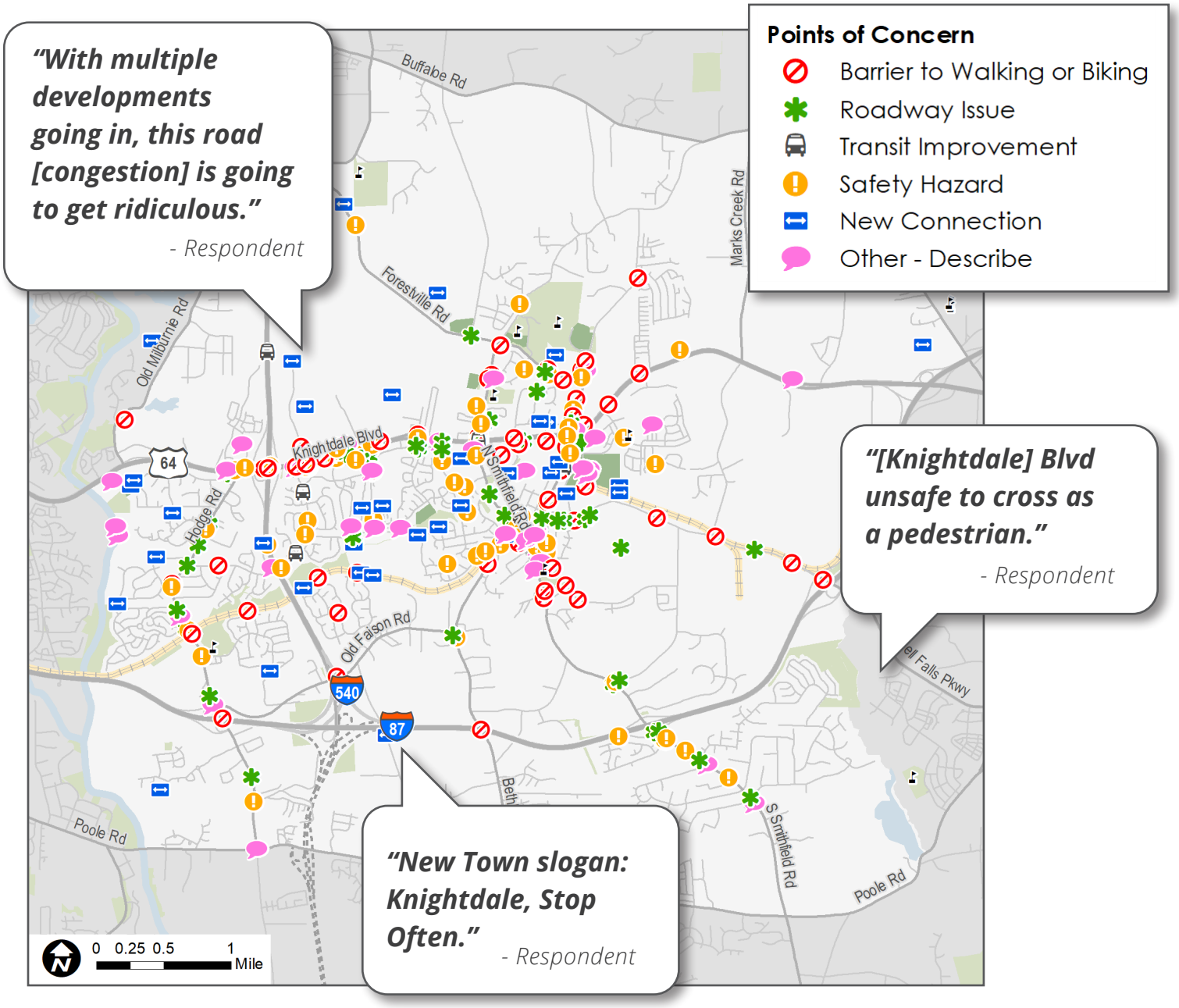
Interactive Map

The interactive map identified problem areas and points of interest within the Knightdale study area. Using ArcGIS Online mapping capabilities, respondents identified a variety of features, including needed intersection improvements, safety hazards, and community landmarks, among others that were portrayed as points and icons on the interactive map. **The web map provided a different and needed perspective** on specific issues than could be fully captured through face-to-face discussions or traditional survey methods.

282

Total Comments

Figure 2.9: Interactive Map Comments.



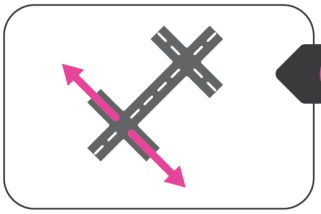
STAKEHOLDER DISCUSSIONS

Advisory Committee

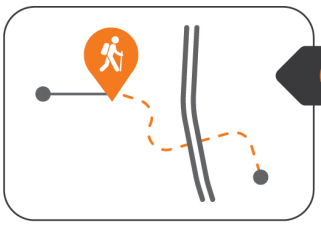
The Advisory Committee (AC), comprised of technical staff, practitioners and representatives of various groups that implement policy inside the Knightdale study area, acted as an advisory board for the project. The committee met with the Stantec project team a total of four times, generally on a quarterly basis, during the time frame of the study. Meeting virtually, the committee reviewed progress, gave direction and input, and provided feedback to the project team. AC members were also helpful to publicize the project website, survey, and public meeting opportunities with their constituents.

Focus Groups

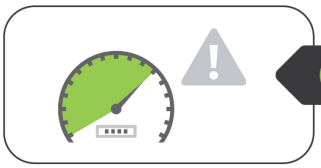
Focus group discussions offered the opportunity to look deeper into transportation and mobility issues impacting Knightdale, to engage with area stakeholders to determine new opportunities and strategies for improvement, and coordinate among neighboring and partnering organizations. **Six focus group meetings were held** over January and February of 2022, with thirty-five total attendees. Groups and topics included Parks & Recreation (Greenways), Public Safety, the NCDOT, neighboring municipalities, as well as short-range and long-range transit planning. Key takeaways are below:



1. **Connect over, under, and through existing barriers: I-540, Neuse River & the Railroad.**

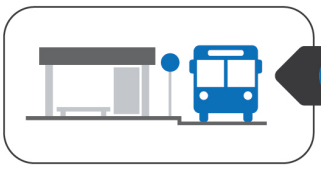


2. **Expand regional greenway trail connections, with development community providing greater access.**



3. **Reduce traffic speeds, maintain flow of traffic and improve incident management.**

4. **Coordinate growth and land use across jurisdictions (especially Raleigh, Knightdale, Wendell, & Wake County), and be consistent with development community.**



5. **Explore long-range planning strategies to enhance public transportation (rail, bus, micromobility).**

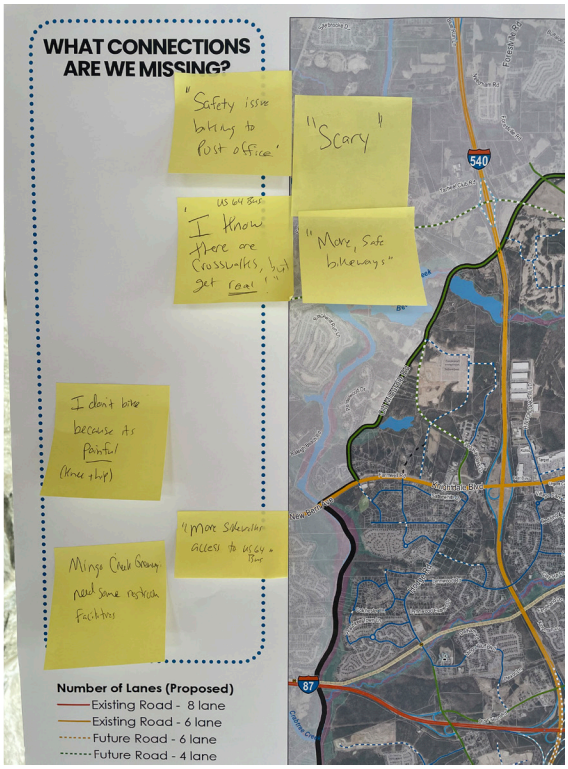
Pop-Up Events / Traveling Roadshows

Traveling roadshows offer an opportunity to reach out to populations otherwise lacking representation in the planning process. During phase two (Investigation) of this study, the planning team attended two public events: the **Knightdale Christmas Tree Lighting Ceremony**, held on Friday, December 3rd, 2021, and the **Latin American Festival**, held on Saturday, May 7th, 2022. Both events took place at the Knightdale Station Park. Visitors to the team's booth could learn more about the CTP, including its purpose, goals, and progress to date, leave comments on a map of Knightdale for specific concerns or areas of interest, and interact with the planning team in-person in a comfortable, informal environment.

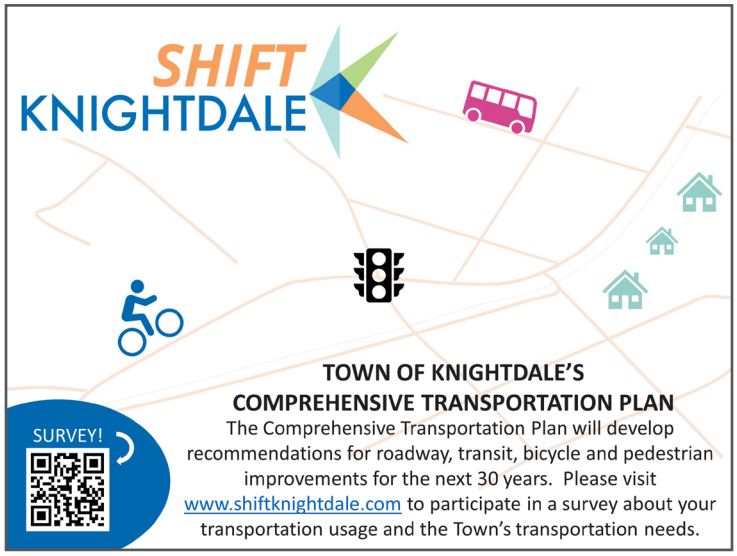
At both events the team received valuable feedback about Knightdale's transportation network, the community's concerns and opportunities for improvement. Key themes included:

- ***Safety:*** particularly crossing major roadways, such as Knightdale Boulevard. Few destinations are found north of Knightdale Boulevard; those who live north of the roadway travel mostly by car.
- ***Connectivity:*** the Mingo Creek Trail and Neuse River Trail are highly desirable amenities, but connectivity to these and other resources are limited. Attendees voiced a desire for more safe bikeways connecting to the greenway network, as well as improved sidewalk connections to and from shopping areas.
- ***Awareness:*** despite efforts to boost transit awareness and ridership figures, many attendees were not aware of the GoRaleigh transit service. Lack of marketing materials and outreach efforts to Spanish-speaking populations may be hindering greater use of the service, particularly by these population groups.

Tree Lighting Ceremony attendees provide input.



PUBLIC MEETINGS



Yard signs like those above were used to get the word out for public meetings. Left: the Yard sign for the Project Symposium. Right: the Open House.

Project Symposium

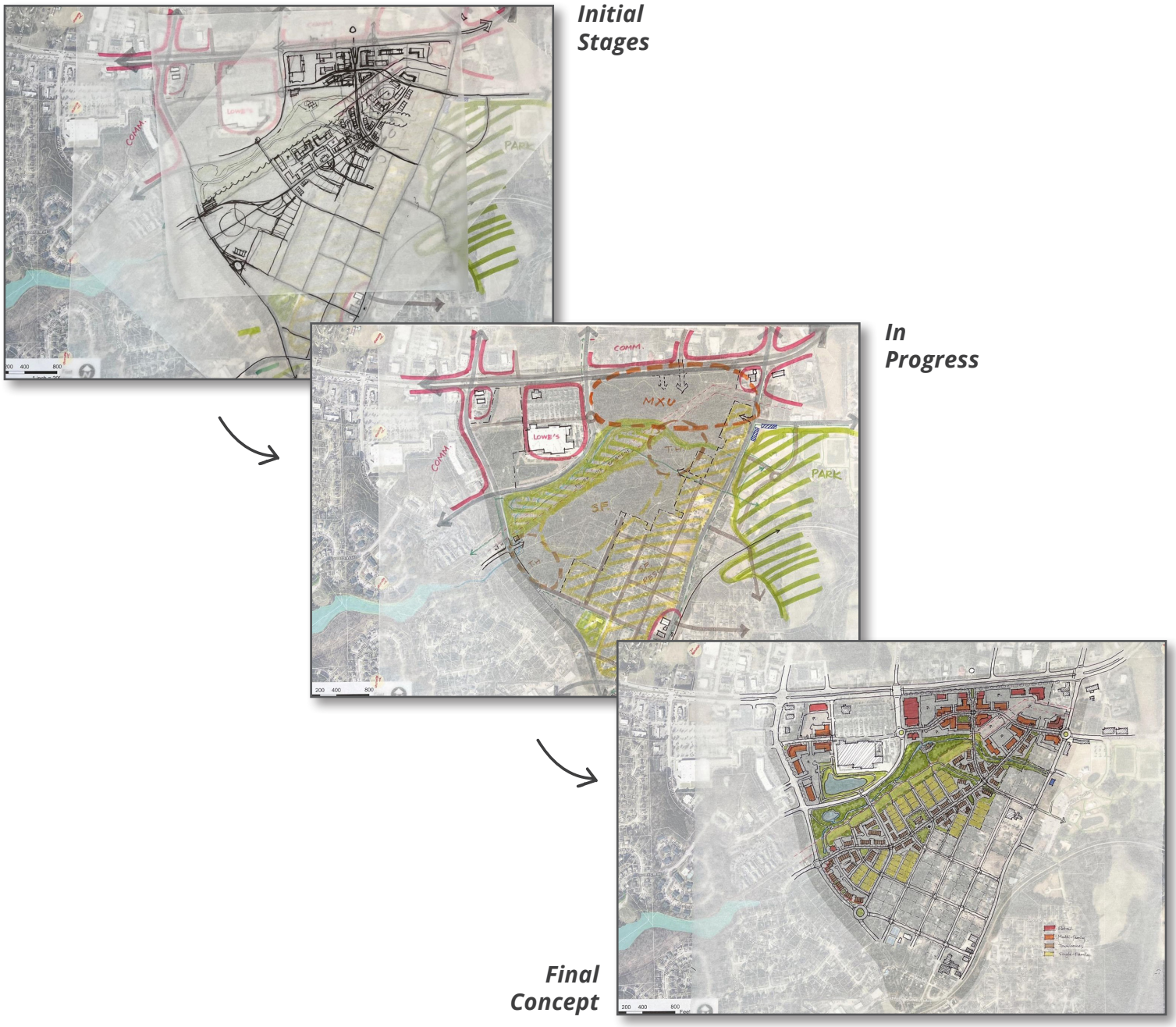
The virtual Project Symposium offered the first opportunity for the public to collaborate with the project team. The team received vital feedback on project principles and objectives, which was used to refine key themes and principles to guide subsequent design phases of the planning process. The **Symposium was held virtually via Zoom** on Tuesday, March 1st, 2022. To ensure the greatest public participation, **two virtual workshop sessions were held:** the first took place at 12:30 PM, while the second was that same evening at 5:30.

Open House

The final public meeting of the CTP process was the Open House, hosted in September 2022. In contrast to the symposium, where attendees offered input on challenges and opportunities, as well as goals and objectives for Knightdale's mobility network, the Open House was an **opportunity to provide feedback on the Plan's recommendations** and strategies for achieving those goals. The event kicked off the start of a longer, thirty-day comment period where the public could offer feedback online. The Open House was held in-person with good attendance, and feedback received was used to refine the ultimate recommendations.

Public Urban Design Workshop

The Design Workshop, held from March 30-31, 2022, was a two day, hands-on, dynamic event with residents, stakeholders, and the project design team. During the workshop, a multidisciplinary team of planners, urban designers, and engineers collaborated to create new development concepts for an **eighty-acre parcel of land in Old Town Knightdale** to create a transit-supportive community in Knightdale's downtown. Held over two days in person, public-facing sessions were facilitated to present concepts and receive feedback from stakeholders and the public. Morning meetings with stakeholders allowed the team to drill down into design nuances, while evening public reveal presentations invited all interested parties to attend, provide feedback, and see the influence of their participation on designs over the course of the workshop. Following the workshop, all materials produced during the week were viewable through the project website.



Initial Stages

In Progress

Final Concept

Visual Preference Survey

Conducted during the Urban Design Workshop, the Visual Preference Survey helped to inform the conceptual redevelopment by identifying the community's preferred development types, land uses, and mobility options. Learn more about the concept design and how these features were incorporated in Chapter 5.

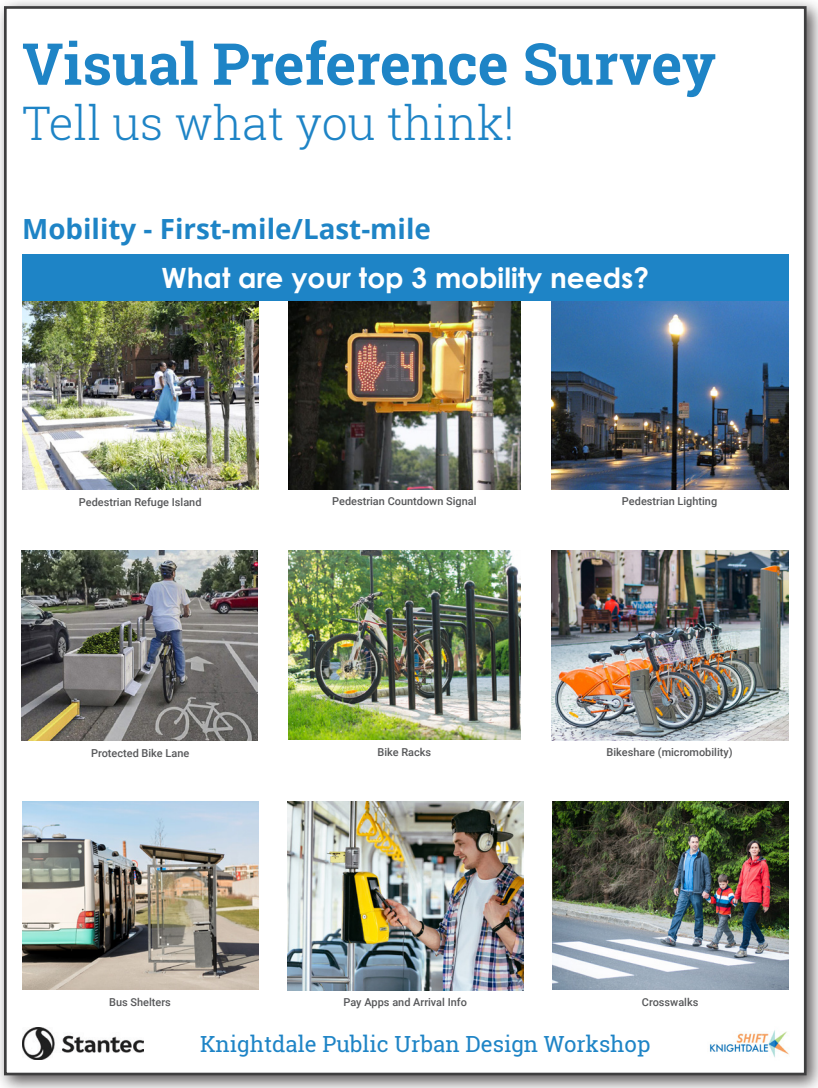
525

Total Responses

50% of respondents preferred **3-Story Mixed-Use** development.

65% of respondents preferred **Neighborhood Restaurant** as a local retail / grocery / restaurant option.

59% of respondents preferred **Cottage Courts** for single-family residential development.



View of the "Mobility" Visual Preference Survey board.

KEY TAKEAWAYS

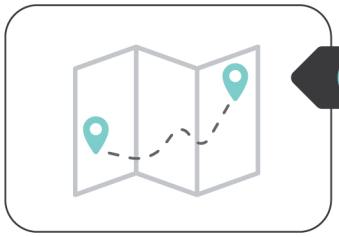
This chapter has examined the planning context for Knightdale's mobility network, as well as the concerns and aspirations of the community. Out of this review and engagement, key themes have emerged, whether as repeat topics of conversation, patterns of survey responses and map comments, or themes and goals that have carried through time in Knightdale's plans. These themes, summarized below, represent the key takeaways of this chapter.

1 **Awareness of transit service is lacking.**

Building awareness of existing service is key to growing ridership that supports further enhancement of existing service.

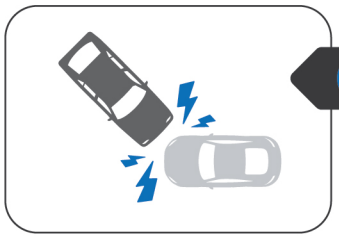
2 **Knightdale residents are supportive of expanding a multimodal network.**

Major roadways (I-540, I-87) and the Neuse River are barriers to all transportation - whether automobiles, biking, or walking.

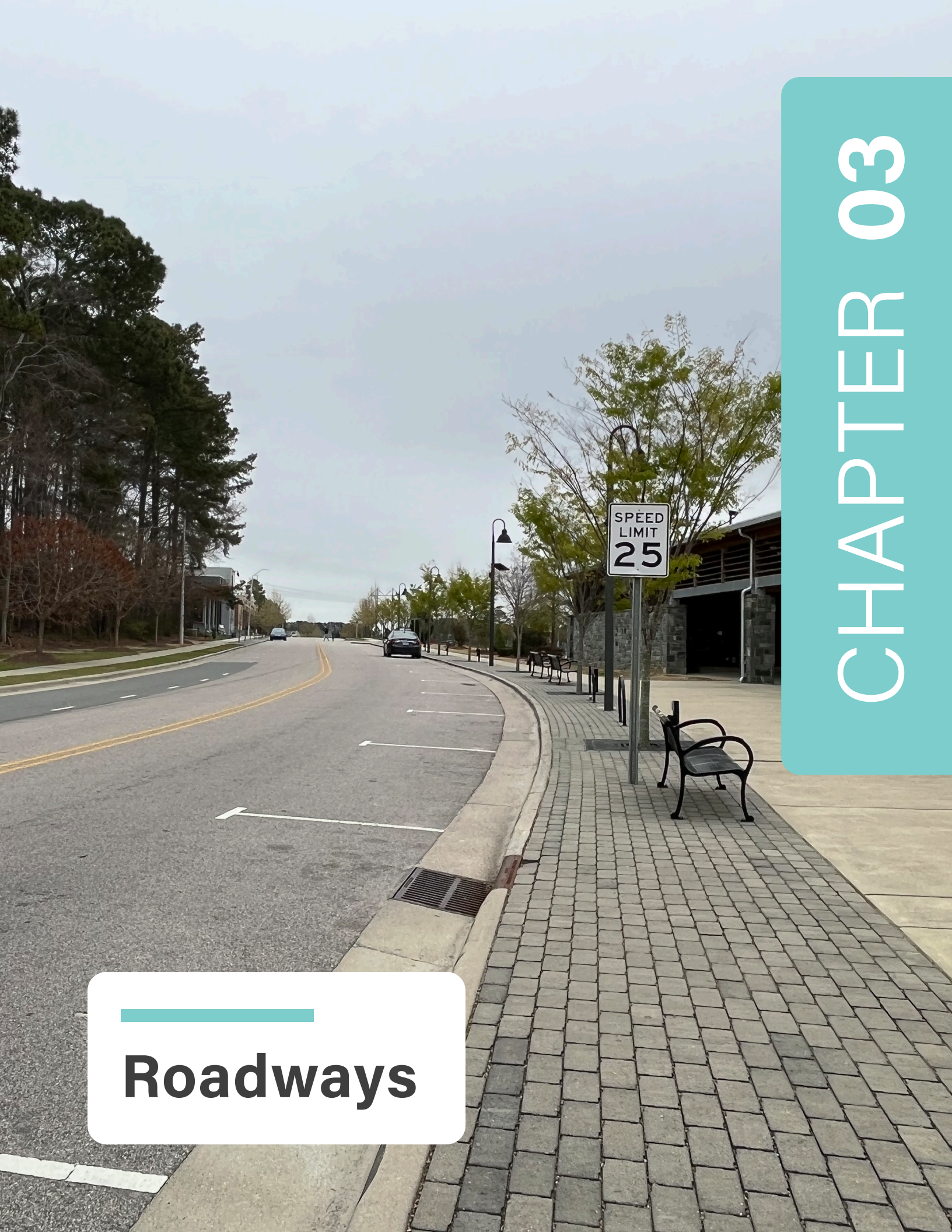


3 **Greenway and trail connections facilitate recreation, but lack of connectivity prevents use for daily transportation use.**

Better connectivity of roads is needed to alleviate congestion, and create new opportunities for bicycle and pedestrian modes.



4 **Traffic operations and roadway design contribute to unsafe conditions, particularly along major corridors.**



CHAPTER 03

Roadways

Roadways

Existing roadways: N Smithfield Rd intersection with McKnight Dr - looking east

Knightdale residents overwhelmingly travel by automobile, making its system of roadways of paramount importance to its future mobility network. **An efficient roadway network may have a tremendously positive impact upon a community's broader multimodal network**, and likewise an inefficient roadway network has the opposite impact: higher vehicle speeds contribute to unsafe conditions for drivers, bicyclists and pedestrians alike; congested corridors cause delays for freight movement and transit.

This chapter begins with an examination of the core issues relating to Knightdale's roadway system. Both natural and manmade barriers shape movement within and through Knightdale and will continue to impact its growth and development. This analysis provides a valuable framework that will guide system-level recommendations and priority projects for improving Knightdale's roads. Lastly, this chapter concludes with a detailed look at two important intersections to conceptualize what future improvements could look like.

This Chapter Covers:

- **What Do We Know?**
  - Major mobility barriers constrain Knightdale
  - Unsafe conditions impact major corridors
  - Congestion is expected, but not inevitable
- **How do we improve our Roadways?**
- **Roadways Recommendations**
  - Concept Design: Widewaters Parkway Extension Bridge
  - Concept Design: Improvements to Old Faison Road and Bethlehem Road

What do we know?

MAJOR MOBILITY BARRIERS CONSTRAIN MOVEMENT IN AND AROUND KNIGHTDALE.

Knightdale's waterways aren't the only constraint on mobility in the region. Major limited access freeways, like I-87 and I-540, as well as the railroad, also restrict where and how residents and visitors can move within and through Knightdale. Circles in **Figure 3.1** indicate the primary opportunities to cross railroads and major water bodies within the study area. Notably, **there are only three roadways in Knightdale that cross the Neuse River:** New Bern Avenue, I-87, and Poole Road. This forces all east-west roadway traffic onto these corridors, creating high-volume conditions that may be perceived as unsafe for vulnerable users. The roadways themselves also act as barrier, preventing adjacent neighborhoods from connecting to each other. Downtown accessibility is limited both by Mingo Creek as well as the Norfolk-Southern Railroad corridor.

With few roadways or bikeways between these neighborhood pockets, overall street connectivity is limited to arterial roadways, with fewer local roads to balance traffic more evenly. More local roadway connections would mean a safer, more robust

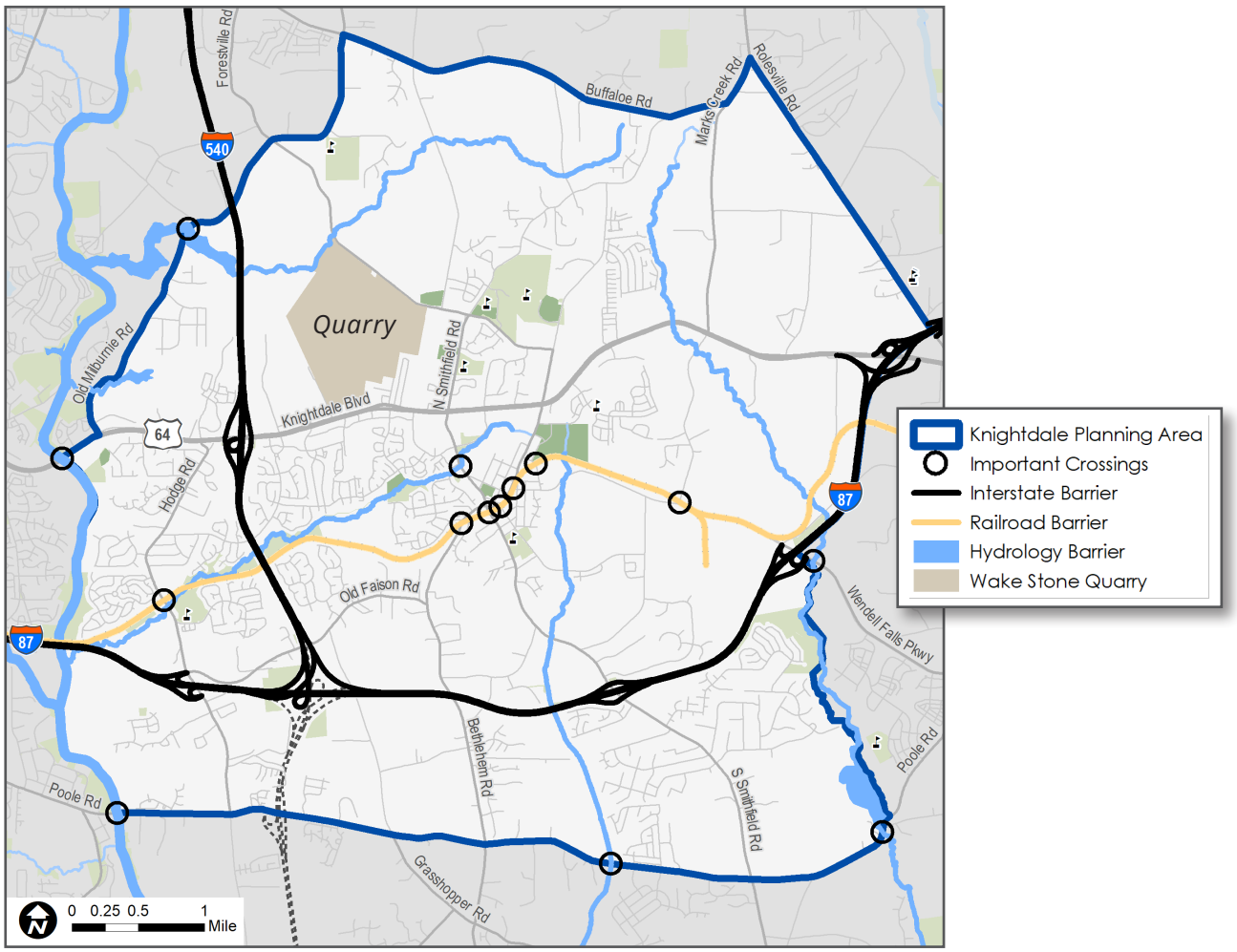


Figure 3.1: Network and intersection barriers map

low-stress network for walking or biking. In addition to limiting roadway connections, these constraints and barriers also discourage residents from choosing multimodal travel over their personal vehicle for its perceived safety and convenience. Fortunately solutions to this are commonly known: improving existing local street connections and requiring stub-outs as part of new development help to create the internal connections. Often, these improvements also come with sidewalks and bike facilities, which further support Knightdale's expanding bicycle and pedestrian network.

UNSAFE CONDITIONS IMPACT MAJOR CORRIDORS.

The 10-year trend of severe crashes within Knightdale has been increasing. From 2011 to 2020, 56 fatal or severe injury (FSI) crashes have occurred within the Knightdale area, with half (29) occurring since 2018. These may be influenced by recent population growth and an increased number of local vehicle trips. **Lack of street lighting** may play a factor in these FSI crashes, as 55% occurred in dark conditions, and 48% occurred during the dark on unlit roadways. **One quarter of fatal and severe injury crashes involved alcohol** as a contributing factor, while speed was a contributing factor for only 16% of crashes. This suggests that enforcement and programmatic strategies are needed as part of a Vision Zero / Safe Systems approach to transportation planning, and operations.

Finally, there may be a seasonal influence as well: over the ten year period, FSI crashes are more common in **fall and winter months** (October-January), although July stands out as the worst month for FSI crashes.

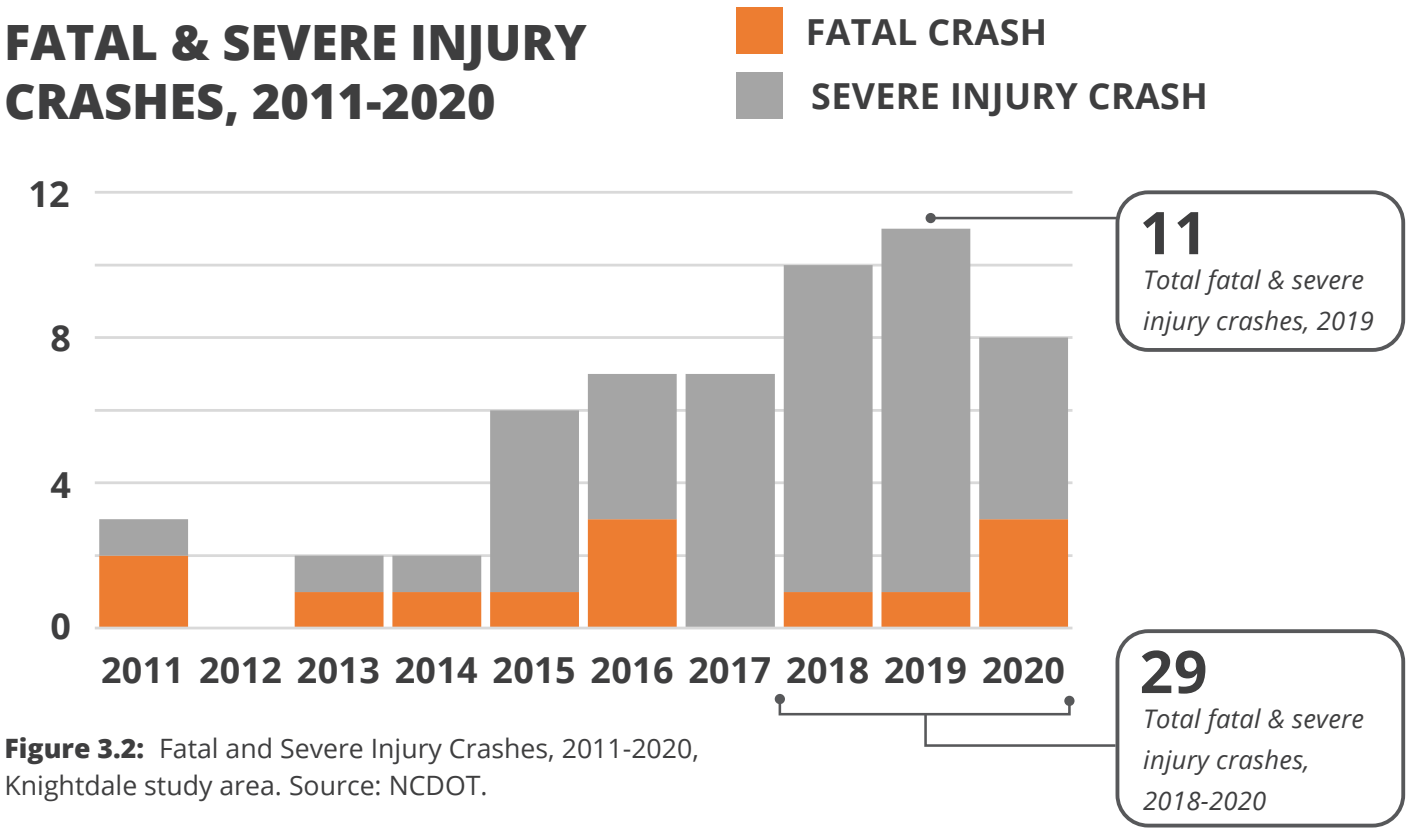


Figure 3.2: Fatal and Severe Injury Crashes, 2011-2020, Knightdale study area. Source: NCDOT.

Crashes are rarely distributed evenly across a road network, as unsafe conditions or geometric design along corridors or at intersections can contribute to higher crash totals in a particular area. In Knightdale, three corridors with a high number of intersection crashes stand out:

- Knightdale Boulevard/US 64 BUS
- Smithfield Road
- Hodge Road

These three roadways function as major arterials in Knightdale's network due to their local and regional connections. **Of the twenty highest-crash intersections in the planning area, eighteen are found along these three roadways**, including all of the top ten, and the intersection of Knightdale Boulevard and Smithfield Road ranks 114th on the statewide Highway Safety Improvement Plan (HSIP) Warrant List. Other high-crash corridors of interest include Poole Road (the southern boundary of the planning area), I 87, and Bethlehem Road/First Avenue/Old Knight Road.

Notably, these roads are also some of the most high-volume corridors in the area. Improvements to these corridors, only a fraction of Knightdale's road network, that **prioritize safety over volume and free-flow, can greatly improve overall conditions for those traveling around Knightdale**.

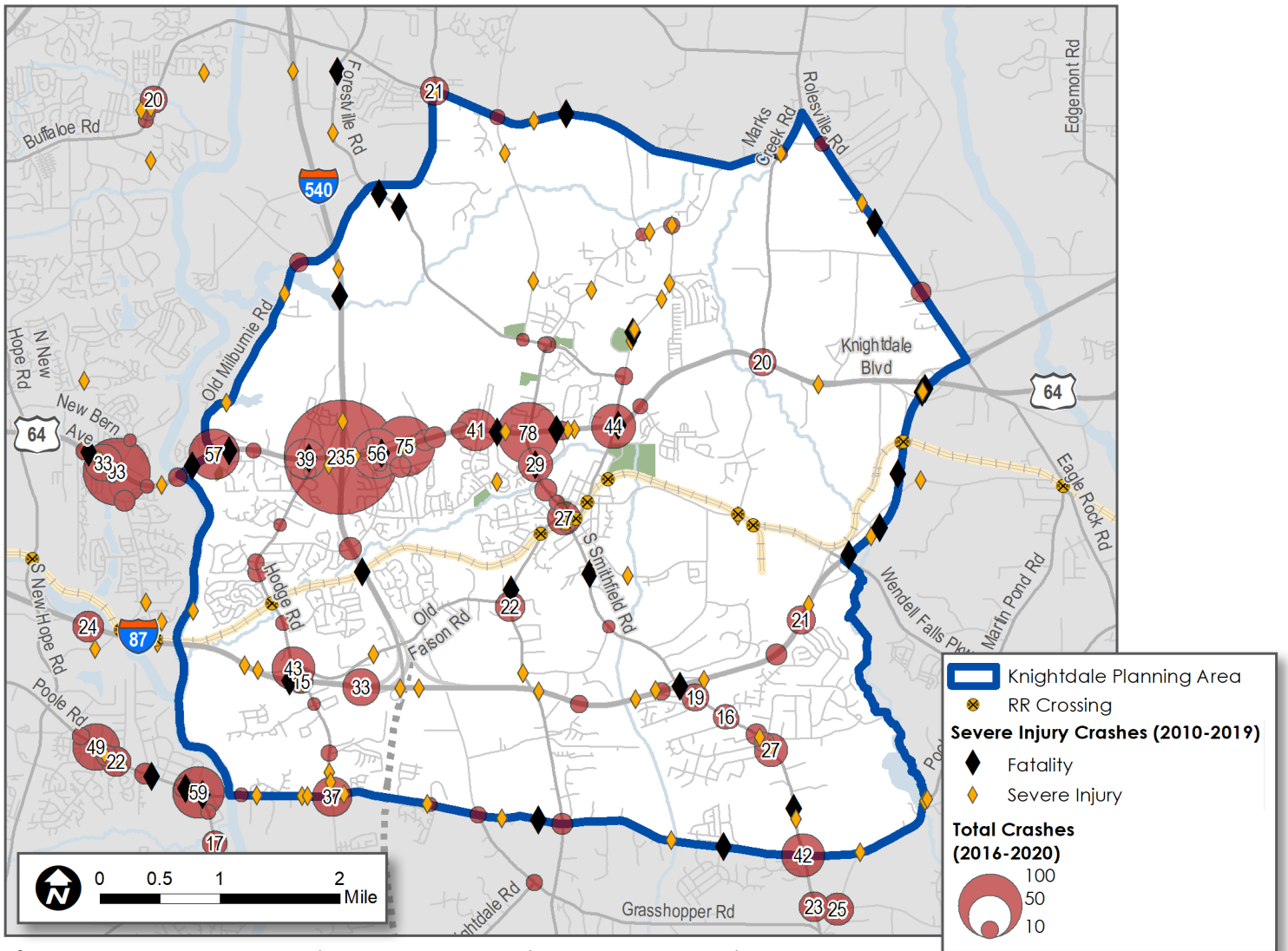


Figure 3.3: Intersection crashes, 2016-2020, and Severe Injury Crash locations, 2010-2019

CONGESTION IS EXPECTED, BUT NOT INEVITABLE.

A regional model, if used effectively, can be valuable for an objective, consistent, and relative comparison between corridors, bottlenecks, or subareas within the region. Model output such as volume over capacity (v/c) values help a region visualize its "good-fair-poor" road segments (**Figure 3.4**), approximate their change over time or between different scenarios. A regional travel demand model is less effective when used to examine individual roads, within a small portion of the region, and/or determining what "will happen" with traffic.

I-87 and I-540 carry a majority of vehicles within and through the Town, also accounting for a majority of the red (over capacity) segments (**Figure 3.4**).

Planned improvements reflected in the model include widenings on Knightdale Boulevard, Smithfield Road, and reconfiguration of interchange ramps to relieve congestion at Smithfield Road, and Wendell Falls Parkway.

Fortunately, stakeholders and Knightdale residents understand that **congestion is not a problem solved through endless widening:** alternative strategies must be considered that travel models often fail to consider. These include **creating new local roadway connections, changing travel behaviors** (flexible work hours, remote work), and **improving the competitiveness of alternative modes** like transit, biking, or walking.

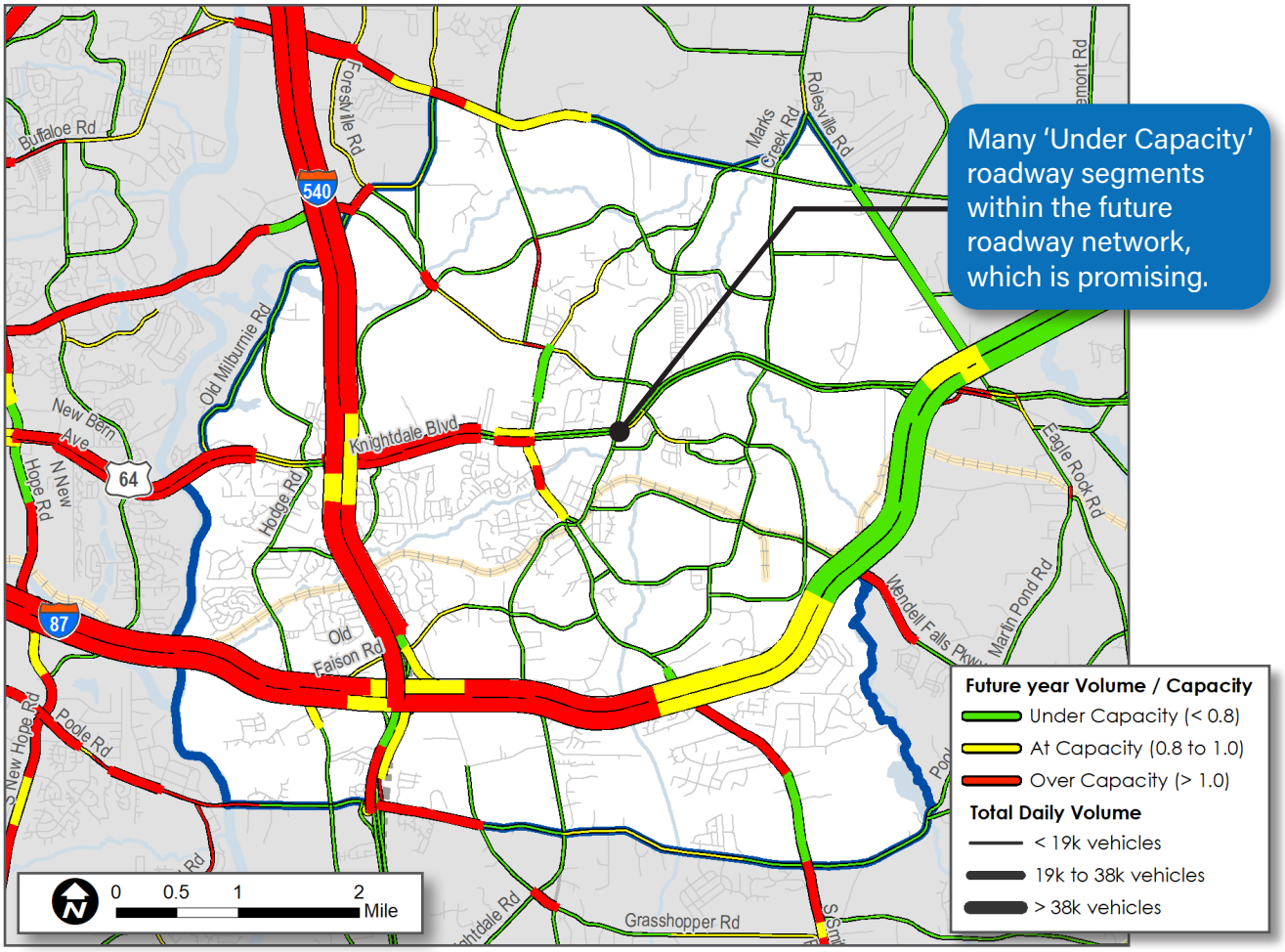
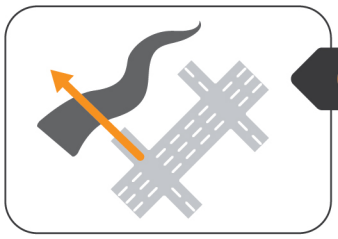


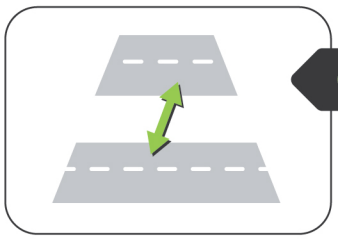
Figure 3.4: Projected 2050 travel conditions, Knightdale study area. Source: CAMPO Triangle Regional Model.

How do we improve our roadways?

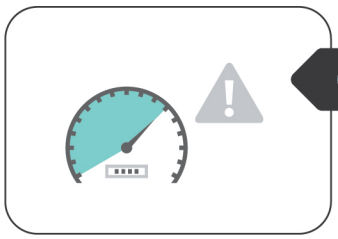
Several themes and common issues emerged around Knightdale's road network, both from public feedback and detailed analysis. Coupled with national trends and best practices, these themes help to form the framework for how to create safer streets, restore and improve roadway functionality, and ultimately increase the quality of life for all.



1. **New roadway connections** must be added, particularly crossing the mobility barriers at I-87, I-540 and the Neuse River.



2. Building out an **interconnected local street network** can greatly improve accessibility within Knightdale. These include many roadway segments that would be too small to be included in the Triangle Regional Model.



3. Speeding and congestion are concerns, but they can be alleviated through **traffic calming improvements** and roundabouts to improve flow without adding delay.

4. Private partners and government agencies must collaborate to construct a future road network that **connects Knightdale with adjacent communities** and their plans for development.

Roadways Recommendations

Everyone, regardless of age, ability, income, race, or ethnicity, should be able to get to community destinations and public places in a safe, comfortable, and convenient manner – whether walking, driving, bicycling, or taking public transportation. But too many streets in Knightdale, NC have been designed to prioritize moving cars at higher speeds to minimize traffic delay instead of **safety for all users**.

BEST DESIGN PRACTICES FOR A MULTIMODAL APPROACH

Speed, and its Influence on Safety

Speed is the most important factor that determines whether or not a pedestrian survives a collision with the driver of a car. Increase the vehicle speed and the likelihood of survival drops massively. Roadway design has a strong impact on how people drive and is often more influential on driver behavior than the posted speed limit. While speed limit signs may only be posted every few blocks or miles, the road's design is ever-present, continually providing guidance and visual cues. While there are myriad factors involved in these deaths, our streets have been previously designed to move many cars quickly and "efficiently" at the expense of safety for everyone who uses them.

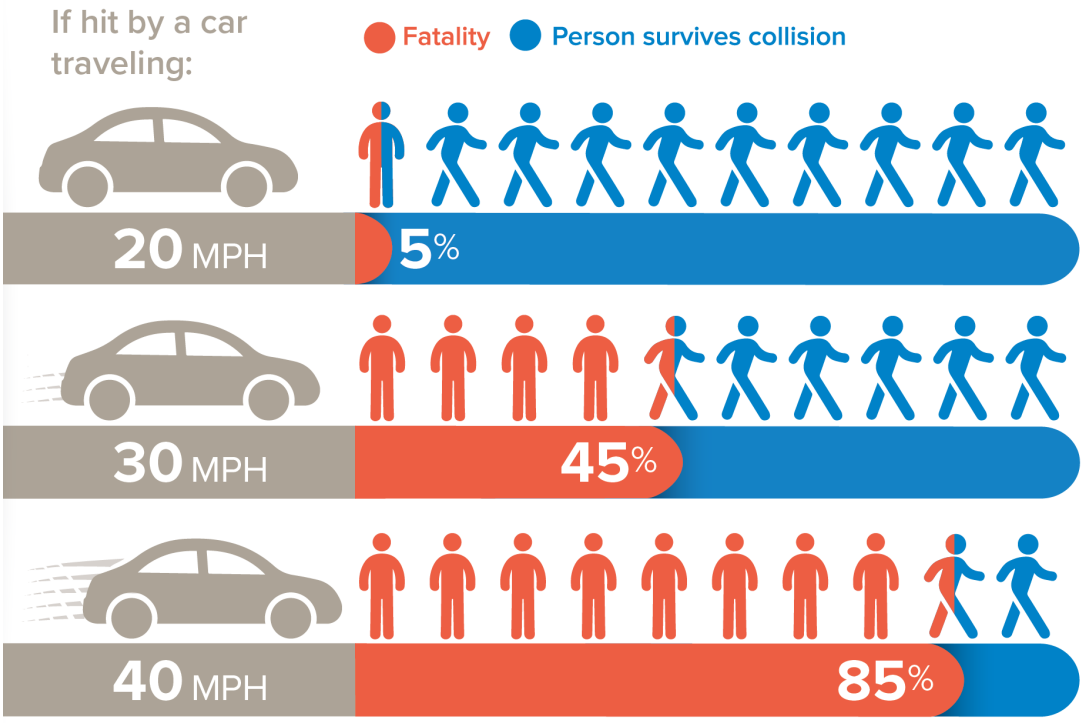
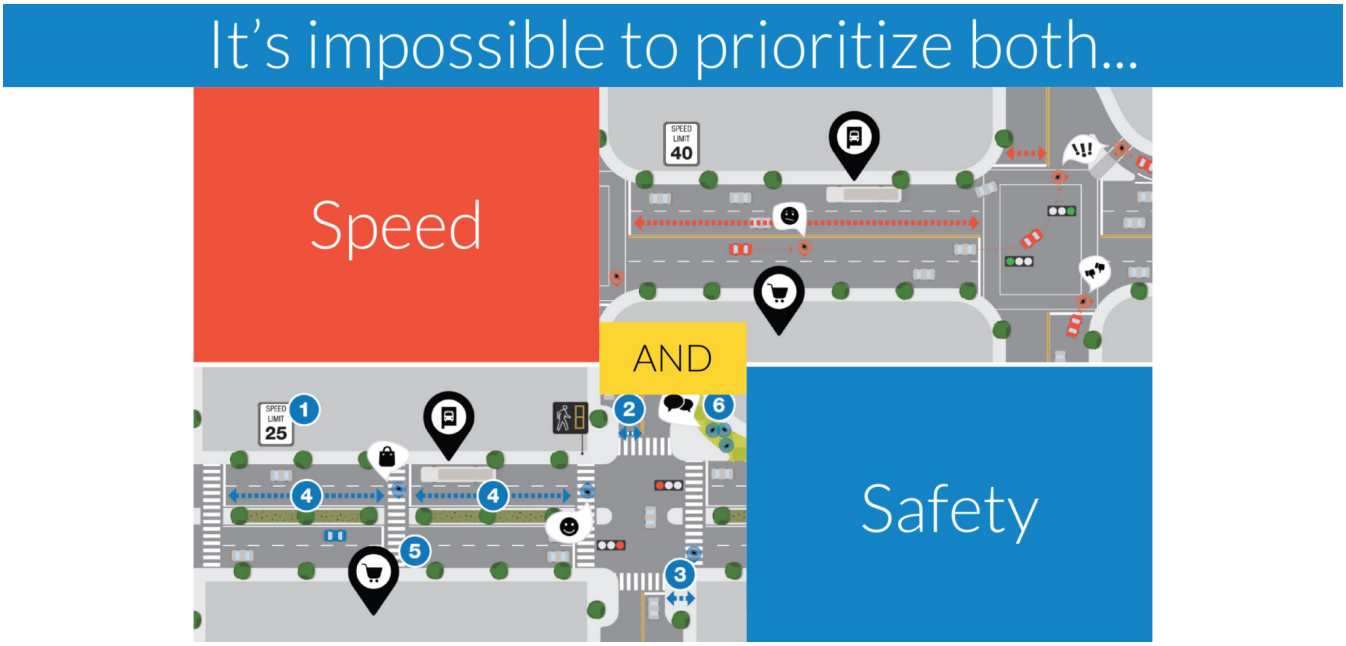


Figure 3.5: Speed and likelihood of survival in the event of crash. *Source: National Traffic Safety Board. (2017). Reducing speeding-related crashes involving passenger vehicles.*

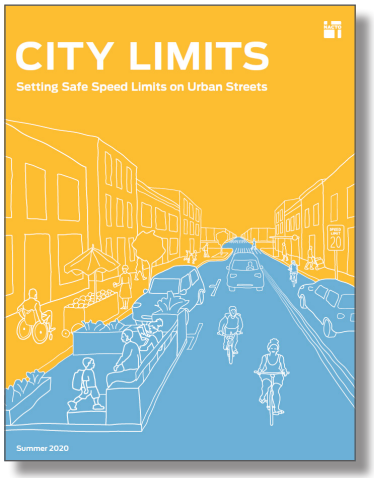


Our goal with roadway design should be to make dangerous behavior difficult and safe behavior easy. Designing roads for slower speeds also reduces the need for traffic enforcement, which not only saves public tax dollars but also mitigates potential conflicts with police. **Vision Zero / Safe Systems approach** is a strategy that unifies these transportation principles within a municipal government committment that guides all other departments (development services, engineering, police, public works). Knightdale's Town Council is preparing a Vision Zero Resolution concurrently with this Plan (Appendix section).

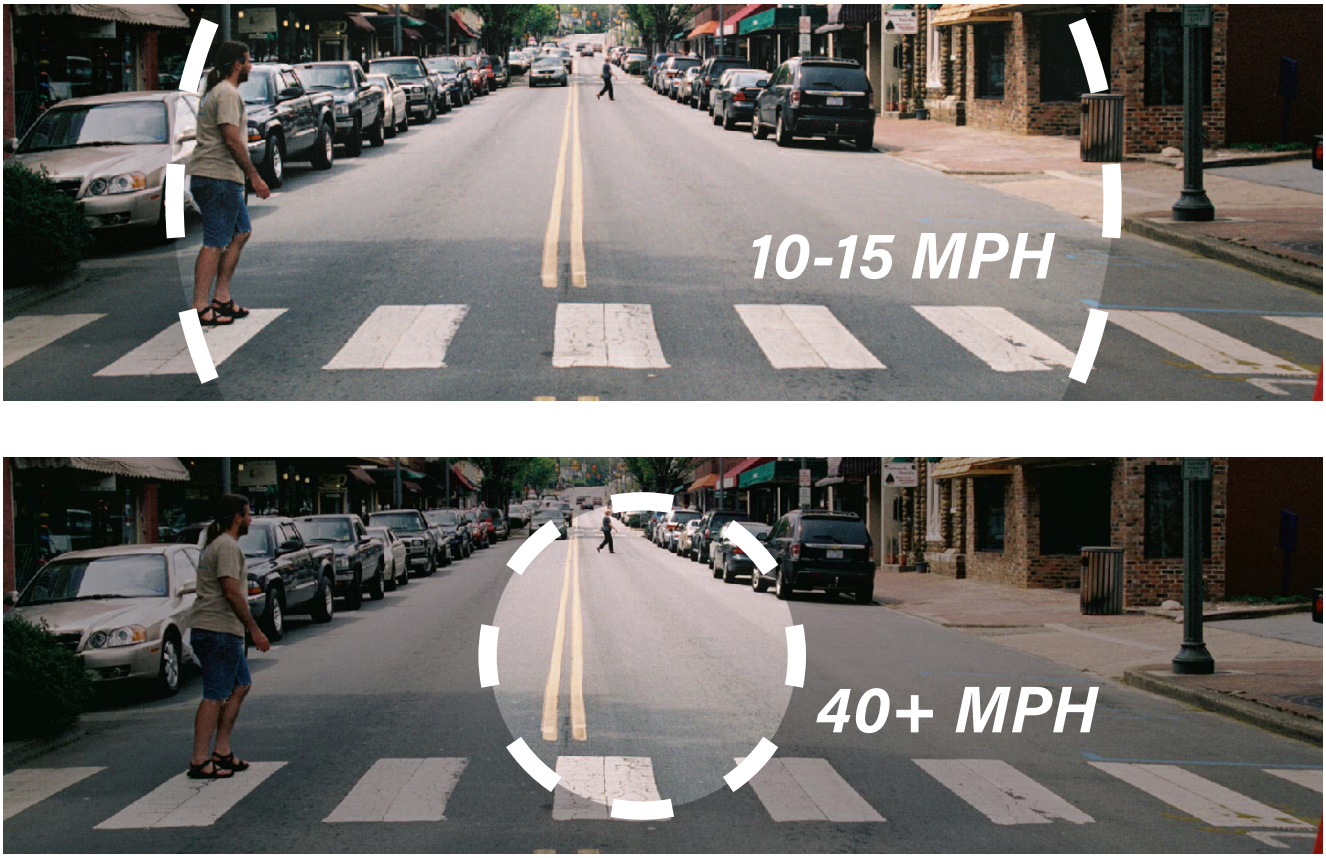
Other roadway design resources include NACTO's City Limits: Setting Safe Speed Limits on Urban Streets guide for a detailed, context-sensitive method to set safe speed limits on urban streets. City Limits outlines a three-method approach to speed limit setting that provides an alternative to percentile-based speed limit setting:

- Setting default speed limits on many streets at once (such as 25 mph on all major streets and 20 mph on all minor streets),
- Designating slow zones in sensitive areas, and
- Setting corridor speed limits on high priority major streets, using a safe speed study, which uses conflict density and activity level to set context-appropriate speed limits.

Designing streets for slower speeds is directly connected to improving safety and reducing deaths. Improving safety requires more than simply providing sidewalks and crosswalks as drivers follow visual cues. Reducing the posted speed limit cannot overcome a roadway with wide lanes (>12') that allow room for driver inattention, long distances between intersections where driver must slow down, and extra space to accelerate through turns. These common roadway characteristics have *enabled* higher speeds to feel appropriate.



So what can be done? Changes to street design that send drivers visual cues to slow down are needed to reduce the frequency and severity of crashes. Narrower travel lanes (between 10'-11' width) naturally slow traffic, as do shorter distances between intersections that require drivers to slow down and stop more frequently. High-visibility, signalized crosswalks make drivers more aware of people walking, and extending curbs shortens the distance required to cross the street. These design changes are most successful when we balance the needs of a variety of modes of travel, most often referred to as Complete Streets.



Traffic calming measures slow traffic, increasing drivers' peripheral vision.

Matching Functionality with Street Type

Figure 3.6 represents the relationship between **arterial roadways**, like Knightdale Boulevard or Poole Road, that maximize mobility of the vehicle, and **local roadways** that maximize access to the surrounding land uses (like commercial destinations, or your home). The middle areas (Collector streets) represent a larger number of balanced street types, such as First Avenue, Bethlehem Road, or Robertson Street.

In developing this Plan, the Town has reviewed and updated its cross-sections found in the Town **Unified Development Ordinance (UDO)** for each street type. These typical cross-sections guide developer decision for street construction. These updates aim to improving safety, matching biking and walking facilities to street types based on speed and separation, and aligning corridors with current design principles and NCDOT standards.

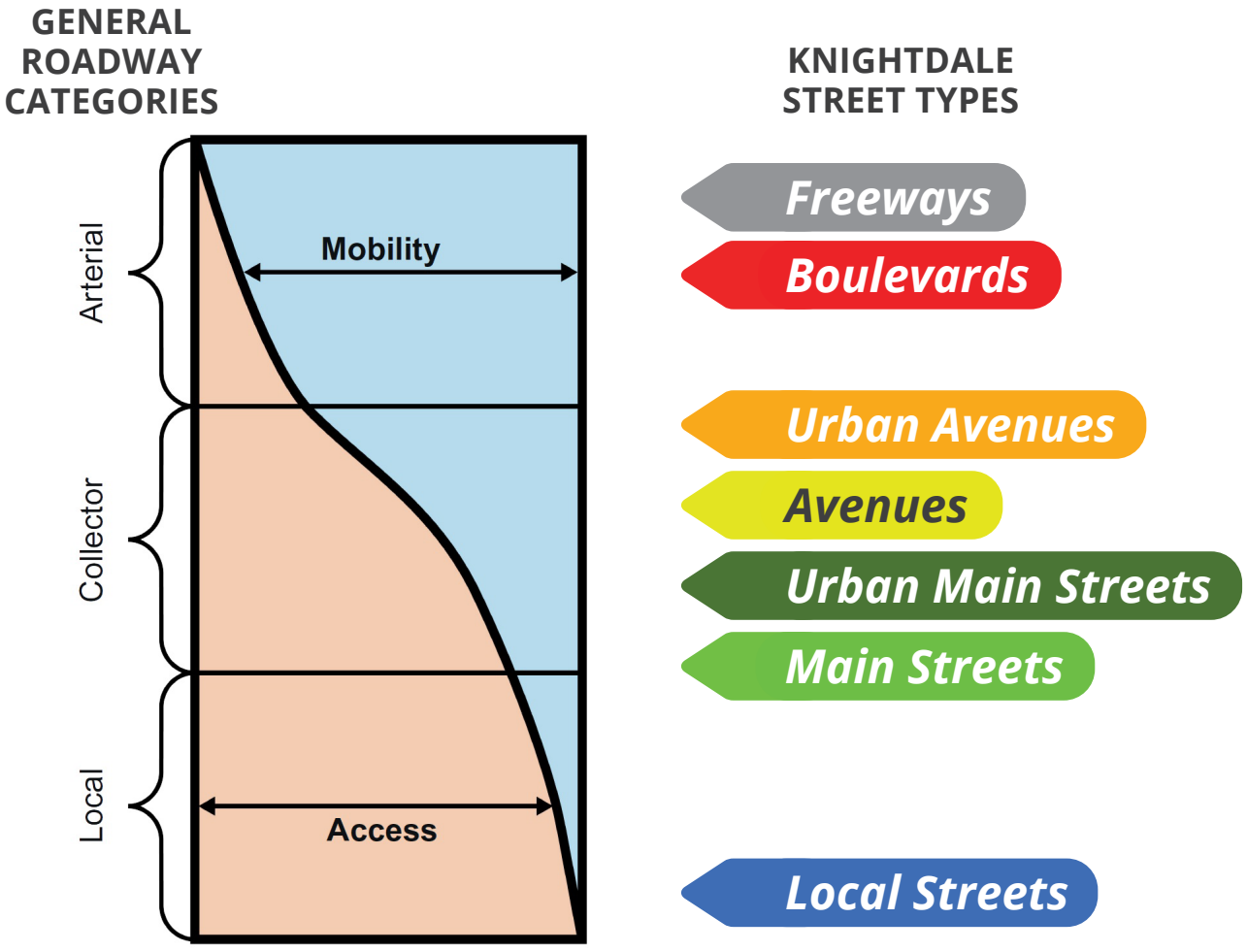


Figure 3.6: Relationship between roadway functional classification and the needs roadways serve: mobility and access.

Boulevards

Boulevards support the heavy-traffic roadways like Buffaloe Road, Poole Road, and portions of Smithfield Road or Hodge Road. They are 4-lane (or 6-lane) roadways with a 45 MPH posted speed.

Urban Avenues

A relatively small number of roads function as Urban Avenues, located just north of Old Town Knightdale. These streets are typically 2-lanes or 3-lanes wide, with 25 MPH posted speeds, and on-street parking.

Avenues

The most common street type, with 2-lane and 3-lane options, and approximately 75-foot right-of-way, and a 35 MPH posted speed limit (Town limits).

Urban Main Streets

Prominent within Old Town Knightdale, these two-lane multimodal roadways are 25 MPH, with on-street parking.

Main Streets

Low speed and low volume roadways that function as collector streets, providing access to residential areas.

See **APPENDIX C** for typical street cross-sections.

Local Streets

Primarily 2-lane residential streets with low traffic volume and low posted speed. Many subdivision local streets have been omitted for clarity.

Future Roadway Network

Figure 3.7 represents the comprehensive, long-term vision for Knightdale's roadway network, displaying roadway types that correspond to Knightdale's Unified Development Ordinance street types, intersection improvements, and new construction for future growth. This map reflects current development site plans, and potential collector street connections that would support the function of the roadway network. As Knightdale continues to grow, new pressures, concerns, and opportunities for improvement will arise. This map, and these recommendations, **should be considered a living document, continuously updated by Town staff over time**.

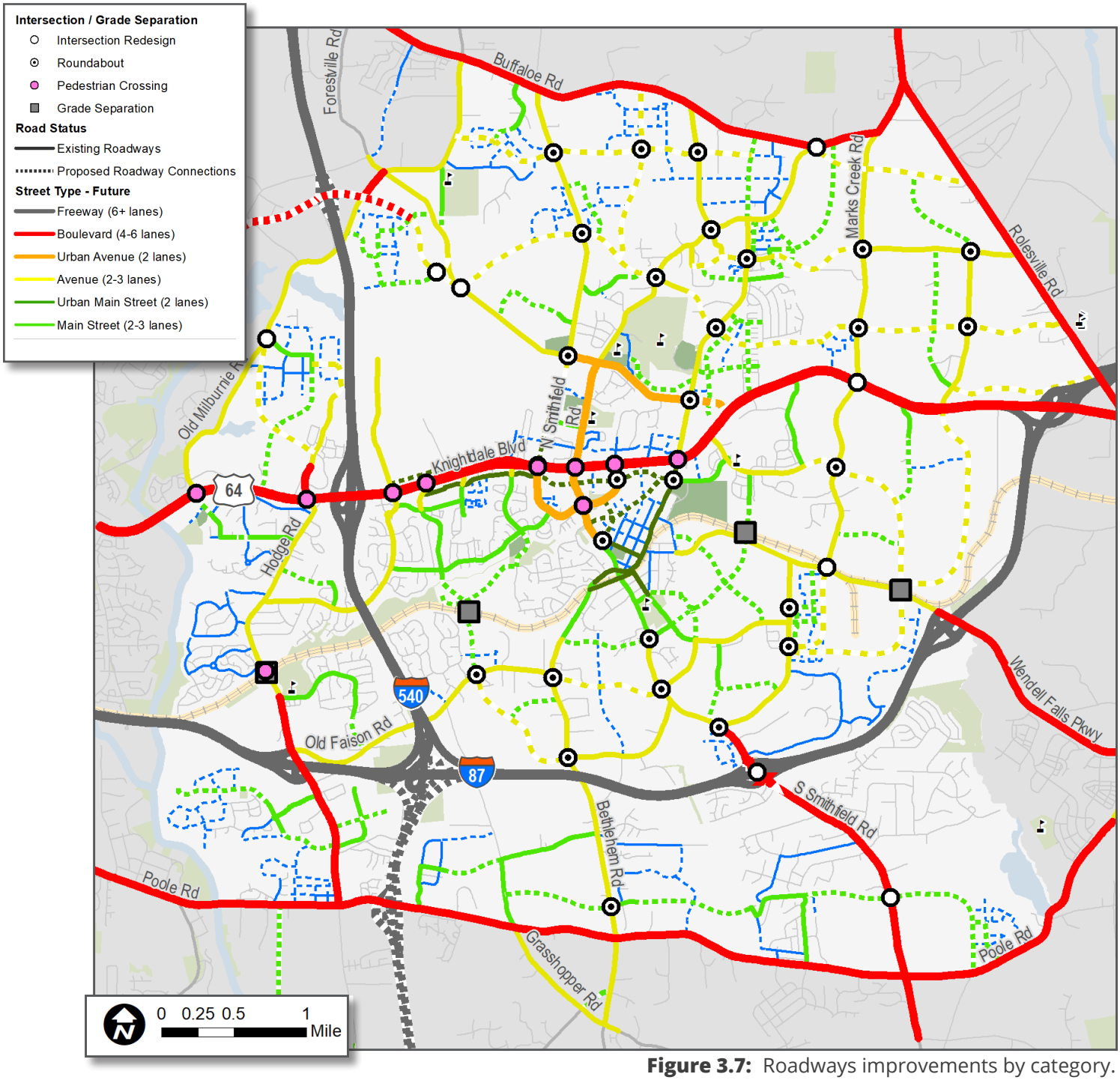


Figure 3.7: Roadways improvements by category.

Roadway Project Types

	LOCATIONS
INTERSECTION REDESIGN PROJECTS	**9**

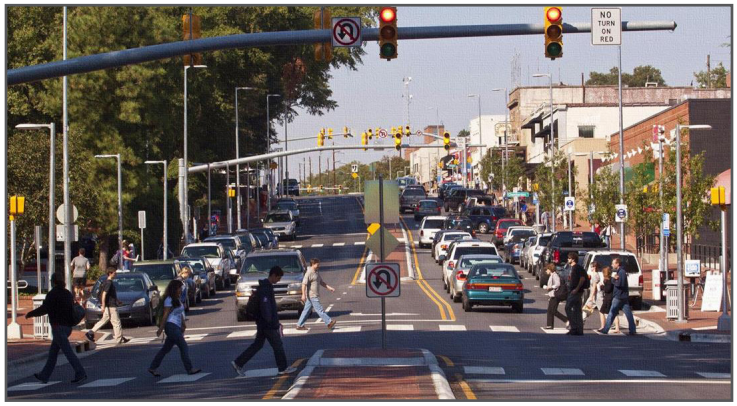
Including:

- Knightdale Boulevard @ Marks Creek Road
- Smithfield Road @ King Farm Lane
- Buffaloe Road @ Horton Road

	LOCATIONS
GRADE SEPARATION PROJECTS	**4**

Including:

- Hodge Road @ Railroad
- Widewaters Parkway Extension @ Railroad
- East Knightdale Loop Road @ Railroad



	LOCATIONS
PEDESTRIAN CROSSING PROJECTS	**10**

Including:

- Knightdale Boulevard @ Hinton Oaks Blvd
- Knightdale Boulevard @ Parkstone Towne Blvd
- Hodge Road @ Mingo Creek Greenway

	LOCATIONS
ROUNDABOUT PROJECTS	**28**

Including:

- Forestville Road @ Old Crews Road
- Bethlehem Road @ Old Faison Road
- First Avenue @ Knightdale Station Run
- Smithfield Road @ Main Street

	PROJECTS	MILES
ACCESS MANAGEMENT PROJECTS	**2**	**4.1**

Including:

- Smithfield Road
- Knightdale Boulevard / US 64 Business

	PROJECTS	MILES
MODIFY EXISTING PROJECTS *(Roadway modifications that do not include widening to add more lanes)*	**12**	**16.3**

Including:

- Bethlehem Road
- Knightdale-Eagle Rock Road

	PROJECTS	MILES
WIDENING PROJECTS *(to add lanes)*	**18**	**37.2**

Including:

- Poole Road, widen to four lanes
- Hodge Road south of Mingo Bluff Boulevard, widen to three lanes
- Buffaloe Road, widen to four lanes

	PROJECTS	MILES
NEW LOCATION PROJECTS	**70**	**48.6**

Including:

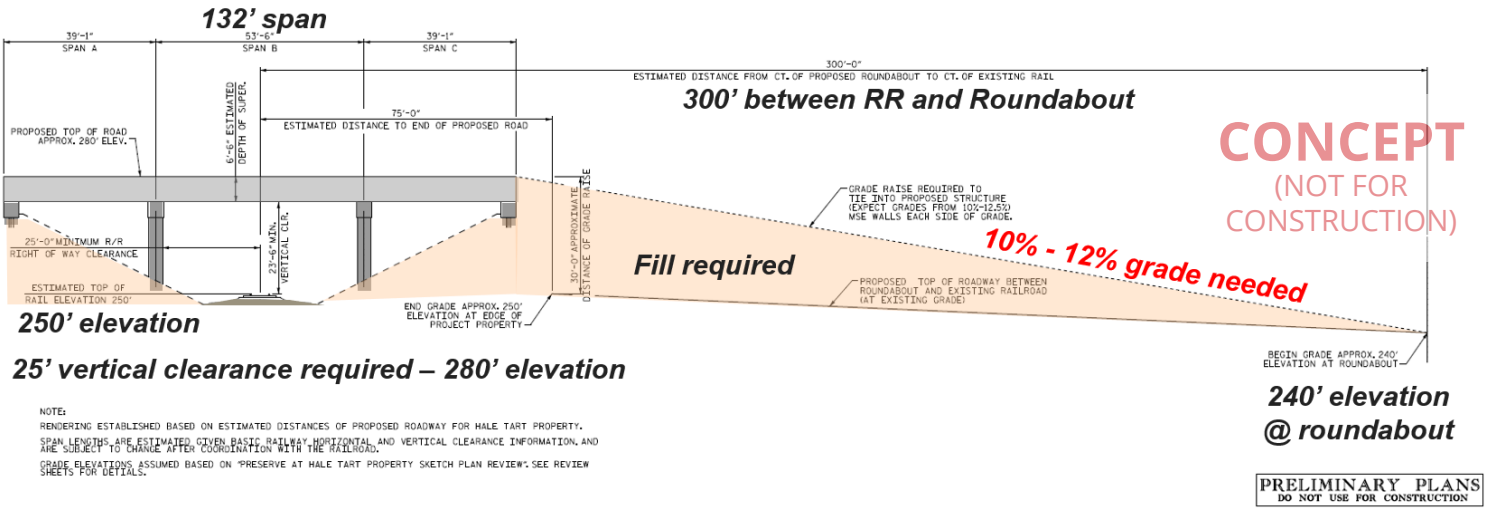
- Skycrest Drive Extension
- Widewaters Parkway Extension
- Old Crews Road Extension
- Many local road connections associated with development projects

CONCEPT DESIGNS

Concept designs focus on cost-effective alternatives that align with feedback and direction obtained early in the planning process with stakeholders, Town staff, and the public. The conceptual designs represent a 20% level design with quantities of needed infrastructure that is used to estimate project costs for a next step feasibility study.

WIDEWATERS PARKWAY EXTENSION BRIDGE

Figure 3.8: Elevation profile of proposed railroad corridor bridge.



The railroad corridor and Mingo Creek serve as two barriers to north-south connectivity, and Widewaters Parkway is highlighted in this Chapter's recommendations to create a better connected multimodal network. However, the location for making this connection is constrained by the existing topography that slopes downward toward Mingo Creek. Norfolk Southern will require a 25' vertical separation over the railroad, requiring mitigation options for development to be considered to accommodate this necessary connection.

DESIGN CONSIDERATIONS:

Required minimum horizontal and vertical clearance for bridging over/under railroad right-of-way

Horizontal: 25' clearance from center rail
Vertical: 23'-6" clear

~7,500 sqft. of new bridge (135' x 55')

Est. top of bridge roadway ~280' elevation

Large volume of fill required for slope back to adjacent properties

Roundabout approximately 300' from beginning of the bridge, approx. 10-12% grade needed

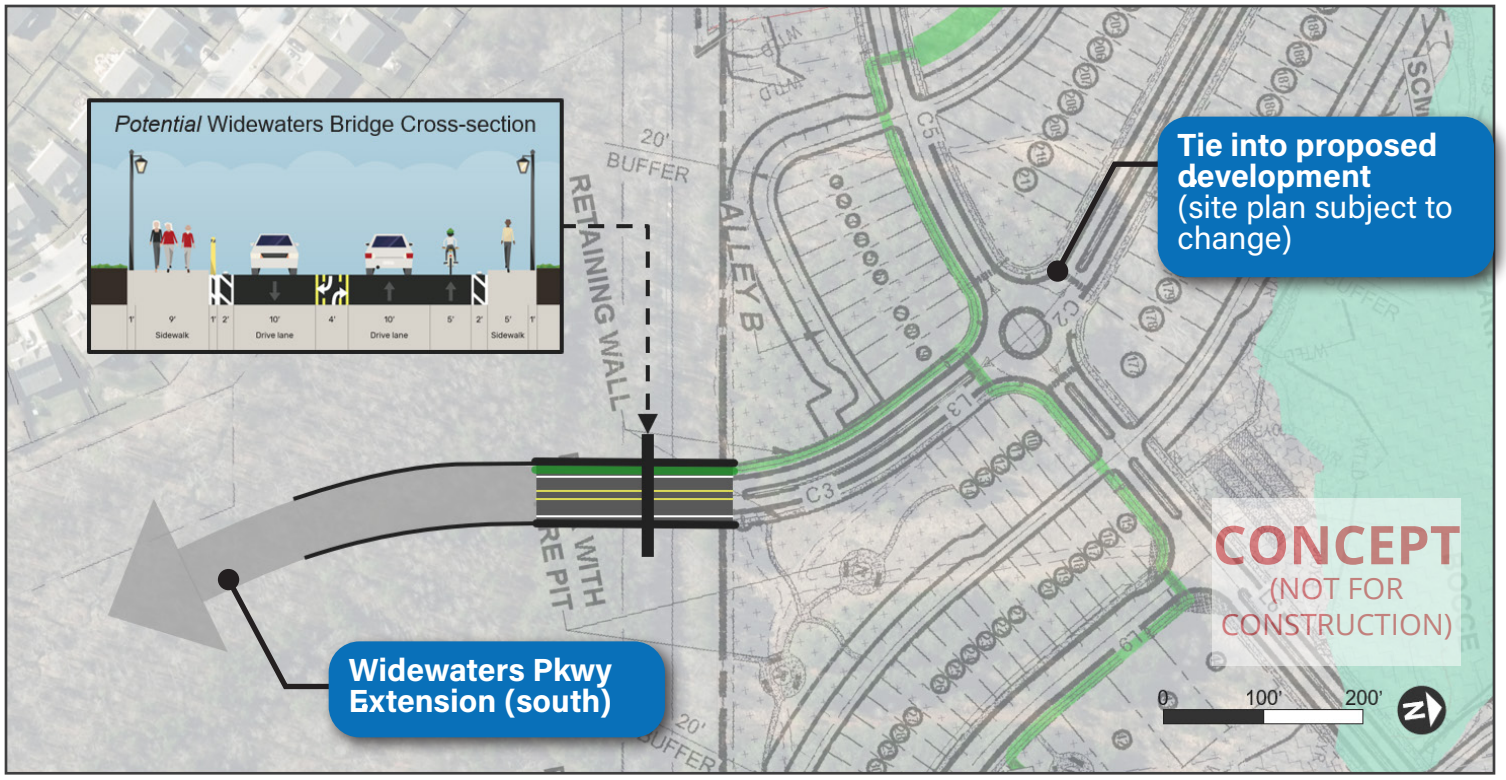


Figure 3.9: Approximate location and alignment of proposed bridge.

Options for Development

Three potential alternatives should be considered:

- **Raise homes and surrounding site plan** to tie into desired bridge, rather than using retaining wall in front of homes. This will require a *significant* amount of fill; or
- Use **mechanically stabilized earth (MSE) walls** along length of main corridor to keep homes at existing elevation. Expect grades to be 10%-12.5% from roundabout to tie into begin bridge. Note that homes will include a retaining wall in their viewshed; or
- Construct the bridge using a **combination of fill and retaining walls** to accommodate the roadway approach at a more reasonable 5% grade.

Cost Estimate: **$1.6M - 2.3M***
(planning level - for bridge only)

**ROW Acquisition not included. Includes 10% for engineering design, 5% for NCDOT oversight, 30% contingency.*

Tunneling under the railroad was considered, however, the existing water table for the adjacent stream (Mingo Creek) would likely require a pump station, preventing this option.

CONCEPT DESIGN: *IMPROVEMENTS TO OLD FAISON ROAD & BETHLEHEM ROAD*

This intersection is located in the south side of Knightdale. Surrounding land uses include large lot single family residences with the potential for increased development at this intersection. The intersection is currently a **3-way skewed intersection that challenges visibility for on-coming traffic.** Traffic volumes along Old Faison Road are 3,800 AADT, while Bethlehem Road carries approximately 5,400 AADT. A total of 18 crashes have occurred over the previous five years (2016-2020) at this intersection, though no fatal or severe injury crashes were reported.

Future plans include the addition of a fourth leg to this intersection, extending Old Faison Road east and connecting with Smithfield Road, as well as adding sidewalks and a sidepath. Two options for improvements should be considered for this important intersection and gateway into the community.

OPTION A: *Traditional Intersection Improvement*

- Construct four approaches, and widen Old Faison Road to 3-lanes
- Install new traffic signal
- Install high visibility crosswalks, pedestrian countdowns and ADA-compliant curb ramps
- 25’ turn radius maximum with curb-and-gutter approaches
- Add sidepath along the south side of Old Faison Road, and the west side of Bethlehem Road
- Add sidewalks along the north side of Old Faison Road, and both sides of Bethlehem Road north of this intersection
- Add bike lanes to northern leg of Bethlehem Road

OPTION B: *Roundabout Improvement*

- Reconstruct four roadway approaches
- Install high visibility crosswalks with splitter islands and ADA-compliant curb ramps
- Single-lane roundabout with mountable 11’ truck apron
- Add sidepath and sidewalks, similar to Option A
- Add bike lanes to northern leg of Bethlehem Road
- Slows vehicle speeds, and maintains traffic flow without stopping

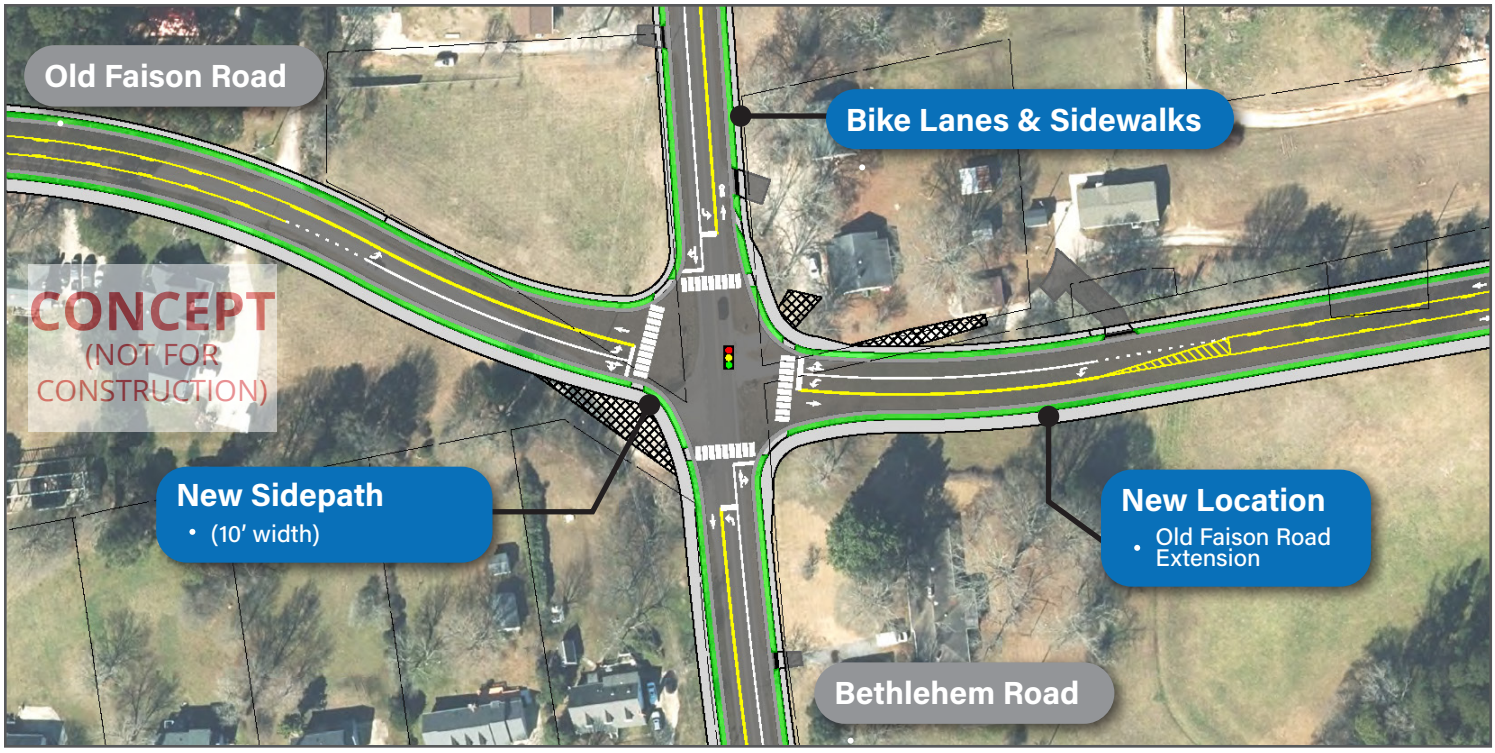


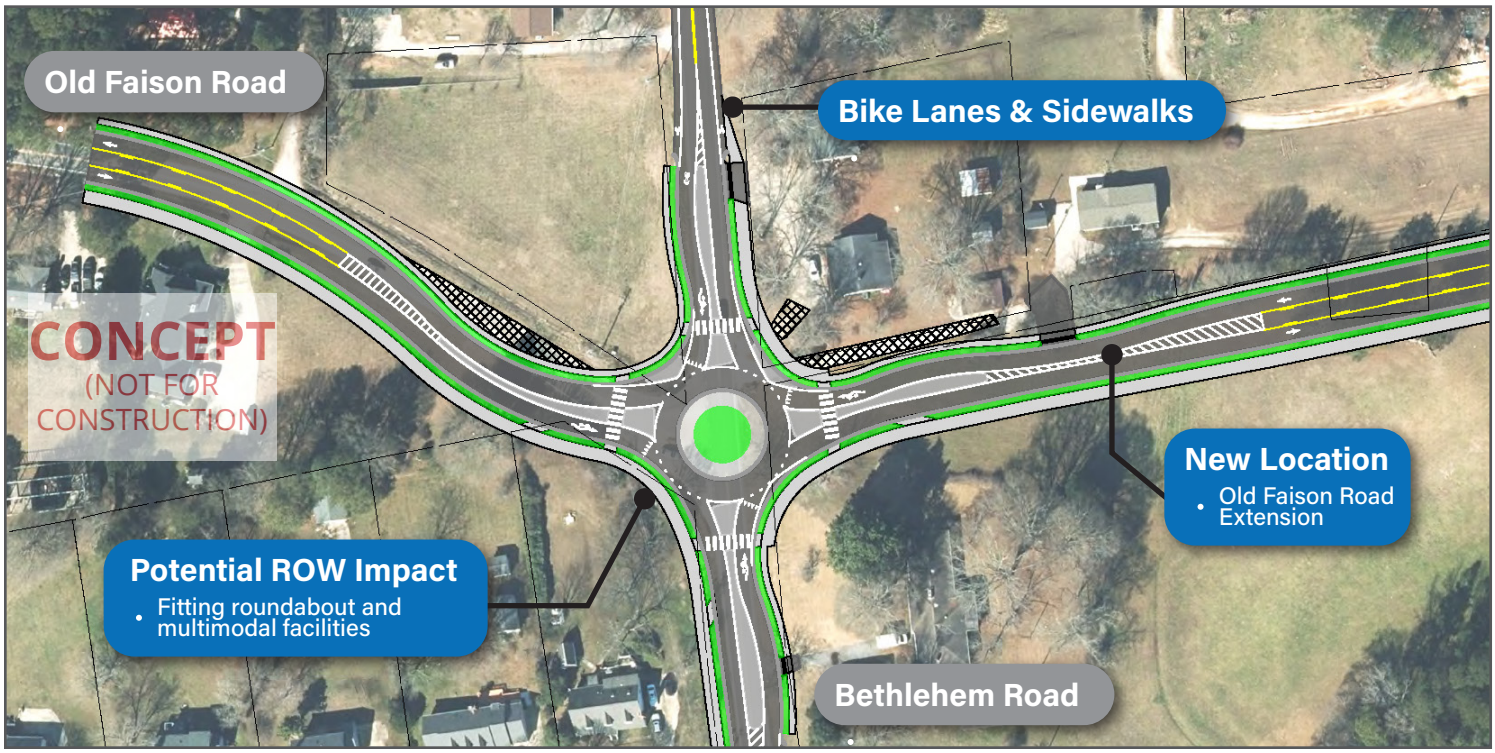
Figure 3.10: Option A - Traditional Intersection Improvement

Cost Estimate*: **$1.2 - 1.7M**
Option A

**ROW Acquisition not included. Includes 10% for engineering design, 5% for NCDOT oversight, 30% contingency.*

Cost Estimate*: **$1.7M - 2.4M**
Option B

Figure 3.11: Option B - Roundabout Improvement



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CHAPTER 04

Biking & Walking

Biking & Walking

Separated Bike Lane example (above the curb) in Rochester, NY.

Regardless of how we get to a destination, we are all pedestrians at some stage of our travel. Biking and walking facilities are essential to a multimodal mobility network, and **their design impacts how all users move, whether for transportation or recreation.** Safe, connected, direct facilities encourage more walking and biking, and improve the livability of a community.

This chapter begins with an examination of the core issues relating to Knightdale's biking and walking network. Like many communities, Knightdale experiences both missing facilities and connectivity gaps between segments. Automobile-oriented development has created pockets of safe, slow-speed networks that are inadvertently separated by, higher-speed, higher-volume corridors that are unsafe to cross.

This chapter provides the context for system-level recommendations and priority projects that improve Knightdale's biking and pedestrian network. Lastly, this chapter concludes with a conceptual look at pedestrian improvements to Knightdale Boulevard.

This Chapter Covers:

- **What Do We Know?**
  - There are gaps in Knightdale's network
  - High-stress corridors discourage more biking and walking
  - Crashes are a concern for all
- **How do we improve Biking & Walking?**
- **Biking & Walking Recommendations**
  - Concept Design: Knightdale Boulevard Pedestrian Improvements

What do we know?

THERE ARE GAPS IN KNIGHTDALE'S NETWORK.

Most residential subdivisions contain existing (internal) sidewalks, in large part due to privately-funded construction as a development requirement from the Unified Development Ordinance (UDO). Major thoroughfares between these residential areas, however, are generally lacking sidewalk or bikeway facilities, reducing overall connectivity of the network. Several intersections along Knightdale Boulevard (US 64 BUS) lack adequate crossing facilities at signalized intersections, and these are also existing transit stop locations (GoRaleigh Route 33) including:

- Knightdale Boulevard @ Old Knight Road / N First Avenue
- Knightdale Boulevard @ Parkside Commons Drive
- Knightdale Boulevard @ Hinton Oaks Boulevard (crossing Knightdale Boulevard)

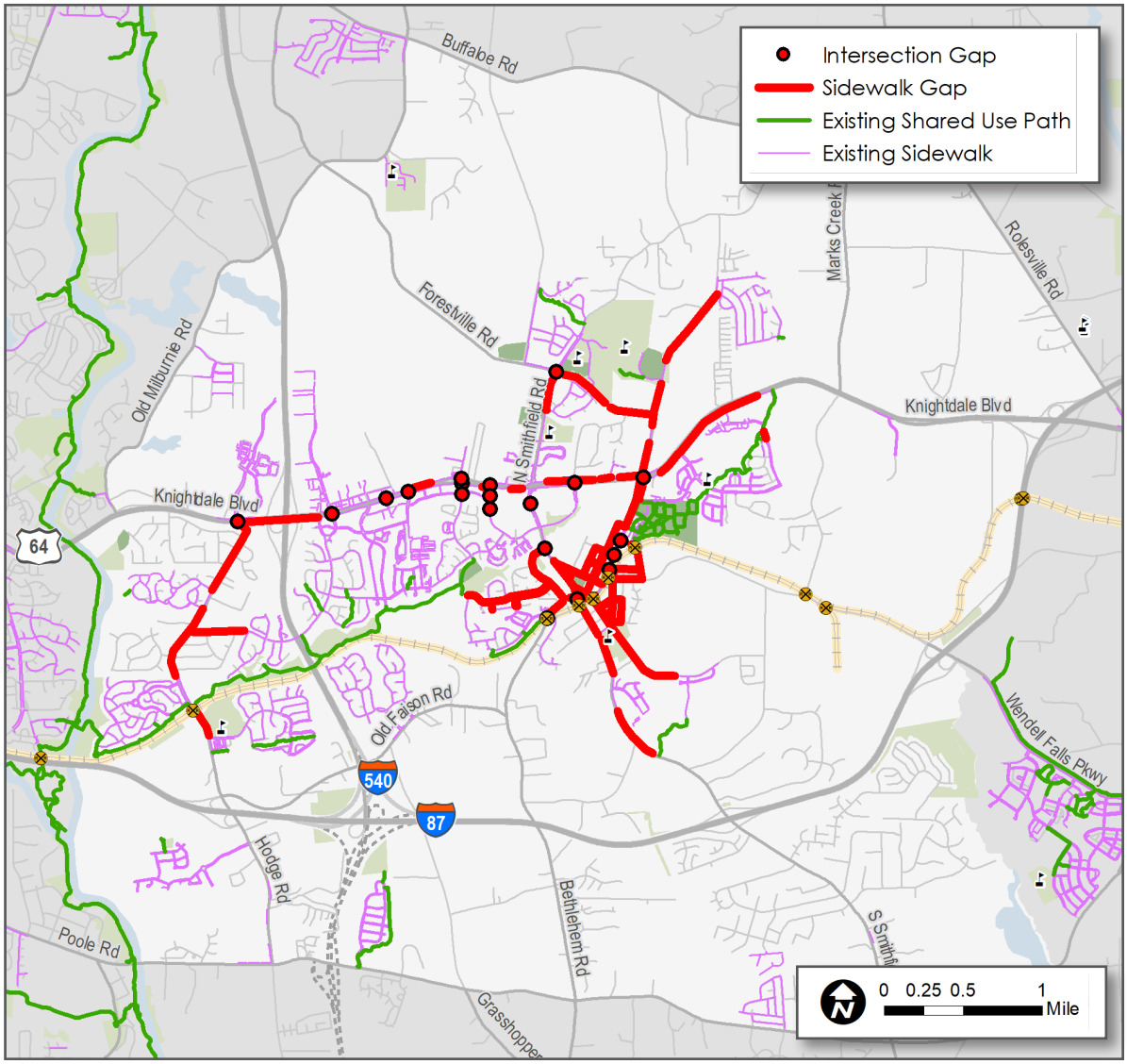


Figure 4.1: Network and intersection gaps for bicyclists and pedestrians, Knightdale.

Smithfield Road and Bethlehem Road (south of Old Town), as with many arterials in Knightdale, also lack sidewalk connections for long portions of the corridor. Smithfield Road, in particular, lacks sidewalks that would connect Old Town / Residential neighborhoods with the Mingo Creek Greenway (and planned extension). The existing sidewalk network within Old Town Knightdale is aging, with a number of gaps to be connected along Smithifeld Road, Railroad Street, and Maple Street. Pedstrian enhancements are needed for ADA-compliant curb ramps or the addition of marked crosswalks along Flrst Avenue, Smithfield Road, Fayetteville Street, Robertson Street, and others. Knightdale-area schools and transit stops are also **missing critical sidewalk connections and/or crosswalks**. Along Knightdale Boulevard, many transit stops are located at midblock locations, increasing the distance transit users must walk to access transit or cross at signalized intersections.

HIGH-STRESS CORRIDORS DISCOURAGE BIKING AND WALKING.

Individual bicyclists have different tolerance for riding near vehicles, often called a Level of Traffic Stress (LTS). LTS uses traffic speeds, volumes, and existing bicycle facilities to *qualitatively* assign roads to different types of bicycle users, and allow planners to track changes over time to measure progress. The higher the level of perceived stress, the fewer bicyclists are likely to be comfortable riding along that roadway.

Nearly two-thirds of Knightdale's total road mileage is within the Easy-All category, while 18% are within the Caution or Advanced. The challenge, however, is that **these represent 35 miles of important roads that connect with key destinations** within the Town and larger regional network. Notable Advanced or Caution corridors include:

- US 64 Business/Knightdale Boulevard,
- Hodge Road,
- Smithfield Road, and
- Bethlehem Road/First Avenue

45%

of Knightdale area roads have sidewalks (89 of 200 miles)

15.5

Total miles of existing bike facilities (includes paved shoulders and shared-use paths in Knightdale Station Park)

NOTE: the Knightdale area includes roadways beyond the municipal limits.

These corridors contain roadway conditions that are challenging for all but the most confident of bicyclists, and may represent a psychological barrier for most users, similar to physical barriers such as I-87 or I-540 where bicyclists are prohibited. For neighborhoods south of the railroad, a significant barrier itself, these corridors may be the only means of accessing other facilities in Knightdale, and particularly the Mingo Creek Greenway. Within residential areas, bicycling conditions are more favorable, with most residential streets providing safe, easy travel for a majority of users.

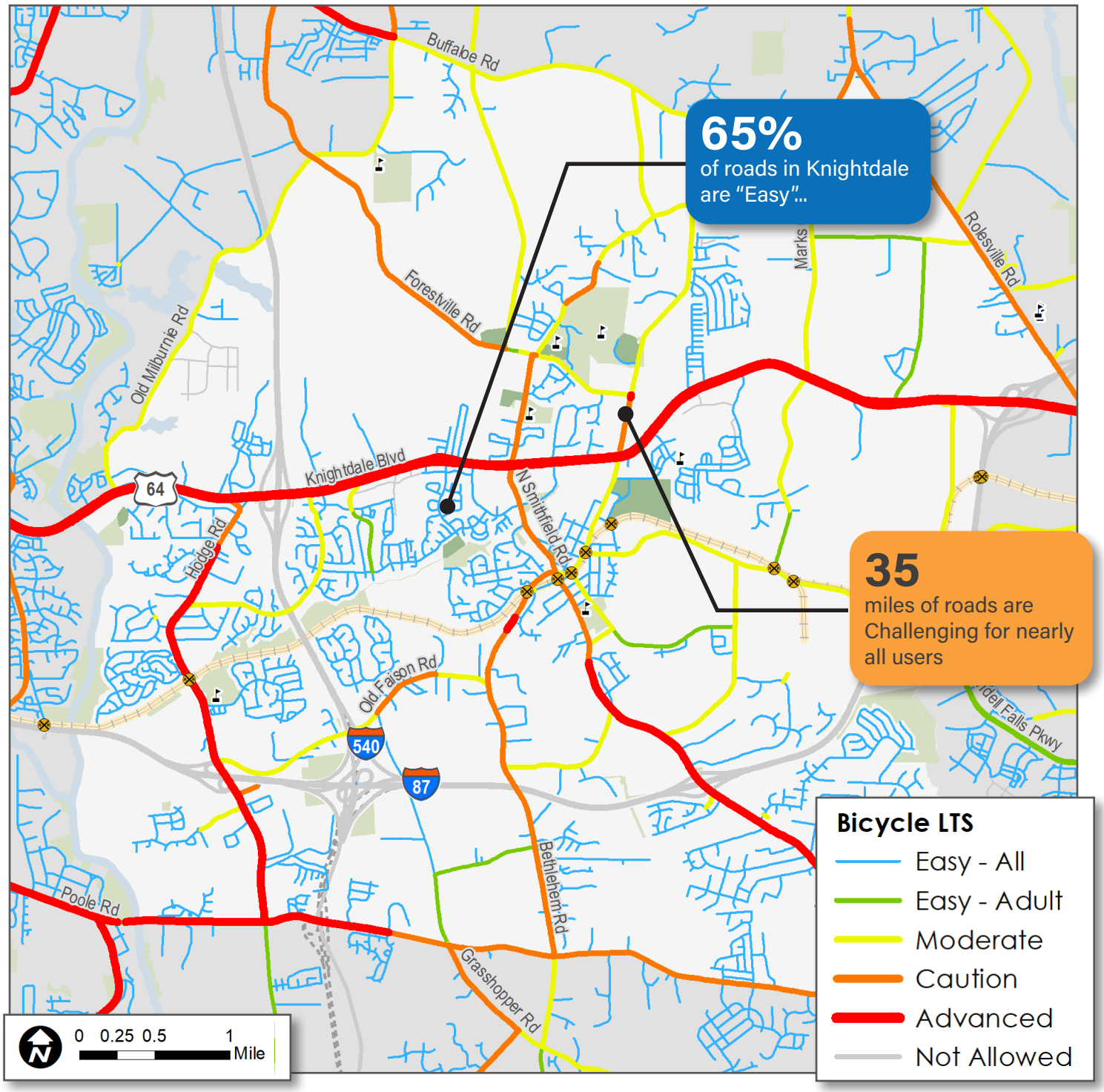


Figure 4.2: Bicycle Level of Traffic Stress (LTS) for roadways within Knightdale area.

CRASHES ARE A CONCERN FOR ALL.

High concentrations of bicycle or pedestrian crashes may reveal locations where the existing infrastructure is inadequate or where demand for walking and biking is highest. On the other hand, poor infrastructure may also discourage biking or walking due to personal safety concerns, often termed 'latent' or unmet demand.

Bicycle and pedestrian crash locations identified three primary clusters ('hot spots'):

- Knightdale Boulevard corridor, and particularly the Smithfield Road Intersection
- New Bern Avenue/Knightdale Boulevard, near Milburnie Park (near Neuse River Bridge)
- Poole Road corridor, west of Grasshopper Road.

Like other communities across the United States, Knightdale has seen an increase in bicycle and pedestrian crashes over the past decade (**Figure 4.3**). This trend is not unique, and influenced by several factors, such as increased popularity, increased traffic volumes and vehicle-miles traveled, and/or improved reporting process. Strategies for improving bicycle and pedestrian safety include traffic calming to reduce vehicle speeds, improving sight distances for drivers, bicyclists and pedestrians, reducing crossing distances and increasing separation from motor vehicle traffic will help to address safety concerns within the Knightdale community.

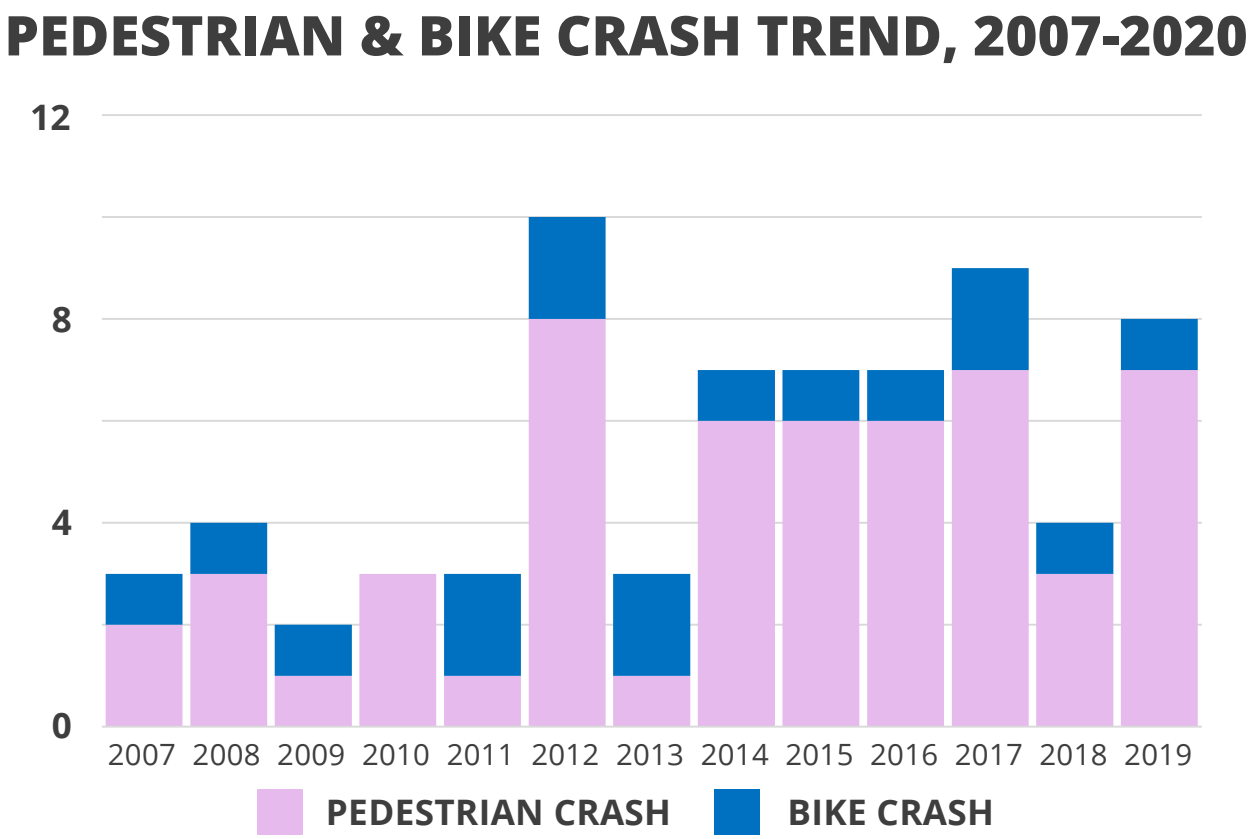
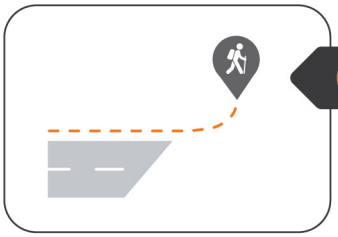


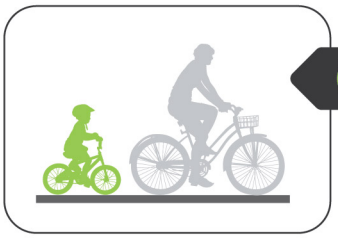
Figure 4.3: Pedestrian and bicycle crash trends, Knightdale study area. *Source: NCDOT.*

How do we improve our biking and walking network?

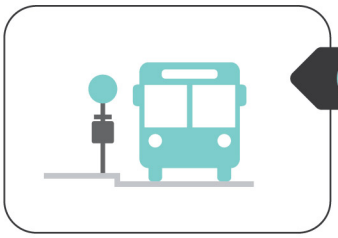
Analyses of Knightdale's biking and walking network, as well as feedback received through engagement efforts, revealed a select number of important issues and observations. These issues and their solutions form the framework, summarized below of the recommendations that follow in this Chapter:



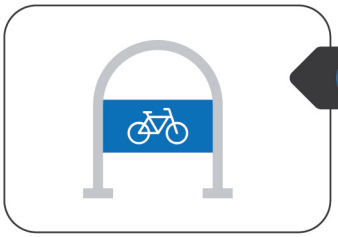
1. Better biking and walking **access to greenways** is needed.



2. **A low-stress** network will provide alternatives to major intersections, while also fixing safety issues.



3. Biking and walking infrastructure should provide **greater first & last mile access to transit** as part of anintegrated, multimodal system.



4. Don't forget parking: **more bike racks** and secure bike parking. Pursue a Bikeshare program to compliment bike parking amenities.

"I wish there were bike amenities here. There's nowhere to park my bike when I ride."

- Interactive Map respondent

"Cars are rude to bicyclists."

- Interactive Map respondent

Biking & Walking Recommendations

A complete network of safe, connected and convenient facilities for biking and walking will help Knightdale to achieve its broader community goals. These multimodal facilities encourage residents and visitors to move, whether for work or play, and create a more resilient community.

The Town of Knightdale should strive to construct an interconnected and seamless network of biking facilities, to be constructed incrementally over time. The network should be thoughtfully planned to connect users to desired destinations, both civic and recreational, and consider the comfort level of all ages and abilities. Gaps in the network, whether roadway segments or dangerous intersections, serve as potential barriers to most traveling by bike or foot.

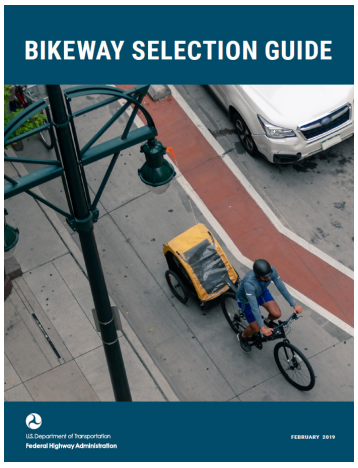
Principles of Bike Network Design

There are seven key principles for bike network design, and among these, the first three are particularly important in guiding bikeway selection:

- **SAFETY:** Reduce the frequency and severity of crashes and minimize potential conflict points between vehicles and bicyclists.
- **COMFORT:** Minimize stress, anxiety, and safety concerns for the design user.
- **CONNECTIVITY:** Direct and convenient trips that provide access to desired community destinations served by the roadway network.

THE SEVEN PRINCIPLES OF BIKE NETWORK DESIGN:

- *Safety*
- *Comfort*
- *Connectivity*
- *Directness*
- *Cohesion*
- *Attractiveness*
- *Unbroken Flow*



Source: FHWA Bikeway Selection Guide

"High traffic volumes and speeds with a narrow road on a curve makes cycling scary!"

- Interactive Map respondent

"The entire length of Knightdale Blvd is a barrier to bicycling."

- Interactive Map respondent

Relationship between Facility Type and Traffic

Selecting the best bikeway facility type for a given roadway can be challenging since the selection must balance traffic conditions, land use context, and implementation cost. **Figure 4.4** highlights the relationship between facility type and roadway speed and volume situations. **With major high-volume roads in Knightdale acting as key barriers, separated facilities are a focal point for recommendations.**

Selecting a bikeway is not a prescriptive process and other factors should be considered beyond speed and volume. For instance, the types of traffic (transit, freight, taxi zones, etc), on-street parking, available roadway or roadside space, intersection density, and surrounding land use all play a role in determining the best low-stress facility type.

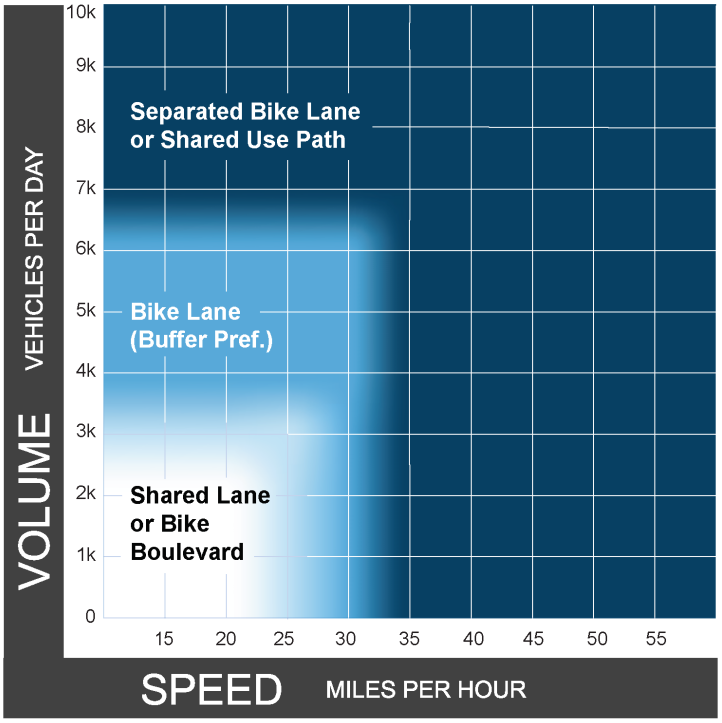


Figure 4.4: Relationship between speed, volume, and the appropriate bikeway facility.
Source: FHWA Bikeway Selection Guide.

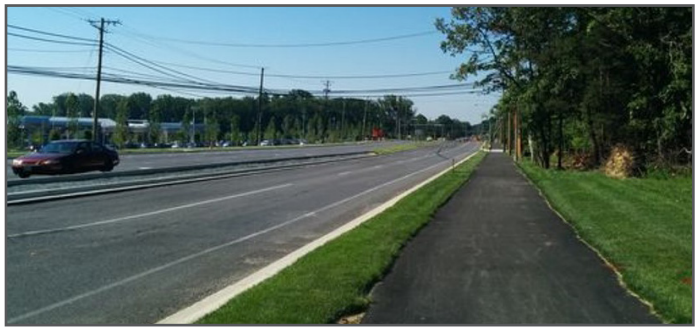
*Our updated **STREET TYPE CROSS-SECTIONS** in **CHAPTER 3** incorporate biking and walking facilities based on these safety and design principles!*

Types of Bike Facilities

Separated

SEPARATED BIKE LANES

- Exclusive space for bicyclists along a roadway
- Physically **separated from motor vehicles and pedestrians** by both vertical and horizontal elements
- May be located between or above the curb



SIDEPATHS

- Physically **separated from adjacent travel lanes above the curb**
- May be located on one or both sides of a street
- Designed to support and encourage pedestrian use alongside bicyclists
- Often referred to as "Shared Use Paths" (SUPs) or "Multi-Use Paths" (MUPs)

GREENWAYS

- Similar to sidepaths, but follow a stream/natural resource corridor or railroad
- Accommodates pedestrians and bicyclists
- Many cities or DOTs use "Shared Use Paths" or "Multi Use Paths" interchangeably with Greenway

On Street

BUFFERED BIKE LANES

- Conventional bike lane with designated buffer space that separates adjacent motor vehicle travel and/or parking
- 3' buffer recommended
- Allowable per MUTCD guidelines for buffered lanes

TRADITIONAL BIKE LANES

- Exclusive space for bicyclists marked by pavement striping and signage
- Adjacent to motor vehicle travel and flows in the same direction
- 5' minimum, 6' preferred (NACTO)

Shared

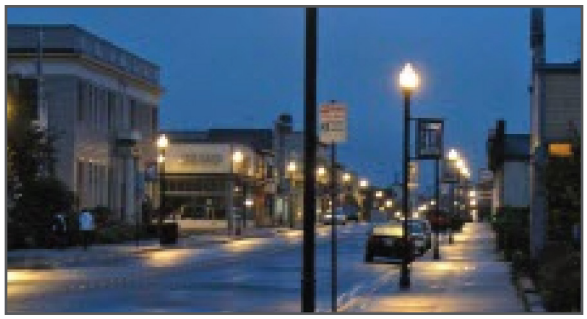
SHARED LANE MARKINGS

- Bicyclists ride with mixed traffic
- Ideal for roadways with speeds 25 miles per hour or below
- Most suitable for roadways with low traffic volumes

Types of Pedestrian Facilities

SIDEWALK CONNECTIONS

- Fill sidewalk gaps by connecting with or extend existing sidewalks
- Minimum 5 feet width. Wide sidewalks (>10 feet) may serve as Sidepaths (bicyclists and pedestrians)
- Provide ADA-compliant curb ramp design for citizens with limited mobility



PEDESTRIAN-SCALED LIGHTING

- Install lighting on both sides of wide streets and in commercial districts
- Place lights in advance of midblock and intersection crosswalks on both approaches
- Space approximately 50 - 75 feet apart
- Direct pedestrian lighting downward to limit light pollution

HIGH-VISIBILITY CROSSWALKS

- Use solid white lines (ladder style), 6 inches to 2 feet in width
- Minimum 6 feet width of walkway, and wider than the pedestrian facility it connects to
- Where bicycles frequently cross, consider a bike box/ two-stage left turn boxes in addition to advance stop bars

PEDESTRIAN COUNTDOWNS

- Ensure that signals are visible to pedestrians
- When possible, provide a Leading Pedestrian Interval (LPI)
- Provide supplemental non-visual guidance for pedestrians with sensory restrictions
- Marked crosswalks should be installed in conjunction with pedestrian signals

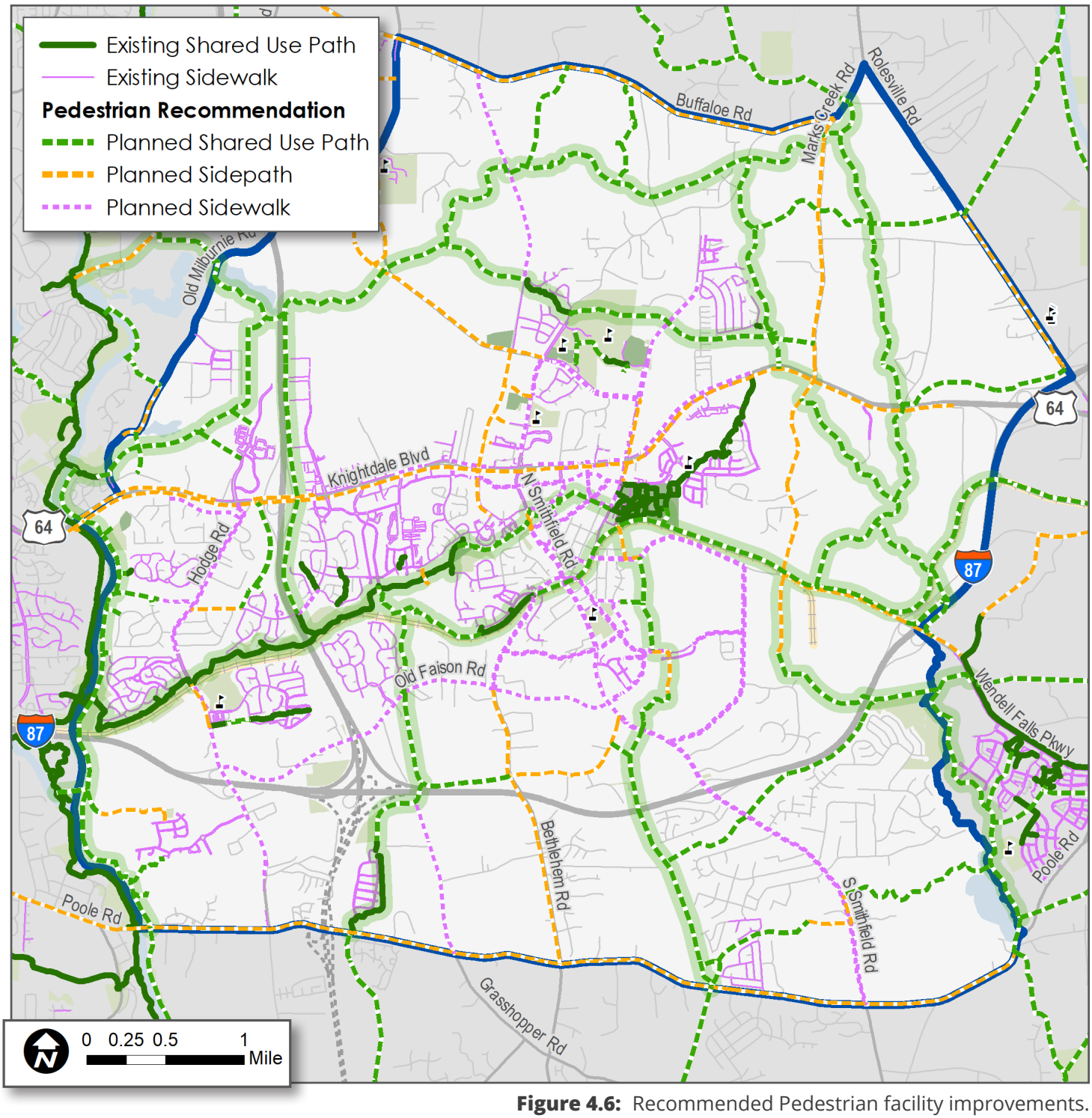


Figure 4.6: Recommended Pedestrian facility improvements.

"All neighborhoods need to be connected to the greenway."

- Survey respondent

"I really love the greenway and use it quite frequently."

- Survey respondent

Pedestrian Projects

	STREETS	MILES
SIDEWALKS	44	41.2

Including:

- First Avenue
- Main Street
- Robertson Street

+50%

Sidewalk miles, covering 130 of Knightdale's 200 road miles

	STREETS	MILES
SIDEPATHS *(Above the curb; accommodates pedestrians and bicyclists)*	26	33.2

Including:

- Knightdale Boulevard
- Smithfield Road
- Marks Creek Road

33.2

Planned miles of sidepaths

	SEGMENTS	MILES
SHARED USE PATHS *(Follows creek or stream; accommodates pedestrians and bicyclists)*	21	50.0

Including:

- Mingo Creek Greenway
- Marks Creek Greenway
- Beaverdam Creek Greenway

58.0

Miles of Existing + Planned Shared-Use Paths

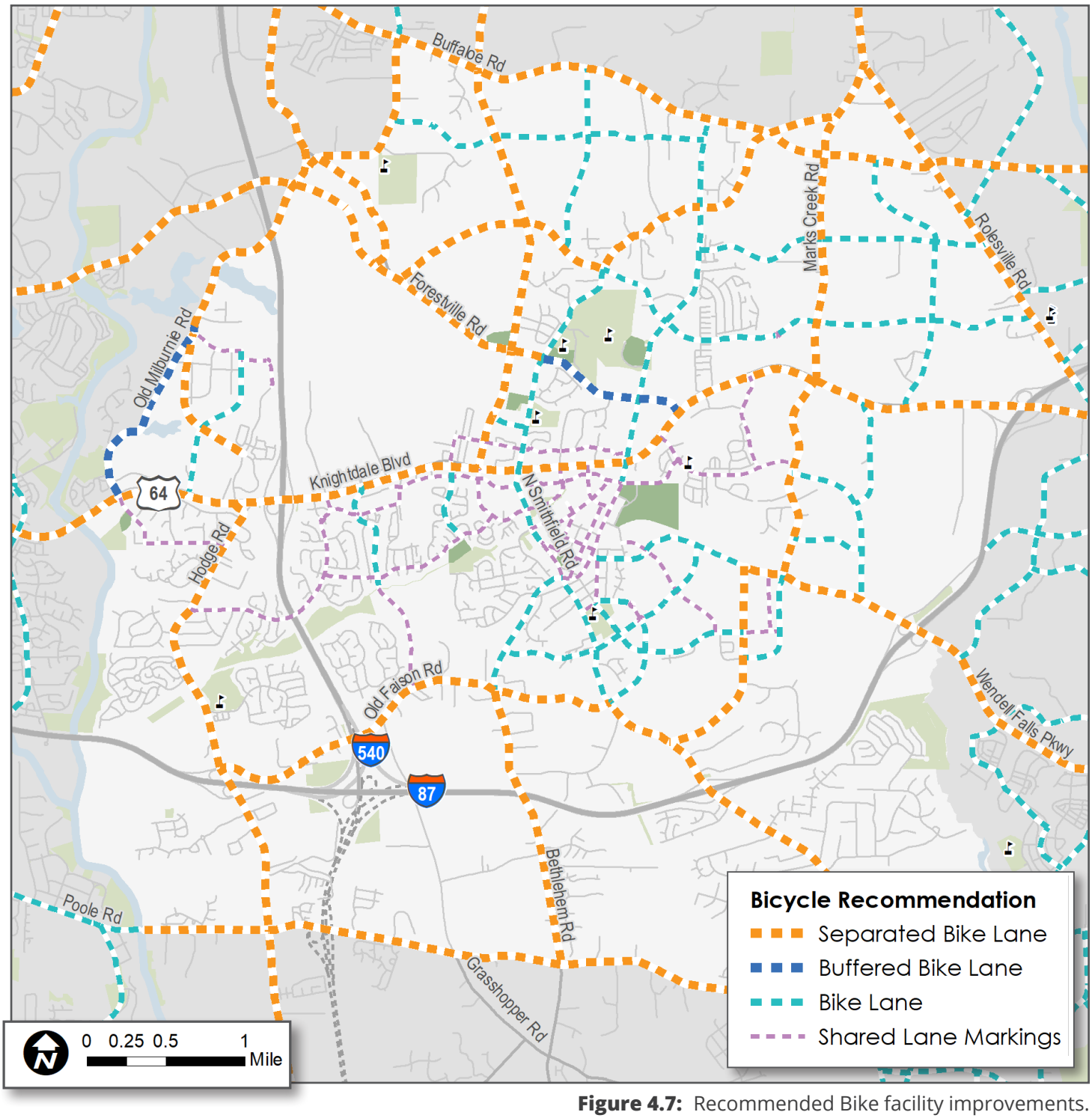


Figure 4.7: Recommended Bike facility improvements.

Implementing this Bicycle Network Plan will take many years, and improvements will be make in coordination with roadway projects, repaving projects, or new developments. This CTP is a living document, and must be revised continually to appropriately prioritize these improvements as a component of all transportation projects.

Bicycle Projects

	STREETS	MILES
SHARED LANE MARKINGS	29	18.7

Including:

- First Avenue
- Main Street
- Knightdale Station Run
- Laurens Way

2,000%

Planned increase in shared lane marking mileage

	STREETS	MILES
BIKE LANES	26	26.8
BUFFERED BIKE LANES	1	1.0

Including:

- Old Knight Road
- Fayetteville Street
- Bethlehem Road

27.2

Planned miles of bike lanes (0.3 miles of existing lanes)

NOTE:
Flexibility of design is paramount; each roadway has unique site conditions. Refer to FHWA Bikeway Selection Guide (2019) when considering the most-appropriate bike facility type for each corridor.

	STREETS	MILES
SEPARATED BIKE LANES *(Between or above the curb; depends upon site conditions)*	29	50.1

Including:

- Hodge Road
- Forestville Road
- Marks Creek Road
- Old Faison Road
- Old Crews Road
- Knightdale-Eagle Rock Road

"Bike lanes are only useful on major roads if there's some form of divider between car traffic and bike traffic."

- Survey respondent

CONCEPT DESIGN: KNIGHTDALE BOULEVARD PEDESTRIAN IMPROVEMENTS

Concept designs focus on cost-effective alternatives that align with feedback and direction obtained early in the planning process with stakeholders, Town staff, and the public. Hot spot concepts offer preliminary engineering design for a priority location that needs improvement. The conceptual designs represent a 20% level design with quantities of needed infrastructure that is used to estimate project costs for a next step feasibility study.

Short-Term Improvements

This initial section of Knightdale Boulevard improvements will fill the sidewalk gaps from Hinton Oaks Boulevard to N. First Avenue, Knightdale Station Park and the proposed Knightdale Town Center (TOD, Chapter 5). The short-term objectives of this concept design are to **improve access to existing bus stops** and **improve pedestrian crossings** at seven (7) signalized intersections along Knightdale Boulevard east of the I-540 interchange.

Cost Estimate*: **$1.9M - 2.8M**
(planning level)

**ROW Acquisition not included. Includes 10% for engineering design, 5% for NCDOT oversight, 30% contingency.*

DESIGN CONSIDERATIONS:

- Close the sidewalk gaps along Knightdale Boulevard, north side (approx. 4,725 feet) and south side (approx. 4,900 feet)
- Improve access to existing **Knightdale Route 33 bus stops**
- Improve pedestrian crossings at seven (7) signalized intersections:
  - High-visibility crosswalks
  - Pedestrian Countdowns & Refuge Islands
  - ADA-compliant curb ramps
  - Pedestrian-scale lighting

High-visibility crosswalks.

Pedestrian countdowns and refuge islands.

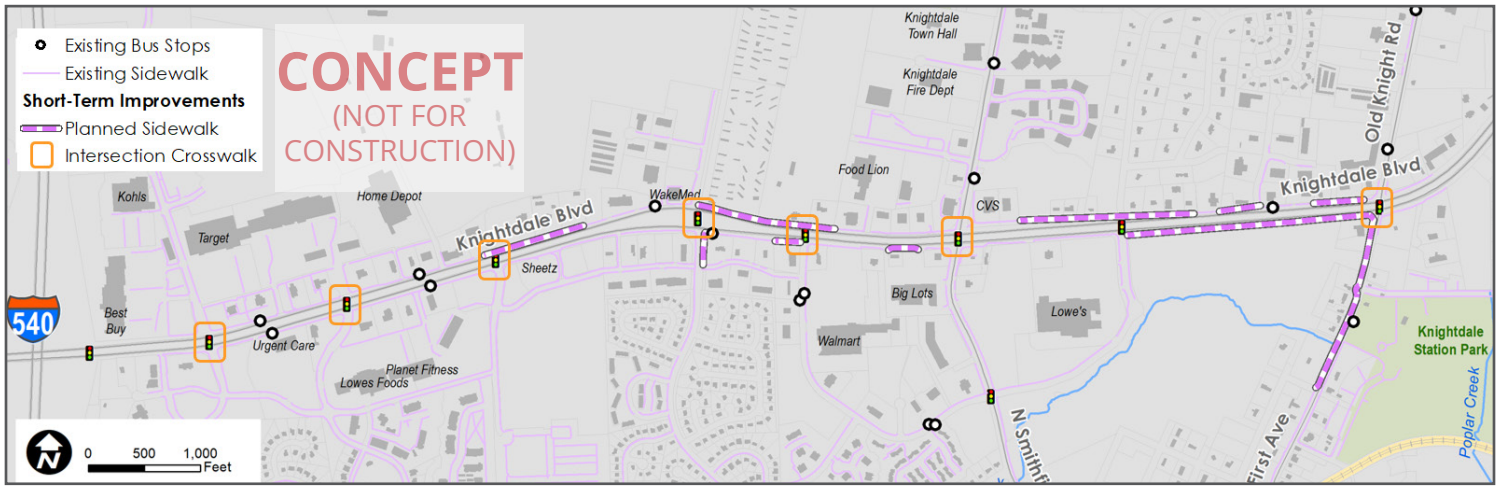


Figure 4.8: Short-term concept for Knightdale Boulevard improvements. Filling the sidewalk gaps and improving access to transit stops is the emphasis for Phase 1.

Long-Term Improvements

The long-term objective is to provide **a continuous 10' to 12' multiuse path/sidepath** along the south side (adjacent to, or replacing sidewalk), beginning at the Neuse River bridge. This will require coordination with NCDOT, a modification to the I-540 bridge to include repurposing the eastbound auxiliary lane and the associated loop.


ADA-Compliant Curb Ramps.

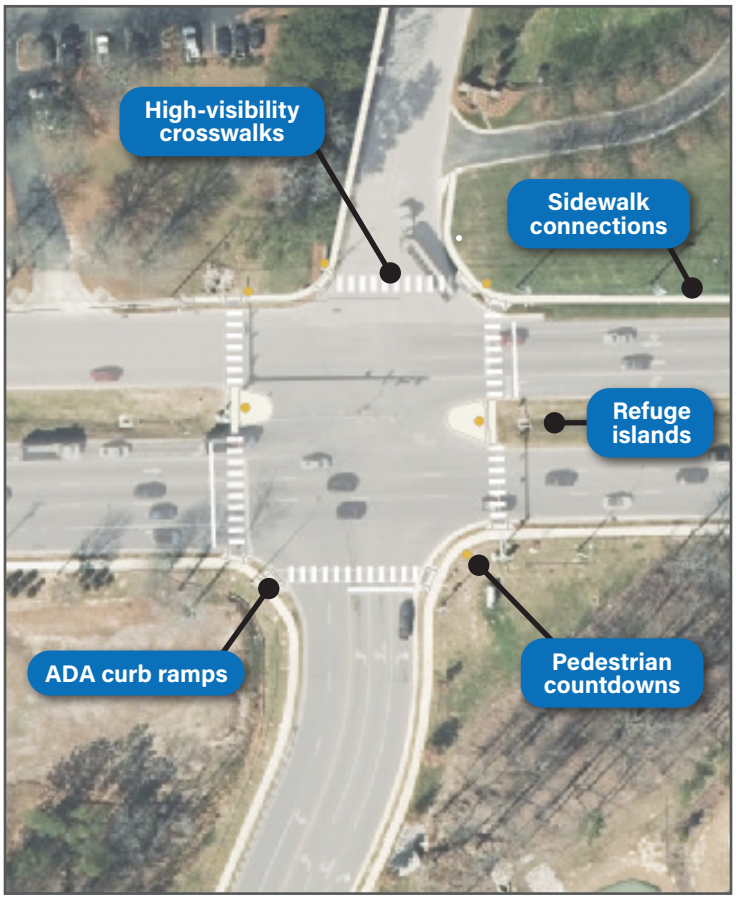


Figure 4.9: Example of pedestrian improvements to improve access to transit stops.

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CHAPTER 05

Transit

Transit

Knightdale Route 33, operated by GoRaleigh.

Knightdale's location has provided it with the advantage of being proximate to the major urban centers of the Triangle Region, all of which are less than a half-hour away by private automobile. While the Town desires greater **public transportation choices,** driving has become the 'most convenient' mode of travel.

With the passage of the Wake County Transit Plan, perhaps no mode of transportation has spurred more excitement than public transportation. New service options, including the extension of bus rapid transit (BRT), express bus service, and the prospect of passenger rail have all appeared in regional transportation planning efforts, and Knightdale features squarely in the conversation for all. But aligning desire with infrastructure requires work, and the existing transit service must be preserved and enhanced to further Knightdale's multimodal vision.

This chapter begins with an examination of the possible barriers that are limiting the existing transit service(s). Recommendations will focus on increasing service frequency, increasing awareness and information, as well as incorporating emerging, smarter mobility options to support traditional fixed-route transit. Finally, the chapter concludes with a conceptual design for transit-supportive development in Old Town Knightdale.

This Chapter Covers:

- **What do we know?**
  - Transit Service is Minimal, but Reliable
  - Expanding Transit service will require an increase in development density
- **How do we improve transit?**
- **Transit Recommendations**
  - Concept Design: Transit-Supportive Development

What do we know?

TRANSIT SERVICE IS MINIMAL, BUT RELIABLE.

GoTriangle and GoRaleigh provide express (the ZWX route, which does not currently stop inside Knightdale's Town limits) and local (Route 33) bus in the vicinity of Knightdale. The **ZWX Express route** runs daily Monday through Friday from 6am to 7pm with three runs happening in the morning peak period and one in the evening peak period. Fares are typically $3.00 per trip. **Route 33** operates from 6:00am to 10:00pm, connecting Old Town and the town hall complex with the New Hope Commons (Wal Mart) shopping center to the west, where it has transfers to Routes 15 (Wake Med and Downtown Raleigh) and 15L (Trawick Connector that circulates in northeast Raleigh). Route 33, discussed in detail in the Transit Mobility Plan, converted from an express route (KRX) to local service during this time period and realized increased ridership afterwards in 2019 and 2022 as well.

GoWake Access provides door-to-door, shared-ride service for Wake County residents who are 60 years or older, disabled, have work-related transportation needs, have trips outside of Raleigh or Cary, or who participate in an eligible service (e.g., Medicaid). Service is provided Monday-Saturday from 6am-6pm. Fees for the service vary from $0 (vaccinations or Medicaid) to $4 per trip, depending on eligibility criteria met by the rider. Rides must be scheduled 1 (general) to 3 (Medicaid) days in advance. Ridership on GoWake Access has not fluctuated much during the past four available years of data.

Data shows **ridership continues to recover (ZWX) or even increase (Route 33) through the pandemic. (Figures 5.1 and 5.2).** The ZWX route has historically had the highest ridership of the three eastern Wake routes, and increased substantially in 2019. Increasing ridership totals and a positive growth trend will help to support expanding service.

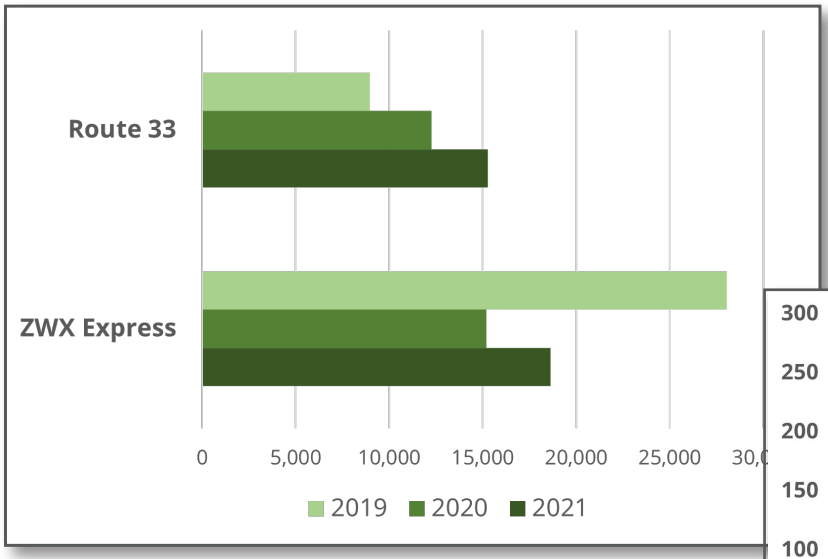
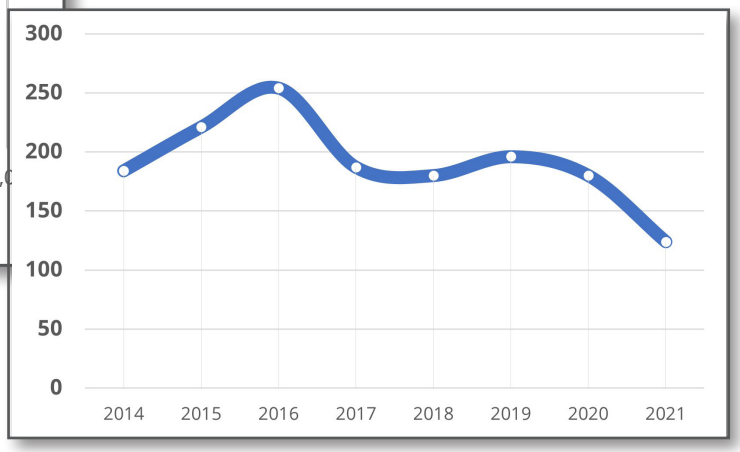


Figure 5.1: Average Daily Boardings, from FY2019 to FY2021.

Figure 5.2: GoWake Access (formerly TRACS) Annual Riders, 2014 to 2021.



EXPANDING TRANSIT SERVICE WILL REQUIRE AN INCREASE IN DEVELOPMENT DENSITY.

Relative boardings and alightings (terms used for getting on and off the bus or other transit vehicle) for September 2021 in Wake County generally and near Knightdale are displayed by stop (**Figure 5.3**). The large, dark-red circle dominating the image is the downtown Raleigh transfer point at Moore Square; over 21,000 boardings and alightings were recorded for this one month. Remaining circles are much smaller, representing individual stops. The largest stop location within Knightdale is the Walmart Park-&-Ride stop on McKnight Drive. Knightdale Station Park is the second largest.

Figure 5.4 on the next page provides more indicators that suggest the overall viability of various types of mobility options in Knightdale and the Knightdale Study Area, comparing them to Wake County. These statistics should be considered in coordination with Knightdale's service goals.

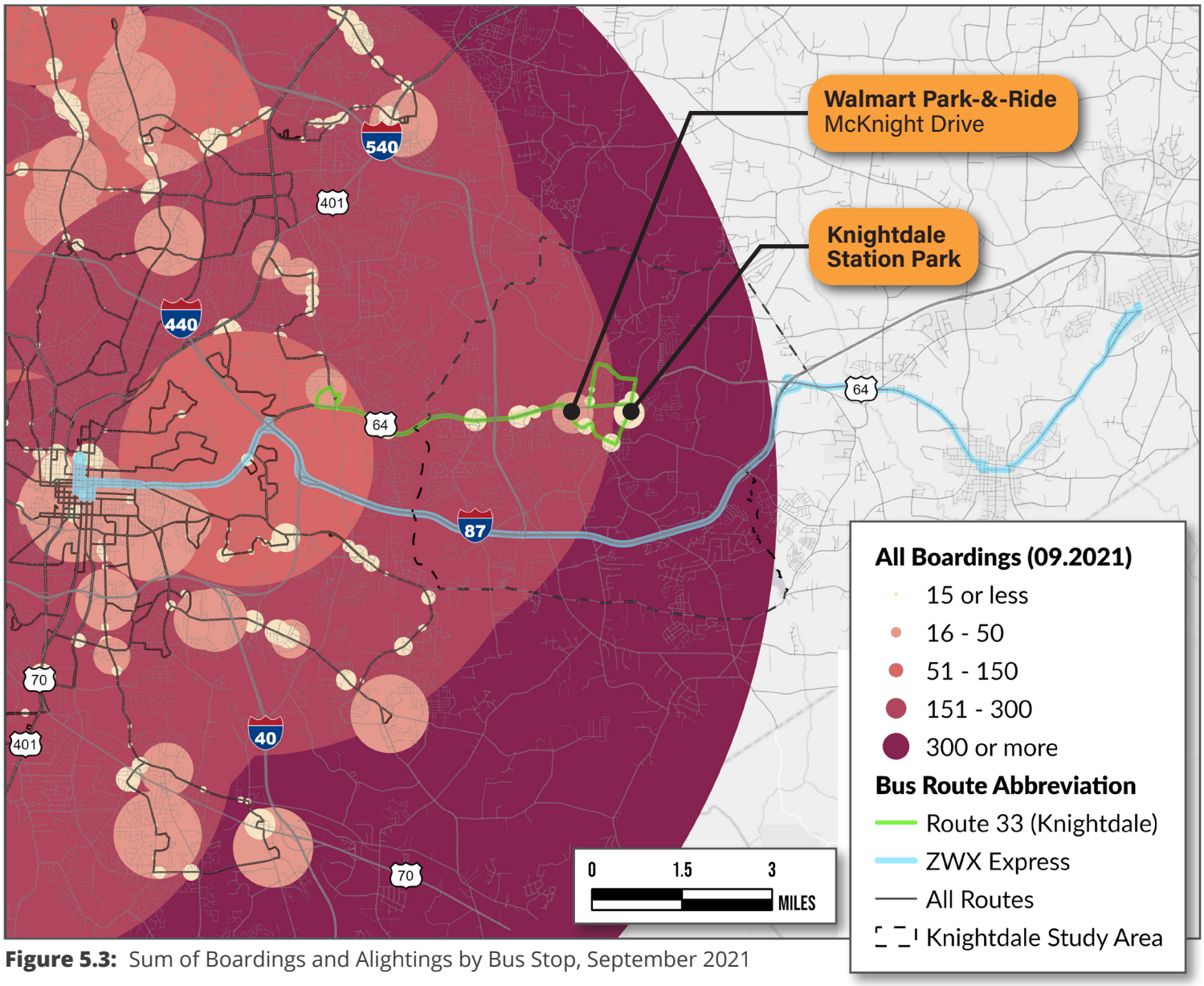


Figure 5.3: Sum of Boardings and Alightings by Bus Stop, September 2021

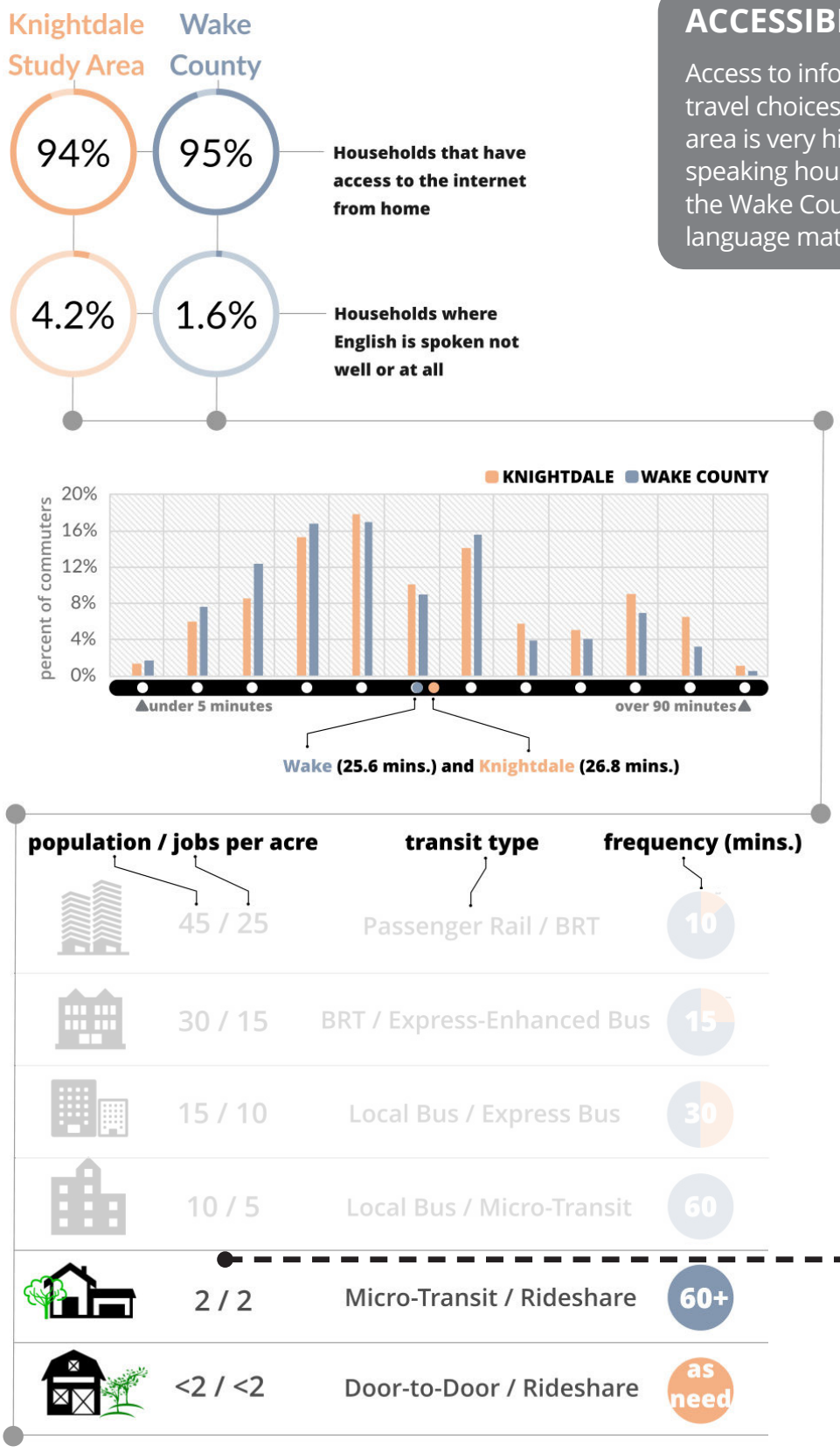


Figure 5.4: Transit Readiness of Knightdale (Study Area and Town)

ACCESSIBILITY

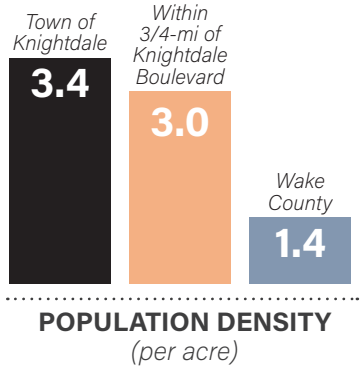
Access to information is critical to making travel choices. Internet access in the study area is very high (94%), but non-English speaking households (4.2%) is well above the Wake County figure,implying Spanish language materials are important to provide.

TRAVEL TIMES

Average commute times (U.S. Census 2015-2020 sample) are similar for both Wake County and Knightdale at 26 minutes. Knightdale is slightly higher, perhaps becasue it's far from RTP employment.

LAND USE DENSITY

Different transit systems (left) *typically* support density of residents and jobs. ***Knightdale (and study area) as well as Wake County have densities that traditionally support carshare, micro-transit, and rideshare.***



See the **Transit-Supportive Development Concept** for a *potential* site plan to add **ten dwelling units per acre.** This scale of density has the potential to change these metrics.

While population densities and even current ridership on traditional transit are important, the volume of riders isn't the only metric for successful public transportation in smaller and rural communities. **Densities of homes and businesses will and do support public transportation in the most-populated parts of Knightdale (Figure 5.5).** Development densities in the vicinity of controlled access freeways (I-540 or I-87) are sometimes approaching levels generally deemed viable for fixed-route and BRT transit services, although access to the area is sometimes convoluted by the need to route through secondary street networks removed from the freeway.

In **Figure 5.5**, commercial and residential units were summed and divided by the acreage of the parcel they are on to calculate a per acre density value. Some adjustments were made to this dataset to account for uses like self-storage buildings with many individual units (storage, not residential). Parcel boundaries were then "extruded" vertically to represent development densities, with green shading representing at least 10 units per acre. Note that densities typically are relevant to locations where townhome- or apartment-style residences are now in place. Green shadings represent locations that support fixed-route transit, providing a different picture of transit viability than the town-wide or study area-wide statistics from **Figure 5.5.**

However, quality transportation service seeks to fill transportation needs that aren't only expressed in raw numbers, including needs associated with youth, seniors, mobility-constrained, and others that lack personal mobility. Taking these contexts into account - growth, development patterns, existing services, and meeting an array of mobility needs including those of traditionally under-represented groups - helped shape the recommendations that follow, as did substantial public input.

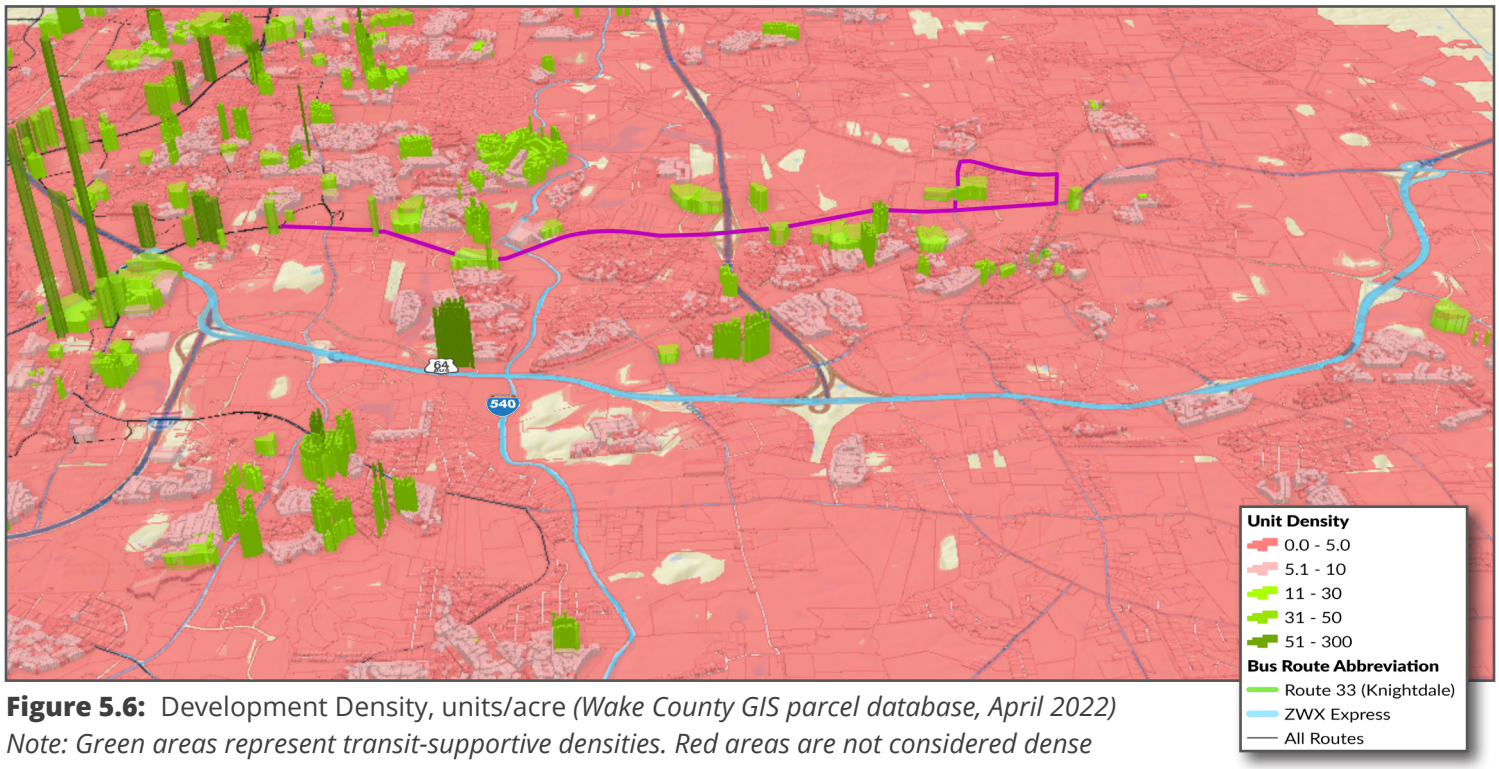


Figure 5.6: Development Density, units/acre *(Wake County GIS parcel database, April 2022)*
Note: Green areas represent transit-supportive densities. Red areas are not considered dense enough to support transit.

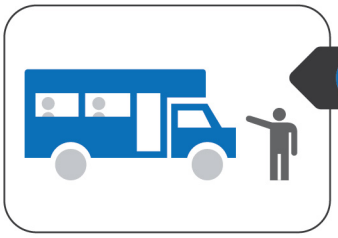
How do we improve transit?

With routine, reliable service now established, Knightdale has a base upon which greater transit service can be built. Public feedback and data analysis has clearly demonstrated that transit service improvements are both needed and strongly desired within the community. How do we get there? The following themes emerged through investigation and outreach, which form the framework for how transportation investment and land use decisions can operate to support an expanded, integrated transit system in Knightdale and its surroundings.

1 **Frequency** of transit service must be improved to provide a competitive alternative to driving.

2 **Development density** must dramatically increase to justify expanded transit service, especially along Knightdale Boulevard and in Old Town Knightdale.

3 **Mobility hubs** have significant potential to integrate transit into Knightdale's transportation system, and **improve the first/last mile access** to transit.



4 **Microtransit** services may complement and replace portions of existing transit service.

MOVING IN THE RIGHT DIRECTION!

Knightdale has several developments planned (in the pipeline) or under construction that will further increase density near Route 33:

- 2,060 residential units,
- 535,000 sf of commercial development,
- 500,000 sf flex warehouse, and
- Three (3) hotels

Transit Recommendations

Public Transportation will become a more important component of Knightdale's mobility network as the Town continues to grow in population. Many factors will influence whether public transportation is viable as a competitive alternative to motor vehicle travel.

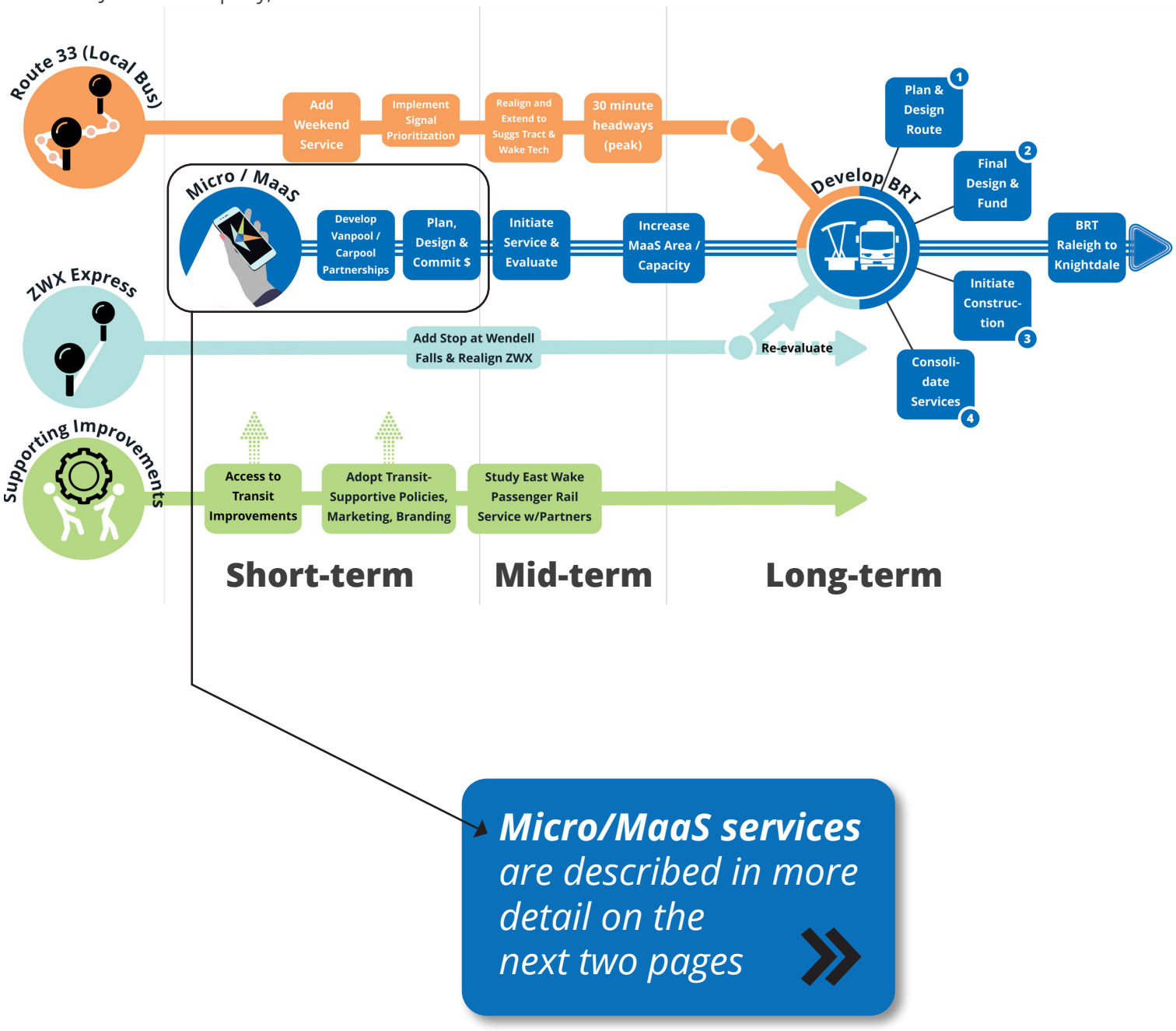
Public input (Chapter 2) on the challenges, opportunities, and importance of public transportation options largely align with observations drawn from existing conditions analysis: frequency and accessibility need improvement as well as increased promotion, and steps need to be taken to boost ridership. A phased strategy has been developed to (a) improve or enhance existing service, (b) expand to offer new services, and (c) explore supporting improvements that relate to policy or agency coordination.

Recommendations Timeframe

Generally, recommendations align with three time periods, representing a **logical progression of integrated implementation for local bus service,** express service, micromobility/MaaS, and supporting policies and infrastructure investments that **culminate in the development of a bus rapid transit service.** This approach can best be described as: "crawl before you walk, and walk before you run."

- ***Short-Term Transit (1-5 years).*** Access improvements to existing bus stops, policy modifications to support transit-oriented development, and enhancements to existing service to increase ridership.
- ***Mid-Term Transit (6-9 years).*** Frequency improvements on local bus service, expanded micro-transit service, add stop on ZWX line at Wendell Falls, and route extensions both east and west for local service.
- ***Long-Term Transit (10+ years).*** Coordinate with GoRaleigh, GoTriangle, Town of Wendell, and Wake County to extend New Bern Avenue BRT service, increasing micro-transit capacities and optimizing other fixed-route services.

Figure 5.7: Strategy for Phased Implementation of Recommendations.
Source: JS Lane Company, LLC.



What is Mobility-as-a-Service (MaaS)?

Traditional transportation projects and programs focus heavily on roadway or other mode-specific infrastructure development. ***Combining the definition of micromobility and mobility as a service (MaaS) produces recommendations for the services, education, and infrastructure that allow people to select from a broad set of mobility solutions, finding the transportation service, route, time, vehicle, and cost that works best for them.*** Micromobility features small, lightweight, and often electric vehicles while MaaS focuses more on the broader ecosystem of booking and payment systems that support a wide variety of travel options (including micromobility vehicles). These elements of Public Transportation are relatively new, and the technology supporting them is rapidly changing. Coordination with **CAMPO** and **NCDOT-Integrated Mobility Division** is important to ensure seamless development of technologies and to assist with implementation.

MOBILITY AS A SERVICE, DEFINED

"Mobility as a Service (MaaS) **integrates various forms of transport services into a single mobility service accessible on demand**. A MaaS operator facilitates a diverse menu of transport options to meet a customer's request, be they public transport, ride-, car- or bike-sharing, taxi or car rental/ lease, or a combination thereof.

For the user, MaaS can offer added value by using **a single application to provide access to mobility with a single payment channel** instead of multiple ticketing and payment operations. For its users, **MaaS should be the best value proposition** by helping them meet their mobility needs and solve the inconvenient parts of individual journeys and the entire system of mobility services."

- The MaaS Alliance (https://maas-alliance.eu)

Examples of MaaS concepts that can augment mobility choices in Knightdale include the following; any list is partial and is constantly expanding as more innovation enters this space.

Car-Sharing Services allow people with infrequent mobility needs that they can't accommodate any other way to have access to a shared car. These systems can be pooled among limited users or operated through a company like Turo or ZipCar.

Augmented TNC (Transportation Network Companies) Services are changing what people think of when they talk about companies like Uber or Lyft. Public subsidies for rides that begin or end at transit lines or medical services help improve existing services and equity propositions. NE Wake SmartRide is one local example launched in March 2022.

Dedicated Cross-Service Mobile Apps are being developed now by individual cities tailored to their specific needs and service arrangements. Since a key component of MaaS is access to multiple modes it helps to have an app in your pocketbook that manages bikesharing, escooters, shared cars, bus ticketing, parking, or rental reservations through one integrated platform.

Hybrid Transit Options like on-call route deviation or enhanced / expanded paratransit services, sometimes in cooperation with private taxi companies, are also making traditional transit options more innovative and competitive.

What are Mobility Hubs?

Mobility Hubs are places that collect two or more transportation options in one place. They often have elements of micromobility and MaaS, and are therefore great places to start implementing these techniques in smaller but growing communities like Knightdale.

Mobility hubs can and should be **scaled to evolve over time** and match the needs of the communities within 1 - 2 miles of the hub. Mobility hubs are typically built around a fixed transit stop. Knightdale should focus on starting with an initial Neighborhood-scale hub (providing basic services), and add elements from Commuter or Regional categories as needs dictate and resources become available (**Figure 5.7**). Sixteen *potential* Mobility Hub locations have been identified, shown in **Figure 5.8** and **Table 5.9**.

Mobility Hub Element *(refer to graphic below)*	Neighborhood	Commuter	Regional
1. Fixed-Route bus stops	●	⊙	●
2. Static travel information	●	⊙	●
3. Seating, shelter, lighting	●	⊙	●
4. Bike parking	●	●	●
5. Real-Time travel information		⊙	●
6. Electric vehicle charging	❍	●	●
7. E-Scooter rentals	❍	❍	●
8. Bike station	❍	❍	●
9. Microtransit pickup/dropoff		❍	●
10. Affiliated with Major Destination			●
11. Restroom / Changing station / Lockers		❍	●
12. Ticketing		❍	●
13. Retail / Vendors			●
14. Integrate High-Capacity Transit	❍	❍	●
15. Dedicated car share space(s) (Zipcar)		❍	●
16. Dedicated vanpool space(s)		❍	●

●*Typical* ⊙*Typical if on Transit Route* ❍*Location-Dependent*

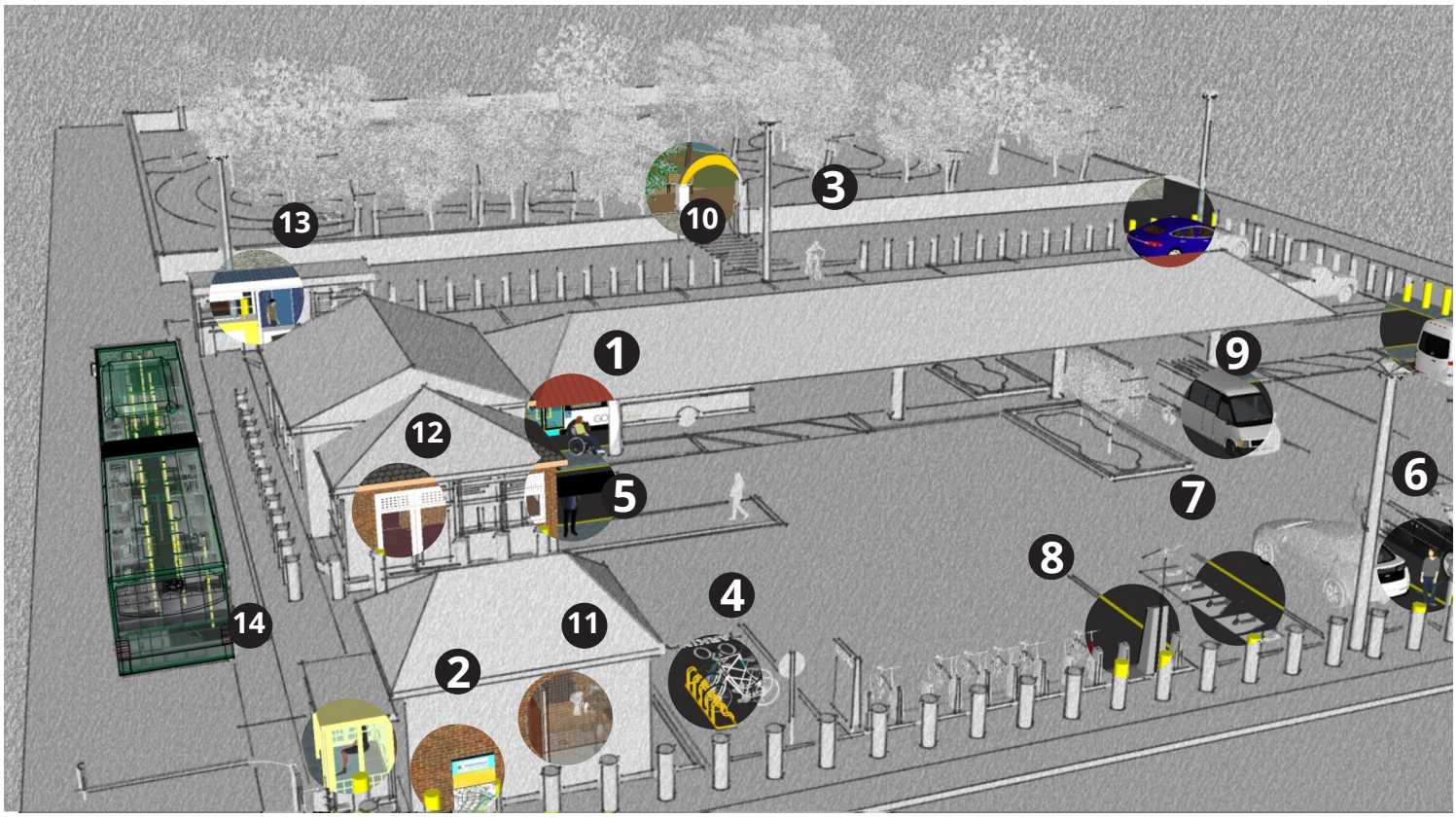


Figure 5.8: Scaling the Elements of a Mobility Hub. Source: JS Lane Company, LLC

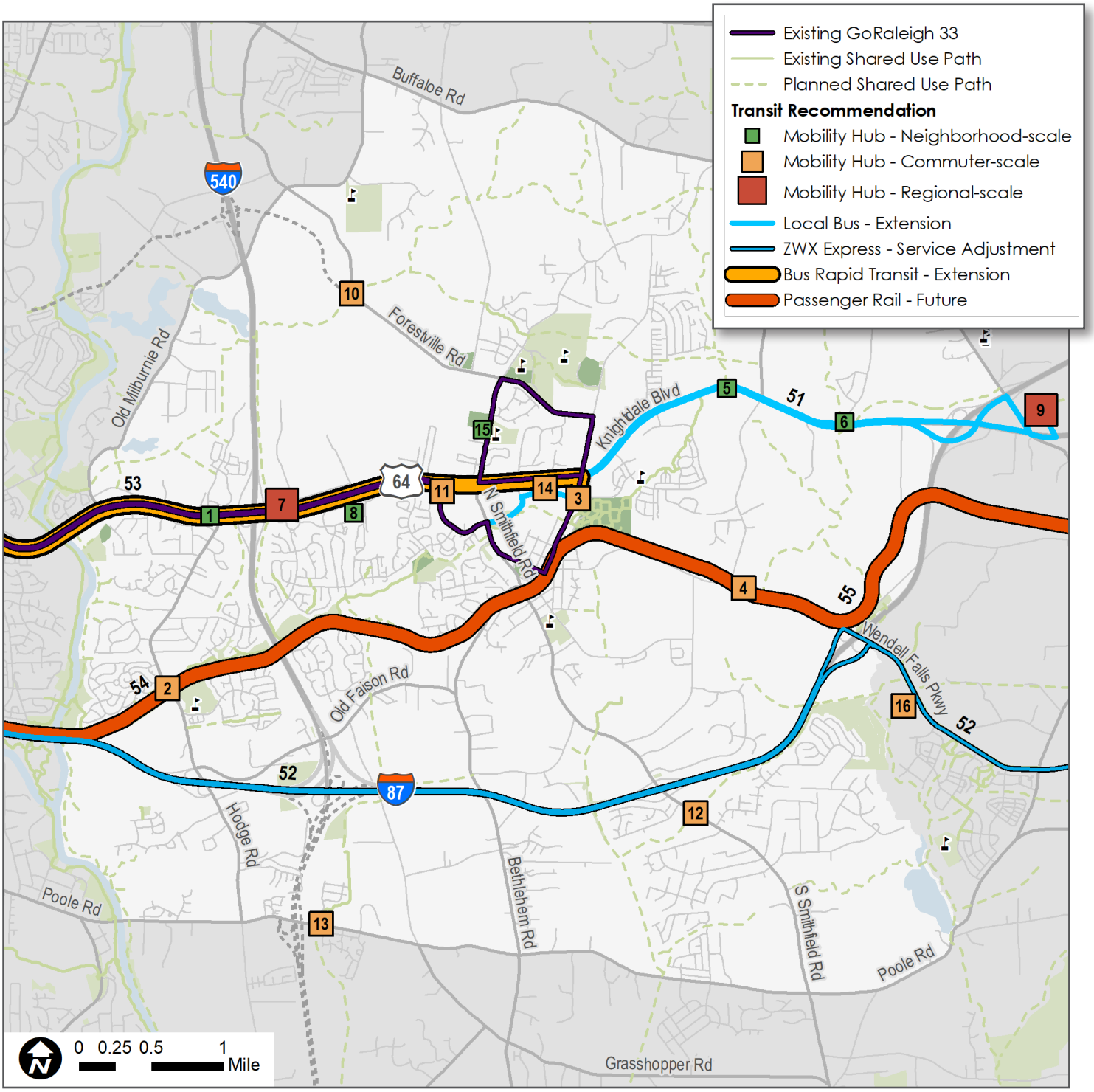


Figure 5.9: Transit Project Recommendations

ID	TRANSIT PROJECT NAME *From / To (Near / And)*	STATUS	TYPE	PRIORITY
1	**Mobility Hub near Knightdale Blvd @ Hodge Rd** Near Knightdale Boulevard and Hodge Road	New Facility	Mobility Hub - Neighborhood	Medium
2	**Mobility Hub near Hodge Rd @ Mingo Creek Greenway** Near Hodge Road and Mingo Creek Greenway	New Facility	Mobility Hub - Commuter	Medium
3	**Mobility Hub near Knightdale Station Park** Near First Avenue and Knightdale Station Run	New Facility	Mobility Hub - Commuter	Short
4	**Mobility Hub near Knightdale-Eagle Rock @ Railroad** Near Knightdale-Eagle Rock Road and Future Greenway	New Facility	Mobility Hub - Commuter	Long
5	**Mobility Hub near Future Marks Creek Greenway** Near Knightdale Boulevard and Marks Creek Road	New Facility	Mobility Hub - Neighborhood	Medium
6	**Mobility Hub near Keiths Road** Near Knightdale Boulevard and Keiths Road	New Facility	Mobility Hub - Neighborhood	Medium
7	**Mobility Hub near Shoppes at Midway** Near Knightdale Boulevard and Hinton Oaks Boulevard	New Facility	Mobility Hub - Regional	Medium
8	**Mobility Hub near Lowes Foods Shopping Center** Near Knightdale Boulevard and Village Park Drive	New Facility	Mobility Hub - Neighborhood	Long
9	**Mobility Hub near East Wake Tech Campus** Near Rolesville Road	New Facility	Mobility Hub - Regional	Long
10	**Mobility Hub near Forestville Rd** Near Forestville Road and Future Skycrest Drive Extension	New Facility	Mobility Hub - Commuter	Long
11	**Mobility Hub near Walmart P&R** Near Knightdale Boulevard and McKnight Drive	New Facility	Mobility Hub - Commuter	Short
12	**Mobility Hub near Smithfield Rd** Near Smithfield Road and Future Greenway	New Facility	Mobility Hub - Commuter	Medium
13	**Mobility Hub near Poole Rd** Near Poole Road and Stony Falls Way	New Facility	Mobility Hub - Commuter	Medium
14	**Mobility Hub near Future Suggs Tract Redevelopment** Near Future Roadway and Future Roadway	New Facility	Mobility Hub - Commuter	Medium
15	**Mobility Hub near Town Hall Complex** Near Steeple Square Court and Smithfield Road	New Facility	Mobility Hub - Neighborhood	Medium
16	**Mobility Hub near Publix / Wendell Falls** Near Wendell Falls Parkway and Taylor Road	New Facility	Mobility Hub - Commuter	Long
51	**GoRaleigh Route 33 Extension (Wake Tech East)** From McKnight Drive to Wake Tech East Campus	Existing Service	Local Bus	Mid
52	**Realignment of ZWK Express Route** From Wendell Downtown to I-87 Interchange	Existing Service	Express Bus	Mid
53	**Bus Rapid Transit Extension** From Knightdale Boulevard to First Avenue	New Service	Bus Rapid Transit	Long
54	**Passenger Rail - Phase 1** From Raleigh Union Station to Knightdale Old Town	New Service	Passenger Rail	Long
55	**Passenger Rail - Phase 2** From Knightdale Old Town to Wendell Downtown	New Service	Passenger Rail	Long

Table 5.10: Table of Transit Project Recommendations

CONCEPT DESIGN: OLD TOWN KNIGHTDALE TRANSIT-SUPPORTIVE DEVELOPMENT

Transit-Oriented or People-Oriented?

Previous Town plans and public feedback show interest in improving transit ridership and service within Knightdale. New infill developments that have transit-supportive densities (>10 persons per acre) will be needed to make this an attractive alternative to driving. While several such development projects are progressing in Town, more can always be done. The Town of Knightdale sponsored a two-day workshop (March 30-31, 2022) to strategize and 'test-fit' these transit-supportive development ideas within an 84-acre tract of land in the Old Town area. The conceptual development described in this section demonstrates how changing ***land use*** to add density can support Knightdale's broader **transportation** goals, including greater transit service and increasing usage of alternative modes to the motor vehicle. A development pattern that is created only to support public transportation generally won't attract enough attention to motivate the necessary policy changes that underpin transit-oriented development. These types of places, including "pop-up" shops, experiential retail, and reclaimed spaces from parking lots to alleyways, have seen an increase in popularity in urbanized areas for many other reasons, including support of new job opportunities, attracting youthful employees, creating effective mobility choices for seniors, sponsoring a diversity of housing types and price points, and enriching the economic and social tapestry of a community.

Urban Design Framework

The site, approximately 84 acres in area, lies in the Old Town Knightdale focus area, immediately north of the core downtown. The property is privately owned and has adequate size and layout to include a mix of uses and public amenities, making it an ideal opportunity to integrate density and walkability into the master plan. Route 33 travels around (not through) this property, and Knightdale Station Park is immediately adjacent (to the east).

Working with the property owner and the Town of Knightdale, and incorporating the community's preferences from the Visual Preference Survey (described in Chapter 2), a framework was established for site development with core goals centered on placemaking.

URBAN DESIGN FRAMEWORK
Establishing a new 'front door' on Knightdale Blvd
Developing a 'Town Center' environment that prioritizes the pedestrian experience
Focusing on transit-oriented development (TOD) and a strong connection with Knightdale Station Park and a future potential Bus Rapid Transit (BRT) station
Enhancing connectivity through traffic calming and multimodal integration
Prioritizing scale and context:
Single family development should be adjacent to existing single family
Scale can then increase to townhouses and then up to mixed-use and retail within the town center area

Developing the Concept

The two-day design workshop generated initial design concepts and then refined these concepts through public feedback. Several key issues were identified along the way, helping to improve upon iterations of the design to reflect on community.

Mobility

Connectivity and mobility were central concerns during the development of the new Town Center. To create ample opportunities for safe, convenient access into and out of the center, the design team created a Preferred Access Plan (PAP), depicting the important intersections and nodes of activity where access for all users needed to be maintained, enhanced, or constructed. Through identifying the walksheds centered around these points, further needed connections could be identified, and the facilities necessary to make these connections safe for all -- like traffic calming measures, midblock pedestrian crossings, and roundabouts -- could be planned.

Through this exercise, the team identified the need for more interconnected two- to three-lane streets with **traffic calming measures to slow speeds,** greater connections to Knightdale Boulevard, Smithfield Road, and N First Avenue, sidepaths, greenways, and sidewalks, and improved high-quality intersections at entry points to include pedestrian countdowns, pedestrian-level lighting, street trees, and high-visibility crosswalks.

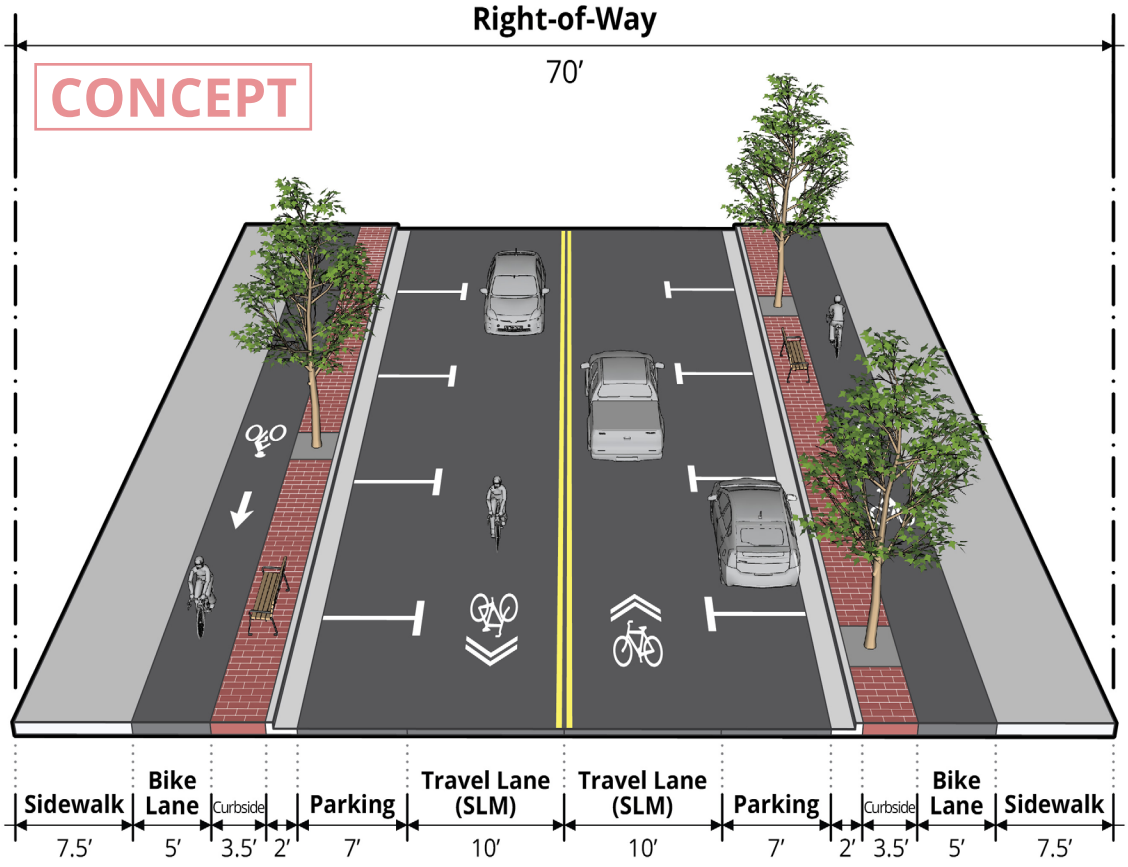
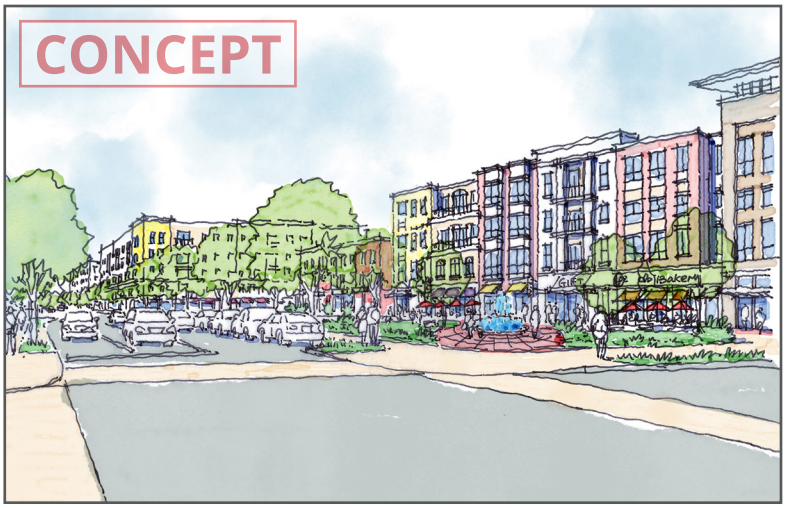


Figure 5.11: Proposed Urban Main Street Cross Section - Future Town Center Roadway.

Artist's rendering of the proposed Village Green.



New Roadway
- Knightdale Station Run to McKnight Drive

New roundabout
- Main Street & Smithfield Road

Town Square
- Part of the open space network (green)

Figure 5.12: Transit-Oriented Development Concept in Old Town Knightdale. *source: Stantec Consulting Services Inc., 2022*

The Concept

The final plan incorporates a mix of commercial, retail, multi-family, and single-family residential uses into a cohesive community and extension of Knightdale's downtown. The design:

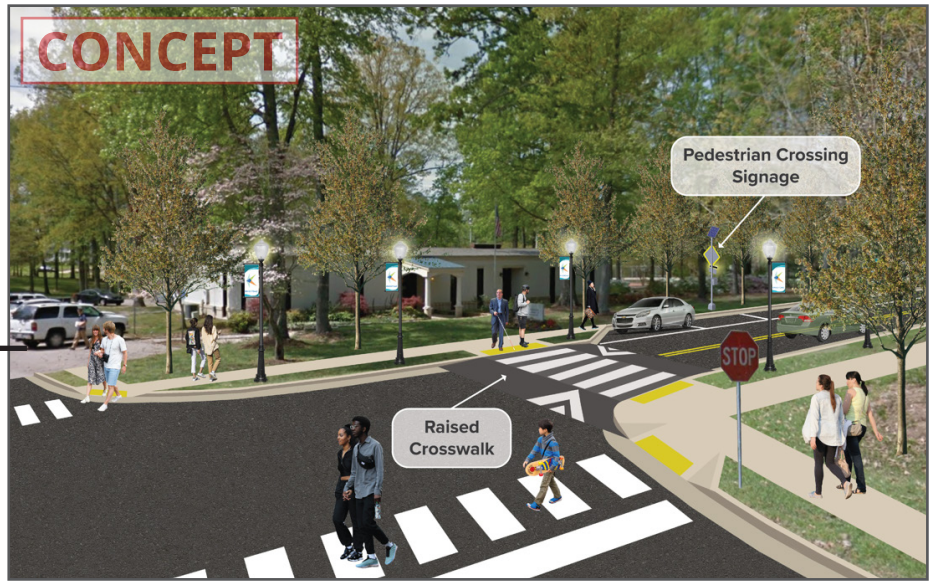
- Integrates **Mingo Creek** and the **Mingo Creek Greenway** as a community asset
- Creates a new **Town Square**
- Creates a new road network improving connections, including:
  - Extending **Knightdale Station Run** to **McKnight Drive** at a new roundabout
  - New road connection from **Carrington Drive** to **Knightdale Station Run**
  - New **roundabout** at Main Street and Smithfield Road
- Incorporates new development:
  - **Retail/Commercial:** 230,000 to 270,000 sqft.
  - **Multifamily Residential:** 380-420 units
  - **Townhomes:** 365 units
  - **Single-Family Residential:** 70 units

N First Avenue at Sycamore Drive. The Mingo Creek Greenway extends here.

This concept proposes development that could be 3x greater than Knightdale's current density.

815 to 855 units / 84 acres
Approx. 10 residential units /acre

Main Street at Third Avenue. Traffic calming measures shown.



Fiscal Impact

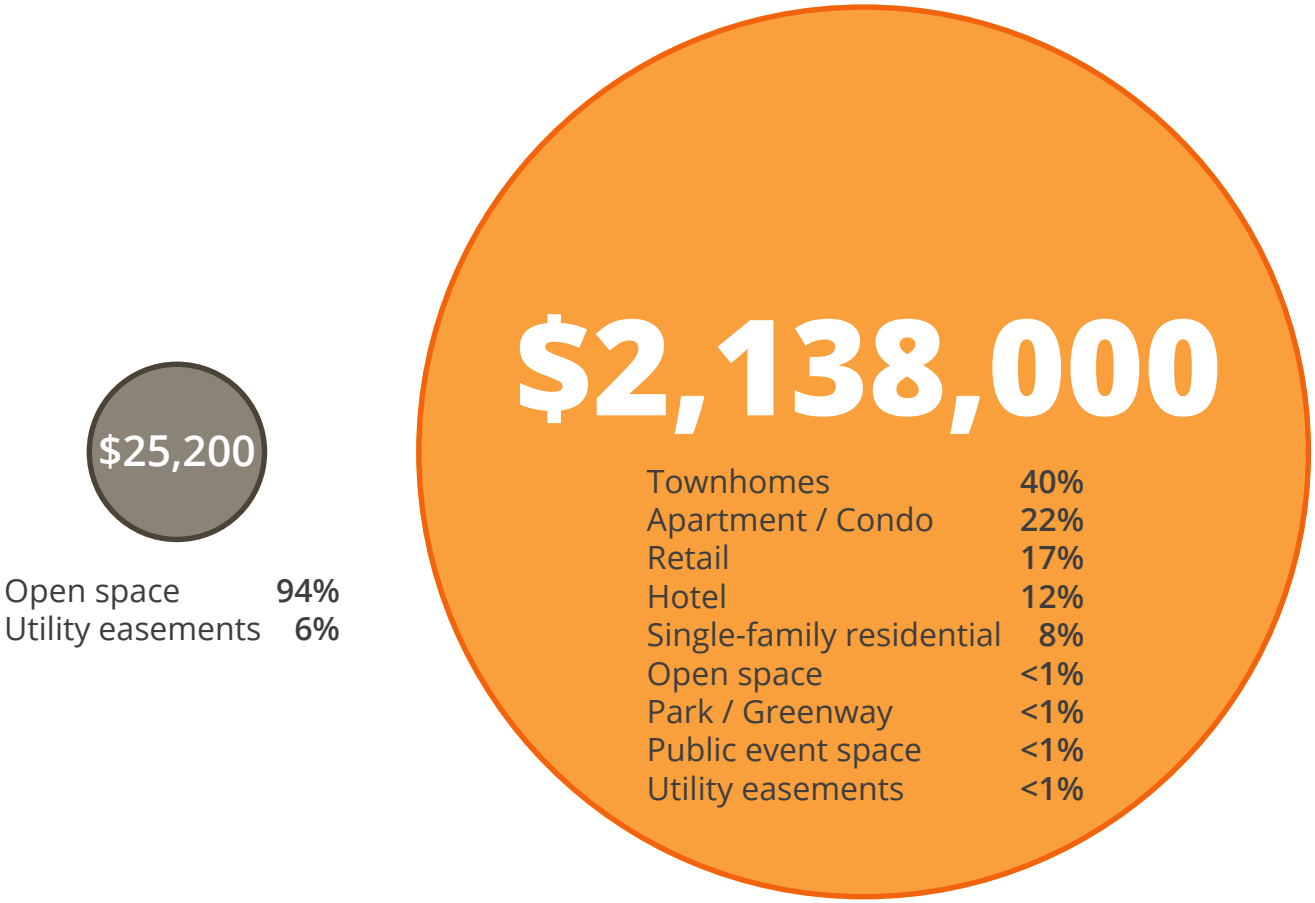
What degree of financial impact can such a development have?

To determine the financial benefits of the proposed development plan, the design team undertook a financial impact analysis, examining projected tax and fee revenues based upon current conditions (open space) as well as the conceptual development.

FISCAL IMPACT: The annual fiscal impact for the Town ($0.60 per $100 of property value) and Wake County ($0.42) amounts to a value of about **$2.1 million annually** from property taxes and fees (assessed to residential uses), less the costs of providing additional services and maintenance incurred by additional users of public infrastructure. Note that this analysis does not account for new residents to Wake County as of this development, which adds to the 7.25% sales tax revenue base (of which 2% goes to Wake County for schools, parks, and other services).

ESTIMATED ANNUAL FISCAL REVENUES
CURRENT V. DEVELOPMENT SCENARIO
(County and local taxes)

Figure 5.13: Estimated Annual Fiscal Revenues by land use/ development type, current v. development scenario.



CHAPTER 06

Implementation

Implementation

Knightdale's mobility network will never be fully completed, rather, it will be continually modified over time to meet the changing needs of its residents. To successfully implement this vision over time, the Town will **focus on its most pressing issues** and **put its resources to their most effective use.**

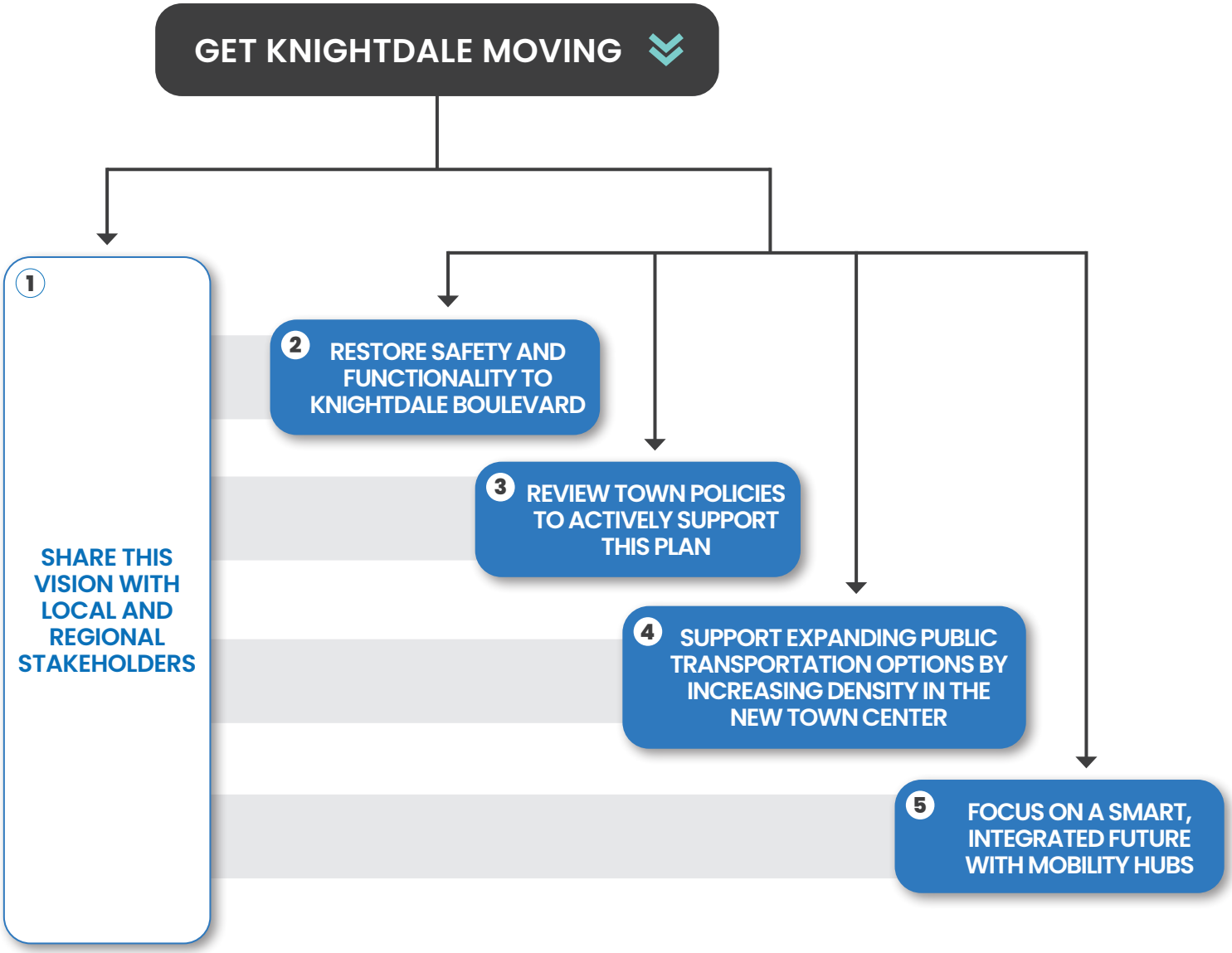
This chapter begins with an implementation strategy for realizing the recommendations contained in this Plan. Five "big moves" are envisioned for Knightdale, which entail both targeted improvement areas and inter-governmental collaboration. Key infrastructure and policy improvements are listed as actions steps for each move. Key regional partners are identified and their relationship to particular aspects of the Plan are detailed. Finally, this Chapter concludes with a brief discussion of sources of funding available to the Town.

This Chapter Covers:

- **Five Big Moves**
  1. Share this Vision with Local and Regional Stakeholders
  2. Restore Safety and Functionality to Knightdale Boulevard
  3. Review Town Policies to Actively Support this Plan
  4. Support Expanding Public Transportation Options by Increasing Density in the New Town Center
  5. Focus on a Smart, Integrated Future with Mobility Hubs
- **Regional Partners**
- **Funding**

FIVE BIG MOVES to Get Knightdale Moving

Faced with continued growth pressures and an ambitious vision for an expansive, integrated multimodal transportation network, the Town and its partners must be effective with their time and resources and coordinated in their efforts. While developing this plan, a few key areas of emphasis have been repeatedly mentioned. These places, issues, and themes form the basis of five "**big moves**" – five broad task areas that, when executed, will prove to return the greatest safety, mobility, and standard of life improvements:



1. SHARE THIS VISION WITH LOCAL AND REGIONAL STAKEHOLDERS

Knightdale's growth and mobility pressures are influenced by its neighbors. As Knightdale's jurisdiction grows closer to nearby Raleigh and Wendell, improving connectivity, expanding safe, convenient multimodal networks, and creating a safer transportation system means Knightdale must continue and expand its collaboration efforts with other partners. Additionally, many of Knightdale's major corridors – including Knightdale Boulevard – are owned by the North Carolina Department of Transportation (NCDOT). All of this means that this plan can't just sit on a shelf. Knightdale must be proactive in collaboration, using this CTP vision to update boundary street networks that overlap with its regional partners, and strive for consistency.

- **Share this Vision with CAMPO and the NCDOT:** coordinate with CAMPO to update its roadway network and internal projects databases, the regional Metropolitan Transportation Plan (MTP) projects, and potential projects within current or future State Transportation Improvement Program (STIP) list of projects. CAMPO can also advise on LAPP-eligible for smaller-scale projects. NCDOT refers to this as "project integration."
- **Share this Vision with Raleigh, Wendell, and Wake County:** this plan envisions changes to the design and function for roads who are shared with neighboring municipalities, as well as new sidepaths that connect to a regional network of trails.
- **Share this Vision with Local Stakeholders:** Town departments, including Parks and Recreation and Public Works, should review the plan to identify opportunities for implementing design changes or projects (such as new Sidepaths or greenways) within their own initiatives and programs.

2. RESTORE SAFETY AND FUNCTIONALITY TO KNIGHTDALE BOULEVARD

No road was discussed more frequently during the development of this Plan than Knightdale Boulevard, and consequently improving Knightdale Boulevard represents the biggest of moves for Knightdale. This is the gateway to your community. Addressing safety issues, implementing streetscaping improvements, improving bicycle and pedestrian connectivity and accessibility along and across the corridor, and preparing for transit service improvements in the future all entail coordination with regional partners, continued stakeholder outreach, and financial commitment to realize all of the changes envisioned in this plan. By tackling this corridor, the Town can remove one of the greatest barriers to mobility within its control. To do so, the Town should:

- **Focus on bicycle and pedestrian crossing improvements:** long crossing distances and large intersections without crosswalks restrict biking and walking to individual blocks, while missing sidewalks and sidepaths create hazardous conditions (walking along unstable ground, or within the roadway). Short-term improvements can make use of SPOT Safety funds to install high-visibility crosswalks and ADA curb ramps, while long-term improvements can add safe, separated multimodal sidepaths along the corridor.

- **Improve roadway connectivity surrounding Knightdale Boulevard:** making connections among side streets and parallel roads can act as a pressure-relief valve during peak periods and rebalance traffic, moving towards a more resilient system. Driveway consolidation, cross-access and “back-door” access between complimentary uses enhances the operation and safety of the corridor by removing unnecessary trips.

- **Address safety issues:** geometric improvements to intersections, controlling curb-cuts, use of medians, standardizing pedestrian crossings, and coordinated traffic signal infrastructure can all reduce opportunities for vehicle conflict among all users.

3. REVIEW TOWN POLICIES TO ACTIVELY SUPPORT THIS PLAN

Make System-level Networks a living document

This Plan reflects Knightdale's vision and commitment in 2022, but as projects are implemented and completed, the Town's transportation network will evolve. Keeping this Plan relevant and useful for Town staff will entail transforming it into a living document that is easily accessible (online), transparent, and continuously updated through IT automation. Doing so ensures that Knightdale residents, town departments, neighboring jurisdictions, and local stakeholders know where to access mobility network information.

- Publish the Bike Network, Pedestrian Network, and Street Network Plans as part of a publicly-viewable ArcGIS Online service (similar to the Interactive Development Map service)
- Share this Plan with Town departments, and review / update on a routine basis
- Directly link the Unified Development Ordinance (UDO) to this CTP, and specifically the Bike Network Plan, Pedestrian Network Plan, and the Street Network Plan so that these facilities may be incrementally constructed and connected by the development community

Adopt a Complete Streets Policy

A Complete Streets Policy reinforces the importance of all modes of transportation within the planning process, both for building new projects and for retrofitting existing roadways. The North Carolina Department of Transportation (NCDOT) has adopted a Complete Streets policy and companion design guide that ensures that rights-of-way are planned, designed, constructed, operated, and maintained to provide safe, comfortable access for all users. While ideally Complete Streets accommodate all modes and users of all abilities, sometimes right-of-way and design constraints exist. In these cases, Complete Streets policies can help assess trade-offs to determine the best implementation approach. In addition to Complete Streets, it is important to consider access management for roadway safety and capacity.

Example of a Complete Street - Existing and Proposed. Location: Summer Avenue, Memphis, TN.

Implement Vision Zero Resoluation

Vision Zero is a traffic safety approach that aims to eliminate roadway fatalities and serious injuries through a safe systems approach. Vision Zero focuses on designing the transportation system to account for human behavior in order to predict and eliminate crashes. The Knightdale Town Council is adopting a resolution supporting Vision Zero principles and projects in the implementation of the Comprehensive Transportation Plan. The Town should continue to integrate Vision Zero policies into planning documents and project development following the adoption of the CTP. The Vision Zero resolution is contained in the Appendix.

Create a Traffic Calming Program

Traffic speed and safety issues were perhaps the most stated concern from the public – both issues that a traffic calming program can address. Traffic calming measures refer to physical improvements to (mostly residential) roadways that naturally reduce vehicle speeds, rather than relying upon police enforcement. Often, these measures can be implemented on existing roadways without restriping or modification of the existing curb line, proving to be a cost-effective means of improving safety, and walkability. Things to consider when creating a Traffic Calming Program:

1. The objective is to be consistent and transparent
2. Choose context-sensitive countermeasures that are self-enforcing
3. Create an objective, data-driven program with clearly identified thresholds to qualify
4. Involve a public petition process to nominate roadways

Review Developer Commitments and Requirements for Private Development

While this plan addresses the future vision for public infrastructure in Knightdale, it's important to remember that the majority of Knightdale's future roads, bikeways, sidepaths and sidewalks will be built through private development and redevelopment. As partners, the development community must also be an active participant in shaping the future mobility infrastructure. Adopting this Plan is a start, but subsequent to completing this CTP, Knightdale should take the following steps to align future development with this vision:

- **Partner with Developers to Implement the Multimodal CTP Vision:** This applies to roadway infrastructure, signal enhancements or modifications, bike facilities (bike lanes or sidepaths) and beautification / stormwater BMPs. Traffic Impact Analyses (TIAs) and rezoning conditions should account for broader impacts of development on the surrounding mobility networks, not just to a project's immediate surroundings.
- **Developer Education Campaign:** Knightdale should share this vision with developers, educating the development community to better understand the quality of development desired by the Knightdale leadership. Not all developers are created equal, and as Knightdale has become one of the fastest growing places in the state, this represents taking responsibility for how it develops. For transportation, this means educating developers to adopt and embrace the tenets of Complete Streets and creating walkable, safe communities.

4. SUPPORT EXPANDING PUBLIC TRANSPORTATION OPTIONS BY INCREASING DENSITY IN THE NEW TOWN CENTER

Expanding public transportation so that it's a viable, affordable, convenient, and direct alternative to motor vehicles has been a central theme of this CTP. More frequent service evolves incrementally, by consistently increasing daily ridership and demonstrating this trend month-by-month, year-by-year. The best strategy involves increasing development density along transit routes, and particularly in the New Town Center of Knightdale, on the scale of 10+ units per acre. To achieve that type of density, Knightdale should pursue an "Old Town Knightdale Master Plan" to coordinate land uses and transportation decision-making. The site plan for the New Town Center developed in this Plan (See Chapter 5) is a great place from which to begin. A successful Downtown Master Plan will:

- **Identify a clear vision** for Old Town Knightdale;
- Create a set of **Guiding Principles that directly support** transit-oriented communities and development; and
- Set specific, measurable goals for implementing the Plan with identified site plan opportunities and **attainable timeframes for development**

5. FOCUS ON A SMART, INTEGRATED FUTURE WITH MOBILITY HUBS

Mobility hubs and smart mobility may seem like the stuff of the future, but the planning and implementation of hubs begins today. A thoughtfully planned network of mobility hubs can augment existing public transportation service by extending its range, enable transfers between multiple modes of transportation more convenient, and ultimately more effectively distributing trips and reducing vehicle miles traveled (VMT). Reducing reliance on a single mode and a few major thoroughfares will help Knightdale effectively manage growth in the near-term while accelerating towards a fully integrated, multimodal network in the future. As Knightdale begins to plan for and construct mobility hubs, it should consider the following:

- **Focus on an integrated system:** Mobility hubs by definition link multiple modes of transportation (transit, biking, scooters, walking, car-share, EV charging). Build hubs near existing public transportation stops and facilitate easier, more convenient transfers. Pursue a Town-wide Bikeshare program, and locate stations at Mobility Hubs.
- **Communicate with Transportation Network Companies and the private sector:** Microtransit service has the potential to greatly expand both the range of transit service (door-to-door) as well as the area served by mobility hubs. Working early and often with TNC partners can help identify new locations for hubs as development occurs.

Performance Measures

Knightdale's Performance Measures

This plan represents a vision for Knightdale's future transportation network. With more needs than there are funds available, **not all projects will be built at once,** and projects must be prioritized to balance funding with need and impact. Performance measures aid in this prioritization by approximating the beneficial return on investment (ROI), and allow for comparison between projects aligning with **Knightdale's mobility goals.** Performance measures relate to goals, but they must be ***quantifiable***, and easily capable of measuring over time (repeatable).

Knightdale should choose performance measures that are important locally, meaning they may align with those of the Federal Highway Administration (FHWA), or the Capital Area Metropolitan Planning Organization (CAMPO) as potential funding partners. Lastly, the Town should not be afraid to ***modify these measures over time.*** As Knightdale grows and evolves, some performance measures may outlast their usefulness, and others become more important.

IDENTIFIED PERFORMANCE MEASURES:
Safety
Multimodal
Accessibility / Connectivity
Equity
Environmental Impact
Cost-Effectiveness

Performance Measures from Others

Federal Highways Administration (FHWA)

The FHWA has defined a (limited) set of National Performance Measures which relate to its priorities for the Interstate and National Highway System. These are known as PMs 1 through 3: Safety, Infrastructure Condition, and Reliability.

FHWA PERFORMANCE MEASURES (PMs):

PM 1: Safety

Fatalities & Fatality Rate (per 100M VMT)

Serious Injuries & Serious Injury Rate (per 100M VMT)

Non-Motorized Fatalities & Serious Injuries

PM 2: Infrastructure Condition & Asset Management

Percent of Pavement in Good / Poor Condition

Percent of Bridges in Good / Poor Condition

PM 3: Reliability

Level of Travel Time Reliability (LOTTR)

Freight Reliability (LOTTTR)

For more information on FHWA performance measures: https://ops.fhwa.dot.gov/perf_measurement/fundamentals/index.htm

North Carolina Department of Transportation (NCDOT)

The North Carolina Department of Transportation (NCDOT) utilizes performance measures to determine the effectiveness of projects, and prioritize them for funding through the Strategic Transportation Investments (STI) formula. These factors include the following criteria scores, with different weights for Statewide, Regional, and Division needs:

NCDOT PERFORMANCE MEASURES:

- **Congestion**
- **Freight**
- **Safety**
- **Multimodal**
- **Benefit-Cost**
- **Economic Competitiveness**
- **Accessibility/Connectivity**

Capital Area Metropolitan Planning Organization (CAMPO)

The Capital Area Metropolitan Planning Organization (CAMPO) is Knightdale's most important partner in implementing this vision. CAMPO administers the Strategic Transportation Prioritization process (known as SPOT) to evaluate potential projects for the State Transportation Improvement Plan (STIP), and receives federal and state funds for projects that are locally administered (LAPP). For both of these funding programs, CAMPO uses evaluation criteria that determine a project's competitiveness for funding. These priority factors and scoring criteria are:

CAMPO Prioritization Methodology

Roadway Criteria	Bike / Ped Criteria
Delay Reduction	Safety
Cost-Benefit Payback Period	Access
Multimodal Network Impacts	Demand / Density
User Benefits	Connectivity
Safety	Cost-Effectiveness
Environmental Impacts	

LAPP Evaluation Methodology

CAMPO evaluates "effectiveness" for each of three project categories:

- **Highway** effectiveness
- **Bike/Ped** effectiveness
- **Transit** effectiveness

Additionally, points are awarded for local priority, consistency with local plans, and prior agency funding. See LAPP Scoring Criteria: https://www.campo-nc.us/funding/locally-administered-projects-program

Regional Partners

Town staff is not alone! There are numerous partner organizations to tap in to and help initiate change.

PARTNERS

CAMPO:

The Capital Area MPO coordinates transportation planning activities among its member counties and cities, provides technical assistance and conducts corridor / small area planning studies, and maintains and administers funding programs to support its members, including the Locally Administered Projects Program (LAPP) and the Metropolitan Transportation Plan (MTP). In sharing this CTP, Knightdale can work with CAMPO to identify competitive projects through various sources of funding and prepare for implementation.

Wake County:

Wake County is an important regional partner in coordinating improvements that extend beyond Knightdale's borders. Wake County can support coordinated regional development, on-demand public transportation service (NE Wake SmartRide), and open space/greenway projects both with planning and funding opportunities.

GoTriangle (and GoRaleigh):

As the regional transportation authority, GoTriangle coordinates and manages public transportation service among its member jurisdictions. Collaboration efforts include GoTriangle (ZWX Express) and GoRaleigh (Route 33), new public transportation services, integration with NE Wake SmartRide microtransit, and/or and similar projects or services.

NCDOT:

Most primary corridors in North Carolina are owned and maintained by the North Carolina Department of Transportation, making them an important partner. Several departments within the NCDOT are valuable partners for integrating and implementing this CTP, including:

Transportation Planning Branch (TPB) – Long Range Transportation Planning and comprehensive needs as well as Strategic Corridors.

Division 5 – Highways and maintenance. This includes safety improvements, signal upgrades/ coordination as well as corridor retrofits.

Integrated Mobility Division (IMD) – Bicycle, Pedestrian, and Public Transportation needs as well as Complete Streets projects.

Traffic Safety Unit (TSU) – Crashes and Safety Monitoring.

ITS & Signals Unit – Roadway operations, technology, and signal equipment.

Funding

There are various transportation funding opportunities available to local governments in North Carolina. Some funds are restricted to specific uses while other have the flexibility to be allocated for various needs. Motor fuel tax (MFT), Powell Bill funds and vehicle registration fees are among the most common types of funding local governments collect that are dedicated for transportation maintenance and improvements, including Complete Streets. But be advised, many communities are seeing a long-term decline in MFT funds as cars become more fuel efficient or drivers switch to electric vehicles. Other revenue, including local sales tax (requires legislative approval) and ad valorem (property) tax can also be used to address transportation needs.

BONDS

Transportation projects can be funded through issuance of municipal bonds. These bonds, which are either revenue-backed (for projects like toll roads) or general obligation (backed by a municipality's credit), can be used to finance all of a transportation project or provide the local share with matching state or federal funds. For projects with significant community interest or support, bonds can be a means of accelerating development and construction.

For example, bonds could be used for:

- Widewaters Parkway extension & grade separation
- Old Town Knightdale sidewalk network gaps

MUNICIPAL SERVICE DISTRICTS

In North Carolina, a Municipal Service District is a special property tax district. In other states and territories, these are commonly referred to as business improvement districts (BID). The Town may levy an ad valorem tax within a designated geographic area, like Old Town Knightdale or along Knightdale Boulevard. The proceeds of that tax would exclusively be used to finance additional services or projects provided in the district. Funds generated can be used to fund the capital costs of streets and sidewalks, which may include the acquisition of property, construction, expansion, and improvement of real property. A vote by the affected landowners is required by North Carolina General Statutes.

TAX INCREMENT FINANCING

Since 2004, North Carolina has permitted local governments to use Tax Increment Financing (TIF), sometimes called project development financing, to allow local governments to issue bonds to help develop, in conjunction with private entities. In practice, TIFs essentially freeze the town's revenue from a designated district and allow any increases in property taxes within the district to be set aside as strictly for use within that district. As part of this process, the local government can apply for bonds to improve infrastructure, demolish buildings, or pay for other costly, up-front development expenses to spur further private development. As security for the bonds, local governments pledge the additional ad valorem tax revenues expected from the redeveloped area's increased property values and commercial activity.

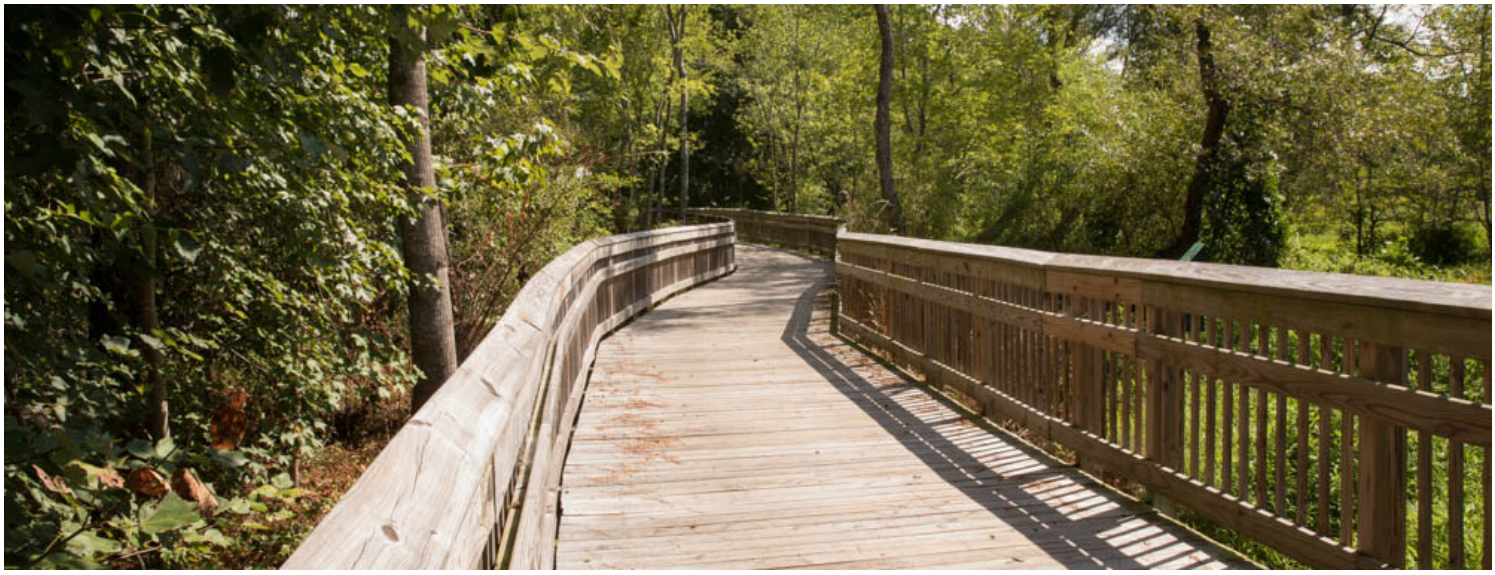
Both Municipal Service Districts and TIF Districts expire after a certain period of time. Depending on how quickly they are able to meet their objectives, these programs can be retired early or extended. At this time, Knightdale does not have any active Municipal Service Districts or TIF Districts. Establishing an Old Town Knightdale TIF or Service District is one example of this funding option.

COMMUNITY FUNDING AREA PROGRAM (CFAP)

Managed through the Capital Area MPO (CAMPO), the Community Funding Areas Program provides an opportunity for towns and the RTP in Wake County, that would otherwise have limited fixed-route transit services, to create or accelerate public transportation services and programs.
Projects must support or supplement rather than supplant existing transit services or funding. The CFAP can be used to support new transit services, such as pilot projects and flexible, innovative transit services such as partnerships with Transportation Network Companies. Funds can be used to expand existing transit services, but they cannot be used to fund services already in operation. Examples of eligible new services may include:

- Microtransit / MaaS services (Carpool, Vanpool)
- Bikeshare and/or eScooter services
- Planning or programming studies for these services

LOCALLY ADMINISTERED PROJECTS PROGRAM (LAPP)



Mingo Creek Greenway extension (LAPP-funded project).

The Locally Administered Projects Program (LAPP) is used by CAMPO to prioritize and program local transportation projects within the region that utilize federal funding and are the responsibility of the MPO, like the Surface Transportation Block Grant Program – Direct Allocation (STBGP-DA) and the Congestion Mitigation for Air Quality (CMAQ). LAPP is competitive funding program that accepts either roadway, bicycle and pedestrian, or transit projects; while Complete Streets elements are required for all projects considered. LAPP projects are funded using the federal funding sources directly attributed to the region with a minimum 20% local match. As a CAMPO member, Knightdale is eligible to apply for these funds for project categories such as:

- Roundabout projects
- Complete Streets & Multimodal Improvements
- Access Management projects

SPOT SAFETY AND HAZARD ELIMINATION FUND

The Spot Safety and Hazard Mitigation funds smaller project types (i.e., intersection safety, corridor access management, etc.) that do not necessarily require significant funding or acquisition of right-of-way. NCDOT uses a cost-benefit analysis to justify specific projects. Examples may include:

- Intersection Redesign Projects
- Pedestrian Crossing improvements

TRANSPORTATION ALTERNATIVES (SAFE ROUTES TO SCHOOLS)

The Transportation Alternatives (TA) Set-Aside from the Surface Transportation Block Grant (STBG) Program provides funding for a variety of generally smaller-scale transportation projects such as pedestrian and bicycle facilities; community improvements such as historic preservation and vegetation management; environmental mitigation related to stormwater and habitat connectivity; recreational trails; safe routes to school projects; and vulnerable road user safety assessments. Safe Routes to School (SRTS) is a program within TA that enables and encourages children to walk and bicycle to school; makes walking and bicycling to school a safe and more appealing transportation option, and facilitates the planning, development and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of school.

Several examples of projects that may qualify include:

- Sidewalk Projects
- Bike Lane Projects
- Sidepath Projects
- Pedestrian Crossing Improvements

STRATEGIC TRANSPORTATION INVESTMENT LAW (STI)

STI allows NCDOT to use funding to enhance transportation infrastructure as well as supporting a higher quality of life for a municipality. STI established the Strategic Mobility Formula that allocates revenues through a factor-based scoring technique. The projects that are scored with the STI are within the current State Transportation Improvement Program (STIP). The STIP identifies funding information and scheduling for transportation projects statewide. The following project types may be eligible for STI funds:

- Knightdale Boulevard Improvements
- Hodge Road Improvements
- New Location / Widening Projects

SHARE THIS VISION:

Knightdale should coordinate with NCDOT and CAMPO to align appropriate projects onto the Metropolitan Transportation Plan (MTP), for consideration for funding within the State Transportation Improvement Program (STIP).

REBUILDING AMERICAN INFRASTRUCTURE WITH SUSTAINABILITY AND EQUITY (RAISE)

The Rebuilding American Infrastructure with Sustainability and Equity, or RAISE Discretionary Grant program, provides a unique opportunity for the USDOT to invest in road, rail, transit and port projects that promise to achieve national objectives. Previously known as the Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) discretionary Grants, Congress has dedicated nearly $9.9 billion for thirteen rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact. A limited number of projects in

U.S. Department of Transportation

RAISE GRANTS

Rebuilding American Infrastructure with Sustainability and Equity

Knightdale may qualify for RAISE grant funding:

- Smithfield Road Complete Streets/ Streetscaping Project
- Norfolk Southern Rail-Trail Project

SAFE STREETS FOR ALL (SS4A)

A new grant program through the FHWA, SS4A provides grants directly to cities, towns, counties, transit agencies, MPOs and other regional agencies for Vision Zero policy and infrastructure initiatives to address safety issues for all users. Importantly, State Departments of Transportation are not eligible to apply, placing the impetus on local municipalities to develop projects and policies, and apply for funding. Funds may be put towards developing a **Comprehensive Safety Action Plan**, or planning, design, and implementation of projects and strategies identified in that Action Plan.

FEDERAL RAIL ADMINISTRATION (FRA) GRANTS

The Federal Rail Administration makes grant funds available for rail projects through two competitive discretionary grant programs: the **Railroad Crossing Elimination Grant Program** and the **Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program.** Projects must focus on improving the safety and mobility of people and goods. State DOTs, MPOs, and Municipalities are eligible to receive funding through both programs. Further details are available at: https://railroads.dot.gov/grants-loans/competitive-discretionary-grant-programs/competitive-discretionary-grant-programs

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Appendix

A. ADVISORY COMMITTEE MEETINGS & COORDINATION

B. ENGAGEMENT SUMMARY

C. PROJECT RECOMMENDATION TABLES & CROSS-SECTIONS

D. TRANSIT MOBILITY PLAN

E. COMPLETE STREETS MATERIALS

F. VISION ZERO RESOLUTION

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- AVAILABLE DIGITALLY -

Appendix A

ADVISORY COMMITTEE MEETINGS & COORDINATION

- AVAILABLE DIGITALLY -

COMPREHENSIVE TRANSPORTATION PLAN ADVISORY COMMITTEE

MINUTES

950 Steeple Square Court, Knightdale, North Carolina 27545

December 17, 2021

The Knightdale Comprehensive Transportation Plan (CTP) Advisory Committee met at 11:30 a.m. on a virtual Zoom meeting that was also streamed live for the public on YouTube.

PRESENT:	*Andrew Spiliotis, Project Manager* *Jason Brown, Development Services Director* *Donna Goodman, Long Range Planner* *Heather Mosesso, Planner* *Kevin Lewis, Senior Planner* *Dustin Tripp, Assistant Town Manager* *Ben McDonald, Town Council* *Stephen Morgan, Town Council* *Jessica Day, Mayor* *Greg Hedgepeth, Community Policing Advisory Board* *Chris Parker, Land Use Review Board* *Brandon Watson, CAMPO* *Craig Poole, Citizen* *Meg Buckingham, Citizen* *Marcus Short, Citizen* *Mike Rutkowski, Stantec* *Timothy Tresohlavy, Stantec*
ABSENT:	*Mark Swan, Town Council* *Blanca Boreguin, Citizen* *Bill Summers, Town Manager* *Erica Ortman, Stantec*
Staff Members Present:	*Andrew Spiliotis, Project Manager* *Jason Brown, Development Services Director* *Donna Goodman, Long Range Planner* *Heather Mosesso, Planner* *Kevin Lewis, Senior Planner* *Dustin Tripp, Assistant Town Manager*
Council Members Present:	*Jessica Day, Mayor* *Stephen Morgan, Town Council* *Ben McDonald, Town Council*

Meeting called to order by Andrew Spiliotis at 11:35 AM.

ITEM I. APPROVAL OF MINUTES
N/A

ITEM II. The CTP kickoff meeting agenda included the following items and discussions:

A. Introductions & Context

Andrew Spiliotis reviewed the Advisory Committee meeting agenda and meeting purpose. He also provided context on how the Town of Knightdale arrived at undergoing a CTP. The need for a CTP was identified in the Strategic Plan (2019) and continues to be an essential need given continued population growth. Spiliotis noted the CTP is also an opportunity for integrating recent local and regional planning efforts, as well as refining the transportation component of the KnightdaleNext Comprehensive Plan.

Spiliotis shared the project website (www.ShiftKnightdale.com) which includes an active online survey and an interactive map. Advisory Committee members were asked to promote the website and survey.

Spiliotis summarized what the CTP will encompass. The CTP will evaluate current & future needs, provide a holistic look at multimodal transportation, and guide future improvement projects by near-, mid-, and long-term needs. The partners in the process include CAMPO, NCDOT, GoRaleigh, GoRaleigh, Wake County, neighboring municipalities and others.

B. Schedule

Mike Rutkowski introduced the three phases of the project schedule, highlighting significant milestones along the way. He noted some of the public engagement and existing condition tasks are already underway.

Rutkowski shared the role the Advisory Committee will play during the CTP process. The Advisory Committee will assist with validating the planning process, identifying the current status of planning efforts, and serving as a conduit for stakeholders and the public by promoting the website and its resources.

C. Visioning

Mike Rutkowski initiated the discussion by asking members to tell us their long-range vision for mobility and which topics are critically important to them. All Advisory Committee members participated in the discussion. Common discussion themes included:

- Maximize the use of existing transportation infrastructure. For example, sync traffic signals in key corridors
- Enhance connectivity across Knightdale Boulevard and the railroad
- Promote projects to fill in sidewalk gaps
- Slow traffic on local roadways
- Expand the greenway network
- Continue to enhance connectivity as part of new development projects
- Consider new transit options such as micro-transit, local circulators and commuter rail
- Monitor commuter traffic in emerging corridors such as between Clayton and Knightdale
- Integrate Vision Zero into the CTP analysis
- Evaluated Access Management principles for managing traffic on Knightdale Boulevard

- Focus on moving people rather than cars
  - Identify small needed tweaks to the existing UDO's transportation network maps
  - Emphasize safety along roadways through lighting and other Crime Prevention Through Environmental Design (CPTED) principles
  - Identify strategies for maintaining access for emergency services, particularly if/when there is a crash
  - Develop a comprehensive pedestrian or bicycle network that utilizes greenways and lower volume streets
  - Ensure rural roads are improved as new developments come online
  - Integrate existing transportation plans and projects into the CTP

D. Existing Conditions

Timothy Tresohlavy walked through some of the existing data resources, maps, and tables, highlighting some key takeaways. He noted the visioning discussion will help guide how we review and summarize existing conditions information.

E. Next Steps

The meeting concluded with Andrew Spiliotis summarizing the next steps and asking about future Advisory Committee meeting dates. Members shared that Mondays and lunchtime are challenging. Meeting after 4:00 pm on days where the Town does not have existing meetings is the preference. Spiliotis noted he would follow up in early January with a poll asking about ideal meeting times.

ITEM III. NEW BUSINESS

None at this time.

ITEM IV. ADJOURNMENT

Andrew Spiliotis adjourned the meeting at 1:00 pm.

Meeting Summary

Town of Knightdale
Comprehensive Transportation Plan

MEETING #2
Advisory Committee

Tuesday February 22, 2022 @ 5 pm (*Virtual Zoom Meeting*)

Attendees

Andrew Spiliotis, Project Manager
Jason Brown, Dev Services Director
Dustin Tripp, Assistant Town Manager
Mark Swan, Town Council
Ben McDonald, Town Council
Stephen Morgan, Town Council
Jessica Day, Mayor
Greg Hedgepeth, Police Advisory Board
Chris Parker, Land Use Review Board
Meg Buckingham, Citizen
Mike Rutkowski, Stantec
Timothy Tresohlavy, Stantec

Summary

INTRODUCTIONS & CONTEXT – (Town)
Andrew welcomed everyone to our second Advisory Committee meeting, and reviewed some context on how this CTP project came about.

SCHEDULE – (Stantec)
Stantec reviewed the general project schedule, highlighting the three phases: (1) Outreach & Data Gathering; (2) Analysis & Forecasts; (3) Refinement & Documentation.

Outreach Summary to date – (Stantec)
Stantec reviewed the different forms of outreach (website, survey, interactive map, pop-up event, focus group discussions, email blasts, greenway signage, etc.) noting more than 425 unique visitors to the website, and more than 175 interactions with residents during the December tree lighting ceremony pop-up event.

AC Member discussion:

- How do we push the online survey to high school students, and help our Youth respondent %?

Mobility Observations – (Stantec)
Stantec reviewed Safety, Barriers, Network, and Transit that serve as key observations from initial review of data.

AC Member discussion:

- Micromobility study (Northeast Wake County) as 1-year Pilot
- Community Funding Areas – coordinated through CAMPO
- Review mobility gaps nearest Mingo Creek Greenway, be sure short segment connections are identified as gaps/needs
- Old Faison Road should also be identified as a mobility gap moving forward – site of future Town Activity Center

Issue Identification – (Stantec)
Stantec facilitated an interactive discussion using MURAL whiteboard to identify comment issues that AC members experience

Knightdale Advisory Committee Meeting #2 ISSUES IDENTIFICATION • Stantec (mural.co)

AC Member discussion:

- Physical issues to address – including roadway names
  - I-87 exit at Smithfield Road – signal backup
  - Forestville Road: should this be 2-3 lane in future, and not a 4-lane boulevard?
  - Improving connectivity between Old Town and Knightdale Blvd corridor
  - Access Management needed along Knightdale Blvd, perhaps limiting signals?

- More connections with Mingo Creek Greenway
- **Need to map out all stub out streets in Town**
- Roundabouts rather than traffic signals
- Village Park neighborhood needs ADA compliance for all crossings
- Complete Streets retrofit for:
  - Old Faison Rd
  - Forestville Road
  - Hodge Road
- Need a north-south connector over Railroad tracks
- Knightdale Blvd @ First Ave is dangerous to cross on foot (lacking crosswalks)
-

- Policy topics that would benefit future developments
  - Including culverts for greenway trail crossing under future I-540
  - Sidepaths (biking and walking) versus Sidewalks (pedestrian only), where width is appropriate
  - Vision Zero policy, and how it overlap with the design and development requirements
  - Education campaign to support multimodal priorities
  - ADA compliance
  - Require development to include cross-access between properties (commercial)
  - Continue to require street stub out, even if neighbors push back, this is long-range improvement strategy for the Town
  - Reinforce the creation of a low-stress network of roads/paths

NEXT STEPS – (Town)
Public Symposium will be held virtually on **Tuesday March 1st at both 12:30 pm and 5:30 pm**. AC members are invited, and encouraged to help promote the event. We want all members of the public to join us.

Following the Symposium, the project will formalize key themes into Guiding Principles that shape the remainder of the project.

At the end of March we'll hold a TOD / Catalyst Site workshop (Wed 3/30 – Thur 3/31) that focuses on land use development as a 'test fit' for TOD strategies. AC members are invited to attend and bring interested parties to the table for discussion. These events should be tailored to adjacent property owners, we want to hear your opinions.

Our 3rd AC meeting is tentatively scheduled for May 2022, and the date is still tbd.

AC Member discussion:
- Public Symposium – general public
- TOD Catalyst Site – interested property owners
- Will be important to include visual examples to *complement* these concepts

ATTACHMENTS

- Meeting slides (PDF)

Project Webpage: www.ShiftKnightdale.com

Project Contacts

Town of Knightdale

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Project Consultants

Stantec Project Team

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Timothy Tresohlavy, Sr. Trans. Plan. 919.532.2333 — Timothy.Tresohlavy@Stantec.com

Agenda

Town of Knightdale
Comprehensive Transportation Plan

MEETING
Work Session

Monday March 21, 2022 @ 10am - 12pm (*Town Hall*)

Meeting Agenda

1. **Welcome** – (Town Staff) – 7 min
   a. Why are we here?
   b. Project Context

2. **Observations on Mobility** – (Stantec/Staff) – 10 min
   a. What we heard
   b. Reference Maps/Data (this will be a combination of PPT and plot maps)

3. **Roadways & Connectivity** – (Stantec/Staff) – 40 min
   a. Maps: V/C deficiencies, Comp Plan connectivity map, NEAS/MTP Roadway Recs, etc.
   b. Collector Street Connectivity & Barriers work maps
   c. Exercise: mark up map (widening, connectivity, access man, Complete Streets, intersections, etc.)

4. **Bike/Ped/Trails** – (Stantec/Staff) – 35 min
   a. Maps: Online Survey Map, Planned Trail connectivity map, NEAS Bike/Ped Recs, etc.
   b. Exercise: mark up map (key destinations, on-road and off-road)

5. **Transit** – (Scott/Stantec/Staff) – 25 min
   a. Maps: Route 33 (w/ stop locations), Eastrans map, microtransit, etc.
   b. Exercise: mark up map (Key destinations/TOD, routing, new service, BRT Extension, P&R, circulator?, etc.)

6. **Next Steps** – (Town Staff) – 3 min

Adjourn

Project Contacts

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Meeting Summary

Town of Knightdale
Comprehensive Transportation Plan

MEETING #3
Advisory Committee

Tuesday June14, 2022 @ 5:30 pm (*Virtual Zoom Meeting*)

Attendees

Andrew Spiliotis, Project Manager
Jason Brown, Dev Services Director
Dustin Tripp, Assistant Town Manager
Donna Goodman
Mark Swan, Town Council
Ben McDonald, Town Council
Stephen Morgan, Town Council
Jessica Day, Mayor
Greg Hedgepeth, Police Advisory Board
Chris Parker, Land Use Review Board
Brandon Watson, CAMPO
Kevin Lewis, Citizen
Timothy Tresohlavy, Stantec
Scott Lane, JS Lane Co

Summary

INTRODUCTIONS & CONTEXT – (Town)
Andrew welcomed everyone to our third AC meeting.
Andrew reviewed some context on how this CTP project came about, and the role of this Advisory Committee to validate the planning process and promote its website resources. The generalized schedule was presented showing progress since our last meeting.

Approval of AC#1 and AC#2 Meeting Minutes – (Town)
A motion was made to approve previous meeting minutes.

OUTREACH TO DATE – (Stantec)
Stantec provided an update on the website visitors, survey respondents and interactive map points of interest contributed. Two most recent events were highlighted:

- Public Workshop (March 30-31)
  - Focused on land use development as a 'test fit' for TOD strategies on an 84-acre parcel
  - Refinement of our framework and site plan, based on feedback received.
- Latin America Festival (May 7)
  - Pop-up event to discuss transportation needs with residents @ Knightdale Station Park.

DRAFT RECOMMENDATIONS by mode – (Stantec)
Stantec reviewed the system-level improvements identified to the roadway network, walking & biking network, and public transportation (transit). Roadway needs have evolved since the 2018 Comp Plan, and Stantec stepped through the additions and refinements to date.

Street types from the Knightdale UDO were presented, with cross-section examples for each. Stantec walked through the revised roadway needs have been formatted to be consistent with the UDO street types.

Stantec stepped through future roadway lanes showing only 6+ lane roads; then 4+ lane roads; and finally, 2+ lane roads for comparison. Discussion with the AC members followed.

AC Member discussion:
Roadway – Draft Recommendations

- There appear to be many roads with larger ROW needed – Town of Knightdale would like to de-emphasize vehicular modes
  - Defer to traffic engineers on the suitability for construction/design
- Concerned about **Hodge Road** – north of I-87 interstate exit ramps

- Can local preference for less than 4 lanes over-ride the NCDOT planning for capacity improvements?
- These are *DRAFT* recommendations at this stage in the process – plenty of time for revisions
- Goals is for more walkable and bikeable to cross roadways
- Reduce speed limits to 35 mph or lower

- **Smithfield Road** – does it need to be 6-lanes in the future? (south of I-87 exit)
  - Smithfield Road will always serve as a north-south connector
- Old Faison Road serves as a significant entrance to Old Town
- Hopeful for Shared Use Paths to be more prevalent than on-road bike lanes
- Can Knightdale 'fatten up' the activity along the Boulevard (further north and south) and add more developable areas?
- Are there intersection improvements to help improve capacity (roundabout; ITS signals) without widening?

Stantec discussed the three priority project (hot spot) concept designs that have been identified for additional study. The purpose is to generate an early concept that addresses the needs for improvement as part of a future LAPP grant project.

Mural link for further review:
https://app.mural.co/t/stantec8401/m/stantec8401/1654887237912/dca9d78f847ae77d5908d6ed54fd68408b339c37?sender=ee60007d-c5a3-4c49-a2c5-87a404bdc3d6

Stantec presented existing sidewalks + greenways before comparing with proposed connections to be included in this CTP, specifically 24 miles of sidewalks, and 68 miles of greenways/shared use paths. Bicyclist comfort was discussed, in relation to the FHWA bike user profiles, suggesting that Knightdale plan for the all-ages-&-abilities group (AAA). Stantec then walked through the on-road bikeways, highlighted by the separated bike lanes along major roads with higher traffic speeds and volumes. The greenways network was then added to show the overall network of low-stress bike routes.

AC Member discussion:

Walking & Biking – Draft Recommendations

- Several significant Shared Use Path connections proposed in vicinity of Hodge Rd / I-540 / Knightdale Blvd
  - Diane Street sidepath is a great idea – connecting near Hodge Road toward the Neuse River Greenway
- Possible for a Hodge Rd **grade separated crossing** of the Railroad tracks? Why not?
- Potential for east-west connector just north of Poole Road (under I-540 SE) – ask NCDOT for a tunnel

JS Lane presented a phased recommendation strategy for improving transit services. Short-term needs include Saturday service, extending the existing route to Wake Tech and expanding the NE Wake County Microtransit service area to cover Knightdale. Mid-term and Long-term recommendations were also presented for > 5 years.

Transit – Draft Recommendations

- Mobility Hubs can be small-medium-large scale in size
  - Great ideas to located near planned greenways
  - Use the Mobility Hubs locations for reference during development plan review
  - Suggest additional mobility hub near Poole Rd @ Hodge Rd
- Many sidewalk and intersection crossing improvements identified near transit stops
- What are the approximate timelines for the planned short-, mid-, and long-term transit enhancements?
  - Ideally 2-3 years; 3-6 years; and 6-10 years – though this is dependent on Wake County Transit Plan
- Are transit recommendations available in GIS? Yes!

Prioritization – (Stantec)
Stantec shared the results of funding allocation from the earlier survey, suggesting that respondents would split transportation funds relatively evenly between roadway (46%) and multimodal (54%).

Stantec reviewed the criteria utilized by CAMPO to prioritize project needs for funding (SPOT process).

AC Member discussion:

- Align prioritization with CAMPO's formulas for Roadway
  - Public feedback generally aligns well with their formula, highlighting accessibility, safety, and multimodal
- Align prioritization with CAMPO's formula for Biking & Walking, highlighting safety, access, and connectivity
- Align prioritization for Transit with Wake County Transit Plan for funding eligibility

NEXT STEPS – (Town)
Draft recommendations to be further refined through June.

Tentatively scheduled for a Public Open House in early August – date is tbd. This will initiate the 30-day public comment period for the Draft recommendations of this CTP.

Our 4th AC meeting is tentatively scheduled for July / August 2022 – date is still tbd.

ATTACHMENTS

- Meeting slides (PDF)

Project Webpage: www.ShiftKnightdale.com

Project Contacts

Town of Knightdale

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Project Consultants

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Stantec Project Team

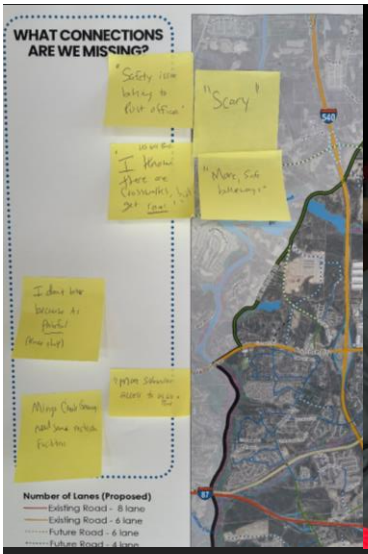
Stantec

- AVAILABLE DIGITALLY -

Appendix B

ENGAGEMENT SUMMARY

- AVAILABLE DIGITALLY -



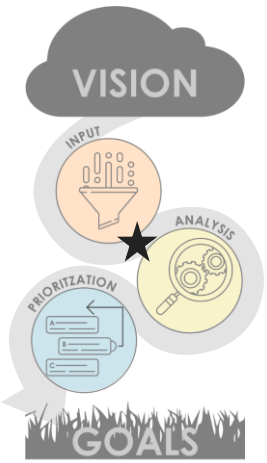
Knightdale Comprehensive Transportation Plan

Summary of Engagement – Nov 2021 – Sept 2022

Stantec

Guiding Principles

- **Improving connections** over/thru existing barriers
- Identify **transit-supportive** redevelopment opportunities
- Reduce vehicular **traffic speeds**, while maintaining traffic flow
- Fund **multimodal** improvement projects, in particular lighting & intersection crossings
- Multi-jurisdictional **coordinated development** with Raleigh & Wendell areas
- **Mixed-Use and restaurant** development types preferred

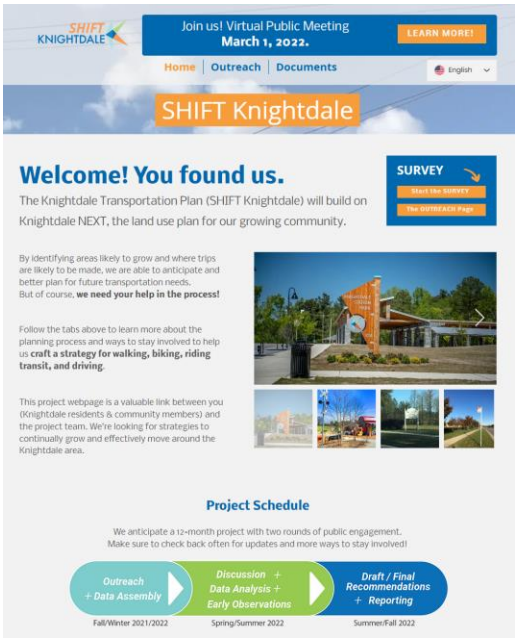


Outreach to Date

Project Webpage (1,600 unique visitors)
- Online Survey – CTP (313 respondents)
- Online Survey – VPS (490 points added)
- Interactive Map (282 points added)

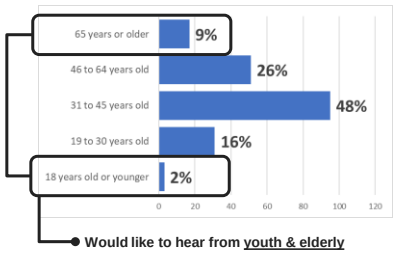
Advisory Committee Meetings (x2)
- Issue Identification

Community Outreach / Promotion
- Pop-up Event 12/3 (175+ interactions)
- Focus Group discussions (x6) (40+ attendees)
- Symposium (20+ attendees)
- Public Design Workshop 3/31 (23+ attendees)
- Open House Event 9/20 (25+ attendees)



Online Survey

313 **Responses** to date!



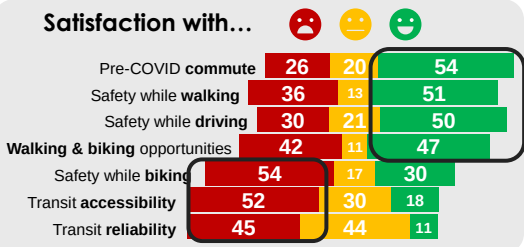
Would like to hear from youth & elderly

53% Of respondents long-term residents (6+ years)

Critical transportation problems

1. **Congestion/traffic**
2. **Lack of sidewalks**
3. **Lack of bike lanes/trails**
4. **Safety/Vehicle Crashes**

Satisfaction with…



How shall we improve mobility…

1. More **biking & walking facilities**
2. Better **traffic operations**
3. **Complete Streets**

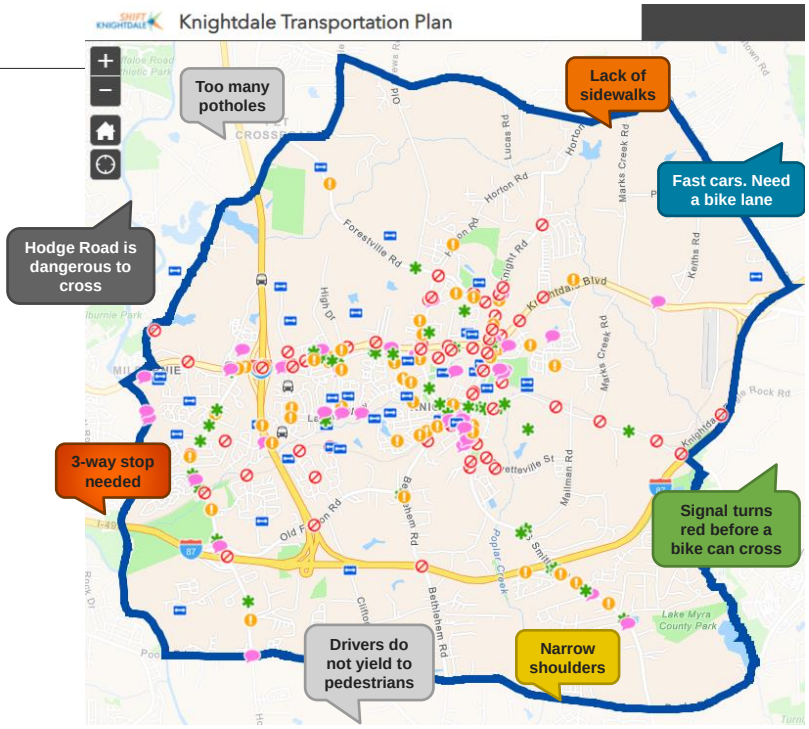
as of 28Mar2022

Interactive Map

Points of Concern	
65	Barrier to Walking or Biking
56	Roadway Issue
7	Transit Improvement
73	Safety Hazard
39	New Connection
42	Other - Describe

282 points added

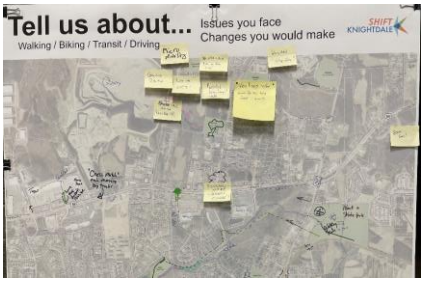
as of 23Mar2022



Pop-up Event

Christmas Tree Lighting
Friday Dec 3rd

Interacted with 175+ people
Distributed 125+ survey cards
Received 50+ map comments



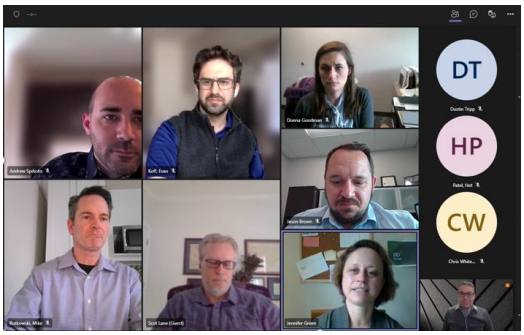
Knightdale Station Park

Focus Group Discussions

Facilitated six (6) discussions, with 40+ subject-matter experts in Jan / Feb

- Parks & Recreation
- Public Safety / Fire / Police
- NCDOT Division + IMD
- Neighboring Municipalities
  - Raleigh, Wendell, Wake County, CAMPO
- Transit – Short Range
- Transit – Long Range

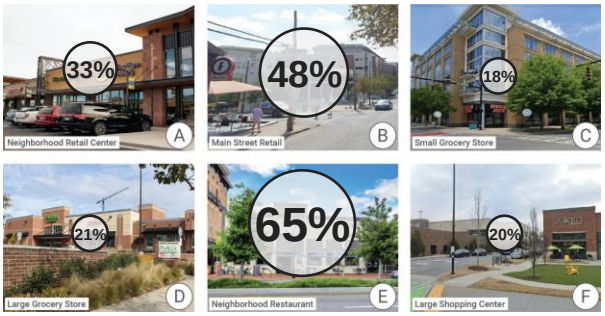
Virtual Discussions



Mixed-Use Development

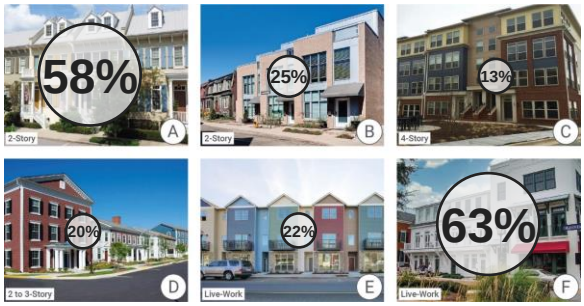
Choose two (2)

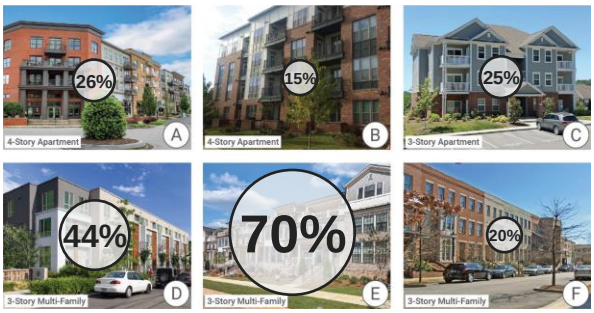
Retail / Grocery / Restaurant



Townhome

Choose two (2)

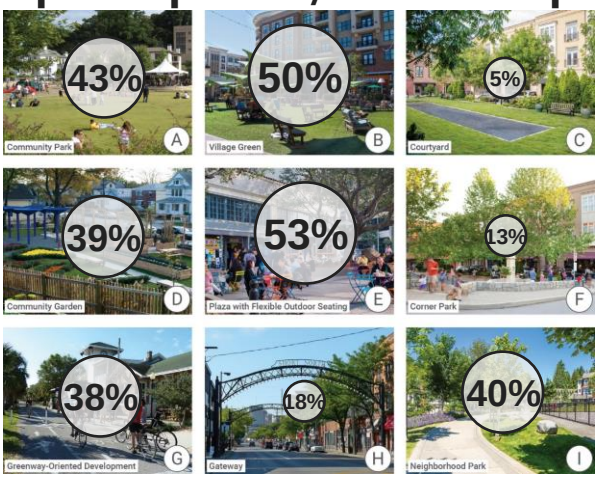


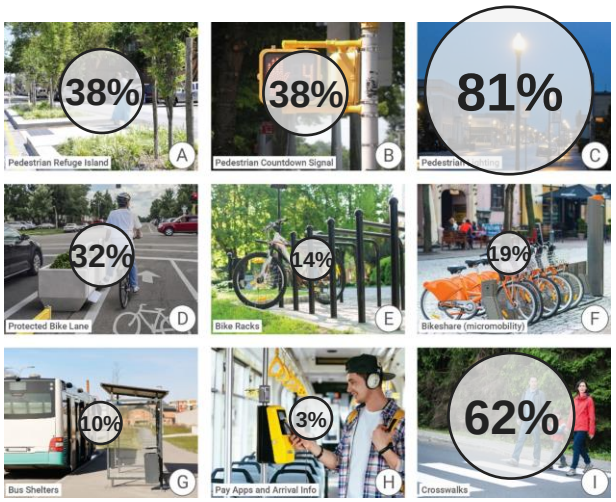


Multi-Family Residential

Open Space / Landscape

Choose three (3)





Mobility

- AVAILABLE DIGITALLY -

Appendix C

PROJECT RECOMMENDATION TABLES & CROSS-SECTIONS

- AVAILABLE DIGITALLY -

ROADWAY

ProjID	Corridor Name	From Road	To Road	Miles	Proposed Lanes	Propsed Street Type	Posted Speed	Project Type	Related Note	Additional Note
1	Knightdale Boulevard	Hinton Oaks Boulevard	-	-	6	Boulevard	45	Pedestrian Crossing		High visibility crosswalks +
2	Knightdale Boulevard	Widewaters Parkway	-	-	6	Boulevard	45	Pedestrian Crossing		High visibility crosswalks +
3	Smithfield Road	McKnight Drive	-	-	3	Urban Avenue	35	Pedestrian Crossing		High visibility crosswalks +
4	Knightdale Boulevard	McKnight Drive West	-	-	6	Boulevard	45	Pedestrian Crossing		High visibility crosswalks +
5	Knightdale Boulevard	Smithfield Road	-	-	6	Boulevard	45	Pedestrian Crossing		Pedestrian signals
6	Knightdale Boulevard	McKnight Drive / Maplewood Drive	-	-	6	Boulevard	45	Pedestrian Crossing		High visibility crosswalks +
7	Knightdale Boulevard	First Avenue / Old Knight Road	-	-	6	Boulevard	45	Pedestrian Crossing		Pedestrian signals
8	Knightdale Boulevard	Hodge Road	-	-	6	Boulevard	45	Pedestrian Crossing		Pedestrian signals
9	Knightdale Boulevard	Old Milburnie Road	-	-	6	Boulevard	45	Pedestrian Crossing		High visibility crosswalks +
10	Hodge Road	Mingo Creek Greenway	-	-	3	Avenue	45	Pedestrian Crossing		
11	Old Milburnie Road	Legacy Oaks Drive	-	-	4	Boulevard	45	Intersection Redesign		Developer dependent
12	Skycrest Drive Extension	Forestville Road	-	-	3	Avenue	55	Intersection Redesign		Developer dependent
13	Forestville Road	New Roadway Connection	-	-	3	Avenue	55	Intersection Redesign		Developer dependent
14	Knightdale Boulevard	Old Crews Road Extension	-	-	6	Boulevard	45	Intersection Redesign		Developer dependent; new 4-way intersection
15	Buffaloe Road	Horton Road	-	-	4	Boulevard	45	Intersection Redesign		Realignment of intersection
16	Knightdale Boulevard	Marks Creek Road	-	-	6	Boulevard	55	Intersection Redesign	Unsignalized, no N/S movement	
17	Knightdale-Eagle Rock Road	Marks Creek Road	-	-	3	Avenue	45 / 55	Intersection Redesign		Railroad crossing
18	I-87 Interchange	Smithfield Road	-	-	4	Boulevard	45	Intersection Redesign	MTP project	Diverging Diamond Interchange
19	Smithfield Road	King Farm Road	-	-	4	Boulevard	45	Intersection Redesign		Future roadway connection
20	Hodge Road	Railroad corridor	-	-	3	Avenue	45	Grade Separated		NCDOT roadway
21	Widewaters Parkway Extension	Railroad corridor	-	-	2	Avenue	35	Grade Separated		Developer & Town dependent
22	Heartland Flyer Drive Ext	Railroad corridor	-	-	2	Main Street	-	Grade Separated		
23	East Knightdale Loop Road	Railroad corridor	-	-	3	Avenue	-	Grade Separated		
24	Forestville Road	Old Crews Road	-	-	3	Avenue / Urban Avenue	35 / 55	Roundabout		
25	Old Crews Road	Tommies Drive Extension	-	-	3	Avenue	45	Roundabout		Developer dependent
26	Old Crews Road	Future Roadway	-	-	3	Avenue	45	Roundabout		Developer dependent
27	Future Roadway	Future Roadway	Brio Development	-	2	Avenue	-	Roundabout		Developer dependent
28	Lucas Road	Future Roadway	-	-	2	Avenue	45	Roundabout		Developer dependent
29	Horton Road	Lucas Road	-	-	3	Avenue	55	Roundabout		
30	Horton Road	Tommies Drive	-	-	3	Avenue	55	Roundabout		Developer dependent
31	Old Knight Road	Haywood Glen Drive	-	-	2	Avenue	45	Roundabout		Developer dependent
32	Old Knight Road	Tommies Road Extension	-	-	2	Avenue	45	Roundabout		Developer dependent
33	Old Knight Road	Forestville Road	-	-	3	Urban Avenue	35 / 45	Roundabout		
34	Keiths Road	Puryear Road	-	-	3	Avenue	55	Roundabout		Developer dependent
35	Puryear Road	Marks Creek Road	-	-	3	Avenue	55	Roundabout		Developer dependent
36	Keiths Road	Future Roadway	-	-	2	Avenue	55	Roundabout		Developer dependent
37	Marks Creek Road	Future Roadway	-	-	3	Avenue	55	Roundabout		Developer dependent
38	Marks Creek Road	Future Roadway	-	-	3	Avenue	45	Roundabout		Developer dependent
39	Mailman Road	Future Roadway	-	-	3	Avenue	55	Roundabout		Developer dependent

ProjID	Corridor Name	From Road	To Road	Miles	Proposed Lanes	Propsed Street Type	Posted Speed	Project Type	Related Note	Additional Note
40	Mailman Road	Sawdust Lane	-	-	3	Avenue	55	Roundabout		Developer dependent
41	Smithfield Road	Mailman Road	-	-	3 / 4	Avenue	45	Roundabout		
42	Smithfield Road	Rainier Lake Drive	-	-	3	Avenue	45	Roundabout		
43	Smithfield Road	Broadway Street	-	-	3	Avenue / Main Street	35	Roundabout		
44	Smithfield Road	Main Street	-	-	2	Main Street	35	Roundabout		
45	First Avenue	Knightdale Station Run	-	-	2	Urban Main Street	25	Roundabout		Developer dependent
46	McKnight Drive	Future Roadway	-	-	2	Urban Avenue	25	Roundabout		Developer dependent
47	Bethlehem Road	Old Faison Road	-	-	2/3	Avenue	45	Roundabout		
48	Bethlehem Road	Crosscut Place	-	-	2	Avenue	45	Roundabout		
49	Old Faison Road	Widewaters Parkway Extension	-	-	3	Avenue	45	Roundabout		Developer dependent
491	Hodge Road	Lynnwood Road	-	-	3	Avenue	45	Roundabout		Citizen request
50	Bethlehem Road	Greythorne Extension	-	-	2	Avenue	45	Roundabout		
51	Smithfield Road	McKnight Dr / Maplewood Dr	Main Street	0.36	3	Urban Avenue	35	Access Management		Complete Streets Treatments
52	Forestville Road	Old Milburnie Road	Old Crews Road	1.92	3	Avenue	55	Widening	MTP project	Posted Speed reduction
53	Forestville Road	Old Crews Road	Old Knight Road	0.93	3	Urban Avenue	45	Widening	MTP project	Posted Speed reduction
54	Poole Road	Neuse River Bridge	Marks Creek / Lake Myra Rd	6.10	4	Boulevard	45	Widening	MTP project	Future NC 540 Interchange; Coordinate with Raleigh
55	Skycrest Drive Extension	I-540 Interchange	Knightdale ETJ	1.32	4 / 3	Avenue	-	New Location	MTP project	Future NC 540 Interchange
56	Bethlehem Road	Old Faison Road	Smithfield Road	0.92	2	Main Street	45	Modify Existing	MTP project	Posted Speed reduction
57	Buffaloe Road	Old Milburnie Road	Horton Rd	3.72	4	Boulevard	45	Widening	MTP project	
58	Hodge Road	Poole Road	Mingo Bluff Blvd	1.54	4	Boulevard	45	Widening	MTP project	
59	Hodge Road	Mingo Bluff Blvd	Knightdale Blvd	1.57	3	Avenue	45	Widening	MTP project	Posted Speed reduction
60	Hodge Road / Legacy Oaks Drive	Hodge Road	Old Milburnie Road	1.00	2	Avenue	-	New Location	MTP project	
61	Old Milburnie Road	Pinnacle Peak Dr	Buffaloe Road	2.72	3 / 4	Avenue / Boulevard	45	Widening	MTP project	Coordinate with Raleigh
62	Robertson St / Knightdale-Eagle Rock Rd	First Avenue	I-87 Interchange	2.21	2 / 3	Avenue	35 / 45	Modify Existing	MTP project	Posted Speed reduction
63	Smithfield Road	Knightdale Boulevard	Forestville Road	0.74	3	Avenue	45	Modify Existing	MTP project	
64	S Smithfield Road	I-87 Interchange	Mailman Road	0.34	4	Boulevard	45	Widening	MTP project	
641	S Smithfield Road	Mailman Road	Main Street	1.61	2 / 3	Avenue / Main Street	35 / 45	Modify Existing	MTP project	Posted Speed reduction
65	Old Faison Road	Hodge Road	Bethlehem Road	2.06	3	Avenue	45	Widening	MTP project	Posted Speed reduction
66	Rainier Lake Drive Extension	Bethlehem Road	S Smithfield Road	0.79	3	Avenue	35	New Location	MTP project	
67	Bethlehem Road	Grasshopper Road	Old Faison Road	2.72	2	Avenue	45	Modify Existing	MTP project	Posted Speed reduction
68	Forestville Road Extension	Old Knight Road	Knightdale Blvd	0.29	2	Avenue	-	New Location	MTP project	New signalized intersection
681	Carolina Avenue Extension	Dead End	Marks Creek Road	0.25	3	Avenue	-	New Location	MTP project	Developer dependent
69	East Knightdale Loop Road	Mailman Road	Carolinian Avenue	2.26	3	Avenue	-	New Location	MTP project	New grade separation at RR
70	Marks Creek Road	Knightdale-Eagle Rock Road	Horton Rd	3.14	3	Avenue	55	Widening	MTP project	Posted Speed reduction
71	Mailman Road	S Smithfield Road	Knightdale-Eagle Rock Rd	1.42	3	Avenue	55	Widening	MTP project	Posted Speed reduction
711	Sawdust Lane Extension	Mailman Road	Knightdale-Eagle Rock Rd	0.74	2	Avenue	-	New Location	MTP project	Developer dependent
72	Old Knight Road	Knightdale Boulevard	Horton Rd	1.81	2 / 3	Avenue	35 / 45	Modify Existing	MTP project	Posted Speed reduction
73	Horton Road	Old Knight Road	Marks Creek Road	1.22	3 / 4	Avenue / Boulevard	55	Widening	MTP project	Posted Speed reduction
74	Horton Road	Knollcrest Lane	Old Knight Road	1.14	3	Avenue	55	Widening	MTP project	Posted Speed reduction
75	Rolesville Road	Wendell Boulevard	Marks Creek Road	2.83	4	Boulevard	45	Widening	MTP project	Coordinate with Wendell

ProjID	Corridor Name	From Road	To Road	Miles	Proposed Lanes	Propsed Street Type	Posted Speed	Project Type	Related Note	Additional Note
76	Puryear Road	Marks Creek Road	Rolesville Road	1.08	2	Avenue	55	Modify Existing	MTP project	Posted Speed reduction
77	Smithfield Road Interchange	I-87 Interchange	-	0.93	4	Boulevard	45	Modify Existing	MTP project	Diverging Diamond Interchange
78	North Knightdale Corridor	Forestville Road	Horton Road	1.57	3	Avenue	-	New Location	MTP project	
79	Haywood Glen Drive Extension	Dead End	Puryear Road	0.68	2	Avenue	-	New Location	MTP project	
80	East Wake Drive	Forestville Road	Old Milburnie Road	0.45	2	Main Street	-	New Location	MTP project	School access road
81	S Smithfield Road	Poole Road	I-87 Interchange	1.80	4	Boulevard	45	Widening	MTP project	
82	Knightdale Boulevard	Neuse River Bridge	First Ave / Old Knight Rd	3.74	6	Boulevard	45	Access Management	MTP project	Multimodal project
83	Knightdale Boulevard	First Avenue / Old Knight Road	I-87 Interchange	2.61	6	Boulevard	45 / 55	Widening	MTP project	BRT preparation project
84	Lucas Road	Horton Road	Buffaloe Road	0.88	2	Avenue	45	Modify Existing	MTP project	
85	Keiths Road	Knightdale Boulevard	Puryear Road	1.12	2	Avenue	55	Modify Existing	MTP project	
86	Widewaters Parkway Extension	Old Faison Road	Laurens Way	0.75	2	Main Street	25	New Location	MTP project	Developer dependent; Grade separated bridge
87	Red Mountain Lane Extension	Forestville Road	Old Crews Road	0.57	3	Main Street	-	New Location	MTP project	Wake Stone Athletic Park
88	Old Crews Road Extension	Knightdale Boulevard	Forestville Road	0.91	2	Urban Main St, Avenue	-	New Location	MTP project	
89	EBC Village Way Extension	Dead End	East Knightdale Loop Road	0.48	2	Main Street	-	New Location	MTP project	Developer dependent
90	Mingo Bluff Boulevard Extension	Dead End	Old Faison Road	0.27	2	Main Street	-	New Location	MTP project	
101	Northern Connector	Old Milburnie Road	Old Knight Road Extension	2.18	2	Avenue	-	New Location	New CTP project	Developer dependent
102	Brilliant Drive Extension	Dead End	Northern Connector	0.15	2	Main Street	-	New Location	New CTP project	
103	Old Crews Road	Forestville Road	Buffaloe Road	1.92	3	Avenue	45	Widening	New CTP project	Developer dependent
104	Connector Road	North Knightdale Corridor	Buffaloe Road	1.22	2	Avenue	-	New Location	New CTP project	Developer dependent
105	Old Knight Road Extension	Horton Road	Buffaloe Road	0.59	2	Main Street	-	New Location	New CTP project	Developer dependent
106	Sweet Pine Lane Extension	Dead End	Horton Road	0.98	2	Main Street	-	New Location	New CTP project	Developer dependent
107	Buffaloe Road Extension	Horton Road	Rolesville Road	1.10	2	Avenue	-	New Location	New CTP project	
108	Keiths Road Extension North	Puryear Road	Buffaloe Road Extension	0.75	2	Main Street	-	New Location	New CTP project	Developer dependent
109	Haywood Glen Drive Extension	Bunn Farm Lane	Old Knight Road	0.40	2	Avenue	-	New Location	New CTP project	Developer dependent
110	Mamas Way	Haywood Glen Drive Extension	Horton Road	0.22	2	Avenue	-	Widening	New CTP project	Developer dependent
111	Jasmine View Way	Dead End	Cherry Maple Street	0.27	2	Main Street	-	New Location	New CTP project	Developer dependent
112	Cherry Maple Street	Haywood Glen Drive Extension	Horton Road	0.36	2	Main Street	-	New Location	New CTP project	
113	Star Ruby Drive	Haywood Glen Drive Extension	Old Knight Road	0.35	2	Main Street	-	New Location	New CTP project	Developer dependent
114	Gold Run Court	Start Ruby Drive	Haywood Glen Drive	0.14	2	Main Street	-	New Location	New CTP project	Developer dependent
115	Connector Road	North Knightdale Corridor	Old Crews Road	0.52	2	Main Street	-	New Location	New CTP project	
116	Tommies Drive Extension	Horton Road	Marks Creek Road	1.44	2	Avenue	-	New Location	New CTP project	
117	Pythagoras Lane Extension	Marks Creek Road	Rolesville Road	1.31	2	Avenue	-	New Location	New CTP project	
118	Knott Drive	Dead End	Puryear Road	0.81	2	Main Street	-	New Location	New CTP project	Developer dependent
119	Knott Drive Extension	Keiths Road	Rolesville Road	1.05	2	Avenue	-	New Location	New CTP project	Developer dependent
120	Futue Main Street	Lawson Ridge Road	Old Knight Road	0.59	2	Main Street	-	New Location	New CTP project	Developer dependent
121	Bryan Chalk Lane	Old Knight Road	Rose of Sharon Drive	0.33	2	Main Street	-	New Location	New CTP project	Developer dependent
122	Connector Road	Forestville Road	Mondo Lane	0.75	2	Main Street	-	New Location	New CTP project	Developer dependent
123	Mondo Lane	Old Knight Road	Aqua Marine Lane	0.25	2	Main Street	-	New Location	New CTP project	Developer dependent
124	Tea Olive Drive	Knightdale Blvd	Mondo Lane	0.50	2	Main Street	-	New Location	New CTP project	Developer dependent
125	Alan Park Roadway	Old Milburnie Road	Skycrest Drive Extension	1.53	2	Main Street	-	New Location	New CTP project	Developer dependent

ProjID	Corridor Name	From Road	To Road	Miles	Proposed Lanes	Propsed Street Type	Posted Speed	Project Type	Related Note	Additional Note
126	Arapahoe Ridge Drive	Knightdale Boulevard	Pinnacle Peak Drive	0.95	2	Main Street	-	New Location	New CTP project	Developer dependent
127	Hodge Road	Dead End	New Road	0.30	2	Avenue	-	New Location	New CTP project	Developer dependent
128	Shoppes at Midway Drive	Hinton Oaks Boulevard	Old Montague Lane	0.55	2	Urban Main Street	-	New Location	New CTP project	
129	Milburnie Road	Dead End	Knightdale Blvd	0.17	2	Main Street	-	New Location	New CTP project	NCDOT project
130	Whitfield Street Extension	Cliffview Dr	Westover Drive	0.08	2	Main Street	-	New Location	New CTP project	
131	Needwill Court Extension	Dead End	Riverburch Drive	0.37	2	Main Street	-	New Location	New CTP project	
132	Parkside Commons Drive Extension	Southampton Drive	Laurens Way	0.29	2	Main Street	-	New Location	New CTP project	
133	Southampton Drive Extension	St Johns Street	Dead End	0.66	2	Main Street	-	New Location	New CTP project	Developer dependent
134	Village Park Drive	McKnight Drive West	First Avenue	0.96	2	Urban Main Street	-	New Location	New CTP project	Developer dependent
135	Fifth Avenue Extension	Main Street	McKnight Drive	0.31	2	Urban Main Street	-	New Location	New CTP project	Developer dependent
136	Carrington Drive Extension	Smithfield Road	Village Park Drive	0.63	2	Urban Main Street	-	New Location	New CTP project	Developer dependent
137	First Avenue	Smithfield Road	Knightdale Blvd	0.92	2	Urban Main Street	-	Modify Existing	New CTP project	
138	Connector Road	Fayetteville Street	Keith Street	0.91	2	Main Street	-	New Location	New CTP project	Developer dependent
139	Broadway Street Extension	Bethlehem Road	Smithfield Road	0.63	2	Main Street	-	New Location	New CTP project	Developer dependent
140	Broadway Street Extension	Fayetteville Street	Robertson Street	0.88	2	Main Street	-	New Location	New CTP project	Developer dependent
141	Heartland Flyer Drive Ext	Robertson Street	Dead End	0.25	2	Main Street	-	New Location	New CTP project	Developer dependent; Grade separated bridge
142	Rainier Lake Drive Extension	Fayetteville Street	Hester Street	0.45	2	Avenue	-	New Location	New CTP project	Developer dependent
143	Fayetteville Street	First Avenue	Mailman Road	1.36	2	Urban Main Street, Avenu	-	Modify Existing	New CTP project	
144	Fayetteville Street Extension	Mailman Road	Sawdust Lane Extension	0.24	2	Main Street	-	New Location	New CTP project	Developer dependent
145	Project Hope Streets	Mailman Road	Knightdale-Eagle Rock Rd	0.83	2	Main Street	-	New Location	New CTP project	Developer dependent
146	Connector Road	Marks Creek Road	East Knightdale Loop Road	0.47	2	Main Street	-	New Location	New CTP project	Developer dependent
147	Keiths Road Extension South	East Knightdale Loop Road	Knightdale Blvd	1.61	2	Avenue	-	New Location	New CTP project	Developer dependent
148	Glen Manor Trail Extension	Dead End	Smithfield Road	0.26	2	Main Street	-	New Location	New CTP project	Developer dependent
149	Connector Road	Glen Manor Trail Extension	Mailman Road	0.44	2	Main Street	-	New Location	New CTP project	Developer dependent
150	Widewaters Parkway Extension	Old Faison Road	Bethlehem Road	0.97	2	Avenue	-	New Location	New CTP project	Developer dependent
151	Connector Road	Widewaters Pkwy Ext	Bethlehem Road	0.38	2	Main Street	-	New Location	New CTP project	Developer dependent
152	Harden Hill Lane	Dead End	Panther Rock Boulevard	0.70	2	Main Street	-	New Location	New CTP project	Developer dependent
153	Harden Hill Lane	Panther Rock Boulevard	Hodge Road	0.40	2	Main Street	-	New Location	New CTP project	Developer dependent
154	Quiet Creek Lane	Dead End	Clifton Road	0.40	2	Main Street	-	New Location	New CTP project	Developer dependent
155	Greythorne Place Extension West	Clifton Road	Bethlehem Road	0.75	2	Main Street	-	New Location	New CTP project	Developer dependent
156	Greythorne Place Extension East	Dead End	Sumter Point Way	0.81	2	Main Street	-	New Location	New CTP project	Developer dependent
157	Rutledgeville Lane Extension	Dead End	Poole Rd / Major Slade Rd	1.58	2	Main Street	-	New Location	New CTP project	Developer dependent
158	Lake Myra Collector Road	Poole Road	Rutledgeville Lane Extension	0.40	2	Main Street	-	New Location	New CTP project	Developer dependent
159	Mt Carmel Road Extension	Dead End	North Knightdale Corridor	0.10	2	Main Street	-	New Location	New CTP project	Developer dependent

PEDESTRIAN

ProjID	Corridor	From Road	To Road	Miles	Proposed Lanes	Posted Speed	Project Type	Additional Note
20	Lynnwood Road	Mingo Creek Trail	Clay Hil Rive	0.22	2	25	Sidewalk	Greenway access
21	Satterwhite Drive	Westover Road	Hodge Road	0.50	2	25	Sidewalk	Access to transit
22	Hodge Road - Both Sides	Lynnwood Estates Drive	Knightdale Blvd	2.14	2	45	Sidewalk	Sidewalk gap
23	Hodge Road - East Side	Mingo Bluff Blvd	Mingo Creek Greenway	0.24	3	45	Sidewalk	Greenway access
25	Dianne Street	Hodge Road	Future Road Connection	0.24	2		Sidewalk	Sidewalk gap
25	Hodge Road	Kemp Drive	Hodge Road Elementary School	1.08	3	45	Sidewalk	Sidewalk gap
28	Knightdale Blvd - North Side	Parkstone Towne Blvd	End of Sidewalk	0.17	4	45	Sidewalk	Sidewalk gap
29	Knightdale Blvd - North Side	Bozeman Drive	McKnight Drive	0.22	4	45	Sidewalk	Sidewalk gap
30	North Smithfield Road - Both Sides	Malabys Church Drive	Forestville Road	0.88	3	25	Sidewalk	Sidewalk gap
31	Old Knight Road - East Side	Knightdale Blvd	Aqua Marine Lane	1.29	2 / 3	35	Sidewalk	Sidewalk gap
32	Forestville Road	Smithfield Road / Horton Road	Old Knight Road	0.90	3	25	Sidewalk	Sidewalk gap
33	Old Crews Road	Mt Carmel Road	Buffaloe Road	1.43	3	35	Sidewalk	MTP project
34	Knightdale Blvd - North Side	Sidewalk Gap near Auto Zone	Sidewalk Gap near Valvoline	0.29	4	45	Sidewalk	Sidewalk gap
35	Knightdale Blvd - North Side	Knightdale Water Tower	Forest Drive	0.07	4	45	Sidewalk	Sidewalk gap
36	Knightdale Blvd - North Side	Sidewalk Gap near Enterprise	Old Knight Road	0.09	4	45	Sidewalk	Sidewalk gap
37	Knightdale Blvd - North Side	Old Knight Road	Morning Flyer Way	0.92	4	45	Sidewalk	Sidewalk gap
38	Parkside Commons Drive - East Side	Village Park Drive	Knightdale Blvd	0.05	2		Sidewalk	Sidewalk gap
40	Knightdale Blvd - South Side	Sidewalk Gap near KFC	McKnight Drive	0.04	4	45	Sidewalk	Sidewalk gap
41	Knightdale Blvd - South Side	Sidewalk Gap near KFC	Sidewalk Gap near Shopping Center	0.05	4	45	Sidewalk	Sidewalk gap
42	North First Ave - Both Sides	Sycamore Stret	Knightdale Blvd	0.32	2	25	Sidewalk	Sidewalk gap
43	Sycamore Street Extension	First Avenue	Knightdale Blvd	0.72	2	25	Sidewalk	Transit access
44	Future Urban Boulevard	Smithfield Road	Future Road Connection	1.25	2	25	Sidewalk	Developer dependent
45	Knightdale Blvd - South Side	McKnight Drive	First Avenue	0.41	4	45	Sidewalk	Sidewalk gap
46	Knightdale Blvd - South Side	First Avenue	Morning Flyer Way	0.78	4	45	Sidewalk	Sidewalk gap
47	Village Park Drive	McKnight Drive	First Avenue	1.69	2	25	Sidewalk	Sidewalk gap
48	McKnight Drive	Smithfield Road	Future Road Connection	0.33	2	25	Sidewalk	Sidewalk gap
49	Future Roadway	Main Street	McKnight Drive	0.61	2	25	Sidewalk	Developer dependent
50	Smithfield Road	Broadway Street	Carrington Drive	1.81	2	25	Sidewalk	School access
51	Main Street	Smithfield Road	First Avenue	0.28	2	25	Sidewalk	Park access
52	Robertson Road	First Avenue	Mailman Road	2.21	2	35 / 45	Sidewalk	
53	First Avenue	Bethlehem Road / Crossie Street	Fayetteville Street	0.54	2	35	Sidewalk	School access
54	Fayetteville Street	First Avenue	Mailman Road	2.39	2	35 / 45	Sidewalk	School access
55	Flowers Street / Kelley Meadows Road	Fayetteville Street	Broadway	0.38	2	25	Sidewalk	School access
56	Bethlehem Road	Old Faison Road	First Avenue / Crossie Street	1.40	2 / 3	45	Sidewalk	
57	Broadway Street Extension	Bethlehem Road	Smithfield Road	1.24	2	25	Sidewalk	School access
58	Broadway Street	Smithfield Road	Future Road Connection	0.49	2	25	Sidewalk	School access
59	Highland Ridge Lane	End of Road	Rainier Lake Drive	0.29	2	25	Sidewalk	Developer dependent
60	Old Faison Road - North side	Hodge Road	Bethlehem Road	2.06	3	35	Sidewalk	MTP project
61	Old Faison Road Extension - North side	Bethlehem Road	Smithfield Road	0.78	3	35	Sidewalk	Developer dependent

PEDESTRIAN

ProjID	Corridor	From Road	To Road	Miles	Proposed Lanes	Posted Speed	Project Type	Additional Note
62	Rainier Lake Drive	Smithfield Road	Fayetteville Street	0.67	2	35	Sidewalk	Developer dependent
63	Smithfield Road	Poole Road	Mailman Road	4.58	4	45	Sidewalk	MTP project
64	Smithfield Road	Mailman Road	Broadway Street	1.24	3	45	Sidewalk	MTP project
65	Mailman Road	Smithfield Road	Robertson St / Knightdale-Eagle Rock Rd	2.83	3	55	Sidewalk	MTP project
66	Clifton Road	Poole Road	I-87 / Future Greenway	1.04	2		Sidewalk	Greenway connector
101	McKnight Drive - West side	Laurens Way	Knightdale Blvd	0.34	3	25	Sidepath	Transit access
102	Knightdale Blvd - North side	Neuse River Bridge	H&R Drive sidewalk	0.96	6	45	Sidepath	Greenway connector
103	Knightdale Blvd - North side	I-540 Interchange SB	I-540 Interchange NB	0.42	6	45	Sidepath	I-540 safety project
104	Knightdale Blvd - South side	Neuse River Bridge	I-540 Interchange SB	1.73	6	45	Sidepath	Greenway connector; bridge over Neuse River
105	Knightdale Blvd - South side	I-540 Interchange SB	I-540 Interchange NB	0.37	6	45	Sidepath	I-540 safety project
106	Knightdale Blvd - South side	Hinton Oaks Blvd	First Avenue / Old Knight Road	2.06	6	45	Sidepath	Adjacent or replace sidewalk
107	Knightdale Blvd - South side	First Avenue / Old Knight Road	Marks Creek Road	1.48	6	45	Sidepath	
108	Knightdale Blvd - South side	Marks Creek Road	Three Sisters Road	0.97	6	45	Sidepath	
109	Buffaloe Road - South side	Old Milburnie Road	Marks Creek Road	3.04	4	45	Sidepath	MTP project
110	Marks Creek Road	Robertson St / Knightdale-Eagle Rock Rd	Horton Road	3.13	3	55	Sidepath	MTP project
111	Rolesville Road	I-87 Interchange	Puryear Road / Future Greenway	1.22	4	45	Sidepath	MTP project
112	Skycrest Drive Extension	I-540 Interchange	Forestville Road	0.82	3	45	Sidepath	MTP project
113	Forestville Road	Old Milburnie Road	Smithfield Road	2.48	3	55	Sidepath	MTP project
114	Old Crews Road Extension	Knightdale Blvd	Forestville Road	1.17	3	35	Sidepath	Developer dependent
116	Hodge Road Sidepath	Mingo Bluff Blvd	Prince Town Street	0.32	3	45	Sidepath	
117	Bethlehem Road - West side	Poole Road	Old Faison Road	1.88	2	45	Sidepath	
118	Crosscutt Place / Old Ferrell Road	Bethlehem Road	Smithfield Road	0.96	2	55	Sidepath	
119	Connector Lake Myra Greenway	Greenway connection	Knightdale-Eagle Rock Road	0.52	2	35	Sidepath	Developer dependent, Trunkline Greenway
120	Knightdale-Eagle Rock Road	Marks Creek Road	I-87 Interchange	0.86	3	55	Sidepath	Three segment project
121	Wendell Falls Pkwy	I-87 Interchange SB	I-87 Interchange NB	0.23	4	55	Sidepath	Three segment project
123	Poole Road Sidepath - North side	Riverview Road	Lake Myra Road	6.10	4	45	Sidepath	MTP project
124	Lake Myra Park Connector	Future Roadway Connection	Future Lake Myra Park Entrance	0.48	2	25	Sidepath	Greenway connector
125	East Neuse Greenway Connector	Greenway connection	Colton Creek Road	0.41	2	35	Sidepath	Greenway connector
126	Keith Street Connector	Greenway connection	Poplar Street	0.33	2	35	Sidepath	Trunkline Greenway connector
127	Old Milburnie Road Connector	Penselwood Drive	Greenway Connector	0.45	2	45	Sidepath	Greenway connector
311	Old Knight Road - First Ave - Park Connector	Knightdale Station Park	Knightdale Community Park	0.68	2 / 3	35	Sidepath	Connect Parks
128	Lower Beaverdam Creek Greenway	Neuse River	I-540 crossing	2.31	-	-	Shared Use Path	Trunkline Greenway - segment 1
129	Upper Beaverdam Creek Greenway	Old Milburnie Road	Beaverdam Creek Split	1.93	-	-	Shared Use Path	Trunkline Greenway - segment 2
130	Lower Beaverdam Creek Greenway	Beaverdam Creek Split	Marks Creek Road	2.32	-	-	Shared Use Path	Trunkline Greenway - segment 3
131	Upper Beaverdam Creek Greenway	Beaverdam Creek Split	Marks Creek Road	3.49	-	-	Shared Use Path	Trunkline Greenway - segment 4
132	Connector Beaverdam Creek Greenway	Upper Beaverdam Creek	Buffaloe Road	0.77	-	-	Shared Use Path	
133	Connector Beaverdam Creek Greenway	Upper Beaverdam Creek	Buffaloe Road	0.82	-	-	Shared Use Path	

PEDESTRIAN

ProjID	Corridor	From Road	To Road	Miles	Proposed Lanes	Posted Speed	Project Type	Additional Note
134	Marks Creek Greenway	I-87 Interstate	Upper Beaverdam Creek	3.29	-	-	Shared Use Path	Trunkline Greenway
135	East Knightdale Greenway	Knightdale-Eagle Rock Road	Horton Road	3.81	-	-	Shared Use Path	Trunkline Greenway
136	Lake Myra Greenway	Poole Road	Knightdale-Eagle Rock Road	3.63	-	-	Shared Use Path	Trunkline Greenway
137	Poplar Creek Greenway	Poole Road	Knightdale Station Park	2.78	-	-	Shared Use Path	Trunkline Greenway
138	East I-540 Greenway	Poole Road	Beaverdam Creek	4.64	-	-	Shared Use Path	Trunkline Greenway
139	East Neuse River Greenway	Poole Road	Lower Beaverdam Creek	5.04	-	-	Shared Use Path	Trunkline Greenway
140	Connector Marks Creek Greenway	Marks Creek Greenway	Rolesville Road	1.52	-	-	Shared Use Path	Trunkline Greenway
141	Mingo Creek Greenway Extension	Mingo Creek Park	Knightdale Station Park	1.46	-	-	Shared Use Path	Trunkline Greenway
142	Knightdale Community Park Greenway	Lawson Ridge Road	Bryan Chalk Lane	0.53	-	-	Shared Use Path	
143	Connector East Knightdale Greenway	East Knightdale Greenway	Rolesville Road	1.16	-	-	Shared Use Path	
144	Connector Poplar Creek Greenway - North	Poplar Creek Greenway	Lake Myra Greenway	1.84	-	-	Shared Use Path	Trunkline Greenway
145	Connector Poplar Creek Greenway - South	Poplar Creek Greenway	Lake Myra Park	2.20	-	-	Shared Use Path	Trunkline Greenway
146	Lynnwood Road Connector	Hodge Road	Knightdale Blvd	1.17	-	-	Shared Use Path	
147	I-87 Bridge / Tunnel	I-87 Interchange	Wendell Falls Pkwy	0.68	-	-	Shared Use Path	Three segment project
148	East Wake Rail Trail	Mingo Creek Greenway	I-87 Interstate	4.65	-	-	Shared Use Path	Trunkline Greenway

BICYCLE

ProjID	Corridor Name	From Road	To Road	Miles	Status	Proposed Lanes	Posted Speed	Project Type	Note
1	Buffaloe Road	Old Milburnie Road	Horton Road	2.62	Existing	4	45	Separated Bike Lane	
2	Buffaloe Road Extension	Horton Road	Rolesville Road	1.10	New Road	2	35	Separated Bike Lane	MTP roadway project
3	Future Avenue	Old Milburnie Road	Future Road	2.18	New Road	2	35	Bike Lane	Developer dependent
4	Forestville Road	Old Milburnie Road	Smithfield Road / Horton Road	2.23	Existing	3	55	Separated Bike Lane	Sidepath
5	Forestville Road	Smithfield Road / Horton Road	Old Knight Road	1.01	Existing	3	35	Buffered Bike Lane	Roadway extension project dependent
6	Future Avenue	Forestville Road	Horton Road	1.56	New Road	3	35	Separated Bike Lane	Developer dependent
7	Tommies Drive Extension	Horton Road	Old Knight Road	0.57	New Road	2	35	Separated Bike Lane	Developer dependent
8	Future Avenue	Old Knight Road	Marks Creek Road	1.11	New Road	2	35	Bike Lane	Developer dependent
9	Future Avenue	Marks Creek Road	Rolesville Road	1.44	New Road	2	35	Bike Lane	Developer dependent
10	Old Crews Road	Forestville Road	Buffaloe Road	1.92	Existing	3	45	Separated Bike Lane	
11	Future Avenue	Future Avenue	Buffaloe Road	1.22	New Road	2	35	Bike Lane	Developer dependent
12	Horton Road	Tommies Drive	Old Knight Road	0.79	Existing	2	55	Separated Bike Lane	Posted speed is too high for bike lanes
13	Horton Road	Old Knight Road	Marks Creek Road	1.22	Existing	3	55	Separated Bike Lane	Posted speed is too high for bike lanes
14	First Avenue / Old Knight Road	Knightdale Station Run	Buffaloe Road	2.52	Existing	2 / 3	45	Bike Lane	
15	Marks Creek Road	Knightdale Boulevard	Rolesville Road	2.16	Existing	3	55	Separated Bike Lane	Posted speed is too high for bike lanes
16	Keiths Road	Knightdale Boulevard	Puryear Road	1.14	Existing	2	55	Bike Lane	
17	Keiths Road Extension	Puryear Road	Future Road	0.75	New Road	2	25	Bike Lane	Developer dependent
18	Rolesville Road	I-87 Interchange	Marks Creek Road	2.53	Existing	4	45	Separated Bike Lane	Sidepath
19	Old Milburnie Road	Pinnacle Peak Drive	Buffaloe Road	2.85	Existing	4	45	Separated Bike Lane	MTP roadway project
20	Skycrest Drive Extension	I-540 Interchange	Forestville Road	1.13	New Road	3	35	Separated Bike Lane	MTP roadway project
21	Horton Road	Forestville Road	Tommies Drive	0.74	Existing	3	35 / 55	Bike Lane	
22	Haywood Glen Drive Extention	Old Knight Road	Marks Creek Road	0.87	New Road	2	35	Bike Lane	Developer dependent
23	Puryear Road	Marks Creek Road	Rolesville Road	1.08	Existing	2	55	Bike Lane	
24	Old Crews Extension	Knightdale Boulevard	Forestville Road	0.79	New Road	3	35	Separated Bike Lane	Developer dependent
25	Smithfield Road	Knightdale Boulevard	Forestville Road	0.75	Existing	3	35	Bike Lane	
26	Steeple Square Court	Old Crews Extension	Smithfield Road	0.24	Existing / New Rc	2	25	Bike Lane	Developer dependent
27	Future Local Roadway	Bozeman Drive	First Avenue	1.35	New Road	2	25	Shared Lane Markings	east-west bike route
28	Legacy Oaks Drive	Hodge Road	Old Milburnie Road	0.99	New Road	2	35	Separated Bike Lane	MTP roadway project
29	Heron Pond Street	Knightdale Boulevard	Pinnacle Peak Drive	1.08	New Road	2	25	Bike Lane	Developer dependent
30	Pinnacle Peak Drive	Old Milburnie Road	Heron Pond Street	0.35	Existing	2	25	Shared Lane Markings	City of Raleigh jurisdiction
31	Hodge Road	Knightdale Boulevard	Legacy Oaks Drive	0.31	Existing	3 / 4	35	Separated Bike Lane	
32	Knightdale Boulevard	Neuse River Bridge	I-540 Interchange	1.49	Existing	4/ 5	45	Separated Bike Lane	Sidepath
33	Knightdale Boulevard	I-540 Interchange	First Avenue / Old Knight Road	2.23	Existing	6	45	Separated Bike Lane	Sidepath
34	Knightdale Boulevard	First Avenue / Old Knight Road	Marks Creek Road	1.46	Existing	6	45	Separated Bike Lane	Sidepath
35	Knightdale Boulevard	Marks Creek Road	I-87 Interchange	1.54	Existing	6	55	Separated Bike Lane	Sidepath
36	Milburnie Road	Knightdale Boulevard	Whitfield Street	0.36	New Road	2	25	Shared Lane Markings	NCDOT roadway connection
37	Whitfield Street	Whitfield Street	Hodge Road	0.53	Existing	2	35	Shared Lane Markings	
38	Hodge Road	Poole Road	I-87 Interchange	1.15	Existing	4	45	Separated Bike Lane	MTP roadway project
39	Hodge Road	I-87 Interchange	Knightdale Blvd	1.96	Existing	3	45	Separated Bike Lane	MTP roadway project
40	Lynnwood Road	Hodge Road	Knightdale Blvd	1.65	Existing	2 / 3	25	Shared Lane Markings	
41	Old Faison Road	Hodge Road	Bethlehem Road	2.05	Existing	3	45	Separated Bike Lane	MTP roadway project
42	Flatrock Park Drive	Lynnwood Road	Parkstone Towne Boulveard	0.48	Existing	2	25	Shared Lane Markings	
43	Village Park Drive	Parkstone Towne Boulveard	First Avenue	1.71	Existing	2	25	Shared Lane Markings	

BICYCLE

ProjID	Corridor Name	From Road	To Road	Miles	Status	Proposed Lanes	Posted Speed	Project Type	Note
44	Laurens Way	Lynnwood Road	McKnight Drive	1.26	Existing	2	25	Shared Lane Markings	
45	Widewaters Parkway Extension	Old Faison Road	Laurens Way	0.75	New Road	2	35	Shared Lane Markings	Developer dependent
46	Widewaters Parkway	Laurens Way	Knightdale Blvd	0.76	Existing	2	25	Bike Lane	
47	Parkside Commons Drive	Laurens Way	Knightdale Blvd	0.51	Existing	2	25	Bike Lane	
48	McKnight Drive	Knightdale Boulevard	Knightdale Blvd	1.03	Existing	2 / 3	25	Shared Lane Markings	
49	Bethlehem Road	Poole Road	Old Faison Road	1.87	Existing	2	45	Separated Bike Lane	
50	Bethlehem Road	Old Faison Road	Smithfield Road	0.92	Existing	2 / 3	45	Bike Lane	
51	Smithfield Road	Poole Road	Rainier Lake Drive	2.78	Existing	3 / 4	45	Separated Bike Lane	Posted speed is too high for bike lanes
52	Smithfield Road	Ranier Lake Drive	Bethlehem Road / First Avenue	0.90	Existing	2 / 3	35	Bike Lane	
53	Smithfield Road	Bethlehem Road / First Avenue	Main Street	0.27	Existing	2	35	Shared Lane Markings	
54	Smithfield Road	Main Street	Knightdale Blvd	0.52	Existing	3	35	Bike Lane	
55	Future Roadway	Smithfield Road	Knightdale Station Run Extension	0.63	New Road	2	25	Shared Lane Markings	
56	Fourth Avenue Extension	Smithfield Road	Future Road	0.41	Existing / New Ro	2	25	Shared Lane Markings	Developer dependent
57	Main Street	Smithfield Road	First Avenue	0.80	Existing	2	25	Shared Lane Markings	
58	Oakwood Street	Smithfield Road	First Avenue	0.37	Existing / New Ro	2	25	Shared Lane Markings	
59	Second Avenue	First Avenue	Future Road	0.53	Existing	2	25	Shared Lane Markings	
60	First Avenue	Smithfield Road	Knightdale Station Run	0.80	Existing	2	25	Shared Lane Markings	
61	Sycamore Street Extension	Knightdale Boulevard	First Avenue	0.37	New Road	2	25	Shared Lane Markings	Developer dependent
62	Ridge Street	Smithfield Road	Fayetteville Rpad	0.10	Existing	2	25	Shared Lane Markings	
63	Hester Street	Ridge Street	Robertson Street	0.30	Existing	2	25	Shared Lane Markings	
64	Ranier Lake Drive	Smithfield Road	Hester Street	1.15	Existing / New Ro	2	35	Bike Lane	Developer dependent
65	Future Main Street	Bethlehem Road	Robertson Street	1.60	New Road	2	25	Bike Lane	Developer dependent
66	Old Faison Road Extension	Bethlehem Road	Smithfield Road / Rainier Lake Drive	0.79	New Road	3	35	Separated Bike Lane	MTP roadway project
67	Fayetteville Street	Ridge Street	Mailman Road	1.16	Existing	2	45	Bike Lane	
68	Future Main Street	Fayetteville Street	Keith Street	0.91	New Road	2	25	Shared Lane Markings	Developer dependent
69	Knightdale Station Run	First Avenue	Carolinian Avenue	0.43	Existing	2	25	Shared Lane Markings	
70	Carolinian Avenue	Knightdale Boulevard	Mailman Road	1.02	Existing	2	25	Shared Lane Markings	
71	Future Main Street	Carolinian Avenue	Knightdale Blvd	0.65	New Road	2	25	Shared Lane Markings	Developer dependent
72	Robertson Street	First Avenue	Mailman Road	1.11	Existing	2	35	Bike Lane	
73	Knightdale-Eagle Rock Road	Mailman Road	I-87 Interchange	1.23	Existing	3	55	Separated Bike Lane	Posted speed is too high for bike lanes
74	Mailman Road	Smithfield Road	Robertson Street	1.42	Existing	3	55	Separated Bike Lane	Posted speed is too high for bike lanes
75	Fayetteville Street Extension	Mailman Road	Future Roadway	0.24	New Road	2	25	Shared Lane Markings	MTP roadway project
76	Future Roadway	Fayetteville Street Extension	Knightdale-Eagle Rock Road	0.38	New Road	2	25	Shared Lane Markings	Developer dependent
77	Marks Creek Road Extension	Mailman Road	Knightdale-Eagle Rock Road	0.74	New Road	2	35	Bike Lane	Developer dependent
78	Marks Creek Road	Knightdale-Eagle Rock Road	Knightdale Blvd	1.37	Existing	3	45	Separated Bike Lane	Posted speed is too high for bike lanes
79	Future Avenue	Knightdale-Eagle Rock Road	Marks Creek Road	1.12	New Road	3	35	Bike Lane	Developer dependent
80	Future Roadway	Marks Creek Road	Future Avenue	0.47	New Road	2	25	Bike Lane	Developer dependent
81	Future Avenue	Future Roadway	Knightdale Blvd	0.74	New Road	2	35	Bike Lane	Developer dependent
82	Poole Road	Neuse River Bridge	Lake Myra Road	5.97	Existing	4	45 / 55	Separated Bike Lane	Posted speed is too high for bike lanes
83	Future Roadway	Hodge Road	Heron Pond Street	0.38	New Road	2	35	Shared Lane Markings	
84	Future Fifth Avenue	Main Street	McKnight Drive	0.30	New Road	2	25	Shared Lane Markings	Developer dependent
85	Keith Street / Poplar Street	Robertson Street	First Avenue	0.31	Existing	2	35	Shared Lane Markings	

ProjID	Transit Project Name	Near Road	To Road	Length (miles)	Status	Project Type
1	Mobility Hub near Knightdale Blvd @ Hodge Rd	Knightdale Blvd	Hodge Road	--	New Facility	Mobility Hub - Neighborhood
2	Mobility Hub near Hodge Rd @ Mingo Creek Greenway	Hodge Road	Mingo Creek Greenway	--	New Facility	Mobility Hub - Commuter
3	Mobility Hub near Knightdale Station Park	First Avenue	Knightdale Station Run	--	New Facility	Mobility Hub - Commuter
4	Mobility Hub near Knightdale-Eagle Rock @ Railroad	Knightdale-Eagle Rock Road	Future Greenway	--	New Facility	Mobility Hub - Commuter
5	Mobility Hub near Future Marks Creek Greenway	Knightdale Blvd	Marks Creek Road	--	New Facility	Mobility Hub - Neighborhood
6	Mobility Hub near Keiths Road	Knightdale Blvd	Keiths Road	--	New Facility	Mobility Hub - Neighborhood
7	Mobility Hub near Shoppes at Midway	Knightdale Blvd	Hinton Oaks Blvd	--	New Facility	**Mobility Hub - Regional**
8	Mobility Hub near Lowes Foods Shopping Center	Knightdale Blvd	Village Park Drive	--	New Facility	Mobility Hub - Neighborhood
9	Mobility Hub near East Wake Tech Campus	Rolesville Road	--	--	New Facility	**Mobility Hub - Regional**
10	Mobility Hub near Forestville Rd	Forestville Road	Future Skycrest Drive Extension	--	New Facility	Mobility Hub - Commuter
11	Mobility Hub near Walmart P&R	Knightdale Blvd	McKnight Drive	--	New Facility	Mobility Hub - Commuter
12	Mobility Hub near Smithfield Rd	Smithfield Road	Future Greenway	--	New Facility	Mobility Hub - Commuter
13	Mobility Hub near Poole Rd	Poole Road	Stony Falls Way	--	New Facility	Mobility Hub - Commuter
14	Mobility Hub near Future Suggs Tract Redevelopment	Future Roadway	Future Roadway	--	New Facility	Mobility Hub - Commuter
15	Mobility Hub near Town Hall Complex	Steeple Square Court	Smithfield Road	--	New Facility	Mobility Hub - Neighborhood
16	Mobility Hub near Publix / Wendell Falls	Wendell Falls Parkway	Taylor Road	--	New Facility	Mobility Hub - Commuter
51	GoRaleigh Route 33 Extension (Wake Tech East)	McKnight Drive	Wake Tech East Campus	8.4	Existing Service	Local Bus
52	Realignment of ZWK Express Route	Wendell Downtown	I-87 Interchange	3.1	Existing Service	Express Bus
53	Bus Rapid Transit Extension	Knightdale Blvd	First Avenue	5.9	New Service	Bus Rapid Transit
54	Passenger Rail - Phase 1	Raleigh Union Station	Knightdale Old Town	13.0	New Service	Passenger Rail
55	Passenger Rail - Phase 2	Knightdale Old Town	Wendell Downtown	7.0	New Service	Passenger Rail

Stantec

Memo

To:	Andrew Spiliotis, Town of Knightdale Knightdale, NC	From:	Timothy Tresohlavy, AICP, GISP Raleigh, NC
Project/File:	Knightdale CTP – Transit Study	Date:	November 11, 2022

Reference: Street Type Cross-sections, and Bikeway Design Flexibility

During the CTP process (2021-22) the Town of Knightdale *refined* its typical street cross-sections to provide more consistency and design flexibility for NCDOT, the Town, and the development community. This memo directly relates to Urban Main Streets, Avenue, and Urban Avenue street types, in particular, offering some general guidance on which treatments are influenced by site context (e.g., driveways), and some applicable resources to reference.

GENERAL GUIDANCE - The following pages provide *additional* context to support for this summary.

Street Type Cross-Section	Best Use	Avoid / Minimize
Urban Main Street – Separated Bike Lanes	• **High pedestrian areas** • Safe crossings	• **Splitting users one-way**, and crossing the street
Urban Main Street – Sidepath	• **Greenway connectors** • Two-way travel • Near transit stops	• Frequent driveways / mailboxes • Steep slopes / retaining walls
Main Street – Bike Lanes	• < 30 MPH roads • **Residential streets**, with rear-loaded alleys	• Frequent driveways / mailboxes • Garbage / recycling pickup • Turning vehicles (conflicts)
Avenue – Sidepaths	• **Greenway connectors** • Two-way travel	• **High pedestrian areas**
Avenue – Buffered Bike Lanes	• 30-35 MPH residential streets • Pavement reallocation (lane diet opportunity)	• Frequent driveway / mailbox • Garbage / recycling pickup • On-street parking
Urban Avenue – Sidepaths	• **Greenway connectors** • Near transit • Constrained ROW (10' wide path)	• **High pedestrian areas**
Urban Avenue – Separated Bike Lanes	• High pedestrian areas	• Greenway connectors
Urban Avenue – Buffered Bike Lanes	• Extra wide pavement (**lane diet opportunity**)	• Near Roundabouts
Boulevard – Buffered Bike Lanes	• High pedestrian areas • Traffic signals (two-stage crossing)	• Frequent driveway / mailbox • Garbage / recycling pickup • On-street parking
Boulevard – Sidepath	• High speed/volume roads	• Crossing the road

Note: Maintaining consistency of existing and new facilities along a single roadway is paramount. Avoid fragmented retrofits.

Reference: Street Type Cross-sections, and Bikeway Design Flexibility

Town of Knightdale Street Types

Typical street cross-sections represent 'ideal' conditions, suggesting that they are not intended to be *precise*, but rather should be modified to meet local site context of the road or intersection. The Town of Knightdale offers the following street types (columns), with the following bikeway types (rows):

General Right-of-Way	*70'*	*70'*	*75'*	*80'*	*100'*
Median option(s)	*-*	*Yes*	*Yes*	*-*	*Yes*
Bikeway Type	**Urban Main Street**	**Main Street**	**Avenue**	**Urban Avenue**	**Boulevard**
Sidepath	●		❍	●	●
Separated Bike Lane (above curb)	●			●	
Separated Bike Lane (between curbs)			❍	❍	❍
Buffered Bike Lane			●	●	❍
Bike Lane		●			
Shared Lane Markings	●				

Assumptions:

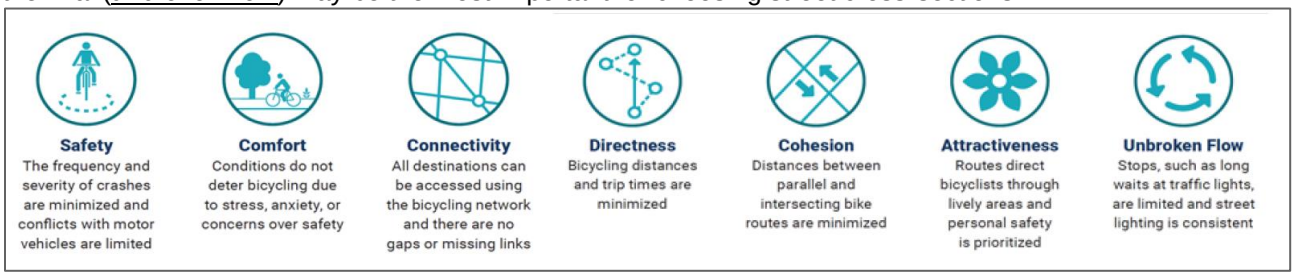
● represents the ***preferred*** street type bikeway treatment
❍ represent an *optional* bikeway treatment is possible
All street types include a curb-and-gutter (within Town limits)

What roadside elements will impact the selection of street cross-sections?

- Driveways and/or mailboxes
- Utilities (power lines, water/sewer, fire hydrants)
- Business or retail signage
- Greenways / trails (existing or planned)
- Posted speed or roadway, or current daily traffic volumes
- Presence of traffic signals
- Presence of right-turn lanes and/or on-street parking
- Adjacent land uses (commercial/retail or residential)

Bikeway Network Considerations & Design Flexibility

Thinking of the bicycle network *separately* from the roadway network can also help select the most appropriate street cross-section. FHWA guidance identifies **seven (7) principles for bike network design**, the final (*unbroken flow*) may be the most important for choosing street cross-sections:



Source: FHWA Bikeway Selection Guide (2019)

Reference: Street Type Cross-sections, and Bikeway Design Flexibility

The selection of bikeways also relates to bike user categories, and whether the Town chooses to emphasize all-ages-and-abilities (AAA). This often translates to separating bicycles above the curb for most roadways that are over 30 MPH, or over 6,000 vehicles per day (e.g., Sidepath, or Separated Bike Lanes).

Sidepaths are most appropriate for locations that are proximate to existing / proposed greenway trails. Route consistency is paramount to avoid 'splitting' users on different sides of a roadway (one-way travel). This would apply to Marks Creek Road (#70), which connects with five (5) future greenways, or Old Knight Road (#72) connecting two Town Parks.

Sidepaths are likewise more appropriate for *higher speed, higher volume roads*, such as Knightdale Blvd, Poole Rd, Forestville Rd, or the future Skycrest Dr extension (#55). Choosing between the Sidepath (both walking and biking) or Separated Bike Lane with Sidewalk adjacent options for the Urban Main Street may depend on whether the project is retrofitting a current road (First Ave #137), or building a new road (Village Park Dr extension #134).

Buffered Bike Lanes are appropriate to provide additional width needed for fire or emergency response vehicles, *particularly with the Avenue street type that includes a median*. Examples include the future Old Crews Road extension (#88), Tommies Drive extension (#116-117), or similar development project roadways (Avenues) that *minimize the number of driveways* that disrupt bike lanes. Also note that Buffered Bike Lanes allow for *future* flexibility to become separated bike lanes (by adding vertical element) if speed or traffic volumes increase.

Bike Lanes (traditional) are included on the Main Street cross-section, which is generally a residential street classification (e.g., Lauren's Way, Mingo Bluff Blvd, Fayetteville St, or Parkside Commons Dr).

Shared Lane Markings are *only* included on the Urban Main Street types, where posted speed and traffic volume are the lowest. These roads are only found in the vicinity of Old Town Knightdale, such as First Ave, Main St, Railroad St, a portion of Fayetteville St, and several proposed new roadway extensions.

Resources:

- *FHWA Bikeway Selection Guide* (2019) - https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-07/fhwasa18077.pdf
- *FHWA resource guide and literature review* - Tools to Diagnose and Solve the Problem | FHWA (dot.gov)
- *FHWA Case Study for Safe, Comfortable, and Connected Pedestrian-Bicycle Networks volume II* (2016) - https://www.pedbikeinfo.org/cms/downloads/NetworksReport_Vol2_Dec2016.pdf

Regards,

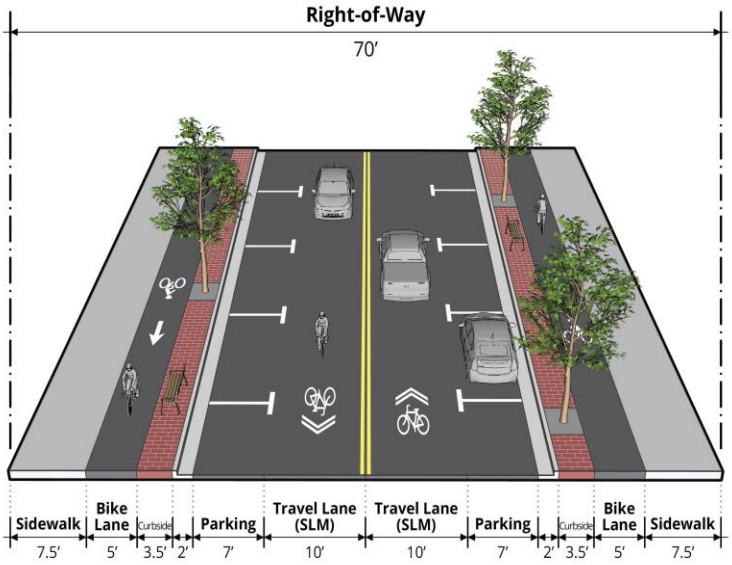
STANTEC CONSULTING SERVICES INC.

Timothy Tresohlavy AICP
Senior Transportation Planner

Urban Main Street – 2-lanes

Separated Bike Lanes (above the curb)

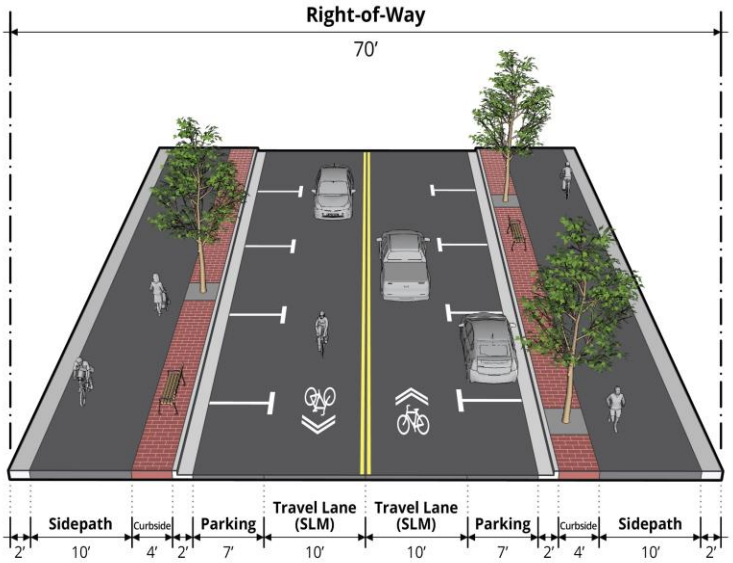
70’ ROW



Urban Main Street – 2-lanes

Sidepaths

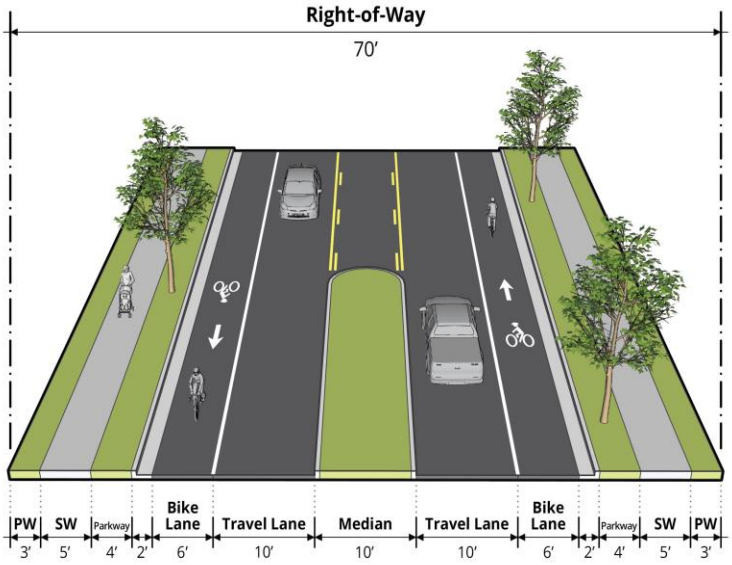
70’ ROW



Main Street – 3-lanes

Bike Lanes

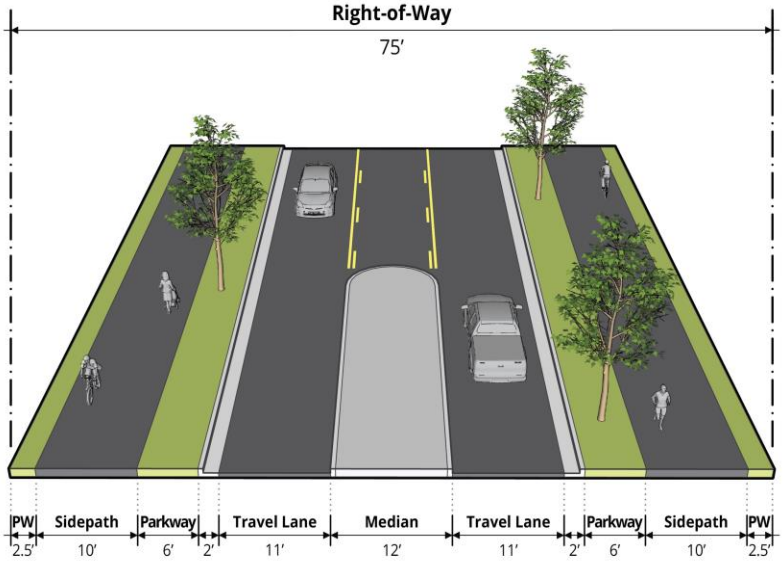
70’ ROW



Avenue – 3-lanes

Sidepaths

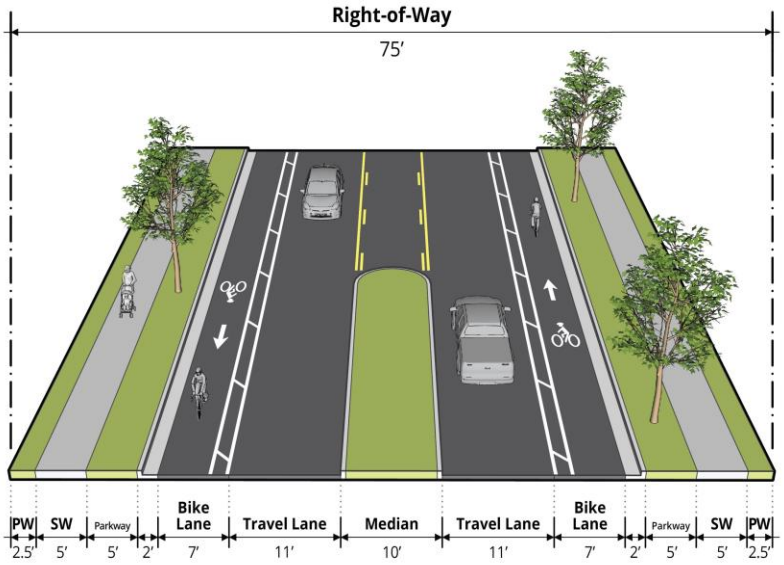
75’ ROW



Avenue – 3-lanes

Buffered Bike Lanes

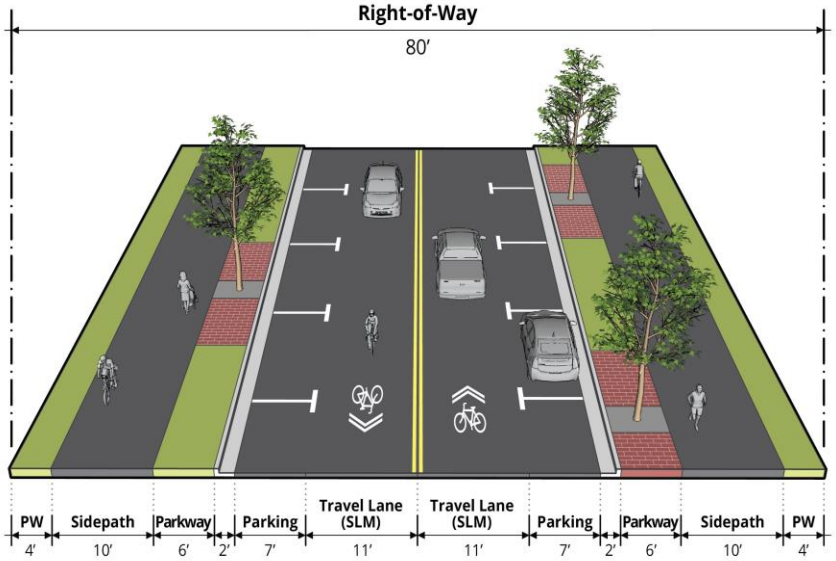
75’ ROW



Urban Avenue – 2-lanes

Sidepaths

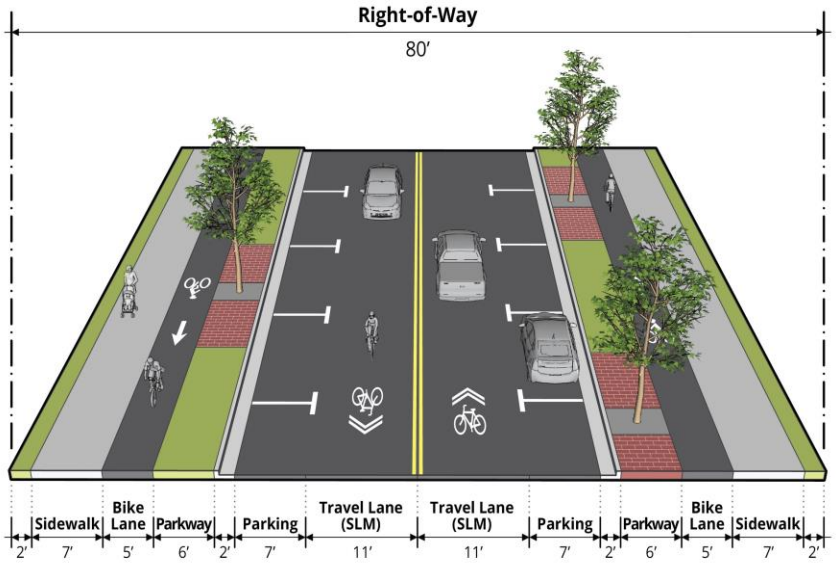
80’ ROW



Urban Avenue – 2-lanes

Separated Bike Lanes (above the curb)

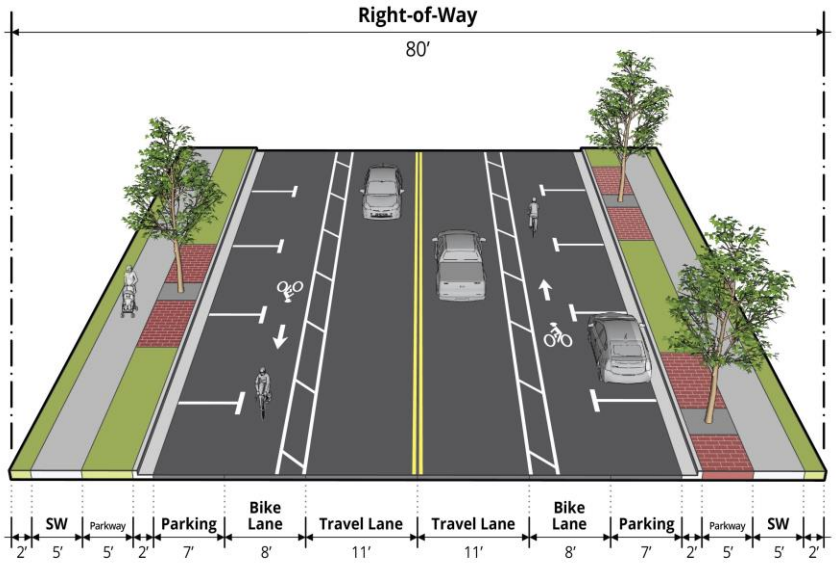
80’ ROW



Urban Avenue – 2-lanes

Buffered Bike Lanes

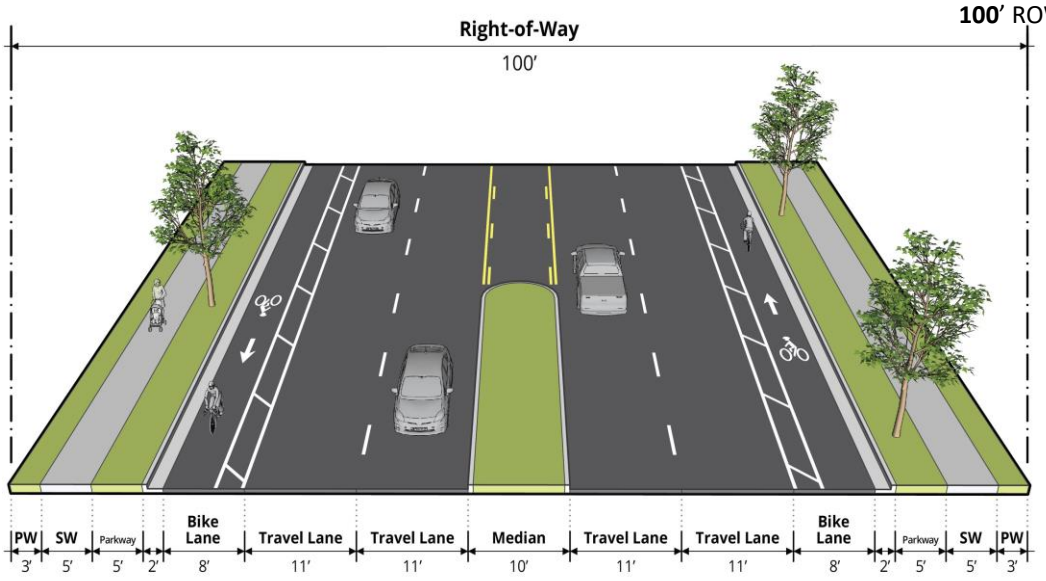
80’ ROW



Boulevard – 4-lane median

Buffered Bike Lanes

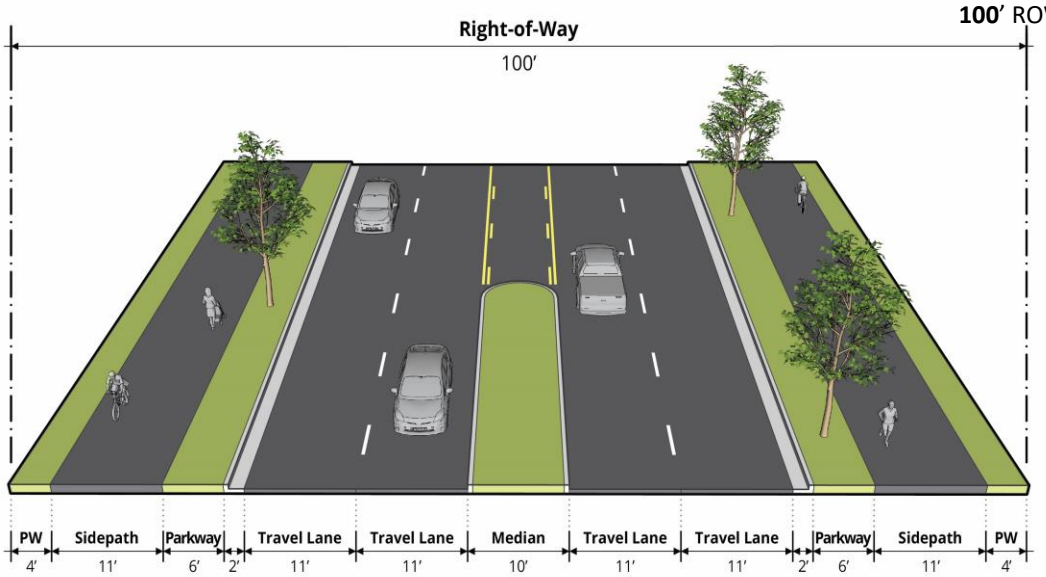
100′ ROW



Boulevard – 4-lane median

Sidepaths

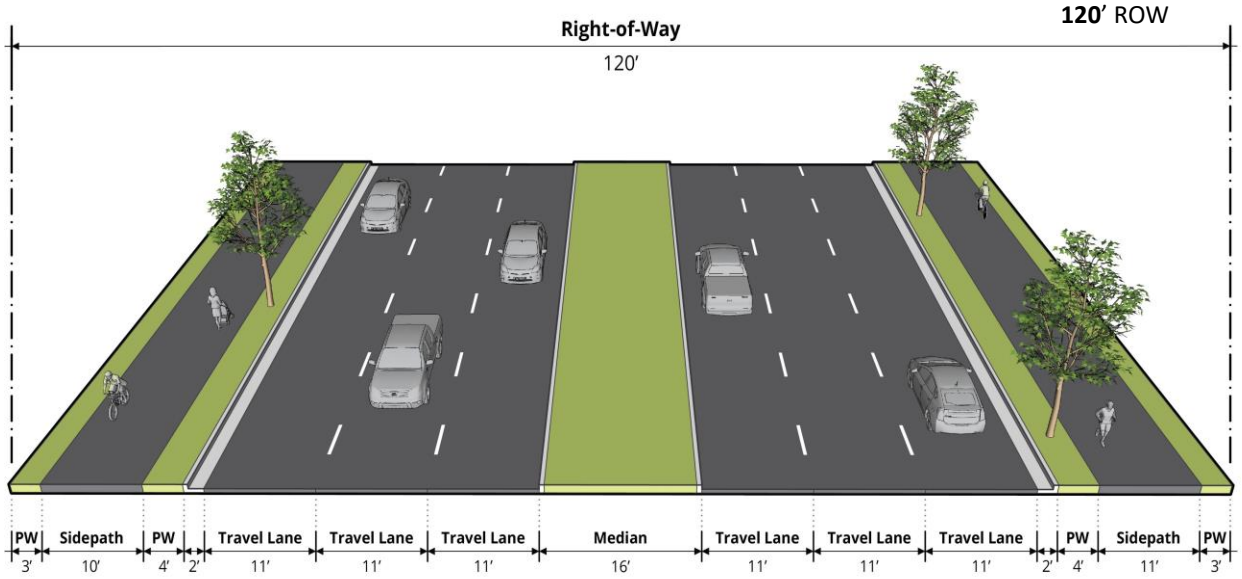
100′ ROW



Knightdale Boulevard – 6-lane median

Sidepaths

120’ ROW



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Appendix D

TRANSIT MOBILITY PLAN

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KNIGHTDALE

TRANSIT MOBILITY PLAN

10.22.2022

Table of Contents

Acknowledgments

Mayor

Jessica Day

Knightdale Town Council

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Councilor Steve Evans

Mayor Pro Tem Stephen Morgan (CTP Review Committee)

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Andrew Spiliotis, Project Manager

Plan Participants

Thank you to everyone that participated in the development of the Knightdale Comprehensive Transportation Plan and this Transit Mobility Plan.

1 Executive Summary

The Knightdale Transit Mobility Plan lays out a vision of mobility for Knightdale's residents, businesses, and visitors. This vision considers public transportation broadly and in innovative ways that create opportunities and improve both safety and mobility. Here are the main results.

Knightdale's location has provided it with the advantage of being proximate to the major urban centers of the Triangle Region, all of which are less than a half-hour away by private automobile. The Town's history has been shaped by geography, including the Neuse River, railroad, and highways that dramatically improved east-west mobility.

More recent planning exercises conducted by partners like the Capital Area Metropolitan Planning Organization as well as Knightdale's own studies have focused on developing the Town as if land were a precious resource, and that transportation mobility is both influenced and enhanced by patterns of land development. In the plans and policies reviewed, Knightdale has taken a strong stance on creating a healthy, equitable community, and public transportation is cited often as a major contributor to that goal. Knightdale's Unified Development Ordinance (UDO) is a culmination of these ideas, and puts into place robust requirements for transit amenities, connectivity, and other best practice design strategies.

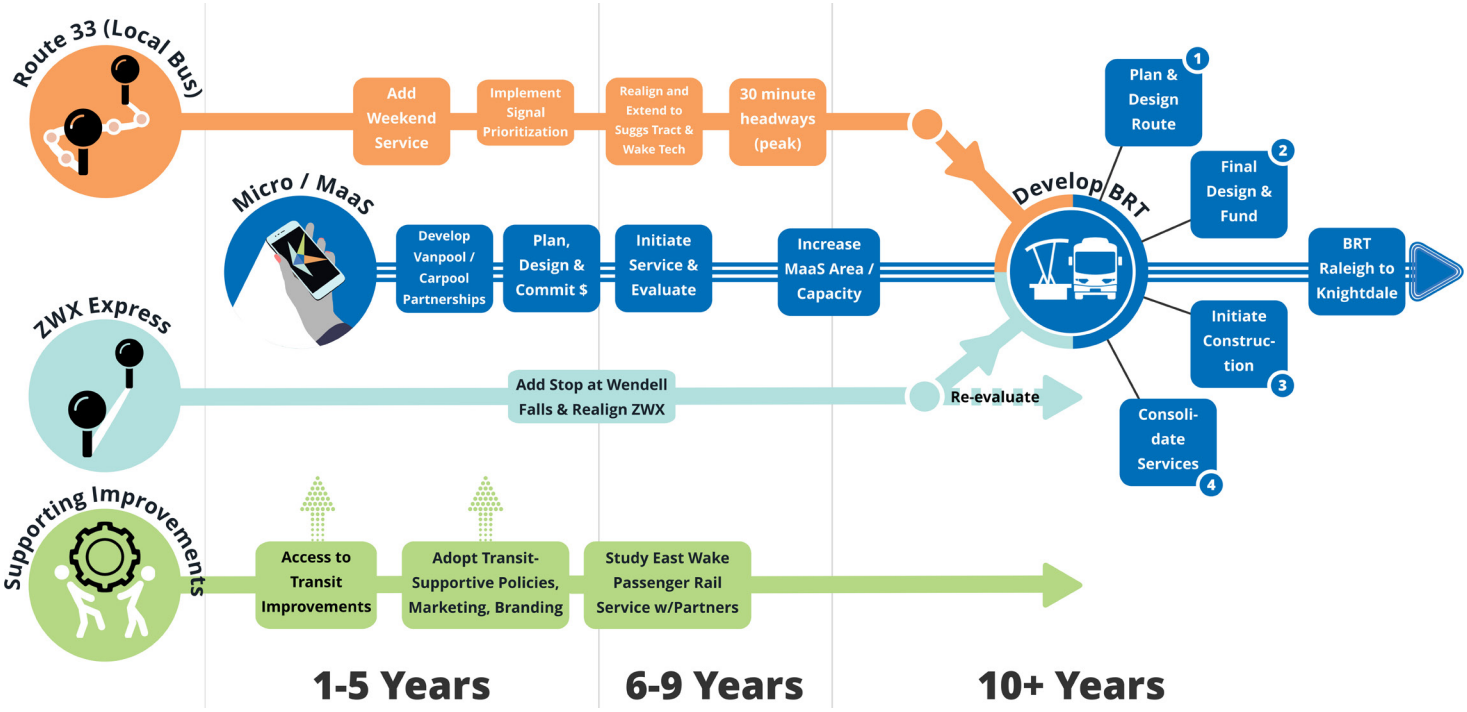
External trends are also considered in this Transit Mobility Plan. Trends like a rapid adoption of information technologies married to mobility services on demand, sometimes termed microtransit specifically for enhancements to public transportation that makes it more user friendly more often; or called mobility-as-a-service (MaaS) in the broader sense that includes many public and private strategies for improving personal mobility.

The rationales for pursuing a strong public transportation program in Knightdale, often in partnership with other agencies, are several:

- Social Equity concerns about how readily different people can access jobs, medical care, and education;
- Preserving mobility in an era when public revenues, constructing more roadway capacity, and mitigation for environmental concerns - both human and natural - have made traditional roadway improvements less attractive; and
- The recognition that changing personal preferences for living and transportation arrangements coupled with the proliferation of granular, personal mobility services and options are increasing "the size of the tent" and audience for public transportation alternatives.

Recommendations were developed from involving the public, such as those present at the Latin American Festival (May 2022), who told us about the needs for better information, more expansive service, and better connections to transit stops. In response, this Transit Mobility Plan offers a staged slate of recommendations (see summary graphic below), starting with adjustments to existing local bus service (Route 33) and express bus service (ZWX Route). Connectivity improvements to make pedestrian and biking access to transit services easier are preeminent in the early stages of recommendations as well, as are policy modifications and pursuit of microtransit that supports existing transit and door-to-door trips.

These basic improvements set the stage for more capacity in microtransit offerings, branding and marketing all transit services in a coordinated fashion to ensure that there is good information readily available to anyone that wishes to use these options. Ultimately, the New Bern Corridor Bus Rapid Transit (BRT) service will enter Knightdale's commercial core on Knightdale Boulevard, providing high-frequency, time-competitive public transportation for the first time in the Town's history. Future passenger rail service is also a possibility, creating opportunities for economic development and connecting eastern Wake County's municipalities with the City of Raleigh.



The Town of Knightdale is pleased to present the Transit Mobility Plan, which is organized into the development of context, existing transit environments, and recommendations. Please contact Knightdale's Development Services Department for additional information and assistance.

2 Planning Contexts

A plan for transportation often emphasizes projects that dictate how people get from place to place as part of its basic design. Roads move cars (sometimes buses, inefficiently); bike lanes bikers; and sidewalks walkers. A plan for mobility includes these things but gives people more *choices* about how they use them.

For nearly a century, the obvious answer to how to move efficiently has been by a private car. This choice is obvious because it has been heavily subsidized by tax dollars to construct and maintain roadways; by requiring private enterprise to pay for parking; and making everyone pay for the costs of pollution, greenhouse gas emissions, car crashes, accident and construction delays, and the disruption to neighborhoods. A common, if not the most common, objection to new development that offers more housing, job, and retail opportunities is that it's going to increase the traffic in one neighborhood, and make congestion on major arterial roadways worse.

This Transit Mobility Plan briefly discusses the nature of mobility issues to better understand the relevance of the solutions that follow. It will take time to make the options competitive with the way 98% of Knightdale work trips are made today, but the result will be a more equitable, efficient, and flexible transportation system. It's time to break a less-than-virtuous cycle.

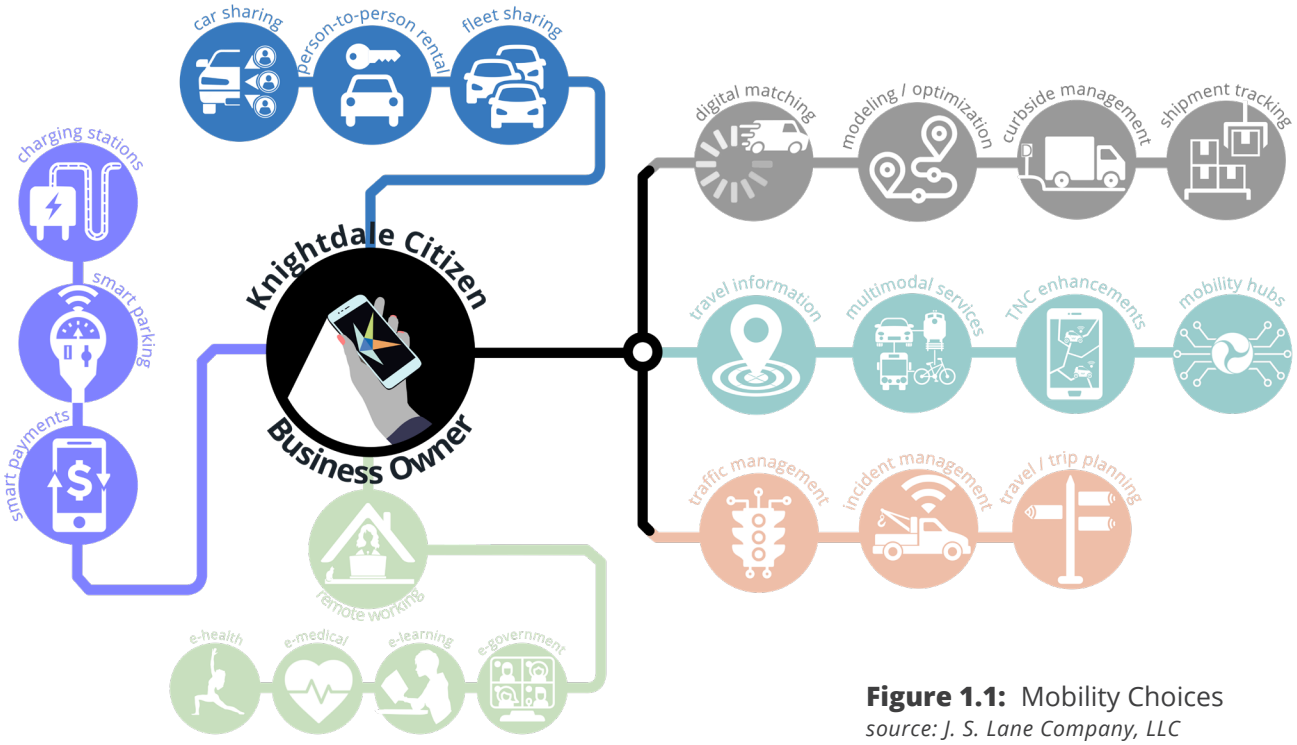


Figure 1.1: Mobility Choices
source: J. S. Lane Company, LLC

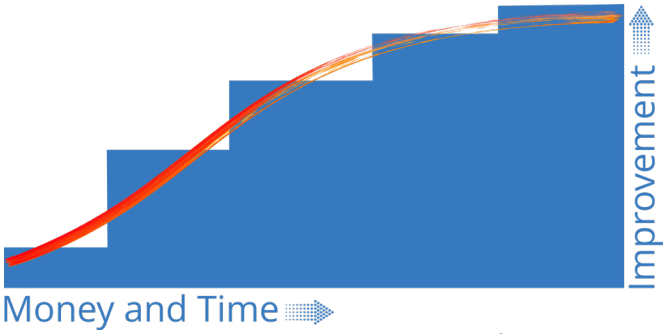


Figure 1.2: Transportation Investment and Time

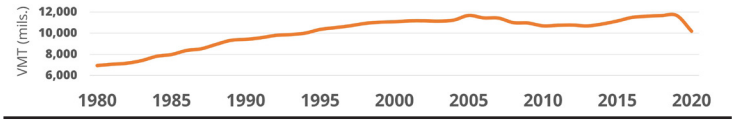


Figure 1.3: NC Miles of Travel (million), 1980-2020

"I LOVE LIVING IN KNIGHTDALE.

It is much quieter and more family-friendly than Raleigh, and you can be anywhere in Raleigh within 20 minutes because of close proximity to the interstates." - *NICHE website, June 2020*

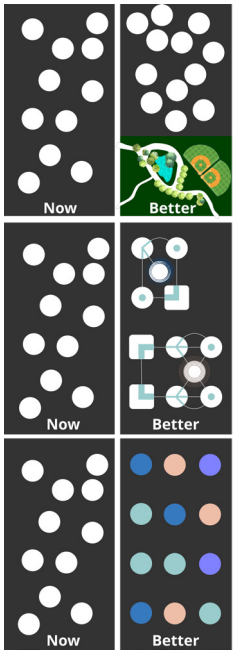
The person who made this comment on a town comparison website is right: it's easy to be in downtown Raleigh from the corner of First Avenue and Smithfield Road in 20 minutes...in your own car.

If you're taking public transportation, the trip is over three times as long, involving a bus transfer and 8 minutes of walking. **It is slightly shorter to ride a bicycle (62 minutes) than it is to make the average transit trip (65 minutes) now** between the two downtowns, assuming one leaves at 8am when transit service is available. More time is required to plan for the travel time variances of a bus, too.

Relative travel times from Knightdale to Raleigh

More and More to Do Less and Less. The section of US 64 Knightdale Bypass (now I-87) that used a design-build approach was 9.6 miles long and cost $197.5 million (2022 dollars) to construct in 2005. The six-lane freeway involved moving 3.7 million cubic yards of dirt, right-of-way acquisition, major utility relocations, mitigating wetland and stream impacts, and building 23 bridges. A planned 2040 project that would add two lanes for a similar length is estimated at $97 million. In other words, ***the improvement may cast nearly half the price of the original project***. More money is required to make less of an impact (Figure 1.2).

A Different Path? While per-capita drive miles have slowed in North Carolina (Figure 1.3), driving in Knightdale and Wake County have not. There are many reasons people choose how and how much to travel, some of which are under Knightdale's ability to influence through policy, infrastructure, and programming commitments (Figure 1.4).



Density supports **public transportation** and **biking / walking infrastructure,** and makes trips shorter, and makes **room for open space and parks**.

Design fosters **community** and **quality**, requiring investments in **technology, durable and low-impact materials,** and **active mode infrastructure**.

Diversity of complementary land uses supports a **robust economic base** in Knightdale, **shorter trips**, and **greater potential for biking and walking**.

Figure 1.4: Travel Factors & Knightdale Influence

Past Plans and Policy

The details of specific plans adopted by Knightdale, the Capital Area Metropolitan Planning Organization (CAMPO), and Wake County are detailed in the appendix (Appendix A). **Figure 1.5 provides highlights of how these adopted plans specifically influence the context and understanding of the current policy environment for mobility in Knightdale.**

These plans, particularly those adopted by Knightdale in recent years, have shown a consistent emphasis on developing land and transportation systems in ways that support equitable growth and transportation choices. The reasons given for these decisions vary, but typically include social justice / equity, environmental protection, resiliency / sustainability, improved mobility, or economic diversification and strength.

Wake County Transit

A 10-year transit plan updated periodically, its most recent version included BRT service to New Hope Commons (Route 33). The Plan's objectives of accessibility, frequent service, and urban mobility align with much of what Knightdale is trying to achieve.

MPO Plans & Programs

The Capital Area Metropolitan Planning Organization (CAMPO) updates the official metropolitan transportation plan (MTP) and administers other key, shorter-range funding opportunities (LAPP and CFA programs). The MPO is a vital project development partner.

Knightdale Next

The Town's comprehensive plan often uses transit and transit-oriented development to describe preferred land uses. Transit provisions are supported on "every non-access controlled street," as are emerging technologies and Bus Rapid Transit.

PLANWake 2021

Wake County's comprehensive plan shares similar goals with this effort: increasing non-automotive trips, creating areas of "intentional" development that support transit, and providing socially equitable, integrated housing and mobility choices.

NE Microtransit Study

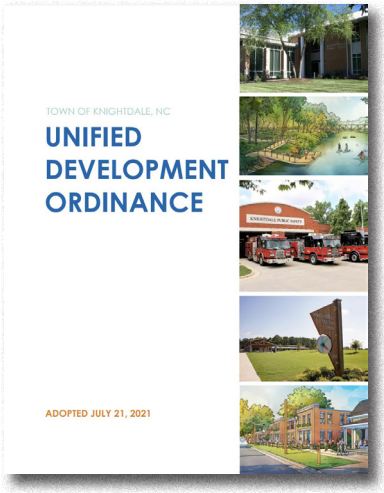
This study was completed in 2021 and led to a pilot implementation in 2022. The pilot has a limited connection to Knightdale's Route 33, but evaluating its success and potential expansion into more of Knightdale is an exciting proposition.

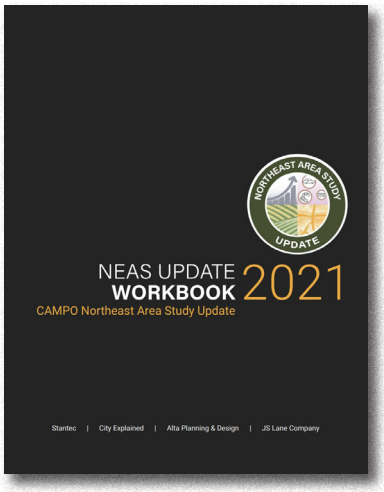
Unified Development Ordinance (UDO)

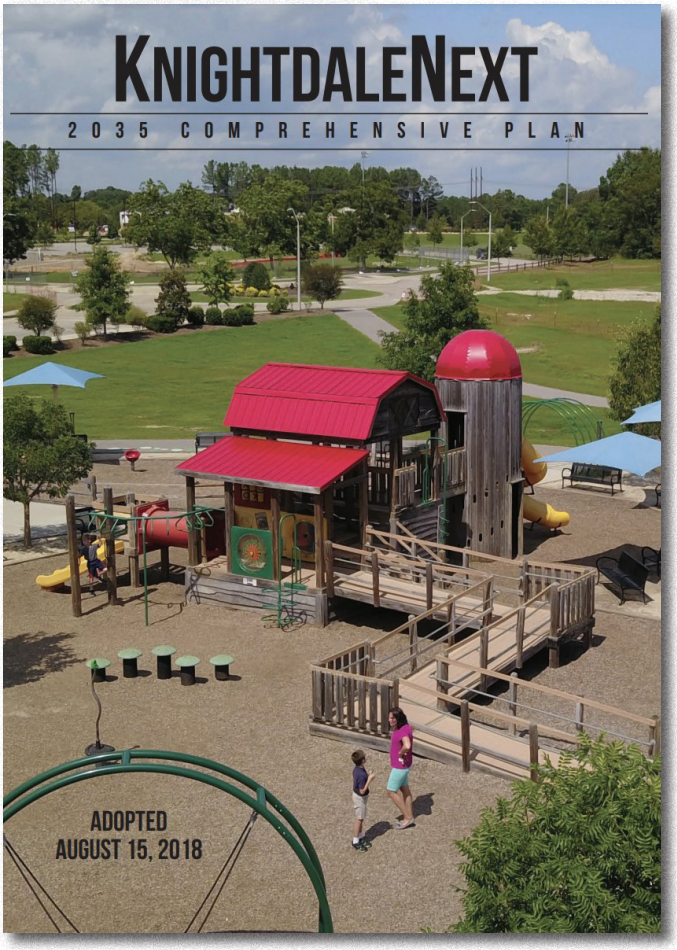
The UDO supports transit well, requiring connectivity and stop improvements especially on Avenues and Main Street roadway classes. Additional details for traffic studies or language adjustments might be considered to strengthen it even further.

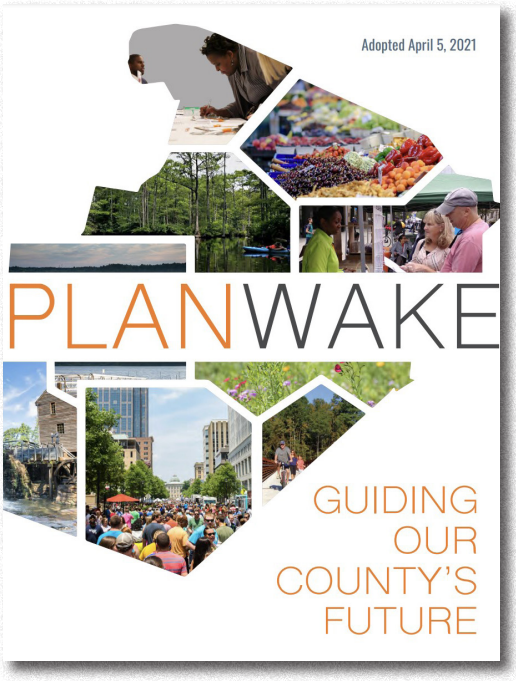
Figure 1.5: Summary of Transit **Plans** and **Implementation Policies**


WAKE COUNTY
NORTH CAROLINA
Northeastern Wake County –
NC Rural Microtransit Service Plan
Final Plan – March 2021
KFH GROUP
KFH Group, Inc.
Bethesda, MD | Austin, TX | Seattle, WA


TOWN OF KNIGHTDALE, NC
UNIFIED
DEVELOPMENT
ORDINANCE
ADOPTED JULY 21, 2021


NORTHEAST AREA STUDY
UPDATE
NEAS UPDATE
WORKBOOK 2021
CAMPO Northeast Area Study Update
Stantec | City Explained | Alta Planning & Design | JS Lane Company


KNIGHTDALENEXT
2035 COMPREHENSIVE PLAN
ADOPTED
AUGUST 15, 2018


Adopted April 5, 2021
PLANWAKE
GUIDING
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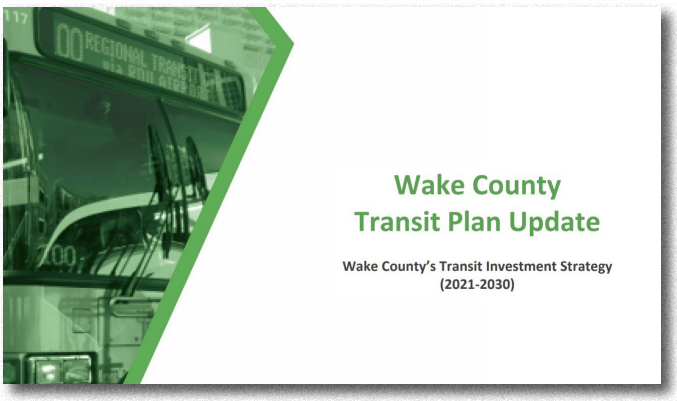
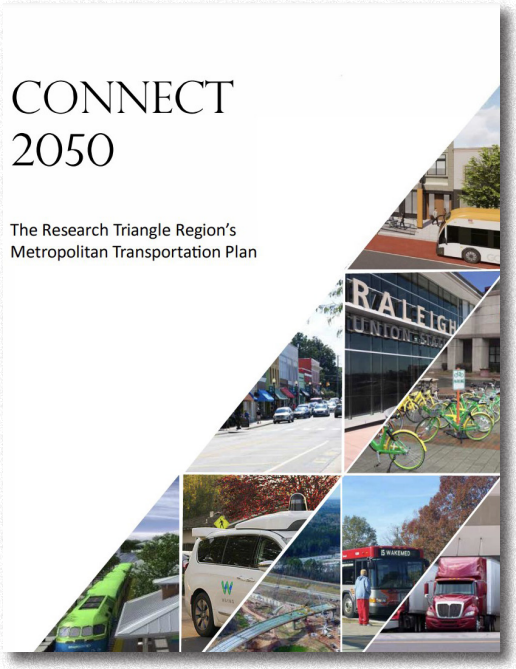

Wake County
Transit Plan Update
Wake County's Transit Investment Strategy
(2021-2030)


CONNECT
2050
The Research Triangle Region's
Metropolitan Transportation Plan

Transit Conditions & Barriers

Urban Transportation Services

GoTriangle and GoRaleigh provide express (the ZWX route, which does not currently stop inside Knightdale's Town limits, having stops in Zebulon, Wendell, Wake Medical and downtown Raleigh) and local (Route 33) bus in the vicinity of Knightdale. The ZWX Express route runs daily Monday through Friday from 6am to 7pm with three runs happening in the morning peak period and one in the evening peak period. Route 33 operates from 6:00am to 10:00pm, connecting Old Town and the town hall complex with the New Hope Commons (Wal Mart) shopping center to the west, where it has transfers to Routes 15 (Wake Med and Downtown Raleigh) and 15L (Trawick Connector that circulates in northeast Raleigh).

Ridership data reviewed to produce **Figure 1.6 shows that ridership continues to recover (ZWX) or even increased through the pandemic.** The ZWX route has historically had the highest ridership of the three eastern Wake express routes, and increased substantially in 2019. Fares are typically $3.00 per trip. However, all of the east Wake express routes have generally low ridership compared to other routes operated by GoTriangle.

Route 33, discussed in detail later, converted from an express route (KRX) to local service during this time period and realized increased ridership afterwards, even during the pandemic. Fares are $1.25 per trip. GoRaleigh took over maintenance of Route 33 in late 2021, likely a positive development as this Route fits the profile of a local, not regional, service like those administered by GoRaleigh.

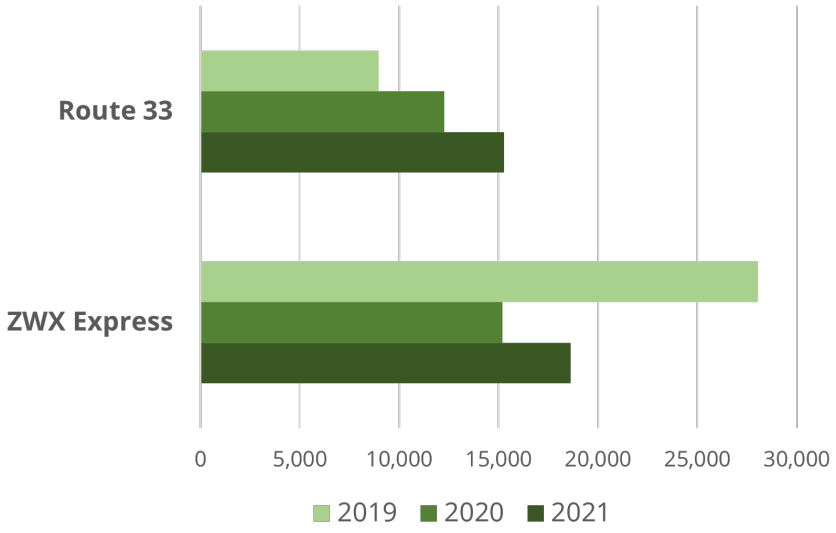


Figure 1.6: Average Daily Boardings, from 2019 to 2021
(note that service was suspended in April, 2020)

Rural and Suburban Transportation Services

GoWake Access provides door-to-door, shared-ride service for Wake County residents who are 60 years or older, disabled, have work-related transportation needs, have trips outside of Raleigh or Cary, or who participate in an eligible service (e.g., Medicaid). Service is provided Monday-Saturday from 6am-6pm. Fees for the service vary from $0 (vaccinations or Medicaid) to $4 per trip, depending on the eligibility criteria met by the rider. Rides must be scheduled 1 (general) to 3 (Medicaid) days in advance by the rider.

The full service cost per trip as of 2020 reported to the National Transit Database was $31.36. By way of comparison, Mecklenburg County's service was $20.07 per trip and Guilford County was $26.14 per trip. Figure 1.7 shows annual ridership for this service.

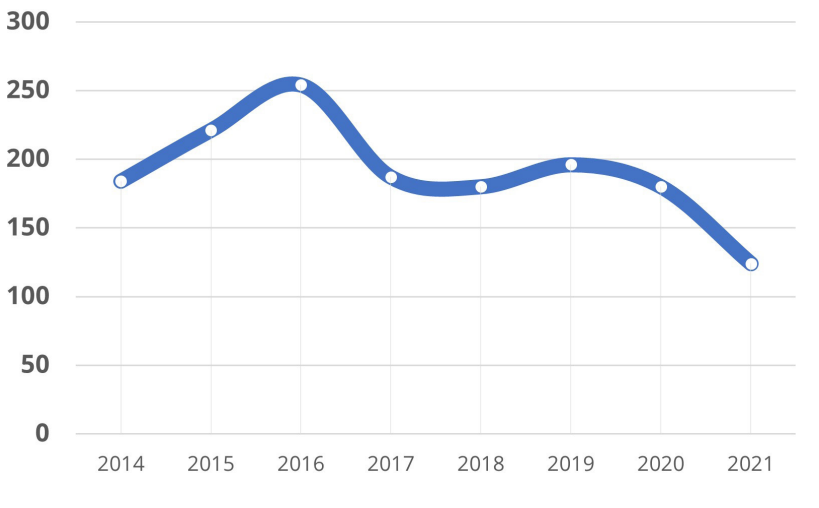


Figure 1.7: GoWake Access Annual Riders, 2014 to 2020

Ridership on GoWake Access dropped in 2021 not only due to pandemic-related reasons, but also because of a driver shortage (Figure 1.7).

Wake County was demonstrating a pilot microtransit service model during the summer of 2022. Preliminary ridership origins (orange dots) and destinations (blue dots) are shown in Figure 1.8, below. The largest concentrations of trip ends support the Route 33 eastern terminii, many with trips that start or end to the east of Knightdale.

Figure 1.8: Northeast Area Microtransit Pilot Origins and Destinations (*note: March through June, 2022*)

GO Wake ACCESS

GO Raleigh

GO Triangle

Support for Transit Now

The map below (Figure 1.9) shows the relative boardings and alightings (terms used for getting on and off the bus or other transit vehicle) for September 2021 in Wake County generally and near Knightdale, specifically. The large, dark-red circle dominating the image is the downtown Raleigh transfer point at Moore Square; over 21,000 boardings and alightings were recorded for this one month.

The 178 respondents in eastern Wake County that answered a 2020 *Wake Transit Plan* survey acknowledged transit's benefits for them and indicated support for more service.

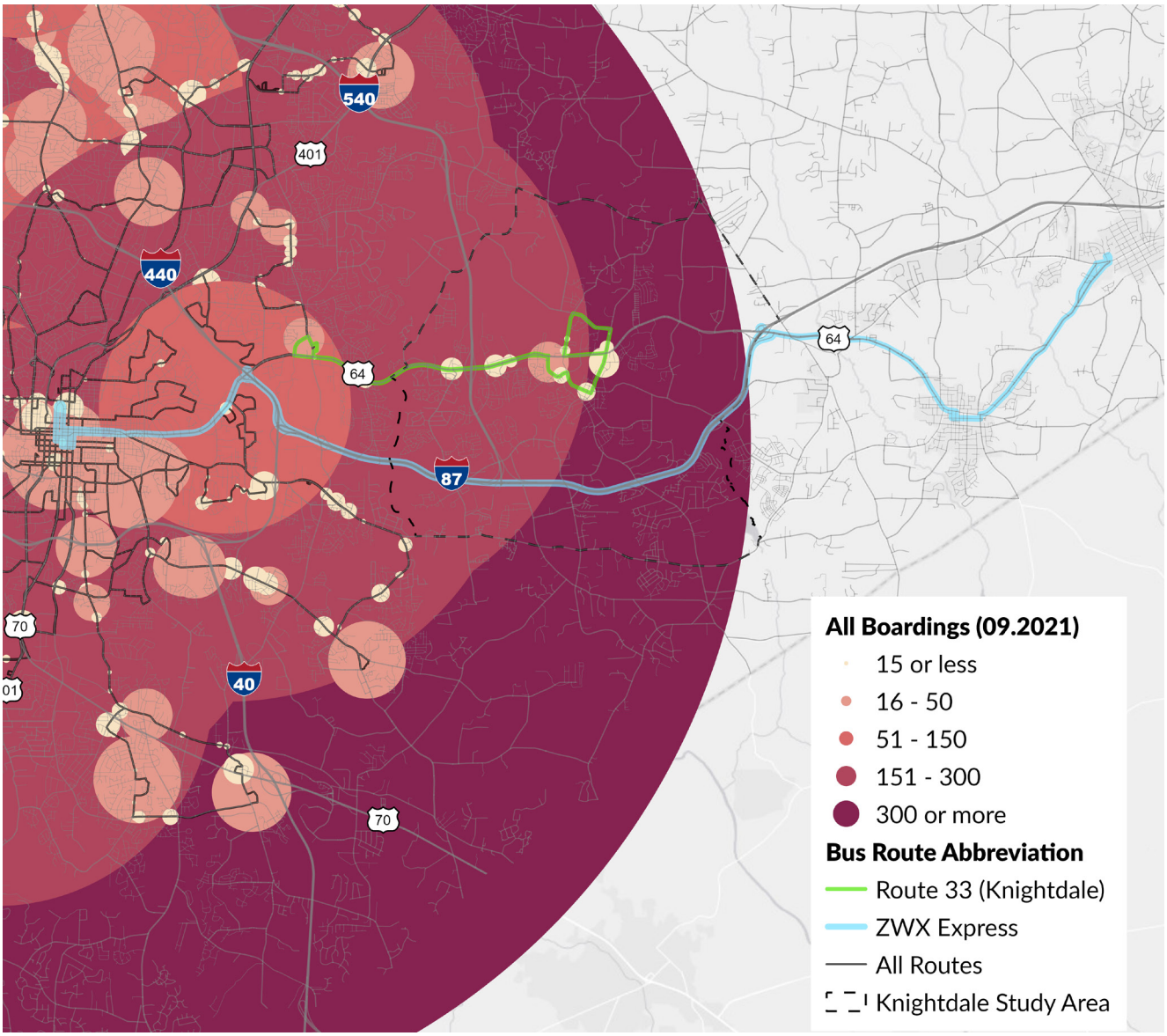


Figure 1.9: Sum of Boardings and Alightings by Bus Stop, September 2021

Diving deeper into the Route 33 ridership characteristics, **Figure 1.10 shows that there are substantial differences in the activity along the length of the route.** The WalMart-New Hope Commons stop, which transfers with Route 15 (Wake Med) and the Trawick circulator route, has more boardings and alightings, on average, than the next three most-active stops combined. The ZWX (Zebulon-Wendell Express) route currently has no stops within Knightdale.

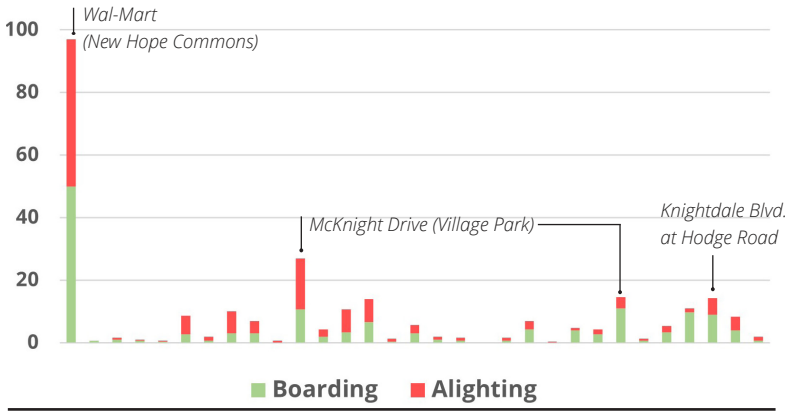


Figure 1.10: Average Daily Ridership on Route 33 (4.22 to 6.22)

The Route 33 volumes, while more modest than ZWX, have clearly risen even through the global pandemic (data from January 2019 through June 2022 were used for Figure 1.11).

Figure 1.12 on the next page provides more indicators that suggest the overall viability of various types of mobility options in Knightdale and the Knightdale Study Area, comparing them to Wake County.

As noted in the text box below, these statistics should be considered in light of Knightdale's service goals as well as traditional transit performance measures.

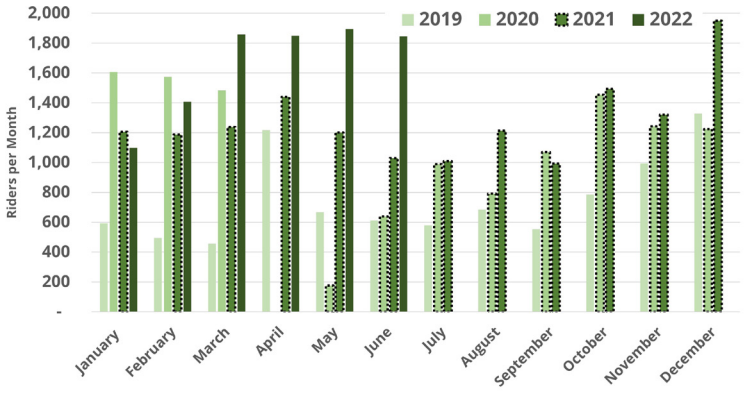
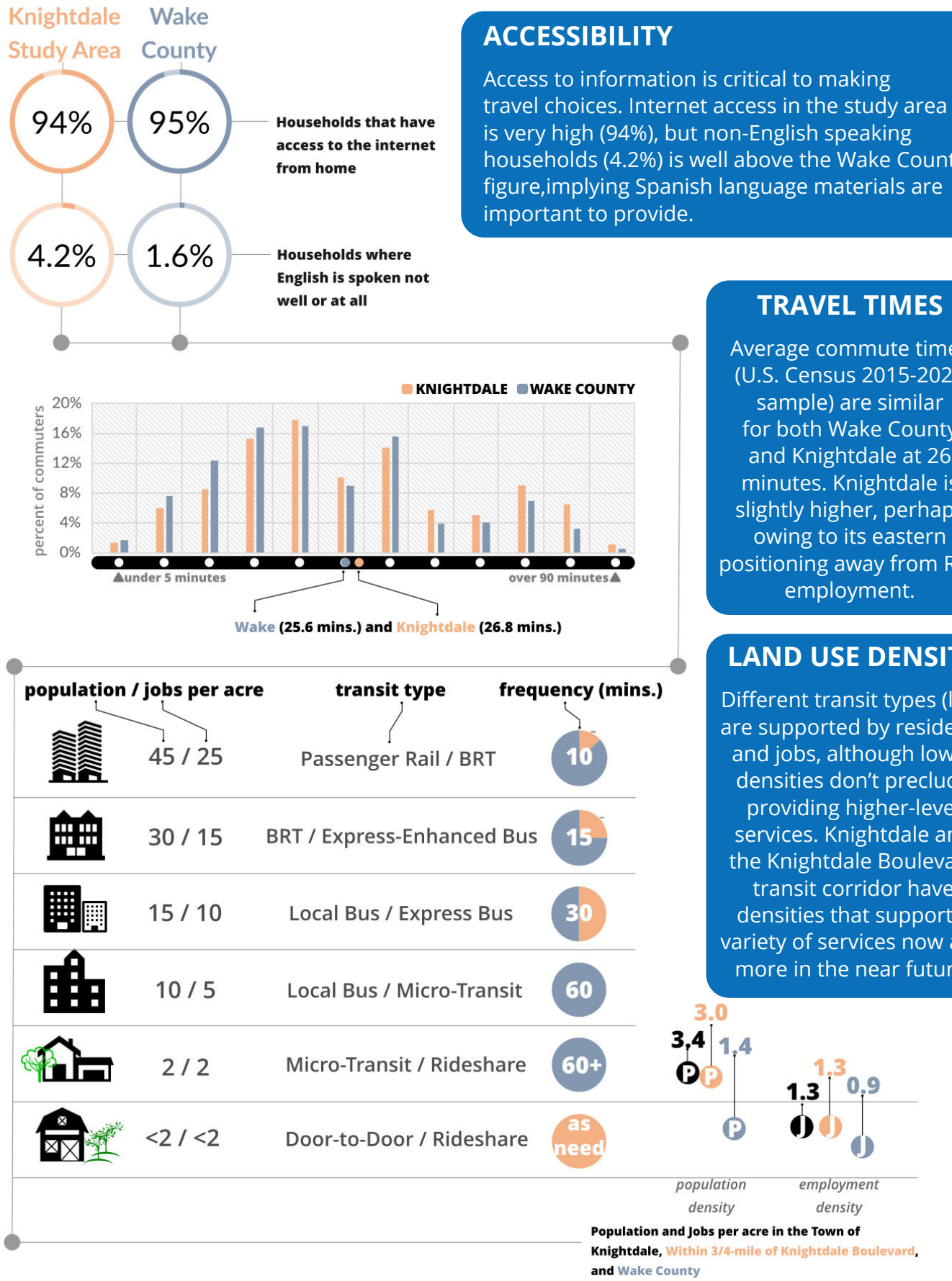


Figure 1.11: Average Ridership on Route 33 (10.21 to 6.22)

"IT'S NEVER BEEN ABOUT NUMBERS.

We've never been able to just rest on the numbers of people that rural transit serves....It's [about] the value and outcomes they create in their communities...." *- Andrei Greenawalt, Head of Public Policy, Via*

Mr. Greenawalt was specifically referencing rural transit, but the conditions in much of Knightdale's planning area emulate some of the challenges rural areas face with population densities that are currently too low to generate large numbers of riders on a traditional, fixed-route bus transit service.



ACCESSIBILITY

Access to information is critical to making travel choices. Internet access in the study area is very high (94%), but non-English speaking households (4.2%) is well above the Wake County figure,implying Spanish language materials are important to provide.

TRAVEL TIMES

Average commute times (U.S. Census 2015-2020 sample) are similar for both Wake County and Knightdale at 26 minutes. Knightdale is slightly higher, perhaps owing to its eastern positioning away from RTP employment.

LAND USE DENSITY

Different transit types (left) are supported by residents and jobs, although lower densities don't preclude providing higher-level services. Knightdale and the Knightdale Boulevard transit corridor have densities that support a variety of services now and more in the near future.

Figure 1.12: Transit Readiness of Knightdale (Buffer of Knightdale Boulevard and Town)

While population densities and even current ridership on traditional transit are important, the volume of riders isn't the only metric for successful public transportation in smaller and rural communities. **Densities of homes and businesses will and do support public transportation in the most-populated parts of Knightdale (Figure1.13)**. Development densities in the vicinity of controlled access freeways (I-540 or I-87) are sometimes approaching levels generally deemed viable for fixed-route and BRT transit services, although access to the area is sometimes convoluted by the need to route through secondary street networks removed from the freeway.

In Figure 1.13, commercial and residential units were summed and divided by the acreage of the parcel they are on. Some adjustments were made to this dataset to account for uses like self-storage buildings. Parcel boundaries were then "extruded" to represent development densities, with green shading representing at least 10 units per acre. Note that densities typically are relevant to locations where townhome- or apartment-style residences are now in place. Green shadings help support fixed-route transit, providing a different picture of transit viability than the town-wide or study area-wide statistics from Figure 1.12.

However, quality transportation service seeks to fill transportation needs that aren't only expressed in raw numbers, including needs associated with youth, seniors, mobility-constrained, and others that lack personal mobility. **Figure 1.14 on the next page indicates the presence of these various transit user groups.**

Taking these contexts into account - growth, development patterns, existing services, and meeting an array of mobility needs including those of traditionally under-represented groups - helped shape the following recommendations, as did substantial public input.

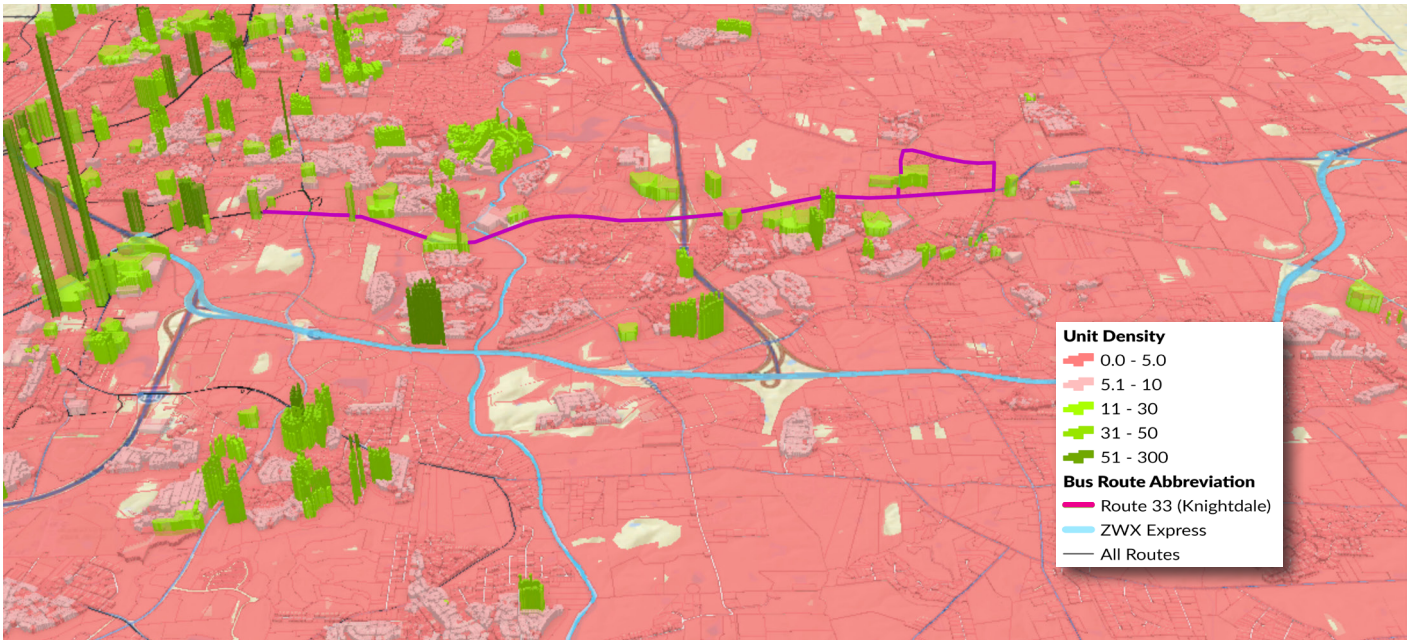
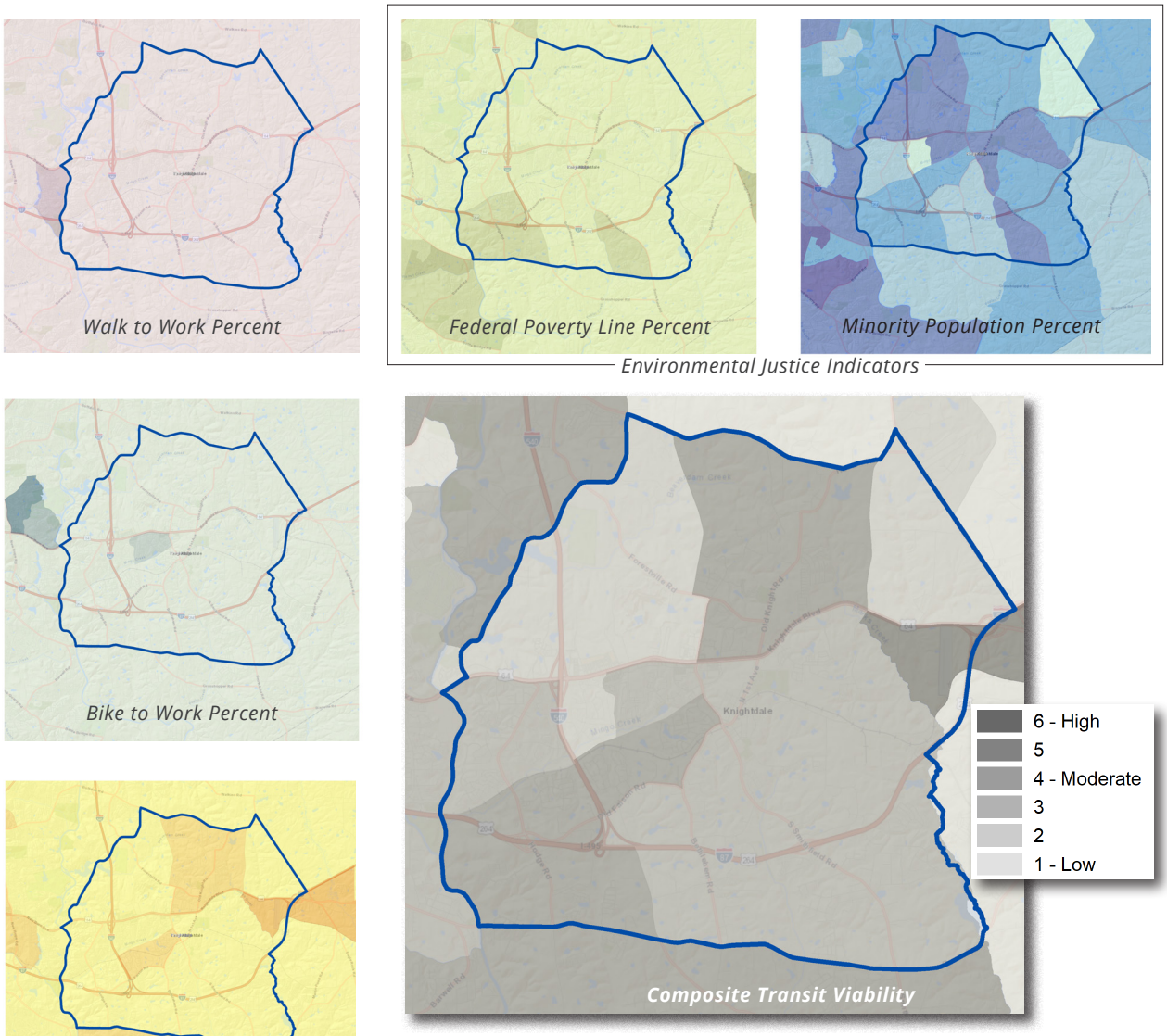


Figure 1.13: Development Density, units/acre *(Wake County GIS parcel database, April 2022)*



The maps on this page illustrate various factors that have traditionally played into analyses of transit viability and equity (low-income and minority populations, in box). Darker colors indicate a greater proportion of that variable. The larger map above is a composite overlay of all variables.

Figure 1.14: Transit Viability Factor Maps and Composite Transit Viability (ACS data, 2015-2019)

Summary of Existing Transit Conditions and Barriers

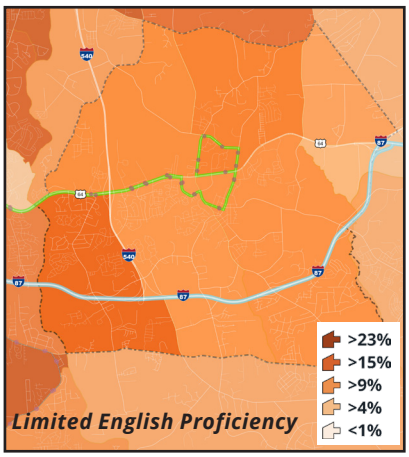
The following is an encapsulation of the current state of transit and major considerations for developing recommendations for future improvements.

Existing Services. Currently, services are limited to weekday fixed-route local service from downtown Knightdale and Town Hall to the New Hope Commons shopping center in Raleigh, with transfers to additional fixed-route and circulator bus service. An express route (ZWX) does pass through the southern periphery of the study area, but there are no stops in or near Knightdale (the nearest is the Wake Medical Center complex in east Raleigh). Fares for the local service are $1.25, and paratransit (door-to-door) service is available for typically $4 per trip, but requires significant advance notice and ample time for pickup and dropoff variations.

Support for Public Transportation. Past plans and policies in Knightdale and nearby communities strongly support public transportation, including recommendations in the Town's *Comprehensive Plan*. Past surveys of eastern Wake County residents also indicate support for public transportation options (source: *Northeast Area Study Update*, 2021).

Barriers to Transit. Significant barriers still exist that stand in the way of enhancing existing services or providing new ones.

- *Information / Marketing.* Providing transit information in Spanish is important for the households that have limited English-speaking proficiency (*see figure, right*). Having a coordinated approach to create a consistent, town-centric brand for public transportation is important, as well as providing the underlying marketing resources to build awareness of transit: several people noted that they were not aware Knightdale has existing transit services.
- *Access.* Walk-up trips are crucial to public transportation's success, and providing more connectivity between developed parcels and completing sidewalk and biking networks will improve accessibility to transit stops. Infrastructure projects that support biking and walking need to prioritize those areas that rely on public transportation (and biking or walking) and proximity to transit stations. GoRaleigh's efforts to add shelters, benches, and other stop amenities along Route 33 is also noteworthy.



- *Land Use Support.* Knightdale's *Comprehensive Plan* supports transit-oriented development, and making that support more tangible through increasing density and design requirements in the areas around transit will build the foundation for higher-quality transit services like bus rapid transit (BRT) and passenger rail service.

Trends and Technology. As connected-autonomous vehicles, vehicle sharing, micromobility, and mobility-as-a-service options become more widespread, Knightdale should leverage those concepts with partnering agencies. Dense and diverse land use patterns and intelligent infrastructure like signal prioritization (beneficial to emergency response and transit vehicles) set the table for other transit services to be implemented later. Mobility-as-a-Service and Micromobility Hubs are two technology-enabled practices discussed on the following pages.

explanation: mobility-as-a-service (MaaS)

Traditional transportation projects and programs focus heavily on roadway or other mode-specific infrastructure development. ***Combining the definition of micromobility and mobility as a service (MaaS) produces recommendations for the services, education, and infrastructure that allow people to select from a broad set of mobility solutions, finding the transportation service, route, time, vehicle, and cost that works best for them.*** Micromobility features small, lightweight, and often electric vehicles while MaaS focuses more on the broader ecosystem of booking and payment systems that support a wide variety of travel options (including micromobility vehicles). Recommendations in the ever-changing MaaS space follow.

MOBILITY AS A SERVICE, DEFINED

"Mobility as a Service (MaaS) **integrates various forms of transport services into a single mobility service accessible on demand**. A MaaS operator facilitates a diverse menu of transport options to meet a customer's request, be they public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or a combination thereof.

For the user, MaaS can offer added value by using **a single application to provide access to mobility with a single payment channel** instead of multiple ticketing and payment operations. For its users, **MaaS should be the best value proposition** by helping them meet their mobility needs and solve the inconvenient parts of individual journeys and the entire system of mobility services."

- The MaaS Alliance *(https://maas-alliance.eu)*

Coordination with CAMPO and NCDOT is important to ensure seamless development of technologies and to assist with implementation.

Car-Sharing Services allow people with infrequent mobility needs that they can't accommodate any other way to have access to a shared car. These systems can be pooled among limited users or operated through a company like Turo or ZipCar.

Hybrid Transit Options like on-call route deviation or enhanced / expanded paratransit services, sometimes in cooperation with private taxi companies, are also making traditional transit options more innovative and competitive.

Augmented TNC (Transportation Network Companies) Services are changing what people think of when they talk about companies like Uber or Lyft. Public subsidies for rides that begin or end at transit lines or medical services help improve existing services and equity propositions. The NE Wake SmartRide program is one example.

Dedicated Cross-Service Mobile Apps are being developed now by individual cities tailored to their specific needs and service arrangements. Since a key component of MaaS is access to multiple modes it helps to have an app in your pocketbook that manages bikesharing, escooters, shared cars, bus ticketing, parking, or rental reservations through one integrated platform.

explanation: mobility hubs

Mobility Hubs are places that collect two or more transportation options in one place. They often have elements of micromobility and MaaS, and are therefore great places to start implementing these techniques in smaller but growing communities like Knightdale.

Mobility hubs can and should be scaled to evolve over time and to match the needs of the communities within 1 - 2 miles of the hub. In all cases, mobility hubs are built around a fixed transit stop. Knightdale should focus on starting with Neighborhood-scale hubs, and add elements from Commuter and Regional categories as needs dictate and resources become available (Figure 1.15).

Mobility Hub Element *(refer to graphic below)*	Neighborhood	Commuter	Regional
1. Fixed-Route bus stops	●	⊙	●
2. Static travel information	●	⊙	●
3. Seating, shelter, lighting	●	⊙	●
4. Bike parking	●	●	●
5. Real-Time travel information		⊙	●
6. Electric vehicle charging	❍	●	●
7. E-Scooter rentals	❍	❍	●
8. Bike station	❍	❍	●
9. Microtransit pickup/dropoff		❍	●
10. Affiliated with Major Destination			●
11. Restroom / Changing station / Lockers		❍	●
12. Ticketing		❍	●
13. Retail / Vendors			●
14. Integrate High-Capacity Transit	❍	❍	●
15. Dedicated car share space(s) (Zipcar)		❍	●
16. Dedicated vanpool space(s)		❍	●

●*Typical* ⊙*Typical if on Transit Route* ❍*Location-Dependent*

Figure 1.15: Scaling the Elements of a Mobility Hub

3 Transit Mobility Improvements

While the Transit Mobility Plan emphasizes practical project and policy recommendations that bolster transit service, reliability, and quality, it's important to remember that roadway, biking, walking, and economic opportunity are all ingredients to carrying out a successful mobility plan.

Generally, recommendations fall into three time periods to facilitate a logical progression of integrated implementation for local bus service, express service, micromobility/MaaS, and supporting policies and infrastructure investments that culminate in the development of a bus rapid transit service (Figure 1.15, next page).

- ***Short-Term Transit (1-2 years).*** Access improvements, policy modifications to support transit-oriented development, and enhancements to existing service
- ***Mid-Term Transit (3-5 years).*** Frequency improvements on local bus service, expanded micro-transit service, add stop on ZWX line at Wendell Falls, and route extensions both east and west for local service.
- ***Long-Term Transit (6-10 years).*** Work with GoRaleigh, GoTriangle, Town of Wendell, and Wake County to implement new BRT service, increasing micro-transit capacities and optimizing other fixed-route services.

The vision for transit mobility in Knightdale can be summarized in a vision statement: **Successful mobility in Knightdale means connecting our people with the transportation choices they want to use.**

1 M MOBILITY =

3 P PEOPLE +

2 C CHOICES

Summary of Recommendations

Sometimes a high-level view of how transit implementation will work helps to provide a foundation for understanding the specific, detailed recommendations. The graphic below **(Figure 1.16) can be used as a reference point for considering how existing transit services would be first augmented, then potentially supplemented, by progressively more advanced forms of public transportation. Note that the Town is already doing some supporting actions, like programming sidewalk improvements or executing transit-friendly development policies, and that there is already local and (nearby) express bus service.** It's important to understand how seemingly diverse recommendations work in concert to set the stage for each advancement. For example, connected pedestrian and biking networks help current and future transit services, and public policy that intensifies the quantity and quality of development in transit corridors are put in place in the near term to prepare the landscape for bus rapid transit and, eventually, passenger rail services.

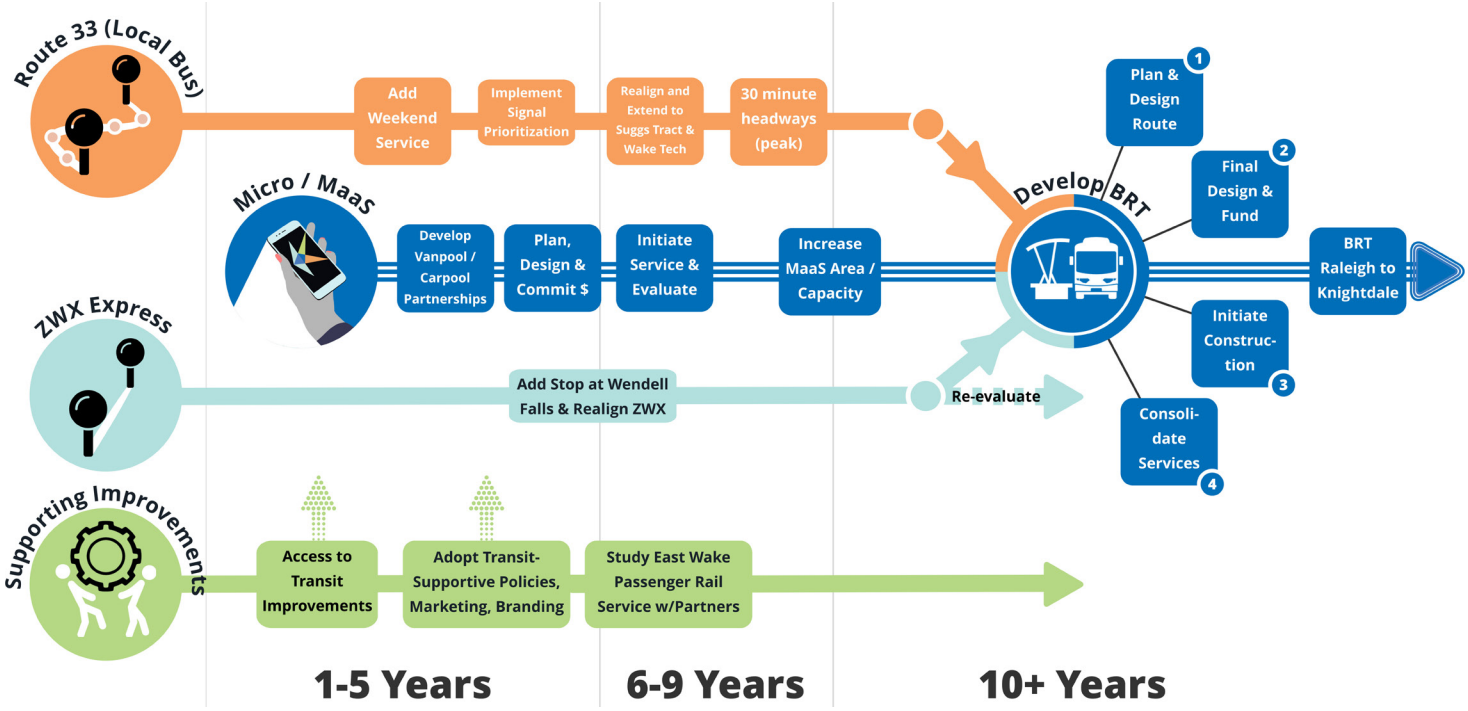


Figure 1.16: Strategy for Phased Implementation of Recommendations

Short-Term Recommendations

The short-term (this page and next) and mid- and long-term recommendations (next two pages) provide specific detail on how the vision for transit mobility in Knightdale will be implemented and the timeframes for various key elements and supporting projects.

Short-term (one to five years) actions include accessibility projects to connect people with bus service on foot; making intersections safer and less of a barrier to cross busy streets; and programmatic actions including expansion of micro-transit service and policies that support transit use through marketing and policies that increase the design density and quality along major transit corridors.

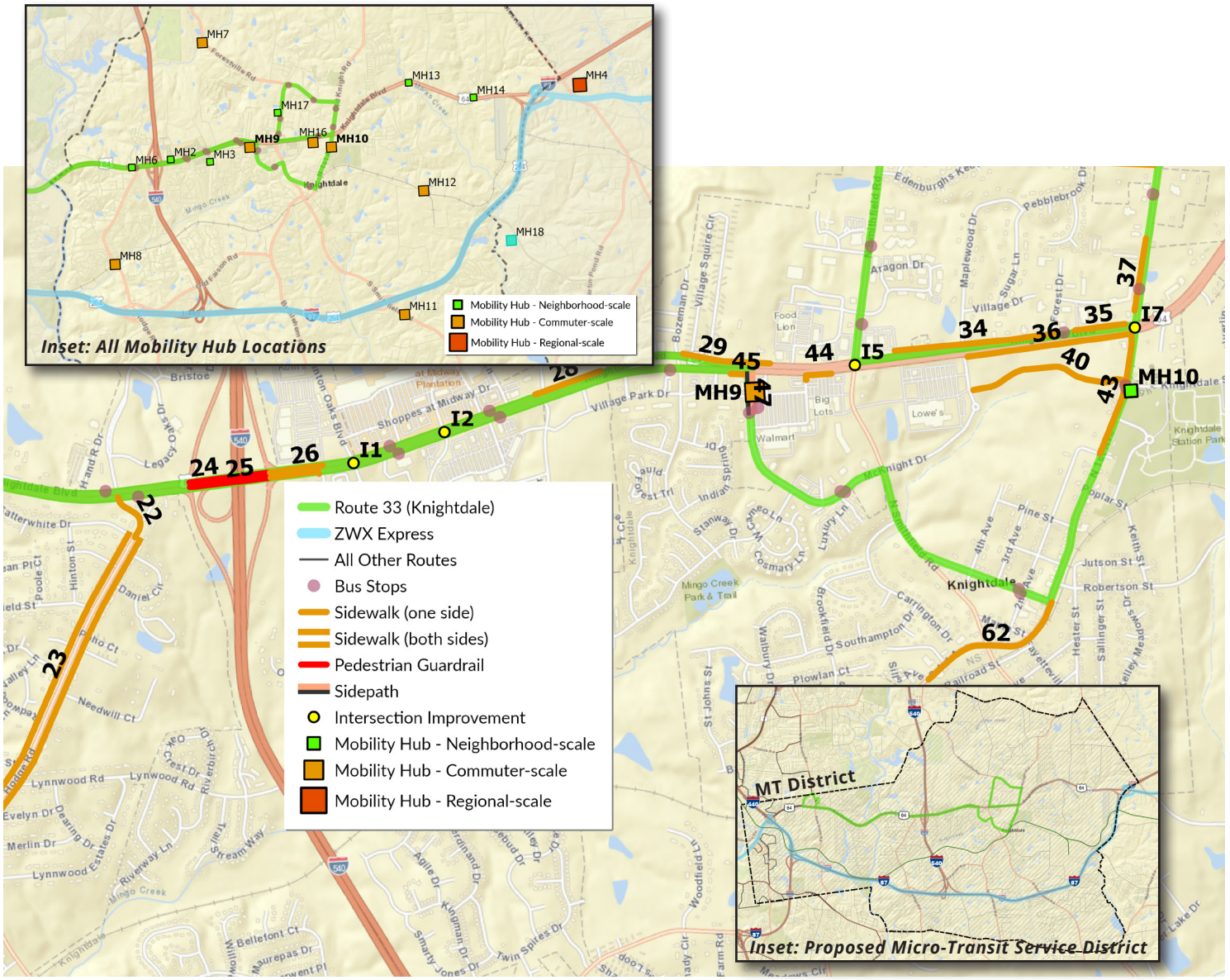


Figure 1.17: Short-Term Transit Mobility Recommendations

Map ID	Location	Type	Notes	Length (feet)
various	refer to inset map	Mobility Hub	Construct mobility hubs (neighborhood, commuter, and regional scales)	
I1	US 64 Bus / Hinton Oaks Blvd	Intersection Improvement	Add high-visibility crosswalks (3); install pedestrian median refuges (2); install pedestrian signals (4 corners)	
I2	US 64 Bus / Widewaters Pkwy.	Intersection Improvement	Add high-visibility crosswalk (1); install pedestrian median refuges (2); install pedestrian signals (2 corners)	
I5	US 64 Bus / N. Smithfield Road	Intersection Improvement	Add pedestrian signals (2 corner heads+median); pedestrian refuge on west leg w/two-stage crossing; add pedestrian-scale lighting; replace / repaint existing crosswalks and stop bars	
I7	US 64 Bus / N First Ave-Old Knight Rd	Intersection Improvement	Add pedestrian-activated signals (4 corners); install high-visibility crosswalks (4); install pedestrian refuges (2); install pedestrian-scale lighting (4)	
22	Hodge Road	Sidewalk	Connect Satterwhite Drive (and proposed Hodge Road sidewalks to Mingo Creek Greenway to the south) to US 64 Bus.	255
23	Hodge Road	Sidewalk (both)	Extend Hodge Road sidewalks north from south of Lynnwood Estates Dr. to Satterwhite Dr.	1,999
24	US 64 Bus over I-540	Pedestrian Guardrail	Install pedestrian safe guardrail and raised pedestrian buffer (concrete) on north side of I-540 bridge	404
25	US 64 Bus over I-540	Pedestrian Guardrail	Install pedestrian safe guardrail and raised pedestrian buffer (concrete) on south side of I-540 bridge	405
26	US 64 Bus	Sidewalk	Sidewalk near shops at Midway (north side)	264
27	US 64 Bus	Sidewalk	Sidewalk at Shops at Midway, west of Lowe's Foods (south side)	250
28	US 64 Bus	Sidewalk	North side, from west of High Drive	346
29	US 64 Bus	Sidewalk	North Side, west of Food Lion to Bozeman Dr.	438
33	Forestville Road	Sidewalk	South side, Old Knight Road to west of Pebblebrook Drive	558
34	US 64 Bus	Sidewalk	North side (note that existing sidewalk will need to be replaced)	794
35	US 64 Bus	Sidewalk	North side, McKnight Drive to Old Knight Road	250
36	US 64 Bus	Sidewalk	South side, Maplewood Drive to west of N. First Avenue	813
37	Old Knight Road	Sidewalk	West side, north of Knightdale Boulevard	366
40	New Street	Sidewalk	Private funded with new street (Suggs' Tract)	811
43	North First Ave	Sidewalk	West Side, serves Suggs Property and Knightdale Station Park	640
44	US 64 Bus	Sidewalk	South side, west of N. Smithfield Road (fronting Big Lots)	153
45	US 64 Bus	Sidewalk	South side, from west of McKnight Drive	93
47	McKnight Drive	Sidewalk	East side; Stop #8458 to Knightdale Boulevard	187
62	First Avenue	Sidewalk	East side; part of Old Town construction; short-term gap elimination	785
MT District	*Micro-Transit Service District*	*Expanded Service*	*Expand the Northeast Wake micro-transit geofence area to include both Knightdale study area and Wake Medical complex*	*N/A*
not shown	*Route 33*	*Service Enhancements*	*Add weekend service (1); increase frequency, and (2) add limited weekend service*	*N/A*
not shown	*Marketing & Branding*	*Program*	*Retain services of professional marketing company to help brand and market existing and (ongoing) service enhancements*	*N/A*
not shown	*Town-Wide*	*Supportive Policy*	*Increase density allowances and design / connectivity requirements through development of Transit Overlay District*	*N/A*
not shown	*Town-Wide*	*Program*	*Support the creation of vanpool and carshare arrangements through existing GoTriangle programs*	*N/A*
not shown	*US 64 Business (Knightdale Blvd.)*	*Signal Timing*	*Study and complete signal prioritization for emergency and transit vehicles on US 64 Business / Knightdale Boulevard from New Hope Road to North First Avenue*	*N/A*

Table 1.18: Short-Term Transit Mobility Recommendations

Mid- and Long-Term Recommendations

Mid- and long-term actions continue building on the shorter-term objectives, including branding transit services, creating pedestrian and bicycling connections to bus stops and (more) Mobility Hubs, and expanding local bus service. But the longer-term vision incorporates bus rapid transit (express bus service with additional stop amenities that generally travels in its own rights-of-way) extended from the New Bern Wake Medical campus to the west. This vision also includes studying passenger rail alternatives and costs, then moving forward with implementation when the major partners are ready.

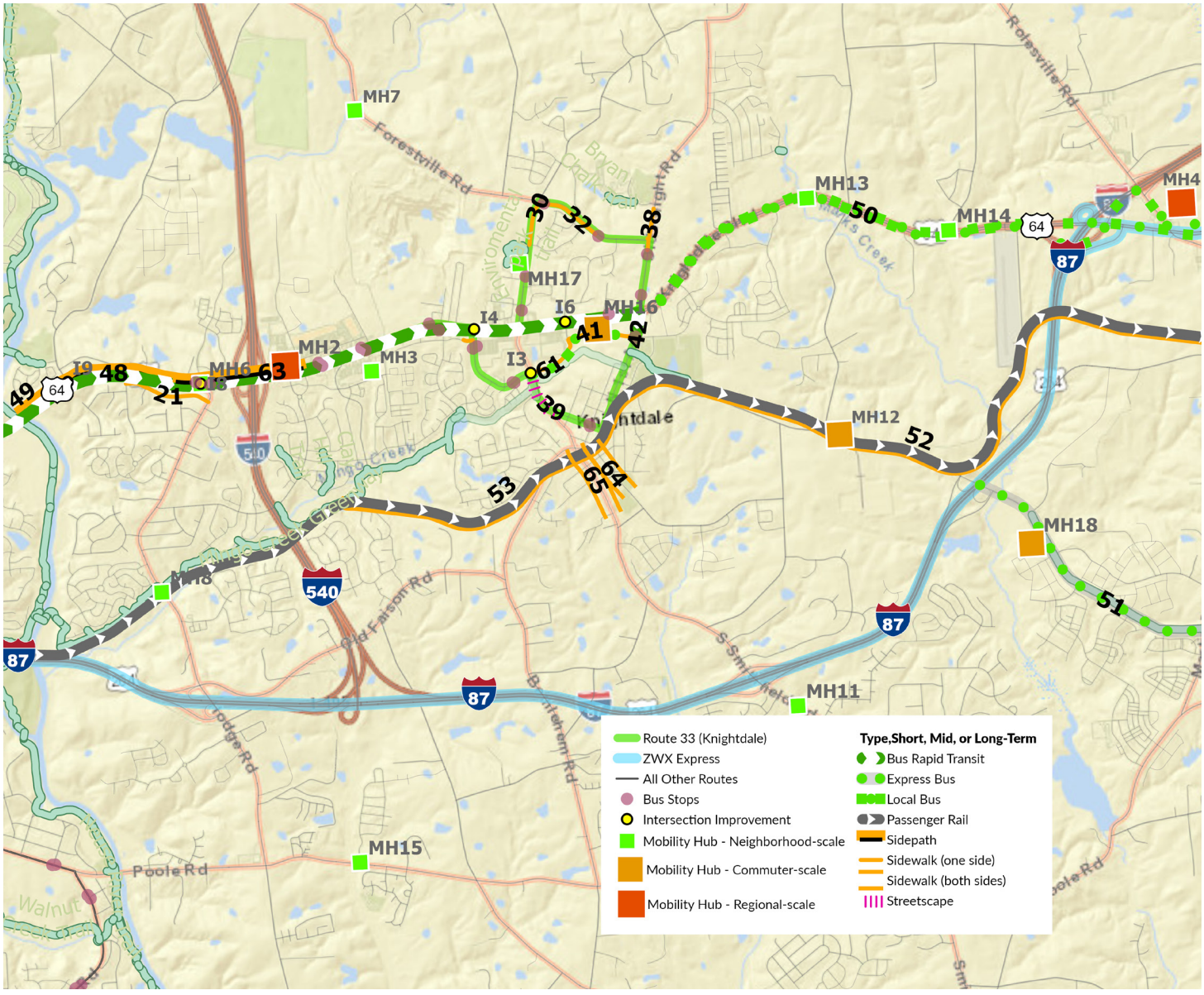


Figure 1.19: Mid- and Long-Term Mobility Recommendations

Map ID	Location	Type	Notes	Length (feet)
various	*refer to map*	Mobility Hub	Construct mobility hubs (neighborhood, commuter, and regional scales)	
I3	N. Smithfield Road / McKnight Road	Intersection Improvement	Add high-visibility crosswalks (2); install pedestrian signals (2 corners) - should be part of gateway improvements as Old Town develops	
I4	US 64 Bus / McKnight Dr	Intersection Improvement	Add high-visibility crosswalks (3); pedestrian-scale lighting (2 on south corners); pedestrian refuges (3); pedestrian-activated signals (4)	
I6	US 64 Bus / Maplewood Dr	Intersection Improvement	With sidewalk construction on north side: Add high-visibility crosswalks (4); pedestrian-activated signals (4); pedestrian refuges (2)	
I8	US 64 Bus / Hodge Road	Intersection Improvement	Add high-visibility crosswalks (3); install pedestrian median refuges (2); install overhead lighting (4); Town is adding new crosswalk (east leg)	
I9	Old Milburnie / Knightdale Road	Intersection Improvement	Add bus stops, crosswalks, and pedestrian signals (4 corners). Add pedestrian refuge in medians (2). Redesign to improve Farmwell Road pedestrian crossings	
21	Satterwhite Drive	Sidewalk	North side, Hodge Road to Westover Drive	999
30	N. Smithfield Road	Sidewalk	East side, Forestville Road to Edenburghs Keep Drive	496
31	Old Knight Road	Sidewalk	West side, south of Forestville Road	113
32	Forestville Road	Sidewalk	South side, east of N. Smithfield Road to west of Pebblebrook Drive	660
38	Old Knight Road	Sidewalk	West side, connects to Knightdale Community Park	365
39	Main St. and N. Smithfield Road	Streetscape	Widen with new development, add streetscaping amenities, pedestrian-scale lighting	703
41	McKnight Drive	Sidewalk	North side, extension of McKnight Drive across Suggs' tract	1,478
42	North First Ave	Sidewalk	East side, connects with Knightdale Station Park	178
46	Village Park Drive	Sidewalk	North side, west of McKnight Drive	113
48	US 64 Bus	Sidepath	North side sidepath (12'); could use Farmwell Road for temporary section on eastern half of alignment	1,936
49	US 64 Bus (parallel)	Sidepath	Sidepath along US 64 Business (Knightdale Boulevard)	81
50	Route 33 Extension	Local Bus	Extension of Route 33 from Wake Tech East to Old Town	7,180
51	Wendell Boulevard	Express Bus	Re-Routing of ZWX; include new stop in Wendell Falls	9,352
52-57	NS Rail-Trail	Sidepath	Three Sisters Rd to Poplar Street; entering downtown Knightdale; connects with Knightdale Station Park	5.1
58	US 64 Bus.	Bus Rapid Transit	US 64 / Knightdale Boulevard, Stops at Midway, Village Square, and Knightdale Station Run (terminus)	10,928
59	NS Railroad	Passenger Rail	Connect Raleigh Union Station to Knightdale Old Town (phase 1)	25,839
60	NS Railroad	Passenger Rail	Passenger Rail service between Old Town Knightdale and downtown Wendell (phase 2)	13,846
61	McKnight Drive / new street	Local Bus	Realign Route 33 on McKnight Drive extension to North First Avenue	1,473
64	Fayetteville St.	Sidepath	Connecting to Knightdale Elementary School and Park from First Avenue to Park	676
65	S. Smithfield Rd.	Sidepath	Connecting to Knightdale Elementary School and Park from First Avenue to Park	876

Table 1.20: Mid- and Long-Term Transit Mobility Recommendations

Appendix: Plan & Policy Review

The adopted plans and policies of Knightdale, as well as Wake County and other government partners, are crucial to shaping the land use patterns and transportation networks that support public transportation. These plans and policies are summarized in the main body of the Transit Mobility Plan, detailed in the pages that follow, and are considered in this Plan's recommendations.

KnightdaleNext 2035 Comprehensive Plan (2018)

KnightdaleNext's Growth Framework identifies key nodal areas for growth and public and private investment. Core areas include the US 64 Bus/Knightdale Boulevard corridor, Smithfield Road corridor, and Old Town Knightdale. Investment areas are designated for more compact, efficient infill development, with mixed uses and walkable activities that use placemaking to create a distinct community identity. Old Town Knightdale should develop as the center of the community, with walkable development for in-town living and public spaces for events.

Ten Guiding Principles frame the Plan.

1. Unique Activity Centers
2. Natural Environment
3. Infill Development and Redevelopment
4. Parks and Recreation
5. Transportation
6. Compact Development Patterns
7. Community Design
8. Economic Vitality
9. Community Facilities & Services
10. Great Neighborhoods & Expanded Home Choices

The Plan proposes a network of trails, greenways, and bicycle routes largely aligning with existing major corridors and streams. The Mingo Creek Greenway, which connects to the City of Raleigh's greenway network, is proposed for extension to Knightdale Station Park and to the eastern municipal limits. The Plan also calls for the creation of a connected street network that incorporates Complete Streets design principles. New arterials and collector streets are proposed throughout the town, with significant new road construction north of Old Town Knightdale.

The Plan identifies five focus areas for detailed conceptual recommendations to highlight preferred development patterns. Transit investment is cited, with phased extension of the New Bern Avenue Bus Rapid Transit first to the Shoppes at Midway Plantation, and a second phase to east of Old Town Knightdale.

1. The Mixed Density Residential/Recreation Complex/Retail area calls for safe, comfortable pedestrian and bike facilities within new development to include benches, lighting, and bike racks, to make alternative transportation more viable along important routes.
2. Suburban infill areas should deemphasize cars by prioritizing pedestrian space and facilities, with new UDO policies incorporating pedestrian-oriented street and streetscape design standards.
3. Transit-Oriented Development areas should facilitate future transit through incorporation of transit facilities.

Takeaways for Transit Mobility Plan

- Concentration of development at key locations and routes
- Increase demand and services for alternative transportation modes, like transit, biking, and walking
- Prioritize investments in key nodes and focus areas identified in the Plan
- Acknowledge updates to earlier, cited plans, like the Greenways and Pedestrian plans

Knightdale Unified Development Ordinance (2021)

Knightdale's UDO translates town policies and strategies to shape the development of the Town. The UDO defines arterial and collector streets, and for Knightdale-owned roads it requires roundabouts to be constructed at the intersection of collectors, arterials, or any combination of these.

Subdivision Standards define the arrangement of properties and streets create a hierarchy of road types with design specifications. Streets are separated into three categories:

- Alleys and Local Streets
- Avenues (and Urban Avenues) and Main Streets
- Boulevards and Freeways

These street classifications do not align with the existing Functional Classification Map or Arterials and Collectors Map, but roughly correspond with local roads, collectors, and arterials in traditional functional classifications. Design standards identify requirements for lane width, right-of-way, parking, medians, and bicycle/pedestrian facilities. In the case of Avenues and Main Streets, these are designed to "improve transit operation" (Chapter 10.4.A.2).

Development standards include requirements for large commercial parking areas (100 spaces or more) to have a park-and-ride area of five spaces established and signed within them (Chapter 7.1.E.). Additional accommodations may be required as well to support existing or future transit services, including shelters and benches.

Parking allowances of up to 10% are permitted to adjust the minimum parking amounts if the lot is within 900 feet of public transit (Chapter 7.1.H.1.b). Parking maximums, a best practice standard, are also required.

Chapter 7.3.H. requires pedestrian connections to be made to "existing or planned" transit stops and between developments.

Chapter 11.3 is notable for its description of circulation and connectivity requirements applied to new developments, which are of key importance to transit accessibility. The Traffic Impact Analysis (TIA) guidelines require showing how transit, bike, and pedestrian improvements can reduce vehicular travel demand from proposed site developments (Chapter 12.3.J.4.h).

Takeaways for Transit Mobility Plan

- Contemplate adjustments to an already very strong UDO to support transit
- Consider the development of an Overlay District ("floating zone") for primary transit corridors, or modify an existing Overlay District description
- Clarify the requirements in 7.1.E. to refer to "planned" transit services in the private provision of transit stop amenities, as is done in Chapter 7.3.H.
- Modifications to the street cross-sections that describe Avenues and Main Streets should include (1) a depiction of a street intersection to show how pedestrian safety and connectivity are incorporated into the design of these streets, and (2) a depiction of a transit stop and shelter area.

Capital Area MPO Transportation Planning (various)

The Capital Area Metropolitan Planning Organization (CAMPO) serves a regional role in transportation development for long-range planning as well as shorter-term planning for site-specific and transit improvements. They manage the Locally Administered Projects Program (LAPP) and Community Funding Area (CFA) programs. These programs are key implementation tools for planning and operating transit services and infrastructure improvements (like intersection improvements and pedestrian/bicycle connectivity projects). Projects using state or federal transportation dollars must be on the adopted Metropolitan Transportation Improvement Program, MTIP, which CAMPO prepares and adopts with NCDOT and other partners. The long-range plan exercises are described below.

Capital Area Metropolitan Transportation Plan 2050 (MTP, 2022). CAMPO's *CONNECT 2050* MTP identifies planned and prioritized improvements to Knightdale's multimodal transportation network through the year 2050. Specific projects are readily accessed on-line (link). BRT is shown in this plan extending to Knightdale as a "future" project from Raleigh to a point east of downtown Knightdale, as is commuter rail extending from Raleigh to Knightdale and destinations to the east.

Northeast Area Study & Update (NEAS, 2021). The *NEAS Update* builds upon the 2014 *Northeast Area Study*, which encompasses Knightdale and surrounding areas of eastern Wake County and southern Franklin County. The goal of *NEAS* is to ensure the development of a cohesive transportation network through coordinated strategies among the 435 square mile study area. *NEAS*'s preferred development scenario envisions growth concentrated in key priority areas, corresponding with those identified in the Knightdale's *Comprehensive Plan*. Reducing traffic congestion, increasing walkability, reinvigorating downtowns, and protecting natural resources led the *NEAS Update's* recommendations, which for Knightdale included the following transit improvements.

- Extension of the New Bern Avenue Bus Rapid Transit to Knightdale, and creation of Urban Complete Streets corridor along Knightdale Boulevard/US 64 Business and Old Town Knightdale
- Formation of a NEAS-Area circulator route
- Transit Service to the new Wake Tech Campus along US 64 Business

Takeaways for Transit Mobility Plan

- Recognize the importance of the LAPP and CFA programs to implementation, and ensure that recommendations strengthen the applications to optimize funding opportunities - note that there were no eastern Wake County projects funded in FY2023 LAPP
- Utilize this channel to study and advance bus rapid transit (BRT) and commuter rail transportation (CRT) recommendations.
- Transmit the *Transit Mobility Plan* to CAMPO, and coordinate with CAMPO staff prior to adoption to ensure that regional planning (e.g., MTP) is aligned with local recommendations and goals

Wake County Transit Plan (2021)

The Wake Transit Plan (link) defines a ten-year strategy for investment in public transit throughout Wake County. Goals of the Plan are defined as four "Big Moves", with strategies associated for each: Connect Regionally, Connect All Wake Communities, Frequent and reliable urban mobility, and enhanced access to transit. This Plan acknowledges population and employment increases in Knightdale, although the area is still low-density compared to what is desired for fixed-route transit.

Sixty-minute, all-day service was part of the Route 33 transition from an express route. The New Bern Avenue BRT corridor will extend east of the I-440 Beltway to the New Hope Commons shopping center (the western terminus of Route 33 now). The BRT project is expected to open in mid- to late-2025, although actual construction processes can take longer than expected.

Frequent, reliable urban mobility: with frequent defined as 15 minutes or better, the plan calls for frequent service along the New Bern Avenue/Knightdale Boulevard corridor east of WakeMed Raleigh. The Plan also mentions expansions of service duration and weekend services county-wide.

Takeaways for Transit Mobility Plan

- The Wake Transit Plan is guided by committee (TPAC), which meets monthly. Coordination and attendance at these meetings, as well as with CAMPO staff, should continue
- Recommendations should cross over into the Wake County Transit Plan, and look to accelerate or expand planned service provisions in accordance with this Plan's focus on expanded service, mobility choices, and accessibility

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Northeast Wake County Rural Microtransit Service Plan (2021)

This microtransit plan was funded in part by a federal grant and has led to a pilot service being initiated in 2022. GoWake SmartRide NE service will be implemented through a partnership with Uber but utilize ADA-accessible vans. Once service is requested through the Uber app, riders must meet the vehicle at a designated location. The initial pilot is fare-free. The service span is from Monday through Friday from 6:00 AM to 7:00 PM, within the service span of Route 33 currently.

The pilot's boundary for the service zone only has a Knightdale connection at the eastern terminus of Route 33 in this initial pilot phase.

Takeaways for Transit Mobility Plan

- Evaluate the applicability of microtransit for Knightdale as the pilot phase of this study progresses
- Consider working with GoWake to obtain an expansion of the microtransit service boundary ("geofence") to include the core area of Knightdale along Route 33, New Hope Commons shopping center, and (potentially) to the Wake Medical Center campus to the west

New Bern Avenue BRT Planning (ongoing)

Bus Rapid Transit (BRT) is planned for four corridors in Wake County, and the most advanced corridor extends from downtown Raleigh to New Hope Commons along US Highway 64 / New Bern Road (link). While this initial phase does not extend into Knightdale, it does connect with and support Route 33, Knightdale's only fixed-route transit option currently.

Future expansions of the New Bern BRT corridor would occur eastward, into downtown Knightdale and could overlap with the Knightdale Boulevard MTP project mentioned elsewhere.

Takeaways for Transit Mobility Plan

- BRT requires higher population and employment densities to be viable, so land use policies are important now for encouraging denser, connected development along the Knightdale Boulevard corridor
- Good accessibility on foot or by bike would also support BRT-style transit, and therefore needs to be considered along existing (Route 33) and potential future (Knightdale Boulevard and Old Town Knightdale) high-frequency transit service areas
- Stay closely involved with BRT development, and seek to understand the design requirements, incentives, and policies that support BRT

PLANWake (2021)

PLANWake's vision is to "create a county that is inclusive and equitable, healthy and active, and sustainable and vibrant" (link). Subarea plans will continue to detail this higher-level plan.

Metrics that are particularly relevant to the Transit Mobility Plan include increasing non-automotive trip-making, more "intentional" development that supports transit and walking modes, expand services to vulnerable populations, and reduce combined costs of housing and transportation to no more than 45% of household income. For this last, the Housing+Transportation Index shows portions of the southwest sections of the Knightdale Study Area not meeting this goal (link).

Takeaways for Transit Mobility Plan

- Participate in the additional, small-area planning process to advance the objectives of this Transit Mobility Plan
- Acknowledge the overlap between the goals of transit mobility and the functional framework and metrics described by PLANWake

B Appendix: Transit-Oriented Development

Public transportation depends on concentrations of people and complementary places that are not in close proximity (people and places in close proximity are highly desirable and are the focus of biking and walking travel modes). The following summarizes the results of a process used to refine a future development concept for an approximately 84-acre tract in Old Town, completed in 2022.

Transit-Oriented or People-Oriented?

A development pattern that is created only to support public transportation generally won't attract enough attention to motivate the necessary policy changes that underpin transit-oriented development. These types of places, including "pop-up" shops, experiential retail, and reclaimed spaces from parking lots to alleyways, have seen an increase in popularity in urbanized areas for many other reasons, including support of new job opportunities, attracting youthful employees, creating effective mobility choices for seniors, sponsoring a diversity of housing types and price points, and enriching the economic and social tapestry of a community.

In the Spring of 2022, the Town of Knightdale sponsored a two-day workshop and market study to assess the best uses for an 84-acre tract of land in the Old Town area. A survey conducted for the study indicated that mixed-use living, pedestrian-oriented transportation, and neighborhood-focused retail options were strong preferences (Figure 1.21).

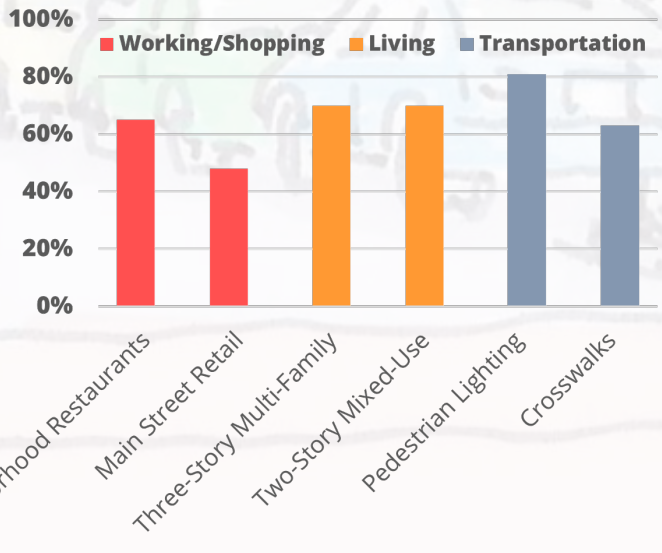

Figure 1.21: Rendering of Preferred Live-Work Arrangement (left) and Survey Results (right)

The resulting conceptual design (Figure 1.22) presented from the workshop in April 2022 incorporated the preferred land use and mobility elements, all of which contribute to an overall transit-oriented design. These elements ***support density*** (townhomes, apartments, and small- or medium-lot residential homes), ***high-quality design*** (pedestrian safety and accommodations that provide access to transit stops), and ***diversity of complementary uses*** (vertically and horizontally integrated living, working, live-work, and recreational spaces).

The site borders the Knightdale transit route (Route 33) as well as Knightdale Station Park. This accessibility and attraction, including events staged at the Park, were noted as additional key ingredients in the development of a Mobility Hub. Shared vehicles, bicycle/pedestrian accommodations, escooter rentals, fixed-route bus access, and vehicle charging would complement the lifestyles suggested from the mixed-use nature of the conceptual development scenario.

Figure 1.22: Transit-Oriented Development Concept in Old Town with 1000' and 2000' walk distances shown
source: Stantec Consulting Services Inc., 2022

C Appendix: References & Resources

The following were instrumental in developing the Mobility Plan section of the Shift Knightdale Comprehensive Transportation Plan. Each source has a brief annotation to guide further consultation. The staffs of the Capital Area Metropolitan Planning Organization, GoTriangle, and GoRaleigh were invaluable resources as well.

1. "Highway Statistics Series," Policy and Governmental Affairs, Office of Highway Policy Information, accessed April 2022, https://www.fhwa.dot.gov/policy information/statistics.cfm. *Refer to Table VM-2 in each year for VMT estimates by state (and rural / urban system elements, although these were not used in this summary).*
2. *Transit ridership estimates were obtained by CAMPO through work being done by Nelson-Nygaard on the Wake Bus Transit Plan. It would be advisable to make this information more accessible and updated, perhaps through Wake GIS or another portal, going forward.*
3. McGowan, Heather, "U.S. 64 bypass on track for December completion date." *Triangle Business Journal*, June 28, 2004, accessed April 2022, www.bizjournals.com/triangle/stories/2004/06/28/focus5.html. *One of several articles used to piece together what happened with this project, an early application of the highly touted "design-build" concept for most of its length.*
4. Andrei Greenawalt, Head of Public Policy, Via, live webcast: Policy experts unpack how you can tap into $300M of new rural transit funding. April 28, 2022.
5. Laura McCarthy, Alexa Delbosc, Graham Currie & Andrew Molloy, "Factors influencing travel mode choice among families with young children (aged 0–4): a review of the literature," Transport Reviews, 37:6, 767-781, DOI: 10.1080/01441647.2017.1354942. 2017, https://www.tandfonline.com/action/showCitFormats?doi=10.1080%2F01441647.2017.1354942. *As good a latter-day compendium of reference works on family mobility considerations as one is likely to find.*
6. "Mobility Hubs," Shared Use Mobility Center, accessed April 2017, https://6c6.77f.myftpupload.com/wp-content/uploads/2019/08/Mobility-Hubs_SUMC_Web.pdf. *A robust and detailed treatment of the major elements and sub-elements (e.g., design features) for the evolving concept of a mobility hub. Other publications by the Shared Use Mobility Center are also recommended (https://sharedusemobilitycenter.org/publications).*
7. "Future Scenario: Smart Mobility Hubs (MHUB)," Baseline Mobility Group and Resource Systems Group, 2019. https://nmcdn.io/e186d21f8c7946a19faed23c3da2f0da/8bfec28a290449a7b10eb1fee3a0e264/files/programs-studies/corridor-studies/Commuter-Corridors-Study/CAMPO_MHUB_191129_FINAL. *Condensed summary of the results of travel model runs assuming supportive policies of widespread use of mobility hubs (spoiler alert: very modest changes in congestion, around 2% results in mode shift).*
8. "Mobility Hubs: A Reader's Guide," Los Angeles City Planning Department, accessed April 10, 2022, https://www.urbandesignla.com/resources/MobilityHubsReadersGuide.php. *A detailed resource describing elements of a scalable series of mobility hub evolutions.*
9. "The MaaS Alliance," accessed April 2022, https://maas-alliance.eu. *An inclusive online resource dealing with this wide-ranging term and its practical applications, including a number of useful publications (refer to the "Library").*

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KNIGHTDALE

TRANSIT MOBILITY PLAN

10.22.2022

- AVAILABLE DIGITALLY -

Appendix E

COMPLETE STREETS MATERIALS

- AVAILABLE DIGITALLY -

Smart Growth America
Improving lives by improving communities

National Complete Streets Coalition

Comprehensive Transportation Plan

Overview of Complete Streets: Knightdale, NC

Prepared by **Smart Growth America**

August 2022

Overview

Streets are an important part of creating livable, desirable communities. Everyone, regardless of age, ability, income, race, or ethnicity, should be able to get to community destinations and public places in a safe, comfortable, and convenient manner – whether walking, driving, bicycling, e-scootering, rolling, using a mobility-assistive device, or taking public transportation. But too many streets, including in Knightdale, NC are designed to prioritize moving cars at dangerously high speeds without delay instead of safety for all people who use the street.

A Complete Streets approach integrates people and place in the planning, design, construction, operation, and maintenance of our transportation networks. This helps prioritize safety for everyone over the speed of vehicles, balance the needs of different modes, and support local economic vitality, cultures, and natural environments.

Amongst the various goals of the CTP, Knightdale intends to holistically evaluate the multimodal transportation network as well as guide transportation improvements made from developments. Their engagement feedback revealed various priorities including identifying transit-supportive redevelopment opportunities to add density, mixture of land uses and travel modes along Knightdale Boulevard, improving roadway safety by reducing vehicular traffic speeds, while maintaining appropriate traffic flow with coordinated traffic signals as well as funding multimodal improvement projects, in particular lighting and intersection crossings along major corridors.

Need for more Complete Streets and national trends

While the unprecedented COVID-19 pandemic upended many aspects of daily life, including how people get around, one terrible, long-term trend was unchanged: the alarming increase in people being struck and killed while walking. The number of people struck and killed while walking reached yet another new high in 2020. More than 6,500 people were struck and killed while walking in 2020, an average of nearly 18 per day, and a 4.5 percent increase over 2019.

This epidemic continues growing worse partially because our nation's streets are dangerous by design, designed primarily to move cars quickly at the expense of keeping everyone safe. **The result in 2020 was a significant increase in all traffic fatalities, even with less driving overall due to the pandemic.** Although everyone is affected by dangerous street design in some way, this burden is not shared equally. Despite other changes, the pandemic perpetuated existing disparities in who is being killed at the highest rate as shown in the two graphics below.

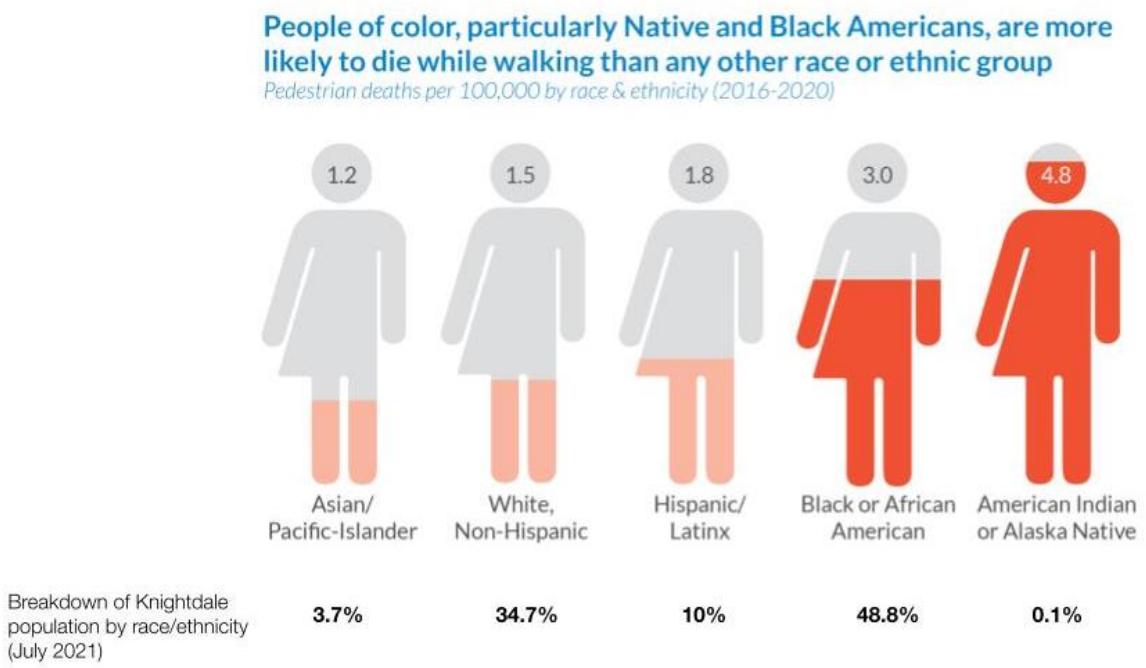


Image source: Dangerous by Design 2022 (here), Knightdale Demographics source: US Census (here)

The conditions people face when they want to walk or bike—whether to work or for recreation—are not the same for all Americans. Low-income communities are significantly less likely to have access to parks and other opportunities for safe recreational walking and are less likely to have sidewalks, marked crosswalks, and street design to support safer, slower speeds. Lower-income neighborhoods are also more likely to contain major arterial roads built for high speeds and higher traffic volumes at

intersections, exacerbating dangerous conditions for people walking.

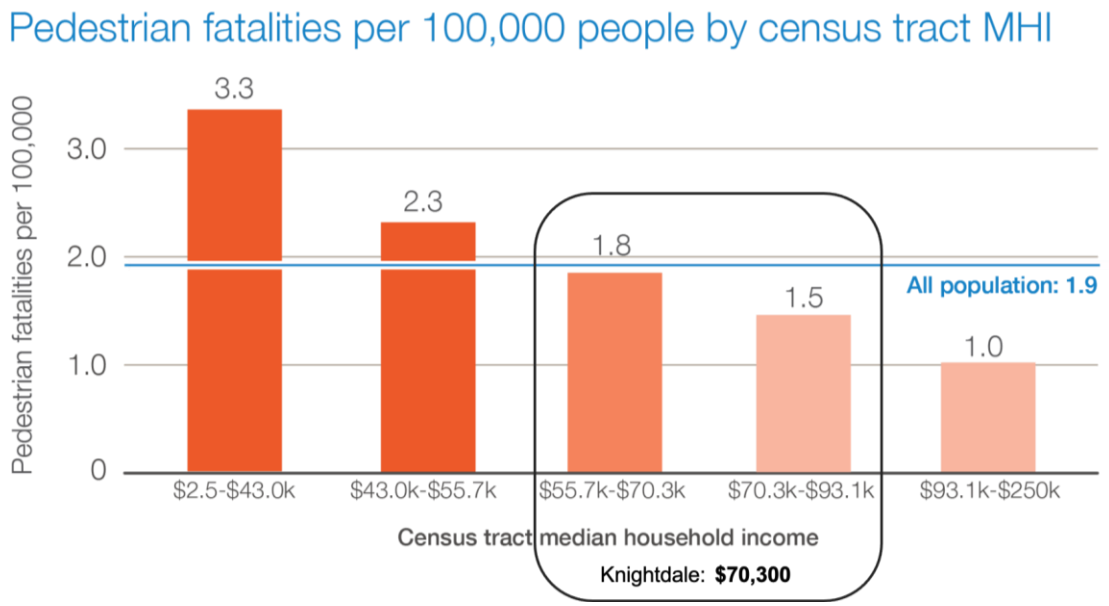


Image source: Dangerous by Design 2022 (here), Knightdale demographics source: US Census (here)

Pedestrian fatalities: Risk and trends in Raleigh-Cary MSA region

North Carolina is the 14th most dangerous state according to the latest 2022 Dangerous by Design rankings with 2.04 average pedestrian deaths per 100k people (per year). There are six North Carolina MSAs on the list of 100 largest MSAs in the US ranked in Dangerous by Design. Within those six North Carolina MSAs, *(see Appendix A for detailed figured for the North Carolina MSAs),* following are the standings of the Raleigh-Cary MSA:

- #3 most dangerous within NC MSA's
- #2 highest pedestrian deaths in NC (2016-2020)
- #4 difference in average daily walking trips in NC (2019 to 2020*)
- #2 pandemic change in fatality rate in NC (avg. 2016-19 vs 2020)
- #3 long term trend in fatality rate in NC (Five-year averages for 2011-15 vs 2016-20)

As seen above, the Raleigh-Cary region is the third most dangerous MSA within North Carolina based on the average pedestrian deaths per 100k people (per year). The region saw the **fourth largest increase in walking trips in 2020** of MSAs in North Carolina compared to the four previous years on average, indicating a potential pent up demand for walking. But the region also saw North Carolina's **second largest increase in the fatality rate** for people walking in 2020 compared to the four previous years indicating unsafe walking conditions in the region.

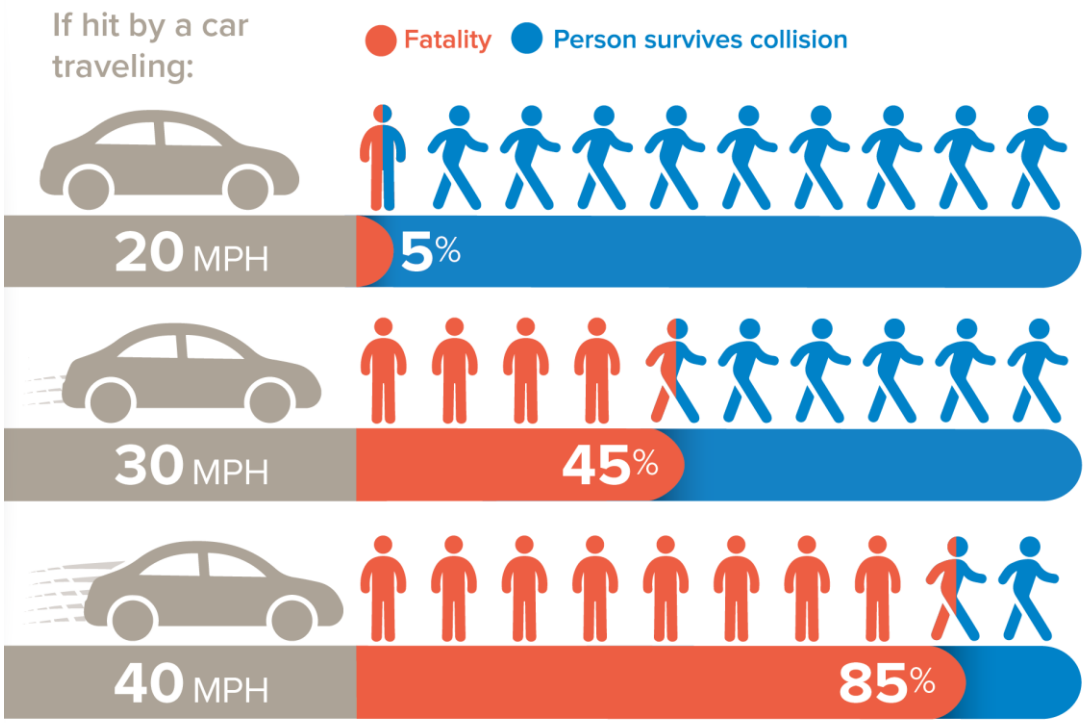
Federal programs and initiatives

To reverse these trends and save lives, we need to protect all users of the transportation system through our policies, programs, and funding, while prioritizing the safety of those who are most at risk. The **U.S. Department of Transportation has recently introduced new programs and resources to address this trend.** As announced in March 2022, the Federal Highway Administration (FHWA) has committed to working with state, regional, tribal, and local agencies to advance widespread implementation of the Complete Streets Design Model to improve safety and accessibility for all users. The infrastructure law created a new grant program to help communities tackle the increasing rate of roadway deaths. The Safe Streets and Roads for All program allows localities to take direct steps to improve safety for all roadway users, whether they're setting up a Vision Zero plan or actually planning, designing, and constructing street safety improvements. The Federal Highway Administration (FHWA) requires a Comprehensive Action Plan (otherwise known as a Vision Zero plan) prior to funding the planning and construction of safety projects with SS4A program dollars. SS4A funding opportunities are available for applicants in varying stages of Vision Zero planning.

Design best practices for a multimodal approach

Speed, and its influence on safety

Speed is the most important factor that determines whether or not a person walking, rolling or getting around with an assistive device survives a collision with the driver of a car. Increase the vehicle speed and the likelihood of survival drops massively. And **roadway design has a strong impact on how people drive and is often more influential on driver behavior than the posted speed limit.** While speed limit signs may only be posted every few blocks or miles, the road's design is ever-present, continually providing guidance and visual cues. While there are myriad factors involved in these deaths, our streets are designed to move many cars quickly at the expense of safety for everyone who uses them.



National Traffic Safety Board (2017) Reducing Speeding-Related Crashes Involving Passenger Vehicles. Available from: https://www.ntsb.gov/safety/safety-studies/Documents/SS1701.pdf

Our goal with design should be to make dangerous behavior difficult and safe behavior easy. Designing roads for slower speeds also reduces the need to rely on law enforcement, which not only saves money but also prevents potentially deadly encounters with police for Black and Brown people. Refer to NACTO's City Limits: Setting Safe Speed Limits on Urban Streets guide for a detailed, context-sensitive method to set safe speed limits on urban streets. **City Limits outlines a three-method approach to speed limit setting that provides an alternative to percentile-based speed limit setting:**

1. Setting default speed limits on many streets at once (such as 25 mph on all major streets and 20 mph on all minor streets),
2. Designating slow zones in sensitive areas, and
3. Setting corridor speed limits on high priority major streets, using a safe speed study, which uses conflict density and activity level to set context-appropriate speed limits.

Principles of traffic calming: Influence of street design on speed and safety

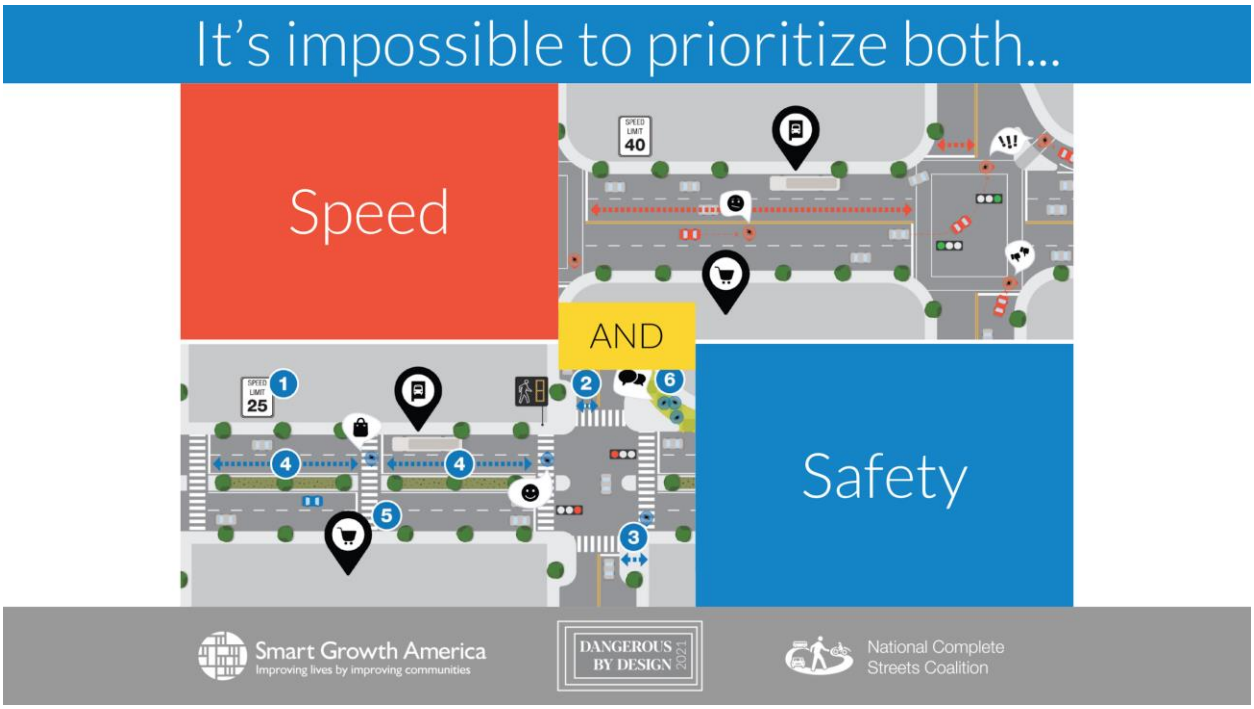


Image source: Dangerous by Design 2021 (here)

Designing streets for slower speeds is directly connected to improving safety and reducing deaths. Improving safety requires more than simply providing sidewalks and crosswalks as drivers follow visual cues. If a street has wide lanes that allow room for mistakes, long distances between intersections where drivers need to slow down, and room to make wide, high-speed turns in those intersections, setting a posted speed limit below 40 miles per hour has little impact—the environment has made higher speeds feel appropriate.

Changes to street design that send drivers visual cues to slow down are needed to reduce the frequency and severity of crashes. Narrower travel lanes naturally slow traffic, as do shorter distances between intersections that require drivers to slow down and stop more frequently. As illustrated in the image below, high-visibility, signalized crosswalks make drivers more aware of people walking, and extending curbs shortens the distance required to cross the street. These design changes are most successful when transit vehicle drivers, emergency service vehicle operators, and other operators of large vehicles are included in the project scoping process to balance the needs of a variety of modes of travel. *(Refer to some real-world examples from one of the country's most dangerous metro areas to show how our streets are dangerous by design)*

A number of cities have also enacted **temporary changes to street design through tactical urbanism and demonstration projects to test those approaches in partnership with emergency services and other stakeholders before making them permanent.** *(Refer to this*

guide by NACTO on Interim Design Strategies which is a part of their larger Urban Street Design Guide). Quick-builds, also known as demonstration projects or tactical urbanism projects, are temporary, low- cost improvements that test changes to street design, allowing communities and transportation departments to try new ideas and gather feedback about a tangible redesign concept before proposed changes are made permanent. They also provide elected officials a low-risk method to see how their community reacts before committing to a permanent solution or policy change. But every single one of these projects also incorporated proven methods to reduce crashes, injuries, and fatalities, documented by the Federal Highway Administration (FHWA).

For more information on how cities across the country have used this approach, refer to **Safety demonstration project case studies** from Orlando, Lexington, and South Bend (here); Durham, NC, Huntsville, AL, and Pittsburgh, PA (here); and three smaller Washington cities —Airway Heights, Arlington, and Wenatchee (here).

Complete Streets policy and implementation

The National Complete Streets Coalition (NCSC) has identified the key elements of a comprehensive Complete Streets policy to help communities develop and implement policies and practices that ensure streets are safe for people of all ages and abilities, balance the needs of different modes of transportation, and support local land uses, economies, cultures, and natural environments. The Complete Streets movement has evolved from when it first began over a decade ago to focus far more on implementation and equity. In response to these changes, in 2017 the Coalition updated and revised the Complete Streets policy framework to require more accountability from jurisdictions and provisions that account for the needs of the most vulnerable users.

Based on an understanding of the vision, mission and goals of the Comprehensive Transportation Plan (CTP) in Knightdale, the following issues are worth considering. *(Refer to Appendix B. for model policy examples for each of the 10 elements)*

- **Exceptions:** Effective policy implementation requires a process for exceptions to providing for all modes in each project. The exception process must also be transparent by providing public notice with opportunity for comment and clear, supportive documentation justifying the exception. In addition to defining exceptions through good policy language, there must be a clear process for granting them, preferably with approval from senior management. Establishing this within a policy provides clarity to staff charged with implementing the policy and improves transparency and accountability to other agencies and residents.

- **Design:** Complete Streets implementation relies on using the best and latest state-of-the-practice design standards and guidelines to maximize design flexibility. Creating meaningful change on the ground both at the project level and in the creation of complete, multimodal

transportation networks requires jurisdictions to create or update their existing design guidance and standards to advance the objectives of the Complete Streets policy.

Refer to Florida DOT's Context Classification Guide that was integrated into their design manual as an example of guidance on land use and transportation measures that differentiate between different contexts and its influence on design decisions.

- **Performance Measures:** How do you know if your Complete Streets policy is working? Communities with Complete Streets policies can track their progress in a variety of ways, including the number of miles of bike lanes, the percentage of the sidewalk network that has been completed, the number of people who choose to ride public transportation, and/or the number of people walking and biking along a street. They can also include performance measures that reflect broader long term goals, such as improved public health or economic outcomes. The best Complete Streets policies not only establish performance measures in line with the goals stated in their communities' visions and under multiple categories, but also spell out a process and timeline for reporting on progress. Incorporating equity into performance measures by measuring differences across different demographics is also especially important for governments to determine whether disparities are exacerbated or mitigated.

- **Implementation Steps:** There are various key steps to implementation such as restructuring or revising related local procedures, plans, regulations, and other processes to align with the policy's goals; developing new design policies and guides, revising existing design guidance, or adopting national or state level recognized design guidance; and offering workshops and other training opportunities to transportation staff, community leaders, and the general public. Strong policies include an accountable and inclusive implementation process, such as creating a committee to oversee implementation with representative internal and external stakeholders; and creating a community engagement plan that considers equity by targeting advocacy organizations and underrepresented communities.

- **Project Selection Criteria:** There is a common misconception that making streets safer and more inviting for people traveling actively *requires identifying new funding* for pedestrian and bicycle infrastructure, but changing the project selection criteria often makes it possible to increase the share of existing funding going to those investments. Strong Complete Streets policies include a statement that the locality will develop project selection criteria that emphasize complete streets and specific guidance on those criteria, including emphasis on active transportation infrastructure; targeting underserved communities; alleviating disparities in health, safety, economic benefit, access destinations; and creating better multimodal network connectivity for all users.

Jurisdictions should include **equity criteria** in their project selection process and give the criteria meaningful weight. In many communities, decisions about where and how to invest funds in transportation are often made informally, based on political will or based on "squeaky wheel" complaints from residents. However, the result of this informal process for prioritizing projects *often exacerbates existing disparities* in the built environment: wealthier, whiter communities with expectations of political responsiveness continue to receive investment in infrastructure to support active transportation, while lower-income communities of color who have been neglected by elected leaders and transportation decision-makers continue to be marginalized.

Refer to the Benefits of Complete Streets tool which is designed to provide a way to quantify the benefits of Complete Streets projects across various impact categories such as health, safety, environment, and economy—using an approach that keeps equity at the center. Although this tool is not meant to model benefits to support project selection, it does provide a starting point for comparison data to help you determine if the project supports your specific community's equity efforts.

Development context influences how a roadway functions

There are many aspects of land use and transportation planning, policy, and design that influence whether an area is safe and attractive for people walking, bicycling, and taking transit, and rolling. Recognizing that there are dozens of potential considerations to building a Complete Street, this section focuses on the relationship between land use and transportation as well as form-based code which need to work in combination with Complete Streets to support healthy, safe and active neighborhoods.

The interdependent relationship between land use and transportation

While traditionally seen as only involving transportation, a comprehensive, strong Complete Streets approach requires changes to both transportation and land use. Land use and transportation have an interdependent relationship. For example, communities that have denser, compact development—where schools, jobs, retail, food, parks, housing, healthcare are in close proximity—make it easier and more convenient to walk, bike, or move actively using assistive devices to reach these places as part of everyday life. This leads to safer, healthier communities and stronger economies.

Conversely, when types of destinations are separated from one another (ex. residential areas located far from any retail or employment) and when they are far apart (even separated by a large parking lot) it becomes much more difficult to reach destinations without a car. Those who cannot afford or are unable to operate a personal vehicle must rely on public transit if it exists or walk, bike, or navigate inconvenient—often dangerous—long distances to get where they need to go. By changing land use standards, guidance, and policies, decision-makers can bring community amenities closer together

and support a Complete Streets transportation network. Listed below are some of the principles of zoning reforms to make development decisions that support compact, walkable and activity friendly communities.

1 | Reduce parking minimums

Parking minimums, common in most communities throughout the US, require landowners and developers to provide a specific minimum amount of off-street parking. These rules often require an unnecessary amount of parking. Parking minimums encourage car trips to reach destinations while making other modes of travel less convenient by physically spreading out and separating housing, businesses, and other everyday destinations with seas of underused parking spaces. Parking minimums can also raise the cost of housing and commercial space, as developers recoup the cost of parking they were required to build, making communities less affordable. Removing parking minimums allows destinations to come closer together, supports more activity-friendly developments, encourages economic growth, and mitigates housing costs. In addition to removing parking minimums, below are some additional parking policy reforms that Knightdale should consider:

- Require developers to manage driving demand generated by their development through transportation demand management (TDM) measures rather than meeting the demand by constructing new roads and adding parking. *Learn more about using TDM to manage driving demand in Modernizing Mitigation.*
- Require developers to unbundle the cost of parking from rent in residential and commercial development. *Learn more from Seattle, Washington.*
- Incentivize shared use parking. *Learn more from Atlanta, GA and learn more about shared use parking implementation.*
- Implement pricing strategies without overburdening low-income residents through approaches like progressive duration pricing. *Learn more about parking pricing.*
- Use curbside management strategies like designating specific space for ride hailing and truck loading. *Learn more about curbside management best practices.*

2 | Set urban growth boundaries to reduce sprawl

Since 2000, Knightdale has grown by 153% and is the 10th fastest growing municipality in North Carolina.[1] Considering this high growth Knightdale should strongly consider setting urban growth boundaries to reduce sprawl. By concentrating development within a defined boundary, communities can make transit and active transportation more convenient by keeping everyday destinations closer together. Clustering development within a defined boundary not only makes active travel more viable,

[1] https://www.knightdalenc.gov/business/economic-development

but it also improves access to jobs and economic opportunities for people who cannot afford or cannot operate a motor vehicle.

3 | Adopt Form-based zoning code

Places with form-based zoning typically have increased construction activity, multi-family development, and mixed-use development that improve quality of life, walkability, and access to services and amenities for local business owners and residents. Real estate developers may also benefit from form-based codes, as they can increase flexibility and predictability of the development approval process. *Learn more in this beginners guide for form-based codes, additional resources can be found on the Form-Based Codes Institute's website.*

4 | Allow and incentivize higher density and mixed use development

When discussing mixing uses and density, in particular, it is important to be clear about what density means. It does not mean Manhattan and skyscrapers. It means creating a center of activity, instead of one-story buildings spread out behind parking as far as the eye can see. By clustering development and allowing just one extra story, an area might also have room for public spaces and parks. Consider establishing minimum residential densities (e.g., 15 units/acre) and minimum heights for commercial structures (e.g., two or three stories), particularly in designed TOD i.e., transit-oriented development areas. Do not require minimum side setbacks except if the structure is adjacent to a different zone district to promote a town center that is compact and walkable.

Appendix A: Dangerous by Design statistics for North Carolina MSAs

Rank	Metro area	Average ped deaths/100k people per year	Pedestrian deaths (2016-2020)	Difference in average daily walking trips, 2019 to 2020	Pandemic change in fatality rate (avg. 2016-19 vs 2020)	Long term trend in fatality rate (Five-year averages for 2011-15 vs 2016-20)
44	Charlotte-Concord-Gastonia, NC-SC	2.04	265	58%	0.40	0.42
46	Greensboro-High Point, NC	1.98	76	57%	0.11	0.31
57	Raleigh-Cary, NC	1.6	109	54%	0.35	0.2
60	Durham-Chapel Hill, NC	1.54	49	41%	0.21	-0.18
63	Winston-Salem, NC	1.49	50	73%	-0.76	0.11
73	Virginia Beach-Norfolk-Newport News, VA-NC	1.38	122	40%	-0.39	-0.01

Appendix B: Complete Streets policy language examples

Community	Topic	Link
Amhurst, MA	1 – Vision and intent	https://www.amherstma.gov/DocumentCenter/View/44607/2-Complete-Streets-Policy-05-14-2018
Des Moines, IA	2 – Diverse Users	https://cms2files.revize.com/desmoines/document_center/
Cleveland Heights, OH	3 – All projects and phases	https://www.clevelandheights.gov/DocumentCenter/View/5394/37-2018-Complete-Streets-APPROVED-VERSION?bidId=

Neptune Beach, FL	4 – Exceptions	https://www.ci.neptune-beach.fl.us/sites/g/files/vyhlif3516/f/uploads/resolution_no._2018-07_complete_streets_0.pdf
Plymouth, IN	5 – Jurisdiction	https://www.plymouthin.com/egov/documents/1618412724_87863.pdf
Madison, CT	6 – Design	https://www.madisonct.org/DocumentCenter/View/1920/Complete-Streets-Policy---Adopted-May-29-2018-
Cleveland Heights, OH	7 – Land Use and Community Context	<above>
Baltimore, MD	8 – Performance Measures	https://transportation.baltimorecity.gov/sites/default/files/Baltimore%20Complete%20Streets%20Manual%20Final%20March%202021-compressed.pdf
Roeland Park, KS	9 – Project Prioritization	https://library.municode.com/ks/roeland_park/codes/code_of_ordinances?nodeId=CHXIIISTSI_ART9COSTPO
Des Moines, IA	10 – Implementation	<above>
Warsaw, MO	10 – Implementation – Sense of place	https://mobikefed.org/sites/default/files/warsaw-mo-bill_no._2016-22_ord._240-2016-03.pdf
Arlington, WA	10 – Implementation – Demonstration Projects	http://www.arlingtonwa.gov/DocumentCenter/View/1855/Arlington-Complete-Streets-Policy

- AVAILABLE DIGITALLY -

Appendix F

VISION ZERO RESOLUTION

- AVAILABLE DIGITALLY -

TOWN OF KNIGHTDALE

950 Steeple Square Court
Knightdale, NC 27545
KnightdaleNC.gov

RESOLUTION #22-11-16-007
RESOLUTION IN SUPPORT OF NC VISION ZERO

WHEREAS, deaths and serious injuries on our roadways are unacceptable as crashes are preventable; and

WHEREAS, traffic-related deaths and serious injuries in the United States have disproportionately impacted people of color, low-income households, older adults and youth, people with disabilities, and households with limited motor vehicle access; and

WHEREAS, streets and transportation systems have traditionally been designed primarily for maximum motor vehicle capacity and mobility, rather than the safe accommodation of all modes and users; and

WHEREAS, measures to make Knightdale's transportation network safer should encourage Knightdale residents and visitors to take more trips by walking, bicycling, transit and by using multiple modes such as walking to transit; and

WHEREAS, residents embracing multiple transportation modes will contribute to the Town of Knightdale's ability to foster thriving, healthy, livable neighborhoods; and

WHEREAS, Vision Zero provides a framework for reducing traffic deaths to zero and increasing roadway safety through a combination of education, engineering, encouragement, evaluation, and enforcement; and

WHEREAS, Vision Zero is an ethical imperative by which the responsibility for eliminating traffic deaths and increasing roadway safety is shared by transportation system designers and system users; and

WHEREAS, while transportation system users are responsible for following the rules for using the road, transportation system designers are responsible for the design, operation and use of the transportation system and are thereby responsible for the level of safety within that system; and

WHEREAS, successful Vision Zero programs are a result of a complete government approach and community support of Vision Zero objectives in recognition of the shared responsibility of designers and users; and

WHEREAS, building safe and secure communities is a key priority of the Town of Knightdale's Strategic Plan; and

WHEREAS, the Town of Knightdale seeks to improve transit, pedestrian, bicyclist, and

roadway safety in its area; and

WHEREAS, the Town operates a Traffic Calming Program available for citizen requests and has implemented traffic calming requirements in the Unified Development Ordinance for proposed subdivisions, requiring evaluation through the planning and design process; and

WHEREAS, the Town supports and participates in Watch for Me NC, a bicycle and pedestrian safety program; and

WHEREAS, the Town is an active partner with the Governor's Highway Safety Program (GHSP), a state program that provides support and resources to law enforcement agencies to reduce traffic crashes and promote highway safety awareness through a variety of grants, traffic safety/ awareness, messages and safe driving initiatives; and

WHEREAS, The Town has established a partnership with Mothers Against Drunk Driving (MADD), and participates in the VIP for a VIP Program Vehicle Injury Prevention for a Very Important Person) educating teen drivers about the dangers of driving impaired and/or distracted driving; and

WHEREAS, the Town works with the Safe Routes to School Improvement Program to identify needs in the walk and bike to school transportation network for our school sites; and

WHEREAS, in 2022, the Town is adopting its first Comprehensive Transportation Plan, Shift Knightdale, which incorporates the framework of NC Vision Zero; and

WHEREAS, the Town is an active partner with GoRaleigh to make transit a viable mode of transportation in Knightdale; and

WHEREAS, NC Vision Zero provides an additional framework for reducing traffic deaths and serious injuries to zero, while increasing safe, healthy, and equitable mobility for all.

NOW, THEREFORE, BE IT RESOLVED by the Town Council of the Town of Knightdale, North Carolina that:

1. The Knightdale Town Council adopts NC Vision Zero as a comprehensive and holistic approach to achieving the goal of zero fatalities on Knightdale roadways.

2. This Resolution shall take effect immediately upon its adoption.

This the 16th day of November 2022.

BY: _____
Jessica Day, Mayor

ATTEST: _____
Brittney Hunt, Deputy Town Clerk

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