

December 2024



The Knightdale

SAFETY ACTION PLAN REPORT



KNIGHTDALE
Safety Action Plan

The Safety Action Plan was prepared by:

The Town of Knightdale

with

Kimley-Horn

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Introduction

INTRODUCTION



Purpose

The Knightdale Safety Action Plan is the Town's vision for improving transportation safety in Knightdale. It includes a High-Injury Network (HIN), which is a map of the Town's roadway system highlighting the areas historically known to experience the most crashes—particularly fatal and serious injury crashes. The HIN becomes the Town's way of identifying the highest priority road segments for safety improvements.

The accompanying projects, actions, and strategies will help guide investments in roadway safety throughout Knightdale. The Plan uses data to analyze where fatal and serious injury crashes occur and outlines a tailored set of realistic projects and practical strategies that align with Knightdale's needs and the community's vision for transportation safety.

Process

The Knightdale Safety Action Plan includes three phases: Vision and Needs, Analysis and Recommendations, and Documentation and Adoption. Meetings with the Task Force and public engagement opportunities guide each phase, including key interim deliverables, such as the State of Safety Report, the Project Identification and Prioritization, and the Safety Action Plan report document.



Key Elements

The Plan is anchored around three key elements: the High-Injury Network (HIN), Project Prioritization, and an Action Table that provides a wealth of practical strategies to support the Town's roadway safety goals.



VISION ZERO OVERVIEW



Roughly 40,000 people are killed each year in roadway crashes in the United States. In 2021, more than 1,700 people died in North Carolina (Source: North Carolina Vision Zero). In recent years, there has been an uptick in roadway deaths and serious injuries.

To help prevent this tragic loss of life and health, there needs to be a coordinated approach among planners, engineers, public health professionals, law enforcement, elected officials, and all who travel our roadways. Vision Zero is a global movement to help provide that coordinated approach to prevent roadway deaths and serious injuries.

The goal of Vision Zero is to eliminate all traffic fatalities and serious injuries, while increasing safe, healthy, and equitable mobility for all.

Safe Systems Approach

To achieve this goal, Vision Zero is grounded in a process called the Safe Systems Approach, which involves proactively implementing strategies most effective at preventing the most dangerous crashes before they even happen and ensuring when crashes do happen, they are not severe.

At the heart of the Safe Systems Approach are six key principles developed by the United States Department of Transportation (USDOT):

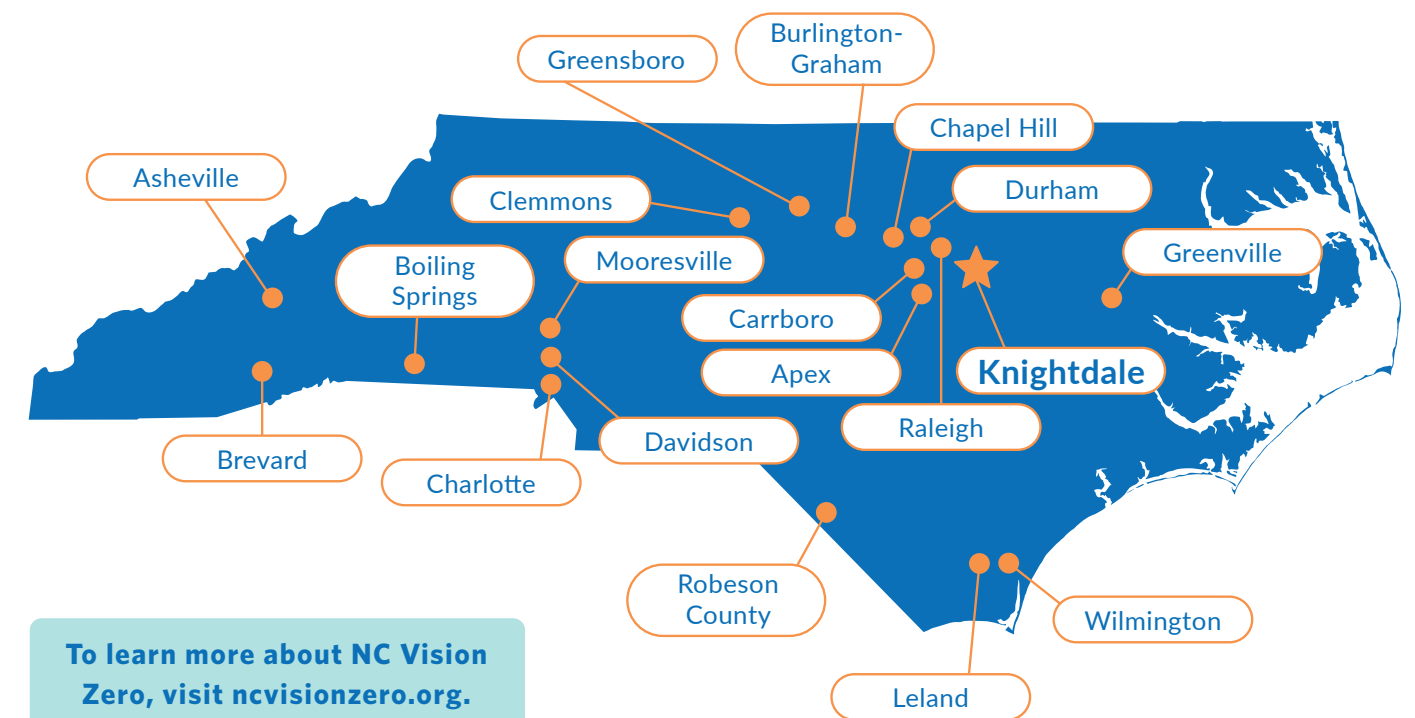
- **Deaths and serious injuries are unacceptable.** A single roadway death or serious injury is too many. Therefore, the Safe Systems Approach prioritizes strategies to prevent crashes that result in death and serious injuries.
- **Humans make mistakes.** Human error is a given, so the Safe Systems Approach emphasizes building a transportation system that anticipates mistakes to prevent the most dangerous crashes.
- **Humans are vulnerable.** The transportation system must be built with these human needs and vulnerabilities in mind, and not simply focus on moving people and goods quickly.
- **Responsibility is shared.** Everyone is responsible for preventing fatal and serious injury crashes, those who plan, design, build, manage the transportation system, and those who use it.
- **Safety is proactive.** The Safe Systems Approach relies on finding proactive solutions to identify risks in the roadway network and implement solutions to mitigate and eliminate those risks.
- **Redundancy is critical.** A robust transportation system that allows all users to travel in the manner they choose safely and efficiently is key to the Safe Systems approach. This acts as a fail-safe to keep roadway users protected if one part fails.

NC Vision Zero

NC Vision Zero is focused on eliminating roadway deaths and injuries in the state. Knightdale is one of 17 communities who have adopted a goal of zero traffic fatalities and serious injuries. As an NC Vision Zero partner community, Knightdale will use this Action Plan to establish and implement data-driven strategies to improve safety, using the following NC Vision Zero principles:

- No loss of life on our roads is acceptable.
- All road users deserve safe streets.
- Injury or death is not an inevitable price to pay for mobility.

Knightdale is one of 18 communities in the state that have adopted the zero traffic fatalities and serious injuries goal.





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The State of Safety

ABOUT THE STATE OF SAFETY

The Knightdale State of Safety is a foundational assessment of the existing characteristics, physical conditions, and socio-demographic trends related to transportation safety in the community. The intent of this document is to showcase the need for further investment in transportation safety in Knightdale. As a part of this planning process, a wide variety of data was analyzed by the project team. The State of Safety isn't a full accounting of all available data, but showcases the information and trends most relevant for identifying safety needs in Knightdale. **The full State of Safety Report will be included as an appendix to this document.**

Data Sources

This report leverages a variety of data sources that provide unique and foundational data related to transportation safety in Knightdale. Those sources that provided the bulk of the data in this report are identified and described below:

US Census American Community Survey (ACS)

The ACS is an ongoing survey by the US Census Bureau that collects detailed population and housing information on a yearly basis down to block group level.

Connect NCDOT Mapping Resources

The North Carolina Department of Transportation (NCDOT) maintains these mapping resources to help with planning and mapping things like traffic volumes, safety scores, speed limits, planned projects, and other transportation network data.

NCDOT Crash Data

NCDOT maintains a crash database for planning-level analysis. Due to differences in recording methods, not all crashes are captured within the location-based data; however, those recorded act as a good high-level representation of crashes in the area.

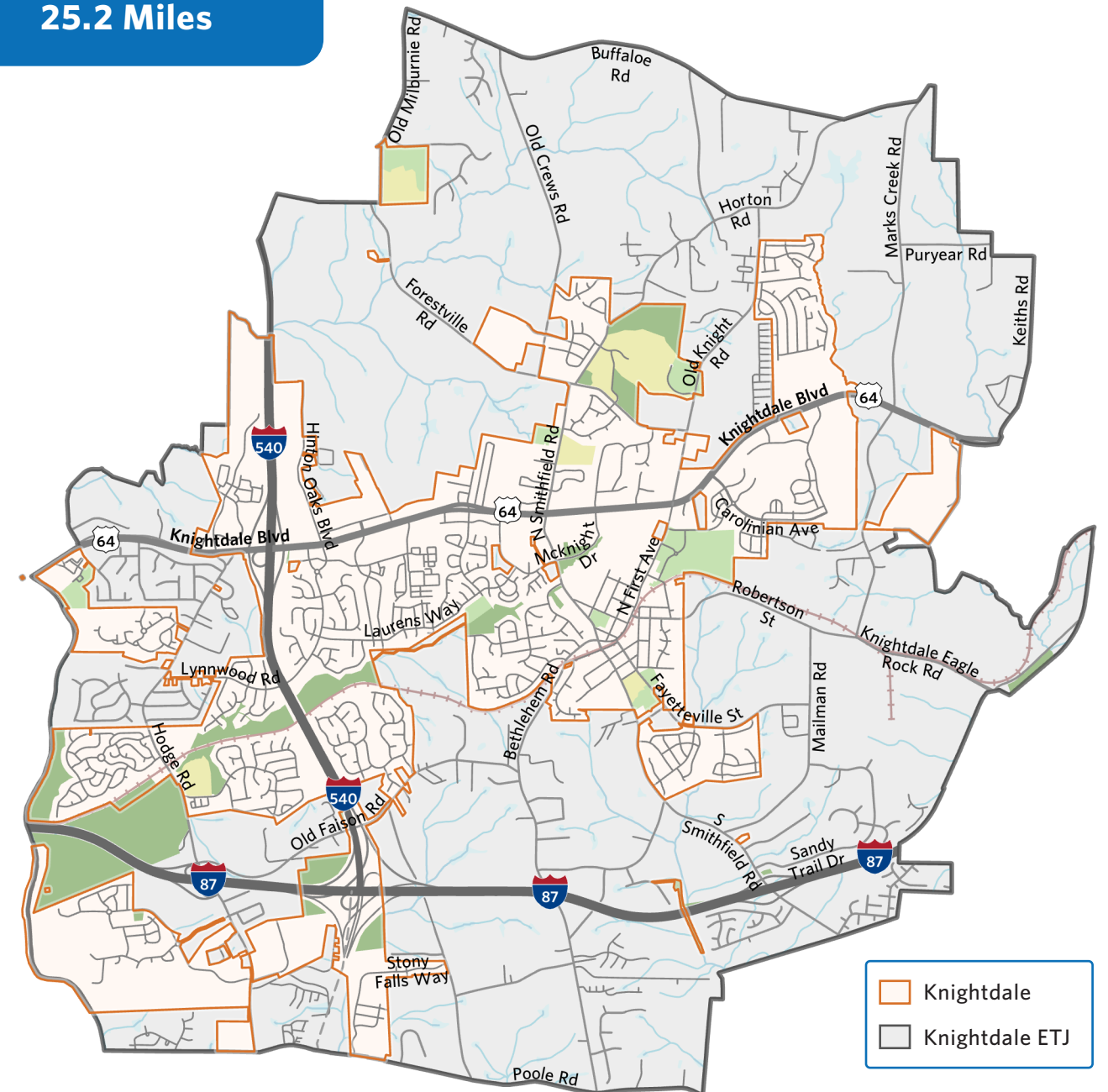
NC OneMap and Wake County GIS

NC OneMap is North Carolina's open data portal with mapping layers for the entire state. Similarly, Wake County maintains a similar open data portal with county-specific data.

Study Area

The Study Area for the Knightdale Safety Action Plan is the extraterritorial jurisdiction (ETJ) for the Town. The ETJ extends beyond formal boundaries of Knightdale, but represents a broader area that the Town has some amount of legal authority. For the purposes of the Knightdale Safety Action Plan, the project team will review and analyze all data within the existing ETJ to ensure a comprehensive approach to transportation safety planning for the community.

**Knightdale ETJ Area
25.2 Miles**

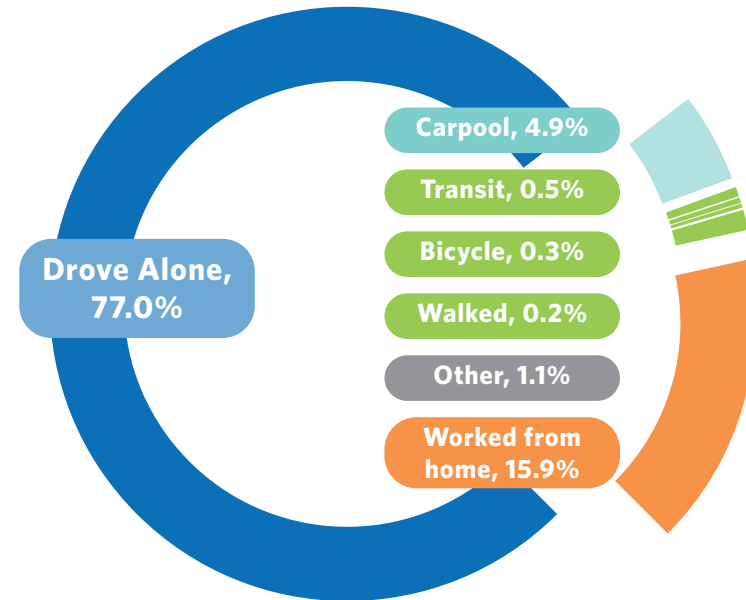




The Community Conditions provide a snapshot of the demographic conditions within the Town of Knightdale. In this section, we outline how people commute to work, where they live, their access to a car, the racial and ethnic makeup of the Town, and the median income.

Commute Mode

Commute data shows us that the majority of Knightdale residents either drive alone (77%) or carpool (4.9%) on their way to work for a typical day. Multimodal options (like transit, biking, and walking) are used sparingly (1% total). It's also worth noting that almost 16% of residents work from home, meaning that their typical driving patterns are different than those that drive to their jobs each day.

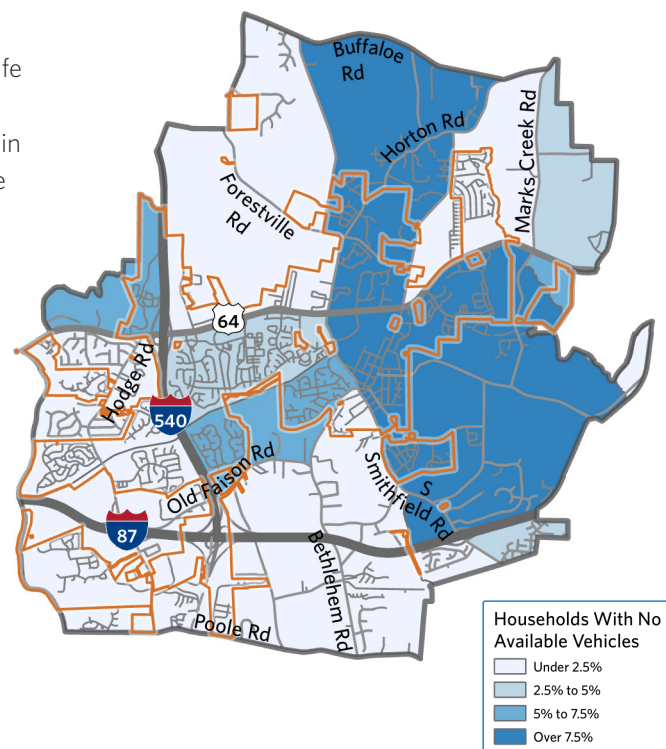


Just over 1.1% of residents commute by transit, walking, or biking.

Vehicle Access

Areas where vehicle access is limited are likely also more in need of safe multimodal transportation options, compared to other parts of the community. Within Knightdale's jurisdiction, over 7.5% of households in areas in the east and north of the ETJ (shown in dark blue) do not have access to a vehicle. It's worth noting that most of these areas are not as densely populated or developed as the central and eastern side of Town. Additionally, households in neighborhoods and apartments west of Downtown, south of Knightdale Boulevard, and east of I-540 show some limited access as well (between 2.5% and 7.5% of households).

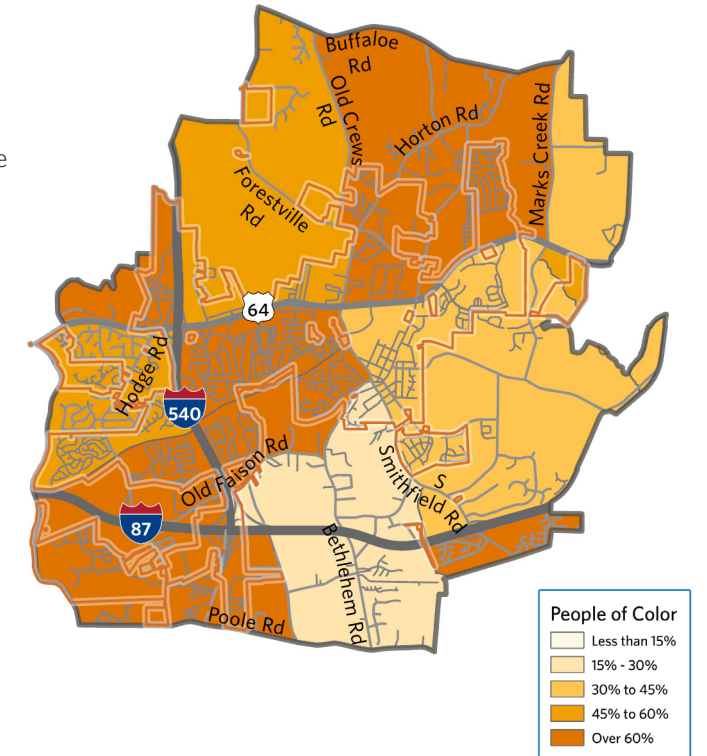
Rural areas in the east and residential areas west of Downtown have some of the most households without access to a vehicle.



Percent People of Color

Statistically, communities of color are most often impacted by transportation safety issues. The highest concentrations of non-white residents are in the central, southwest, and northeast areas (over 60% persons of color). Additionally, there is some correlation between the Town's most diverse communities and the areas that most lack access to a vehicle in the household.

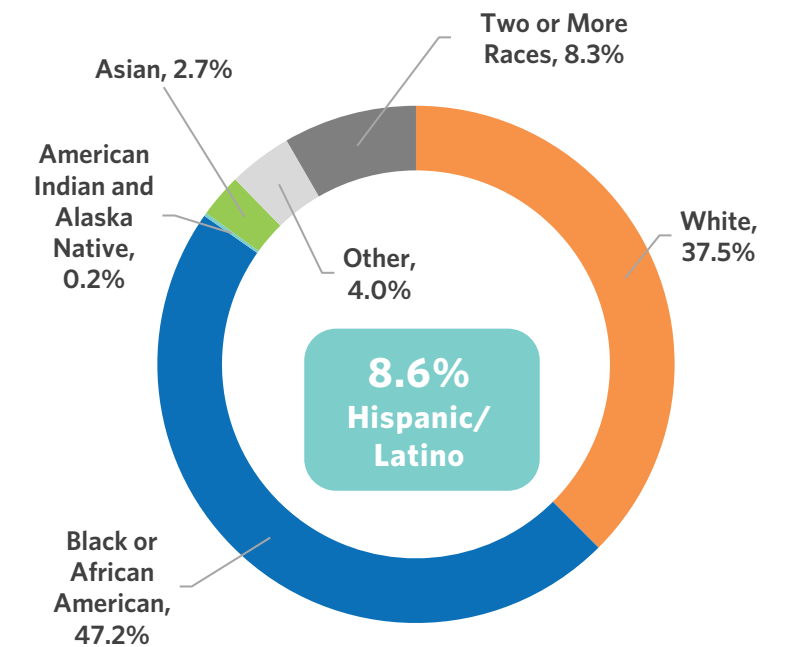
People of color are more than 30% of the population in every part of the Knightdale area except the south central area along Bethlehem Road.



Racial Distribution

Knightdale is a very diverse community, especially when compared with adjacent municipalities. 62.5% of Town residents are non-white, with the highest share in Black or African American communities (47.2%). The next largest ethnic group is Hispanic/Latino at 8.6%. Hispanic/Latino is considered by the US Census Bureau as an ethnicity, not a race—which is why it isn't included in the full chart to the right.

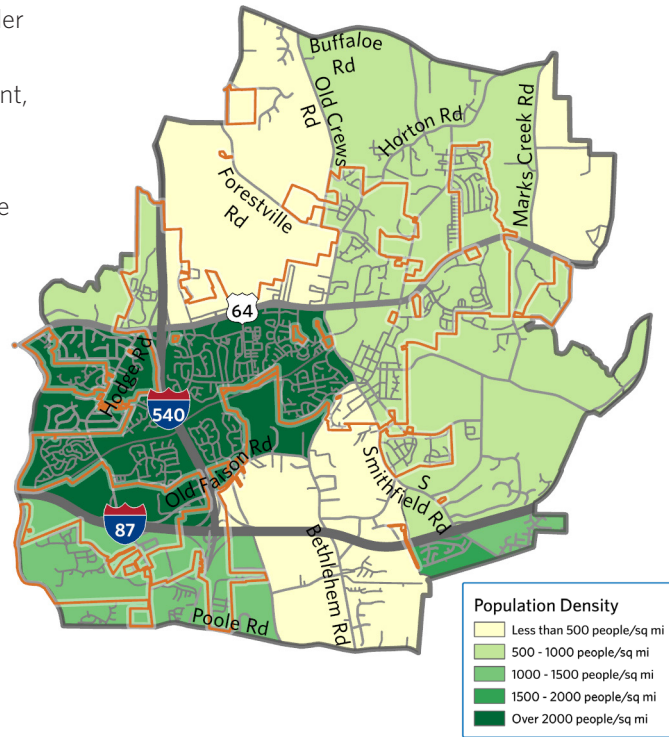
Black/African Americans are the largest racial group in the Knightdale area, making up almost half of the population.



Population Density

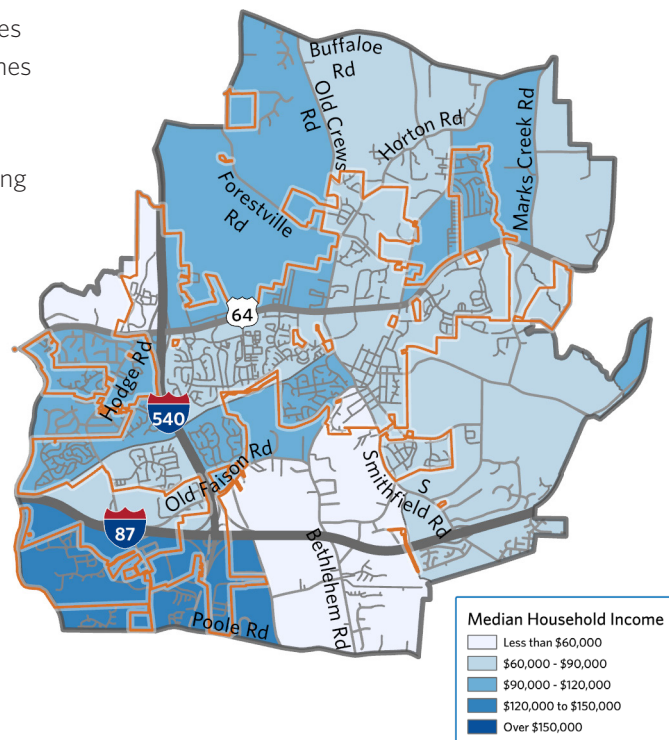
The western part of the Town between Knightdale Boulevard and I-87 has the highest population density, largely due to much of Knightdale's older residential neighborhoods and subdivisions being located in that area and growth coming out from the Raleigh area. With recent development, the population density in other areas may begin to rise as new dense residential subdivisions are constructed. Areas with higher population densities are often better areas for multimodal transportation and have increased needs to design for safety of people outside of cars.

While Knightdale's highest population density is currently in the west, new development will likely increase densities elsewhere in the ETJ.



Median Household Income

Everywhere in Knightdale's ETJ other than its bottom left corner has a median household income of less than \$120,000, with the communities in the southern middle along Bethlehem Road having household incomes under \$60,000. Other areas have median incomes under \$90,000 throughout the more rural parts of the east. Lower income households may find it more difficult to afford transportation costs related to owning a car or have less cars per household than others.



Overall Median Household Income
\$79,364



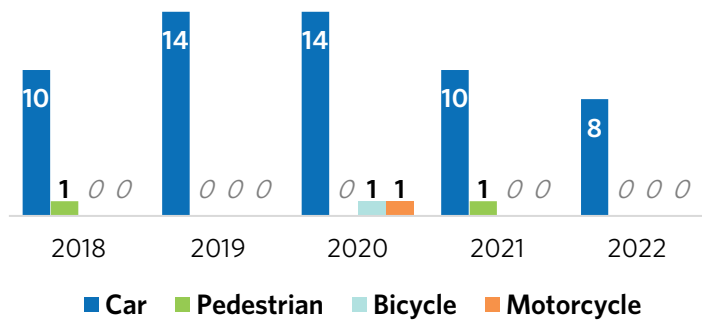
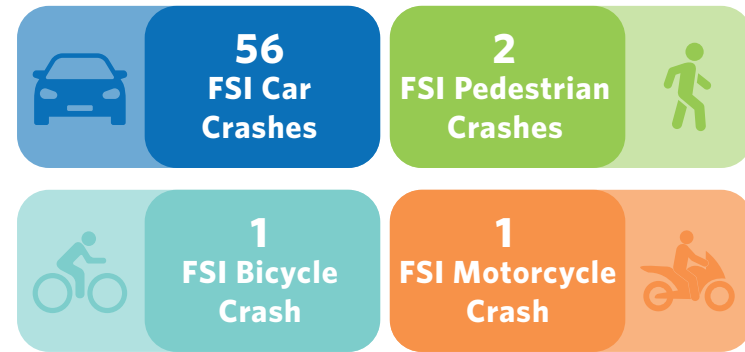


The Transportation Conditions describe the crash history in Knightdale, including overall crash history and contributing factors.

Fatal and Serious Injury (FSI) Crashes By Year, By Mode

Between 2018 and 2022, Knightdale and its extraterritorial jurisdiction experienced over 3,700 crashes. While the area saw a high amount of crashes, only a small percentage were fatal or caused severe injuries (FSI), with 56 fatal or severe car crashes, 2 FSI pedestrian crashes, and one FSI crash each with bicycles and motorcycles.

The vast majority of fatal and severe injury crashes between 2018 and 2022 were car crashes. Only about 3.4% of fatal and severe crashes involved pedestrians, and even fewer involved motorcycles or bicycles.



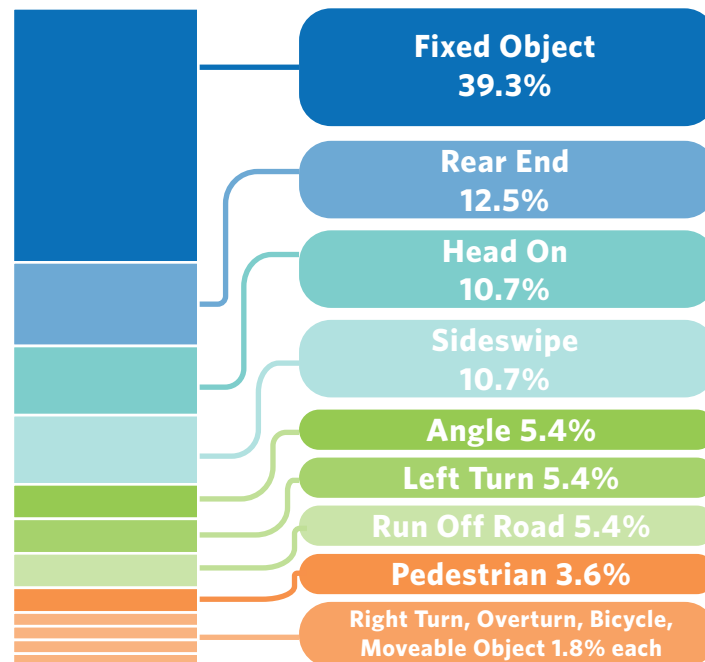
Of 2018-2022, fatal car crashes were at their highest in 2019 and 2020. 3/4 non-car crashes of the period occurred during the height of the COVID pandemic in 2020-2021.

Percent of FSI Crashes By Type

Amongst recorded fatal and severe crashes between 2018 and 2022, most were crashes with a fixed object (39.3%), followed by rear end collisions (12.5%), head on collisions (10.7%), and sideswipes (10.7%).

Head on crashes were one of the most likely crash types to be fatal or severe. 6 out of 21 total head on crashes (28.6%) were fatal or caused severe injury. For comparison, 22 out of all 468 fixed object crashes (4.7%) were fatal or severe, and 7 out of all 1446 rear end crashes (less than 0.5%) were fatal or severe.

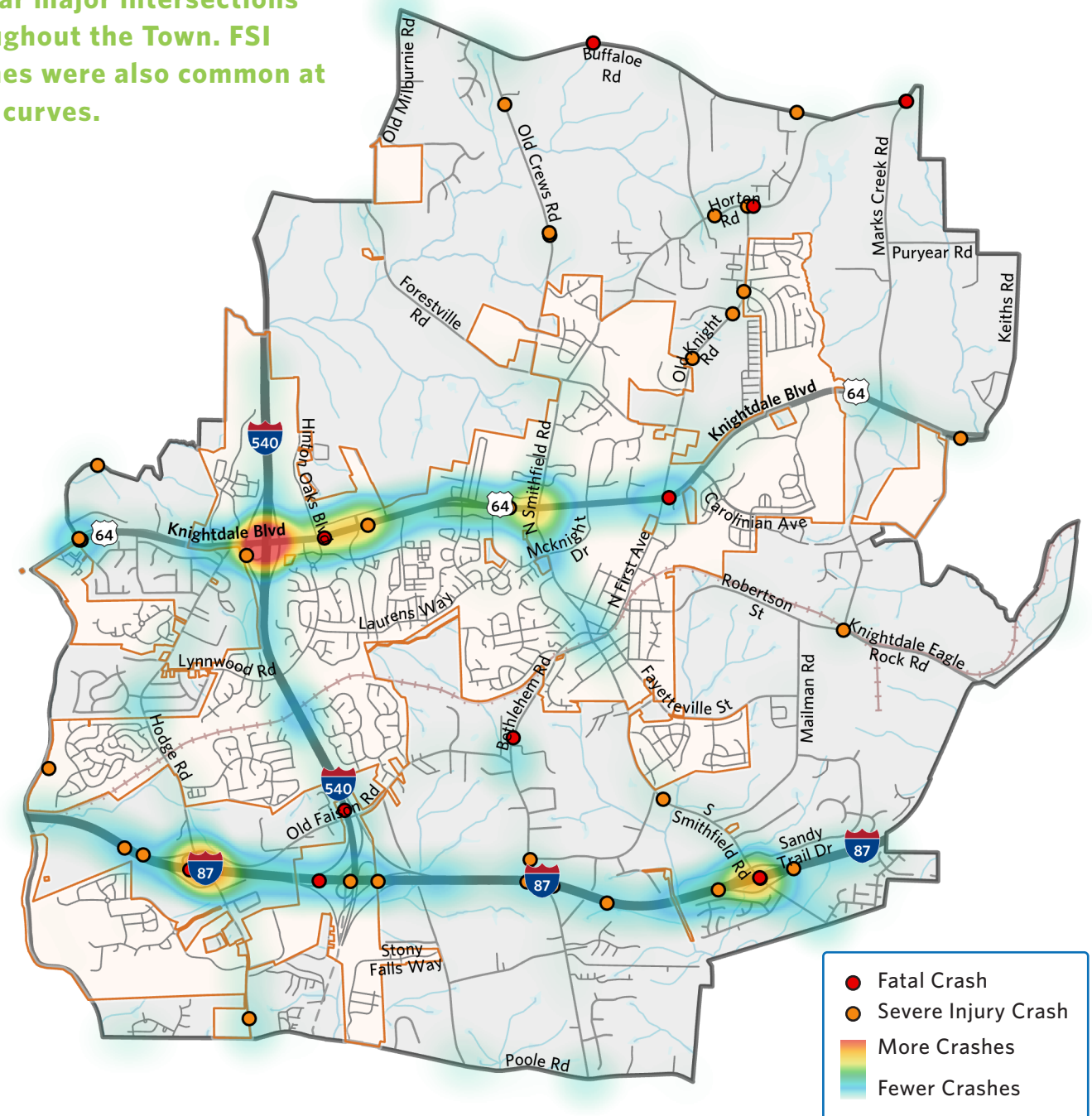
More than a quarter of all head on crashes were either fatal or caused severe injury.



Crash History

From 2018 to 2022, the overall majority of spatially mappable crashes happened on Knightdale Boulevard (Business US 64), I-540, I-87, or Smithfield Road. Hodge Road, Poole Road, and Bethlehem Road also saw some crash hotspots. However, many of the smaller roads in the north with less overall crashes had a larger share of the fatal and severe injury crashes, such as Old Knight Road, Horton Road, and Old Crews Road. Some tight curves and uncontrolled exurban intersections also tended to have a higher number of crashes. Knightdale Boulevard and I-87 saw the most fatal and severe crashes overall.

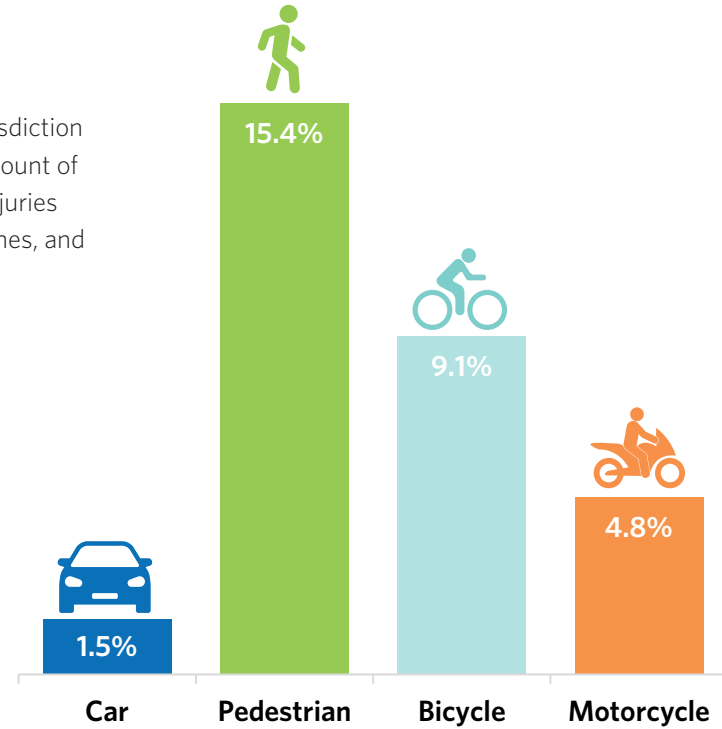
Most crash hot spots were at or near major intersections throughout the Town. FSI crashes were also common at tight curves.



Likelihood of FSI in Crashes Involving Each Mode

Between 2018 and 2022, Knightdale and its extraterritorial jurisdiction experienced over 3,700 crashes. While the area saw a high amount of crashes, only a small percentage were fatal or caused severe injuries (FSI), with 56 fatal or severe car crashes, 2 FSI pedestrian crashes, and one FSI crash each with bicycles and motorcycles.

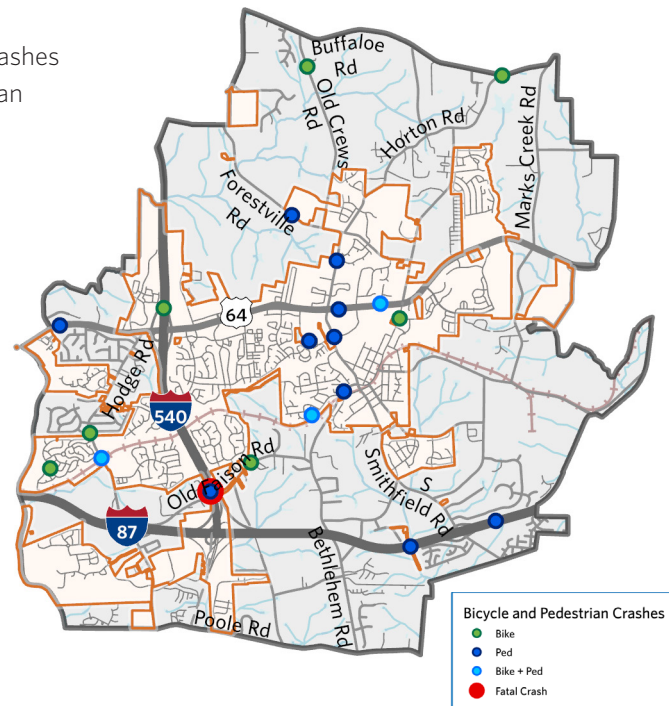
Pedestrians and bicyclists are much more likely to get killed or severely injured if involved in a crash than drivers.



Bicycle and Pedestrian Crashes

Pedestrian crashes seem to occur more in the town core, while bike crashes were often on more rural-suburban roads further out. Several pedestrian crashes roughly followed Smithfield Road near and north of the Town center. In contrast, other than one bike crash near Knightdale Station Park, bicycle crashes followed more rural-suburban roads like Hodge Road, Old Faison Road, Old Crews Road, and Horton Road. Only one pedestrian crash from 2018 to 2022 was fatal, where a pedestrian was hit on the Old Faison Road bridge over I-540.

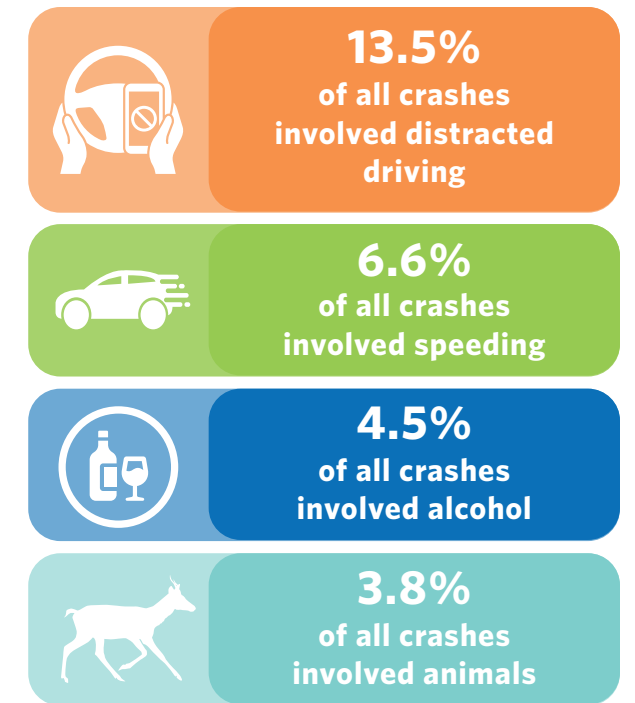
Most pedestrian crashes were roughly along Smithfield Road in central Knightdale.



Contributing Factors

Across all recorded crashes, distracted driving was the most common contributing factor, with over 13% of crashes from 2018 to 2022 involving it. Speeding (6.6%), alcohol (4.5%), and animal crashes (3.8%) were also major contributing factors.

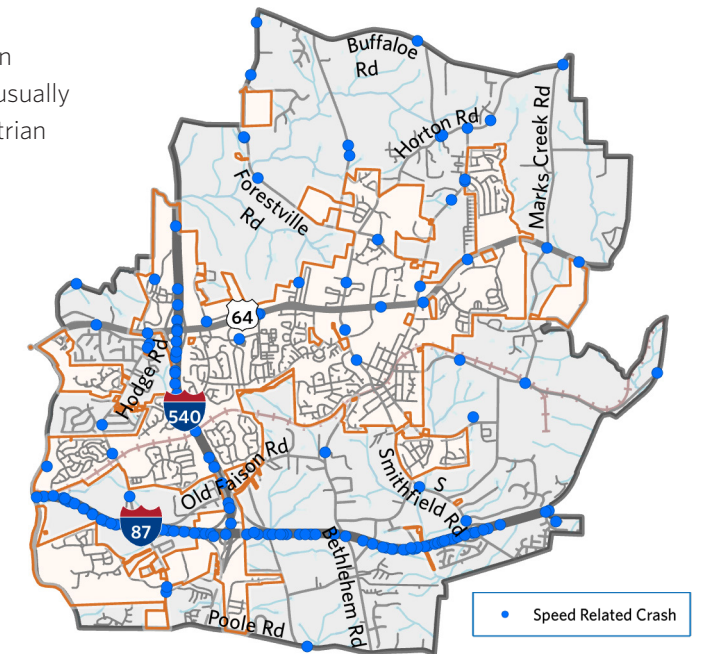
Over half of crashes involving distracted driving were rear end collisions from failing to stop.



Crashes Involving Speeding

Speeding is often part of the cause of crashes and plays a large role in severity. The higher the speed of a crash, the more severe the crash usually is, especially if the crash involved a vulnerable road user like a pedestrian or bicyclist. While the majority of speed related crashes were along I-540 and I-87, higher speed arterials and rural roads where its easier for drivers to pick up speed also saw a lot of speed related crashes. Roads like Knightdale Boulevard, Smithfield Road, Horton Road, Old Knight Road, Hodge Road, and Forestville Road saw the majority of non-interstate speed related crashes.

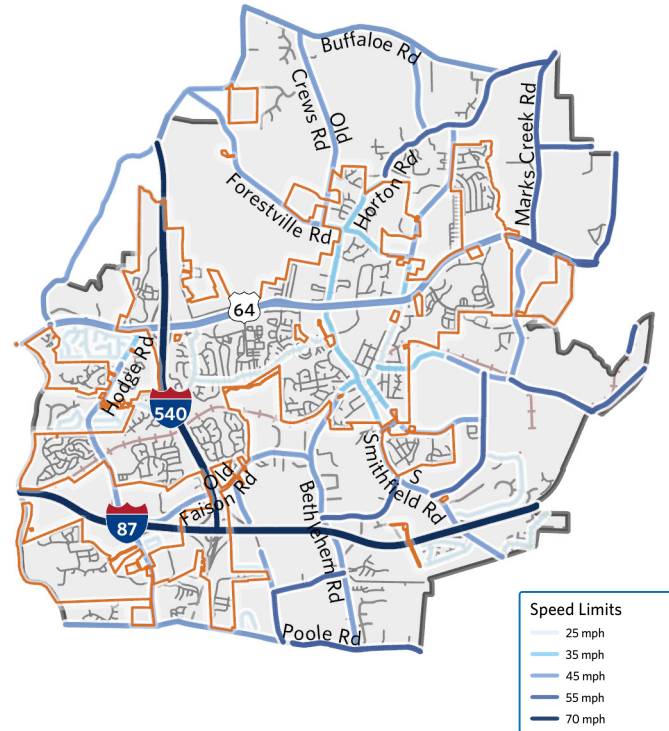
Out of 246 speed-related crashes, about 3.3% were fatal or caused severe injury.



Speed Limits

There is a sharp contrast between speed limits within the Town Limits and speeds on roads outside the Town. Within the Town itself, smaller streets like First Avenue, Laurens Way, and Lynnwood Road have 25 mile per hour (mph) speed limits, and most other major roads through the core of Knightsdale have 35 mph speed limits (with the exception of Knightsdale Boulevard with a 45 mph speed limit). Most of these speed limits immediately increase at the Town Limits, and outside of the Town most NCDOT controlled roads have a speed limit of 45 or 55 mph.

Notably lower speed limits do not necessarily mean lower speeds- actual traffic speeds depend on the design of the road and surroundings.



Speed limits are generally lower within the Town, with most roads seeing immediate speed limit increases upon leaving the Town Limits.

Speed Limits and Crashes Involving Speeding

Above 35 miles per hour, speed limits alone do not appear to deter speeding drivers. Very few speed-related crashes in the study area from 2018-2022 occurred on roads with a speed limit of 25 mph or lower. However, for speed limits 35 mph and higher, there was no correlation between speed-related crashes and the speed limit of the road (excluding interstates), with crashes involving speeding appearing on most major roadways.



Most major roads with a speed limit of at least 35 miles per hour experienced a crash involving speeding, with little connection between speeding crashes and speed limit.



KEY TAKEAWAYS



Our most traveled intersections are in need of safety improvements.

Not surprisingly, our intersections (especially those near interstate interchanges), see the highest volume of crashes. While these high volume crash areas don't directly correlate to crashes that involve serious injuries or fatalities, they do still highlight a need to improve safety at these types of intersections to ensure safety issues don't get worse in the future.

Our more rural corridors are more likely to experience severe crashes.

Our highest volume intersections and corridors don't necessarily yield the majority of our fatal and serious injury crashes (FSI). When normalized using traffic volumes, our more rural corridors often see higher FSI crash rates, indicating a need to improve safety conditions on many of the corridors on the fringe of the community.

Pedestrians and bicyclists are our most vulnerable road users.

Based on the crash analysis, pedestrian and bicyclists are significantly more likely to be killed or seriously injured if involved in a crash. Areas of high multimodal demand (key crossings and intersections, downtown, parks, schools, etc.) are in need of improvements to ensure that those in our community that want to walk or bike are safe doing so.

Areas of higher crash density are more likely to be in communities of color.

Many of the areas in our community that experience high crash rates are in communities of color. Additionally, these community members may be less likely to have access to a vehicle in the home, therefore making them more vulnerable to multimodal crashes as well.



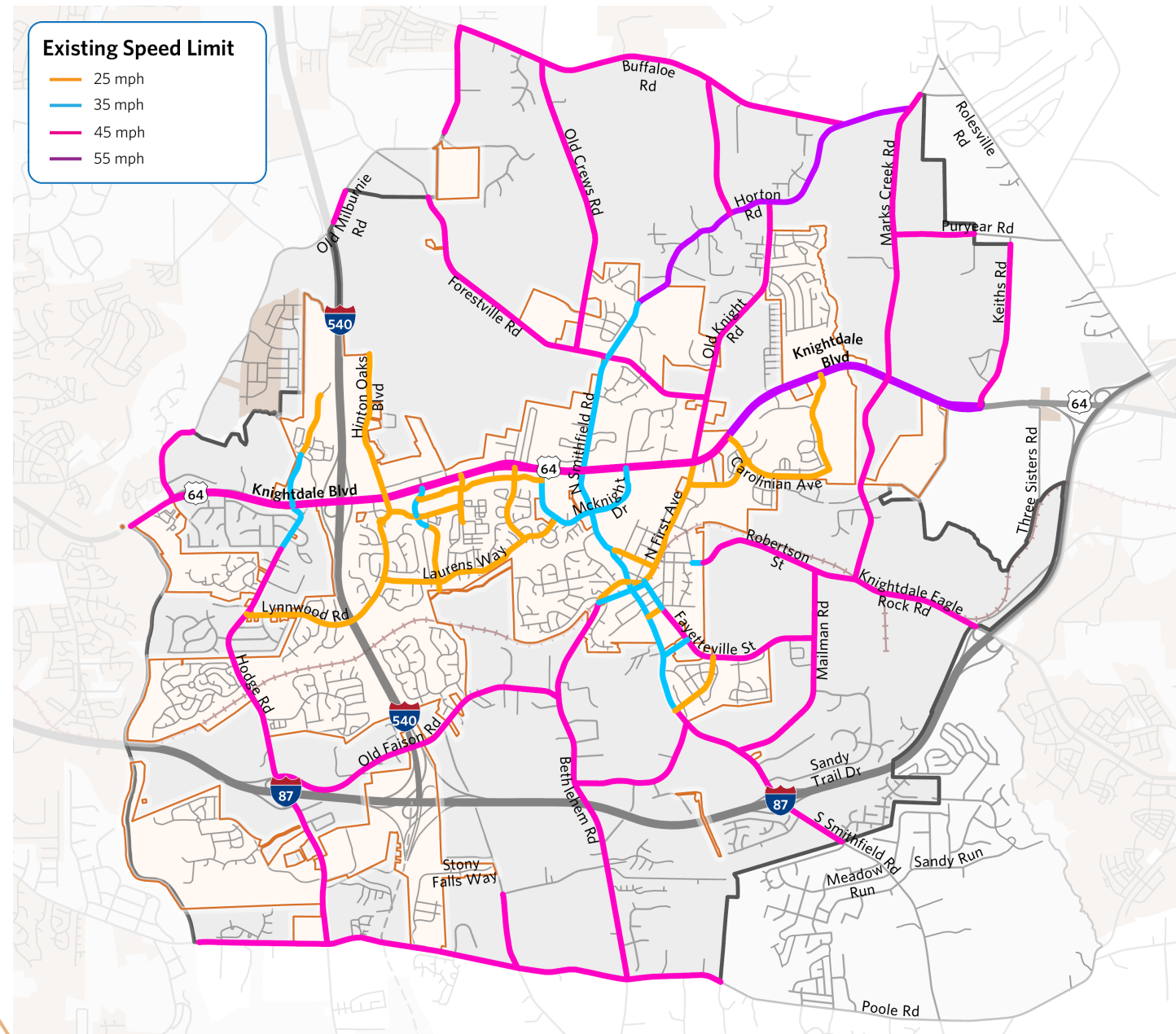
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**Speed Audit
Results**

OVERVIEW



Speed related safety concerns are expressed in the Town of Knightdale's Comprehensive Transportation Plan (CTP). In addition, Knightdale is undergoing rapid development, and the analysis described in this section will be a tool to help the Town identify locations where speed limits need to be adjusted to accommodate evolving land use contexts. As part of the Knightdale Safety Action Plan (SAP), the project team partnered with Town staff to undertake a speed audit of the network. The goals of the audit were to identify corridors with speeding concerns and recommend safety improvements. This process followed the Safe Systems Approach adopted by the USDOT, which names safe speeds as a key pillar to achieving Vision Zero. Achieving safe speeds is accomplished through context-appropriate roadway design, education, and enforcement. As vehicles travel at high speeds, the driver's ability to react to hazards is limited—vulnerable road user safety decreases and the severity of crashes increase.





Data Collection

To collect existing operating speed data, various probe data sources were used—the types of speed data collected is important for making informed recommendations. The 85th percentile speed is the speed at, or below which, 85% of drivers travel on the road. The 50th percentile represents the average speed of travelers on a road. One data source, called StreetLight, can provide 50th and 85th percentile speeds on the identified network. For this evaluation, the project team used recorded 50th and 85th percentile speeds from January 2022 to May 2023 from StreetLight.

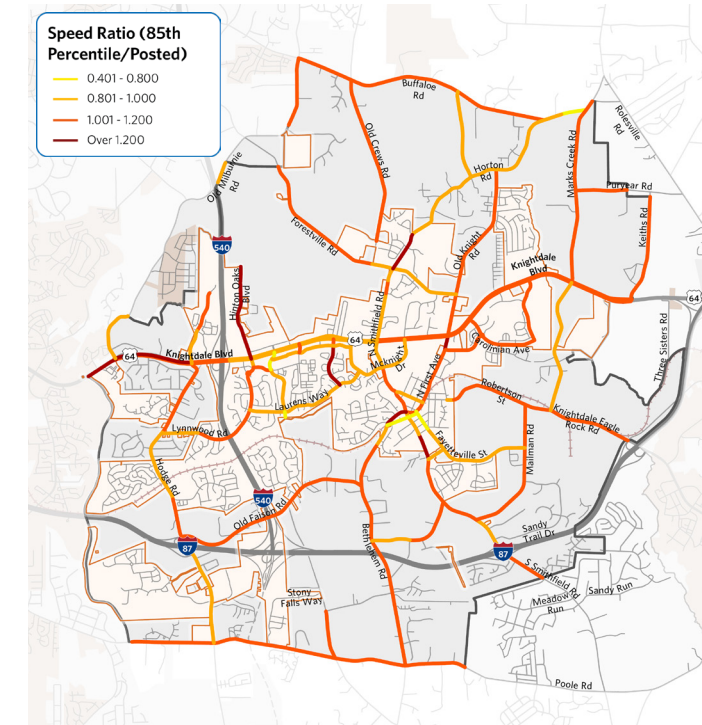
Evaluation Process

Using the posted speed limits and the 85th percentile speeds from StreetLight, the project team developed a speed ratio that indicated whether cars tended to travel faster or slower than the posted speed limit. The following performance measure thresholds were developed to analyze Knightdale's roadway network:

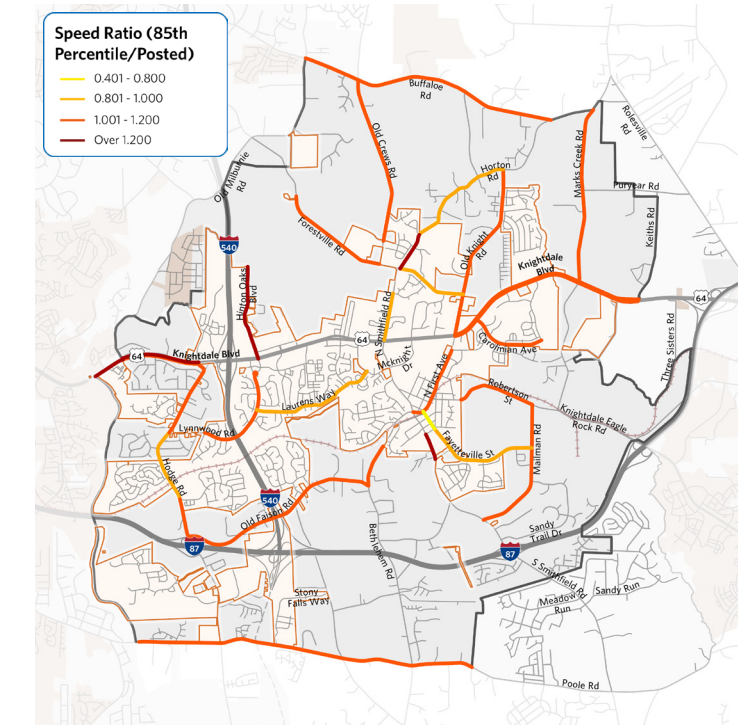
- **Ratio < 0.4** indicates slowness on the corridor
- **Ratio < 0.401 - 0.99** indicates field conditions operating slightly below posted limits
- **Ratio = 1.0** indicates field conditions operating at posted limits
- **Ratio 1.01 - 1.2** indicates field conditions operating slightly above posted limits
- **Ratio 1.201 <** indicates speeding on the corridor



Speed Ratio—Overall Network



Speed Ratio—Corridors



Using these thresholds, the Town of Knightdale selected 21 corridors for further evaluation to determine if current speed limits were appropriate. These corridors included a range of speed ratios, corridors that were on the High-Injury Network (HIN) and showed speed issues, or corridors for which the Town had received complaints.

To explore potential speeding reductions and mitigations, the project team used a Federal Highway Administration (FHWA) tool called USLIMITS2. USLIMITS2 uses a variety of factors to evaluate speed limits, including:

- The posted speed limit
- Existing speeds (50th and 85th percentile)
- Average annual daily traffic (AADT)
- Crash data

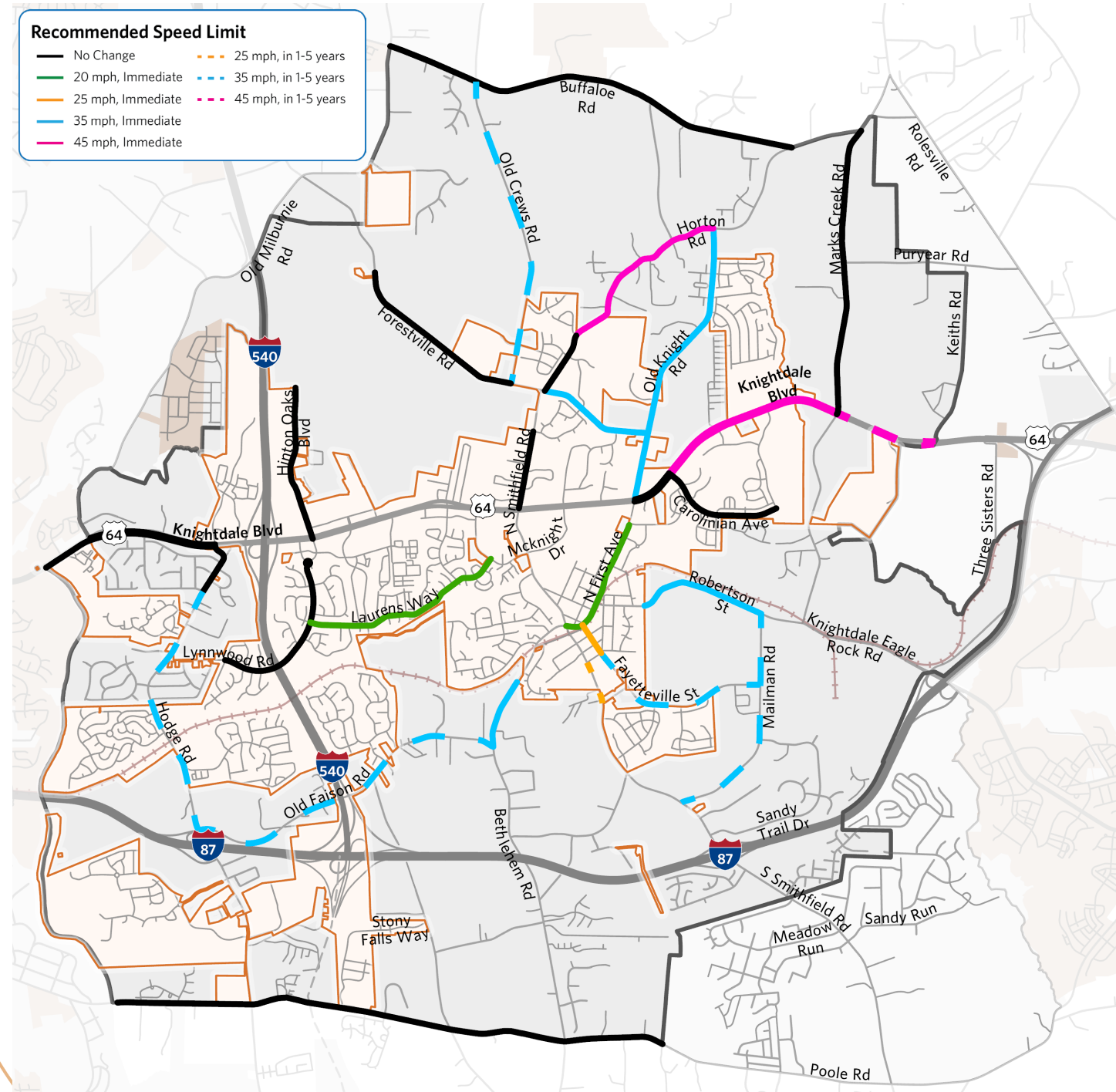
The project team incorporated the results from the USLIMITS2 tool as additional justification for recommended speed limit reductions on certain corridors in Knightdale. When the USLIMITS2 results did not justify a reduction, but notable safety concerns are known to be present—the project team relied on additional engineering judgment, local knowledge, and future plans (sidewalk improvements, bus route expansions, road connectivity).

KEY FINDINGS

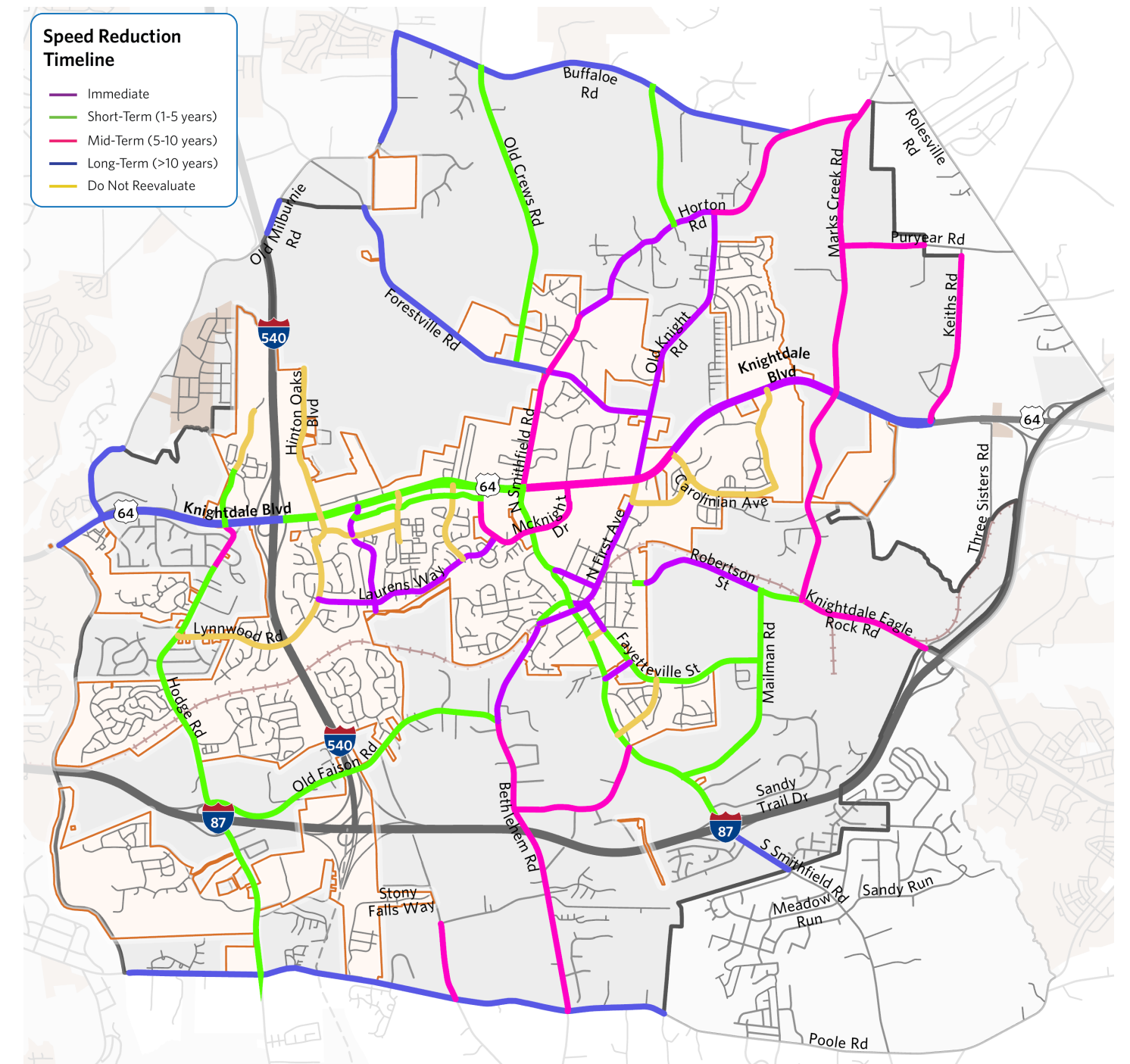


Recommended Speed Limits

The map below shows the speed recommendations for the 21 corridors analyzed with USLIMITS2.



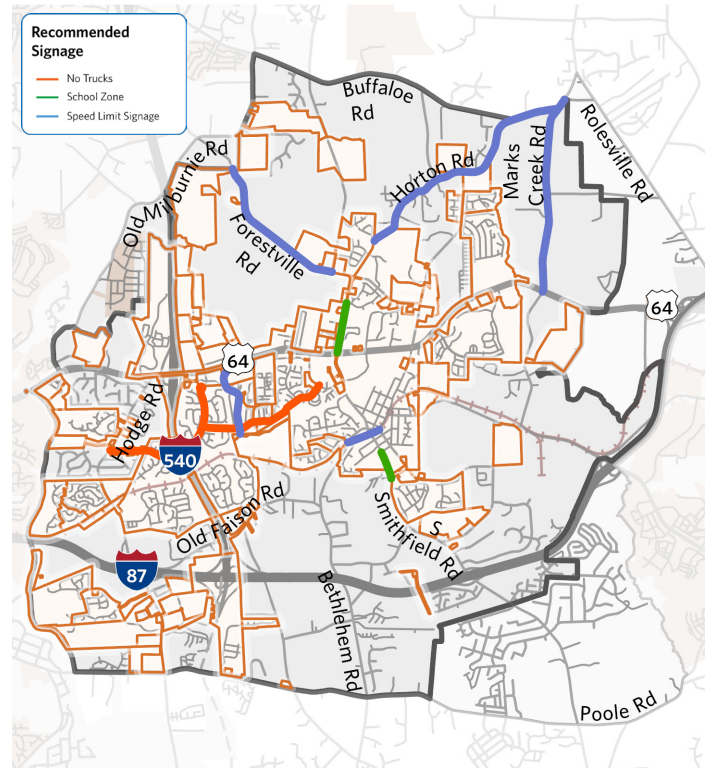
Once each corridor had been given a recommended speed, the project team assessed the remaining network to determine when and where speed limit changes should occur. A timeline of immediate, short (1-5 years), mid (5-10 years), and long-term (10+ years) was assigned. The only corridors added to immediate that were not included in the USLIMITS2 analysis were corridors with a speed ratio <math><0.9</math>, or where the operating speeds were already supportive of a lower speed. Neighborhood streets and roadways that are not anticipated to see an increase in vehicle or pedestrian traffic—that do not have existing crash related issues—were recommended to not be reevaluated, unless the Town receives complaints or a determines a spike in crashes.



Recommended Signage

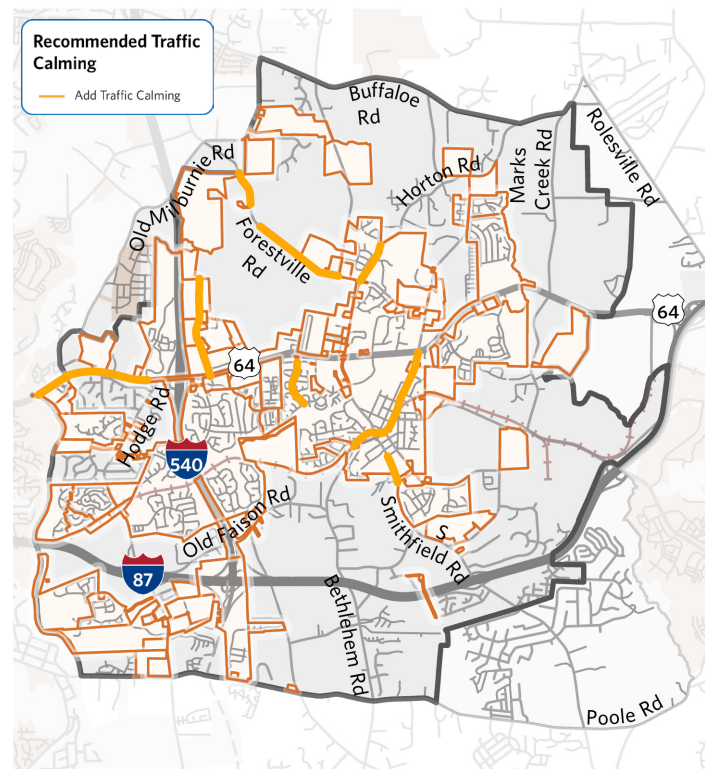
Concurrent with the speed limit audit, the project team reviewed signage across the Town, particularly for the 21 corridors that received a detailed review. In some places, signage preventing truck travel was recommended. In others, School Zone signage was recommended. Finally, where additional speed limit signage is a recommendation, the Town could add posted speed limit signs on corridors where it is lacking and unclear what the speed limits are.

This did not include a review of all signage on all roads, so this list—while useful—should not be considered comprehensive. The map below shows the signage recommendations for the corridors reviewed.



Recommended Traffic Calming

There were several roads with a speed ratio greater than 1.2, indicating excessive speeding. However, due to a variety of factors, several of these corridors were not considered by USLIMITS2 results as supporting a recommendation for lower speed limits. Therefore, these were identified individually for additional traffic calming measures. The map below shows the corridors recommended for additional traffic calming measures.





4

Engagement Summary

ENGAGEMENT



Public Open House

In March 2024, a public open house was held at Knightdale Town Hall to introduce the Safety Action Plan, educate the public on Vision Zero, present the primary safety findings from the State of Safety, and provide interactive ways for attendees to express safety concerns. Photos from the public open house are shown on the page to the right.

The project team asked attendants to pinpoint safety concerns on a map of the study area by type—such as lack of pedestrian or bicycle facilities, congestion, lack of visibility or lighting, unsafe intersections, or speeding. In addition, attendees completed a variety of other activities:

- Showing where they work, play, and live on a map
- Providing comments related to specific concerns
- Sharing their highest safety priorities
- Indicating their perceived level of safety on Knightdale roads

Vision Zero Task Force Meetings

To help guide the planning process and act as a conduit to the residents in Knightdale, a Vision Zero Action Plan Task Force was formed. Our four meetings with the Task Force were key in shaping this plan to ensure it reflects Knightdale's priorities. Task Force members included representatives from the Town Management office, Fire Department, the Police Department, and Town Council.

Joint Planning Open House

In April 2024, Town staff hosted a joint planning open house with the Town Council and the Land Use Review Board (LURB). At the open house, Council and the LURB provided input on the Knightdale Safety Action Plan, the Comprehensive Land Use Plan Update, and the Knightdale Boulevard Pedestrian Project.

Engagement Hub

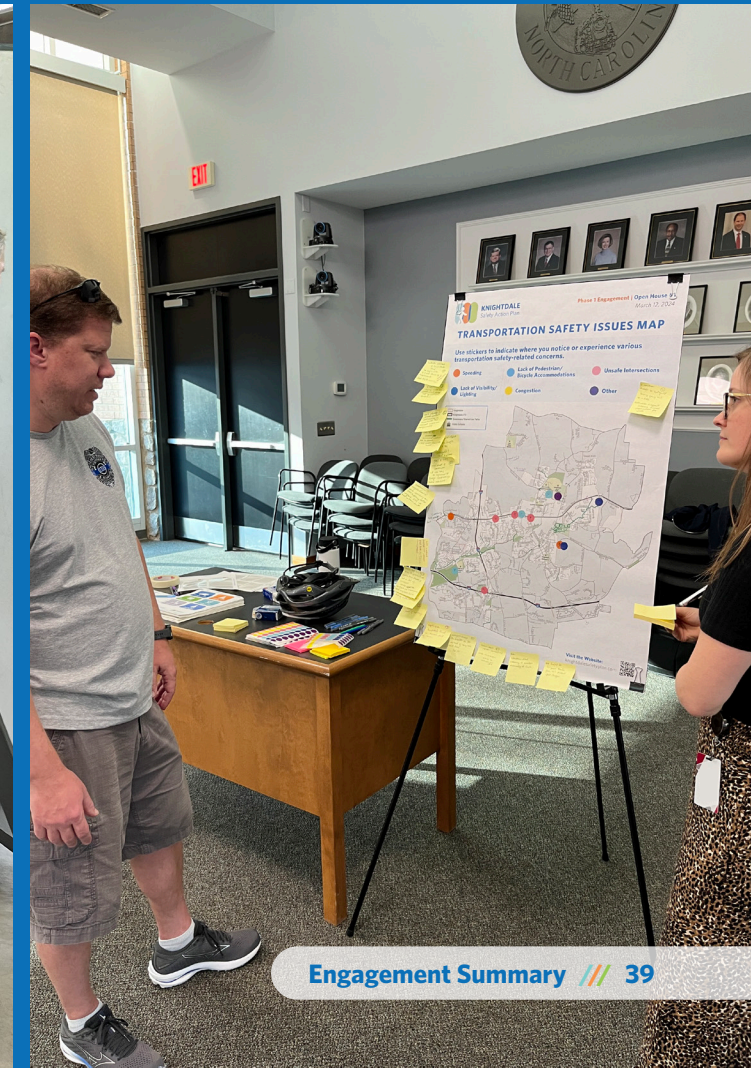
Housed within the project website, the engagement hub provided a way for anyone interested in the Knightdale Safety Action Plan to share their thoughts and ideas when it was most convenient for them. It included an interactive transportation issues map and digital survey. Similar to the in-person engagement at the public open house, the interactive map allowed participants to pinpoint specific locations of safety concerns on a map of the study area by concern type. These were open from late April to early June on the project website.

Project Website

The project team created a website to act as a digital hub for the project, including information about the Safety Action Plan and Vision Zero, links to documents like the State of Safety Report, and an engagement hub where people could virtually participate in engagement about the project. The website also included a built-in translation feature to make the engagement materials and information available in multiple languages.

Community Events

To provide additional opportunities for engagement and continue spreading the word about the project, the Knightdale planning staff attended two community events over the course of the project—including the Latin American Festival in April 2024 and the Arts and Education Festival in August 2024.



WHAT WE HEARD

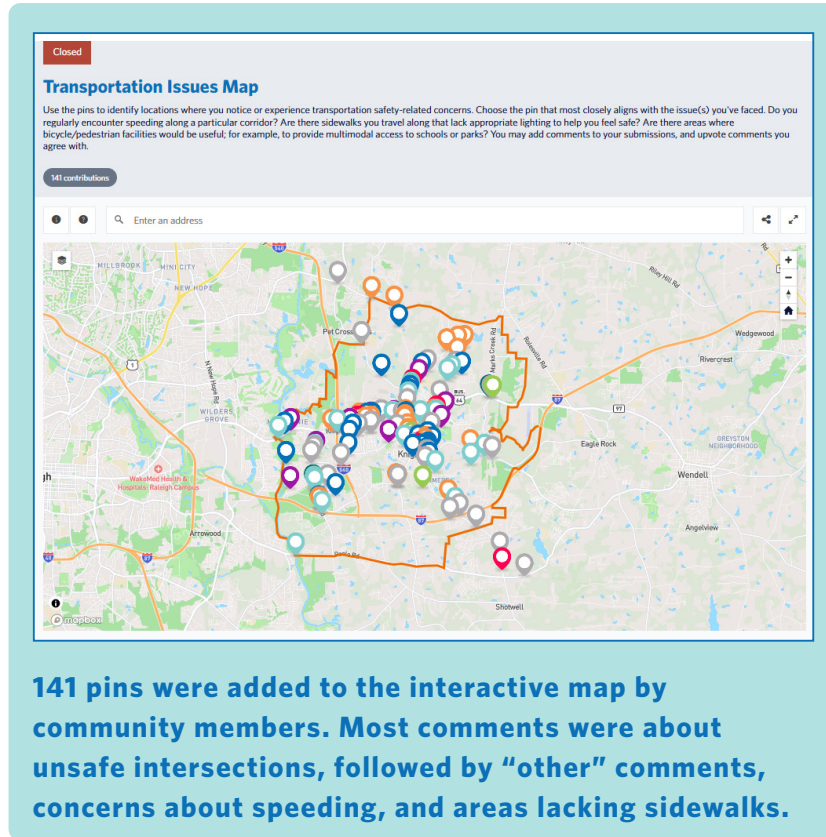


Transportation Issues Map

One of the key activities within the Engagement Hub was the transportation issues map. With this map, participants could drop pins to identify locations where they've noticed or experienced transportation safety-related concerns. They could choose from a variety of categories:

- Speeding
- Lacks Sidewalk
- Lacks Crosswalk
- Lacks Bike Facility
- Unsafe Intersection
- Lacks Lighting
- Congestion
- Other

Most comments were about unsafe intersections, following by comments marked "other," concerns about speeding, and areas lacking sidewalks.

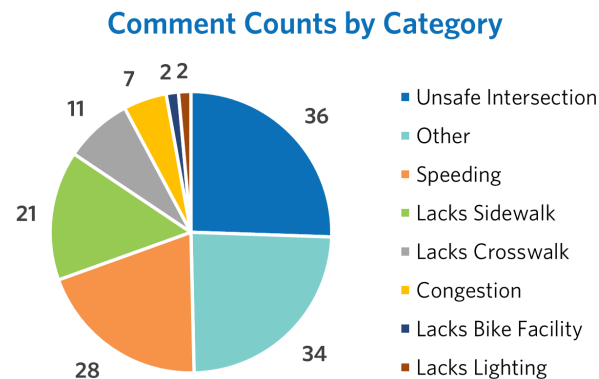


In addition, comments were largely concentrated in four areas:

- Downtown Knightdale
- Along Knightdale Boulevard (US-64 Business)
- Along Smithfield Road
- Along Old Knight Road and First Avenue

Downtown Knightdale saw several comments focused on speeding, especially along Park Avenue and Hester Street. Knightdale Boulevard saw a significant number of comments about unsafe intersections, followed by equal numbers of comments about speeding and missing sidewalks. Smithfield Road mostly saw comments about unsafe intersections clustered around the downtown area and near Knightdale Boulevard, though other parts of the roadway received comments about congestion. Comments along Old Knight Road focused primarily on missing sidewalks and lack of bike facilities.

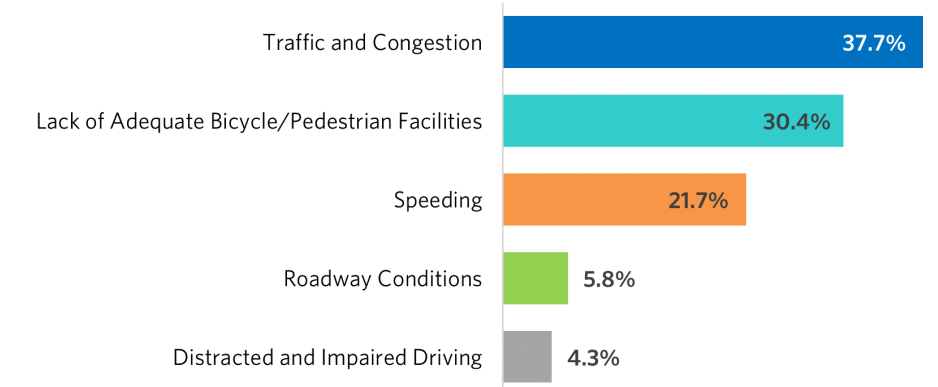
Besides the aforementioned corridors, other locations with intersection safety concerns included Bethlehem Road at Old Faison Road, Hodge Road at Old Faison Road, and North Smithfield Road at Carrington Drive.



Quick Poll

The project website homepage included a quick poll that asked people to indicate the most pressing transportation safety issue affecting Knightdale today. The poll received 69 responses with the top three responses being about Traffic and Congestion, Lack of Adequate Bicycle/Pedestrian Facilities, and Speeding.

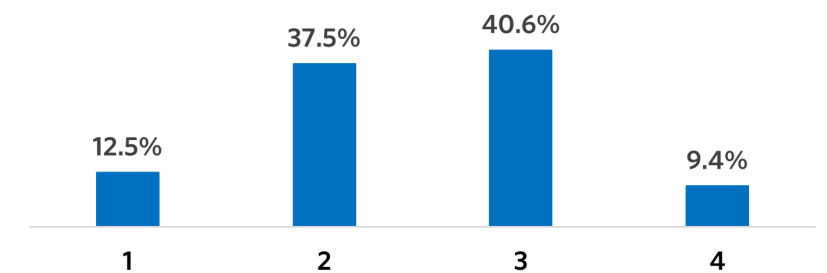
The most pressing concerns are Traffic and Congestion, Lack of Adequate Multimodal Facilities, and Speeding.



Survey

How safe is it to travel in Knightdale?

On a scale of 1 to 5, most responses were in the middle of the range, indicating respondents do not feel completely safe. No responses gave Knightdale a perfect 5 for safety.



What are your thoughts on transportation safety in Knightdale?

Generally, responses indicated driving in Knightdale overall feeling safe outside of dangerous intersections, but that walking and biking felt significantly less safe due to the lack of facilities. While several comments mentioned congestion, many of these comments noted safety concerns from road rage when drivers become frustrated with traffic and drive erratically. Nighttime visibility also emerged as a concern.

"Lots of congestion leads to a large number of people acting irrationally as they try to speed to their destination/appointments."

"It's generally safe for driving with some problematic intersections. It doesn't feel that safe to walk or bike, with some exceptions like the greenway."

"Crack down on speeders."

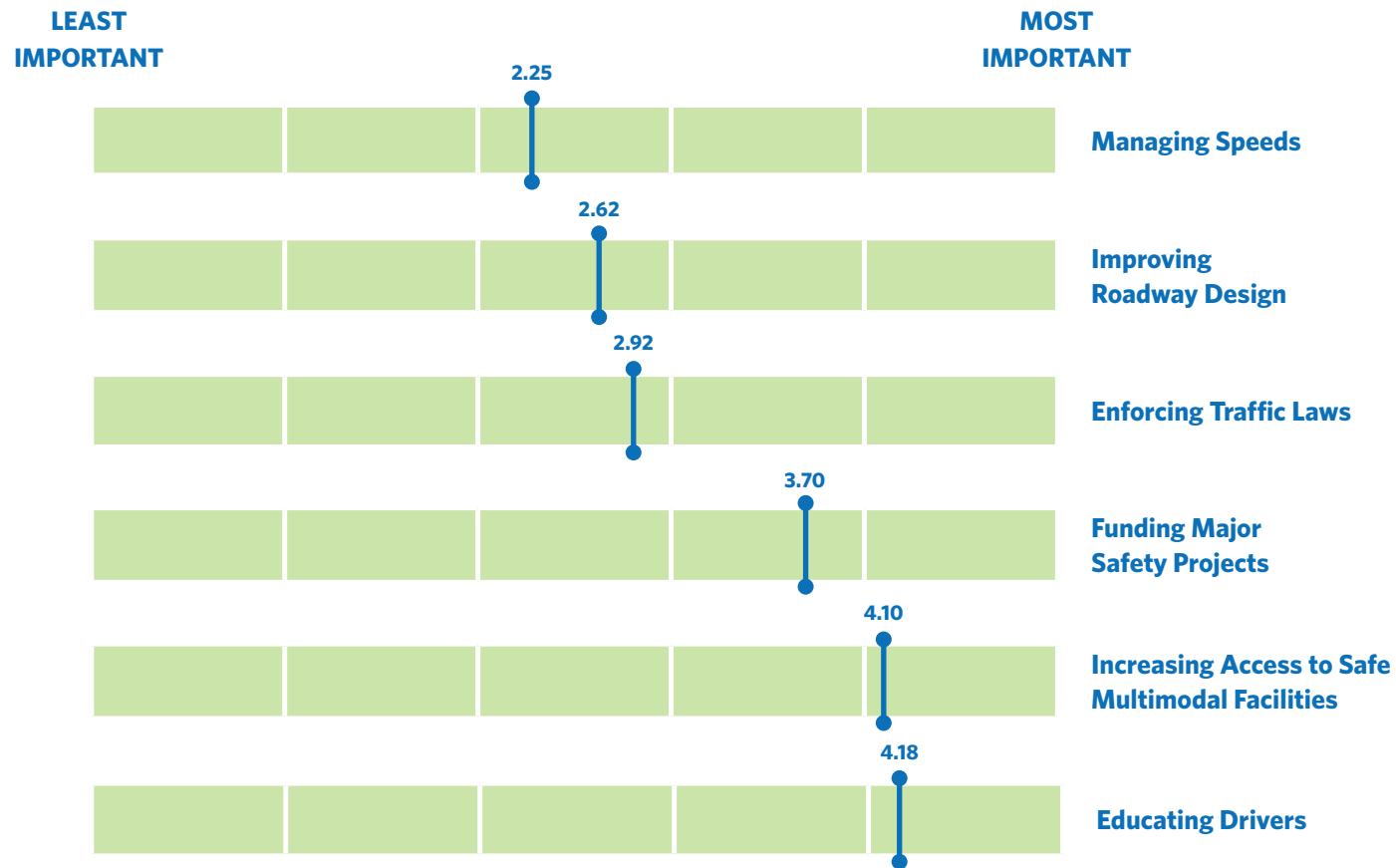
"Fill in all the sidewalks that are needed, add safe bicycle lanes, and expand the greenway."

"It is very unsafe to drive around, especially at night and [during] bad or rainy weather."

"With only a single viable travel corridor running east west, the sheer amount of traffic is unsafe."

What safety improvements are most important and pressing in Knightsdale?

On a scale of 1 to 5, most responses were in the middle of the range, indicating respondents do not feel completely safe. No responses gave Knightsdale a perfect 5 for safety.



Increasing Access to Safe Multimodal Facilities and Educating Drivers are the improvements the majority of participants feel are most important and pressing.



Demographic Questionnaire

The survey also asked a series of demographic questions to track how closely respondents reflected the population of Knightsdale.

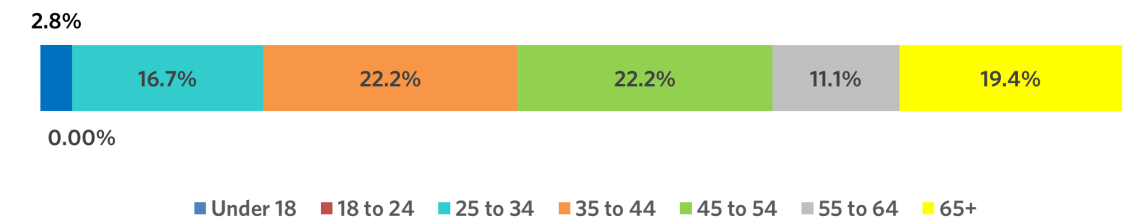
Which of the following best describes you?

I live in Knightsdale	91.7%
I work in Knightsdale	16.7%
I own a home in Knightsdale	80.6%
I own a business in Knightsdale	5.6%
I attend school in Knightsdale	5.6%
I attend special events in Knightsdale	47.2%

Most engagement participants live and own a home in Knightsdale (91.7% and 80.6%, respectively). Notably, most work outside of Knightsdale, suggesting the potential for high commuter traffic during peak AM and PM times.

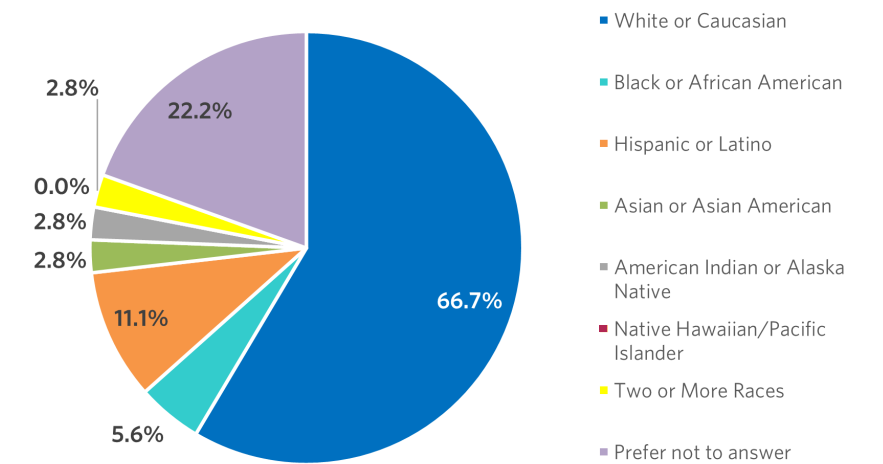
Age

Nearly half of engagement participants are between the ages of 35 to 54 (44.4%).



Race/Ethnicity

The majority of respondents identify as White/Caucasian (66.7%). 11.1% identify as Hispanic or Latino.





5

**High-Injury
Network**

HIGH-INJURY NETWORK



Methodology

After analyzing where and how crashes occur in and around Knightdale, the project team looked closer at what parts of the roadway network have had fatal and serious injury crashes, large numbers of minor injury crashes, and bicycle/pedestrian crashes. Overlaying crash data and the road network revealed what parts of the network have experienced the most injury-causing crashes (or in the case of bicycle and pedestrian crashes, pose injury risks for vulnerable road users). This information led to the generation of a High-Injury Network (HIN) for Knightdale to help guide strategic investments in safety. This section explains the methodology behind the creation of the HIN.

Segmenting the Network

First, the roadway network was split into segments to group related crashes. We generated a network of road segments approximately 0.5 miles in length each (with all segments between one-third and two-thirds of a mile).

Counting Crashes per Segment

Next, we associated crashes with their corresponding street segment(s) in preparation for scoring. For each segment, we calculated the number of crashes by type along each segment and coded the numbers into the network attributes. Since interstates are state-owned, state-operated, and state-maintained with little opportunity for the Town to influence design/construction, crashes along I-87 and I-540 were excluded from this process and from the resulting High-Injury Network.

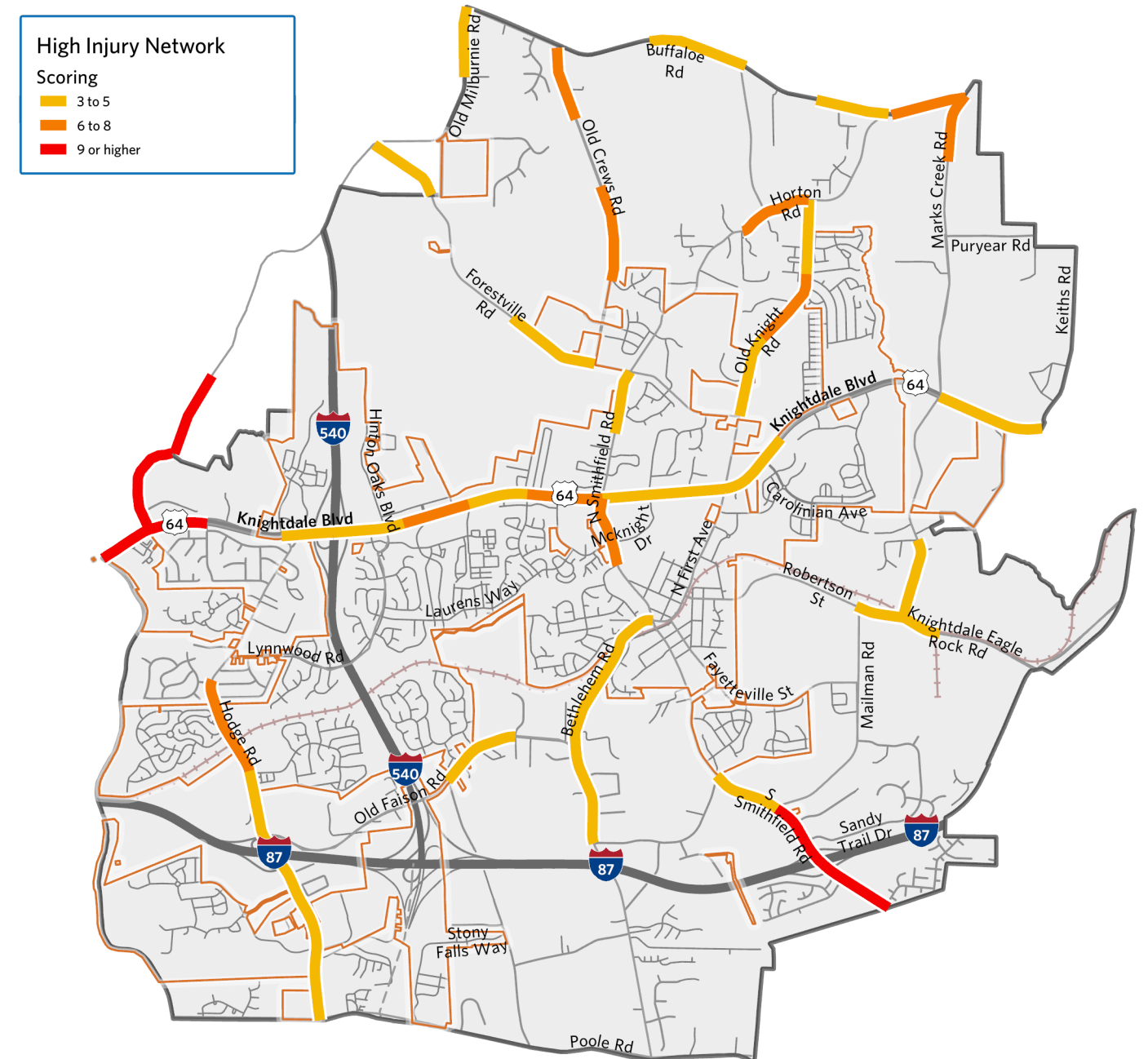
Calculating Scores

Lastly, scores were assigned to all segments based on the crashes that occurred along the segments. Scoring for each crash type was weighted by severity. Fatal and severe injury crashes were weighted the highest individually, while minor injury crashes were scored based on frequency of crashes. Because bicyclists and pedestrians are more vulnerable at the same crash impact level, crashes that involved them were also more heavily weighted. The following formula was used to calculate each segment's severity score:

FATAL OR SEVERE INJURY (FSI) CRASHES <i>(Severity of K or A)</i>	<ul style="list-style-type: none"> Each FSI crash: 3 points
MINOR INJURY CRASHES <i>(Severity of B or C)</i>	<ul style="list-style-type: none"> Between 1 and 10 minor injury crashes: 1 point Between 11 and 20 minor injury crashes: 2 points Between 21 and 30 minor injury crashes: 3 points Between 31 and 40 minor injury crashes: 4 points 41 or more minor injury crashes: 5 points
BICYCLE OR PEDESTRIAN CRASHES	<ul style="list-style-type: none"> Each bicycle or pedestrian crash: 2 points

$$\begin{aligned} &\text{Minor injury crash range score (x1) + Number of bicycle or pedestrian crashes (x2)} \\ &+ \text{Number of fatal and severe injury (FSI) crashes (x3)} \\ &= \text{severity score} \end{aligned}$$

This map shows the resulting High-Injury Network and the score range for each segment. All scored segments that received a score of 3 or higher are included in the HIN, ensuring that segments with at least one fatal or severe crash in the last five years are automatically included in the network. Segments with a score of 6 or higher may either have had multiple FSI crashes or high numbers of minor injury crashes. When referring to the HIN in prioritizing focus and resources, higher scores would help indicate segments with a higher need/priority for safety investments.





6

Projects and Prioritization



The Town of Knightdale has a robust program of pipeline projects to help improve the transportation network. These are projects the Town could implement as well as improvements that will occur through continued development. The Town supports efforts by private development to increase safety, improve access, and provide multimodal connections.

For the Safety Action Plan, the project team drew from project lists identified as part of the Comprehensive Transportation Plan (CTP) as well as documented priorities from the North Carolina Department of Transportation (NCDOT), Town Council, and the Town of Knightdale Development Services Department (Development Services) to first collect a master list of projects referred to as the universe of projects. Projects that could reasonably be assumed to have an impact on transportation safety in Knightdale were considered, and included:

- Speed issues (prioritized separately based on the findings of the previously mentioned speed audit)
- Bicycle/pedestrian facilities
- Spot safety and maintenance projects
- Intersection improvements

This list was further refined by overlaying the universe of projects over the High-Injury Network (HIN) and determining which projects fell along the HIN. As part of this process, the project team performed a gap analysis of the HIN—or those places along the network where no project had yet been identified to improve safety.

Calculating the Prioritization Score

To prioritize the HIN projects, the project team, in coordination with the Task Force, developed context-sensitive prioritization scores that outline what is most important in Knightdale. This prioritization provides the Town with the guidance necessary to understand where resources are most needed to improve safety.

For each of the three main project types (bicycle/pedestrian facilities, spot safety and maintenance projects, and intersection improvements), project-type specific criteria were developed.

Bicycle/Pedestrian Facilities	Spot Safety and Maintenance Projects	Intersection Improvements
<ul style="list-style-type: none"> ○ School proximity ○ Along a transit route ○ CTP roadway designation ○ Park proximity ○ Downtown proximity ○ Traffic volume ○ Connects residents to commercial destinations ○ Fills in a network gap 	<ul style="list-style-type: none"> ○ Number of crash incidents at project site ○ Severity of crash incidents at project site ○ Quality of life improvement 	<ul style="list-style-type: none"> ○ Traffic volume ○ CTP / Council Priority ○ Number of crash incidents at project site ○ Severity of crash incidents at project site ○ Quality of life improvement

In addition to these project-type specific criteria, the project team used a set of universal criteria to help compare the list of projects against one another. The universal criteria included:

- Roadway location (in Town vs. out of Town)
- Cost (low, medium, high)
- Ease of implementation
- Roadway speed
- Demographics
- Public feedback
- HIN score

To further refine the projects and ensure the prioritization captured the Town’s vision for safety in Knightdale, each scored criterion was weighted. To determine the weights, the project team used input from the public and the Task Force on the following question:

If you had funding for projects that will improve transportation safety in Knightdale, which projects would you spend your money on?

Projects that provide safer access to important destinations

Projects that incorporate multimodal facilities

Projects that mitigate traffic and congestion

Projects that address safety issues in the roadway

Projects that improve safety in our vulnerable communities

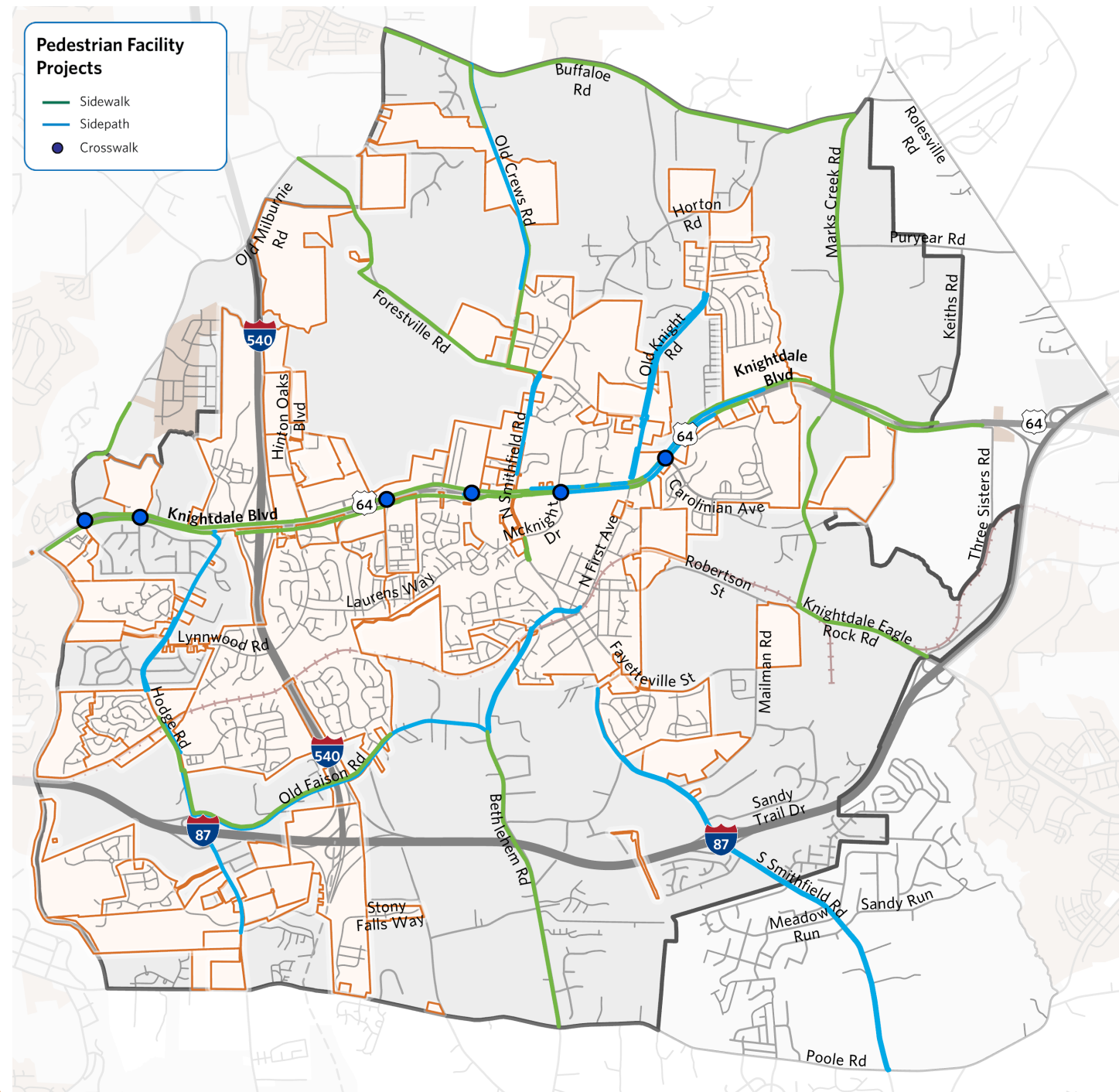
Projects that are easiest to implement

The rankings from the public and the rankings from the Task Force were averaged together to create a multiplier to weight the scores.



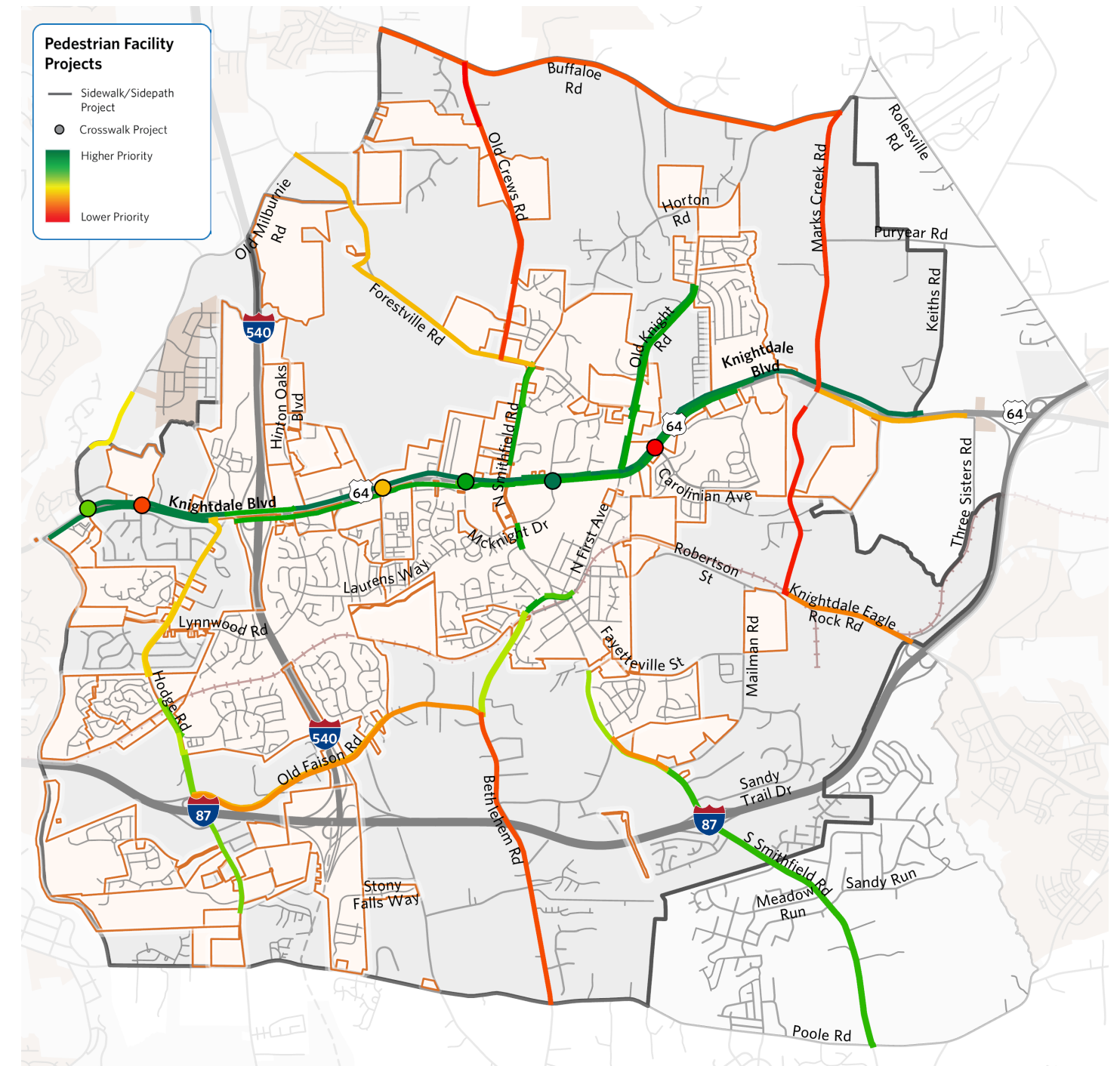
Pedestrian Facilities

Pedestrian facility projects, including sidewalks, sidepaths, and crosswalk locations, were prioritized as a group. 50 of these projects were identified, including 21 sidewalk projects, 23 sidepath projects, and six crosswalk projects.



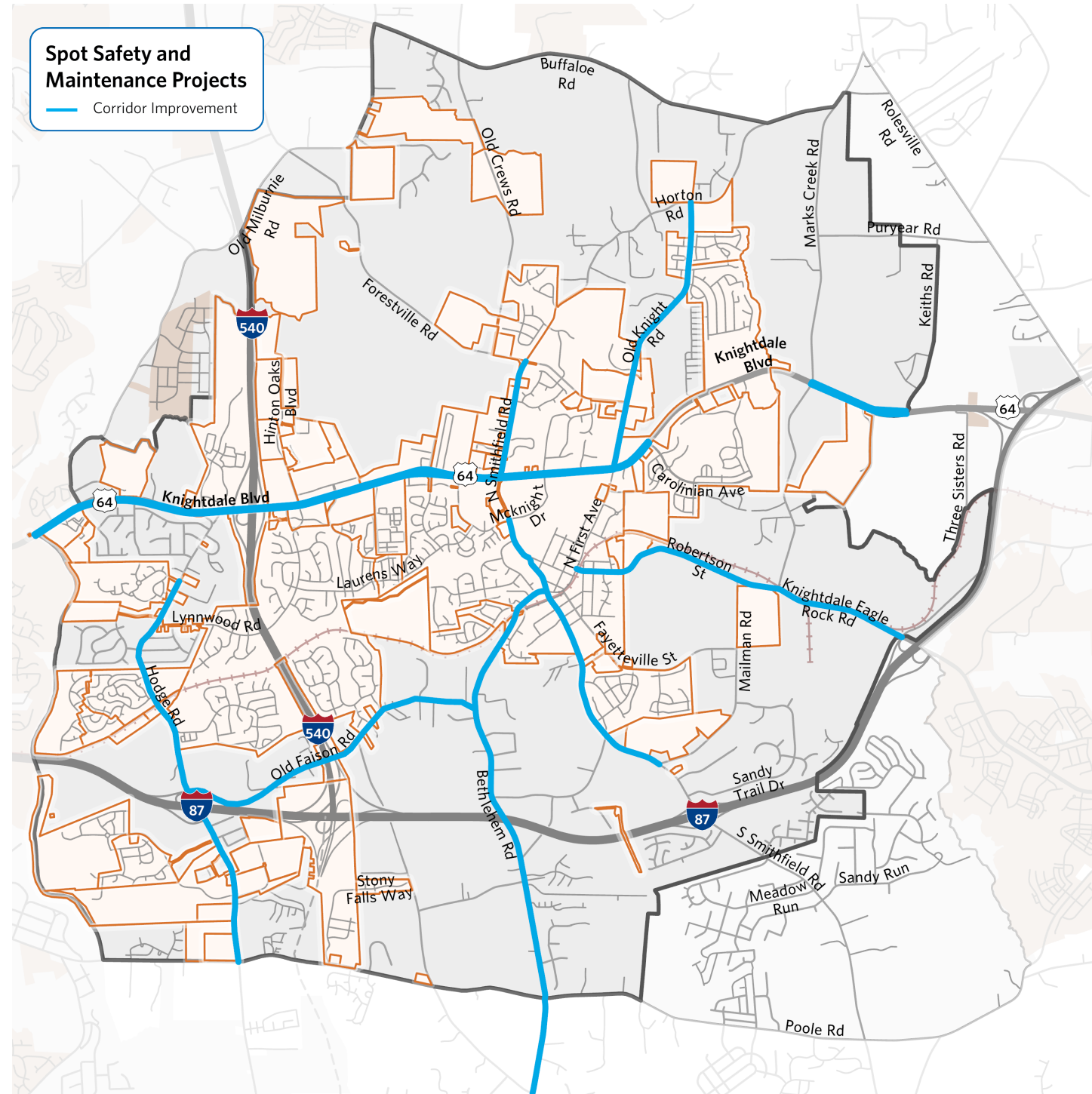
Prioritized Pedestrian Facilities

Projects along Knightdale Boulevard/GoRaleigh Route 33 emerged as top priority projects, along with projects surrounding Downtown.



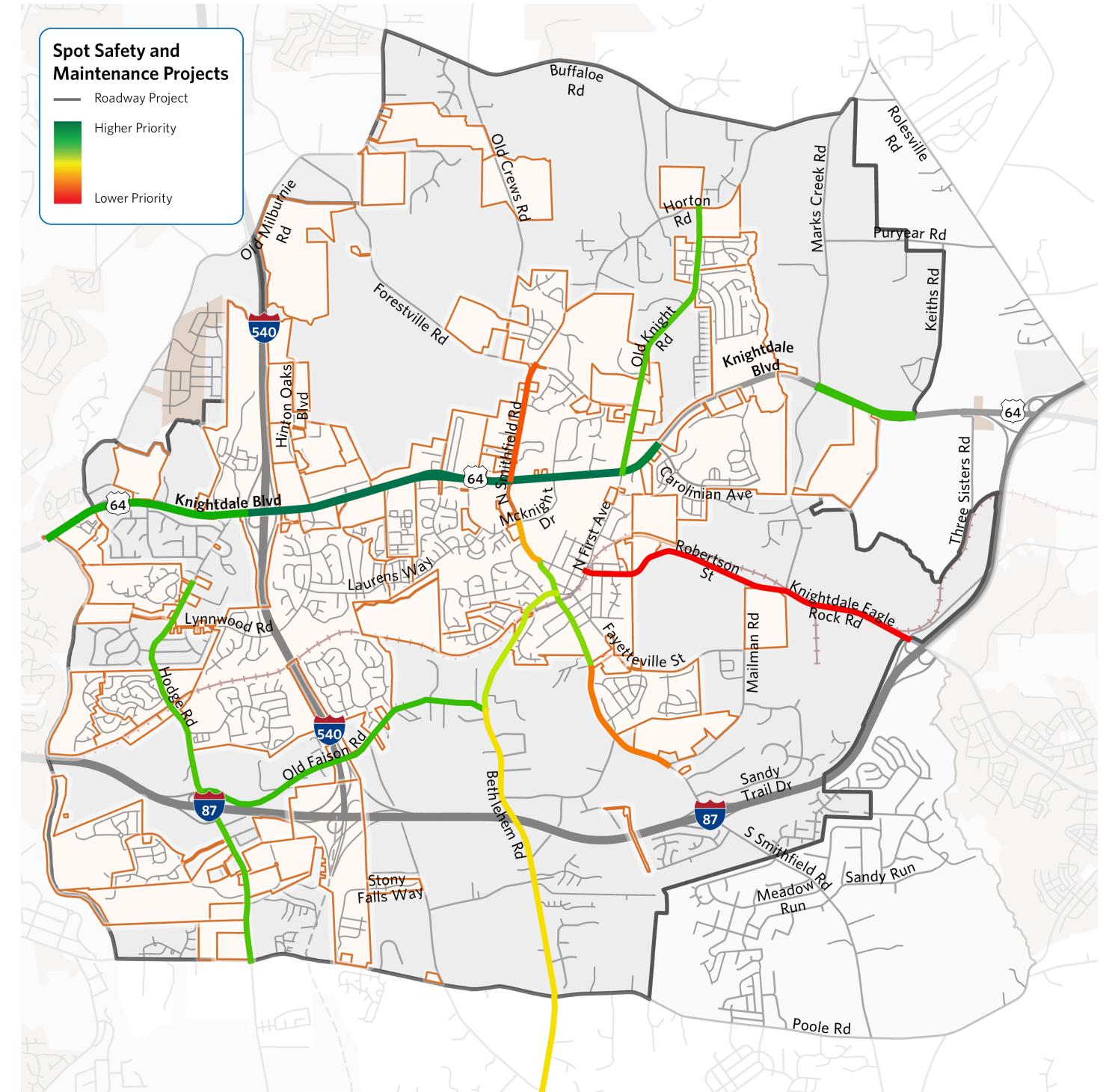
Spot Safety and Maintenance Projects

Spot safety and maintenance projects were categorized broadly as corridor improvement projects. 16 projects were identified, including three access management projects and nine other modifications.



Prioritized Spot Safety and Maintenance Projects

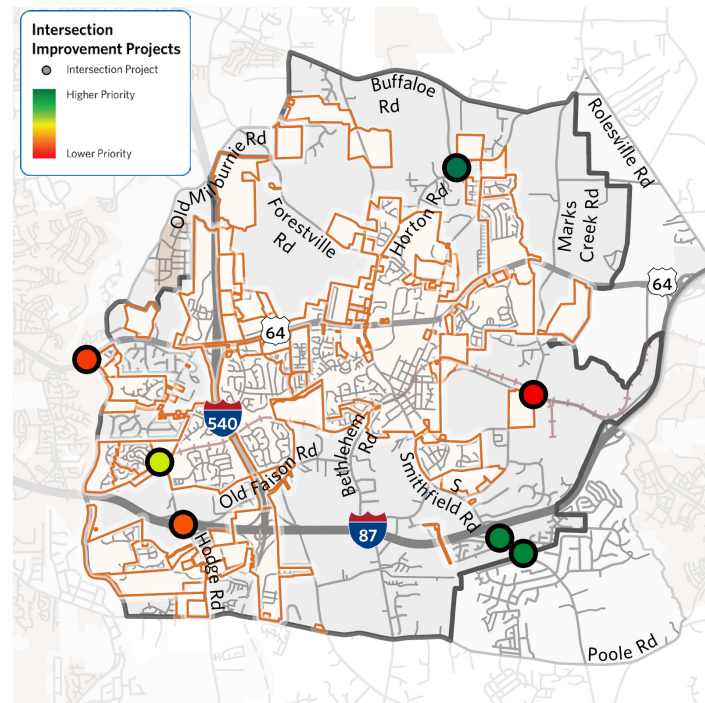
Projects along Knightdale Boulevard received the highest prioritization scores, followed by Old Knight Road and projects around Downtown Knightdale on Smithfield Road and First Avenue/Bethlehem Road.



Prioritized Intersection Improvements

Roadway-focused intersection/point improvements including grade separations, bridge improvements, and other general intersection improvements were grouped together for prioritization. Four projects were identified within this category. **Programmed projects were omitted from the rankings, including the following NCDOT intersection projects: Poole/Smithfield, Old Faison/Hodge, 1st/Smithfield, Smithfield/I-87, and Poole Road Bridge over the Neuse River. These projects are underway.**

The grade separation of Hodge Road over the railway received the highest prioritization score, followed by the two bridge widenings (Hodge Road over I-87; Knightdale Blvd over the Neuse River). The realignment of the intersection between the Marks Creek Road Extension and Knightdale-Eagle Rock Road ranked lowest; however, there may still be smaller steps taken to improve visibility at said intersection in the interim.

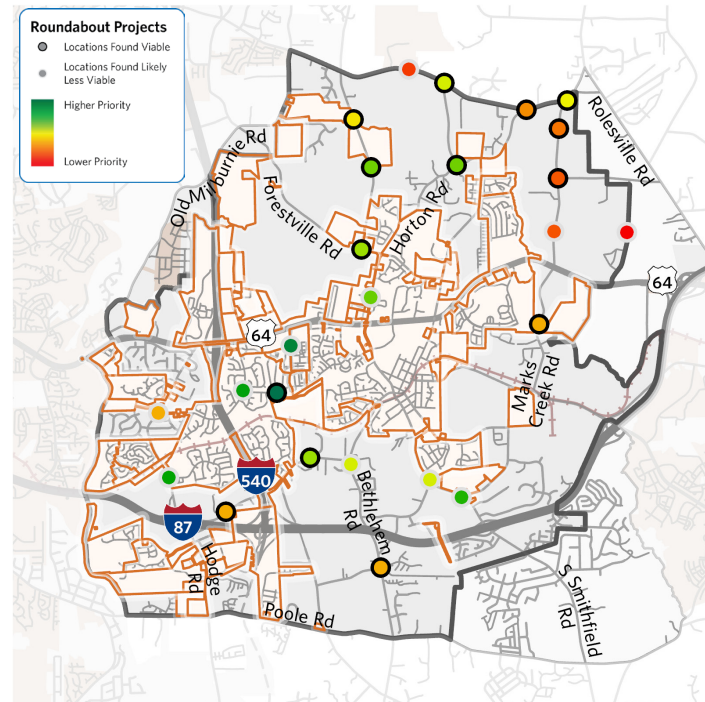


Prioritized Roundabouts

The Town's development ordinance requires that roundabouts be considered at significant intersections. The Town therefore wanted to further refine a list of intersections where roundabouts were the most feasible. While prioritized separately from other intersection projects, the 25 roundabout projects largely followed the same prioritization process. However, when receiving a score for traffic volumes, the results of the roundabout feasibility screening were used to give points to volumes within the optimal range identified for both need and NCDOT viability, rather than to roadways with the highest volumes. While all 25 roundabouts were prioritized, the map below notes which roundabouts were identified as less viable through the screening process.

Out of the roundabouts that both made it through screening as most viable and ranked as high priorities, Laurens Road at Widewaters Parkway emerged as the highest priority, followed by Lucas Road at Horton Road, Old Crews Road at future CTP Avenue South, Old Faison Road at future Widewaters Parkway Extension, and Old Crews Road at Forestville Road. However, several of these roundabouts are dependent on the construction of other projects.

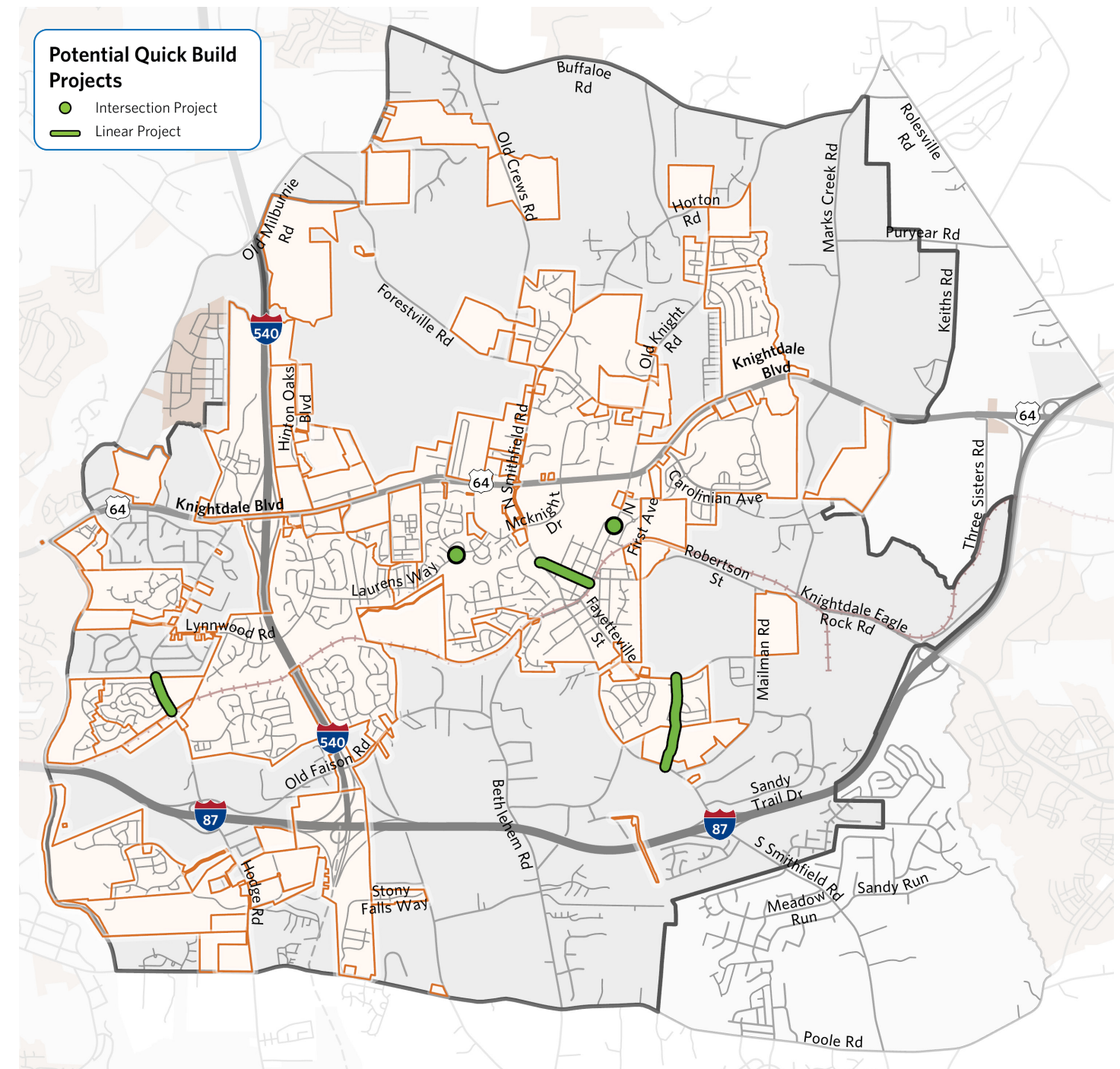
Other roundabouts along Hodge Road, Lynnwood Road, Parkstone Towne Boulevard, and Smithfield Road also ranked high in the prioritization process but were screened as less feasible due to traffic volumes, V/C, or grade concerns.



Quick Build Projects

As part of the Knightdale Safety Action Plan, a selection of quick build projects were identified that could be quickly implemented. They include:

- **Main Street between Smithfield road and 1st Avenue**—parallel parking, stop striping, traffic calming, lane striping, sharrows
- **Hodge Road at Mingo Creek Greenway Crossing**—restripe excess pavement for trail parking and traffic calming
- **Glen Manor Trail between Fayetteville Street and Village Gate Development (under construction)**—stripe bike lanes and a through lane divider
- **Raised intersection for 1st Avenue at Sycamore Street**—to address speeding at this stop sign
- **Laurens Way at Parkside Commons**—mini roundabout demonstration project





7

Action Plan

OVERVIEW AND ACTIONS



The following actions represent Knightdale's commitment to roadway safety. These are the additional ways—outside of transportation projects that improve safety—that Knightdale will work toward the goal of preventing roadway deaths and serious injuries.

Programs, policies, and strategies are organized around three key themes:

- Design Improvements to Increase Safety (D)
- Community Awareness, Education, and Engagement (C)
- Implementation Support (I)

For each measure, the lead agencies or party as well as key partners are shown.

- DS = Development Services
- PD = Police
- FD = Fire
- NCDOT = North Carolina Department of Transportation
- VZTF = Vision Zero Task Force
- CR = Community Relations

In addition, each action has an associated performance measure and an estimated recommendation for implementation (near term, medium term, long term).

Action Table

D | Design Improvements to Increase Safety

Action #	Description	Measure	Lead Agency(ies)	Key Partner(s)	Priority
D-1	Apply the USDOT Safe Systems Approach to the design of new and improved streets. Prevent crashes by anticipating human mistakes and ensuring that if a crash occurs, it is unlikely to seriously hurt or kill someone.	Per capital and total fatal/severe injury crashes	DS	Other Departments	Near Term
D-2	Continue requiring sidewalks with new development.	Miles of sidewalks	DS	NCDOT; development community	Near Term
D-3	Proactively require traffic calming measures, such as roundabouts, raised intersections, and raised crosswalks where appropriate, in new development.	Number of new development projects including traffic calming measures	DS	Development community	Near Term

Action #	Description	Measure	Lead Agency(ies)	Key Partner(s)	Priority
D-4	Incorporate elements to improve safety into already planned road improvement, utility, and street maintenance projects.	Number of improvements	DS	NCDOT, utility companies	Near Term
D-5	Use recommendations within the Safety Action Plan to prioritize conversion of existing intersections into roundabouts.	Number of intersections converted to roundabouts	DS	NCDOT	Near Term
D-6	Review FHWA's Proven Safety Countermeasures (PSC) when conducting new roadway design or implementing safety-related improvements to existing facilities to ensure alignment with the Proven Safety Countermeasures Initiative (PSCi).	Number of corridors with PSCi methods incorporated	DS	NCDOT	Near Term
D-7	Review the Town's updated traffic calming policy to include additional provisions for eliminating fatal and serious injury crashes.	Traffic Calming policy updated	DS	VZTF; PD; FD	Medium Term
D-8	Expand the recommendations for school zone signage improvements from the Knightdale SAP to incorporate all school zone corridors within Knightdale's planning area. Currently, only the 21 corridors evaluated using USLIMITS2 are included.	Number of school zone corridors with improved signage	DS	NCDOT	Medium Term
D-9	Develop a lighting approach for the Town focused on safety and identification of locations appropriate for pedestrian-scale lighting.	Number of locations with adequate lighting added	DS	NCDOT	Long Term
D-10	Identify lane diet opportunities where wide lanes can be reduced in width to slow motor vehicle travel speeds and provide space for other travel modes.	Number of safety conversions on Town-maintained streets and HIN segments	DS	NCDOT	Long Term

C | Community Awareness, Education, and Engagement

Action #	Description	Measure	Lead Agency(ies)	Key Partner(s)	Priority
C-1	Meet with the Vision Zero Task Force each quarter to review safety data and continue to develop community messaging to advance Vision Zero.	Facilitation of quarterly meetings	DS; VZTF		Near Term
C-2	Create a unified communications strategy for Vision Zero in Knightsdale. Consistently use the Knightsdale Vision Zero brand to publicize safety improvements that are planned or implemented.	Public familiarity with Vision Zero and local safety improvements	CR	DS; VZTF	Near Term
C-3	Collaborate with and continue to learn from other Vision Zero communities in North Carolina, including by sending staff representatives to the NC Vision Zero Leadership Institute each year.	Staff sent to NC Vision Zero Leadership Institute	DS	VZTF, NC Vision Zero, NC Vision Zero Communities	Near Term
C-4	Represent Vision Zero at a minimum of two Town events or festivals per year. At these events, distribute educational resources produced by NC Vision Zero and others to promote bike safety, motorcycle safety, seat belt use, and discourage distracted, impaired, and drowsy driving.	Number of events attended, number of educational materials distributed	DS; PD; VZTF		Near Term
C-5	Develop an approach for communicating safety data to the community.	Public familiarity with local safety conditions	CR	DS; VZTF; PD; NC Vision Zero	Near Term
C-6	Partner with statewide, regional, and local organizations (such as NCDOT, Wake County Schools, elected officials, and local advocacy groups) to publicize the Vision Zero campaign and promote safe driving to their audiences.	Number of partner organizations	CR; PD; FD	NCDOT; community partners; DS	Medium Term
C-7	Become a Watch for Me NC partner community to receive educational and marketing material to support pedestrian and bicycle safety in Knightsdale through a collaborative effort with NCDOT.	Become a Watch for Me NC partner	DS; VZTF	NCDOT	Medium Term

Action #	Description	Measure	Lead Agency(ies)	Key Partner(s)	Priority
C-8	Create a program for residents to request new sidewalks or improved pedestrian crossings. Advertise this resource to residents as part of the ongoing Vision Zero campaign.	Creation of request program; number of requests filled	DS	Town residents	Long Term
C-9	Integrate Vision Zero principles into driver's education programs at local schools by partnering with Police Department and Wake County Public School System (WCPSS).	Number of student drivers educated about Vision Zero principles	CR; PD; DS	WCPSS	Long Term

I | Implementation Support

Action #	Description	Measure	Lead Agency(ies)	Key Partner(s)	Priority
I-1	Ensure existing sidewalks are well maintained and meet Town standards.	Maintenance calls fulfilled for sidewalk issues	DS	NCDOT	Near Term
I-2	Research requirements for and pursue state and federal grants to improve safety, especially Safe Streets and Roads for All (SS4A). Use the Safety Action Plan and the High-Injury Network to select projects for grant funding.	Number of projects funded/ Amount of grant funding received	DS; VZTF	State and federal agencies; Town Boards and Committees	Near Term
I-3	Use the results of the speed audit within the Safety Action Plan to update speeds at identified locations. For corridors managed by NCDOT, make requests to change speeds.	Number of street segments reduced in speed limit	DS; PD	NCDOT	Medium Term
I-4	Conduct audit of existing signal operations to support safety goals. This may include considerations for retiming signals to support safe speeds, as well as adding leading pedestrian intervals, restricted turn phases, and walk signals with countdown timers and activation buttons.	Reduction in vulnerable user conflict; reduction in recorded crash modification factors	DS	NCDOT	Medium Term

Action #	Description	Measure	Lead Agency(ies)	Key Partner(s)	Priority
I-5	Update a comprehensive sidewalk inventory of all existing sidewalks in Knightsdale and identify all gaps in the sidewalk network.	Completeness of the digital sidewalk network	DS	NCDOT	Medium Term
I-6	Conduct more comprehensive corridor study of Knightsdale Boulevard to assess current conditions and more closely evaluate identified safety improvements for vehicular, bicycle, pedestrian, and future transit users as well as bus rapid transit (BRT) running way locations.	Completion of Knightsdale Boulevard Corridor Study	DS; NCDOT	Other Departments; Town residents	Medium Term
I-7	Continue using the TIA process to intentionally identify opportunities for new development to include multimodal facilities, including the potential for additional safety improvements for projects along the High-Injury Network or near the site of a past fatal or serious injury crash.	TIA policy updated; additional multimodal facilities	DS	Town Boards and Committees; development community	Medium Term
I-8	Track and continuously update relevant data, such as travel speed, traffic volume, posted speed limit, signal locations, sign locations, and street lighting. Partner with the Knightsdale Police Department to ensure that crash location data is as accurate as possible.	Number of maintained crash- and transportation-related datasets	DS; PD; FD	Regional partners; NCDOT	Medium Term
I-9	Create a sidewalk program that leverages Town, state, and federal resources to address gaps in the sidewalk/multimodal network.	Ongoing sidewalk Capital Investment Program created	DS	NCDOT	Long Term

Roundabout Guidelines

As part of the Knightsdale Safety Action Plan, the project team developed updated roundabout standards that considered factors like pedestrian and bicycle accommodations, landscaping, traversable truck aprons, entry radius, signage, entry and exit width, and pedestrian crossings. Standard specifications are included for single-land roundabouts, multi-lane roundabouts, and miniature roundabouts. **The full roundabout standards are included in an appendix.**



CONCLUSION



The safety of those who live, work, and play in Knightdale is top of mind in everything we undertake as a Town. We envision a future in Knightdale where everyone—regardless of how they choose to get around—can get to their chosen destinations safely, comfortably, and efficiently. Developing strategies and implementing projects specifically designed to increase roadway safety will be an important step in achieving this goal. The Knightdale Safety Action Plan is the Town's toolkit; it provides the framework, guidance, and strategies to improve roadway safety in the near term and well into the future. The plan outlines how the Town can implement safer roadway design, prioritize pedestrian and bicycle facilities to fill gaps in the multimodal network, and create a culture of safety through education and awareness. Town administration and staff, elected officials, residents, and visitors all have a role to play to ensure the safety needs of this community are met. Through their support, the Knightdale Safety Action Plan will be successful in helping achieve the goal of safety for all.

APPENDICES



Appendix A - State of Safety Report.....	A-1
Appendix B - Speed Limit Reduction Decision Tree.....	B-1
Appendix C - Data Management Plan.....	C-1
Appendix D - Roundabout Design Guidance.....	D-1
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March 2024



The Knightdale

STATE OF SAFETY



KNIGHTDALE
Safety Action Plan

INTRODUCTION

The Knightsdale State of Safety is a foundational assessment of the existing characteristics, physical conditions, and socio-demographic trends related to transportation safety in the community. The intent of this document is to showcase the need for further investment in transportation safety in Knightsdale. As a part of this planning process, a wide variety of data was analyzed by the project team. The State of Safety isn't a full accounting of all available data, but showcases the information and trends most relevant for identifying safety needs in Knightsdale.

Data Sources

This report leverages a variety of data sources that provide unique and foundational data related to transportation safety in Knightsdale. Those sources that provided the bulk of the data in this report are identified and described below:

US Census American Community Survey (ACS)

The ACS is an ongoing survey by the US Census Bureau that collects detailed population and housing information on a yearly basis down to block group level.

Connect NCDOT Mapping Resources

The North Carolina Department of Transportation (NCDOT) maintains these mapping resources to help with planning and mapping things like traffic volumes, safety scores, speed limits, planned projects, and other transportation network data.

NCDOT Crash Data

NCDOT maintains a crash database for planning-level analysis. Due to differences in recording methods, not all crashes are captured within the location-based data; however, those recorded act as a good high-level representation of crashes in the area.

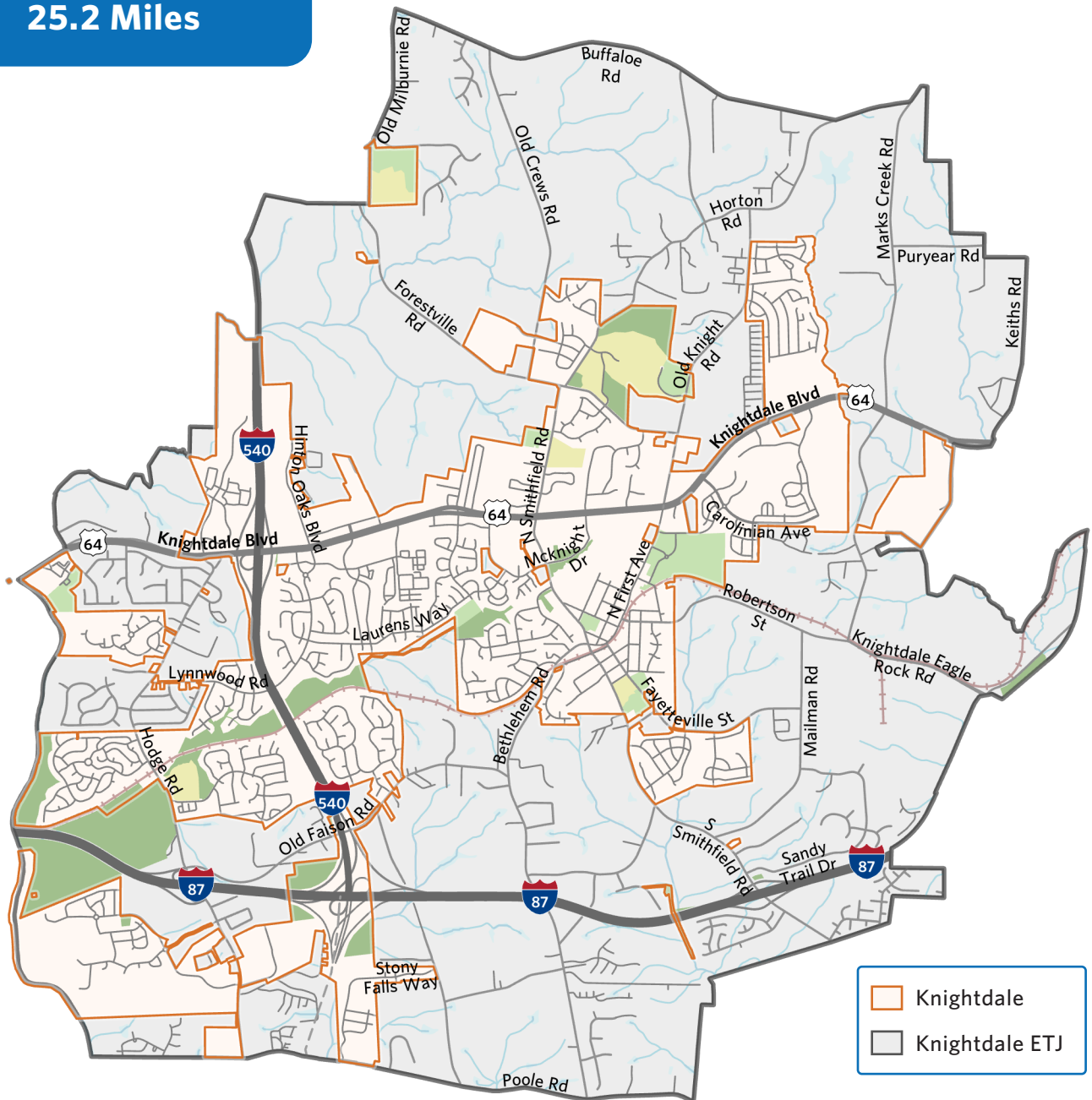
NC OneMap and Wake County GIS

NC OneMap is North Carolina's open data portal with mapping layers for the entire state. Similarly, Wake County maintains a similar open data portal with county-specific data.

Study Area

The Study Area for the Knightdale Safety Action Plan is the extraterritorial jurisdiction (ETJ) for the Town. The ETJ extends beyond formal boundaries of Knightdale, but represents a broader area that the Town has some amount of legal authority. For the purposes of the Knightdale Safety Action Plan, the project team will review and analyze all data within the existing ETJ to ensure a comprehensive approach to transportation safety planning for the community.

Knightdale ETJ Area
25.2 Miles

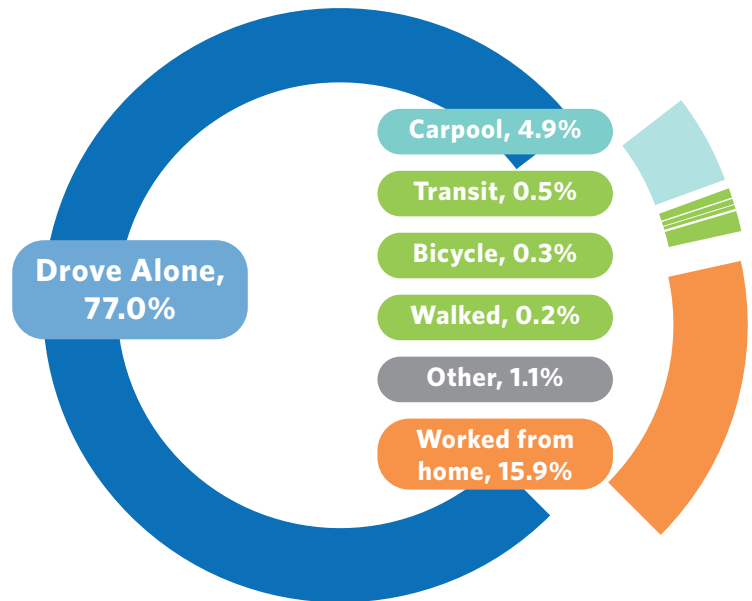




Commute Mode

Commute data shows us that the majority of Knightdale residents either drive alone (77%) or carpool (4.9%) on their way to work for a typical day. Multimodal options (like transit, biking, and walking) are used sparingly (1% total). It's also worth noting that almost 16% of residents work from home, meaning that their typical driving patterns are different than those that drive to their jobs each day.

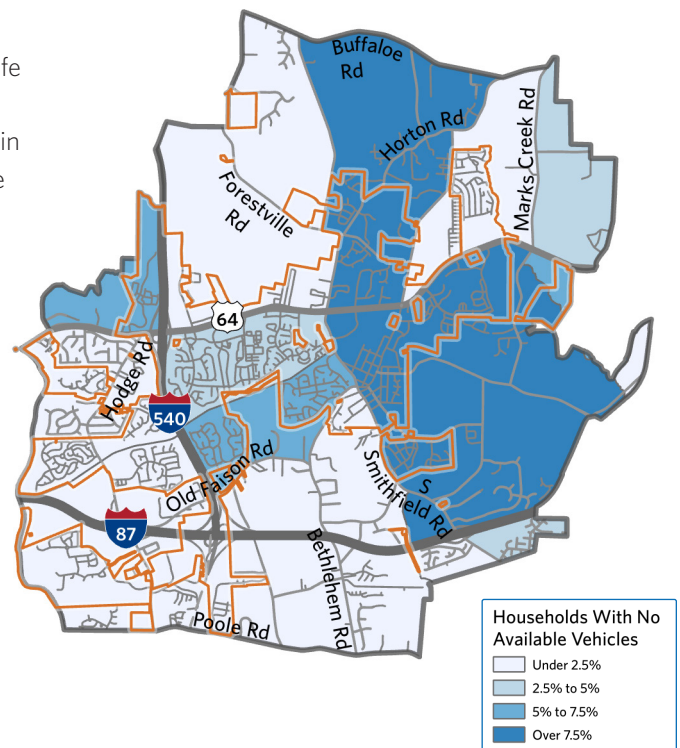
Just over 1.1% of residents commute by transit, walking, or biking.



Vehicle Access

Areas where vehicle access is limited are likely also more in need of safe multimodal transportation options, compared to other parts of the community. Within Knightdale's jurisdiction, over 7.5% of households in areas in the east and north of the ETJ (shown in dark blue) do not have access to a vehicle. It's worth noting that most of these areas are not as densely populated or developed as the central and eastern side of Town. Additionally, households in neighborhoods and apartments west of Downtown, south of Knightdale Boulevard, and east of I-540 show some limited access as well (between 2.5% and 7.5% of households).

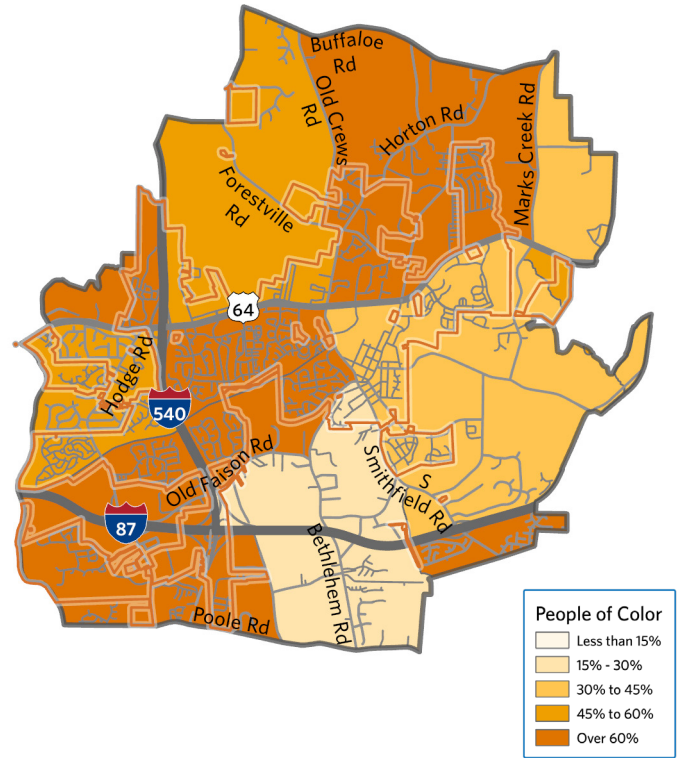
Rural areas in the east and residential areas west of Downtown have some of the most households without access to a vehicle.



Percent People of Color

Statistically, communities of color are most often impacted by transportation safety issues. The highest concentrations of non-white residents are in the central, southwest, and northeast areas (over 60% persons of color). Additionally, there is some correlation between the Town’s most diverse communities and the areas that most lack access to a vehicle in the household.

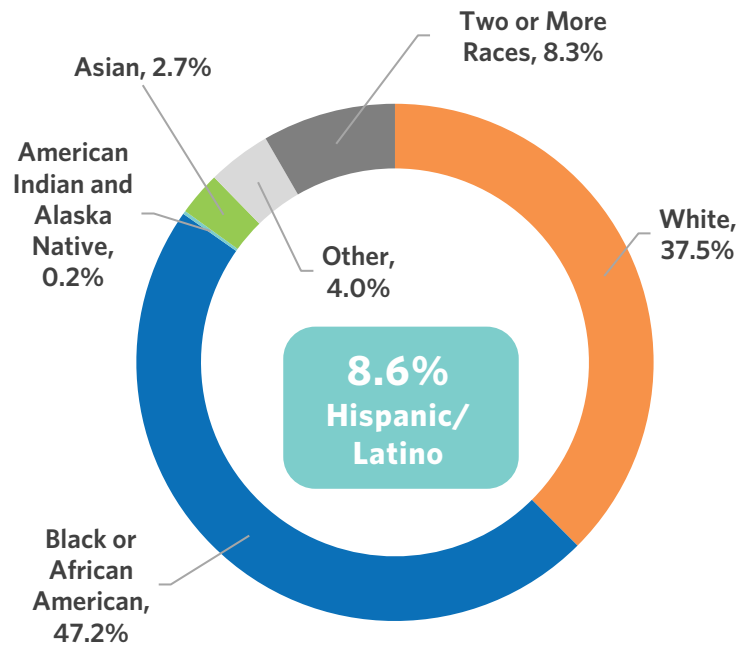
People of color are more than 30% of the population in every part of the Knightdale area except the south central area along Bethlehem Road.



Racial Distribution

Knightdale is a very diverse community, especially when compared with adjacent municipalities. 62.5% of Town residents are non-white, with the highest share in Black or African American communities (47.2%). The next largest ethnic group is Hispanic/Latino at 8.6%. Hispanic/Latino is considered by the US Census Bureau as an ethnicity, not a race—which is why it isn’t included in the full chart to the right.

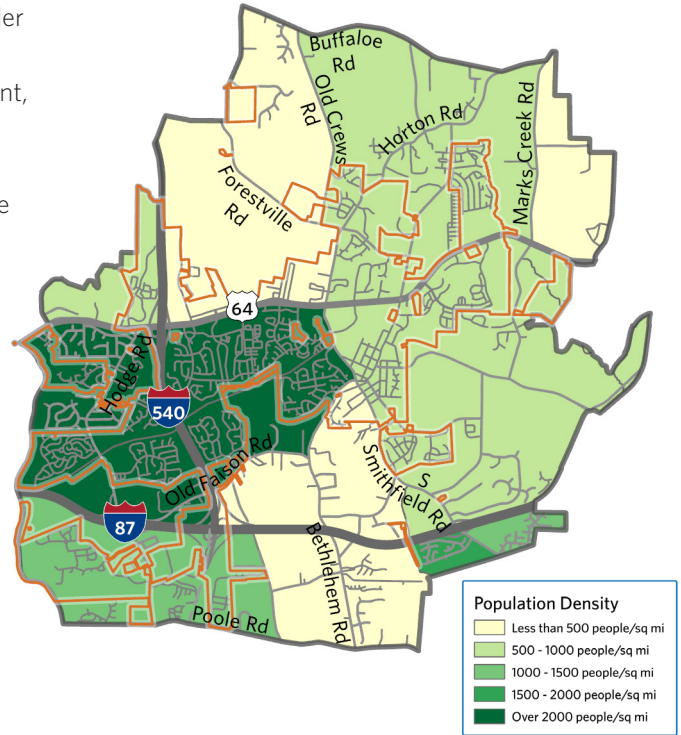
Black/African Americans are the largest racial group in the Knightdale area, making up almost half of the population.



Population Density

The western part of the Town between Knightdale Boulevard and I-87 has the highest population density, largely due to much of Knightdale’s older residential neighborhoods and subdivisions being located in that area and growth coming out from the Raleigh area. With recent development, the population density in other areas may begin to rise as new dense residential subdivisions are constructed. Areas with higher population densities are often better areas for multimodal transportation and have increased needs to design for safety of people outside of cars.

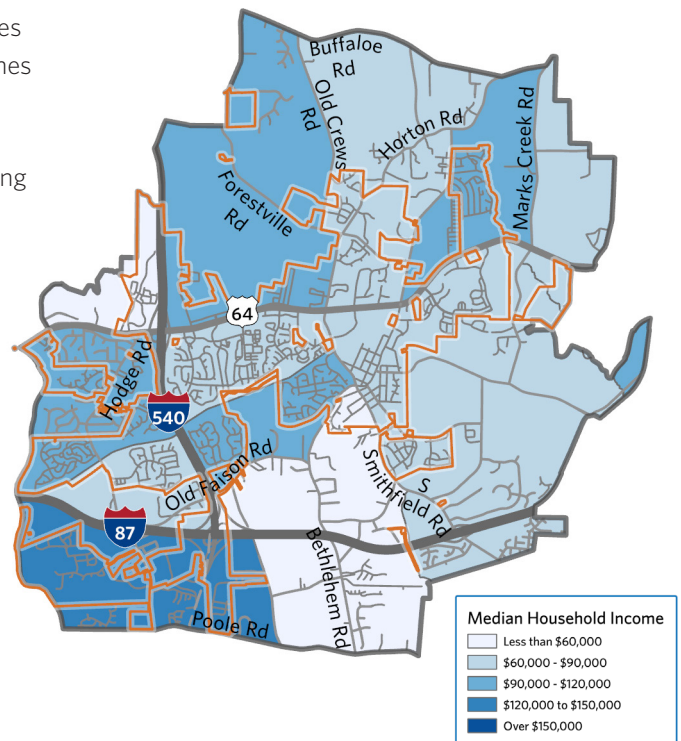
While Knightdale’s highest population density is currently in the west, new development will likely increase densities elsewhere in the ETJ.



Median Household Income

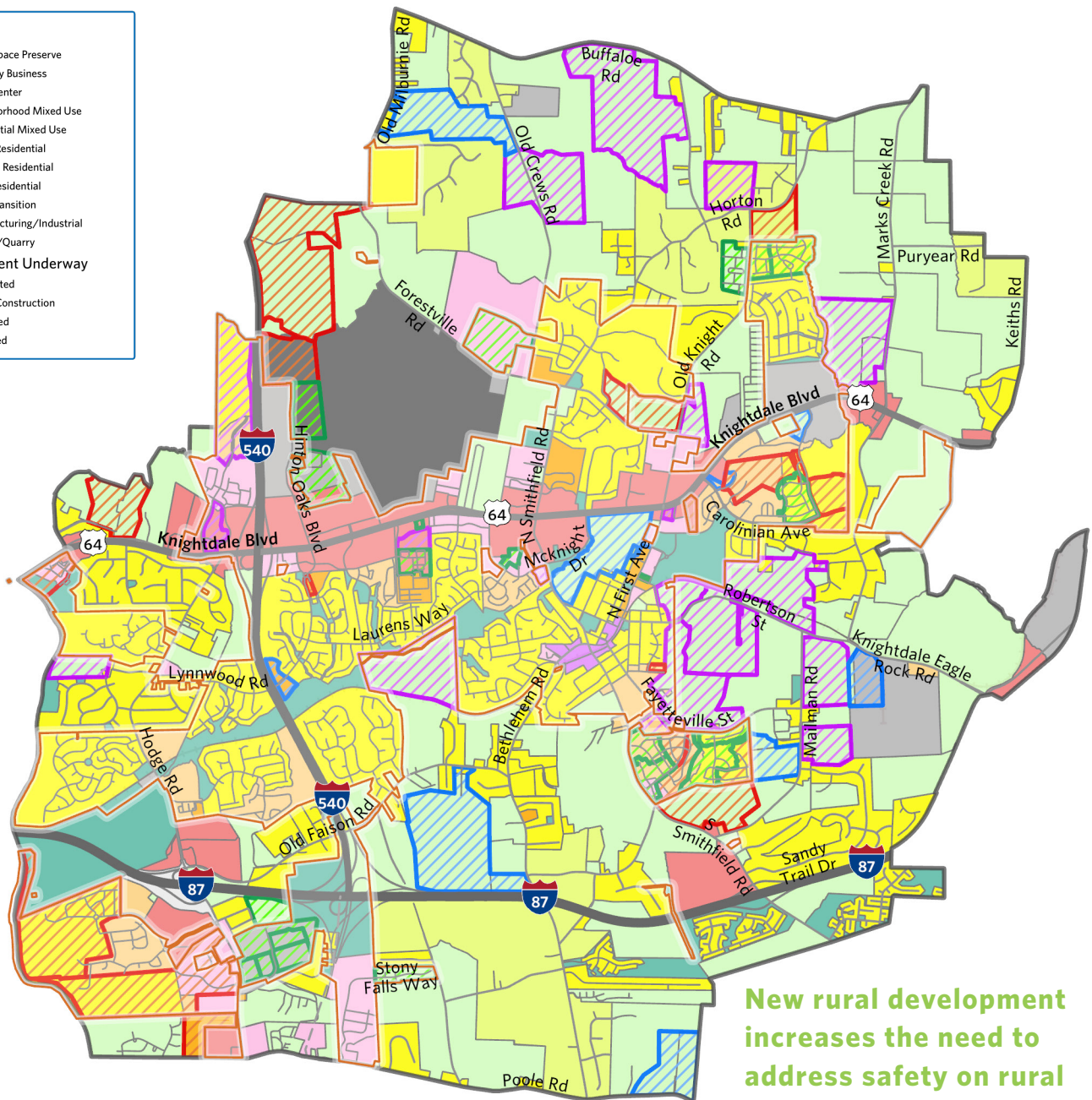
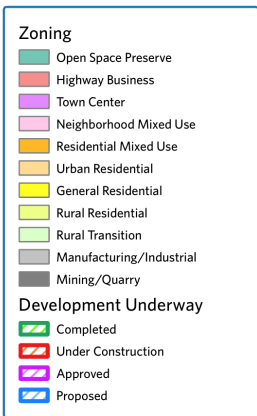
Everywhere in Knightdale’s ETJ other than its bottom left corner has a median household income of less than \$120,000, with the communities in the southern middle along Bethlehem Road having household incomes under \$60,000. Other areas have median incomes under \$90,000 throughout the more rural parts of the east. Lower income households may find it more difficult to afford transportation costs related to owning a car or have less cars per household than others.

**Overall Median Household Income
\$79,364**



Current Land Use

In order for denser walkable mixed use or commercial developments to be successful, they need to be safe for people to get around outside of a car. Most areas currently zoned for commercial, mixed use, or industrial are either lining Knightdale Boulevard or surrounding an I-87 exit. Residential communities tend to be set behind these areas, with bits of urban residential lining some major corridors and residential within the mixed use areas. Other areas have tended to primarily be rural, home to mostly woods, farms, and county homes. However, the Knightdale ETJ is beginning to see new development around the edges, with several large subdivisions and a couple industrial developments going up in areas that were formerly mostly rural. This increases the need to address safety issues along rural roads as well, as they will likely see higher traffic volumes going forward.



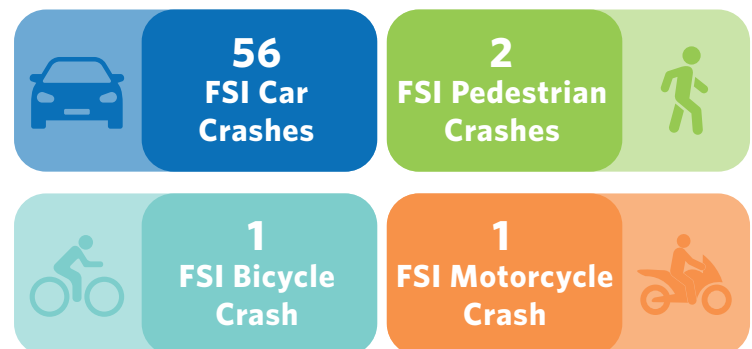
New rural development increases the need to address safety on rural roads.



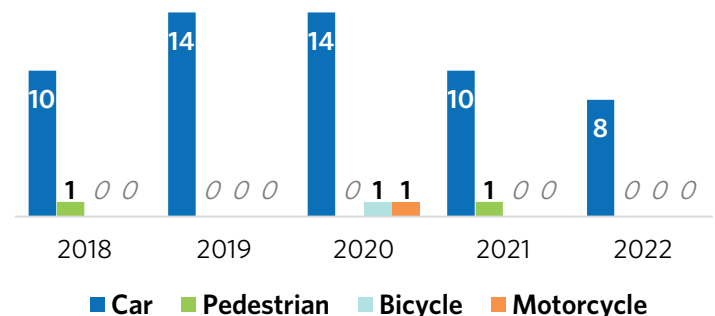
Fatal and Serious Injury (FSI) Crashes By Year, By Mode

Between 2018 and 2022, Knightdale and its extraterritorial jurisdiction experienced over 3,700 crashes. While the area saw a high amount of crashes, only a small percentage were fatal or caused severe injuries (FSI), with 56 fatal or severe car crashes, 2 FSI pedestrian crashes, and one FSI crash each with bicycles and motorcycles.

The vast majority of fatal and severe injury crashes between 2018 and 2022 were car crashes. Only about 3.4% of fatal and severe crashes involved pedestrians, and even fewer involved motorcycles or bicycles.



Of 2018-2022, fatal car crashes were at their highest in 2019 and 2020. 3/4 non-car crashes of the period occurred during the height of the COVID pandemic in 2020-2021.

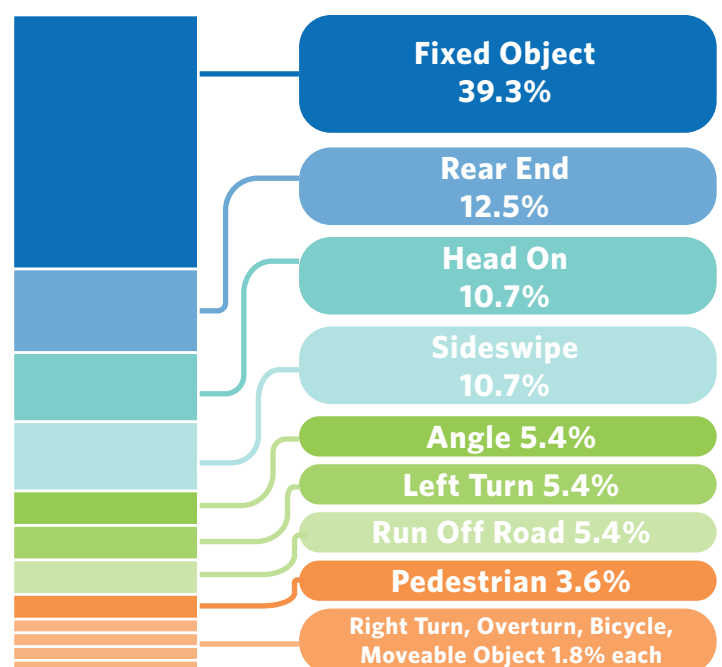


Percent of FSI Crashes By Type

Amongst recorded fatal and severe crashes between 2018 and 2022, most were crashes with a fixed object (39.3%), followed by rear end collisions (12.5%), head on collisions (10.7%), and sideswipes (10.7%).

Head on crashes were one of the most likely crash types to be fatal or severe. 6 out of 21 total head on crashes (28.6%) were fatal or caused severe injury. For comparison, 22 out of all 468 fixed object crashes (4.7%) were fatal or severe, and 7 out of all 1446 rear end crashes (less than 0.5%) were fatal or severe.

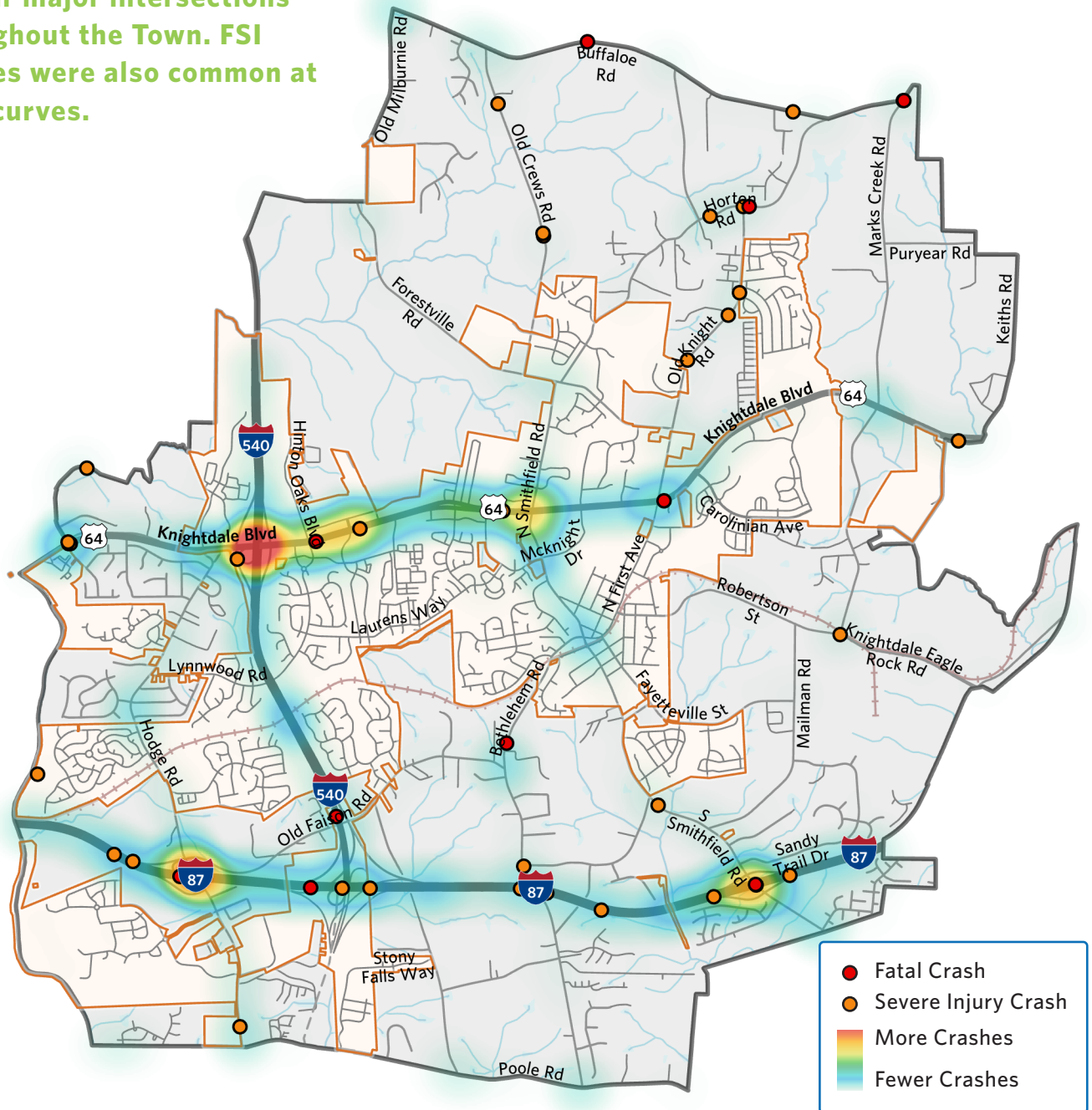
More than a quarter of all head on crashes were either fatal or caused severe injury.



Crash History

From 2018 to 2022, the overall majority of spatially mappable crashes happened on Knightdale Boulevard (Business US 64), I-540, I-87, or Smithfield Road. Hodge Road, Poole Road, and Bethlehem Road also saw some crash hotspots. However, many of the smaller roads in the north with less overall crashes had a larger share of the fatal and severe injury crashes, such as Old Knight Road, Horton Road, and Old Crews Road. Some tight curves and uncontrolled exurban intersections also tended to have a higher number of crashes. Knightdale Boulevard and I-87 saw the most fatal and severe crashes overall.

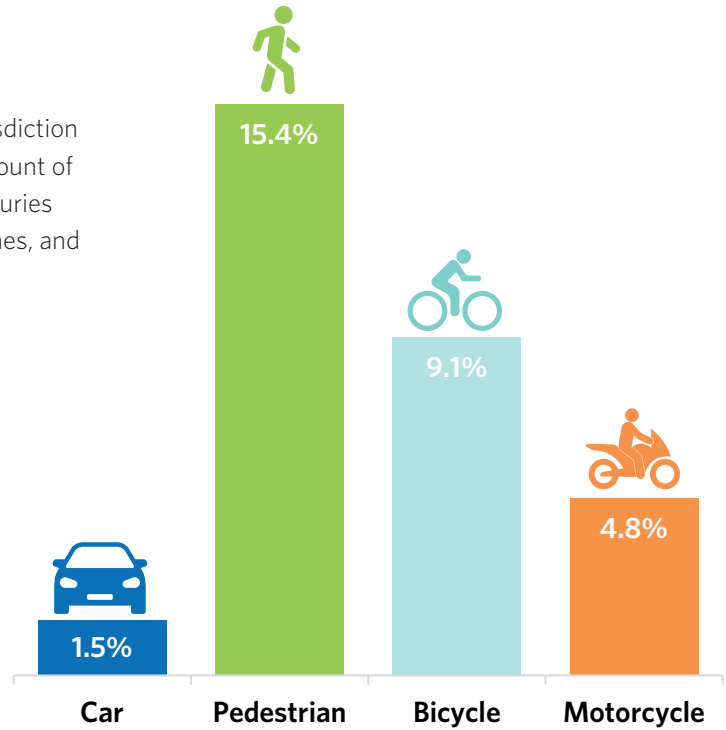
Most crash hot spots were at or near major intersections throughout the Town. FSI crashes were also common at tight curves.



Likelihood of FSI in Crashes Involving Each Mode

Between 2018 and 2022, Knightdale and its extraterritorial jurisdiction experienced over 3,700 crashes. While the area saw a high amount of crashes, only a small percentage were fatal or caused severe injuries (FSI), with 56 fatal or severe car crashes, 2 FSI pedestrian crashes, and one FSI crash each with bicycles and motorcycles.

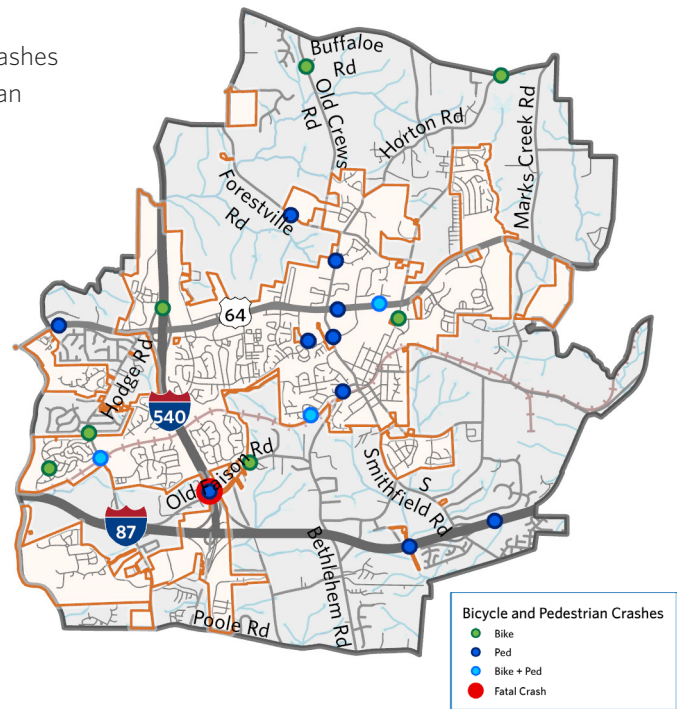
Pedestrians and bicyclists are much more likely to get killed or severely injured if involved in a crash than drivers.



Bicycle and Pedestrian Crashes

Pedestrian crashes seem to occur more in the town core, while bike crashes were often on more rural-suburban roads further out. Several pedestrian crashes roughly followed Smithfield Road near and north of the Town center. In contrast, other than one bike crash near Knightdale Station Park, bicycle crashes followed more rural-suburban roads like Hodge Road, Old Faison Road, Old Crews Road, and Horton Road. Only one pedestrian crash from 2018 to 2022 was fatal, where a pedestrian was hit on the Old Faison Road bridge over I-540.

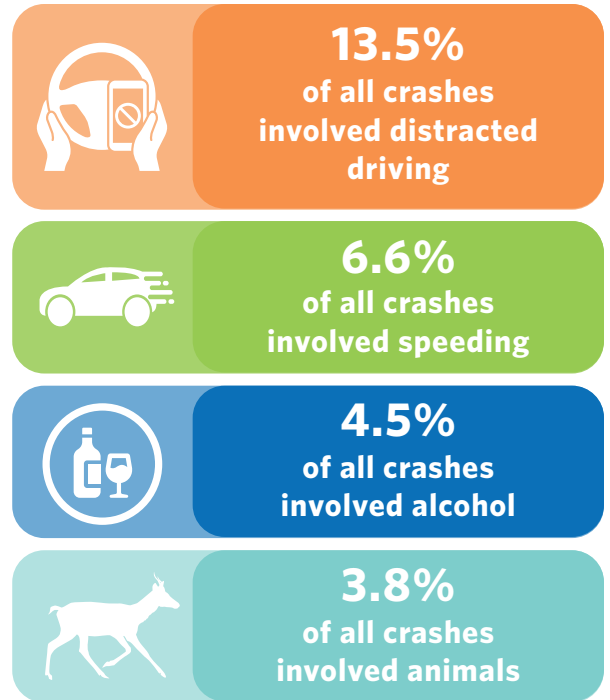
Most pedestrian crashes were roughly along Smithfield Road in central Knightdale.



Contributing Factors

Across all recorded crashes, distracted driving was the most common contributing factor, with over 13% of crashes from 2018 to 2022 involving it. Speeding (6.6%), alcohol (4.5%), and animal crashes (3.8%) were also major contributing factors.

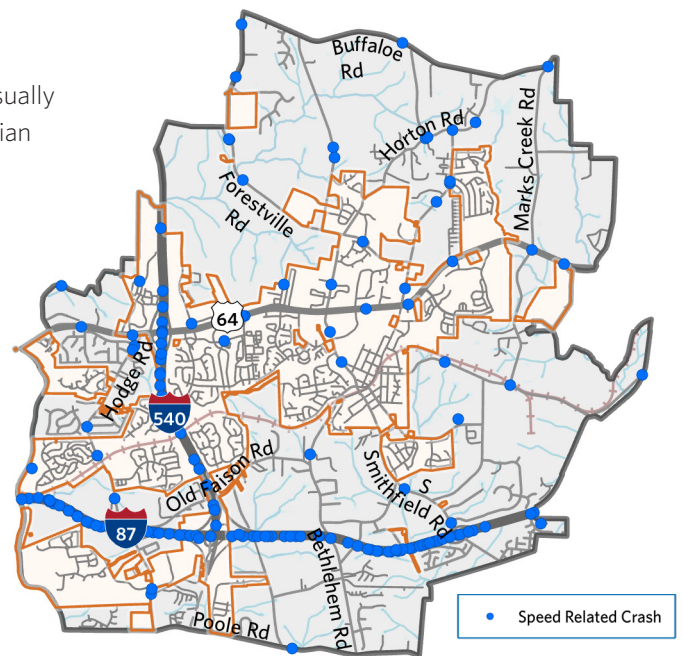
Over half of crashes involving distracted driving were rear end collisions from failing to stop.



Crashes Involving Speeding

Speeding is often part of the cause of crashes and plays a large role in severity. The higher the speed of a crash, the more severe the crash usually is, especially if the crash involved a vulnerable road user like a pedestrian or bicyclist. While the majority of speed related crashes were along I-540 and I-87, higher speed arterials and rural roads where its easier for drivers to pick up speed also saw a lot of speed related crashes. Roads like Knightdale Boulevard, Smithfield Road, Horton Road, Old Knight Road, Hodge Road, and Forestville Road saw the majority of non-interstate speed related crashes.

Out of 246 speed-related crashes, about 3.3% were fatal or caused severe injury.

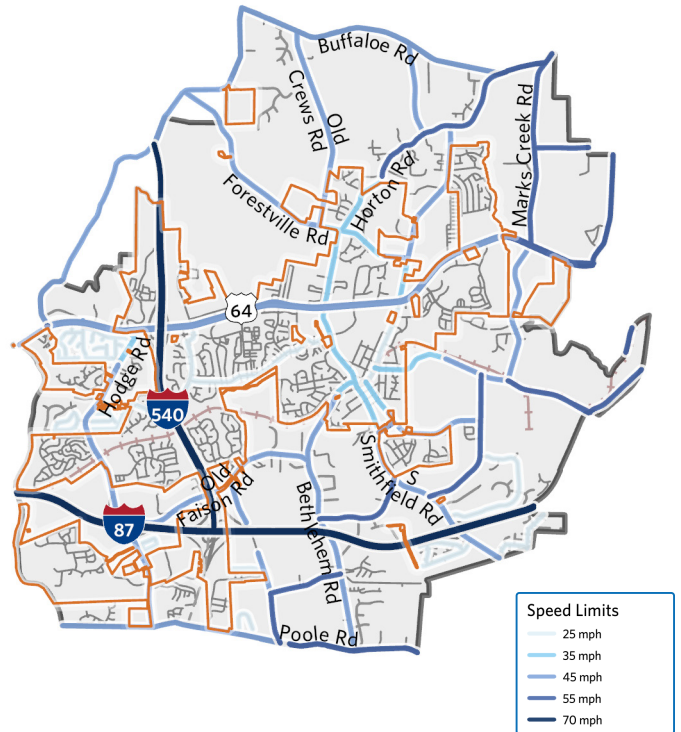


Speed Limits

There is a sharp contrast between speed limits within the Town Limits and speeds on roads outside the Town. Within the Town itself, smaller streets like First Avenue, Laurens Way, and Lynnwood Road have 25 mile per hour (mph) speed limits, and most other major roads through the core of Knightsdale have 35 mph speed limits (with the exception of Knightsdale Boulevard with a 45 mph speed limit). Most of these speed limits immediately increase at the Town Limits, and outside of the Town most NCDOT controlled roads have a speed limit of 45 or 55 mph.

Notably lower speed limits do not necessarily mean lower speeds- actual traffic speeds depend on the design of the road and surroundings.

Speed limits are generally lower within the Town, with most roads seeing immediate speed limit increases upon leaving the Town Limits.



Speed Limits & Crashes Involving Speeding

Above 35 miles per hour, speed limits alone do not appear to deter speeding drivers. Very few speed-related crashes in the study area from 2018-2022 occurred on roads with a speed limit of 25 mph or lower. However, for speed limits 35 mph and higher, there was no correlation between speed-related crashes and the speed limit of the road (excluding interstates), with crashes involving speeding appearing on most major roadways.

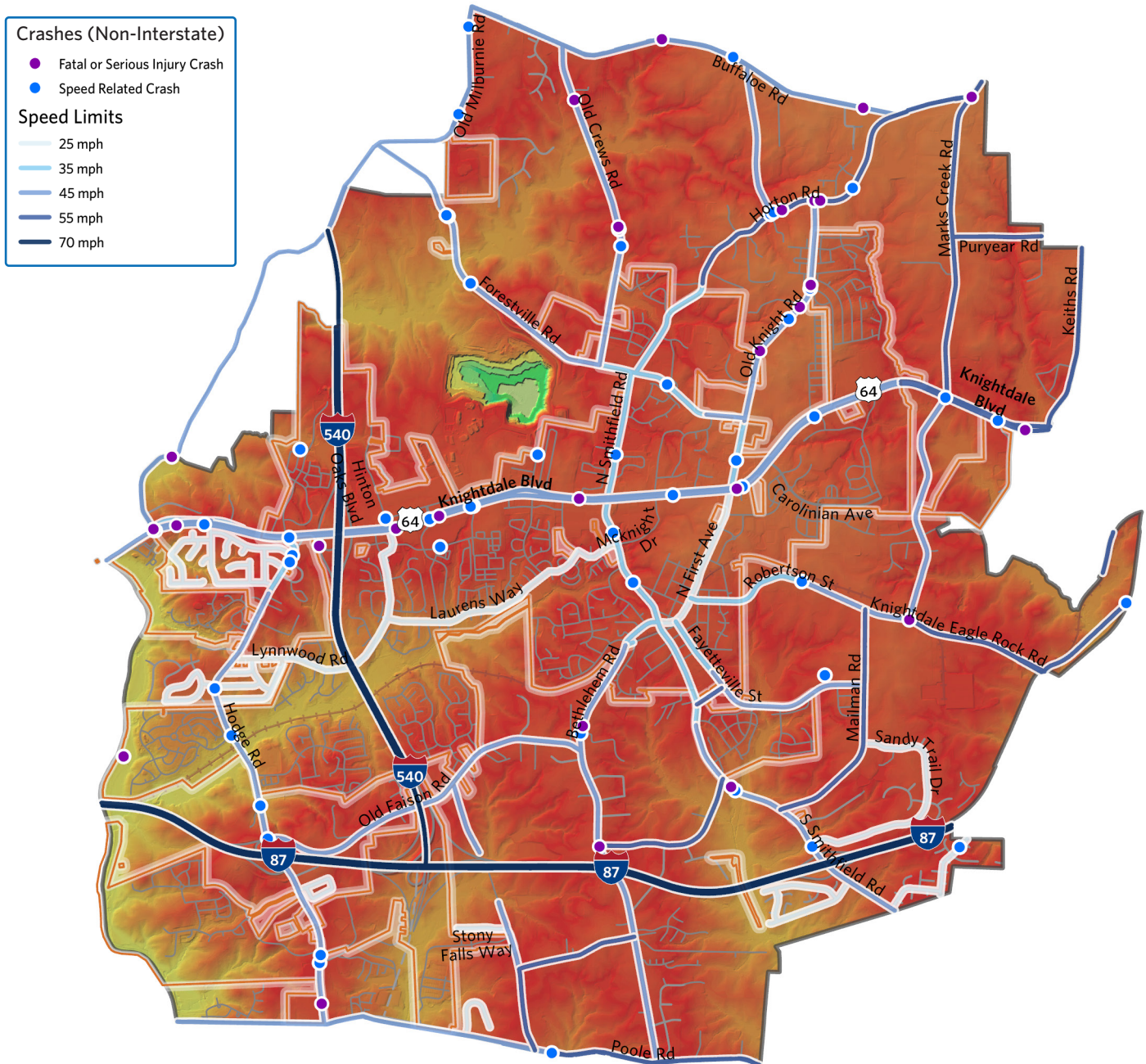
Most major roads with a speed limit of at least 35 miles per hour experienced a crash involving speeding, with little connection between speeding crashes and speed limit.



Topography

While the Knightsdale study area does not have very extreme topography, low rolling hills are common throughout, especially on rural roadways. Many of the lowest areas are around streams, rivers, and other water bodies, but do not necessarily impact the design of roads and bridges.

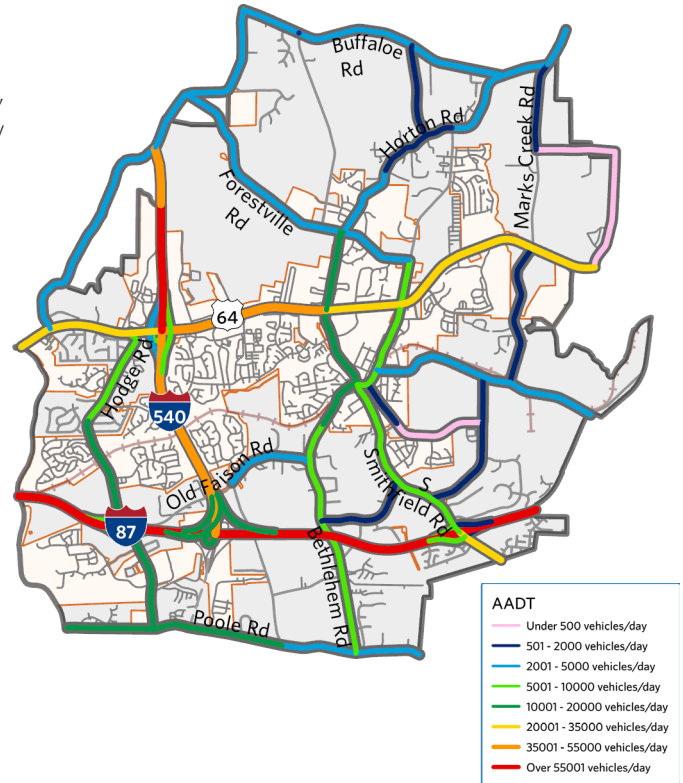
There was no noticeable correlation between 2018-2022 crashes causing injury and places with topographic change. However, non-interstate speeding crashes did appear to correlate more with small hills, dips, and other changes in elevation. While this correlation is not necessarily causation, it is possible that elevation changes combined with high speeds and curves contributed to speeding drivers losing control and crashing in some cases.



Traffic Volumes

The Knightdale area's highest traffic volumes are along the major thoroughfares- I-540, I-87, and Knightdale Boulevard. Smithfield Road, Hodge Road, and Bethlehem Road also see significant volumes of daily traffic (above 5,000 cars a day). Smithfield Road south of I-87 sees traffic volumes comparable to parts of Knightdale Boulevard.

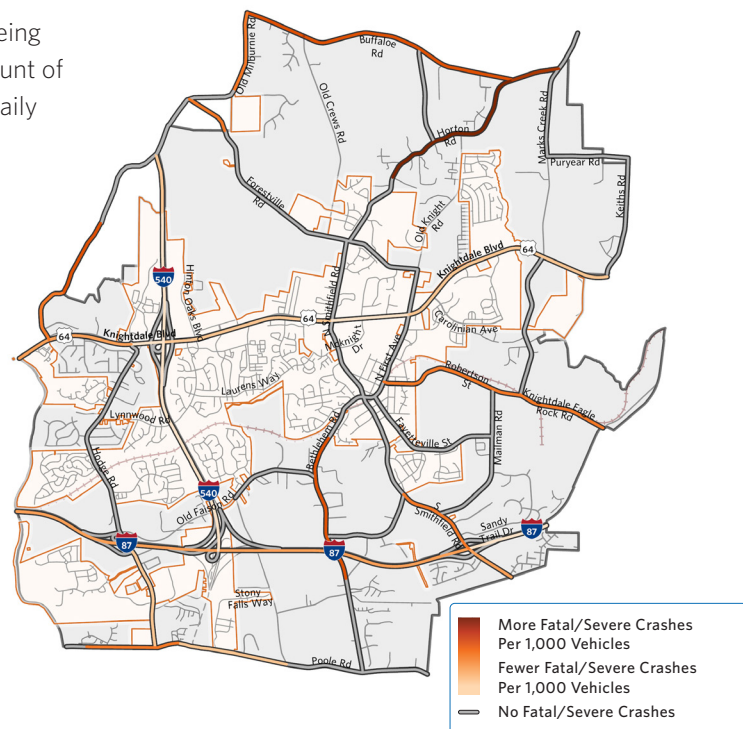
Excluding I-87 and I-540, the highest volume roads in the area are Knightdale Boulevard and Smithfield Road south of I-87.



FSI Crashes by Volume

One way to highlight roadways that have larger safety concerns is by seeing where there are disproportionately high amounts of crashes for the amount of traffic the roadway sees. Looking at fatal and severe crashes per 1,000 daily vehicles (2018-2022), Horton Road, Buffalo Road, Old Milburnie Road, Bethlehem Road, and Robertson St/Knightdale Eagle Rock Rd had the highest rates of FSI crashes. Parts of Smithfield Road near I-87 also saw high rates.

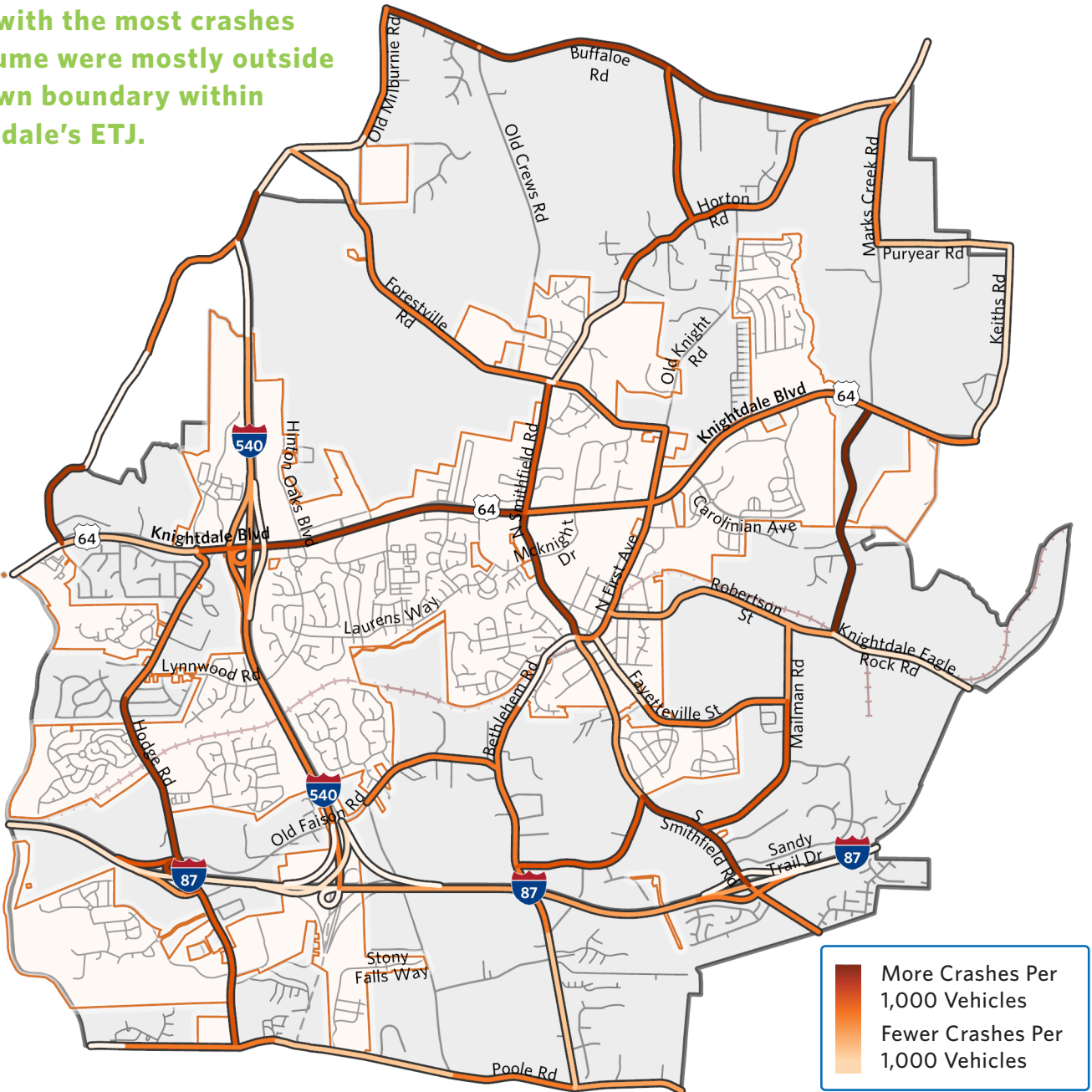
Despite having some of the lowest traffic volumes, Horton Road had several FSI Crashes, highlighting potential safety concerns.



All Crashes By Volume

When looking at all crashes per 1,000 daily vehicles (2018-2022), Buffalo Road again rose to the top, this time joined by much of Knightdale Boulevard, Hodge Road, Smithfield Road, Marks Creek Road, and Lucas Road. Parts of Horton Road, Mailman Road, and Old Ferrell Road also saw noticeable rates of crashes. While Knightdale Boulevard and Smithfield Road near the Town's core had some of the highest rates of crashes by volume, notably, most of the roadway segments with the worst rates are largely outside of the Knightdale Town Limits or on the periphery.

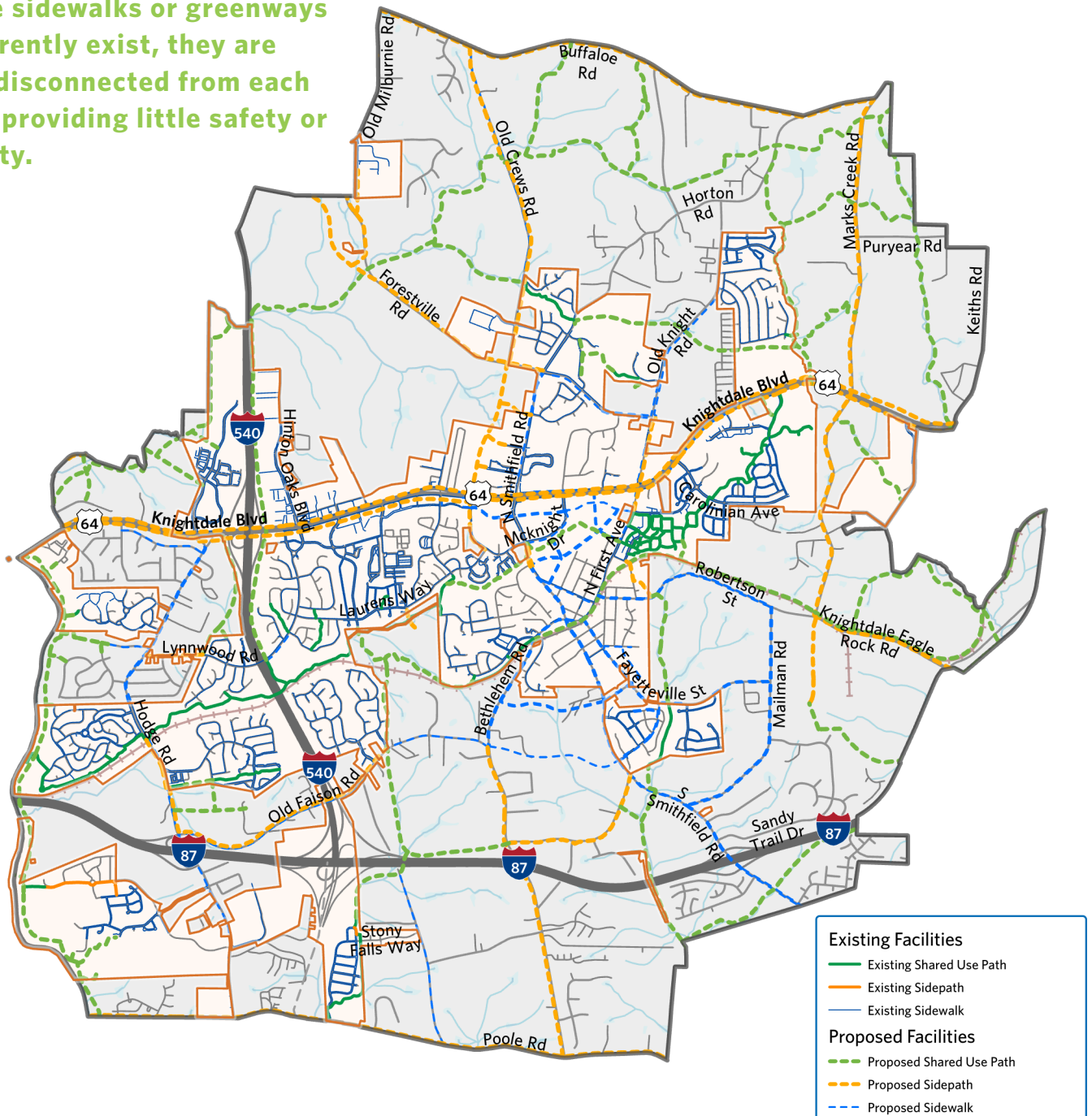
Besides Knightdale Boulevard, roads with the most crashes by volume were mostly outside the Town boundary within Knightdale's ETJ.



Existing and Recommended Multimodal Facilities

Knightdale currently has a fairly disconnected network of multimodal facilities. Most existing sidewalks are mostly within residential subdivisions, and while there are existing greenways and shared use paths, they are generally disconnected from each other. The Knightdale Comprehensive Transportation Plan includes long-term plans to add sidepaths on both sides of Knightdale Boulevard and along other major corridors, construct sidewalks connecting smaller streets and subdivisions, and connect greenways and shared use paths through and around the Town. Unlike many towns its size, Knightdale's downtown area is home to many gaps in multimodal facilities; a combination of sidewalks and shared use paths are proposed to make the area more walkable.

Where sidewalks or greenways do currently exist, they are often disconnected from each other, providing little safety or mobility.



Planned Transportation Improvements

NCDOT has a few State Transportation Improvement Program (STIP) and Spot Safety projects planned for the Knightsdale area, including relocating crosswalks at Mingo Creek Greenway, adding turn lanes at the Old Faison Road and Hodge Road intersection, finishing the 540 loop, and turning I-87's interchange with Smithfield Road into a diverging diamond interchange. The Town also has identified 25 intersections where they believe roundabouts could be a potential design solution for safety or congestion concerns. In addition to the roundabout projects, the Town is working on multimodal projects to extend the Mingo Creek Greenway, add a sidewalk to Old Knight Road between Forestville Road and Knightsdale Boulevard, and add crosswalks at three intersections along Knightsdale Boulevard and points on GoRaleigh Route 33.



KEY CORRIDORS



1 Knightdale Boulevard (Business US 64) From Neuse River to Keiths Road

Corridor Length: 5.8 miles



Knightdale Boulevard (Business US 64) is the main east-west surface arterial, cutting through several commercial areas and connecting Knightdale west to Raleigh and east to Wendell. While the corridor is lined with shopping and retail and served by Knightdale’s one local bus line, Knightdale Boulevard was designed as a highway first and local road second. Most of the corridor is six lanes wide with a wide median, limited sidewalks, no bike accommodations, and few pedestrian crossings.

<p>KEY INTERSECTIONS <i>(Based on traffic volumes and safety concerns)</i></p>	<ul style="list-style-type: none"> ○ Old Milburnie Road ○ Hodge Road ○ Hinton Oaks Boulevard ○ Smithfield Road ○ Old Knight Road
<p>TRAFFIC VOLUMES <i>(2022)</i></p>	<p>21,500 to 41,000 vpd</p>
<p>CRASH HISTORY <i>(2018-2022)</i></p>	<p>Fatal/serious injury crashes: 11 Total Crashes: 1,186</p>
<p>ROADWAY CHARACTERISTICS</p>	<p>Typical cross-section: 4 to lanes, divided Right-of-way: 150+ feet Posted speed limit: 35-45 mph (55 mph in east) Multimodal facilities: Partial/incomplete sidewalks</p>
<p>MAJOR DESTINATIONS</p>	<ul style="list-style-type: none"> ○ Midtown Commons Shopping Center and Knightdale Marketplace ○ Walmart, Lowe’s, and other retail surrounding Smithfield Rd intersection ○ AMATEK and Scheider Electric (industrial park)
<p>CONSTRAINTS, BARRIERS, AND ISSUES</p>	<ul style="list-style-type: none"> ○ Sidewalk gaps and poor/limited pedestrian crossings ○ Inaccessible bus stops
<p>TYPICAL LAND USE(S)</p>	<p>Commercial/retail with some residential and rural areas in the east and west</p>

2 Horton Road and Smithfield Road

From Knightdale Boulevard to Poole Road

Corridor Length: 6.6 miles



Horton Road and Smithfield Road were recently realigned to act as one crescent-shaped north-south corridor through the Town. The corridor is primarily residential in the north and south, while the central segment include schools, retail areas, and part of the old Town core near Downtown. New denser subdivisions are being built in the north and south. Most of the corridor is only two or three lanes wide, but it widens significantly between Aragon Drive and McKnight Drive to around five lanes.

<p>KEY INTERSECTIONS <i>(Based on traffic volumes and safety concerns)</i></p>	<ul style="list-style-type: none"> ○ Buffalo Road ○ Old Knight Road ○ Knightdale Boulevard ○ First Avenue ○ I-87 Ramps
<p>TRAFFIC VOLUMES <i>(2022)</i></p>	<p>1,800 to 25,000 vpd (>5,000 vpd south of Forestville Rd, <5,000 north. 25,000 vpd is near I-87)</p>
<p>CRASH HISTORY <i>(2018-2022)</i></p>	<p>Fatal/serious injury crashes: 8 Total Crashes: 468</p>
<p>ROADWAY CHARACTERISTICS</p>	<p>Typical cross-section: 2 lanes or 3 lanes with center turn lane (5 in select spots) Right-of-way: 60 to 90 feet Posted speed limit: 35 mph within Town, 45 mph to south, 55 mph to north Multimodal facilities: Partial/incomplete sidewalks</p>
<p>MAJOR DESTINATIONS</p>	<ul style="list-style-type: none"> ○ Forestville Elementary School & Knightdale High School ○ Lockhart Elementary School ○ Retail surrounding Knightdale Boulevard intersection ○ Downtown Knightdale
<p>CONSTRAINTS, BARRIERS, AND ISSUES</p>	<ul style="list-style-type: none"> ○ Crashes at unsignalized intersections, especially with sharp turns
<p>TYPICAL LAND USE(S)</p>	<p>Suburban residential subdivisions with some retail near Knightdale Boulevard</p>

3 Hodge Road

From Knightdale Boulevard to Poole Road

Corridor Length: 3.1 miles



Hodge Road is a north-south corridor that connects the residential and industrial areas in southwest Knightdale west of I-540. The curvy corridor is primarily residential, largely rural large lot but with new denser subdivisions in some areas. Hodge Road is almost entirely two or three lanes wide. However, there are locations where the road surface is significantly wider than the travelway with only striping to differentiate travel lanes, which could visually encourage higher speeds. Hodge Road also experiences considerable cut through traffic when southbound I-540 backs up approaching I-87.

<p>KEY INTERSECTIONS <i>(Based on traffic volumes and safety concerns)</i></p>	<ul style="list-style-type: none"> ○ Knightdale Boulevard ○ Lynwood Road ○ Old Faison Road/I-87 WB Ramps ○ Poole Road
<p>TRAFFIC VOLUMES <i>(2022)</i></p>	<p>9,800 to 17,500 vpd</p>
<p>CRASH HISTORY <i>(2018-2022)</i></p>	<p><i>Fatal/serious injury crashes: 2</i> <i>Total Crashes: 345</i></p>
<p>ROADWAY CHARACTERISTICS</p>	<p><i>Typical cross-section: 2 lanes or 3 lanes with center turn lane</i> <i>Right-of-way: 60 to 70 feet</i> <i>Posted speed limit: 45 mph (35 mph closest to Knightdale Boulevard)</i> <i>Multimodal facilities: Partial/incomplete sidewalks</i></p>
<p>MAJOR DESTINATIONS</p>	<ul style="list-style-type: none"> ○ Hodge Road Magnet Elementary School ○ Eastgate 540 Industrial Park
<p>CONSTRAINTS, BARRIERS, AND ISSUES</p>	<ul style="list-style-type: none"> ○ Limited sidewalks ○ Little to no paved shoulder ○ Areas with roadway far wider than lanes, potentially encouraging speeding ○ Sharp curves, often with low visibility ○ Cut through traffic when I-540 SB backs up at I-87
<p>TYPICAL LAND USE(S)</p>	<p>Suburban residential areas/subdivisions and industrial areas</p>

4 Old Knight Road, First Avenue, and Bethlehem Road
From Horton Road to Poole Road

Corridor Length: 5.6 miles



Old Knight Road, First Avenue, and Bethlehem Road are part of one corridor that extends from Horton Road in the north, through the heart of Downtown as First Avenue, and through more rural areas as Bethlehem Road. While most residential along the corridor is rural, new large dense subdivisions are being built along the northern part of Old Knight Road. Most of the corridor is only two lanes wide, though on street parking is provided through Downtown.

<p>KEY INTERSECTIONS <i>(Based on traffic volumes and safety concerns)</i></p>	<ul style="list-style-type: none"> ○ Horton Road ○ Knightdale Boulevard ○ Smithfield Road ○ Old Faison Road ○ Poole Road
<p>TRAFFIC VOLUMES <i>(2022)</i></p>	<p>5,900 to 10,500 vpd</p>
<p>CRASH HISTORY <i>(2018-2022)</i></p>	<p><i>Fatal/serious injury crashes: 9</i> <i>Total Crashes: 116</i></p>
<p>ROADWAY CHARACTERISTICS</p>	<p><i>Typical cross-section: 2 lanes (with on street parking in Downtown)</i> <i>Right-of-way: 60 to 80 feet</i> <i>Posted speed limit: 35 mph around Downtown, 45 mph elsewhere</i> <i>Multimodal facilities: Limited sidewalks in Downtown</i></p>
<p>MAJOR DESTINATIONS</p>	<ul style="list-style-type: none"> ○ Knightdale Community Park and Knightdale High School ○ Knightdale Station Park ○ Downtown Knightdale
<p>CONSTRAINTS, BARRIERS, AND ISSUES</p>	<ul style="list-style-type: none"> ○ Sidewalk gaps throughout downtown, no sidewalks elsewhere ○ Little to no paved shoulder ○ Inaccessible bus stops (Old Knight Road)
<p>TYPICAL LAND USE(S)</p>	<p>Residential subdivisions, rural residential, and a small town center</p>

5

Poole Road

From Neuse River to Cal-Erin Circle

Corridor Length: 3.4 miles



Poole Road acts as the southernmost boundary of the Knightdale ETJ. The two-lane rural road is mostly lined with homes and rural areas, with some small stores, churches, and other community amenities at major intersections. Most crashes along the corridor seem to be at unsignalized intersections. Traffic along Poole Road is expected to grow when the interchange with future I-540 opens.

<p>KEY INTERSECTIONS <i>(Based on traffic volumes and safety concerns)</i></p>	<ul style="list-style-type: none"> ○ Hodge Road ○ Clifton Road/Grasshopper Road ○ Bethlehem Road
<p>TRAFFIC VOLUMES <i>(2022)</i></p>	<p>4,000 to 14,500 vpd (highest in west near Neuse River)</p>
<p>CRASH HISTORY <i>(2018-2022)</i></p>	<p>Fatal/serious injury crashes: 0 Total Crashes: 60</p>
<p>ROADWAY CHARACTERISTICS</p>	<p>Typical cross-section: 2 lanes Right-of-way: 60-80 feet Posted speed limit: 45-55 mph Multimodal facilities: Paved shoulders</p>
<p>MAJOR DESTINATIONS</p>	<ul style="list-style-type: none"> ○ Paul's Grill and Grocery
<p>CONSTRAINTS, BARRIERS, AND ISSUES</p>	<ul style="list-style-type: none"> ○ Crashes at intersections ○ Potential future traffic upon 540 completion
<p>TYPICAL LAND USE(S)</p>	<p>Exurban residential with churches and small stores at intersections</p>

6

Buffaloe Road

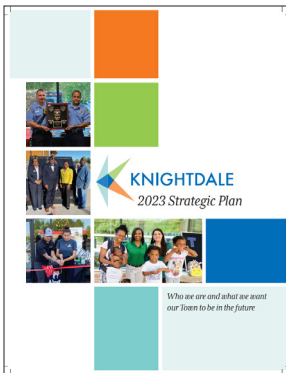
From Old Milburnie Road to Horton Road

Corridor Length: 2.6 miles



Buffaloe Road acts as the northernmost boundary of the Knightdale ETJ. The occasionally hilly two-lane rural road is mostly surrounded by woods or farms, with Haven Farm and Shoppe as the largest destination along the corridor besides churches and subdivisions. Large subdivisions are beginning to appear to the west of the ETJ, but little has occurred in the ETJ at this time. Most crashes along the corridor seem to be at curves and unsignalized intersections.

<p>KEY INTERSECTIONS <i>(Based on traffic volumes and safety concerns)</i></p>	<ul style="list-style-type: none"> ○ Old Milburnie Road ○ Old Crews Road ○ Lucas Road ○ Horton Road
<p>TRAFFIC VOLUMES <i>(2022)</i></p>	<p>3,400 vpd</p>
<p>CRASH HISTORY <i>(2018-2022)</i></p>	<p><i>Fatal/serious injury crashes: 2</i> <i>Total Crashes: 57</i></p>
<p>ROADWAY CHARACTERISTICS</p>	<p><i>Typical cross-section: 2 Lanes</i> <i>Right-of-way: 60 feet</i> <i>Posted speed limit: 45 mph</i> <i>Multimodal facilities: Paved shoulders</i></p>
<p>MAJOR DESTINATIONS</p>	<ul style="list-style-type: none"> ○ Haven Farm Venue and Shoppe
<p>CONSTRAINTS, BARRIERS, AND ISSUES</p>	<ul style="list-style-type: none"> ○ Low visibility in areas with woods, hills and curves ○ Crashes at curves and some unsignalized intersections
<p>TYPICAL LAND USE(S)</p>	<p>Exurban residential, rural/forest cover, agriculture, churches</p>



Knightdale 2023 Strategic Plan (2023)

The Knightdale Strategic Plan is a collaborative plan between Knightdale citizens, staff, and Town Council to help establish priorities, actions, investments, and a path to meeting organizational goals for the Town now and going forward. Several objectives focused on safety or multimodal connectivity throughout the Town, with overarching goals to keep the Town safe, connected, and healthy.

KEY TAKEAWAYS

- Continue to proactively develop regulations and codes to ensure citizen safety as Knightdale grows.
- Support the Town's Vision Zero approach to eliminate all traffic fatalities and severe injuries.
- Embrace opportunities for physical connectivity through the network.
- Ensure multimodal transportation choices to connect to the region.
- Encourage non-vehicular transport.

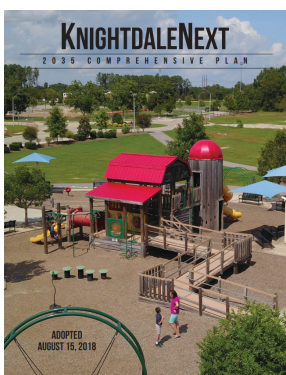


Knightdale Comprehensive Transportation Plan (2022)

Building on the preceding KnightdaleNext Comprehensive Plan, the Knightdale Comprehensive Transportation Plan (CTP), aka Shift Knightdale, looks specifically at Knightdale's current and planned future transportation conditions, with a strong emphasis on safety and multimodal conditions.

KEY TAKEAWAYS

- Missing facilities (including missing crosswalks) and safety concerns keep people from walking or biking more.
- Traffic operations and roadway design contribute to unsafe conditions along major corridors.
- Improvements need to prioritize safety over volume and free-flow.
- Knightdale Boulevard, Hodge Road, and Smithfield Road were some of the worst corridors for intersection crashes.

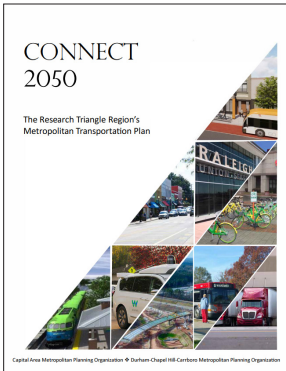


KnightdaleNext 2035 Comprehensive Plan (2018)

The KnightdaleNext 2035 Comprehensive Plan is the Town's official growth and conservation plan and includes a broad land use, mobility, and economic development playbook for the future of Knightdale and its ETJ.

KEY TAKEAWAYS

- Growth and investment areas should include a mix of uses and activities close and walkable.
- Schools and institutions should be walkable and bikable community anchors.
- Knightdale Boulevard is planned for BRT and will need safe pedestrian and bicycle networks along the route.
- Roadway designs need to be well-connected, fit the surrounding context, and meet complete street principles.

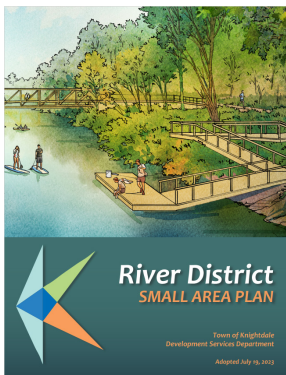


Connect 2050 Metropolitan Transportation Plan (2023)

Connect 2050, the Metropolitan Transportation Plan for the Triangle region (including Knightdale), is a regionwide federally required plan that goes a step beyond the preceding Comprehensive Transportation Plan in prioritizing and cost-restraining recommended projects for construction. Unlike the CTP, the MTP is required to restrict project phasing to expected available funds.

KEY TAKEAWAYS

- Several existing two-lane roads are shown with long-term plans for widening to four lanes or addition of a center turn lane.
- The interchange at I-87 and Smithfield Rd will be turned into a diverging diamond interchange. (Horizon year of 2040).
- The I-87/I-540 interchange is listed for improvement by 2030, along with the planned NC 540/Poole Rd interchange.
- Roadway designs should prioritize steady, safe, reliable, moderate speed travel over high-speed travel.

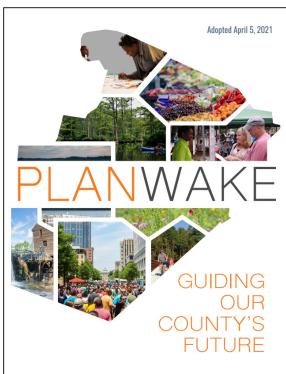


River District Small Area Plan (2023)

This small area plan looks at the existing conditions and establishes a vision for the future of the River District, a growing area lining the western edge of Knightdale along the Neuse River known for its nature and outdoor recreation opportunities.

KEY TAKEAWAYS

- The district should embrace Trail and Transit Oriented Development, including trail improvements, mobility hubs, and clustered density near transit stops.
- Sidewalks/crosswalks are recommended along all high-volume, high-speed corridors, where collector roads intersect, and where walking is expected based on land use.
- Sidepaths and greenways will form the core of the area's bike/ped facility network.
- Continue coordination with NCDOT surrounding traffic control improvements.

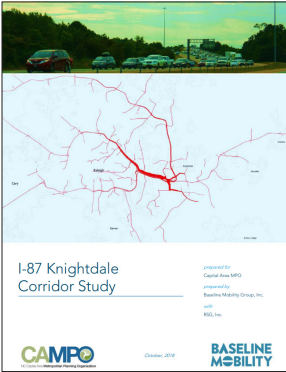


PLANWake Comprehensive Plan (2021)

PLANWake is a comprehensive plan for Wake County broadly that discusses land use and other goals. Little exclusive to Knightdale or its ETJ was included in any detail; however, the areas of Knightdale shown as planned for Walkable Centers are relevant to know where pedestrian and potentially bicycle traffic is planned/expected to continue to increase going forward.

KEY TAKEAWAYS

- Areas along/north of Knightdale Blvd, surrounding Knightdale Blvd/Smithfield Rd, & SW of I-87/I-540 are planned as walkable centers.



I-87 Knightdale Corridor Study (2018)

This corridor study focused on safety and congestion challenges with I-87 through Knightdale as the corridor sees significant growth in traffic volumes and corresponding struggles. It recommended several projects on surrounding roads in Knightdale to help address issues that wouldn't be solved by other existing or planned projects.

KEY TAKEAWAYS

- I-87 is increasingly serving statewide travel needs due to connecting Raleigh with Rocky Mount and Wilson to the southeast
- NC 540 outer loop should relieve some traffic from I-87 when complete.
- Several projects were recommended to address remaining safety and congestion issues, including safety improvements and pedestrian crossing improvements on Knightdale Boulevard by 2035.



 **KNIGHTDALE**

← Shopping

↑ Recreation Center

↑ Baseball Complex



Methodology

After analyzing where and how crashes occur in and around Knightdale, the project team looked closer at what parts of the roadway network have had fatal and serious injury crashes, large numbers of minor injury crashes, and bicycle/pedestrian crashes. Overlaying crash data and the road network revealed what parts of the network have experienced the most injury-causing crashes (or in the case of bicycle and pedestrian crashes, pose injury risks for vulnerable road users). This information led to the generation of a High-Injury Network (HIN) for Knightdale to help guide strategic investments in safety. This section explains the methodology behind the creation of the HIN.

Segmenting the Network

First, the roadway network was split into segments to group related crashes. We generated a network of road segments approximately 0.5 miles in length each (with all segments between one-third and two-thirds of a mile).

Counting Crashes per Segment

Next, we associated crashes with their corresponding street segment(s) in preparation for scoring. For each segment, we calculated the number of crashes by type along each segment and coded the numbers into the network attributes. Since interstates are state-owned, state-operated, and state-maintained with little opportunity for the Town to influence design/construction, crashes along I-87 and I-540 were excluded from this process and from the resulting High-Injury Network.

Calculating Scores

Lastly, scores were assigned to all segments based on the crashes that occurred along the segments. Scoring for each crash type was weighted by severity. Fatal and severe injury crashes were weighted the highest individually, while minor injury crashes were scored based on frequency of crashes. Because bicyclists and pedestrians are more vulnerable at the same crash impact level, crashes that involved them were also more heavily weighted. The following formula was used to calculate each segment's severity score:

FATAL OR SEVERE INJURY (FSI) CRASHES <i>(Severity of K or A)</i>	<ul style="list-style-type: none"> Each FSI crash: 3 points
MINOR INJURY CRASHES <i>(Severity of B or C)</i>	<ul style="list-style-type: none"> Between 1 and 10 minor injury crashes: 1 point Between 11 and 20 minor injury crashes: 2 points Between 21 and 30 minor injury crashes: 3 points Between 31 and 40 minor injury crashes: 4 points 41 or more minor injury crashes: 5 points
BICYCLE OR PEDESTRIAN CRASHES	<ul style="list-style-type: none"> Each bicycle or pedestrian crash: 2 points

$$\begin{aligned}
 &\text{Minor injury crash range score (x1) + Number of bicycle or pedestrian crashes (x2)} \\
 &\quad + \text{Number of fatal and severe injury (FSI) crashes (x3)} \\
 &\quad = \text{severity score}
 \end{aligned}$$

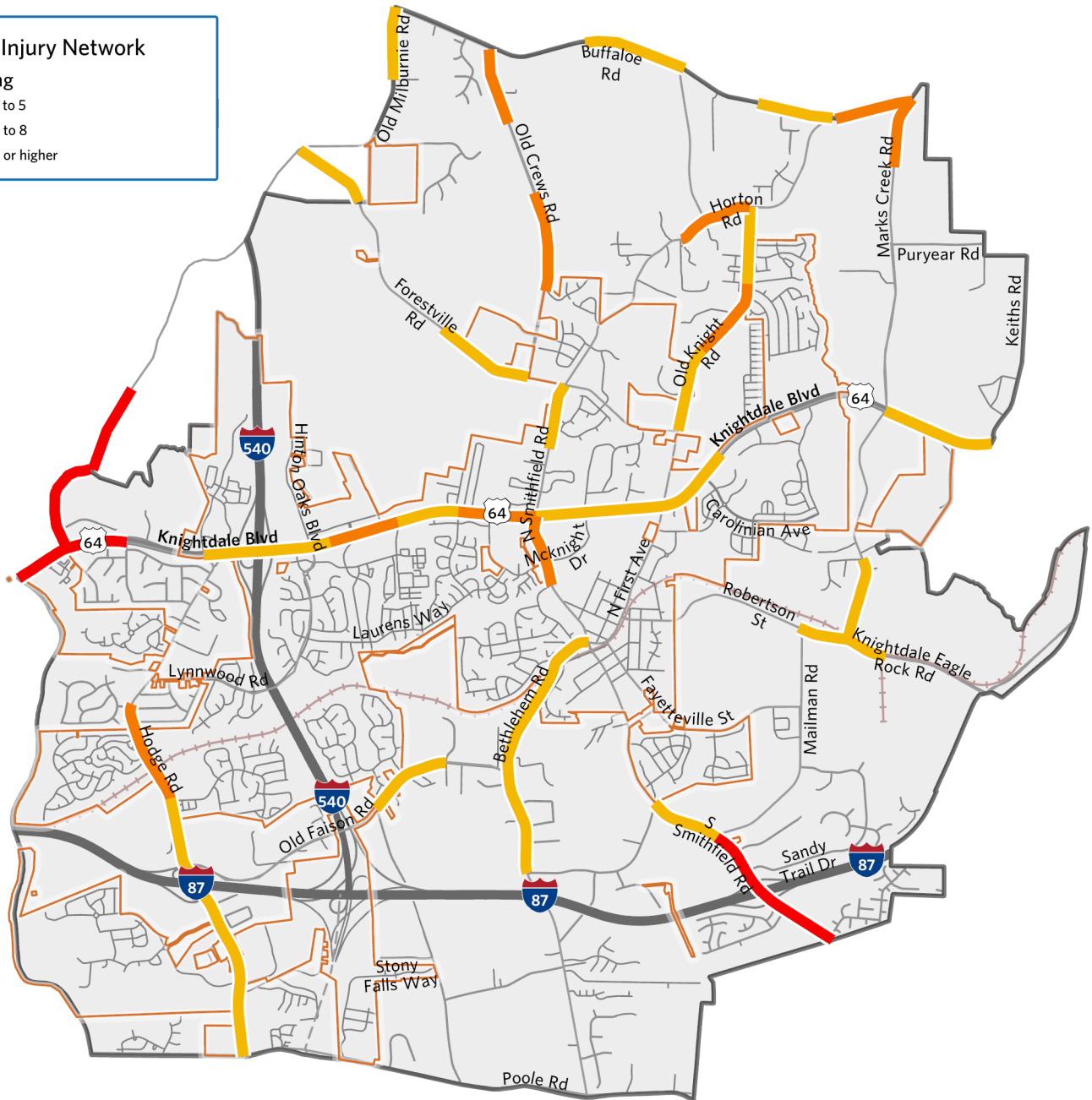
High-Injury Network

This map shows the resulting High-Injury Network and the score range for each segment. All scored segments that received a score of 3 or higher are included in the HIN, ensuring that segments with at least one fatal or severe crash in the last five years are automatically included in the network. Segments with a score of 6 or higher may either have had multiple FSI crashes or high numbers of minor injury crashes. When referring to the HIN in prioritizing focus and resources, higher scores would help indicate segments with a higher need/priority for safety investments.

High Injury Network

Scoring

- 3 to 5
- 6 to 8
- 9 or higher





KEY TAKEAWAYS

Our most traveled intersections are in need of safety improvements.

Not surprisingly, our intersections (especially those near interstate interchanges), see the highest volume of crashes. While these high volume crash areas don't directly correlate to crashes that involve serious injuries or fatalities, they do still highlight a need to improve safety at these types of intersections to ensure safety issues don't get worse in the future.

Our more rural corridors are more likely to experience severe crashes.

Our highest volume intersections and corridors don't necessarily yield the majority of our fatal and serious injury crashes (FSI). When normalized using traffic volumes, our more rural corridors often see higher FSI crash rates, indicating a need to improve safety conditions on many of the corridors on the fringe of the community.

Pedestrians and bicyclists are our most vulnerable road users.

Based on the crash analysis, pedestrian and bicyclists are significantly more likely to be killed or seriously injured if involved in a crash. Areas of high multimodal demand (key crossings and intersections, downtown, parks, schools, etc.) are in need of improvements to ensure that those in our community that want to walk or bike are safe doing so.

Areas of higher crash density are more likely to be in communities of color.

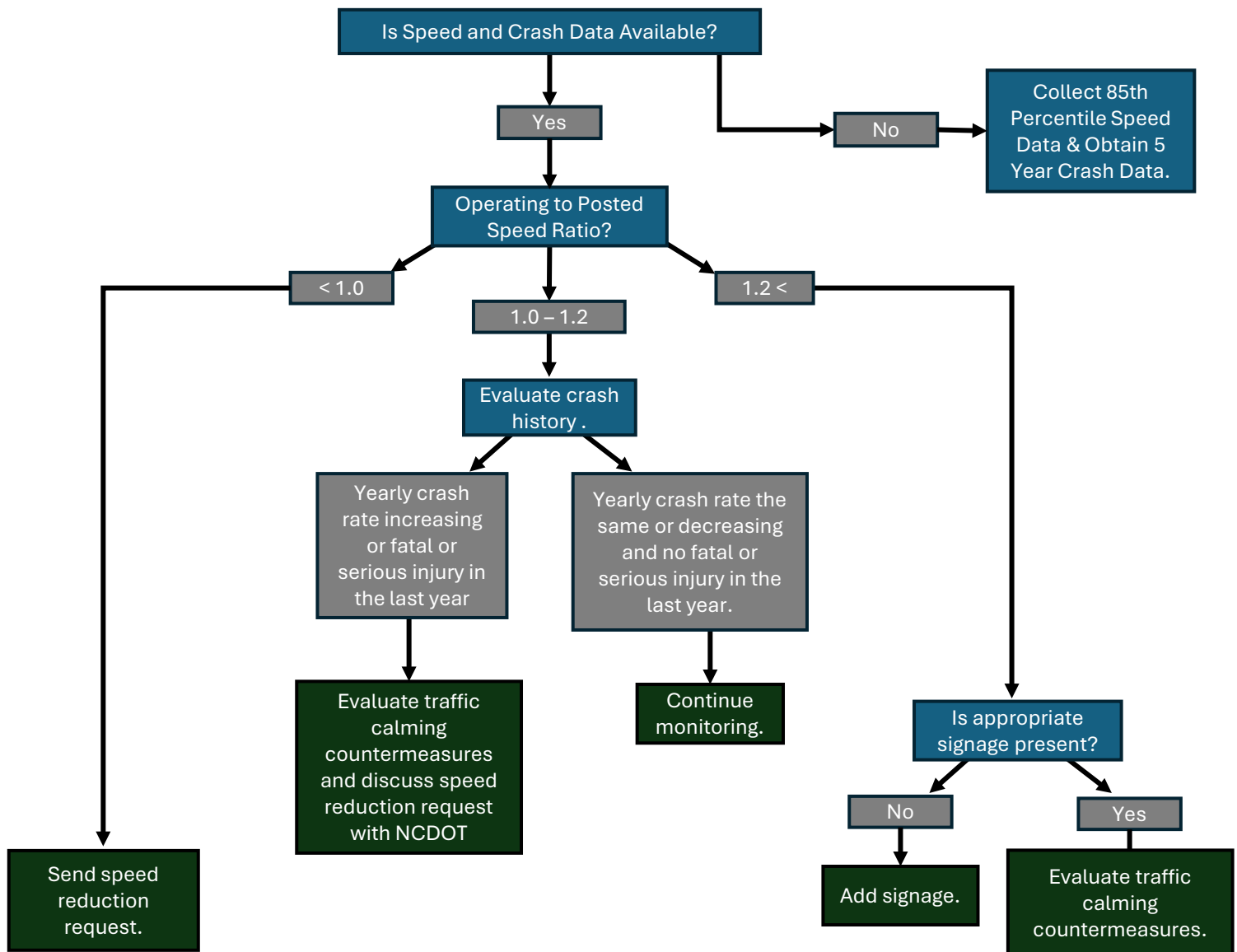
Many of the areas in our community that experience high crash rates are in communities of color. Additionally, these community members may be less likely to have access to a vehicle in the home, therefore making them more vulnerable to multimodal crashes as well.



KNIGHTDALE
Safety Action Plan

Prior to evaluating a corridor for speed alterations, the following questions should be considered. If you answered 'yes' to any of the following, an evaluation for a speed change request should be performed using the methodology below.

1. Has the town received any complaints or have police noted speeding issues on the corridor?
2. Has AADT increased by 15% year over year?
3. Are crash rates increasing year over year or higher than rates for roads of a similar type?
4. Have there been any fatalities or serious injuries in the last year?
5. Has the corridor experienced changes in pedestrian/transit activity or land uses?



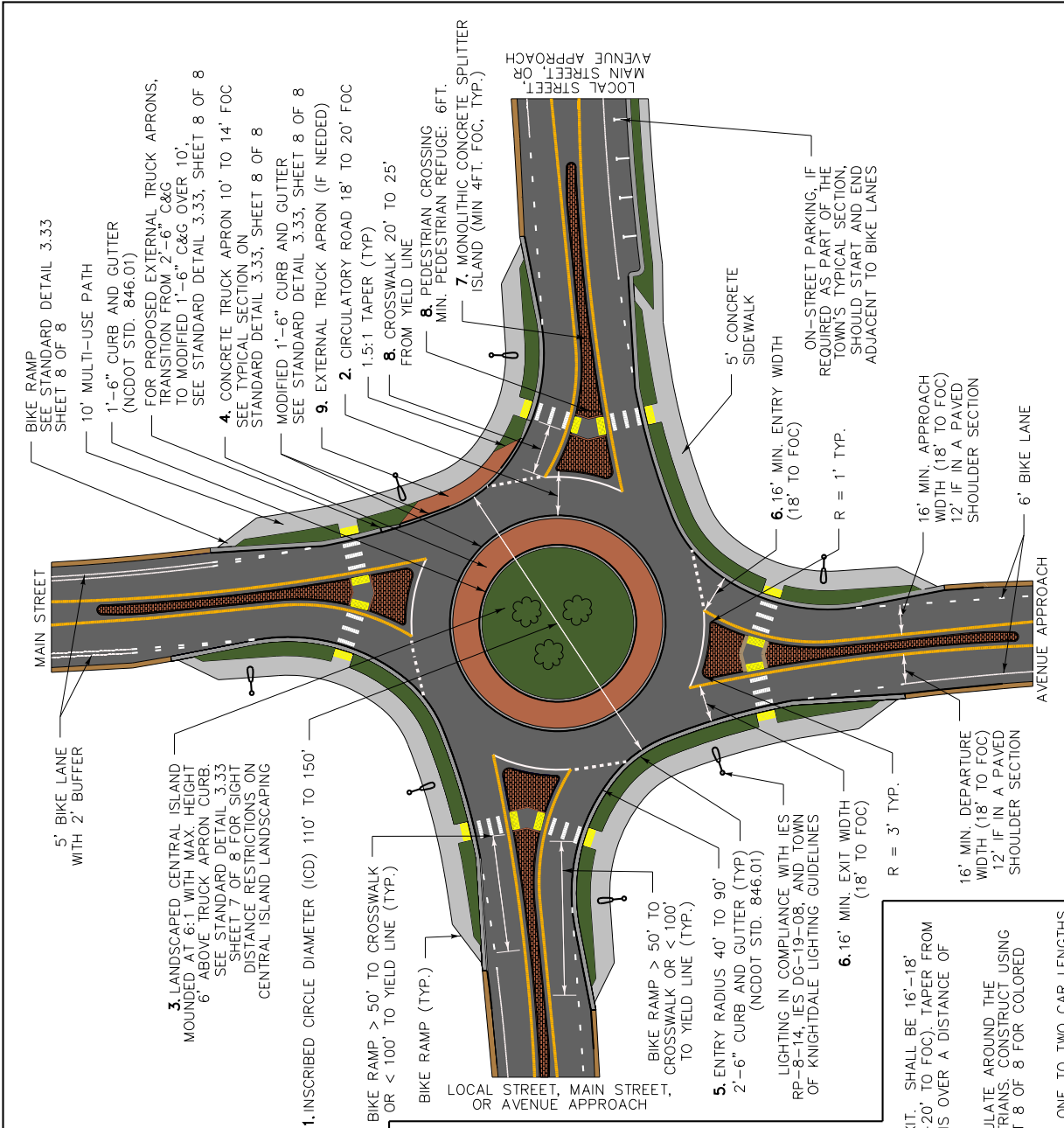
Vision Zero Data Management Plan

This document is intended to serve as a guide to the Town for maintaining the Knightdale Safety Action Plan via internal data management and updates to external data. Tracking and maintaining up-to-date information is essential to understanding the status of the Safety Action Plan and Vision Zero in Knightdale, and will allow the plan to be a living document that adapts to Knightdale's future needs.

The table below describes the relevant data to be collected and maintained, its source, and the recommended frequency of updates.

Description	Source	Tracked Metrics/Performance Measures	Recommended Collection Frequency
CRASH DATA			
NCDOT Crash Data GIS data including locations, types, severity, user type, and contributing factors	NCDOT 5-year crash history Email Daniel Carter at NCDOT (dlcarter4@ncdot.gov) or submit Crash Data Request Form	Number of fatal/serious injuries, crash type breakdown, user type breakdown, contributing factors breakdowns	Annually
Town Fatal/Serious Injury (FSI) Crash Data Use to create a combined dataset of NCDOT crashes and any additional FSI crashes	Knightdale Police Department	See above	Annually
High-Injury Network Use crash data to periodically update the High-Injury Network	Crash data (see above)	See above. Use updates to the HIN to track whether safety improvement projects are having an effect over time.	Update every 2-3 years
FACILITY DATA			
Bicycle and Pedestrian Facilities Maintain a continuously updated database of existing sidewalks, sidewalk gaps and bike facilities	Town of Knightdale	Miles of sidewalks, miles of bicycle facilities, miles of sidewalk gaps	Annually or continuously
Road Ownership Maintain record of road ownership/maintenance responsibility as new streets are built or change ownership	Town of Knightdale	Miles of HIN on Town-owned streets	Annually or continuously

<p>Posted Speed Limits Maintain a GIS file of all speed limits in the Knightdale Planning Area (NCDOT and Town streets)</p>	<p>NCDOT via Web Map And Town of Knightdale</p>	<p>Number of speed limit reductions, percentage of road mileage above 35 mph</p>	<p>Annually or continuously</p>
<p>Annual Average Daily Traffic (AADT) Maintain record of AADT as recorded by NCDOT and by the Town when data is collected</p>	<p>NCDOT via ConnectNCDOT See link to download.</p>		<p>Annually</p>
<p>Recorded/Actual Speeds Maintain a record of recorded speeds on roadways in the Knightdale Planning Area</p>	<p>Manually recorded speed data (Town of Knightdale or NCDOT)</p>	<p>85th percentile speeds</p>	<p>At Town discretion when conditions surrounding a corridor change significantly from during initial speed audit</p>
PROJECT DATA			
<p>Transportation Projects Maintain a single feature class that combines all transportation projects in the Town.</p>	<p>NCDOT (STIP, MTP, Town Projects - Funded and Proposed) And Town of Knightdale</p>	<p>Number of projects completed by type (i.e., sidewalk, Complete Streets, traffic calming, crossing improvements, safety conversions), track which projects are on the HIN</p>	<p>Annually or continuously</p>
<p>Maintenance Projects</p>	<p>Town of Knightdale</p>	<p>Number of maintenance projects completed (i.e., resident-initiated sidewalk repair), track which projects are on the HIN</p>	<p>Annually or continuously</p>
OTHER DATA			
<p>Demographic Data Including commute mode, vehicle access, population, median household income, race/ethnicity</p>	<p>American Community Survey 5-Year Estimates via https://data.census.gov/</p>	<p>Notable demographic shifts such as population growth, income changes, etc. that may influence safety</p>	<p>Every 3-5 years</p>
<p>Education and Outreach Track awareness of Vision Zero and outreach materials distributed</p>	<p>Town of Knightdale</p>	<p>Number of Vision Zero pledges signed, number of students educated about Vision Zero through Driver's Education, promotional materials distributed, events hosted</p>	<p>Continuously</p>
<p>Development Track new and recently completed developments within the Knightdale planning area</p>	<p>Town of Knightdale</p>	<p>Proposed, approved, and under-construction developments that may influence need or priority of nearby safety improvements or speed reductions</p>	<p>Continuously</p>



SUBMITTAL REQUIREMENTS:	
IN ACCORDANCE WITH THE GUIDANCE AND PROVISIONS OF THESE DISPLAYS, THE TOWN REQUIRES THE SUBMISSION OF A SET OF DESIGN CHECKS THAT INCLUDES:	
1.	DESIGN VEHICLE SWEEP PATHS
2.	GEOMETRIC SPEED CHECKS (FASTEST PATH CALCULATIONS)
3.	SIGHT DISTANCE CHECKS
REVISIONS	
DATE	DESCRIPTION
TOWN OF KNIGHTDALE STANDARD DETAILS	

PRINCIPLES:

THE DESIGN OF A SINGLE LANE ROUNDABOUT SHOULD HAVE ENOUGH ENTRY PATH DEFLECTION TO CREATE BALANCED SPEEDS THROUGH THE ROUNDABOUT. THE USE OF LEFT OFFSET HELPS IN REDUCING SPEEDS IN ADVANCE OF THE ENTRY LINE. THIS IS ESPECIALLY IMPORTANT FOR COMPACT ROUNDABOUTS.

GEOMETRY DEFINITIONS:

- 1. INSCRIBED CIRCLE DIAMETER:** MEASURE OF THE SIZE OF A ROUNDABOUT, GOVERNED BY NUMBER OF ENTRY AND EXIT LANES, SIZE OF DESIGN VEHICLE, AND PROPERTY CONSTRAINTS.
- 2. CIRCULATORY ROAD:** SHALL BE 16'-18" FROM EDGE OF TRAVEL TO EDGE OF TRAVEL (EOT-TO-EOT), OR 18'-20' TO OUTSIDE FACE OF CURB (FOC).
- 3. LANDSCAPED CENTRAL ISLAND:** A CENTRAL NON-TRAVELABLE AREA. SIGHTLINES SHALL BE MAINTAINED AROUND THE OUTSIDE, BUT MAY BE OBSTRUCTED THROUGH THE CENTRAL ISLAND BY LANDSCAPING.
- 4. TRUCK APRON:** A TRAVERSABLE AREA FOR TRUCKS. SEE STANDARD DETAIL 3.33, SHEET 8 OF 8 FOR COLORED AND STAMPED CONCRETE GUIDANCE.
- 5. ENTRY RADIUS:** THE SMALLEST CURB RADIUS BEFORE OR AT THE YIELD LINE, NOT THE SAME AS ENTRY PATH RADIUS OR DEFLECTION.
- 6. ENTRY/EXIT WIDTH:** AT THE ROUNDABOUT ENTRANCE/EXIT, MEASURED FROM SPLITTER ISLAND STRIPE TO EOT (18'-20' TO FOC), TAPER FROM TYPICAL APPROACH LANE WIDTHS TO ENTRY/EXIT WIDTHS OVER A DISTANCE OF 75'-100'.
- 7. CONCRETE SPLITTER ISLAND:** DIRECTS DRIVERS TO CIRCULATE AROUND THE ROUNDABOUT AND PROVIDES REFUGE AREA FOR PEDESTRIANS. CONSTRUCT USING NCDOT STD. 852.01, SEE STANDARD DETAIL 3.33, SHEET 8 OF 8 FOR COLORED AND STAMPED CONCRETE GUIDANCE.
- 8. PEDESTRIAN CROSSING:** TWO-STAGE CROSSING LOCATED ONE TO TWO CAR LENGTHS (20'-25') BEHIND THE YIELD LINE. CROSSINGS SHOULD BE PERPENDICULAR TO THE TRAVEL LANE.
- 9. EXTERNAL TRUCK APRON:** MAY BE USED AS NEEDED TO ACCOMMODATE LARGE DESIGN VEHICLES RIGHT TURN SWEEP PATH. TRANSITION FROM 2'-6" C&G TO MODIFIED 1'-6" C&G OVER 10'. CONSTRUCT CONCRETE EXTERNAL TRUCK APRON TO BE THE SAME DEPTH AS THE TRUCK APRON. EXTERNAL TRUCK APRONS SHOULD NOT PASS THROUGH CROSSWALKS. SEE STANDARD DETAIL 3.33, SHEET 8 OF 8 FOR COLORED AND STAMPED CONCRETE GUIDANCE.

GENERAL NOTES:

SHIFT FROM TOWN TYPICAL SECTION DIMENSIONS TO THE DIMENSIONS SHOWN IN THIS DETAIL USING THE APPROACH AND DEPARTURE TAPER LENGTHS AS SHOWN IN NCDOT ROADWAY DESIGN MANUAL (RDM) FIGURE 8-11

USE A = WS/60 (WHEN S LESS THAN/EQUAL TO 40 MPH)
 USE A = WS (WHEN S GREATER THAN 40 MPH)
 A = APPROACH OR DEPARTURE TAPER LENGTH
 S = DESIGN SPEED

FOR ROUTES MAINTAINED BY NCDOT, AN ENCROACHMENT AGREEMENT FROM NCDOT DIVISION OFFICE IS REQUIRED. COORDINATE WITH NCDOT DIVISION OFFICE FOR DESIGN REVIEW.

REFER TO NCDOT ROADWAY DESIGN MANUAL SECTION 8.10.3 FOR STORM DRAIN DESIGN GUIDANCE.

REFER TO NCHRP REPORT 1043 FOR ADDITIONAL ROUNDABOUT DESIGN GUIDANCE.

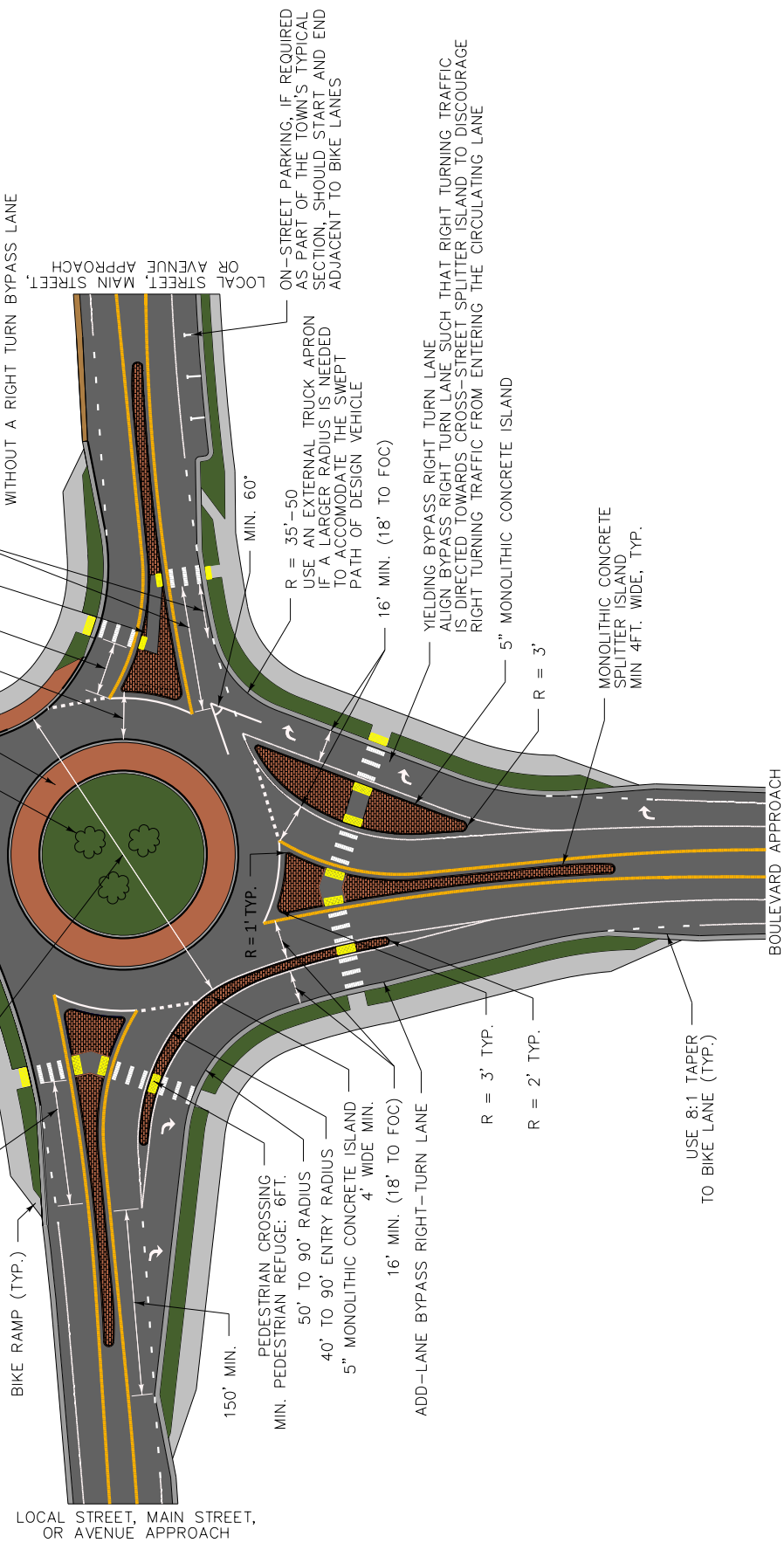
PHYSICAL CHARACTERISTICS SINGLE LANE ROUNDABOUT (GEOMETRY)	
1 of 8	STANDARD NO. 3.33

SUBMITTAL REQUIREMENTS:
 IN ACCORDANCE WITH THE GUIDANCE AND PROVISIONS OF THESE DISPLAYS, THE TOWN REQUIRES THE SUBMISSION OF A SET OF DESIGN CHECKS THAT INCLUDES:

1. DESIGN VEHICLE SWEEP PATHS
2. GEOMETRIC SPEED CHECKS (FASTEST PATH CALCULATIONS)
3. SIGHT DISTANCE CHECKS

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DATE	DESCRIPTION

**TOWN OF KNIGHTDALE
 STANDARD DETAILS**

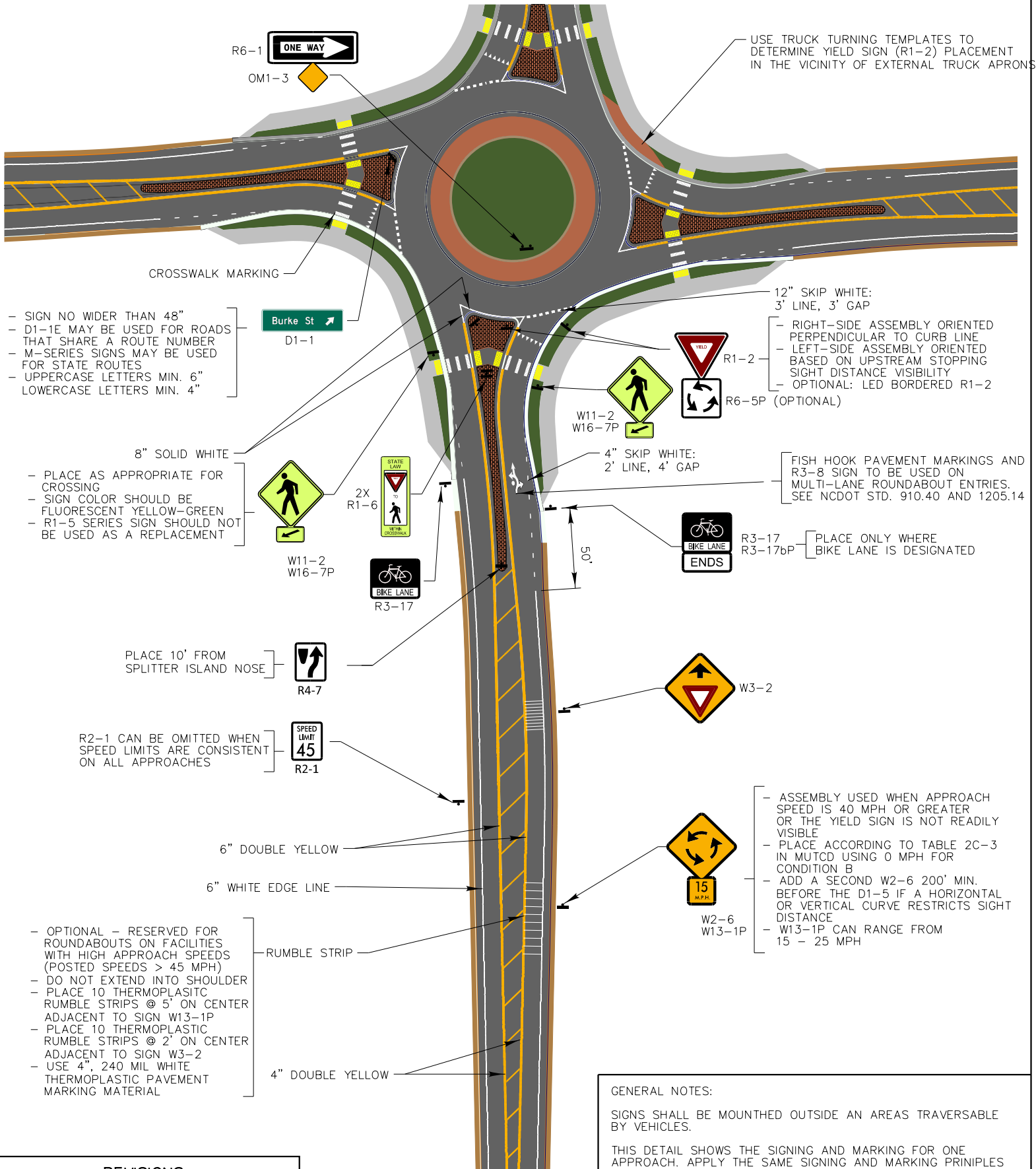


**PHYSICAL CHARACTERISTICS
 SINGLE LANE ROUNDABOUT WITH BYPASS LANES
 (GEOMETRY)**

GENERAL NOTES:
 SEE STANDARD DETAIL 3.33, SHEET 1 OF 8 FOR DESIGN PRINCIPLES, GEOMETRY DEFINITIONS, SUBMITTAL REQUIREMENTS, AND ADDITIONAL ROUNDABOUT DESIGN GENERAL NOTES

2 of 8

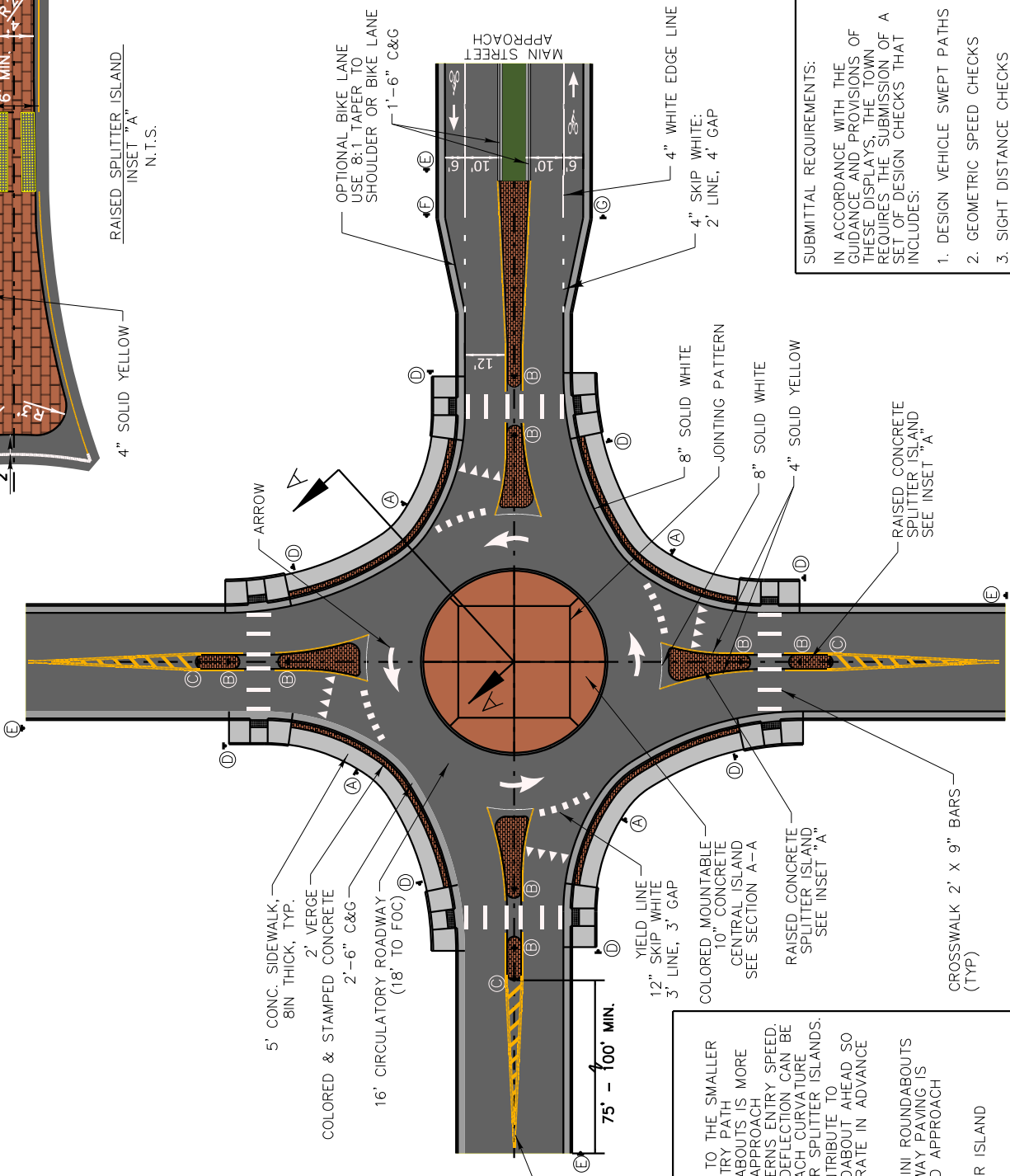
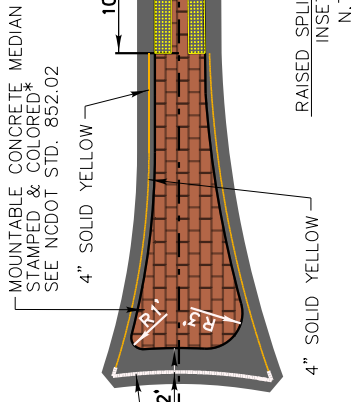
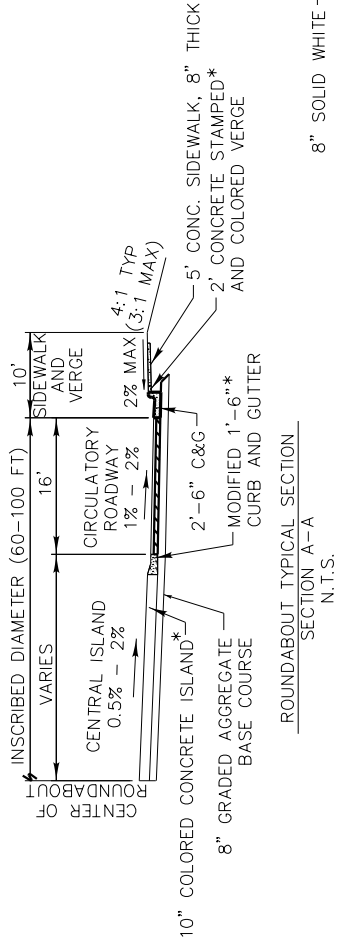
STD. NO.
3.33D-2



REVISIONS

DATE	DESCRIPTION

* NOTE: SEE STANDARD DETAIL 3.33, SHEET 8 OF 8 FOR COLORED AND STAMPED CONCRETE SPECIFICATIONS AND MODIFIED 1'-6" CURB AND GUTTER DETAILS



SIGN LEGEND	
(A)	R1-2, R6-5P 36" x 36" x 36" 30" x 30"
(B)	STATE LAMP R1-6 12' x 36" FLUORESCENT YELLOW-GREEN
(C)	R4-7c 18" x 30"
(D)	W11-2, W16-7p 30" x 30", 24" x 12"
(E)	W2-6 30" x 30"
(F)	BICYCLE LANE ENDS
(G)	R3-17, R3-17bP 24" x 18", 24" x 8"

SUBMITTAL REQUIREMENTS:
 IN ACCORDANCE WITH THE GUIDANCE AND PROVISIONS OF THESE DISPLAYS, THE TOWN REQUIRES THE SUBMISSION OF A SET OF DESIGN CHECKS THAT INCLUDES:
 1. DESIGN VEHICLE SWEEP PATHS
 2. GEOMETRIC SPEED CHECKS
 3. SIGHT DISTANCE CHECKS

GENERAL NOTES
 1. MINI-ROUNDABOUTS - DUE TO THE SMALLER CIRCLE SIZE, GEOMETRIC ENTRY PATH DEFLECTION AT MINI-ROUNDABOUTS IS MORE CHALLENGING, THEREFORE, APPROACH CURVATURE, TYPICALLY GOVERNS ENTRY SPEED. ALONG WITH LEFT OFFSET, DEFLECTION CAN BE ACHIEVED THROUGH APPROACH CURVATURE (CHICANES) AND/OR LONGER SPLITTER ISLANDS. THESE FEATURES ALSO CONTRIBUTE TO RECOGNITION OF THE ROUNDABOUT AHEAD SO THAT DRIVERS MAY DECELERATE IN ADVANCE OF THE ENTRY POINT.
 2. USE THIS STANDARD FOR MINI ROUNDABOUTS WHERE CIRCULATORY ROADWAY PAVING IS ASPHALT OR CONCRETE AND APPROACH SPEEDS ARE <35 MPH.
 3. SEE INSET "A" FOR SPLITTER ISLAND DIMENSIONS

REVISIONS	
DATE	DESCRIPTION

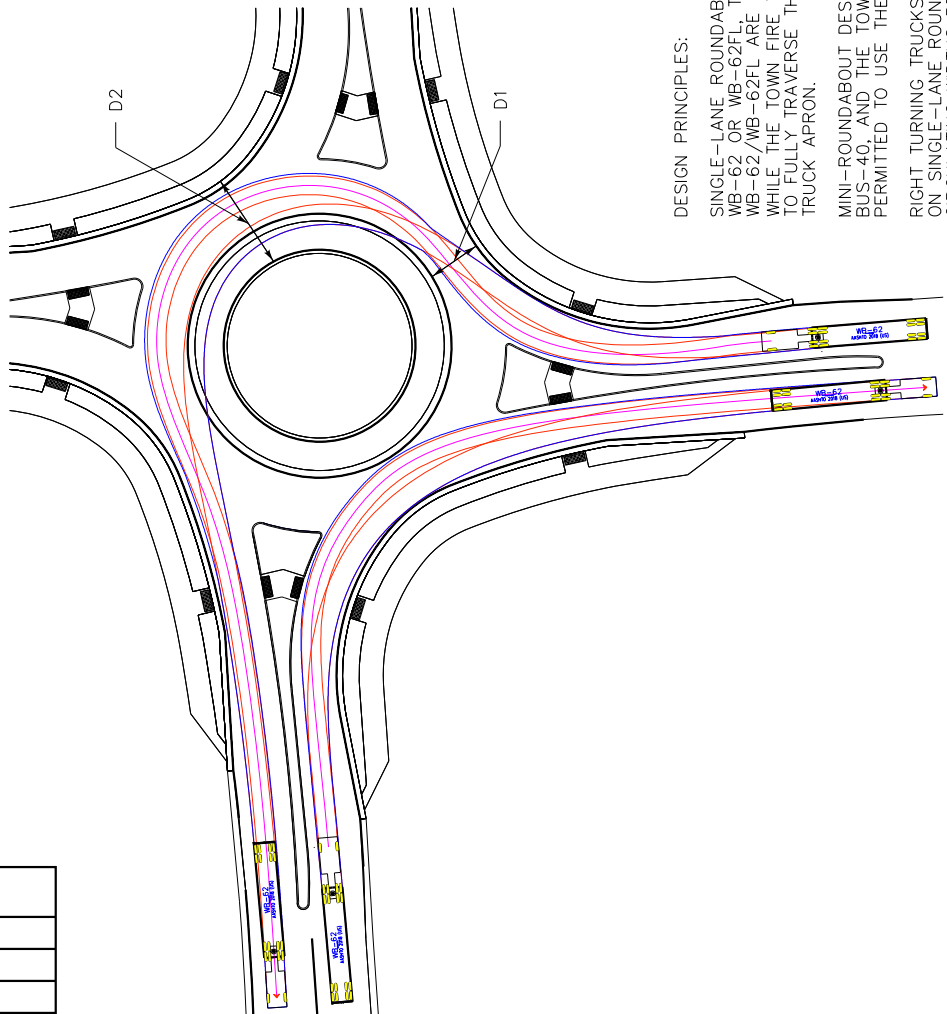
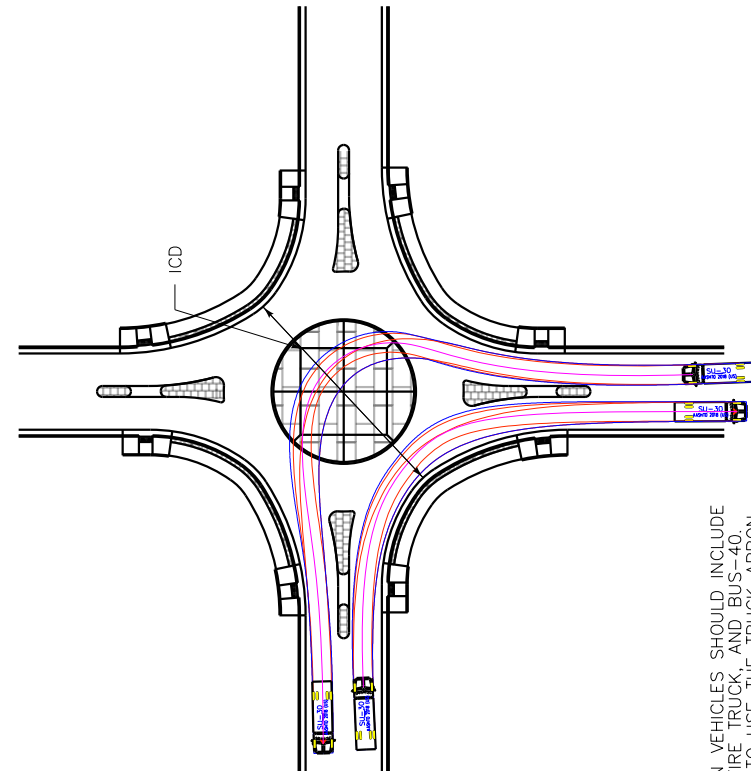
MINI-ROUNDBOUT ICD REQUIREMENTS FOR VEHICLE U-TURNS AND LEFT TURNS (LT)		DESIGN VEHICLES			
INSCRIBED CIRCLE DIAMETER	SU-30	BUS-40	FIRE TRUCK	WB-62	
				LT-ONLY	NO
60	LT-ONLY	NO	LT-ONLY	NO	NO
65	LT-ONLY	LT-ONLY	LT-ONLY	YES	NO
70	LT-ONLY	LT-ONLY	YES	YES	NO
80	LT-ONLY	LT-ONLY	YES	LT-ONLY	YES
90	YES	YES	YES	YES	YES
100	YES	YES	YES	YES	YES

TABLE NOTE: SPLITTER ISLANDS SHOULD BE MOUNTABLE OR TRIMMED AS NEEDED BASED ON SWEEPED PATHS

MIN. RIGHT TURN RADIUS	
SU-30	30 FT
BUS-40	25 FT
FIRE TRUCK	16 FT
WB-62	DETERMINED BY AUTOTURN
WB-62FL	DETERMINED BY AUTOTURN

TURNING WIDTH REQUIRED FOR SINGLE-LANE ROUNDBOUTS ('D' IN FT)	DESIGN VEHICLES				
	D1 (EOP)		D2 (FOC)		
	SU-30	BUS-40	FIRE TRUCK	WB-62	WB-62FL
110	14*	15	14	32	39
120	14*	15	14	30	36
130	14*	14	14*	27	33
140	14*	14	14*	26	30

NOTE: THE VALUES PROVIDED ABOVE ARE FOR GENERAL GUIDANCE.
*14 FT MINIMUM EOP/18 FT FOC



DESIGN PRINCIPLES:

SINGLE-LANE ROUNDBOUT DESIGN VEHICLES SHOULD INCLUDE WB-62 OR WB-62FL, THE TOWN FIRE TRUCK, AND BUS-40. WHILE THE TOWN FIRE TRUCK AND BUS-40 SHOULD BE ABLE TO FULLY TRAVERSE THE ROUNDBOUT WITHOUT USING THE TRUCK APRON.

MINI-ROUNDBOUT DESIGN VEHICLES SHOULD INCLUDE SU-30, BUS-40, AND THE TOWN FIRE TRUCK, ALL OF WHICH ARE PERMITTED TO USE THE TRUCK APRON.

RIGHT TURNING TRUCKS ARE NOT TO USE THE TRUCK APRON ON SINGLE-LANE ROUNDBOUTS. WHERE ENTRY, EXIT, OR CIRCULATING WIDTHS BECOME EXCESSIVE FOR RIGHT TURNS, CONSIDER USING AN EXTERNAL TRUCK APRON. EXTERNAL TRUCK APRONS SHOULD NOT PASS THROUGH CROSSWALKS.

GENERAL NOTES:

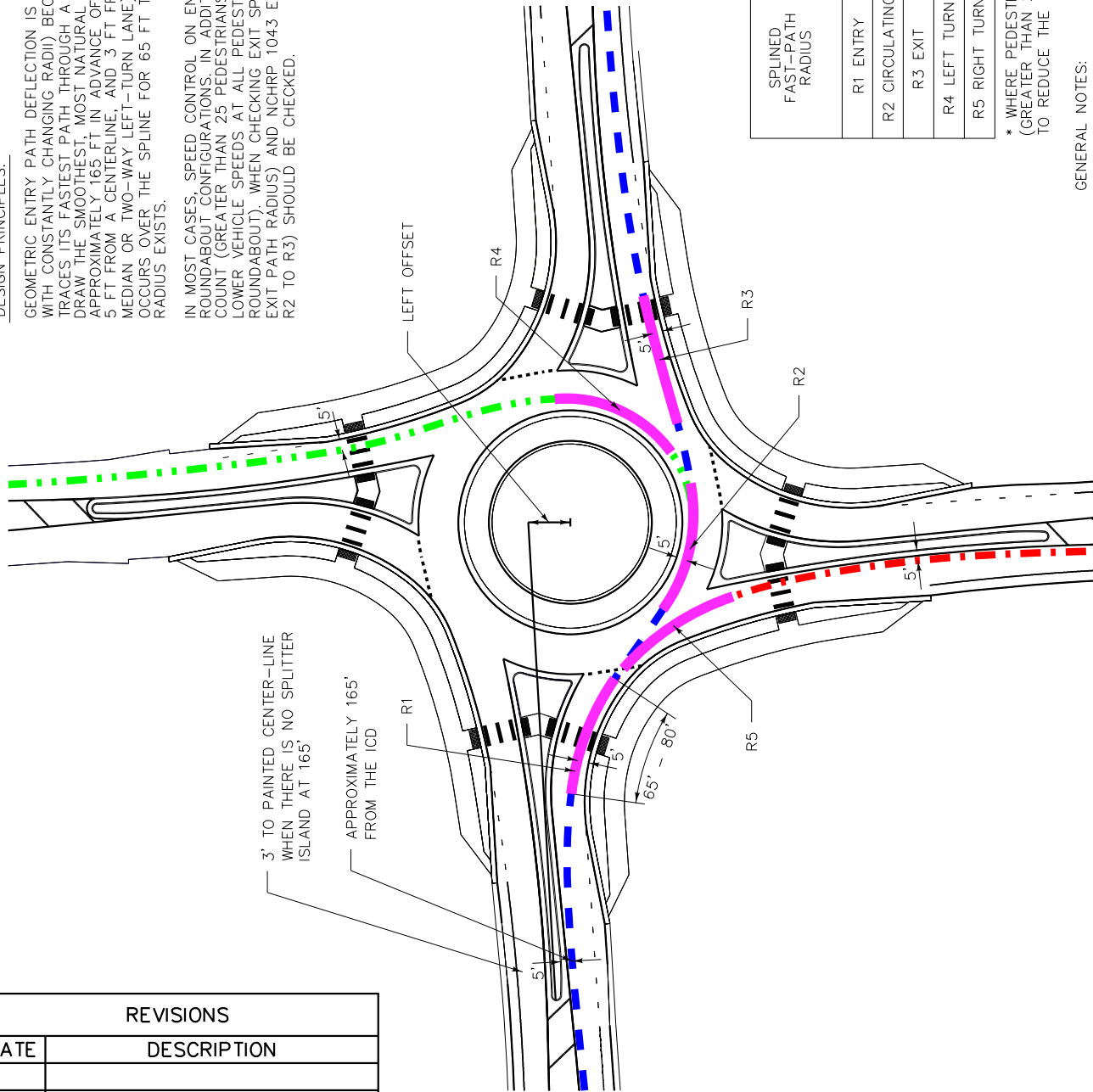
1. CHECK LEFT, THROUGH, AND RIGHT TURN MOVEMENTS FOR EACH RELEVANT DESIGN VEHICLE.
2. D1: CIRCULATORY ROADWAY SHOULD BE 18FT TO 20FT MEASURED FROM THE FACE OF CURB

REVISIONS	
DATE	DESCRIPTION

DESIGN PRINCIPLES:

GEOMETRIC ENTRY PATH DEFLECTION IS BEST REPRESENTED BY A CONTINUOUS SPLINE (A CURVE WITH CONSTANTLY CHANGING RADI) BECAUSE THIS MOST CLOSELY APPROXIMATES HOW A VEHICLE TRACES ITS FASTEST PATH THROUGH A ROUNDABOUT. A SPLINE ALSO ALLOWS ANALYSTS TO DRAW THE SMOOTHEST, MOST NATURAL VEHICULAR PATH. IT IS DRAWN FROM A STARTING POINT APPROXIMATELY 165 FT IN ADVANCE OF THE ENTRY LINE, WITH AN OFFSET OF 5 FT FROM CURBS, 5 FT FROM A CENTERLINE, AND 3 FT FROM OTHER PAVEMENT MARKINGS (SUCH AS A PAINTED MEDIAN OR TWO-WAY LEFT-TURN LANE). THE CRITICAL ENTRY PATH RADIUS, REFERRED TO AS R1, OCCURS OVER THE SPLINE FOR 65 FT TO 80 FT, NEAR THE YIELD POINT, WHERE THE TIGHTEST RADIUS EXISTS.

IN MOST CASES, SPEED CONTROL ON ENTRY IS THE MOST IMPORTANT FASTEST PATH CRITERIA FOR ROUNDABOUT CONFIGURATIONS. IN ADDITION, IF A LOCATION HAS A SIGNIFICANT PEDESTRIAN COUNT (GREATER THAN 25 PEDESTRIANS PER HOUR), STEPS SHOULD BE TAKEN TO FACILITATE LOWER VEHICLE SPEEDS AT ALL PEDESTRIAN CONFLICT AREAS (INCLUDING EXIT SPEEDS FROM THE ROUNDABOUT). WHEN CHECKING EXIT SPEEDS, BOTH THE PREDICTIVE METHOD (BASED ON THE R3 EXIT PATH RADIUS) AND NCHRP 1043 EQUATION 9.7 (WHICH ACCOUNTS FOR ACCELERATION FROM R2 TO R3) SHOULD BE CHECKED.



SPLINED FAST-PATH RADIUS	RECOMMENDED RADIUS FOR SINGLE-LANE ROUNDABOUT (FT)	RECOMMENDED RADIUS FOR MINI-ROUNDABOUT (FT)
R1 ENTRY	120FT TO 165FT	100FT TO 165FT
R2 CIRCULATING	70FT TO 120FT	70FT TO 100FT
R3 EXIT	120FT TO 300FT*	90FT TO 150FT
R4 LEFT TURN	TRUCK APRON R.+5FT	CENTER ISLAND R.+5FT
R5 RIGHT TURN	70FT TO 100FT	50FT TO 90FT

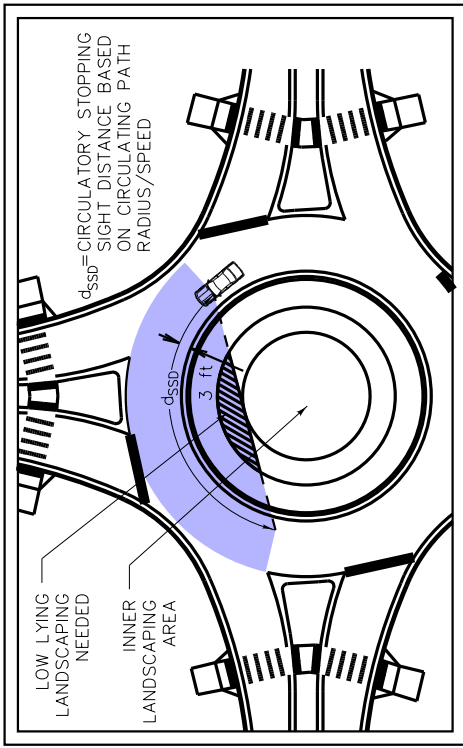
* WHERE PEDESTRIAN USE OF AN EXIT CROSSWALK IS FREQUENT (GREATER THAN 25 PEDESTRIANS PER HOUR), ADJUST EXIT RADI TO REDUCE THE R3 TO <200FT.

GENERAL NOTES:

1. R1, R2, R3 PATH TO FOLLOW NATURAL SPLINE.
2. GEOMETRIC ENTRY SPEED USUALLY GOVERNED BY R1 RADIUS, BUT MAY BE GOVERNED BY R5 RADIUS.
3. ON DESIGNS THAT CANNOT ACHIEVE DEFLECTION USING CENTRAL ISLAND AND APPROACH ALIGNMENT OFFSET TO THE LEFT OF CENTER-LINE, ADD REVERSE CURVES ON THE APPROACH SPLITTER ISLAND, SEPARATED BY A SHORT TANGENT 50FT TO 100FT. APPROACH CURVE RADI TO BE SIZED USING AASHTO GREEN BOOK TABLE 3-13. MINIMUM RADI AND SUPERELEVATION FOR LOW-SPEED STREETS IN URBAN AREAS TO MAINTAIN NORMAL CROWN.

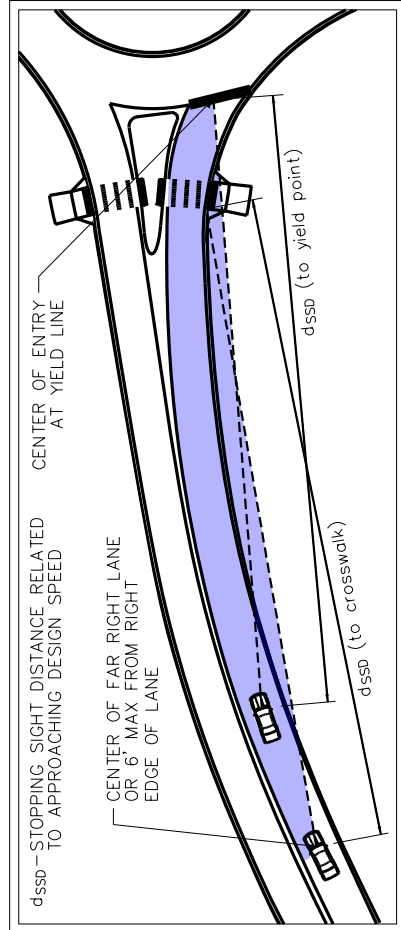
REVISIONS	
DATE	DESCRIPTION

CIRCULATING STOPPING SIGHT DISTANCE



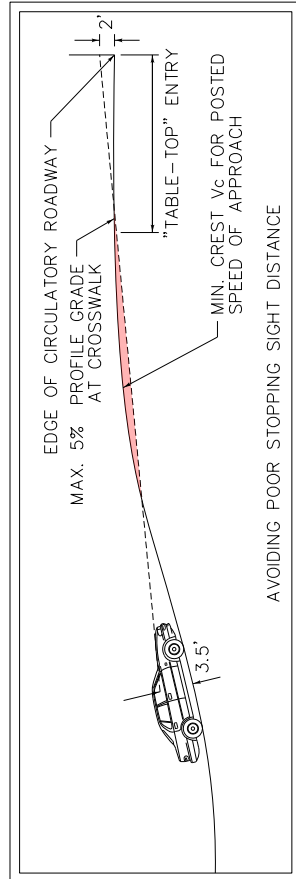
* SSD VALUES BASED ON APPROACH POSTED SPEED AND AASHTO GREEN BOOK CHAPTER 3.2 - SIGHT DISTANCE

APPROACH STOPPING SIGHT DISTANCE



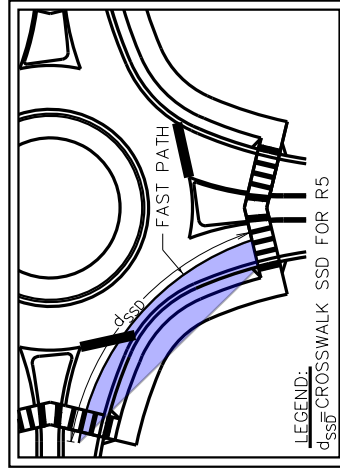
* SSD VALUES BASED ON APPROACH POSTED SPEED AND AASHTO GREEN BOOK CHAPTER 3.2 - SIGHT DISTANCE

VERTICAL SIGHT DISTANCE



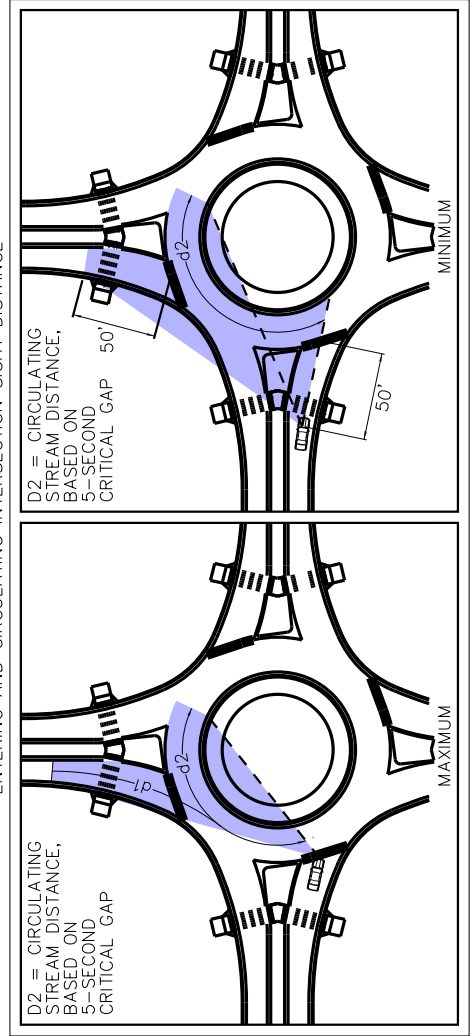
AVOIDING POOR STOPPING SIGHT DISTANCE

STOPPING SIGHT DISTANCE TO THE DOWNSTREAM CROSSWALK



LEGEND:
d_ssd CROSSWALK SSD FOR R5

ENTERING AND CIRCULATING INTERSECTION SIGHT DISTANCE

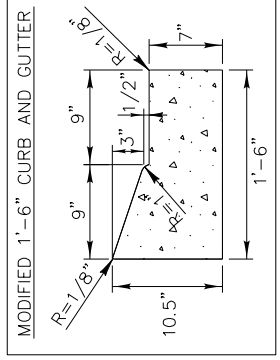
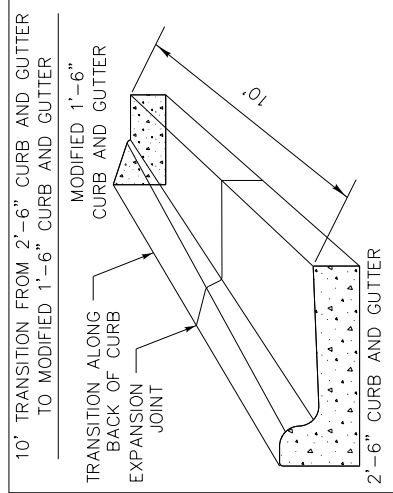
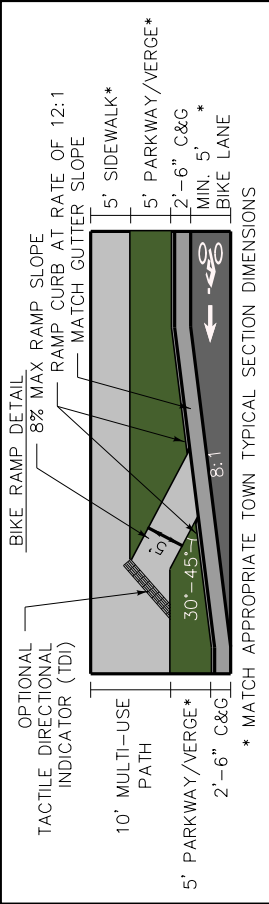
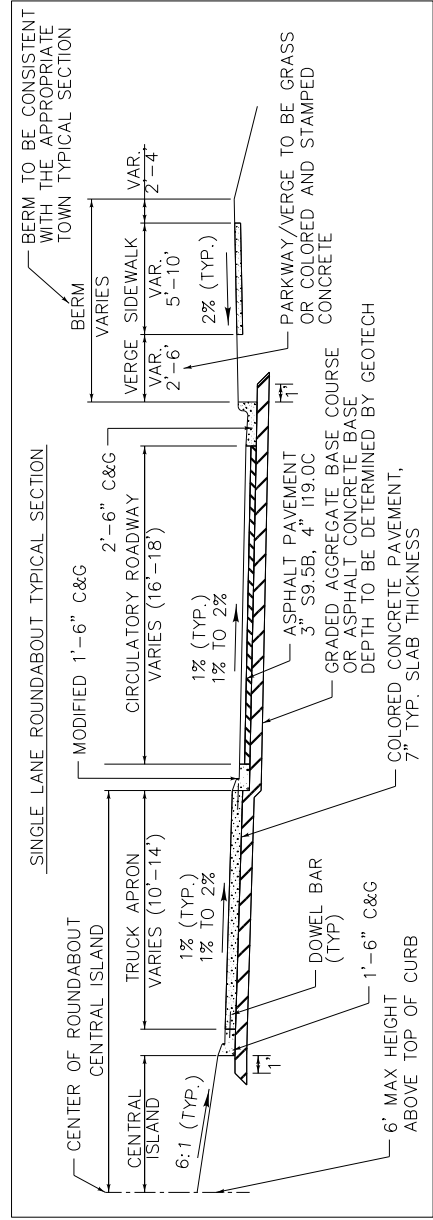


REVISIONS

DATE	DESCRIPTION

REVISIONS	
DATE	DESCRIPTION

**TOWN OF KNIGHTDALE
STANDARD DETAILS**



COLORED AND STAMPED CONCRETE SPECIFICATIONS:

ALL CONCRETE TRUCK APRONS SHOULD BE COLORED CONCRETE BUT NOT STAMPED.

ALL CONCRETE SPLITTER ISLANDS AND CONCRETE VERGES BETWEEN CURB AND PEDESTRIAN SURFACES SHOULD BE COLORED AND STAMPED.

ALL CONCRETE SURFACES THAT ACCOMMODATE PEDESTRIAN TRAFFIC (SIDEWALK, MULTI-USE PATH) SHOULD NOT BE COLORED OR STAMPED.

CONCRETE COLOR SHOULD BE FEDERAL STANDARD COLOR 10076 ACCORDING TO AEROSPACE MATERIAL SPECIFICATION STANDARD 595 (AMS-STD-595).

STAMPED CONCRETE SHOULD BE RUNNING BOND OR HERRINGBONE AND IS SUBJECT TO APPROVAL BY THE TOWN OF KNIGHTDALE.

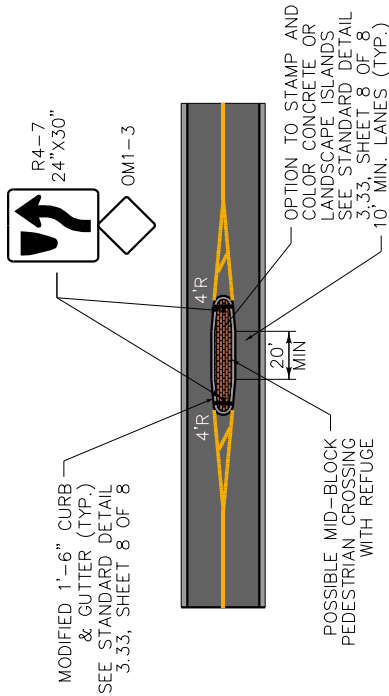
COLORED CONCRETE SHOULD BE AN INTEGRAL CONCRETE MIX (MIXED IN THE TRUCK). SUBMIT COLORED CONCRETE SPECS AND PATTERN SHOP DRAWINGS TO THE TOWN OF KNIGHTDALE FOR REVIEW.

**MISCELLANEOUS
ROUNDABOUT DETAILS**

STD. NO.

3.33D-8

MEDIANS



WHILE MEDIANS PROVIDE LESS TRAFFIC CALMING PERFORMANCE THAN CHICANES, THEY ARE STILL GOOD TRAFFIC CALMING MEASURES THAT HAVE A WIDER RANGE OF APPLICATIONS SINCE MEDIANS CAN BE LONGER AND REQUIRE LESS TAPER LENGTH.

USE $A=WS^2/60$ TO CALCULATE TAPER LENGTHS - SEE FORMULA BELOW.

CHICANES ARE APPROPRIATE TRAFFIC CALMING MEASURES FOR COLLECTORS AND LOCAL STREETS.

CHICANES ARE MOST APPROPRIATE FOR ROADWAY FACILITIES WITH POSTED SPEEDS EQUAL TO OR LESS THAN 25 MPH.

THE DESIGN SPEED FOR CHICANES SHOULD BE THE SAME DESIGN SPEED USED DURING THE ORIGINAL ROADWAY DESIGN. VERIFY THAT ALL PROPOSED TRAFFIC CALMING MEASURES CAN BE SAFELY NAVIGATED BY EMERGENCY VEHICLES.

FOR SIGHT DISTANCE AND VISIBILITY PURPOSES, CHICANES ARE NOT RECOMMENDED FOR INSTALLATION ON ROADWAY SECTIONS WITH GRADES IN EXCESS OF 6%.

USE $A=WS^2/60$ TO CALCULATE TAPER LENGTHS, WHERE

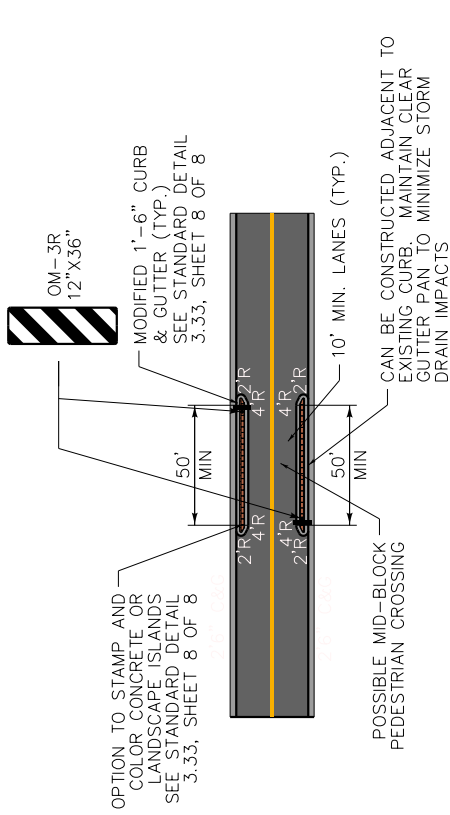
A = APPROACH OR DEPARTURE TAPER LENGTH

W = WIDTH OF LATERAL SHIFT

S = POSTED SPEED

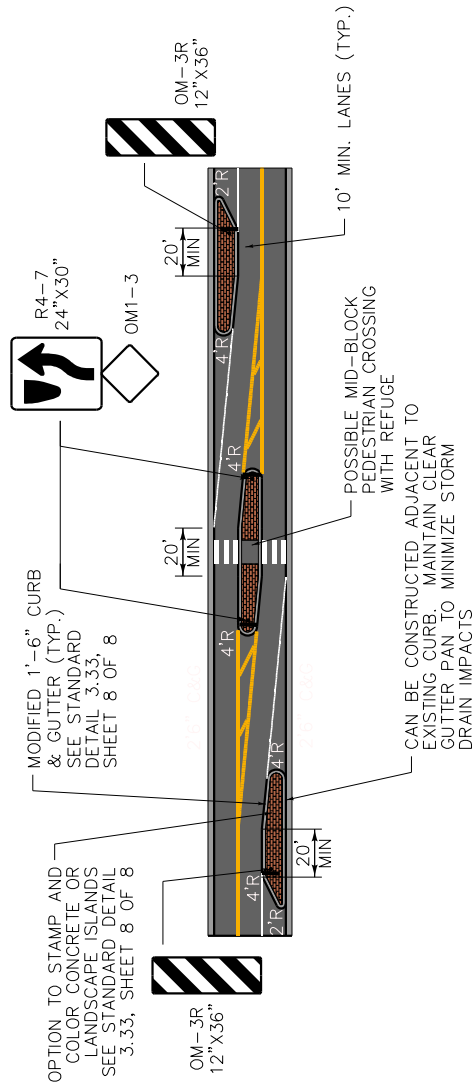
NOTE: USE POSTED SPEED AS OPPOSED TO DESIGN SPEED WHEN CALCULATING TRAFFIC CALMING MEASURE TAPER LENGTHS.

CHOKERS



CHOKERS PROVIDE TRAFFIC CALMING MEASURES THROUGH THE ENCOURAGEMENT OF LOWER SPEEDS THROUGH THE PINCH POINT. SHORTER PEDESTRIAN CROSSING DISTANCES ARE POSSIBLE IF A MID-BLOCK CROSSING IS PROVIDED.

CHICANES



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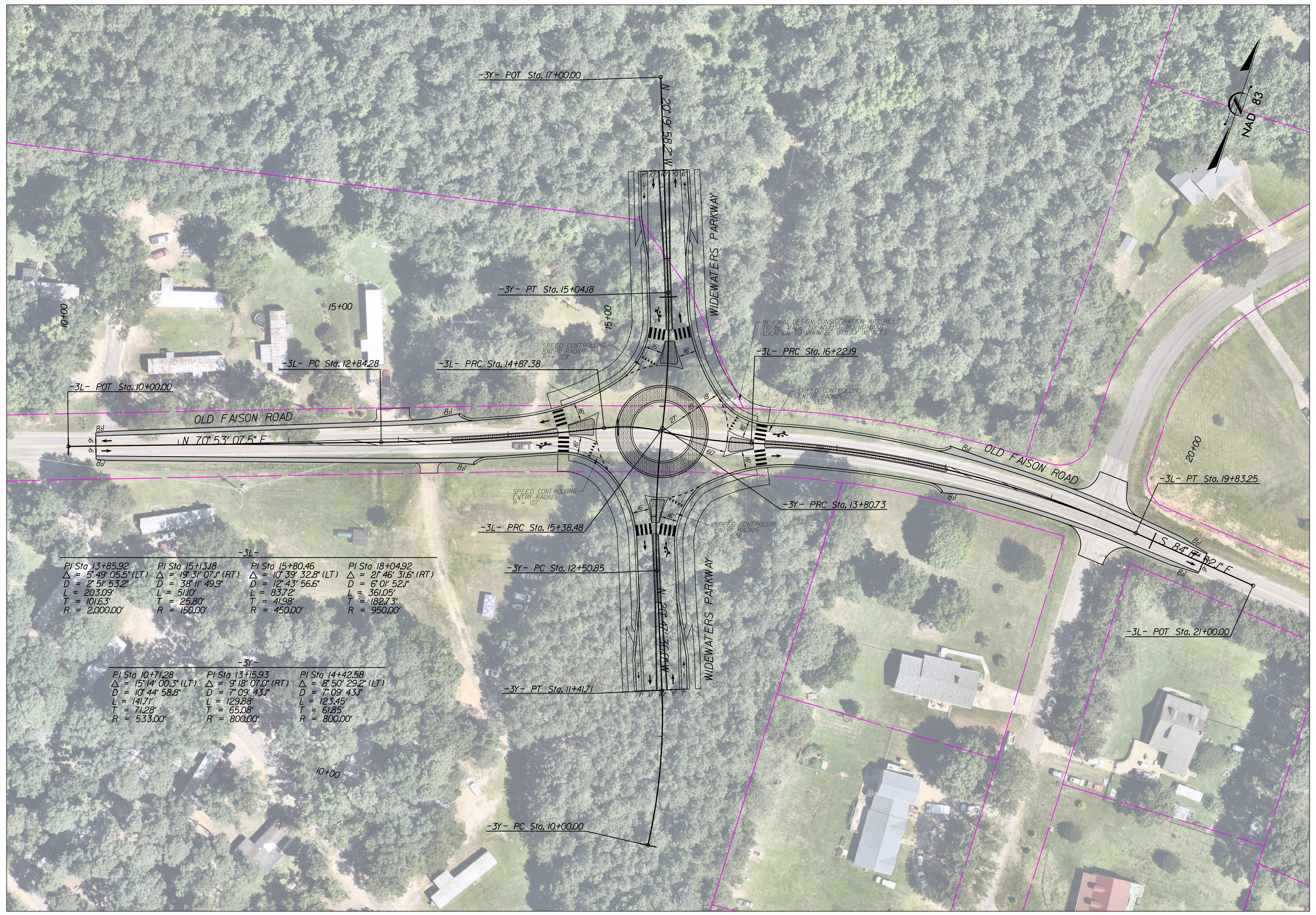
11/7/2024



-2L-			-2Y-		
PI Sta 14+64.86	PI Sta 15+51.77	PI Sta 18+13.78	PI Sta 12+10.25		
$\Delta = 16^{\circ} 12' 10.8"$ (RT)	$\Delta = 16^{\circ} 50' 05.9"$ (LT)	$\Delta = 0^{\circ} 19' 25.7"$ (RT)	$\Delta = 22^{\circ} 36' 09.7"$ (RT)		
D = 22' 55' 05.9"	D = 16' 22' 12.8"	D = 2' 36' 15.7"	D = 10' 44' 58.8"		
L = 70.70'	L = 102.84'	L = 12.43'	L = 210.26'		
T = 35.59'	T = 51.79'	T = 6.22'	T = 106.52'		
R = 250.00'	R = 350.00'	R = 2,200.00'	R = 533.00'		

PROJECT:	KNIGHTDALE SAP RBT STDS	CLIENT:	KNIGHTDALE start something	PLANS BY:	 © 2024 421 FAYETTEVILLE STREET SUITE 600, RALEIGH, NC 27601 WWW.KIMLEY-HORN.COM NC LICENSE # F-1012	KHA PROJECT 013169012	DATE 11/7/2024	SCALE 1"=40'	DESIGNED BY: TGS	DRAWN BY: AMM	CHECKED BY: XXX	NO.	REVISIONS	DATE	BY
	KNIGHTDALE, NORTH CAROLINA		PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION										HYDRAULIC ENGINEER	PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	ROADWAY ENGINEER
SHEET NUMBER	2	SHEET TITLE:	MAILMAN ROAD SMITHFIELD ROAD ROUNDAUT												

K:\ARL_Roadway\016627000 - Knightdale SAP Rbt Stds\Roadway\Pro\016627000_rdy_psh_3_widewaters_oldfaison.dgn 11/7/2024



-3L-			
PI Sta 13+85.92	PI Sta 15+13.18	PI Sta 15+80.46	PI Sta 18+04.92
$\Delta = 5^{\circ} 49' 05.5''$ (LT)	$\Delta = 19^{\circ} 31' 07.1''$ (RT)	$\Delta = 10^{\circ} 39' 32.8''$ (LT)	$\Delta = 21^{\circ} 46' 31.6''$ (RT)
D = 2' 51' 53.2"	D = 38' 11' 49.9"	D = 12' 43' 56.6"	D = 6' 01' 52.1"
L = 203.09'	L = 51.0'	L = 83.72'	L = 361.05'
T = 101.63'	T = 25.80'	T = 41.98'	T = 182.73'
R = 2,000.00'	R = 150.00'	R = 450.00'	R = 950.00'

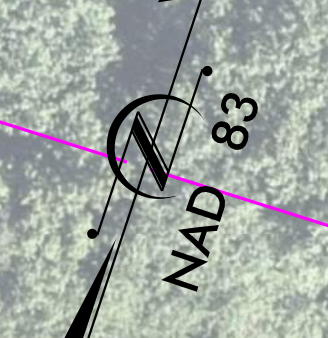
-3Y-		
PI Sta 10+71.28	PI Sta 13+15.93	PI Sta 14+42.58
$\Delta = 15^{\circ} 14' 00.3''$ (LT)	$\Delta = 9^{\circ} 18' 07.0''$ (RT)	$\Delta = 8^{\circ} 50' 29.2''$ (LT)
D = 10' 44' 58.8"	D = 7' 09' 43.1"	D = 7' 09' 43.1"
L = 141.71'	L = 129.88'	L = 123.45'
T = 71.28'	T = 65.08'	T = 61.85'
R = 533.00'	R = 800.00'	R = 800.00'

IN FINAL DESIGN, CONSIDERATION WILL NEED TO BE MADE TO ADJUST ROUNDABOUT LOCATION TO MINIMIZE UTILITY IMPACTS

SPEED CONTROLLING ENTRY RADIUS R = 132'

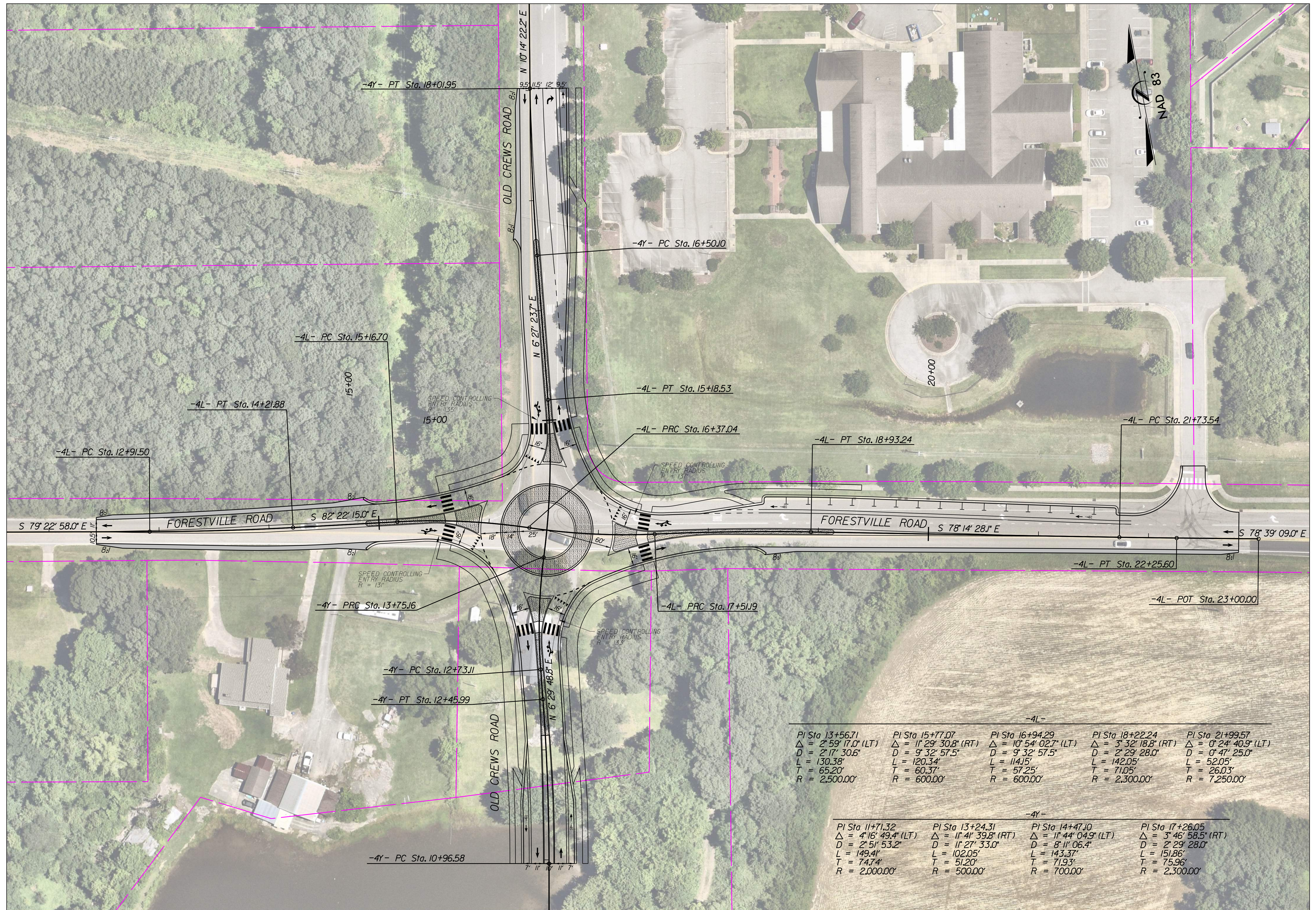
SPEED CONTROLLING ENTRY RADIUS R = 127'

SPEED CONTROLLING ENTRY RADIUS R = 129'





PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>							
HYDRAULIC ENGINEER							
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>							
ROADWAY ENGINEER							
KHA PROJECT 013169012	DATE 11/7/2024	SCALE 1" = 40'	DESIGNED BY TGS	DRAWN BY AMM	CHECKED BY XXX	REVISIONS	BY
PLANS BY: Kimley»Horn © 2024 421 FAYETTEVILLE STREET SUITE 600, RALEIGH, NC 27601 PHONE: 919-677-2000 WWW.KIMLEY-HORN.COM NC LICENSE # F-1012		CLIENT: KNIGHTDALE <i>start something</i>					
SHEET TITLE: WIDEWATERS PARKWAY OLD FAISON RD ROUNDABOUT		PROJECT: KNIGHTDALE SAP RBT STDS KNIGHTDALE, NORTH CAROLINA					
SHEET NUMBER 3							

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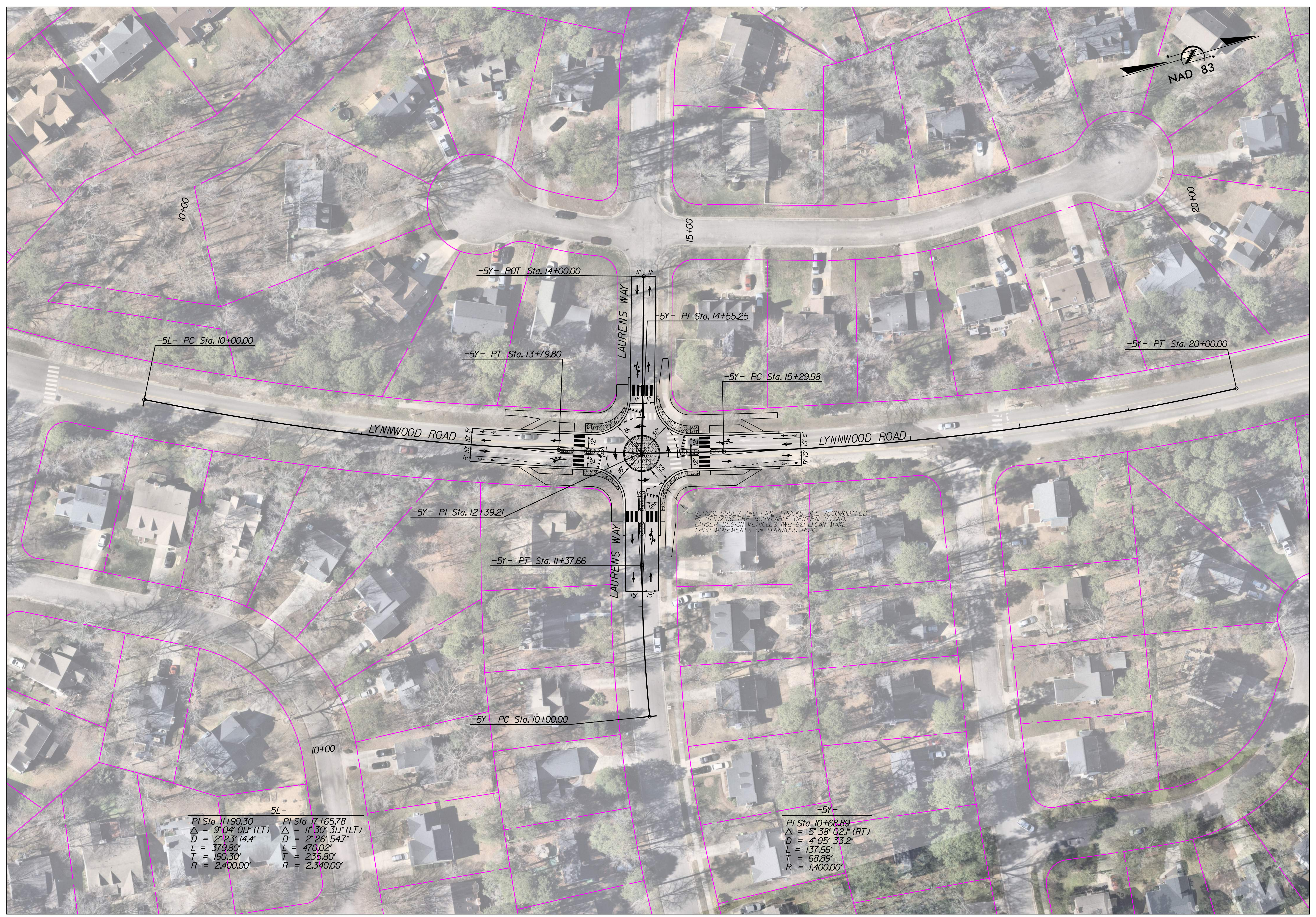
-4L-				
PI Sta 13+56.71	PI Sta 15+77.07	PI Sta 16+94.29	PI Sta 18+22.24	PI Sta 21+99.57
$\Delta = 2^\circ 59' 17.0" (LT)$	$\Delta = 11^\circ 29' 30.8" (RT)$	$\Delta = 10^\circ 54' 02.7" (LT)$	$\Delta = 3^\circ 32' 18.8" (RT)$	$\Delta = 0^\circ 24' 40.9" (LT)$
$D = 2^\circ 17' 30.6"$	$D = 9^\circ 32' 57.5"$	$D = 9^\circ 32' 57.5"$	$D = 2^\circ 29' 28.0"$	$D = 0^\circ 47' 25.0"$
$L = 130.38'$	$L = 120.34'$	$L = 114.15'$	$L = 142.05'$	$L = 52.05'$
$T = 65.20'$	$T = 60.37'$	$T = 57.25'$	$T = 71.05'$	$T = 26.03'$
$R = 2,500.00'$	$R = 600.00'$	$R = 600.00'$	$R = 2,300.00'$	$R = 7,250.00'$

-4Y-			
PI Sta 11+71.32	PI Sta 13+24.31	PI Sta 14+47.10	PI Sta 17+26.05
$\Delta = 4^\circ 16' 49.4" (LT)$	$\Delta = 11^\circ 41' 39.8" (RT)$	$\Delta = 11^\circ 44' 04.9" (LT)$	$\Delta = 3^\circ 46' 58.5" (RT)$
$D = 2^\circ 51' 53.2"$	$D = 11^\circ 27' 33.0"$	$D = 8^\circ 11' 06.4"$	$D = 2^\circ 29' 28.0"$
$L = 149.41'$	$L = 102.05'$	$L = 143.37'$	$L = 151.86'$
$T = 74.74'$	$T = 51.20'$	$T = 71.93'$	$T = 75.96'$
$R = 2,000.00'$	$R = 500.00'$	$R = 700.00'$	$R = 2,300.00'$

PROJECT:		KNIGHTDALE SAP RBT STDS		KNIGHTDALE, NORTH CAROLINA							
SHEET TITLE:		OLD CREWS RD FORESTVILLE RD ROUNDBOULT									
CLIENT:		 KNIGHTDALE <i>start something</i>									
PLANS BY:		 © 2024 421 FAYETTEVILLE STREET SUITE 600, RALEIGH, NC 27601 PHONE: 919-677-2000 WWW.KIMLEY-HORN.COM NC LICENSE # F-0102									
ROADWAY ENGINEER		KHA PROJECT: 013169012 DATE: 11/17/2024 SCALE: 1"=40' DESIGNED BY: TOS DRAWN BY: AMM CHECKED BY: XXX									
PRELIMINARY PLANS		DO NOT USE FOR CONSTRUCTION									
HYDRAULIC ENGINEER											
PRELIMINARY PLANS		DO NOT USE FOR CONSTRUCTION									
REVISIONS		<table border="1"> <tr> <th>No.</th> <th>DATE</th> <th>BY</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>				No.	DATE	BY			
No.	DATE	BY									
SHEET NUMBER		4									

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11/7/2024





-5L-
 PI Sta. 11+90.30 PI Sta. 17+65.78
 $\Delta = 9^{\circ} 04' 01.1''$ (LT) $\Delta = 11^{\circ} 30' 31.1''$ (LT)
 $D = 2^{\circ} 23' 14.4''$ $D = 2^{\circ} 26' 54.7''$
 $L = 379.80'$ $L = 470.02'$
 $T = 190.30'$ $T = 235.80'$
 $R = 2,400.00'$ $R = 2,340.00'$

-5Y-
 PI Sta. 10+68.89
 $\Delta = 5^{\circ} 38' 02.1''$ (RT)
 $D = 4^{\circ} 05' 33.2''$
 $L = 137.66'$
 $T = 68.89'$
 $R = 1,400.00'$

SCHOOL BUSES AND FIRE TRUCKS ARE ACCOMMODATED BY UTILIZING THE MOUNTABLE CENTRAL ISLAND. LARGER DESIGN VEHICLES (WB-62' CAN) MAKE THRU MOVEMENTS ON LYNNWOOD ROAD.



PROJECT:	KNIGHTDALE SAP RBT STDS		KNIGHTDALE, NORTH CAROLINA
	SHEET NUMBER 5		
SHEET TITLE:	LAURENS WAY LYNNWOOD ROAD ROUNDBOUT		
CLIENT:	 KNIGHTDALE start something		
PLANS BY:	 © 2024 421 FAYETTEVILLE STREET SUITE 600, RALEIGH, NC 27601 PHONE: 919-677-2000 WWW.KIMLEY-HORN.COM NC LICENSE # F-1012		
KHA PROJECT	013169012	DESIGNED BY:	TGS
DATE	11/7/2024	DRAWN BY:	AMM
SCALE	1" = 40'	CHECKED BY:	XXX
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			
ROADWAY ENGINEER			
HYDRAULIC ENGINEER			
REVISIONS			
No.		DATE	BY

Implementation Grant Checklist

LEADERSHIP AND GOAL SETTING

- A high-ranking official and/or governing body in the jurisdiction publicly committed to an eventual goal of zero roadway fatalities and serious injuries
- The commitment includes either setting a target date to reach zero OR setting one or more targets to achieve significant declines in roadway fatalities and serious injuries by a specific date

PLANNING STRUCTURE

- To develop the Action Plan, was a committee, task force, implementation group, or similar body established and charged with the plan's development, implementation, and monitoring?

SAFETY ANALYSIS

- Analysis of existing conditions and historical trends to provide a baseline level of crashes involving fatalities and serious injuries across a jurisdiction, locality, Tribe, or region
- Analysis of the location where there are crashes, the severity, as well as contributing factors and crash types
- Analysis of systemic and specific safety needs, as needed (e.g., high-risk road features or specific safety needs of relevant road users)
- A geospatial identification (geographic or locational data using maps) of higher risk locations

ENGAGEMENT AND COLLABORATION

- Engagement with the public and relevant stakeholders, including the private sector and community groups
- Incorporation of information received from the engagement and collaboration into the plan
- Coordination that included inter-and intra-governmental cooperation and collaboration, as appropriate

EQUITY CONSIDERATION

- Considerations of equity using inclusive and representative processes
- The identification of underserved communities through data
- Equity analysis developed in collaboration with appropriate partners, including population characteristics and initial equity impact assessments of proposed projects and strategies

POLICY AND PROCESS CHANGES

- The plan development included an assessment of current policies, plans, guidelines, and/or standards to identify opportunities to improve how processes prioritize safety
- The plan discusses implementation through the adoption of revised or new policies, guidelines, and/or standards

STRATEGY AND PROJECT SELECTIONS

- Does the plan identify a comprehensive set of projects and strategies to address the safety problems in the Action Plan, with information about time ranges when projects and strategies will be deployed, and an explanation of project prioritization criteria?

PROGRESS AND TRANSPARENCY

- A description of how progress will be measured over time that includes, at a minimum, outcome data
- The plan is posted publicly online

ACTION PLAN DATE

- Was at least one of your plans finalized and/or last updated between 2019 and April 30, 2024?

Implementation Grant Checklist (Other Considerations)

OTHER IMPLEMENTATION GRANT CONSIDERATIONS*

**As identified in Amendment 1 to the USDOT FY24 Safe Streets and Roads for All Funding Opportunity document*

- Have ownership and/or maintainance responsibilities over a roadway network
- Have safety responsibilities that affect roadways
- Have agreement from the agency that has ownership and/or maintainance responsibilities within the applicant's jurisdiction
- Must include Eligible Activity C "Carrying out projects and strategies identified in an Action Plan"
- Ability to Meet Implementation Grant Selection Criteria:
 - Selection Criterion #1: Safety Impact
 - Selection Criterion #2: Equity, Engagement and Collaboration
 - Selection Criterion #3: Effective Practices and Strategies
 - Selection Criterion #4: Other DOT Strategic Goals (Climate and Sustainability, Economic Competitiveness, Workforce)
 - Selection Criterion #5: Supplemental Planning and Demonstration Activities
- Demonstration of Project Readiness (e.g., consideration of environmental, permitting, and review processes; design; and construction)
- Implementation Grant Supplement Estimated Budget (including Implementation Cost information)
- Federal funding requested per person(s) killed or seriously injured from 2017-2021
- Lead Applicant Unique Entity Identifier (UEI) and System for Award Management Registration
- Letters of Support (optional)



TOWN OF KNIGHTDALE

950 Steeple Square Court
Knightdale, NC 27545
KnightdaleNC.gov

RESOLUTION #24-12-18-003

RESOLUTION ADOPTING THE SAFETY ACTION PLAN AS PART OF THE COMPREHENSIVE TRANSPORTATION PLAN & REAFFIRMING VISION ZERO COMMITMENT

WHEREAS, the ShiftKnightdale Comprehensive Transportation Plan, adopted in November 2022, included a commitment to safety and a resolution committing the Town to Vision Zero; and

WHEREAS, the Town was awarded a United States Department of Transportation Safe Streets for All grant to develop a transportation Safety Action Plan; and

WHEREAS, in December 2023, the Town launched a year-long planning process to develop a Safety Action Plan; and

WHEREAS, the Safety Action Plan was developed through collaboration with the Town, the North Carolina Department of Transportation, community members, local municipal partners, transit operators, and other stakeholders; and

WHEREAS, the Safety Action Plan's purpose is to create a High Injury Network Map for the purposes of identifying crash concentrations and prioritizing projects, as well as developing recommendations for speed limit reductions and other implementation actions; and

WHEREAS, the Safety Action Plan analyzes roundabout feasibility, and will add new Standard Specifications, *Roundabout Design Guidance (Standard 3.34 1-8)* and *Other Traffic Calming Measures (Standard 3.34)*, to the Town's *Standard Specifications and Details Manual*, adopted November 2024 by Resolution #24-11-20-003);

WHEREAS, the Town Council will work together with staff, the North Carolina Department of Transportation and the community in implementing the Safety Action Plan; and

WHEREAS, the Town adopted Resolution #22-11-16-007 in support of Vision Zero as part of the Comprehensive Transportation Plan adoption on November 16, 2022; and

WHEREAS, the Town continues a commitment to Vision Zero and aims to achieve zero roadway fatalities and serious injuries by 2050; and

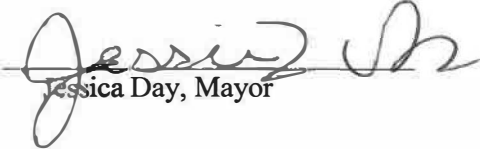
WHEREAS, pursuant to public notice requirements, a public hearing was held on November 21, 2024, to consider the proposed Safety Action Plan; and

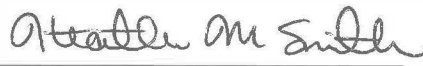
WHEREAS, on December 9, 2024, the Land Use Review Board recommended adoption of the Safety Action Plan; and

NOW, THEREFORE, BE IT RESOLVED that the Town Council of the Town of Knightdale approves and adopts the Safety Action Plan and amends the Standard Specifications to add *Standard 3.33 (1-8) Roundabouts Design Guidance* and *Standard 3.34 Other Traffic Calming Measures*; and

NOW, THEREFORE, BE IT FURTHER RESOLVED that the Safety Action Plan is incorporated into the Comprehensive Transportation Plan.

This the 18th day of December, 2024.

BY: 
Jessica Day, Mayor

ATTEST: 
Heather M. Smith, Town Clerk



KNIGHTDALE
Safety Action Plan