

TRANSPORTATION

I. INTRODUCTION

The Knightdale Transportation Master Plan addresses mobility needs throughout the Town of Knightdale's planning jurisdiction and urban service area. The Plan seeks to encourage the development of a network of interconnected streets that works to disperse traffic and reduce congestion on arterials while connecting and integrating neighborhoods within the Town. Equally as important, the Plan encourages the development of a network of sidewalks, bicycle lanes and mass transit options to provide an attractive and safe mode of travel for cyclists and pedestrians.

In addition to dispersing traffic, interconnected street networks encourage alternate modes of transportation to the automobile, enhance transit service opportunities, and potentially reduce vehicle miles traveled within the street network. The overall network function, and the comfort and safety of multi-modal or shared streets to disperse traffic are primary to the system's efficiency.

One of the biggest challenges facing Knightdale during the next twenty years is planning for a safe and efficient transportation system. As the population of Knightdale and the region continues to increase so will traffic demand. The result without proper planning is congestion and unsafe conditions.

The goal of the Plan is to address regional as well as local issues. While the plan focuses on mobility, it is also designed to preserve the local character and heighten community design. In achieving this goal, the plan recommends street design guidelines that serve the traffic needs, while encouraging type and density of development suitable to the area.

Finally, the plan is intended to function cooperatively with the long-range plans of agencies such as the Triangle Transit Authority (TTA), Capital Area Metropolitan Planning Organization (CAMPO), the North Carolina Department of Transportation (NCDOT), other neighboring municipalities (Raleigh, Wendell and Zebulon) and Wake County government.

The intent of the Transportation Master Plan is to plan a transportation network that enhances quality community design. The purpose of evaluating the transportation system is the understanding of which improvements are needed now and which improvements are needed in the future.

THE SIX MAJOR PARTS OF THE TRANSPORTATION PLAN:

1. BACKGROUND AND DATA

The entire transportation plan serves as a basis for the coordinated implementation of roadway improvements to protect the integrity and safety of the street network and provide an acceptable level of mobility to the citizens of Knightdale. This introductory part includes:

- History of Transportation Planning in Knightdale
- Existing Conditions

2. STREET CLASSIFICATION SYSTEM

This system provides the development community with a certain level of expectation regarding required transportation improvements. However, the administrator of the Unified Development Ordinance may always reserve the right to adjust the individual classification based on more detailed traffic studies and local conditions at the time of consideration.

3. TRANSPORTATION MAPS

These maps include the general recommendations and classifications for arterials, collectors, bicycle facilities and pedestrian facilities.

4. MASS TRANSIT

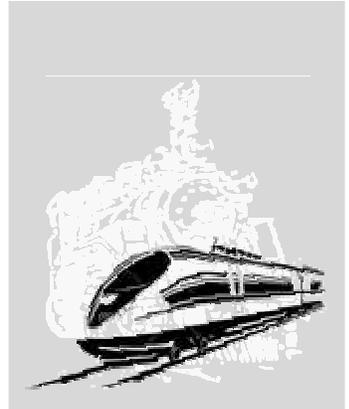
This part includes a discussion of recent transit developments and current initiatives as well as laying out short and long-term plans for the Town.

5. STREET DESIGN GUIDELINES

Part 5 lists guidelines regarding the design of Town rights-of-way (1) to promote a safe and pedestrian friendly street system and (2) to promote an interconnected pattern of multi-user streets throughout Town.

6. TRANSPORTATION OBJECTIVES AND ACTION ITEMS

As with other chapters of this Plan, the last part outlines the Town's main transportation objectives and their associated action items or "tasks".



II. BACKGROUND AND DATA

The Knightdale Transportation Plan contains recommendations for maintaining and improving the Town's street network. Road design details are only generalized in this plan; specific cross-section construction details and dimensions can be found in the Town of Knightdale Standard Specifications and Construction Details and the Unified Development Ordinance.

A. HISTORY OF TRANSPORTATION PLANNING IN KNIGHTDALE

1. CREATION OF THE 1993 KNIGHTDALE THOROUGHFARE PLAN

On May 19, 1993, the Town of Knightdale adopted its first Thoroughfare Plan. The original Plan was a cooperative effort between the Town of Knightdale and the NCDOT. The Thoroughfare Plan was created to meet the following objectives:

- Guide the development of the urban street system to meet changing traffic demands;
- Develop an adequate major street system as land development occurs;
- Reduce travel and transportation costs;
- Reduce the cost of major street improvements to the public by coordinating the street system with community development;
- Enable citizens to make plans and improvements with full knowledge of public intent;
- Minimize disruption and displacement of people and businesses through long-range planning for major street improvements;
- Reduce air and noise pollution that may be created by traffic;
- Increase travel safety;
- Mitigate urban sprawl on U.S. 64 Business (a.k.a. Knightdale Boulevard); and
- Reduce Knightdale's dependency on Knightdale Boulevard for vehicular trips internal to Knightdale.

2. COMPREHENSIVE TRANSPORTATION PLAN

Although the basic Thoroughfare Plan objectives are still in place, the NCDOT initiated a new program for comprehensive transportation planning in 2002 as required by the North Carolina General Assembly. The Thoroughfare Plan, as approved in 1993, has been replaced by a new NCDOT Comprehensive Transportation Plan (CTP). The 1993 Thoroughfare Plan was replaced by the CTP to:

- Provide opportunities for multi-modal transportation options, which are not addressed on the current (1993) plan;
- Provide a series of maps outlining multi-modal options rather than the provision of one thoroughfare plan map;
- Provide a larger hierarchy of streets rather than limiting the map to thoroughfares only; and
- Break down each category of street type into three levels: “existing, proposed and needs improvement”.

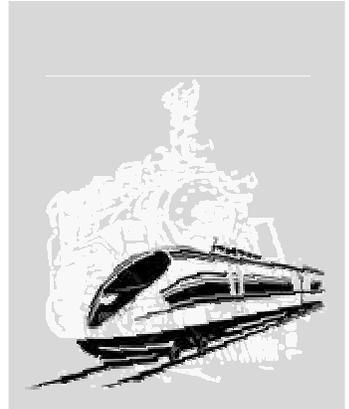
Presently, the CTP plans for road infrastructure improvements through the year 2040. In conjunction with the CTP, the Capital Area Metropolitan Planning Organization and Federal Highway Administration (FHWA) also approved a 2035 Long Range Transportation Plan in 2009 that focuses on implementation and meeting the air quality mandates from the federal government.

3. KNIGHTDALE TRANSPORTATION PLAN (2002-2010)

Consequently, in 2002, the Knightdale Transportation Plan was reorganized to align with the basic guidelines of NCDOT’s new Transportation Plan by:

- a. Encouraging similar street terminology;
- b. Providing multi-modal transportation options; and
- c. Providing a series of maps and guidelines to show the various options of the transportation system.

During the drafting of the UDO, this most recent version of the local transportation plan was fine tuned and adopted into the UDO as three (3)



separate appendices: the Arterial Plan, the Collector Plan and the Greenway and Bike Route Plan. These three (3) plans have again been reviewed by CPUC2, and the adopted recommendations are included in Section IV as the 2010 Knightdale Transportation Master Plan (Figure 7.4).

4. CREATION OF THE FUNCTIONAL CLASSIFICATION MAP

On August 7, 1995, the Town of Knightdale adopted its first UDO. The UDO merged the zoning and subdivision regulations into one comprehensive document. A Functional Classification Map was adopted as part of the 1995 UDO, indicating the expected street cross-section of each road throughout Knightdale’s planning jurisdiction and urban service area. This Functional Classification Map was not updated during the UDO revision process in 2005; however, it has been updated here and is included as Figure 7.5 along with a corresponding Functional Classification Table (Figure 7.7). Chapter 17 of the current UDO, *Infrastructure Improvement Requirements*, outlines standards for the street hierarchy system and provides street cross-section requirements. More detailed information regarding the classification system can be found in Section III of this chapter.

B. EXISTING CONDITIONS

1. U.S. HIGHWAY 64 BUSINESS / KNIGHTDALE BOULEVARD

U.S. Highway 64 Business (aka Knightdale Boulevard) is not only the primary gateway into Knightdale, but also one of the Town’s most important transportation and economic corridors. Because of the importance of Knightdale Boulevard, the Town has dedicated much attention to its appearance and function over the years-, having at one time or another adopted a Special Thoroughfare Overlay District, endorsed a U.S. 64 Corridor Plan and established a Planning and Appearance Board. Knightdale continues to request and receive enhancement funding for median landscaping on Knightdale Boulevard at several locations. Most recently, the Town worked with NCDOT to enhance the landscaping and appearance of the newly opened Interstate 540/Knightdale Boulevard interchange.

Due to the boulevard’s importance, the Town should continue to plan for traffic improvements that address efficiency and safety and aesthetic enhancements that boost the overall appearance of the corridor. Planning includes the construction of Village Park Drive as a parallel collector street. The parallel collector street allows traffic to access the commercial property adjacent to

**Traffic Count Data:
Along Knightdale Blvd.
Between Smithfield and
Old Knight roads.**

Year	Count
1998	48,000
2001	45,000
2003	49,000
2005*	18,000
2007**	21,000
2009	21,000

*US 64/264 Bypass First Open
**I-540 First Open

Knightdale Boulevard without having to travel on the arterial. The commercial areas created by Village Park Drive are, and should continue to be, pedestrian friendly. As a collector, the drive is designed to promote slower travel speeds and accommodate pedestrians on both sides of the street.

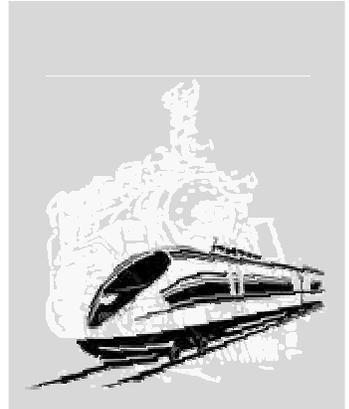
The Town has programs and projects in place to improve the appearance of Knightdale Boulevard and to help ensure quality development. The corridor width and high volume of traffic presents a barrier to cyclists and pedestrians. The Town should continue to coordinate efforts with NCDOT to explore techniques that allow for the safe crossing of Knightdale Boulevard for non-motorized transportation. Now that the US 64/264 Bypass has removed a large volume of traffic from Knightdale Boulevard, a greater emphasis should be placed on designing the Boulevard as one of Knightdale's main arterials rather than as a regional highway.

2. US HIGHWAY 64/264 AND INTERSTATE-540

As part of the NCDOT highway system, two major limited access freeways have been constructed through the Town of Knightdale's urban service area: The US 64/264 Bypass (now US Highway 64/264) and the Eastern Wake Expressway (now Interstate 540). These two freeways prompted a tremendous amount of inquiries from citizens and the development community and have directly influenced the construction of a significant number of both residential and commercial projects. Such projects include The Shoppes at Midway Plantation, Midtown Commons, Legacy Oaks, Riverview Commons, Langston Ridge Subdivision, Princeton Manor Subdivision, Churchill Subdivision, Cheswick Subdivision and Poplar Creek Village Subdivision. Additional land continues to be speculated on, but has been somewhat more dependent on the public provision of utility trunk lines. Consequently, the influence of these freeways is likely to continue for years, if not decades.

a. US HIGHWAY 64/264

The US 64 Bypass project consisted of a 10.2-mile, 6-lane freeway with seven (7) interchanges serving Raleigh, Knightdale and Wendell. It connected the terminus of the existing US 64 freeway in the vicinity of Rolesville Road with the Interstate 440 Raleigh Beltline. With this section now complete, there are 125 miles of limited access freeway along US 64 from the Town of Williamston in eastern North Carolina to the Town of Cary.



Prior to construction, the US 64 Bypass was the number one priority on the CAMPO Transportation Improvement Program (TIP) priority list. Due to incredible traffic volumes at peak hours along what is now Knightdale Boulevard, the Bypass was determined to be the best solution to ease congestion.

The US 64 Knightdale Bypass Interchange Study (*Appendix A*), a small area plan produced by the Town with the assistance of the consulting firm Stantec, sought to ensure that local municipalities and future highway users would get the maximum benefit from the Bypass project by preserving mobility, addressing citizen concerns, increasing public safety, ensuring economic viability, and facilitating regional cooperation in planning efforts. To fulfill these goals, the study provides land use and transportation recommendations in the areas along the Bypass corridor and near the proposed interchanges. To a degree, the initial recommendations of this study have been superseded by the proactive re-zoning of these areas during the process of adopting the revised 2005 UDO; however, the plan still provides important background information and insight into the thoughts at the time the bypass was in its initial planning stages.

b. INTERSTATE 540

Interstate 540 runs perpendicular to the Bypass with two (2) existing interchanges in Knightdale's urban service area. A future interchange is planned at Poole Road as part of the future extension southwest towards Garner. The interstate highway provides access to areas west of Knightdale, including the City of Durham, Raleigh-Durham International Airport (RDU) Research Triangle Park (RTP). This direct regional access has made Knightdale even more attractive to developers and has resulted in making the Knightdale Boulevard interchange area both a local and a regional shopping destination.

3. LOCAL ROADS

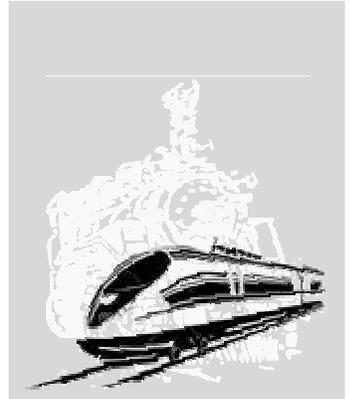
In Knightdale, Smithfield Road, Bethlehem Road, Robertson Street and First Avenue/Old Knight Road function as streets that radiate from Old Town Knightdale. When all radial streets meet in a central area, congestion problems result. To avoid this problem, it is important to have a system of cross-town streets that create alternative connections around the central area. This cross-town street system allows traffic moving from one side of Old Town to the other by skirting Old Town's perimeter and then entering the core near a given

destination. A good cross-town system frees the central area of cross-town traffic, thereby permitting Old Town to function as a mixed-use or mix of use area with pockets of higher density destination points. Examples of cross-town streets include Forestville Road and its associated extension and Old Faison Road and its associated extension.

The function of the local street system is to provide direct access to property. To provide for a safe local street system, facilities should be designed in such a way as to reduce travel speeds. Traffic calming techniques such as entryway landscaping, traffic throttles, speed humps, bulb outs, textured treatments, and pavement markings should be utilized. Careful selection of traffic calming techniques is recommended so as not to interfere with emergency services. Furthermore, local street planning should favor a modified grid system, rather than long dead-end or long cul-de-sac streets. The use of the grid allows traffic to disperse over several routes, rather than relying on a single street. It also allows for better access by emergency vehicles.

4. TOWN CENTER STREET PLAN

As development and/or redevelopment of the downtown area continues, a modified version of the current grid system of streets should be maintained. New streets connecting Old Town to new developments should be designed to protect community character, walkability and safety. While preserving this historic street grid, new vehicular connections may be extended into greenfield development areas through the use of indirect routing, "T"-intersections, roundabouts and narrowed pavement in an effort to prevent excessive cut-through traffic. Information and guidelines for specific streets within Old Town can be found in Appendix B – "Old Town Knightdale Plan".



III. STREET CLASSIFICATION SYSTEM

An adequate road system must be maintained to allow motorists to travel in an efficient and safe manner. In planning a road network, it is important to have an understanding of the different classifications of roads that are proposed by the Transportation Master Plan. The goal of this classification system are to:

1. Update terminology and cross-section details to meet new demands for increased multi-modal planning in the region; and
2. Follow similar transportation planning objectives of the NCDOT Comprehensive Transportation Plan.

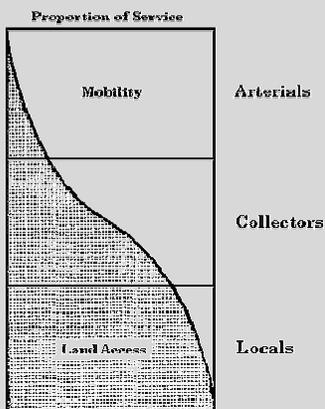
A. THE STREET CLASSIFICATIONS

Streets are classified according to their function. Higher order classifications focus on mobility, while lower order classifications accommodate access. As a result, separate design standards are applicable to each class. The intent of the 2027 Comprehensive Plan is to assure the classification in each system is compatible, and the cross-section and right-of-way recommended agrees with adopted plans from adjacent towns and Wake County.

Historically, transportation plans throughout the state included two types of maps: a thoroughfare map and a collector street map. Under current NCDOT terminology, one comprehensive map is proposed which shows both. The purpose of the collector street plan was to facilitate connections between residential and commercial properties and the minor thoroughfares. These connections help reduce traffic on major facilities by providing a means for inter-neighborhood travel without the need to access higher class streets.

In the Knightdale Transportation Plan, the collector street component was developed based on the design district types and expected densities associated with each design district as presented in Chapter 5. In turn, the corresponding cross-sections are planned in such a way as to accommodate neighboring density. For example, roads in the less dense rural areas are predominantly two lanes, while roads through higher density development zones are proposed as three to five lanes since traffic is expected to surpass the capacity of a two-lane roadway. Figures 7.1 through 7.3 show general cross-sections that may be used as guides for the various street classifications. The street classifications are:

Relationship of functionally Classified Systems in Serving Traffic Mobility and Land Access



“Freeway” (old terminology – Freeway) A multi-lane median divided facility with full control of access. US 64 Bypass and the Eastern Wake Expressway are identified as *Freeways*.

“Arterial” (old terminology – Boulevard; Principal Arterial; Major and Minor Thoroughfare) An arterial is a street used to promote moderate mobility with limited access, moderate volume and moderate speed. Travel speeds are projected at 30 to 45 miles per hour with a cross-section of four (4) lanes plus medians with turning pockets or turning lanes. Driveways are encouraged to be primarily right-in/right-out with occasional median crossovers permitted. The street should also focus on pedestrian safety, and design standards should be used that enhance pedestrian safety and aesthetics.

“Collector” (old terminology – Avenue; Major and Minor Collector) Collectors focus on access, typically at the expense of speed and mobility. Their intended purpose is to distribute traffic from the boulevards and parkways to the local system and vice versa. Traffic calming measures, pedestrian and bicycle accommodations, reduced turning radii and landscaping highlight this type of facility.

“Local” (old terminology – Local) A minor street which is intended to carry local traffic from collectors to individual lots within residential neighborhoods. Local streets include cul-de-sacs and feature design standards that enhance aesthetics, safety and mobility for pedestrians.

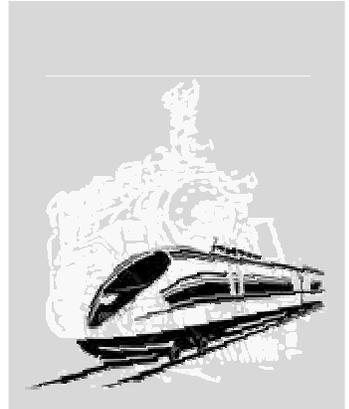


FIGURE 7.1 - EXAMPLE OF URBAN VILLAGE STREET DESIGN

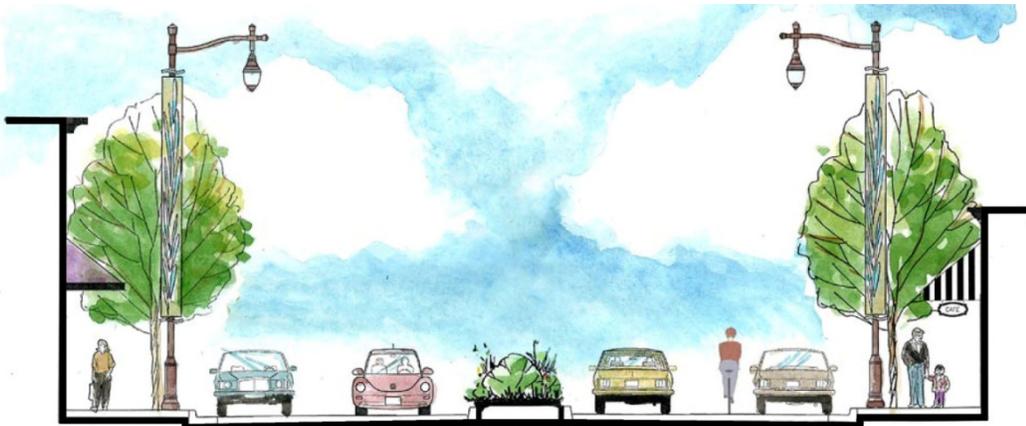


FIGURE 7.2 - EXAMPLE OF NEIGHBORHOOD STREET DESIGN



FIGURE 7.3 - EXAMPLE OF COUNTRYSIDE STREET DESIGN



B. LEVEL OF SERVICE

In addition to an understanding of street classifications, it is important to have an understanding of how a road is evaluated before planning a road network.

The level of service (LOS) is one criteria used to evaluate streets. Traffic volumes and roadway capacity are the primary factors in determining the level of service. Levels of service help identify areas of needed roadway improvements and represent a range of conditions as opposed to a precise volume or condition. Standardized descriptions of road segment LOS are:

LOS A – “Free Flow”: Highest level of service, described primarily free flowing traffic at average travel speeds. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream.

LOS B – “Reasonably Free Flow”: Represents reasonably unimpeded traffic flow operations at near free flow speeds. The ability to maneuver within the traffic stream is only slightly restricted.

LOS C – “Stable Flow”: Represents stable traffic flow operations. Ability to maneuver and change lanes is more restricted than in LOS B, although traffic continues to move.

LOS D – “Approaching Unstable Flow”: Ability to maneuver in traffic is restricted. Small increases in traffic flow may cause substantial increases in queues. Events in the traffic stream can take longer to dissipate.

LOS E – “Unstable Flow”: Traffic flow is characterized by significant delays and lower operating speeds. Small disruptions in the traffic stream can lead to long queues. Queues are not easily dissipated, and can often cause stop and go conditions on roadways.

LOS F – “Forced or Breakdown of Flow”: Traffic flow is characterized by very low speeds. Traffic operations become stop-and-go. Comfort and convenience are extremely low and frustration is high.

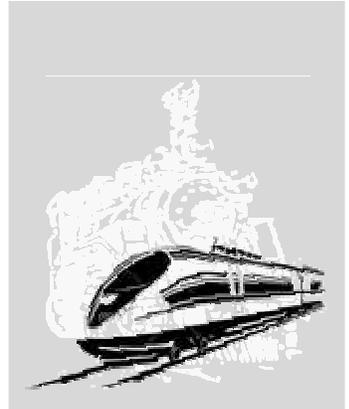
In addition to segmental LOS, there is also an intersection LOS. Intersection LOS is based on average delay, and may be seen at left.

Signalized Intersections

LOS	Delay
A	≤ 10 seconds
B	11-20 seconds
C	21-35 seconds
D	36-55 seconds
E	56-80 seconds
F	> 80 seconds

Unsignalized Intersections

LOS	Delay
A	≤ 10 seconds
B	11-15 seconds
C	16-25 seconds
D	26-35 seconds
E	36-50 seconds
F	> 50 seconds

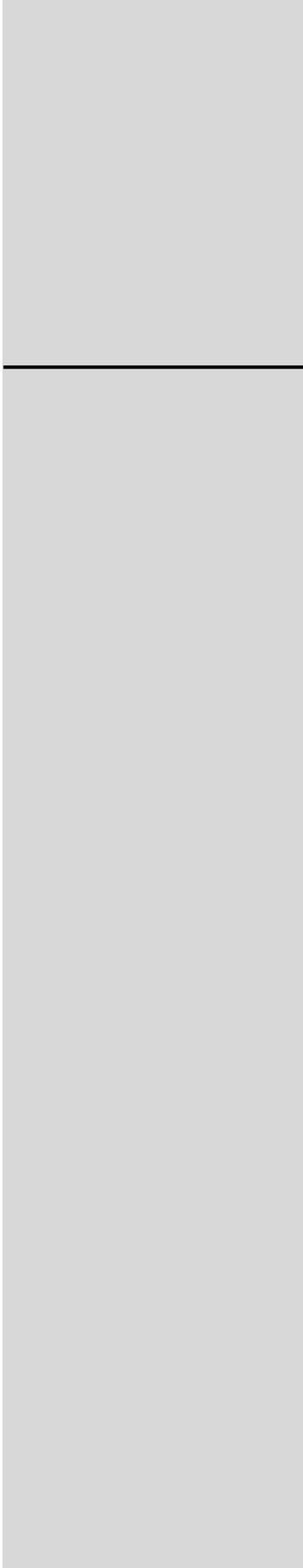


IV. TRANSPORTATION MAPS

The primary transportation planning concept that evolved from the CPUC1's analysis of the planned road network is that one (1) street may not have the same street classification throughout the length of the street. The Knightdale Transportation Plan intends to recognize that street classifications be allowed to change character as they pass from one design district to another. Therefore, one will notice a degree of correlation between these maps and the Design District Master Plan.

Also, the same concept might be said of bicycle and pedestrian travel that also occurs within these rights-of-way. As the traveler passes from one design district to another, the type of bicycle and pedestrian accommodation may change depending upon the degree of safety and mobility required. Therefore, bicycle routes may vary between wide shoulders and striped lanes while pedestrian facilities may vary between standard sidewalks and wider asphalt paths.

The purpose of Figures 7.4 through 7.7 is to provide guidance to Town staff when engaging discussions with developers and the NCDOT regarding required road improvements. The recommendations contained within these figures are not meant to be the exact or final determination, but serve as a starting point that may be modified depending on the exact conditions encountered at the time. CPUC2 took time to consider the plans of neighboring jurisdictions, including Wendell, Raleigh, Wake County and CAMPO; so care should be taken when modifying the recommendations for facilities that cross jurisdictional boundaries.



ARTERIAL & COLLECTOR STREET PLAN



Town of Knightdale
Planning Department
2010

Legend

- Urban Service Area Boundary
- - - Proposed Arterial Connections
- - - Proposed Collector Connections
- Existing Arterial Streets (Needs Improvements)
- Existing Collector Streets (Needs Improvements)
- Streets
- Knightdale Corporate Limits (2009)
- Surface Waters
- Surface Streams



1 inch = 3,400 feet

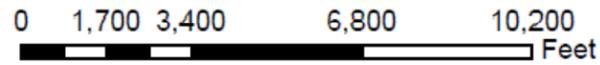
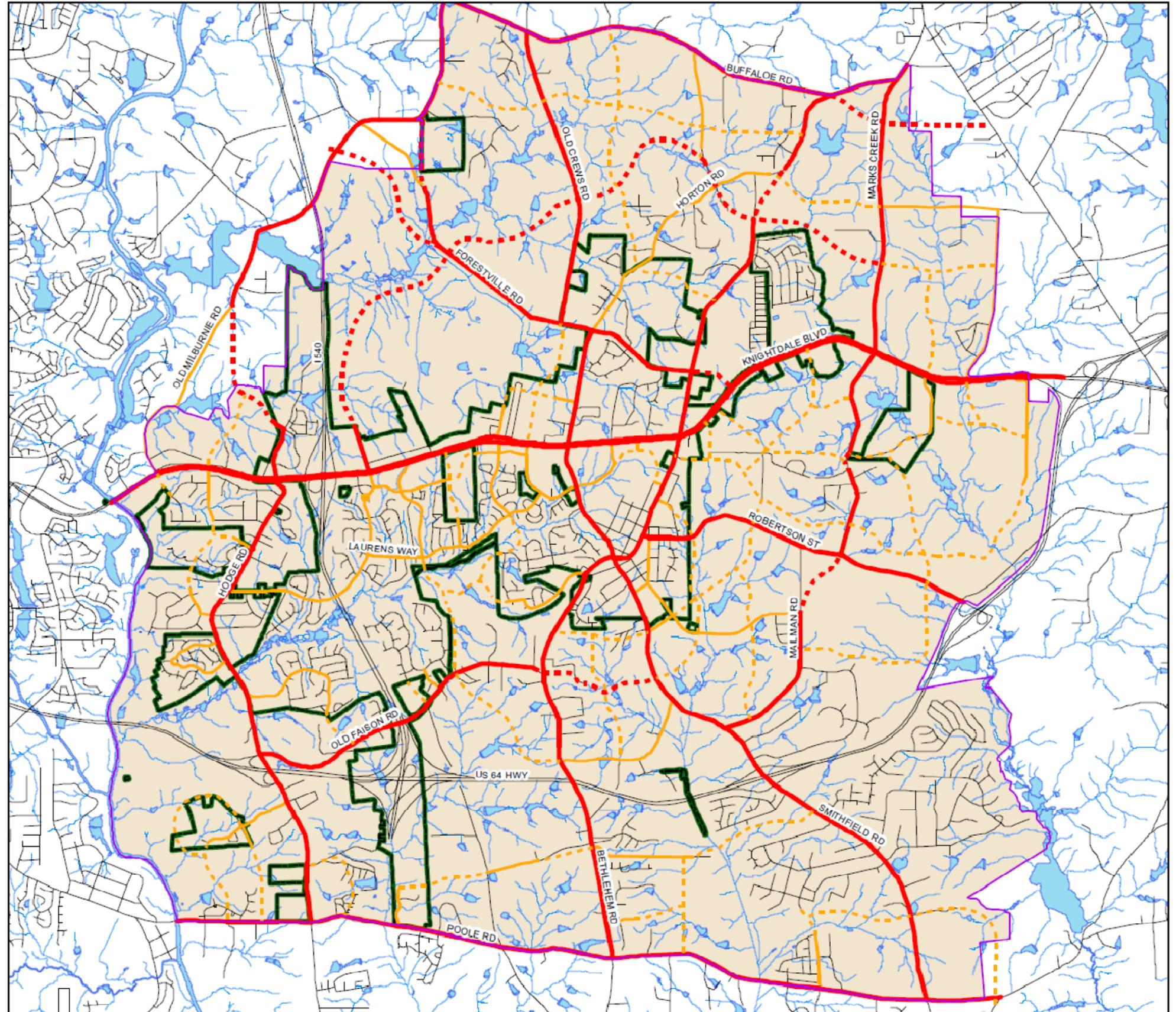


FIGURE 7.4



FUNCTIONAL CLASS PLAN



Town of Knightdale
Planning Department
2010

Legend

- Six Lane Boulevard - Variable Width
- Boulevard - 100 Foot ROW
- Urban Avenue - 90 Foot ROW
- Avenue - 74 Foot ROW
- Main Street - 64 Foot ROW
- Local Street - 54 Foot ROW
- Knightdale Corporate Limits (2009)
- Urban Service Area Boundary
- Streets
- Surface Waters
- Surface Streams



1 inch = 3,400 feet

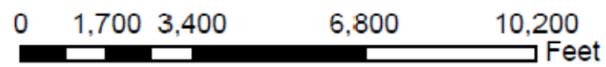
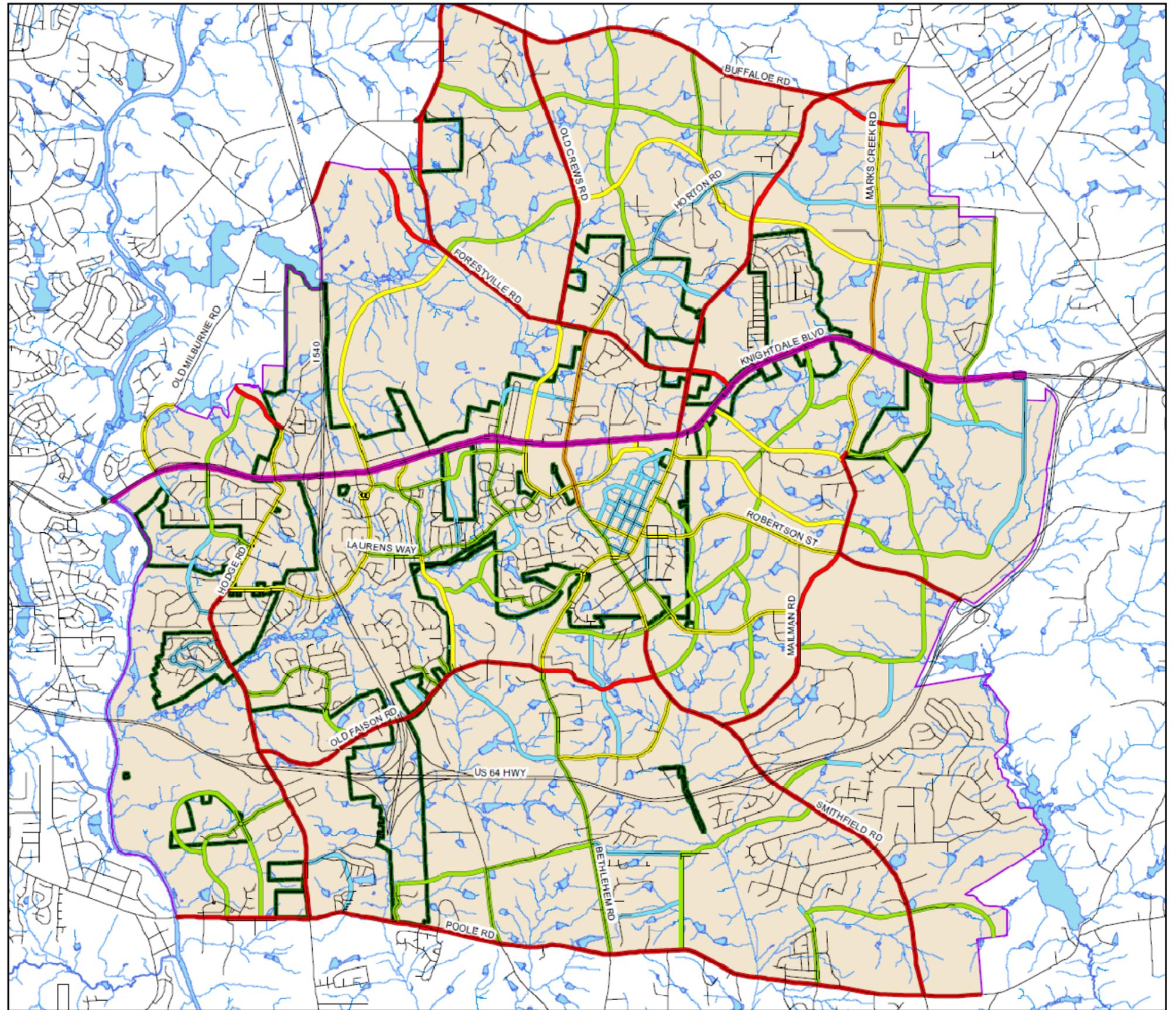


FIGURE 7.5



BICYCLE & PEDESTRIAN PLAN



Town of Knightdale
Planning Department
2010

Legend

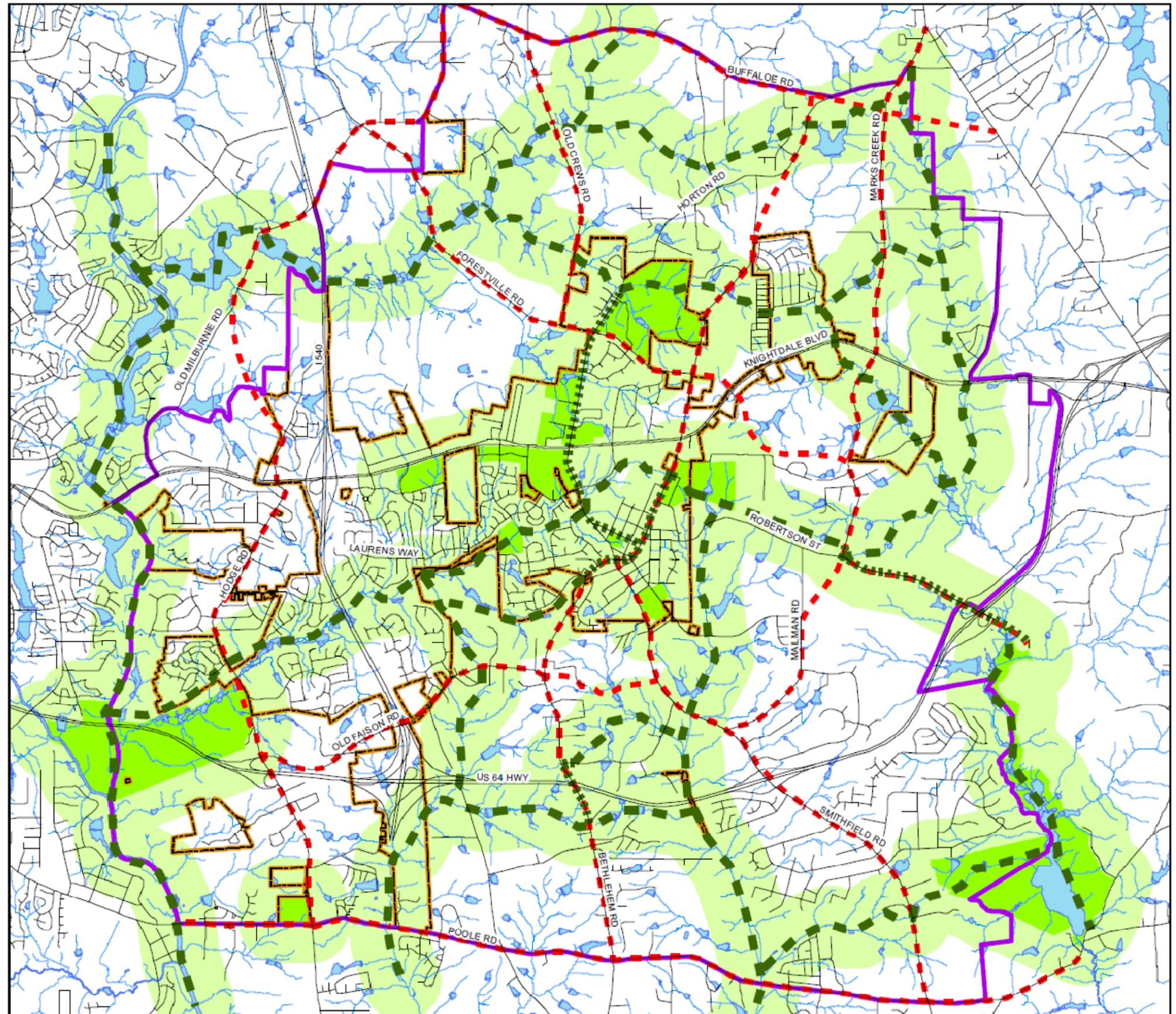
- Streets
- 10' Multi-Use Paths
- ▤ Wide Sidewalks
- Cross-Town Bicycle Routes
- Urban Service Area Boundary
- ▭ Knightdale Corporate Limits (2009)
- Surface Waters
- Surface Streams
- Pedestrian Destination Areas
- High Pedestrian Connectivity Area



1 inch = 3,400 feet



FIGURE 7.6



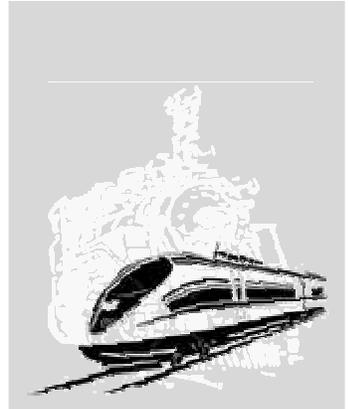


FIGURE 7.7: FUNCTIONAL CLASS TABLE

Route	Classification	Sidewalk	Curb/Gutter	On-Street	Bike Markings
Ballast Drive Extension	Main	2S	S	N	N
Bethlehem Road					
<i>Poole Rd to Old Faison Rd</i>	Main	1M	N	N	Y
<i>Old Faison Rd to Railroad St</i>	Avenue	2S	S	N	Y
Broadway Street & Extensions	Main	2S	S	N	N
Broadway Ext to Mailman Collector	Main	2S	S	N	N
Broadway Ext to Old Ferrell Collector	Local	2S	S	N	N
Buffaloe Road & Extension	Boulevard	2S	S	N	Y
Buffaloe to Old Knight Collector					
<i>Buffaloe Rd to Horton Rd</i>	Main	2S	S	N	N
<i>Horton Rd to Old Knight Rd</i>	Local	1M	N	N	N
Caspian Drive	Main	2S	S	N	N
Codi Lane	Main	2S	S	N	N
Colchester Drive & Extension	Local	2S	S	N	N
Crosscut Place Extension	Local	1M	N	N	N
Crosstie Street	Main	2S	S	N	N
EBC Village Way & Extension	Main	2S	S	Y	N
EBC Village to Mailman Collector					
<i>EBC Village Way to Kdale-Eagle Rock</i>	Main	2S	S	Y	N
<i>Kdale-Eagle Rock Rd to Mailman Rd</i>	Main	2S	S	N	N
EBC Village Way/Three Sisters Rd Coll.	Local	1M	N	N	N
Fayetteville Street					
<i>Railroad St to Broadway St</i>	Main	1S	S	N	N
<i>Broadway St to Mailman Rd</i>	Avenue	2S	S	N	N
First Avenue					
<i>Railroad St to Smithfield Rd</i>	Avenue	2W	S	Y	Y
<i>Smithfield Rd to Sixth St</i>	Avenue	1W	S	Y	Y
<i>Sixth St to Knightdale Blvd</i>	Avenue	1S	S	N	Y
Forestville Road	Boulevard	2S	S	N	Y

SIDEWALKS

2S = Two sidewalks
 1S = One sidewalk
 1M = One mutli-use path
 2W = Two wide sidewalks
 1W = One wide sidewalk

CURB/GUTTER

S = Standard Curb/Gutter
 N = None

ON-STREET

Y = Marked On-Street
 Parking
 N = No marking

BIKE MARKINGS

Y = Appropriate markings
 and signage required
 N = No marking or signage
 required

SIDEWALKS

2S = Two sidewalks

1S = One sidewalk

1M = One multi-use path

2W = Two wide sidewalks

1W = One wide sidewalk

CURB/GUTTER

S = Standard Curb/Gutter

N = None

ON-STREET

Y = Marked On-Street

Parking

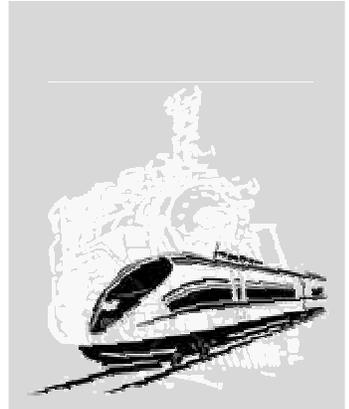
N = No marking

BIKE MARKINGS

Y = Appropriate markings and signage required

N = No marking or signage required

Route	Classification	Sidewalk	Curb/Gutter	On-Street	Bike Markings
Forestville Road Extension					
<i>Old Knight Rd to Knightdale Blvd</i>	Boulevard	2S	S	N	Y
<i>Knightdale Blvd to Mark's Creek Rd</i>	Avenue	2S	S	N	Y
Greythorne Place	Local	1M	N	N	N
Hardin Hill Lane	Main	2S	S	N	N
Hidden Hollow Lane	Local	1M	N	N	N
Hinton Oaks Boulevard					
<i>Lynnwood Rd to Forestville Rd</i>	Avenue	2S	S	N	N
<i>Forestville Rd to Old Crews Rd</i>	Main	1M	N	N	N
<i>Old Crews Rd to Marks Creek Rd</i>	Avenue	2S	S	N	N
<i>Marks Creek Rd to Keiths Rd</i>	Main	2S	S	N	N
Hodge Road					
<i>Poole Rd to Lynnwood Rd</i>	Boulevard	2S	S	N	Y
<i>Lynnwood Rd to Legacy Oaks Dr</i>	Avenue	2S	S	N	Y
<i>Legacy Oaks Dr to ETJ Line</i>	Boulevard	2S	S	N	Y
Horton Road					
<i>Forestville Rd to Hinton View Dr</i>	Avenue	1W	S	N	N
<i>Hinton View Dr to Old Knight Rd</i>	Local	1M	N	N	N
K-Held Road & Extension	Main	1M	N	N	N
Keith Rd & Extension	Main	2S	S	N	N
Kemp Drive	Local	2S	S	N	N
King Farm Lane & Extension	Main	2S	S	N	N
Kingman Drive	Local	2S	S	N	N
Knightdale Boulevard	6-Lane Divided (NCDOT)	2S	S	N	N
Laurens Way	Main	2S	Y	Y	N
Lucas Road	Main	2S	S	N	N
Lynnwood Road	Avenue	2S	S	N	N
Mailman Road	Boulevard	2S	S	N	Y



Route	Classification	Sidewalk	Curb/Gutter	On-Street	Bike Markings
Mark's Creek Road					
<i>Robertson St to Knightdale Blvd</i>	Avenue	2S	S	N	Y
<i>Knightdale Blvd to Hinton Oaks Blvd</i>	Urban Avenue	2S	S	N	Y
<i>Hinton Oaks Blvd to Todd Rd</i>	Avenue	2S	S	N	Y
McKnight Drive	Avenue	2S	Y	N	N
Mingo Creek Boulevard & Extension	Main	2S	S	N	N
New Massey Farm Road					
<i>First Ave to Mark's Creek Rd</i>	Avenue	2S	S	Y	N
<i>Mark's Creek Rd to Mark's Creek</i>	Main	2S	S	N	N
Northern East-West Collector					
<i>Old Milburnie Rd to Lucas Rd</i>	Main	2S	S	N	N
<i>Lucas Rd to Horton Rd</i>	Main	1M	N	N	N
Old Crews Road & Extension					
<i>Knightdale Blvd to Forestville Rd</i>	Avenue	2S	S	N	N
<i>Forestville Rd to Buffaloe Rd</i>	Boulevard	2S	S	N	N
Old Faison Road	Boulevard	2S	S	N	Y
Old Faison Road Extension	Boulevard	2S	S	N	Y
Old Ferrell Road / Crosscut Place	Main	2S	S	N	N
Old Knight Road	Boulevard	2S	S	N	Y
Old Milburnie Road					
<i>Alison Dr to Knightdale Blvd</i>	Local	2S	S	N	N
<i>Knightdale Blvd to ETJ Line</i>	Avenue	2S	S	N	N
<i>I-540 to ETJ Line</i>	Boulevard	2S	S	N	Y
<i>East Wake Middle Sch to Buffaloe Rd</i>	Boulevard	2S	S	N	Y
Panther Rock Boulevard	Main	2S	S	N	N
Parkside Commons Drive					
<i>Knightdale Blvd to Laurens Way</i>	Main	2S	S	N	N
<i>Laurens Way to Southampton Dr</i>	Local	1M	N	N	N
Poole Road	Boulevard	2S	S	N	Y
Poplar Street Extension	Main	2S	S	N	N
Princeton Park Avenue	Local	2S	S	N	N

SIDEWALKS

2S = Two sidewalks

1S = One sidewalk

1M = One multi-use path

2W = Two wide sidewalks

1W = One wide sidewalk

CURB/GUTTER

S = Standard Curb/Gutter

N = None

ON-STREET

Y = Marked On-Street

Parking

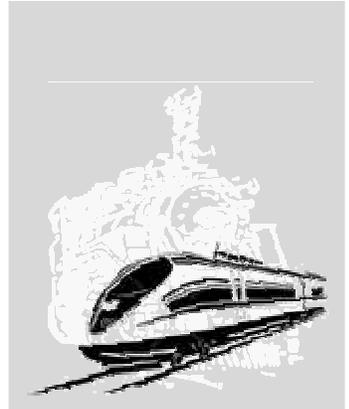
N = No marking

BIKE MARKINGS

Y = Appropriate markings and signage required

N = No marking or signage required

Route	Classification	Sidewalk	Curb/Gutter	On-Street	Bike Markings
Princeton Town Street	Local	2S	S	N	N
Puryear Road					
<i>Horton Road to Mark's Creek Road</i>	Local	1M	N	N	N
<i>Mark's Creek Road to ETJ Line</i>	Main	1M	N	N	N
Ranchester Road	Main	2S	S	N	N
Robertson Street					
<i>First Ave to Mark's Creek Rd</i>	Avenue	2S	S	N	N
<i>Mark's Creek Rd to US 64/264</i>	Boulevard	2S	S	N	Y
Rutledge Landing Drive & Extension	Main	2S	S	N	N
Second Avenue Extension	(See Old Town Plan)				
Smithfield Road					
<i>Poole Rd to Broadway St</i>	Boulevard	2S	S	N	Y
<i>Broadway St to Ridge St</i>	Avenue	1S	S	N	Y
<i>Ridge St to First Ave</i>	Main	1S	S	N	Y
<i>First Ave to Main St</i>	Main	-	S	N	N
<i>Main St to Carrington Dr</i>	Main	1W	S	N	N
<i>Carrington Dr to Forestville Rd</i>	Urban Avenue	1W	S	N	N
Southampton Drive Extension	Main	2S	S	N	N
Steeple Square Court	Local	2S	Y	N	N
Sternwheel Way					
<i>Knightdale Blvd to Village Park Dr</i>	Main	2S	S	N	N
<i>Village Park Dr to Laurens Way</i>	Local	2S	S	N	N
Stony Falls Way	Main	2S	S	N	N
Three Sisters Road & Extension	Local	1M	N	N	N
Village Park Drive	Main	2S	Y	Y	N
Westover Drive & Extension	Main	2S	S	N	N
Widewaters Parkway & Extension					
<i>Knightdale Blvd to Village Park Dr</i>	Avenue	2S	S	N	N
<i>Village Park Dr to Laurens Way</i>	Main	2S	S	N	N
<i>Laurens Way to Old Faison Rd</i>	Avenue	2S	S	N	N
<i>Old Faison Rd to Bethlehem Rd</i>	Local	1M	N	N	N



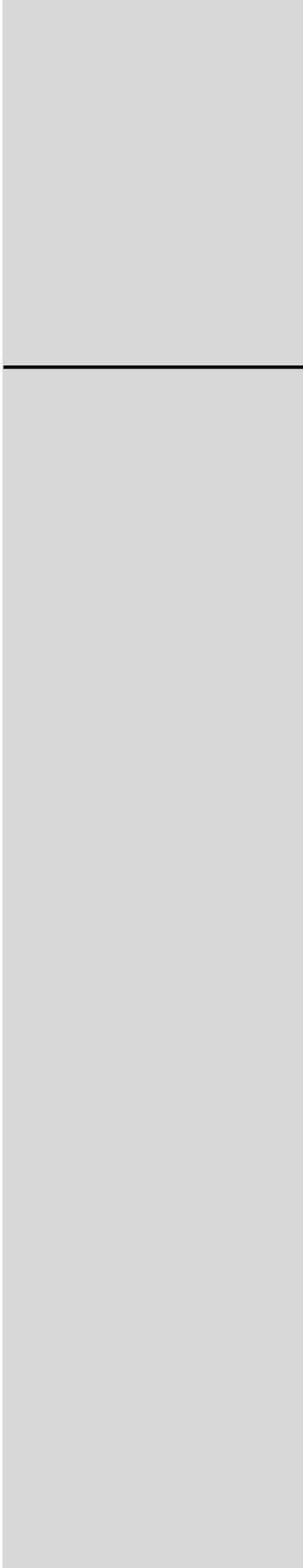
V. MASS TRANSIT

The Mass Transit Plan (Figure 7.8) indicates a corridor to be studied for a future multi-modal transit hub that includes a commuter rail station, along with bus service priorities of both a regional and local scope.

The Town of Knightdale has been exploring commuter rail since 1990 when a study was conducted by Barton-Aschman Associates and Hammer, Siler, George Associates to evaluate the potential for transit in the Triangle Region. The findings of the study indicated a transit system would be viable if land use development patterns changed dramatically over the next 20 years. The long-term possibility of transit in the Knightdale area is good given that there is an adequate supply of undeveloped land along the railroad corridor to support commuter rail and pockets of planned density and transit-worthy destinations to support expanded bus service. According to the most recent plans spearheaded by *Triangle Transit*, the railroad line through Knightdale has been designated as a long-range commuter rail route.

In 1992, the Triangle Region Planning Directors Exchange (PDX) authored a report titled "Land Use and Development Standards to Support Transit in the Research Triangle Region of North Carolina". The PDX was charged by the Greater Raleigh Metropolitan Planning Organization (which is now the Capital Area MPO) and the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization to develop land use and development standards to support transit. Numerous other reports have been prepared on commuter rail potential in the Triangle Region.

Other modes of transportation are also being explored. In early 2010, express bus service began between Knightdale and Raleigh with boarding locations at Widewaters Village, Legacy Oaks, WakeMed and downtown Raleigh. The Town has also been actively pursuing funding opportunities in the hopes of beginning an in-town circulator bus service that would penetrate more neighborhoods and provide connection opportunities to the express bus as well as service to in-town destinations. The Town of Knightdale continues to work with Triangle Transit, CAMPO, Capital Area Transit (CAT) and other organizations to plan for additional mass transit services such as regular CAT route service into Knightdale, cross-town express service from Knightdale to nearby regional centers, park-and-ride lots and light rail.



MASS TRANSIT PLAN



Town of Knightdale
Planning Department
2010

Legend

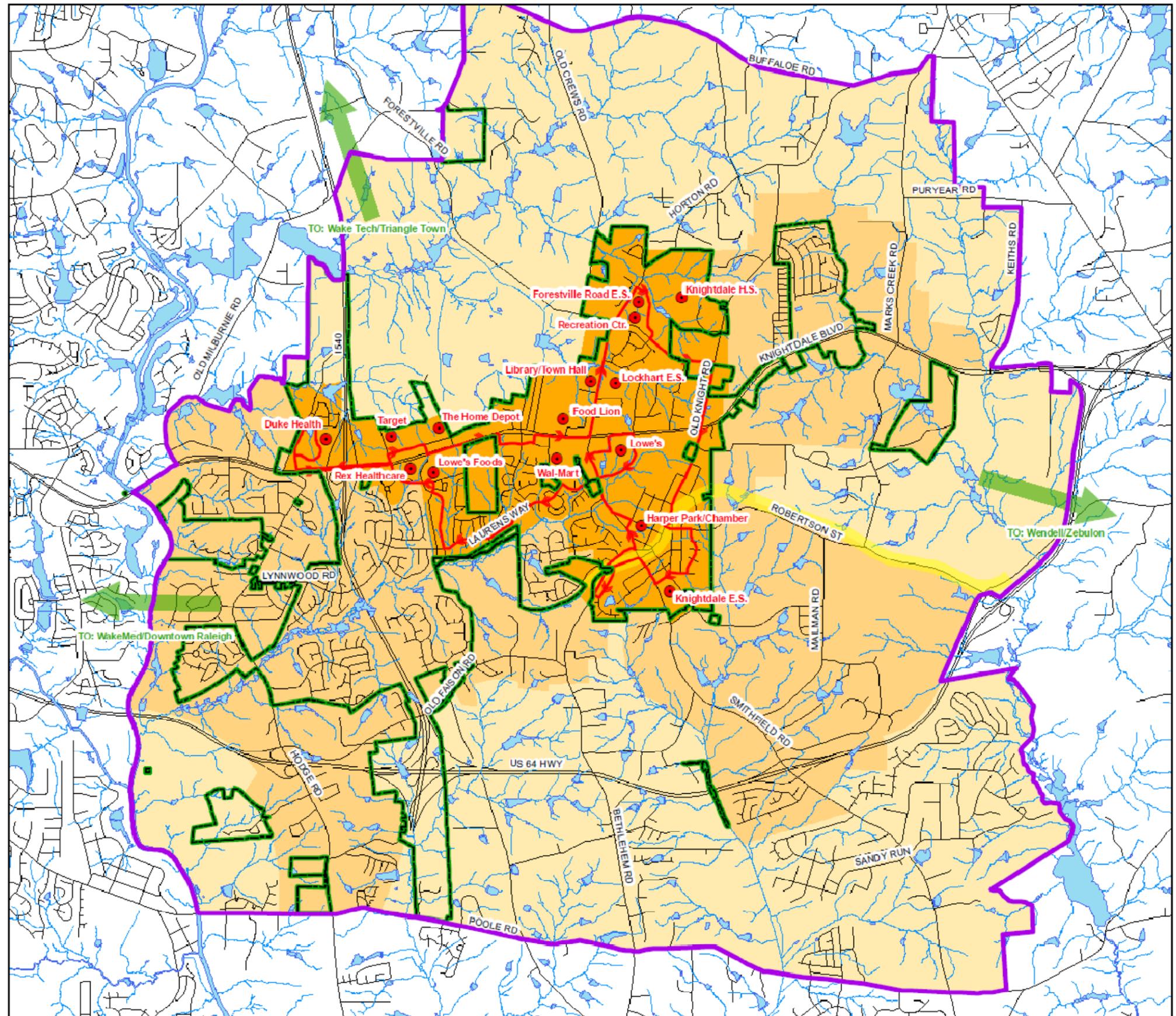
- Points of Interest in Short-Term Area
- Sample Short-Term Area Route
- Short-Term Transit Service Area (1-5 Yrs)
- Mid-Term Transit Service Area (5-15 Yrs)
- Future Transit Service Study Area (15+ Yrs)
- Desired Regional Transit Connectivity
- Future Transit Hub Study Area
- Streets
- Knightdale Corporate Limits (2009)
- Urban Service Area Boundary
- Surface Streams
- Surface Waters

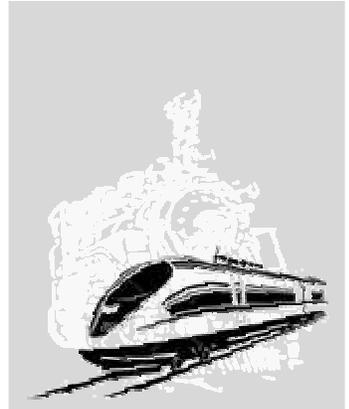


1 inch = 3,400 feet



FIGURE 7.8





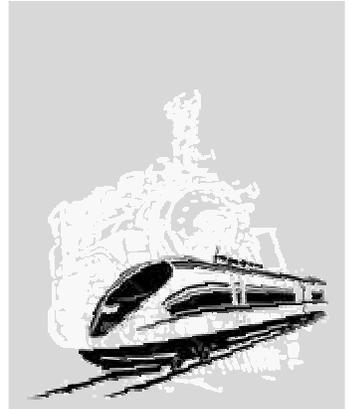
VI. DESIGN GUIDELINES

A. STREET DESIGN GUIDELINES

It is the intent of the Street Design Guidelines to promote the construction of streets that are integral components of community design. The guidelines encourage the development of a network of interconnecting streets that disperse traffic while connecting and integrating the rural and urban areas of town. Equally important, the guidelines encourage the development of a network of sidewalks and bicycle lanes that provide an attractive and safe mode of travel for cyclists and pedestrians. The Street Design Guidelines provide a tool to retain, recognize or modify significantly the urban and rural character of streets throughout Knightdale.

- ST-1. Streets in the Urban Village Design District and within Countryside Village and Neighborhood centers should provide on-street parking where practical.
- ST-2. Streets should interconnect both within a development and with adjoining development.
- ST-3. Cul-de-sacs are permitted only where topographic and/or environmental conditions offer no practical alternatives for connections.
- ST-4. Street stubs should be provided within a development adjacent to open land to provide for future connections.
- ST-5. Street designs should permit the comfortable use of the street by automobiles, bicyclists, and pedestrians.
- ST-6. The streetscape should include appropriate street trees planted in a manner consistent with their function.
- ST-7. Commercial streets should have trees which complement the façade of the buildings and which shade the sidewalk.
- ST-8. Residential street trees should provide a tree canopy that shades both the street and the sidewalk.
- ST-9. In the Countryside and Neighborhood Design Districts, natural features like streambeds and stands of significant trees or topographic features like rock outcroppings should be utilized as public amenities and for the visual enhancement of the streetscape.

-
- ST-10. Closed or gated streets should be discouraged as they do not reflect the public nature and purpose of a street.
- ST-11. Where practical, a “close” should be encouraged in place of a cul-de-sac. *(A close is a front space for buildings located in the interior of the block. It may be pedestrian or it may have a one-way roadway loop around a green area, typically used for passive recreation. Its minimum width must coincide with emergency vehicle turning radii.)*
- ST-12. The use of traffic calming measures such as raised (table) intersections, lateral shifts, changes in pavement material, and traffic circles should be encouraged as alternatives to conventional traffic control measures.
- ST-13. Speed bumps (or humps) should be discouraged as they obstruct the efficient delivery of emergency services.
- ST-14. The scale of lighting fixtures and the illumination provided should be appropriate for both pedestrian and vehicular movements.
- ST-15. Parking along all streets should be signed, marked or otherwise clearly delineated.
- ST-16. Blocks should not be less than 200 feet nor more than 1,320 feet (1/4 mile), unless special site, topographic or environmental factors are present; or the block is part of a Countryside Village Center, Neighborhood Center or Urban Village Design District.
- ST-17. Travel lanes should generally not be narrower than ten feet or wider than 12 feet unless accommodating alternative methods of transportation.
- ST-18. A modified grid street system should be designed throughout higher density areas of the town; thereby increasing the number of access routes for emergency response.



B. PEDESTRIAN AND BICYCLE TRAVEL

Walking and cycling serve an important role in Knightdale's local transportation system as well as being a component of a healthy lifestyle. Developing a walking and cycling network directly advances the Town Council's current vision of Knightdale being a Safe, Transparent, Active, Green and Engaged community. Adequate, convenient and safe facilities such as sidewalks, walking paths, multi-use paths, wide outside street lanes and trails are necessary to promote pedestrian and cycling activity. They should be designed to comfortably separate each of the different modes of transportation.

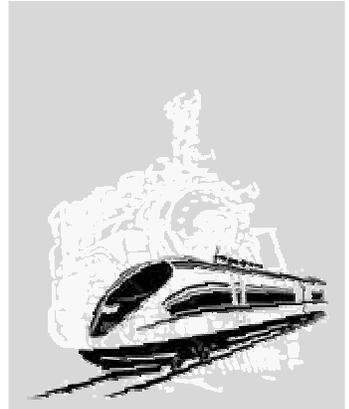
Cycling is also an excellent alternative to motorized transportation around town. While the current commute distances and travel patterns do not lend themselves to cycle trips, the increase in employment within Knightdale, coupled with more mixed-use and mix of use development will offer more cycling opportunities for Knightdale residents. In addition, opportunities for recreational cycling along greenways provide an excellent source of physical exercise that can have the added benefit of enhancing quality of life. For these reasons, Knightdale has developed a bicycle and pedestrian plan including both transportation and recreational uses. The plan recommends locations for independent trails such as the Mingo Creek Greenway, shared bicycle facilities along roadways and areas where sidewalk connectivity should be high. The recommendations of the bicycle and pedestrian plan along with the following design guidelines should form the basis of applicable regulations in the UDO and drawings in the Standard Specifications and Details Manual.

The following guidelines are established:

- BP-1. Sidewalks should be buffered from automobile traffic. Buffering may be accomplished through planting strips, on-street parking, larger sidewalk widths or similar methods.
- BP-2. In general, sidewalks should be located on both sides of the street within the Town Center and Neighborhood Districts.
- BP-3. Sidewalks serving non-residential uses within the Town Center or in any Village Center within the Neighborhood or Countryside Design Districts should be designed to the curb and provide for a minimum of eight (8) feet in width outside of outdoor seating areas, tree grates and other street furniture.
- BP-4. Planting areas between the sidewalk and the road should be a minimum of six (6) feet wide and designed to accommodate both plantings and

underground utilities. If this cannot be accomplished, utilities should be located behind the sidewalks within the right-of-way and/or a utility easement.

- BP-5. Planting strips should be typically located between the curb and sidewalk to provide a comfortable and safe separation between vehicular and pedestrian movement. Within commercial areas and other sidewalks with high pedestrian volumes, grated tree wells may be used in lieu of planting strips.
- BP-6. Street trees should be planted to not impede the sight distances of intersections.
- BP-7. Street furniture such as benches, waste containers, flower and shrub planters, lampposts and kiosks should be required for non-residential uses within Old Town or in any Village Center within the Neighborhood or Countryside Design Districts to enhance the area's pedestrian feel.
- BP-8. Mid-block crossings, bulb-outs, signaled crosswalks and similar techniques may be used to accommodate pedestrians when appropriate traffic and site conditions exist.
- BP-9. Streets and street intersections shall have well-marked and well-lit crosswalks, with medians on wider streets to encourage pedestrian safety.
- BP-10. Curb radii should be designed to reduce pedestrian crossing times along all streets requiring sidewalks. In general, curb radii should not exceed 25 feet and are encouraged to be 15 feet or less in pedestrian areas. Roll curbs should be allowed for access to commercial or industrial facilities to accommodate large vehicles.
- BP-11. Bicycle travel should be supported with striped lanes for bicycle routes on wider streets, and medians where multi-use trails intersect streets.
- BP-12. Striped bicycle lanes, where recommended, should be a minimum of four (4) feet wide, not including the gutter. In places where a lane is not recommended, a "sharrow" and/or wide outside lane along with appropriate signage should be used.



BP-13. Street designs should include bicycle-friendly stormwater grates and manhole covers.

VII. TRANSPORTATION OBJECTIVES AND ACTION ITEMS

The Objectives and Action Items are provided to direct the planning and implementation strategies related to transportation planning in Knightdale and are in accordance with the overall goals of the 2027 Comprehensive Plan.

A. OBJECTIVES

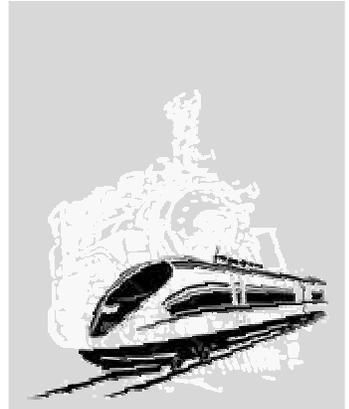
The Town of Knightdale shall seek to:

1. Ensure that multiple transportation options are provided for its citizens;
2. Coordinate transportation options and facilities with surrounding public and private entities to achieve a well-connected and accessible regional transportation network;
3. Ensure through the development approval process that access to transportation facilities promotes and balances safety, efficiency, convenience and economic considerations;
4. Ensure through its policies, ordinances and specifications that facilities are designed to promote safe interaction between different transportation modes;
5. Educate citizens on issues related to transportation such as, but not limited to: safety practices, efficiency measures, design, public health benefits and environmental protection; and
6. Encourage land use development patterns and connectivity that shorten average trip times across all modes of transportation; thereby reducing congestion and delay.

B. ACTION ITEMS

The following tasks provide a course of action for the Town to implement the previous transportation objectives:

-
- TR-1. Participate in the planning and/or decision-making processes (as appropriate) of regional and neighboring transportation agencies including CAMPO, Town of Wendell, City of Raleigh, Wake County Human Services and Triangle Transit;
- TR-2. Update and amend the Town's Arterial, Collector, Bike Route and Greenway plan maps found in the Town's Unified Development Ordinance at least once every five (5) years, including a comprehensive review of adopted plans from other transportation agencies covering or abutting the Town's jurisdiction;
- TR-3. Evaluate Arterial, Collector, Bike Route, Greenway and Pedestrian plan amendments by answering the following questions:
- Does the project promote public health and safety?
 - Does the project fulfill the Town's obligation to provide facilities and services?
 - Does the project increase the efficiency of existing facilities?
 - Does the project conform to the goals and objectives of this master plan?
- TR-4. Review and report construction progress annually on improvements required by the Town's Arterial, Collector, Bike Route, Greenway and Pedestrian plans;
- TR-5. Display transportation plans and plan amendments in Town Hall, on the Town's website, at relevant public hearings, at information booths, during open houses and other public outreach events;
- TR-6. Require and/or incentivize site plans to incorporate multi-modal access, including safe and direct access for pedestrians;
- TR-7. Review and inspect road improvements associated with new master plan submissions and construction documents for compliance with adopted transportation plans and standard specifications;
- TR-8. Secure dedicated right-of-way and/or public easements (as appropriate) during the plan approval process for planned road extensions, new roads, transit stops, park and ride lots, transit stations and greenways;



-
- TR-9. Require existing grid street patterns in “Old Town” to be extended where possible, and require the use of modified grid systems in new residential and mixed-use neighborhoods;
 - TR-10. Develop and maintain an approved list of traffic calming devices that reinforce the posted speed or intended posted speed through residential areas;
 - TR-11. Require landscape and hardscape enhancements and fine-scale design features for new collector and arterial corridors;
 - TR-12. Work with NCDOT to adopt strategies for safe and convenient crossings of Knightdale Boulevard;
 - TR-13. Explore, plan, implement and review mass transit services within and through Knightdale’s jurisdiction;
 - TR-14. Facilitate dialogue and cooperation between regional public transportation providers and developers to construct, maintain and ensure the safety of park and ride stations and transit-oriented developments;
 - TR-15. Pursue and participate in efforts to introduce commuter rail service along the existing rail corridor;
 - TR-16. Create a Pedestrian Plan that prioritizes sidewalk and multi-purpose path construction, connectivity and repair; and
 - TR-17. Apply for and secure funding from local, state, federal and non-profit sources to assist in the planning and construction of new transportation facilities as well as assisting in the addition of safety, efficiency and environmental enhancements to existing transportation facilities.

