

# STREET DESIGN MANUAL

RALEIGH, NORTH CAROLINA

January 29, 2015

---

**RESOLUTION NO. 2013 – 851**

**A RESOLUTION TO ADOPT THE RALEIGH STREET DESIGN MANUAL AND REPEAL THE STREETS, SIDEWALKS AND DRIVEWAY ACCESS HANDBOOK**

WHEREAS, the Raleigh Street Design Manual is an adjunct to the recently adopted Unified Development Ordinance; and  
WHEREAS, the Manual provides technical specifications used in construction of public improvements; and  
WHEREAS, many of the technical specifications are engineering based standards that are not appropriate for inclusion in the Unified Development Ordinance; and

WHEREAS, the Manual will replace the existing Streets, Sidewalks and Driveway Access Handbook; and  
WHEREAS, these enhancements were reviewed and discussed with public input.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF RALEIGH, NORTH CAROLINA:

- a) The Raleigh Street Design Manual dated November 6, 2013 together with the Planning Commission recommendations dated August 13, 2013 contained in certified recommendation number CR-11547, are hereby adopted.
- b) The Raleigh Street Design Manual shall be effective five days after the adoption of this resolution.
- c) The Streets, Sidewalk and Driveway Access Handbook is hereby repealed coincident with the adoption of the Raleigh Street Design Manual.
- d) The Raleigh Street Design Manual is incorporated by the Unified Development Ordinance, Part 10A of the City Code.
- e) Except as otherwise authorized in this section, changes to the Raleigh Street Design Manual shall be approved by the City Council after a public hearing. The following changes may be made by staff without need for a City Council public hearing:
  - f) Technical corrections to illustrations where standards are not altered.
  - g) Correction of typographical errors, erroneous information or the addition of or alteration to references to external forms, applications or other governmental information.
  - h) Updates that are a result of recently adopted reference manuals required by Federal or State law.
- i) The addition of any City Council-adopted alternative street cross section or public improvement related to specific capital improvement projects or streetscape plans projects. This shall include street right-of-way width, location and dimension of all components contained within the right-of-way, street furniture elements, pavement treatment, pedestrian lighting, tree lawn and sidewalks.
- j) Formatting and publication of the document where content is not altered.

Adopted: November 19, 2013

Effective: November 24, 2013

Revised: July 1, 2015

Distribution: Planning –Bowers, Crane, Lamb, Daniel

Public Works –Kallam, McGee

## INTRODUCTION

Raleigh's [Unified Development Ordinance \(UDO hereby\)](#), sets forth many street typologies to work with various streetscapes and frontage types. While the UDO establishes the appropriate street type, this manual assists with specific design details related to the engineering aspects of the various street typologies.

It is the responsibility of the developer to take future roadway plans of the City and NCDOT into consideration when developing a site plan for a future development. In addition, character and circulation patterns of developments in the immediate vicinity should also be taken into consideration to address existing development patterns and context Sources of information include, but are not limited to:

- A. The Arterials, Thoroughfares, and Collector Plan the [Street Plan Map](#) in the Transportation Element of Raleigh's Comprehensive Plan
- B. [NCDOT Transportation Improvement Program](#)
- C. [Capital Improvement Program](#)
- D. [City of Raleigh and Wake County Short and Long Range Transit Plans](#)
- E. [Capital Area Metropolitan Planning Organization](#)
- F. [City Council authorized Street and Sidewalk Projects](#)
- G. [2030 Comprehensive Plan](#)
- H. [American Association of State and Highway and Transportation Officials \(AASHTO\)](#)
- I. [Manual on Uniform Traffic Control Devices \(MUTCD\)](#)
- J. [Public Right of Way Advisory Group \(PROWAG\)](#)
- K. [American with Disability Accessible Design Requirements](#)
- L. [NCDOT Policy on Street and Driveway Access To North Carolina Highways Manual](#)

# Table of Contents

<b>INTRODUCTION</b>	<b>i</b>
<b>CHAPTER 1 STREETS FOR ALL USERS</b>	<b>1</b>
Article 1.1 Purpose and Scope	1
Article 1.2 Complete and Context Sensitive Streets	2
Article 1.3 Process of Street Design	2
<b>CHAPTER 2 STREET ELEMENT OVERVIEW</b>	<b>3</b>
Article 2.1 Streetscape	3
Article 2.2. Travelway	3
Article 2.3 Roadway Classification Design Vehicle Type	4
<b>CHAPTER 3 STREET TYPES</b>	<b>5</b>
Article 3.1 New Streets	5
Article 3.2 Street Types Overview	7
Section 3.2.1 Sensitive Area Streets	7
Section 3.2.2 Local Streets	7
Section 3.2.3 Mixed Use Streets	7
Section 3.2.4 Major Streets	7
Section 3.2.5 Industrial and Service Streets	7
Section 3.2.6 Accessways	7
Section 3.2.1 Sensitive Area Streets	8
Section 3.2.2 Local Streets	12
Section 3.2.3 Mixed-Use Streets	17
Section 3.2.4 Major Streets	21

Section 3.2.5 Industrial and Service Streets	25
Section 3.2.6 Accessways	29
<b>Article 3.3 Existing Streets</b>	<b>32</b>
<b>Article 3.4 Existing Private Streets</b>	<b>34</b>
<b>CHAPTER 4 PLAN AND PERMITTING REQUIREMENTS</b>	<b>36</b>
<b>Article 4.1 Right-of-Way Permits</b>	<b>36</b>
<b>Article 4.2 Encroachments</b>	<b>36</b>
<b>Article 4.3 Travel Lane and Sidewalk Closures</b>	<b>37</b>
<b>Article 4.4 NCDOT Coordination</b>	<b>38</b>
<b>Article 4.5 Centralized Delivery Requirement by the US Postal Service</b>	<b>39</b>
<b>Article 4.6 Plot Plan Information for Residential Curb Cuts and Driveways</b>	<b>40</b>
Section 4.6.1 Plot Plan Requirements	40
<b>CHAPTER 5 ADMINISTRATIVE REQUIREMENTS</b>	<b>42</b>
<b>Article 5.1 Design Adjustments</b>	<b>42</b>
Section 5.1.1 Design Adjustment Procedure per the UDO	42
<b>Article 5.2 Fees-in-Lieu for Infrastructure and Streetscape</b>	<b>43</b>
Section 5.2.1 Exemptions to Fee-in-lieu and/or Construction	43
<b>Article 5.3 Surety</b>	<b>44</b>
<b>Article 5.4 Reimbursements</b>	<b>45</b>
<b>CHAPTER 6 INFRASTRUCTURE REQUIREMENTS</b>	<b>47</b>
<b>Article 6.1 Infrastructure Sufficiency</b>	<b>47</b>
Section 6.1.1 Roadway Construction Through- and Adjoining Developments	47
Section 6.1.2 Minimum Paving Construction	47
<b>CHAPTER 7 TRAFFIC IMPACT ANALYSIS</b>	<b>49</b>

<b>Article 7.1 Traffic Studies</b>	<b>49</b>
Section 7.1.1 Initiating Traffic Studies	49
Section 7.1.2 Criteria requiring Traffic Studies	50
Section 7.1.3 Study Area	51
Section 7.1.4 Traffic Study Scope	51
Section 7.1.5 Traffic Analysis	53
Section 7.1.6 Traffic Study Report	57
Section 7.1.7 Infrastructure Sufficiency	58
Section 7.1.8 Traffic Study Submittal Requirements	59
<b>Article 7.2 Traffic Mitigation Plan</b>	<b>59</b>
<b>Article 7.3 Shared Parking Studies</b>	<b>59</b>
Section 7.3.1 initiating Parking Studies	59
Section 7.3.2 Analysis	60
Section 7.3.3 Shared Parking Analysis Report	60
Section 7.3.4 Shared Parking Analysis Submittal Requirements	61
<b>CHAPTER 8 RIGHT-OF-WAY CONVEYANCE AND EASEMENTS</b>	<b>62</b>
<b>Article 8.1 Right-of-Way Dedication</b>	<b>62</b>
Section 8.1.1 Reservation Periods for Public Land	62
Section 8.1.2 Adjustments to required Right-of-Way widths	62
<b>Article 8.2 Slope Easements</b>	<b>64</b>
<b>Article 8.3 Additional Easements</b>	<b>64</b>
<b>CHAPTER 9 BLOCKS AND ACCESS REQUIREMENTS</b>	<b>65</b>
<b>Article 9.1 Blocks</b>	<b>65</b>
Section 9.1.1 Block Perimeter	66

<b>Article 9.2 Residential Access System</b>	<b>69</b>
<b>Article 9.3 Subdivision Access</b>	<b>70</b>
<b>Article 9.4 Site Access</b>	<b>71</b>
<b>Article 9.5 Driveways and Cross Access</b>	<b>72</b>
Section 9.5.1 Driveways for Residential Uses	73
Section 9.5.2 Driveways for Mixed use and Non-residential Uses	73
Section 9.5.3 Cross Access	74
<b>CHAPTER 10 PARKING AREAS</b>	<b>76</b>
<b>Article 10.1 Parking lot Design and Layout (On-site Parking)</b>	<b>76</b>
<b>Article 10.2 Queuing Areas</b>	<b>77</b>
<b>Article 10.3 Solid Waste Design requirements for Parking Areas and Driveways</b>	<b>77</b>
<b>Article 10.4 On-Street Parking in the Public Right-of-Way</b>	<b>78</b>
<b>CHAPTER 11 STREETScape DESIGN AND OPERATION</b>	<b>79</b>
<b>Article 11.1 Streetscape Types</b>	<b>79</b>
Section 11.1.1 Adopted Streetscape Plans	80
Section 11.1.2 Approved Design Adjustment for Alternative Streetscapes for Existing Roadways	80
<b>Article 11.2 Streetscape Elements</b>	<b>83</b>
Section 11.2.1 Utility Placement Easement	83
Section 11.2.2 Sidewalk in the Public Right-of-way	83
Section 11.2.3 Sidewalk Access Ramps	86
Section 11.2.4 Planting Area	86
Section 11.2.5 Street Furniture	86
Section 11.2.6 Drainage	86
Section 11.2.6 Street Lights	87

Section 11.2.7 Bicycle Rack Installation Standards	90
Section 11.2.8 Transit Amenities and Elements	91
<b>CHAPTER 12 ROADWAY, INTERSECTION, AND TURN LANE DESIGN</b>	<b>92</b>
<b>Article 12.1 Roadway Design</b>	<b>92</b>
Section 12.1.1 Horizontal Street Design	92
Section 12.1.2 Vertical Street Design	92
Section 12.1.3 Cul-de-sac Design	94
Section 12.1.4 Intersection Design	94
Section 12.1.5 Traffic Control Devices	95
Section 12.1.6 Roadway Transition	95
<b>Article 12.2 Turn Lanes</b>	<b>96</b>
Section 12.2.1 Turn Lane Warrants	97
Section 12.2.2 Total Turn Lane Length	99
Section 12.2.3 Turn Lane Storage	99
Section 12.2.4	101
<b>Article 12.3 On-Road Bicycle Facilities</b>	<b>102</b>
<b>Article 12.4 Curb and Gutter</b>	<b>103</b>
Section 12.4.1 Curb Installation requirements	103
Section 12.4.2 Curb Return Radii	104
<b>Article 12.6 Sight Distance</b>	<b>104</b>
Section 12.6.1 Stopping Sight Distance	105
Section 12.6.2 Intersection Sight Distance	106
<b>GLOSSARY</b>	<b>108</b>

## CHAPTER 1 STREETS FOR ALL USERS

### Article 1.1 Purpose and Scope

- A. This Manual has been developed in conjunction with the Unified Development Ordinance, which recognizes the critical link between land use and transportation, insuring that both work together to preserve and create great places within the City of Raleigh.
- B. Articles of the Unified Development Ordinance have been included in this Manual. The Articles and Sections in this Manual that are included from the UDO will be boxed and have a cross reference. In the case where any requirement in the City of Raleigh Code conflicts with any regulation or standard presented in this manual, the City of Raleigh Code shall control.
- C. The design guidelines contained in this Manual are intended to provide for adequate and coordinated development with necessary facilities to serve and protect all users of Raleigh's transportation system.
- D. Staff will apply fundamental engineering principles and practices in the evaluation of the design and construction plans in review.
- E. It is recognized that certain improvements financed wholly or in part with State and Federal funds are subject to the regulations and standards prescribed by those agencies. Such regulations and standards may be different than those of the City and may take priority over City regulations and standards presented in this manual. The guidance presented herein is based on nationally-accepted design parameters, including AASHTO's A Policy on the Geometric Design of Highways and Streets and Flexibility in Highway Design, and supplemented by context-specific guidance such as that contained in the joint ITE/CNU Designing Walkable Urban Thoroughfares: A Context Sensitive Approach.
- F. The Public Works Director, or his/her designee thereafter referred to as the Public Works Director, in consultation with other City departments and state agencies, may in accordance with [Section 10.2.18](#) of the [Unified Development Ordinance](#), approve design adjustments for identified regulations established in [Chapter 8](#) of the Unified Development Ordinance.

## Article 1.2 Complete and Context Sensitive Streets

In 2009, NCDOT adopted a Complete Streets Policy. The Policy Statement is cited for reference below:

Transportation, quality of life, and economic development are all undeniably connected through well-planned, well-designed, and context sensitive transportation solutions. To NCDOT, the designations “well-planned”, “well designed” and “context-sensitive” imply that transportation is an integral part of a comprehensive network that safely supports the needs of the communities and the traveling public that are served.

The North Carolina Department of Transportation, in its role as stewards over the transportation infrastructure, is committed to:

- A. Providing an efficient multi-modal transportation network in North Carolina such that the access, mobility, and safety needs of motorists, transit users, bicyclists, and pedestrians of all ages and abilities are safely accommodated;
- B. Caring for the built and natural environments by promoting sustainable development practices that minimize impacts on natural resources, historic, businesses, residents, scenic and other community values, while also recognizing that transportation improvements have significant potential to contribute to local, regional, and statewide quality of life and economic development objectives;
- C. Working in partnership with local government agencies, interest groups, and the public to plan, fund, design, construct, and manage complete street networks that sustain mobility while accommodating walking, biking, and transit opportunities safely.

This policy requires that NCDOT’s planners and designers will consider and incorporate multimodal alternatives in the design and improvement of all appropriate transportation projects within a growth area of a town or city unless exceptional circumstances exist. Routine maintenance projects may be excluded from this requirement; if an appropriate source of funding is not available.

The City of Raleigh supports that complete streets as an important aspect of the quality of life in the City, and has therefore developed a palette of street typologies that accommodate all users within the context of the UDO. While the street typologies adhere to the principles of Complete Streets, some place more emphasis on moving vehicular traffic than others. Context and frontage type strongly influence the balance between various modes of transportation.

The sections contained herein were developed concurrently and in coordination with NCDOT’s Complete Streets Policy; however, in some instances, they may vary somewhat from the NCDOT sections in order to be consistent with a certain land use or development type context.

## Article 1.3 Process of Street Design

Streets shall be designed to be consistent and supportive of their context, serving all modes of mobility which occur within that context in a safe and efficient manner.

The street typologies, their primary functions and elements are defined herein. Typical cross-sections are depicted with the acknowledgement that appropriate modifications to the preferred cross-sections and dimensions may be approved. Any deviations from the required dimensions must be approved by the Public Works Director as a Design Adjustment.

These street typologies are set forth in the [Unified Development Ordinance, Article 8.4](#); however, this Manual provides the typologies with additional and more detailed engineering and technical specification.

## CHAPTER 2 STREET ELEMENT OVERVIEW

Within the public right-of-way, the two primary zones are the Streetscape and Travelway.

### Article 2.1 Streetscape

The Streetscape is the primary pedestrian realm, accommodating people walking, stopping, and sitting, and also functions as the transitional area between moving traffic and land uses. The streetscape is also the place where transitions between the pedestrian mode and other modes of **transportation** occur, and thus its design characteristics including landscaping, aesthetics, multimodal accessibility to support desired development patterns. The streetscape is located on both sides of the Travelway.

### Article 2.2. Travelway

The Travelway refers to the paved width of a street between curbs accommodates moving and stationary vehicles in a variety of modes. On wider street cross-sections, additional landscaping such as medians may be present to provide safe havens for pedestrian crossing, traffic separation and calming, restrictions of dangerous turn movements, drainage, and other beneficial functions. The Travelway may include the following elements:

- A. General Travel Lane - General travel lanes accommodate vehicles of all types. The design and control for the general travel lane determine the width of the lane(s) and the street, as well as other geometrics such as curb radii. The width of the travel lane directly corresponds with the operating speed of the street and the level of mobility and access.
- B. Bicycle Facility - Bicycles may be accommodated in their own space or in a shared lane with other vehicles in the ROW.
- C. Transit Facility - Buses, streetcars, taxis, and other mass transit vehicles may be accommodated in their own space or in a shared lane with other vehicles in the ROW.
- D. On-Street Parking - Parking within the ROW, typically adjacent to a curb, accommodates automobiles, bicycles or other vehicles. Parallel orientation is most common, though angled (head in and back in) parking may be used to provide additional spaces where sufficient ROW exists and off-street parking capacity is very limited. The presence of on-street parking encourages lower vehicular travel speeds on streets and buffers pedestrians from moving traffic.
- E. Gutter and/or Shoulder - The choice between gutter and shoulder depends primarily on area drainage characteristics, environmental sensitivity, land use intensity, and aesthetic intent. For most street typologies, a cross-section supporting more urban development involves the use of curb and gutter.
- F. Median - Medians can range in width depending on street type and context. They may accommodate integrated turn lanes, pedestrian refuges at cross-streets and mid-block, drainage swales, shade trees, promenades transit lines and stations. If space permits, landscaped medians provide a beneficial aesthetic and street narrowing effect in almost any context.

- G. Turn Lane - Turn lanes may be continuous, integrated with spot medians, or installed at intersections with high vehicular turning volume. Where center left turn lanes are provided on streets with four or more general travel lanes, medians with a pedestrian refuge shall be added to aid in safe crossing as well as more efficient traffic signal phasing.

### Article 2.3 Roadway Classification Design Vehicle Type

The **Design Vehicle Table** lays out the vehicle types have been used in the engineering specifications for each street type. Every street type shall appropriately accommodate emergency vehicles and Solid Waste Pickup vehicles

**Table 1 Design Vehicle Table**

Street Type	Design Vehicle
Sensitive Area Street	Single Unit Truck (SU-30) Interstate Semi-Trailer (WB-62)
Local Streets	Passenger Car (P) Single Unit Truck (SU-30)
Mixed Use Streets	Single Unit Truck (SU-30)
Major Streets	Intermediate Semi-Trailer (WB-40) Interstate Semi-Trailer (WB-62)
Industrial and Service Streets	Interstate Semi-Trailer (WB-62)
Accessways	Single Unit Truck (SU-30), Person
Alley	Single Unit Truck (SU-30)

## CHAPTER 3 STREET TYPES

### Article 3.1 New Streets

This Article describes guidelines for the construction of new streets throughout the City and is intended to provide a catalog of pre-approved street types that are appropriate to use. This information can be found in [Article 8.4 of the Unified Development Ordinance](#).

#### Intent

The intent of the new streets regulations is to provide a palette of street typologies and design elements that reflect the character of different areas within the City.

The new street regulations provide adequate travel lanes for vehicles, cyclists and pedestrians.

Administrative design adjustments approved by the Public Works Director pursuant to [Section 8.4.1.E](#) may be appropriate when an existing building would impede roadway expansion; when transitioning from a different street section; or where strict compliance with the UDO and this Street Design Manual would pose a safety hazard.

Gated public streets shall not be permitted.

#### Applicability

When a preliminary plan, final plat or site plan proposes the construction of a new street the requirements of this Article apply.

Sidewalks, streets and street trees must be installed and constructed in accordance with this Article.

Existing streets may remain serving existing development in their current configuration; however, they shall not be extended or substantially rebuilt except in conformance with this Article

#### Letter of Acceptance Required

Sidewalks, streets and street trees must be installed prior to the issuance of a letter of final acceptance.

A conditional letter of acceptance may be issued in accordance with [Section 8.1.3](#) where the Public Works Director determines that landscaping in the public right-of-way cannot be installed due to inclement weather conditions, a surety in the amount of 125% of the value of the landscaping shall be provided to the City, in accordance with [Section 8.5.1 B](#). The landscaping improvements shall be installed within 12 months of issuance of the conditional letter of acceptance.

Where determined appropriate by the Public Works Director, the sidewalk and street tree planting area may occur on private property subject to an easement for public access.

#### Tree Planting

Unless otherwise noted below, all trees planted in accordance with this Article must be shade trees.

Where overhead utilities exist, 1 understory tree shall be planted every 20 feet on center, on average.

All required street trees must meet the design and installation requirements of [Section 7.2.7](#).

Where development abuts a street controlled by the North Carolina Department of Transportation, street trees may not be required in the right-of-way, at the discretion of the North Carolina Department of Transportation. In this instance, a Type C2 street protective yard is required in accordance with [Section 7.2.4](#).

**Administrative Design Adjustment Findings**

The Public Works Director may in accordance with [Section 10.2.18](#) approve a street design adjustment, subject to the following findings:

The approved adjustment meets the intent of this Article;

The approved adjustment conforms to the Comprehensive Plan and adopted City plans;

The approved adjustment does not increase congestion or compromise safety;

The approved adjustment does not create additional maintenance responsibilities for the City;

The approved adjustment has been designed and certified by a Professional Engineer; and

The approved adjustment shall address stormwater collection and conveyance and not adversely impact stormwater collection.

DRAFT

## Article 3.2 Street Types Overview

This list provides the new Street Types in the City of Raleigh and ETJ. The schematic and required dimensions along with Engineering Specifications are laid out in the article for each type. Cross sections of each can be found in the [City of Raleigh Standard Details](#).

### Section 3.2.1 Sensitive Area Streets

- A. Sensitive Area Parkway
- B. Sensitive Area Avenue
- C. Sensitive Area Residential Street

### Section 3.2.2 Local Streets

- A. Neighborhood Yield
- B. Neighborhood Local
- C. Neighborhood Street
- D. Multifamily Street

### Section 3.2.3 Mixed Use Streets

- A. Avenue 2-Lane, Undivided or Divided
- B. Avenue 3-Lane, Parallel Parking
- C. Main Street, Parallel or Angular Parking

### Section 3.2.4 Major Streets

- A. Avenue 4-Lane, Parallel Parking
- B. Avenue 4-Lane and 6-Lane, Divided
- C. Multi Way Boulevard, Parallel Parking or Angular Parking

### Section 3.2.5 Industrial and Service Streets

- A. Industrial Street
- B. Alley, Residential
- C. Alley, Mixed Use

### Section 3.2.6 Accessways

- A. Primary Internal Access Drive
- B. Pedestrian Passage

### Section 3.2.1 Sensitive Area Streets

In areas of Raleigh where stormwater and wastewater do not feed into sewers, other forms of drainage must be provided. Along encompassed streets, open channel drainage ditches are typical and must be accommodated within special cross-sections. The following roadway cross-sections are intended for use in these “Sensitive” areas.

- A. **Sensitive Area Parkways** are semi-limited access corridors, and are often used to preserve scenic views. They are intended primarily to support regional travel. Medians are a standard feature of parkways in almost every case, except where a narrower cross-section is needed to minimize right-of-way and environmental impact.
- B. **Sensitive Area Avenues** are for use in low-intensity areas that do not have sewer provisions. They have relatively narrow paved widths, which includes shoulders for bicycle and pedestrian uses in retrofit situations lacking sidewalks.
- C. **Sensitive Area Residential Streets** are appropriate in rural conditions with large lot homes, without water and sewer provisions..

DRAFT

### 3.2.1 A Sensitive Area Parkway

A sensitive area parkway would be most appropriate as a high volume regional connector road where surroundings are primarily conservation or agricultural land. A multiuse trail on both sides of the street is a preferred way to accommodate pedestrians and cyclists. Ideally, both trails and shoulders are installed. Express transit service may be implemented on Sensitive Area Parkways.

**INSERT PICTURE**

DRAFT

### 3.2.1 B Sensitive Area Avenue

A sensitive area avenue is used in rural conditions where it provides important connectivity for multiple travel modes. It should not be used in a completely residential setting (see “Sensitive Area Residential Street” instead.) The Sensitive Area Avenue type provides great flexibility in accommodating future physical growth, and could be reconfigured to a “Main Street” cross-section within targeted development nodes if drainage facilities were upgraded. Sidewalk is required on both sides of the street.

**INSERT PICTURE**

DRAFT

### 3.2.1 C Sensitive Area Residential Street

Sensitive Area Residential Streets are installed in places where natural runoff water drainage is preferred, and traffic volume is relatively low. Typically this type would be used in an agricultural or primarily low-density residential setting. Sidewalk is required on both sides of the street.

**INSERT PICTURE**

DRAFT

### Section 3.2.2 Local Streets

Local Streets provide access to individual lots, accommodate pedestrians and serve as low speed bicycle and vehicle routes. Local streets should be relatively short in total distance and used less frequently compared to other street typologies. [Table 2 Unit Specifications for Local Street Types](#) specifies the amount of units per street type.

**Table 2 Unit Specifications for Local Street Types**

Street Specification	Units
A - Neighborhood Yield	Up to 40 units
B - Neighborhood Local	41 – 150 units
C - Neighborhood Street	151 – 350 units
D - Multifamily Street	Apartments and Townhomes (150 units or less)

DRAFT

### 3.2.2 A Neighborhood Yield

Neighborhood Yield is an unstriped two-way street accommodating parallel parking on one side. Neighborhood Yield streets operate best under low speed and volume conditions, giving opposing vehicle drivers the time and space necessary to successfully negotiate potential conflicting movements and serving no more than 40 units and no longer than ½ mile. Sidewalks are required on both sides of the street. Items in the amenities zone such as streetlights and trees should be installed at a pedestrian scale so as to provide a high level of comfort for residents and non-motorized street users.

**INSERT PICTURE**

DRAFT

### **3.2.2 B Neighborhood Local**

Neighborhood Local Streets are used in primarily residential developments serving from 41 and up to 150 residential units and no longer than ½ mile. They accommodate on-street parallel parking on both sides and feature two general travel lanes for vehicular use, including automobiles, bicycles, and occasional local transit or freight vehicles. Sidewalks are required on both sides of the street.

**INSERT PICTURE**

DRAFT

### 3.2.2 C Neighborhood Street

Neighborhood Streets are used primarily in areas serving between 151 and up to 350 residential units and also where residential uses may be compatible with non-residential uses in a mixed-use context. They accommodate on-street parallel parking on both sides and feature two general travel lanes for vehicular use, including automobiles, bicycles, and occasional local transit or freight vehicles. Sidewalks are required on both sides of the street. Traffic calming design elements such as intersection bulb-outs can help to moderate vehicle speeds on Neighborhood Streets.

**INSERT PICTURE**

DRAFT

### 3.2.2 D Multifamily Street

Multi-Family Local Streets are intended to provide direct lot access and a relatively high level of on-street parking capacity (minimum of 75% along the frontage of this street type) in residential (Apartments and Townhomes) settings. Two general travel lanes are present along with the allowance of a row of parking on each side in a parallel, perpendicular or angled configuration. Multi-family streets are to be used exclusively for residential developments built under the apartment or townhouse building types defined in the Unified Development Ordinance. Multi-family streets cannot be used to meet the block perimeter. The street type is limited to 150 units and must tie into the appropriate street section per the [Unit Specifications for Local Street Types](#). Sidewalks are required on both sides of the street in a public easement. In these sections, the parking is not in the right of way.

**INSERT PICTURE**

DRAFT

### Section 3.2.3 Mixed-Use Streets

The two general street types that are classified as “Mixed-use Streets” and Avenues and Main Streets.

- A. Avenue 2-Lane, Undivided or Divided
- B. Avenue 3-lane, Parallel Parking
- C. Main Street, Parallel or Angular Parking

**Avenues** are walkable, low-speed streets, generally shorter in length than boulevards. They provide access to abutting commercial and mixed land uses as well as multi-unit residential development. They serve as primary bicycle and pedestrian routes, and may accommodate local transit vehicles. Avenues may feature a median and on-street parking.

**Main Streets** are designed to provide connections between neighborhoods and districts, as well as providing access to Avenues and Boulevards from local streets. Main Streets are highly walkable and may serve as the primary street for commercial or mixed-use centers. On-street parking is typically provided.

DRAFT

### 3.2.3 A Avenue 2-Lane, Undivided or Divided

This type is intended primarily for use in situations on roads directly adjacent to the Streetscape. The existing context may include any land use, but is often characterized by architecture such as strip malls, internally oriented subdivisions serving > 350 dwelling units with a middle turn lane, or detached development with large setbacks. In recognition of the fact that this type of facility often plays a significant role in local multimodal mobility, the cross-section provides distinct general travel and bicycle lanes. Sidewalks are required on both sides of the street. **The center turn lane right of way width should be used for existing streets. The median right of way width should be used when new development is introduced or medians are present along the existing facilities.**

**INSERT PICTURE**

DRAFT

### **Section 3.2.3 B Avenue 3-Lane, Parallel Parking**

A three-lane avenue with on-street parking and bike lanes offers significant flexibility. The cross-section is ideal to use in a context featuring residential uses with some ground floor commercial uses or in areas with a mixture of uses. This type provides significant multimodal accessibility and mobility, yet maintains lower speeds and an appealing character, particularly when the center lane includes some landscaped median features. Sidewalks are required on both sides of the street.

**INSERT PICTURE**

DRAFT

### **Section 3.2.3 C Main Street, Parallel or Angular Parking**

The Main Street type is most appropriate in where active frontage and mixed commercial uses exist. On-street parking can be installed in parallel or angled fashion, depending on need and available right-of-way. Due to high anticipated pedestrian activity, design speeds are kept low. This condition also allows bicycles to share space with automobiles in general travel lanes, negating the need for distinct bike lanes. Main Streets are primary candidates for “festival” treatments, in which a portion of the street may be temporarily restricted to non-motorized traffic only for special events. Additional landscaping and traffic calming techniques that are ideal on Main Streets include street trees in grated wells, curb bulb-outs, and a relatively high density of street furniture and public art. Pedestrian-scale street lighting should be installed, and utilities should be located underground, in alleys or other streets to the greatest extent possible. Sidewalks are required on both sides of the street.

**INSERT PICTURE**

DRAFT

### Section 3.2.4 Major Streets

The categories of streets classified as “Major Streets” are Avenues with four or more lanes and Boulevards.

- A. Avenue 4-Lane, Parallel Parking**
- B. Avenue 4-Lane and 6-Lane, Divided**
- C. Multi Way Boulevard, Parallel Parking or Angular Parking**

Four- and Six-Lane Avenues have a similar purpose to two- and three-lane Avenues but apply to thoroughfare and arterial streets that require four or more lanes to accommodate traffic demand. Avenues with four or more lanes always feature medians. Signalized intersections are spaced further apart on major streets to better facilitate vehicular mobility. Midblock pedestrian crossings shall be installed on long blocks to maintain walkability in areas where pedestrian usage could be heavy. Major transit routes are often found on these corridors.

Boulevards are designed to support multiple travel modes, including automobiles, freight movers, transit vehicles, pedestrians and bicyclists. Boulevards balance high vehicular capacity with high pedestrian and vehicular accessibility to adjoining urban land uses. Landscaped medians separate and buffer through traffic from a local access are that accommodate parking, low-speed vehicular traffic, bicyclists and pedestrians.

There are two typical multi-way boulevard configurations: parallel and angled parking where a center median exists with two additional side medians and accessways. Multi-Way configurations are intended to fully support multiple travel modes, providing a high level of mobility and access. They have high vehicular capacity and side accessways provide additional options for right turns, allowing intersections to operate more efficiently.

### 3.2.4 A Avenue 4-Lane, Parallel Parking

The four-lane avenue provides a good level of mobility for all street users, and is a preferred street type for urban contexts where transit vehicles and cyclists are part of the traffic mix. Medians provide refuge for crossing pedestrians. For more pedestrian-intensive contexts, the width of the Streetscape may be expanded. Curb parking provides vehicular access to adjoining land uses and buffers pedestrians from moving traffic. Sidewalks are required on both sides of the street.

**INSERT PICTURE**

DRAFT

### 3.2.4 B Avenue 4-Lane and 6-Lane, Divided

This cross-section features four or six general travel lanes, bike lanes, and buffered sidewalks on both sides of the street. Due to the emphasis on through vehicle mobility, it is not conducive to on-street parking; however, the outside general travel and bike lane could be reconfigured to be a transit / bike / right-turn only lane if warranted by context and placed within the multimodal transportation network.

**INSERT PICTURE**

DRAFT

### 3.2.4 C. Multi-Way Boulevard, Parallel or Angular Parking

A Multi-Way Boulevard is used to provide a high level of both access and mobility. These boulevards consist of general travel lanes separated from side accessways with raised center and side medians, which contain landscape features, transit shelters, or other items. On-street parking is placed within accessways, either in parallel or angled fashion. Bicyclists are expected to use accessway lanes rather than general travel lanes for mobility. Sidewalks are required on both sides of the street.

**INSERT PICTURE**

DRAFT

### **Section 3.2.5 Industrial and Service Streets**

- A. Industrial Street**
- B. Alley, Residential (Private)**
- C. Alley, Mixed Use (Private)**

Streets within industrial and service areas typically carry lower traffic volumes but accommodate a higher proportion of truck traffic. Pedestrian facilities do not need to be as generous as in mixed-use areas, and separate bicycle facilities are not provided for. This street section represents the minimum standard for commercial property for the purpose of facility fees and reimbursements.

A related type is the alley, defined as a narrow low-speed road behind buildings that provides access to parking, service areas and rear uses such as accessory structures. It may also accommodate utilities, in shoulders or easements. Some informal pedestrian and bicycle use is to be expected on alleys, but these activities can share space with motorized vehicles due to land constraints, general lack of amenities, and low traffic volume. Sidewalks are required on both sides of the street

DRAFT

### 3.2.5 A Industrial Street

INSERT PICTURE

DRAFT

### 3.2.5 B Alley, Residential (Private)

Residential alleys can provide access to accessory housing units and rear-entry parking, as well as provide a location for utilities and services such as garbage removal if built to street standards to support those types of vehicles. They vary in total width from 16 to 20 feet. Alleys can also provide shortcuts for pedestrians and cyclists. They are ideal locations to implement low impact development techniques such as permeable pavement.

**INSERT PICTURE**

DRAFT

### **3.2.5 C Alley, Mixed-Use (Private)**

Mixed Use Alleys provide access to service entrances, loading docks and garages as well as providing a location for utilities and garbage. They vary in width from 20 to 24 feet, depending on whether they are one-way or two-way. They are ideal locations to implement low impact development techniques such as permeable pavement.

**INSERT PICTURE**

DRAFT

### **Section 3.2.6 Accessways**

Accessways are used to provide a formal travel path within a block for pedestrians and/or vehicles.

- A. Primary Internal Access Drive**
- B. Pedestrian Passage**

DRAFT

### 3.2.6 A Primary Internal Access Drive

The primary internal access drive type can be applied to the main entrances of major developments set back from roads such as malls, corporate offices, and high volume strip centers. It provides pedestrian and vehicular access as well as design flexibility for future retrofits (such as infill development adjacent to this street). This type is typically applied to a private easement within a property, though may be converted to future public use as part of a grid-reliant infill and redevelopment opportunity. Sidewalks are required on both sides of the street.

**INSERT PICTURE**

DRAFT

### 3.2.6 B Pedestrian Passage

Pedestrian passageways are off-limits to motorized vehicles and provide additional pedestrian and bicycle connectivity through medium and large blocks. They may be used in any context. The type may also be applied to standalone greenways and shall be constructed of a durable material to facilitate pedestrian movements and are dedicated as public access easements. The addition of a pedestrian passage permits an increase in minimum block perimeter as per [Section 8.3.2 B 3 of the UDO](#).

**INSERT PICTURE**

DRAFT

## Article 3.3 Existing Streets

This information can be found in [Article 8.5 of the UDO](#).

### General Provisions

This Article describes guidelines for the construction of street improvements and streetscapes for existing streets throughout the City. It is intended to address when street and streetscape improvements are appropriate through the application of the pre-approved street types in this chapter.

### Intent

The intent of the existing streets regulations is to provide the application of the Street Plan Map and the streetscapes to existing streets to reflect the character and context of areas in the City.

The existing street regulations provide adequate travel lanes for vehicles, cyclists and pedestrians.

Administrative Design Adjustments approved by the Public Works Director pursuant to [Section 8.5.1 G](#) may be appropriate when an existing building would impede expansion, when transitioning from a different street section or where strict compliance with this UDO and the Raleigh Street Design Manual would pose a safety hazard.

### Applicability

Any new development activity and any addition or repair subject to the requirements of Sec. 10.2.5 and Sec. 10.2.8. must meet street type and streetscape standards of this Article for existing streets abutting the subject property.

The streetscape types of [Section 8.5.2](#) shall be applied based on the zoning and frontage type applied to the subject property.

Unless otherwise specifically provided, no permit for the construction, reconstruction, extension, repair or alteration of any building, structure or use of land and no building or land or any part of any building or land, may be occupied or used until the streetscape requirements of this Article have been met.

Gated public streets shall not be permitted.

Administrative design adjustments approved by the Public Works Director pursuant to [Section 10.2.18](#) may be appropriate when an existing building would impede roadway expansion; when transitioning from a different street section; or where strict compliance with the [UDO](#) and this Raleigh Street Design Manual would pose a safety hazard.

### Additions and Repairs

A building or site may be renovated or repaired without meeting the streetscape standards, provided there is no increase in gross floor area or improved site area.

When a building or site is increased in gross floor area or improved site area cumulatively by more than 10%, the streetscape provisions of this Article must be met.

### Change in Use Exempt

A change in use does not trigger application of the streetscape requirements of this Article.

### Letter of Acceptance

Sidewalks, streets and street trees must be installed prior to the issuance of a letter of final acceptance.

A conditional letter of acceptance may be issued in accordance with [Section 8.5.3](#) where the Public Works Director determines that landscaping in the public right-of-way cannot be installed due to inclement weather conditions, a surety in the amount of 125% of the value of the landscaping shall be provided to the City, in accordance with [Section 8.5.1 B](#). The landscaping improvements shall be installed within 12 months of issuance of the conditional letter of acceptance.

Where determined appropriate by the Public Works Director, the sidewalk and street tree planting area may occur on private property subject to an easement for public access.

#### **Tree Planting**

Unless otherwise noted below, all trees planted in accordance with this Article must be shade trees.

Where overhead utilities exist, 1 understory tree shall be planted every 20 feet on center, on average.

All required street trees must meet the design and installation requirements of [Section 7.2.7](#).

Where development abuts a street controlled by the North Carolina Department of Transportation, street trees may not be required in the right-of-way, at the discretion of the North Carolina Department of Transportation. In this instance, a Type C2 street protective yard is required in accordance with [Section 7.2.4](#).

#### **Fee-in-Lieu**

Where the Planning and Development Officer determines that construction of improvements would result in the improvement of less than ½ of a linear block face; an equivalent payment in lieu of construction may be required.

#### **Adopted Streetscape Plans**

In the event an adopted streetscape plan regulates streetscape improvements, the adopted Plan shall control. The adopted streetscape plans are contained within the Raleigh Street Design Manual.

The requirements of this Article are intended to serve as minimum standards. Where a streetscape plan adopted before the effective date of this UDO sets a lower standard, the standard in this Article shall prevail.

The City Council may modify an adopted Streetscape Plan following written notice to property owners along the street.

#### **Administrative Design Adjustment Findings**

The Public Works Director may in accordance with [Section 10.2.18](#) approve an existing street design adjustment, subject to all of the following findings:

The approved adjustment meets the intent of this Article;

The approved adjustment conforms to the Comprehensive Plan and adopted City plans;

The approved adjustment does not increase congestion or compromise safety;

The approved adjustment does not create additional maintenance responsibilities for the City; and

The approved adjustment has been designed and certified by a Professional Engineer

## Article 3.4 Existing Private Streets

This information can be found in [Section 8.5.3 of the UDO](#).

### General

No new private streets are allowed.

All existing private streets must remain under maintenance of the homeowners' association and must be maintained to equivalent public street standards.

Private alleys must be constructed to the standards in Sec. 8.4.7. of the UDO and the construction standards specified in the Raleigh Street Design Manual.

Private alleys are not dedicated to the public and shall not be publicly maintained.

### Homeowners' Association

In no case shall the City be responsible for failing to provide any emergency or regular fire, police or other public service when such failure is due to lack of access to such areas due to inadequate design or construction, blocking of access routes, inadequate maintenance or any other factor within the control of the developer, homeowners' association or occupants.

In no case shall any approval, permit or certificate granted be valid unless the homeowners' association documents clearly indicate the limitations of governmental responsibility and unless all conveyances indicate those limitations provided, however, the provisions of this section and all other provisions of the homeowners' declaration are applicable to the portions of the development conveyed and the owners of the conveyed portion, whether or not any such provisions are incorporated into the conveying documents.

### Locked Gate Access

Any private street in existence or approved prior to September 1, 2013 may be considered for gated access.

All private streets and drives with access limited by locked gates or similar devices must provide a pass-key and lock-box of a type, at a location and installed in a manner as may be required by the City fire department for the provision of emergency access.

The owner, including any homeowners' association, shall maintain the lockbox, gate and gate lock in a working order so as to ensure accessibility by emergency personnel and vehicles.

The City and other applicable governmental entities and their respective emergency personnel shall be granted in writing the right, without liability, to break the locked gate or such similar device when emergency personnel reasonably believe that doing so is necessary to save life, prevent serious bodily harm, put out a fire, to prevent a crime or to apprehend an apparent lawbreaker or to avert or control a public catastrophe.

### Traffic Flow

It shall be the responsibility of the homeowners' association to establish speed limits and to maintain uninterrupted traffic flow along all private streets. If it is necessary for "no parking" signs to be erected, for street lights to be installed, for repairs to be made or towing of vehicles to be undertaken, this is all to be done at the expense of the homeowners' association.

### Street Signs

All streets must contain identification as required in [Section 7.3.13 H](#).

**Setbacks and Lot Widths**

All private streets shall be treated as public street rights-of-way for purposes of determining required setbacks and lot widths.

**Maintenance**

The final plat shall be conditioned as follows:

Require perpetual maintenance of private streets by a homeowners' association to the same standards as connecting public streets for the safe use of persons using the streets; and

State that the City has absolutely no obligation or intention to ever accept such streets as public right-of-way.

DRAFT

## CHAPTER 4 PLAN AND PERMITTING REQUIREMENTS

The Engineering Review Group for the Transportation Field Services division reviews all plans that are submitted to the City of Raleigh through the different processes to ensure that proposed development and construction within public rights-of-way and site layout in Raleigh's jurisdiction are in compliance with all applicable codes and standards. Permits and approvals are required for plans by the City of Raleigh and North Carolina Department of Transportation (NCDOT hereby). Applications and checklists, along with information about the individual processes can be found on the [Guide to Raleigh's Development Process Article](#).

### Article 4.1 Right-of-Way Permits

For all permit submittal requirements, permit issuance, and fees, please see the Development Services – Customer Service Center and the current [Development Fee Schedule](#). Some projects may require additional processes based on the impact to the public right-of-way.

- A. **Site Final** - The inspector will check the condition of the existing and new infrastructure improvements, and site related items.
- B. **Construction Purposes** - When work occurs in the public right of way such as lane closures, sidewalk closures and items not pertaining to street or sidewalk repair or improvements, this permit will be required.
- C. **Driveway/Sidewalk** - When new curb cut construction is proposed, this permit will be required. When new sidewalk construction is proposed, not related to Infrastructure Construction Drawings, this permit will be required.
- D. **Street Cut permits (Permit to do work in the Public Right of Way)** - When existing sidewalk or a driveway is modified or replaced, this permit will be required. When utility contractors are doing work in the public right of way, this permit will be required. Use this link for the application [Work on Public Ways \(Street Cut\) Permit Application](#).
- E. **Lane Closure Permit** - A permit required for the closure of a travel lane and/or parking lane measured from Back of Curb to Back of Curb. This permit is issued by the Transportation Operation Division of Public Works.

### Article 4.2 Encroachments

The Encroachment approval is a process by which private property owners, firms or corporations may request use of the Public Right of Way for private purposes, such as landscaping, structures or outdoor dining. This review process is intended to ensure the health and safety of the public, as well as protection against potential damage to the streetscape, trees and vegetation, sidewalks, streets, and other publicly owned amenities.

Major Encroachments are permanent structures for private use in the public right-of-way in any part of the City. City Council reviews and approves major encroachments following City staff reviews.

Minor Encroachments are temporary items for private use in the public right-of-way. Examples include outdoor dining tables, awnings and street vending carts. [The Standards for Private use of Public Spaces \(PUP's\)](#) is a guide for procedures and standards for approval. Requests for minor encroachments are reviewed and approved by City staff.

### Article 4.3 Travel Lane and Sidewalk Closures

- A. All sidewalk, traffic lane, and on street parking closures must allow for safe vehicular traffic flow and pedestrian access around the construction site
- B. Sidewalk closures result in re-routing pedestrian traffic and must be reviewed for the safe movement of pedestrians and meet [American with Disability Accessible Design Requirements](#), and the [Public Right of Way Advisory Group \(PROWAG\)](#) guidelines during construction.
- C. Travel lanes and parking lanes must meet [Manual on Uniform Traffic Control Devices \(MUTCD\)](#) standards.
- D. [The building department may become involved with the review when a covered sidewalk and/or tunnels are introduced to the plan.](#)

Extra planning and design must be considered to provide for safe movement of vehicular and pedestrian traffic in areas where pedestrian activity is a priority such as Pedestrian Business Overlay Districts (PBOD's), where the DX district is mapped, or where SF, UG or UL frontages are mapped.

Right-of-way plan elements for temporary street/sidewalk closures must include the following at a minimum:

1. Location of the building or job area
2. Location of the sidewalk
3. Location of on-street parking
4. Location of any transit facilities
5. Direction of travel lanes
6. Location of any streetscape item (utilities, street furniture, trees, signs)
7. Location of transit stops
8. Description of same improvements 100 feet to either side of the site
9. Location of eight foot chain link fence
10. Location of covered sidewalk and details of construction in accordance with the NC State Building Code, Chapter 33
11. Site accessibility/ADA requirements in accordance with the NC Building Code
12. Compliance with Site Access as required in [Section 8.3.5 of the UDO](#)
13. Type and Location of barricades
14. Location of traffic merge cones
15. Location of businesses affected by barricades and/or fences
16. Estimated timeframe for project
17. Any items that will be affected by the closure
18. Logistics and construction phasing from the contractor
19. [Traffic Control Plan and Pedestrian Notes](#)

## Article 4.4 NCDOT Coordination

- A. Any time a project has the potential to impact a State-maintained roadway, all efforts should be made to coordinate with the North Carolina Department of Transportation (NCDOT). Therefore, a joint meeting between the applicant, NCDOT and the City is often recommended early in the process to discuss project specifics. They include, but are not limited to, access location and types, potential roadway improvements, necessary Right of Way dedication and a project timeline.
- B. Within the City of Raleigh's jurisdiction, the City has site plan approval for developments; however on State-maintained roadways the NCDOT has the ultimate authority for any work in the Right-of-Way. It is the sole responsibility of the requesting party to determine if a street is State-maintained or not.
- C. It is common for a project to involve both the NCDOT and the City of Raleigh. Plan submittals, review and approvals should be coordinated concurrently with both agencies to avoid conflicting requirements. In situations where an agency's regulation differs from that of the other agency, the more restrictive of the two shall govern.
- D. Applicant is encouraged to coordinate early and often with the two agencies, because NCDOT's review process does not always coincide with the City's, the Notification of any changes to a project's plan based on review comments or requirements is essential to avoiding delays in the approval process.
- E. The NCDOT's Street and Driveway Access Permit Application requires a Local Governmental Authority's approval prior to submission. The City must have an approved Site Plan prior to signing the back of NCDOT's application form. Likewise, the City will withhold final Construction and/or building permits approval until all executed NCDOT permits are approved.
- F. As a project moves forward into the construction phase, both the NCDOT and the City of Raleigh have enforcement authority to ensure safety in the Right-of-Way is not being compromised. Both agencies have the ability to affect a project's progress if there is reason to believe proper construction practices are not being adhered to and/or if unsuitable materials are being used in the Right of Way. Failure to comply with permits and the approved plans may result in revocation of permits.
- G. The City of Raleigh has the authority to withhold the issuance of a Certificate of Occupancy until all work is completed and in compliance with the approved permits.
- H. For additional information regarding the coordination between NCDOT and the City of Raleigh please see [NCDOT Policy on Street and Driveway Access To North Carolina Highways Manual](#) Chapter 2, Section A."

## Article 4.5 Centralized Delivery Requirement by the US Postal Service

The former process that allowed residential developers to choose between curb line and cluster box delivery, for new construction, is no longer in place. In April 2012, the Postal Service changed this process and USPS now determines the type of delivery that is most efficient appropriate for the area to be served.

During the development stage of a new subdivision, it is the responsibility of the customer (developers and builders) to provide the necessary mail receptacle equipment. The City of Raleigh does not allow encroachments in the public right-of-way for the mail receptacles. The developer or builder may place the mail receptacle in an easement on private property, or set aside a lot that residents of the subdivision can utilize by vehicle or foot and pick up mail.

The [Modes of Delivery and Installation Standards](#) provide information for developers to ensure that the project will receive mail service. More information on installation requirements can be provided by the Growth Development Coordinator for the US Postal Service. For contact information please visit the [USPS Delivery Requirements](#) page on the City of Raleigh Website.

DRAFT

## Article 4.6 Plot Plan Information for Residential Curb Cuts and Driveways

When a curb cut for a new driveway apron is proposed, or new sidewalk is installed, a Right-of-Way permit for a driveway cut or sidewalk installation must be obtained first. This requirement applies to property where there is a dwelling or a proposed dwelling.

If a curb cut exists, but no sidewalk section exists behind the driveway apron, A Right-of-Way permit for sidewalk installation will be applied to the project.

Existing driveways or sidewalk sections that are replaced like-for-like without any modifications or additional linear footage can be handled by filling out a [Work on Public Ways \(Street Cut\) Permit Application](#).

A Right-of-Way Permit is not needed for a driveway or any other work that does not extend into the right-of-way.

### Section 4.6.1 Plot Plan Requirements

When a curb cut for a new driveway apron is proposed, or new sidewalk is installed, a Right-of-Way permit for a driveway cut or sidewalk installation must be obtained first. Use this [Driveway Cuts](#) link to access the web article for more information on plan submittal and prerequisites.

This section elaborates on the additional requirements for plot plan depictions for a driveway permit. Further information about standard residential driveways can be found in the [Raleigh Standard Detail Drawings, Detail T-10.01.1](#), and [Detail 10.01.2](#). For a residential driveway on valley curb see [Detail 10.02](#). For residential driveway installation on non-curb and guttered street see [Detail 10.03](#).

Also see the following [Sample Plot Plans for residential driveway depictions](#).

1. Plans shall bear the Note: "ALL CONSTRUCTION SHALL BE PER CITY OF RALEIGH AND/OR NCDOT STANDARDS AND SPECIFICATIONS."
2. Show the property lines and dimension the subject lot.
3. Show location of residential structure.
4. Show and dimension any existing curb and gutter, and existing sidewalk.
5. Show recorded sight distance triangles or sight easements across the property frontage.
6. Locate and dimension all existing and proposed driveways, and their radii.
7. Residential driveways dimensions are required to be per [Table 7 Driveway Dimensions](#) and perpendicular to the street within the right-of-way.
8. The driveway must be a minimum 18 feet in length as measured from the right-of-way line to the face of the garage or structure.
9. Label street name and dimension street right-of-way(s) width(s).
10. Non-alley loaded driveways may intersect a street no closer than 20 feet from the intersection of two street rights-of-way. The minimum corner clearance from the curb line or edge of pavement of intersecting streets shall be at least twenty (20) feet from the point of tangency of the radius curvature, or twenty (20) feet from the intersection of right-of-way lines, whichever is greater. The radius of the driveway shall not encroach on the minimum corner clearance.
11. Driveways must be located a minimum of 3.5 feet from the side lot line, however, a driveway may be located on the lot line closer than 3.5 feet if it is shared with an adjacent lot. [See Page 3 for sample](#)
12. No residential lot may have more than two driveways on the same street.

13. Driveways may be no closer than 40 feet from any other driveway (measured from inside edge to inside edge of proposed driveway).
14. Show any structure in the public right-of-way (Power poles, storm boxes, etc.)
15. A sight distance triangle may be required to be shown when there are potential obstructions in the right of way such as trees, challenging topography, or fences and walls.
16. The minimum driveway depth (18') cannot encroach on a recorded sight distance easement.
17. Any proposed sidewalk construction per approved infrastructure Construction Drawings if applicable.
18. All non-utilized curb cuts must be removed and replaced with standard curb and gutter or abandoned (on non-curb and guttered streets).
19. Gravel driveways are not permitted in the public right-of-way. All installation on any street (curb and gutter, non-curb and gutter) must meet the Transportation Details standards.

DRAFT

## CHAPTER 5 ADMINISTRATIVE REQUIREMENTS

### Article 5.1 Design Adjustments

- A. The purpose of a Design Adjustment is to allow a developer to seek variance from specific elements of the Unified Development Ordinance. All Design Adjustments shall be reviewed in accordance with the provisions of [Section 10.2.18](#) of the [Unified Development Ordinance](#) and the applicable Design Adjustment findings.
- B. A request for Design Adjustment may be submitted at the time of application for a preliminary subdivision plan, site plan or plot plan. A Design Adjustment may also be requested by staff during plan review if it is deemed necessary. The application cannot be processed until a plan is in review. The Design Adjustment must be approved prior to any plan approval.
- C. Further information about Design Adjustments can be found in the [Design Adjustments Article](#)

#### Section 5.1.1 Design Adjustment Procedure per the UDO

This Information can be found in [Section 10.2.18](#) of the [Unified Development Ordinance](#)

##### **Applicability**

The Public Works Director has the authority to approve a request for a design adjustment set forth in this UDO. All design Adjustments shall be reviewed in accordance with the provisions of this section and the applicable design adjustment findings.

##### **Application Requirements**

An application for a design adjustment shall be submitted in accordance with Sec. 10.2.1.B. A request for a design adjustment must be submitted at the time of application for a preliminary subdivision plan, plot plan or site plan or at such time the design adjustment is proposed in conjunction with the review of infrastructure construction plans, a plot plan or site plan.

An application for a design adjustment must be signed and notarized by the property owner in order to initiate a request for an adjustment. The applicant shall submit pertinent material necessary for review; in addition to the submittal material required for a subdivision, plot plan or site plan. This may include detailed landscape plans, roadway cross-sections, site or subdivision layout or other project-specific information.

##### **Public Works Director Action**

In reviewing the design adjustment, the Public Works Director shall consult with the heads of the departments of Planning, Public Utilities, Transportation, Parks and Recreation, Inspections and the Fire Department to check the proposed request against the requirements of this UDO and other applicable technical requirements of the City.

The Public Works Director shall consider the applicable intent statements and design adjustment findings for the request and either approve, approve with conditions or deny the request within 60 days of the receipt of a completed application.

Additional review time may be necessary when the design adjustment involves review by another municipal or state entity or when detailed engineering studies are submitted to or required by the Public Works Director.

The reasons for such approval or disapproval shall be stated in writing. In accordance with [Section 10.2.1 C 6](#), notice of the decision shall be provided to the applicant and the property owner (if the property owner is not the applicant) and to each person who has filed a written request for notice with the Public Works Director prior to their decision.

Within 30 days from the date the application was decided, an appeal of the Public Works Director's action may be made to the Board of Adjustment in accordance with [Section 10.2.11](#).

## Article 5.2 Fees-in-Lieu for Infrastructure and Streetscape

Where the Public Works Director determines that construction of public improvements would not be feasible, a fee in lieu may be permitted. In this instance, right-of-way dedication and all necessary easements shall be dedicated to the City. Engineering drawings may be required to determine the extent of public improvements and easements.

The installation of the designated streetscape is part of the construction of public improvements and shall be subject to a fee in lieu when the street is not to be constructed. In the event the streetscape is not installed, a fee shall apply based on each tree required or tree grate that is required.

When a Fee-in-lieu has been paid previously, the Developer will be responsible for the difference between the new infrastructure requirements and the previous infrastructure requirements. Please refer to the [Development Fee Schedule](#).

### Section 5.2.1 Exemptions to Fee-in-lieu and/or Construction

- A. Streets with curb and gutter, other than Thoroughfare or Major Street system roadways, which were built pursuant to earlier City or State paving standards, do not have to be widened unless such widening is needed to alleviate safety problems or increased traffic congestion. Sidewalk construction, curb and gutter improvements, right-of-way dedication, and fees for additional pavement and streetscape improvements required in this chapter shall not be exempted by this provision.
- B. Exemptions for construction shall be provided for existing single-family lots, single-family subdivisions which have all lots fronting on existing streets, and multi-unit conversions of existing single-family homes, except when construction is needed to extend adjacent street and sidewalk facilities.
- C. Exemptions for construction and fee-in-lieu payment for curb and gutter and sidewalk shall be provided for frontage on roadways that are exempt from curb and gutter requirements, such as streets within a Watershed Protection Overlay District. Construction or fee-in-lieu payment for additional pavement widths to provide sufficient travel lane or shoulder widths per minimum City or State standards may still be required.
- D. Exemptions for construction may be provided for frontage along future thoroughfares when construction as part of the development is not required in the plan approval process.
- E. Exemptions for construction and fee-in-lieu payment may be provided for frontage along streets approved for construction funding by the State Transportation Improvement Program or other State funding programs, provided that the NCDOT Board of Transportation has authorized the project for public bid or for right-of-way acquisition. The City's street improvement assessment policies may be applicable in these cases, as directed by the City Council.

- F. Exemptions may be provided for frontage along streets approved for construction funding in the City's Capital Improvement Program, provided that the City Council has authorized the project for public bid or for right-of-way acquisition. The City's normal street improvement assessment policies will be applicable in these cases, as directed by the City Council.
- G. Exemptions for street construction and fee-in-lieu payment may be provided for frontage along existing or planned future roadways having full control of access (i.e., no direct access from the property to the roadway is permitted)
- H. Exemptions for construction may be provided where the City for the same improvements or on a property where assessments for same street improvements by the City were previously levied has received a previous fee-in- lieu payment. In certain cases, the City may elect to refund a previous fee-in- lieu payment if the Public Works Director determines that construction of frontage improvements would be more appropriate.
- I. **No Street Tree fee will be required for street trees around the bulb of a cul-de-sac. The Street trees end where sidewalk ends per detail T-10.06.**

### Article 5.3 Surety

Sureties are required for all public improvements. For further information about the process, see "Sureties" on [www.raleighnc.gov](http://www.raleighnc.gov). This information can be found in [Section 8.1.3 of the UDO](#).

#### Construction Surety

If all development-related improvements and installations are not completed and accepted by the City prior to a request to record all or a part of any subdivision or issuance of a building permit for any site plan, whichever first occurs, a security instrument shall be posted, in lieu of completion of the work, in an amount of 125% of the estimated construction cost of the development related improvements which remain incomplete and with surety and conditions satisfactory to the City, providing for and securing to the City the actual construction and installation of improvements.

All development-related improvements that are secured by a surety shall be installed prior to the issuance of the first certificate of occupancy within the subdivision phase or prior to the issuance of the first certificate of occupancy for the site plan, whichever event first occurs on the property. Except the final coat of asphalt for street improvements and the installation of permitted street furniture or sidewalks may at the option of the applicant be installed within 24 months following the issuance of the first certificate of occupancy provided surety in the amount of 125% of these improvements are first provided to the City. Where improvements are required on a State-maintained road, a 100% construction surety is required. In this instance, proof of bond or surety with the State must be supplied to the City.

Where the Public Works Director determines that landscaping in the public right-of- way cannot be installed due to inclement weather conditions, a surety in the amount of 125% of the value of the landscaping shall be provided to the City, in accordance with Sec. 8.5.1.B. The landscaping improvements shall be installed within 12 months of issuance of the conditional letter of acceptance.

#### Acceptance

Any development-related improvements shall not be officially accepted until the improvements have been inspected by the City, corrections are made in the field and on the approved infrastructure construction plans, a reproducible copy of the as-built drawings is provided to the Public Works Department and the warranty required in the following section is provided to the City.

## Warranty

All development-related improvements must have a warranty guaranteeing the work against defects for a period of 2 years from the date of final acceptance of construction.

If the development-related improvements are constructed at different times, then the guarantee shall continue until 2 years from the date of final acceptance of the improvement last completed.

The warranty shall list the City as a beneficiary.

A warranty surety shall be provided in an amount of 15% of the estimated value of the warranted development-related improvements. The surety shall expire 6 months after the expiration of the warranty period.

## Article 5.4 Reimbursements

Reimbursements can be requested for public improvements. The [Reimbursement Zone Map](#) lays out the areas where each reimbursement applies to. See the [Infrastructure Reimbursements Article](#) for additional information and a [Sample Reimbursement Application Packet](#).

This information can be found in [Section 8.6.3 of the UDO](#).

### . Improvements Eligible for Reimbursement

The City will pay to the developer unit costs in the Development Fee Schedule for development-related improvements over and above the unit costs for applicable streets.

The following installations are eligible for reimbursement:

- a. Any street construction in excess of the minimum standard needed to serve the development;
- b. Any right-of-way dedication in excess of the minimum standard needed to serve the development; and
- c. Right-of-way for controlled-access freeways.

Reimbursements are subject to availability of funds and eligibility for reimbursement through the City's facility fee program.

### Method and Conditions of Reimbursement

All general and development-related improvement costs shall be based on the Development Fee Schedule, provided that the City Council shall grant alternative mitigation when the total expenditures for both the thoroughfare facility fees and road improvement costs in excess of the applicable street improvements exceed the costs attributable to the development for Thoroughfare construction within the benefit area as indicated in [Article 8.9 Facility Fees](#).

Current reimbursement fees are listed in the Development Fee Schedule, kept on file by the Planning and Development Officer and are updated and adopted by the City Council.

No monetary payments will be allowed if the developer utilizes the dedicated right-of-way for impervious surface coverage in the -FWPOD, -SWPOD or -UWPOD.

T The dedicators shall waive their statutory right to withdraw dedications prior to receiving any payment.

Reimbursements shall be paid at the rate in effect when dedication occurs or construction costs are incurred.

The City shall pay such other costs incidental to the development of the general area which, in the opinion of the City Council, should properly be borne by the City. The City Council shall set forth the terms of such payment.

**Expiration of Reimbursement**

Any request for reimbursement for street, greenway or utility installation must be submitted to the City within 2 years of completion and final acceptance by the City or State, whichever is applicable.

DRAFT

## CHAPTER 6 INFRASTRUCTURE REQUIREMENTS

### Article 6.1 Infrastructure Sufficiency

- A. Every Subdivision or Site Plan shall be subject to a determination of the infrastructure sufficiency, to lessen congestion in the streets, to facilitate the efficient and adequate provision of transportation, water and sewage, and to secure safety from fire.
- B. Infrastructure shall be considered sufficient where it is demonstrated to have available capacity to accommodate the demand generated by the proposed development as well as other approved developments and PD Master Plans.
- C. In order to avoid undue hardship, the applicant may propose to construct or secure sufficient funding for the facilities necessary to provide capacity to accommodate the proposed development at the adopted level of service. The commitment for construction or advancement of necessary facilities shall be included as a condition of development. More information can be found in [Article 8.2 of the UDO](#).
- D. **Plot plans may not be subject to infrastructure improvements, but will be reviewed and can be subject to safety improvements.**

#### Section 6.1.1 Roadway Construction Through- and Adjoining Developments

- A. All public roadways inside the corporate limits of the City shall be constructed in conformance with City standards and specifications; however, if the roadway is maintained by NCDOT, then the roadway shall be constructed in conformance with either City or NCDOT standards and specifications, whichever is more stringent.
- B. All public roadways that are outside the corporate limits of the City and when water or sewer is connected to the City utility system, or made available within one (1) year after approval of a development plan, shall be constructed in conformance with either City or NCDOT standards and specifications, whichever is more stringent.
- C. Roadways that are outside the Corporate limits of the City and where neither City water nor sewer are available or made available within one (1) year after approval of a site plan, shall be constructed in conformance with NCDOT standards and specifications. The City of Raleigh Public Works Department will not require any exactions above and beyond NCDOT requirements.
- D. Roadways that are within a Watershed Protection Area Overlay District or classified as a sensitive area thoroughfare, shall be constructed in conformance with either City or NCDOT standards and specifications, whichever is more stringent.
- E. The minimum design cross-section for roadways constructed to City standards are illustrated in City of Raleigh Standard Details. Consult NCDOT for minimum design cross-sections for roadways that require their approval.

#### Section 6.1.2 Minimum Paving Construction

- A. The developer shall be responsible for the cost and installation of the applicable width and pavement design requirements. Frontage improvements shall be installed for roadways in accordance with adopted City or State standards and specifications. The developer shall make off site street improvements constructed to minimum street pavement standards in accordance with this section.
- B. Minimum street pavement standards shall be twenty feet (20 feet) from edge of pavement to edge of pavement for two way streets. The street width may be increased at the discretion of the City, if required to mitigate safety problems or expected increases in traffic congestion.

- C. The developer shall also provide additional pavement surfaces for turning movements to serve the development where prescribed by a traffic impact analysis or as specified elsewhere in this chapter. Street improvements required in excess of minimum paving construction standards associated with a site plan may be eligible for reimbursements per [Section 8.6.3 of the UDO](#). Additional pavement surfaces required to accommodate turning movements generated by the development are not eligible for reimbursement.
- D. The City may elect to require payment of a fee-in-lieu of installation to the applicable minimum paving construction standards as outlined in this section. Methodology for requiring fee-in-lieu payments is specified in the City's administrative regulation for "Fee-in-lieu of Determination and Administration.
- E. An exemption from paving construction requirements shall not relieve the developer of a payment in-lieu of construction unless otherwise specified.
- F. An asphalt overlay may be required for the frontage along developments when there are multiple cuts and/or the road has been damaged by construction traffic.

DRAFT

## CHAPTER 7 TRAFFIC IMPACT ANALYSIS

### Article 7.1 Traffic Studies

In order to better serve the public, the City of Raleigh has adopted a set of minimum standards for traffic studies. This document provides guidance to ensure consistency, to make findings more accurate and to maximize confidence in the results. Deviation from these practices requires justification. By reviewing reports, plans, and submittals, the City of Raleigh in no way relieves the traffic engineer of possible claims or additional work resulting from errors or omissions.

The purpose of a Traffic Study is:

- a) To provide reliable guidance on short- and long-range planning of site access and off-site improvements
- b) To assist developers and property owners in making critical land use decisions regarding traffic and other modal needs
- c) To provide government review agencies with recommendations for achieving responsive and consistent transportation and access policies

There are three main types of traffic studies:

1. Trip Generation Report: calculates the expected AM/PM peak hour traffic generated by a proposed development or change of use
2. Traffic Assessment: calculates the expected AM/PM peak hour traffic and quantifies the current amount of capacity, delay and queuing at nearby intersections
3. Traffic Impact Analysis: includes all information in a traffic assessment and analyzes future traffic operations based on impacts generated by the proposed development or change of use

Street and intersection capacity shall be measured based on the methodology of the Highway Capacity Manual (latest edition). Traffic volumes shall be computed by the methodology of the Institute of Transportation Engineers (ITE).

#### Section 7.1.1 Initiating Traffic Studies

In considering the transportation aspects of land development, it is important to determine early in the process if and when a traffic study is needed. Not all land development projects warrant a traffic impact analysis; City staff shall determine when trip generation, traffic assessment or traffic impact analysis reports are required.

*Guidance: For rezoning cases, the basis of comparison for trip generation thresholds will be the difference between the maximum allowable land use intensity under current zoning compared to the maximum land use intensity under the proposed zoning. For site plans and subdivisions, the basis of comparison for trip generation thresholds shall be the difference between trips generated by the site at the time of preliminary plan submittal versus the expected increase in roadway trips upon development of the site.*

### Section 7.1.2 Criteria requiring Traffic Studies

Traffic studies are required for development projects based on four criteria, outlined here.

1. **Land Uses:** Traffic impact analyses shall be required for the following land uses
  - a. Single Family Residential Developments  $\geq$  150 Dwellings
  - b. Apartment Developments  $\geq$  240 Dwellings
  - c. Residential Condo/Townhome Developments  $\geq$  300 Dwellings
  - d. General Office Buildings  $\geq$  64,000 sq.ft.
  - e. Medical Office Buildings  $\geq$  47,000 sq.ft.
  - f. Shopping Centers  $\geq$  23,000 sq.ft.
  - g. Supermarkets  $\geq$  20,000 sq.ft.
  - h. Convenience Market w/ Gas Pumps: 6 or more Fueling Positions<sup>1</sup>
  - i. Pharmacy w/ Drive-Thru  $\geq$  29,000 sq.ft.
  - j. Drive-In Bank  $\geq$  11,500 sq.ft.
  - k. Fast-Food Restaurant w/ Drive-Thru  $\geq$  6,000 sq.ft

*Guidance: The land use sizes listed in Section 7.1.2 are intended for development of vacant parcels. For developed parcels, the assessment of need for a traffic study will be based on the expected change in traffic volume.*

2. **Traffic Volume:** Traffic impact analyses shall be required for the following trip volumes:
  - a. Peak Hour Trips  $\geq$  150 veh/hour
  - b. Peak Hour Trips  $\geq$  100 veh/hour if primary access is on a 2-lane road
  - c. More than 100 veh/hour trips in the peak direction
  - d. Daily Trips  $\geq$  3,000 veh/day
  - e. Enrollment increases at public or private schools

*Guidance: The volumes listed in Section 7.2.2 are for new trips on the public street system after deductions for pass-by trips and, for mixed-use developments, internal capture trips.*

3. **Site Context:** Traffic impact analyses shall be required when the following conditions exist in the vicinity of the development site:
  - a. Affects a location with a high crash history [Severity Index  $\geq$  8.4 or a fatal crash within the past three years]
  - b. Takes place at a highly congested location [volume-to-capacity ratio  $\geq$  1.0 on both major street approaches]
  - c. Creates a fourth leg at an existing signalized intersection
  - d. Exacerbates an already difficult situation such as a RR Crossing, Fire Station Access, School Access, etc.
  - e. Access is to/from a major arterial roadway such as a Parkway, Multi-Way Boulevard or Multi-Lane Avenue

---

<sup>1</sup> Fueling positions are defined as the maximum number of vehicles that can be fueled simultaneously

- f. Proposed access is within 1,000 feet of an interchange
- g. Involves an existing or proposed median crossover
- h. Involves an active roadway construction project
- i. Involves a break in controlled access along a corridor

4. **Miscellaneous Applications:** Traffic impact analyses shall be required:
- a. In response to Raleigh Planning Commission concerns, or
  - b. As directed by the Raleigh City Council

### Section 7.1.3 Study Area

The extent of a traffic study depends on the location and size of the proposed development and the conditions prevailing in the surrounding area. It is recognized that an excessively large study area may unnecessarily increase costs, time and effort for the developer, the traffic engineer and City staff. Alternatively, an inappropriately small traffic study area may fail to include roadway segments and/or intersections that would need to be improved to accommodate the trips generated by a proposed development.

Any traffic study that analyzes off-site impacts shall include all site access points and major intersections (signalized and unsignalized) adjacent to the site.

*Guidance: City staff (with input from the developer's traffic engineer) will determine any additional areas to be included based on local or site-specific conditions, development size or neighborhood sensitivities. The study area boundaries may also be influenced by impacts other than pure capacity issues such as neighborhood cut-thru trips, known congestion issues, accident history, temporary anomalies in the existing roadway system that would influence travel patterns, long-range transportation planning goals, etc.*

### Section 7.1.4 Traffic Study Scope

It is critical that all parties discuss the traffic study early in the planning process. An understanding as to the level of detail and the assumptions required for analysis will be determined at that time. In addition to learning the study issues, coverage and level of detail, the traffic engineer must obtain and verify the following information:

- a) Available traffic counts
- b) Information about available transit, bicycle and pedestrian facilities
- c) Committed and planned roadway improvements and the schedule for those improvements
- d) Approved development and background traffic data
- e) Applicable agency codes and policies
- f) Existing congestion locations within the study area
- g) Crash data for all intersections and/or street segments within the study area
- h) Traffic signal timings
- i) Committed and planned signal system improvements
- j) Neighborhood sensitivities
- k) Other traffic-related issues determined by City staff

*Guidance: City staff will assist the traffic engineer in obtaining all information needed to initiate and complete the traffic study.*

**Existing Conditions:** Once all information listed in the study scope has been obtained, it is used to create an existing conditions traffic model. The existing conditions model will be used to create a foundation for assessing the land use and traffic impact changes over time. Thus it is critical that the existing conditions model be as accurate as possible.

Traffic volumes shall reflect normal weekday and/or peak hour traffic conditions. When submitting a traffic study document for review, the traffic counts used for capacity analysis purposes shall have been taken no more than one year prior to the submittal date of the document. Exceptions to this standard can be approved on a case-by-case basis. In some cases, it is necessary to conduct new traffic counts. Counts shall not be taken on holidays, when school is not in session, during adverse weather or when special events occur. The existing conditions model shall accurately reflect the current street and traffic control environment including, but not limited to:

- a) Road geometry
- b) Number and type of travel lanes
- c) Auxiliary turning lanes, storage lengths and tapers
- d) Medians and two-way left turn lanes
- e) Traffic volumes, including heavy vehicles and pedestrians
- f) Transit stops, exclusive bicycle lanes and on-street parking (when applicable)
- g) Cycle length, signal offsets, splits and phase sequence
- h) Detector layout and detector settings
- i) Phase settings such as recall mode, volume-density settings, minimum green, maximum green and clearance times
- j) Two-way and all-way stop control
- k) Roundabouts and other unconventional intersections

Guidance: *City staff will assist the traffic engineer in obtaining turning movement counts, existing signal plans and current signal timings from City of Raleigh archives.*

**Non-Site Traffic Forecast :** Estimates of non-site traffic are required to complete the analysis of horizon year conditions. Non-site traffic volumes, when added to existing volumes, are typically known as Background Traffic. These estimates characterize the “base” conditions, i.e., traffic conditions prior to a site being redeveloped. Non-site traffic consists of two components: existing traffic volumes projected forward to the horizon year using an annual grow rate and trips generated by approved developments within or adjacent to the study area.

Projections of existing traffic volumes to the horizon year are dependent on an assumed annual growth rate. City staff (with input from the developer’s traffic engineer) will determine the appropriate growth rate based on information such as the Triangle Regional Traffic model, historical daily traffic volumes obtained from NCDOT, existing turning movement counts, previous traffic studies or other sources.

Guidance: *City staff will provide any necessary information on approved development trips within the study area.*

**Site Traffic Generation:** The ITE *Trip Generation Manual* (latest edition) shall be used to compute Daily, AM peak and PM peak period trips for each land use. At the discretion of City staff, locally obtained trip generation data can be substituted. The ITE *Trip Generation Handbook* (latest edition) method shall be used to select between trip generation average rates and equations. Trip generation for individual outparcels shall be calculated separately from the remainder of the development. Some land uses require additional justification or local studies. For example, the use of Specialty Retail shall include definite plans for the specific retail that will be in place.

**Internal Capture Trips:** Internal capture calculations shall be used cautiously. The internal capture calculations shall utilize the percentages from the ITE *Trip Generation Handbook* (latest edition) to estimate the internal capture reduction percentage. Alternatively, the National Cooperative Highway Research Program Report 684 *Enhancing Internal Trip Capture Estimates for Mixed-Use Developments* can be used with concurrence of City staff. Reductions for internal capture shall be applied to multi- or mixed-use sites only. Internal capture shall not be taken for AM peak hours or from lodging land uses without prior approval by city staff. Internal capture procedures shall not be used on a retail-only site. The internal capture reduction shall be applied before the pass-by trips are calculated.

**Pass-by Trips:** Pass-by percentages shall be obtained from the ITE *Trip Generation Handbook* (latest edition). Pass-by percentages shall only be applied to land uses numbered in the 800s and 900s. For multi-use developments, pass-by percentages shall be applied to the retail component only. Pass-by trips shall not exceed 10% of the total volume on the adjacent street.

**Alternative Mode Trips:** Increasingly, site trips are made by alternative modes such as transit, bikes and walking; City staff recognizes this trend. Reductions in passenger car trips due to alternative modes will be considered, case-by-case, provided that the rationale behind the reduction is clearly stated and evidence or data to support the reduction is reviewed and approved by City staff.

**Site Traffic Distribution and Assignment:** The expected volume of trips generated by a development must be distributed and assigned to the roadway network so that traffic impacts on intersections and street segments can be analyzed and quantified. Site traffic distribution shall be based on clearly stated assumptions and the rationale behind those assumptions. Primary trip distribution shall be based on a gravity model. Pass-by trips shall follow the existing volume distribution of the primary access road.

*Guidance: All efforts should be made to ensure that upstream and downstream traffic volumes along corridors balance and maintain continuity. If balanced volumes are not attainable, explanation must be provided. Documentation regarding the balancing methodology must be provided in the technical appendices.*

**Crash History:** The traffic study report shall include a section on the accident history of study area intersections and/or street segments. It must assess the number and types of accidents that have occurred in the past three years; it must evaluate the accident severity. If any of the study intersections have a high Severity Index, i.e., greater than 8.40, the report shall discuss possible countermeasures. The North Carolina Department of Transportation maintains a database of all reported accidents that occur within the state. NCDOT has developed special software known as TEAAS<sup>2</sup> to analyze and report on crashes that occur on roadway segments. TEAAS reports shall be included in the technical appendices. City staff will assist the traffic engineer in obtaining TEAAS reports from NCDOT.

### **Section 7.1.5 Traffic Analysis**

**Traffic Model Analysis Programs:** Except for very simple cases, all traffic analyses shall be produced with special software programs that are designed specifically for traffic model applications. For software to be acceptable it must be based on the most current Highway Capacity Manual methods.

---

<sup>2</sup> *Traffic Engineering Accident Analysis Software*

Synchro	Signalized intersection delay
	Unsignalized intersection delay
SimTraffic	Queuing and blocking
	Roundabouts
	Simulation
	Actuated signal cycle variables
	Arterial delay
	Arterial travel time
	Arterial speed and Level-of-Service
	Network total stops
	Network stops per vehicle
	Network fuel consumed
Network air quality/vehicle emissions	
Artplan	Multimodal Level-of-Service

*Guidance: Use of alternate analysis software must be approved by City staff; however the above software is not specifically endorsed by City staff. Other traffic analysis tools and programs will be considered on a case-by-case basis. City staff shall determine the appropriateness of the alternative models.*

**Measures of Effectiveness:** When performing analyses, providing overall intersection Level-of-Service alone is not sufficient. Items such as queuing, approach level of service, and volume-to-capacity ratio for example shall also be evaluated. The measures of effectiveness listed in Table 2 shall be used for all traffic studies unless waived by City staff.

Signalized intersection	Intersection average delay per vehicle
	Intersection level-of-service
	Approach average delay per vehicle
	Approach level-of-service
	Movement volume
	Percent of cycles maxed out (by phase)
	Maximum observed queue length
	Average queue length
	Upstream block time (%)
	Storage block time (%)
	Volume-to-capacity ratio (by phase)
	Intersection vehicle hours of delay
	Unsignalized intersection
Movement level-of-service	
Movement maximum queue length	
Arterial	Delay
	Travel time
	Speed
	Level-of-Service
Network	Stops per vehicle
	Fuel consumed
	Overall delay
	Air quality/vehicle emissions
	Multimodal Level-of-Service

*Guidance: Measures of effectiveness for isolated intersections, all intersections along a particular road or all intersections within a roadway network can provide important information when evaluating transportation and land use alternatives. Network and Arterial MOEs are not appropriate for every study. City staff will determine the appropriate measures of effectiveness for each traffic study on a case-by-case basis.*

Scenarios: Analyses shall be submitted for each of the following scenarios:

Scenario	Rezoning	Site Plan/ Other
Existing Year	Yes	Yes
Background/Horizon Year	Yes	Yes
Build-out under current zoning	Yes	Yes
Build-out under proposed zoning	Yes	No
Build-out in phases	No	Yes
Build-out with proposed mitigation	No	Yes

**Traffic Analysis Default Values:** The existing cycle length, signal offsets, splits and phasing scheme for all traffic signals within the study area shall be maintained for all analysis scenarios. Traffic models shall match the signal plans with respect to detector size, detector location and all other detector settings unless it can be demonstrated that the detectors have been field adjusted to other values. All nodes and links within the traffic models shall be accurately located based on NC Grid Coordinates.

Microsimulation programs, such as SimTraffic, shall use a seed time of 10 - 15 minutes and a recording time of 60 minutes. The resulting performance measures shall be averaged over at least 10 simulation runs.

The Base Saturation Flow Rate shall be used in accordance with the Highway Capacity Manual (latest edition). Lane Utilization Factors shall be used in accordance with the Highway Capacity Manual (latest edition). A Peak Hour Factor (PHF) of 0.90 shall be used. If traffic counts have been acquired, the resulting PHF may be used for existing and projected conditions. Where schools are present, a PHF of 0.50 shall be used for the AM peak period.

*Guidance: The seeding interval should be set to a minimum of 10 minutes or the length of time required for a vehicle to traverse the entire network (including stop time) whichever is greater.*

**Traffic Signal Timing:** If a proposed mitigation involves changing the cycle length, phase duration, phase sequence, splits or offsets of any traffic signal then the traffic engineer will be required to meet personally with Public Works staff in the Raleigh Traffic Control Center. The traffic engineer must demonstrate to Public Works staff's satisfaction that their proposed signal changes will not have unacceptable adverse impacts on other intersections or signals. Public Works staff will determine the area to be considered and the extent of the signal network to be studied. Public Works staff will determine the quality and quantity of information necessary to evaluate the proposed signal timing plan. Once Public Works staff has met with the developer's traffic engineer, staff will have five business days to decide if they will accept or not accept the proposed signal changes. City staff will reply to the traffic engineer in writing and either state explicitly that the proposed changes are acceptable or explain why the proposed signal changes were rejected.

Recommended storage lane lengths shall be provided for all exclusive turn lanes. The 95th percentile queue from a deterministic model or the maximum observed queue from a simulation (whichever is larger) shall be used to determine the storage lane length. Queuing shall not exceed the storage capacity of the approach. Full storage for queue lengths shall be rounded up to the nearest 25 feet with a minimum of 100 feet for both right-turn and left-turn lanes. A default taper length of 100 feet shall be modeled for all added lanes unless specific taper lengths are known.

**Multimodal Analysis:** All traffic studies shall include a section on Multimodal Level of Service (MMLOS). City Staff will provide information on obtaining software to automate the MMLOS analysis. The traffic engineer will provide an assessment and discussion of current MMLOS conditions in the body of the report as well as a description of how the proposed development will advance Multimodal Level of Service.

### **Section 7.1.6 Traffic Study Report**

The traffic study report is to be an objective, technical summary of the analysis process. The submitted traffic analysis document shall include, but is not limited to: a summary of the analysis and results, site plans, traffic counts and forecasts, volume generation, any assumptions used in the analysis, and any variations from these guidelines. It shall be signed and sealed by a Professional Engineer who is licensed to practice engineering in North Carolina. To facilitate examination by City staff and other interested parties, a one- or two-page executive summary that concisely summarizes the study purpose, findings and conclusions shall be provided.

The traffic study report shall include all current signal timing and signal offset data, obtained from the Raleigh Traffic Operations Center or NCDOT, in the technical appendices.

The traffic study report shall show a side-by-side comparison of background traffic performance measures at the network, arterial, intersection and approach levels to build-out performance measures. The report shall quantify and qualify the changes in magnitude. It will identify which traffic impacts are directly attributable to the development and discuss them in the body of the report.

The analyses shall be presented in a straightforward and logical sequence. The analyses shall lead the reader step-by-step through the various stages of the process to the resulting conclusion and recommendations. Sufficient detail shall be included so that City staff will be able to follow the rationale and methodology of the analysis.

Whenever possible, data should be presented in tables, graphs, maps and diagrams rather than narrative text. When appropriate, schematics drawings of roadway improvements, such as intersection reconfigurations, may be included and described in the text. Since the report may be read by nontechnical decision-makers and interested citizens, it should be as concise as possible with a minimum of jargon.

**Conclusion and Recommendations:** All conclusions and recommendations shall be based solely on information contained within the report; all findings shall be clearly documented. It is acceptable to cite publications within the public realm such as the Manual on Uniform Traffic Control Devices, the AASHTO Highway Safety Manual, Federal Highway Administration reports, etc., in order to provide supporting evidence or to articulate key points provided that the citation includes the title, section/chapter and page number of the reference source.

Recommendations where mitigation or improvements are identified “by others” shall clarify which parties are to provide the additional improvements. The traffic study report shall provide documentation that those parties have agreed to construct the additional improvements. The study shall not use planned, but unfunded improvements, by government agencies as a means of mitigation.

The traffic study report shall not include political views or statements, nor shall it take an advocacy position.

*Guidance: City staff reserves the right to impose additional conditions and to ask for additional information during the course of the review if warranted by obvious concerns over possible traffic impacts on adjacent properties, roads or intersections. Inadequate reports will be returned to the traffic engineer for completion or modification. In such cases, City staff will state in writing the report’s deficiencies and will provide direction for addressing those deficiencies.*

### Section 7.1.7 Infrastructure Sufficiency

Development plans and rezoning cases have a burden to prove that the expected increase in trips will not create unsafe or inefficient traffic conditions. Streets shall provide a level of service of LOS-E or better. If the expected increase in trips does create unsafe or inefficient traffic conditions, the developer must mitigate the traffic impacts. Mitigation may involve changes to signal timings, constructing additional lanes, restricting access, prohibiting left turns or other measures.

Where a traffic assessment report or traffic impact analysis demonstrates a degradation of overall intersection level of service below LOS-E or impacts to an existing intersection operating at level of service LOS-F, the proposed site plan may be approved provided that:

- a) The residential density does not exceed 50 units per acre, or
- b) The office floor area ratio does not exceed 0.5, or
- c) The floor area ratio for commercial uses does not exceed 0.25, or
- d) The peak hour delay at the intersection does not exceed what would be produced by development consistent with items A, B, or C above as shown by a Traffic Impact Analysis.

If items a, b, c, and d above are applicable, the applicant shall prepare and submit a traffic mitigation plan (see Article 7.2 Traffic Mitigation Plan) to the Public Works Director.

**Exceptions:** An exception to the infrastructure sufficiency requirements shall be granted for one or more of the following situations:

- a) The City has a capital improvement project within the adopted 5-year Capital Improvement Program that would improve the level of service above LOS-F
- b) NCDOT has proposed a project within the first four years of the adopted 7-year Transportation Improvement Program that would improve the level of service above LOS-F
- c) There is within  $\frac{1}{4}$  mile of the site plan an existing or funded transit stop that is served by one of the following: fixed or dedicated-guideway transit, five (5) vehicles an hour on a single route in one direction during peak commuting hours or ten (10) vehicles an hour in any direction during peak commuting hours
- d) The site is mapped with a conditional use district approved within the prior 20 years that includes a trip budget as a zoning condition, or
- e) If the property is zoned Downtown Mixed Use (DX-).

### **Section 7.1.8 Traffic Study Submittal Requirements**

Submit all traffic model data files, a pdf file of the traffic study report [including appendices] and two bound copies of the traffic study report directly to:

City of Raleigh, Office of Transportation Planning  
One Exchange Plaza, Suite 727  
Raleigh, NC 27601

City staff will acknowledge receipt of the report via email within 24 hours. Until acknowledged by City staff, the report has not been officially received.

*Guidance: Staff's preference is that one hard copy contains the body of the report and the second hard copy contains both the body and the technical appendix.*

### **Article 7.2 Traffic Mitigation Plan**

The mitigation plan shall identify capital projects and phasing strategies that would bring the development impact to within the acceptable threshold specified in Section 7.1.7. This plan may identify improvements undertaken by the private sector, the public sector or both. Site plan approval shall not be granted until the Public Works Director determines that the plan provides reasonable and adequate mitigation. Factors to be considered by the Public Works Director include:

- a) Whether the cost of the mitigation measures exceeds the value of the proposed development;
- b) Transportation demand management strategies including multi-modal improvements are included;
- c) Alternative access strategies are considered;
- d) New street connections are evaluated

### **Article 7.3 Shared Parking Studies**

As described in [Section 7.1.5 of the UDO](#), an applicant may request shared parking to meet the minimum vehicle parking requirements for mixed use projects or for multiple uses that are located near one another and which have different peak parking demands or operating hours.

#### **Section 7.3.1 Initiating Parking Studies**

Not all development projects are eligible for shared parking. It is important to determine early in the process if a shared parking study is appropriate, therefore an applicant shall discuss any expectations of shared parking with City staff early in the planning process to determine whether it is applicable to the site development. When significant changes to the plan occur, the applicant shall discuss with City staff to ensure if shared parking remains eligible.

*Guidance:* City staff will assist the applicant in obtaining all information needed to conduct a shared parking study. City staff can provide a spreadsheet tool to assist in the preparation and review of shared parking applications. Submittal of the spreadsheet tool is not a substitute for a clear and complete Shared Parking Analysis Report.

### **Section 7.3.2 Analysis**

Applicants wishing to use shared parking as a means of reducing the total number of required spaces may submit a shared parking analysis using the Urban Land Institute (ULI) Shared Parking Model (latest edition). The analysis must be prepared and sealed by a registered engineer in the State of North Carolina with transportation expertise.

Any modification of default parking ratios, adjustment factors, or time-of-day factors provided shall be highlighted and justified. Adjustments will be considered, case-by-case, provided that the rationale behind the modification is clearly stated and supporting evidence or data is reviewed and approved by City staff.

Reserved parking spaces for a specific tenant or dwelling unit may not be included in the shared parking calculation.

**Measures of Effectiveness:** Parking provided for a development using shared parking should be at least the number or of parking spaces demanded during the highest peak hour of parking demand during the year, as determined by the ULI methodology.

### **Section 7.3.3 Shared Parking Analysis Report**

The shared parking report is to be an objective, technical analysis. All conclusions and recommendations shall be based solely on information contained within the report; all findings shall be clearly documented. It is acceptable to cite publications within the public realm such as ULI's Shared Parking or ITE' Parking Generation in order to provide supporting evidence or to articulate key points provided that the citation includes the title, section/chapter and page number of the reference source.

Following the ULI methodology, the analyses shall be presented in a straightforward and logical sequence. The analyses shall lead the reader step-by-step through the various stages of the process to the resulting conclusion and recommendations. Sufficient detail shall be included so that City staff will be able to follow the rationale and methodology of the analysis.

Whenever possible, data should be presented in tables, graphs, maps and diagrams rather than narrative text. Since the report may be read by nontechnical decision-makers and interested citizens, it should be as concise as possible with a minimum of jargon.

**Conclusions and Recommendations:** The shared parking report is to be an objective, technical analysis. All conclusions and recommendations shall be based solely on information contained within the report; all findings shall be clearly documented. It is acceptable to cite publications within the public realm such as ULI's Shared Parking or ITE' Parking Generation in order to provide supporting evidence or to articulate key points provided that the citation includes the title, section/chapter and page number of the reference source.

The shared parking analysis report shall not include political views or statements, nor shall it take an advocacy position.

*Guidance:* City staff reserves the right to impose additional conditions and to ask for additional information during the course of the review. Inadequate reports will be returned to the engineer for completion or modification. In such cases, City staff will state in writing the report's deficiencies and will provide direction for addressing those deficiencies.

#### **Section 7.3.4 Shared Parking Analysis Submittal Requirements**

Submit all shared parking model data files, a pdf file of the shared parking analysis report [including appendices] and two bound copies of the shared parking analysis report directly to:

City of Raleigh, Office of Transportation Planning  
One Exchange Plaza, Suite 727  
Raleigh, NC 27601

City staff will acknowledge receipt of the report via email within 24 hours. Until acknowledged by City staff, the report has not been officially received.

Guidance: *Staff's preference is that one hard copy contains the body of the report and the second hard copy contains both the body and the technical appendix.*

DRAFT

## CHAPTER 8 RIGHT-OF-WAY CONVEYANCE AND EASEMENTS

### Article 8.1 Right-of-Way Dedication

All Public roadways, exclusive of slope easements, shall be platted and dedicated in conformance with the [Street Plan Map](#) and

DRAFT

**Table 3 Right-of-Way Width requirements.** It is the responsibility of the Developer to take future roadway plans of the City and NCDOT into account when laying out a development plan. Extra right-of-way dedication can be required for additional pavement to accommodate turning movements.

### **Section 8.1.1 Reservation Periods for Public Land**

Where a proposed park, greenway, open space, school, fire station or other public use shown in the Comprehensive Plan is located in whole or in part in a development, the City Council may require the reservation of the land for future use.

The reservation shall continue in effect for a period of not more than 1 year from the date of approval of the preliminary plan or site plan. This reservation period may be extended for an additional year upon submission of a letter to the City Council of intent to purchase by the appropriate governmental agency. Further extensions may be permitted upon mutual agreement between the land owner and the City Council, each of which shall not exceed 2 years.

### **Section 8.1.2 Adjustments to required Right-of-Way widths**

The Public Works Director may reduce the required minimum right-of-way width due to the location of an existing building or use in the proposed new right-of-way. A Design Adjustment shall be required for any exemption.

The area within the "Christmas Plan" which is bound by North, East, South and West Street may be exempt from RW dedication. A Design Adjustment shall be required for any exemption.

- a) Any property whose direct frontage is on North, East, South and West Street is eligible for the adjustment.
- b) For a corner lot that has frontage on North, East, South and West Street, and frontage on a right-of-way, not in the Christmas Plan, the frontage not within the Christmas plan boundary is not eligible for the adjustment.

**Table 3 Right-of-Way Width requirements**

Street Classifications	Minimum Right-of-way width (feet)	Public or Private
<b>Sensitive Area Streets</b>		
1. Sensitive Area Parkway	154	Public
2. Sensitive Area Avenue	80	Public
3. Sensitive Area Residential Street	70	Public
<b>Local Streets</b>		
1. Neighborhood Yield	55	Public
2. Neighborhood Local	59	Public
3. Neighborhood Street (Collector)	64	Public
4. Multifamily Street	22	Public
<b>Mixed Use Streets</b>		
1. Avenue 2-Lane Undivided	64	Public
2. Avenue 2-Lane Divided	76 with center turn, 80 with median	Public
3. Avenue 3-Lane Parallel Parking	90 with center turn, 94 with median	Public
4. Main Street Parallel Parking	73	Public
5. Main Street Angular Parking	96	Public
<b>Major Streets</b>		
1. Avenue 4-Lane, Parallel Parking	122	Public
2. Avenue 4-Lane, Divided	104	Public
3. Avenue 6-Lane Divided	126	Public
4. Multi-Way Boulevard, Parallel Parking	154	Public
5. Multi-Way Boulevard, Angular Parking	177	Public
<b>Industrial and Service Streets</b>		
1. Industrial Street	69	Public
2. Alley, Residential	20' Easement	Private
3. Alley, Mixed Use	24' Easement	Private
<b>Accessways</b>		
1. Primary Internal Access Drive	36' Private (BoC - BoC)	Private with Public Access easement
2. Pedestrian passage	20'	Private with Public Access easement

## Article 8.2 Slope Easements

A slope easement of twenty (20) feet in width shall be required adjoining each side of a street right-of-way. The City may reduce or increase the slope easement width due to topography.

- a) The slope easement shall be located behind the new proposed right-of-way dedication.
- b) Tree Conservation Areas cannot be located within a slope easement per [Section 9.1.4 C of the UDO](#).
- c) A slope easement must be dedicated when a stub street is extended to an adjoin parcel to connect in the future per [Section 8.3.4 C](#).

## Article 8.3 Additional Easements

- A. A Public Access Easement grants an easement for public use, to allow the public an access over the property owned by a private entity.
- B. A Right of Access grants access rights to the adjacent properties for the purpose of allowing their residence or business to be maintained and to government agencies for the purpose of installing, removing and reading water meters, maintaining and replacing water and sewer facilities, fire lanes and acting for other purposes consistent with public safety and welfare, including law enforcement, fire protection, animal control, emergency services, solid waste collection and the delivery of mail.
- C. A Sidewalk Easement may be necessary to allow the City of Raleigh to access and maintain the sidewalk beyond the right of way when the footprint of the sidewalk exceeds the existing right of way.

## CHAPTER 9 BLOCKS AND ACCESS REQUIREMENTS

The majority of this information can be found in [Article 8.3 of the UDO](#). It has been combined with previous policies that carried over into this Manual. For NCDOT maintained Roads, the [Policy on Street and Driveway Access to NC Roads](#) must also be taken into account. The more stringent policies apply.

- A. The intent of the maximum block perimeter and connectivity regulations is to provide a well-connected street network.
- B. Large blocks with limited connectivity discourage walking, contribute to street congestion and add driving distance that can negatively impact emergency services. New streets should be designed to consider future development.
- C. The access regulations are intended to provide safe and convenient vehicular and pedestrian access within developments and between adjacent developments and to lessen traffic congestion. Pedestrian, bike and vehicular access should be safe, direct and convenient.
- D. Design adjustments to the requirements of this Article may be appropriate where topographic changes are too steep, where existing buildings, streams or other natural or man-made obstructions or site layout of developed properties prevent cross access, where adjoining uses are incompatible or where strict compliance with the UDO would pose a safety hazard.

### Article 9.1 Blocks

- A. Every lot shall have frontage on a public street, except those developments which were approved for private streets prior to the effective date of this UDO. Except as otherwise stated in this UDO, all lots must front on a street that has a pavement width of at least 20 feet.
- B. The intent of the maximum block perimeter and connectivity regulations is to provide a well-connected street network. Large blocks with limited connectivity discourage walking, contribute to street congestion and add driving distance that can negatively impact emergency services. New streets should be designed to consider future development.
- C. Design adjustments to the requirements of this Article may be appropriate where topographic changes are too steep, where existing buildings, streams or other natural or man-made obstructions or site layout of developed properties prevent cross access, where adjoining uses are incompatible or where strict compliance with this UDO would pose a safety hazard.

### Section 9.1.1 Block Perimeter

The block perimeter standards apply to preliminary subdivision plans, final plats and site plans submitted in accordance with [Section 10.2.5](#) and [Section 10.2.18 of the UDO](#).

#### A. Block Standards

Residential blocks must have sufficient width to provide for 2 tiers of residential lots, except where single tier lots are required to accommodate single-loaded streets where across from a public park or open space, to allow for unusual topographical conditions or when adjacent to the outer perimeter of a subdivision.

**Table 4 Block Perimeter and Dead-End Streets** shows the maximum block perimeter and maximum length for a dead-end street by zoning district. In the event that a single block contains more than 1 zoning district, the most restrictive requirement applies

**Table 4 Block Perimeter and Dead-End Streets**

	Block Perimeter (max.)	Dead End Street (max.)
<b>R-1, R-2, R-4, R-6: Average Lot Size on Block</b>		
40,000+ sf	8,000'	1,000'
20,000 - 39,999 sf	6,000'	750'
10,000 - 19,999 sf	5,000'	600'
6,000 - 9,999 sf	4,500'	550'
up to 5,999 sf	3,000'	400'
<b>R-10: By District</b>		
R-10	2,500'	300'
<b>Mixed Use Districts</b>		
DX-, -TOD	2,000'	Not allowed
RX-, NX-, CX-, OX-: 3 or 4 Stories	3,000'	400'
RX-, NX-, CX-, OX-: 5 Stories	2,500'	300'
OP-, IX-,	4,000'	500'
<b>Special Districts</b>		
CM, AP	n/a	n/a
IH	6,000'	400'
MH	3,000'	400'
CMP, PD	4,000' or based on master plan	400' or based on master plan

The Dead end Street length is measured per the following graphic:  
**Figure 1 Measurement of Dead-End Street Length**

DRAFT

## **B. Block Measurement**

- a) A block is bounded by a public right-of-way (not including an alley). All public rights-of-way proposed as part of a development must be improved with a street.
- b) Block perimeter is measured along the edge of the property adjoining the public right-of-way, except for the measurement of dead-end streets, which are measured from intersecting centerline.
- c) The maximum block perimeter may be extended by 50% where the block includes a pedestrian passage or an alley that connects the 2 streets on opposing block faces. Pedestrian passages and alleys may connect dead-end streets.
- d) A block may be broken by a civic building or open lot, provided the lot is at least 50 feet wide and deep and provides a pedestrian passage that directly connects the 2 streets on each block face.
- e) Within a single phase of any subdivision or development, individual block perimeters may exceed the maximum by 25% provided that the average of all block perimeters in the phase does not exceed the maximum.
- f) The Public Works Director may waive the block perimeter requirements or maximum dead-end street length, when steep slopes in excess of 25%, freeways, waterways, railroad lines, preexisting development, tree conservation areas, stream buffers, cemeteries, open space or easements would make the provision of a complete block infeasible or does not advance the intent of this Article.
- g) Where the block pattern is interrupted by public parkland, including greenways, that is open and accessible to the public, pedestrian access points shall be provided with a minimum spacing equal to  $\frac{1}{2}$  of the maximum block perimeter.

**Figure 2 Residential Block Measurement Methods**

## Article 9.2 Residential Access System

The Local Street access system consists of roadways that are relatively short in length and primarily serve residential uses. The main function is to provide direct driveway access to abutting land and connect to the higher classified streets. Residential access to and from streets shall be constructed in accordance with City standards outlined below.

- a) Neighborhood Yield and neighborhood Local streets are used primarily to serve residential developments
- b) Neighborhood Streets can be used where residential uses may be compatible with non-residential uses in a mixed-use context.
- c) Multi-family streets cannot be used to meet the block perimeter.
- d) The Multi-family street type is limited to 150 units and must tie into the appropriate street section per the Unit specifications for street types shown below:

The determination of thresholds or the number of dwelling units a Local access system will serve shall use the following criteria and shall be constructed in accordance with City standards as outlined below.

- a) Dwelling units with direct driveway access to the street shall be counted as being served by the street.
- b) Any multi-unit development (townhomes and apartments) that gain access to the street shall count each dwelling unit to determine the amount.
- c) Multi-unit living developments require one access point from a public street (not counting multi-family street type) for every 150 dwelling units.

**Table 5 Unit Specifications for Local Street Types**

Street Specification	Units
A - Neighborhood Yield	Up to 40 units
B - Neighborhood Local	41 – 150 units
C - Neighborhood Street	151 – 350 units
D - Multifamily Street	Apartments and Townhomes (150 units or less)

**Table 6 Access Point requirement per unit count**

Access Points	Units
1 Access point	0-150
2 Access points	151-300
3 Access points	301-450

## Article 9.3 Subdivision Access

### Open Access

Subdivisions must provide roadways that remain permanently open to the public and provide community-wide access as part of an overall connected street network.

### Connectivity Required

Proposed streets must be interconnected and must connect with adjacent streets external to the subdivision in order to provide multiple routes for pedestrian and vehicle trips from, to and within the subdivision.

### Stub Streets

Where a development adjoins unsubdivided land, stub streets within the new subdivision shall be extended to the meet maximum block perimeter standards of Section 9.1.1 of this Manual.

The stub street must be extended to the boundary of the abutting property to the point where the connection to the anticipated street is expected.

Stub streets must be located so that the portion of the block perimeter located on the subject property does not exceed 50% of the applicable block perimeter maximum.

If a stub street exists on an abutting property, the street system of any new subdivision must connect to the stub street to form a through street.

When the entirety of a creek crossing is in the subdivision, the crossing must be in a single phase in its entirety.

When stubbing to the edge of the site, the stub street will be built to the furthest point possible without NCDWQ approval and a fee in lieu of construction is paid for the remainder. Any right-of-way and slope easements needed to build the connection shall be dedicated.

Where a stub street is provided, a barricade using a design approved by the Public Works Director must be constructed at the end of the stub street, pending the extension of the street into abutting property. A sign noting the future street extension shall be posted at the applicant's expense.

The Public Works Director may eliminate the requirement for a stub street when:

- a) Steep slopes in excess of 25%; freeways, waterways, railroad lines, preexisting development, tree conservation areas, stream buffers,
- b) Cemeteries, open space or easements would make the provision of a stub street infeasible; or
- c) A high intensity nonresidential use is located adjacent to a proposed residential subdivision

## Article 9.4 Site Access

### A. General Access Requirements

- a) All existing and proposed development must provide a satisfactory means of vehicular, pedestrian, and bicycle ingress and egress to and from a street or an abutting site.
- b) All on-site parking areas must have vehicular access from a street, an alley, a drive aisle, or a cross-access easement.
- c) All on-site parking areas must be designed to allow vehicles to enter and exit the parking area in a forward motion, unless otherwise approved by the Public Works Director. An improved alley may be used as maneuvering space for access to on-site parking areas.
- d) For any development, the number of driveway access points may be restricted where it is necessary for the purpose of decreasing traffic congestion or hazards. These restrictions may include required common access points.
- e) Nothing in this Article shall prevent site access to any property.

### B. Pedestrian Access

1. Pedestrian access shall consist of an accessible, easily-discernible and ADA compliant walkway or multi-use path with a minimum width of 5 feet.
2. The pedestrian access surface located on private property shall be constructed of concrete, asphalt or other fixed, firm and nonslip material as approved by the Public Works Director.
3. Pedestrian access routes between buildings and public rights-of-way shall be physically separated from vehicular surface areas, except where required to cross a drive aisle; such crossings shall be perpendicular wherever practicable. If the pedestrian access is immediately adjacent to a drive aisle or vehicular surface area, it shall be raised.
4. Site plans containing multiple principal buildings shall submit a phasing plan. The phasing plan shall include all necessary elements to address phasing of walkway construction for the existing principal buildings and uses on the site as new buildings and building expansion occurs in the future.
5. All existing and proposed development must provide safe, direct, and convenient pedestrian access connecting main entrances of buildings, establishments, or uses on a site that allows for public access, with all other such entrances and with available access points including parking, all public streets, sidewalks, and transit stops with the exception of the following uses which are exempt.
  - a) Single- or two-unit living;
  - b) Multi-unit living with 6 or fewer dwelling units;
  - c) Agricultural use;
  - d) Parks, open space and greenways;
  - e) Cemetery;
  - f) Telecommunication tower;
  - g) Off-premise sign;
  - h) Minor utilities; and
  - i) Other uses not containing a principal building on the premise (with the exception of a parking facility)

## Article 9.5 Driveways and Cross Access

- a) All driveway design and construction must comply with the City of Raleigh Standard Details or the Fire Code when conflict exists.
- b) Commercial Driveway Access to and from streets shall be constructed with the standards and specifications provided in the manual “Policy on Street and Driveway Access to North Carolina Highways” as adopted and amended by NCDOT.
- c) The standard commercial driveway access for the city shall be the “street” type driveway section.
- d) Driveway dimensions measured at the street right-of-way shall be in accordance with **Table 7 Driveway Dimensions**
- e) The Public Works Director may require wider driveways where unusual traffic, grade, or site conditions exist
- f) The Fire Department and Solid Waste Services may require larger radii at entrances to accommodate larger vehicles

**Table 7 Driveway Dimensions**

	<b>Width (min)</b>	<b>Width (max)</b>	<b>Radius (max)</b>
Residential up to 6 spaces	8'	12'	10'
Residential 7+ spaces (one way)	12'	16'	10'
Residential 7+ spaces (two-way)	20'	24'	10'
Mixed Use/Commercial (one-way)	12'	18'	10'
Mixed Use/Commercial (two-way)	20'	32'	15'
Industrial/Service	30'	40'	30'

Driveway access points shall be located according to **Figure 3 Location of Commercial Driveway Access Points**

**Figure 3 Location of Commercial Driveway Access Points**

### Section 9.5.1 Driveways for Residential Uses

- a) When an improved alley with a width of at least 20 feet is provided, all vehicular access shall take place from the alley. Access may be taken from the side street on corner lots.
- b) Except for townhouse lots, all lots 40 feet or less in width platted after the effective date of this UDO are required to take vehicular access from an alley.
- c) No residential lot may have more than 2 driveways on the same street. Multiple driveways that service 1 lot may be no closer than 40 feet to each other.
- d) Non-alley loaded driveways may intersect a street no closer than 20 feet from the intersection of 2 street rights-of-way.
- e) Driveways must be located a minimum of 3.5 feet from the side lot line. However, a driveway may be located on the lot line closer than 3.5 feet if it is shared with an adjacent lot.
- f) Parking and driveway areas shall not constitute more than 40% of the area between the front building line and the front property line.
- g) The standard residential driveway access shall be the “ramp” type driveway section per the City of Raleigh Standard Details Manual.
- h) Residential driveway access alignment and grades shall comply with City of Raleigh Standard Details.
- i) **When only a curb cut exists, the sidewalk section behind the curb cut may be required to be installed.**

### Section 9.5.2 Driveways for Mixed use and Non-residential Uses

- a) If on-site parking areas can be accessed from an improved alley with a right-of-way of at least 24 feet in width, access from the alley is required and new curb cuts along the public right-of-way are not allowed.
- b) Driveways are allowed based on the property frontage of any street. Additional driveways require approval from the Public Works Director.
- c) **When a lot has frontage on multiple streets, access shall be gained of the lesser classified street**
- d) Driveways accessing up to 80-foot wide street rights-of-way must be spaced 200 feet apart centerline to centerline and driveways accessing more than an 80-foot wide street right-of-way must be spaced 300 feet apart centerline to centerline.
- e) A driveway serving any non-residential use or multi-unit living shall not be permitted to access neighborhood yield or neighborhood local streets unless the proposed access point is the lesser of 300' from an avenue, boulevard or parkway, or the intersection of another public street.
- f) Offers of cross-access shall be prohibited where a proposed nonresidential use or multi-unit living may potentially obtain access from a neighborhood or residential street, unless the resulting access meets the provisions of subsection d above.
- g) Driveways may intersect a street no closer than 50 feet from the intersection of 2 street rights-of-way, not including an alley.

### Section 9.5.3 Cross Access

#### A. All lots abutting a street other than a local street shall comply with the following standards:

- a) Internal vehicular circulation areas shall be designed and installed to allow for cross-access between abutting lots;
- b) When an abutting owner refuses in writing to allow construction of the internal vehicular circulation on their property, a stub for future cross-access shall be provided as close as possible to the common property line.
- c) When cross-access is waived by the Public Works Director in accordance with [Section 8.6.3 of the UDO](#), bicycle and pedestrian connections shall be provided between abutting properties except where there is a perennial wet stream crossing greater than 15 feet in width that interferes with such access.
- d) Rights of vehicular and pedestrian access shall be granted to all abutting properties contemporaneously with the recording of the final subdivision plat or prior to issuance of a building permit for an approved site plan, whichever event first occurs on the property after September 1, 2013. This right of cross-access shall be recorded by plat in the register of deeds office in the county where the property is located. By the end of the next business day following the recordation, the applicant shall provide to Planning and Development evidence of recordation of the cross-access agreement. No building permit will be issued until evidence of recordation of the cross access agreement is provided to the City.

#### B. The content of the cross-access agreement required by the City shall be as follows:

- a) Pedestrian and vehicular access is granted to all properties on the same block face as the property owner establishing the cross-access. The owner may make the pedestrian and vehicular access contingent upon the granting of reciprocal vehicular and pedestrian access right to the granting property.
- b) The location of the pedestrian and vehicular access is described over all sidewalks, vehicular drives and driveways located on the property or by specific metes and bounds.
- c) The beneficiaries granted access rights include the lot owners, their successors, heirs and assigns, tenants and subtenants, lenders, employees, customers and guests.
- d) Each lot owner is required to maintain the vehicular and pedestrian access areas on their lot. Maintenance shall include, but not be limited to repair, fixing potholes and repaving.
- e) All lot owners and tenants granted vehicular and pedestrian access rights shall have the right together with their contractors, but not obligation, to maintain all portions of pedestrian vehicular and access ways. If such owners, tenants and their contractors engage in any maintenance activities off their lot, they shall have the right of contribution to be reimbursed for their actual expenses from the defaulting lot owner, provided at least 30 days prior written notice is first provided to the defaulting lot owner.
- f) A temporary construction easement is granted to the abutting lot owner and tenants and their contractors to enter the adjoining property to install connecting internal drives not previously extended to the property line.
- g) A notice provision explaining how and where to send written notice.
- h) A provision prohibiting the erection of fences walls and other obstructions that prevent the use of vehicular and pedestrian access ways.
- i) A statement that the cross access agreement runs with the land and it is binding on all successors, heirs and assigns and that the easement rights are perpetual.

- j) A statement that the cross access agreement is a requirement of the Raleigh City Code and that it may not be terminated or amended in violation of the Raleigh City Code and such amendments and terminations are void ab initio.
- k) The cross access agreement shall be signed by all of owners of the granting property.
- l) All lenders and their trustees with interests in the granting property shall subordinate their security interests to the cross access agreement.

DRAFT

## CHAPTER 10 PARKING AREAS

### Article 10.1 Parking lot Design and Layout (On-site Parking)

- A. Parking lots should be designed to provide for safe pedestrian and vehicular circulation.
- B. Pedestrian flow should provide for as few conflicts with vehicle traffic as possible.
- C. Required parking spaces shall be arranged and sized in accordance with [Table 8 Regular Parking Space Parking Area Design](#) and [Table 9 Compact Space Parking Area Design](#) schedules shown in the following graphic. Stall depths and module widths shall be measured to the back of curb or to the edge of pavement if curbing is not used.
- D. Handicap parking spaces shall be designed and delineated in accordance with the Means of Egress and Accessibility standards outlined in the current [North Carolina Building Code](#). Parking lots should also be signed and maintained with appropriate traffic control devices and pavement markings so as to regulate the safe movement of vehicles and pedestrians within the parking area.
- E. Direct accessible routes within the site shall be provided from public transportation stops, accessible parking, accessible passenger loading zones and all public streets or sidewalk to the accessible building entrance served. See [Section 7.1.6 of the UDO](#) for additional information for parking location and layout.
- F. Required parking and drive aisles must be constructed of permanent non-erodible surface treatments as follows:
  - a) Porous or semi-porous monolithic or paver material;
  - b) Masonry or concrete pavers
  - c) Poured concrete or asphalt

#### Figure 4 On-Site Parking Layout

Table 8 Regular Parking Space Parking Area Design

Parking Angle(P)	Curb Width (C)	Stall Depth (S)	Stall Width (W)	Aisle Width (A)	(Module Width (B))
90	8.5	18.0	8.5	22.0	60.0
60	9.8	19.8	8.5	14.5	54.1
45	12.0	18.7	8.5	12.0	49.4
30	17.0	16.4	8.5	12.0	44.8
0	22.0	8.0	8.5	12.0	28.0

Note: The dimension for Stall Depth (S) is measured to the back of curb.

**Table 9 Compact Space Parking Area Design**

Parking Angle(P)	Curb Width (C)	Stall Depth (S)	Stall Width (W)	Aisle Width (A)	(Module Width (B)
90	7.5	15.0	7.5	22.0	52.0
60	8.7	16.8	7.5	14.5	48.1
45	10.6	15.9	7.5	12.0	43.8
30	15.0	14.0	7.5	12.0	40.0
0	19.0	7.5	7.5	12.0	27.0

Note: The dimension for Stall Depth (S) is measured to the back of curb.

Modifications to the On-Site Parking Lot Layout graphic may be made in accordance with the following:

- a) A reduction in aisle width in parking decks and other structures if there is a compensating increase in the stall width.
- b) Reductions in aisle width, the utilization of stacked parking stalls, or other changes to access or dimension of parking areas if parking is performed on a continuing basis by paid employee attendants.
- c) Allowance of stacked parking stalls, where each stall does not have access to an aisle or street, if the parking area is specifically designed and designated in the field to serve a particular dwelling unit in a planned development. The parking stall may be located in a garage, carport, or other enclosed space.

### **Article 10.2 Queuing Areas**

- A. Adequate space must be made available on-site for the stacking, storage and queuing of vehicles.
- B. Vehicles using drive-thru facilities may not encroach on or interfere with the public use of streets and sidewalks by vehicles or pedestrians.
- C. A restaurant with drive-thru facilities must provide at least 8 queuing spaces for vehicles when 1 drive-thru lane exists and 6 spaces at each when more than 1 lane exists.
- D. A bank with drive-thru facilities must provide at least 3 queuing spaces per drive-thru lane.

### **Article 10.3 Solid Waste Design requirements for Parking Areas and Driveways**

The [Solid Waste Collection Design Manual \(future link\)](#) dictates the requirements for regulations and standards for adequate and coordinated land development, collection, storage, and disposal plans with necessary facilities, devices, pre and post collection practices to allow for the most efficient, effective, and sustainable provision of materials management services throughout the City.

## Article 10.4 On-Street Parking in the Public Right-of-Way

- A. On-street parking shall consist of parallel, angular (60 degree) or perpendicular spaces only in accordance with the chart below.
- B. On-street parking cannot be utilized to meet to meet on-site parking requirements for any development.

**Table 10 On-Street Parking Area Design**

Parking Angle(P)	Curb Width (C)	Stall Depth (S)	Stall Width (W)
90	8.5	18.0	8.5
60	9.8	19.8	8.5
0	22.0	8.0	8.0

Note: The dimension for Stall Depth (S) is measured to the back of curb.

DRAFT

## CHAPTER 11 STREETScape DESIGN AND OPERATION

The streetscape is the area that falls into the public right of way which is measured from the back of curb to the right-of-way line along with the Utility Placement Easement behind the right-of-way line. Considerations in Streetscape design include sidewalk width, slope, furniture, pedestrian accommodation, utilities, landscaping, and building access.

Primary guidance on best practices in this chapter is drawn from multiple guidelines:

- a) [\*ITE Manual on Designing Walkable Urban Thoroughfares\*](#)
- b) [\*Raleigh City Tree and Landscape Guide\*](#)
- c) [\*Section 8.5.2 of the UDO, Streetscape Types\*](#)
- d) [\*Public Right of Way Advisory Group \(PROWAG\)\*](#)
- e) [\*American with Disability Accessible Design Requirements\*](#)

### Article 11.1 Streetscape Types

- A. The required streetscape type is determined by the zoning district or by the designated frontage. Where there is a conflict between a designated frontage and the zoning district, the designated frontage standard applies. If more than one streetscape can be used, the Planning and Development Officer shall make the final determination.
- B. Any Major or Minor Encroachment (See Article 4.1 in this Manual) in the Streetscape area within the Public right-of-way requires approval by Staff or City Council prior to any building permit approval.
- C. A variation to the Streetscape may require a Design Adjustment by the Public Works Director. See the [\*Design Adjustments Article on www.raleighnc.gov\*](#).

The following Streetscape types are found in [\*Section 8.5.2 of the UDO\*](#):

- a) Main Street
- b) Mixed Use
- c) Commercial
- d) Residential
- e) Multi-Way
- f) Parking
- g) Sidewalk and Tree Lawn

### Section 11.1.1 Adopted Streetscape Plans

The City of Raleigh has additional [Streetscape and Parking Standards](#), and [Streetscape Capital Programs](#) that vary from the standard Streetscape Types found in [Section 8.5.2 of the UDO](#).

- A. In the event an adopted streetscape plan regulates streetscape improvements, the adopted Plan shall control.
- B. The requirements of this Chapter are intended to serve as minimum standards. Where a streetscape plan adopted before the effective date of the UDO sets a lower standard, the standard in this Chapter shall prevail.
- C. The City Council may modify an adopted Streetscape Plan following written notice to property owners along the street.
- D. When a streetscape along an existing street is constrained by an existing building, the Public Works Director may adjust the streetscape standards to the minimum extend necessary to accommodate the existing area between the face of the building and back of curb. Modifications shall conform to standards laid out in [Section 8.5.3 B of the UDO](#).

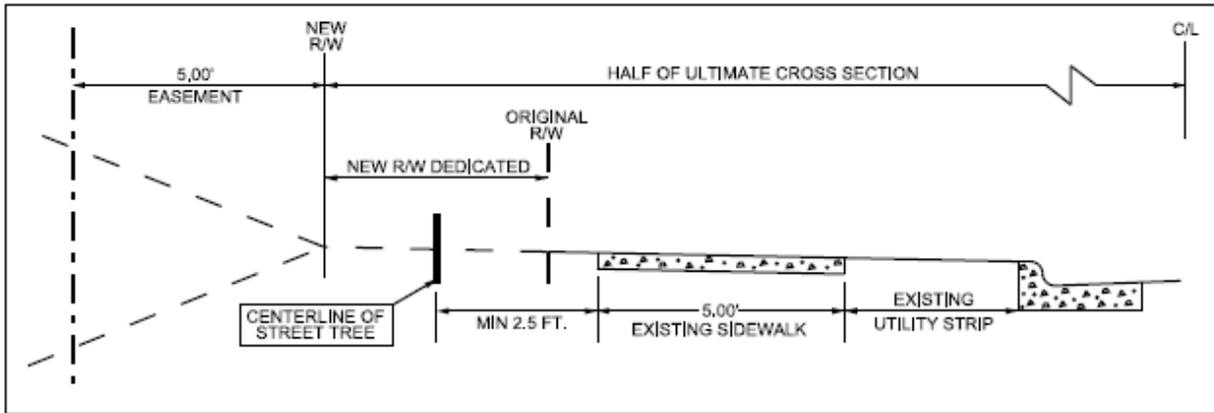
### Section 11.1.2 Approved Design Adjustment for Alternative Streetscapes for Existing Roadways

This section is intended to provide supplemental design criteria for applying the Unified Development Ordinance (UDO) streetscape along existing public streets and accommodating existing conditions. Per [Section 8.5.1 G](#) of the UDO, the Public Works Director has the ability to approve a design adjustment on an existing street. Recognizing the most common existing conditions along public streets within the City of Raleigh, this is intended to provide a standard approach to allowing specific alternatives that meet the detailed conditions and provisions, shown hereafter.

[Section 8.5.2 of the UDO](#) provides the information and diagrams for the streetscape types. The purpose of this is to address the challenges associated with the streetscapes for “Commercial”, “Residential” and “Sidewalk and Tree Lawn”.

The reviewer must still document the use of an “Approved Alternative Streetscape” when applying development required infrastructure improvements to an existing street. A formal application to and reviewed by the Public Works Director is not necessary, if all the specified conditions of the utilized alternate are met. This section shall be used at the discretion of Public Works staff only, shall only be applicable along existing streets. The alternatives will be pertinent only for placement of new street trees within public Right of Way. Requests to use existing street trees on private property to satisfy the infrastructure responsibility along the development’s frontage would require an exclusive [Design Adjustment](#), independent of this section.

### Approved Alternate Streetscape A



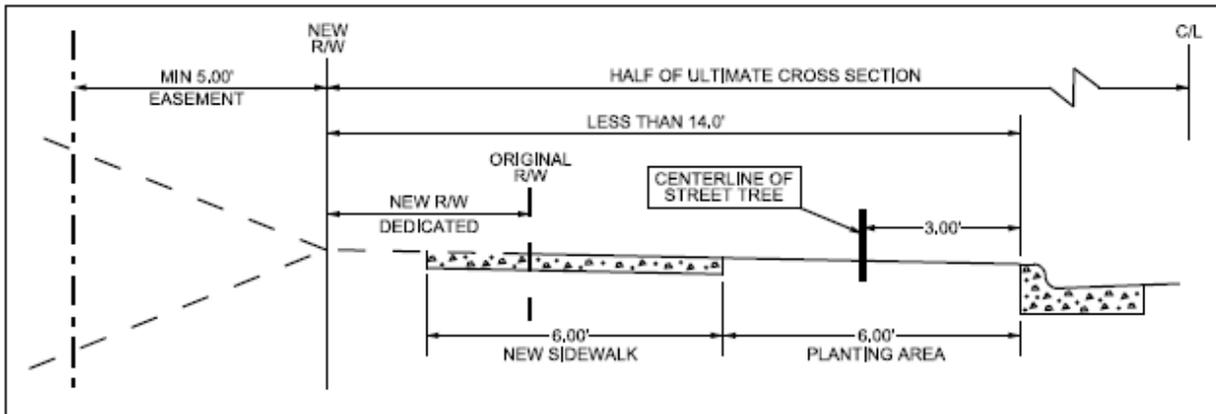
#### Required Existing Conditions:

- There shall be an existing 5 foot concrete sidewalk with a utility strip at the back of the curb
- With new right-of-way dedication, sufficient width is available for street tree placement at least 2.5 feet (3 feet is preferred) from the back of the existing sidewalk
- The trees will be within the public right-of-way.

#### Additional Requirements:

A fee-in-lieu for the remaining 1 foot concrete sidewalk along the entire property frontage shall be paid to the City.

## Approved Alternate Streetscape B



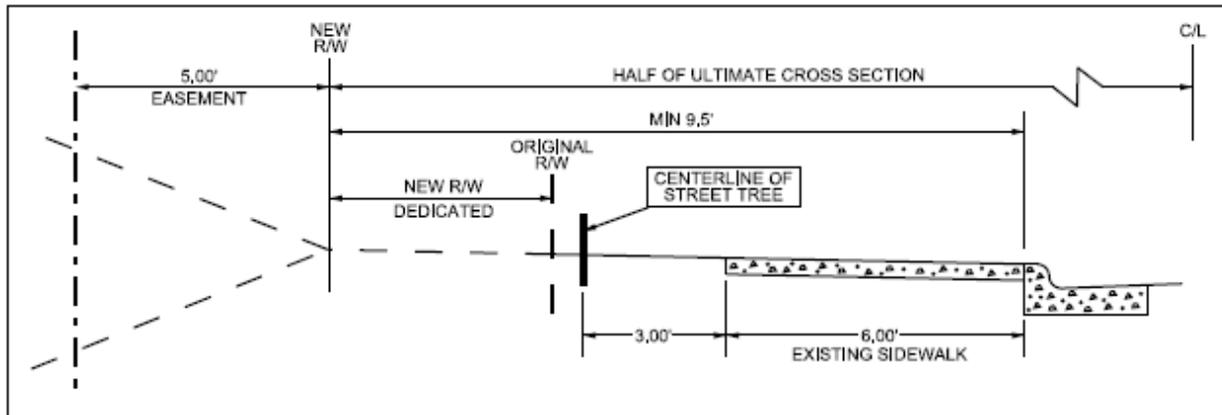
### Required Existing Conditions:

- Even with new right-of-way dedication, a 14 foot streetscape section cannot be accommodated.
- The sidewalk does not exist or will not be retained with development.

### Additional Requirements:

Based on existing right-of-way width and new required dedication, a portion of sidewalk may fall outside the right-of-way. A public sidewalk easement will be required.

## Approved Alternate Streetscape C



### Required Existing Conditions:

- Existing 6 foot sidewalk along the back of curb
- With new right-of-way dedication, sufficient width is available for street tree placement at least 3 feet from the back of the existing sidewalk and still be within public right-of-way.

### Additional Requirements:

None.

## Article 11.2 Streetscape Elements

The Streetscape is made up of multiple elements which differ depending on the street type and frontage.

### Section 11.2.1 Utility Placement Easement

- The utility placement easement is the area behind the right-of-way line on private property where any utilities including, but not limited to, Fiber optics, Power poles, Power lines, Telephone, Cable and Telecommunication should be installed.
- The easement measures a minimum of five feet behind the required right-of-way line.
- Utility Poles are required to be installed behind the sidewalk in the utility placement easement.

### Section 11.2.2 Sidewalk in the Public Right-of-way

- All public roadways inside the corporate limits of the City and outside the City when water or sewer is connected to the City utility system shall be constructed with sidewalks installed on both sides of any new street per [Table 11 Minimum Sidewalk Width and Location](#)
- Additional right-of-way or easements may be required if sidewalk is located outside the existing right-of-way.
- Sidewalks shall be required in areas served by any street. Sidewalks shall provide general pedestrian access within the development served and shall connect with all public sidewalks, public streets, and greenway access points. Each block, or each building in the case of multi-unit living, shall be served by a connection to the pedestrian access system.

- d) Except for alleyways, in no case is it allowable to construct a transportation facility of any type expressed in this manual without distinct and accessible pedestrian accommodations.
- e) The minimum sidewalk dimension is a clear width requirement which cannot contain obstacles and shall allow for the minimum ADA required width.

DRAFT

**Table 11 Minimum Sidewalk Width and Location**

Street Classifications	Both Sides	Type	Min. width
<b>Sensitive Area Streets</b>			
1. Sensitive Area Parkway	X	Multi-use Trail	10'
2. Sensitive Area Avenue	X	Sidewalk	5'
3. Sensitive Area Residential Street	X	Sidewalk	5'
<b>Local Street</b>			
1. Neighborhood Yield	X	Sidewalk	6'
2. Neighborhood Local	X	Sidewalk	6'
3. Neighborhood Street (Collector)	X	Sidewalk	6'
4. Multifamily Street	X	Sidewalk (Easement)	6'
<b>Mixed Use Streets</b>			
1. Avenue 2-Lane Undivided	X	Sidewalk	6'
2. Avenue 2-Lane Divided	X	Sidewalk	6'
3. Avenue 3-Lane Parallel Parking	X	Sidewalk	8'
4. Main Street Parallel Parking	X	Sidewalk	10'
5. Main Street Angular Parking	X	Sidewalk	10'
<b>Major Streets</b>			
1. Avenue 4-Lane, Parallel Parking	X	Sidewalk	10'
2. Avenue 4-Lane, Divided	X	Sidewalk	6'
3. Avenue 6-Lane Divided	X	Sidewalk	6'
4. Multi-Way Boulevard, Parallel Parking	X	Sidewalk	10'
5. Multi-Way Boulevard, Angular Parking	X	Sidewalk	10'
<b>Industrial and Service Streets</b>			
1. Industrial Street	X	Sidewalk	6'
2. Alley, Residential		Travel Lane	20' Easement width
3. Alley, Mixed Use		Travel Lane	24' easement width
<b>Accessways</b>			
1. Primary Internal Access Drive	X	6'	Sidewalk
2. Pedestrian passage	X	Sidewalk	20' Public Access Easement

### Section 11.2.3 Sidewalk Access Ramps

Sidewalk access ramps shall be provided at all intersections where curb and gutter are provided and where sidewalks and/or greenway trails intersect any street.

Sidewalk access ramps shall be constructed per City of Raleigh [Standard Details](#) (See transportation Details T-20.01.1 through 20.04.5) and/or current [Public Right of Way Advisory Group \(PROWAG\)](#) standards.

### Section 11.2.4 Planting Area

- A. All required street trees shall be installed in the planting area per City of Raleigh Standards and the [City Tree Manual](#) .
- B. Where overhead utilities exist, 1 understory tree shall be planted every 20 feet on center, on average.
- C. Where development abuts a street controlled by the North Carolina Department of Transportation as shown on the [Raleigh Powell Bill Map](#), street trees may not be required in the right-of-way, at the discretion of the North Carolina Department of Transportation. In this instance, a Type C2 street protective yard is required in accordance with [Section 7.2.4 of the UDO](#). See the [Guidelines for Planting within Highway Right-of-Way](#) on NCDOT maintained roads for guidance.
- D. Unless otherwise noted below, all trees planted in accordance with this Article must be shade trees.
- E. All required street trees must meet the design and installation requirements of [Section 7.2.7 of the UDO](#).
- F. When Urban Trees are installed with root expansion paths, it must be ensured that the minimum density requirements under the sidewalk sections are met
- G. In a downtown setting (buildings up to the right-of-way line), the utilities, shall be located in line with the planting strip
- H. A fee-in-lieu can be required when it is determined that trees cannot be installed.
- I. No Street Tree installation will be required for street trees around the bulb of a cul-de-sac. The Street trees end where sidewalk ends per detail [T-10.06](#).

### Section 11.2.5 Street Furniture

The following types of street furniture can be provided for certain frontages and may be at the owner's expense. Any street furniture must be approved through the Encroachment process by City Council.

- a) Bicycle Racks
- b) Benches
- c) Parking Meters
- d) Bus Shelters
- e) Pedestrian Lighting
- f) Planters and/or Flower boxes
- g) Trash Receptacles

### Section 11.2.6 Drainage

The drainage area is located between the edge of pavement and the planting area on a Sensitive Area Street unless a design requires otherwise. A [Design Adjustments](#) will be required for any changes to this requirement.

### Section 11.2.6 Street Lights

- A. The City of Raleigh has a streetlight program that strives to provide lighting for all public roads inside the corporate city limits. The standards for streetlight design are dictated by the roadway type. For roads that are City maintained the requirements are dictated by the [Guide for Street Lighting and Developers Requirements](#) . For roads that fall on the State Highway System, lighting standards must adhere to NCDOT's standards. Private property developers must adhere to the site lighting standards laid out in [Article 7.4 of the UDO](#).
- a) Streetlights within the City of Raleigh are leased from local energy providers. Standard installation includes an energy efficient Light-Emitting Diode (LED) fixture mounted on a 30' wood pole.
  - b) Certain roadway improvement projects may include the installation of streetlights on gray fiberglass poles at city expense.
  - c) No decorative or pedestrian scale streetlight posts or fixtures are leased by the City of Raleigh outside of City initiated streetscape projects.
  - d) Decorative or pedestrian scale lighting is optional on City of Raleigh public streets, and will not be paid for by the City unless it is a City driven project. The developer and/or property owner will be completely responsible for up-front and ongoing costs of pedestrian scale lights on all non-City projects. The different styles of approved products are available from the local energy providers.
  - e) Energy provider leased Light-Emitting Diode (LED) streetlight fixtures must be used on public right-of-way if they are to be added to the City account. The energy provider will conduct all troubleshooting, repairs, and maintenance.
  - f) The energy provider must develop a lighting plan meeting or exceeding the City of Raleigh lighting standards as stated in Sec. 10-3059 of the City Code of Ordinances. This plan must be approved by Transportation Operations staff before the energy provider is authorized to install.
  - g) The energy provider generally determines the type (wattage) of LED streetlight fixture to be used along each public roadway and the associated pole spacing to meet the City's lighting standards. This can be modified by City staff if need be, and must be approved by staff before installation begins.
  - h) All streetlights must be underground fed, unless overhead infrastructure already exists where streetlights will be placed.
  - i) Underground facility installation and any abnormal costs (trenching, boring, reseeded, rock removal, etc.) associated with streetlight installation must be paid for by the developer, per the Street Lighting Developer Requirements.
  - j) In order for the streetlights to be added to the City account, they must be installed on 30' wood or gray fiberglass poles. If gray fiberglass is used, a \$250/pole buy down can be paid to the City in order to have the streetlights added to our account. This buy down must be paid before City staff will authorize the installation of gray fiberglass poles.
  - k) If the developer uses any type of black poles, post-top lamp streetlights, or pedestrian scale lighting the streetlights cannot be added to the City's streetlight account. These must remain on a private account. If a state registered non-profit owner's association exists for the development, an agreement can be drafted to allow for the annual reimbursement of city standard lighting costs to the association.
- B. The developer, when installing underground electrical and telephone service shall also install at his expense underground terminal facilities for street lighting along public streets according to the standards required by the Illuminating Engineering Society publication Road Lighting; provided however, that the average maintained foot-candle (fc) level for outlying and rural roads as defined in said publication shall be no less than three-tenths (0.3) and the uniformity ratio shall be no greater than sixty-four (64). The City will not take responsibility for any street lighting system until it meets the above standards.

- a) The developer is responsible for installation of streetlights on all local access system roadways (residential and commercial), which will be built or improved as part of their development project. (.4 fc and 6:1 uniformity).
- b) The developer is responsible for installation of streetlights on all collector system roadways (residential and commercial), which will be built or improved as part of their development project. (.6 fc and 4:1 uniformity)
- c) The developer is responsible for installation of streetlights on all minor thoroughfare system roadways, which will be built or improved as part of their development project (.9 fc and 4:1 uniformity). If the roadway is built to State standards the street lighting is subject to State lighting requirements.
- d) The developer is responsible for installation of streetlights on all major system roadways, which will be built or improved as part of their development project (1.2 fc and 4:1 uniformity). If the roadway is built to State standards the street lighting is subject to State lighting requirements.
- e) The developer is responsible for installation of streetlights on all secondary system roadways, which will be built or improved as part of his development project. If the roadway is built to State standards, the street lighting is subject to State lighting requirements. The City may opt to participate in streetlight installations that would close any gaps in the streetlight system created by this requirement.

DRAFT

**Table 12 Lighting Design for City Maintained Streets**

<b>Street Classifications</b>	<b>Maintained Foot Candle (avg.)</b>	<b>Uniformity</b>
<b>Sensitive Area Streets</b>	0.9	4:1
1. Sensitive Area Parkway	0.6	4:1
2. Sensitive Area Avenue	0.4	6:1
3. Sensitive Area Residential Street		
<b>Local Street</b>	0.4	6:1
1. Neighborhood Yield	0.4	6:1
2. Neighborhood Local	0.6	4:1
3. Neighborhood Street (Collector)	0.6	4:1
4. Multifamily Street		
<b>Mixed Use Streets</b>	0.9	4:1
1. Avenue 2-Lane Undivided	0.9	4:1
2. Avenue 2-Lane Divided	0.9	4:1
3. Avenue 3-Lane Parallel Parking	0.9	4:1
4. Main Street Parallel Parking	0.9	4:1
5. Main Street Angular Parking		
<b>Major Streets</b>	1.2	4:1
1. Avenue 4-Lane, Parallel Parking	1.2	4:1
2. Avenue 4-Lane, Divided	1.2	4:1
3. Avenue 6-Lane Divided	1.2	4:1
4. Multi-Way Boulevard, Parallel Parking	1.2	4:1
5. Multi-Way Boulevard, Angular Parking		
<b>Industrial and Service Streets</b>	0.6	4:1
1. Industrial Street	0.4	6:1
2. Alley, Residential	0.4	6:1
3. Alley, Mixed Use		
<b>Accessways</b>	0.4	6:1
1. Primary Internal Access Drive	0.4	6:1
2. Pedestrian passage	0.4	6.1

## Section 11.2.7 Bicycle Rack Installation Standards

### A. Standard U-Rack Design

A popular type of bike rack is the simple inverted-U design. Each inverted-U rack element accommodates two bikes, one on each side, and allows both wheels and the frame to be secured to the rack simultaneously.

Distance to other Racks:

- a) Racks aligned parallel to each other (side by side) must be at least 36 inches (3ft) apart.
- b) Rack units aligned end to end must be at least 96 inches (8ft) apart.

Distance from a Curb:

- a) Rack units placed perpendicular to the curb must be at least 48 inches (4ft) from the curb to the nearest vertical component of the rack.
- b) Rack units placed parallel to the curb must be at least 24 (2ft) inches from the curb.

Distance from Wall:

- a) Rack units placed perpendicular to a wall must be at least 48 inches (4ft) from the wall to the nearest vertical component of the rack.
- b) Rack units placed parallel to a wall must be at least 36 inches (3ft) from the rack to the wall.

Other Distances:

- a) Allow at least 72 inches (6ft) for safe pedestrian clearance
- b) Racks should be placed at least 6 inches off of brick pavers
- c) Racks should be placed at least 48 inches (4ft) from tree grates
- d) Racks should line up with existing infrastructure (tree grates, existing racks, benches, etc)

Refer to [Standard Detail B.20.03](#) in the [City of Raleigh Standard Details](#) .

### **On Street Bike Corral**

On-street Bicycle Parking Corrals are bicycle racks placed in the parking lane on the roadway where short-term demand for bike parking is high. Corrals typically have 6 to 12 bicycle racks in a row and can park 10 to 20 bicycles. This uses space otherwise occupied by one car.

#### Installation Standards

- a) Bike corrals should be at street corners, upstream of the intersection.
- b) Two reflective wheel stops should be placed at least 24 inches (2ft) from the rack.
- c) The wheel stop located next to existing on-street parking should be placed 36 inches (3ft) from the parking tick mark.
- d) The rack should be placed thirty three inches from the face of curb.
- e) A four inch solid white thermoplastic strip should be placed between the wheel stops and three inches from the parking tick mark.

Refer to [Standard Detail B.20.03](#) in the [City of Raleigh Standard Details](#).

### **Section 11.2.8 Transit Amenities and Elements**

Bus Stop elements and amenities are placed within the Streetscape area of the public right-of-way or can be placed on private property on an easement. For further information refer to the [Passenger Amenity Study](#), for Transit Design Standards.

## CHAPTER 12 ROADWAY, INTERSECTION, AND TURN LANE DESIGN

### Article 12.1 Roadway Design

- A. Complete Roadway Improvements, in conformance with the minimum roadway design cross-sections shall be made by developments along all frontages of the property or properties involved.
- B. Roadway improvements may include construction, fee-in-lieu, or combination of the two, which will be determined by staff, or off-site improvements.
- C. When a development is required to improve roadways, the developer shall be required to install pavement markings on the surface per approved plans.
- D. All pavement marking plans and installation shall be in conformance with [MUTCD](#) standards and specifications.

#### Section 12.1.1 Horizontal Street Design

- A. Design criteria for design speed, centerline radius, reverse curve tangent distance and maximum superelevation rates for streets are summarized in [Table 13 Horizontal and Vertical Alignment Design Criteria](#). Superelevation rates, minimum runoff lengths and methods of distribution should be in accordance with [AASHTO](#) standards and specifications.
- B. The minimum tangent length of an approaching intersection should be 50 feet for local access system streets. All higher system streets shall have a tangent section no less than 100 feet approaching the intersection. Tangent lengths shall be measured from the intersection of the two rights-of-way.

#### Section 12.1.2 Vertical Street Design

- A. Wherever practical, streets should follow the existing contours of a site so as to avoid excessive grading and removal of existing vegetation. Street grades shall not be less than 0.75%. Standards for vertical street design are listed in [Table 13 Horizontal and Vertical Alignment Design Criteria](#).
- B. At signalized intersections, the maximum grade approaching the intersection should not exceed two percent and extend a minimum distance of 200 feet in each direction measured from the outside edge of travel way of the intersecting street.
- C. For intersections not controlled by a traffic signal, the maximum grade approaching the intersection should not exceed five percent and extend a minimum distance of 100 feet in each direction.

**Table 13 Horizontal and Vertical Alignment Design Criteria**

New Street Classifications	Design Speed (mph)	Min. centerline Radius (feet)	Max. Rate of Superelevation for Min. CL Radius (ft per ft)	Min. tangent b/w reverse curves (feet)	Maximum Gradient * (%)	Min. Vertical Curve Length ** (feet)	Minimum rate of vertical curvature, K (LF per % of A ***)	
							Crest	Sag
<b>Sensitive Area Streets</b>								
1. Sensitive Area Parkway	50	930	0.04	400	7	150	84	96
2. Sensitive Area Avenue	40	535	0.04	250	8	125	44	64
3. Sensitive Area Residential Street Collector	35	375	0.04	200	9	100	29	49
4. Sensitive Area Residential Street Local	25	150	NA	0	12	50	12	26
<b>Local Street</b>								
1. Neighborhood Yield	25	150	NA	0	12	50	12	26
2. Neighborhood Local	25	150	NA	0	12	50	12	26
3. Neighborhood Street (Collector)	35	375	0.04	200	9	100	30	50
4. Multifamily Street	35	375	0.04	200	9	100	30	50
<b>Mixed Use Streets</b>								
1. Avenue 2-Lane Undivided	30	250	0.04	150	9	100	19	37
2. Avenue 2-Lane Divided	35	375	0.04	200	8	100	30	50
3. Avenue 3-Lane Parallel Parking	40	535	0.04	250	8	125	44	64
4. Main Street Parallel Parking	30	250	0.04	150	9	100	19	37
5. Main Street Angular Parking	30	250	0.04	150	9	100	19	37
<b>Major Streets</b>								
1. Avenue 4-Lane, Parallel Parking	40	535	0.04	250	8	125	44	64
2. Avenue 4-Lane, Divided	40	535	0.04	250	8	125	44	64
3. Avenue 6-Lane Divided	50	930	0.04	400	7	150	84	96
4. Multi-Way Boulevard, Parallel Parking	40	535	0.04	250	8	125	44	64
5. Multi-Way Boulevard, Angular Parking	40	535	0.04	250	8	125	44	64
<b>Industrial and Service Streets</b>								
1. Industrial Street	35	375	0.04	200	9	100	29	49
2. Alley, Residential	20	75	NA	0	12	50	12	26
3. Alley, Mixed Use	20	75	NA	0	12	50	12	26
<b>Accessways</b>								
1. Primary Internal Access Drive	25	150	NA	0	12	50	12	26

Note: \* The minimum gradient on streets shall be at least 0.75%.

\*\* All vertical curves must be symmetrical parabolic curves.

\*\*\* A=the algebraic difference in vertical curve grades

### Section 12.1.3 Cul-de-sac Design

- A. Minimum dimensions for circular cul-de-sac streets are shown in the City of Raleigh Standard Details Manual. Alternative turnaround designs on residential streets serving six dwelling units or less may be considered for alternate designs. Alternative designs must readily accommodate emergency vehicles and Solid Waste Trucks.
- B. Medians may be permitted where the cul-de-sac radius is increased and it can be demonstrated that emergency vehicles and sanitation trucks can be accommodated. The City will not maintain landscaped medians and a private maintenance agreement for the median shall be required to be approved by the City Attorney through the Encroachment Process.
- C. Streets that do not require fire turn-around may utilize 75' diameter cul-de-sac measured back-of-curb to back-of-curb. For different turn around designs other than a cul-de-sac, see alternate [Fire Apparatus Access Roads in the 2015 International Fire Code](#).
- D. See [Table 4 Block Perimeter and Dead-End Streets](#) for dead-end street length.

### Section 12.1.4 Intersection Design

Streets should intersect at or as near 90 degrees as possible, but no less than 75 degrees. Intersections with more than four legs should be avoided whenever possible. The following table describes optimal street spacing specifications. To achieve the optimal level of connectivity and street spacing shown in the following table, a variety of street network patterns can be implemented.

**Table 14 Optimal Street Spacing requirements**

Street Type	Optimal Street type Spacing	Optimal Cross-Street Spacing
Parkway (4-6 lane), Multi-Way Boulevard (6 lane)	4-6 miles	1/2 mile
Parkway (4 lane), Multi-Way Boulevard (4-6 lane), Avenue (6 lane)	4-6 miles	1/2 mile
Avenue (6 lane), Avenue (4 lane, no parking)	1 mile	1/4 mile
Avenue (3-4 lane), Main Street (2-3 lane)	1 mile	300 - 600'
Avenue (2-lane), Main Street (2-3 lane), Industrial Street, Local Streets (Mixed)	1/4 mile (1200')	300 - 600'
Local Streets (Residential)	150 - 600'	150 - 600'

### Section 12.1.5 Traffic Control Devices

All traffic control devices should be designed in accordance with the standards and specifications as published in the latest [Manual on Uniform Traffic Control Devices \(MUTCD\)](#). The typical intersection control shall be two-way stop control, which provides stop control on the side-street intersection approaches and free flow on the main street.

All-way stop control may be provided at intersections where traffic volumes or other conditions are consistent with the warrants set forth in the MUTCD. Signal control may only be provided at intersections where vehicle or pedestrian volumes meet the thresholds set forth for new signals in the MUTCD.

A roundabout may be constructed at any intersection location where it may be desired in order to enhance intersection capacity, reduce vehicle speeds along a corridor, or enhance intersection aesthetics. Roundabouts shall be designed in accordance with the criteria set forth in [Roundabouts, An Informational Guide, Second Edition](#). Care should be taken in order to ensure roundabouts are not located in close proximity to adjacent stop or signal controlled intersections where long queues may back up into the roundabout.

### Section 12.1.6 Roadway Transition

When constructing a street that will directly connect with an existing street of different width, it is necessary to install a transition taper between the two. The length of taper depends upon the offset differences between the outside traveled edge of the two sections and the design speed of the roadway. When tapers are located on a curve, the separate halves of the roadway should be designed with different curves to create the taper without any angle points in the curvature.

Formulas for determining transition taper lengths are shown below:

Street Width Transition Tapers

**For speeds <= 40 mph**

$$L = \frac{W * S^2}{60}$$

**For speeds > 40 mph**

$$L = W * S$$

Where,

**L** = transition taper length

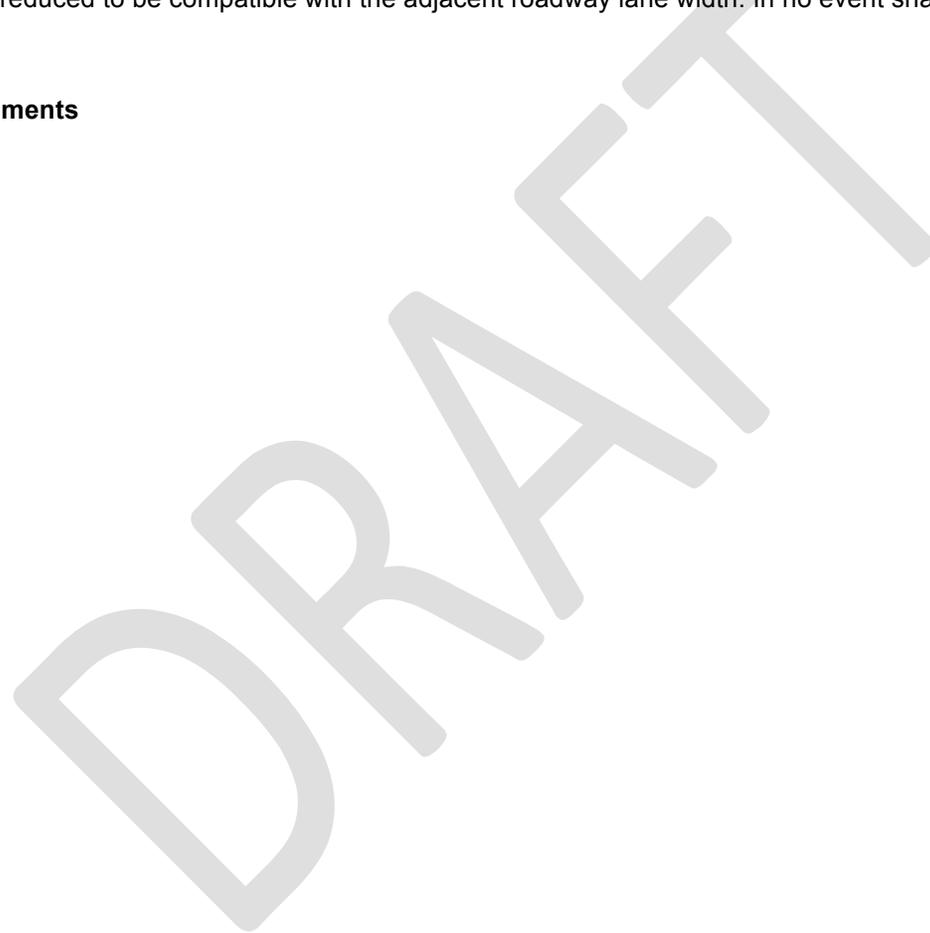
**W** = width of pavement offset (feet)

**S** = roadway design speed (mph)

## Article 12.2 Turn Lanes

It may be necessary to construct turning lanes for right and left turns into a driveway or street for safety and capacity reasons or where roadway speeds and traffic volumes are high or if there are substantial turning volumes. The purpose of a separate turning lane is to expedite the movement of through traffic, increase roadway capacity, permit the controlled movement of turning traffic, and promote the safety of all traffic. Design elements, which make up a turning lane, are shown in [Figure 5 Turn Lane Design Elements](#). Turn lanes should be 12 feet in width; however, the lane width may be reduced to be compatible with the adjacent roadway lane width. In no event shall the turn lane width be less than ten feet.

### Figure 5 Turn Lane Design Elements



## Section 12.2.1 Turn Lane Warrants

Additional pavement surfaces to accommodate movements shall be required and constructed at intersections to the standards specified in [Table 15 Left Turn Lane Warrants for Two-Lane Roads](#) and [Figure 6 Right Turn/Deceleration Warrants](#) under the following conditions:

### 1. Left Turn Lane – Signalized Intersections

- a) Where fully protected left-turn phasing is provided; or,
- b) Where peak hour left-turn volume exceeds 100 vph; or,
- c) Where delay caused by left turning vehicles blocking through vehicles would reduce the operating capacity of the intersection below level service “D” (LOS-D), as defined in the latest [Highway Capacity Manual](#).

### 2. Right Turn lane – Signalized Intersections

An exclusive right-turn lane shall be provided where the right turning volumes exceeds 300 vph and the adjacent through lane volume also exceed vph per lane. When calculating the adjacent through lane volume, it should be assumed that all through lanes have equal volumes.

### 3. Left Turn Lane – Unsignalized Intersection

A separate left turn lane shall be provided on a two lane roadway, depending on the percent of left turning vehicles in the advancing volume against opposing volume.

For four lane roadways or greater in width, a separate left turn lane should be provided when delay caused by the left turning vehicles blocking through vehicles, would reduce operating capacity of the intersection below level of service “D” (LOS-D), as defined in the latest [Highway Capacity Manual](#).

### 4. Right Turn – Deceleration Lane, Unsignalized Intersection

A separate turn / deceleration lane shall be provided depending on the roadway’s single lane volume, the volume of the right turning vehicles and the posted speed of the roadway.

### 5. Additional Turn Lanes

The City may require additional turning lanes and tapers or other improvements when it believes that the absence of such improvement will create and unsafe condition or would reduce the operating capacity of the intersection below level of service “D” (LOS-D), as defined in the latest [Highway Capacity Manual](#).

**Table 15 Left Turn Lane Warrants for Two-Lane Roads**

OPPOSING VOLUME (veh./hr.)	ADVANCING VOLUME (veh./hr.)			
	5% Left Turns	10% Left Turns	20% Left Turns	30% Left Turns
<b>40-mph Operating Speed</b>				
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
<b>50-mph Operating Speed</b>				
800	280	210	165	135
600	350	260	195	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295
<b>60-mph Operating Speed</b>				
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

Note: For operating speeds not shown, interpret between given values

## Figure 6 Right Turn/Deceleration Warrants

Insert Figure

### Section 12.2.2 Total Turn Lane Length

A separate turning-lane consists of a taper plus a full width turn lane. The design of the lane is based primarily on the speed at which drivers will turn into the lane, the speed to which drivers must reduce in order to turn into the driveway or side street after traversing the deceleration lane, and the amount of vehicular storage that will be required.

The total length of the turning lane and taper should be determined by either:

- a) The combination of turn lane or through lane queue storage plus the bay taper, or
- b) Right turn / deceleration requirements, whichever is greater.

### Section 12.2.3 Turn Lane Storage

#### A. Signalized Intersection

Where traffic is to be controlled by a traffic signal, the turn lane should be of sufficient length to store the turning vehicles and clear the equivalent lane volume of all other traffic on the approach, whichever is the longest. This length is necessary to ensure that full use of the separate turn lane will be achieved and that the queue of the other vehicles on the approach will not block vehicles from the turn lane.

The storage requirements for turn lanes should be based upon the peak 15-min. flow rates of turning traffic. The average number of turns per cycle can then be multiplied by a factor to account for random variations in arrivals.

The length of turn lane can be estimated by the following formula:

$$L = \frac{V * K * 25 * (1 + p)}{N}$$

Where,

**L** = storage length of turn lane (feet)

**V** = peak 15 minute flow rate of turning volume (vph)

**K** = constant to reflect random arrivals

**K** = 2.0 for 95% probability of storing all vehicles

**K** = 1.5 for 90% probability of storing all vehicles

**25** = approximate length of vehicle (feet per vehicle)

**N** = number of cycles for hour

The storage requirement for a separate turn lane is also based on the amount of queue length necessary to accommodate other vehicles arriving on the approach during the red phase of the cycle.

The “red time” formula for estimating the storage length for other vehicles is as follows:

$$L = \frac{V * K * 25 * (1 - g/c)}{(N * I)}$$

Where,

**L** = storage length of turn lane (feet)

**V** = peak 15 minute flow rate of turning volume (vph)

**K** = constant to reflect random arrivals

**K** = 2.0 for 95% probability of storing all vehicles

**K** = 1.5 for 90% probability of storing all vehicles

**25** = approximate length of vehicle (feet per vehicle)

**G** = green time (seconds)

**C** = cycle length (seconds)

**N** = number of cycles for hour

**I** = number of approaching vehicle lanes

### **B. Unsignalized Intersection**

The storage length for turning vehicles at intersections not controlled by a traffic signal should be determined by using the formulas for signalized intersections as outlined above. Storage requirements should be based on an assumed minimum cycle length of 90 seconds.

### **C. Right Turn/Deceleration Lengths**

The lengths required to come to a stop from either the design speed or an average running speed of a roadway, are indicated in the following table. The lengths assume the roadway is on a two percent or less vertical grade. The desirable deceleration lengths should be used on new roadways and the minimum may be used along existing roadways. Longer deceleration lengths may be required on downgrades greater than two percent.

**Table 16 Right Turn/Deceleration Lengths Table**

Design Speed (mph)	Right Turn/Deceleration Length (feet)	
	Desirable (1)	Minimum (2)
30	235	185
35	270	240
40	315	295
45	375	350
50	435	405
55	480	450

(1) Assumes stop condition

(2) Assumes 15 mph speed differential

**Section 12.2.4**

Approach, Departure and Bay Taper length for separate turn lanes shall be based on the following formulas:

Approach and Departure Taper for  
Speeds <= 40 mph

$$L = \frac{W * S^2}{60}$$

Approach and Departure Taper for  
Speeds > 40 mph

$$L = \frac{W * S}{3}$$

Where,

**L** = taper length, (feet)

**W** = width of offset, (feet)

**S** = design speed, (mph)

## Article 12.3 On-Road Bicycle Facilities

### A. Bike Lane

Bicycle Lanes are along portions of the roadway that has been designated by pavement markings for the preferential and exclusive use of bicyclists. Bicycle Lanes are always located on both sides of the roadway and carry bicyclists in the same direction as motor vehicle traffic.

Design Standards:

- a) The minimum width for a bicycle lane is four feet.
- b) Bike Lanes shall be the minimum prescribed for each cross section for new streets
- c) Symbols should be placed on the far side of every intersection, or at every decision point.
- d) Minimum width of a bike lane next to on-street parking is six feet.
- e) Bike lane should be dropped 100 feet from stop bar at intersection with a shared right/through lane condition.
- f) Mini skips should be placed whenever a bike lane is dropped; skips should be a 50ft in length.
- g) Bike lane should be placed between the through lane and a dedicated right turn lane.
- h) Bike lane should break for residential street or major driveway (more than 2 lanes).

Refer to Standard Detail [B-10.01](#), [B-10.02](#), and [B-10.04](#) in the [City of Raleigh Standard Details](#).

### B. Shared Lane (Sharrow) Markings

Design Standards:

- a) Sharrows should be placed after every decision point or at intervals of 250-feet
- b) When parking is prohibited and travel lane width is greater than or equal to 13 feet, place Sharrow 48 inches from face of curb.
- c) When parking is prohibited and travel lane width is less than 13 feet, place Sharrow in center of travel lane.
- d) When parking is present and travel lane width is greater than or equal to 15-feet, place Sharrow 13 feet from face of curb.
- e) When parking is present and travel lane width is less than 15 feet, place Sharrow in center of travel lane.

Refer to Standard Detail [B-10.03](#) in the [City of Raleigh Standard Details](#).

## Article 12.4 Curb and Gutter

All public roadways inside the corporate limits of the City, and outside the City when water or sewer is connected to the City utility system, shall be constructed with curb and gutter. Details for curb and gutter installations can be viewed in the [City of Raleigh Standard Details](#). See Detail [T-10.26.1](#) for standard curb and gutter installation.

### Section 12.4.1 Curb Installation requirements

1. Standard curb and gutter can be used on all streets.
  2. Granite curb shall be required when it previously existed or a streetscape plan recommends the use.
  3. Valley-type curbs are permitted for Neighborhood Yield and Neighborhood Local, if all the following are met:
    - a) Where any existing street containing a standard curb and gutter is to be extended, the curb and gutter shall be extended to at least the next intersection.
    - b) Curb treatments shall be the same on both sides of a street, but a different treatment may be used adjoining a median.
    - c) At the interface of differing curb or shoulder treatments, drainage structures are to be installed to assure uninterrupted flow of storm water between the two drainage systems.
- A. Curb and gutter will not be required on the following streets:
- a) Sensitive area thoroughfares or roadways located within a Reservoir Watershed Protection Area Overlay District. Curb and gutter may be required where right-of-way is restricted or where needed to control stormwater erosion and sedimentation. **(NOTE: Curb and gutter shall be installed at all intersections around the radii.)**
  - b) Roadways other than thoroughfare system roadways that were inside the City limits and paved prior to 1950.
  - c) Where curb and gutter is not planned to be installed in the future as part of design plans on street improvements, or where none is required as part of a City Council approved Neighborhood Plan.

### Section 12.4.2 Curb Return Radii

- A. Public street Intersections shall provide appropriate curb radii using the [Table 1 Design Vehicle Table](#) in order to allow the design vehicle to safely complete a turn without encroaching on adjacent Streetscape elements, including sidewalks and landscaping.
- B. Designers should take into account bicycle lane width and parking lane width when designing curb radii, as the travel lane offset allows for a larger effective radius for large vehicles. When a design vehicle larger than a Passenger Vehicle (P) is used and there are multiple receiving lanes, the design should account for the ability of the turning vehicle to use all receiving lanes.
- C. Where on-street parking lanes are provided, curb extensions (bulbouts) may be considered, reducing the effective crosswalk width for pedestrians. This may have an effect of increasing the required curb radius however, so care should be taken to account for the relevant design vehicle.
- D. Where intersection radii larger than 25 feet are required in order to accommodate large vehicles, designers should consider incorporating mountable curbs, truck aprons, or channelized turn lanes in order to minimize the impact to intersection width for pedestrians.
- E. Every intersection shall appropriately accommodate Emergency Vehicles:

### Article 12.6 Sight Distance

- A. Sight distance is the length of roadway ahead visible to the driver. The minimum sight distance available on the roadway should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path.
- B. Minimum stopping sight distances shall be provided in both the horizontal and vertical planes for planned roadways as related to assumed driver's eye height and position.
- C. Adequate sight distance should be provided at all driveway access points and shall be in accordance with the standards provided in this Manual.
- D. Sight triangles easements shall be shown on all NCDOT maintained roadways for any driveway access according to the manual "Policy on Street and Driveway Access to North Carolina Highways," as adopted and amended by NCDOT.
- E. This note must be placed on all plans: "Within the area of above defined sight triangle, there shall be no sight obstructing or partly obstructing wall, fence, sign, foliage, berms, or parked vehicles between the heights of 24 inches and eight feet above the curb line elevation or the nearest traveled way if no curbing exists."
- F. Objects that can be permitted in the sight distance triangle are utilities such as hydrants, utility poles, utility boxes, and traffic control devices. Those objects must be located to minimize visual obstruction.

### Section 12.6.1 Stopping Sight Distance

Where there are sight obstructions (such as walls, cut slopes, buildings and other hazards) on the inside of curves, changes in roadway alignment may be required to obtain adequate stopping sight distance if the sight obstruction cannot be removed.

**Table 17 Stopping Sight Distance**

Operating speed (mph)	Minimum stopping sight distance (in feet), Street grade in percent						
	Upgrades			Flat	Downgrades		
	9%	6%	3%	0%	-3%	-6%	-9%
25	140	145	150	150	155	165	175
30	180	185	200	200	210	215	230
35	225	230	240	250	265	275	290
40	270	280	290	305	315	335	355
45	320	330	345	360	380	400	430
50	375	390	405	425	450	475	510

**Figure 7 Sight Distance Measurement**  
INSERT PICTURE

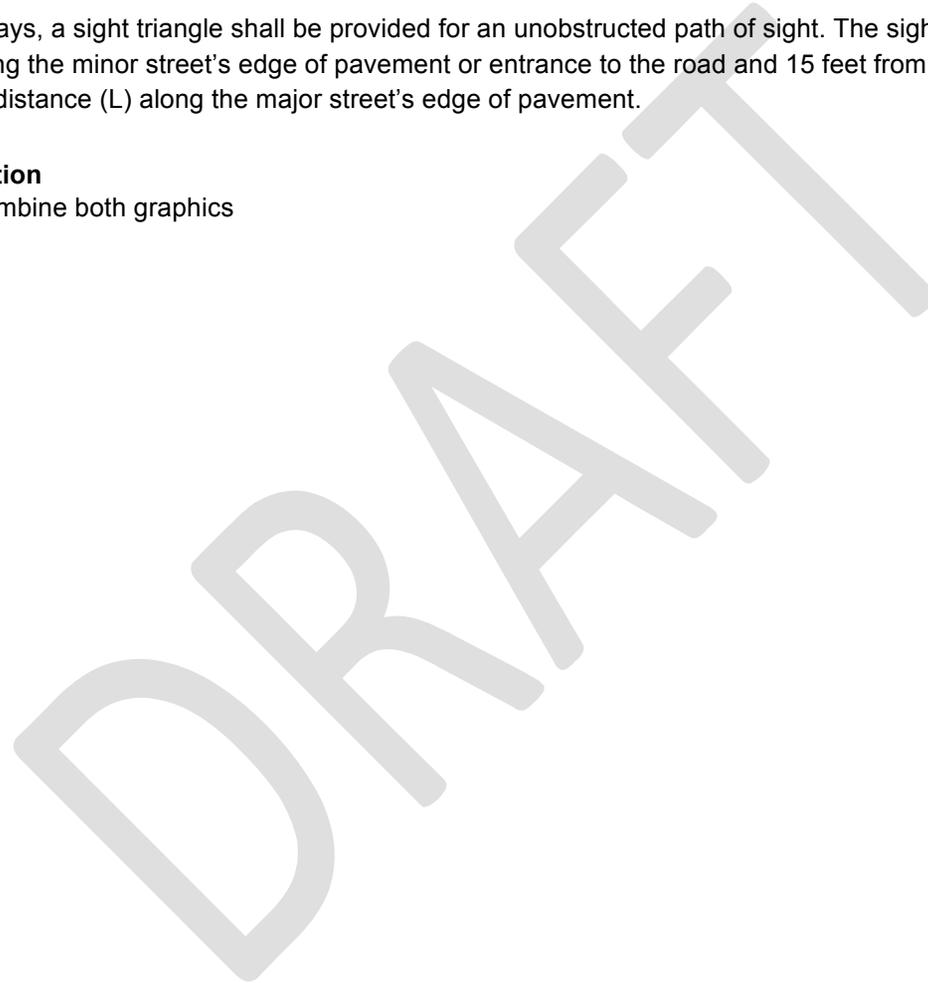
### Section 12.6.2 Intersection Sight Distance

Intersections should be planned and located to provide as much sight distance as possible. A basic requirement for all controlled intersections is that drivers must be able to see the control device well in advance of performing the required action. Stopping sight distance on all approaches is needed as a minimum. Obstruction-free sight triangles shall be provided in both the horizontal and vertical planes, as related to assumed driver's eye height and position.

At any intersection of two roadways, a sight triangle shall be provided for an unobstructed path of sight. The sight distance triangle can be defined by connecting a point that is along the minor street's edge of pavement or entrance to the road and 15 feet from the edge of pavement of the major street, with a point that is distance (L) along the major street's edge of pavement.

#### Figure 8 Sight Distance Depiction

Insert and draw new graphic, combine both graphics



**Table 18 Intersection Stopping Sight Distance** summarizes the required sight distance (L) along the road for a stopped vehicle to cross the street. If a roadway is divided with a median width of 20 feet or more for passenger vehicle crossings, or 40 feet or more for truck crossings, the required sight distance may be based on a two-stop crossing and consideration given to the width of each one-way pavement at a time.

**Table 18 Intersection Stopping Sight Distance**

Speed limit (mph)	Minimum Intersection Sight Distance (ft)							
	2 Lane Undivided		3 Lane Undivided or 2 Lane Divided w/ 12' median		4 Lane Undivided		5 Lane Undivided or 4 Lane Divided w/ 12' median	
	LEFT TURN	RIGHT TURN	LEFT TURN	RIGHT TURN	LEFT TURN	RIGHT TURN	LEFT TURN	RIGHT TURN
<b>20</b>	230	200	240	200	250	200	270	200
<b>25</b>	280	240	300	240	320	240	340	240
<b>30</b>	340	290	360	290	380	290	400	290
<b>35</b>	390	340	420	340	440	340	470	340
<b>40</b>	450	390	480	390	500	390	530	390
<b>45</b>	500	430	530	430	570	430	600	430
<b>50</b>	560	480	590	480	630	480	670	480
<b>55</b>	610	530	650	530	690	530	730	530

Notes: The sight distances shown in this chart shall be considered approximate only for a passenger car to turn onto the major street from a side street grade of 3% or less.

The distances from this chart are measured along the CL of the roadway (Sight Distance Length L from illustration).

The sight line (or resulting sight distance easement line if outside r/w) shall begin at the driver's eye approximately 15 feet from EP and end at the center of the closest oncoming lane.

Depending on specific site conditions additional adjustments may be required to sight distances. These factors may include, but are not limited to, side street approach grades greater than 3%, median widths of the crossing street, skewed intersections, or other variables that would affect sight distances.

Any adjustments to the above sight distances shall be in accordance with section "Intersection Control" of the latest edition of the AASHTO Manual.

## GLOSSARY

**AASHTO** American Association of State Highway Transportation Officials.

**Access Point** A point of ingress and/or egress, which connects a development to a public or private street.

**Approach.** The portion of an intersection leg which is used by traffic approaching the intersection.

**Bicycle Lanes** A portion of the roadway that has been designated by pavement markings for the preferential and exclusive use of bicyclists.

**Capacity.** The maximum sustainable hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform segment of a lane or roadway during a given time period under prevailing traffic, roadway and control conditions.

**City.** The City of Raleigh, North Carolina.

**City Code.** The Charter and Code of Ordinances of the City of Raleigh, North Carolina.

**City Council.** The governing body for the City of Raleigh, North Carolina.

**City Standards and Specifications.** Those standards prescribed for construction set out in this Manual and the City Code.

**Commercial Driveway Access.** Any driveway access point that does not meet the definition of residential driveway access.

**Comprehensive Plan.** The “Raleigh Comprehensive Plan” was adopted by the City Council as a guide for the development of the City and territory surrounding the City, consisting of maps, charts and text.

**Connective Street.** A street within a development, other than a cul-de-sac street or loop street, which will allow vehicular and pedestrian circulation to adjoining developments; thereby providing for community-wide circulation.

**Coordination (signal).** Maintaining a predictable time relationship between the operation of a traffic signal relative to the operation of other signals in a group or system.

**Curb cut** - The entrance (apron) to connect the driveway to the street

**Cycle.** A complete sequence of traffic signal indications.

**Cycle Length.** The time elapsed between the endings of two sequential terminations of a given interval. For coordinated signals, this is measured by using the coordinated phase green interval.

### **Design Adjustment**

**Design Speed** - Usually up to five miles per hour above the expected operating speed of the facility under design.

**Design Vehicle.** Motor, non-motor vehicles and pedestrians with representative weight, dimensions, and operating characteristics that are used to establish street design controls and standards

**Development or Development Plan.** Any site plan, subdivision, or plot plan

**Detector.** A device used to sense the presence or absence of vehicles or pedestrians in the vicinity of a signalized intersection.

**Detector Settings.** Controls used to affect the operation of a detector.

**Developer.** A site planner, landowner or subdivider.

**Development/Development Plan.** Any site plan, subdivision plan, or plot plan.

**Driveway Access Point.** A point of ingress and egress, or both, which is considered a private driveway. It can be either a residential access point or a commercial driveway access point.

**Driveway Width** The narrowest width of driveway measured parallel with the edge of street.

**Facility -**

**Frontage.** The distance along a property (additional sidewalk or shoulder width) required between the pedestrian traveler and adjacent building or environmental features to maintain comfort.

**Green Interval.** The duration of the green indication for a given movement at a signalized intersection.

**Internal Capture Trip.** A trip made within the confines of a mixed use development that does not use the off-site street system.

**ITE.** Institute of Transportation Engineers

**Level-of-Service (LOS).** A quantitative stratification of a performance measure or measures that represent quality of service, measured on an A – F scale, with LOS A representing the best operating conditions from the traveler’s perspective and LOS F the worst.

**LID.** Low Impact development

**Loop Street.** A street which is designed to discourage through traffic from other areas and both ends of the loop street connect with the same intersecting street.

**Measures of effectiveness (MOEs).** Measureable quantities and characteristics used to compare traffic impacts from various alternatives.

Measures of effectiveness quantify traffic impacts and allow for an objective examination of the results. Traffic impacts can be quantified in a variety of ways such as delay, queuing or average speed and at different scales. In many instances, the specific quantity for a given MOE is not as significant as the relative change of in MOE quantity between different alternatives. “Scale” refers to impacts for a specific area under review: an isolated intersection, all intersections along a particular road or all intersections within a roadway network.

**Median.** That portion of a divided roadway separating the traveled ways for traffic in opposite directions.

**Mitigation.** Alleviation, reduction, abatement or diminution of traffic impacts created by a development.

**Mixed Use Development.** A single real estate project that consists of two or more land use classifications between which trips can be made without using the offsite street system.

**Multimodal.** Being used by more than one travel mode such as motor vehicles, pedestrians and bicycles.

**Multimodal Level-of-Service (MMLoS).** A type of analysis where the level-of service of each travel mode on a facility is evaluated simultaneously.

**NCDOT.** North Carolina Department of Transportation

**Offset -** The time that the reference phase of a traffic signal begins (or ends) relative to the system master time zero.

**On-Street Bike Corral.** On-street Bicycle Parking Corrals are bicycle racks placed in the parking lane on the roadway.

**Pass-by Trip.** A trip made as an intermediate stop from an origin to a destination that does not require a route diversion.

**Phase (signal).** The part of the signal cycle allocated to any combination of traffic movements receiving the right-of-way simultaneously during one or more intervals. A phase includes the green, yellow change, and red clearance intervals.

**Phase Sequence.** The sequence of service provided to each traffic movement, or a description of the order in which left-turn movements are served relative to the through movements.

**Phase Settings.** Controls used to influence the start, duration and ending of a signal phase.

**Primary Trip.** A trip made for the specific purpose of visiting a destination. Stopping at the destination is the primary reason for the trip.

**Pavement Markings.** All lines, words or symbols, except signs officially placed within the roadway or parking area to regulate, warn or guide traffic.

**Peak-Hour Volume.** Hourly traffic volume used for roadway design and capacity analysis, usually occurring during one or more peak travel hours during a 24 hour period.

**Public Works Director.** The Department Head of the City of Raleigh Public Works Department.

**Reference Phase.** One of the two coordinated phases of a traffic signal.

**Residential Driveway Access.** A driveway access point serving a single family dwelling, mobile home, detached townhouse, two attached townhouses, duplex, multi-unit supportive housing residence, supportive housing residence which is required to provide no more than two (2) off-street parking spaces, or a driveway serving a nonresidential use if the daily volume of two-way driveway traffic is expected to be less than fifty (50) vehicles.

**Right-of-Way.** An interest in land to the City which provides for the perpetual right and privilege of the City and its agents, franchise holders, successors, and assigns to construct, install, improve, repair, maintain, and use a public street, including related and customary uses of street rights-of-way such as sidewalk, bike path, landscaping, traffic control devices and signage, sanitary sewer, stormwater drainage devices, water supply, cable television, electric power, gas, and telephone transmission and related purposes in, upon, over, below, and across the rights-of-way. The City is authorized to remove, and keep removed from the rights-of-way all trees, vegetation, and other obstructions as is determined to be necessary by the City to maintain, repair, and protect facilities located in the right-of-way

**Right-of-Way Centerline**

- a) The right-of-way centerline of a two-way street shall be a point equidistant between the inside edges of the innermost through travel lane in each direction of travel.
- b) The right-of-way centerline of a one-way street shall be a point equidistant between the outside edges of the outermost through travel lanes in the direction of travel.
- c) Where the alignment of an existing street is to be altered or changed, the right-of-way centerline shall be determined in accordance with the new realignment plan, provided the City and/or NCDOT have approved the plan.
- d) In special cases where non-symmetrical street widening, narrowing, re-striping, or other unique situations has occurred not covered by the above scenarios, the right-of-way centerline shall be defined by the Public Works Director.

**Roadway.** See definition of street.

**Roundabout.** An unsignalized intersection with a generally circular shape, characterized by yield on entry and circulation around a central island.

**Shall.** When used in the context of this Manual and its contents, shall indicates a mandatory action, procedure or practice.

**Shared Lane (Sharrow) Markings.** Shared lane markings are used on roadways where dedicated bicycle lanes are desirable but not possible due to physical or other constraints.

**Shopping Center.** A planned, unified development which contains at least three (3) retail or recreational establishments within a minimum of twenty-five thousand (25,000) square feet of floor area gross on a land area of at least two and one-half (2.5) acres in size.

**Should.** As used in the context of traffic studies, should indicates a mandatory action, procedure or practice that City staff is empowered to waive.

**Slope Easement.** An easement, which is reasonably necessary and incidental to the construction within the adjoining right-of-way of public street or sidewalk, or both, by the City, state, or their contractors. The purposes to which the easement area may be used include cutting, sloping, filling, installation of stormwater drain pipes or other drainage facilities, grading or otherwise changing the natural contour of the easement area in order to support and to accommodate the development of the adjacent street right-of-way, in accord with generally accepted engineering practices. Following the construction of the adjacent street or sidewalk, or both, the area subject to this easement will be graded, stabilized, and restored using conventional engineering and landscaping methods. Thereafter, the landowners with the underlying fee interest may make and enjoy all lawful uses of the property subject to this easement, provided there be no damage to the lateral and subjacent support of the public street, sidewalk, or both or to any stormwater drainage facility.

**Split.** The segment of the cycle length allocated to each phase or interval that may occur. In an actuated controller unit, split is the time in the cycle allocated to a phase – the sum of the green, yellow change, and red clearance intervals for a phase.

**Street.** A general term for denoting a public way for purposes of pedestrian, bike and vehicular travel, including the entire area within the right-of-way.

**Street Furniture.** Items that are placed in the public right-of-way along the frontage of a development. Items include:

- a) Bicycle Racks
- b) Benches
- c) Parking Meters
- d) Bus Shelters
- e) Pedestrian Lighting
- f) Planters and/or Flower boxes
- g) Trash Receptacles

**Traffic Engineer.** A professional engineer who is licensed by the North Carolina Board of Examiners for Engineers and Land Surveyors to practice engineering and who has special knowledge of traffic engineering principles through a combination of education, training and experience.

**Traffic Engineering.** The application of scientific and mathematical principles to facilitate the safe and efficient movement of people, goods and information.

**Traffic Impact.** A measurable, quantifiable or qualified effect on one or more traffic performance measures. Traffic impacts can be beneficial or detrimental.

**Traffic Performance Measures.** Synonymous with Measures of Effectiveness.

**Traffic Sign.** A device mounted on a fixed or movable support, conveying a message or symbol to regulate, warn or guide traffic.

**Traffic Study.** A collective term for Trip Generation Reports, Traffic Assessment

**Report or Traffic Impact Analysis Reports (see below).**

- a) Trip Generation Report: Calculates the expected number of new trips that a development will generate during the AM and PM peak periods. Trip generation reports are required for all rezoning cases. Exceptions can be made for rezoning cases that do not affect the trip generation characteristics of the property such as tree conservation areas, stormwater retention, location and size of building signs, etc.
- b) Traffic Assessment (TA) Report: Calculates the expected number of new trips and calculates the current amount of delay, queuing and traffic capacity available at the nearest intersection(s). If existing delays and volume-to capacity ratios are low, City staff may conclude that the adjacent roadway network can absorb new trips without becoming congested. In that case, no further study is needed.
- c) Traffic Impact Analysis (TIA) Report: Calculates the expected number of new trips and calculates the current amount of delay, queuing and traffic capacity available at the nearest intersections. TIAs calculate the amount of delay, queuing and volume-to-capacity ratio and other variables both before and after a development is built. City staff will then use engineering judgment to determine if the developers should mitigate some of the traffic impacts from their development by adding a new turn lane or installing some other improvement. If mitigation is recommended, the TIA shall recalculate the traffic impacts after the mitigation measures have been installed. It will quantify those impacts that can be directly attributed to the new development and the effect of any mitigation.

**Travelway.** The travelway refers to the paved width of a street between curbs accommodates moving and stationary vehicles in a variety of modes.

**Trip.** Travel between an origin and a destination.

**Urban Design Guidelines.** A portion of the Guidelines section of the Raleigh Comprehensive Plan that describes the elements of Mixed-Use Neighborhood and Village Centers.

**Volume.** The number of vehicles passing a given point during a specified period of time