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Chapter 7. Development Standards

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7.1. Parking

A. **Purpose and Intent.** Vehicle accommodation areas such as parking lots, loading areas, and circulation drives are necessary elements in the urban environment. However, these areas are known to increase stormwater volume and velocity, increase the levels of surface pollutants, increase surface-level heat and glare, reduce the efficiency of the connecting street system, and increase the number of potential conflict points with the surrounding pedestrian network. This chapter regulates the construction, expansion, and renovation of vehicle accommodation areas in a manner that seeks to minimize and mitigate these known impacts.

B. **Applicability.** The standards of this Section are applicable across all zoning districts, except as described in this section.

1. **Town Center (TC) District.**

   a. Developments which do not involve an increase of more than twenty-five (25) percent in the building floor area are exempt from the standards of this Section;

   b. Developments which involve only a change of use and which will not increase the number of parking spaces by more than ten (10) percent are exempt from the standards of this Section; and

   c. Required loading areas must still be provided but may be designated on-street and/or within public alleys.

2. **Central Business District.** For uses located within the Central Business District, compliance with parking standards may be achieved by making payments in accordance with the Town of Knightdale Fee Schedule adopted by the Town Council to the Fund 70 Capital Reserve account. The payment shall be based upon a dollar amount per parking space, and all parking payment moneys shall be used to acquire, maintain, administer, and/or improve public parking.

C. **Loading Areas.**

1. Off-street loading space available for the loading and unloading of vehicles shall be provided for all retail, wholesale and industrial uses, as well as for any expansion of such uses or change in use requiring the regular delivery or shipment of goods, merchandise or equipment to the site.

2. Loading areas may not otherwise be used for conducting the operations and activities of the permitted use, including, but not limited to, the display or storage of vehicles or materials.
3. Loading areas shall be located on the private lot and shall not be located within, or so as to interfere with, any public right-of-way, off-street parking area, or pedestrian circulation area.
4. No loading dock or overhead doors shall face upon a street right-of-way except in cases where no practical alternative exists, as determined by the Land Use Administrator.
5. Adequate space for standing, turning, loading, and unloading services shall be provided in a manner that does not interfere with required off-street parking areas, pedestrian circulation areas, and the public use of streets or alleys.
6. Each loading berth shall be located so as to facilitate access to a public street or alley and shall not interfere with other vehicular or pedestrian traffic and shall not interfere with the function of parking areas. In no instance shall loading areas rely on backing movements into public rights-of-way.
7. All required loading areas shall be paved and maintained in a dust-free condition at all times. Said surface shall be marked in a manner that clearly indicates required loading areas.
8. Loading areas shall not be considered for meeting the requirements of Section 7.1 (E), (F), or (G).

D. **Cross Access.** All developments featuring on-site parking lots shall be designed to allow for cross-access to adjacent properties to encourage shared parking (Section 7.1 (J)(3)). When cross access is deemed impractical by the Land Use Administrator on the basis of severe topography, environmental constraints, or vehicular safety factors, the requirement may be deviated from, provided that appropriate bicycle and pedestrian connections are provided between adjacent developments or land uses. Development plans shall provide cross-access easement and complete the connection if completing the link can derive an immediate benefit. If no immediate benefit can be derived, development plans shall provide cross access and construction easements and arrange the site design so when the adjoining property owner extends the connection to the property line, the link will be completed. If the link is to be completed in the future, the grade of the connection, parking, landscaping, and other improvements must be set to allow for extension into the adjacent property.

E. **Park and Ride / Transit Accommodations.**

1. Shopping centers that provide one hundred (100) or more motorized vehicle parking spaces shall designate at least five (5) percent of the required spaces as "Park and Ride" spaces; however, no more than one-hundred (100) spaces shall be required.
2. A sign or signs shall be used to designate that the spaces are reserved for park and ride use during non-holiday weekdays between 6AM and 6PM.
3. Park and ride spaces should be located adjacent to one another in a cohesive manner.
4. Bus shelters, transit easements, or other transit-oriented accommodations may be required to be installed by the developer in the vicinity of the Park and Ride area or existing or proposed transit stop if the Land Use Administrator determines that GoWake Access, Go Triangle, GoRaleigh, or another publicly-sponsored transit provider would benefit from the improvements.

F. **Bicycle Parking.**

1. Multi-family residential uses shall provide bicycle parking at a rate of one (1) bicycle parking space for every twenty (20) motorized vehicle spaces; however, no more than one hundred (100) total bicycle parking spaces shall be required for any single development.
2. Nonresidential uses with off-street parking for motorized vehicles of at least fifteen (15) spaces and not more than forty (40) spaces shall provide a minimum of two (2) bicycle parking spaces.

3. Nonresidential uses with off-street parking for motorized vehicles of more than forty (40) spaces shall provide bicycle parking at a rate of one (1) bicycle parking space for every ten (10) motorized vehicle spaces; however, no more than one hundred (100) total bicycle parking spaces shall be required for any single development.

G. **Motorized Vehicle Parking.**

1. **Calculations.**

a. **Multiple Uses.** In mixed use developments or on lots containing more than one use, the total number of allowed parking spaces shall be determined by adding together the maximum number of spaces for each proposed use as if they were separate.

b. **Fractions.** When measurements of the number of allowed spaces result in a fractional number, any fraction of less than one-half (0.5) is rounded down to the next lower whole number, and any fraction of one-half (0.5) or more is rounded up to the next higher whole number.

c. **Unlisted Uses.** In the case of uses not specified in Section 7.1 (G)(2), the Land Use Administrator shall determine the closest similar use. If no similar use exists, required parking shall be determined by a parking study specific to the use.

2. Parking for motorized vehicles shall be provided according to the following table of ratios:

Use Category	Maximum Parking Spaces
Residential	1.5 per bedroom up to 3.0 per unit
Lodging	1.25 per guest room
Office / Service	4.0 per 1,000 SF
Retail	4.0 per 1,000 SF
Restaurant	1.0 per 100 SF
Entertainment / Recreation	4.0 per 1,000 SF
Manufacturing / Wholesale / Storage	2.0 per 1,000 SF
Civic / Institutional	*
Infrastructure	*
1. All square footage is in gross square feet of the use that is creating the parking demand. 2. For uses marked with *, maximum allowed spaces are to be determined by a parking study specific to the use.	

H. **Adjustments to Motorized Vehicle Parking Ratios.**

a. **Tree Preservation.** Site design shall prioritize the retention of healthy trees with a twelve (12) inch or greater DBH from being damaged or removed

b. **Transit**. The maximum number of spaces required by 7.1 (G)(2) may be adjusted by up to ten (10) percent by the Land Use Administrator when the subject lot is located within nine hundred (900) feet of a public transit stop.

c. **Pedestrian Access**. The maximum number of spaces required by 7.1 (G)(2) for non-residential uses may be adjusted by up to ten (10) percent by the Land Use Administrator when the Land Use Administrator deems the use to be neighborhood-serving and when the subject lot is accessible to residents within one-thousand three-hundred and twenty (1,320) feet by a continuous sidewalk network.

d. **Public Parking Lots**. The maximum number of spaces required by 7.1 (G)(2) for non-residential uses may be adjusted by up to ten (10) percent by the Land Use Administrator when the subject lot is within nine hundred (900) feet of a parking lot that is available for use by the public without charge.

e. **Multifamily, Mixed Use, and Nonresidential Uses**. Where on-street parking is permitted, on-street spaces located directly along a parcel's frontage may count toward the maximum parking allowed for any use except a single-family dwelling.

2. **Exceeding Parking Ratio Maximums.** To minimize the negative impacts associated with excess parking surfaces, the stated parking ratio maximums in Section 7.1 (G)(2) may only be exceeded if all parking is provided in a below or above-ground parking structure.

I. **Additional Standards for Motorized Vehicle Parking.**

1. **Disabled Parking.** Parking for the disabled shall be provided in accordance with the North Carolina State Accessibility Code.

2. **Electric Vehicle Parking.** Parking stalls with electric vehicle charging stations shall be centrally located and clustered within parking lots and shall be provided at the ratio detailed below.

a. Multi-family residential uses with five (5) or more dwelling units shall provide a minimum of two (2) electric vehicle charging stations. Additional stations shall be provided at a rate of one (1) electric vehicle charging station for every forty (40) motorized vehicle spaces. No more than ten (10) total electric vehicle charging stations shall be required for any single applicable development.

b. Nonresidential uses with off-street parking for motorized vehicles of more than forty (40) spaces shall provide a minimum of two (2) electric vehicle charging stations. Additional stations shall be provided at a rate of one (1) electric vehicle charging station for every forty (40) motorized vehicle spaces. No more than fifteen (15) total electric vehicle charging stations shall be required for any single applicable development.

3. **Use of Parking Areas.** Required parking areas shall be available for the parking of operable vehicles of residents, customers, and employees, and shall not be used for the storage of vehicles or materials, or for the parking of vehicles used for loading or unloading, or in conducting the use.

II. **Alternatives to Provision of On-Site Parking.** In lieu of actual on-site construction of off-street parking spaces, all or any portion of the off-street parking may be provided as follows:

1. **Remote Parking**. Remote parking (a dedicated off-site satellite parking lot) may be permitted, subject to certification by the Land Use Administrator that the following requirements have been met:

a. The use being served by the remote parking shall be a permitted principal use, as established in Section 3.1, in the zoning districts within which the lot containing such parking is located;

b. A safe, direct, paved, lighted, and convenient pedestrian route shall exist or be provided between the remote parking and the use being served;

c. At least one (1) parking space within each remote parking lot shall be within six hundred sixty (660) feet or one-eighth (1/8) mile of a public entrance to the structure housing the use being served (or to the lot housing the use being served in cases where no structure exists) as measured along the route provided in accordance with subsection (b); and

d. The continued availability of remote parking spaces necessary to meet the requirements of this section shall be ensured by an appropriate condition that the continued validity of the zoning compliance or special use permit shall be dependent upon the permit holder's continued ability to provide the requisite number of parking spaces.

2. **Combined Parking**. Combined parking (dedicated parking on the same zoning lot) may be permitted, , subject to certification by the Land Use Administrator that such joint usage of the combined parking complies with either:

a. The peak usage of the parking facility by one use will be at night or on Sundays (such as with theaters, assembly halls, or places of worship), and the peak usage of the parking facility by the second use will be at other times; or

b. The second use is an accessory use to the first use, such as restaurants and meeting rooms to hotels and motels.

3. **Shared Parking**. Shared parking (dedicated parking on an adjacent zoning lot) may be permitted, subject to certification by the Land Use Administrator that such joint usage of the shared parking complies with both:

a. The peak usage of the parking facility by one (1) use will be at night or on Sundays (such as with theaters, assembly halls, or places of worship), and the peak usage of the parking facility by the second use will be at other times; and

b. The joint use of shared off-street parking between two (2) uses is made by contract between two (2) or more applicable property owners.

K. **General Off-Street Vehicle Accommodation Design Standards.**

1. **Location.** No off-street vehicle accommodation area is permitted within any required setback, except that driveways providing access to the area may be installed across said setback. It is the intent that these driveways be as nearly perpendicular to the street right-of-way as possible.

2. **Surfacing and Curbing.** All vehicle accommodation area surfacing shall be constructed in accordance with the Knightdale Standard Specifications & Construction Details.

a. **Required Surfacing**. All vehicle accommodation areas and drives connecting such areas with public rights-of-way shall be surfaced with a prepared or permeable hard surface.

i. **Prepared Hard Surface**. Prepared hard surface treatment shall include but not be limited to asphalt, concrete, or unit pavers.

ii. **Permeable Hard Surface**. Permeable hard surface treatment shall include but not be limited to pervious concrete, porous asphalt, brick/stone pavers, or engineered turf pavers.

b. **Exemptions.** The following situations are exempted from the prepared hard pavement surfacing and curbing requirements of this section, except that they must comply with the requirements of Section 7.1 (K)(2)(d) for un-surfaced areas:

i. Single-family dwellings in the RR1 and RT districts.

ii. A parking lot used only for occasional use (Use that occurs on two (2) or fewer days per week) or is temporary in nature (not exceeding 24 months); and

iii. Whenever a proposed development involves only one (1) of the following:

a) An accessory structure; or

b) A change in use which will not increase the number of required parking spaces by more than ten (10) percent and the existing parking lot does not comply with the requirements of Section 7.1 (G).

iv. The Land Use Administrator may exempt up to seventy-five (75) percent of the employee parking spaces in the MI District from the paving requirements of the Section. To qualify for the exemption, the parking spaces may not be visible, either by effective buffer screening or because of the grade of the site, from any public right-of-way or a residentially or commercially zoned property.

c. **Curbing Required.** All vehicle accommodation areas shall be curbed using standard curb and gutter with a minimum width of one-and-a-half (1.5) feet. Landscape islands, aisles, and areas shall be similarly curbed to protect vegetation except when approved by the Land Use Administrator for stormwater management purposes.

d. **Un-surfaced Areas.** The following standards shall apply to un-surfaced areas except for single-family dwellings in the RR1 and RT districts.

i. Landscape aisles or spatial separations shall be provided to ensure that the parking spaces will be readily identifiable to the users;

ii. The area must be dust-free, and covered with a maintained pervious ground cover such as grass or mulch (no bare earth); and

iii. The perimeter of the vehicle accommodation area encompassing the parking spaces and the side of any un-surfaced drive or aisle leading to said spaces shall be edged with one (1) of the following materials, including but not limited to: brick, pressure treated timbers, or cast in place concrete. All such edge treatments shall be anchored into place and be a minimum dimension of six (6) inches square.

3. **Screening.** Vehicle accommodation areas shall be screened in accordance with Section 7.5 (B).

4. **Containment.** Off-street vehicle accommodation areas shall be designed so that parked vehicles do not encroach upon or extend onto public rights-of-way, sidewalks, or strike against or damage any wall, vegetation, utility, or other structure.

L. **Specific Circulation Drive Design Standards.**

1. **Location.** A circulation drive may be permitted around the front of the building but may not encroach into the front setback or any required landscape area.

2. **Width.** Circulation drives shall not exceed ten (10) feet in width, except that they may be up to twenty (20) feet wide when adjacent to an arterial and located in an MI, BO, or HB district or if on-street parking spaces are provided.

3. **Paving Treatments.** Circulation drives shall be enhanced with alternative paving treatments such as unit pavers, stamped concrete, or stamped asphalt. At a minimum, two (2) ten (10) foot long treatments must be included at the beginning and the terminus of the drive as an indicator to the driver that they are entering and leaving a pedestrian area. Additional treatment locations will be required if and where pedestrian crossings of the circulation drive are anticipated.

M. **Specific Motorized Vehicle Parking Area Design Standards.**

1. **Location.** Parking areas are prohibited from being located in the front yard of a lot as well as from in front of a building's primary façade unless otherwise permitted in Chapter 6: Building Type Standards.

2. **Landscaping.** Parking lots are to be treated as enclosures; therefore, parking lot landscaping (Section 7.4 (J)) and screening (Section 7.5 (B)) shall be placed in a manner that breaks the lot into parking modules of not more than thirty-six (36) spaces.

3. **Parking Space Dimensions.** Parking spaces should be dimensioned in accordance with the Town of Knightdale Standard Specifications and Details Manual.

4. **Special Event Parking.** Off-street areas used for special event parking (to accommodate occasional overflow volumes) may be constructed of a dust-free, compacted, pervious ground cover such as grass or mulch. The owner of the property shall be responsible for the maintenance of such parking in a clean and dust-free condition.

N. **Specific Bicycle Parking Design Standards.**

1. **Location.**

   a. Bicycle parking shall be made available within fifty (50) feet of a building's main entrance(s).

   b. Where there is more than one (1) building on the site, or parking is shared with an adjacent site, bicycle parking must be distributed equally to serve all buildings and main entrances.

2. **Conversion from Motorized Spaces.** During the site plan approval process, the DRC may allow a new or a pre-existing development to convert up to five (5) percent of its motorized vehicle spaces to non-required additional bicycle parking, as long as the spaces are conveniently located near a building entrance or park and ride reserved spaces as detailed in 7.1(E). Converted parking spaces shall yield at least four (4) bicycle parking spaces per motorized vehicle space.

7.2. Driveways

A. **Number of Driveway Access Points**.

1. **Single-Family Residential Lots in General**.

Parcel Frontage	Number of Access Points Allowed
<= 100 ft	1
> 100 ft	2

2. **Along Arterials and Collectors.** Developments should minimize or eliminate curb cuts along arterials and collectors. Single-family lots, attached or detached, shall not have access to a collector or arterial street. Instead, rear-loaded alley access is permitted. Where possible, vehicular access drives should be shared with the adjacent properties and/or alleys should be utilized for access. All lots, parcels, or any other division of land adjacent to an arterial or collector may be allowed driveways or street connections in accordance with the following.

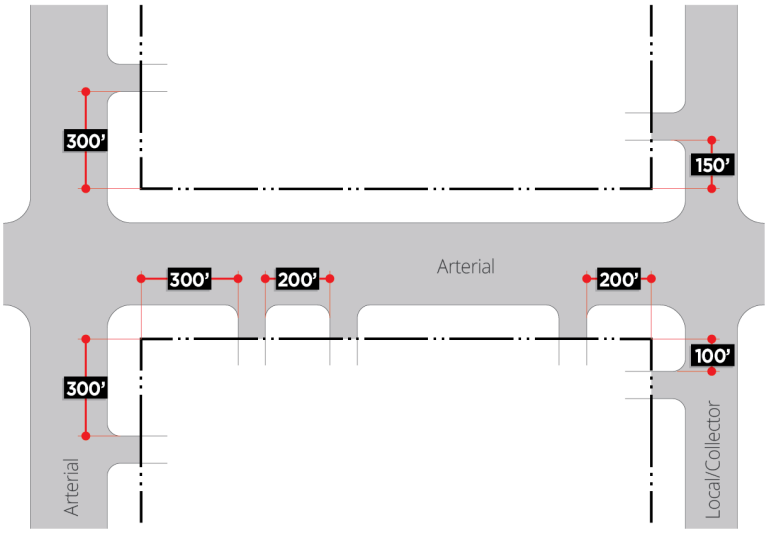
Parcel Frontage	Number of Access Points Allowed
< 500 ft	1
501 – 1200 ft	2
>1200 ft	3

B. **Location of Driveway Access Points**.

1. **In General.** Except for shared drives, all driveways shall be a minimum of two (2) feet from the property line.

2. **Along Arterials.** Location guidelines for driveway access points along arterials are shown in the illustration below in relation to the direction of traffic flow. If access to a lot, parcel, or other lawful division of land is physically unobtainable under the provisions illustrated below, driveway access points shall be located the greatest distance possible from one another and from other streets.

Figure 7.1. Location of Driveway Access Points



C. **Exemptions.** Public Safety Facilities are exempt from the location of driveway access points standard and width restrictions found in this section and the Knightdale Standard Specifications & Construction Details.

7.3. Sidewalks and Pedestrian Walkways

In order for walking to be a viable transportation choice for local trips, circulation routes must be safe, convenient, and highly connected. Pedestrian circulation and connectivity should primarily take place adjacent to planned streets within the right-of-way; however, a considerable amount of pedestrian activity also takes place on-site, where vehicle speeds are lower but the number of potential conflict points are higher. As such, the following standards shall be met when designing sidewalks and pedestrian walkways for all non-single family development:

A. Sidewalks shall be provided along all sides of the lot that abut a public street, where the existing right-of-way permits.

B. Existing development shall provide sidewalks along all sides of the lot that abut a public street, where the existing right-of-way permits, when substantial rehabilitation, as detailed in Section 11.2 (D)(2), is done to the existing building(s) or site.

C. Pedestrian walkways at building foundations shall have a minimum width of ten (10) feet.

D. Sidewalks and pedestrian walkways shall be constructed to have a minimum width equal to the width of existing or proposed abutting sidewalk or pedestrian walkway or of five (5) feet, whichever is greater. Sidepath and greenway widths shall be a minimum of ten (10) feet.

E. All sidewalks and pedestrian walkways shall be designed to comply with the design standards outlined in Section 10.4.

F. Pedestrian crossings shall be made safer for pedestrians whenever possible by shortening crosswalk distances with roadway designs including, but not limited to, curb extensions, reduced curb radii, and the elimination of free right-turn lanes. Traffic calming devices may only be installed according to the Town's "Traffic Calming Policy" as most recently adopted by the Town Council. Pedestrian crossings at mid-block or unsignalized locations shall be accompanied by Rectangular Rapid Flash Beacon (RRFB) signals. If a mid-block pedestrian crossing is not granted by NCDOT, the bicycle and pedestrian infrastructure shall be modified to account for a crossing at a bordering signalized intersection that is determined to be the most suitable by the entity or entities owning the intersection roadways.

G. Pedestrian walkways shall form an on-site circulation system that minimizes the number of points of conflict (where pedestrian networks and bicycle/vehicle networks intersect) between pedestrians and vehicles, particularly where pedestrians access on-site parking and building entrances.

H. Pedestrian walkways shall connect building entrances to one another and building entrances to public sidewalk connections and existing or planned transit stops.

I. All developments that contain more than one (1) building shall provide walkways between the principal entrances of the buildings.

J. In certain circumstances the Town may reserve the right to require the installation of additional safety structures such as fences, vegetative buffers, landscaping elements, or any combination of the three, where pedestrian sidewalks and walkways are adjacent to inadequate shoulders or steep slopes that present the potential for safety concerns.

K. Trunk line greenways, as shown in Appendix B, shall be designed in a way that minimizes roadway and alley crossings to the maximum extent possible. Trunk line design shall adhere to natural features such as creeks, as shown in Appendix B, even if that entails providing creek and smaller tributary bridge crossings.

L. Signage shall be provided where trunk line greenways intersect other greenways, and where trunk line greenways intersect bicycle and pedestrian destinations such as parks, open space, schools and activity centers. Signage shall adhere to any applicable Town Standard Specifications for greenway signage.

M. If a development site includes public greenways on the Comprehensive Transportation Plan Appendix B Sidepaths & Greenways Plan, any private greenways on the development site shall directly connect to the public greenway network unless deemed not possible by the Land Use Administrator.

N. Public and private greenways shall not overlap with Stormwater Control Measure (SCM) primary access easements, unless approved by the Stormwater Administrator. If the overlap is approved, the greenway shall be built to a standard that will accommodate maintenance vehicles.

O. Amenities shall be placed incrementally along pedestrian corridors. Placement shall be approved with Construction Drawings by the Land Use Administrator.

7.4. Landscaping and Tree Protection

A. **Purpose and Intent**.

1. The protection of existing trees and the provision of landscaping are essential components of the built urban form of the Town. The purpose of this section is to regulate the protection, preservation, installation, and long-term management of vegetation within the Town of Knightdale. Landscaping requirements are intended to:

   a. Minimize potential nuisances such as visual impacts from adjacent properties;

   b. Minimize transmission, noise, dust, odor, litter, and glare of lights;

   c. Provide for a separation of space and establish a sense of privacy;

   d. Promote the preservation of open space; and

   e. Mitigate adverse grade changes between adjacent properties.

2. The appropriate use of existing and supplemental landscaping improves the aesthetic appearance of new development, thereby enhancing the local business economy while preserving and protecting the identity and character of Knightdale. Furthermore, the use of native evergreen and deciduous plant materials blend new construction with the existing natural and built environments while maintaining the aesthetic character of the Town, and the installation of drought-tolerant plant materials promotes good soil management and water conservation.

B. **Applicability**.

1. **Expansions and Changes of Use.** These regulations shall apply to all newly developed properties as well as changes of use, expansions which increase the gross heated square footage of an existing building by more than twenty-five (25) percent, and expansions of vehicle accommodation areas by more than twenty-five (25) percent.

2. **Modification of Standards.** Where necessary to accommodate creativity in site design, or where topographic or physical site conditions are not feasible, the Land Use Administrator may modify these requirements, provided that the type and amount of landscaping or other features are equivalent in effectiveness.

3. **Enhanced Standards**. The Town may require additional landscape beyond the landscape required in this Section in areas identified as Gateways in the Knightdale Next Comprehensive Plan.

4. **Emergencies.** In the case of emergencies such as windstorms, ice storms, fire, or other disasters, the requirements of this Ordinance may be waived by the Town during the emergency period so that the requirements of this Ordinance will in no way hamper private or public work to restore order in the Town. This shall not be interpreted to be a general waiver of the intent of this Ordinance.

5. **Exemptions.**

   a. **Lots Less Than Two (2) Acres.** Any lot less than two (2) acres shall be exempt from the tree protection provisions of this chapter. Subdivision of property to circumvent these requirements is not permitted.

   b. **Timbering and Silviculture.** Normal forestry activity on forestland that is taxed on the basis of its present use value as forestland under Article 12 of Chapter 105 of the General Statutes or that is conducted in accordance with a forest management plan that is prepared or approved by a forester registered in accordance with Chapter 89B of the General Statutes shall be exempt from the tree protection provisions of this Chapter (Section 7.4).

      i. If a forest landowner harvests timber and they will be developing the lot within the next three (3) to five (5) years, it is particularly important to maintain any buffers that might be required under current

zoning. The landowner should also be reminded in such instances that protected trees as listed in Section 7.4 (H) or any canopy required under Section 7.4 (M) will have to be accounted for. Timbering and silviculture may not be used to circumvent the requirements of this chapter for development. Forest landowners should keep a record of when the tract was harvested since that date may come into question should a development plan be submitted to the Town in the future.

ii. In cases where the harvest results in the removal of all or substantially all of the trees that fall within required buffers, or fails to account for protected trees under Town regulations governing development of the tract of land, the Land Use Administrator may deny a building permit or refuse to approve a site or subdivision plan for either a period of up to three (3) years if it was not a willful violation of the Town's regulations, or up to five (5) years if it was a willful violation of the Town's regulations.

C. **Plant Classifications**. All measures of plant maturity shall be as defined by the most recently approved American Standard for Nursery Stock (ANSI Z60.1), published by the American National Standards Institute.

1. Canopy Tree: Any tree listed on the Town of Knightdale Approved Canopy Tree List or other species approved by the Land Use Administrator that is hardy to "Zone 8," has an expected mature height of thirty-five (35) feet or higher and has an expected mature width of at least thirty (30) feet or greater.

2. Understory Tree: Any tree listed on the Town of Knightdale Approved Understory Tree List or other species approved by the Land Use Administrator that is hardy to "Zone 8" and has an expected mature height of ten (10) to fifteen (15) feet or higher.

3. Shrub: Any shrub listed on the Town of Knightdale Approved Shrub List or other species approved by the Land Use Administrator that is hardy to "Zone 8" and has an expected mature height of two and a half (2.5) feet or higher.

4. Groundcover: Mature groundcover plants are any shrub or grass species approved by the Land Use Administrator that is hardy to "Zone 8" and range from a few inches to no more than two and a half (2.5) feet in height.

D. **General Provisions.**

1. **Landscape Plan.** Prior to any site disturbance, a Landscape Plan meeting the requirements of Section 12.3 (I) shall be submitted and approved.

2. **Pre-Construction Conference.** Prior to the commencement of any activities requiring a building or Zoning Compliance Permit, an on-site pre-construction conference shall take place with the developer and the Land Use Administrator to review procedures for the protection and management of all landscape elements that are to remain as identified on the Landscape Plan (see Section 12.3 (I)).

3. **Combustible Landscaping Materials Prohibited.** No pine straw or any other material with a fire rate of spread more than twenty-four (24) inches per minute as determined by the most recent study of the National Institute of Standards and Technology shall be placed, kept, or stored within ten (10) feet of buildings with any portion of the exterior wall covered with combustible material. Single-family residential homes are exempt from this prohibition.

4. **Existing Landscaping.**

   a. **Vegetation.**

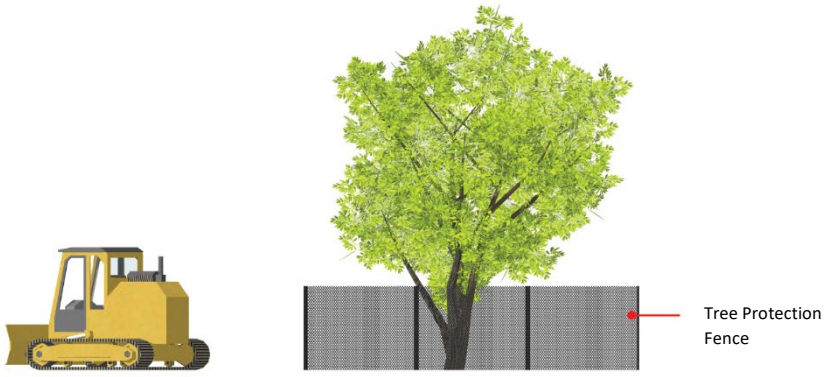
      i. **Use.** The use of existing trees or shrubs to satisfy the landscaping requirements of this Chapter is strongly encouraged. Existing significant vegetation within a landscaped area required by this Chapter shall be preserved unless otherwise approved by the Town of Knightdale at the time of Master Plan approval and shall be credited toward the applicable standard.

      ii. **Protection.**

         a) **Planning and Surveying.** Through the protection of trees and existing vegetation, the Town encourages new development to be creative in design and placement of buildings, structures, parking, and other impervious surfaces as to preserve natural features and to complement the existing topography when practical. No tree greater than twelve (12) inches in diameter at breast height (DBH: measured at 4.5 feet above grade) located on public property or within a required tree protection area (Section 7.4) shall be removed for the purpose of surveying without approval from the Land Use Administrator.

         b) **During Construction.** Tree protection fences shall be placed around all protected trees designated to be saved prior to the start of development activities or grading in accordance with Standard 2.10 of the Town of Knightdale Standard Specifications and Details Manual. Tree protection fences shall remain in place until development activities are completed. To prevent unintended compaction of soil, the area within the protective barricade shall remain free of all building materials, dirt or other construction debris, construction traffic, storage of vehicles and materials, and mass grading.

Figure 7.2: Existing Landscaping, During Construction Standards



c) Except for driveway access points, sidewalks, curb, and gutter; no paving with concrete or other impervious materials within five (5) feet of a tree drip line shall be allowed unless otherwise approved. Where grading within a tree dripline cannot be avoided, cut and fill shall be limited to one-quarter (¼) to one-half (½) of the area within the dripline, and tree roots must be pruned with clean cuts at the edge of the disturbed area. No fill shall be placed within the dripline of a tree without venting to allow air and water to reach the roots.

b. **Fences, Walls, and Berms.** Existing walls or fences meeting the requirements of Section 5.10 and berms within a landscaped area required by this Chapter may be used to fulfill the standards for the type of buffer and screening required by Section 7.4 (I), provided that these elements are healthy and/or in a condition of good repair.

c. **Other Features.** Other existing site features within a landscaped area required by this Chapter which do not otherwise function to meet the standards for the required landscaping shall be screened from the view of other properties or removed, as determined during review and approval of the Master Plan.

E. **Grading and Development in Required Landscaped Areas.**

1. **All Areas.** Landscaped areas required by this Chapter shall not contain any development, impervious surfaces, or site features that do not function to meet the applicable standards for that area or that require removal of existing significant vegetation.

2. **Buffer Yards.** No grading, development, or land-disturbing activities shall occur within a buffer yard if forest canopy, specimen trees or significant vegetation exists within these areas, unless approved by the Land Use Administrator. If grading within a buffer yard is proposed, slopes of 1:3 or less are encouraged to ensure the proper transition of grades to the adjacent property and to facilitate landscaping and maintenance.

F. **Use of Off-Site Landscape Easements.** Permanent off-site landscape easements may be used to meet required buffer yards provided that the size or shape of the parcel significantly restricts the ability to reasonably use the property and meet the buffer yard requirements. These easements must be recorded prior to or in conjunction with the approval of the site or subdivision plan.

G. **Installation and Maintenance Standards.**

1. **Installation of New Vegetation and Landscape Features.** In general, new plant material should complement existing vegetation native to the site. The use of drought-tolerant, indigenous, native and/or regionally grown species of trees, shrubs, and groundcover is encouraged in order to make planted areas compatible with existing native habitats and to reduce dependency on irrigation. In addition to the following requirements, all installations shall be in accordance with Town of Knightdale *Standard Specifications & Detail Manual.*

   a. **Minimum Size.** Landscaping should be of sufficient size so that mature appearance will be achieved within three (3) years of installation for shrubs and within five (5) years of installation for trees. Where the following minimum size requirements overlap, the higher standard shall prevail:

      i. **Evergreen trees** of any classification shall not be less than six (6) feet in height with a minimum two (2) inch caliper.

      ii. **Multi-stemmed trees** of any classification shall have at least three (3) stalks and not be less than eight (8) feet in height.

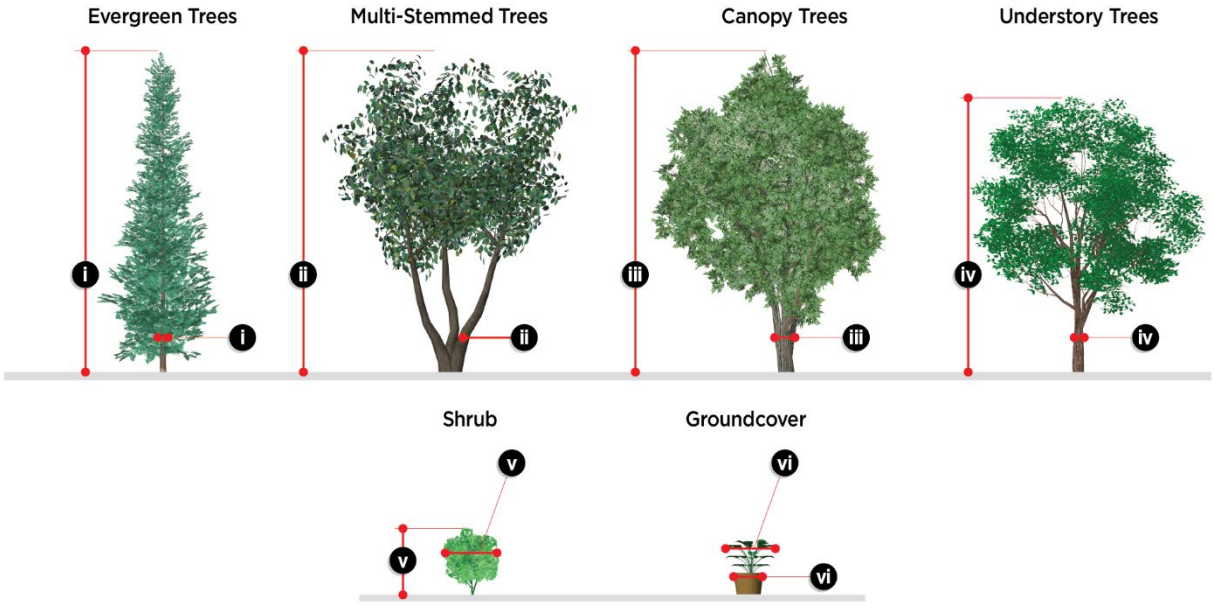
      iii. **Canopy trees** shall not be less than eight (8) feet in height with a minimum two (2) inch caliper.

      iv. **Understory trees** shall be a minimum of one and a quarter (1¼) inch caliper and have a minimum height of six (6) feet.

      v. **Shrubs** shall be at least three (3) gallons in container size, have a minimum height of eighteen (18) inches and have a minimum spread of twelve (12) to fifteen (15) inches.

      vi. **Groundcovers** shall be a minimum of one-and-a-half (1½) to two-and-a-half (2½) inch pots with a minimum spread of four (4) inches.

Figure 7.3: New Vegetation and Landscape Features, Minimum Size



b. **Species Diversity Requirements**.

i. At a minimum, the species of every other tree along the street frontage shall alternate in order to maximize diversity as deemed appropriate by the Land Use Administrator.

ii. A minimum of fifty (50) percent of the landscape features utilized on a parcel that is less than one-half (0.5) acre shall be drought and salt-tolerant native species.

iii. A minimum of sixty (60) percent of the landscape features utilized on a parcel that is between one-half (0.5) and five (5) acres shall be drought and salt-tolerant native species. Total landscape features, excluding turf, shall not be comprised of more than thirty (30) percent of any single species or fifty (50) percent of any genus.

iv. A minimum of seventy-five (75) percent of the landscape features utilized on a parcel that is greater than five (5) acres shall be drought and salt-tolerant native species. Total landscape features, excluding turf, shall not be comprised of more than twenty (20) percent of any single species or twenty-five (25) percent of any genus.

v. The percentage limits above may be varied in conjunction with approval of vegetated stormwater management areas.

c. **Planting Area**.

i. **Canopy Trees.** Each canopy tree shall be provided with a minimum pervious ground area of three hundred (300) square feet for root growth (exception: Street Trees) and should be planted on slopes not to exceed 1:4 vertical to horizontal distance.

ii. **Groundcover.** Groundcover must be planted with on-center spacing equivalent to the average mature spread for each particular species.

d. **American Standard for Nursery Stock.** All new plant material shall be of good quality, free from disease, installed in a sound manner, mulched (3–4 inch layer), and meet the standards set forth in the American Standard for Nursery Stock by the American Nursery & Landscape Association (ANLA). The selection of plants, planting methods, minimum height, root ball and container size, number of branches, and width, shall conform to the American Standard for Nursery Stock published by the ANLA for that type of tree or shrub at the time of installation.

e. **Guying and Staking.** All new trees shall be properly guyed and staked at the time of planting.

f. **Mulch and Drainage.** Adequate drainage and mulching shall be provided in all cases, particularly for medians and islands.

g. **Soil.** Installation practices shall be utilized which preserve and replace existing topsoil or amend the soil to reduce compaction.

h. **Bare Earth Prohibited.** All portions of a landscaped area not planted with shrubs and trees or covered by a wall or other screening device shall be planted with ground cover and/or grass or covered with natural mulch with a minimum depth of two (2) inches.

i. **Overhead Utility Lines.** Where a canopy tree is required and overhead utility lines exist, two (2) understory trees shall be substituted with the approval of the Land Use Administrator.

j. **Easements & Right-of-Ways.** Nothing shall be planted or installed within an underground or overhead utility easement or a drainage easement without the consent of the Town and the easement holder at the time of Master Plan approval.

k. **Warranty.** The contractor shall warrant all new plant material for one (1) year from the time of installation.

l. **Certificates of Occupancy and Requests for Delay.** All landscaping, mulching, and seeding shall be installed in accordance with the approved site plan and the standards of this Section prior to issuance of a Certificate of Occupancy. Requests for a delay in complying with this requirement will be considered following a written request directed to the Land Use Administrator. Such request for a delay shall note the timeframe during which the planting shall be completed. Certificates of Occupancy will be issued with the approval of a request for planting delay if deemed reasonable. Reasonable requests may be granted due to:

i. Unusual environmental conditions such as drought, ice, over-saturated soil (deep mud), or inappropriate planting, provided that the developer or the property owner provide the Town with a surety bond in accordance with Section 10.1 ensuring the installation of the remaining landscape materials; or

ii. Circumstances beyond the developer's or property owner's control, such as incomplete construction or utility work to occur in a proposed landscaped area within thirty (30) days after expected site completion, provided that the developer or property owner submits a letter from the utility company to the Town stating the estimated installation date and provides a cash bond in accordance with Section 10.1 to ensure the installation of the required landscaping.

iii. In the former case, the Town may issue a Temporary Certificate of Occupancy for a period of thirty (30) to one-hundred eighty (180) days, relative to the next planting season; while in the latter case, the Town of Knightdale may issue a Temporary Certificate of Occupancy for a period not to exceed thirty (30) days.

2. **Maintenance.**

a. **General Responsibility.** The owners of property shall be responsible for all natural and physical features required by this Chapter and shall preserve and maintain these features in healthy growing conditions, replace them when necessary, and keep the areas around them free of refuse and debris in a manner that prevents refuse and debris from washing onto public rights-of-way.

b. **Irrigation.** The use of irrigation is permitted in all required landscaping areas as required by this Section and may connect to the public water system subject to the requirements of the Town's Standards Specifications and Details Manual and other applicable Town ordinances or policies. The use of moisture metering devices and automatic timers with any irrigation system is required. The use of xeriscape practices and drip irrigation is also encouraged unless otherwise required.

c. **Pruning.** All vegetation should be allowed to reach and be maintained at its mature size.

i. **Tree "Topping" Prohibited.** Tree "topping"—the removal of more than twenty-five (25) percent of a tree's canopy—is considered to be damage and disfigurement (Section 7.4 (G)(2)(e)) and shall be prohibited on all trees on public property, public rights-of-way, required tree save areas and parking lot landscaping areas unless otherwise approved by the LURB. Trees in locations where proper pruning practices are impractical may be exempted from this article at the determination of the Land Use Administrator.

ii. **Responsibilities Along Public Rights-of-Way.**

a) **Private Property Owners.** The owner of any tree or shrub on private property that overhangs any public right-of-way within the Town shall prune the branches so that such branches shall not obstruct the light from any streetlamp or obstruct the view of any street intersection and so that there shall be a clear space of eight (8) feet above the surface of the street or sidewalk.

b) **Town of Knightdale.** The Town of Knightdale Public Works Director is authorized to prune trees and shrubs on public properties and in public rights-of-way.

c) **State of North Carolina.** The North Carolina Department of Transportation (NCDOT) is authorized to prune trees and shrubs in the public rights-of-way owned by the State of North Carolina.

d. **Removal.**

i. **Public Property and Rights-of-Way.** The removal by any entity of a tree or shrub that is dead, infected by disease, or determined to be a hazard to public safety and welfare and subsequent replacement may be approved by the Land Use Administrator. Trees removed must be replaced in accordance with the replacement provisions of this section.

ii. **Private Property.** Owners shall remove all dead, diseased, or hazardous trees and shrubs as well as any broken or decayed limbs which constitute a menace to the safety of the public. The Town shall have the right to cause the removal of any dead or diseased trees and shrubs on private property when such tree or shrub constitutes a hazard to life and property, or harbor insects or disease which constitutes a potential threat to other vegetation in the Town. The Land Use Administrator will notify property owner(s) of the requirement to remove such trees, shrubs, or limbs. Removal shall be done at the owner(s) expense within sixty (60) days after the date of service of written notice. Failure of the owner(s) to comply with such provisions shall constitute a violation of this ordinance and shall be subject to the applicable procedures and penalties of Chapter 13.

iii. **Stumps.** When removing trees and shrubs, stumps shall be removed or ground to a minimum depth of four (4) inches below ground level.

e. **Disturbance, Damage, and Disfigurement.**

i. **In General.** All disturbed, damaged or disfigured vegetation within tree protection and landscaping areas identified in this Section shall be replaced to meet the standards of this ordinance as well as the approved site plan.

ii. **Severe Weather and Natural Disasters.** In the event that any required vegetation is severely damaged due to an unusual weather occurrence or natural disaster, the owner shall have one (1) growing season to replace or replant following the event or following the issuance of a Certificate of Occupancy for any event-related site reconstruction, whichever is later.

f. **Replacement.**

i. **Responsibility.** Vegetation within a required tree protection or landscaped area that dies within one (1) year of construction completion shall be removed and replaced with new vegetation of equal or greater size by the contractor providing the warrant (Section 7.4 (G)(1)(k)). Should any vegetation required in a tree protection or landscaped area die after the expiration of the warranty, the property owner shall replace it within one-hundred eighty (180) days with vegetation of equal or greater size.

ii. **Plan Approval.** A plan denoting the proposed location and species of replacements shall be submitted to the Town of Knightdale for approval. The Land Use Administrator may elect to present the plan to the LURB for final approval.

iii. **Standards.**

a) **Canopy Trees Eight (8) Inch Caliper or Greater.** Any canopy tree with a caliper of at least eight (8) inches (measured along the trunk at 12 inches above grade) at the time of damage, disturbance, disfigurement, or removal shall be replaced with one (1) or more trees which have a

caliper of at least two and one half (2½) inches and a cumulative caliper equal to or greater than the original tree.

b) **All Vegetation.** All vegetation shall be replaced in a manner that satisfies the applicable type, amount, and performance criteria required by this Chapter.

g. **Inspections.** The Land Use Administrator may inspect the site once a year or on the basis of a complaint after the issuance of a Certificate of Occupancy in order to ensure compliance with the approved site plan and to ensure that the vegetation and landscaping is properly maintained. The Land Use Administrator may issue a Notice of Violation to comply with the provisions of this ordinance if warranted upon an inspection under the provisions of Chapter 13.

H. **Tree Protection.**

1. **Required Tree Save Areas.** Trees and existing vegetation shall be preserved in accordance with the table below.

Tree Save Area		Protection Measures
Priority Tier 1	*Floodways* *Required Stream Buffers* *Required Buffer Yard* *Slope Areas Greater than 25%* *Wetlands*	All Vegetation and Soil to Remain Undisturbed *In some cases, limited disturbance may occur within the areas to be protected provided all necessary approvals are obtained. Such activities include, but are not limited to the following:* *1. Mitigation of development activities.* *2. Restoration of previously disturbed areas.* *3. Utility installations and emergency public safety activities.* *4. Construction of a trail or pedestrian walkway that will provide public access.* *5. Required Street or Driveway connections.*
Tier 2	*100 Year Floodplains* *Front Setback Areas* *Street Tree Planting Strip* *Residential Landscaping Areas* *Required Open Space* *Slope Areas of 15-25%*	All Trees Greater than 12" DBH to Remain Undisturbed, or Replacement trees shall be planted at a rate of 1 tree per 12" DBH, and should be incorporated into open space amenities wherever possible.**
Tier 3	*All Other Locations*	All Trees Greater than 24" DBH to Remain Undisturbed, or Replacement trees shall be planted at a rate of 1 tree per 12" DBH, and should be incorporated into open space amenities wherever possible.**
*** Required street trees, parking lot landscaping, residential landscaping and buffer yard plantings may not be counted towards replacement requirements.*		

2. **Credits for Preservation of Existing Trees in Parking Lots.** Trees that are saved in a parking lot landscaping area may be credited towards the requirements of Section 7.4 (J). Each tree preserved will require a minimum pervious area around its trunk equal to an area measuring five (5) feet beyond the drip line.

Size of Preserved Tree	Credit Toward Required Plantings
Tree Measuring 6-12" DBH	One (1) Required Parking Lot Tree
Tree Measuring 13-24" DBH	Two (2) Required Parking Lot Trees
Tree Measuring 25" DBH or Greater	Three (3) Required Parking Lot Trees

I. **Buffers.**

1. **Required Buffer Yards.** Required buffer yards are intended to give spatial separation and to decrease visual contact between incompatible uses. To further this intent, at least forty (40) percent but no more than sixty (60) percent each of canopy trees and understory trees, and at least eighty (80) percent of shrubs must be evergreen. Buffer yards shall be required in accordance with the table below when any use is being established on a property that abuts an existing developed lot or less intense zoning district.

Base District of Proposed Development	Adjacent Base District				
	OSP RT RR GR3 GR8	*UR12 RMX*	*NMX TC*	*HB*	*MI*
OSP RT RR GR3 GR8					
UR12 RMX	**B**				
NMX TC	**C**	**A**			
HB BO	**D**	**C**	**B**		
MI	**D**	**D**	**D**	**C**	

Buffer yards are intended to be constructed along the perimeter of the property; however, when there is irregular topographic conditions such as the perimeter of the property is at a lower grade than the use being screened, the Land Use Administrator may require the relocation of the required buffer yard in order to better serve its purpose.

2. **Type A Buffer Yard**.

   a. **Minimum Width**. Ten (10) feet

   b. **Minimum Landscape Height and Opacity**.

      i. Ground to Four (4) Feet. Semi-Opaque Screen

      ii. Four (4) to Thirty (30) Feet. Intermittent Visual Obstruction

   c. **Maximum Landscape Horizontal Openings**.

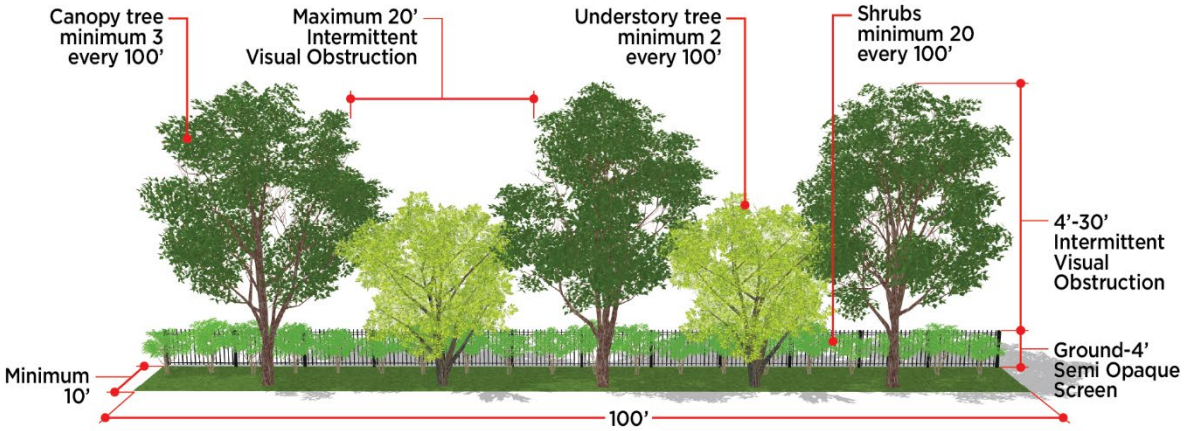
      i. Five (5) Feet. Semi-Opaque Screen

      ii. Twenty (20) Feet. Intermittent Visual Obstruction

   d. **Performance Standard**. A buffer which is ten (10) feet in width and contains screening materials which at maturity provide semi-opacity from the ground to a height of four (4) feet as well as intermittent visual obstruction from a height of four (4) feet up to a height of 30 feet. Vegetative screening materials within intermittent visual obstruction areas shall contain horizontal openings no greater than twenty (20) feet in width upon the plants' maturity.

   e. **Required Plantings**. For every one hundred (100) linear feet, there shall be at least three (3) Canopy Trees, two (2) Understory Trees, and twenty (20) shrubs. Depending on the species chosen, additional trees or shrubs may be necessary to meet the performance standard in subsection "d" above.

Figure 7.4: Type A Buffer Yard Standards



3. **Type B Buffer Yard**.

   a. **Minimum Width**. Twenty (20) feet

   b. **Minimum Landscape Height and Opacity**.

      i. Ground to Six (6) Feet. Semi-Opaque Screen

      ii. Six (6) to Thirty (30) Feet. Intermittent Visual Obstruction

   c. **Maximum Landscape Horizontal Openings**.

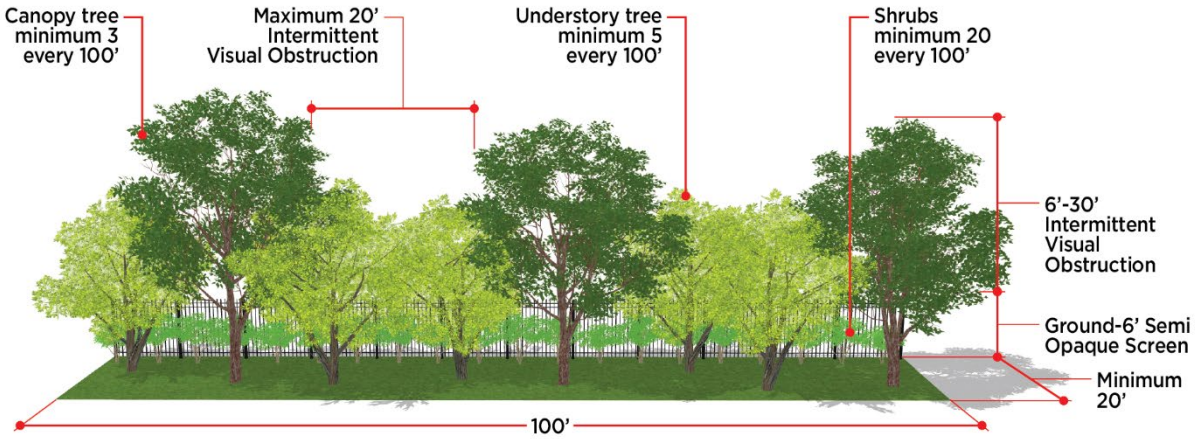
      i. Five (5) Feet. Semi-Opaque Screen

      ii. Twenty (20) Feet. Intermittent Visual Obstruction

   d. **Performance Standard**. A buffer which is twenty (20) feet in width and contains screening materials which at maturity provide semi-opacity from the ground to a height of six (6) feet, and intermittent visual obstruction from a height of six (6) feet up to a height of thirty (30) feet. Vegetative screening materials within intermittent visual obstruction areas shall contain horizontal openings no greater than twenty (20) feet in width, and vegetative screening materials within semi-opaque areas shall contain horizontal openings no greater than five (5) feet in width upon the plants' maturity.

   e. **Required Plantings**. For every one hundred (100) linear feet, there shall be at least three (3) Canopy Trees, five (5) Understory Trees, and twenty (20) shrubs. Depending on the species chosen, additional trees or shrubs may be necessary to meet the performance standard in subsection "d" above.

Figure 7.5: Type B Buffer Yard Standards



4. **Type C Buffer Yard**.

   a. **Minimum Width**. Thirty (30) feet

   b. **Minimum Landscape Height and Opacity**.

      i. Ground to Six (6) Feet. Semi-Opaque Screen

      ii. Six (6) to Thirty (30) Feet. Intermittent Visual Obstruction

   c. **Maximum Landscape Horizontal Openings**.

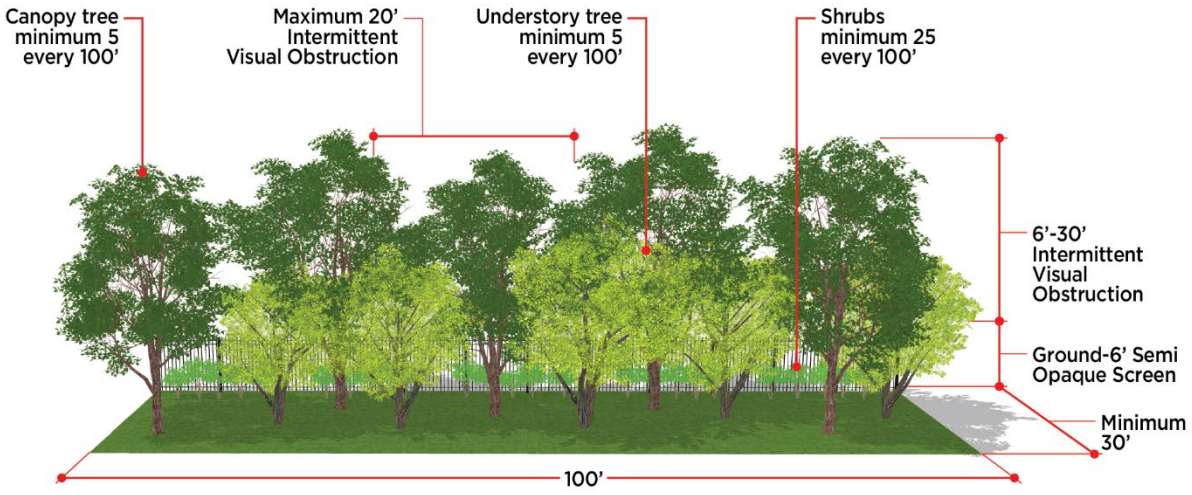
      i. Five (5) Feet. Semi-Opaque Screen

      ii. Twenty (20) Feet. Intermittent Visual Obstruction

   d. **Performance Standard**. A buffer which is thirty (30) feet in width and contains screening materials which at maturity provides semi-opacity from the ground to a height of six (6) feet, and intermittent visual obstruction from a height of six (6) height up to a height of thirty (30) feet. Vegetative screening materials within intermittent visual obstruction areas shall contain horizontal openings no greater than twenty (20) feet in width; vegetative screening materials within semi-opaque areas shall contain no horizontal openings greater than five (5) feet in width upon the plants' maturity.

   e. **Required Plantings**. For every one hundred (100) linear feet, there shall be at least five (5) Canopy Trees, five (5) Understory Trees, and twenty-five (25) shrubs. Depending on the species chosen, additional trees or shrubs may be necessary to meet the performance standard in subsection "d" above.

Figure 7.6: Type D Buffer Yard Standards



5. **Type D Buffer Yard**.

   a. **Minimum Width**. Fifty (50) feet

   b. **Minimum Landscape Height and Opacity**.

      i. Ground to Thirty (30) Feet. Opaque Screen

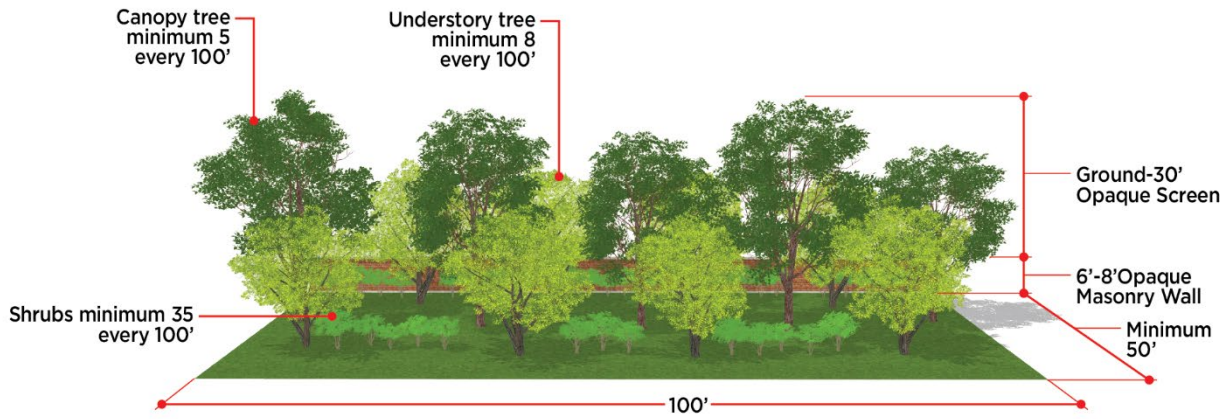
   c. **Maximum Landscape Horizontal Openings**. None permitted.

   d. **Minimum Wall Height and Opacity**. A fully opaque, masonry wall with a minimum height of six (6) feet and a maximum height of eight (8) feet shall be provided.

   e. **Performance Standard**. A buffer which is fifty (50) feet in width and contains screening materials which at maturity provides opacity from the ground to a height of thirty (30) feet. Vegetative screening materials within opaque areas shall contain no horizontal openings upon the plants' maturity.

   f. **Required Plantings**. For every one hundred (100) linear feet, there shall be at least five (5) Canopy Trees, eight (8) Understory Trees, and thirty-five (35) shrubs. Depending on the species chosen, additional trees or shrubs may be necessary to meet the performance standard in subsection "d" above.

Figure 7.7: Type D Buffer Yard Standards



6. **Berms with a Fence or Wall.** Fences or walls with earthen berms may be substituted for half of the shrub requirement in all buffer yard types (Section 7.4 (I)) where a wall is not required. All berms shall not exceed:

   a. a slope with a maximum rise of one (1) foot to a run of two (2) feet,

   b. a maximum height of four (4) feet and

   c. a maximum width of forty (40) percent of the required buffer width.

   Berms shall be stabilized with a ground cover or other suitable vegetation or permanent slope retention device. Berms taller than four (4) feet shall be approved by the Land Use Administrator on a case by case basis, but shall conform to the slope and width restrictions as previously detailed.

7. **Special Highway Overlay District (SHOD).** The SHOD acts as a buffer yard around freeways within Knightdale's ETJ (Section 2.15 (B)).

J. **Interior Parking Lot Landscaping**.

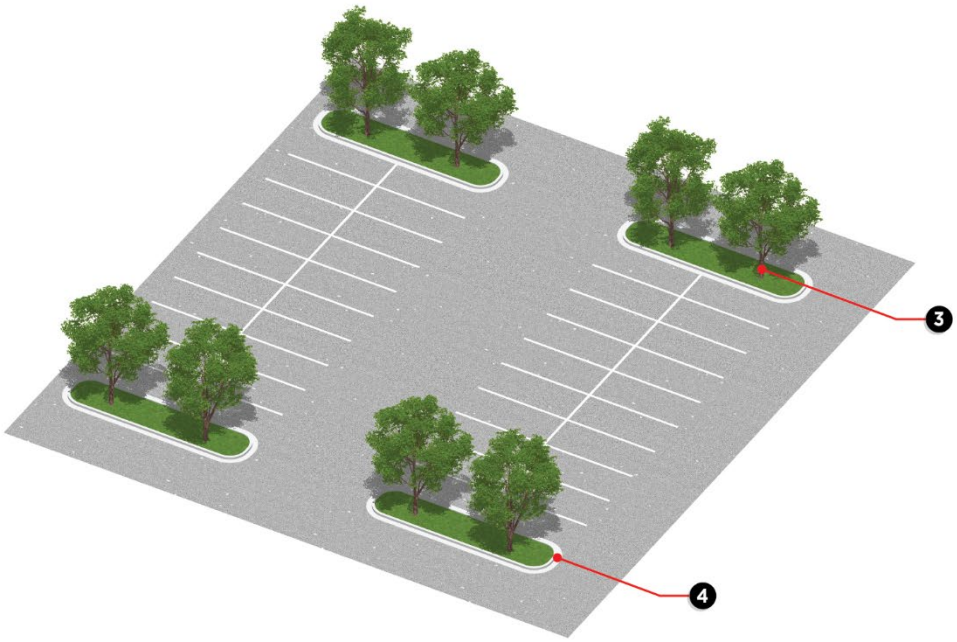
1. **Purpose.** Parking lot landscaping functions as a tree ceiling providing shelter from sun and rain and minimizing the impact of runoff by providing "green" surface area on which to collect.

2. **Applicability.** Parking lots with more than sixteen (16) parking spaces shall be landscaped. (Exception: Single-family Dwellings and Duplexes)

3. **Minimum Plantings.** No parking space shall be more than sixty (60) feet from the base of a deciduous canopy tree. In addition, landscape areas shall be provided at the end of each parking row and shall contain a deciduous canopy tree.

4. **Performance Standards.** Deciduous canopy trees shall be planted in a manner that provides shade for the entire parking lot at maturity. Each canopy tree shall be provided with a minimum pervious ground area of three hundred (300) square feet for adequate root growth which shall be separated from parking spaces by an eighteen (18) inch standard curb and gutter designed to minimize damage by vehicles to plants within the landscaped area.

Figure 7.8: Interior Parking Lot Landscaping Standards



K. **Residential Landscaping and Plat Notes**.
The following paragraphs shall be noted on an approved Preliminary Plat and Final Plat:

1. Each single-family or duplex lot shall contain a minimum of one (1) canopy tree for every two thousand (2,000) square feet of lot area or fraction thereof up to twenty-thousand (20,000) square feet in lot area. Any portion of the residential lot occupied by a recorded utility easement shall not be included as part of the total lot area. The location of planting to account for physical conditions may be adjusted by the Land Use Administrator.

2. The use of existing trees meeting the following standards to satisfy this requirement is encouraged. Existing large shade trees measuring more than six (6) inches in DBH may be counted towards fulfilling this requirement.

3. Required street trees (Section 7.4 (L)) may not be counted towards the fulfillment of the residential landscaping requirement. Apart from required street trees, all other trees required under this Chapter shall be planted within the private lot.

4. Foundation plantings consisting of evergreen shrubs shall be installed along the entire foundation wall of the building. Plant installation shall be a minimum of two (2) feet in height planted at four (4) foot intervals.

L. **Street Tree Plantings.**

1. All development shall be required to have street trees along all public rights-of-way in accordance with the illustrations of Street Classification and Design found in Section 10.4 (A). Street trees are not required along public rights-of-way in the Open Space Preserve (OSP) zoning district.

2. The species of every other tree along a street frontage shall alternate in order to maximize species diversity.

3. Street trees shall be canopy trees and shall be installed at a minimum average distance of forty (40) feet on-center in a planting strip a minimum of five (5) feet in width. Where overhead utilities exist prior to development, understory trees may be substituted, as approved by the Land Use Administrator. The planting strip shall be located as detailed below.

   a. **Town of Knightdale Roadways**. On roadways under Town of Knightdale jurisdiction, the planting strip shall be located between the sidewalk and roadway.

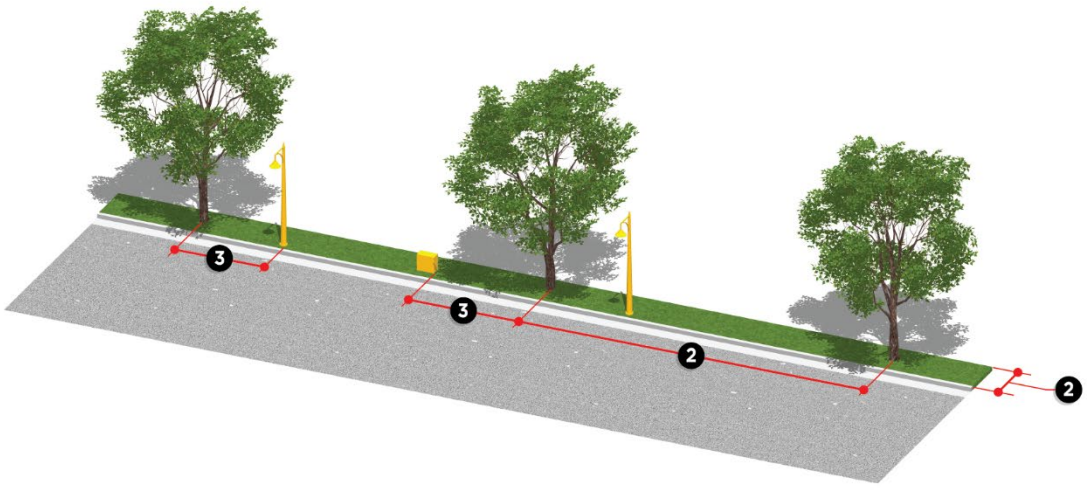
   b. **North Carolina Department of Transportation (NCDOT) Roadways**. On roadways under NCDOT jurisdiction, the planting strip shall be located in accordance with applicable NCDOT specifications.

4. Street trees shall be placed at least ten (10) feet from light poles and twelve (12) feet from electrical transformers in order to allow these utilities to be safely serviced (understory trees may be placed within five (5) feet of such devices).

5. Street trees shall be deciduous hardwoods and shall meet the criteria set forth in Section 7.4 (C).

6. **Street Tree Maintenance**. Street trees shall be maintained in good, trimmed, and neat condition, and at maturity should provide thirteen and one-half (13.5) feet of clearance to accommodate emergency response vehicles.

Figure 7.9: Street Tree Planting Standards



M. **Overall Tree Canopy.**

1. **Applicability.** To preserve and maintain appropriate undisturbed tree cover, and where needed, require the provision of replacement tree cover on development sites.

2. **Tree Cover Area.** All new development on lots or parcels over two (2) acres must meet the following tree cover requirement during the initial master plan process. A tree cover area equal to the perimeter of the development in feet multiplied by twenty (20) shall be maintained on-site up to a maximum tree cover area consisting of ten (10) percent of the entire site. Any required landscape buffer yards and Neuse River Basin Riparian Buffers (NRBs) may be credited toward this requirement. In the event that the required tree cover area cannot be met with the required landscape buffer yards and NRBs, additional space must be set aside. In this additional space, preference is given to preserving existing trees rather than utilizing new plantings.

3. **Performance Standards for Additional Space.**

   a. **Mature Forest.** (100% of calculated additional space required). If not directly adjacent to NRBs or landscape buffer yards, each preserved tree cover area of mature forest must be at least two-thousand five hundred (2,500) square feet with no dimension less than fifty (50) feet wide. To qualify, the average tree canopy height must exceed twenty-five (25) feet.

   b. **Maturing Forest.** (110% of calculated additional space needed). If not directly adjacent to NRBs or landscape buffer yards, each preserved tree cover area of maturing forest must be at least two-thousand five hundred (2,500) square feet with no dimension less than fifty (50) feet wide. To qualify, the average tree canopy height must exceed twelve (12) feet.

   c. **Re-planted Areas.** (125% of calculated additional space needed) If not directly adjacent to NRBs or landscape buffer yards, each re-planted tree cover area must be at least two-thousand five hundred (2,500) square feet with no dimension less than fifty (50) feet wide. To qualify, trees must meet the standards for new plantings as found in Section 7.4 (G), and the area must be vegetated with three (3) canopy trees and five (5) understory trees per five hundred (500) square feet.

N. **Replacement of Disturbed and Damaged Vegetation Pursuant to a Notice of Violation (Section 14.3).** All disturbed (altered, removed, topped, excessively pruned, etc.) landscaped areas and vegetation shall be replanted to meet the standards of this section as well as the approved site or Master Plan. Existing vegetation required to be preserved (buffers, tree protection areas, etc.) that has been damaged or destroyed during the course of development activity shall be subject to civil penalty and replaced in accordance with the requirements of this section, taking into account any unique site conditions and significant vegetation remaining within the landscaped area.

1. **Plan Required.** A revegetation plan shall be submitted that takes into consideration the development condition of the site, significant vegetation remaining within landscaped areas, and the replacement plant materials. The Town of Knightdale may require equal amounts of new vegetation to be installed equal to the size of the vegetation removed. The Land Use Administrator may elect to present the replanting plan to the DRC for final approval.

2. **Replacement.** Replacement consists of one (1) or a combination of any of the following measures:

   a. Replant according to the requirements of this Section.

   b. Replace damaged or destroyed significant vegetation in both required landscaping and tree protection areas with an equal amount of new vegetation according to the size of vegetation removed. Any tree with a caliper of at least fifteen (15) inches that is damaged or removed shall be replaced with one (1) or more trees that have a caliper of at least two and one half (2½) inches and a cumulative caliper equal to or greater than the original tree. Trees damaged or destroyed less than fifteen (15) inches in diameter shall be replaced to satisfy the performance criteria of this section. Understory plantings may also be required to

restore the buffer performance criteria for the disturbed area. These measures may be modified by the Land Use Administrator based upon site conditions.

c. For all other cases where the existing vegetation is damaged or removed, the type and amount of replacement vegetation required shall be of the type and amount that is necessary to provide the type of required landscaping identified in the Notice of Violation or tree protection area identified on the approved landscape plan.

3. **Replanting Area.** Replanting should be located within the vicinity of the violation. If the area is too small for sufficient growth, a more suitable location on the site may be selected as permitted by the Land Use Administrator.

7.5. Screening

A. **General Screening Requirements**. A buffer yard's vegetation requirements may also be used where specified as a screening device to mitigate the negative visual impacts of certain site amenities. Unlike buffer yards, screens are intended to be compact and constructed adjacent to the amenity for which the screen is required. A screen shall not exceed the minimum width specified for the buffer yard (thereby the minimum width now functions as a maximum width). Where irregular topographic conditions such as steep slopes exist, the Land Use Administrator may require the relocation of the screen in order to better serve its purpose. Effective screening devices may include solid decorative brick walls, or wood fences with an earthen berm or tight evergreen hedges which shall reach the required height within two (2) years of planting, or any combination of the above. Where sight triangles for drives or streets overlap, these requirements are waived, and groundcover vegetation shall be used exclusively. Single-family and two-family dwellings are exempt from screening requirements.

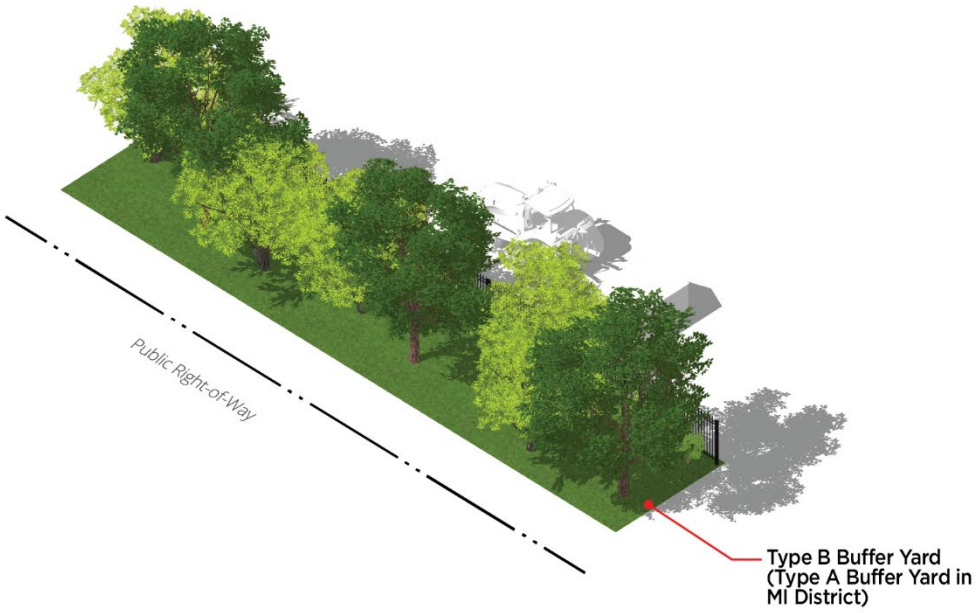
B. **Vehicle Accommodation Areas.** The sides of all vehicle accommodation areas (parking lots, loading docks, drive-thru facilities, circulation drives, etc.) fronting a public right-of-way and sides not otherwise protected by a buffer yard as determined by the Land Use Administrator shall be screened as follows to reduce the negative impacts of automobile headlights and glare on adjacent properties.

1. **Parking Lots.** All sides of parking lots fronting street rights-of-way shall be screened with a Type A Buffer Yard (Section 7.4 (I)(2)). Sides adjacent to an arterial shall be screened with a Type B Buffer Yard (Section 7.4 (I)(3)).

2. **Other Vehicle Accommodation Areas.** Other vehicle accommodation areas shall be screened from off-site view with a Type B Buffer Yard (Section 7.4 (I)(3)).

C. **Open Storage**. In addition to meeting any fencing or wall requirements in Chapter 3 or Chapter 4 of this Ordinance, any open storage of merchandise, equipment, tractor trailers, materials, or goods other than those on display for retail sales shall be screened from view from any street right-of-way in accordance with the standards prescribed for Type B Buffer Yards in Section 7.4 (I)(3), except for in the MI District where such areas shall be screened from view from any internal street right-of-way with a Type A Buffer yard as prescribed in Section 7.4 (I)(2).

Figure 7.10: Open Storage Screening Standards



D. **Above-Ground Utilities**. Above-ground utilities shall be screened by the elements of a Type B Buffer Yard (Section 7.4 (I)(3)) that pertain to Semi-Opaque Screens up to six (6) feet in height or the height of the utility, whichever is less.

E. **Trash and Recycling Receptacles**. All containment areas for trash and recyclables, including devices such as compactors, dumpsters, and commercial roll-out bins, as well as locations for stacking cardboard, pallets, and similar items shall be restricted to side or rear yards only and screened from off-site view.

1. **Containment Areas**. All containment areas shall meet the following standards:

   a. All containment areas shall be enclosed to contain windblown litter.

   b. The height of the enclosure shall meet or exceed the highest point of any compactor, dumpster, or bin.

   c. The enclosure shall be opaque and finished with masonry materials consistent with those of the principal structure.

   d. All containment devices shall be placed on a concrete pad with a concrete apron that is large enough to provide adequate support, allow for positive drainage, and conform to the Wake County Health Department regulations governing compactor pads.

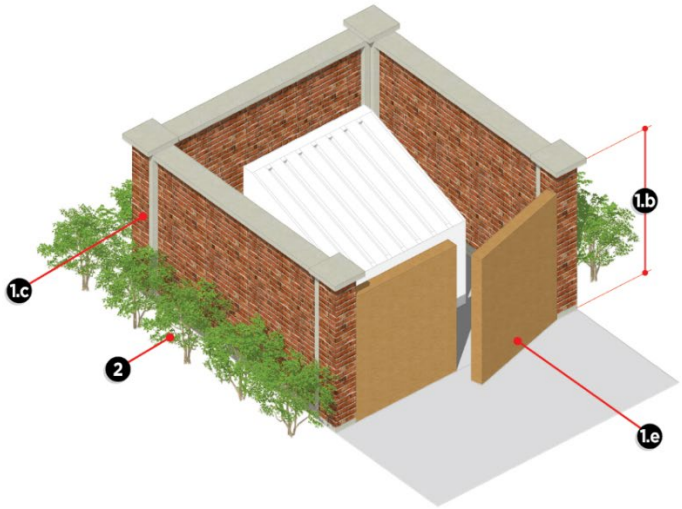
   e. The enclosure shall feature opaque gates made from permitted fence materials (Section 7.6) to allow for access and security. Gates shall be closed at all times except for when the receptacle(s) is being accessed.

   f. Property owners shall be responsible for ensuring trash and recycling receptacles are placed in the enclosure at all times other than when they are being emptied by a service vehicle.

   g. All containment devices shall be located as far as possible from sidewalks and other pedestrian facilities and in a location that is accessible to service vehicles.

2. **Landscape Screening**. All containment areas shall be screened by the elements of a Type B Buffer Yard (7.4 (I)(3)) that pertain to Semi-Opaque Screens up to six (6) feet in height or the height of the enclosure, whichever is less.

Figure 7.11: Trash and Recycling Receptacle Screening Standards



F. **Wireless Telecommunication Facility – Tower**. See Section 5.9 (C) for specific information necessary to meet the required additional screening standards.

7.6. Fences and Walls

A. **House and Townhouse Building Types.**

1. **Front Yard Height.** Fences shall not exceed four (4) feet in height, and garden/decorative walls shall not exceed three (3) feet in height.

2. **Side/Rear Yard Height.** Fences or garden/decorative walls shall not exceed six (6) feet in height.

3. **Easements**. Fences are only permitted in easements as permitted via the Town of Knightdale Stormwater Manual and/or the City of Raleigh Public Utilities Handbook.

4. **Materials.**

   a. Garden/decorative walls and fence piers shall be brick, or stone consistent with those materials of the principal building.

   b. Retaining walls shall be wood, brick, stone, or decorative concrete masonry blocks.

   c. Front yard fences shall be wood picket, wrought iron, or materials similar in appearance and durability with a maximum opacity of fifty (50) percent.

   d. Side and rear yard fences not exceeding four (4) feet in height may be wood, wrought iron, or materials similar in appearance and durability.

   e. Side and rear yard fences exceeding four (4) feet in height shall be wood or a material similar in appearance and durability.

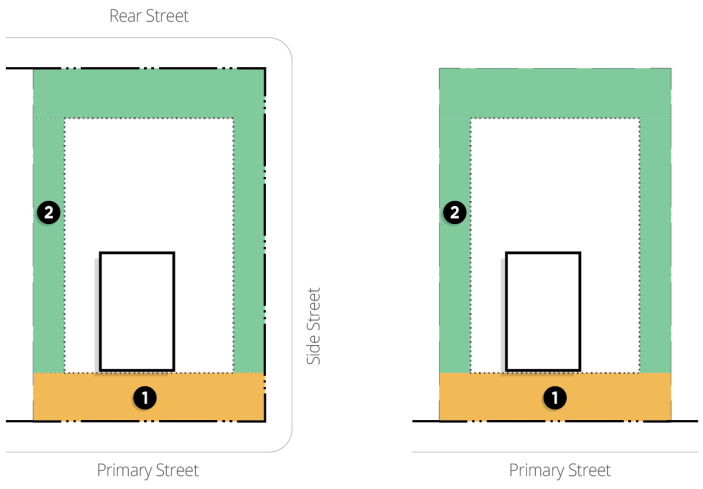
   f. No fence shall be constructed of chain link, wire mesh, woven wire, dangerous materials, materials that would constitute a nuisance, razor wire, barbed wire, or any material that conducts electricity.

5. **Exceptions.**

   a. Engineered retaining walls necessitated by severe topography (slopes) are not subject to the height limitations of this section.

   b. Vinyl wrapped chain link may be used for ball fields and sport courts and shall not exceed ten (10) feet in height.

Figure 7.12: House and Townhouse Building Type Fence and Wall Standards



B. **Apartment, Mixed-Use, Civic, Institutional, Commercial, Outlot/Liner Commercial, or Large Lot Commercial Building Types in All Districts Except MI.**

1. **Front Yard.** Fences or garden/decorative walls in front yards shall not be permitted.

2. **Side/Rear Yard Height.** Fences or garden/decorative walls shall not exceed eight (8) feet in height.

3. **Materials.**

   a. Garden/decorative walls and fence piers shall be brick, or stone consistent with those materials of the principal building.

   b. Retaining walls shall be wood, brick, or stone.

   c. All fences shall be wrought iron or a material similar in appearance and durability.

   d. No fence shall be constructed of chain link, wire mesh, woven wire, dangerous materials, materials that would constitute a nuisance, razor wire, barbed wire, or any material that conducts electricity.

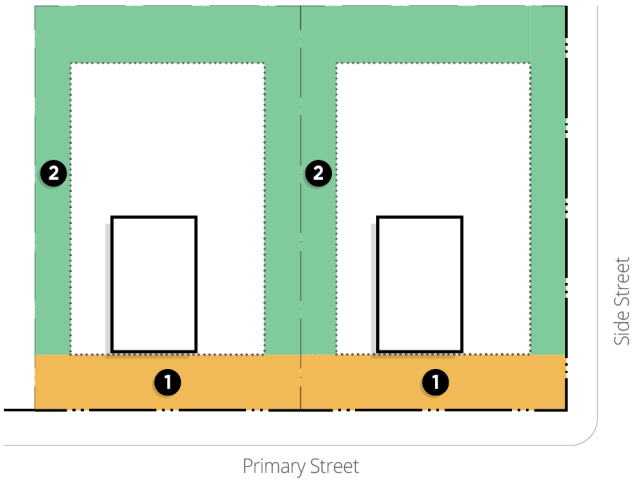
4. **Exceptions.**

   a. Engineered retaining walls necessitated by severe topography (slopes) are not subject to the height limitations of this section.

   b. Wireless Telecommunication Facility – Tower (Section 5.9 (C)) uses are not subject to the height limitations of this section.

   c. Vinyl wrapped chain link may be used for ball fields and sport courts and shall not exceed ten (10) feet in height.

Figure 13: Apartment, Mixed Use, Civic, Institutional, Commercial, Outlot/Liner Commercial, or Large Lot Building Type Fence and Wall Standards



C. **Commercial or Manufacturing Building Types in MI District.**

1. **Front Yard Height.** Fences or garden/decorative walls shall not exceed six (6) feet in height.

2. **Side/Rear Yard Height.** Fences or garden/decorative walls shall not exceed eight (8) feet in height unless topographic conditions necessitate additional height. The Land Use Administrator may approve fences or walls not exceeding nine (9) feet in height. Requests for heights exceeding nine (9) feet are subject to approval from the Town Council.

3. **Materials.**

   a. Retaining walls shall be wood, brick, or stone.

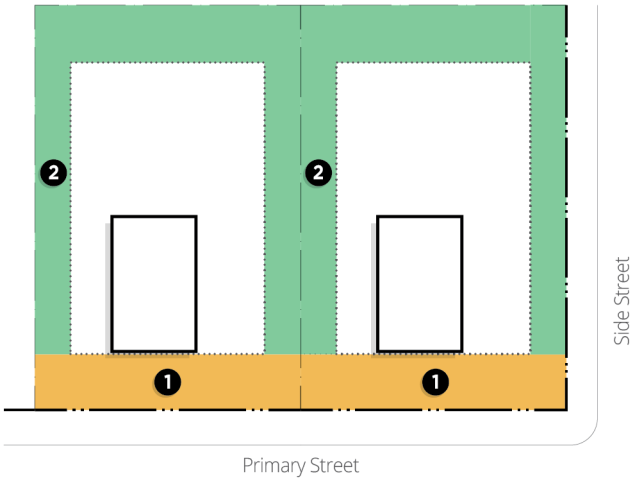
   b. Barbed wire or chain link fences are restricted to the rear yard, shall not be visible from a street right-of-way, and shall not be adjacent to any lot in or zoned for residential use.

4. **Exceptions.**

   a. Engineered retaining walls necessitated by severe topography (slopes) are not subject to the height limitations of this section.

   b. Vinyl wrapped chain link may be used for ball fields and sport courts and shall not exceed ten (10) feet in height.

Figure 7.14: Commercial or Manufacturing Building Type Fence and Wall Standards



7.7. Lighting

A. **Purpose and Intent**. The purpose of this Chapter is to define practical and effective measures by which the obtrusive aspects of outdoor light usage may be reduced; while preserving safety, security, and the nighttime use and enjoyment of property. Poorly designed lighting contributes to excessive light trespass, strong glare, and poor color rendering that can adversely impact adjacent properties, neighboring areas, and motorists. These measures are intended to:

1. Curtail the degradation of the nighttime visual environment;

2. reduce light trespass and glare by encouraging lighting practices that direct appropriate amounts of light where and when it is needed and prohibiting the use of poorly shielded or inappropriately directed lighting fixtures; and

3. reduce energy waste by increasing the use of energy-efficient sources.

B. **Applicability**. The standards of this Chapter are applicable for new development across all zoning districts, except as described below. Changes to existing non-conforming lighting are subject to the provisions of Section 13.8.

1. **Outdoor Recreational Lighting**. Because of their unique requirements for nighttime visibility and limited hours of operation, the lighting of active recreation areas, such as ball fields and tennis courts, are not considered in this Chapter. However, lighting fixtures for such uses shall be mounted and aimed so that the illumination falls within the primary playing area and immediate surroundings and so that no direct light illumination is directed off site. Under all circumstances, lighting used for active recreational purposes shall be extinguished no later than 11:00 p.m.

2. **Flags**. Lighting of the United States of America or State of North Carolina flags.

3. **Temporary Needs**. Circus, fair, carnival, or other similar civic/community event lighting; and construction and emergency lighting; provided said lighting is temporary and is discontinued immediately upon the end of the event, completion of construction work or abatement of the emergency necessitating said lighting.

4. **Underwater**. Underwater lighting used for illumination of swimming pools and fountains.

5. **Gas Lighting**. Ornamental gas lights and lanterns.

6. **Holiday Displays**. Holiday lighting displays so long as said lighting does not produce light trespass.

7. **Low-Voltage Landscape Lighting**. Low-voltage lighting systems so long as said lighting is shielded to not produce glare or light trespass.

C. **Prohibited Lighting**. The following lighting is prohibited unless otherwise expressly permitted by this ordinance:

1. Flickering, rotating, blinking, flashing lights or lights that change in intensity or color.

2. Search lights, laser lights, or any similar high-intensity lights.

3. Unshielded accent, building-mounted luminous tubes. Shielded neon, argon, LED, fluorescent or similar luminous tubes shall not be used as a source of lighting except as provided for signs in Chapter 8.

4. Light strings utilizing lamps greater than fifteen (15) lumens.

5. Lighting that could be confused for a traffic control device, or any other fixture or device operated in such a manner as to constitute a hazard or danger to persons or safe vehicular operation.

6. Wall-mounted fixtures (e.g. wall packs) are generally prohibited as they are not intended to provide general building, parking area or site lighting; but they may be permissible as accent lighting (Section 7.7 (3)(E)) or security lighting (Section 7.7 (E)(5)).

D. **General Outdoor Lighting Standards**. Outdoor lighting shall meet the following general standards as well as any additional standards in Section 7.7 (E) as may apply.

1. **Plan Required**. Any person submitting a site plan or applying for a building, electrical, or sign permit to install outdoor lighting fixtures shall submit a lighting plan (Section 12.3 (I)(2)) providing evidence that the proposed lighting work will comply with the standards of this Section.

2. **Fixture Classification**. Unless otherwise expressly permitted, all exterior lighting fixtures shall either have a fixture cutoff classification of "Full Cutoff" or be fully shielded (no light at or above horizontal).

3. **LED Fixtures**. All street and site lighting utilizing an LED fixture shall:

   a. **Color Rendering**. Be rated a minimum Color Rendering Index (CRI) value of seventy (70) or better.

   b. **Color Temperature**. Have a 'white light' correlated color temperature not exceeding four thousand (4,000) degrees Kelvin.

4. **Pole Placement**. All pole-mounted outdoor lighting shall be located outside of utility easements, designed in coordination with the landscaping plan (Section 12.3 (I)(1)), located outside of landscaping islands, and located as far from large shade trees as the landscaping plan will allow.

5. **Maximum Pole Height**. Unless otherwise restricted, all pole-mounted fixtures shall be mounted at heights no greater than thirty-seven (37) feet above grade.

6. **Maximum Light Level at Property Line**. All outdoor lighting fixtures shall be designed and located such that the maximum light level shall be one-half (0.5) maintained foot candle at any property line unless otherwise permitted by this Section or where the required by the NC Building Code as a component of the minimum requirements for a means of egress system.

7. **Severe Changes in Elevation**. In cases of elevated and non-elevated commercial sites that adjoin residential property where lighting installation causes offensive light trespass or glare, the Land Use Administrator may require the shielding of fixtures at the time of installation or at any point thereafter. If the installation of shields does not alleviate the offense, the Land Use Administrator may require additional mitigation measures including, but not limited to:

   a. Changing the aim;

   b. Re-locating perimeter light fixture(s) to the interior of the site;

   c. Changing the mounting height;

   d. Changing the light distribution pattern; or

   e. Removing the pole and fixture from the site.

E. **Additional Outdoor Lighting Standards for Specific Lighting Types**. In addition to meeting the general lighting standards in Section 7.7 (D), the following types of lighting shall also meet the additional specific standards listed below.

1. **Street Lighting**. Street lighting shall be placed on all streets by the developer to allow for the safe use of streets by cars, cyclists, and pedestrians. Developer placed lighting shall also include all improved frontages on local and NCDOT streets. Developers requesting upgrades from the Town's minimum street light specification of a fiberglass pole with a fully-shielded, arm-mounted LED fixture shall pay the Town up front the difference in the costs of maintenance for the desired LED fixture and pole covering a period of ten (10) years. Developers interested in pursuing this option should consult with the Land Use Administrator concerning the Town's "Premium Lighting Policy". All street lighting shall conform to the specific standards for LED lighting in subsection 'B' as well as the following design standards:

    a. **Average Spacing Maximums**. The following maximum average spacing requirements between streetlights shall apply to all local, collector, and arterial street classifications according to the use context of the adjacent land as listed below, except alleys (Section 10.4 (A)(1)(a)) which are exempt from said requirements.

        i. **Local & Collector Streets**.

            a) Residential at less than three (3) unit per acre – five hundred (500) feet.

            b) Residential from three (3) to eight (8) units per acre – two-hundred fifty (250) feet.

            c) Residential over eight (8) units per acre – one-hundred fifty (150) feet.

            d) All other uses – three hundred (300) feet.

        ii. **Arterial Streets**. All uses – one-hundred fifty (150) feet.

    b. **Minimum Initial Delivered Lumen Levels**.

        i. Local Streets – four thousand eight hundred (4,800) lumens.

        ii. Collector Streets in Residential Areas – twelve thousand five hundred (12,500) lumens.

        iii. Collector Streets in Other Areas – twelve thousand five hundred (12,500) lumens.

        iv. Arterial Streets – eighteen thousand five hundred (18,500) lumens.

    c. **BUG Rating**. All streetlights shall be fully shielded (no light at or above horizontal) and shall not exceed the following BUG ratings established for each type of street:

        i. Local Streets - B1, U1, G2

        ii. Collector Streets in Residential Areas - B2, U2, G3

        iii. Collector Streets in Other Areas - B3, U3, G3

        iv. Arterial Streets - B3, U3, G4

    d. **Placement**.

        i. Although the primary purpose of street lighting is to provide adequate lighting for the roadway, street lighting should also promote pedestrian safety. Therefore, lighting should be placed in a manner to minimize the casting of shadows on sidewalks.

        ii. Lighting shall be placed as far from street trees as the landscaping plan will allow.

iii. Lights on newly constructed streets shall be alternately staggered on each side of the street wherever possible.

iv. Lighting shall be placed at all street intersections, in street curves, and at the end of any street or cul-de-sac.

2. **Post-Top Pedestrian Lighting**. Unless otherwise expressly permitted, decorative post-top fixtures may only be used for the lighting of pedestrian walkways and public gathering spaces and shall also meet the following standards:

   a. **Mounting Height**. Shall not be mounted at a height greater than eighteen (18) feet;

   b. **BUG Rating**: LED or other BUG-rated fixtures shall not exceed a rating of B3, U1, G1;

   c. **Lumens**: Shall not exceed seven thousand two hundred fifty (7,250) initial delivered lumens (LED) or nine thousand (9,000) source lumens as may apply; and

   d. **Permitted Locations**. Shall only be utilized in the following locations:

      i. In commercial and mixed-use area street rights-of-way where sidewalk, utility, and planting strips have been combined (see Sections 10.4), or

      ii. Along pedestrian facilities located outside the street right-of-way, or

      iii. Along pedestrian facilities located more than twenty (20) feet from any vehicular accommodation area.

3. **Accent Lighting - Building, Landscaping and Signs**. All accent lighting, except for low-voltage lighting systems (Section 7.7 (B)(7)) shall meet the following additional standards:

   a. **Lamp Output**. Accent lighting should be integrated with the architectural character of the building and shall use low-luminosity lamps (2,000 source lumens or less) unless otherwise justified.

   b. **Maximum Vertical Illuminance**. The illumination on any vertical surface shall not exceed one-half (0.5) maintained foot candles and shall not spill over roof lines or building edges.

   c. **Signs**. Light fixtures used to illuminate signs shall be mounted on the top of the sign structure whenever possible.

   d. **Residential Post Lights**. All residential post top lights shall:

      i. Not exceed eight (8) feet in height; and

      ii. Have a translucent lens covering the light source.

4. **Vehicular Accommodation Area and General Site Lighting**. General site lighting and lighting for vehicular accommodation areas shall have an average horizontal illumination as specified in the tables in Section 7.7 (F) "Lighting Levels", and shall meet the following additional standards:

   a. **BUG Rating**. LED or other BUG-rated fixtures exceeding seven-thousand two-hundred fifty (7,250) initial delivered lumens or nine thousand (9,000) source lumens as may apply, shall not exceed a rating of B3, U0, G4.

   b. **Circumstances Requiring Forward Throw**. Parking area lighting fixtures within twenty-five (25) feet of any public street right-of-way or a commercial to residential/group care facility property line must be a forward throw fixture (type IV light distribution as defined by IESNA).

5. **Security Lighting.**

    a. **Flood/Spotlights**. Spotlights shall not be used as general site lighting but may be permissible for added security provided the following standards are met.

        i. Spotlights shall be aimed so that the main beam from the light source is not visible from a neighboring property.

        ii. Spotlights shall be installed such that the fixture shall be aimed down at least 45 degrees from horizontal.

        iii. Fixtures shall use low luminosity lamps (2,000 source lumens or lower).

        iv. Shields shall be added as needed for conformity to this Section.

    b. **Wall-Mounted Lights**. Wall-mounted fixtures are not intended to provide general building or site lighting but may be used at building entrances for added security. Wall-mounted fixtures shall:

        i. Use low luminosity lamps (2,000 source lumens or lower) unless justified otherwise through the planning approval process.

    c. **Dawn to Dusk Security Lights**.

        i. Each lamp shall not exceed seven-thousand two-hundred fifty (7,250) initial delivered lumens (LED) or nine thousand (9,000) source lumens as may apply.

        ii. Each lamp shall be mounted at heights no greater than twenty-seven (27) feet above grade.

6. **Vehicular Canopies and Gas Station/Convenience Store Aprons**. Areas under a vehicular canopy and the approach to the canopy shall have an average horizontal illumination as specified in the table in Section 7.7 (F)(2) "Other Outdoor Areas", and shall meet the following additional standards:

    a. Lighting under vehicular canopies shall be designed so as not to create glare off site. Acceptable methods include one or more of the following:

        i. Recessed fixture incorporating a lens cover that is either recessed or flush with the bottom surface of the vehicular canopy; or

        ii. Surface-mounted fixture incorporating a flat lens that provides a fully shielded light distribution.

    b. Lights shall not be mounted on the top or sides (fascia) of the canopy, and the sides of the canopy shall not be externally illuminated.

F. **Lighting Levels**. The following standards shall be required of all exterior lighting with the exception of public street lighting which is exempt. The number of fixtures to be provided shall be based upon the desired level of uniform illumination as established by the following table and current standards of the IESNA. Fixture locations should be chosen to minimize glare, trespass, and conflicts with the landscaping plan as stated in Section 7.7 (B). If a lighting installation causes offensive light trespass or glare, the Land Use Administrator may require the shielding of fixtures at the time of installation or at any point thereafter. The level of illumination shall be based upon the primary activity in each area to be lighted as outlined below.

1. **Open Parking Facilities**. For lighted parking lots, the minimum light level shall be no less than 0.2 foot candles. All light levels are measured at ground level. The light level requirements for individual parking lots vary depending on the activity classification.

   The specified minimum foot candle value above 0.2 foot candles as outlined in the following table means that the lowest light level point or location in the parking lot must not exceed the minimum stated foot candle value in the table (i.e. 0.9 foot candles for large shopping centers). An average to minimum uniformity ratio of 4:1 means that the average foot candle to minimum foot candle ratio cannot be worse (higher) than 4:1. See the following table:

Table 7.7(F)(1) Lighting Levels of Open Parking Facilities

Activity	Maintained Footcandles	Uniformity Avg/Min
Parking, residential, multi-family - low to medium activity	0.5 FC Min	4:1
Parking, industrial/commercial/ institutional/municipal - High activity, i.e. large shopping centers/ fast food facilities, major athletic/civic cultural events	0.9 FC Min	4:1
Parking, industrial/commercial/ institutional/municipal - Medium/low activity, i.e. community shopping, office parks, hospitals, commuter lots, cultural/civic/ recreational events, residential neighborhood shopping, industrial employee parking, schools, churches	0.5 FC Min	4:1

2. **Other Outdoor Areas**.

Table 7.7(F)(2) Lighting Levels of Other Outdoor Areas

Use	Maximum Illumination Allowes (Avg. Footcandles Maintained)
Service Stations: Approaches/Pump Islands	7/30
Outdoor Display Areas (i.e. car lots)	30
Tractor Trailer and Other Outdoor Storage Areas	20
Building Exteriors	3
Public Entrances	5
Employee and Other Entrances	3
Building Surroundings	2
Vital Locations or Structures	5

G. **Measurement**.

1. **Location**. Light level measurements shall be made at the property line of the property upon which the light to be measured is being generated. If measurement on private property is not possible or practical, light level measurements may be made at the boundary of the public street right-of-way that adjoins the property of the complainant or at any other location on the property of the complainant. Measurements shall be made at finished grade (ground level), with the sensor in the horizontal position and not mounted more than six (6) inches above ground level, and with the light-registering portion of the meter held parallel to the ground and pointing upward.

2. **Light Meter Specifications**. Lighting levels are to be measured in FCs with a direct-reading portable light meter. The meter shall:

    a. have cosine and color correction;

    b. have an accuracy tolerance of no greater than plus or minus five (5) percent; and

    c. have been calibrated within the last two (2) years.