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Chapter 11. Subdivision Standards

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11.1. General Provisions

- A. **Maximum Development Density.** The maximum development density per gross acreage of a subdivision shall be as established per zoning district as detailed in Table 11.1(A) below.

Table 11.1(A) Maximum Development Density	
District	Maximum Development Density Per Gross Acreage
RT	.5 unit/acre
RR1	1 unit/acre
GR3	3 units/acre
GR8	8 units/acre
UR12	12 units/acre
RMX	18 units/acre
NMX	no maximum
TC	no maximum
HB	not applicable
BO	not applicable
MI	not applicable

- B. **Required Distribution of Uses.** The minimum and maximum required distribution of uses shall be as detailed in Table 11.1(B) below and shall be calculated as the net development area which excludes street rights-of-way and dedicated open space as detailed in Section 11.2.

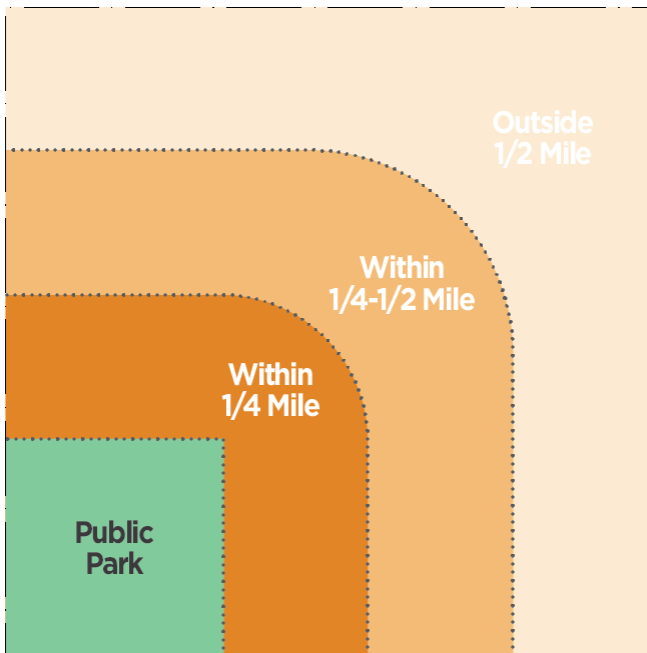
Table 11.1(B) Required Distribution of Uses		
Use Type	Minimum Distribution	Maximum Distribution
Dwelling-Duplex/Townhouse	10%	40%
Dwelling-Multifamily	5%	40%
Dwelling-Single Family	15%	60%
Mixed Use*	10%	100%
Lodging/Office/Service/Retail/Restaurant/Entertainment/Recreation*	5%	20%
Civic/Institutional*	As determined by the Town Council	
*Minimum and maximum distribution requirements shall apply only to nonresidential subdivisions or subdivisions with both residential and non residential uses.		

11.2. Recreational Open Space

- A. **Purpose and Intent.** Open spaces are characterized by the fact that the outdoor space has some recreational, ecological, and/or aesthetic value. Open space generally includes but is not limited to: outdoor areas not covered by buildings, structures, parking lots, “dry” stormwater detention facilities, public rights-of-way, or required setbacks. Specifically, recreational open space is distinct from those areas that are ecologically significant and must be protected in their pristine state in that it is designed to supplement the human habitat through its use and enjoyment. While Chapter 9 addresses the requirements related to areas of ecological value, the intent of these requirements is to allow for the active or passive usage of centrally located land as neighborhood recreational open spaces available to the public, and not to permit the use of leftover or otherwise unusable land to fulfill the requirements of this Chapter.
- B. **General Provisions.**
1. **Consistency with Parks and Recreation Master Plan.** Areas noted on any adopted Parks and Recreation Master Plan as open space shall be incorporated into developments where applicable.
 2. **Location and Improvement.** Recreational open space shall be planned and improved to provide focal points for a neighborhood and are centrally located so that they are accessible and usable by persons living within a half (½) mile walking distance. A central square or green, for example, may comprise a majority of the area required for dedication. Improved shall mean cleared of underbrush and debris and containing active or passive enhancements as described in Section 11.2 (C)(7).
 3. **Preservation of Natural Aesthetic Features.** Significant stands of trees, stream bed areas, and other valuable natural aesthetic features shall be preserved within the recreational open space areas where practical.
 4. **Placement of Amenities.** Recreational open space amenities such as playground equipment, statues, and fountains should be located toward the interior of squares and parks, sufficiently away from the public right-of-way, to provide for the adequate safety of users.
 - a. Pet waste stations shall be provided along public greenways every 2,000 feet. Placement consideration shall be based on proximity to other existing waste stations, proximity to other open space amenities and access to roads for collection purposes. If the public greenway segment being constructed is less than 2,000 feet, the requirement may be waived unless the segment connects into the existing greenway network and creates a 2,000 foot greenway segment without a pet waste station. The pet waste station design shall be in accordance with the Town’s Standard Specifications and Details Manual.
 - b. Benches shall be provided along public greenways every 2,000 feet. Placement consideration shall consider the location of other amenities, presence of shade, providing rest from climbing hills and/or taking advantage of viewsheds. If the public greenway segment being constructed is less than 2,000 feet, the requirement may be waived unless the segment connects into the existing greenway network and creates a 2,000 foot greenway segment without a bench. Bench designs shall be in accordance with the Town’s Standard Specifications and Details Manual.
 5. **Ownership.** Dedicated recreational open space may be held in private ownership, provided that the necessary easements are recorded with the Wake County Register of Deeds in a form approved by the Town. Otherwise, dedicated recreational open space shall be separately deeded to a homeowner’s association, a non-profit land trust or conservancy, Wake County, or the Town of Knightdale (upon approval by the Town Council).
- C. **Recreational Open Space Dedication.** All developments with more than eight (8) residential units shall be required to dedicate recreational open space. The amount of recreational open space required for dedication shall be determined using the following Recreational Open Space Dedication Matrix (“Dedication Matrix”) included in Table 11.2(C)(4). The Dedication Matrix is based upon similar dedication requirements throughout the State of North Carolina with a few enhancements:

1. **Proximity to Improved Publicly Dedicated Recreational Open Space Credits.** The Dedication Matrix accounts for the availability of accessible recreational open space in close proximity to the proposed development, referred to as “Proximity Zone.” The portion of a development within a half (0.5) mile walk (along sidewalks or other pedestrian access within a public right-of-way or public easement) to existing publicly dedicated recreational open space (parks, greenways, etc.) are granted a reduction in required recreational open space dedication of twenty-five (25) percent. Similarly, the portion of a development within a quarter (0.25) mile of existing publicly dedicated recreational open space is granted a fifty (50) percent reduction in required dedication. Publicly dedicated recreational open space means that the property has been dedicated to the Town of Knightdale or other government agency, is actively maintained through a maintenance agreement or acceptance for maintenance by the government agency, and has been improved as provided for in Section 11.2(B)(2).
2. **Density (Dwelling Units/Acre).** To encourage the preservation of proportional acres of land in higher density developments, the Dedication Matrix provides for an increasing requirement in the dedication of recreational open space as gross density also increases.
3. **Number of Bedrooms.** In addition to density, the Dedication Matrix was also designed to base recreational open space requirements on the estimated number of bedrooms in a given development rather than the more typical dedication based upon the number of dwelling units, since bedroom counts better represent the actual number of residents for whom an appropriate amount of recreational open space is needed. For the purposes of good faith estimation, all single-family developments will dedicate open space at a rate of three and one-half (3.5) bedrooms per unit unless otherwise stipulated. In the absence of known building specifications, duplexes, townhomes, and multifamily will dedicate open space at a rate of two and one-half (2.5) bedrooms per unit.
4. **Recreational Open Space Dedication Matrix.** The Dedication Matrix shall be used as detailed below.
 - a. Estimate average density for each zone of proximity within the development.
 - b. Estimate the total number of bedrooms within each zone of proximity.
 - c. Multiply the total number of bedrooms within each zone of proximity times the dedication rate (in square feet) for the corresponding average density for each zone of proximity.
 - d. If applicable, add the preceding results for each zone of proximity together to determine the total dedication required.

Table 11.2(C)(4) Required Open Space Dedication Matrix				
Proximity Zone	Dedication Rate (square feet)			
	0-2 du/acre	2-6 du/acre	6-10 du/acre	+10 du/acre
Outside 1/2 mile	500	520	550	580
Between 1/4 and 1/2 mile	375	390	413	435
Within 1/4 mile	250	260	275	290

EXAMPLE:

A developer wants to subdivide a 50-acre tract of land into 120 lots for 120 single-family dwellings. The good faith estimated number of bedrooms per dwelling is 3.5. 8 acres are within $\frac{1}{4}$ mile of existing publicly dedicated open space, while another 24 acres are between $\frac{1}{4}$ and $\frac{1}{2}$ mile. (Assumption: In the absence of specific information, dwelling units may be equally distributed across the entire acreage.)

How much recreational open space is required for dedication?

Density = 120 units / 50 acres or 2.4 gross dwelling units/acre (applies to whole site)

Bedroom Estimate:

Total bedrooms = 120 units * 3.5 bedroom/unit or 420 bedrooms

Total bedrooms within $\frac{1}{4}$ mile = 420 bedrooms * (8/50 acres) or 68 bedrooms

Total bedrooms $\frac{1}{4}$ - $\frac{1}{2}$ mile = 420 bedrooms * (24/50 acres) or 202 bedrooms

Total bedrooms outside $\frac{1}{2}$ mile = 420 bedrooms * (18/50 acres) or 152 bedrooms

Open Space Calculations (square foot multipliers come from chart, 2.4 is between 2 – 6):

Within $\frac{1}{4}$ mile = 68 bedrooms * 260 square feet or 17,680 sf

$\frac{1}{4}$ - $\frac{1}{2}$ mile = 202 bedrooms * 390 square feet or 78,780 sf

Outside $\frac{1}{2}$ mile = 152 bedrooms * 520 square feet or 79,040 sf

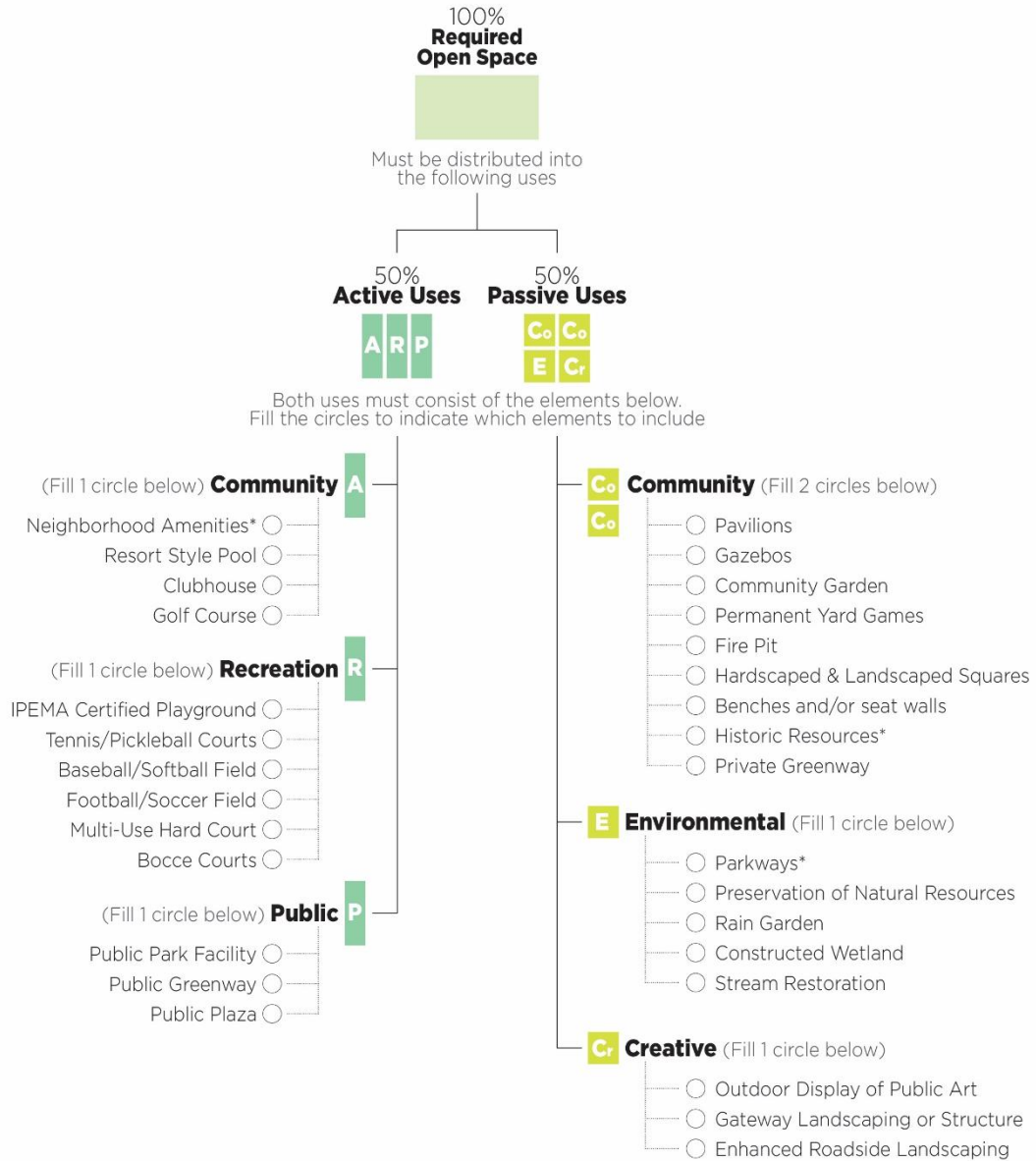
Total Recreational Open Space = 17,680 sf + 78,780 sf + 79,040 sf or 175,500 square feet
(also 4.03 acres or 8% of the total area)

5. **Variation Permitted from Final Build-Out.** Because the open space dedication requirements are based upon preliminary estimations of bedroom units in a given development, changing market conditions and the final build-out of a project may yield a different bedroom count. In order to accommodate for variations, this code will allow the number of actual bedrooms to exceed the estimated number of bedrooms as follows:
 - a. Less Than 10% = No further dedication required
 - b. 10% - 25% = Payment in Lieu required for additional bedrooms
 - c. More than 25% = Additional recreational open space dedication required
6. **Payment in Lieu of Recreational Open Space Dedication.** If recreational open space within a development is physically impractical due to unusual topographic conditions, then the Town Council may, at its discretion, accept either an equitable amount of land in another location or a fee paid to the Town in lieu of dedication. A combination of dedication and payments in lieu of dedication are permitted.

Payments in lieu of dedication shall be approved as part of the Development Plan. All payments made in lieu of dedication shall be made in accordance with the Town's Fee Schedule at the time of Final Plat approval. Failure to submit the required fee along with other required Final Plat materials will delay approval of the Final Plat until payment is rendered. All funds received for payment in lieu of dedication shall be used for the acquisition, development, or redevelopment of public open space within the Town.

7. **Recreational Open Space Criteria.** In addition to meeting the general requirements of Section 11.2, land proposed for improved recreational open space shall meet the following criteria:

Figure 11.1: Open Space Menu



8. **Topography.**
 - a. **Active.** The average slope of the land for active recreation shall not exceed seven and one-half (7.5) percent.
 - b. **Passive.** The average slope of the land for passive recreation shall not exceed the average slope of the entire subdivision or development, and in no case shall the average slope exceed fifteen (15) percent unless otherwise approved by the DRC for the preservation of natural resources.
9. **Shape.**
 - a. **Active.** The shape of land for active recreation shall be sufficiently square or rectangular to be suitable for, but not limited to, playgrounds, courts, or playfields.
 - b. **Passive:** The shape of land for passive recreation shall be sufficient to encompass the walking or jogging path, natural or cultural resource or other proposed area to be enjoyed.
10. **Unity.** Land provided for recreational open space shall form a single parcel except where the DRC determines that two (2) or more parcels are more suitable to the accessibility needs (Section 5.7 (E)) of a particular subdivision. The DRC may require that such parcels be connected by a path contained within a strip of recreation area which shall have a minimum width of thirty (30) feet. A maximum width of fifty (50) feet may be required where slope, parallel utility lines or other site conditions warrant additional width.
11. **Accessibility.**
 - a. All recreational open space shall have at least fifty (50) feet of frontage on at least one (1) public street within the subdivision.
 - b. All public and private greenways shall be ten (10) feet multi-use asphalt paths. All public greenways shall be located on an easement of at least thirty (30) feet in width that guarantees access by pedestrians and non-motorized vehicles.
 - c. Construction standards for public and private greenways shall be in accordance with Town of Knightdale Standard Specifications & Detail Manual. Greenway bridges shall also be in accordance with Town of Knightdale Standard Specifications & Detail Manual.

D. **Recreational Open Space Credits.**

1. **Parkways.** For each street segment within a development that is single-loaded (buildings fronting on one side only with recreational open space on the other), the area consisting of the length times half of the width of said street segment right-of-way shall be credited at a rate of one-hundred (100) percent against the passive recreational open space square foot requirement.
2. **Historic Resources.** Historic resources determined by the Land Use Administrator as candidates for local historic district or local historic landmark designation per Chapter 160D-945 or 160D-144 of the North Carolina General Statutes, and are identified for preservation as part of a development proposal shall be credited two-hundred (200) percent of the area against the passive recreational open space square foot requirement. In the case of historic buildings “preservation” shall constitute active rehabilitation and use of the building or deeded transfer of the building(s) and associated property to a local historic preservation organization enabled to receive such transfers.
3. **Neighborhood Amenities.** Developments that provide neighborhood amenity facilities will receive a credit of twenty-five (25) percent of the required passive open space, and twenty-five (25) percent of the required active open space (to be equally divided). The amenities shall contain a resort-style pool or equivalent with a minimum of two-thousand five-hundred (2,500) square feet in surface water and a clubhouse with a minimum of one-thousand five-hundred (1,500) square feet. Such amenity must be open to all residents of the neighborhood and are not subject to private membership separate from any related HOA dues.

11.3. Circulation and Connectivity

A. **Purpose and Intent.** The purpose of this Section is to support the creation of a highly connected transportation system within the Town in order to:

1. Provide choices for drivers, bicyclists, and pedestrians;
2. Promote walking and bicycling;
3. Connect neighborhoods to each other and to local destinations such as schools, parks, and shopping centers;
4. Reduce vehicle miles of travel and travel times;
5. Increase effectiveness of municipal service delivery; and
6. Free up arterial capacity to better serve regional long-distance travel needs.

It is the intent of this UDO to build streets that are integral components of community design. Streets must be pedestrian in nature and shall be designed with sufficient detail to complement the architectural detail of neighborhoods and commercial centers. In addition to the standards of this Chapter, streets shall also conform to the provisions of Chapter 10.

B. **Arterial and Collector Plans.**

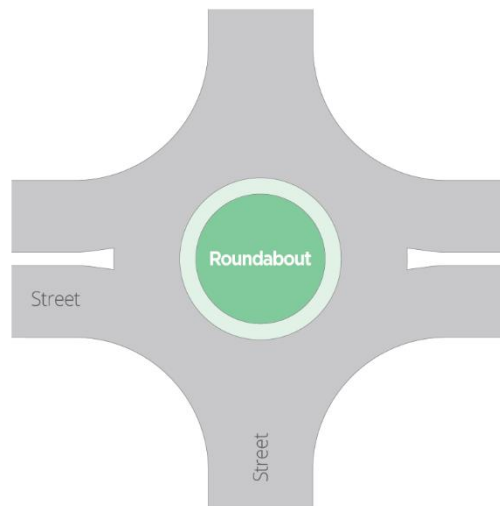
1. **Conformity.** The street layout in any development shall conform to the arrangement, width, and location of public streets indicated on the Town's Comprehensive Transportation Plan (See Roadway Network Plan, Appendix A; Sidepaths and Greenways Plan, Appendix B). Whenever a tract of land included within any proposed development plan embraces any part of the arterial or collector systems as designated on the Town's Comprehensive Transportation Plan, the development shall be required to dedicate and plat the arterial or collector right-of-way and shall be responsible for the cost and the installation of the improvements in accordance with the Town's standards for streets.

Developments that embrace only one (1) side of an existing or planned arterial or collector right-of-way will only be required to dedicate and plat additional right-of-way for that portion of street with which the development has frontage and shall be responsible for the cost and the installation of the improvements in accordance with the Town's standards for streets.

2. **Street Stubs.** New developments are required to stub streets to the outer perimeter boundaries of the development based on the criteria below. If the street in question meets at least two (2) of the criteria, then the street must be built to an appropriate collector street standard.
 - a. The street intersects directly with an arterial street and provides access to an area with an overall density of ten (10) dwelling units per acre, or provides access to more than one-hundred fifty (150) dwelling units.
 - b. The street by its general configuration, in relationship to the existing development of the area, in effect serves a collector function.
 - c. The street extends into an undeveloped area in such a manner as to serve a future collector function.
 - d. The street serves as the primary access to a significant nonresidential, institutional, or recreational land as well as an access to a residential area of twenty (20) or more acres.
3. **Street Design.** New developments that provide new streets that are not identified on the Town's Comprehensive Transportation Plan, but meet any of the following criteria must be built to an appropriate collector street standard.

- a. The street intersects directly with an arterial street and provides access to an area with an overall density of ten (10) dwelling units per acre or provides access to more than one-hundred fifty (150) dwelling units.
 - b. The street by its general configuration, in relationship to the existing development of the area, in effect serves a collector function.
 - c. The street extends into an undeveloped area in such a manner as to serve a future collector function.
 - d. The street serves as the primary access to a significant nonresidential, institutional, or recreational land, as well as an access to a residential area of twenty (20) or more acres.
4. **Intersection Design.** The intersection of two (2) collector streets, a collector street and an arterial street, two (2) arterial streets, or at other intersection as required by the Town, shall be designed as a roundabout when under the jurisdiction of the Town of Knightdale. When under the jurisdiction of the NCDOT, roundabouts shall be the Town of Knightdale's local preference.

Figure 11.2: Intersection Design Preference



- C. **Conformity to Adopted Plans.** All site and subdivision plans shall conform to the arrangement, width, and location of public transportation elements indicated in appendices A and C (Transit & Mobility Hub Plan) as approved by the Land Use Review Board and adopted by the Town Council. All site and subdivision plans shall also meet the requirements of the Long-Range Transportation Plan for the Capital Area Metropolitan Planning Organization (CAMPO) as adopted by the CAMPO Transportation Advisory Committee and the North Carolina Department of Transportation.

Whenever a tract of land included within any proposed development plan embraces any part of the arterial or collector systems as designated on the Town's Comprehensive Transportation Plan (appendices A and B), the development shall be required to dedicate and plat the arterial or collector right-of-way and shall be responsible for the cost and the installation of the improvements in accordance with the Town's standards for streets.

D. **Transportation Impact Analysis (TIA).**

1. **Purpose.** TIAs are used to evaluate whether or not the scale of development is appropriate for a particular site and what improvements may be necessary, on and off the site, to provide safe and efficient access and traffic flow. It is an essential part of the development review process to assist developers and government agencies in making land use decisions involving annexations, subdivisions, rezoning, special land uses, and other development reviews.

As a specialized study that evaluates the effects of a development's traffic on the surrounding transportation infrastructure, the TIA helps identify where the development may have a significant impact on safety, traffic and transportation operations, and provides a means for the developer and government agencies to mitigate these impacts.

2. **Threshold.** A TIA, meeting the requirements of Section 12.3(J), is necessary in the following instances:
 - a. For any proposed rezoning, preliminary subdivision, or master plan if the nature of the proposed rezoning or development is such that the number of trips it can be expected to generate equals or exceeds one-hundred fifty (150) new peak hour trips; or
 - b. When the Land Use Administrator determines:
 - i. That a new project's traffic will substantially affect an intersection or a roadway segment already identified as operating at a failing level of service (LOS), or
 - ii. That a project may create a hazard to public safety, or
 - iii. That a project will substantially change the off-site transportation system or connections to it.

- E. **Vehicular Connectivity.** Traffic studies have shown that highly connected street networks provide much greater traffic throughput and mobility for a community, at less cost. A high degree of connectivity should occur not only at the level of arterials but also on collector, local, and other secondary roads. Such connectivity vastly improves a street network's performance. The street pattern should not force short trips of one (1) or two (2) miles onto arterials; it should be possible to make trips of this sort by using collector or other secondary streets. With a highly connected street network, cross-town trips should be possible using fairly direct secondary roads.

1. **General Street Layout.** In general, streets should be designed and located so that they relate to the topography, preserve natural features such as streams and tree growth, and provide adequate public safety and convenience for motorists, cyclists and pedestrians alike. To accomplish this, local public and private streets may incorporate traffic calming devices in conformance with the Town's "Traffic Calming Policy" as most recently adopted by the Town Council.

The proposed street layout shall also be coordinated with the existing street system of the surrounding area. Where a through street or a series of streets establishes a connection between two (2) public streets, such street shall be a public street.

2. **Street Classification.** The Town shall make the final determination of the classification of streets in a proposed development based on guidance from the Comprehensive Plan. Street classifications are defined in Section 10.4 (A).

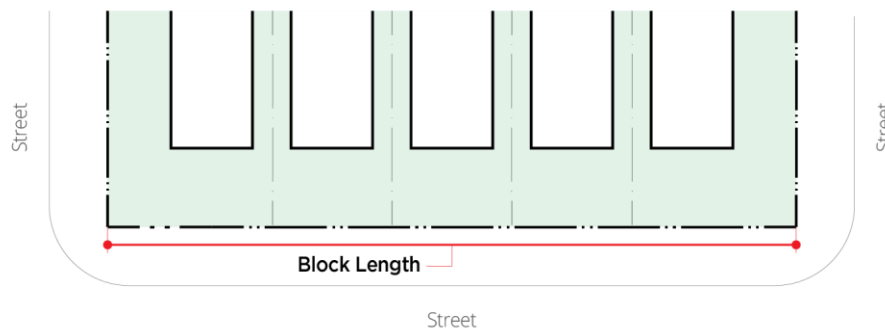
3. Street Stubs.

- a. **Continuation of Adjoining Street Systems.** Vehicular connections from adjacent property (street stub-outs) must be utilized unless the Land Use Administrator deems the connection impractical due to topographic conditions, environmental constraints, property shape or property accessibility.
- b. **New Street Stubs.**
 - i. **Development Perimeter and Surrounding Parcels.** New developments are required to stub streets to the outer perimeter boundaries of the development so as to ensure access of surrounding properties to a public right-of-way and in accordance with appendices A and B.
 - ii. Whenever connections to existing or proposed streets on an adjoining property are required, the street right-of-way shall be extended and the street developed to the property line of the subdivided property (or to the edge of the remaining undeveloped portion of a single tract) at the point where the connection to the existing or proposed street is expected.
 - iii. Where land is subdivided into parcels and tracts larger than ordinary building lots, such parcels and tracts shall be arranged in a phasing plan so as to allow for the opening of future streets and logical further subdivision.
 - iv. The Town may require temporary turnarounds to be constructed at the end of such streets pending their extension. Where a temporary turnaround is required that precludes the completion of street right-of-way improvements to the property line, please see Section 10.1 (C).
 - v. The Town may require the extension of a stub or connection where necessary to permit the convenient movement of traffic between residential neighborhoods or to facilitate access to neighborhoods by emergency service vehicles or for other sufficient reasons.
- c. If the street being stubbed meets at least two (2) of the following criteria, then the street must be built to an appropriate collector street standard:
 - i. The street intersects directly with an arterial street and provides access to an area with an overall density of ten (10) dwelling units per acre or provides access to more than one-hundred fifty (150) dwelling units.
 - ii. The street by its general configuration, in relationship to the existing development of the area, in effect serves a collector function.
 - iii. The street extends into an undeveloped area in such a manner as to serve a future collector function.
 - iv. The street serves as the primary access to a significant nonresidential, institutional, or recreational land, as well as an access to a residential area of twenty (20) or more acres.

- Block Length.** Maximum block lengths inside proposed developments shall be in accordance with lengths shown in the following table. Short block lengths are intended to create a better pedestrian-scaled environment. The Land Use Administrator may allow a deviation from this requirement if it is determined that this requirement is impractical due to topographic conditions, environmental constraints, property shape, or property accessibility.

Table 11.3(E)(1): Maximum Block Length												
	OSP	RT	RR1	GR3	GR8	UR12	RMX	NMX	TC	HB	BP	MI
<i>Standards (Maximum)</i>												
Block length (ft)	n/a	1,500 ft	1,500 ft	1,000 ft	1,000 ft	800 ft	800 ft	660 ft	660 ft	n/a	n/a	n/a

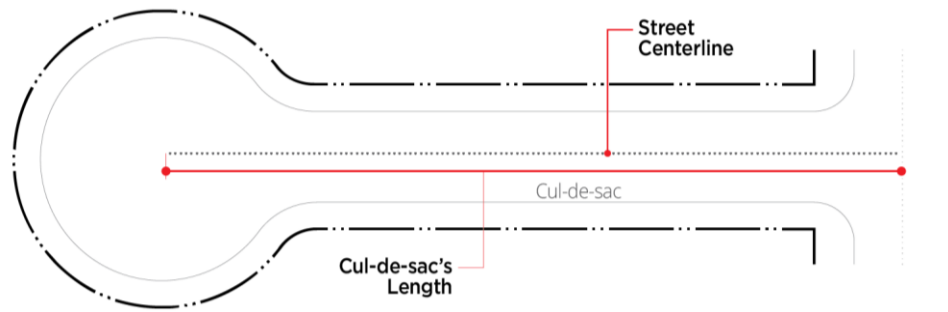
Figure 11.3: Block Length Standards



- Cul-de-sacs.** Permanent cul-de-sac streets and dead-end streets are discouraged in the design of street network systems, and they should only be used when topography, the presence of natural features, and/or vehicular safety factors make a vehicular connection impractical. Where cul-de-sacs or dead-end streets are unavoidable, developments shall incorporate provisions for future vehicular connections to adjacent, undeveloped properties, and to existing adjacent developments where existing connections are poor. No system of multiple branching cul-de-sacs from a single junction with a connected street network is permitted unless the Land Use Administrator deems it allowable due to environmental constraints. Any permanent dead-end streets or cul-de-sac shall comply with the length limits (as measured along the street centerline) shown in the following table and shall be provided with a turnaround at the closed end of the street as set forth in the Town’s Standard Specifications and Details Manual and the Fire Code, unless otherwise approved by the Fire Code Official.

Table 11.3(E)(2): Cul-de-Sac Length												
Standards	All Buildings											
	OSP	RT	RR1	GR3	GR8	UR12	RMX	NMX	TC	HB	BP	MI
<i>Standards (Maximum)</i>												
Cul-de-Sac Length (ft)	n/a	500 ft	500 ft	300 ft	300 ft	200 ft	200 ft	n/a	n/a	n/a	n/a	n/a

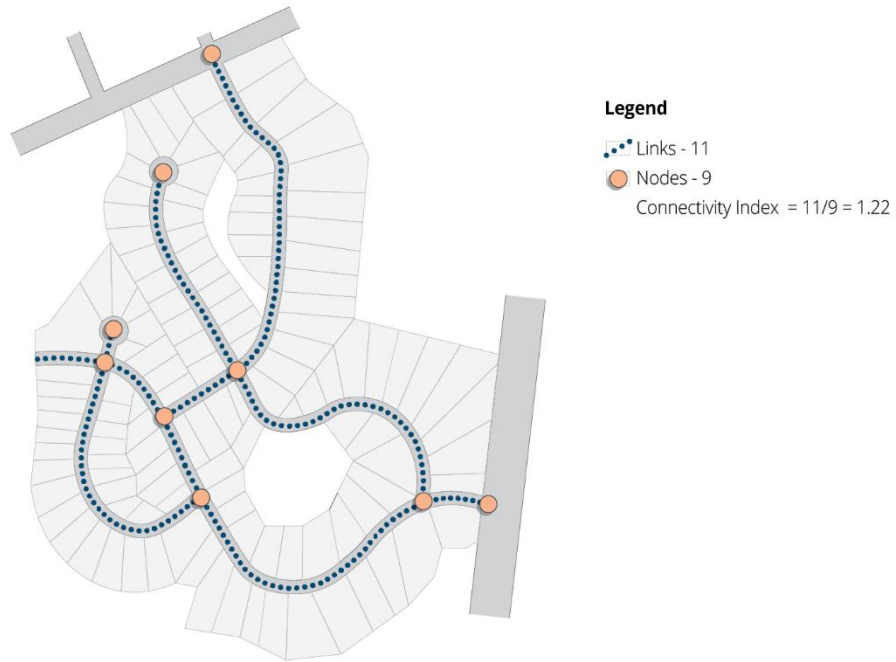
Figure 11.4: Cul-de-Sac Standards



6. **Second and Additional Points of Access Required for Residential Developments.** Residential development shall be required to provide points of access as detailed in the following sections. The number of further open and functioning vehicular access points shall be controlled and determined by the development's Town-approved TIA (Section 12.3 (J)). If a TIA should establish a higher standard for the number of open and functioning vehicular access points from the existing public street system, the requirement of the TIA shall prevail. The requirements herein shall not preclude a development from also meeting the following connectivity index required in Section 11.3(E)(7). For purposes of this section, a median-divided vehicular access point counts as a single vehicular access point. This section does not preclude developments from connecting to existing street stubs and/or street stub rights-of-way abutting their property. When two points of open and functioning vehicular access are required, the placement shall be in accordance with the Fire Code.
 - a. **One- and Two-Family Dwelling Developments.** At a minimum, a second point of open and functioning vehicular access from the existing public street system (not a stub-out) is required for developments of one- or two-family dwellings that contain one-hundred (100) residential units or more, and a third shall be required for developments that exceed five-hundred (500) residential units. These second and third points shall be open and functioning prior to the issuance of the 100th and 501st Certificate of Occupancy respectively for the development.
 - b. **Multi-family Residential Developments.** At a minimum, a second point of open and functioning vehicular access from the existing public street system (not a stub-out) is required for multi-family residential developments that exceed 100 dwelling units. However, if all buildings are equipped with an approved automatic sprinkler system, multi-family projects with up to 200 dwelling units may have a single open and functioning vehicular access. Regardless of automatic sprinkler systems, all multi-family developments with more than 200 dwelling units shall have two separate open and functioning vehicular access roads.
7. **Connectivity Index.** A Connectivity Index shall be used to determine the adequacy of street layout design. This is calculated as the ratio of the number of street *links* (road sections between intersections) in the project's street layout divided by the number of street *nodes* (intersections and cul-de-sac heads). For comparison purposes, a perfect grid has a Connectivity Index of 2.00 or higher, while a conventional cul-de-sac subdivision is often 1.00 or less. The accompanying illustration exhibits a connectivity index of 1.22 (links are shown as circles and nodes are shown as stars). Street links on existing adjacent streets that are not part of the proposed subdivision are not included in the connectivity index calculation. The illustration has eleven (11) links and nine (9) nodes for an index of $11 / 9 = 1.22$. Any development shall be required to achieve a Connectivity Index as shown in the following table.

Table 11.3(E)(3): Connectivity Index												
Standards	All Buildings											
	OSP	RT	RR	GR3	GR8	UR12	RMX	NMX	TC	HB	BP	MI
<i>Connectivity Index (Min.)</i>												
Index Score	n/a	1.30	1.30	1.40	1.40	1.40	1.40	1.50	1.60	n/a	n/a	n/a

Figure 11.5: Connectivity Index



8. **Land Use Administrator-Awarded Modifications.** The Land Use Administrator may award reductions to the minimum index value if it is determined that more than sixty (60) percent of any “side” of a development (four [4] sides total) faces impracticalities for connectivity to adjacent properties due to the presence of controlled-access highways, railroad rights-of-way, NRBs or existing developments that have not provided street stub-outs for connection purposes. In addition, the Land Use Administrator may award bonuses to a development’s index score where pedestrian greenways are provided to link any cul-de-sac to another street or cul-de-sac within the development.

Table 11.3(E)(4): Administrator-Awarded Modifications			
Standards	Rights of Way		
	Controlled-Access Highway, Railroad Right-of-Way or Adjacent Developments with No Street Stub-Outs	Neuse River Buffer (NRB)	Pedestrian Greenway
<i>Administrator-Awarded Reductions</i>			
Index Value	-0.05	-0.03	-
<i>Administrator-Awarded Bonuses</i>			
Index Value	-	-	0.03

9. **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.
10. **Bicycle Amenities.** In North Carolina, a bicycle has the legal status of a vehicle and is permitted to operate on any roadway where NC Board of Transportation policy does not expressly prohibit non-motorized vehicles (i.e. interstates and other fully-controlled, limited access highways). In addition to the preceding requirements of this Section:
- Bicycle amenities in the form of bike lanes shall be incorporated in the design of all arterials, collector streets and roads with bicycle routes identified on *Appendix A: Roadway Network Plan and Appendix B: Sidepaths and Greenways Plan*; and
 - Bicycle parking shall be provided according to the requirements established in sections 7.1 (F) and (N).

- F. **Pedestrian Circulation & Connectivity.** 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 numbers of potential conflict points are much higher. As such, the following standards shall be met when designing a connected pedestrian circulation system:
1. All pedestrian walkways shall be designed to comply with the design standards outlined in Chapter 7.
 2. 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 and approved by the Fire Code Official. 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.
 3. 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.
 4. Pedestrian walkways shall connect building entrances and building entrances with public sidewalk connections and existing or planned transit stops.
 5. All developments that contain more than one (1) building shall provide walkways between the principal entrances of the buildings.
 6. Multi-purpose paths, whether required by Appendix B or built to satisfy the recreational requirements of Section 11.2, shall connect to the street system in a safe and convenient manner. These paths should be used to enhance pedestrian and bicycle travel where the existing circulation system does not serve these patrons well.
 7. 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. Signage shall also 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 be in accordance with Town of Knightdale Standard Specifications & Detail Manual.
 8. If a development site includes public greenways on the Comprehensive Transportation Plan Appendix B Sidepaths and 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.
 9. Public and private greenways shall not overlap with Stormwater Control Measure (SCM) primary access easements, unless approved by the Stormwater Administrator.

G. Access Management.

1. Number of Driveway Access Points.

a. Single-Family Residential Lots In General.

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

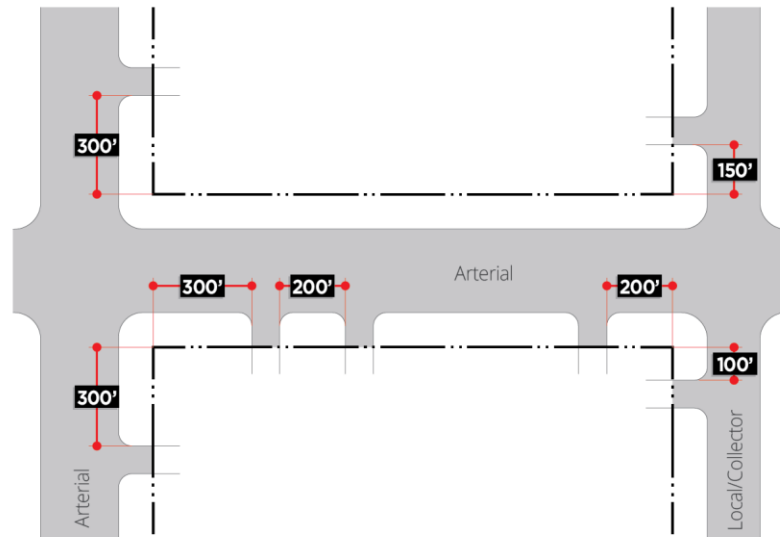
- b. **Along Arterials and Collectors.** Developments should minimize or eliminate curb cuts along arterials and collectors. Single Family lots, attached or detached, shall not have access to a collector or arterial street. Instead, rear-loaded alley access is permitted. Where possible, vehicular access 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.

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

2. Location of Driveway Access Points.

- a. **In General.** Except for shared drives, all driveways shall be a minimum of two (2) feet from the property line.
- b. **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 11.6: Location of Driveway Access Points



- H. **Median Cross-Over Spacing.** In general, if the left turn lane storage requirements for adjacent intersections overlap, the minimum spacing specified below shall be increased to provide adequate left turn lane storage in both directions. Additionally, where the NC DOT Driveway Manual or Median Crossover Guide conflicts, the stricter of the two (2) standards should prevail.
- I. **Median Cuts for Alleys.** Providing turning cuts in landscaped roadway medians shall not be allowed for alleys unless approved by the Land Use Administrator.