

9 INFRASTRUCTURE STANDARDS

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9.1 INTENT

The standards of this Chapter are intended to promote the creation of streets, sidewalks, greenways, and other forms of public infrastructure that contribute to the network of inviting, pedestrian-and bicycle-friendly public spaces throughout the Town. The Town's hierarchical street network is to be safe, attractive, and friendly for multiple modes of travel.

9.2 STREET DESIGN PRINCIPLES

The Ordinance promotes the development of a network of interconnecting streets that disperse traffic while connecting and integrating neighborhoods with the existing fabric of the Town. The Ordinance also promotes a network of sidewalks, bicycle lanes, and greenways that provide an attractive and safe mode of travel for cyclists and pedestrians. On-street parking is generally encouraged.

The following street design principles encourage streets to be designed and used as critical public spaces by both vehicles and people, and shall be followed when developing new streets:

- A. Streets shall interconnect between a new development and adjoining development in accordance with the standards of this Ordinance.
- B. Cul-de-sacs shall only be permitted where topographic conditions and/or exterior lot line configurations offer no practical alternatives for connection or through traffic.
- C. Street stubs shall be provided where development is adjacent to undeveloped property to provide for future connections. Stubs shall be constructed to extend to the adjacent property line. Street stubs may be eliminated where topographic conditions offer no practical alternatives for connection or where confirmed environmentally sensitive lands would likely be negatively impacted by a future street connection, at the discretion of the of the TRC. Environmental conditions that are eligible for this exemption include but are not limited to floodplains, streams, and wetlands. Where stubs have been provided on property adjoining new development, the newly proposed development plan shall incorporate the continuation of the stubbed street into the development.
- D. In accordance with the standards in Section 9.3, Street Types, Section 9.4, Street, Sidewalk, and Bike Path Design Standards, and applicable street cross-section standards in the LMO Appendices, new streets should be designed to create an environment that prioritizes pedestrian safety and comfort while also accommodating vehicular traffic. Streets should incorporate such features as wide planting strips to separate pedestrians from traffic, bulb-outs to reduce intersection width, on-street parking, and travel lanes only as wide as necessary to provide adequate access to surrounding land uses and to facilitate traffic movement.
- E. Sidewalks shall be constructed on both sides of new streets and thoroughfares except where otherwise exempted by this Ordinance. The permit-issuing authority may grant exceptions to this requirement upon recommendation by the TRC if it is shown that local pedestrian traffic on local streets or other non-pedestrian-oriented streets warrant the inclusion of sidewalk on one side of the street only, or where alternatives, such as an adjacent greenway, are already present or included in the design.
- F. New development, redevelopment, and infill development along existing streets and thoroughfares that are recommended for sidewalks in the *Elon Bicycle, Pedestrian, and Lighting Plan* shall include sidewalk construction and dedication of right-of-way or easements along the entire frontage of the parcel(s).
- G. Streets shall be designed to utilize the existing contours of the site and minimize removal of significant trees and significant stands of trees to the extent practicable.
- H. Streets shall be constructed in accordance with the design and construction standards referenced in this Ordinance and shall be dedicated to the Town of Elon or State of NC upon construction, or shall provide for public access via easement where streets are held in private ownership.

- I. Closed, guarded, or gated streets shall be prohibited within the Town.
- J. Street acceptance for public maintenance shall be at the discretion of Town Council or the North Carolina Department of Transportation (NCDOT), as applicable, following submission of a petition for acceptance.
- K. All new on-street parking shall be parallel, except as recommended by the Technical Review Committee and approved by the permit-issuing authority.
- L. Traffic calming devices such as raised intersections; lateral shifts; traffic circles; curb bulb-outs; textured pavement and other design features are encouraged as alternatives to conventional traffic speed control measures.

9.3 STREET TYPES

The following street types shall be permitted for use in new developments, in accordance with the *Traditional Neighborhood Development Guidelines Manual* and *Subdivision Roads Minimum Construction Standards Manual* published by NCDOT, their successor publications, or the Town of Elon's Engineering Standard Specifications and Details. Whenever a new street is to be constructed, the street shall be defined by one of the following classifications. Whenever a subdivision street continues an existing street that formerly terminated outside of the subdivision, the classification of the street will be based upon the street in its entirety, both inside and outside of the subdivision.

- A. Alley – A private or public secondary access with a minimum right-of-way or access easement of 25' and no less than 20' between edges of pavement.
- B. Local Residential Street – A public street providing primary access to residential land uses that does not connect thoroughfares nor provide the primary access to more than 100 residential units. Local Residential Streets shall have a minimum right-of-way width of 50' and a street width of no less than 31' back of curb to back of curb.
- C. Residential Collector Street - A public street providing primary access to residential land uses that provides access to more than 100 residential units. Residential Collector Streets shall have a minimum right-of-way width of 60' and a street width of no less than 40' back of curb to back of curb.
- D. Local Non-Residential Street - A public street providing primary access to non-residential land uses that will be a low traffic road as determined by the TRC. Local Non-Residential Streets shall have a minimum right-of-way width of 50' and a street width of no less than 31' back of curb to back of curb.
- E. Local Non-Residential Collector Street - A public street providing primary access to non-residential land uses. Local Non-Residential Collector Streets shall have a minimum right-of-way width of 60' and a street width of no less than 40' back of curb to back of curb.
- F. Thoroughfare, Minor – A public street collecting traffic from streets and collector streets that is not intended for primary access to residential land uses. Minor Thoroughfares include most NCDOT roads within the Town and are generally designed to accommodate moderate volumes of traffic. The rights-of-way and pavement widths of Minor Thoroughfares shall be determined by NCDOT for state-maintained roads. Rights-of-way and pavement widths of any Town-maintained roads within this classification shall be determined by the TRC based on traffic volume and usage.
- G. Thoroughfare, Major - A public street collecting traffic from collector streets and thoroughfares that is not intended for primary access to residential land uses. Most Major Thoroughfares within Town are NCDOT roads and are designed to accommodate moderate to large volumes of traffic. The rights-of-way and pavement widths of Minor Thoroughfares shall be determined by NCDOT for state-maintained roads. Rights-of-way and pavement widths of any Town-maintained roads within this classification shall be determined by the TRC based on traffic volume and usage.
- H. Existing private streets shall continue to be classified as such unless and until the street is accepted for maintenance by the Town or state pursuant to a request by the developer or other responsible entity. Such acceptance shall only be made in accordance with Section 9.9 Public Infrastructure Acceptance Policy.

9.4 STREET, SIDEWALK, AND BIKE PATH DESIGN STANDARDS

9.4.1 STREET STANDARDS

A. STREET DESIGN AND CONSTRUCTION SPECIFICATIONS

Street design and construction specifications for both public and private streets shall comply with the Town of Elon Standard Specifications and Details for Water, Sewer, and Street Improvements or NCDOT standards as appropriate.

B. ROW WIDTH

Street rights-of-way widths shall be per Section 9.3, Street Types.

C. BLOCKS

Blocks shall generally be rectilinear in shape, and range from a minimum of 150 feet to a maximum of 600 feet in length between cross-streets. Exceptions may be made where topography, environmental protection, preservation of existing buildings, and/or unique lot configurations offer no practical alternatives. Such exceptions may be approved by the Technical Review Committee prior to final approval.

Blocks shall have sufficient depth to allow 2 tiers of lots of minimum depth except where single tier lots are required to separate residential development from another type of use, or when abutting a perennial stream, lake, other body of water, or a park or open space.

D. CUL-DE-SACS

Cul-de-sacs may be permitted where topographic conditions and/or exterior lot line configurations offer no practical alternatives for connectivity or through traffic. Cul-de-sacs shall not exceed 250 ft in length from the nearest intersection with a street providing through access, except where topography, environmental protection, preservation of existing buildings, and/or unique lot configurations offer no practical alternatives. Such exceptions may be approved by the TRC prior to final approval. Cul-de-sacs over 150' in length shall have a minimum diameter of 96 ft, or the NC Fire Code, whichever is greater.

E. CONNECTION TO ADJACENT PROPERTIES

The street network of a new development shall stub to adjacent properties with development potential whenever possible and where topographic conditions allow at the discretion of the TRC and the Planning Board. Where a stub abuts a stream, one-half (1/2) the cost of crossing the stream shall be bonded to allow for connection to future development across the stream. Development across the stream from an existing stub shall incur one-half (1/2) the cost of the crossing and have responsibility for the construction of the crossing. Street stubs may be eliminated where topographic conditions offer no practical alternatives for connection, at the discretion of the TRC.

F. REQUIRED CONNECTIVITY RATIO

1. A connectivity ratio of at least 1.2 shall be required for new Major Subdivisions and Conservation Subdivisions.
2. The connectivity ratio shall be calculated by dividing the number of street links by the number of nodes or end links, including cul-de-sac heads.
3. A link shall be any portion of a street, other than an alley, defined by a node at either end. Stubs to adjacent property shall be considered links.
4. A node shall be the terminus of a street or the intersection of two or more streets.
5. The requirements of Section 9.4.1.F may be waived by the Planning Board upon a finding that significant topographic constraints, existing development patterns, or other substantial physical limitations exist which make achieving the required connectivity ratio impracticable.

CHAPTER 9: INFRASTRUCTURE STANDARDS

Connectivity Ratio Examples

Example 1:

Does not meet ratio

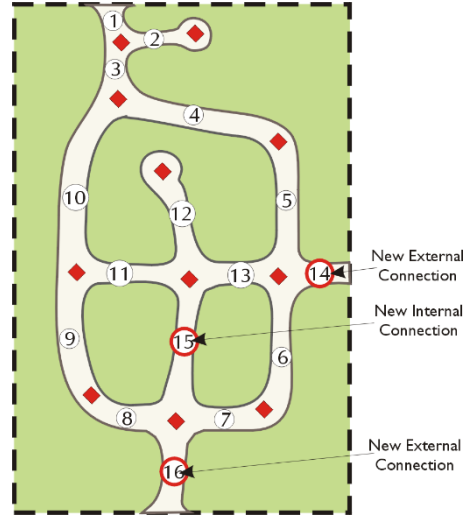
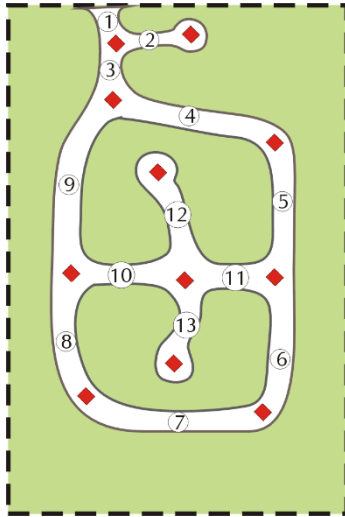
(13 links/11 nodes = 1.18)

Example 2:

Modified to meet ratio

(16 links/11 nodes = 1.45)

Number = link, ◆ = node



G. INTERSECTIONS

1. Street trees and on-street parking shall be located at least 20 feet from intersections to allow an adequate turning radius for emergency vehicles.
2. Bulb-outs shall not be allowed on streets less than 30 feet wide, face of curb to face of curb.
3. Sight triangles for corner lots and driveways shall be shown on recorded plats in accordance with NCDOT standards. No structures or vegetation over 30 inches in height shall be allowed within these sight triangles.

H. CURB AND GUTTER

Curb and gutter shall be required along all streets except in the Rural Residential (RUR) District.

I. TRAFFIC CALMING

Any proposed traffic calming devices, including on-street parking, speed tables and cushions, planting bulb-outs, shall be reviewed and approved by the Town Engineer (for Town-maintained roads) or NCDOT (for State-maintained roads).

J. LANDSCAPING

Where landscaping is required along street rights-of-way per Chapter 7, Development Standards, said landscaping shall not be installed within any utility easement.

K. STREET LIGHTING

Streetlights shall be installed by the developer on all streets at an average separation not to exceed two hundred (200) feet. The Town will accept responsibility of the lights at the time streets are accepted for maintenance. Light poles shall be located within the utility easement but shall provide lighting within the right-of-way unless otherwise approved by the TRC.

L. UNDERGROUND UTILITIES

Underground Town of Elon utilities shall be located within the right of way when possible. Where such installation is not practicable, a utility-specific easement shall be provided. All non-Town utilities shall be located within a ten (10) foot utility easement behind the right-of-way line.

1. Where crossing of Town streets is required, the utility shall obtain an encroachment agreement from the Town.
2. Street trees shall be located so that they do not interfere with sidewalks, storm drainage, sanitary sewer,, and water lines. This may require placement of trees outside of the right-of-way.

9.4.2 SIDEWALK STANDARDS

A. DESIGN AND CONSTRUCTION SPECIFICATIONS

New sidewalks shall be constructed in accordance with the Town of Elon Engineering Standard Specifications and Details for Water, Sewer, and Street Improvements.

B. REQUIRED STREET TYPES

1. Sidewalks shall be required along both sides of all new streets except alleys, except where this requirement is waived in accordance with Section 9.2.F.
2. Sidewalks shall also be required along any sections of existing streets which abut the perimeter of new development and redevelopment.
3. Greenways meeting the requirements of Section 9.6 or multi-use paths may be provided instead of sidewalks for development within the Rural Residential District . This option may be granted by Town Council for development in other districts.

C. SIDEWALK WIDTH

1. Sidewalks serving residential development shall be a minimum of five (5) feet in width.
2. Sidewalks in the UNV District shall be eight (8) feet in width. Additionally, sidewalks serving mixed-use and commercial development shall be a minimum of eight (8) feet in width.

D. CROSSWALKS

The Technical Review Committee may require construction of a properly lighted ADA compliant pedestrian crosswalk at least 10 feet in width to provide safe pedestrian access to public areas such as a park, greenway, or school.

E. CHANGE OF USE

Sidewalks shall also be installed where a Change of Use (as defined in Section 4.2.1.H would increase the average daily trip generation on site according to the ITE (Institute of Transportation Engineers) Trip Generation Manual.

9.4.3 BIKE PATH STANDARDS

A. DEVELOPMENT WITHIN TOWN LIMITS

New development involving the construction of; local non-residential collector streets and major or minor thoroughfares within the Town Limits shall include bike lanes of a minimum of 4 feet in width.

B. DESIGN REQUIREMENTS

Bike lanes and bike paths shall be designed according to the *North Carolina Bicycle Facilities Planning and Design Guidelines* published by NCDOT, or its successor publication.

9.5 GREENWAY DESIGN PRINCIPLES

New greenways shall adhere to the following design principles:

- A. Greenways may be proposed along designated linear corridors, including streams, rivers, abandoned railroads, and utility easements.
- B. Greenways shall connect to new development wherever possible. Greenway stubs shall be provided within developments when development is adjacent to land designated for greenway construction.
- C. Greenways shall be designed to fit the contours of the land and shall minimize the removal of significant trees.
- D. Greenways shall be constructed in accordance with the design and construction standards of this Chapter and shall be maintained for public access, either by easement or public dedication of land.
- E. Variations and exceptions to the Greenway design standards of Section 9.6 may be granted by the approving authority.

9.6 GREENWAY DESIGN STANDARDS

9.6.1 GREENWAY DESIGN AND CONSTRUCTION SPECIFICATIONS

Greenway design and construction specifications comply with the Town of Elon Standard Specifications and Details for Water, Sewer, and Street Improvements or NCDOT standards as appropriate.

shall comply with the Town of Elon Standard Specifications and Details for Water, Sewer, and Street Improvements or NCDOT standards as appropriate.

9.6.2 APPLICABILITY

A public greenway easement of 20 feet in width shall be deeded to the Town of Elon as part of the development approval process for any parcel of land which includes a greenway segment as identified on Map 12 in the *Town of Elon Bicycle, Pedestrian, and Lighting Plan*. The developer shall be responsible for constructing a greenway within said greenway easement, except this requirement shall be waived for single-family development of fifty lots or less.

9.7 WATER, STORM, AND SANITARY SEWER

Water, storm, and sanitary sewer shall be constructed according to the standards of the Town of Elon Standard Specifications and Details for Water, Sewer, and Street Improvements.

9.8 FEE-IN-LIEU

Where the construction of infrastructure required by this Ordinance would conflict with another existing or planned infrastructure project, a developer may choose a payment-in-lieu option for satisfying these requirements, in accordance with Section 5.2.9.

9.9 PUBLIC INFRASTRUCTURE ACCEPTANCE POLICY

Prior to the Town of Elon accepting any streets, sidewalks or greenways for ownership and maintenance, the following conditions shall be met:

- A. Certificates of Occupancy shall have been issued for at least 51% of the lots on any street segment being proposed for Town acceptance.
- B. The developer shall contact the Town Public Works Director in writing to request an inspection of the condition of the infrastructure being proposed for Town maintenance.
- C. If said infrastructure meets Town standards, a resolution date shall be set and a one-year waiting period will begin.
- D. If said infrastructure does not meet Town standards, the developer shall perform any necessary repairs, and request another inspection upon completion. If said repairs are satisfactory, the one-year waiting period will begin at this time.
- E. Upon expiration of the one-year waiting period, the Town Engineer or their designee shall inspect the street, sidewalk, or greenway. If the condition of said infrastructure still meets Town standards, the street shall be accepted for maintenance purposes by Town Council. If substandard conditions exist, necessary repairs shall be made and a new one-year waiting period shall begin.

9.10 PERFORMANCE GUARANTEES

Where a developer seeks to convey lots within a subdivision or to receive building and zoning compliance permits prior to required infrastructure being completed, performance guarantees may be agreed to in accordance with the requirements of Section 5.2.15.