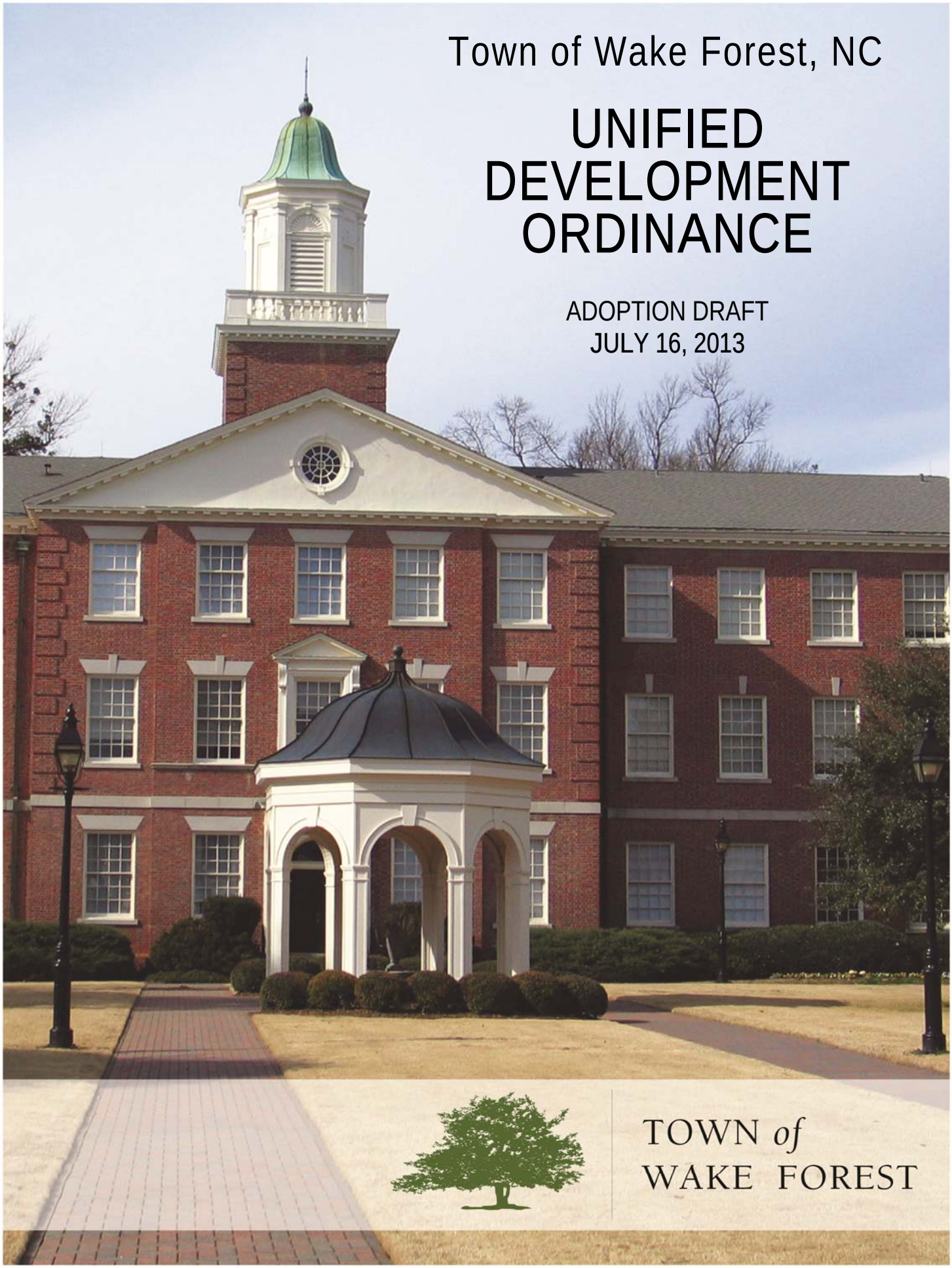
Town of Wake Forest, NC

UNIFIED DEVELOPMENT ORDINANCE

ADOPTION DRAFT
JULY 16, 2013



TOWN *of*
WAKE FOREST

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TYPICAL DEVELOPMENT REVIEW PROCESS CHART

B APPENDIX

WAKE FOREST MANUAL OF SPECIFICATIONS, STANDARDS AND DESIGN

1 PURPOSE & APPLICABILITY

1.1 TITLE

This ordinance shall be known and may be cited as the Unified Development Ordinance for the Town of Wake Forest, North Carolina. This ordinance may also be known and may be referred to as the "UDO."

1.2 AUTHORITY

The development regulations contained in this ordinance have been adopted pursuant to the authority conferred by the North Carolina General Statutes. Specifically, principal authorization comes in the North Carolina General Statutes in Chapter 160A (Planning and Regulation of Development). The Unified Development Ordinance of Wake Forest, North Carolina also uses powers granted in other sections of the North Carolina General Statutes relating to particular types of development or particular development issues.

1.3 JURISDICTION

All provisions of this ordinance shall apply within the corporate limits of the Town of Wake Forest, North Carolina and within the town's extraterritorial jurisdiction, as identified on the Zoning Map of the Town of Wake Forest, except that property in the extraterritorial jurisdiction which is used for bona fide farm purposes is exempt from the requirements of this ordinance, pursuant to NCGS 160A-360(k). The Zoning Map is on file with the Town Clerk and with the Administrator of this ordinance. The map and its boundaries shall be incorporated and made a part of this ordinance.

1.4 PURPOSE AND INTENT

The regulations contained in this ordinance have been adopted in accordance with the Community Plan for the Town of Wake Forest, North Carolina, as adopted, in order to:

- Maintain the small town character and attractive appearance of the community while continuing to encourage growth.
- Promote a vibrant, revitalized downtown with a unique mix of land uses and historical character.
- Provide well planned infrastructure to serve the community in a more comprehensive, environmentally responsible, and timely manner.
- Encourage growth that pays for itself through efficient development patterns that support the sustainable fiscal management of municipal services.
- Create a balanced and efficient multi-modal transportation system
- Facilitate walking and biking in the community by providing a well-integrated network of streets, sidewalks, bikeways, walking trails, and greenway trails.
- Preserve valuable open space and the environmental quality of the community
- Expand the community's parks and recreation system
- Promote excellent educational opportunity and lifelong learning through neighborhood schools that serve as civic anchors to the diverse communities that surround them.
- Ensure that commercial development is balanced and compatible with surrounding neighborhoods, and provides enduring value to the community.
- Promote quality, walkable, mixed-use neighborhoods with a wide variety of housing types, including affordable housing.

- Support the continued development of the community as a destination for arts and culture, beginning with value placed upon the unique historic character of the town.
- Support the development of the community's business sector and strengthen the local tax base.
- Protect public safety.
- Encourage civic pride and community involvement and provide a means of meaningful cooperation between the community and town government.

1.5 CONSISTENCY WITH ALL ADOPTED PLANS AND POLICIES

In accordance with NCGS 160A-382-383 all development plans, subdivision master plans and rezonings shall be in conformance with all adopted plans and policies (including comprehensive plans, transportation plans, small area plans, open space and greenway plans, or any other plan adopted by the Wake Forest Board of Commissioners).

1.5.1 IMPLEMENTATION OF PLAN

This ordinance is intended to implement the vision statements, policies, and actions of the Community Plan for the Town of Wake Forest as adopted on September 15, 2009.

1.5.2 AMENDMENTS TO UDO AND COMMUNITY PLAN

A. The Unified Development Ordinance of Wake Forest, North Carolina also uses powers granted in other sections of the North Carolina General Statutes relating to particular types of development or particular development issues. Any amendments to or actions pursuant to this ordinance shall be consistent with the Community Plan.

B. The Community Plan for the Town of Wake Forest may be amended and this Unified Development Ordinance and the incorporated Zoning Map shall reflect those changes through appropriate amendments in accordance with Section 15.14.

1.5.3 ADOPTED SMALL AREA PLANS

All development plans shall be consistent with any adopted small area plans. Small area plans may contain any of the following elements:

- Multi-Modal Circulation Network (pedestrian, bicycle, automobile, and public transit networks)
- Green Infrastructure Network (floodplains, wetlands, lakes, streams, parks, squares, and other public open spaces)
- Location of sites reserved for Civic & Institutional buildings and uses
- General Massing and Development Intensity Pattern
- Specific Design Guidelines (in addition to those contained in this ordinance)

1.5.4 VARIATIONS TO ADOPTED PLANS

Specific alignments, locations, or areas of public facilities noted in any adopted plan may be varied on a site by site basis as requested by the developer or the Administrator, provided the integrity of the proposed network and connections, location, or area shown in the plan are maintained.

1.5.5 CONFLICTS WITH ADOPTED PLANS

In the event of a conflict or inconsistency between this ordinance and any adopted plans the requirements of this ordinance shall take precedence.

1.6 REQUIRED CONFORMANCE WITH THIS ORDINANCE

1.6.1 REQUIRED CONFORMANCE

No land or structure shall be used or occupied, and no structure or parts shall be constructed, erected, altered, or moved, unless in conformity with all of the regulations herein specified for the zoning district in which it is located subject to the provisions of Section 13.1.1. Every building erected, moved, or structurally altered shall be located on a lot conforming to the requirements of the district.

From and after the adoption of the UDO, no real property lying within the jurisdiction of the UDO shall be subdivided except in conformance with all applicable provisions of the UDO. In addition, after the effective date of the UDO, no plat for subdivision of land within the jurisdiction of the UDO shall be certified for recording by the Administrator, nor shall the Clerk of Superior Court order the recording of a plat until it has been submitted and approved in accordance with the provisions of the UDO.

1.6.2 CONFORMANCE TO SUBDIVISION STANDARDS AND REQUIRED IMPROVEMENTS UPON DEVELOPMENT

All existing lots of record, platted prior to the adoption of this ordinance and upon which no buildings have been erected, shall be grandfathered upon the date of adoption of this ordinance and shall not be subject to the new lot standards herein. However, buildings upon such lots shall be subject to standards in this ordinance including all related site improvements.

1.7 TRANSITIONAL PROVISIONS

The following transitional provisions shall apply to various activities, actions and other matters pending or occurring as of the effective date of this ordinance.

1.7.1 VIOLATIONS CONTINUE

Any violation of any previous ordinance of the Town of Wake Forest shall continue to be a violation under this ordinance and shall be subject to the penalties set forth at the time of the violation, unless the use, development, construction or other activity is clearly consistent with the express terms of this ordinance.

1.7.2 COMPLETION OF CURRENT DEVELOPMENT PLANS UNDER PREVIOUS ORDINANCES

A. Permit Issued: Any building or development for which a permit or plan approval was issued prior to the effective date of this ordinance or any amendment thereto, may be completed in conformance with the issued permit or plan approval and other applicable permits and conditions.

B. Application Filed

1. Any type of land development application which has been officially filed with the appropriate town official prior to the effective date of this ordinance or any amendment thereto, may continue to be processed under the land use rules and regulations in effect prior to said date.

2. The application approval process for such applications must be completed within one year of the filing date. Completion of the application approval process is considered to be the issuance of the appropriate town permit, certificate, or other designation sought under the land use rules and regulations in effect prior to the effective date of this ordinance.

3. If the application approval process is not completed within the specified time, then the application process may be completed only in strict compliance with the requirements of this ordinance.

4. The specified time may be extended at the discretion of the Administrator due to delays in approvals from agencies external to the Town of Wake Forest.

1.8 CONFLICT RESOLUTION AND INTERPRETATION

1.8.1 CONFLICT RESOLUTION AND INTERNAL CONSISTENCY

A. This ordinance is not intended to abrogate any other law, ordinance or regulation. However, whenever the requirements of this ordinance are at variance with the requirements of any other lawfully adopted rules, regulations or ordinances, the most restrictive or that imposing the higher standards shall govern.

B. Except as hereinafter provided, these regulations shall not be deemed to interfere with, abrogate, annul, or otherwise affect in any manner whatsoever any easement, covenants, or other agreements between parties.

C. In any event, wherever the requirements of this ordinance are in conflict with other requirements of laws of the United States or the State of North Carolina, or with lawfully adopted town rules, regulations, ordinances, and policies, or with development-imposed deed restrictions or covenants, the most restrictive, or that imposing the highest standards, shall govern.

D. In the event of a conflict or inconsistency between the text of this ordinance and any caption, figure, illustration or map contained herein, the text shall control.

E. This ordinance is not intended to abrogate any easement, covenant, or other private agreement. However, where the regulations of this ordinance are more restrictive or impose higher standards or requirements than such easement, covenant or other private agreement, then the requirements of this ordinance shall govern. Unless deed restrictions, covenants or other contracts directly involve the Town of Wake Forest as a party in interest, the town shall have no administrative responsibility for enforcing such deed restrictions or covenants.

F. Should the courts declare any section or provisions of this ordinance invalid, such decision shall not affect the validity of the ordinance as a whole or any part thereof, other than the part so declared to be invalid.

1.8.2 INTERPRETATION

In interpreting and applying these regulations, the requirements contained herein are declared to be the minimum requirements necessary to carry out the purpose of these regulations and are adopted for the promotion of the public health, safety, and general welfare.

1.9 EFFECTIVE DATE

All other provisions of this ordinance shall become effective July 16, 2013.

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2 DISTRICT PROVISIONS

2.1 OFFICIAL ZONING MAP

2.1.1 ZONING MAP

A. Zoning Districts: The boundaries of each zoning district are shown on a map entitled "Town of Wake Forest Official Zoning Map" which is hereby made a portion of this ordinance. The Official Zoning Map shall bear the adoption date of this ordinance and the signatures of the Mayor and Town Clerk.

B. Overlay Districts: Certain overlay districts such as the Special Highway Overlay District, the Watershed Protection Districts, etc., are hereby established and incorporated by reference. The spatial data for such overlay(s) shall be presented with the Official Zoning Map as appropriate.

C. Administration and Maintenance of Zoning Map: The Official Zoning Map shall be maintained in the Wake Forest Planning Department and a copy shall be kept on file with the Town Clerk. The Administrator shall separately maintain the digital files that comprise the map and record all map amendments in a separate metadata file.

2.1.2 INTERPRETATION OF BOUNDARIES

When uncertainty exists with respect to the boundaries or districts as shown on the Official Zoning Map, the following rules shall apply:

A. District boundary lines are generally intended to be along or parallel to property lines, lot lines, the center line of street, alleys, railroads, easements, other rights-of-way, and creeks, streams, or other water channels.

B. In the absence of specified distances on the map, dimensions or distances shall be determined by the scale of the Official Zoning Map.

C. Where the Zoning Map shows a district boundary dividing a lot, each part of the lot shall conform to the standards established by this ordinance for the land development or overlay district in which that part is located.

D. When the street or property layout existing on the ground is at variance with that shown on the Official Zoning Map, the Planning Board shall interpret the district boundaries of this ordinance in accordance with Section 14.4.

2.2 DISTRICT PROVISIONS

2.2.1 URBAN (FORM-BASED) DISTRICTS GENERAL OVERVIEW

A number of the key districts for the Town of Wake Forest are ordered and classified according to the Rural-Urban Transect. The Transect is a method of classifying the natural and built environments as a continuum of six conditions, ranging from rural to urban. The value of the Transect is that it classifies development form with the appropriate land use and development context. For example, a rural street typically has no curbs or sidewalks and its buildings are often irregularly spaced. An urban street, depending on the intensity of urbanism, may have curbs and gutters, regularly placed street trees, sidewalks, and building forms that are more regular in form and spacing. Each urban zoning category has detailed provisions for the mix of uses, building type, density, height, street design, the design of parks and open space, the mix of uses, building design, parking, streetscape and other aspects of the human environment.
In order to implement the intent of this ordinance, there are hereby created several base districts with the designations and general purposes listed under each and the specifically permitted uses, special uses, dimensional standards and permitted building types included. Each base district has a corresponding Conditional District designation which shall be administered in accordance with Section 2.6.

Natural & Rural Areas
The Transect begins with two areas that are rural in character: the Natural Area, which is made up of lands protected in perpetuity as natural, recreational or agricultural areas; and the Rural Area, which includes areas of high agricultural, scenic, or environmental value that should be protected.

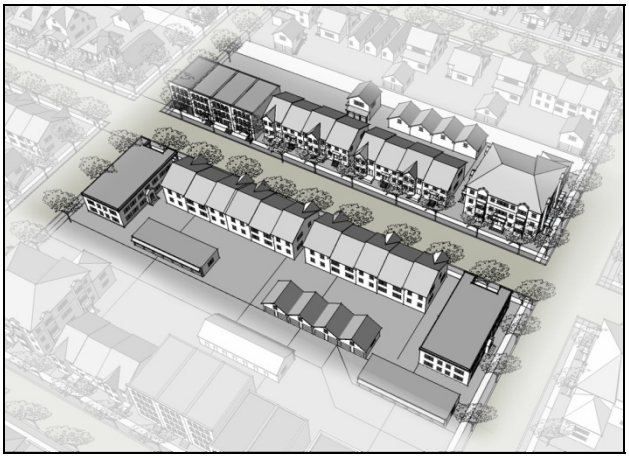
Suburban Area
The transition area between countryside and town is called the Suburban Area. This area consists primarily of single family homes. Although this area is primarily a residential area, it may have other development types, such as schools and other civic uses.

General Urban Area
General Urban development is primarily residential, but more urban in character, having a higher density with a mix of housing types and a greater mix of uses, including neighborhood-serving commercial uses.

Urban Center Area
At the more urban end of the spectrum is the Urban Center Area. This can be a small neighborhood center or a larger Village/Town center, the latter serving more than one neighborhood.

Urban Core Area
The Urban Core or Downtown serves not only adjacent neighborhoods, but the entire town and the region. While it is typically the central business district where the greatest mix of uses occurs, the historic character and location of Wake Forest's downtown is too small in size and scale to serve as a primary urban core area.

2.2.2 URBAN DISTRICT DESCRIPTIONS

BASE DISTRICT DESCRIPTION	
A. Urban Residential (UR) *Previous District(s): R10 & R8 in urban contexts* The Urban Residential District is established as a predominately residential district in which a variety of types of housing is permitted, including single-family and duplex residences, small apartment buildings and townhouses.	
B. Residential Mixed-Use (RMX) *Previous District(s): R5 & O-I in urban contexts, MF, RA-C* The Residential Mixed-Use District is established to accommodate a variety of housing types in a neighborhood setting. The regulations of this district are intended to provide areas of the community for those persons desiring small residences and multifamily structures in relatively high density neighborhoods within walking or biking distance from mixed-use centers as well as some limited commercial uses in pedestrian-scaled, residential-style structures.	
C. Neighborhood Mixed-Use (NMX) *Previous District(s): O-I & NB in urban contexts, RA-C* The Neighborhood Mixed-Use District is established as a pedestrian-scaled, mixed-use district which caters to the everyday needs of nearby neighborhoods, stressing accessibility by automobiles, bicycles, and pedestrians.	

BASE DISTRICT DESCRIPTION	
D. Renaissance Area Historic Core (RA-HC) The Historic Core of the Renaissance Area permits the sensitive continuation of the "Main Street" environment of White Street and its secondary streets. The ground floor of buildings on White Street should be comprised of active uses including retail or restaurants with office and residential located on second stories. Side streets east of White Street may have a greater variety of ground floor uses.	
E. Urban Mixed-Use (UMX) *Previous District(s): RA-UC* The Urban Mixed-Use District accommodates an active, pedestrian-friendly area of community-scale commercial, residential, office, and civic uses in both vertically mixed-use, as well as free-standing buildings. Retail should be placed at street level, with residential uses in rear or upper stories.	

2.2.3 TABLE OF URBAN DISTRICT DEVELOPMENT STANDARDS

Base Districts	UR	RMX	NMX RA-HC	UMX
A. BUILDING TYPE (Section 5.4 – 5.8)	Civic/Institutional Detached House Townhouse	Civic/Institutional Detached House Townhouse Apartment Commercial	Civic/Institutional Townhouse Apartment Commercial	Civic/Institutional Townhouse Apartment Commercial
B. PRIVATE FRONTAGE (Section 5.3)				
1. Common Lawn	Permitted	Permitted	Prohibited	Prohibited
2. Porch & Fence	Permitted	Permitted	Prohibited	Prohibited
3. Terrace or Light Court	Permitted	Permitted	Permitted	Permitted
4. Forecourt	Permitted	Permitted	Permitted	Permitted
5. Stoop	Permitted	Permitted	Permitted	Permitted
6. Shopfront/Awning	Prohibited	Permitted	Permitted	Permitted
7. Gallery	Prohibited	Prohibited	Permitted	Permitted
8. Arcade	Prohibited	Prohibited	Permitted	Permitted
C. DEVELOPMENT STANDARDS				
1. Max. Density *(Units/Acre)*	10 dua	24 dua	n/a	n/a
2. Open Space (min) per CH 7	5%	5%	2% for projects 5 acres or greater	2% for projects 5 acres or greater
3. Park Space (min) per CH 7	2%	2%	2% for projects 5 acres or greater	2% for projects 5 acres or greater
4. Maximum Development Size if not in TND	80 acres	40 acres	n/a	n/a
D. PRINCIPAL BUILDING				
1. Principal Front Setback	20 ft max.	18 ft max.	12 ft max (NMX) 5 ft max. (RA-HC)	6 ft max.
2. Street Side/Secondary Front Setback	5 ft min.	5 ft min.	12 ft max.	6 ft max.
3. Side (from adjacent lot) Setback*	5 ft min.	0 ft min.		
4. Rear Setback	20 ft min. OR 5ft min. w/ rear alley access	5 ft min.	0 ft min.	0 ft min.
5. Frontage Buildout	n/a	n/a	60%	70%
E. ACCESSORY STRUCTURE				
1. Side Setback*	5 ft min.	5 ft min. OR 0 ft for attached structures	5 ft min. OR 0 ft for attached structures	n/a
2. Rear Setback*	5 ft min.	5 ft min.	5 ft min.	n/a
3. Garage Setback from Alley	15 ft from face of garage to centerline of alley			
3. Other Standards	20 ft min. behind building frontage line		Rear Yard Only	
F. PARKING CONFIGURATION				
1. Parking Requirements	By Use - See Section 9.4			
2. Parking Location	By Building Type - See Section 9.3			
G. HEIGHT				
1. Min. Height	None	None	16 ft	2 stories
2. Max. Height	3 stories	6 Stories (May Exceed with an SUP)	6 Stories (May Exceed with an SUP) (3 Stories along White Street from Elm to Roosevelt)	6 Stories (May Exceed with an SUP)

** May be increased subject to building code standards*

2.2.4 RURAL AND SUBURBAN DISTRICTS

In order to maintain existing auto-oriented commercial and industrial areas, and conventionally developed residential subdivisions, there are hereby continued several base districts with the designations and general purposes listed under each and the specifically permitted uses, special uses, and dimensional standards included. It is expected that the expansion or enlargement of these districts will be minimal as more than sufficient area currently exists in accordance with the adopted Community Plan for such single-use categories. Each base district has a corresponding Conditional District designation which shall be administered in accordance with Section 2.6.

BASE DISTRICT	DESCRIPTION
A. Open Space District (OS)	The Open Space District is established to preserve and protect environmentally sensitive lands (e.g. floodways, wetlands) and properties that are already under public ownership and/or otherwise restricted for use for passive or active recreational use.
B. Rural Holding District (RD) *Previous District(s): RD*	The Rural Holding District is established as a district in which the principal uses of the land are restricted due to lack of available utilities, unsuitable soil types or steep slopes.
C. General Residential (GR3, GR5, GR10) *Previous District(s): R20, R15, R10, R5, MF, O-I* *R-20 & R-15 convert to GR3* *R-10 converts to GR5* *R-5, MF & O-I convert to GR10 where applicable*	The General Residential Districts are established to maintain previously developed suburban residential subdivisions for their existing or approved low-to-medium density single-family dwellings and related recreational, religious and educational facilities. Intended to act as a transitional zoning district between rural development in the county and the urban development of the town, these regulations are further intended to discourage any use which would be detrimental to the predominately residential nature of the areas included within the district.
D. Neighborhood Business (NB) *Previous District(s): NB, O-I*	The Neighborhood Business District is established as a district in which the principle use of land is for retail trade and services purposes of a lower intensity than the Highway Business (HB) District. Such districts are generally located near residential areas and cater to the everyday needs of nearby residential neighborhoods, stressing accessibility by automobiles, bicycles, and pedestrians.
E. Highway Business (HB) *Previous District(s): HB*	The Highway Business District is generally located on the major thoroughfares in town and provides opportunities for the provision of offices, services and retail goods. The regulations for this district are intended to accommodate the predominately auto-oriented pattern of existing development while encouraging the creation of new pedestrian-friendly, mixed-use areas that avoid strip commercial development and establish more resilient land development patterns.
F. Institutional Campus Development (ICD) *Previous District(s): ICD*	This district is intended to allow for the continued and future use, expansion, and new development of academic and religious campuses and of governmental and health facilities, where the campus or facility has a total development size greater than 10 acres. The goal is to promote the many varied uses associated with such institutions while maintaining the overall design integrity of the campus setting and minimizing any adverse impacts on the neighboring residential and historic areas. In the attempt to meet this goal numerous requirements are included, such as but not limited to buffers, landscaping, outdoor lighting, parking, signage, building height, setbacks, and the like.
G. Light Industrial (LI) *Previous District(s): I*	The Light Industrial District is established to accommodate externally benign industrial and office uses that pose little nuisance to adjacent residential or mixed-use areas.
H. Heavy Industrial (HI)	The Heavy Industrial District is established to accommodate those industrial, manufacturing, or large-scale utility operations that are known to pose levels of noise, vibration, odor, or truck traffic that are considered nuisances to surrounding development.

2.2.5 TABLE OF RURAL AND SUBURBAN DISTRICT DEVELOPMENT STANDARDS

Standard	Rural Holding District (RD)	General Residential (GR3, GR5, GR10)	Neighborhood Business (NB)	Highway Business (HB)	Institutional Campus Development (ICD)	Light Industrial (LI)	Heavy Industrial (HI)
A. DEVELOPMENT STANDARDS							
1. District/Development Area (min)	n/a	n/a	n/a	n/a	10 acres	10 acres	20 acres
2. Development/District Exterior Setback/Buffer	n/a	n/a	n/a	n/a	30 ft Setback from exterior streets and 20 ft from surrounding parcels	50 ft Buffer (Note: Along frontage of existing streets a 50 ft setback shall apply)	150 ft Buffer
3. Density (max)***	1 unit per acre	GR3: 3 units/acre GR5: 5 units/acre GR10: 10 units/acre	n/a	n/a	determined by adopted master plan	n/a	n/a
4. Open Space (min) per CH 7	10%	10%	n/a	n/a	25%	n/a	n/a
5. Park Space (min) per CH 7	2.5%	2.5%	n/a	n/a	n/a	n/a	n/a
6. Building Floor Area (Max)	n/a	n/a	50,000 sf	100,000 sf (may exceed max with SUP)	n/a	n/a	n/a
7. Development Floor Area (Max)	n/a	n/a	125,000 sf	n/a	n/a	n/a	n/a
B. LOT STANDARDS							
1. Lot Area (min)*	40,000 sq ft	GR3: 10,000 sq ft GR5: 7,500 sq ft GR10: 5,000 sq ft	None except max. 15 acres for Shopping Centers	20,000 sf	n/a	40,000 sf (interior lots only)	5 acres (interior lots only)
2. Lot Width at Front Setback (min)*	60 ft	50 ft	none	150 ft	n/a	n/a	n/a
C. PRINCIPAL BUILDING							
1. Principal Front Setback (min)**	20 ft	20 ft	20 ft	30 ft	n/a	30 ft	n/a
2. Street Side/Secondary Front Setback (min)**	20 ft	20 ft	20 ft	30 ft	n/a	30 ft	n/a
3. Side (from adjacent lot) Setback (min)*	10 ft	8 ft	15 ft	10 ft	n/a	15 ft	n/a
4. Rear Setback (min)	25 ft	25 ft	20 ft	30 ft	n/a	20 ft	n/a
D. ACCESSORY STRUCTURE							
1. Side Setback (min)	10 ft	10 ft	10 ft	10 ft	10 ft	10 ft	10 ft
2. Rear Setback (min)	10 ft	10 ft	10 ft	10 ft	10 ft	10 ft	10 ft
3. Other Standards	See Section 4.6	See Section 4.6	See Section 4.6	See Section 4.6	See Section 4.6	See Section 4.6	See Section 4.6
E. PARKING CONFIGURATION							
1. Parking Location	By Building Type - See Section 9.3						
2. Specific Restrictions	n/a	n/a	Parking in Front Yard setback not permitted	Parking in first 10 ft of Front Yard setback not permitted	Parking in Exterior setback not permitted except as part of an approved CD plan	Parking in Front Yard & Exterior setback not permitted	Parking in Exterior setback not permitted
F. BUILDING HEIGHT							
1. Principal Building (max)	35 ft	3 stories	3 stories	3 stories	35 ft	35 ft	35 ft
2. Accessory Structure (max)	35 ft	2 stories	2 stories	2 stories	35 ft	35 ft	35 ft
3. Additional Height Permitted w/Additional Setback (Subject to SUP)	n/a	n/a	n/a	90 ft height permitted in US-1 Corridor Area	1 ft additional height permitted with each 1 ft horizontal setback	n/a	n/a

** For townhomes this standard applies to the entire townhome development, not individual townhome lots. Different requirements may apply if located in a Special Highway Overlay District.*

*** Different requirements may apply if located in a Special Highway Overlay District.*

**** Subject to the provisions of the Watershed Protection Overlay Districts (where applicable).*

2.3 USES PERMITTED

2.3.1 USE CATEGORIES

All uses permitted in the UDO have been divided into 10 categories, defined as follows:

A. Residential: Premises available for long-term human habitation by means of ownership and rental, excluding short-term leasing or rental of less than 1 month.

B. Lodging: Premises available for short-term human habitation, including daily and weekly rental.

C. Office/Service: Premises available for the transaction of general business and the provision of services, but excluding retail sales and manufacturing, except as a minority component.

D. Commercial/Entertainment: Premises available for the commercial sale of merchandise, prepared foods, and food and drink consumption, but excluding manufacturing.

E. Civic: Premises available for organizations dedicated to religion, government, arts and culture, recreation and sports, and other similar areas of public assembly.

F. Educational/Institutional: Uses and premises dedicated to education, social service, health care, and other similar functions.

G. Automotive: Uses and premises accessed predominately by or dedicated to the sale, maintenance, servicing and/or storage of automobiles or similar vehicles.

H. Industry/Wholesale/Storage: Premises available for the creation, assemblage, storage, and repair of items including their wholesale or retail sale.

I. Agricultural: Premises for growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch or their natural habitat and all related functions.

J. Infrastructure: Uses and structures dedicated to transportation, communication, information, and utilities.

2.3.2 INTERPRETATION OF USE MATRICES

A. Permitted/Prohibited Uses: Uses not listed as permitted (P); permitted with additional supplemental standards (PS); or requiring a special use permit (SUP) are presumed to be prohibited (-) from the applicable zoning district.

B. Uses Not Listed: In the event that a particular use is not listed in the Use Matrix, and such use is not listed as a prohibited use and is not otherwise prohibited by law, the Administrator shall determine whether a materially similar use exists in this chapter. Should the Administrator determine that a materially similar use does exist, the regulations governing that use shall apply to the particular use not listed and the Administrator's decision shall be recorded in writing. Should the Administrator determine that a materially similar use does not exist, this chapter may be amended to establish a specific listing for the use in question.

C. Materially Similar Uses: The Administrator may determine that a use is materially similar if a permitted use is similarly classified by one or more of the following use classification systems:

1. American Planning Association Land-Based Classification Standards (LBCS)
2. North American Industrial Classification System (NAICS)
3. Institute of Transportation Engineers (ITS) Trip Generation Guide

2.3.3 USE TABLE

Uses listed as (P) or (PS) which require an Enhanced Transportation Impact Analysis (according to Section 6.11.1), and all residential developments over 100 units, are subject to the Major Site Plan Review Process established in Section 15.8.2. See Appendix A – Typical Development Review Process Chart for more information regarding how the development process will be administered according to the use allowances established below.

	RURAL		SUBURBAN								URBAN				
USE TYPES	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
A. RESIDENTIAL	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Dwelling-Single Family	–	P	P	P	P	–	–	P	–	–	P	P	–	–	–
Dwelling-Duplex	–	–	–	P	P	–	–	P	–	–	P	P	–	–	–
Dwelling-Multifamily	–	–	–	–	P	–	–	P	–	–	PS	P	P	P	P
Dwelling-Accessory	–	PS	PS	PS	PS	–	–	PS	–	–	PS	PS	PS	PS	PS
Family Care Home (6 or fewer residents)	–	PS	–	PS	PS	PS	–	PS	–	–	PS	PS	PS	PS	PS
Live-Work Units	–	–	–	–	PS	P	P	PS	–	–	PS	PS	PS	P	P
Manufactured Housing – Class A	–	PS	–	PS	PS	–	–	–	–	–	SUP	–	–	–	–
Manufactured Housing – Class B & C	–	SUP	–	SUP	SUP	–	–	–	–	–	–	–	–	–	–
Manufactured Home Park	–	SUP	–	–	–	–	–	–	–	–	–	–	–	–	–
Residential Care Facilities (More than 6 Residents)	–	–	PS	PS	PS	PS	PS	PS	–	–	PS	PS	PS	PS	PS
B. LODGING	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Bed and Breakfast Homes (Up to 8 Rooms)	–	SUP	SUP	SUP	–	–	–	PS	–	–	SUP	PS	PS	PS	PS
Boarding or Rooming House (12 or less persons)	–	–	PS	PS	–	PS	PS	PS	–	–	PS	PS	PS	PS	PS
Dormitory	–	–	–	–	–	–	–	P	–	–	–	–	–	–	–
Hotel/Inn (Less than 20 Rooms)	–	–	–	–	SUP	P	P	P	–	–	–	P	P	P	P
Hotel/Inn (No Room Limit)	–	–	–	–	–	P	P	P	–	–	–	–	P	P	P
C. OFFICE/SERVICE	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
ATM	–	–	–	–	–	P	P	P	P	P	–	P	P	P	P
Banks, Credit Unions, Financial Services	–	–	–	–	–	P	P	P	–	–	–	P	P	P	P
Business Support Services	–	–	–	–	–	P	P	P	P	–	–	P	P	P	P
Dry Cleaning & Laundry Services	–	–	–	–	–	P	P	P	–	–	–	P	P	P	P
Funeral Homes/Crematoria	–	P	–	–	–	P	P	–	–	–	–	P	P	P	P
Home Occupation	–	PS	PS	PS	PS	P	P	P	–	–	PS	PS	P	P	P
Medical Clinic	–	–	–	–	–	P	P	P	–	–	–	P	P	P	P
Personal Services	–	–	–	–	–	P	P	P	–	–	–	P	P	P	P
Personal Services, Restricted	–	–	–	–	–	–	P	–	–	–	–	–	–	–	–
Post Office	–	–	–	–	–	P	P	P	–	–	–	P	P	P	P
Professional Services	–	–	–	–	–	P	P	P	–	–	–	P	P	P	P
Small Equipment Repair/Rental	–	–	–	–	–	P	P	–	P	P	–	–	P	P	P
Veterinary Services	–	–	–	–	–	P	P	P	P	P	–	PS	PS	PS	PS
D. COMMERCIAL/ENTERTAINMENT	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Adult Establishment	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alcoholic Beverage Sales Store	–	–	–	–	–	P	P	–	–	–	–	P	P	P	P
Amusements, Indoor	–	–	–	–	–	P	P	–	P	–	–	–	P	P	P

	RURAL		SUBURBAN								URBAN				
USE TYPES	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Amusements, Outdoor	–	–	–	–	–	–	P	–	P	–	–	–	–	–	–
Bar/Tavern	–	–	–	–	–	P	P	–	–	–	–	–	P	P	P
General Commercial	–	–	–	–	–	PS	P	P	–	–	–	PS	P	P	P
General Commercial – Use Greater than 100,000 sf	–	–	–	–	–	–	SUP	–	–	–	–	–	–	–	–
Internet Sweepstakes Facilities	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Night Club	–	–	–	–	–	P	P	–	–	–	–	–	P	P	P
Open Air Retail	–	–	–	–	–	P	P	SUP	–	–	–	PS	PS	PS	PS
Outside or Display Sales	–	–	–	–	–	PS	P	PS	–	–	–	PS	PS	PS	PS
Pawnshops	–	–	–	–	–	P	P	–	–	–	–	–	P	P	P
Racetrack	–	–	–	–	–	–	–	–	P	P	–	–	–	–	–
Restaurant	–	–	–	–	–	P	P	P	–	–	–	P	P	P	P
Riding Stables	–	P	P	–	–	–	–	–	–	–	–	–	–	–	–
Shooting Range, Outdoor	–	SUP	–	–	–	–	–	–	SUP	SUP	–	–	–	–	–
Theater, Indoor Movie or Live Performance	–	–	–	–	–	P	P	P	–	–	–	–	P	P	P
Theater, Outdoor	–	–	–	–	–	–	P	P	–	–	–	–	PS	PS	PS

E. CIVIC	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Cemetery	PS	PS	PS	PS	PS	PS	PS	PS	–	–	PS	PS	PS	PS	PS
Civic Meeting Facilities	–	P	–	–	–	P	P	P	–	–	P	P	P	P	P
Community or Cultural Facility	–	P	P	P	P	P	P	P	–	–	P	P	P	P	P
Conference/Convention Center	–	P	–	–	–	–	P	P	–	–	–	–	–	–	P
Public Safety Station	–	SUP	SUP	SUP	SUP	P	P	P	P	P	P	P	P	P	P
Recreation Facilities, Indoor	–	P	P	P	P	P	P	P	–	–	P	P	P	P	P
Recreation Facilities, Outdoor	P	P	P	P	P	P	P	P	–	–	P	P	P	P	P
Religious Institution	–	P	P	P	P	P	P	P	–	–	P	PS	PS	PS	PS
Sports Arena/Stadium	–	–	–	–	–	–	SUP	SUP	P	–	–	–	–	–	SUP

F. EDUCATIONAL/INSTITUTIONAL	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Child/Adult Day Care Home (8 or less persons)	–	P	P	P	P	P	P	P	–	–	P	P	P	P	P
Child/Adult Day Care Center (More than 8 persons)	–	PS	–	–	–	PS	PS	PS	–	–	–	PS	PS	PS	PS
College/University	–	–	–	–	–	–	–	P	–	–	–	–	–	–	–
Community Support Facility	–	PS	PS	PS	PS	PS	P	P	–	–	PS	PS	PS	PS	SUP
Correctional Institution	–	–	–	–	–	–	–	–	SUP	SUP	–	–	–	–	–
Halfway Homes	–	–	–	–	–	SUP	–	–	–	–	–	SUP	–	SUP	–
Hospital	–	–	–	–	–	–	P	P	P	–	–	–	–	–	–
Schools – Elementary & Secondary	–	PS	PS	PS	PS	PS	PS	PS	–	–	PS	PS	PS	PS	PS
Schools – Vocational/Technical	–	–	–	–	–	–	–	P	–	–	–	P	P	P	P
Studio – Art, dance, martial arts, music	–	–	–	–	–	P	P	P	P	–	–	P	P	P	P

G. AUTOMOTIVE	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Drive-Thru/Drive-In Facility	–	–	–	–	–	PS	P	–	–	–	–	–	SUP	SUP	SUP
Gas/Fueling Station	–	–	–	–	–	PS	P	–	–	–	–	–	–	PS	PS
Heavy Equipment/Manufactured Home Rental/Sales	–	–	–	–	–	P	P	–	P	–	–	–	–	–	–
Parking Lot/Structure – Principal Use	–	–	–	–	–	P	P	P	P	P	–	P	P	P	P
Theater, Drive-In	–	–	–	–	–	–	P	–	P	–	–	–	–	–	–
Vehicle Rental/Leasing/Sales	–	–	–	–	–	P	P	–	P	–	–	–	–	PS	PS
Vehicle Rental – Moving Trucks	–	–	–	–	–	P	P	–	–	–	–	PS	PS	PS	PS

	RURAL		SUBURBAN								URBAN				
USE TYPES	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Vehicle Services – Minor Maintenance/Repair	–	–	–	–	–	PS	P	–	P	P	–	–	–	PS	PS
Vehicle Services – Major Repair/Body Work	–	–	–	–	–	–	P	–	P	P	–	–	–	–	–

H. INDUSTRY/WHOLESALE/STORAGE	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Industry, Light	–	–	–	–	–	–	PS	–	PS	PS	–	–	–	–	–
Industry, Heavy	–	–	–	–	–	–	–	–	–	PS	–	–	–	–	–
Landfill	–	–	–	–	–	–	–	–	–	SUP	–	–	–	–	–
Light Manufacturing Workshops	–	–	–	–	–	P	P	–	P	P	–	P	P	P	P
Materials Recovery & Waste Transfer Facilities	–	–	–	–	–	–	–	–	SUP	PS	–	–	–	–	–
Recycling Collection Stations	–	–	–	–	–	PS	PS	PS	PS	PS	–	–	–	–	–
Storage - Outdoor Storage Yard	–	–	–	–	–	–	P	–	P	P	–	–	–	–	–
Storage – Self-Service	–	–	–	–	–	PS	PS	–	P	P	–	–	–	–	–
Storage – Warehouse, Indoor Storage	–	–	–	–	–	–	–	–	P	P	–	–	–	–	–
Wholesaling and Distribution	–	–	–	–	–	–	–	–	P	P	–	–	–	–	–

I. AGRICULTURE	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Animal Production	–	SUP	SUP	–	–	–	–	–	–	–	–	–	–	–	–
Backyard Pens/Coops	–	P	PS	PS	PS	PS	PS	PS	–	–	PS	PS	PS	PS	PS
Nurseries & Garden Centers	P	P	P	P	–	–	–	P	–	–	–	–	–	–	–
Gardens (Community and Private)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Kennels, Outdoor	–	SUP	–	–	–	–	PS	–	P	P	–	–	–	–	–
Produce Stands	–	PS	PS	PS	PS	PS	PS	PS	–	–	PS	PS	PS	PS	PS
Swine Farms	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

J. INFRASTRUCTURE	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Airstrip	–	SUP	SUP	–	–	–	–	–	SUP	SUP	–	–	–	–	–
Wireless Telecommunications Tower	–	SUP	SUP	SUP	SUP	SUP	SUP	SUP	SUP	SUP	SUP	SUP	SUP	SUP	SUP
Wireless Telecommunications Facility (Non-Tower)	–	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
Utilities – Class 1	–	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Utilities – Class 2	–	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Utilities – Class 3	–	–	–	–	–	–	–	–	P	P	–	–	–	–	–

K. OTHER	OS	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC	NMX	UMX
Temporary Uses	See Section 4.7 for Specific Provisions														

2.4 OVERLAY DISTRICTS

For purposes of managing certain environmentally sensitive or visually important geographic areas, certain overlay districts have been established to impose design, use, or other standards in addition to the requirements of the underlying base district.

2.4.1 OVERLAY DISTRICT DESCRIPTIONS

OVERLAY DISTRICT	DESCRIPTION
A. Local Historic District and Landmarks Overlay (HL-O)	In order to establish a process in designated historic districts for the review of development applications and the maintenance of historic features in the community, the Local Historic District and Landmarks Overlay District is hereby created.
B. Special Highway Overlay (SH-O)	This district is established to protect and to preserve the natural scenic beauty along major access corridors located in the Town of Wake Forest's zoning jurisdiction; and, to protect the carrying capacity of these major thoroughfares by reducing the hazards arising from unnecessary points of ingress and egress and cluttered roadside development; and, to reduce the costs of future highway expansions by requiring buildings and structures to be sufficiently set back from future rights-of-way to provide adequate storage for vehicles until they can safely enter the highway. It is the intent of this district to ensure that development occurring in the special highway overlay district shall be in harmony with and shall preserve the natural beauty and character of the existing landscape as well as be consistent with the adopted corridor plans for US 1 and the NC-98/Dr. Calvin Jones Highway Bypass accordingly.
C. Required Shopfront (SF)	In order to implement vibrant, pedestrian-friendly areas in Form-based Districts, the Required Shopfront Overlay District has been created to ensure that the ground floor of buildings in designated blocks are designed using either Shopfront & Awning, Gallery, or Arcade private frontage.
D. Falls Lake Watershed Protection Overlay (FL-CA & FL-WMA) *Previous District(s): R-40W*	The Falls Lake Watershed Protection regulations are established as an overlay district to preserve water quality in the Falls Lake water supply watershed in order to provide safe drinking water. The intent of this district is to establish regulations which ensure the availability of public water supplies at an acceptable level of water quality for present and future residents. Two districts are hereby created: The Falls Lake-Critical Area (FL-CA) and the Falls Lake-Watershed Management Area (FL-WMA).
E. Richland Creek Watershed Protection Overlay (RC-CA & RC-WMA)	The Richland Creek Watershed Protection regulations are established as an overlay district to preserve water quality in the Richland Creek water supply watershed in order to provide safe drinking water. The intent of this district is to establish regulations which ensure the availability of public water supplies at an acceptable level of water quality for present and future residents. Two districts are hereby created: The Richland Creek-Critical Area (FL-CA) and the Richland Creek -Watershed Management Area (FL-WMA).
F. Smith Creek Watershed Protection Overlay (SC-CA) *Previous District(s): R-80W*	The Smith Creek Watershed Protection regulations are established as an overlay district to preserve water quality in the Smith Creek/Wake Forest Reservoir water supply watershed in order to provide safe drinking water. The intent of this district is to establish regulations which ensure the availability of public water supplies at an acceptable level of water quality for present and future residents.

2.4.2 HISTORIC DISTRICT AND LANDMARKS OVERLAY (HL-O) DISTRICT

A. Purpose: The Historic District and Landmarks Overlay District (HL-O) is a zoning overlay district established pursuant to NCGS §160A-400 and created with the purpose of implementing additional protections and controls on properties and structures located within locally designated Historic Districts as well as to individual Historic Landmarks.

B. Applicability: All locally designated Historic Districts and Historic Landmarks shall be a part of the Historic District and Landmarks Overlay District.

C. Procedures:

- Designation of Historic Landmarks/Districts – 15.11.1
- Certificates of Appropriateness-Minor – 15.11.2
- Certificates of Appropriateness-Major – 15.11.3

D. Certificate of Appropriateness

1. **COA Required:** No exterior feature of any building or other structure in an HL-O (including masonry walls, fences, light fixtures, utility structures, steps, pavement, signs, landscape and color or other appurtenant features), shall be erected, altered, restored, moved or demolished until after an application for a Certificate of Appropriateness has been submitted to and approved by the Historic Preservation Commission. A Certificate of Appropriateness is required to be issued by the Commission prior to the issuance of a building permit or other permit granted for the purposes of constructing, altering, moving or demolishing structures. Any building permit or such other permit not issued in conformity with this section shall be invalid. A Certificate of Appropriateness shall be required whether or not a building or other permit is required. The Town of Wake Forest and other public entities shall be required to obtain a Certificate of Appropriateness prior to any changes in the character of public facilities, utilities, or public buildings.

2. **COA Conditions of Approval:** In approving a Certificate of Appropriateness, the Commission may attach reasonable conditions necessary to carry out the purposes of this ordinance.

3. **Exterior Features:** For purposes of this ordinance, "exterior features" shall include the architectural style, general design, and general arrangement of the exterior of a building or other structure, including the kind and texture of the building material, the size and scale of the building or other structure, and the type and style of all windows, doors, light fixtures, signs, and other appurtenant fixtures, as well as historic signs, significant landscape, archaeological and natural features of the area, and shall apply to all sides of any such structures that can be seen from any adjacent street (excluding rear lanes or alleys) or public park. In the case of outdoor advertising signs, exterior features" shall mean the style, material, size, and location of all such signs.

4. **Limitation on Review of Interior Features:** Notwithstanding this ordinance, jurisdiction of the Commission over interior spaces shall be limited to specific interior features of architectural, artistic, or historical significant in publicly owned landmarks, and of privately owned historic landmarks for which consent for interior review has been given by the owner. If an owner's consent for interior review has been filed in the office of the Wake County Register of Deeds and indexed according to the name of the owner of the property in the grantee and grantor indexes, such consent shall bind future owners and/or

successors in title. The ordinance establishing the historic designation shall specify the interior features to be reviewed and the specific nature of the Commission's jurisdiction over those features.

5. **Normal Maintenance and Repair/Certain Changes Not Prohibited:** Nothing in this ordinance shall be construed to prevent the ordinary maintenance or repair of any exterior architectural feature of a historic landmark or property located within a district that does not involve a change in design, material, or outer appearance thereof. Nor shall this ordinance be construed to prevent the construction, reconstruction, alteration, restoration, moving, or demolition of any such feature when a building inspector or similar official certifies to the Commission that such action is required for the public safety because of an unsafe or dangerous condition. Nothing herein shall be construed to prevent a property owner from making any use of their property not prohibited by other statutes, ordinances, or regulations. Nothing in this ordinance shall be construed to prevent the maintenance of or, in the event of an emergency, immediate restoration of any existing above-ground utility structure without approval by the Commission.

6. **Use of Design Guidelines:** The Commission shall adopt, utilize, and amend, as needed, guidelines, not inconsistent with Part 3B Article 19 of Chapter 160A of the N. C. General Statutes and the US Secretary of the Interior's Standards for Rehabilitation for altering, restoring, moving, or demolition of property designated as historic. It is the intention of these guidelines to ensure, insofar as possible, that changes in designated landmarks or properties located within designated districts shall be in harmony with the reasons for designation.

7. **Administrative Approval for Minor Works Allowed:** The Commission staff may issue a Certificate of Appropriateness for minor works as listed in the Commission's Design Guidelines or as otherwise directed by the Commission. Minor works shall include and are defined as those exterior changes that do not involve substantial alterations, additions, or removals that could impair the integrity of the property and/or district as a whole. No application for a minor works Certificate of Appropriateness may be denied without formal action by the Commission.

8. **Delay in Demolition of Designated Properties:** Any application for a Certificate of Appropriateness authorizing the relocation, demolition, or destruction of a building or structure within a HL-O may not be denied. However, the effective date of such a Certificate of Appropriateness may be delayed for a period of up to 365 days from the date of approval of the Certificate of Appropriateness. The Commission may reduce the period of delay where it finds that the owner would suffer extreme hardship or be permanently deprived of all beneficial use of or return from such property by virtue of the delay. During such period the Historic Preservation Commission may negotiate with the property owner and any other parties in an effort to find a means of preserving the building, structure or site.

9. **Properties of Statewide Significance:** The Commission may deny an application for a Certificate of Appropriateness authorizing the demolition or destruction of a building, site, or structure determined by the State Historic Preservation Office to have statewide significance, as defined in the criteria of the National Register of Historic Places, unless the Commission finds that the owner would suffer extreme hardship or be permanently deprived of all beneficial use or return by virtue of the denial.

E. Demolition by Neglect: Demolition by neglect of any designated historic landmark or property located within a district shall constitute a violation of this ordinance. For the purposes of this ordinance "demolition by neglect" shall generally mean the failure to properly maintain a structure, whether intentionally or not, such that it falls into such disrepair that it may become uninhabitable. The local governing body may take appropriate actions to prevent demolition by neglect, as outlined in Section 16.2.8, provided such actions include appropriate safeguards to protect the property owner from undue economic hardship.

F. Permitted Uses: All uses permitted in the applicable land development district underlying a historic overlay district are permitted in the HL-O.

2.4.3 SPECIAL HIGHWAY OVERLAY (SH1-O AND SH2-O)

A. Applicability: The Special Highway Overlay Districts shall apply to all properties located on either side of a major access corridor (as noted below) beginning at the centerline of the existing right-of-way. The depth of the district is 1,000 feet and shall follow identifiable boundaries whenever possible measured on either side of the right-of-way of the major access corridor. All such locations shall be noted on the official zoning map.

- Highway US-1 (SH1-O)
- Dr. Calvin Jones Highway (SH2-O)

B. Exceptions to Location: Exceptions to the district depth and location can be applied:

- Where identifiable conditions exist to screen the visibility of motorists, or
- At an intersection targeted for shopping center development.

C. Landscaping and Buffering: It is the intent of this section that the frontage along the designated thoroughfares to the extent practical be left in an undisturbed or enhanced state of vegetation, and that sufficient areas of natural buffer remain so that the proposed use will be visually in harmony with the natural wooded character of the area. Removing or denuding of natural forest vegetation along major access corridors is strongly discouraged; however, it is understood that conditions may exist as stated in Section 2.4.3.F-G, which may warrant removing of natural forest vegetation. (Exemption: Existing lots of record that are developed for single-family detached or duplex dwelling units)

Yard Type/Lot Condition in the SH-O Districts	Required Yard to Preserve Natural Vegetation or its Planted Equivalent (Measured Perpendicular to the Right-of-way)	Supplement Plantings if Limited or No Vegetation Exists in SH-O Yard
Frontage of the existing or proposed right-of-way	50 ft	5 trees per 50 feet of SH-O yard
Frontage of the existing or proposed right-of-way of any access/frontage road adjacent to any major access corridor	30 ft	3 trees per 50 feet of SH-O yard
Street frontages of streets that intersect with a major access corridor for a distance of 200 feet	30 ft	3 trees per 50 feet of SH-O yard
Those portions of front, rear or side yards that are not adjacent to a major access corridor or not part of the 50 foot SH-O yard and are not devoted to the uses, buildings and structures of a permitted use	Preservation of all existing vegetation	See Section 8.3

D. Dimensional Requirements:

1. **Yards Abutting Major Access Corridor:** 100 feet (Off-Street Parking shall be setback a minimum of 50 feet)
2. **Minimum Lot Size:** 80,000 square feet for non-residential development. Residential development lot size shall comply with underlying zoning district.
3. **Mean Lot Width:** 200 feet

E. Maximum Number of Driveways:

1. One combined entrance and exit shall be permitted for each lot with frontage along a major access corridor;
2. For lots with 500 feet or more of frontage along a major access corridor 2 combined entrances and exits shall be permitted;
3. For lots with frontage on an access/frontage road adjacent to a major access corridor, the number of entrances shall be determined as provided in Section 9.8 of this ordinance.

F. Modification of Standards (Minor): The administrator, in reviewing a development application, may adjust specific SH-O yards and setback requirements for yards adjacent to the major access corridor or intersecting streets provided the average depth of a required yard or setback for the entire parcel is maintained. In permitting site-specific variations the Administrator shall find that the requested modification:

1. Is consistent with the overall purpose and intent of these requirements;
2. Is necessitated by the configuration and/or topography of the land, which makes it impractical to comply with the yard and setback requirements of this section for specific areas of the parcel;
3. Does not reduce the required yard or setback by more than 50%.

G. Modification of Standards (Major): The Board of Commissioners, in reviewing a development application, may adjust (either reduce or increase) minimum SH-O yards and setback requirements for yards adjacent to the major access corridor or intersecting streets upon making a finding that the proposed adjustment of those requirements:

1. Is consistent with the overall purpose and intent of these requirements;
2. Is necessitated by the configuration and/or topography of the land, which makes it impractical to comply with the yard and setback requirements of this section;
3. Is no greater than is necessary to allow for reasonable development of the tract;
4. Will not adversely affect the value of adjoining or abutting property, or that the use is a public necessity; and
5. Is necessitated to preserve existing natural vegetation considered to be a landmark or in an advanced stage of growth, removal of which would visually affect the natural wooded character of the area.

H. Expansions and Changes of Use: For properties which have expansions or additions which singularly or collectively exceed 25% of the gross floor area and/floor surface area, or change use which requires additional off-street parking made after application of this section, the SH-O yard requirements are as follows:

1. Where adjacent to a major access corridor, provide SH-O yard of 25 feet of natural vegetation or planted equivalent. Screening shall be provided at a rate of 3 trees per 50 linear feet of SH-O yard.
2. Where adjacent to a street intersecting a major access corridor, provide a SH-O yard of 15 feet of natural vegetation or planted equivalent. Screening shall be provided at a rate of 2 trees per 50 linear feet of SH-O yard.

2.4.4 REQUIRED SHOPFRONT (SF)

A. Intent: While retail/restaurant uses are not required uses, the intent of the Required Shopfront Overlay is to provide a building frontage that would not preclude those uses at some point in the future through the depth of the first and second layer.

B. Permitted Frontages: If a block face is designated on the Zoning Map as "Required Shopfront," then all new development along that designated street frontage must provide one of the following Private Frontages (per Section 5.3) at sidewalk level along the entire length of the frontage:

1. Shopfront & Awning,
2. Gallery, or
3. Arcade.

2.4.5 WATER SUPPLY WATERSHED PROTECTION OVERLAY DISTRICTS

Development standards for state designated water supply watershed protection areas apply within the following districts as outlined in Section 12.6.

A. FL-CA (Falls Lake Critical Area) District;

B. FL-WMA (Falls Lake Watershed Management Area) District;

C. RC-CA (Richland Creek Critical Area) District;

D. RC-WMA (Richland Creek Watershed Management Area) District; and

E. SC-CA (Smith Creek Critical Area) District.

2.5 FLOATING OVERLAY DISTRICTS

The floating overlay districts are included as tools for development regulation that will encourage integrated mixed-use development as the town continues to grow and expand. The intent of the floating overlay districts is to allow more flexibility for these types of development in certain instances without requiring a standard legislative rezoning process. Instead, administrative (by-right) and/or quasi-judicial processes are established to allow development to proceed under the regulations outlined for each floating overlay district. When a floating overlay district is applied, the requirements for the floating overlay district shall supersede any conflicting requirements of the base district. All requirements of the base district that do no conflict with the standards of the floating overlay district shall apply.

2.5.1 TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND)

A. Purpose and Intent: The Traditional Neighborhood Development (TND) is a floating overlay district option established to allow for the development of fully integrated, mixed-use, pedestrian-oriented neighborhoods in order to minimize traffic congestion, suburban sprawl, infrastructure costs and environmental degradation. This district is a planned development district in that it is created through the combination of other form-based districts as sub-districts under the umbrella of the TND.

B. Process and Applicability:

1. The TND Floating Overlay District designation shall automatically apply by-right to all development sites of 100 acres or greater. The approval of TND Master Plans on such properties shall follow the procedures for Subdivision Master Plans found in Section 15.9.2. The designation of land allocations by transect zone (as outlined in 2.2.7.D below) shall be made a part of this application and approval.

2. Development sites of less than 100 acres may be developed under a TND Floating Overlay District subject to the Conditional District rezoning process established in Section 15.15. A TND Master Plan, indicating land allocations by transect zone (as outlined in 2.2.7.D below), proposed subdivisions of property, and other information required by Section 15.15 shall be made a part of the Conditional District Master Plan application and approval.

C. Findings of Fact for TND Master Plan Approval: In granting approval of a TND Master Plan, the approving authority shall make the following findings of fact, in addition to other findings of fact required elsewhere in this ordinance:

1. The plan is in compliance with the specifications of this ordinance.

2. The plan conforms to the adopted plans (as applicable) for the physical development of the town.

3. The impacts to adjacent property of higher-intensity, non-residential uses are adequately mitigated.

4. The impacts of traffic generated by the TND on the existing road network are mitigated.

5. All neighborhoods have identifiable centers and edges.

6. All lots are within walking distance to retail and/or recreation opportunities (a distance not greater than ¼ mile).

7. Uses and housing types are mixed and in close proximity to one another.

8. Street networks are interconnected and blocks are small.

9. Civic buildings are given prominent sites throughout the neighborhood.

D. Maximum Permitted Densities:

Underlying District	Maximum Overall Density
RD District	6 dua
GR3	6 dua
GR5	10 dua
GR10	16 dua
All Other Districts	Not Restricted

E. Land Allocation by Transect Zone: When composing the TND Master Plan, the form-based districts in Section 2.2.1 shall be used as sub-districts and so designated on the zoning map within the ranges noted below (ranges are noted in % of gross land area).

1. **UR:** 30-80%

2. **RMX:** 10-30%

3. **NMX:** 10-30%

4. **Civic Structures:** A minimum of 2% of the land area shall be reserved for the construction of civic structures (schools, community buildings, religious institutions, etc.) and their support facilities (parking areas, etc.). Such sites shall be in prominent locations that are centralized to the neighborhood, accessible to the greater community, and help to visually anchor important vistas. The required reservation does not include recreational open space such as parks, playgrounds, greenways, or conserved lands.

F. Specific Development Standards

1. **Neighborhood Design:** The entire land area of the TND shall be divided into blocks, streets, lots and open space areas.
2. **Land Use Relationships:** Similar land use categories shall generally front across streets. Dissimilar categories shall abut at rear lot lines. Corner lots which front on streets of dissimilar use shall be set back the same as the adjacent use with the lesser setback.
3. **Open Space:** No portion of the TND shall be further than ¼ mile from a publicly accessible (public or privately maintained with a public access easement) recreational open space as defined in Chapter 7, including recreational open space outside of the TND boundaries. Recreational Open Space shall be provided in accordance with the requirements of Chapter 7.
4. **Dimensional Standards and Building Types:** The Dimensional Standards and Building Types shall be established in accordance with the neighborhood design, but within 200 feet of all property boundaries (not across streets) the lot widths and depths and building types shall be generally consistent with adjacent zoning district(s) of a lower development intensity/density.

2.6 CONDITIONAL DISTRICTS (CD)

Conditional Districts are districts with conditions voluntarily added by the applicant and approved in a legislative procedure by the Board of Commissioners in accordance with G.S. 160A-382. Conditional Districts provide for orderly and flexible development under the general policies of this ordinance without the constraints of some of the prescribed standards guiding by-right development. Because Conditional District developments are constructed in a comprehensive manner, they establish their own building, street, block, and lot pattern which may be unique from other surrounding blocks or neighborhoods. This Conditional District may be used in any district but is not intended to relieve hardships that would otherwise be handled using a variance procedure.

2.6.1 STANDARDS FOR CONDITIONAL DISTRICTS

Within a Conditional District (CD), petitioners may place additional requirements or standards onto themselves and their property or ask that certain uses identified in the specific zoning category or provisions in Chapters 2-12 be decreased. It shall be the Board of Commissioners' final decision to grant approval or denial of the CD zoning amendment in light of the revised development standards presented in accordance with the procedures of Section 15.15. If no specific request is made by the petitioner to the change in the development standards or if the petition is silent on the point, it shall be understood that the underlying zoning district guidelines and standards shall apply.

In addition to the modification of specific district provisions (except use), the various provisions detailed in Chapters 2-12 may be varied if specifically requested by the petitioner as part a Conditional District application with the exceptions outlined below:

CH	Title	Exception to modifications:
2	District Provisions	Uses permitted may not be added unless the use proposed is not currently defined or contemplated by the Code. Permitted uses may be removed from the petition.
3	Supplemental Use Standards	
4	General Provisions for All Districts	
5	Building Design Standards	
6	Subdivision and Infrastructure Standards	
7	Recreation Facility Fees, Parks and Open Space Land	May substitute dedication of public open space for recreation facilities fees per Board of Commissioners approval. Amount required may not be reduced.
8	Tree Protection, Buffers and Landscaping	No further modifications permitted.
9	Parking and Driveways	
10	Lighting	
11	Signs	No further modifications permitted.
12	Erosion, Flood, Stormwater and Watershed Standards	No further modifications permitted.

3 SUPPLEMENTAL USE STANDARDS

3.1 APPLICABILITY

There are certain uses that exist which may be constructed, continued, and/or expanded provided they meet certain mitigating conditions specific to their design and/or operation. Such conditions ensure compatibility so that different uses may be located in proximity to one another without adverse effects to either. When uses are listed in the Use Matrices in Chapter 2 as Uses Permitted with Additional Standards (PS) or uses requiring Special Use Permits (SUP) they shall comply with the additional criteria set forth in this chapter for that use in addition to other applicable criteria contained in this ordinance.

3.1.1 USES PERMITTED WITH ADDITIONAL STANDARDS (PS)

A. Permitted uses with special requirements are uses permitted by right, provided that the specific standards set forth in this article are met.

B. The specified standards are intended to ensure that these uses fit the vision of the zoning districts in which they are permitted, and that these uses are compatible with other development permitted within the districts.

3.1.2 SPECIAL USE PERMIT APPLICATIONS (SUP)

A. Special Uses are uses which are generally compatible with other land uses permitted in a zoning district but which, because of their unique characteristics or potential impacts on the surrounding neighborhood and/or the town as a whole, require individual consideration in their location, design, configuration, and/or operation at the particular location proposed.

B. All Special Uses shall at a minimum meet the standards for the zoning district in which they are located and the specific standards set forth in this article for that specific use. In addition to determining that the application meets all other requirements of this ordinance (no variances are permitted) the Board of Commissioners must find the following:

1. The proposed special use conforms to the character of the neighborhood, considering the location, type and height of buildings or structures and the type and extent of vegetation on the site.

2. The proposed use will not cause undue traffic congestion or create a traffic hazard.

3. Adequate utilities (water, sewer, drainage, electric, etc.) are available for the proposed use.

4. The proposed use shall not be noxious or offensive by reason of vibration, noise, odor, dust, smoke or gas.

5. The establishment of the proposed use shall not impede the orderly development and improvement of surrounding property for uses permitted within the zoning district.

6. The establishment, maintenance or operation of the proposed use shall not be detrimental to or endanger the public health, safety or general welfare.

7. The application will not substantially injure the value of adjoining or abutting property

8. The property use is consistent with the officially adopted plans and policies of the town.

C. The Planning Board shall provide a recommendation in an advisory capacity to the Board of Commissioners in assisting the Board of Commissioners to make its determination.

D. Individual consideration of the use may also call for the imposition of individualized conditions in order to ensure that the use is appropriate at a particular location and to ensure protection of the public health, safety and welfare.

E. Approval procedures for Special Use Permits are found in Section 15.10.

3.1.3 CONFLICT WITH OTHER REGULATIONS

A. If there is a conflict between the standards set forth in this chapter and any other requirements of this ordinance, the standards of this ordinance shall control except as set forth below.

B. The zoning district in which a particular use is permitted is controlled by the use listings found for the individual districts. In the event of any inconsistency between this article and the use listings for the districts, the use listings found in Chapter 2 shall control.

3.2 SUPPLEMENTAL USE STANDARDS – RESIDENTIAL

3.2.1 DWELLING – MULTIFAMILY (UR)

A. Building Type and Permitted Units: Multifamily units in these districts shall be restricted to the Detached House and Townhouse building types only. A maximum of 4 units is permitted in a Detached House (Quadruplex) and it shall be designed such that a maximum of two main entrances are on the fronting façade (similar to a duplex configuration). Additional building entrances may be provided on the side and rear of the building.

3.2.2 DWELLING – ACCESSORY (RD, GR3, GR5, GR10, ICD, UR, RMX, RA-HC, NMX, UMX - FOR DETACHED HOME LOTS ONLY)

A. Number: Only one accessory dwelling is permitted per lot.

B. Placement on the Lot: A detached accessory dwelling shall be sited to the side or rear of the principal building.

C. Yard Requirements: The accessory dwelling shall meet the accessory structure setbacks in Sections 2.2.3.E or 2.2.5.D as appropriate.

D. Compatibility

1. The accessory dwelling shall meet all applicable design standards for the zoning district in which it is located in accordance with Chapter 5.
2. The accessory dwelling shall be clearly subordinate (size, etc.) to the main structure.
3. The exterior of the accessory dwelling shall be compatible with the principal residence in terms of color, siding, and roofing appearance.

E. Manufactured Housing, Campers, Recreational Vehicles, Etc. Prohibited For Use: Manufactured housing, campers, travel trailers and recreational vehicles are not permitted for use as an accessory dwelling.

F. Outside Entrance: If located within the principal dwelling, the apartment may have a private outside entrance, but such an entrance shall be located on or facing the side or rear of the principal dwelling.

G. Apartment Features: The apartment must contain complete kitchen facilities including a stove or cook top and a full bath including lavatory, water closet, and tub or shower (or combination).

H. Parking: One off-street parking space shall be provided in addition to those required for the principal dwelling.

I. Signs: No signs visible from the street or public sidewalk are permitted.

3.2.3 FAMILY CARE HOME (6 OR FEWER RESIDENTS) (NB, ICD, UR, RMX, RA-HC, NMX, UMX)

A. Family Care Homes shall be certified by the International Building Code, as amended by the NC Building Code.

B. No Family Care Home shall be closer than ½ mile to another such use.

3.2.4 LIVE-WORK UNITS (GR10, ICD, UR, RMX, RA-HC)

Construction shall meet requirements of the International Residential Code, and the following:

A. The maximum total size of a Live-Work unit shall be 3,000 square feet and 3 stories in height.

B. The work area shall occupy a maximum of 50% or less of the total unit.

C. The non-residential area function shall be limited to the first or main floor only.

D. A maximum of 5 non-residential worker or employees are allowed to occupy the non-residential area at any one time.

E. The same tenant shall occupy the work area and living area. Mixed occupancy shall be subject to the stricter building code requirements.

3.2.5 ALL MANUFACTURED HOUSING - *CLASS A* (RD, GR5, GR10, UR); CLASS B & C (RD, GR5, GR10)

All manufactured HUD homes and offices, whether used for residential or business purposes and whether placed in a manufactured home park or on an individual lot of record, shall meet the following requirements:

A. General Provisions for All Manufactured Housing

1. Each manufactured home stand and space shall be graded to provide adequate storm drainage away from the structure and such that there will exist no more than 3 feet difference between the chassis of the home or office and the finished grade of the stand along the entire perimeter of the home or office proper.

2. The manufactured home or office is set up in accordance to the standards set by the North Carolina Department of Insurance in the current edition of the North Carolina Regulations for Manufactured Homes, including, but not limited to, all footings, supporting piers, anchors, and tie downs.

3. The tongue, moving hitch, wheels, axles, and transporting lights are all removed.

4. Stairs, porches, entrance platforms, ramps, and other means of entrance and exit to and from the home are installed in accordance with the requirements of the North Carolina State Building Code, attached firmly to the primary structure, and anchored securely to the ground.

5. Other than those within the manufactured home or office itself, all installations of plumbing and electrical wiring and all gas and oil appliances shall comply with the provisions of the building, plumbing, electrical, heating, and gas regulations of the North Carolina State Building Code.

6. Empty liquefied petroleum gas containers and other objects and materials not approved by the Wake Forest Fire Department shall not be stored under manufactured homes or offices.

B. Class A Manufactured Homes (Double Wides):

1. A continuous permanent masonry foundation, unpierced except for required ventilation and access, shall be installed around the entire perimeter of the home or office. If the masonry foundation is not brick, stone, or decorative concrete block it shall be parged (coated with a mortar-like finish) on the visible side. Class A Manufactured Homes have additional requirements, as described in the definition section of this ordinance.

2. Class A Manufactured Housing in GR5 and GR10 Districts shall be permitted if so designated on the Preliminary Plat.

C. Class B (single-wide) or Class C (mobile home) Manufactured Homes:

1. Each single-wide manufactured home or office shall be installed with skirting provided by the manufacturer specifically for such use, unpierced except for required ventilation and access, around the entire perimeter of the home or office. Skirting shall be made of a material compatible with the siding of the home or office.

2. Class B and Class C Manufactured Housing (Single-wide manufactured HUD homes) shall be permitted in Manufactured Home Parks only.

3.2.6 MANUFACTURED HOME PARK (RD)

A. General Park Requirements

1. No manufactured home park shall be approved for a site less than 10 contiguous acres under single ownership or control.

2. The manufactured home park shall be screened from all adjacent property with a Type C buffer in accordance with Section 8.5.3.

3. The operator/manager of a manufactured home park shall designate and enforce a uniform type of underpinning of all manufactured homes in the community.

4. All streets within a manufactured home park shall comply with the standards set forth in Chapter 6.

5. An acceptable plan for the collection and disposal of garbage shall be included in the site plan for the manufactured home park.

6. Recreational space shall be provided in accordance with Chapter 7.

B. Manufactured Home Space Requirements

1. Each manufactured home stand and space shall be graded to provide adequate storm drainage away from the structure and such that there will exist no more than 3 feet difference between the chassis of the home or office and the finished grade of the stand along the entire perimeter of the home or office proper.
2. Each home shall be at least 35 feet from any property line.
3. Each manufactured home space shall have a permanent site number sign that is clearly visible from the street running in front of the home.
4. A minimum of 2 parking spaces shall be provided for each manufactured home.
5. A visitor parking area, consisting of 1 space for each 5 manufactured home units located within the park, shall be provided. This parking area does not have to be paved.

3.2.7 RESIDENTIAL CARE FACILITIES (MORE THAN 6 RESIDENTS) (ALL DISTRICTS EXCEPT OS, RD, LI, & HI)

A. Buffering: Residential care facilities must be buffered from adjacent residentially zoned property with a Type C buffer in accordance with Section 8.5.3.

B. Licensing: Prior to the submission of an application for a certificate of zoning compliance, an owner/operator of a residential care facility shall have received a license from the State of North Carolina for such a facility.

C. Number of Units: Unless located and having access on a Collector Street or higher order street, no residential care facility shall contain more than 16 units.

D. Development Standards

1. To the extent practicable, the community shall provide access connectivity (vehicular and pedestrian) to adjacent neighborhoods.
2. Where a community adjoins a residential district, with or without an intervening street or alley, to the maximum extent practicable, residential uses within the community shall be located adjacent to the residential district, and non-residential uses and signs shall be located and oriented away from the residential district.

E. Accessory Uses: The following accessory uses are permitted: congregate dining facilities, recreational and social facilities, health care facilities, gift shops, snack shops, banks, barber/beauty shops, and similar services for residents.

3.3 SUPPLEMENTAL USE STANDARDS - LODGING

3.3.1 BED AND BREAKFAST HOMES (UP TO 8 ROOMS) (RD, GR3, GR5, ICD, UR, RMX, RA-HC, NMX, UMX)

A. Location: In GR3 and GR5 districts, Bed and Breakfast Homes with more than 4 rentable rooms shall be located on corner lots only.

B. Owners: An owner/manager of a bed and breakfast home shall reside on the property.

C. Activities: Activities and functions at the bed and breakfast home shall be provided for overnight guests only and shall be limited to breakfast and an afternoon and/or evening refreshment.

(For RD, GR3 and GR5 Only) In addition to the functions for overnight guests, the bed and breakfast home may have 6 private parties, receptions or similar activities per year. In no way is this provision meant to restrict the owner/manager's use of their home for personal entertaining.

3.3.2 BOARDING OR ROOMING HOUSE (12 OR LESS PERSONS) (GR3, GR5, NB, HB, ICD, UR, RMX, RA-HC, NMX, UMX)

A. Parking: In GR3, GR5, ICD, UR, RMX, RA-HC, NMX and UMX districts, parking areas shall not be permitted in the front yard and shall be screened from adjacent properties by a Type B buffer.

B. Owner: The owner shall serve as a full-time manager or otherwise designate a full-time manager, either of which shall permanently reside on the premises.

C. Building and Lot Standards

1. The minimum size of any sleeping room shall be 200 square feet per resident.
2. One full bath consisting of tub or shower, toilet and sink shall be provided for each 4 residents.
3. Full kitchen facilities, consisting of a stove, oven, sink, refrigerator, food preparation area, and storage areas shall be provided and accessible to all tenants.
4. Signs, other than address/tenant identification signs which meet the requirements of Chapter 11, shall not be permitted.
5. All of the lot area which is not used for parking, sidewalks, buildings, utility structures or site access must be landscaped and maintained.

3.4 SUPPLEMENTAL USE STANDARDS – OFFICE/SERVICE

3.4.1 HOME OCCUPATION (RD, GR3, GR5, GR10, UR, RMX)

A. General Standards

1. The home occupation shall be clearly incidental and secondary to residential occupancy.
2. The use shall be carried on entirely within an enclosed structure on the premises.
3. The home occupation shall be operated by a resident of the dwelling.
4. A maximum of 25% of the gross floor area of the dwelling unit may be used for the home occupation.
5. A maximum of 2 full-time equivalent non-residents of the dwelling may be employed on the premises.

B. Exterior Appearance

1. The use shall not change the residential character of the dwelling.
2. Storage of goods and materials associated with the home occupation must be completely within an enclosed structure.

3. Parking must be provided so as not to create hazards or street congestion.
4. All parking associated with the home shall be accommodated off-street or in spaces directly in front of the residence.
5. No display of goods, products, services or other advertising (except permitted signage as set forth in Chapter 11, Signs) shall be visible from outside of the dwelling.
6. No generation of dust, odors, noise, vibration or electrical interference or fluctuation shall be perceptible beyond the property line.

3.4.2 VETERNINARY SERVICES (RMX, RA-HC, NMX, UMX)

A. **General Standards:** Only animals in veterinary care may stay overnight. No kennels or storage of animals shall be permitted outside unless otherwise permitted in the district in which it is located.

3.5 SUPPLEMENTAL USE STANDARDS – COMMERCIAL/ENTERTAINMENT

3.5.1 GENERAL COMMERCIAL (NB, RMX)

A. **Maximum Area of Development:** The maximum aggregated gross floor area of all commercial uses in a development shall be as follows: RMX: 20,000 square feet; NB: 50,000 square feet

3.5.2 OPEN AIR RETAIL (ICD, RMX, RA-HC, NMX, UMX)

A. **Location:** The use shall be conducted behind the prevailing setback line for the district.

B. **Sidewalk Kiosks, Vendor Carts, Concession Stands, etc:** Such uses shall be permitted to operate within the right-of-way provided that adequate pedestrian clearance on the sidewalk is maintained (minimum of 5 feet) and the automobile and bicycle travelway is clear of obstructions.

C. **Parking:** No permanent parking is required but the use must accommodate reasonable vehicular circulation and parking to preclude off-site impacts as determined by the Administrator.

3.5.3 OUTSIDE SALES (NB, ICD, RMX, RA-HC, NMX, UMX)

A. **Location:** Outside sales must be clearly secondary to the primary use within the associated permanent structure and shall generally be located to the side or rear of the principal structure. Display of merchandise for sale outdoors in the front yard shall not exceed a maximum of 12 feet from the front face of the building.

B. **Displays on public sidewalks:** Merchandise for sale may be placed on the public sidewalk in front of the shop where the building is directly adjacent to the sidewalk provided that adequate pedestrian clearance on the sidewalk is maintained (minimum of 5 feet). Such sales may also be subject to other town ordinances.

3.5.4 SHOOTING RANGE, OUTDOOR (RD)

A. **Buffering:** Outdoor shooting ranges shall be buffered from adjoining properties with a Type A buffer as set forth in Section 8.5.3.

B. Location: Outdoor shooting ranges shall be located no closer than ¼ mile to any church, school or dwelling.

3.5.5 THEATER, OUTDOOR (RMX, RA-HC)

A. Buffering/Location

1. Outdoor theaters shall be buffered from adjoining residential uses with a Type A buffer as set forth in Section 8.5.3.
2. The performance and audience areas for any outdoor theater shall be located a minimum of 200 feet from any adjacent residentially zoned property.

B. Access: Primary access to all outdoor theaters shall be to a collector or higher order street.

C. Operational Standards

1. Lights shall be shielded and positioned so as not to shine onto adjacent properties.
2. Lights and loud speaker systems shall be subject to the Town of Wake Forest Code of Ordinances, Part II, Chapter 14, Article III.

3.6 SUPPLEMENTAL USE STANDARDS – CIVIC

3.6.1 CEMETERY (ALL DISTRICTS EXCEPT LI & HI)

A. Minimum Lot Size: A minimum of 3 contiguous acres shall be required to establish a cemetery, columbarium or mausoleum not located on the same tract of land as a church.

B. Minimum Yard Requirements

1. The minimum yard required for all structures, excluding gatehouse, is 50 feet from any exterior property line. Gatehouses shall be excluded from any minimum yard requirement.
2. The minimum yard required for mausoleums and columbariums adjacent to a street shall be equal to a principal building front yard in the district.
3. The minimum yard required for any grave or burial plot is 50 feet from any exterior property line. This requirement does not apply where the adjacent property contains an existing cemetery.
4. The minimum yard required for any grave or burial plot adjacent to a street shall be equal to a principal building front yard in the district provided that, where graves or burial plots are adjacent to streets and closer than 50 feet, a low planted screen shall be provided between the street and the cemetery. Such screen shall be 8 feet wide planted with evergreen shrubbery placed a maximum of 5 feet on center. All shrubs shall achieve a height of 4 feet within 3 years.

3.6.2 RELIGIOUS INSTITUTIONS (RA-HC, NMX, UMX)

A. Prohibited Except as an Accessory Use: a religious institution is prohibited from operating in a commercial or mixed-use building type except as an accessory use (less than 50% of the total first floor area) to an otherwise permitted use. All such operations shall be to the rear of the structure away from the public frontage or in upper stories. The use of upper stories by the religious institution is not limited.

B. Operating Hours: Commercial uses related to religious institutions (e.g., bookstores) must be open for business during typical business hours (from 8 am to 5 pm on regular non-holiday weekdays) in order to be considered as a primary use.

3.7 SUPPLEMENTAL USE STANDARDS – EDUCATIONAL/INSTITUTIONAL

3.7.1 CHILD/ADULT DAY CARE CENTER (MORE THAN 8 PERSONS) (RD, NB, HB, ICD, RMX, RA-HC, NMX, UMX)

A. Outdoor Play Space for Child Care Homes

1. Outdoor play space for Child Care Homes shall be provided in accordance with the regulations of North Carolina Department of Human Resources.
2. Outdoor play space shall be enclosed on all sides by building, and/or permitted types of walls or fences. The minimum height for such fences shall be 4 feet.
3. Outdoor play space may not include driveways, parking areas, or land otherwise unsuitable for children's play space.
4. Outdoor play space may not be in the established front yard.

B. Adult Day Care Centers: Adult Day Care Centers shall meet the requirements of the North Carolina Department of Health and Human Service's "Adult Day Care and Day Health Services Standards for Certification."

3.7.2 COMMUNITY SUPPORT FACILITY (RD, NB, RMX, RA-HC, NMX)

A. Location: No such use may be located within a quarter mile (1320 feet) of another such use measured as a straight line on a map unless as part of an accessory use to an existing religious institution.

3.7.3 CORRECTIONAL INSTITUTION (LI, HI)

A. Buffering: Correctional institutions shall be buffered from adjoining residentially zoned property with a Type A buffer as set forth in Section 8.5.3.

3.7.4 HALFWAY HOUSES (NB, RMX, NMX)

A. Location: No such use may be located within a half mile (2640 feet) of another such use measured as a straight line on a map.

3.7.5 SCHOOLS – ELEMENTARY & SECONDARY (ALL DISTRICTS)

A. For Schools in the RD Zone Only: To encourage walking and bicycle accessibility by schoolchildren to schools, it shall be required by the applicant to demonstrate how such accessibility can be achieved, given the low density nature of this district. Accommodation may include the construction of additional off-premise sidewalks, multi-use trails/paths or greenways to connect to existing networks.

B. For All Schools:

1. Athletic fields and parking areas must be buffered from adjacent residentially zoned property with a Type B buffer as set forth in Section 8.5.3.

2. Connectivity (vehicular and pedestrian) to surrounding residential areas is required. Where a full vehicular connection is impractical, a multi-use trail connection shall be provided.
3. Student pick-up/drop-off areas shall adhere to NCDOT standards for vehicular circulation and stacking.

3.8 SUPPLEMENTAL USE STANDARDS – AUTOMOTIVE

3.8.1 DRIVE-THRU/DRIVE-IN FACILITY (NB)

A. **Location:** Such facilities shall be located and accessed only in the third layer as noted Section 9.3.

B. **Circulation:** Vehicle storage/stacking areas for drive-thru uses shall be located outside of and physically separated from the right-of-way of any street and shall not cause interruption of any public sidewalk or bicycle facility.

3.8.2 GAS/FUELING STATION (NB, NMX)

A. **Canopies/Pumps:**

1. Must be located to the side or rear of the principal building.
2. Pump canopies must be located at least 50 feet from any interior side or rear property line that adjoins residentially developed property.
3. Must be buffered from adjoining residential uses with a Type B Buffer in accordance with Section 8.5.3.
4. The maximum number of pumps permitted at a single gas/fueling station shall be 12.

B. **Principal Buildings:** A conforming principal building is required and shall be a minimum of 1,600 square feet.

C. **Lighting:** All lighting must be shielded to direct light and glare only onto the lot or parcel where the gas/fueling station is located and shall be in accordance with Section 10.3.8.C.

3.8.3 VEHICLE RENTAL/LEASING/SALES (NMX, UMX)

A. **Screening:** Vehicles must be stored in an area that is screened from the public right-of-way and adjacent residential neighborhoods by a Type B buffer in accordance with Section 8.5.3.

B. **Principal Structure Required:** All parking areas shall be placed in accordance with the provisions of Section 9.3 and shall be accessory to an otherwise conforming building.

3.8.4 VEHICLE RENTAL-MOVING TRUCKS (NB, RMX, RA-HC, NMX, UMX)

A. **Screening:** Vehicles must be stored in an area that is screened from the public right-of-way and adjacent residential neighborhoods by a Type A buffer in accordance with Section 8.5.3.

B. **Storage:** When vehicle rental is an accessory use, the storage of vehicles shall not occupy more than the minimum number of required spaces.

C. Principal Structure Required: All parking areas shall be placed in accordance with the provisions of Section 9.3 and shall be accessory to an otherwise conforming building.

3.8.5 VEHICLE SERVICES – MINOR MAINTENANCE/REPAIR

A. Screening: All outdoor storage areas shall be screened by a Type A buffer in accordance with Section 8.5.3.

B. Vehicle Bays: Vehicle bays shall be set perpendicular to the street or otherwise screened from direct view by landscaping.

3.9 SUPPLEMENTAL USE STANDARDS – INDUSTRY/WHOLESALE/STORAGE

3.9.1 INDUSTRY, LIGHT (HB, LI, HI)

A. Off-Site Impacts: No generation of dust, odors, noise, vibration or electrical interference or fluctuation shall be perceptible beyond the property line.

B. Environmental Hazards: All establishments shall be maintained so as not to create environmental hazards (such as oil or gas leaks or spills) that pose a threat to ground or surface water quality, air quality, wildlife and/or humans.

C. Vehicular Access: Vehicular access to the site shall be provided on a thoroughfare of suitable industrial capacity as determined by the Administrator and/or any required Transportation Impact Analysis.

3.9.2 INDUSTRY, HEAVY (HI)

A. Location: All such uses must be located a minimum distance of 500 feet from the GR3, GR5, GR10 and UR districts and any parallel conditional district to those districts.

B. Environmental Hazards: All establishments shall be maintained so as not to create environmental hazards (such as oil or gas leaks or spills) that pose a threat to ground or surface water quality, air quality, wildlife and/or humans.

C. Vehicular Access: Vehicular access to the site shall be provided on a thoroughfare of suitable industrial capacity as determined by the Administrator and/or any required Transportation Impact Analysis.

3.9.3 MATERIAL RECOVERY & WASTE TRANSFER FACILITIES (LI, HI)

A. Location: All such uses must be located a minimum distance of 500 feet from the GR3, GR5, GR10 and UR districts and any parallel conditional district to those districts.

B. Environmental Hazards: All establishments shall be maintained so as not to create environmental hazards (such as oil or gas leaks or spills) that pose a threat to ground or surface water quality, air quality, wildlife and/or humans.

C. Vehicular Access: Vehicular access to the site shall be provided on a thoroughfare of suitable industrial capacity as determined by the Administrator and/or any required Transportation Impact Analysis.

D. Screening

1. A minimum 150-foot buffer area is required along all property lines and public rights-of-way. No materials recovery and waste transfer activities, including parking, access roads, buildings, or disposal shall occur in the buffer area. Roads for access to the site may cross the 100-foot area, and monitoring wells may be located within the 100-foot area. All existing trees within the buffer area shall be preserved, except to allow for construction of necessary road crossings and monitoring wells.
2. A Type A buffer shall be required in the buffer area along all property lines and public rights-of-way regardless of the adjacent zoning. Existing plant material may be included in the computation of the required plantings, with approval of the Administrator.

3.9.4 RECYCLING COLLECTION STATIONS (NB, HB, ICD, LI, HI)

A. Location

1. All outdoor storage, collection loading and processing areas must be located a minimum distance of 500 feet from the GR3, GR5, GR10 and UR districts and any parallel conditional district to those districts.
2. All outdoor storage, collection loading and processing areas must be located a minimum distance of 50 feet from the adjacent property line.

B. Environmental Hazards: All establishments shall be maintained so as not to create environmental hazards (such as oil or gas leaks or spills) that pose a threat to ground or surface water quality, air quality, wildlife and/or humans.

C. Vehicular Access: Vehicular access to the site shall be provided on a thoroughfare of suitable industrial capacity as determined by the Administrator and/or any required Transportation Impact Analysis.

3.9.5 STORAGE – SELF-SERVICE (NB, HB)

A. Entrances: Separate entrances to individual storage units from outside the building are not permitted.

3.10 SUPPLEMENTAL USE STANDARDS – AGRICULTURE

3.10.1 ANIMAL PRODUCTION (RD, GR3)

A. Size of Lot: Animal production may only occur on a lot exceeding 2 acres in size.

B. Number of Animals: Not more than one animal unit shall be kept, maintained or stabled per 6,000 square feet of land.

C. Distance from Dwelling Unit: All animals shall be fenced so that they are no closer than 100 feet from a dwelling unit on an adjacent property. This provision shall not apply if a dwelling unit is constructed so as to encroach upon an existing animal production use. However, an existing animal production use may not expand towards a newly established residential use.

3.10.2 BACKYARD PENS/COOPS (ALL DISTRICTS EXCEPT OS, LI, HI)

A. Permit Required: No person shall stable, tie or otherwise keep within the town, nearer than 100 feet to any dwelling house, apartment or other residence occupied by any person, without first obtaining a development permit from the town any of the following types of animals: Cattle; Horses; Mules; Swine; Sheep; Goats; or Fowl.

B. Exceptions from Permit Requirement: A permit shall not be required for any person wanting to keep no more than 10 hens.

C. Enclosure: All above mentioned animals shall be kept in a fenced area, or other enclosure, sufficient to prevent their encroachment on neighboring properties.

3.10.3 KENNELS, OUTDOOR (RD, HB)

A. General Standards

1. Any building or pen housing animals shall be located a minimum of 150 feet from any residentially zoned or developed property.
2. Areas used for exercising or training of animals shall be securely fenced to prevent the animals from straying.

B. Disposal of Waste

1. All animal refuse and food shall be kept in airtight containers and disposed of on a regular basis.
2. Animal wastes shall not be stored within 150 feet of any property line or surface waters unless located indoors.

C. Buffering: All such outdoor kennels and similar animal shelters shall be buffered from any adjoining residentially zoned property with a Type A buffer in accordance with Section 8.5.3.

3.10.4 PRODUCE STANDS (ALL DISTRICTS EXCEPT OS, LI, HI)

A. Duration: Produce stands shall be permitted by the Administrator to operate on an individual parcel for a period of time not to exceed 90 consecutive days and no more than 2 events per calendar year.

B. Hours of Operation: Hours of operation shall be limited to 7:00 AM – 10:00 PM.

3.11 SUPPLEMENTAL USE STANDARDS – INFRASTRUCTURE

3.11.1 AIRSTRIP (RD, GR3, LI, HI)

A. Screening: Hangars or open storage shall be screened with a Type B buffer from all property lines, except those properties with LI and HI zoning.

B. Noise: No outdoor public address system shall be permitted which can be heard beyond the boundaries of the property.

C. Hours of Operation: Hours of operation shall be limited from 6 am – 10 pm.

3.11.2 WIRELESS TELECOMMUNICATIONS FACILITY [ALL DISTRICTS]

A. Purpose and Legislative Intent: The Town of Wake Forest finds that Wireless Telecommunications Facilities (WTF) may pose significant concerns to the health, safety, public welfare, character and environment of the town and its inhabitants. The town also recognizes that facilitating the development of wireless service technology can be an economic development asset to the town and of significant benefit to the town and its residents. In order to insure that the placement, construction or modification of Wireless Telecommunications Facilities is consistent with the town's land use policies, the town is adopting a single, comprehensive, Wireless Telecommunications Facilities application and permit process. The intent of this section is to minimize the impact of Wireless

Telecommunications Facilities, establish a fair and efficient process for review and approval of applications, assure an integrated, comprehensive review of environmental impacts of such facilities, and protect the health, safety and welfare of the Town of Wake Forest.

B. Applicability

1. **Permit Required:** No person shall be permitted to site, place, build, construct, modify or prepare any site for the placement or use of a WTF as of the effective date of this section without having first obtained a Special Use Permit (see Sections 3.1.2 and 15.10) and Development Permit (see Section 15.6.1) for a WTF, whichever is applicable. Each modification or co-location of a carrier's or other user's equipment shall require the submission of a WTF application and Development Permit application.

2. **Responsibility for Compliance:** At all times the owner of the property on which a WTF is located, and the owner of the WTF, shall each be responsible for assuring that the WTF is in compliance with this section and shall be held accountable for any violation of this section.

3. **Existing Facilities:** All legally permitted WTFs that existed on or before the effective date of this section shall be allowed to continue as they existed as of the effective date, provided however, that they were constructed and are operating as originally permitted. Any modification of an existing WTF (including co-locations) not previously permitted under this section will require the complete facility and any new installation to comply with this section, as will anything changing the structural load.

4. **Repair and Maintenance:** Any repair and/or maintenance of a WTF that does not increase the height of the structure, alter the profile, increase the footprint or otherwise exceed the conditions of the Special Use Permit does not require an application for a Special Use Permit, but may require a Development Permit or other permits as required.

5. **Exclusions:** The following shall be exempt from this section:

   a. Any facilities expressly exempt from the town's siting, building and permitting authority.

   b. Any reception or transmission devises expressly exempted under the Telecommunications Act of 1996.

   c. When placing wireless facilities on government-owned property or facilities, only non-commercial wireless facilities are exempt from the permitting requirements of this section.

   d. Facilities used exclusively for private, non-commercial radio and television reception and private citizen's bands, licensed amateur radio and other similar non-commercial telecommunications with a tower less than 60 feet in height.

   e. Facilities used exclusively for providing unlicensed spread spectrum technologies, such as IEEE 802.11a, b, g services (e.g., Bluetooth) where i) the facility does not require a new tower or increase the height, silhouette or profile of the structure being attached to ii) where the service is not to be used for commercial purposes; iii) where there is no fee or charge for the use of the service; and iv) where the service is intended to be useable for less than 200 feet.

C. Application Procedures

1. **Pre-Application Meeting Required:** There shall be a pre-application meeting to address issues that will help to expedite the review and permitting process and certain issues or concerns the town may have. A pre-application meeting shall also include a site visit, if there has not been a prior site visit for the requested facility.

2. **Retention of Expert Assistance Cost to be Borne by Applicant:** The town may hire any consultant and/or expert necessary to assist the town in reviewing and evaluating the application, including the construction and modification of the site, once permitted, and any site inspections. The cost of such shall be the responsibility of the applicant in accordance with the town's adopted fee schedule. The payment of the initial expert assistance cost and the application fee to the town shall precede the pre-application meeting or any work being done as regards processing an application. The town will maintain an accounting for the hours expended in the review of the application. The town's consultant/expert shall invoice the town for all time expended in its services.

3. **Carrier Required for Application:** Neither a Special Use Permit, Conditional Use Permit, nor a Development Permit shall be issued for construction of an WTF until there is a specific carrier that documents the technical need for the facility to serve the town and that co-location on an existing structure within the applicant's search ring is not reasonably feasible. Co-location on an existing structure is not reasonably feasible if co-location is technically or commercially impracticable or the owner of the support structure is unwilling to enter into a contract for such use at fair market value. Sufficient documentation to support such claims shall be submitted with an application for the first carrier to determine whether co-location on existing structures is reasonably feasible, as well as to determine the technically needed height of the proposed facility.

4. **Revocation:** Special Use Permits for Wireless Telecommunications Facilities shall automatically be revoked if the physical construction of activity authorized by said permit has not commenced within 120 days of the date of issuance of the applicable permit. Failure to complete construction of a WTF within 90 days subsequent to issuance of a Development Permit shall result in revocation of the Development Permit unless prohibited from completion of such construction by an act of force majeure.

D. General Standards

1. **Screening Required:** All ground facilities shall be screened by a Type A Buffer in accordance with Section 8.5.3.

2. **Compatibility with Surroundings:** The WTF and any and all accessory or associated facilities shall maximize the use of building materials, colors and textures designed to be in harmony with the natural surroundings and blend with the structure to which it may be affixed. This shall include the utilization of stealth, camouflage or concealment techniques as may be required by the town.

3. **Stealth or Camouflage Techniques Required:** All new Wireless Telecommunications Facilities, including but not limited to towers, shall utilize stealth or camouflage techniques, unless such can be shown to be either commercially or technologically impractical.

4. **Wireless Telecommunications Facilities Finish/Color:** Structures shall be galvanized and/or painted with a rust-preventive paint of an appropriate color

to harmonize with the surroundings and shall be maintained in accordance with the requirements of this section.

5. **Underground Utilities Required:** All utilities shall be underground.

6. **Security:** All Wireless Telecommunications Facilities shall be located, fenced or otherwise secured in a manner that prevents unauthorized access.

7. **Lighting:** Wireless Telecommunications Facilities shall not be artificially lighted or marked, except as required by federal regulations.

   a. If lighting is required by the FAA, the Applicant shall provide a detailed plan for sufficient lighting of as unobtrusive and inoffensive an effect as is permissible under State and Federal regulations.

   b. For any WTF for which lighting is required under the FAA's regulations, or that for any reason has lights attached, all such lighting shall be affixed with technology that enables the light to be seen as intended from the air, but that prevents the ground scatter effect so that it is not able to be seen from the ground to a height of at least 12 degrees vertical for a distance of at least 1 mile in a level terrain situation. A physical shield may be used, as long as the light is able to be seen from the air as intended by the FAA. In the event a WTF that is lighted is modified, at the time of the modification the town may require that the tower be retrofitted with the ground-scatter preventing techniques as referenced above.

8. **Flush Mounting Required:** All new or replacement sectorized directional antennas, shall be flush-mounted or as close to flush-mounted as is technologically possible on any structure attached to it, so long as such does not have the effect of prohibiting the provision of service to the intended service area, alone or in combination with another site(s), unless the applicant can prove that it is technologically impracticable.

9. **Placement on Building:** If attached to a building, all antennas shall be flush-mounted on the facade of the building and camouflaged so as to match the color and, if possible, texture of the building, or in a manner so as to make the antennas as visually innocuous and undetectable as is possible given the facts and circumstances involved.

10. **Required Signs**

    a. Notification to persons in the immediate area of the presence of RF radiation or to control exposure to RF radiation within a given area. .

    b. Name(s) of the owner(s) and operator(s) of the antenna(s) as well as emergency phone number(s). The sign shall be on the equipment shelter or cabinet of the applicant and be visible from the access point of the site and must identify the equipment owner of the shelter or cabinet.

    c. On tower sites, an FCC registration number, as applicable, is also to be present.

    d. The signs shall not be lighted, unless required for security purposes.

    e. No other signage, including advertising, shall be permitted.

    f. No sign shall exceed 4 square feet in size

E. Compliance with FCC Standards governing RF Radiation

1. **Compliance Required:** All Wireless Telecommunications Facilities shall be in compliance with the most recent Federal Communications Commission's

regulations governing exposure to RF Radiation (i.e. NIER or Non-Ion Emitting Radiation) for the general public as determined on a cumulative basis reflecting the emissions from all equipment associated with the WTF.

2. **Notice to be Posted:** All WTFs shall be posted with a sign denoting the minimum distance from any antennas an individual may safely stand without being exposed to RF radiation in excess of the FCC's permitted standards and any portion(s) of the structure or the surrounding area that would be exposed to RF radiation in excess of the FCC's permitted standards. In such an instance the RF Radiation from all wireless facilities at that location shall be included in the calculations to show the cumulative effect on any area of the building or structure or area around the WTF deemed accessible by the public or workers.

3. **Post Construction Survey may be Required:** In certain instances, the town may deem it appropriate to have an RF survey of the facility performed after the construction or modification and activation of the facility, such to be done under the direction of the town or its designee, and an un-redacted copy of the survey results provided, along with all calculations, prior to issuance of a Certificate of Compliance.

4. **Barricading of Non-Compliant Structures Required:** If any section or portion of the structure to be attached to or the area around it is not in compliance with the FCC's regulations regarding RF radiation, that section or portion must be barricaded with a suitable barrier and marked off to discourage approaching into the area in excess of the FCC's regulations, as well as placing RF Radiation signs as needed and appropriate to warn individuals of the potential danger.

F. Location Standards

1. **Prohibited Locations:** Telecommunications towers shall be prohibited in Residential Districts, Historic Districts or Renaissance Districts except when no alternative can provide necessary wireless service in that district.

2. **New Towers Not Preferred:** New Telecommunications towers or increasing the height of an existing tower shall always be a last resort.

3. **Priority Locations:** Applicants for Telecommunications towers shall locate, site and erect said Wireless Telecommunications Facilities in accordance with the following priorities, in the order listed:

   a. On existing Wireless Telecommunications Facilities without increasing the height or profile of the tower or structure.

   b. On town-owned properties or facilities or related public utilities (e.g., water towers and power line transmission towers).

   c. On properties in areas zoned for business use, excluding Renaissance Districts.

   d. On properties in areas zoned for rural use.

4. **Justification Required for Non-Preferred Location:** If the proposed site is not proposed for the highest priority listed above, then a detailed explanation and justification must be provided as to why a site of each and all higher priority designations was not selected. The applicant must satisfactorily demonstrate the reason or reasons why such a permit should be granted for the proposed site, and the hardship that would be incurred by the applicant if the permit were not granted as proposed. The test for cost-based arguments shall be commercial impracticability.

5. **Reasons for Denial:** Notwithstanding that a potential site may be situated in an area of highest priority or highest available priority, the town may disapprove an Application for any of the following reasons:

   a. Conflict with safety and safety-related codes and requirements;

   b. Conflict with the historic nature or character of a neighborhood or district;

   c. The use or construction of Wireless Telecommunications Facilities which is contrary to an already stated purpose of a specific zoning or land use designation;

   d. The need for a zoning variance;

   e. The placement and location of Wireless Telecommunications Facilities which would create an unacceptable risk, or the reasonable probability of such, to residents, the public, employees and agents of the town, or employees of the service provider or other service providers;

   f. The placement and location of a WTF would result in a conflict with, ~~or~~ compromise ~~in~~ or change the nature or character of the surrounding area;

   g. Conflicts with the provisions of this section;

   h. Failure to submit a complete application as required under this section after having been provided an opportunity to make complete or otherwise remedy an incomplete application.

6. Notwithstanding anything to the contrary in this section, for good cause shown if it could result in a less intrusive facility or facilities, singly or in combination, and still accomplish the primary service objective, the town may require the relocation of a proposed site, including allowing for the fact that relocating the site chosen by the applicant may require the use of more than one site to provide substantially the same service.

G. Standards for Towers

1. **Town Policy:** As the town has made the policy decision that more towers of a shorter height is in the public interest, as opposed to fewer taller towers, spacing or the distance between towers shall be such that the service may be provided without exceeding the maximum permitted height.

2. **Monopole Required:** All new towers shall be of the monopole type.

3. **Maximum Height:** The maximum permitted total height of a new WTF shall be 90 feet above pre-construction ground level. The maximum permitted height is not an as-of-right height, but rather the maximum permitted height under any circumstances, absent proof of the technological need for a greater height.

4. **Clear Evidence Required:** The applicant shall submit clear and convincing technical documentation justifying the technical need for the total height of any WTF or Antenna requested and the technical need by a specific carrier or user of the WTF for such if the antenna is the first antenna to be attached to a WTF. Documentation in the form of propagation studies must include all modeling data used to produce the studies at the requested height and a minimum of 10 feet lower height to enable verification of the need for the requested height.

5. **Height Exceptions:** Relief from the maximum permitted height of new WTF shall only be considered where clear and convincing technical evidence

substantiates a taller height is technically necessary for a specific carrier or user of the WTF for the provision of wireless service substantially within the town, to the exclusion of any alternative option that is not technologically or commercially impractical, and where denial of a taller height would have the effect of prohibiting the provision of wireless service to the community by a specific carrier or user of the WTF.

a. If the requested height exceeds the 90 foot maximum permitted height, the required documentation shall be provided prior to the consideration of a Special Use Permit request.

b. In determining the necessary height for a WTF, or the height or placement of a co-location on a WTF, the signal strengths analyzed shall be the threshold or lowest signal strength at which the customer equipment is designed to function, which may be required to be determined by the manufacturer's specifications for the customer equipment.

6. Balloon Test Required for New or Expanded Towers: In order to better inform the public in the case of a new telecommunication tower or an increase in height of an existing tower, the applicant shall hold a "balloon test" prior to the initial public hearing on the application. The applicant shall arrange to fly, or raise upon a temporary mast, a minimum of a 10 foot in length brightly colored balloon at the maximum height of the proposed new tower.

a. Sign Required: At least 14 days prior to the conduct of the balloon test, a sign containing the times and date(s) of the balloon test and contact information shall be erected so as to be clearly visible from the road nearest the proposed site and shall be removed no later than 14 days after the conduct of the balloon test. The sign shall be at least 4 feet by 8 feet in size.

b. Published Notification: The dates, (including a second date, in case of poor visibility or wind in excess of 15 mph on the initial date) times and location of this balloon test shall be advertised by the applicant 7 and 14 days in advance of the first test date in a newspaper with a general circulation in the town. The applicant shall inform the town in writing, of the dates and times of the test, at least 14 days in advance. The balloon shall be flown for at least 4 consecutive hours between 10:00 am and 2:00 p.m. on the dates chosen. The primary date shall be on a week-end, but the second date, in case of poor visibility on the initial date, may be on a week day. A report with pictures from various locations of the balloon shall be provided with the application.

c. Notification to adjacent property owners: The applicant shall notify all property owners by first-class mail located within 1,500 feet of the nearest property line of the proposed site and of the date(s) and time(s) of the balloon test. Such notice shall be provided at least 14 days prior to the conduct of the balloon test.

7. Tower Setbacks: All proposed Telecommunications Towers and any other unattached proposed WTF support structures shall be set back from abutting parcels, recorded rights-of-way and road and street lines by the greater of the following distances:

a. A distance equal to the height of the proposed tower or other support structure plus 10% of the height of the structure, otherwise known as the Fall Zone or the existing setback requirement of the underlying zoning district, whichever is greater.

b. Any accessory structure shall be located within the footprint as approved in the Special Use Permit and so as to comply with the applicable minimum setback requirements for the property on which it is situated.

c. The Fall Zone shall be measured from the nearest portion of the right-of-way of any public road or thoroughfare or property line and any occupied building or domicile. Further, the nearest portion of any access road leading to a wireless Telecommunications facility shall be no less than 15 feet from the nearest property line, other than at the point of access from another road, thoroughfare or driveway.

d. There shall be no development of habitable buildings within the Fall Zone.

8. **Structural Engineer Certification Required:** All towers shall be certified as being structurally adequate by a licensed structural engineer to be in accordance with all local, state and federal structural requirements for loads, including wind and ice loads and including, but not limited to all applicable ANSI guidelines (e.g., ANSI-EIA/TIA 222) and any such certification shall be accompanied by a detailed structural report, including all calculations. No WTF shall have equipment attached to it that exceeds a literal 100% of the loading and stress capability the WTF is designed to support.

9. **Removal and Performance Security:** The applicant and the owner of record of any proposed Wireless Telecommunications Facilities property site shall, at its sole cost and expense, be jointly required to execute and file with the town a bond, or other form of security acceptable to the town as to type of security and the form and manner of execution, in an amount of at least $75,000 for a tower and with such sureties as are deemed sufficient by the town to assure the faithful performance of the terms and conditions of this section and any conditions of any Special Use Permit issued pursuant to this section. The full amount of the bond or security shall remain in full force and effect throughout the term of the Special Use Permit and/or in the case of abandonment until any necessary site restoration is completed to restore the site to a condition comparable to that which existed prior to the issuance of the original Special Use Permit.

H. Tower-Sharing/Co-Location

1. **Tower Sharing/Co-Location Required:** The WTF shall be structurally designed to accommodate at least six antenna arrays as regards the load and stress created on the structure, with each array to be sited in such a manner as to provide for flush attachments to the greatest extent possible with the minimum separation required to achieve the co-locations in the minimum height possible without causing interference.

2. **Special Use Permit Not Required for Co-Location:** There shall be no Special Use Permit required for an application to modify or to co-locate an antenna array or other equipment on an existing and properly permitted and erected WTF so long as the co-location or modification does not exceed the parameters of the conditions of the approved Special Use Permit.

3. **Variations to Standards:** As a means of minimizing the height necessary, a claim of interference because of a need to have greater than 6 feet of vertical clearance between facilities, measured from the vertical centerline of one array to the vertical centerline of another, must be proven by technical data showing that there is no technological alternative that would enable the service to be provided that would require less vertical space. This requirement may be waived, provided that the Applicant, in writing, demonstrates that the

provisions of future shared usage beyond 6 users of the WTF is not reasonably feasible.

4. **Feasibility for Co-Location:** The applicant shall provide information necessary to determine whether co-location is feasible based upon the kind of WTF site and structure proposed and the available space on existing structures and approved Wireless Telecommunications Facilities. The owner of a proposed new WTF, and his/her successors in interest, shall:

   a. Respond within 60 days to a request for information from a potential shared-use Applicant;

   b. Negotiate in good faith concerning future requests for shared use of the new WTF by other telecommunications providers;

   c. Allow shared use of the new WTF if another telecommunications provider agrees in writing to pay reasonable charges;

   d. Failure to abide by the conditions outlined above may be grounds for revocation of the Special Use Permit.

5. **Flush Mounting Required:** Unless it can be proven that such would be technologically impracticable, all antennas attached to a tower or other structure shall be flush mounted or as near to flush mounted as is possible without prohibiting or having the effect of prohibiting the provision of service, or provide clear and convincing technical evidence using hard data and a detailed narrative, that flush mounting cannot be used and would serve to prohibit or have the effect of prohibiting the provision of service.

6. **Structural Engineer Certification Required:** The application co-locations on all towers shall be structurally certified by a licensed structural engineer to be in accordance with all local, state and federal structural requirements for loads and stresses, including wind and ice loads and stresses and including, but not limited to all applicable ANSI guidelines (e.g., ANSI-EIA/TIA 222) and any such certification shall be accompanied by a detailed structural report, including all calculations.

I. Removal of Wireless Telecommunications Structures and Facilities

1. **Notice Required:** The owner of any WTF or wireless facility shall be required to provide a minimum of 30 days written notice to the Administrator prior to abandoning any WTF or wireless facility.

2. **Conditions for Removal:** Under the following circumstances, the town may determine that the health, safety, and welfare interests of the town warrant and require the removal of Wireless Telecommunications Facilities:

   a. Abandonment (i.e. not used as Wireless Telecommunications Facilities) for a period exceeding 90 consecutive days or a total of 180 days in any 365 day period, except for periods caused by force majeure or acts of God, in which case, repair or removal shall commence within 90 days of abandonment;

   b. Disrepair such that it creates a health or safety hazard;

   c. Illegally located, constructed, or modified without first obtaining, or in a manner not authorized.

3. **Notice of Removal Required:** Notice of non-compliance shall be given to the property owner and the holder of the Special Use Permit for the Wireless Telecommunications Facilities within 48 hours that said Wireless

Telecommunications Facilities are to be removed. Notwithstanding the preceding, the town may approve an interim temporary use agreement/permit, such as to enable the sale of the WTF.

4. **Compliance with Removal Order:** The Wireless Telecommunications Facilities, and all associated structures and facilities, shall be dismantled and removed from the site and the site shall be restored to as close to its original condition as is possible, such restoration being limited only by physical or commercial impracticability, within 90 days of receipt of written notice from the town. Failure to comply the removal order may result in the removal of said facilities by the town at the sole expense of the property owner or Special Use Permit holder. If the town removes, or causes to be removed, Wireless Telecommunications Facilities, and the owner of the Wireless Telecommunications Facilities does not claim and remove it from the site to a lawful location within 10 days, then the town may take steps to declare the Wireless Telecommunications Facilities abandoned, and sell them and their components.

5. **Temporary Use Permit Agreement:** Notwithstanding anything in this section to the contrary, the town may approve a temporary use permit/agreement for the Wireless Telecommunications Facilities, for no more than 90 days, during which time a suitable plan for removal, conversion, or re-location of the affected Wireless Telecommunications Facilities shall be developed by the holder of the Special Use Permit, subject to the approval of the town, and an agreement to such plan shall be executed by the holder of the Special Use Permit and the town. If such a plan is not developed, approved and executed within the 90 day time period, then the town may take possession of and dispose of the affected Wireless Telecommunications Facilities in the manner provided in this section and utilize the performance bond.

J. Application Requirements

1. Items Specific to the WTF Application (i.e. a new Facility)

a. A detailed narrative description and explanation of the specific objective(s) for the new facility, or the modification of an existing wireless facility, expressly including and explaining the purpose and technical need of a specific, identified wireless carrier, such as coverage and/or capacity needs or requirements, and the specific geographic area of intended coverage;

b. Technical documentation (and related modeling information) that proves the technical need for the WTF to provide service primarily and essentially within the town to the exclusion of all other alternatives. Such documentation shall include a propagation study of the proposed site and all adjoining planned, proposed or existing sites at all frequencies to be used by the carrier that demonstrates either a significant gap in coverage and/or, if a capacity issue is involved, to include an analysis of the current and projected usage (traffic and data studies) using generally accepted industry methods and standards so as to conclusively prove the need for what is proposed. A desire to change, upgrade, or improve the technology or the service shall not be deemed a need in the context of this ordinance;

c. A copy of the applicable FCC license for the carrier(s), as well as a copy of the 5 and 10 year build-out plan required by and filed with the FCC and specifically noting the status of compliance in terms of percentages served;

d. The frequency, modulation and class of service of radio or other transmitting equipment for each frequency band or type of service that the applicant will provide from the facility;

e. The maximum transmission power capability of all radios, as designed, if the applicant is a cellular or functional equivalent carrier, or the maximum transmission power capability, as designed, of all transmission facilities if the Applicant is not a cellular or functional equivalent carrier;

f. The actual intended transmission power stated as the maximum effective radiated power (ERP), both in dBm's and watts;

g. A copy of the FCC license applicable for the intended frequency bands and uses of the Wireless Telecommunications Facilities;

h. Written acknowledgement that any new telecommunications tower shall be designed to accommodate a minimum of six antenna arrays and shall be managed so as not to restrict, prevent or prohibit competition among carriers;

i. The written disclosure of any condition in existence prior to submission of the application that would limit or preclude the ability of the applicant to share any new Telecommunication Tower that it constructs;

j. If increasing the height, profile or footprint of, or the number of attachments to, an existing WTF:

- **i.** The age of the tower in years, including the date of the grant of the original permit;
- **ii.** A description of the type of tower, e.g. guyed, self-supporting lattice or monopole
- **iii.** The make, model, type and manufacturer of the facility and the structural design calculations, certified by a Professional Engineer licensed in the State, proving the facility's capability to safely accommodate the facilities of the applicant without change or modification or if any change or modification of the facility is needed, a detailed narrative explaining what changes are needed, why they are needed and who will be responsible to assure that the changes are made;

k. Application for New WTF versus Co-location: The applicant shall be required to submit a written report demonstrating its meaningful efforts to secure shared use of existing Wireless Telecommunications Facilities or the use of structures within the town that are at or above the surrounding tree height or the tallest obstruction and are within one mile of the proposed tower. Copies of written requests and responses for shared use shall be provided to the town in the application, along with any letters of rejection stating the reason for rejection.

l. A Visual Impact Assessment, which shall include:

- **i.** A computer generated "Zone of Visibility Map" at a minimum of one mile radius from the proposed structure to illustrate locations from which the proposed installation may be seen, with and without foliage;
- **ii.** Photo simulations of "before and after" views from key viewpoints inside of the town as may be appropriate and required, including but not limited to state highways and other major roads, state and local

parks, other public lands, historic districts, preserves and historic sites normally open to the public, and from any other location where the site is highly visible. Guidance will be provided concerning the appropriate key sites at the pre-application meeting. The applicant shall provide a map showing the locations of where the pictures were taken and the distance(s) of each location from the proposed structure;

iii. A visual representation of the visual impact of the proposed facility, including, as applicable, the tower base, guy wires, fencing and accessory buildings from abutting and adjacent properties and streets and any proposed screening.

m. Structural certification and supporting calculations by a licensed structural engineer showing compliance with all local, state and federal structural requirements for loads, including wind and ice loads and including, but not limited to all applicable ANSI guidelines (e.g., ANSI-EIA/TIA 222).

2. General Application Items (these should be combined with the SUP application requirements)

a. The name, address, and phone number of the property owner and the Applicant, including the legal name of the applicant. If the owner of the structure is different than the applicant, the name and all necessary contact information shall be provided;

b. The zoning district or designation in which the property is situated;

c. A site plan showing the address, tax parcel number, parcel dimensions, footprint and the type, proposed structures, location and dimensions of buildings, access drives, location of any guy wires, landscaping and buffers, fencing and any other requirements of site plans;

d. Elevations showing the profile or the vertical rendition of the WTF identifying proposed attachments and all related fixtures, structures, appurtenances and apparatus, including the height above the pre-existing grade, materials, colors and lighting;

e. A map or diagram showing all existing and proposed users and attachments to the facility, including the all related fixtures, structures, appurtenances and apparatus, including height above pre-existing grade, materials, color and lighting;

f. The azimuth, size and center line height location of all proposed and existing antennas on the supporting structure, identified by owner or carrier;

g. The type and design of the WTF, the number and type of antenna arrays proposed and the basis for the calculations of the WTF's structural capacity to accommodate the required number of antenna arrays for which the structure must be designed;

h. The applicant shall disclose in writing any agreement in existence prior to submission of the application that would limit or preclude the ability of the applicant to share any new telecommunication tower that it constructs;

i. The applicant must provide documentation to verify it has the right to proceed as proposed on the site. This requires an executed copy of the lease with the landowner or landlord or a signed letter of agency acknowledging authorization. If the applicant owns the site, a copy of the ownership record is required.

3. Streamlined Co-Location, Modification or Upgrade Informational Requirements: The following information is expressly required for all applications to co-locate on or to modify a WTF or any of the equipment attached to a support structure, or to upgrade any of the equipment attached to a support structure.

a. A site plan of reasonable size done to scale

b. If deemed to be needed, the foundation design, as installed, and if one has not previously been provided a geotechnical sub-surface soils report and foundation recommendation for the tower site or other structure,;

c. For a non-guyed tower that is 5 years old or older, or for a guyed tower that is 3 years old or older, a copy of the latest ANSI report done pursuant to the latest edition of ANSI TIA 222 assessing the physical condition of the WTF. If an ANSI TIA 222 report has not been done pursuant to the preceding schedule, such report shall be done and submitted as part of the application. Neither a Development Permit, nor any Building Permit, shall be issued for any co-location on or modification or upgrade of a WTF or any of the equipment attached thereto where the structure being attached to is in need of structural remediation or remediation regarding the physical condition of the WTF, unless and until all remediation needed work has been completed, or a schedule for the remediation work has been approved by the Administrator;

d. A structural report certified by a Professional Engineer licensed to do business in the State showing the structural adequacy of the WTF to accommodate the proposed modification, upgrade or co-location without exceeding a literal 100% of the designed loading and stress capability of the support structure that is reflective of any loads or stress related to any currently unused but reserved space on the structure;

e. Manufacturer's cut sheets for all proposed transmitting and receiving equipment to be added to the WTF or otherwise changed;

f. Identification/listing of frequency bands for types of <u>all</u> services (e.g. LTE, AWS, Cellular, PCS, etc.) that the applicant has licenses for that are applicable to the community; not just those that are currently offered or proposed;

g. Copy of FCC license for each frequency band for which a license held applicable to the town;

h. Electrical powering information, i.e. the maximum power the equipment is designed to operate at on a per frequency band basis, e.g. for LTW equipment, cellular equipment, PCS equipment and AWS equipment, listed individually

i. A signed statement that the applicant will expeditiously remedy any physical or RF interference with other telecommunications or wireless devices or services caused by its presence or operation.

4 GENERAL PROVISIONS FOR ALL DISTRICTS

4.1 APPLICABILITY

The provisions in this chapter shall apply generally to all development regardless of the underlying zoning district provisions.

4.2 INTERPRETATION OF NUMERICAL STANDARDS

When any requirement of this ordinance results in a fraction of a unit, a fraction of one-half or more shall be considered a whole unit and a fraction of less than one-half shall be disregarded. When the determination of the number of dwelling units permitted on a lot results in a fraction of a dwelling unit, any fractional component shall be disregarded and rounded down to the nearest whole number.

4.3 BASIC LOT AND USE STANDARDS

4.3.1 ALL LOTS TO FRONT ON PUBLIC STREET, CIVIC SPACE OR APPROVED DRIVEWAY

All lots shall front upon a public street right-of-way (publicly dedicated or privately maintained) or a driveway constructed to the standards of this ordinance with a minimum of a 20 foot public access easement or right-of-way. With provision of alley access, lots may front upon a public open space, but access shall be of sufficient design to allow for the provision of emergency services.

4.3.2 NUMBER OF PRINCIPAL BUILDINGS PER LOT

In any zoning district, more than one building containing a permitted principal use may be erected on a single lot, provided that at least one building is fully compliant with the principal building setback requirements in Section 2.2.3 and the private frontage requirements in Section 5.3. All other requirements of this ordinance not related to building placement shall be adhered to for all principal structures.

4.3.3 DIMENSIONAL STANDARDS

A. Yard Requirements

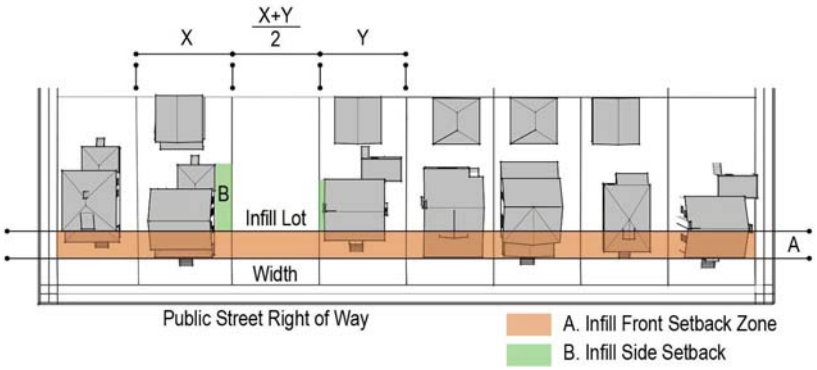
1. **General:** A building, structure or lot shall not be developed, used or occupied unless it meets the minimum yard requirements for the land development or overlay district in which it is located.

2. **Calculating Yards:** The minimum yard is the space defined by measuring perpendicularly from and along the entire boundary of the lot (property line) to the building line as shown in the diagram above.

3. **Orientation:** Side lot lines shall normally be perpendicular or radial to street right-of-way lines.

4. **Assumed Right-of-way:** Where no right-of-way exists or if the right-of-way is only inclusive of the street pavement then the front setback shall be measured from an assumed right-of-way line that is parallel to the edge of pavement and setback a minimum of 10 feet from the edge of the pavement. This calculation is for setback calculation purposes only and does not represent any expressed or implied taking of property.

5. **Infill Lot Standards:** The minimum front or street yard required may be reduced for any lot where the average established front yard on developed lots located within 300 feet on each side of such lot, and fronting on the same street as such lot, is less than the minimum required yard. In such cases, the minimum front or street yard may be less than that required but not less than the average of the existing front yards on the developed lots within 300 feet of each side. In addition for new lots created from existing larger lots, the lot width at the frontage line and the side yard setbacks shall be consistent with the immediately adjacent neighboring parcels on the same side of the street.



4.3.4 ENCROACHMENTS

The features listed below may encroach into a required yard.

A. Arcades: Building arcades, if provided, should be designed to avoid the swing of car doors parked parallel to the arcade. In addition the sidewalk within the arcade should be sufficient to accommodate the intended uses (i.e. outdoor seating) while providing suitable clearances per the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

B. Awnings and Canopies: All awnings and canopies, if provided, shall be supported by means of a frame attached directly to the building receiving beneficial use of the awning. In no case shall awnings be supported by a frame attached to a sidewalk or other public right-of-way. Awnings may encroach up to 6 feet into any required front or street yard but shall not encroach into the street tree planting area or across the street edge of the sidewalk.

C. Bay Windows and Balconies: Bay windows, balconies and similar features projecting from the principal building may encroach up to 3 feet into any required yard.

D. Cornices and Gutters: Cornices, eave overhangs, and similar projections (including gutters) may encroach up to 2 feet into any required yard.

E. Fences & Garden Walls: Fences and garden/yard walls may encroach into required yards but, if higher than 3.5 feet, may not be placed within the site visibility triangle of a public street, private street or driveway contained either on the

property or on an adjoining property. See Section 6.5.2.G concerning the sight visibility triangle.

F. Handicapped Ramps: Ramps for handicap accessibility and fire escapes that are required by the North Carolina State Building Code may encroach into any required yard but may not be closer than 3 feet to any property line.

G. Porches, Decks, and Patios: Uncovered and unenclosed porches, decks, patios, and other similar features not exceeding an average finished height above grade of 30 inches may encroach into the side and rear setback to within 5 feet of the property line.

H. Public Rights of Way Encroachments (Air Rights): With approval of the town or NCDOT (whichever has authority over a street), upper story balconies or bay windows may encroach into the right of way, but shall be a minimum of 3 feet behind the curb.

I. Steps and Stairs: Uncovered and unenclosed steps and stairs may encroach up to 6 feet into any required front or street yard but may not be closer than 5 feet to any property line.

J. Lighting: Required street lighting and any landscape lighting may encroach into any required yard. Any other required site lighting may encroach up to 5 feet into required landscape buffer yards that are greater than 20 feet in width.

4.4 IRREGULAR LOT SETBACKS

The location of required front, side and rear yards (or setbacks) on irregularly shaped lots shall be determined by the Administrator. The determination will be based on the intent and purpose of this ordinance to achieve an appropriate spacing and location of buildings and buildings on individual lots. Where questions arise as to appropriateness, the subdivider may be requested to provide additional design information.

4.4.1 SETBACKS ALONG THOROUGHFARES

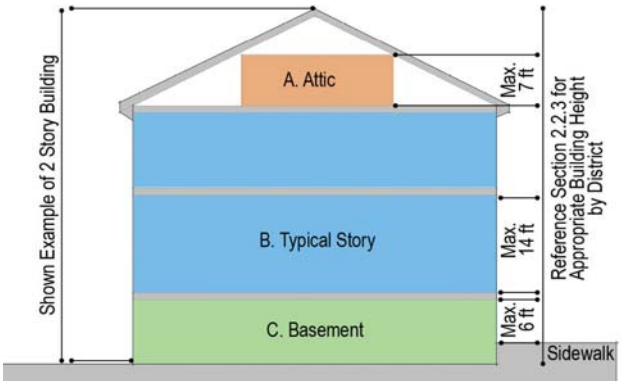
Setbacks along thoroughfares shall be measured from the future right-of-way only if there is a specifically adopted corridor plan that shows, at a minimum, the horizontal alignment of the future roadway, pedestrian and bicycle amenities, streetscape and necessary right-of-way.

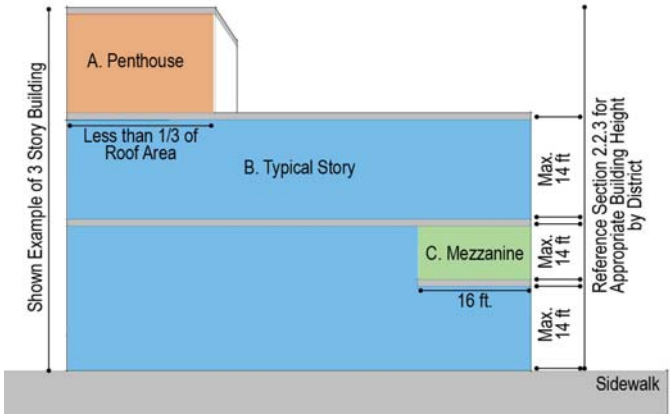
4.5 MEASUREMENT OF HEIGHT

Building heights shall be as specified in Section 2.2 and shall be determined according to the provisions below.

4.5.1 STORY

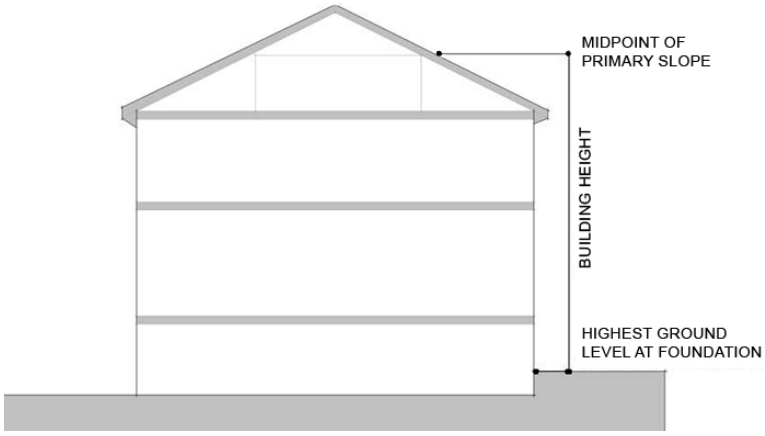
A story is a habitable level within a building of no more than 14 feet in height from finished floor to finished ceiling. Unoccupied attics less than 7 feet in height and raised basements less than 6 feet in height (as measured from the average grade of the fronting sidewalk) are not considered stories for the purposes of determining building height. A mezzanine shall be considered a story if it is contiguous with at least 60% of the building's front façade, is designed to be occupiable, and maintains an average depth of at least 16 feet. A penthouse shall be considered a story if it exceeds one-third of the area of the roof. The under-roof area with dormers does not count as a story.





4.5.2 DIMENSIONAL HEIGHT STANDARDS

Where a specific dimension is used in the calculation of height it shall be measured from the highest ground level at the structure foundation to the midpoint of the primary roof slope.



4.5.3 ITEMS NOT INCLUDED IN HEIGHT CALCULATIONS

The height limitations of this ordinance shall not apply to church spires, belfries, cupolas, and domes not intended for human occupancy, monuments, water towers, mechanical penthouses (provided they are set back 20 feet from the front elevation), observation towers, transmission towers, chimneys, smokestacks, conveyors, flagpoles, masts and antennas (provided evidence from appropriate authorities is submitted to the effect that such building or buildings will not interfere with any airport zones or flight patterns).

4.6 ACCESSORY USES AND STRUCTURES

The purpose of this section is to establish standards for accessory uses and structures in the Town of Wake Forest's land use jurisdiction. Except as provided elsewhere in this chapter, it shall be unlawful for any person to erect, construct, enlarge, move or replace any accessory use or structure without first obtaining a certificate of zoning compliance from the Administrator.

4.6.1 GENERAL

A. Accessory uses and structures may only be used for purposes permitted in the district in which they are located.

B. **Not for Dwelling Purposes**: Accessory structures shall not be used for dwelling purposes except as approved Accessory Dwelling Units in accordance with Section 3.2.2.

C. **Building Permits May Be Required**: Depending on the size of the structure and the incorporation of various improvements (e.g., electrical, plumbing) a building permit may also be required.

4.6.2 LOCATION, SETBACK, AND HEIGHT

Standards	Single-Family/Two-Family Lots - 2 Acres or Less	Single-Family/Two-Family Lots - Over 2 Acres	All Other Uses
1. Permitted Location	Side/rear yard only	Permitted in all yards – may not be closer than 30 ft to right-of-way	Side/rear yard only
2. Side/Rear Yard Setback	Subject to district setbacks (See Section 2.2)		
3. Height	Subject to district height provisions (See Section 2.2)		

4.6.3 MAXIMUM NUMBER AND AREA

Standards	Single-Family/Two-Family Lots – Less than 1 Acre	Single-Family/Two-Family Lots – 1-3 Acres	All Other Uses and Lots Larger than 3 Acres
1. Maximum Accessory Structures Permitted	2	2	No Maximum
2. Maximum Area (Accessory Dwelling Unit Area is Exempt)	600 sf Per Structure 1000 sf in Aggregate	1000 sf Per Structure 1400 sf in Aggregate	No Maximum

4.6.4 OTHER REQUIREMENTS

A. **Buffering**: Accessory structures with a footprint greater than 600 square feet shall be buffered from any adjacent residential developments with a Type C Buffer as outlined in Section 8.5.3.

B. **Lighting**: Exterior lighting for accessory uses and/or structures shall meet the requirements by which principal structures are governed as set forth in Chapter 10.

4.6.5 WIRELESS TELECOMMUNICATION FACILITIES AS ACCESSORY STRUCTURES

A. The following facilities shall be allowed as accessory structures provided they are "related to" and "customarily incidental" to the principal use and or structure:

1. Television satellite dishes,

2. Antennas and their support structures (including combinations of the two) 60 feet in height or less.

4.7 TEMPORARY USES

Proposed land uses defined as temporary uses shall obtain a Development Permit that outlines the conditions of operations and shall be consistent with the applications of this section. Upon conformance to all requirements of this section, the Administrator has the authority to issue a development permit for temporary uses such as bazaars, festivals, carnivals, produce stands, seasonal outdoor sales, construction offices, and similar uses. Such permit shall be issued for a fixed period of time, to be stated in the permit and shall be subject to such limitations as the Administrator may impose to protect the character of the district affected. The Administrator may consider any prior violation of this ordinance by applicant for which the applicant has received citation or notice from the Administrator as grounds for denial of an application.

4.7.1 GENERAL STANDARDS / PERMIT REQUIREMENTS

A. Development Permit: All permitted temporary uses listed in this section require a Development Permit for temporary use that shall be reviewed and issued by the Administrator.

B. Area: The property on which a temporary use is proposed must contain sufficient space to support the temporary use.

C. Parking: Parking must be adequate to support the proposed temporary use.

D. Restrooms: Restroom facilities, if needed, must be provided.

E. Additional Permits May Be Required: All inspections and permits required by the building code, fire marshal, or applicable government agency must be received.

F. Duration: A temporary use shall last only as long as that time period stated in the development permit but shall not exceed 180 days within a calendar year on any individual lot. Duration of a development permit for temporary use is intended to include days operated, or attended by persons not employed by or volunteering to work at the event and does not include the setup, takedown, clean-up, or rehearsal days of the event.

G. Temporary Use/Event Cleanup: The applicant is responsible for fully removing from the site any structures allowed as temporary uses and also any garbage or rubbish resulting from the temporary use within 3 days after the expiration of the Development Permit. Each day after the expiration of the permit in which applicant fails to fully remove a structure or garbage or rubbish shall be deemed a violation of this ordinance in accordance with Section 16.3.

4.7.2 TEMPORARY EVENTS / USES EXEMPT FROM PERMIT REQUIREMENTS

Development permits for temporary uses are not required for the following events (this exemption does not exclude any other required permits, such as building permit, ABC license, health department approval, etc.):

A. Events with total anticipated assembly of less than 1,500 people and only held one day per calendar year on an individual parcel or site.

B. Private events such as weddings, private parties, funerals, etc.; not open to the general public; and lasting less than 12 hours.

C. Government-sponsored events and those governed by the Wake Forest Code of Ordinances;

D. Regularly established permanent places of worship, sports facilities, schools, auditoriums, or other similar permanently established place of assembly for events that do not exceed the maximum capacity of the structure or site where the assembly is held.

E. Events which occur on property possessing site plan approval for such activities.

F. Indoor promotional events where the size and location of such events shall be reasonably related to the existing building and in no case shall interfere with the day-to-day business operations of on-site or adjacent businesses.

G. Natural disaster and emergency offices.

4.7.3 TEMPORARY USES WITH SPECIFIC REQUIREMENTS

A. Produce Sales, Seasonal Outdoor Sales & Other Similar Uses: Such temporary uses shall not exceed 90 consecutive days and no more than 2 events per calendar year. Hours of operation shall be limited to 7:00 AM – 10:00 PM.

B. Contractor's Office and Equipment/Storage Sheds

1. **Construction Plan Approval Required:** Contractor's office and/or equipment/storage sheds may be placed in any District temporarily on the site of construction of a development for which final site/subdivision construction plans have been approved.
2. **Time Limit:** All such equipment shall be removed upon completion of development.

C. Real Estate Office in a Construction Trailer or Temporary Modular Unit

1. **Use of Temporary Structure:** One temporary structure, such as a construction trailer or temporary modular unit may be used as a real estate sales office in any new construction project in any district. Such a temporary structure shall be used for the sale of units within that project only.
2. **Time Limit:** Temporary real estate offices in construction trailers or temporary modular units may remain on the site until the development completion date.

D. Real Estate Office in a Model Home: A model dwelling may be used as a real estate sales office in a new residential development in any District. Such a model home/sales office may be used for the sale of units within that project only.

E. Large Events (Bazaars, Festivals, Carnivals, Fairs, Circuses, Concerts & Similar Outdoor Gatherings with the total anticipated assembly of 1,500 or more people and duration of 2 or more days per calendar year on an individual parcel or site)

1. The following information is required as part of the application process a minimum of 30 days prior to the planned event:
   - **a.** Anticipated attendance, including previous attendance figures if the event has occurred at least once in the previous 5 years;

b. Anticipated number of days needed to prepare location for use;

c. Means of activity containment (i.e. fencing, security, etc.);

d. Event security, crowd control and traffic safety measures. Provisions for these must be approved by the Town of Wake Forest Police Department;

e. Location of temporary signage as regulated by Section 11.10.14 of this ordinance;

f. Existing land uses of all adjacent properties;

g. Location of restroom facilities;

h. Method and location of garbage impoundment and means of removal;

i. Location and method of site lighting;

j. Signed affidavit verifying that all property owners within 100 feet have been notified of date, time and nature of the event with the letter that was sent attached;

k. Proof of liability insurance;

l. Adequate access for emergency vehicles;

2. If the applicant is not also the owner of the real property upon which the use will take place, then the applicant will include as part of the completed application a copy of the lease or rental agreement pertaining to the temporary use, and also an attachment providing:

a. The name of each responsible party on the lease or rental agreement, as well as any organization on whose behalf a person is applying (collectively "Applicant");

b. The contact information for all responsible parties on the lease or rental agreement as well as any organization on whose behalf a person is applying (collectively "Applicant").

3. **Other Permits May Be Required:** Applicant is responsible for obtaining all other applicable permits, such as building permits, ABC licenses, and health department approval. Proof of application for these permits must be submitted with the development permit application.

4. **Location, Duration, and Hours of Operation:**

a. Events located in residential zoning districts shall be limited to an individual parcel or site for a period of time not to exceed 14 consecutive days and no more than 2 events per calendar year.

b. Events located in non-residential zoning districts shall be limited to an individual parcel or site for a period of time not to exceed 7 consecutive days and no more than 7 events per calendar year.

5 BUILDING DESIGN STANDARDS

5.1 PURPOSE AND INTENT

The purpose of establishing supplementary requirements for development is to ensure that the physical characteristics of proposed development are compatible with the context of the surrounding areas and to preserve the unique visual character and streetscapes of Wake Forest. These requirements strike a balance between creativity and innovation on one hand while avoiding obtrusive, incongruous structures on the other. Wake Forest strongly encourages architectural styles that build upon and promote the existing historic character of the town and supports the view that inspiring, well-maintained, and harmonious development is in the best economic development interests of all residents and businesses.

5.2 APPLICABILITY AND ADMINISTRATION

The provisions outlined in this chapter shall apply throughout the jurisdiction of this code, regardless of the underlying zoning district provisions and shall apply to all development, including renovations, remodelings, face lifts, repainting, and additions to existing structures. However, the building type standards only apply to those buildings which are specified for the various zoning districts in this chapter. This chapter is comprised of a combination of quantitative, easily measureable standards for administrative review and qualitative standards for discretionary review. For those qualitative standards (as noted) that require a discretionary review for compliance, such applications will be reviewed and approved in accordance with Section 15.8.5 by the Design Review Board.

5.2.1 APPLICATION OF BUILDING TYPE REQUIREMENTS

While it is expected that some new building types will be introduced to the town, these variations should be based upon the predominant types listed in this chapter. Innovative planning or design ideas for development in any district where the proposed building types are different than those allowed by the base district requirements may be approved by the Design Review Board in accordance with the discretionary review standards in Section 5.9. All buildings greater than 100,000 square feet in total area shall be subject to the standards of the specific building type and shall be approved by the Design Review Board in accordance with Section 5.9.

5.2.2 ADOPTED PLANS OR HISTORIC GUIDELINES TO TAKE PRECEDENCE

Where specific architectural elements are required as part of an adopted plan or associated with local historic guidelines, these shall take precedence over the building design requirements of this chapter. In the case of a contributing building to the Downtown Wake Forest Historic District, the Secretary of Interior's Standards for Rehabilitation will be used as a guideline for exterior work.

5.2.3 APPLICABILITY OF STANDARDS

The provisions in this chapter shall apply to all new structures and expansions to existing structures in accordance with the following:

A. New Structures: All standards apply.

B. Expansions of Less Than 50% of Floor Area: Standards apply to expansion area only and those areas necessary to visually tie the new to the old.

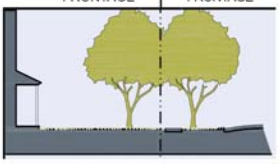
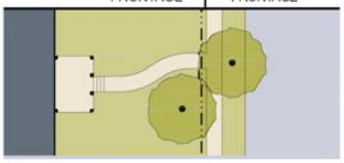
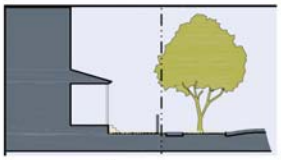
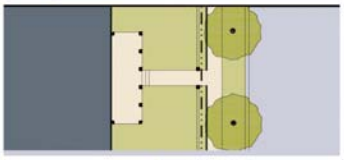
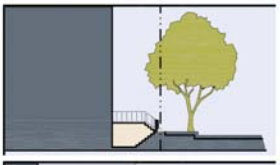
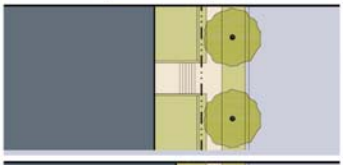
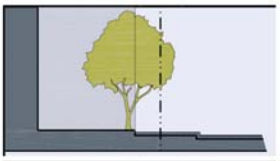
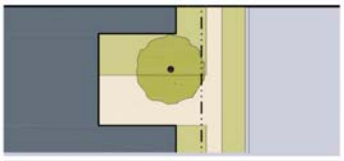
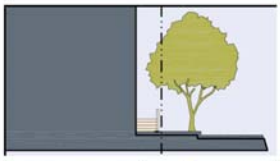
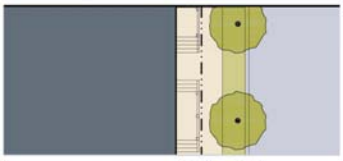
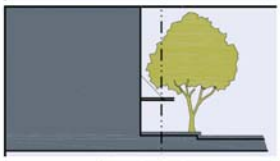
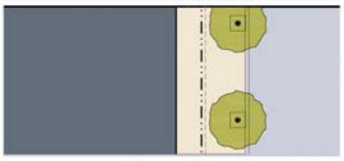
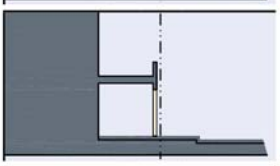
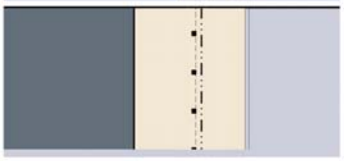
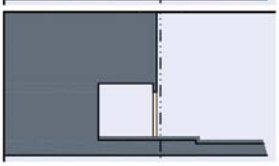
C. Expansions of 50% or Greater in Floor Area: All standards apply to facades visible from the public right-of-way.

5.2.4 MODIFICATION OF STANDARDS/DESIGN EXCEPTIONS

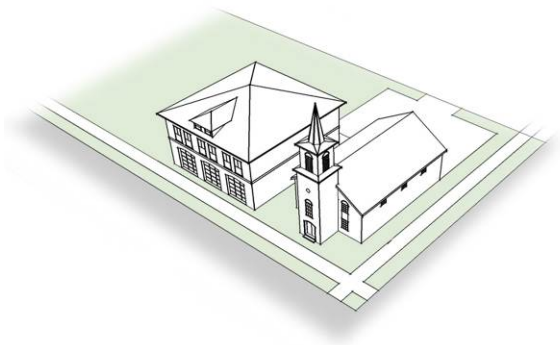
The Administrator may make modifications to the standards in this section upon the written request of the applicant if the standard(s) in question conflicts with other requirements by law, as long as the proposal is in compliance with the Purpose and Intent above. If the applicant and Administrator cannot come to an agreement the proposal shall be submitted to the Design Review Board for review at their next available meeting in accordance with Section 15.8.5.

5.3 PRIVATE FRONTAGE REGULATIONS

Private frontage regulations have been established for buildings in the urban districts (UR, RMX, NMX, UMX and RA-HC). Buildings in these districts shall conform to a private frontage type, as described in the table below, which is permitted within their associated zoning district by the table in Section 2.2.3.

	SECTION LOT ► PRIVATE ► FRONTAGE / ◄ R.O.W. ◄ PUBLIC FRONTAGE	PLAN LOT ► PRIVATE ► FRONTAGE / ◄ R.O.W. ◄ PUBLIC FRONTAGE
Common Yard: a frontage wherein the facade is set back substantially from the property line. The front yard created is visually continuous with adjacent yards, supporting a common landscape.		
Porch & Fence: a frontage wherein the facade is set back from the property line by an attached porch. A fence, low wall or hedge at the property line maintains the demarcation of the yard.		
Terrace or Light Court: a frontage wherein the facade is set back from the property line by an elevated terrace or a sunken light court. This type buffers residential use from urban sidewalks and removes the private yard from public encroachment. The terrace is suitable for conversion to outdoor cafes.		
Forecourt: a frontage wherein a portion of the facade is close to the property line and the central portion is set back. The forecourt created is suitable for vehicular drop-offs. This type should be allocated in conjunction with other frontage types. Large trees within the forecourts may overhang the sidewalks.		
Stoop: a frontage wherein the facade is aligned close to the property line with the first story elevated from the sidewalk sufficiently to secure privacy for the windows. The entrance is usually an exterior stair and landing. This type is recommended for ground-floor residential use.		
Shopfront and Awning: a frontage wherein the facade is aligned close to the property line with the building entrance at sidewalk grade. This type is conventional for retail use. It has a substantial glazing on the sidewalk level and an awning that may overlap the sidewalk to the maximum extent possible.		
Gallery: a frontage wherein the facade is aligned close to the property line with an attached cantilevered shed or a lightweight colonnade overlapping the sidewalk. This type is conventional for retail use.		
Arcade: a colonnade supporting habitable space aligned close to the property line, while the facade at sidewalk level is set back to create a sheltered pedestrian walkway. This type is conventional for retail use.		

5.4 CIVIC / INSTITUTIONAL BUILDINGS

CIVIC / INSTITUTIONAL BUILDINGS The Civic/Institutional Building serves as a landmark and a public gathering place. The use of this designation is limited to public buildings (e.g., schools, fire stations, and town halls), and semi-public buildings (e.g., hospitals and religious institutions). The Civic/Institutional Building defines a sense of prominence or to accommodate the unique needs of its users. Typological Variants: Churches Schools Museums Hospitals Town Hall	

5.4.1 APPLICABILITY AND REVIEW PROCESS

Because of the often unique design requirements and the expected prominence of certain Civic/Institutional buildings, the process for review and approval shall be different than those of the other building types listed in this section. It requires that additional standards, as set forth below, be met, but relaxes some of the standards found in the applicable land development district. Approval of all Civic/ Institutional Buildings shall be vested solely with the Design Review Board in accordance with Section 15.8.5 subject to the following standards.

5.4.2 STANDARDS FOR DESIGN REVIEW

The Design Review Board in reviewing the application shall consider the following in their review and approval of all Civic/ Institutional buildings. Each application shall be considered unique to the sponsoring applicant and location and therefore shall not be bound by previous decisions as precedents.

A. Design and Construction Excellence: Such buildings should be constructed as permanent additions to the long-term vibrancy of the town and should serve to exemplify the very best architectural designs and building practices.

B. Site Prominence: Designers should consider methods in which to place such buildings above the grade of the surrounding buildings as a means to provide site prominence. Methods to consider include the incorporation of a raised entry from the primary street frontage (while still accommodating NC Accessibility Code requirements) and/or the setback of such buildings to create a formal landscaped area or plaza. Where possible, such buildings shall form a terminating vista down a street or across a civic space whenever possible.

C. Building Design Elements: The nature and location of the building should be demonstrated in the architectural design and the detailing. Depending on the expressed architectural style of the building the following elements may be considered for inclusion:

- Pronounced window lintels/sills/muntins/etc.
- Columns with a capital and a base.

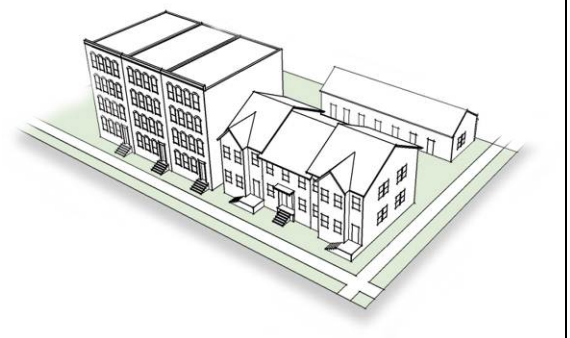
- A water table made up of large, quality masonry units (such as cut or hew stone) or made of smaller masonry units that extend beyond the face of the façade in order to clearly delineate the water table.
- Vertically oriented windows of at least 2:1 ratio.
- Relief in the façade must occur on many levels (the depth of the relief cannot be limited to 1 or 2 patterns repeated).
- Cornice lines with significant depth and multiple levels of relief.
- A very well designed entry way, including doors at the main entry that are monumental (taller, larger, heavier, more ornately designed, etc. than normal).
- A tower element of some nature.

D. High Quality Materials: Acceptable exterior primary wall materials for such buildings include brick, stacked stone, lap siding (cementitious fiber board), stucco, stone/stone masonry units, and architectural concrete masonry units (CMU). Exterior insulation finishing systems (EIFS) may be used as a secondary building material. Under no circumstances shall unfinished concrete block be permitted. No vinyl or metal siding shall be attached to any side of a civic/institutional building that is visible from a public street.

E. Material Colors: Facade colors shall be of low reflectance earth tone, muted, subtle, or neutral colors. Building trim may feature brighter colors as an accent material. The use of high-intensity, metallic, fluorescent, day glow, or neon colors shall be prohibited. Variations in color schemes are encouraged in order to articulate entry ways and public amenities so as to give greater recognition to these features.

F. Submittals: Color samples shall be provided to the staff at the time of site plan review and prior to renovations, remodelings, facelift, and repainting, along with a description of how and where each color will be used. Colored renderings shall also be required.

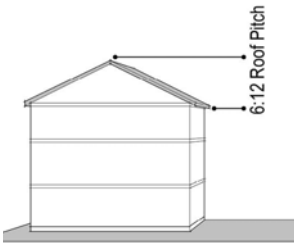
5.5 RESIDENTIAL: DETACHED HOUSE, TOWNHOUSE AND APARTMENT BUILDING

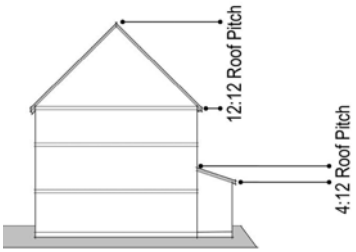
DETACHED HOUSE This building type is flexible in use accommodating primarily residential uses, home occupations, professional offices, and limited retail uses based on the zoning district in which it is located. In general, within a block, building types should be uniform in their use of driveways or alleys. Variations include setting the building on one of the side property lines. Typological Variants: Dwelling-Single family Dwelling-Duplex (Maximum of 2 doors facing the street) Dwelling-Multifamily (Maximum of 2 doors facing the street) Manufactured Home Commercial Conversion Bed and Breakfast	
TOWNHOUSE The townhouse is a building with 2 or more residential units that are located side by side. The Townhouse typically has one yard (rear) through variations including a small front setback to provide some landscaping. Typological Variants: Dwelling-Duplex Dwelling-Multifamily Live-Work	
APARTMENT The apartment building is a multiple-unit building with dwelling units vertically arranged (generally) and with parking typically located below or behind the buildings. Units may be for rental or for sale in condominium ownership or may be designed as continuing care facilities or dormitories. The ground floor may be available for commercial uses. The Apartment Building typically has one yard (rear) though variations include a small front and side setbacks to provide some landscaping. Typological Variants: Dwelling-Multifamily Mixed-Use Building	

5.5.1 APPLICABILITY

The following standards are applicable to all multifamily structures unless otherwise noted. Single family dwellings and duplexes shall be subject to the provisions of 5.5.4.A and 5.5.4.B only.

5.5.2 ROOFS AND EAVES





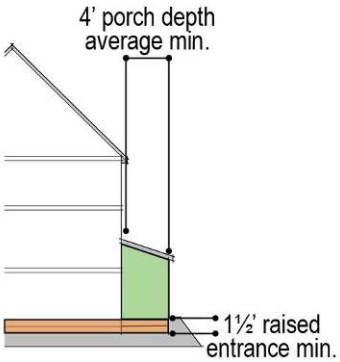
A. Except for residential buildings in the UR and RMX districts, all residential buildings shall have sloped roofs. Flat roofs may be used for the main roof, dormers or above porches, in the UR and RMX districts if approved by the Design Review Board.

B. Main roofs on residential buildings shall have a pitch between 6:12 and 12:12. Monopitch (shed) roofs are allowed only if they are attached to the wall of the main building. No monopitch roof shall have a pitch less than 4:12.

C. Flush eaves shall be finished by profiled molding or gutters.

D. All rooftop equipment (except small items such as fans and vents) shall be screened from view from the public right-of-way within the block.

5.5.3 BUILDING ENTRANCES



A. **Porches:** Useable porches and stoops are recommended to form a predominant motif of the building design and be located on the front and/or side of the building to respond to the climatic conditions and the vernacular of the area. Front porches, if provided, shall be at least 4 feet in average depth.

B. **Raised Entries:** To provide privacy, all residential entrances within 18 feet of the sidewalk shall be raised from the average finished grade of the sidewalk (at the property line) a minimum of 1½ feet.

C. **Visitability/Accessibility:** For residential buildings in developments designed for residents aged 55 and older, there shall be provided 1 zero-step entrance to each building from an accessible path at the front, side, or rear of each building. This does not eliminate the requirements for residential buildings to have raised front entrances unless topographic conditions present no practical alternative.

5.5.4 GARAGES

A. For Houses (on lots of 40 feet or less in width): Garages or off-street parking areas shall be accessed only from an alley. Driveways shall not be permitted to connect to the fronting street. Where topographic or unique site conditions preclude the use of an alley, as determined by the Administrator, a driveway of no more than 12 feet in width may be used to provide access to garages or off-street parking areas in the third layer of the lot only, as defined in Section 9.3. (See illustration below)

B. For Houses (on lots between 40 feet and 50 feet in width): One driveway of no more than 12 feet in width may be used to provide access to garages or off-street parking areas. Garages or off-street parking areas shall be located in the third layer of the lot only, as defined in Section 9.3. (See illustration below)

C. Garage Door Setback from Façade: Garages with front loading bays shall be recessed from the front facade of the house by a minimum of 4 feet and shall be visually designed to form a secondary building volume. Garage doors shall be setback a minimum of 25 feet from the back of sidewalk. (See illustration below)

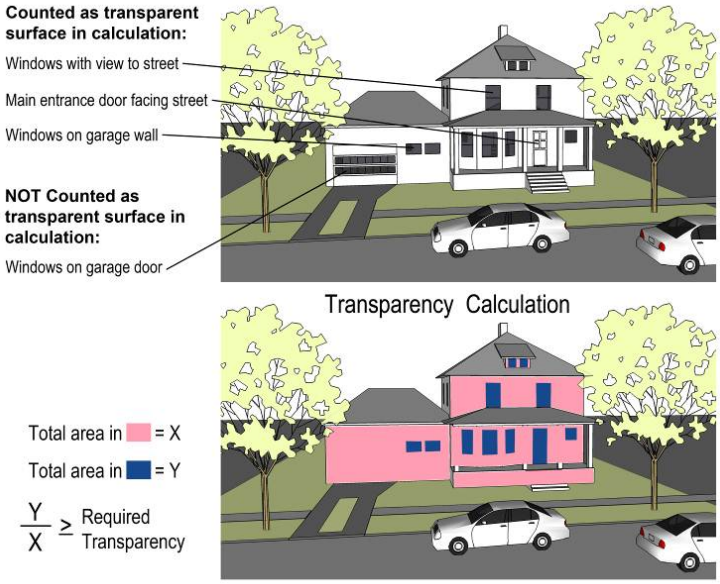
D. Garage Door Width At no time shall the total width of an attached garage door(s) exceed 50% of the total building façade for lots more than 50 feet in width. (See illustration below)

E. Extra Bays to Be Turned: All garages with more than 2 bays shall be turned such that no more than 2 bays are visible from the street. (See illustration below)

F. For All Townhouses: Garages or off-street parking areas shall be accessed only from an alley or via a driveway leading to a detached garage or parking area behind the front facade.

5.5.5 FAÇADE DESIGN / PERMEABILITY / TRANSPARENCY

At least 15% of the area of each façade that faces a street lot line must be windows or main entrance doors. Windows used to meet this standard must allow views from the building to the street. Glass block does not meet this standard. Windows in garage doors do not count toward meeting this standard, but windows in garage walls do count toward meeting this standard. To count toward meeting this standard a door must be at the main entrance and facing the street property line. (See illustration below)



5.5.6 MATERIALS

A. Building Walls: Building walls (including accessory structures greater than 144 square feet) shall be primarily clad in wood clapboard, cementitious fiber board, wood shingle, wood drop siding, primed board, wood board and batten, brick, stone, stucco, or synthetic materials similar and/or superior in appearance and durability. Vinyl may only be used on buildings that are no closer than 20 feet from the next closest building and that do not contain mixed occupancy or multifamily dwelling units. The primary materials used for building walls should reflect the context of the surrounding area or neighborhood.

B. Roof Materials: Residential roofs shall be clad in wood shingles, standing seam metal, terne, slate, asphalt shingles or synthetic materials similar and/or superior in appearance and durability.

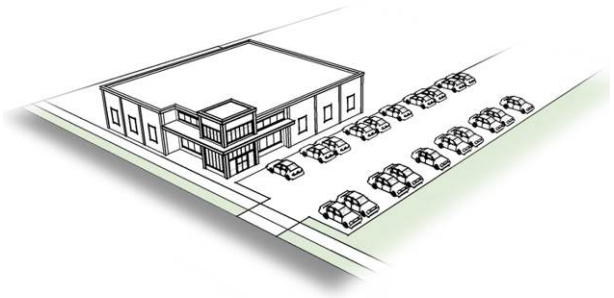
C. Material Colors: Facade colors should reflect the context of the surrounding area and should generally be of low reflectance earth tone, muted, subtle, or neutral colors. Variations in color schemes are encouraged in order to articulate entry ways and public amenities so as to give greater recognition to these features. This paragraph shall not apply to detached houses or townhomes.

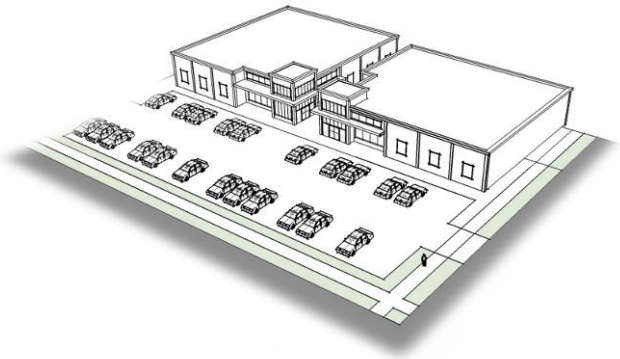
D. Submittals: Color samples shall be provided to the staff at the time of site plan review and prior to renovations, remodelings, facelift, and repainting, along with a description of how and where each color will be used. Colored renderings shall also be required.

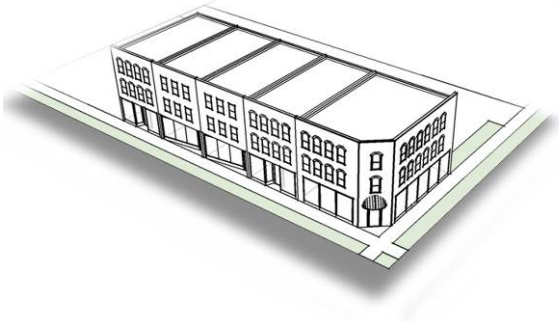
5.6 COMMERCIAL BUILDINGS

COMMERCIAL BUILDINGS
The commercial building is a structure with a high percentage of its ground level façade in transparent fenestration (windows and doors) to encourage pedestrian activity along its frontage. The Commercial Building typically has one yard (rear) though variations include a small front plaza or courtyard to provide public space for outdoor seating as well as a building with complete lot coverage where parking is handled in a manner other than on-site surface parking.

Typological Variants
Commercial Building – Neighborhood
Commercial Building – Highway Commercial
Mixed-Use Building (multi-story)







5.6.1 APPLICABILITY

The following standards are applicable to all commercial buildings.

5.6.2 FACADE MATERIALS

A. Materials: Commercial building walls visible from a public street or civic space shall be primarily brick, stacked stone, stone or stone masonry units, wood clapboard, cementitious fiber board, exposed heavy timber, or architectural concrete masonry units (CMU). Glass curtain walls may be approved subject to Design Review to ensure the styling and details are appropriate for the context. Exterior insulation finishing systems (EIFS) may be used on facades not facing a public street or civic space or as a secondary building material only (less than 25% of the wall area) on primary frontage facades. Under no circumstances shall unfinished concrete block be permitted.

B. Balance of Wall Materials: When 2 or more materials are used on a façade, the heavier material shall be placed below the lighter material (e.g., siding over brick) to give the sense of support and grounding.

C. Material Colors: Facade colors shall be of low reflectance earth tone, muted, subtle, or neutral colors. Building trim may feature brighter colors as an accent material. The use of high-intensity, metallic, fluorescent, day glow, or neon colors shall be prohibited. Variations in color schemes are encouraged in order to articulate entry ways and public amenities so as to give greater recognition to these features.

D. Submittals: Color samples shall be provided to the staff at the time of site plan review and prior to renovations, remodelings, facelift, and repainting, along with a description of how and where each color will be used. Colored renderings shall also be required.

5.6.3 GROUND LEVEL DETAILING

A. Minimize Blank Walls: Expanses of blank walls facing streets (excluding rear access drives or alleys) or public civic spaces may not exceed 20 feet in length. (A "blank wall" is a facade that does not contain transparent windows or doors.)

B. Ground-Level Glazing: Window glazing and doorways shall be the predominant features in the street-level facade. Exterior burglar bars, fixed "riot shutters," or similar security devices shall not be visible from the public right-of-way. All ground level windows shall provide direct views to the building's interior extending a minimum of 6 feet behind the window.

C. Transparency Zone: Glazing that is transparent under all lighting conditions shall extend from a base of contrasting material (not exceeding 4 feet in height above the adjacent grade) to at least the height of the door head. However, spandrel or colored glass may be used above the height of the door head. The table below lists the standards for the required percentage of square footage in the Transparency Zone that must have a glazing treatment.

Commercial Buildings in District	Percentage of Glazing in Transparency Zone	
	Primary Facade	Side Facade
RMX, NMX, RA-HC, UMX	70% min.	50% min.
NB, HB	50% min.	50% min.
Uses greater than 100,000 square feet	40% min.	40% min.

D. Glazing to be Dispersed: Required glazing shall not be aggregated into a single undivided area of glazing treatment. Individual glazing areas shall not span more than 15 linear feet, and must be separated by at least 1 linear foot of contrasting material.

E. Canopies/Awnings: A building canopy, awning, or similar weather protection may be provided and should project a minimum of 5 feet from the façade.

F. Ventilation Grates and Emergency Exit Doors: Ventilation grates or emergency exit doors located at the first floor level in the building facade, which are oriented to any public street, shall be decorative. Unless otherwise required by the building code, such grates and doors shall be located away from pedestrian spaces (sidewalks and pedestrian paths).

5.6.4 UTILITIES

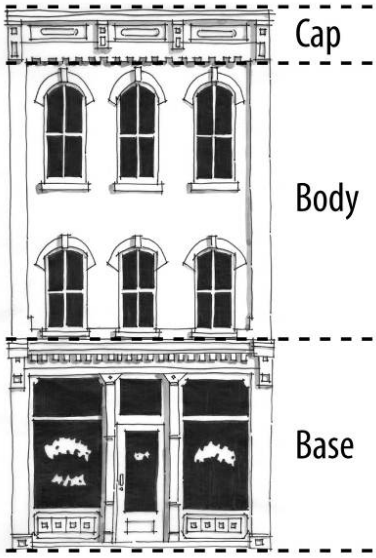
A. Rooftop Equipment: All rooftop equipment shall be screened from view to the extent practical. If, due to the topography of the site, a physical screen would not suffice, alternative methods to minimize the negative aesthetics of the otherwise utilitarian equipment (e.g., painting the equipment to match the building) may be approved by the Administrator.

B. Wall Mounted Equipment: No wall-mounted building utility service equipment (e.g., electrical house panel boxes) shall be placed on the public street right-of-way side of the building.

5.6.5 FAÇADE ARTICULATION

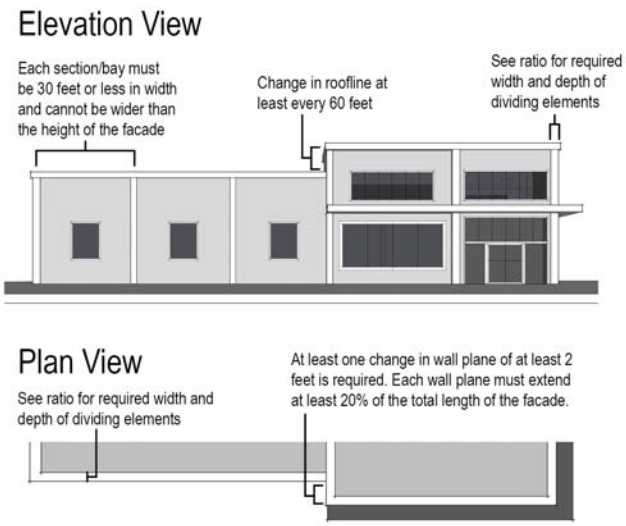
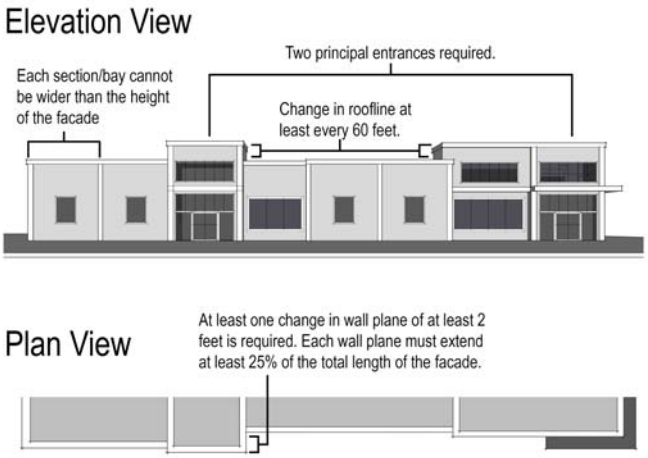
Articulation involves the horizontal and vertical variation of the façade so that walls are subdivided into bays or sections that are vertically proportioned. The following provisions for façade articulation shall apply to any façade visible from a public street or civic space. For buildings set back more than 200 feet from the street, the standards in this subsection apply only to the primary façade facing the street.

A. Vertical Elements: All architectural elevations of principal buildings (over 20 feet in height) visible from a public street or civic space shall have a clearly discernible base, body, and cap. The base shall occupy the lowest portion of the elevation, shall have a height of at least 3 feet, and be constructed of a masonry material. The component described as the body shall constitute a minimum of 50% of the total building height. The cap shall occupy the highest portion of the elevation, excluding the roof, and shall have a dimension that does not exceed the height of the base. The cap shall consist of a cornice, parapet, awning, canopy, eave or other architectural treatment that visually performs in the same manner. The base and cap shall be clearly distinguishable from the body through changes in color, material, pattern, profile, or texture.



B. Expression of Entries: Each entryway shall have 1 or more clearly defined, highly visible customer entrance facing the street. The entrance shall feature 1 or more of the following: canopies or porticos, arcades, arches, wing walls, and/or planters

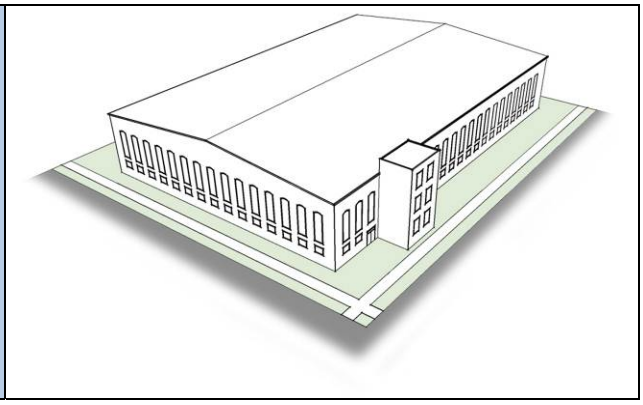
C. Articulation: The frontage of buildings shall be divided into architecturally distinct sections or bays with each section taller than it is wide, unless otherwise noted. Sections or bays shall be visually established by architectural features such as columns, ribs, pilasters or piers, changes in plane, or an equivalent element that otherwise visually subdivides the wall through at least 50% of its height. The following provisions shall apply:

Façade Width/Use Size	Maximum Bay/Section Width	Minimum Type/Depth of Articulation	Rooflines
a. Less than 60 feet	Not Applicable	Not Applicable	Not Applicable
b. 60 feet – 120 feet	30 feet with each section taller than it is wide	At least 1 change in wall plane is required with a minimum depth of 2 feet. No single wall plane may extend more than 80% of the length of the façade. The width of required dividing elements shall be between 1/8 and 1/10 the average height of the adjacent bays. The depth of the required dividing elements shall be at least 1/3 their width.	At least 1 change in roofline every 60 ft
			
c. Uses greater than 120 feet in width or 100,000 square feet whichever is less	Shall not exceed the height of the facade	No walls may extend more than 25% of the length of that side of the building without a minimum change in plane of 2 feet. A second principal entrance is required along frontage	At least 1 change in roofline every 60 ft
			

5.7 INDUSTRIAL BUILDINGS

INDUSTRIAL BUILDINGS
Industrial buildings are expected to be utilitarian in design to accommodate a wide range of internal activities that range from heavy machinery to storage. The industrial building typically has 4 yards (front yard; 2 side yards; and rear yard) to allow for site landscaping to soften the often long expanses of wall that are typical to this type.

Typological Variants
Industrial – Historic (multi-story)
Industrial Warehouse – New



5.7.1 APPLICABILITY

The following standards are applicable to all industrial buildings.

5.7.2 FACADE MATERIALS & COLORS

A. Materials: Industrial building walls shall be predominantly brick, stucco, architectural concrete masonry units (CMU), or EIFS. Vinyl or metal sheeting is prohibited on the front elevations and any side elevations within 20 feet of the front elevation. Under no circumstances shall unfinished concrete block be permitted.

B. Material Colors: Facade colors shall be of low reflectance earth tone, muted, subtle, or neutral colors. Building trim may feature brighter colors as an accent material. The use of high-intensity, metallic, fluorescent, day glow, or neon colors shall be prohibited. Variations in color schemes are encouraged in order to articulate entry ways and public amenities so as to give greater recognition to these features.

C. Submittals: Color samples shall be provided to the staff at the time of site plan review and prior to renovations, remodelings, facelift, and repainting, along with a description of how and where each color will be used. Colored renderings shall also be required.

5.7.3 FAÇADE ARTICULATION

Articulation involves the horizontal and vertical variation of the façade so that walls are subdivided into bays or sections that are vertically proportioned. The following provisions for façade articulation shall apply to any façade visible from a public street or civic space. For buildings set back more than 200 feet from the street, the standards in this subsection apply only to the primary façade facing the street.

A. Articulation

1. The frontage of buildings shall be divided into architecturally distinct sections or bays with each section taller than it is wide.
2. Sections or bays shall be visually established by architectural features such as columns, ribs, pilasters or piers, recesses, projections, windows, awnings, arcades or an equivalent element that visually subdivides the wall through at least 50% of its height.

3. The width of required dividing elements shall be between 1/8 and 1/10 the average height of the adjacent bays. The depth of the required dividing elements shall be at least 1/3 their width.

5.7.4 ROOFTOP EQUIPMENT

All rooftop equipment shall be screened from view to the extent practical given the varied topography of Wake Forest. If, due to the topography of the site, a physical screen would not suffice, alternative methods to minimize the negative aesthetics of the otherwise utilitarian equipment (e.g., painting the equipment to match the building) may be approved by the Administrator.

5.8 MANUFACTURED HOMES

5.8.1 APPLICABILITY

All manufactured homes permitted shall comply with the requirements of 5.3 above (unless the standards below conflict and shall therefore take precedence) and must comply with the standards established by the United States Department of Housing and Urban Development under the National Manufactured Housing Construction and Safety Act of 1974, 42 U.S.C. § 5401, et seq and that satisfies each of the following additional criteria:

5.8.2 STANDARDS

A. The manufactured home is set up in accordance to the standards set by the North Carolina Department of Insurance in the current edition of the North Carolina Regulations for Manufactured Homes, including, but not limited to, all footings, supporting piers, anchors, and tie downs.

B. The tongue, axles, running lights and removable towing apparatus must be removed prior to the issuance of a certificate of occupancy.

C. The manufactured home shall be attached to a permanent foundation of brick, stone, concrete, framing or block that is unpierced except for required ventilation and access as required by the North Carolina State Building Code or for flood hazard construction. If the masonry foundation is not brick, stone, or architectural concrete block it shall be parged (coated with a mortar-like finish) on the visible side.

D. The pitch of the roof of the manufactured home has a minimum vertical rise of 3 inches for every 12 inches of horizontal run.

E. The roof must be covered with a material that is customarily used on site-built dwellings. Aluminum or metal roofing is not permitted unless standing seam metal roofing or metal shingles are utilized.

F. The roof shall have a minimum eave projection and roof overhang of 6 inches, not including the gutter.

G. Exterior siding shall be of a material customarily used on site-built dwellings which does not have a high gloss finish, such as wood, conventional vinyl or metal siding, brick, stucco or similar materials. Smooth, ribbed or corrugated metal or plastic panels are not permitted.

H. Stairs, porches, entrance platforms, ramps, and other means of entrance and exit to and from the home are installed in accordance with the requirements of the North

Carolina State Building Code, attached firmly to the primary structure, and anchored securely to the ground.

I. Other than those within the manufactured home itself, all installations of plumbing and electrical wiring and all gas and oil appliances shall comply with the provisions of the building, plumbing, electrical, heating, and gas regulations of the North Carolina State Building Code.

J. The length of the home shall not exceed 4 times the width, excluding additions.

K. Architectural and aesthetic standards specified in this section shall be applicable to all additions.

L. At the main entrance door there shall be an entryway transition, such as a porch or stoop, that is a minimum 6 feet by 6 feet.

M. The manufactured home must contain a minimum of 900 square feet of enclosed living space.

N. Empty liquefied petroleum gas containers and other objects and materials not approved by the Wake Forest Fire Department shall not be stored under manufactured homes.

O. The siding color shall be compatible with the immediate neighborhood and shall not have a reflectivity exceeding that of white paint.

It is the intent of these criteria to ensure that a Class A Manufactured Home, when installed, shall have substantially the appearance of an on-site, conventionally built, single-family home.

5.9 DISCRETIONARY REVIEW STANDARDS

The requirements of this chapter are intended to facilitate a wide variety of uses in close proximity to one another through the use of detailed design standards that address the key considerations of the pedestrian realm. That is, their primary focus is on the ground floor and those portions of the building that are most readily visible to a typical pedestrian. A secondary focus is the overall aesthetic of community and the visual perceptions that encourage a vibrant economy. The general standards noted below are intended to be used by the Design Review Board in their review of those applications that require additional review beyond the detailed building type design provisions found in the subsequent sections. Each application shall be considered unique to the sponsoring applicant and location and therefore shall not be bound by previous decisions as precedents.

5.9.1 CONFORMITY TO THE COMMUNITY PLAN PRINCIPLES FOR BUILDING AND SITE DESIGN

A. New, expanding, or improved businesses should employ architectural standards consistent with Wake Forest's architectural character and should avoid standard prototype designs otherwise employed in "Anywhere, USA".

B. Exceptional locations, views and vistas in the town should receive exceptional treatment and/or protection in design and development.

C. Noteworthy buildings, important outdoor spaces, objects of historic merit, important monuments, and significant works of art should be placed in positions of visibility and prominence. Their placement should be coordinated with street design.

D. Significant natural and existing man-made elements should be incorporated into the thematic design of new developments.

E. Large trees, ponds, creeks, or other natural features of the landscape should be saved when locating new streets, buildings, parking lots, etc.

F. Community character should be supported by development that is compatible when considered within the context of the surrounding area.

G. Exterior lighting should be attractive, functional and safety conscious, while also avoiding negative impacts on the night sky visibility of Wake Forest.

5.9.2 DESIGN AND CONSTRUCTION EXCELLENCE

All buildings should be constructed as permanent additions to the long-term vibrancy of the town and should serve to exemplify the very best architectural designs and building practices.

5.9.3 MATERIALS & COLORS

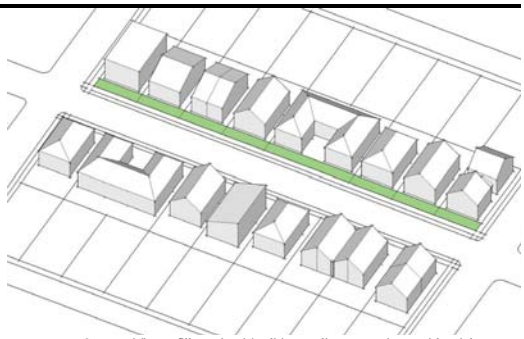
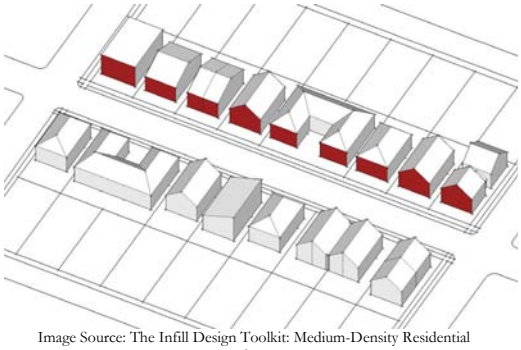
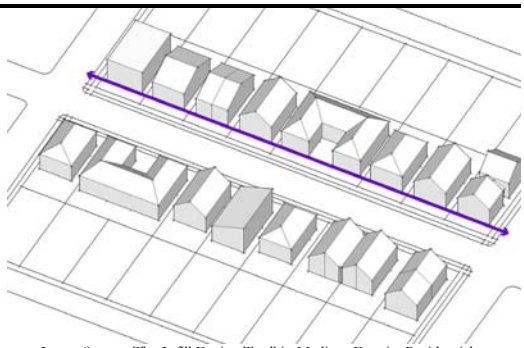
A. Building Materials: The predominant material palette for non-residential structures in Wake Forest is brick. Other acceptable exterior primary wall materials for such buildings include stacked stone, lap siding (cementitious fiber board), stucco, stone/stone masonry units, and architectural concrete masonry units (CMU). Exterior insulation finishing systems (EIFS) may be used as a secondary building material. Under no circumstances shall unfinished concrete block be permitted. No vinyl or metal siding shall be attached to any side of a civic/institutional building that is visible from a public street.

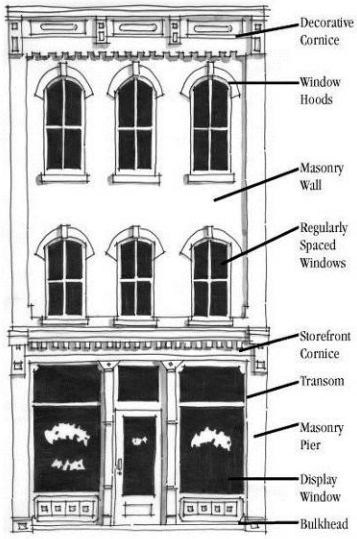
B. Material Colors: Facade colors shall be of low reflectance earth tone, muted, subtle, or neutral colors. Building trim may feature brighter colors as an accent material. The use of high-intensity, metallic, fluorescent, day glow, or neon colors shall be prohibited. Variations in color schemes are encouraged in order to articulate entry ways and public amenities so as to give greater recognition to these features.

C. Submittals: Color samples shall be provided to the staff at the time of site plan review and prior to renovations, remodelings, facelift, and repainting, along with a description of how and where each color will be used. Colored renderings shall also be required.

5.9.4 COMPATIBILITY

A. All development subject to this section shall be compatible with the established architectural character of the town by using a design that is complementary to existing town architectural styles, designs, and forms. As a means to provide guidance for the design of buildings that integrate well into the context of Wake Forest, this section has identified 8 key features necessary to ensure compatibility:

1. **Street Frontage:** Along residential side streets, limit interruptions to front setback landscaping. A key way of achieving this is by preserving existing front yard landscaping and minimizing the amount of frontage devoted to paved vehicle areas.	 Image Source: The Infill Design Toolkit: Medium-Density Residential Development City of Portland Bureau of Planning, December, 2008
2. **Rhythm Of Development Along The Street:** Continue established building rhythms along street frontages. Avoid monolithic massing that disrupts fine-grain neighborhood or mixed-use corridor pattern.	 Image Source: The Infill Design Toolkit: Medium-Density Residential Development City of Portland Bureau of Planning, December, 2008
3. **Building Frontages:** Along street frontages, orient windows, main entrances, and other primary building façade elements toward the street. Care should be taken to avoid the appearance of buildings turning their backs or sides toward the street. Courtyard buildings can contribute to this by orienting main entrances toward courtyards that serve as a semi-public extension of the public realm of adjacent streets.	Image Source: The Infill Design Toolkit: Medium-Density Residential Development City of Portland Bureau of Planning, December, 2008
4. **Front Setback Patterns:** Continue established building setback patterns, where this is a neighborhood priority and is practical. Note: Deep front setbacks can compromise the ability to provide backyard space and/or rear parking, particularly at higher densities.	 Image Source: The Infill Design Toolkit: Medium-Density Residential Development City of Portland Bureau of Planning, December, 2008

5. **Landscaping And Trees:** Use landscaping and trees to achieve compatibility in areas where these are unifying elements of community character.	
6. **Viewshed Protection:** Important vistas and views of the Southeastern Baptist Theological Seminary's church steeple shall be protected and accentuated to the extent practical.	
7. **Architectural Features:** Consider designing buildings to respond to prevalent architectural features of the surrounding context, especially in areas where patterns established by recurring architectural features are well-documented and valued. Consideration should also be given to avoid mimicry of existing buildings, so that opportunities for the continuation of the evolution of architectural style are not stifled.	
8. **Street Vistas:** Important street vistas (such as along town gateways and primary pedestrian streets) should terminate in a focal point, such as a building or other architectural or landscape feature.	

6 SUBDIVISION & INFRASTRUCTURE STANDARDS

6.1 PURPOSE AND INTENT

The purpose of this chapter is to establish criteria for the site development and subdivision of real property within the jurisdiction of the Town of Wake Forest. These standards are set forth to:

- Provide for the orderly growth and development of the Town of Wake Forest; and
- Coordinate proposed development with existing development and with officially adopted plans for the future development of the town; and
- Provide for suitable residential and nonresidential development with adequate streets, utilities and appropriate building sites; and
- Ensure the proper legal description, monumentation, and recordation of subdivided land; and
- Create conditions essential to public health, safety, and general welfare.

6.2 APPLICABILITY

6.2.1 AUTHORITY AND APPLICABILITY

A. Authority: According to the provisions of NCGS 160A-371, the Town of Wake Forest has the authority to regulate the subdivision of land within its territorial jurisdiction.

B. Subdivision Defined: For the purposes of this ordinance, "subdivision" shall mean all divisions of a tract or parcel of land into 2 or more lots, building sites, or other divisions for the purpose of sale or building development (whether immediate or future) and shall include all divisions of land involving the dedication of new streets or a change in existing streets.

C. Statutory Exemptions: The following are not included within the definition for subdivision above and are exempt from the regulations of this ordinance. All such exempt documents or plats to be recorded shall bear the notation, "Exempt pursuant to the Town of Wake Forest Unified Development ordinance," and the signature of the Administrator before being presented for recordation.

1. The combination or recombination of portions of previously subdivided and recorded lots where the total number of lots is not increased and the resultant lots meet or exceed the standards of the UDO; or
2. The division of land into parcels greater than 10 acres in size where no street right-of-way dedication is involved; or
3. The public acquisition by purchase of strips of land for the widening or opening of streets or for public transportation corridors; or
4. The division of a tract in single ownership whose entire area is no greater than 2 acres into not more than 3 lots, where no street right-of-way dedication is involved, and where the resultant lots meet or exceed the standards of the UDO.

D. Site Plans Defined: A site plan is an architectural and/or engineering drawing of proposed improvements for a specific location that depicts such elements as building footprints, driveways, parking areas, drainage, utilities, lighting, and

landscaping. The specific elements that are required of Site Master Plans, Site Construction Plans and Final Plats are outlined in Section 15.4.

E. Conformity Required: From and after the adoption of this ordinance, no real property lying within the jurisdiction of the Town of Wake Forest shall be developed or subdivided except in conformance with all applicable provisions of this ordinance.

6.2.2 REQUIRED CONFORMANCE TO THE WAKE FOREST SPECIFICATIONS MANUAL

The Town of Wake Forest Manual of Specifications, Standards and Design (MSSD) is herein incorporated by reference. Conformance to the MSSD is required in addition to the standards in this ordinance.

6.2.3 PROVISION OF SERVICES AND ACCEPTANCE BY TOWN

According to the Town of Wake Forest Streets and Utilities Acceptance Policy, no street shall be maintained or accepted by the town, nor shall any water or sewer service be extended to or connected with any subdivision of land, nor shall any permit be issued by an administrative agent or department of the Town of Wake Forest for the construction of any building or other improvement requiring a permit, upon any land for which a plat is required to be approved, unless and until the requirements set forth in this ordinance and the MSSD and all other applicable municipal, county, State and Federal requirements have been complied with and the Final Plat has been approved and recorded with the Wake County Register of Deeds.

6.3 REQUIRED IMPROVEMENTS FOR ALL DEVELOPMENT

All required improvements set forth in this chapter shall be installed or constructed by the developer at no cost to the town except as may otherwise be specifically provided herein or by town policy or agreement. Required improvements under this chapter shall not be installed or constructed until required construction plans have been approved by the Administrator. Improvements shall be required according the districts established in Chapter 2 as outlined in the following table:

	Zoning Districts													
Required Improvements	RD	GR3	GR5	GR10	NB	HB	ICD	LI	HI	UR	RMX	RA-HC*	NMX	UMX*
Underground Drainage*	-	-	X	X	X	X	X	X	X	X	X	X	X	X
Curb and Gutter*	-	-	X	X	X	X	X	X	X	X	X	X	X	X
Public Water and Hydrants	-	X	X	X	X	X	X	X	X	X	X	X	X	X
Public Sewer	-	X	X	X	X	X	X	X	X	X	X	X	X	X
Street lights	-	X	X	X	X	X	X	X	X	X	X	X	X	X
Street trees	-	X	X	X	X	X	X	X	X	X	X	X	X	X
Paved Streets	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Street signs (public streets)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Underground Wiring	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Park/Open Space	X	X	X	X	-	-	X	-	-	X	X	X	X	X
Sidewalks*	See Section 6.8.1													

** The Administrator may waive or alter requirements for underground drainage and curb and gutter according to the stormwater management exemptions granted in Section 12.5.1. In certain situations, such waiver or alteration may be dependent upon the use of approved Low Impact Development Infrastructure subject to the provisions of Chapter 12.*

6.3.1 CONNECTION TO MUNICIPAL WATER SUPPLY AND SANITARY SEWER SYSTEMS

A developer shall connect all lots shown on the Subdivision Plat with the municipal water supply and sanitary sewage systems according to the requirements of the City of Raleigh Public Utilities Department, The Town of Wake Forest, and the table below.

	Distance to Municipal Water Supply of Sewage System*			
Number of Lots	0 ft to 300 ft	301 ft to 500 ft	501 ft to 1,000 ft	1,001 ft or more
5 to 20	X	•	•	•
21 to 50	X	X	•	•
51 to 100	X	X	X	•
100 or more	X	X	X	X

X - Indicates the developer MUST connect the subdivision with the municipal water supply and sewage systems at their expense.

• - Indicates the developer MAY connect the subdivision with the municipal water supply and sewage systems at their expense.

* If any part of the subdivision lies within the specified distance, the entire subdivision is considered within the specified distance.

6.3.2 STREET TREES

The location and specification of trees to use in the public right of way is provided in Section 8.6 and in the Wake Forest Official Planting List maintained by the Urban Forestry Board.

6.3.3 STORM DRAINAGE & FLOOD PREVENTION

A. A developer shall provide an adequate drainage system, including necessary open ditches, pipes culverts, drop inlets, bridges, fill-in lots, etc. for the proper drainage of all surface water, according to the provisions of this section, Chapter 12 of this ordinance and the requirements of the MSSD. The developer shall provide the storm water system necessary to carry the water in a manner approved by the Administrator.

B. All storm drainage shall be designed to accommodate the following design storm frequency:

1. Storm Sewer Collection: 10-year storm

2. Ditch Cross Drainage: 25-year storm

3. Catch Basins: 2-year storm

C. Stormwater Best Management Practices and Low Impact Development Techniques are encouraged in the design of all subdivisions and developments. See the *North Carolina Division of Water Quality: Stormwater Best Management Practices Manual* and the *North Carolina Cooperative Extension: Low Impact Development Guidebook*.

D. All development proposals shall be consistent with the need to minimize flood damage according to the provisions of Chapter 12 of this ordinance. All development proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage. All subdivisions and developments shall have adequate drainage provided to reduce exposure to flood hazards.

6.3.4 STREET NAME SIGNS

A. Appropriate street name signs which meet standard municipal specifications shall be placed at all street intersections. The developer shall bear the expense.

B. Proposed street names shall be submitted and subject to the approval of Wake County or Franklin County as appropriate. New names shall not duplicate or be similar to existing street names. Existing street names, however, shall be extended where appropriate.

6.3.5 WASTE MANAGEMENT

The developer shall provide for adequate waste collection and disposal as outlined in the Town of Wake Forest Code of Ordinances.

6.3.6 SUBDIVISION SURVEYS

Prior to the approval of a Final Plat, the following survey reference markers shall be installed.

A. Permanent Concrete Monuments: Permanent concrete monuments 4 inches in diameter or square, 3 feet long, shall be placed at not less than 2 corners of the subdivision and at all corners of all intersections, provided that additional monuments shall be placed where necessary so that no point within the subdivision lies more than 500 feet from a monument. Two or more of the required monuments shall be designated as control corners. The top of each monument shall have an indented cross, metal pin, or metal plate to identify properly the location of the point. All monuments shall be shown on the Final Plat.

B. Markers: All lot corners, all points where the street lines intersect the exterior boundaries of the subdivision, and all angle points and points of curve in each street shall be marked with iron pipe either 3/4 inches or one inch in diameter and 18-24 inches long, driven so as to be within one inch of finished grade.

C. Property Corner Tie: One or more corners of the subdivision shall, by a system of azimuths or courses and distances, be accurately tried to a monument of some United States or State Agency Survey System, such as the United States Coast and Geodetic Survey Systems, where such monument is within 2,000 feet of said corner. Where the North Carolina Grid System coordinates of said monument have been published by the North Carolina Department of Natural and Economic Resources, the coordinates of the referenced corner shall be computed and shown X and Y ordinates on the map. Where such a monument is not available, the tie shall be made to some pertinent and permanent recognizable landmark or identifiable point.

D. Accuracy: The angular error of closure shall not exceed 25 seconds times the square root of the number of angles turned. The linear error of closure shall not exceed one foot per 10,000 feet of perimeter of the lot or tract of land. The accuracy of the survey shall be designated on the Final Plat.

6.3.7 OVERSIZED IMPROVEMENTS AND REIMBURSEMENTS

Where deemed necessary, in the interest of the health, safety, and general welfare of the residents of Wake Forest, the developer shall make certain water and sewer improvements at sizes in excess of those which would normally be required to serve only the subdivision. Where such oversized improvements are required, the developer shall be reimbursed for costs incurred over and above those required to serve the subdivision, according to the adopted water and sewer extension policy of the City of Raleigh Public Utilities Department.

6.3.8 TIME LIMIT FOR COMPLETION OF IMPROVEMENTS

A. Time Limit: Improvements must be completed by the developer for each phase of a development before any of the following occur:

1. 80% of the building construction work is complete in the recorded phase.

2. 2 years have passed since the subdivision or master plan plat, or phase thereof, has been recorded.

3. 1 year has passed since the approval of the performance guarantee as outlined in Section 6.12.

B. Extension of Time Limit: This time limit may be extended at the discretion of the Administrator upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other regulatory permits, financing institution delays, or other similar reasons beyond the control of the applicant.

6.4 LAND SUITABILITY

Land subject to flood hazard, improper drainage, or erosion; OR land that has been used for the disposal of solid waste; OR land that is for other reasons unsuitable for residential or commercial use as determined by the Administrator, shall not be platted or developed for any uses that will continue or increase the danger to health, safety, or property unless the hazards can be and are corrected.

6.4.1 FLOOD HAZARD AREA

Special Flood Hazard Areas and Floodway Areas in Zone AE subject to periodic inundation by 1% annual flood as shown on FEMA flood insurance rate maps shall be identified on all plats. Special Flood Hazard Areas shall be built on only in accordance with Section 12.4 of this ordinance. No grading, clearing, removal of significant vegetation, placement of structures, fill, or any other encroachment activity shall occur within designated Special Flood Hazard Areas which would interfere with the natural water course without approval from the Administrator based upon certification that such activity mitigates the potential adverse impact to flood hazard. Streets, utility lines and structures may be placed within the Special Flood Hazard Area only if their elevation is raised above maximum flood heights or if they are otherwise flood protected.

6.4.2 WATERSHED DEVELOPMENT

All land located within a Watershed Protection Overlay District shall comply with the provisions of Sections 2.4.5, 12.6 and all other provisions of this ordinance regarding Watershed Protection.

6.4.3 LANDFILL DEVELOPMENT

Land that has been used for the disposal of solid waste and not adequately mitigated shall not be subdivided into commercial or residential building sites. This includes areas that have been used, and not adequately mitigated, for the disposal of trash, demolition waste, construction debris, stumps, and other waste materials.

6.5 CONNECTIVITY

6.5.1 STREET NETWORK

A. General: Streets shall be designed and located in proper relation to existing and proposed streets, to the topography, to such natural features as streams and tree growth, to public safety and convenience, and to the proposed use of land to be served by such streets. All proposed streets shall provide for the appropriate projection of principal streets in surrounding areas and provide reasonable access for surrounding acreage or tracts. Requirements may vary at the discretion of the Administrator where compliance is determined not feasible because of topography, the existence of environmentally sensitive lands, the need to preserve cultural resources, and/or other similar considerations.

B. Streets to be Interconnected: All streets shall be designed to form part of an interconnected street pattern. Streets must connect with adjacent street networks to the extent possible. Street designs will be assessed, in terms of meeting this interconnectivity standard, on their ability to: permit multiple routes between origin/destination points; diffuse traffic; and, shorten walking distances.

C. Block Lengths: Block lengths shall adhere to the standards in the following table:

	Minimum Block Length	Maximum Block Length
Rural & Suburban Districts*	250 feet	800 feet
Urban Districts *	250 feet	400 feet

**District classifications as urban vs. rural & suburban is outlined in Section 2.2*

D. Block Width: Blocks shall have sufficient width to provide for 2 tiers of lots of appropriate depth except where otherwise required to separate residential development from through traffic.

E. Cul-de-Sacs: Permanent dead-end streets or cul-de-sacs shall be no longer than 400 feet. In general, streets with one end permanently closed shall be avoided unless the design of the subdivision and the existing or proposed street system in the surrounding area clearly indicates that a through street is not essential at the location of the proposed cul-de-sac.

F. Reserve Strips Prohibited: Reserve strips and non-access easements adjoining street rights-of-way for the purpose of preventing access to or from adjacent property (except those required by the Board of Commissioners to prevent access to thoroughfares), and half-streets shall not be permitted.

G. Subdivision Access Points: Subdivisions shall maintain external access points through street connections to existing roads and/or stubs to future development at the rate of at least one external access point for every 100 single family lots.

H. Street Stubs:

1. **Connection to Street Stubs Required:** New developments shall connect to any existing street stubs from adjacent properties.

2. **Street Stub Prioritization:** New development shall stub to all adjacent properties where practical at the rate of at least one street stub per 800 feet of property boundary when connecting to rural and suburban districts and at least

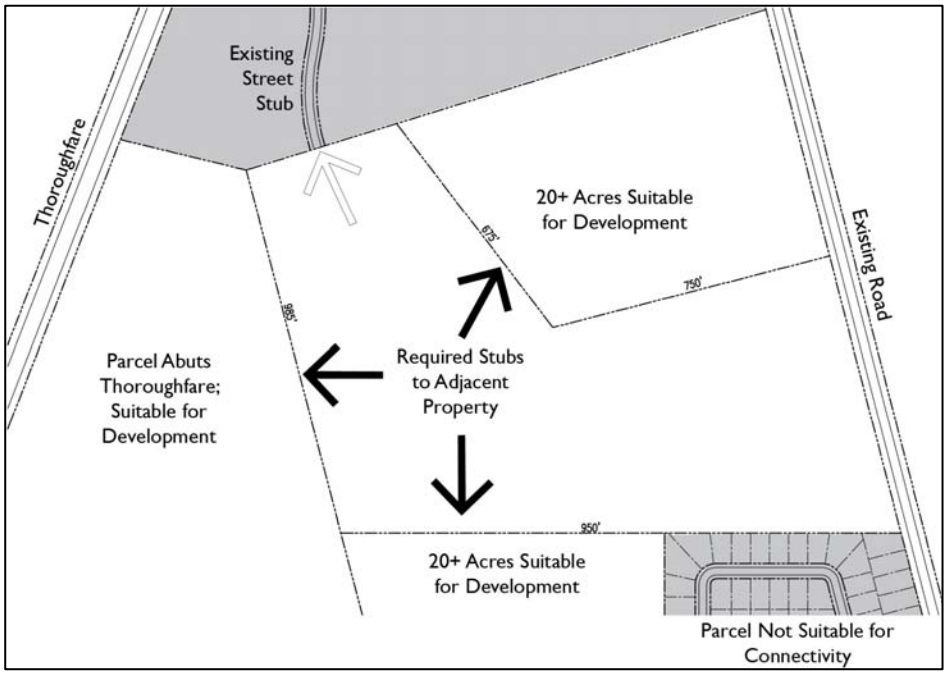
one stub per 400 feet when connecting to urban districts. The location of new required street stubs shall be prioritized as follows: (See illustration below)

a. Adjacent parcels 20 acres or greater

b. Adjacent parcels that abut or are traversed by existing or proposed thoroughfares or collector streets.

c. Where any adopted transportation or land use plan recommends a street connection.

d. Where a required street stub necessitates the crossing of a stream or designated drainageway at the property line to make the required connection to an adjacent parcel, the owner or applicant shall provide a payment in lieu of building the stream crossing equal to half the total cost of the construction based on an engineer certified estimate. Such payment shall be set aside to offset the cost of constructing the stream crossing for future development.



3. **Stub Street Details:** Stub streets and streets intended for extension during future phases shall be designed and constructed to the property line or as close to the line, vertically and horizontally, as practical. It shall be the responsibility of the second development to construct the connection to an existing stub street. Stub streets shall not exceed 150 feet in length without a paved turnaround (permanent or temporary). A clearly visible street sign shall be erected at the end of the stub street stating that the street is planned to connect to a future street. See MSSD for sign specifications.

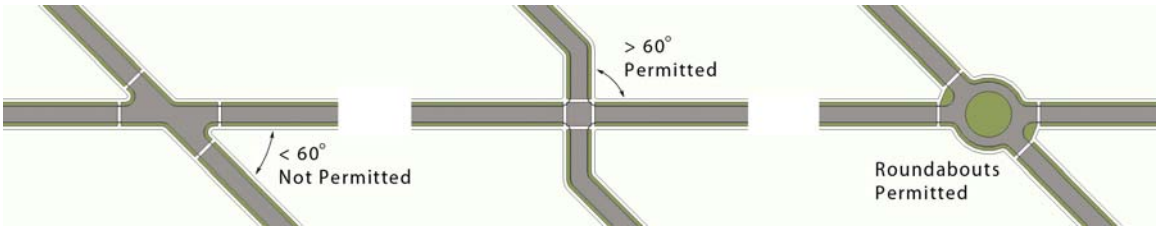
I. Developer Responsible for Grading, Paving and Drainage: In all cases the developer shall be responsible for the cost and installation of the street foundation, paving of all streets and appropriate curbs and gutters as provided on the approved Construction Plan in accordance with the specifications of the Town of Wake Forest and the Division of Highways, N. C. Department of Transportation and Highway Safety. The installation of all street elements shall be in accordance with the MSSD.

6.5.2 INTERSECTIONS

Street intersections shall be designed in the following manner:

A. No more than 2 streets shall intersect at one point, unless the intersection is designed as a roundabout.

B. Streets shall intersect as nearly as possible at right angles, and no street shall intersect any other street at an angle of less than 60 degrees, unless the intersection is designed as a roundabout, as illustrated below.



C. Intersections with major thoroughfares shall be at least 800 feet apart, measured from centerline to centerline. The Board of Commissioners may waive this requirement if such requirement would prevent a property owner fronting on a major thoroughfare from having access to such a facility.

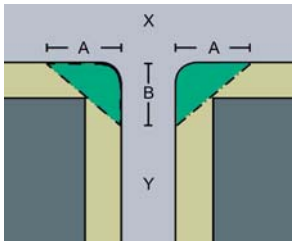
D. Street jogs with centerline offsets of less than 150 feet are prohibited.

E. Property lines at street intersections shall be rounded with a minimum radius of 20 feet.

F. All proposed connections to NCDOT roads shall meet the criteria of the latest revisions of the NCDOT "Subdivision Roads Minimum Construction Standards," and the "Policy on Street and Driveway Access to North Carolina Highways."

G. At all intersections nothing shall be erected, placed, planted, or allowed to grow in such a manner as to materially impede vision above a height of 3.5 feet and within the sight triangle area, formed by a diagonal line between 2 points on the rights-of-way lines, as specified by the illustration at right and the corresponding table below.

Intersection Type (See Diagram at Right)	Required Distance
If X and Y = Wake Forest Streets	A = 25 feet, and B = 25 feet
If X = Wake Forest Street, and Y = Driveway	A = 15 feet, and B = 10 feet
If X or Y = NCDOT Street	NCDOT standards shall apply



6.5.3 PEDESTRIAN/BICYCLE CONNECTIONS

A. Connections to Greenways and Parks: When a development abuts greenways, parks and open space areas, pedestrian/bicycle accessways must be provided at a minimum of every 600 feet when feasible as determined by the Administrator. Where a cul-de-sac street is permitted within a development, pedestrian/bicycle accessways to greenways, parks and open space areas must be provided where such streets back up to these areas.

B. Connection of Cul-de-sacs: Where 2 cul-de-sac streets end within 300 feet of each other, pedestrian/bicycle accessways shall be provided between the cul-de-sacs where feasible as determined by the Administrator.

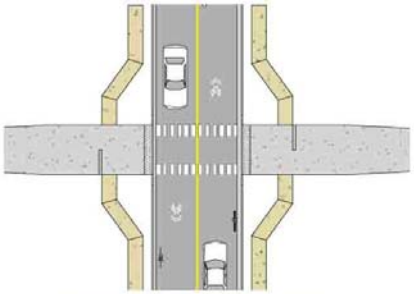
C. Dedication of Pedestrian/Bicycle Accessways: Where pedestrian/bicycle accessways are required by this chapter, a strip of land of at least 20 feet in width shall be dedicated to the town or a homeowner's association to accommodate such pedestrian/bicycle accessways and shall be laid out along front, side or rear property lines. (Also see Section 6.10.1 – Easements and Dedications.)

D. Pedestrian/Bicycle Accessways to be Public: All pedestrian/bicycle accessways shall be maintained for use by the general public.

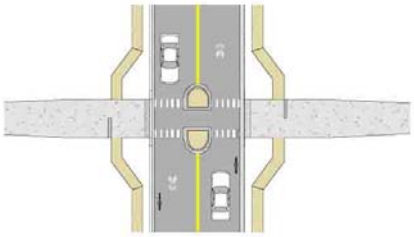
E. Minimum Width: Pedestrian/bicycle accessways shall not be less than 5 feet in width.

F. Surface Treatment of Accessways: Pedestrian/bicycle accessways shall comply with the Federal Americans with Disabilities Act. The surface of accessways shall be constructed of a smooth, compactable material that is accessible for wheelchairs and strollers, unless connecting to a greenway specified in the Wake Forest Open Space Greenway Plan as a Type 2 Trail (low-impact dirt or gravel trail).

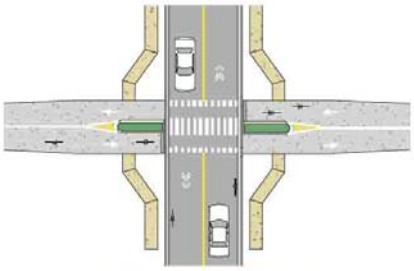
G. Midblock Crosswalks: A pedestrian crosswalk not less than 10 feet in width shall be required across any street 800 feet or more in length where deemed essential by the Administrator. When required such crosswalks shall utilize ladder striping to enhance their visibility.



MID-BLOCK INTERSECTION
Shared Use Path with Sidewalks



MEDIAN REFUGE
Shared Use Path with Sidewalks



MIDBLOCK CROSSING
Shared Use Path with Sidewalks and Medians

6.5.4 PUBLIC TRANSIT CONNECTIONS

Projects with 100 or more residential units or 100,000 square feet of non-residential space that are adjacent to present or planned transit routes shall provide adequate and well-located space for a shelter and bus drop-off area as specified by the local transit operator/authority.

6.6 IMPLEMENTATION OF TRANSPORTATION PLAN & TOWN STREET CLASSIFICATIONS

6.6.1 PROPOSED NEW STREETS

A. New Streets Designated in Transportation Plan: Where a proposed subdivision or development includes any part of a thoroughfare which has been designated as such on the officially adopted Town of Wake Forest Transportation Plan, as provided for by G.S. 136-66 and G.S. 160A, paragraphs 361 and 363, respectively, such part of such thoroughfare shall be reserved, platted, dedicated and constructed in the location shown on the plan and at the width specified in the Transportation Plan.

B. New Streets Not Designated in Transportation Plan: Where a proposed subdivision or development includes a new street which is not included in the Transportation Plan, the developer shall plat, dedicate and construct the street in accordance with one of the preferred street sections outlined in the Town Street Classifications in Section 6.7.2. The street classification chosen shall be approved by the Administrator and shall reflect the expected intensity of land uses fronting the proposed street and the needs of the surrounding street network. In special instances, as approved by the Administrator, required roadways may only need to be reserved or dedicated, not constructed.

6.6.2 EXISTING SUBSTANDARD STREETS

Development along existing streets of inadequate right-of-way shall provide additional right-of-way as follows:

A. Improvements Specified in Transportation Plan: For streets that have specific improvements outlined in the Wake Forest Transportation Plan, additional right-of-way shall be dedicated where necessary to meet the width specified in the Transportation Plan.

B. Improvements Specified in the Town Street Classifications: If the Transportation Plan does not outline specific improvements for a street, development along existing streets shall dedicate additional right-of-way where necessary to meet the minimum widths specified in the Town Street Classifications in Section 6.7.2.

C. Minimum Improvements: Where the existing street is not assigned specific improvements by the Transportation Plan, development shall provide a minimum sidewalk and planting zone according to the table below and the provisions in Section 6.8.

District	OS, RD	GR3, GR5, GR10, LI, HI	UR, RMX, NB, ICD, HB	HB, NMX	RA-HC, UMX
Minimum Sidewalk Width	n/a	5 feet	5 feet	8 ft sidewalk and 8 ft planting strip OR 12 ft sidewalk with tree wells	12 ft sidewalk and 6 ft planting strip OR 16 ft sidewalk with tree wells
Minimum Planting Strip Width	n/a	6 feet (curb) 8 feet (swale, GR3 only)	5 feet		

D. Determination of Required Right-of-Way Dedication: The entire right-of-way shall be provided where any part of a new subdivision or development is on both sides of an existing street, and one-half the required right-of-way measured from the center line of the existing street shall be provided where a new subdivision or development is located only on one side of an existing street. However, the development may not be required to construct a multilane facility unless a Transportation Impact Analysis (see Section 6.11) requires the additional capacity.

E. Installation of Required Street Improvements: In addition to dedication of rights-of-way where required, development along existing streets of substandard improvements shall install all required street improvements that occur outside the vehicular travel lanes, including, but not limited to, street trees, planting strips and/or tree wells, sidewalks, and multi-use paths. Lighting and street furniture shall be the responsibility of the town.

6.7 TOWN STREET CLASSIFICATION & DESIGN

The following standards are intended to provide general clarity for most conditions in Wake Forest. Deviations to these standards may be granted by the Administrator subject to generally accepted safety and engineering practices. For additional guidance, the town may use the "Designing Walkable Urban Thoroughfares: A Context Sensitive Approach" by the Institute of Transportation Engineers and the Congress for the New Urbanism or a similarly generally accepted document.

6.7.1 RULES FOR ASSIGNMENT OF APPROPRIATE STREET DETAILS

The illustration below is a simplified diagram of the many different parts that go into the assemblage of each street. Care should be taken to ensure that context plays a primary role in the selection of the various right-of-way elements.

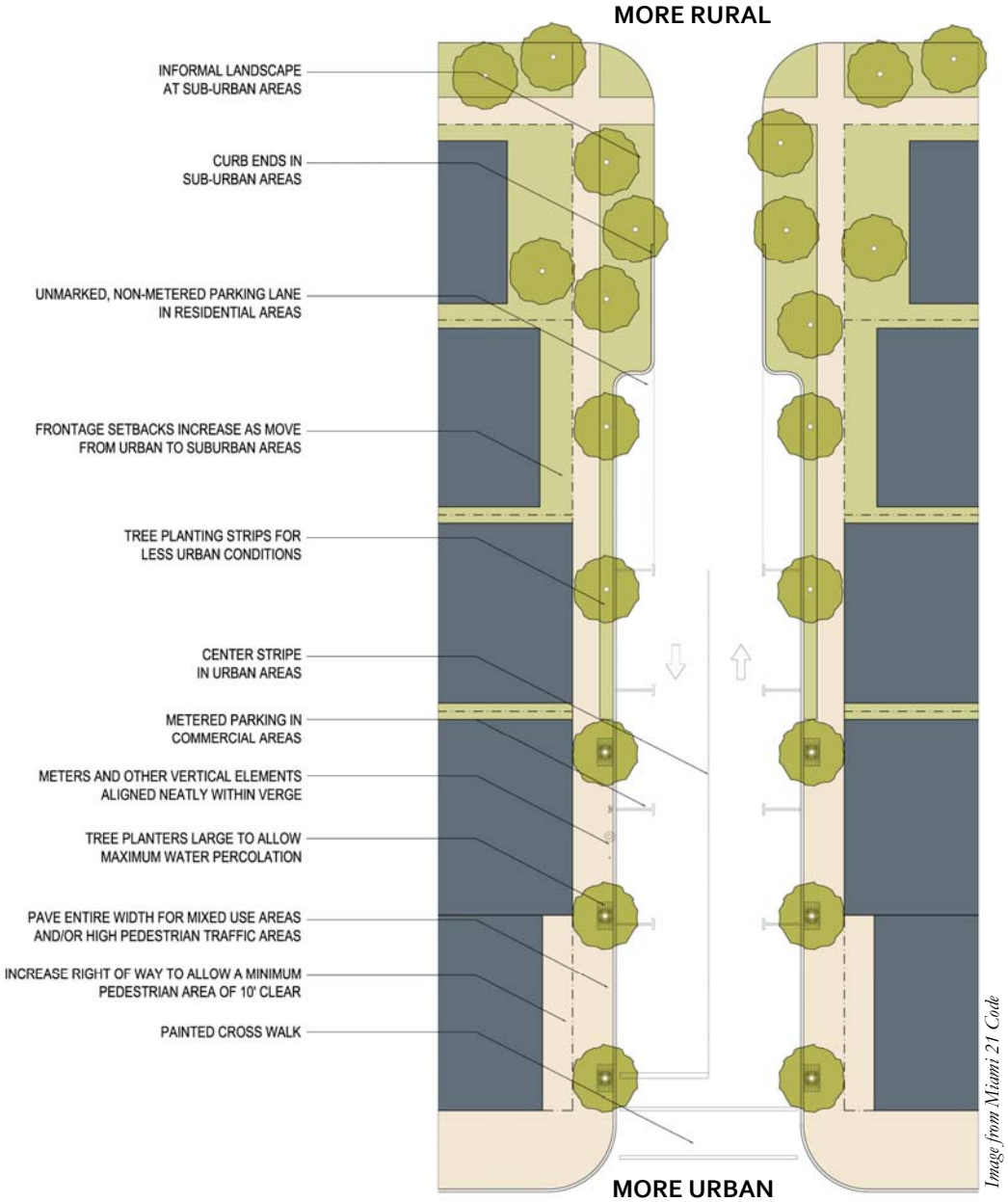


Image from Miami 21 Code

A. Rights-of-Way: The right-of-way should be the minimum required to accommodate the street, median, planting strips, sidewalks, utilities and maintenance consideration.

B. Measurement of Pavement Area Details: The dimensions established in Section 6.7.2 below for lane widths, sidewalks, bike lanes and parking lanes indicate the required face of curb to face of curb measurement, or to the edge of pavement for roadways with open drainage.

C. Turn Lanes: Dedicated right turn lanes, where required, may be taken from the parking lane.

D. Dimension Ranges: Where ranges are given, the project designer should consult with the Administrator as to the appropriate detail.

E. Street Names: Street names shall be subject to the approval of the Wake County GIS. New names shall not duplicate or be similar to existing street names. Existing street names; however, shall be projected where appropriate. The contractor is required to provide block numbers on all street signs.

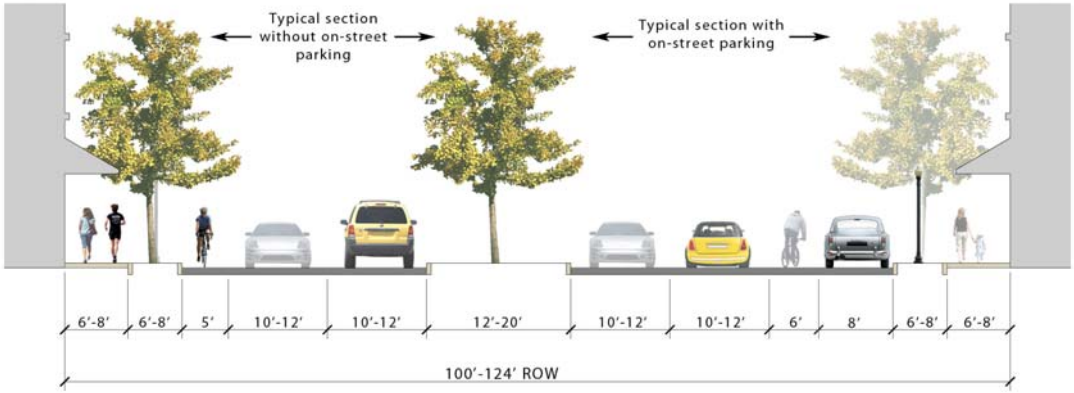
6.7.2 TOWN STREET CLASSIFICATIONS

The street sections in this section are intended to provide **typical** street sections for the purposes of identifying future improvements by both the town and fronting property owners.

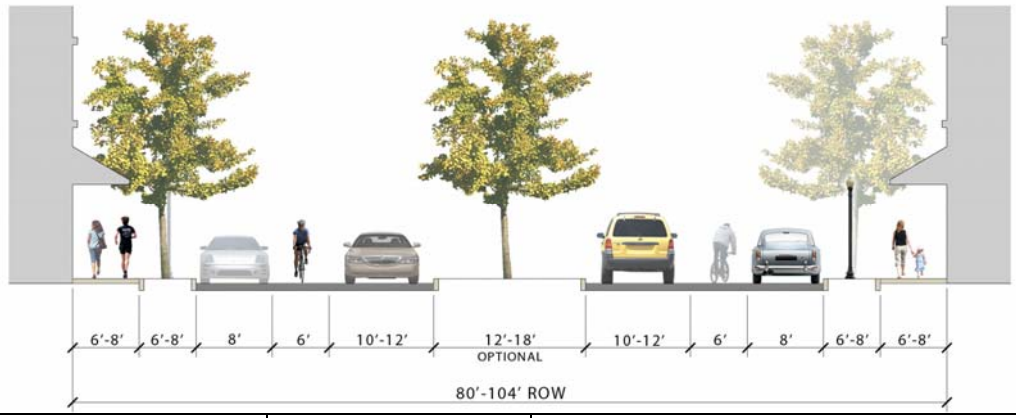
A. Concurrency with Transportation Plan: Unless otherwise indicated on the officially adopted Town of Wake Forest Transportation Plan, all streets, public or private, shall comply with the preferred arrangement indicated on the following street sections. Street sections may deviate from these standards where topographic and environmental conditions necessitate, as determined by the Administrator. The table below indicates which of these street sections correspond to the classifications required in the Transportation Plan.

	Corresponding Transportation Plan Classification					
UDO Street Type	Primary Major Thoroughfare	Secondary Major Thoroughfare	Local Major Thoroughfare	Minor Thoroughfare	Collector Street	Local Street
Urban Boulevard (6.7.2.B) ADT: 25,000 to 55,000*	•	•	•	•		
Avenue (6.7.2.C) ADT: 15,000 to 30,000*			•	•		
Commercial Street (6.7.2.D) ADT: 10,000 to 18,000*				•	•	
Large Residential Street (6.7.2.E) ADT: 2,500 to 15,000*					•	
Residential Yield Street (6.7.2.F) ADT: 0 to 1,000*					•	•
Lane (6.7.2.G) ADT: 0 to 3,000*						•
Alley (6.7.2.H) ADT: n/a (intended for limited access only)*						•

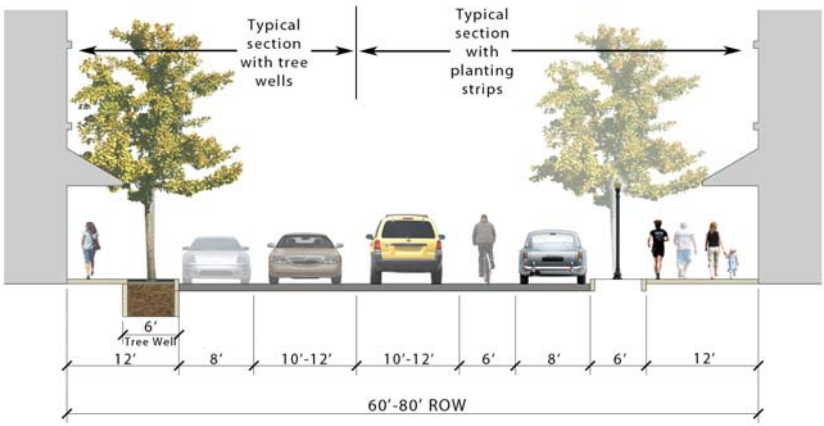
** ADT = Average Daily Traffic*



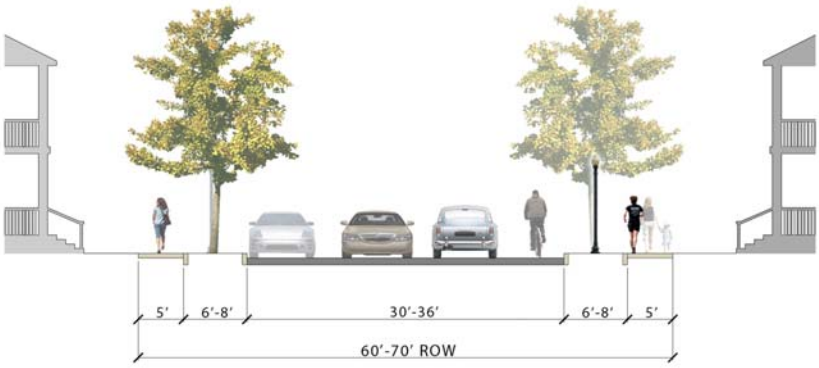
6.7.2.B Urban Boulevard Boulevards provide multi-lane access to commercial and mixed-use developments. Boulevards also serve to carry regional traffic throughout the town.	1. Right-of-Way Width	100 - 124 ft (Curb & Gutter)
	2. Lane Widths	10-12 ft
	3. Median Width	12-20 ft
	4. Design Speed	30-35 mph
	5. Traffic Lanes	4 lanes
	6. Parking Lanes	Both sides @ 8 feet marked (If Provided)
	7. Curb Radius	15-25 ft (See MSSD)
	8. Walkway Type	6 ft sidewalk both sides (Residential districts), 8 ft all other districts
	9. Planter Type	Continuous planting strip - 6 ft (curb) or 8 ft (swale)
	10. Pedestrian Facilities	Intersection bulb outs (Required) & Mid-block crosswalks
	11. Curb Type	Vertical curb & gutter or approved alternative (Additional right-of-way may be required for natural drainage sections)
	12. Landscape Type	1 canopy tree per 50 ft of street frontage (See also 8.6.1)
	13. Bicycle Facilities	5 ft Bike Lane (See also 6.10) or 6 ft w/on-street parking



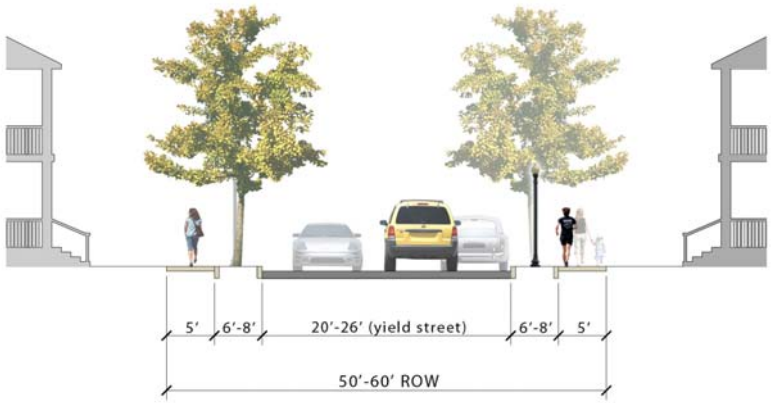
6.7.2.C Avenue Avenues serve as connectors between neighborhoods and area centers. As such, they are used both in residential and commercial areas, often terminating at prominent buildings or plazas. Avenues may also circulate around squares or neighborhood parks.	1. Right-of-Way Width	80 - 104 ft (Curb & Gutter)
	2. Lane Widths	10-12 ft
	3. Median Width	12-18 ft (optional)
	4. Design Speed	25-30 mph
	5. Traffic Lanes	2 lanes
	6. Parking Lanes	Both sides @ 8 feet marked
	7. Curb Radius	15-25 ft (See MSSD)
	8. Walkway Type	6 ft sidewalk both sides (Residential districts), 8 ft all other districts
	9. Planter Type	Continuous planting strip - 6 ft (curb) or 8 ft (swale)
	10. Pedestrian Facilities	Intersection bulb outs (Required) & Mid-block crosswalks
	11. Curb Type	Vertical curb & gutter or approved alternative (Additional right-of-way may be required for natural drainage sections)
	12. Landscape Type	1 canopy tree per 50 ft of street frontage (See also 8.6.1)
	13. Bicycle Facilities	5 ft Bike Lane (See also 6.10) or 6 ft w/on-street parking



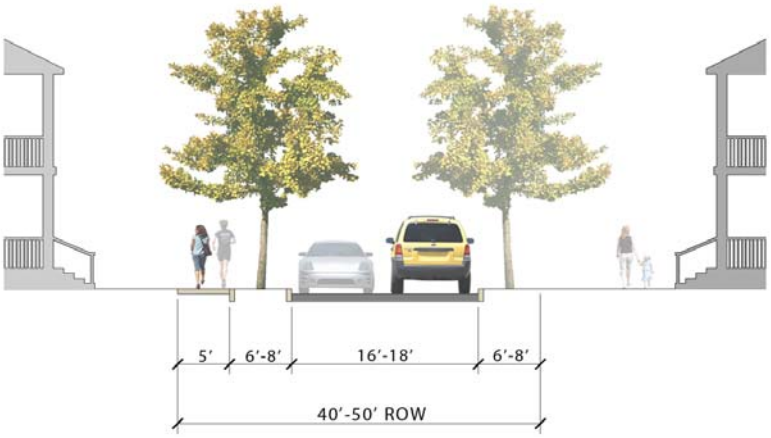
6.7.2.D Commercial Street Main streets are intended to provide access to neighborhoods and high density residential and commercial areas.	1. Right-of-Way Width	60 - 80 ft (Curb & Gutter)
	2. Lane Widths	10-12 ft
	3. Median Width	n/a
	4. Design Speed	20-25 mph
	5. Traffic Lanes	2 lanes
	6. Parking Lanes	Both sides @ 8 feet marked (Or One side only as appropriate)
	7. Curb Radius	15-25 ft (See MSSD)
	8. Walkway Type	12 ft sidewalk both sides (16 ft required for outdoor seating areas) (measured from back of curb to the outside edge of sidewalk)
	9. Planter Type	6 ft continuous planting strip or tree wells (included in walkway type dimension)
	10. Pedestrian Facilities	Intersection bulb outs (Required) & Mid-block crosswalks
	11. Curb Type	Vertical curb & gutter
	12. Landscape Type	1 canopy tree per 50 ft of street frontage (See also 8.6.1)
	13. Bicycle Facilities	5 ft Bike Lane (See also 6.10) or 6 ft w/on-street parking



6.7.2.E Large Residential Street Residential streets (large and yield types) serve as the primary transportation network in the community. Generally, Large Residential Streets serve as the primary travel routes and entryways through residential neighborhoods.	1. Right-of-Way Width	60 ft (Curb & Gutter), 70 ft (Swale)
	2. Pavement Width	30-36 ft
	3. Median Width	n/a
	4. Design Speed	20 mph
	5. Traffic Lanes	2 lanes
	6. Parking Lanes	Informal, one side only if bike lane is included
	7. Curb Radius	15 ft (See MSSD)
	8. Walkway Type	5 ft sidewalk both sides
	9. Planter Type	Continuous planting strip 6 ft (Curb) or 8 ft (Swale)
	10. Pedestrian Facilities	n/a
	11. Curb Type	Vertical curb & gutter, valley curb or approved alternative
	12. Landscape Type	1 canopy tree per 50 ft of street frontage (See also 8.6.1)
	13. Bicycle Facilities	Informal OR 5 ft Bike Lane (See also 6.10)

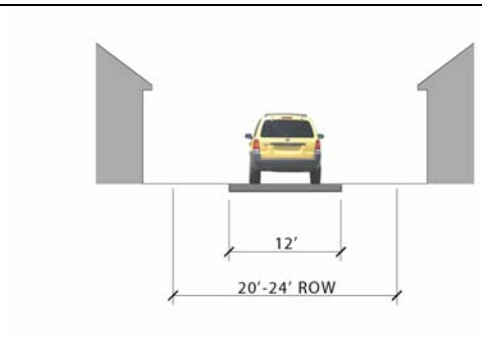


6.7.2.F Residential Yield Street Residential streets (yield and large types) serve as the primary transportation network in the community. Generally, Residential Yield Streets are 2 to 6 blocks in length.	14. Right-of-Way Width	50 ft (Curb & Gutter), 60 ft (Swale)
	15. Pavement Width	20-26 ft
	16. Median Width	n/a
	17. Design Speed	20 mph
	18. Traffic Lanes	2 lanes
	19. Parking Lanes	Informal, one side only
	20. Curb Radius	15 ft (See MSSD)
	21. Walkway Type	5 ft sidewalk both sides
	22. Planter Type	Continuous planting strip 6 ft (Curb) or 8 ft (Swale)
	23. Pedestrian Facilities	n/a
	24. Curb Type	Vertical curb & gutter, valley curb or approved alternative
	25. Landscape Type	1 canopy tree per 50 ft of street frontage (See also 8.6.1)
	26. Bicycle Facilities	Informal



6.7.2.G Lane Lanes are small traveled ways intended to provide direct access to the front of a limited number of single-family structures. Lanes are limited in the number of lots served. Generally, they are very short; often less than 400 feet. Items including, but not limited to, traffic carrying capacity, topography and connectivity, shall be a consideration when permitting a lane in lieu of a street.	1. Right-of-Way Width	40 ft (Curb & Gutter) or 50 ft (Open Drainage)
	2. Pavement Width	16 ft (Curb & Gutter)* or 18 ft (Open Drainage)*
	3. Design Speed	20 mph
	4. Traffic Lanes	2 lanes
	5. Parking Lanes	Informal, one side only if one way
	6. Curb Radius	15 ft (See MSSD)
	7. Walkway Type	5 ft sidewalk one side only (For R and SR Districts See 6.8.1)
	8. Planter Type	Continuous planting strip 6 ft (Curb) or 8 ft (Swale)
	9. Pedestrian Facilities	n/a
	10. Curb Type	Vertical curb & gutter or LID or Swale (Additional right-of-way may be required for natural drainage sections)
	11. Landscape Type	1 canopy tree per 50 ft of street frontage (See also 8.6.1)
	12. Bicycle Facilities	Informal
	13. Maximum Length	800 ft unless approved by the Administrator

**May need to be wider if required by fire code*



6.7.2.H Alley Alleys are intended to be privately maintained and to provide indirect, limited access to the rear of properties but not to accommodate through traffic. Utilities, either above ground or underground, may be located in alleyways to provide service connections to rear elevations.	1. Right-of-Way or Easement Width	20-24 ft
	2. Pavement Width	12 ft – inverted crown*
	3. Parking Lanes	None
	4. Curb Radius	Taper
	5. Walkway Type	Path optional
	6. Curb Type	n/a
	7. Landscape Type	None
	8. Building Setback from Alley Centerline	15 ft
	9. Maximum Length	400 ft unless approved by Administrator

**May need to be wider if required by fire code*

6.8 SIDEWALKS AND OTHER PEDESTRIAN FACILITIES

Sidewalk, pedestrian pathways and other required or proposed pedestrian amenities shall be reflected in all site and subdivision plans.

6.8.1 SIDEWALKS

A. General Standards/Location: Sidewalks are required in accordance with the Town of Wake Forest Transportation and Pedestrian Plan, and the Town Street Classifications in Section 6.7.2. Alternative facilities or a payment in lieu may be considered in accordance with C and D below.

B. Design Standards

1. Where existing sidewalk abuts an area where new sidewalk is to be developed, the new sidewalk shall be the same width as the existing sidewalk or meet the standards of Section 6.7.2, whichever standard width is greater.

2. Where the existing right of way is substandard, the fronting property owner shall be required to dedicate the appropriate amount of right-of-way (as measured from the centerline of the existing street) as well as install all noted sidewalk zone improvements including expanded sidewalks and street trees. Lighting and street furniture shall be the responsibility of the town.

3. Where a sidewalk is required on only one side of the street, in accordance with Section 6.7.2, the Administrator shall determine on which side of the street the sidewalk will be constructed.

4. Within commercial areas and places with high pedestrian volumes, sidewalks should be designed to meet the anticipated pedestrian/traffic volume as well as accommodate outdoor seating areas.

5. Multi-family and planned developments shall provide sidewalks for interior movement of pedestrians and for interior to connect to public sidewalk system.

6. Sidewalks shall be constructed of concrete or other approved materials (such as pavers) and built in accordance with the MSSD and applicable ADA provisions.

7. Where a sidewalk abuts a curb because of right-of-way, topographic or existing building limitation, or by Administrator discretion, the minimum width shall be 6 feet. Where a sidewalk abuts a wall the minimum width shall increase by 1 foot.

C. Alternative Compliance: Alternative provisions for pedestrian movement meeting the intent of this section may be used where unreasonable or impractical situations would result from application of these requirements. Such situations may result from significant street trees, impending road widening, topography, utility easements, lot configuration or other unusual site conditions. In such instances, the Administrator may approve an alternate plan that proposes different pedestrian amenities provided that the intent of this section is fulfilled.

D. Payments in Lieu: In lieu of alternative compliance in C above, the Administrator may approve a payment in lieu (in accordance with an adopted annual fee schedule) where any one or a combination of factors render compliance impractical:

1. Steep slopes
2. Absence of existing sidewalks along the corridor and in the general neighborhood
3. Where sidewalks are not shown on the town's adopted Pedestrian Plan.

6.8.2 GREENWAYS

When required by the Wake Forest Open Space & Greenways Plan or the Wake Forest Transportation Plan, greenways and multi-use paths shall be provided according to the provisions below.

A. Standards for Greenway Types: Greenway width and surface treatment shall comply with the standards for Greenway Types in the Wake Forest Open Space & Greenways Plan as follows:

Greenway Type	Trail Width	Surface Treatment	Right-of-Way / Easement Width
Type 2 – Low-Impact Trail	3 feet minimum 6 feet maximum	Gravel or dirt**	See Section 6.10.1
Type 3 – Unpaved Multi-Use Trail	10 feet minimum* 14 feet maximum	Compacted gravel, soil cement, compacted limestone screenings, crushed stone**	
Type 4 – Paved Multi-Use Trail	10 feet minimum* 14 feet maximum	Asphalt or concrete**	

** The Administrator may allow a reduction of the minimum width in instances where topographical conditions, the presence of drainageways, or similar circumstances prevent the construction of a wider path.*

*** Or other material approved by the Administrator*

B. Connections to Sidewalks: Trail stubs at property lines should be placed in areas that are easily accessible for future connectivity through adjacent parcels. Pedestrian and bicycle connections to greenways shall comply with the provisions in Section 6.5.3.

6.8.3 PEDESTRIAN CROSSWALKS

Mid-block crossings, bulb-outs, raised crosswalks and similar crossing techniques should be commonly used to accommodate pedestrians when appropriate for traffic conditions and site specific situations as directed by the Administrator. All designs shall be consistent with the town's adopted Pedestrian Plan, the town's MSSD and the FHWA Manual on Uniform Traffic Control Devices. For examples of pedestrian crosswalks see Section 6.5.3

6.9 BICYCLE FACILITIES

6.9.1 REQUIREMENT FOR INSTALLATION

A. Bike lanes or separate off-street multi-use paths shall be installed on new or modified roadways where designated for such by the Town of Wake Forest Transportation Plan or similarly adopted plan; and/or as specified in Section 6.9.3 below where the adopted plan does not provide sufficient guidance.

B. Where a proposed development does not include new or widening of existing collector or thoroughfare streets, the developer shall reserve right-of-way sufficient to accommodate the appropriate bikeway facility.

6.9.2 DESIGN STANDARDS

Bike lanes and bike paths shall be designed according to the North Carolina Bicycle Facilities Planning and Design Guidelines published by NCDOT and shall include all appropriate signage and pavement markings. Variations from the NCDOT standards may be allowed subject to approval from the Administrator based on the standards below.

6.9.3 APPLICABILITY OF BICYCLE FACILITIES

Bicycle facilities shall be included in the cross-sections of Section 6.7.2, Town Street Classification based on the matrix below. Motor vehicle volumes shall be based on projected motor vehicle volumes in a 20 year time horizon. Speeds shall be based on the design speed of the proposed roadway.

		Projected Motor Vehicle Volumes (Average Daily Traffic)					
		< 2,500 ADT	2,500 – 5000 ADT	5,000 – 10,000 ADT	10,000 – 20,000 ADT	20,000 – 40,000 ADT	> 40,000 ADT
Roadway Design Speed	< 25 mph	N	N	W	BL	BL	BL
	25 mph	N	W	BL	BL	BL	BL
	30 mph	N	W	BL	BL	BL	S
	35 mph	W	W	BL	BL	BL	S
	40 mph	W	BL	BL	BL	BL	S
	45 mph	W	BL	BL	BL	S	S
	> 45 mph	S	S	S	S	S	S

N Normal Lane, 9-12 feet wide. Cyclists would operate in mixed traffic near the middle of the lane.

W Wide Lane (Sharrows), 13-15 feet wide. Cyclists would generally operate in the right most portion of the lane. MUTCD-approved shared lane markings (sharrows) shall be used. (See image at right)

BL Bike Lane, 4-6 feet wide (striped/marked) or narrow shoulder. In general, bike lanes should be at least 5 feet wide at higher traffic volumes (over 20,000 ADT) and higher speeds (40 mph and higher) and 6 feet wide next to on-street parking.

S Separated Lane. Anything wider than 6 foot bike lane, including wide bike lanes/shoulders or parallel multi-use paths.

Image Source: National Association of City Transportation Officials. "Urban Bikeway Design Guide." 2012.

Sharrows provide designated bicycle routes through wide vehicular travel lanes with shared-lane markings.

6.10 EASEMENTS AND DEDICATIONS

6.10.1 EASEMENT WIDTH

Easements shall be conveyed to the town or other appropriate agency for underground and overhead utility installation, stormwater drainage, pedestrian/bicycle access, and other purposes as required by the town. Easements shall be centered along rear or side lot lines. The minimum width for easements is set out in the table below. The Administrator may vary easement widths if the topography along the proposed right-of-way is such that maintenance equipment or other necessary access cannot reasonably be achieved within the minimum width specified by the table.

Easement Type	Minimum Width
Greenway	50 feet
Pedestrian/Bicycle Accessway	20 feet (See also Section 6.5.3)
Alleys	20 feet
Watercourse or drainage channel	25 feet
Underground storm drainage	20 feet
All other easements	20 feet
Public utility access easement (Suburban Districts only)	5 feet envelope
Utility (water & sewer)	Per City of Raleigh Public Utilities Department

6.10.2 DEDICATION OF STORMWATER INFRASTRUCTURE

A. Stormwater Management Facilities: The Town of Wake Forest in its discretion may accept dedication of any existing or future stormwater management facility for maintenance, provided such facility meets all the requirements of this ordinance and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance. This section is subject to Section 6.10.2.C.

B. Limits of Public Ownership and Maintenance Responsibility: The following components of the drainage infrastructure will not be maintained by the Town of Wake Forest:

1. All drainage easements shall be public to the end of any storm drainage pipe system device. All drainage beyond that point shall be carried in drainage easements which are private and will be owned and maintained by the individual property owner.

2. The Town of Wake Forest assumes no liability or responsibility for adjudicating disputes between property owners regarding non-publicly generated storm water.

3. Drainage systems on private property that do not have dedicated easements.

4. Drainage systems maintained by NCDOT as part of its State highway system.

C. Private Detention/Retention/Water Quality Pond Areas: The town will not accept these areas for maintenance; however, the town reserves the right to enter these areas and remove any debris/blockage that is adversely affecting the town's drainage system. This will be done in an emergency situation without notice. Under normal conditions, the town will contact the owner/developer to have said blockages removed. If unable to do so within a reasonable time, the town reserves the right to charge the owner/developer for any expense incurred by the town in doing so.

D. Natural Water Courses: Natural ditches, streams, creeks, and rivers shall not be maintained by the Town of Wake Forest except to remove debris/blockages that are adversely affecting the town's drainage system.

E. Limitation of Consequential Damage to Private Facilities Located on Public Easements: All public easements, including storm sewers, are to remain clear of obstructions. No buildings, fences, trees, shrubs or other obstructions shall be placed in any easement. Driveways, walkways, asphalt and parking lots may be permitted in easements; however, the town reserves the right to remove such asphalt, concrete, base course and sod as necessary to access its facility in the case of emergency. Pavement or concrete will be replaced with a patch. Sod will be replaced with Fescue or rye seeding. The town will not be responsible for replacing a property owners sod after repairing a drainage line.

6.11 TRANSPORTATION IMPACT ANALYSIS

The Transportation Impact Analysis (TIA) is 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. Ultimately, the TIA can be used to evaluate whether 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.

6.11.1 WHEN REQUIRED

The necessary level of analysis for different development categories is defined in the following table:

Level of Study Required by Development Type	Residential	Office	Hotel	Industrial or Warehouse	Retail/Shopping Center	Other
None (unless located in area of special concern)	<100 units	<50,000 sf	<100 rooms	<150 employees	n/a	<100 peak hour trips
Standard TIA	100 to 500 units	50,000 sf to 350,000 sf	100 to 500 rooms	150 to 1,000 employees	<100,000 sf	100 to 500 peak hour trips
Enhanced TIA	>500 units	>350,000 sf	>500 rooms	>1,000 employees	>100,000 sf	>500 peak hour trips

6.11.2 STANDARD TIA REQUIREMENTS

A standard TIA includes the following elements:

A. Abstract or Summary: Summarize description of proposed development, location, traffic generation, existing and future conditions (level of service), and recommended improvements. The report should not exceed 2 pages and preferably limited to one page.

B. Description of Development: Describe acreage included in development, existing and proposed land use, existing and proposed zoning, proposed density (number of houses, square feet of development, etc.)

C. Study Area: Generally ¼ mile to ½ mile from each proposed site access along roads accessed by the site. This area may, in a few cases, be greater if the site is on a road with no intersections within that distance.

D. Site Location: Include location map showing site in relation to major streets and at least one-mile radius from site.

E. Traffic Generation: Indicate number of trips generated by site daily, AM peak hour, PM peak hour (AM peak hour may be omitted for retail uses which are not expected to generate significant traffic volumes during this period). Indicate internal or pass-by traffic generation if appropriate. For rezoning, indicate traffic generation under existing zoning as well as proposed zoning. Indicate source of trip generation rate, land use code, and units used to derive generation.

F. Trip Distribution: Indicate percentage distribution of trips, by direction, within study area and method used to obtain.

G. Access Location(s): Location of planned streets or driveways and access to existing streets. Indicate other streets or driveways within study area, including those across the street. Indicate coordination with NCDOT where appropriate.

H. Existing Road and Traffic Conditions: Street laneage and classification, traffic control devices, existing daily traffic volumes within study area. Show traffic volumes and level of service of signalized intersections and proposed site access points within study area during AM and PM peak hour (PM only for retail). Include work sheets or computer printouts showing counted traffic volumes and level-of-service. Illustrate in figure(s) showing peak hour volumes, lanes, and level of service. For unsignalized intersections, show level-of-service for individual movements. Discuss transit service if applicable. Discuss accident history, if appropriate.

I. Planned Improvements: Discuss and describe any planned road improvements in the study area which could affect future traffic. Note whether project is shown on thoroughfare plan, collector street plan, or NCDOT TIP.

J. Future Conditions: Same as for existing conditions, plus site traffic assigned to driveways or access points, for condition with full build-out of project, at build-out year. Include growth in background traffic due to other approved developments or to general growth in area. May show more than one phase, if project is to be phased. Discuss any conflict with other driveways or streets, queuing problems, potential safety problems.

K. Pedestrian Facilities: Indicate location of existing and proposed sidewalks and crosswalks, internal pedestrian paths.

L. Recommended Improvements: Indicate improvements required for access points and signalized intersections within study area to operate at acceptable level of service (D or better). These may include site access, internal site circulation, signalization, signal modification (retiming, additional phases), lane modifications or additions, or street widening. A signal warrant study is not required but may be included as supporting documentation where a traffic signal is requested. Note: showing recommended improvements does not necessarily indicate responsibility for improvement. Report may indicate which improvements are due to development and which are due to existing problems or other growth in traffic, and may suggest responsibility of developer or of other parties for improvements. Proposed improvements should be shown schematically on figure.

M. Engineer's Seal: All TIAs are to be prepared and sealed by an engineer registered in the State of North Carolina and specializing in traffic or transportation, with experience in preparing TIAs.

6.11.3 ENHANCED TIA REQUIREMENTS

An enhanced TIA includes all of the elements of a standard TIA plus the following:

A. Study Area: Generally from 1 to 3 miles from each proposed site access along roads accessed by the site. The extent of the study area should be discussed with town staff prior to initiating the TIA.

B. Internal Circulation: Review internal circulation patterns and note recommended changes.

C. Trip Distribution: Use of a computer model for distribution may be desirable for major projects.

D. Future Conditions: Projects in this category, other than perhaps shopping centers, are likely to be phased. It is desirable to show conditions at end of planning period (generally 20-year or horizon used for thoroughfare plan).

E. Recommended Improvements: For major projects, these may involve changes to the thoroughfare plan or collector street plan. The project may include the construction of portions of thoroughfares within or adjacent to the site.

6.11.4 IMPROVEMENTS MAY BE REQUIRED

Based on the findings of the analysis, if a proposed development does not meet the applicable service level standards, the applicant shall be required to upgrade the facilities in accordance with the adopted level of service program. Mitigation measures may involve strategies other than roadway construction or other physical improvements such as changes to traffic signal timing or phasing, and transportation management strategies.

6.11.5 THRESHOLDS FOR MITIGATION

The town requires consideration of roadway and/or operational improvements when the proposed development increases the intersection Volume-to-Capacity Ratio (V/C) beyond the thresholds indicated in the table at right. The town evaluates the impacts of proposed development at intersections (primarily under existing year conditions) based on the increase in V/C ratio as a result of the projected site traffic. This increase is determined by comparing the V/C ratio under existing development conditions and proposed development conditions. For the purposes of this comparison, all unsignalized intersections are analyzed as signalized intersections.

Existing V/C	Allowable Increase in V/C By Development
0.00 – 0.60	0.10
0.61 – 0.70	0.07
0.71 – 0.80	0.05
0.81 – 0.90	0.03
0.91 – 1.00+	0.02

6.11.6 PAYMENTS-IN-LIEU OF IMPROVEMENTS

The town may, at its discretion, accept either mitigation measures to be completed by the developer or a fee paid to the town in lieu of mitigation. The fee shall be equal to the costs of the required mitigation measures, as determined by the Administrator. A combination of mitigation measures and payments-in-lieu of dedication may be permitted. Payments-in-lieu of dedication shall be approved as part of the Subdivision or Site Master Plan.

6.12 IMPROVEMENT GUARANTEES & PERFORMANCE SECURITIES

6.12.1 IMPROVEMENT GUARANTEES

A. Applicability: In lieu of prior construction of the permanent improvements required by this ordinance, the developer shall guarantee that all such improvements will be carried out according to the Town of Wake Forest's specifications at his/her expense. The improvements shall be built or bonded prior to the recording of the final plat.

B. Amount of Improvement Guarantees: Such guarantees shall be in an amount of not less than 125% of the estimated cost of the construction of the required improvements. The amount of guarantee shall be approved by the Administrator based on an engineers certified cost estimate and shall be provided in the manner outlined in Section 6.12.3.

C. Release of Improvement Guarantees: The Administrator shall authorize the release of all or a portion of any guarantee posted as the improvements are completed. Such funds shall be released within 32 days after approval of applicable improvements by the Administrator.

D. Warranty Against Defects

1. Upon completion of construction of new streets, stormwater controls or other required utilities, the developer shall request a warranty inspection. Once all the improvements are deemed acceptable by the Administrator and pass the warranty inspection, the developer shall submit the following to the Administrator:

a. A set of acceptable as-built drawings,

b. A written warranty against defects which shall guarantee the material and workmanship of required improvements for a period of not less than one year from the date of such acceptance.

c. A financial guarantee payable to the town equal to at least 25% of the cost of the installation of such improvements as determined by the Administrator. Such financial guarantee shall be in a form as provided for in Section 6.12.3.

2. Upon approval of these materials and acceptance of the improvements by the town, a 1-year warranty period shall commence. During the 1-year warranty period, the developer shall repair any latent defects that occur. For the purposes of this section, the term "defects" refers to any condition in publicly dedicated facilities, utilities or streets that requires the town to make repairs to such improvements over and above the normal amount of maintenance that they would require. If such defects appear, the warranty may be enforced regardless of whether the facilities, utilities or streets were constructed in accordance with the requirements of this ordinance. At the end of the one-year warranty period, the developer shall request a final inspection. Upon successful completion of all warranty items, the developer shall be released from maintenance responsibilities for the warranted construction.

3. Warranty repairs shall be corrected in accordance with the recommendations of the Administrator.

4. If a developer fails to complete warranty items, future projects of the developer may not be reviewed by the town. In addition, the town shall take appropriate legal action against the developer.

6.12.2 PERFORMANCE SECURITIES

A. Applicability: Performance securities shall be required as follows:

1. **Stormwater Structures:** The Town of Wake Forest may, at its discretion, require the submittal of a performance security in order to ensure that the structural BMPs are maintained by the owner as required by the operation and maintenance agreement.
2. **Temporary Erosion, Sedimentation, and Stormwater Controls:** Performance securities must be provided to the town for all projects of ½ acre (21,780 square feet) or more in surface area.

B. Amount of Performance Security

1. **Stormwater Structures:** The amount of a performance security for the maintenance of structural BMPs, as required by Section 12.5, shall be the present value of an annuity of perpetual duration based on a reasonable estimate of the annual cost of inspection, operation and maintenance of the BMPs approved under the permit, at a discount rate that reflects the jurisdiction's cost of borrowing minus a reasonable estimate of long term inflation. Such security shall be provided in the manner outlined in Section 6.12.3.
2. **Temporary Erosion, Sedimentation, and Stormwater Controls:** The amount of a performance security for temporary erosion, sedimentation and stormwater controls shall be 125% of the cost to remove, maintain or repair all erosion control measures. Such security shall be provided in the manner outlined in Section 6.12.3.

C. Costs in Excess of Established Amounts: If Town of Wake Forest takes action upon failure by the applicant or owner, the Town of Wake Forest may collect from the applicant or owner any difference should the amount of the reasonable cost of such action exceed the amount of the performance security held.

D. Release of Performance Securities

1. **Stormwater Structures:** Not applicable.
2. **Temporary Erosion, Sedimentation, and Stormwater Controls:** Securities will be released upon issuance of a Certificate of Compliance and final Land Disturbance Permit closeout.

6.12.3 TYPES OF GUARANTEES / SECURITIES

Improvements guarantees and performance securities shall be made in one or more of the following forms:

A. A surety bond made by a surety company licensed to do business in North Carolina,

B. A certified check drawn in favor of the Town of Wake Forest, or

C. Cash deposited with the Town of Wake Forest.

6.12.4 FORFEITURE AND DEFAULT

A. Forfeiture Provisions: All improvement guarantees and performance securities shall contain forfeiture provisions for failure, after proper notice, to complete work within the time specified, or to initiate or maintain any actions which may be required of the applicant or owner in accordance with this ordinance, approvals issued pursuant to this ordinance, or an operation and maintenance agreement established pursuant to this ordinance.

B. Default by Developer

1. Upon default, meaning failure on the part of the developer or surety to make timely completion of the required improvements, or to maintain privately owned improvements in accordance with an approved operations and maintenance agreement, the town may require the developer, the surety, or the financial institution holding the escrow account to pay all or any portion of the bond or escrow account fund to the town.
2. Upon payment, the town, at its discretion, may expend such portion of the funds as it deems necessary to complete all or any portion of the required improvements.
3. Such expenditure of funds shall only be made after requesting the owner to comply with the permit or maintenance agreement.

6.13 PROVISION OF SERVICES AND ACCEPTANCE BY TOWN

The following shall not occur upon any land for which a plat is required to be approved, unless and until the requirements set forth in this ordinance have been complied with and the Final Plat has been approved and recorded with the Wake County Register of Deeds:

- No street shall be maintained or accepted by the town, and
- No water or sewer shall be extended to or connected with any subdivision of land, and
- No permit shall be issued by an administrative agent or department of the Town of Wake Forest for the construction of any building or other improvement requiring a permit.

6.14 OWNERSHIP & MAINTENANCE OF COMMON AREAS

All developments containing land, amenities or other facilities under private common ownership shall provide for the ownership & maintenance of such areas. Multi-family developments that are subject to fee-simple lot/unit ownership shall convey all such common areas to a non-profit corporate homeowners' association with a membership of 100% of the lots/units in the development. The developer shall file with the Franklin or Wake County Register of Deeds a "dedication of covenants" and must meet the following criteria:

- The homeowners' association must be established before the units are sold;
- The homeowners' association is established as the responsible entity for the liability insurance, pertinent local taxes, and maintenance of all recreation and other facilities;
- Sums levied by the homeowners' association that remain unpaid shall become a lien on the delinquent property;
- For condominium development, documents must meet the requirements of NCGS 47A Unit Ownership
- All easements over common areas for access, ingress, egress and parking shall be shown and recorded on a final plat with the Franklin or Wake County Register of Deeds

See Section 7.7 for ownership & maintenance requirements specific to open space.

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7 RECREATION FACILITY FEES, PARKS & OPEN SPACE LAND

7.1 PURPOSE AND INTENT

It is the intent of this ordinance to require that each new development contribute to the necessary range of parks and opens space critical to the quality of life for each resident and visitor. It is expected that all new residential development provide centrally-located, unencumbered land as neighborhood park space for human use and/or unimproved open space in addition to contributing to the construction and expansion of community facilities. The required neighborhood park or open space is intended to compliment the community facilities that are supported by the required Recreation Facility Fees.

7.2 APPLICABILITY

Any person developing and/or subdividing property for residential purposes subject to this ordinance shall be subject to the dedication standards and Recreation Facility Fee levied by the town.

7.3 RECREATION FACILITY FEE

Pursuant to the authority granted to the town by the State of North Carolina in Chapter 502, Senate Bill 576 (1989), the town shall impose a Recreation Facility Fee for each new single-family or multifamily dwelling unit including, but not limited to, condominiums, town homes, apartments, and duplexes built in the town or the town's extraterritorial planning area.

7.3.1 APPLICABILITY

A. All residential subdivisions, multi-family developments, planned unit developments and manufactured home parks for which town approval or permitting is required, or real property improvement which results in the creation of residential dwelling units shall be subject to payment of the Recreation Facility Fee.

B. No building permit shall be issued for any new residential dwelling unit until the Recreation Facility Fee has been paid to the town in full.

7.3.2 EXCEPTIONS

A. The Recreation Facility Fee shall not apply to fences, billboards, poles, pipelines, transmission lines, advertising signs or similar structures and improvements, renovations and repairs which do not generate the need for additional or expanded recreational facilities.

B. The Recreation Facility Fee shall not apply to residential subdivisions, multi-family developments, planned unit developments and manufactured home parks, which have received master plan approval and are still valid and active or an established zoning vested right prior to November 17, 1998.

7.3.3 CREDITS

The required Recreation Facility Fee may be credited, subject to approval by the Board of Commissioners, by an equivalent amount of land dedication and/or construction of greenway trails noted on an adopted plan.

7.3.4 FEE AMOUNTS

The Recreation Facility Fee shall be paid to the town in the amounts as determined by the Board of Commissioners.

7.3.5 APPEALS

Any person who feels aggrieved by any action of the town in imposing the facilities fee on a development or the town's classification for the purpose of establishing the rate, must first pay the amount of the facilities fee so charged to him/her, with such amount clearly marked as paid under protest, and thereafter give notice of appeal within a period of 30 days after such payment. Such notice should be delivered by personal service (as defined in Section 1A-1, Rule 4 of the N. C. General Statutes) or registered or certified mail, return receipt requested, directed to the Town Manager. A public hearing shall be held by the Board of Commissioners to review said matter within a period of 35 days following receipt of notice of appeal; the decision upon said appeal shall then be subject to review by the Superior Court by proceedings in the nature of certiorari; any petition for review by the Superior Court shall be filed with the clerk of Superior Court of Wake County within a period of 30 days following the date the decision of the Board of Commissioners is delivered in writing to the appealing party, said delivery to be either by personal service or by registered mail or certified mail, return receipt requested.

7.4 NEIGHBORHOOD PARKS AND OPEN SPACE DEDICATION REQUIREMENTS

In addition to the required Recreation Facility Fees note in 7.3, all new development shall dedicate neighborhood parks and undisturbed open space (as applicable). The intent is to ensure that each new home has a range of parks and open spaces within a typical walking or biking distance of ¼ to ½ mile.

7.4.1 REQUIRED OPEN SPACE CONSERVATION/RECREATION SPACE DEDICATION TABLE

The amount of open space and recreation space required for dedication (measured as a percentage of the gross area of development) shall be as follows:

Context	Category	Required Park Space (Improved) – See Standards in Section 7.5	Required Open Space (Unimproved) – See Standards in Section 7.6	Total Dedicated Space
Rural	OS	Exempt	Exempt	Exempt
	RD	2.5%	10%	12.5%
Suburban	GR3, GR5, GR10	2.5%	10%	12.5%
	NB/HB	Exempt	Exempt	Exempt
	ICD	Exempt	25%	25%
	LI/HI	Exempt	Exempt	Exempt
Urban	UR, RMX	2%	5%	7%
	RA-HC/ NMX/UMX	2% for projects 5 acres or greater	Exempt	2% for projects 5 acres or greater

7.4.2 CREDIT FOR PROXIMITY TO EXISTING PARK SPACE

Developments that are proximate to an existing town-owned, publicly-accessible park space may count all such lands in their park space dedication requirement up to 25% of the required total, subject to the provisions below.

A. The existing park or parks must be within ½ mile of the development, as measured along a road or pedestrian path, to be considered proximate.

B. Adequate pedestrian access from the development to the existing park space must be provided as determined by the Administrator.

7.4.3 CREDIT FOR CONSTRUCTED NEIGHBORHOOD AMENITIES

Developments that provide neighborhood amenity facilities will receive a credit of 25% of the required total, subject to the provisions below.

A. The facilities are open to all residents of the neighborhood and are not subject to a private membership separate from any related HOA dues.

B. Such facilities shall, at a minimum, include a clubhouse a minimum of 1,000 square feet and either tennis courts (minimum of 3 courts) or a pool/ waterpark/sprayground (a minimum of 2,500 square feet in water surface area)

7.4.4 EXEMPTIONS

A. Very Low Density Developments: Neighborhood parks are not required in any residential development with an overall density of 1 unit/acre or less.

B. Small Developments: Developments with 25 units or less in all phases shall not be subject to the requirements of this chapter.

C. Non-Residential & Mixed-Use Development: Neighborhood parks are required only for those areas that are exclusively residential. Commercial and vertically mixed-use buildings and associated areas are exempt from these standards.

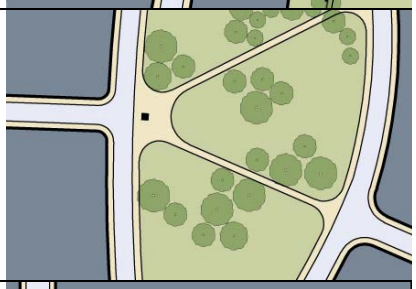
7.5 NEIGHBORHOOD PARK DESIGN STANDARDS

7.5.1 REQUIRED NEIGHBORHOOD PARK TYPES

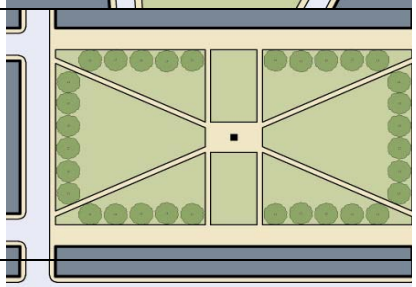
Neighborhood parks, as required by the district provisions, shall conform to one or more of the typologies defined below.

A. Park/Greenway: A natural preserve available for unstructured recreation. Its landscape shall consist of paths and trails, meadows, waterbodies, woodland and open shelters, all naturalistically disposed. Parks may be linear, following the trajectories of natural corridors (greenways). The minimum size shall be 2 acres (except Greenways where there is no minimum).

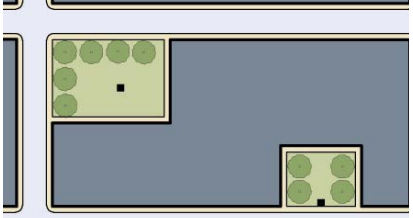
B. Green: An open space available for unstructured recreation. A Green may be spatially defined by landscaping rather than building frontages. Its landscape shall consist of lawn and trees, naturalistically disposed. For the purposes of this section, standalone dog parks shall be considered a variation of the Green park type. The minimum size shall be 1/2 acre.



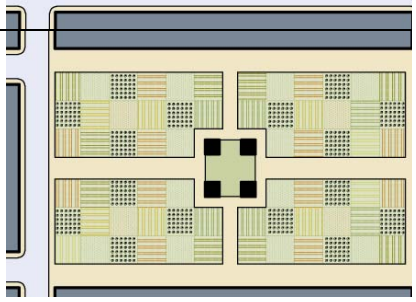
C. Square: An open space available for unstructured recreation and civic purposes. A Square is spatially defined by building frontages. Its landscape shall consist of paths, lawns and trees, formally disposed. Squares shall be located at intersections. The minimum size shall be 1/4 acre and the maximum shall be 2 acres.



D. Playground: An open space designed and equipped for the recreation of children. A playground may include an open shelter. Playgrounds shall be interspersed within Residential areas and may be placed within a block. Playgrounds may be included within parks and greens. There shall be no minimum or maximum size.



E. Community Garden: A grouping of garden plots available for small-scale cultivation, generally to residents of apartments and other dwelling types without private gardens. Community gardens should accommodate individual storage sheds.



7.5.2 LOCATION

A. Land for neighborhood park spaces shall be centrally and internally located so as to serve the needs of the residents of the neighborhood.

B. Required neighborhood parks shall provide focal points for developments.

C. Areas described in the Wake Forest Community Plan, Open Space & Greenway Plan or any other adopted plan as park, recreation, and open space land or greenways shall be preserved and dedicated where practical and feasible. All such dedication and improvement shall also be in conformance with all applicable federal and state rules and/or interlocal agreements. For developments that abut or include areas designated as future greenways on an adopted plan, the Administrator shall require a dedicated 20-foot minimum width public pedestrian and non-motorized vehicle easement be dedicated along all such areas.

7.5.3 ACCESSIBILITY / VISIBILITY

A. All recreation spaces shall be conveniently accessible to all residents of the development, and shall have at least 20 feet of frontage on at least one public street within the development.

B. No residential unit within a development shall be further than ¼ mile (1320 feet), as measured along a road or pedestrian path, from a recreation space as defined above or other publicly-accessible park facility.

C. All recreation spaces shall be visible from dwelling units that are adjacent to the neighborhood park. This includes dwelling units on properties that share a property boundary with the neighborhood park or front the neighborhood park from directly across a street.

7.5.4 USABILITY

A. At least one-quarter of the total land dedicated shall be located outside special flood hazard areas, watercourses, and watershed buffers. All land dedicated shall be outside of wetlands and waters subject to State or Federal regulatory jurisdiction. Within the area proposed for dedication, sufficient engineering data and/or detail shall be indicated to ensure compliance with this section.

B. Areas including ponds, lakes, wetlands, or easements for public utility transmission lines shall not exceed more than 50% of the required neighborhood park space.

7.5.5 MINIMUM AMENITIES

Required recreation space shall be planned, improved, and usable by persons living nearby. Improved shall mean cleared of underbrush and debris and shall contain 2 or more of the following amenities: landscaping, walls or pathways, fences, walks, lighting and electricity, fountains, ball fields, and/or playground equipment.

A. Minimum Amenities (All Neighborhood Park Types):

1. Public Seating: Provide seating areas appropriate to the intended use of the space (e.g., park benches and durable theft/vandalism-resistant chairs in formal/active spaces and garden wall seats in informal/passive spaces).

2. Supplement Tree Planting/Significant Species Preservation: A minimum of 1 tree (2 inch caliper minimum measured 6" above the ground at installation) to be planted in at least 350 square feet of soil or 1 preserved existing canopy tree a minimum of 12" caliper for every 2,500 square feet of required park space.

3. Trash Receptacle: Garbage receptacles and recycling receptacles shall be required for each park space.
4. Bicycle Parking: At least 4 Class III bicycle parking spaces shall be required for every one-quarter acre of neighborhood park space and every ½ mile of greenway. Bicycle parking shall be designed according to the bicycle parking standards in Section 9.6.

B. Minimum Amenities (Parks): At least 25% of the park space land shall be dedicated to active recreation purposes such as playgrounds, tennis courts, ball fields, volleyball courts, etc. The remainder of the park may be designed for passive recreation purposes such as walking, jogging, cycling, disc golf, relaxation, etc. Preservation of natural or cultural resources such as steep slopes, rock outcroppings, mature woodlands or water resources may also be counted towards passive recreation provided there is some method for public enjoyment and appreciation of such resources.

C. Minimum Amenities (Playground): Playground equipment shall be equivalent to the standards established by the Consumer Products Safety Commission and ASTM for playgrounds.

D. Minimum Amenities (Greenway): A greenway path is credited toward the minimum park space dedication requirement at a rate equal to the length of the path times 20 feet in width. The minimum width of the paved path shall be 10 feet.

7.6 UNIMPROVED OPEN SPACE DESIGN STANDARDS

Pursuant to Section 7.4.1, development in certain districts may only require simple open space. Public accessibility is not required or expected but is permitted. Where practical, the following priority list shall be used for the conservation of such areas:

- Primary Conservation Areas (riparian corridors, special flood hazard areas, unique geological formations, rock outcroppings, rare plants, rare plant communities, rare habitats, wetlands, & prime agricultural areas/farmland)
- Unbuildable Areas (areas that have highly erodible soils or slopes in excess of 60%)

7.7 OWNERSHIP & MAINTENANCE

Dedicated park or open space land shall be separately deeded to either a homeowner's association, a non-profit land trust or conservancy, Franklin County, Wake County, the Town of Wake Forest (upon approval by the Board of Commissioners), or may be held in private ownership with conservation easements recorded in the Wake County Register of Deeds in a form approved by the town. A metes and bounds description of the space to be preserved and limits on its use shall be recorded on the development plan, in homeowner covenants, and on individual deeds when open space lands are not held entirely in common. Alternative means of permanent open space preservation may include acceptance by a land conservation trust or a unit of government. Private management alternatives will also be permitted. Non-public ownership strategies must be accompanied by a long-term maintenance plan.

8 TREE PROTECTION, BUFFERS & LANDSCAPING

8.1 PURPOSE

It is the intent of this chapter to protect, refurbish, and improve the aesthetic appeal, scenic beauty, historic character and economic value of properties within the Town of Wake Forest. The regulations in this chapter seek to maintain an overall coverage of mature trees and existing landscaping for the community in order to:

- Maximize the economic vitality and positive community image associated with the town's mature vegetation;
- Protect and enhance property values;
- Maintain the aesthetic quality of the community as a whole;
- Moderate climate and reduce energy costs; and
- Mitigate the negative impacts of noise, glare, air and water pollution, and soil erosion on the environment of the town and on its inhabitants.

8.2 APPLICABILITY

8.2.1 GENERAL PROVISIONS

The requirements of this section shall apply to all land, public and private, in the Wake Forest zoning jurisdiction. Occupancy certificates for uses authorized by this ordinance shall not be issued until such requirements are installed, unless provided otherwise in this section.

8.2.2 EXEMPTIONS

The following conditions are exempt from the provisions of this chapter:

A. Improvements or repairs to interior and exterior features of existing structures or buildings which do not result in expansions or changes in the type of occupancy as set forth in the North Carolina Building Code.

B. A single-family detached dwelling on an individual lot of record.

C. Property covered by an active forestry management plan written by a North Carolina Registered Forester, provided documentation has been furnished to the town.

8.2.3 PRE-EXISTING DEVELOPMENT

A. Non-conforming preexisting development is subject to these standards as follows:

1. A change in type of occupancy, as set forth in the North Carolina Building Code;

2. A change in land use which requires an increase in the number of off-street parking spaces or the provision of a buffer yard;

3. Additions or expansions which singularly or collectively exceed 25% of the land area or gross building floor area existing at the effective date of this ordinance.

B. The Town of Wake Forest recognizes that designing preexisting development to meet new regulations is more difficult and expensive than applying these standards to undeveloped properties. Therefore, greater flexibility will be afforded preexisting development in meeting the requirements of this section, in that:

1. A variance of up to 25% percent may be granted by the Administrator for planting area and dimension requirements where compliance presents hardships due to building location, lot size, or vehicular area configuration;

2. A credit for reducing required off-street parking by 1 space shall be given for the construction of each landscape island.

8.2.4 PROCEDURES

A. When an application is made for a development approval on any land to which the requirements of this section apply, a Landscape Plan shall be prepared as part of the Site Master Plan as outlined in Section 15.8. The specific requirements for a Landscape Plan are included in the checklist for Site Master Plans in the Wake Forest Manual of Specifications, Standards and Design (MSSD).

B. All planting materials specified by the landscape plan shall be installed prior to the issuance of the Certificate of Occupancy. An exception may be granted for a period not to exceed 180 days for the following circumstances, as determined by the Administrator:

1. The unavailability of specified plant material;

2. Weather conditions that prohibit the completion of the project or jeopardize the health of the plant material;

3. Actions or directives issued by any governing body with jurisdictional authority.

C. In such circumstances, the property owner or developer shall submit documentation of the estimated cost for the purchase and installation of the required planting areas and may be required to post a performance guarantee equal to the amount of the contract. The Administrator may issue a Conditional Certificate of Occupancy but shall not issue a Final Certificate of Occupancy until the planting requirements have been completed and approved.

8.2.5 ALTERNATE METHODS OF COMPLIANCE

A. Alternate landscaping plans, plant materials, planting methods or reforestation may be used where unreasonable or impractical situations would result from application of landscaping or tree preservation requirements. Such situations may result from streams, natural rock formations, topography, or other physical conditions; or from lot configuration, utility easements, unified development design, or unusual site conditions.

B. The Administrator may approve an alternate plan, which proposes different plant materials or methods provided that quality, effectiveness, durability, and performance are equivalent to that required by this section.

C. Decisions of the Administrator regarding alternate methods of compliance for landscaping and tree preservation may be appealed to the Board of Adjustment according to the provisions of Section 15.12.

8.3 TREE CANOPY COVERAGE REQUIREMENT

8.3.1 MINIMUM CANOPY COVERAGE REQUIREMENT

All parcels, regardless of land use, shall maintain a minimum tree canopy coverage according to their district classification as follows:

District	Canopy Coverage Requirement
Rural and Suburban Districts	2 canopy trees per 5,000 sq. ft. of parcel area, OR 1 canopy tree and 1 understory tree per 4,000 sq. ft. of parcel area
UR, RMX	1 canopy tree per 10,000 sq. ft. of parcel area
NMX, RA-HC, UMX	1 canopy tree per 10,000 sq. ft. of parcel area – may be waived or altered by the Administrator depending on lot coverage of proposed development and adequate street tree installation.

8.3.2 PRIORITY TREE PROTECTION AREAS

The minimum canopy coverage requirement may be met through the retention of existing vegetation, supplemental plantings, or a combination of both; however, every reasonable effort should be made to meet the baseline canopy coverage area through the retention of existing vegetation in the following priority areas of the site:

A. Required buffer yards between conflicting uses (as defined in this chapter);

B. Thoroughfare buffers and streetyards;

C. Conservation easements;

D. Special Flood Hazard Areas;

E. Historic, landmark and/or specimen trees which meet the requirements of Section 8.4.3.

8.4 TREE PRESERVATION

8.4.1 CREDITS FOR TREE PRESERVATION

Credit may be applied toward the baseline tree canopy requirements by the preservation of existing trees in Priority Tree Protection Areas as well as other additional tree preservation areas on site. Credit will only be applied to existing vegetation that is healthy and meets the requirements of this section. Tree credit rates for each tree preserved shall be determined by the following methods, schedules and standards:

A. Credit for Preservation of Wooded Areas: In order to receive credit for wooded areas, the trees contained in these areas shall be a mixture of healthy and useful canopy and understory trees. The method for calculating tree credits in wooded areas is as follows: one tree per 700 square feet of protected area. Watercourse buffer areas and wetlands are not eligible for the tree credit and the respective amount of parcel area is exempt from the baseline tree coverage requirement.

B. Credit for Preservation of Specimen Trees

Existing DBH of Preserved Tree(s)	Number/Type (Canopy or Understory) of Tree Credits
8" + (Understory)	2 / Understory
20" – 30"	3 / Canopy
31" – 41"	4 / Canopy
42" +	5 / Canopy

DBH shall be rounded off to the nearest inch.
Trees must be of Specimen quality. See Section 8.4.3.

C. All Other Trees: All other trees preserved will receive 1 tree credit with the exception of trees less than 2.5 inches DBH and trees with less than 10 years of remaining life, as determined by the Administrator.

D. Invasive, Dead and Unhealthy Trees

1. No credit will be allowed for any invasive exotic tree, dead tree, any tree in poor health, or any tree subject to grade alterations.
2. The death or unhealthy state of any tree(s) used for preservation credit, within 3 years of establishing the TSA, shall require the property owner to plant new trees equal to the number of credited trees.
3. If any tree(s) used for preservation credit is improperly protected or determined to be hazardous, the Administrator may require new trees be planted equal to the number of credit trees.
4. The Administrator may require trees left outside preservations areas to be removed if improperly protected or determined to be hazardous.

E. Land Dedication: Land that is dedicated to the town that is part of the property being developed may be used towards the tree preservation requirement, if the dedicated land contains trees that meet the requirements above.

8.4.2 TREE SAVE AREAS

Trees survive the stress of construction best when they are left in stands or larger groupings. For that reason, it is encouraged that, wherever possible, the site should be designed and developed so that tree save areas (TSAs) are designated in a single, contiguous unit. In order to qualify for the purpose of meeting the requirements of this section, designated tree save areas must conform to the following standards:

A. Minimum Dimensional Requirements: The extent of the Critical Root Zone (CRZ) of the tree or trees at the outer edges of the tree save area shall constitute the limits of construction for the purposes of this sub-section. The CRZ is the circular area of ground surrounding a tree extending from the center of tree to the greater of

1. 1.5 feet per caliper inch DBH of the tree,
2. The dripline (furthest extent of tree canopy) of the tree, or
3. 6 feet.

B. Minimum Content Requirements: The TSA should contain, as determined by an informal site assessment, predominantly canopy tree species which are at least 2 inches in diameter at breast height (DBH) and a minimum of 10 feet in height.

C. Maintenance & Ownership: When a TSA is established in association with the incentives as listed in this section, it should be designated, where possible, as a dedicated open space, or in a conservation easement.

D. Tree Removal Inside Tree Save Areas: Trees that are in poor health or invasive, exotic species, as determined by the Administrator, may be removed from tree save areas. All tree removal within TSA must have prior approval by the Administrator pursuant to the provisions of this section. However, in an emergency situation due to storm damage, or to alleviate an imminent hazard to the health, safety and welfare of the citizens, or to repair property damage, prior approval for tree removal in previously approved designated tree save areas is not required.

E. Flexibility in Other Requirements: Flexibility in other design requirements will be considered on a case-by-case basis to accommodate the establishment of a TSA.

F. Tree Save Area Incentives: The following incentives are offered to encourage tree preservation in tree save areas.

Action Taken	Incentive
A. Single Family Residential	
1. Establishment of tree save area (TSA)	Reduction of minimum lot area equal to area of TSA (up to 20% maximum reduction)
2. Establishment of a tree save area along a street	Reduction by up to 50% of required street tree plantings at the rate of one less street tree for every 200 square feet of TSA established.
3. Establishment of a tree save area in or along a required buffer yard	Reduction by up to 50% of required buffer yard plantings at the rate of 5% less plantings for every 200 square feet of TSA established.
B. Multi-Family Residential or Non-Residential	
1. Establishment of tree save area	Reduction by up to 20% of minimum parking requirement at the rate of one less parking space for each 200 square feet of TSA established
2. Establishment of a tree save area adjacent to a parking lot	Reduction by up to 50% of required parking lot plantings at the rate of one tree for each 200 square feet of TSA established

8.4.3 SPECIMEN / HISTORIC TREES

It is the intent of this section to promote the preservation of trees which are of a significant enough size and/or of such a historic nature as to be an asset to the community as a whole.

A. Specimen Trees: Where there exists one or more Specimen Trees on property subject to the regulations of this section, every effort shall be made to preserve and protect that tree or trees, according to the protection standards as outlined in this section. For the purposes of this section, Specimen Trees shall be defined as those trees which meet one or more of the following:

1. Any tree in fair or better condition which equals or exceeds the following diameter sizes or which otherwise is noteworthy because of species, age, size, or other exceptional quality, uniqueness and rarity:

Tree Type	Tree Diameter Size
Canopy	20 inch DBH
Understory	8 inch DBH (*Reference ANSI Z60.1-2004 for multi-stem trees)*

2. A tree in fair or better condition must meet the following minimum standards:
   a. A life expectancy of greater than 10 years;
   b. A relatively sound and solid trunk with no extensive decay or hollowness, and less than 20% radial trunk dieback;
   c. No more than one major and several minor dead limbs;
   d. No major insect or pathological problem.
3. Designation as a Champion, Landmark, or Meritorious Tree by the Triangle J Council of Governments Capital Trees Program
4. Designation as a Landmark Tree by the Wake Forest Board of Commissioners

B. **Historic Trees:** Where there exists one or more designated Historic Trees on property subject to the regulations of this section, every effort shall be made to preserve and protect that tree or trees, according to the methods outlined in this section. For the purposes of this section, Historic Trees shall be defined as those trees which meet one or more of the following:
   1. Designation as a Historical Tree by the Triangle J Council of Governments Capital Trees Program;
   2. Designation as a Historic Tree by the Wake Forest Board of Commissioners.

C. **Designation:** Upon petition by the owner of the property on which the tree(s) is located, and the recommendation of the Wake Forest Urban Forestry Board, the Wake Forest Board of Commissioners may designate a specific tree or group of trees as either a Landmark, Historic, or both. In order to be designated as such, the following criteria must be demonstrated by the owner:
   1. **Landmark Trees**
      a. Using the measurement and point system established for state and national champion trees, a nominated tree must have a point total of at least 50% of the current state champion for the particular species; or be a highly visible or recognizable tree or group of trees which has significance for the entire community; and,
      b. Must exhibit such health, condition, and form as to have a reasonable prospect of continuing useful life.
   2. **Historic Trees**
      a. Must be at least 50 years old and exhibit such health, condition, and form as to have a reasonable prospect of continuing useful life; and,
      b. Must be associated with a specific and significant historic event or individual; or contribute to the character of a historic building or property.

D. **Replacement of Specimen Trees**
   1. When a specimen tree is removed from a site during construction, or dies within 5 years following construction, the applicant or developer shall replace such tree on the lot with an amount of trees and/or landscaping of equal value. Valuation of the tree removed or lost shall be determined by the Administrator in consultation with a person qualified by training or

experience to have expert knowledge of the subject. Valuation of trees and vegetation shall be established in accordance with standards established by the Council of Tree and Landscape Appraisers (CTLA).

2. If replacement isn't feasible or desired, as determined by the Administrator, a monetary sum equal to the value of the lost or removed specimen tree(s) may be paid to a tree planting fund maintained by the Town of Wake Forest for the purposes of planting and maintaining trees throughout the jurisdiction of the town.

8.4.4 TREE PROTECTION DURING CONSTRUCTION

It is the intent of this sub-section to establish minimum standards of protection in order to ensure that trees which are to be saved remain undamaged, thus improving their long-term chances of survival.

A. **Clear Delineation:** Tree save areas, buffers or other areas where existing vegetation is to be preserved shall be delineated on the construction site as it is shown on the approved landscape plan.

1. All existing trees and vegetation that are to be preserved shall be completely enclosed with a sturdy and visible fence prior to any land disturbance. Fencing shall extend to the CRZ. In some instances, the Administrator may require an additional area of no disturbance.

2. Fencing of areas adjacent to existing and proposed roadways also is required. Fencing is required on all Town of Wake Forest and State Department of Transportation road projects that are adjacent to protected streetscapes or buffers. The tree protection fencing shall be clearly shown on the site and/or subdivision plan and shall comply with the standards in the MSSD.

3. A stop work order or notice of violation shall be issued if the project is found to be out of compliance with this section or an approved Landscape Plan.

4. All protected trees must be protected from silt with wire mesh fencing, as provided for in the MSSD, placed along the outer uphill edge of the tree protection zones at the land disturbance interface.

5. All tree fencing and erosion control measures shall be installed prior to and maintained throughout the land disturbance process and building construction and may not be removed until the authorization is given by the Town of Wake Forest.

B. **Prohibited Activities in Tree Save Areas**

1. **Land Disturbance:** There shall be no clearing, excavation, soil compaction or changes of the existing grade within the delineated tree save area or tree protection zones. Should the removal of underbrush vegetation take place, every effort should be made to minimize the disturbance.

2. **Storage of Equipment:** The storage of construction or other vehicles and/or equipment, site construction materials, portable buildings, including portable toilets, or other heavy objects is prohibited within delineated tree save areas and tree protection zones.

3. **Encroachments:** If during the course of construction, it does become necessary for activities to take place inside TSA or tree protection zones,

then the Administrator shall be consulted, in advance of any activity. Such activities include but are not limited to the erection of scaffolding, vehicle movement, trenching or excavation. The Administrator shall review the most appropriate way to undertake such activities. If such an encroachment is anticipated, the following preventive measures shall be employed at a minimum:

a. Where utilities must encroach upon a delineated tree save area or tree protection zone, they should be installed by tunneling, rather than by trenching. If it is necessary for roots to be disturbed, then proper root pruning procedures shall be employed.

b. The removal of trees adjacent to tree saved areas can cause inadvertent damage to the protected trees. Wherever possible, it is strongly recommended to cut minimum one and one-half-foot trenches along the limits of land disturbance, so as to cut, rather than tear, roots.

c. Where compaction might occur due to traffic or materials through the tree protection zone, the area must first be mulched with a minimum 6-inch layer of processed pine bark or coarse wood chips (see MSSD). Equipment or materials storage or disposal shall not be allowed within tree protection areas.

8.4.5 TREE REPLACEMENT STANDARDS

A. Replacement of Damaged, Removed or Excessively Pruned Trees and Vegetation: Any tree that is damaged, removed or excessively pruned shall be replaced according to the following standards:

1. **Square Inch for Square Inch Replacement.** Where the cross-sectional (basal) area can be documented, an equal amount of new vegetation ("square inch for square inch") shall be used to quantify the required replacement vegetation. All replacement trees shall have a DBH of at least 2 inches each and a cumulative cross-sectional (basal) area equal to or greater than that of the original tree(s).

2. **Area Replacement.** For all other cases where existing vegetation is damaged or removed, the type and amount of replacement vegetation required shall be the type and amount that is necessary to provide the type of landscaped areas required under this section and/or as required by the approved landscape plan.

3. **Location of Replacement Vegetation.** Replacement vegetation should be located within the vicinity of the violation. If replacement is not practical within the vicinity, a more suitable location on the site may be selected. If no suitable location can be found, a monetary payment may be required. This monetary payment will be based on the current market price for any replacement tree(s) and/or shrubs. This payment shall be used to fund plantings on public properties.

B. Establishment Period: Replacement trees shall be maintained through an establishment period of at least 2 years. The applicant may be required to post a performance guarantee acceptable to the town guaranteeing the survival and health of all replacement trees during the establishment period and guaranteeing any associated replacement costs. If the replacement trees do not satisfactorily survive the establishment period in the judgment of the Administrator, the performance guarantee will be used to purchase and install new replacement trees.

8.4.6 TREE CLEARING PERMIT

Pursuant to NCGS 160A-458.5(c)(1), prior to the commencement of any vegetation clearing or removal on any undeveloped property, the owner (or authorized agent) of such property must obtain a Tree Clearing Permit in accordance with the provisions of Section 15.7.1.

8.5 BUFFERS AND SCREENING

8.5.1 GENERAL PROVISIONS

A. Buffer Yard Lot Standards

1. The designated buffer yards are intended to be an aggregate dimension between the competing uses.
2. If a proposed use is to develop next to an undeveloped or vacant property, the proposed use will be required to designate one-half of the required buffer yard, but not less than 10 feet in width, based on the previous use or the potential use of the adjacent property. The potential use of the adjacent property will be determined by the Administrator according to the existing zoning of the undeveloped property and the potential use as shown on the Growth Strategy Map in the Wake Forest Community Plan.
3. If a proposed use is to develop next to an existing land use which was not previously required to create a buffer yard, the proposed use will be required to create the entire buffer yard.
4. Perpendicular encroachments by driveways, pedestrian-ways, and utilities are permitted, but should be minimized to the extent feasible.

B. Credit for Existing Vegetation: Existing vegetation in buffer yard areas, which meets the minimum standards for a tree save area (TSA) in Section 8.4.2, shall qualify for the screening requirements. Where existing vegetation is insufficient or must be removed due to construction activity, new plantings shall be used to supplement any remaining existing vegetation in order to meet the minimum screening requirements.

C. Ownership of Buffer Yards

1. Any required buffer yard, including those required as a zoning condition, for a single-family or two-family residential development shall not be credited toward meeting the minimum lot size requirements.
2. Where control and/or ownership of the buffer yard is by a separate entity, any disturbance, modifications, removal or damage to the buffer yard by an adjacent homeowner or resident is prohibited.
3. The property owner's association or owner shall be responsible for the maintenance and any violation related to the buffer yard as defined in this section.
4. Buffer yards may be included within residential lots only when all of the following conditions are met:
   a. The subdivision is limited in size and has no homeowners' association; and

b. There is no reason for the formation of a homeowner's association other than to retain ownership and maintenance responsibilities for the buffer yard; and

c. The buffer is placed within a permanent conservation easement or other legal instrument dedicated to the Town of Wake Forest.

8.5.2 BUFFER YARD REQUIREMENTS

The following tables illustrate the required buffer yard types for each district and the composition of each buffer yard type:

District of Proposed Development	Adjacent Zoning District					
	OS, RD, GR3, GR5, GR10	UR, RMX, ICD	NB	NMX, UMX, RA-HC	HB	LI, HI
OS, RD, GR3, GR5, GR10	X	X	X	X	A[1]	A[1]
UR, RMX, ICD[2]	C	X	X	X	X	X
NB[2]	B	C	X	X	X	X
NMX, UMX, RA-HC	C	C	X	X	X	X
HB	A	A	B	C	X	X
LI, HI	A	A	A	A	B	X

A = Type A Buffer; B = Type B Buffer; C = Type C Buffer; X = No buffer required

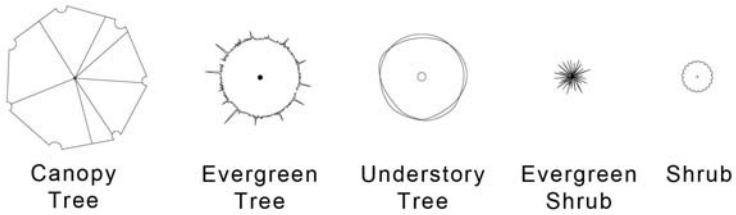
1 Only required where adjacent, more intense use is pre-existing and no equivalent buffer is provided on the adjacent property

2 Only multifamily and non-residential uses shall provide buffers between adjacent single family uses in detached homes

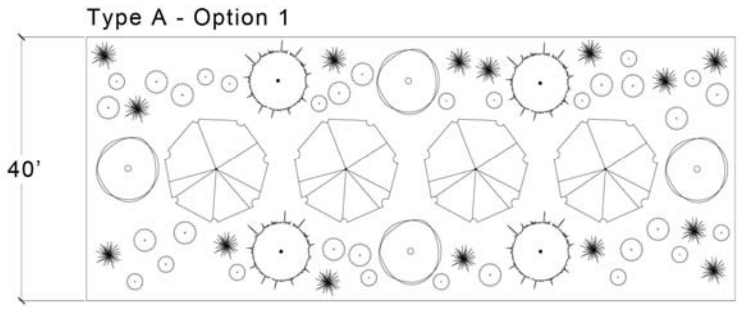
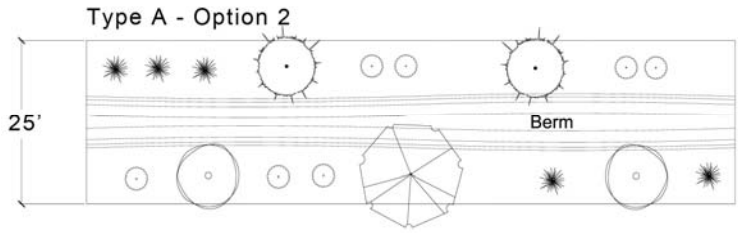
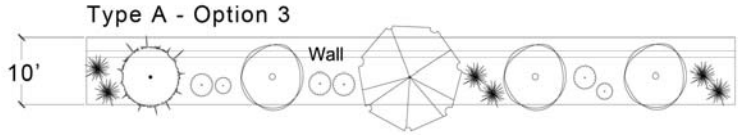
8.5.3 BUFFER YARD COMPOSITION

The required buffer yard types may be established using a combination yard widths, evergreen trees, canopy trees, understory trees, shrubs, fences, walls, and berms. The following tables illustrate the required elements for each buffer yard type.

Buffer Yard Plantings

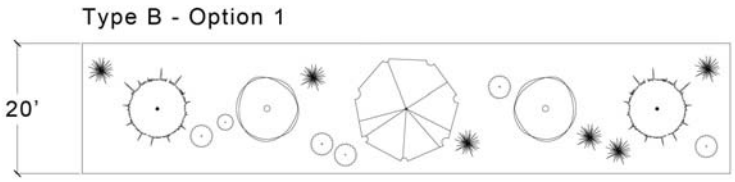
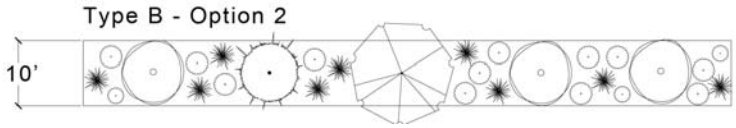


A. Type A Buffer: The intent of the Type A Buffer is to create a completely opaque buffer, having no horizontal openings from the ground to a height of 8 feet within 2 years of planting. A Type A Buffer can be achieved in 3 ways as specified below.

Type A Buffer Yard Options	Minimum Depth	Minimum Plantings per 100 linear feet	Required Barrier
Option 1	40 feet	4 Evergreen Trees 4 Canopy Trees 4 Understory Trees 48 Shrubs	Not Required
			
Option 2	25 feet	2 Evergreen Trees 1 Canopy Tree 2 Understory Trees 12 Shrubs	Berm (See 8.5.4.B)
			
Option 3	10 feet	1 Evergreen Tree 1 Canopy Tree 3 Understory Trees 12 Shrubs	Fence or Wall (See 8.5.4.A)
			

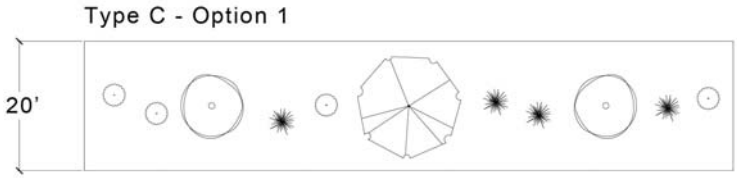
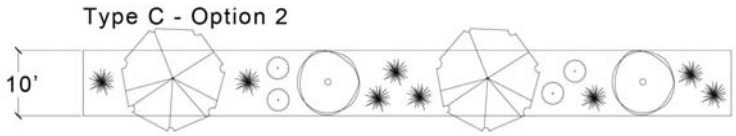
** 50% of required plantings for all options must be evergreen species*

B. Type B Buffer: The intent of the Type B Buffer is to create a semi-opaque buffer, having only seasonal horizontal openings, not to exceed 10% of the total width, from the ground to a height of 8 feet within 2 years of planting. A Type B Buffer can be achieved in 2 ways as specified below.

Type B Buffer Yard Options	Minimum Depth	Minimum Plantings per 100 linear feet	Required Barrier
Option 1	20 feet	2 Evergreen Trees 1 Canopy Tree 2 Understory Trees 12 Shrubs*	Not Required
			
Option 2	10 feet	1 Evergreen Tree 1 Canopy Tree 3 Understory Trees 24 Shrubs*	Not Required
			

** 50% of required shrubs for all options must be evergreen species*

C. Type C Buffer: The intent of the Type C Buffer is to create a semi-opaque buffer, having only seasonal horizontal openings, not to exceed 25% of the total width, from the ground to a height of 6 feet within 2 years of planting. A Type C Buffer can be achieved in 2 ways as specified below.

Type C Buffer Yard Options	Minimum Depth	Minimum Plantings per 100 linear feet	Required Barrier
Option 1	20 feet	1 Canopy Tree 2 Understory Trees 8 Shrubs*	Not Required
			
Option 2	10 feet	2 Canopy Trees 2 Understory Trees 12 Shrubs*	Not Required
			

** 50% of required shrubs for all options must be evergreen species*

8.5.4 ADDITIONS TO BUFFERS AND SCREENING

When it is determined that the conflict of land use is so great that the public safety is not served adequately by the minimum buffer and screening requirements in Section 8.5.2, or where there is a need to prevent a high degree of visual, audio, or physical disorder s, then the Administrator may require the installation of fencing or earthen berms in addition to the minimum required buffers and screening, according to the standards below.

A. Fencing or Walls: Where required, fencing or walls must adhere to the provisions below. Nothing in this section shall prohibit the owner of a single family dwelling from constructing a separate fence along the borders of such property, provided that all required buffer plantings are maintained.

1. In all cases, the finished side of the fence must face the use with the lower intensity.
2. Permitted fence or wall materials include: masonry, stone, architectural block, stucco on masonry, wood or other similar of solid appearance.
3. The design of fencing or walls shall be sufficient to meet the extent of physical screening required by the Administrator.
4. The height of the fence shall be determined by the Administrator based on the following variables: site conditions; topography; use; and/or building height. The minimum height of a fence or wall required by this section shall be 6 feet.

B. Berms: Earthen berms may be required in combination with plant material and fencing for the purposes of screening. Berms shall be tapered appropriately to allow for practical maintenance.

1. The slope of all berms shall not exceed a 2:1 ratio (horizontal to vertical), shall have a top width at least one-half the berm height, and a maximum height of 6 feet above the toe of the berm.
2. All berms regardless of size, shall be stabilized. Topsoils brought in for mounds are to be mixed with native soil to avoid interfacing problems.
3. Berms shall be constructed as to provide adequate sight distances at intersections and along all roads.

   Berms proposed to satisfy the screening requirements of this section shall be vegetated as required by this section. Use of berms as a substitute for existing healthy vegetation is strongly discouraged.

8.5.5 WATERCOURSE (RIPARIAN) BUFFER AREAS

All protected drainageways and surface waters shall maintain riparian buffers directly adjacent to such surface waters in accordance with the standards outlined in Section 12.7.

8.6 STREET TREES

It is the intent of this section to ensure that Wake Forest remains a community of tree-lined streets in order to reduce excessive noise, glare, and heat, and to ensure the aesthetic quality of the town.

8.6.1 STREET TREE REQUIREMENTS

A. Location: Street trees should be planted in the location specified for the corresponding street classification in Section 6.7. However, where not practical due to the location of utilities or other site constraints, street trees may be planted on private property upon dedication of a tree easement. Tree easements should be of a sufficient size to allow access by maintenance equipment to the entirety of the expected mature tree canopy.

B. Minimum Number of Trees: Street trees shall be installed according to the following minimum standards (linear feet of planting area shall exclude driveways):

1. At least 1 canopy tree for every 50 linear feet of planting area, or fraction thereof equal to or greater than 25 feet; or
2. Only when planting of canopy trees is not practical due to the location of utilities, 1 understory tree for every 35 linear feet of planting area, or fraction thereof equal to or greater than 18 feet; or

C. Minimum Spacing: Arrangement of and distance between trees is at the owner's option, except that the minimum spacing between trees should correspond to the expected mature spread of the adjacent trees and in no instance shall be less than:

1. 30 feet between canopy trees,
2. 20 feet between canopy trees and understory trees, and
3. 15 feet between understory trees.

D. Conflict with Street Lighting: Street trees shall be located and planted so as not to diminish the effectiveness of required street lighting, and in no instance shall street lights be located closer than:

1. 15 feet to canopy trees, and
2. 8 feet to understory trees.

E. General Standards

1. The location, species, and approximate planting date of any tree in the public right-of-way or tree easement must be approved by the Administrator prior to planting.
2. Street trees shall be installed according to the standards in the Wake Forest Manual of Specifications.
3. Trees species in major subdivisions should vary from street to street in accordance with Policy ST-3 from the Wake Forest Community Plan

F. Additional Requirements for Special Highway Overlay (SH-O) Districts: Additional requirements for the preservation and planting of trees in streetyards in the SH-O Districts can be found in Section 2.4.3

8.7 VEHICULAR USE AREA SCREENING & LANDSCAPING

8.7.1 SCREENING

All off-street parking, loading areas, and service areas adjacent to and/or visible from a public right-of-way and adjacent properties shall be screened from view by use of one or more of the following:

A. A building or buildings;

B. A change in topography;

C. A planting area a minimum of 8 feet wide planted with evergreen shrubbery placed a maximum of 5 feet on center. All shrubs shall achieve a height of 4 feet within 3 years.

D. Fencing, walls, or berms.

8.7.2 LANDSCAPING

In addition to screening requirements, canopy trees shall be installed in planting areas within parking lots to provide shade coverage for all parking spaces within vehicle service areas. Such planting areas shall meet the following requirements:

A. Planting Area Size: The minimum size of a planting area is dependent upon the number of canopy trees planted within it, as described below.

Number of Canopy Trees in Planting Area	Minimum Size of Planting Area
1	400 square feet
2	700 square feet
3 or more	300 square feet per tree

B. Planting Area Width: A minimum horizontal dimension of 9 feet measured from back of curb, pavement, sidewalk or other separating structure is required for all planting areas.

C. Planting Strip Location: A continuous linear planting strip shall be provided between each 2 parking bays.

D. Minimum Spacing: All parking spaces, or portions thereof, shall be within 60 feet of a planted canopy tree trunk as illustrated in the diagram at right.

E. Groundcover: Each planting area shall be landscaped with mulch, groundcover, or shrubs to protect against soil erosion.

F. Barriers or Wheel

Stops: Barriers, such as wheel stops or 6-inch standard curbs, must be provided between vehicular use areas and landscaped areas.

G. Conflict with Parking Lot Lighting: Trees shall be located and planted so as not to diminish the effectiveness of required parking lot lighting, and in no instance shall lighting be located closer than:

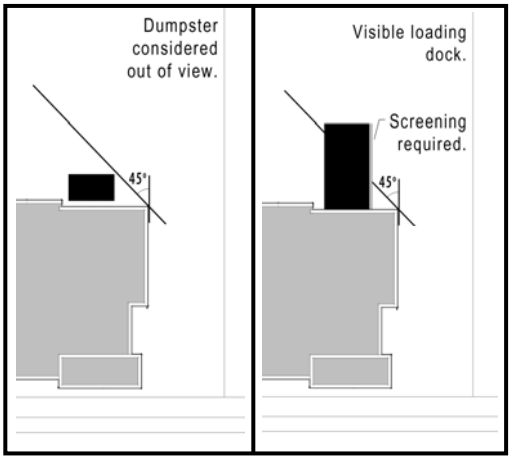
3. 15 feet to canopy trees, and

4. 8 feet to understory trees.

8.8 DUMPSTERS AND MECHANICAL UTILITIES SCREENING

8.8.1 REQUIRED SCREENING

A. All dumpsters, loading docks, outdoor storage areas and utility structures, which are visible from a public street or adjacent property line, shall be screened unless already screened by an intervening buffer yard. Such equipment shall be considered out of view if it is within the 45 degree angles projected from the building edges.



B. Screening shall consist of evergreen shrubs, fencing, walls or berms, and shall comply with all other standards of this section.

C. All screening of utilities shall comply with the requirements of the utility provider.

D. Where possible, enclosures for dumpsters are encouraged to be constructed with materials that are compatible with the design and materials of the principal building. Screening may be created through the use of:

1. Solid-wood fence, or fabricated metal fence, each with shrub plantings placed around the enclosure (they do not need to completely screen the enclosure) that grow as high, or nearly as high, as the fence to provide an attractive separation, or

2. Brick fence, brick/split face block, or decorative block (plantings not required).

8.9 GENERAL INSTALLATION AND MAINTENANCE STANDARDS

It is the intent of this section to ensure that the planting and preservation areas established to meet the requirements of this section are maintained. Minimum spacing requirements are located in Sections 8.6.1.C and 8.7.2.D.

8.9.1 INSTALLATION STANDARDS FOR NEW PLANTINGS

A. Plant Species: Plantings installed to meet the baseline vegetation requirement and other requirements of this section shall be chosen from the Official Planting List maintained by the Town of Wake Forest Urban Forestry Board.

Substitutions may be made only by advance approval of the Urban Forestry Board.

B. Variety: When selecting species for planting, the applicant shall reference the Town of Wake Forest Urban Forest Management Plan as a guide to promote tree diversity. Trees species in major subdivisions should vary from street to street in accordance with Policy ST-3 from the Wake Forest Community Plan.

C. Canopy (Large Shade) Trees: Canopy trees must be a native or locally-adapted species with an expected mature height of 40 feet or greater and an expected mature crown spread of 30 feet or greater. When planted, canopy trees must have a minimum caliper of 1.5 inches as measured at 6 inches above grade. Multi-stemmed trees shall have at least 3 stalks with a minimum 1.5 inch diameter at breast height (DBH), or approximately 4.5 feet above grade, and must be at least 8 feet in height when planted.

D. Understory (Small) Trees: Understory trees have an expected mature height between 20 and 40 feet. When planted, understory trees must be a minimum of 1 inch as measured at 6 inches above grade. Multi-stemmed trees shall have at least 3 stalks and must be at least 6 feet in height when planted.

E. Shrubs: At the time of planting, all shrubs except for shrubs planted as part of a buffer requirement shall be a minimum of 18 inches in height or spread and reach a minimum height of 36 inches and a minimum spread of 30 inches at maturity. Shrubs required in buffers shall be a minimum of 3 feet in height at time of installation measured above grade and reach a minimum of 6 feet in height at maturity and shall be spaced a minimum of 5 feet on-center.

F. Timing of Plantings: Any tree planted to satisfy the requirements of this chapter must be planted after October 1st and before March 31st. Any tree planted after April 1st and before September 30th will not count toward the landscape requirements of this chapter. If the project timing is such that trees to be counted toward the requirements of this chapter cannot reasonably be planted within the required October 1st to March 31st timeframe before the applicant requests a Certificate of Compliance, the Administrator may grant the applicant one additional year from the date of application for a Certificate of Compliance in which to plant such trees. In order to ensure that all such trees are planted within this one year period, the applicant shall provide the town with an improvement guarantee in accordance with the provisions of Section 6.12.

G. Plantings near Parking and Vehicular Use Areas: All planting areas that are adjacent to parking or vehicular use areas shall be protected from vehicular intrusion or damage from excessive vehicular lubricants or fuels.

H. Motorist Obstruction Prohibited: Landscaping shall not obstruct the view of motorists using any street, parking aisle, private driveway or the approach to any street intersection so as to constitute a traffic hazard or a condition dangerous to public safety.

I. Conformance with Nursery Stock Standards: Plant materials used in conformance with the provisions of this section shall conform to standards promulgated by the American Association of Nurseryman in "American Standards for Nursery Stock" (ANSI Z60.1-2004), as amended from time to time hereafter. All plant material shall be free of disease and pests; have good structure and branching form; be free from constricting ties; have a healthy root system without girdling roots; have a visible root collar at the time of planting; and be in vigorous health.

J. Planting in Utility Easements: The planting of required trees and shrubs in utility easements is discouraged, but may be permitted with written approval of the easement owner.

K. Ground Treatment: All tree plantings shall be mulched with 3 inches of shredded bark or 4 inches of pine straw in a 3-foot radius around the tree, or to the dripline, whichever is greater. The mulch shall be free of trash and maintained weed free thereafter. The mulch shall not cover the root collar.

L. Trimming and Pruning: All required plantings shall be allowed to reach their mature size and shall be maintained at their mature size. Trimming and pruning shall be done in strict accordance with the ANSI A300 standards, as amended from time to time hereafter. Topping is not an acceptable pruning practice. The Administrator may require the removal and replacement of any tree(s) that have been topped or excessively trimmed.

M. Staking: Staking is required only when a plant is unable to support itself with its existing root system. Examples of this are: bare rooted plants, a strong wind situation, loose soil, wet conditions, steep slopes and large size plant material. Tree ties are to be a soft, wide (minimum, 1 inch) polymer material. No knots are to be tied around the trunk that may restrict growth. Ties are to be removed after one year following installation.

N. Soil Modification: Soil modifications shall be required on sites where the soil is poor in quality and structure. Soil modifications may include tilling, deep ripping, addition of nutrition/fertilizer or other organic compounds, conditioning additives to effect a change in the water holding capacity of the soil, soil structure, soil texture, and Ph, such as gypsum, sand, lime, dolomite, chemicals, mulches, otherwise.

8.9.2 MAINTENANCE

It shall be the responsibility of the property owner(s) or assigned caretakers to ensure that all regulated landscaped areas, buffers, fencing, and tree save areas are installed, preserved, and maintained in good growing conditions, appearance, and usefulness. Damage and disturbances to these areas shall result in vegetation replacement and/or fines and other penalties. Preservation and maintenance shall include:

A. Any dead, unhealthy, or missing vegetation, shall be replaced with vegetation that conforms to the standards of this section and the approved site and/or subdivision plan.

B. All required buffers, streetyards, vehicular use areas, tree save areas and other landscaped areas shall be free of refuse and debris, shall be treated for pest/diseases in accordance with the approved site and/or subdivision plan, and shall be maintained as to prevent mulch, straw, dirt, or other materials from washing onto streets and sidewalks.

C. The owner(s) shall take actions to protect all plant material from damage during all facility and site maintenance operations. All plant material must be maintained in a way that does not obstruct sight distances at roadways and intersections, obstruct traffic signs or devices, and interfere with the use of sidewalks or pedestrian trails. Plant material, whether located within buffers, tree save areas, or within planted areas (required by the site and/or subdivision plan) shall not be removed, damaged, cut or severely pruned so that their intended form is impaired. Shrubs within vehicular use areas, streetyards, and street fronts may be pruned, but must maintain at least 3 feet in height.

D. In the event that existing required vegetation located within any buffers, tree save areas, streetyards, vehicular use or other landscape areas poses an immediate or imminent threat to improved structures on private property or public property, excessive pruning or removal of the vegetation may be allowable provided authorization is obtained from the Administrator, and the performance standard of the landscape area is maintained consistent with this section. Replacement vegetation may be required as a condition of the permit.

E. In the event that any vegetation or physical element functioning to meet the standards of this section is severely damaged due to an unusual weather occurrence or natural catastrophe, or other natural occurrence, the owner may be required to replant if the requirements of the section are not being met. Replacement vegetation shall conform to the standards of this section and the approved site and/or subdivision plan.

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9 PARKING & DRIVEWAYS

9.1 PURPOSE AND INTENT

Parking lots and similar facilities are necessary elements in the urban environment. However, the provision of parking facilities must be regulated in order to avoid negative impacts such as:

- Increased storm water volume and velocity,
- Increased surface pollutants,
- Increased surface level heat and glare,
- Reduction in the efficiency of the connecting street system, and
- Reduction in the operations of the surrounding pedestrian and bicycle network.

The purpose of this chapter is to ensure the adequate provision of parking in Wake Forest without degrading the urban or natural environment.

9.2 APPLICABILITY

The provisions of this chapter shall apply to all new and expanded development, as well as any changes in use.

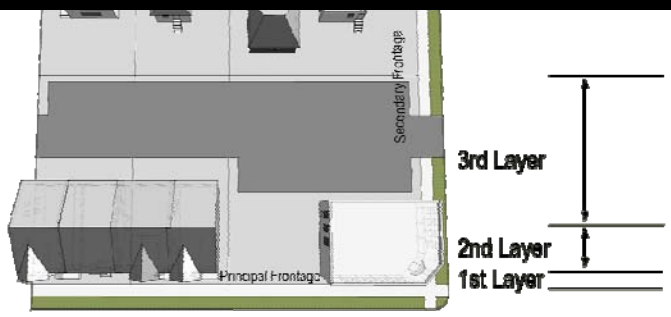
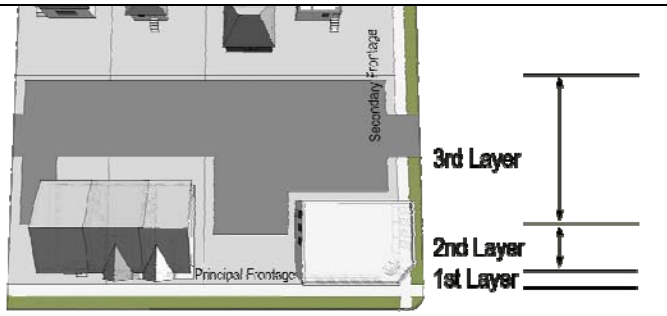
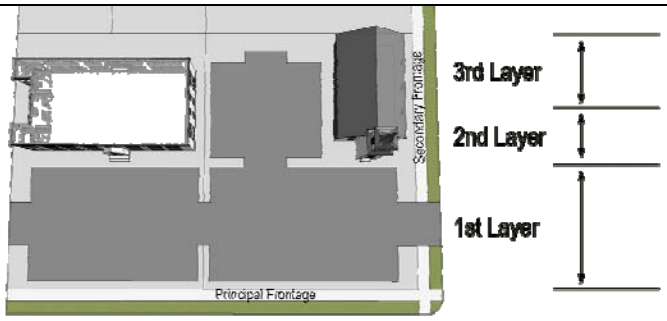
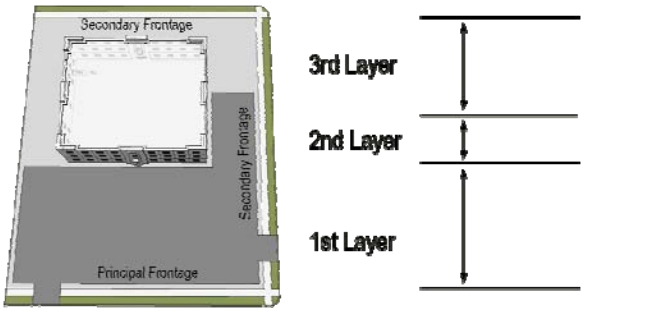
9.3 PERMITTED PARKING LOCATIONS

	Civic/Institutional	Detached House	Townhouse	Apartment	Commercial	Mixed-Use	All Other Bldgs
OS	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RD	U	U	–	–	–	–	–
GR3 & GR5	U	U	–	–	–	–	–
GR10	C	D	B	B	–	–	–
NB	C	D	–	–	C	C	–
HB	C	–	–	–	U	C	–
ICD	B	D	B	B	B	B	
LI	–	–	–	–	U	U	U
HI	–	–	–	–	U	U	U
UR	B	D	B	B	–	–	–
RMX	B	D	B	B	B	B	–
NMX & RA-HC	B	D	B	B	B	B	–
UMX	B	–	A	A	A	A	–

Permitted Parking Configurations*
(Also see diagrams below)

Location A – *Parking permitted in 3rd Layer only*
Location B – *Parking permitted in 2nd and 3rd Layers only*
Location C – *Parking permitted in 2nd and 3rd Layers. Parking in 1st Layer restricted to one drive aisle with 2 bays.*
Location D – *Parking permitted in 2nd and 3rd Layers. Parking in 1st Layer restricted to a driveway or paved surface not to exceed 40% of the lot width.*
U – *Unrestricted*

* These requirements are intended to be applied from the principal frontage of the lot as determined by the Administrator. Parking configurations may have additional restrictions specified in the tables of district standards in Sections 2.2.3 and 2.2.5, and in Chapter 5 – Building Design Standards, and, if located in the Special Highway Overlay District, in Section 2.4.3. The Administrator may waive or alter parking configuration requirements to accommodate unique constraints, such as severe topography, on a site-by-site basis.

PERMITTED PARKING CONFIGURATION DIAGRAMS	
	Location A *Parking permitted in 3rd Layer only* 1st Layer – distance from right-of-way to front of building 2nd Layer – 20 feet 3rd Layer – remainder of lot
	Location B *Parking permitted in 2nd and 3rd Layers only* 1st Layer – distance from right-of-way to front of building 2nd Layer – 20 feet 3rd Layer – remainder of lot
	Location C *Parking permitted in 2nd and 3rd Layers. Parking in 1st Layer restricted to one drive aisle with 2 bays.* 1st Layer – distance from right-of-way to front of building 2nd Layer – 20 feet 3rd Layer – remainder of lot
	Location D *Parking permitted in 2nd and 3rd Layers. Parking in 1st Layer restricted to a driveway or paved surface not to exceed 40% of the lot width.* 1st Layer – distance from right-of-way to front of building 2nd Layer – 20 feet 3rd Layer – remainder of lot
	U – *Unrestricted* 1st Layer – distance from right-of-way to front of building 2nd Layer – 20 feet 3rd Layer – remainder of lot

9.4 PARKING REQUIREMENTS

Permanent off-street parking (including on-street parking in accordance with the requirements below) is required subject to the table below. If required, parking shall be provided at the time of erection, alteration, enlargement, establishment or change of use of any building or open use of land which require additional off-street parking.

9.4.1 PARKING REQUIREMENTS BY USE TABLE

The following table details the required minimum parking ratios by major land use. All area calculations use gross leasable area (GLA). For uses not covered in this table, the parking requirements shall be those of the most similar use as determined by the Administrator. For bicycle parking, the use of a single "inverted U" bicycle parking rack will count as 2 bicycle parking spaces. The minimum required bicycle parking spaces shall be 2 spaces or one rack and the maximum required shall be 20 spaces.

Use Category	Minimum Required Auto Spaces	Minimum Required Bicycle Parking Spaces
Residential		
Dwelling-Single Family & Two Family	1 per unit, or 2 per unit if parking is provided in an enclosed garage	No requirement
Dwelling-Townhome & Multifamily	1.5 per unit	1 per 40 auto spaces
Dwelling-Accessory	1 per unit	No requirement
Live-Work Units	1 per 600 sf	1 per 40 auto spaces
Residential Care Facilities	1 per 2 resident rooms	1 per 40 auto spaces
All Other Residential Uses	No requirement	No requirement
Lodging – All Lodging Uses	1 per room	1 per 50 auto spaces
Office/Service		
Child/Adult Day Care Centers (More than 8 persons)	1 space per classroom	1 per 50 auto spaces
Medical Clinic	1 per Examination Room	1 per 50 auto spaces
All Other Office/Service Uses	1 per 600 sf	1 per 50 auto spaces
Commercial		
Restaurant	1 per 400 sf	1 per 50 auto spaces
All Other Commercial Uses	1 per 400 sf	1 per 40 auto spaces
Entertainment/Recreation		
Amusements (Indoor)	No requirement	1 per 40 auto spaces
Amusements (Outdoor)	No requirement	1 per 40 auto spaces
Recreational Facility (Indoor)	No requirement	1 per 40 auto spaces (minimum of 4 racks)
Theater (Indoor & Outdoor)	1 per 8 seats	1 per 40 auto spaces
All Other Entertainment/Recreation Indoor Uses	No requirement	1 per 40 auto spaces
All Other Entertainment/Recreation Outdoor Uses	No requirement	1 per 40 auto spaces
Civic/Institutional		
Religious Institution (RA-HC, NMX, UMX)	No requirement	1 per 50 seats
Religious Institution (All Other Districts)	1 per 8 seats in the main assembly hall	1 per 50 seats
Schools – Elementary & Secondary	1 per 8 seats in the main assembly hall or gymnasium*	1 per 50 students
Studio – Art, dance, martial arts, music	1 per 400 sq ft	1 per 20 auto spaces
All Other Civic/Institutional Uses	No requirement	1 per 40 auto spaces
Manufacturing/Wholesale/Storage		
Storage – Self-Service	No requirement	No requirement
All Other Manufacturing/Wholesale/Storage Uses	No requirement	1 per 50 auto spaces
Agricultural – All Agricultural Uses	No requirement	No requirement
Infrastructure – All Infrastructure Uses	No requirement	No requirement

**Designated bus parking areas shall not count toward this requirement*

9.4.2 MAXIMUM PARKING

The minimum parking requirements above have intentionally been set well below general market expectations as a means to mitigate against the negative aspects of paved surfaces on the environment such as excessive water runoff, water pollution, and urban heat island effect. To this end, there shall also be a maximum parking standard for large parking facilities as follows:

A. Pervious Pavement Required

1. If a parking lot exceeds 150 spaces and includes more than twice the minimum number of spaces established for a use, as outlined in Section 9.4.1 above, any parking spaces over twice the minimum required must be installed using pervious pavement systems only.
2. If there are no minimum parking requirements for the use given in Section 9.4.1 above, the maximum parking standard shall be 35% of the site area.

B. Exception: Where poorly draining soil types prevent the use of this technique, the Administrator may grant an exception to the maximum parking standard above upon sufficient justification from the applicant of the need for such extra parking facilities.

9.4.3 EXEMPTIONS AND ADJUSTMENTS

A. Exemptions: Uses in the RA-HC District are exempt from the minimum parking requirements of this section.

B. Tree Preservation: The minimum number of parking spaces required may be adjusted by the Administrator when it has been determined that the reductions are necessary to preserve a healthy tree or trees (with a 12 inch or greater diameter at breast height) from being damaged or removed, and where the site plan provides for the retention of said tree or trees.

9.4.4 SATELLITE PARKING

A. If the off-street parking spaces required by this section cannot be reasonably provided on the same lot on which the principal use is located, such space may be provided on any land within 600 feet. Such measurement shall be taken from the edge of the parking area on the lot to the entryway of the remote parking area.

B. Shared Satellite Parking: Upon approval by the Administrator, satellite parking facilities may be shared by 2 or more uses which do not share normal operating hours.

C. Parking for Permitted Uses Only: If satellite parking is utilized to fulfill parking requirements, the owner or authorized agent for the land upon which such remote parking is located shall restrict the use of such parking area for parking only in connection with the use(s) or structure(s) for which such remote parking is provided. Such restriction shall be recorded through an easements plat properly filed with the Register of Deeds of Wake County, which may be released only by written consent of the town. Remote parking for a particular use shall not be established in any district that does not allow that use.

9.5 VEHICLE PARKING DESIGN STANDARDS

9.5.1 PARKING AREA GENERAL DESIGN STANDARDS

A. Parking areas shall be located and designed to avoid undue interference with the use of public rights-of-way, driveways or pedestrian ways. Parking stalls shall not be located in areas that would require backing into access driveways or streets except where allowed for residences.

B. Parking design and location shall be in accordance with the Wake Forest Manual of Specifications & Standards.

C. Parking stalls shall be located a minimum of 10 feet from public rights-of-way and buildings to allow sufficient separation for sidewalks, landscaping and other site features except along the backs of buildings in areas designed for loading and unloading.

D. Parking shall not be located in landscaped, open space or tree save areas.

E. Parking areas shall be maintained to provide for vehicle access and shall be kept free of litter, debris, outdoor display and sales and material storage, including portable containers.

F. Parking for service vehicles shall be designated, located and screened to minimize the view from adjacent properties and rights-of-way, generally at the rear of buildings.

G. Vehicle storage or display areas shall be identified on the site plan distinct from customer and employee parking areas and shall comply with parking access, location and design requirements, except that striping of the display or storage area shall not be required. Vehicle storage or display areas shall not be located in a manner that interferes with vehicle or pedestrian access aisles or driveways.

H. Tractor trailers, cargo trucks, busses and other large commercial vehicles or heavy equipment parking and storage shall comply with parking access, location and design requirements except for stall size and aisle size which shall be as appropriate for the vehicles to be stored and shall be designated on a site plan.

9.5.2 SURFACING

Off-street parking areas shall be properly graded, marked and located on improved lots or within parking structures. The material for surface parking spaces and corresponding access drives required by this section, except for single-family detached and duplex residences, shall consist of suitable material as set forth below.

A. Suitable Materials: Suitable paving materials for required parking areas include, but are not limited to, asphalt, porous asphalt, porous paving blocks, and concrete. Compacted stone (road bond) and gravel are permitted as paving materials in the 3rd Layer of a lot (as described in Section 9.3) or in loading and service areas.

B. Accessible Spaces: All accessible spaces and corresponding access paths shall consist of concrete or asphalt.

C. Gravel: When gravel is used it must be maintained on site with a concrete apron at the traveled way.

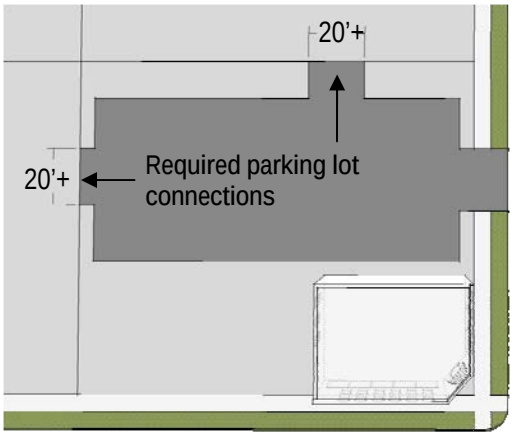
D. Pervious Surfaces: Porous paving blocks and pervious paving materials are permitted and encouraged as material for parking lots. The use of reinforced grass as a parking lot surface is permitted for satellite parking areas.

E. Parking Space Marking: The individual parking spaces in a lot shall be delineated in all parking lots except those utilizing road bond, gravel, grass or other vegetative surfacing.

9.5.3 CONNECTIVITY

A. Adjoining parking lots serving (or potentially serving) non-residential or multi-family uses shall be interconnected as follows: (See illustration below)

1. The parking lot under development has a minimum of 24 parking spaces or equivalent parking area.



2. At least 1 connection is provided at all lot lines that are coincident for at least 60 feet with another lot zoned for non-residential use.

3. The connection is at least 20 feet wide.

4. If applicable, the connection aligns with a connection that has been previously constructed on an adjacent property.

5. The connection has a slope of no greater than 15 percent.

6. The connection is not placed where a building on an adjacent property is within 50 feet of the lot line which would hamper traffic movements within the parking lot.

7. The connection is placed in an area which will not require the removal of significant natural features such as wetlands or trees with a caliper of 6 inches or more.

8. In the event these conditions cannot be met without undue hardship, or if such connections would create undesirable traffic flow, the Administrator may waive the connection requirement.

B. Where a parking lot connection is required an easement for ingress and egress to adjacent lots shall be recorded by the property owner with the Wake County Register of Deeds in the form of an easement plat.

9.5.4 STRUCTURED PARKING

A. Screening Required: Where an above-ground parking structure fronts a public street, the ground level shall be screened in such a way that cars are not visible from the street (e.g., structure could be wrapped by retail, office or some other active use along the primary façade).

B. Materials: Along pedestrian oriented streets, parking structure façades shall be treated with high quality materials and given vertical articulation and emphasis compatible with the principle structure. The façade shall be designed to visually screen cars.

C. Entries: Pedestrian entries shall be clearly visible.

D. Bicycle Parking: Parking structures shall provide bicycle parking within the structure. It shall be located on the level closest to the street and/or a primary building entrance.

9.6 BICYCLE PARKING STANDARDS

Bicycle parking shall be provided by all non-residential, multi-family, recreation and industrial uses. Bicycle parking facilities required by this section shall be designed to provide convenient bicycle parking and to protect parked bicycles from damage. Acceptable rack elements, rack location and access, rack area and site conditions such as protection from the elements and visibility shall conform to the Association of Pedestrian and Bicycle Professionals Bicycle Parking Guidelines.

9.6.1 BICYCLE PARKING FACILITIES

Bicycle parking spaces shall be Class I, Class II, or Class III facilities. Racks which only support one wheel are not acceptable.

A. Class I: Bicycle lockers are generally rectangular enclosures, each holding one or 2 bicycles.

B. Class II: Bicycle parking racks which allow all 3 major components of the bicycle, back wheel, frame, and front wheel, to be locked, without removal of the front wheel.

C. Class III: Racks such as loop, post, rails, "A" and inverted "U" racks. Each rack provides 2 bicycle parking spaces. Common properties in a class III facility include its support of the bicycle with or without the front wheel removed and post or pipe dimensions which allow the lock to encompass the front tire and down post or the rear wheel and seat post. Class III facilities are recommended for short-term parking, although, in combination with shelter, they can be adequate for long-term storage.

"Inverted U" bicycle rack

9.6.2 GENERAL BICYCLE PARKING DESIGN STANDARDS

A. Multi-Family Development: Required bicycle parking spaces in multi-family development shall be provided in Class I facilities, or in Class II or III facilities if shelter is provided to accommodate long-term storage. If completely enclosed garages or accessory storage structures of at least 8 feet by 6 feet that may be locked or otherwise secured by individual tenants are provided for every unit in a multi-family development, no additional bicycle parking shall be required.

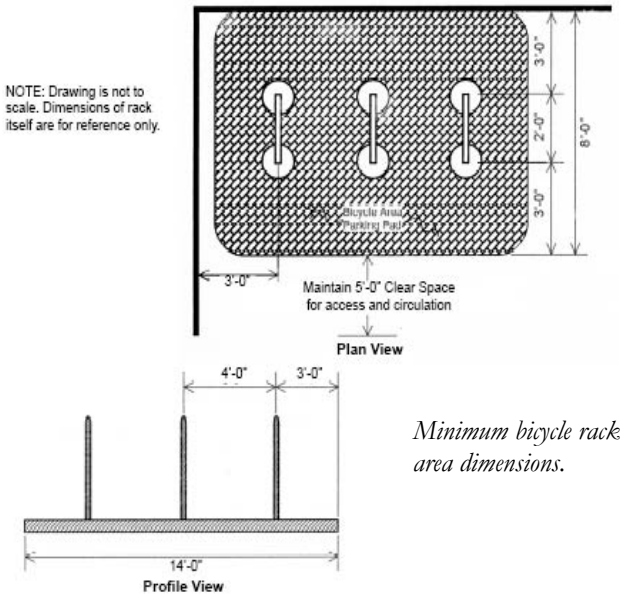
B. Surfacing: Bicycle parking shall be provided on a hard-surface, all-weather pavement of asphalt or concrete with curb ramps installed as appropriate.

C. Signage: Where not clearly visible from the access way, directional signage shall be provided to route bicyclists to the bicycle parking facility.

D. Installation: Installation shall be according to the manufacturers' instructions.

E. Placement: Bicycle parking shall be:

1. Separated from automobile parking by a physical barrier or by at least 5 feet where automobile parking is prohibited and shall be located as close to public and employee entrances as possible without interfering with the flow of pedestrian and vehicular traffic.
2. Conveniently located near entrances (where multiple entrances exist, the racks shall be dispersed among the entrances rather than located in large groupings)
3. Located so as not to interfere with pedestrian access.



Minimum bicycle rack area dimensions.

9.7 TRANSPORTATION FACILITY PERMITS

A Transportation Facility (TF) is any surface parking lot of 1500 spaces or more, a combination of surface and structure parking of 1000 spaces of more, or any parking structure of 750 spaces. Transportation Facilities must comply with the regulations pertaining to the TF Program administered by the North Carolina Department of Environmental and Natural Resources, Division of Air Quality. Any existing facility that plans a modification that exceeds the above threshold is subject to the TF Program regulations.

9.8 DRIVEWAY ACCESS

9.8.1 DRIVEWAY STANDARDS

Any use which requires lowered or cutaway curbs, for purposes of ingress or egress, shall be subject to the provisions below.

A. Maximum Number of Driveways: The maximum number of combined entrances and exits allowed on any parcel shall correspond to the frontage of that parcel on any one street as indicated in the following table, except that properties with frontage on major access corridors in the Special Highway Overlay Districts shall be subject to the driveway requirements of Section 2.4.3.E:

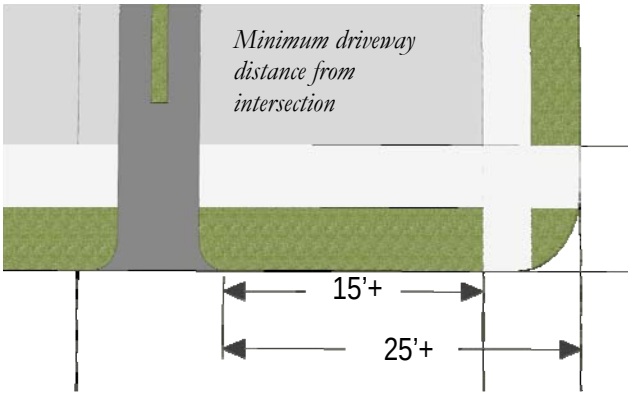
Frontage Width	Maximum Permitted Driveways
Less than 50 feet	1 – For residential properties the requirements of Section 5.5.4 shall also apply.
50 feet to 200 feet	2
More than 200 feet	2 - Additional entrances or exits shall be permitted after showing of actual requirements of convenience and necessity and upon approval of the Planning Board.

B. Location: Driveways shall be located at a point along the frontage where it is possible for drivers of vehicles entering the highway to see in both directions along the traveled way far enough to allow entering the roadway without creating a hazardous situation.

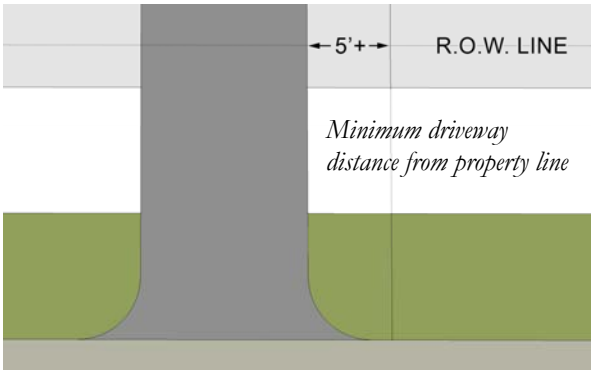
C. Minimum Separation

1. The distance between any 2 curb cuts on the same side of the street shall be not less than 15 feet. Said distance shall be measured between the points of tangency of the curb return radii and the established curb line of the abutting street.

2. At street intersections, no curb cut shall be located within 25 feet of the intersection of 2 curb lines or such lines extended, or within 15 feet of the intersection of 2 property boundaries, right-of-way lines, or such lines extended, whichever is least restrictive.



3. All driveways shall be constructed so as to be at least 5 feet from any property line at the right-of-way, except that a curb return may become tangent to a curb line at a point where said property line extended intersects said curb line.



D. Driveway Width: Required driveway width pertains to the measurement at the sidewalk. At other points in the driveway the width may vary.

1. **Single Family Detached Residential Driveways:** Driveways on detached single family residential properties shall have a maximum width of 12 feet.

2. **All Other Driveways:** The width, in feet, of a driveway approach shall be within the minimum and maximum limits as specified below.

   a. One-way drives shall have a minimum width of 12 feet and shall not exceed a maximum width of 30 feet.

   b. Two-way drives shall have a minimum width of 16 feet and shall not exceed a maximum width of 36 feet.

3. **Public Service Driveways Exempt:** Driveways for fire protection, law enforcement, and other public services shall be exempt from the driveway width requirements of this paragraph.

E. Joint Use Driveway

1. Wherever feasible, the Administrator shall require the establishment of a joint use driveway serving 2 abutting properties.

2. When a property is developed before an abutting property is developed, the site shall be designed to ensure that its driveway and circulation may be modified to

create a joint use driveway and interconnected parking with the abutting property at a later date.

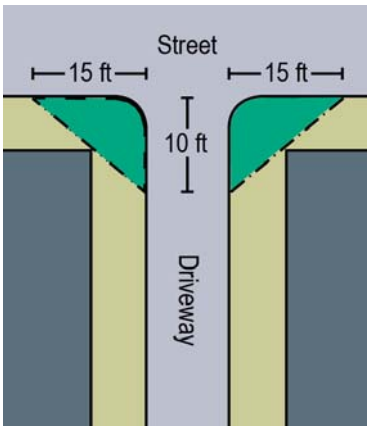
F. Utility Driveways: A 10 foot wide curb depression shall be provided at all locations where utilities cross curb and gutter to run into off-site easements. The purpose for the depression is to provide equipment access to easements without "hopping" over the curb.

G. Compliance with Local and State Requirements

1. Any person or corporation desiring to construct a driveway or other connection within the right-of-way of the town or state shall, before beginning any construction, secure the appropriate permits from the authorizing agency, allowing such construction. Driveway connections to residences are normally excluded from this requirement, but may be included at the option of the authorizing agency.
2. Failure to secure a permit prior to construction may result in the removal of the driveways and/or denial of access at that location.

H. Driveway Sight Triangles

1. At all driveway approaches, a sight area shall be maintained. Within the sight area no fence, wall, sign, graded slope or embankment, parked vehicle, hedge, foliage, tree or other planting, and no other object or structure shall be placed, erected or maintained which will obstruct visibility at a height greater than 2.5 feet.
2. Sight triangles for driveways are formed by a 10 foot side measured along the edge of the driveway approach and a 15 foot side measured along the edge of the traveled way. For sight triangle distances related to other intersection types see Section 6.5.2.G.



10 LIGHTING

10.1 PURPOSE AND APPLICABILITY

10.1.1 PURPOSE

The standards set forth in this section are designed to focus on the actual physical effects of lighting, as well as the effect that lighting may have on the surrounding neighborhood. It is the intent of this section to:

A. Minimize light pollution, such as glare and light trespass.

B. Conserve energy and resources.

C. Maintain night-time safety and utility.

D. Improve the night-time visual environment.

10.1.2 APPLICABILITY

Unless otherwise specified, this section shall apply to all development in the Town of Wake Forest which requires an application and/or UDO approval as specified in this ordinance. This includes, but is not limited to, changes of use, building expansions/reconstruction and parking area expansions for existing development according to the provisions in Section 13.1.

10.1.3 NONCONFORMING LIGHTING

Any nonconforming lighting fixture lawfully in place or approved by the town prior to the adoption of this ordinance shall be exempt from these requirements. Routine maintenance, including changing the lamp, ballast, starter, photo control, lens, and other required components, is permitted for all existing fixtures. At the time that a nonconforming fixture, which was installed prior to the adoption of this ordinance, is replaced, moved, upgraded, or otherwise changed, the fixture must be replaced by a fixture that is in compliance with this ordinance and the NC Energy Code.

10.2 PROHIBITIONS AND EXEMPTIONS

10.2.1 PROHIBITIONS

The following lighting types shall be prohibited within the jurisdiction of the Town of Wake Forest:

A. The use of laser source light or any similar high intensity light for outdoor advertising or entertainment is prohibited.

B. The operation of searchlights for advertising purposes is prohibited.

C. Site lighting that may be confused with warning, emergency, or traffic signals is prohibited.

D. Lights that flash, move, revolve, rotate, scintillate, blink, flicker, vary in intensity or color, or use intermittent electrical pulsation are prohibited.

E. Awnings and canopies used for building accents over doors, windows, and etc. shall not be internally lit (i.e. from underneath or behind) so as to visually turn a translucent material into an internally illuminated material. Lighting may be

installed under canopies that light the sidewalk, or downlights onto the architectural features of a building.

10.2.2 EXEMPTIONS

The following exemptions shall be granted from the requirements of this section:

A. Luminaires used for public-roadway illumination may be installed at a maximum height of 37 feet and may be positioned at that height up to the edge of any bordering property.

B. All temporary emergency lighting needed by the Police or Fire Departments or other emergency services, as well as all vehicular luminaires, shall be exempt from the requirements of this ordinance.

C. All hazard warning luminaires required by Federal regulatory agencies are exempt from the requirements of this article, except that all luminaires used must be red and must be shown to be as close as possible to the federally required minimum lumen output requirement for the specific task.

D. Individual residential lighting that is not part of a site plan or subdivision plan for street or other common or public area outdoor lighting.

E. Lighting associated with holiday, festival or other temporary uses permitted in Section 4.7.

F. Lighting of public art that has been permitted or otherwise approved by the town.

G. Other Municipal or State lighting installed for the benefit of public health, safety, and welfare.

H. All fixtures installed or temporarily used by public agencies, their agents, or contractors for the purpose of illuminating public streets.

I. Lighting of US and North Carolina State Flags provided the flag standard does not exceed the maximum permitted building height for that district.

10.3 DESIGN STANDARDS

10.3.1 GENERAL DESIGN STANDARDS

A. Background spaces such as parking lots and driveways shall be illuminated as unobtrusively as possible to meet the functional needs of safe circulation and of protecting people and property.

B. Foreground spaces, such as building entrances and plaza seating areas, shall utilize lighting that defines, highlights, or enhances the space without glare.

C. The style of light standards and fixtures shall be consistent with the style and character of architecture proposed on the site.

D. Light poles and fixtures shall be of a matte or low-gloss grey, black, dark earthen, or bronze finish, unless permission is granted by the Administrator for a special color scheme or theme.

E. No outdoor pole lighting fixture shall be located within any required landscape buffer yard or street yard, except for those lighting encroachments permitted by Section 4.3.4.

F. Unique areas or neighborhoods within the jurisdiction, such as but not limited to any locally designated municipal historic district, any National Register historic

district, and downtown Wake Forest, may have additional design guidelines for lighting.

G. Light sources must be compatible with the light produced by surrounding uses and must produce an unobtrusive degree of brightness in both illumination levels and color temperature.

H. Natural areas and natural features shall be protected from light spillage from off-site sources.

I. All exterior lighting, on or off a building, shall be either amber in color (a temperature rating equal to or less than 2,700 Kelvin) or turned off at 11:00 p.m. or at closing, whichever is earlier, with the exception of low-light output (800 lumens or lower) landscaping or other decorative lighting, signage lighting, or customer entrance or service area lights aiming down and installed under a canopy or similar roof structure.

10.3.2 DISTRICT LIGHTING STANDARDS IN FOOTCANDLES (FC)

A. Maximum lighting levels shall adhere to the standards in the chart below. All numerical values in the chart below represent measurements in footcandles.

	OS, RD, GR3, GR5	GR10, UR, RMX	NMX, RA-HC, UMX, NB, ICD	HB, LI, HI
Light Trespass Off Property	0.1	0.3	0.8	1
Display/Canopy Areas	8	12	20	20
Parking Areas	4	4	6	6
All Other On-Site Lighting	4	6	10	10

1. The values in the preceding chart for "All Other On-Site Lighting" and "Display/Canopy Areas" shall represent the maximum point of illuminance measured at grade in footcandles.

a. Exception: Outdoor display lots for vehicle sales and leasing may exceed 20 foot-candles if outdoor white lighting is cut off, leaving only security lighting that is amber in color (a temperature rating equal to or less than 2,700 Kelvin), after closing or 11:00 p.m., whichever comes earlier.

2. The values of the preceding chart for the "Light Trespass Off Property" shall represent the maximum point of illuminance as measure at the propery line in footcandles.

a. Exception: In the case of buildings closer than 10 feet to the property line using only wall packs, light trespass may be greater than one foot-candle as long as the wall packs are fully shielded to direct the light downward, have a light output of 1,600 lumens or lower, and the light source (lamp) is not visible from off-site.

3. The values of the preceding chart for "Parking Areas" shall represent the average point of horizontal illuminance measured in footcandles, provided that in all districts the maximum uniformity ratio shall be 4:1 minimum to average.

10.3.3 CONTROL OF GLARE – LUMINAIRE DESIGN FACTORS

A. Pole light fixtures shall have a flat lens oriented horizontally or have shields installed on each side of the fixture to hide the lens.

B. Any luminaire shall be a full-cutoff type fixture.

C. Any luminaire shall be mounted at a height equal to or less than 30 feet above finished grade.

D. The maximum mounting height of all outdoor lighting with a 90 or less degree cut-off fixture shall be 30 feet. The maximum mounting height of all outdoor lighting without a full 90 degree or less cut-off fixture shall be 16 feet. Poles may be mounted on a concrete pier of no more than 3 feet in height.

E. Poles shall be matte or low-gloss finish to minimize glare from the light source.

F. Other than floodlights, flood lamps, and spotlights all outdoor lighting fixtures of more than 2,000 lumens shall be full-cutoff type fixtures. Any fixture that is not full-cut off shall be a directional fixture (such as flood lights) and may be used provided they shall be aimed and fully shielded to prevent light spillage.

G. Exceptions to Paragraphs A through F above:

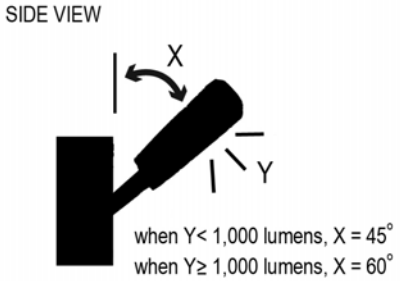
1. Non-cutoff decorative post-mounted fixtures equipped with a solid top and mounted 18 feet or less above ground and other non-cutoff dusk to dawn utility type fixtures mounted 25 feet or less may be used. The maximum initial lumens generated by each fixture shall not exceed 9500 initial lamp lumens.

2. All metal halide, mercury vapor, fluorescent, and other white-colored light source lamps used in non-cutoff fixtures (excluding flood lights) shall be coated with an internal white frosting inside the outer lamp envelope.

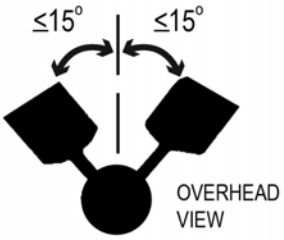
10.3.4 SECURITY LIGHTING

A. Unshielded flood lights and spotlights, installed for security and activated by motion sensor, are permitted. These unshielded lights must be mounted and aimed in a manner that minimizes up-lighting and light trespass.

B. All floodlights shall be installed such that the fixture shall be aimed down at least 45 degrees from vertical. All flood or spot lamps emitting 1,000 or more lumens shall be aimed at least 60 degrees down from vertical or shielded such that the main beam from the light source is not visible from adjacent properties or the public street right-of-way.



C. Flood lights and display lights shall be positioned such that any such fixture located within 50 feet of a public street right-of-way is mounted and aimed perpendicular to the right-of-way, with a side-to-side horizontal aiming tolerance not to exceed 15 degrees from perpendicular to the right-of-way.



10.3.5 LANDSCAPE LIGHTING

Landscape and decorative lighting using incandescent lighting with a light output of 800 lumens or less is permitted, provided that the light is installed and aimed to prevent lighting build up and light trespass and shielded to prevent view from the public right of way.

10.3.6 OUTDOOR RECREATIONAL LIGHTING

Because of their unique requirements for nighttime visibility and their limited hours of operation, ball fields, basketball courts, tennis courts, outdoor performance areas and similar recreational uses are exempt from the exterior lighting standards provided above. However, these uses shall adhere to the requirements below.

A. Outdoor recreational lighting shall not exceed a maximum permitted post height of 80 feet. The Administrator may set a shorter maximum pole height if the specific recreational use does not require the taller pole.

B. Lights shall be shielded and positioned so as not to shine onto adjacent roadways or properties.

C. All fixtures shall be fully shielded or be designed or provided with Manufacturer's Glare Control Package, so as to minimize up-light, spill-light, and glare.

D. Fixtures shall be designed and aimed so that their beams fall within the primary playing area and the immediate surroundings, so that off-site direct illumination is significantly restricted. The maximum permitted illumination at the property or right-of-way line shall not exceed 2 foot-candles and all lights, except for any amber color (a temperature rating equal to or less than 2,700 Kelvin) security lights, shall be cut off after use.

10.3.7 STREET LIGHTING

Street lighting shall be placed on all streets to allow for the safe use of streets by both cars and pedestrians. All street lighting shall be placed in accordance with the following minimum design standards:

A. Street Light Spacing: Minimum average street light spacing shall be adequate to protect the public safety in the district in which the development is located according to the standards of the Wake forest Public Works Department.

B. Roadway Illumination Requirements: The roadway illumination requirements shall be enforced according to the Town Street Classifications in Section 6.7.2 as outlined in the table below adapted from the most recent edition of the Illumination Engineering Society of North America, "Lighting Handbook."

	Boulevard	Avenue	Commercial Street	Residential Street	Lane
Minimum Average Maintained Illuminance	.8 footcandles	.8 footcandles	.6 footcandles	.3 footcandles	.3 footcandles
Uniformity Ratio*	3 to 1	3 to 1	3.5 to 1	6 to 1	6 to 1

* *Uniformity Ratio is the average maintained illuminance (in footcandles) of the roadway design area divided by the lowest value for illuminance (in footcandles) at any point in the area.*

C. Lighting shall be placed at all street intersections and is preferred at street curves.

D. Pedestrian-scaled street lighting (no taller than 18 feet) shall be required in the NMX, RA-HC, UMX, NB, and ICD districts, using decorative fixtures of a similar character to those existing in these districts (see images at right).

E. Pedestrian-scaled lighting (no taller than 18 feet) shall be prioritized over automobile lighting in all districts. Lighting shall be placed in a manner to limit the casting of shadows on sidewalks.

F. All street lights shall utilize a cutoff fixture. Where buildings are close to the street (less than 15 feet from the right-of-way), full cutoff fixtures are required to limit glare and light spillage on upper levels.

G. Alleys are excluded from the spacing and lighting requirements of this section.

10.3.8 ADDITIONAL LIGHTING USE REGULATIONS FOR SPECIFIC AREAS

A. Building Façade Lighting

1. Floodlights, spotlights, or any other similar lighting shall not be used to illuminate buildings or other site features unless approved as an integral architectural element on the development plan.

2. On-site lighting may be used to accent architectural elements but not used to illuminate entire building(s).

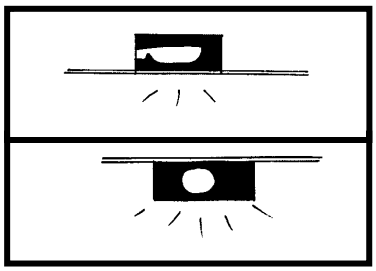
3. Where accent lighting is used, the maximum illumination on any vertical surface or angular roof surface shall not exceed 5.0 average maintained footcandles.

4. Building facade and accent lighting will not be approved unless the light fixtures are selected, located, aimed, and shielded so that light is directed only onto the intended target and spillover light is minimized.

5. Wall packs on buildings may be used at entrances to a building to light unsafe areas, but must be fully shielded to direct the light downward, must have a light output of 1,600 lumens or lower, and the light source shall not be visible from off-site.

B. Outdoor Display Areas: The mounting height of outdoor display area fixtures shall not exceed 30 feet above finished grade.

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



1. Recessed fixture incorporating a lens cover that is either recessed or flush with the bottom surface of the vehicular canopy. (See top right)
2. Surface mounted fixture incorporating a flat lens that provides a cutoff or shielded light distribution. (See bottom right)
3. Other methods approved by the Administrator.

10.4 ADMINISTRATION

10.4.1 LIGHT MEASUREMENT TECHNIQUE

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 light-registering portion of the meter held parallel to the ground pointing up. The meter shall have cosine and color correction and have an accuracy tolerance of no greater than plus or minus 5%. Measurements shall be taken with a light meter that has been calibrated within the year. Light levels are specified, calculated and measured in footcandles (FC). Foot-candles (FC) can be calculated by dividing the lumens (L) by the distance squared (D2) (i.e. F = L / D2).

10.4.2 COMPLIANCE

A. Lighting plans required as part of a site construction plan shall include, at a minimum, the following information:

1. Point-by-point footcandle arrays in a printout format indicating the location and aiming of illuminating devices. The printout shall indicate compliance with the maximum maintained footcandles required by this ordinance.
2. Description of the illuminating devices, fixtures, lamps, supports, reflectors, poles, raised foundations and other devices (including but not limited to manufacturers or electric utility catalog specification sheets and/or drawings, and photometric report indicating fixture classification [cutoff fixture, wall pack, flood light, etc.]).

B. Subsequent phases of an entire development shall have a uniform design plan for lighting and fixtures. New phases must meet all requirements in effect at the time of obtaining a permit, but lighting plans must consider preexisting lighting in earlier phases, both in design and intensity of light.

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11 SIGNS

11.1 GENERAL PURPOSE AND INTENT

It is the purpose of this chapter to authorize the use of signs whose size, type, and location are compatible with their surroundings; to ensure signs do not become a public hazard or nuisance or traffic hazard; to preserve the characteristics of each district and to protect and enhance the overall appearance of the community. It is not the intent of this chapter to prohibit any sign, display or device containing any lawful noncommercial message.

11.2 APPLICABILITY

All signs within the Town of Wake Forest's jurisdiction area shall be covered by these regulations and be erected, constructed, or maintained in accordance with the provisions of this section.

11.2.1 PERMITS REQUIRED

A. Except as provided otherwise in Section 11.10 or elsewhere in this chapter, it shall be unlawful for any person to erect, construct, enlarge, move or replace any sign without first obtaining a sign permit, in accordance with the Development Permit process in Section 15.6.1, from the Administrator to ensure compliance with the provisions of this ordinance.

B. Additional permits may be necessary pursuant to the regulations in the state building code or other sections of this ordinance.

11.2.2 ALTERATION OF SIGN FACE

Cleaning, electrical repair, resurfacing and other maintenance of a sign shall not require a permit. The changing of tenant name panels on multiple-tenant development signage and the change of copy on other signs specifically designed for changeable copy shall not require a permit.

11.3 COMPUTATION OF SIGNAGE MEASUREMENTS

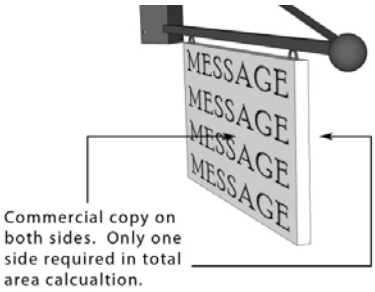
11.3.1 COMPUTATION OF SIGN AREA

A. The area of a sign face shall be deemed to be the entire area within the smallest polygon that will encompass the extreme limits of the writing, representation, emblem, or other display on the sign that can be reasonably calculated.

B. The area shall also include any material or color forming an integral part of the background of the display or used to differentiate the sign from the backdrop or structure against which it is placed.

C. Frames or structural members not bearing informational or representational matter shall not be included in computation of the area of a sign face.

D. All sides of a multi-sided sign shall be included in the computation of area, except that the total area of a 2-sided back-to-back to sign shall only be calculated as the area of one of the sides as illustrated at right.



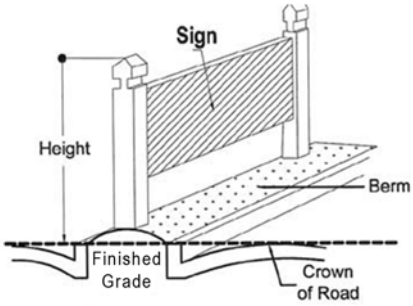
11.3.2 COMPUTATION OF HEIGHT

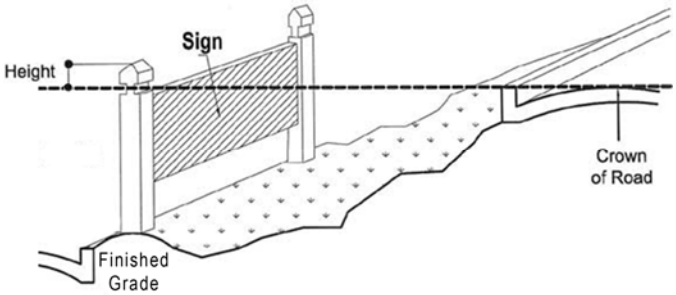
A. Attached Signs: The sign height for attached signs shall be computed as the distance from the finished grade at the base of the building to which the sign is attached to the top of the highest component of the sign

B. Freestanding Signs: The sign height for ground signs shall be computed as the lesser of:

1. The distance from the base of the sign at the finished grade to the top of the highest component of the sign; or

2. The distance from the nearest adjacent street grade to which the sign is oriented, and on which the lot has frontage, to the top of the highest component of the sign.





11.4 GENERAL PROVISIONS

11.4.1 LOCATION AND ENCROACHMENT

A. Permitted signs shall be located outside of the street right-of-way, behind sidewalk areas and outside of required site triangles, except where encroachments are specifically permitted by the provisions of this chapter.

B. All attached signs shall be mounted and attached to buildings in a secure manner, shall not include wire or turnbuckle guy and shall be maintained in good repair for safety and appearance.

C. No non-governmental sign shall be attached to or painted on power poles, light poles, telephone poles, traffic signs or other objects not intended to support a sign. Neighborhood identification banners may be approved at the discretion of the Administrator.

11.4.2 MATERIALS AND STRUCTURAL REQUIREMENTS

A. All attached signs and sign support frames shall be mounted and attached to building or ground in a secure manner, shall not include wire or turnbuckle guy and shall be maintained in good repair for safety and appearance.

B. All permanently installed signs shall be able to resist normal loads from positive and negative wind pressure, snow and other conditions as required by the current edition of the North Carolina version of the International Building Code.

C. The Administrator and/or the Building Inspector reserves the right to require sign load calculations and attachment design from a state licensed structural engineer, and to require same engineer to certify the sign installation in writing.

11.5 NONCONFORMING SIGNS

11.5.1 LIMITATION ON NON-CONFORMING SIGNS

Signs erected after the passage of this section shall conform to the standards set forth herein. All legal nonconforming signs in existence as of the effective date of this chapter may be continued and shall be maintained in good condition. Nothing in this ordinance shall prevent the normal maintenance of an existing non-conforming sign. However, a nonconforming sign shall not be:

A. Changed to another type or shape of nonconforming sign; provided, however, the copy, content, or message of the sign may be changed so long as the shape or size of the sign is not altered.

B. Structurally altered, except for normal maintenance.

C. Physically expanded, enlarged, or extended in any manner.

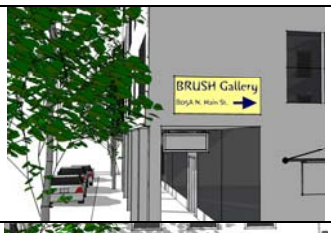
D. Reestablished after discontinuance for 60 days.

E. Reestablished after the sign is removed, except for normal maintenance.

F. Reestablished after damage or destruction where the estimated expense of reconstruction exceeds 50% of the appraised replacement cost of the sign in its entirety.

11.6 ATTACHED SIGNS

11.6.1 ATTACHED SIGNAGE TYPES

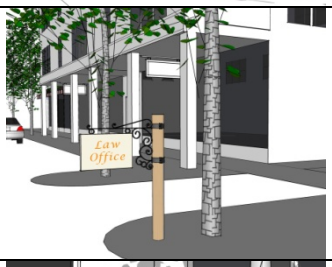
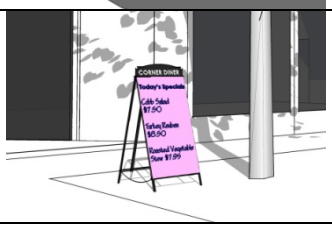
A. Wall Signs: Flat signs, channel lettering or three-dimensional signs which are painted or attached (parallel) to the wall of a building or structure.	
B. Window/Door Signs: Flat signs or lettering which are painted or attached to the window of a building or structure.	
C. Awning/Canopy Signs: Signs integrated into traditional storefront awnings that project over a sidewalk from the building façade.	
D. Parapet Signs: A building-mounted sign erected upon and completely over any portion of the roof of a building.	
E. Theatre Marquee Signs: Three dimensional signs projecting from the side of a building which may extend above the roof line and/or incorporate changeable type.	
F. Projecting/Suspended Signs: Pedestrian-scaled signs on the first floor of a building mounted to the side of the building or underside of a balcony or arcade which can be read from both sides.	
G. Address/Tenant Identification Signs: Incidental signs that list tenants, unit numbers, address, contact information, hours of operation, and similar non-commercial characteristics, in a multi-tenant building with common entry.	

11.6.2 ATTACHED SIGNAGE STANDARDS

	Permitted Location	Maximum Area	Maximum Height	Encroachments	Other Requirements	Maximum Number
Wall Signs	OS, RD, GR3, GR5, GR10, UR	0.5 sq ft per linear ft of building wall	No sign shall extend above roofline	No encroachment allowed	12 inch maximum protrusion	2 signs per building wall
	HB, NB, RMX, NMX, RA-HC, UMX	1.5 sq ft per linear ft of building wall				4 signs per building wall
	ICD	4 sq ft per building entrance 24 sq ft per building at main entrance				1 per building entrance
Window / Door Signs	Urban Districts: All Businesses except Home Occupations	15% of the gross glass area on any one side of the building	n/a	No encroachment allowed	Signs shall not be separately illuminated	n/a
	Rural/Suburban Districts: All Businesses except Home Occupations	30% of the gross glass area on any one side of the building				
Awning / Canopy Signs	All Businesses except Home Occupations	50% of the awning area	n/a	NMX, RMX and RA-HC only: May encroach over sidewalk area to within 4 ft of curb and shall have 7 ft clearance	Signs shall not be separately illuminated	n/a
Parapet Signs	NB, HB, LI, HI	1.5 sq ft per linear ft of building wall to be erected upon. Area shall be considered in sum with the permitted wall sign area.	n/a	No encroachment allowed	Only permitted when an existing higher portion of the building is located behind the proposed sign.	1 per tenant
Theatre Marquee Signs	Theatres only	32 sq ft	n/a	NMX, RMX and RA-HC only: May encroach over sidewalk area to within 4 ft of curb and shall have 7 ft clearance	Such signs must be perpendicular to the façade of the building or at a 45 degree angle from the corner of the building.	1 per tenant
Projecting / Suspended Signs	NMX, UMX, RA-HC	6 sq ft per story up to a maximum of 12 sq ft	No sign shall extend above roofline	NMX, RMX and RA-HC only: May encroach over sidewalk area to within 4 ft of curb and shall have 7 ft clearance	Such signs shall project perpendicular to the wall not more than 3 ft. All lettering and graphics shall be permanent.	1 per tenant
Address / Tenant Identification Signs	All Districts	1 sq ft per tenant, owner, location or business	n/a	No encroachment allowed	n/a	1 per tenant

11.7 FREESTANDING SIGNS

11.7.1 FREESTANDING SIGNAGE TYPES

A. Monument Signs: Signs erected independent of a building, with an integral support structure.	
B. Post & Arm Signs: Minor or secondary signs which are used to identify the address of a building, or to identify the profession, family, organization, business, etc., occupying the building.	
C. Portable / A-Frame Signs: Pedestrian-scaled non-permanent signs which are used to display menus, daily specials, sale announcements and similar messages.	

11.7.2 FREESTANDING SIGNAGE STANDARDS

	Permitted Location	Maximum Area	Max. Height	Other Requirements	Max. Number
Monument Signs Also see 11.8.7, 11.8.8 and 11.9	OS, RD, GR3, GR5, GR10, UR	4 sq ft for residential uses 12 sq ft for all other uses	6 ft	5 ft minimum setback	1 per tenant
	HB	70 sq ft per development	20 ft		
	NB, RMX, NMX	40 sq ft per development	12 ft		
	LI, HI	100 sq ft per business lot	10 ft		
	UMX, RA-HC	15 sq ft	5 ft		
	ICD	24 sq ft	7 ft		1 per public entrance and 1 per building
Post & Arm Signs	Businesses and Home Occupations in all districts except UMX and RA-HC	4 sq ft	4.5 ft	5 ft minimum setback	1 per tenant
Portable / A-Frame Signs	UMX, RA-HC	8 sq ft per side	4.5 ft	• Signs may be located on a public sidewalk, but must maintain at least 48 inches of unobstructed pedestrian space. • Signs must be removed at the close of business each day. • Rough-cut plywood is not an acceptable sign material. Decorative trim or molding shall surround the message area. Lettering shall be professionally painted or applied; however, chalkboard signs shall be permitted. Only chalkboard signs shall provide for changeable copy. • Illumination is prohibited.	1 per tenant

11.8 OTHER SIGNAGE REQUIRING PERMITS

11.8.1 CONSTRUCTION PROJECT SIGNS

A. Permitted Districts: All Districts

B. Surface Area: 32 square feet maximum.

C. Time Limit: These signs are intended to be temporary and must be removed after completion of construction.

11.8.2 SALES OFFICE SIGNS

A. Permitted Districts: All Districts – only on model home lots used as sales offices for single family residential subdivisions.

B. Surface Area: 32 square feet maximum.

C. Time Limit: These signs are intended to be temporary and must be removed after 50% of the lots in the current phase of the development are sold.

11.8.3 TIME AND TEMPERATURE SIGNS

A. Permitted Districts: HB, NB, NMX, UMX

B. Surface Area: 12 square feet maximum.

C. Height: 20 feet maximum.

11.8.4 ELECTRONIC MESSAGE BOARDS

A. Permitted Districts: HB, NB

B. Surface Area: Electronic message boards may be incorporated into a permitted wall or ground sign only, and shall not comprise more than 50% of the primary sign area.

C. Message Variation: The electronic message shall not change in increments of less than 2 minutes and shall not scroll. New messages shall be timed to fade in and out slowly.

11.8.5 HISTORIC IDENTIFICATION PLAQUES

A. Permitted Districts: All Districts – on designated historic sites only

B. Surface Area: 4 square feet maximum per plaque.

11.8.6 DRIVE-THRU MENU BOARDS

A. Permitted Districts: NB, HB, RA-HC, NMX, UMX

B. Location/Placement: Menu boards shall be allowed only as an accessory use to a restaurant having a drive-through window.

C. Surface Area: 32 square feet maximum.

D. Height: 5 feet maximum.

11.8.7 COMMERCIAL DEVELOPMENT SIGNAGE (SITES WITH MULTIPLE BUILDINGS)

All signage for commercial developments with multiple buildings, including shopping centers, malls, business parks and industrial parks, are subject to these provisions.

A. Monument Sign Standards: Monument signs shall conform to one of the options in the following table:

	Number of signs	Size	Height
Option 1	1 per street frontage.	70 square feet	20 feet
Option 2	1 per street frontage and 1 per outparcel.	32 square feet	3.5 feet

B. Additional Standards: Signs for commercial developments located within the Special Highway Overlay Districts (US-1 Highway and NC-98 Bypass Corridors) shall comply with the requirements in Section 11.9.

11.8.8 RESIDENTIAL DEVELOPMENT SIGNAGE

A. Each subdivision, traditional neighborhood development or multi-family development is permitted a maximum of 2 permanent monument signs, to be located at each major entrance to the residential development.

B. Where a subdivision, traditional neighborhood development or multi-family development contains defined neighborhoods, 1 monument sign is permitted for each entrance indicating that neighborhood's name only.

C. Signs are permitted on decorative or retaining walls at entrances to residential developments without limitation to size of the wall.

D. Monument signs shall have a maximum surface area of 12 square feet.

11.9 ADDITIONAL STANDARDS FOR SIGNAGE IN THE SPECIAL HIGHWAY OVERLAY DISTRICT

11.9.1 SPECIAL HIGHWAY OVERLAY SIGNAGE STANDARDS

A. Signs located within the Special Highway Overlay Districts (US-1 Highway and NC-98 Bypass (Dr. Calvin Jones Highway) Corridors) shall meet the following criteria:

Development Type	Maximum Sign Area	Maximum Number of Signs	Maximum Dimensions
• Single family residential developments, • Multi-family subdivisions/developments, and • Commercial or mixed-use developments with less than 300,000 square feet of building area or less than 400 feet of US-1 road frontage	72 sq ft	1 per road frontage	12 ft in height 6 ft in width
• Commercial or mixed-use developments with more than 300,000 square feet of building area and more than 400 feet of US-1 road frontage.	105 sq ft	1 per road frontage	15 ft in height 7 ft in width

B. The following regulations shall be met in addition to the guidelines in the chart above:

1. All monument signs shall be placed immediately adjacent to the right-of-way boundary (or service road boundary), as long as they do not encroach on sight lines.

2. All monument signs shall be double-sided anodized metal box type signs, internally lit, in the shape of a vertical rectangle.

3. All monument signs shall be free-standing monuments and have a 2:1 height-to-width ratio not to exceed the criteria outlined in the table above.

11.10 SIGNS NOT REQUIRING A PERMIT

11.10.1 GOVERNMENTAL SIGNS

A. Signs posted by various local, state and federal agencies in the performance of their duties such as regulatory signs, welcome signs and traffic signs.

B. Signs installed under governmental authority which note the donation of buildings, structures or streetscape materials (such as, but not limited to benches, park facilities, etc.).

11.10.2 FLAGS, ETC.

A. Flags or insignia of any nation, organization of nations, state, county or municipality, any religious, civic or fraternal organization, or any educational or cultural facility and/or any one corporate flag per lot provided the height of any pole shall not exceed the maximum building height for the district. Refer also to the United States Flag Code for usage of the United States Flag.

B. Flags with commercial messages are allowed without a permit at the rate of one 3-foot by 5-foot flag per lot. Any such commercial flags beyond this allowance must receive approval as an attached or freestanding sign according to the provisions of this chapter.

11.10.3 TEMPORARY HOLIDAY DECORATIONS

Temporary decorations or displays, when such are clearly incidental to and are customarily and commonly associated with any national, local or religious holiday/celebration.

11.10.4 WINDOW DISPLAYS

Merchandise, pictures or models of products or services that are incorporated as an integral part of a window display inside a building.

11.10.5 BUILDING MARKER SIGNS

A sign cut or etched into masonry, bronze or similar material on a building.

11.10.6 LEGAL AND WARNING SIGNS

A. Signs erected to warn of danger or hazardous conditions such as signs erected by public utility companies or construction companies.

B. Signs required for or specifically authorized for a public purpose by any law, statute or ordinance.

C. Signs that display information pertinent to the safety or legal responsibilities of the general public with regard to a particular piece of property shall be located on the premises to which the information pertains. No advertising may be affixed to such a sign.

11.10.7 OCCUPANT/STREET NUMBER SIGNS

A. Signs not exceeding 2 square feet and not illuminated, bearing property numbers, post office box numbers, names of occupants, or other identification of premises not having commercial connotations. All such signs must be placed in such a manner as to be visible from the street.

B. Unit identification numbers shall be located on the front wall within 18 inches of the entrance, or if not feasible architecturally, prominently displayed on the building. Unit numbers for single-family dwellings only may, in lieu of being located on the front wall, be located on the mail boxes or similar-sized surface attached thereto. Group housing developments which are comprised of courts or units not fronting a public street must be located on identification signs containing the name of the court, street or way and the unit numbers on each private entrance.

11.10.8 VENDING MACHINE/AUTOMATIC TELLER AND GASOLINE PUMP SIGNS

Signs attached to and made an integral part of a vending machine, automatic teller machine or gasoline pump if advertising or giving information about the products or services dispensed or vended by that machine.

11.10.9 DIRECTIONAL SIGNS ON PRIVATE PROPERTY

A. Directional signs must be located on the premises to which directions are indicated.

B. Such signs may not exceed 3 feet in height if freestanding.

C. Directional signs may not exceed 4 square feet per face.

D. Such signs may contain no copy (i.e., company name or logo) other than directional information.

E. Illumination of such signs shall be as permitted for on-premises signs in the land development district where the sign is located.

F. No more than 2 signs per entrance or exit shall be permitted.

11.10.10 GAS PUMP ISLAND SIGNS

Portable signs associated with gasoline stations, specifically those denoting gasoline prices, gas types and other petroleum related signage. Such signs must be located at the pump island.

11.10.11 INCIDENTAL SIGNS

A. Signs containing information necessary or convenient for persons coming on a premises shall be located on the premises to which the information pertains.

B. No advertising may be affixed to such a sign.

C. Such signs must be single-faced only and wholly attached to a building (may be located on windows or doors).

11.10.12 REAL ESTATE SIGNS

A. Only 1 sign is allowed per street frontage.

B. Such signs may not be illuminated.

C. Such signs may be no greater than 4 square feet in area (all types of signs) and 4 feet in height (if freestanding) when located on a residential property less than 2 acres.

D. Such signs may be no greater than 16 square feet in area (all types of signs) and 8 feet in height (if freestanding) for non-residential properties or residential properties exceeding 2 acres.

E. Real estate signs shall be removed within 1 day after the closing of the sale, rental or lease of the property.

F. Such signs shall only be located on property for sale or lease.

11.10.13 POLITICAL SIGNS

A. Such signs shall not be illuminated.

B. Political signs shall not be located on any trees, utility poles, publicly-owned property or within a public street right-of-way, except within NCDOT right-of-way according to the standards of NCGS 136-32.

C. Such signs may not exceed 4 square feet in area and 4 feet in height if freestanding.

D. Political signs may be displayed during a period beginning with the established filing date for an election and concluding 15 days after the election. In the event of a runoff election, political signs for the candidates involved may remain on display until 15 days after the runoff election.

11.10.14 TEMPORARY SIGNS

A. Window Signs: Temporary signs which are affixed to the inside of a window and which do not exceed a cumulative total for all such signs of 16 square feet in area per establishment are allowed.

B. Civic Banners: Decorative civic banners may be erected on city utility poles provided the banners are installed and removed by the applicant. Installation must be approved by the Administrator, and the banners must be removed by an agreed upon date. Such civic banners may also be erected on buildings subject to the approval from the Administrator.

C. Special Event Signs: Signs may be erected by public or non-profit organizations such as schools and churches for promoting special events as follows:

1. Signs for public events such as fund drives, fairs, festivals, sporting events, etc. may be displayed for a period of 30 days and may be allowed on- or off-premises. Such signs shall be removed within 7 days of the end of the special event.

2. Such signs shall not be illuminated.

3. Such signs are limited to 32 square feet in area per display surface and 4 feet in height.

D. Yard Sale Signs

1. Such signs may be located on-premises only and may not be located within a public right-of-way nor placed on a tree, street sign or utility pole.

2. Such signs may not be illuminated.

3. Yard sale signs are limited to 4 square feet in area and 4 feet in height.

4. 1 yard sale sign is allowed per street frontage.

5. Such signs must be removed within 7 days of erection.

E. New Businesses and Non-Profits: Temporary or portable signs may be permitted in the NB, HB, LI, HI, NMX, UMX, and RA-HC districts for a period of not over 30 days for non-profit organizations that are exempt by the Internal Revenue Service and to any person(s) or corporation that has opened a new business.

11.11 PROHIBITED SIGNS

11.11.1 OFF PREMISES SIGNS

All off-premises signs unless specifically allowed elsewhere in this chapter are prohibited.

11.11.2 ANIMATED/FLASHING SIGNS OR SIGNS OF ILLUSION

Except for otherwise approved time and temperature signs, signs displaying blinking, flashing or intermittent lights, animation, and moving parts or signs giving the illusion of movement are prohibited. Time and temperature signs that rotate or move are not permitted.

11.11.3 SIGNS RESEMBLING OFFICIAL SIGNS

Any sign that imitates an official governmental sign, or violates the Law of the State relating to outdoor advertising, is prohibited.

11.11.4 SIGNS RESEMBLING TRAFFIC SIGNALS

A. Any sign which by color, location or nature may be confused with official highway signs, warning signs, traffic signals or other regulatory devices are prohibited.

B. Any sign that uses the word "STOP", "SLOW", "CAUTION", "DANGER", or any other word which is likely to be confused with traffic directional and regulatory signs is prohibited.

C. Any sign located in a manner or place which might constitute a traffic hazard is prohibited.

11.11.5 SIGNS ON ROADSIDE APPURTENANCES

Signs attached to or painted on utility poles, telephone poles, trees, parking meters, bridges and overpasses, rocks, other signs, benches and refuse containers, etc. are prohibited unless specifically allowed elsewhere in this chapter.

11.11.6 ABANDONED SIGNS OR SIGN STRUCTURES

A. Signs that advertise an activity or business no longer conducted on the property on which the sign is located are prohibited. Conforming signs designed for changeable copy may be covered instead of removed.

B. Sign structures on which no sign is erected are prohibited.

C. Such signs or sign structures must be removed within 30 days of becoming an abandoned sign or sign structure.

11.11.7 PENNANTS, STREAMERS, BALLOONS, ETC.

Signs containing or consisting of pennants, ribbons, streamers, balloons, or spinners are prohibited.

11.11.8 SIGNS OBSTRUCTING ACCESS

Any sign that obstructs free ingress or egress from a driveway or a required window, door, fire escape, stairway, ladder, or other required opening is prohibited.

11.11.9 SIGNS WITH EXPOSED ELECTRICAL WIRING

All wiring shall be contained in conduit or enclosed in poles or raceways. In no case shall the wiring be exposed to the public.

11.11.10 SIGNS ON PUBLIC PROPERTY

Any sign installed or placed on public property or within a public right-of-way, including any sign held by or otherwise displayed upon a person. Such sign shall be forfeited to the public and is subject to confiscation and disposal. In addition to other remedies hereunder, the Zoning Administrator shall have the right to recover from the owner or person placing such a sign the full costs of removal and disposal of such sign.

11.12 SIGN ILLUMINATION

11.12.1 PERMITTED SIGNAGE ILLUMINATION BY DISTRICT

	None Permitted	External Illumination	Internal Illumination*
OS, RD, GR3, GR5, GR10	•		
UR, RMX, NMX, ICD		•	
NB, UMX, RA-HC, HB, LI, HI		•	•
SHOD			•

** Internal illumination is prohibited within a National Register Historic District*

11.12.2 ILLUMINATION STANDARDS

A. Prohibited Lighting: No flashing or intermittent illumination shall be permitted on any advertising sign or structure.

B. Shielding Required: Any indirect lighting or spot lighting shall require complete shielding of all light sources so as to illuminate only the face of the sign and prevent glare from off-site.

C. Lighting to Comply with Chapter 10: All sign illumination shall be in conformance with Chapter 10, Lighting.

11.13 MAINTENANCE AND INSPECTION OF SIGNS

Signs shall be kept in proper repair. The following maintenance requirements must be observed for all signs visible from any public street or highway within the jurisdiction of the Town of Wake Forest.

11.13.1 DAMAGED SIGNS

A. Surface Appearance: No sign shall have more than 20% of its surface area covered with disfigured, cracked, ripped or peeling paint or poster paper for a period of more than 30 successive days.

B. Broken Displays: No sign shall remain with a bent or broken display area, broken supports, loose appendages or struts or stand more than 15 degrees from the perpendicular for a period of more than 30 successive days.

C. Illuminated Signs: No indirect or internally illuminated sign shall have only partial illumination for a period of more than 30 successive days.

11.13.2 INSPECTIONS

All signs for which a permit is required shall be subject to inspection by the town. A representative of the town shall be authorized to enter at all reasonable times upon any property or premises to ascertain whether the provisions of the code are being obeyed. The town may order the removal of any sign that is not in accordance with the provisions of the code.

11.13.3 ENFORCEMENT

A. Substandard Signs: The owners of any sign judged substandard by the Town of Wake Forest Zoning and Code Enforcement Officer shall be notified in writing and the said owner shall have30 days in which to make repairs. If the said order is not complied with within 30 days, the Zoning Enforcement Officer shall remove such sign at the expense of the owner or lessee thereof plus administrative fees.

B. Signs on Public Property: Any sign installed or placed on public property or within a public right-of-way shall be forfeited to the public and is subject to confiscation and disposal. In addition to other remedies hereunder, the Administrator shall have the right to recover from the owner or person placing such a sign the full costs of removal and disposal of such sign.

12 EROSION, FLOOD, STORMWATER & WATERSHED STANDARDS

12.1 GENERAL PURPOSE AND INTENT

12.1.1 FINDINGS OF FACT

A. Erosion and Sedimentation Control: The erosion of soil from unstabilized development sites has adverse impacts on the condition of public and private property, impairs the Town of Wake Forest stormwater system, and causes pollution and accelerated siltation of lakes, streams and other watercourses. Pursuant to the North Carolina Sedimentation Pollution Control Act of 1973, as amended, the Town of Wake Forest has been directed to implement an erosion and sedimentation control program as outlined in this chapter.

B. Flood Damage Prevention: The flood prone areas within the jurisdiction of the Town of Wake Forest are subject to periodic inundation which can result in loss of life, property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures of flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare. These flood losses can be caused by the cumulative effect of obstructions in floodplains causing increases in flood heights and velocities and by the occupancy in flood prone areas of uses vulnerable to floods or other hazards.

C. Stormwater Management: It has been determined that development and redevelopment can alter the hydrologic response of local watersheds and increases stormwater runoff rates and volumes, flooding, soil erosion, stream channel erosion, nonpoint and point source pollution, and sediment transport and deposition, as well as reducing groundwater recharge. These changes in stormwater runoff contribute to increased quantities of water-borne pollutants and alterations in hydrology which are harmful to public health and safety as well as to the natural environment. These effects can be managed and minimized by applying proper design and well-planned controls to manage stormwater runoff from development sites. Further, the Federal Water Pollution Control Act of 1972 ("Clean Water Act") and federal Phase II Stormwater Rules promulgated under it, as well as rules of the North Carolina Environmental Management Commission promulgated in response to federal Phase II requirements, compel certain urbanized areas, including the Town of Wake Forest, to adopt stormwater controls such as those included in this chapter.

D. Watershed Protection: The Legislature of the State of North Carolina has, in NCGS 143-21, Watershed Protection Rules, directed local governmental units to adopt regulations that meet or exceed the minimum requirements of NCGS 143-214.5 and water supply watershed protection rules adopted by the State Environmental Management Commission in order to protect the water supplies throughout the state.

12.1.2 PURPOSE

A. Erosion and Sedimentation Control: The erosion and sedimentation control regulations of this chapter are adopted for the purposes of regulating certain land-disturbing activities to control accelerated erosion and sedimentation in order to control water pollution from sedimentation, inhibit the accelerated erosion and sedimentation of lakes and watercourses and prevent damage to public and private property by erosion and sedimentation.

B. Flood Damage Prevention:

1. It is the purpose of this section to promote public health, safety, and general welfare and to minimize public and private losses due to flood conditions within the flood prone areas by provisions designed to:

a. restrict or prohibit uses that are dangerous to health, safety, and property due to water or erosion hazards or that result in damaging increases in erosion, flood heights or velocities;

b. require that uses vulnerable to floods, including facilities that serve such uses, be protected against flood damage at the time of initial construction;

c. control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;

d. control filling, grading, dredging, and all other development that may increase erosion or flood damage; and

e. prevent or regulate the construction of flood barriers that will unnaturally divert flood waters or which may increase flood hazards to other lands.

2. Specific objectives of the flood damage prevention provisions are as follows:

a. to protect human life and health;

b. to minimize expenditure of public money for costly flood control projects;

c. to minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

d. to minimize prolonged business losses and interruptions;

e. to minimize damage to public facilities and utilities

f. to help maintain a stable tax base by providing for the sound use and development of flood prone areas; and

g. to ensure that potential buyers are aware that property is in a Special Flood Hazard Area.

C. Stormwater Management: The purpose of this section is to protect, maintain and enhance the public health, safety, environment and general welfare by establishing minimum requirements and procedures to control the adverse effects of increased post-development stormwater runoff and nonpoint and point source pollution associated with new development and redevelopment. This ordinance seeks to meet its general purpose through the following specific objectives and means:

1. Establishing decision-making processes for development that protects the integrity of watersheds and preserves the health of water resources;

2. Requiring that new development and redevelopment maintain the pre-development hydrologic response in their post-development state as practicable for the applicable design storm in order to reduce flooding, stream bank erosion, nonpoint and point source pollution and increases in stream temperature, and to maintain the integrity of stream channels and aquatic habitats;

3. Establishing minimum post-development stormwater management standards and design criteria for the regulation and control of stormwater runoff quantity and quality;

4. Establishing design and review criteria for the construction, function, and use of structural stormwater BMPs that may be used to meet the minimum post- development stormwater management standards;

5. Encouraging the use of better management and site design practices, such as the use of vegetated conveyances for stormwater and the preservation of greenspace and other conservation areas to the maximum extent practicable;

6. Establishing provisions for the long-term responsibility for and maintenance of structural and nonstructural stormwater BMPs to ensure that they continue to function as designed, are maintained appropriately, and pose no threat to public safety;

7. Establishing administrative procedures for the submission, review, approval and disapproval of stormwater management plans, for the inspection of approved projects, and to assure appropriate long-term maintenance.

D. Watershed Protection: The Watershed Protection regulations are established to preserve and improve water quality and provide safe drinking water now and in the future.

12.1.3 PERMITS REQUIRED

A. Land Disturbance (Erosion and Sedimentation Control) Permit: No person shall undertake any land-disturbing activity for which a permit is required, as specified by the erosion and sedimentation control provisions of this chapter, until plans for controlling erosion associated with the activity have been reviewed and approved in accordance with the procedures set forth in Section 15.7.2.

B. Floodplain Development Permit: A Town of Wake Forest Permit to develop in a Flood Hazard Area (Floodplain Development Permit), shall be required in conformance with the provisions of this chapter and Section 15.7.3 prior to the commencement of any development activities within Special Flood Hazard Areas and Future Conditions Flood Hazard Areas.

C. Stormwater Approvals: Stormwater approval is required for all development and redevelopment unless exempt pursuant to Section 12.5.1.A.1. Stormwater approvals pursuant to this chapter shall be granted as part of the Development Permit process outlined in Section 15.6.1.

D. Watershed Development: A Development Permit shall be required, as outlined in Section 15.6.1, indicating conformance with the watershed protection provisions of this chapter prior to the commencement of development activities within the Watershed Protection Overlay District.

12.1.4 REQUIRED CONFORMANCE TO THE MSSD

The Town of Wake Forest Manual of Specifications, Standards and Design, as amended, is herein incorporated by reference. Conformance to the Manual of Specifications, Standards and Design is required in addition to the standards in this ordinance.

12.2 APPLICABILITY

12.2.1 APPLICABILITY BY DISTRICT

The various erosion control, flood damage prevention, stormwater management and watershed protection provisions of this chapter apply according to the table below:

Regulation Type	Geographic Applicability	Relevant Subsections
Erosion and Sedimentation Control Regulations	All Districts	12.3
Flood Damage Prevention Regulations	Special Flood Hazard Areas and Future Conditions Flood Hazard Areas *(established in Section 12.4.1.C)*	12.4
Stormwater Management Regulations	All Districts *(subject to the provisions of Section 12.5.1.A)*	12.5, 12.7
Watershed Protection Regulations	Watershed Protection Overlay Districts *(established in Section 2.4.5)*	12.6, 12.7

12.3 EROSION AND SEDIMENTATION CONTROL REGULATIONS

12.3.1 SCOPE AND EXCLUSIONS

The erosion and sedimentation control regulations of this article shall apply to land-disturbing activity by any person or persons, including the town, as provided for below:

A. Applicability

1. A Land Disturbance Permit shall be required for all land-disturbing of ½ acre (21,780 square feet) or more in surface area in accordance with Section 15.7.2 of this ordinance.

2. Single family lots being graded/built by the same builder/developer at the same time within the same subdivision, whether they are contiguous or non-contiguous, must obtain a Land Disturbance Permit if the total disturbance is 1/2 acre (21,780 square feet) or more in surface area.

3. The town may require a Land Disturbance Permit for land-disturbing activities that are less than 1/2 acre (21,780 square feet) in surface area where sediment control measures are needed to protect against off-site damages, in accordance with Section 15.7.2 of this ordinance.

B. Compliance Required Regardless of Land Disturbance Permit Requirement: Erosion control devices must be installed to prevent any offsite sedimentation for any construction site regardless of the size of the land disturbance. Land-disturbing activity for which a Land Disturbance Permit is not required must still comply with the erosion and sedimentation control regulations of this article, unless specifically excluded in Section 12.3.1.C, below.

C. Exclusions: This section shall not apply to the following types of land-disturbing activity:

1. An activity which is essential to protect human life during an emergency.

2. Land-disturbing activities undertaken on established bona-fide farms for the production of plants and animals, including but not limited to: forage and sod crops, grain and feed crops, tobacco, cotton, and peanuts; dairy animals and dairy products; poultry and poultry products; livestock, including the breeding and grazing of any or all such animals; bees and apiary products; and fur animals.

3. Land-disturbing activities undertaken on forestland for the production and harvesting of timber and timber products and which are conducted in accordance with Forest Practice Guidelines Related to Water Quality (best management practices) as adopted by the North Carolina Department of Environment and Natural Resources. A Tree Clearing Permit may be required such activities as outlined in Section 15.7.1.

4. Land-Disturbing activities for which a permit is required under the Mining Act of 1971, Article 7 of Chapter 74 of the General Statutes.

5. Land-Disturbing activities over which the State has exclusive regulatory jurisdiction as provided in NCGS 113-56(a). Such activities include:

   a. Land-Disturbing activities conducted by the State.

   b. Land-Disturbing activities conducted by the United States.

   c. Land-Disturbing activities conducted by persons having the power of eminent domain.

   d. Land-Disturbing activities conducted by local governments, except that the Town of Wake Forest has declared that all the departments and agencies of the town and its contractors and subcontractors must comply with the regulations of this article according to Section 12.3.1.E, below.

   e. Land-Disturbing activities funded in whole or in part by the County, State or United States.

D. **Affidavit For Exclusions:** Except for exclusions in the event of an emergency, as outlined in 12.3.1.C.1, the owner of the property will be required to file an application for an exclusion and an affidavit stating the use of the property. The Application for Exemption must be filed with the Administrator. The Administrator must review and grant or deny the Application within 30 working days, after receipt of the complete Land Disturbance Permit application (including fees), and provide its decision in writing to the applicant. The erosion and sedimentation control plan must be implemented according to schedule. Failure to meet the conditions of the exemption constitutes a violation of the erosion and sedimentation control regulations of this article and will be retroactive to the granted date of the original exemption. If a complete Land Disturbance Permit application package (including fees) is not received at initial submittal, the application will be automatically disapproved.

E. **Expressly Applied:** The erosion and sedimentation control regulations of this article shall expressly apply to all of the following land-disturbing activities:

1. Temporary access and haul roads, other than public roads, constructed or used in connection with any land-disturbing activity are considered a part of such activity.

2. When the person conducting the land-disturbing activity is also the person conducting the borrow or waste disposal activity, areas from which borrow is obtained and which are not regulated by the provisions of the Mining Act of 1971, and waste areas for surplus materials other than landfills regulated by the North Carolina Department of Energy, Mineral, and Natural Resources: Division of Solid Waste Management, or the Town of Wake Forest, will be considered as part of the land-disturbing activity where the borrow material is being used or from which the waste material originated. When the person conducting the land-disturbing activity is not the person obtaining borrow

and/or disposing of the waste, these areas are considered a separate land-disturbing activity.

3. Land-Disturbing activities connected with utility construction over which the State does not have exclusive regulatory jurisdiction as provided in NCGS 113A-56(a).

F. **Projects Conducted by the Town of Wake Forest**: It is the intent of the town of Wake Forest that all land disturbing activity conducted by the town shall comply with the erosion and sedimentation control regulations of this article. Such projects shall be bound by the provisions for compliance, applicability and exclusions set out in Sections 12.3.1.A through 12.3.1.E.

12.3.2 EROSION & SEDIMENTATION CONTROL PLANS

A. **Erosion and Sedimentation Control Plan Required:** Any person engaged in land-disturbing activity, who fails to file a plan in accordance with the erosion and sedimentation control regulations of this article, or who conducts a land-disturbing activity except in accordance with provisions of an approved plan will be deemed in violation of the erosion and sedimentation control regulations of this section.

B. **Erosion and Sedimentation Control Plan Content:** Applications for a Land Disturbance Permit must contain at least all of the information required for Land Disturbance Permits in Section 15.7.2 of this ordinance and all of the items specified on the checklist in Section 6.4.1 of the MSSD. Detailed guidelines for plan preparation may be obtained from the Administrator upon request.

C. **Control Objectives:** An erosion and sedimentation control plan may be disapproved if the plan fails to adequately address the following control objectives:

1. **Identify Critical Areas:** On-site areas which are subject to severe erosion, and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.

2. **Limit Time of Exposure:** All land-disturbing activity is to be planned and phased to limit exposure to the stabilization timeframes established in Section 12.3.3.E. The construction sequence shall explain the phasing in detail.

3. **Limit Exposed Areas:** All land-disturbing activity is to be planned and conducted to minimize the size of the area to be exposed at any one time.

4. **Mass Land Disturbing:** In order to help maintain remaining town topography, trees, buffers, and to limit exposed areas that are open at once, mass land disturbing will not be allowed except in conformance with an approved plan. For development over 20 acres in land disturbance area, phased grading must be shown on the plans to limit the potential for soil erosion and off site sedimentation.

5. **Control Surface Water:** Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure via sediment control basins in accordance with NC Sediment and Erosion Control Planning and Design Manual.

6. **Control Sedimentation:** All land-disturbing activity is to be planned and conducted so as to prevent off-site sedimentation damage.

7. **Manage Stormwater Runoff:** Plans are to include measures to control the velocity at the point of discharge so as to minimize accelerated erosion and increased sedimentation of the site and stream. Such measures shall be in

accordance with this section, the NC Stormwater Best Management Practices Manual, and the National Pollutant Discharge Elimination System.

D. Grounds for Disapproval: An erosion control plan may be disapproved upon finding that an applicant, or any parent or subsidiary corporation (if the applicant is a corporation):

1. Has not submitted a complete application, including the Land Disturbance checklist.

2. Is conducting or has conducted land-disturbing activity without an approved plan, or has received a notice of violation on a plan previously approved and has not complied with the notice within the time specified in the notice.

3. Has failed to pay a civil penalty assessed pursuant to the North Carolina Sedimentation Pollution Control Act or a local ordinance adopted pursuant to the Act which is due and for which no appeal is pending.

4. Has been convicted of a misdemeanor pursuant to a NCGS 113A- 64(b) or any criminal provision of a local ordinance adopted pursuant to the North Carolina Sedimentation Pollution Control Act (An applicant's criminal record may be considered for only the 2 years prior to the application date); or

5. Has failed to comply with State rules or local ordinances and regulations adopted pursuant to the North Carolina Sedimentation Pollution Control Act on properties located within Town of Wake Forest jurisdiction.

6. Owns neighboring property that is in violation of the erosion and sedimentation control regulations of this ordinance, no permit shall be issued until that violation is corrected.

E. Sale of Property: If the property associated with the approved plan is sold in whole or in part before all conditions of the approved plan are met, the permit holder must provide notice to the new owner/s of conditions of the Land Disturbance Permit and provide the Town of Wake Forest with revised financially responsible owner forms. The new owner(s) shall be required to attend a preconstruction conference with the Administrator.

F. Effect of Approval

1. Until all construction is complete, all permanent erosion and sedimentation control measures are installed, and the site has been stabilized, a copy of the approved plan must be available and accessible on site in a weather proof container. All NPDES, EPA, turbidity and other state laws must be followed. Self-inspections of erosion control sites are required per NCGS 113A-54.1(e) law 15ANCAC 04B .0113.

2. The Town of Wake Forest must forward to the Director of NCDENR Division of Water Quality a copy of each plan for a land-disturbing activity that involves the utilization of ditches for the purpose of de-watering or lowering the water table of the tract.

G. Revised Plans: If the town, whether upon review of a plan or upon inspection of the job site, determines that a significant risk of accelerated erosion or off-site sedimentation exists, or the plan is inadequate to meet the requirements of this article, the town may require a revised plan. Pending the approval of the revised plan, work must stop or continue only under conditions outlined by the Administrator.

12.3.3 STANDARDS

No land-disturbing activity subject to the control of this ordinance shall be undertaken except in accordance with the following mandatory standards. Persons conducting land-disturbing activities must take reasonable measures to protect public and private property from damage caused by such activities. Whenever conflicts exist between federal, state, or local laws, ordinance, or rules, the more restrictive provision shall apply. The town reserves the right to require preparation and approval of an erosion control plan in any instance wherein extensive control measures are required.

A. Erosion Control Measure Must Conform to State Design Manual: All soil erosion and sedimentation control plans and measures must conform to the minimum applicable standards specified in North Carolina's Erosion and Sedimentation Control Planning and Design Manual.

B. Fill Material: Unless a permit for the operation of a landfill from the North Carolina Department of Environment and Natural Resources is on file for the official site, acceptable fill material shall be free of organic or other degradable materials, masonry, concrete and brick in sizes exceeding 12 inches, and any materials which would cause the site to be regulated as a landfill by the State of North Carolina.

C. Sediment To Be Held On Site: The person conducting the land-disturbing activity shall install erosion and sedimentation control devices and practices that are sufficient to retain the sediment generated by the land disturbing activity within the boundaries of the tract during construction upon and development of said tract. All land-disturbance is required to have silt fence on the low side of the lot and a construction entrance with approved woven fabric that meets ASTM D 4632 standards.

D. Sediment Basins: Sediment basins shall have settling efficiency as outlined in the North Carolina Erosion and Sediment Control Planning and Design Manual.

E. Stabilization Required: Stabilization shall be provided whenever land-disturbing activities have ceased, or have temporarily ceased, on any portion of the site. In no instance shall the time of exposure be greater than the stabilization timeframes established by the following tables:

Type of Stabilization	Stabilization Timeframe
Temporary Stabilization	Must be completed within 14 days of any completed phase of grading
Permanent Stabilization	Must be completed within 10 days of competed project grading

NPDES Stormwater Discharge Permit for Construction Activities (NCGO1) NCDENR/Division of Water Quality

NEW STABILIZATION TIMEFRAMES
(Effective Aug. 3, 2011)

SITE AREA DESCRIPTION	STABILIZATION	TIMEFRAME EXCEPTIONS
Perimeter dikes, swales, ditches, slopes	7 days	None
High Quality Water (HQW) Zones	7 days	None
Slopes steeper than 3:1	7 days	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed.
Slopes 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.

F. Protection from Storm Required:

1. Falls Lake Watershed: Such erosion and sedimentation control measures, structures, and devices must be so planned, designed, and constructed as to provide protection from the calculated maximum peak rate of runoff from the 25-year storm. Runoff rates must be calculated using acceptable calculation procedures.

2. All Other Watersheds: Such erosion and sedimentation control measures, structures, and devices must be so planned, designed, and constructed as to provide protection from the calculated maximum peak rate of runoff from 10-year storm. Runoff rates must be calculated using the procedures in the USDA Natural Resources Conservation Services "National Engineering Field Manual for Conservation Practices", or other acceptable calculation procedures.

G. Slope and Fill Angles: The angle for graded slopes and fills may not be greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures.

12.3.4 RESPONSIBILITY FOR MAINTENANCE

A. Owner Shall Be Responsible for Maintenance: During the development of a site, the financially responsible owner must install and maintain all temporary and permanent erosion and sedimentation control measures as required by the approved plan, any provision of this article, or state regulations. After site development, the land owner, association or person in possession or control of the land must maintain all necessary permanent erosion and sediment control measures, except those measures installed within a road or street right-of-way or easement accepted for maintenance by a governmental agency.

B. Maintenance Violations: It is a violation of the erosion and sedimentation control regulations of this section for any persons, companies or corporations to leave mud, dirt, dust or other material upon open public streets, sidewalks, greenways, other travel ways or off site.

C. Inspections

1. The Administrator inspects land-disturbing activities to ensure compliance with the North Carolina Sedimentation Pollution Control Act of 1973, as amended,, this ordinance, or rules or orders adopted or issued pursuant to this section, and to determine whether the measures required in the Plan are effective in controlling erosion and sedimentation resulting from land-disturbing activity. Notice of the right to inspect shall be included in the certificate of approval of each plan.

2. Erosion self-inspections must be conducted by each permit holder per NCGS 15A NCAC 04B .0131.

3. Stormwater self-inspections must be conducted by each permit holder per NCG010000.

12.3.5 OPERATION IN LAKES OR NATURAL WATERCOURSES

Land disturbing activity in connection with construction in, on, over, or under a lake or natural watercourse shall comply with the watercourse buffer requirements in Section 12.7, the requirements of the NC Division of Water Quality and the US Army Corps of Engineers.

12.3.6 CONSTRUCTION BUFFER ZONES

A. Standard Buffer: All land-disturbing activity shall adhere to the watercourse buffer requirements in Section 12.7. In addition, no land-disturbing activity during periods of construction or improvement to land shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the 25% of the buffer zone nearest the land-disturbing activity.

1. **Projects On, Over or Under Water:** The construction buffer requirement shall not apply to a land-disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse.

2. **Construction Buffer Measurement:** Unless otherwise provided, the width of a buffer zone is measured horizontally from the edge of the water to the nearest edge of the disturbed area, with the 25 percent of the strip nearer the land-disturbing activity containing natural or artificial means of confining visible siltation.

12.4 FLOOD DAMAGE PREVENTION

12.4.1 GENERAL PROVISIONS

A. Applicability: This section shall apply to all Special Flood Hazard Areas within the jurisdiction, including Extra-Territorial Jurisdiction (ETJ), of the Town of Wake Forest.

B. Exemptions

1. All new residential construction and substantial residential improvements proposed on a parcel of land that has no buildable area outside the Special Flood Hazard Area (SFHA), and that was recorded prior to May 2, 2006 shall be permitted for development provided that all applicable provisions of this ordinance area met.

2. All subdivisions approved prior to May 2, 2006, shall be exempted from the requirements prohibiting the platting of lots located within the Special Flood Hazard Area, provided the subdivision complies with the requirements in place prior to May 2, 2006.

C. Establishment of Flood Hazard Areas

1. The Special Flood Hazard Areas are those identified under the Cooperating Technical State (CTS) agreement between the State of North Carolina and FEMA in its Flood Insurance Study (FIS) and its accompanying Flood Insurance Rate Maps (FIRM) for Wake County and Franklin County dated May 2, 2006 and April 16, 2013, which are adopted by reference and declared to be a part of this ordinance.

2. In addition, upon annexation to the Town of Wake Forest or inclusion in the Extra-Territorial Jurisdiction (ETJ), the Special Flood Hazard Areas identified by the Federal Emergency Management Agency (FEMA) and/or produced under the Cooperating Technical State agreement between the State of North Carolina and FEMA as stated above, for the unincorporated areas of Wake County and Franklin County, with accompanying maps and other supporting data are adopted by reference and declared to be part of this ordinance.

3. A professional evaluation shall be provided of the potential changes in the Special Flood Hazard Area elevation caused by the obstruction, encroachment,

alteration or relocation of areas identified to have flood hazard soils by Wake County with a total drainage area of more than 5 acres.

D. General Development Restrictions: In general, no new development is allowed in the Special Flood Hazard Areas unless one or more of the following are met:

1. The property/use is exempted from this requirement as identified in Section 12.4.1.B; or

2. The development is for roads, greenways, pedestrian crossings, park-related equipment, or public utilities and facilities such as waste water, gas, electrical, and water systems that are located and constructed to minimize flood damage. Structures for pedestrian crossings (e.g., footbridges, etc.), playground equipment, and other similar items may be permitted if the applicant provides certification by a Professional Engineer, architect, or landscape architect that these encroachments will not result in an increase in flood levels during the base flood.

E. Warning and Disclaimer of Liability: The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering consideration. Floods larger than those considered by this ordinance can and will occur on rare occasions. Actual flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the Special Flood Hazard Areas or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of the Town of Wake Forest or by any officer or employee thereof for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

F. Definitions: Definitions specific to the application and administration of the provisions for flood damage reduction in this section shall be indicated as such in Chapter 17 with the parenthetical note "*(Floodplain Development)*". All other terms in this section shall be defined according to their standard definition in Chapter 17, or if not listed, shall have their everyday meaning as determined by their dictionary definition.

12.4.2 PROVISIONS FOR FLOOD HAZARD REDUCTION

A. General Standards: In all Special Flood Hazard Areas the following provisions are required:

1. All new construction and substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse, and lateral movement of the structure.

2. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

3. All new construction and substantial improvements shall be constructed by methods and practices that minimize flood damages.

4. Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. These include, but are not limited to, HVAC equipment, water softener units, bath/kitchen fixtures, ductwork, electric/gas meter panels/boxes, utility/cable boxes, appliances (washers, dryers, refrigerators, freezers, etc.), hot water heaters, and electric outlets/switches.

5. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.

6. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into flood waters.

7. Any alteration, repair, reconstruction, or improvements to a structure, which is in compliance with the provisions of this ordinance, shall meet the requirements of "new construction" as contained in this ordinance.

8. Nothing in this ordinance shall prevent the repair, reconstruction, or replacement of a building or structure existing on the effective date of this ordinance and located totally or partially within the floodway, non-encroachment area, or stream setback, provided there is no additional encroachment below the regulatory flood protection elevation in the floodway, non-encroachment area, or stream setback, and provided that such repair, reconstruction, or replacement meets all of the other requirements of this ordinance.

9. New solid waste disposal facilities and sites, hazardous waste management facilities, salvage yards, and chemical storage facilities shall not be permitted in a Special Flood Hazard Area. No variances shall be granted for these facilities.

10. All subdivision proposals and other development proposals shall be consistent with the need to minimize flood damage.

11. All subdivision proposals and other development proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.

12. All subdivision proposals and other development proposals shall have adequate drainage provided to reduce exposure to flood hazards.

13. All subdivision proposals and other development proposals shall have received all necessary permits from those governmental agencies for which approval is required by Federal or State law, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334.

B. Specific Standards and Restrictions: In all Special Flood Hazard Areas where Base Flood Elevation (BFE) data has been provided and in Future Conditions Flood Hazard Areas where Future Conditions Flood Elevations data has been provided, the following additional provisions are required:

1. **Residential Construction**

   a. New construction of or substantial improvements to any residential structure (including manufactured homes) shall have the reference level, including basement, elevated no lower than the regulatory flood protection elevation.

   b. No proposed lot for development that is wholly or partly subject to flooding shall be approved unless there is established on the final plat a line representing an actual contour as determined by field survey of the Special Flood Hazard Area elevation as determined by the Federal Emergency Management Agency (FEMA) Special Hazard Area Maps. Such a line shall be known and identified on the site plan or subdivision plan and final plat as the "Development Restriction Floodline."

c. Subdivisions approved after May 2, 2006, may not plat lots for development located within the Special Flood Hazard Area unless all of the following exemptions are met:

i. The Special Flood Hazard Area affects a maximum area of 10% or less of the total acreage of the subdivision;

ii. There is no reason for the formation of a homeowner's association other than to retain ownership and maintenance responsibility for the Special Flood Hazard Area (e.g., covenant, other common areas); and

iii. The Special Flood Hazard Area is placed in a permanent conservation easement at plat recordation.

2. Non-Residential Construction: New construction and substantial improvement of any commercial, industrial, or other non-residential structure shall have the reference level, including basement, elevated no lower than the regulatory flood protection elevation. Structures located in A, AE, and X (Future) Zones may be floodproofed to the regulatory flood protection elevation in lieu of elevation provided that all areas of the structure, together with attendant utility and sanitary facilities, below the regulatory flood protection elevation are watertight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A Professional Engineer, Professional Land Surveyor or Registered Architect shall certify that the standards of this subsection are satisfied. Such certification shall be provided to the Floodplain Administrator as set forth in Section 15.7.3.E along with the operational and maintenance plans.

3. Elevated Buildings: In new construction or substantial improvements of elevated buildings, fully-enclosed areas below the lowest floor shall conform to the following standards:

a. Such enclosed areas shall not be designed or used for human habitation, but shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises.

b. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment (standard exterior door), or entry to the living area (stairway or elevator). The interior portion of such enclosed area shall not be finished or partitioned into separate rooms, except to enclose storage areas;

c. Such enclosed areas shall be constructed entirely of flood resistant materials below the regulatory flood protection elevation.

d. In Zones A, AE and X (Future), such enclosed areas shall include flood openings to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters. To meet this requirement, the openings must either be certified by a professional engineer or architect or meet or exceed the following minimum design criteria:

i. Provide a minimum of 2 flood openings on different sides of each enclosed area subject to flooding;

ii. The total combined area of all flood openings must be at least one square inch for each square foot of enclosed area subject to flooding;

iii. If a building has more than one enclosed area, each enclosed area must have flood openings to allow floodwaters to automatically enter and exit;

iv. The bottom of all required flood openings shall be no higher than one foot above the adjacent grade;

v. Flood openings may be equipped with screens, louvers, or other coverings or devices, provided they permit the automatic flow of floodwaters in both directions; and

vi. Enclosures made of flexible skirting are not considered enclosures for regulatory purposes, and, therefore, do not require flood openings. Masonry or wood underpinning, regardless of structural status, is considered an enclosure and requires flood openings as outlined above.

4. Additions: All additions must meet the applicable standards for new construction.

5. Recreational Vehicles: Recreational vehicles shall either:

a. Be on site for fewer than 180 consecutive days and be fully licensed and ready for highway use with up-to-date state inspection and tags (a recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities, and has no permanently attached additions); or

b. Meet all the requirements for new construction.

6. Accessory Structures: When accessory structures (sheds, detached garages, etc.) are to be placed within a Special Flood Hazard Area, the following criteria shall be met:

a. Accessory structures shall not be used for human habitation.

b. Accessory structures shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters.

c. Flood openings to facilitate automatic equalization of hydrostatic flood forces shall be provided below regulatory flood protection elevation in conformance with Section 12.4.2.B.3.d.

d. Certification requirements: An accessory structure with a footprint less than 150 square feet that satisfies the criteria outlined above does not require an elevation or floodproofing certificate. Elevation or floodproofing certifications are required for all other accessory structures in accordance with Section 15.7.3.E.

C. Standards for Floodplains Without Established Base Flood Elevations: Within the Special Flood Hazard Areas designated as Approximate Zone A where no Base Flood Elevation (BFE) data has been provided by FEMA, the following provisions shall apply:

1. No encroachments, including fill, new construction, substantial improvements or new development shall be permitted within a distance of 20 feet, each side, from the top of bank or 5 times the width of the stream, whichever is greater, unless certification with supporting technical data by a registered professional engineer is provided demonstrating that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

2. The BFE used in determining the regulatory flood protection elevation shall be determined based on one of the following criteria set in priority order:

   a. If Base Flood Elevation (BFE) data is available from other sources, all new construction and substantial improvements within such areas shall also comply with all applicable provisions of this ordinance and shall be elevated or in accordance with elevations established by the Floodplain Administrator.

   b. All subdivision, manufactured home park and other development proposals shall provide Base Flood Elevation (BFE) data if development is greater than 5 acres or has more than 50 lots/manufactured home sites. Such Base Flood Elevation (BFE) data shall be adopted by reference to be utilized in implementing this ordinance.

D. **Floodway and Non-Encroachment Areas:** Areas designated as floodways or non-encroachment areas are located within the Special Flood Hazard Areas. The floodways and non-encroachment areas are extremely hazardous areas due to the velocity of floodwaters that have erosion potential and carry debris and potential projectiles. The following additional provisions shall apply to all development within such areas:

1. No encroachments, including fill, new construction, substantial improvements and other developments shall be permitted unless it has been demonstrated that:

   a. the proposed encroachment would not result in any increase in the flood levels during the occurrence of the base flood, based on hydrologic and hydraulic analyses performed in accordance with standard engineering practice and presented to the Floodplain Administrator prior to issuance of floodplain development permit, or

   b. if an increase in base flood will occur due to the proposed encroachments, an evaluation of alternatives, which would not result in the base flood increase, should be provided for review by the Floodplain Administrator demonstrating why these alternatives are not feasible, upon approval by the Floodplain Administrator, a Conditional Letter of Map Revision (CLOMR) must be approved by FEMA. A Letter of Map Revision (LOMR) must also be obtained upon completion of the proposed encroachment.

2. If paragraph 1, above, is satisfied, all development shall comply with all applicable flood hazard reduction provisions of this ordinance.

3. No manufactured homes shall be permitted, except replacements of existing manufactured homes which meet the following provisions:

   a. The anchoring and the elevation standards of Section 12.4.2.B.3.; and

   b. The no encroachment standard of Section 12.4.2.D.1.

12.5 STORMWATER MANAGEMENT

12.5.1 GENERAL PROVISIONS

A. Applicability: The stormwater management regulations of this section shall apply within the areas designated on the "Phase II Stormwater Map of Town of Wake Forest, North Carolina" (Stormwater Map) with the following exemptions:

1. **Exemptions:** The following types of development and redevelopment shall be exempt from the provisions of this ordinance, provided that they are not in the Falls Lake Watershed and are not part of a large plan of common development or sale:

   a. Development or redevelopment that disturbs less than 1 acre;

   b. All development or redevelopment in the RA-HC and UMX Districts;

   c. Redevelopment in all districts with no increase in impervious coverage; and

   d. All development or redevelopment of State or Federally owned properties.

2. **Illicit Discharges and Connections:** Notwithstanding the exemptions granted above, the provisions regarding illicit discharges and connections in Section 12.5.8 shall apply in all districts and for all types of development.

B. Concurrency with Clean Water Act: Activities that are exempt from the permit requirements of Section 404 of the federal Clean Water Act, as specified in 40 CFR 232 (primarily, ongoing farming and forestry activities), are exempt from the stormwater management provisions of this section.

C. Concurrency with State Neuse River Basin Standards: All development and redevelopment in the jurisdiction of this ordinance shall comply with the standards of the Neuse River Basin: Nutrient Sensitive Waters Management Strategy: Protection and Maintenance of Riparian Areas with Existing Forest Vegetation, adopted as a permanent rule 1 August 2000 (15A NCAC 2B.0233), as amended.

D. Deed Restriction or Covenants Required: The approval of a stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as a recorded deed restriction or protective covenants, to ensure that future development and redevelopment maintains the site consistent with the approved plan.

E. Calculation Requirements: All stormwater calculations (runoff, pipe, ditch and inlet sizing, outlet protection, and detention routing (if required)) shall be submitted to the Administrator. Calculations shall consider inlet and outlet control, hydraulic grade line and backwater as applicable. All detention facilities shall be designed to attenuate developed condition peak discharges to the existing conditions for the given storm as described in the Manual of Specifications, Standards and Design.

12.5.2 STANDARDS FOR LOW IMPERVIOUS SURFACE PROJECTS

Low impervious surface projects shall include those developments that have no more than 24% built upon area for all residential and non-residential development. Total project area shall include total acreage in the tract on which the project is to be developed. Low impervious surface projects shall comply with each of the following standards:

A. Runoff Transport: Stormwater runoff shall be transported by vegetated conveyances to the maximum extent practicable.

B. Watercourse Buffers (Minimum Each Side): See Section 12.7

12.5.3 STANDARDS FOR HIGH IMPERVIOUS SURFACE PROJECTS

High impervious surface projects shall include those developments that have more than 24% built upon area for all residential and non-residential development. Total project area shall include total acreage in the tract on which the project is to be developed. High impervious surface projects shall comply with each of the following standards:

A. Runoff Volume: Stormwater control measures shall be installed that control and treat the difference in stormwater runoff volume leaving the project site between the pre- and post-development conditions for, at a minimum, the 1-year, 24-hour storm. Runoff volume drawdown time shall be a minimum of 24 hours, but not more than 120 hours

B. Suspended Solids: All structural stormwater treatment systems used to meet the requirements of the program shall be designed to have a minimum of 85% average annual removal for Total Suspended Solids.

C. Design Criteria: General engineering design criteria for all projects shall be in accordance with 15A NCAC 2H .1008(c), as explained in the Stormwater Best Management Practice Manual published by the North Carolina Division of Water Quality (hereafter referred to as "NC BMP Manual"), or as amended.

D. Impervious Surface Maximum: New development shall not exceed 70% impervious surface on a project-by project basis. For the purpose of calculating the impervious surface area, total project area shall include total acreage in the tract on which the project is to be developed. The Administrator or approving authority may reduce the impervious cover requirement at the time of plan approval based on plans adopted for specific areas of the town or where it is impractical to meet current requirements.

E. Watercourse Buffers (Minimum Each Side): See Section 12.7

12.5.4 ADDITIONAL STANDARDS FOR THE FALLS LAKE WATERSHED

A. Applicability: The requirements of this section shall apply within the Falls Lake Watershed.

B. Nitrogen and Phosphorous Loading

1. Nitrogen and phosphorus loads contributed by the proposed new development shall not exceed the following unit-area mass loading rates:

a. 2.2 pounds per acre per year for nitrogen, and

b. 0.33 pounds per acre per year for phosphorus.

2. Notwithstanding 15A NCAC 2B.104(q), redevelopment subject to this ordinance that would replace or expand existing structures or improvements and would result in a net increase in built-upon area shall have the option of either meeting the loading standards identified in 12.5.4.B.1, above, or meeting a loading rate that achieves the following nutrient loads from the net increase in built-upon area:

a. 40% reduction for nitrogen, and

b. 77% reduction for phosphorus.

3. The developer shall determine the need for engineered stormwater controls to meet these loading rate targets by using the accounting tool for nutrient loading approved by the Environmental Management Commission for the relevant geography and development type under review. The accounting tool is available

through the NC DWQ website at: http://portal.ncdenr.org/web/wq/ps/nps/fallslake.

C. Control and Treatment of Runoff Volume: Stormwater systems shall be designed to control and treat the runoff generated from all surfaces by the first inch of rainfall in the one-year, 24-hour storm event. The treatment volume shall be drawn down pursuant to standards specific to each practice as provided in the Design Manual. To ensure that the integrity and nutrient processing functions of receiving waters and associated riparian buffers are not compromised by erosive flows, stormwater flows from the development shall not contribute to degradation of waters of the State. At a minimum, the development shall not result in a net increase in peak flow leaving the site from pre-development conditions for the one-year, 24-hour storm event.

D. Partial Offset of Nutrient Control Requirements: Development subject to this section shall attain nitrogen and phosphorus loading rate reductions on-site, as determined by the Administrator, that meet the following criteria prior to using an offsite offset measure:

1. 30% or more reduction in both nitrogen and phosphorus loading from the untreated conditions for any single-family, detached and duplex residential development disturbing more than ½ acre but less than 1 acre.
2. 50% or more reduction in both nitrogen and phosphorus loading from the untreated conditions for any single-family, detached and duplex residential development disturbing more than 1 acre.
3. 30% or more reduction in both nitrogen and phosphorus loading from the untreated condition for other development, including multifamily residential, commercial and industrial development disturbing more than 12,000 square feet but less than one acre.
4. 50% or more reduction in both nitrogen and phosphorus loading from the untreated condition for other development, including multifamily residential, commercial and industrial development disturbing more than 1 acre.

E. Offset Payments: An applicant subject to this section may achieve the additional reductions in nitrogen and phosphorus loading required by this section by making offset payments to the NC Ecosystem Enhancement Program contingent upon acceptance of payments by that program. Applicants may use an offset option provided by the Town of Wake Forest. Applicants may propose other offset measures to the Town of Wake Forest, including providing his or her own offsite offset or utilizing a private seller. All offset measures permitted by this ordinance shall meet the requirements of 15A NCAC 02B .0282 and 15A NCAC 02B .0240.

12.5.5 STANDARDS FOR STORMWATER CONTROL MEASURES

A. Evaluation According to NC BMP Manual

1. All stormwater control measures and stormwater treatment practices (also referred to as Best Management Practices, or BMPs) required under this ordinance shall be evaluated by the Administrator according to the policies, criteria, and information, including technical specifications and standards and the specific design criteria for each stormwater practice, in the Stormwater Best Management Practice Manual published by the North Carolina Division of Water Quality (hereafter referred to as "NC BMP Manual"). The Administrator shall determine whether they will be adequate to meet the requirements of this section as amended.

2. The NC BMP Manual includes a list of acceptable stormwater treatment practices and the specific design criteria for each stormwater practice. Stormwater treatment practices that are designed, constructed, and maintained in accordance with the criteria and specifications in the NC BMP Manual will be presumed to meet the minimum water quality and quantity performance standards of this ordinance.

B. Relationship of NC BMP Manual to Other Laws and Regulations: If the specifications or guidelines of the NC BMP Manual are more restrictive or apply a higher standard than other laws or regulations, that fact shall not prevent application of the specifications or guidelines in the NC BMP Manual.

C. Changes to Standards and Specifications: If the standards, specifications, guidelines, policies, criteria, or other information in the NC BMP Manual are amended prior to the submittal of a complete application for approval pursuant to this ordinance, the new information shall control and shall be utilized in reviewing the application and in implementing this ordinance with regard to the application.

D. Alternative Stormwater Control Measures: Whenever an applicant proposes to utilize a practice or practices not designed and constructed in accordance with the criteria and specifications in the NC BMP Manual, the applicant shall have the burden of demonstrating that the practice(s) will satisfy the minimum water quality and quantity performance standards of this ordinance. The Administrator may require the applicant to provide such documentation, calculations, and examples as necessary for the Administrator to determine whether such an affirmative showing is made.

E. Dedications: The Town of Wake Forest, upon Board of Commissioners approval, may accept dedication of any existing or future stormwater management facility for maintenance, provided such facility meets all the requirements of this chapter and the requirements for easements and dedications in Section 6.10.

F. Improvement Guarantees and Performance Securities: Improvement guarantees and performance securities for the installation and maintenance of required stormwater control structures shall be provided in accordance with Section 6.12.

12.5.6 OPERATION, MAINTENANCE AND INSPECTION

A. Function of BMPs As Intended: The owner of each structural BMP installed pursuant to this ordinance shall maintain and operate it so as to preserve and continue its function in controlling stormwater quality and quantity at the degree or amount of function for which the structural BMP was designed.

B. Nuisance Conditions Prohibited: The owner of each stormwater BMP shall maintain it so as not to create or result in a nuisance condition.

C. Annual Maintenance Inspection and Report: The person responsible for maintenance of any structural BMP installed pursuant to this ordinance shall submit to the Administrator an inspection report from a qualified inspector. All inspection reports shall be on forms supplied by the Administrator. An original inspection report shall be provided to the Administrator beginning one year from the date of as-built certification and each year thereafter on or before the date of the as-built certification.

D. Records of Maintenance Activities: The owner of each structural BMP shall keep records of inspections, maintenance, and repairs for at least 5 years and shall submit the same, upon reasonable request, to the Administrator.

E. Operation and Maintenance Agreement

1. Prior to the conveyance or transfer of any lot or building site to be served by a structural BMP pursuant to this ordinance, and prior to issuance of any permit for development or redevelopment requiring structural BMP pursuant to this ordinance, the applicant or owner of the site must execute an operation and maintenance agreement that shall be binding on all subsequent owners of the site, portions of the site, and lots or parcels served by the structural BMP. Until the transference of 80% of all property, sites, or lots served by the structural BMP, the original owner or applicant shall have primary responsibility for carrying out the provisions of the maintenance agreement.

2. The operation and maintenance agreement shall require the owner or owners to maintain, repair and, if necessary, reconstruct the structural BMP, and shall state the terms, conditions, and schedule of maintenance for the structural BMP. In addition, it shall grant to Town of Wake Forest a right of entry in the event that the Administrator has reason to believe it has become necessary to inspect, monitor, maintain, repair, or reconstruct the structural BMP; however, in no case shall the right of entry, of itself, confer an obligation on Town of Wake Forest to assume responsibility for the structural BMP.

3. The operation and maintenance agreement must be approved by the Administrator prior to plan approval, and it shall be referenced on the final plat and shall be recorded with the county Register of Deeds upon final plat approval. A copy of the recorded maintenance agreement shall be given to the Administrator within 14 days following its recordation.

F. Special Requirement for Homeowners' and Other Associations: For all structural BMPs required pursuant to this ordinance and that are to be or are owned and maintained by a homeowners' association, property owners' association, or similar entity, the required operation and maintenance agreement shall include all of the following provisions:

1. Acknowledgment that the association shall continuously operate and maintain the stormwater control and management facilities.

2. Establishment of an account, which can be spent solely for sediment removal, structural, biological or vegetative replacement, major repair, or reconstruction of the structural BMPs. If structural BMPs are not performing adequately or as intended or are not properly maintained, the Town of Wake Forest may remedy the situation, and in such instances the Town of Wake Forest shall be fully reimbursed from the account. Account funds may be spent by the association for sediment removal, structural, biological or vegetative replacement, major repair, and reconstruction of the structural BMPs, provided that the Town of Wake Forest shall first consent to the expenditure.

3. Prior to plat recordation or issuance of construction permits, whichever shall first occur, the developer shall pay into the account an amount equal to 15% of the initial construction cost of the structural BMPs. Two-thirds of the total amount of sinking fund budget shall be deposited into the account within the first 5 years and the full amount shall be deposited within 10 years following initial construction of the structural BMPs. Funds shall be deposited each year into the account. Any funds drawn down from the account shall be replaced in accordance with the schedule of anticipated work used to create the sinking fund budget.

4. The percent of developer contribution and lengths of time to fund the account may be varied by the Town of Wake Forest depending on the design and materials of the stormwater control and management facility.

5. Granting to the Town of Wake Forest a right of entry to inspect, monitor, maintain, repair, and reconstruct structural BMPs.

6. Allowing the Town of Wake Forest to recover from the association and its members any and all costs the Town of Wake Forest expends to maintain or repair the structural BMPs or to correct any operational deficiencies. Failure to pay the Town of Wake Forest all of its expended costs, after a reasonable time to be determined by the Administrator, shall constitute a breach of the agreement. The Town of Wake Forest shall thereafter be entitled to bring an action against the association and its members to pay, or foreclose upon the lien hereby authorized by the agreement against the property, or both, in case of a deficiency. Interest, collection costs, and attorney fees shall be added to the recovery.

7. A statement that this agreement shall not obligate the Town of Wake Forest to maintain or repair any structural BMPs, and the Town of Wake Forest shall not be liable to any person for the condition or operation of structural BMPs.

8. A statement that this agreement shall not in any way diminish, limit, or restrict the right of the Town of Wake Forest to enforce any of its ordinances as authorized by law.

9. A provision indemnifying and holding harmless the Town of Wake Forest for any costs and injuries arising from or related to the structural BMP, unless the Town of Wake Forest has agreed in writing to assume the maintenance responsibility for the BMP and has accepted dedication of any and all rights necessary to carry out that maintenance.

G. Inspection Program

1. Inspections and inspection programs by Town of Wake Forest may be conducted or established on any reasonable basis, including but not limited to routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to, reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in BMPs; and evaluating the condition of BMPs.

2. If the owner or occupant of any property refuses to permit such inspection, the Administrator shall proceed to obtain an administrative search warrant pursuant to NCGS 15-27.2 or its successor. No person shall obstruct, hamper or interfere with the Administrator while carrying out his or her official duties.

H. Deed Recordation: The applicable operations and maintenance agreement pertaining to every structural BMP shall be recorded with the county Register of Deeds upon final plat approval. If no subdivision plat is recorded for the site, then the operations and maintenance agreement shall be recorded with the county Register of Deeds so as to appear in the chain of the title of all subsequent purchasers under generally accepted searching principles.

I. Signage: Where appropriate, in the determination of the Administrator to assure compliance with this ordinance, structural BMPs shall be posted with a conspicuous sign stating who is responsible for required maintenance and annual inspection. The sign shall be maintained by the owner so as to remain visible and legible

12.5.7 INSTALLATION OF STORMWATER INFRASTRUCTURE

A. New Subdivisions: Storm drainage systems in any new subdivision shall be the sole responsibility of the developer and shall be provided and installed by the developer in accordance with specifications of the Public Works and Utilities Department.

B. Private Property- Other Than New Subdivisions

1. The town will participate with property owners in the installation of storm drains crossing private property, other than in new subdivisions within the town's corporate limits, under the following conditions:

a. The storm drain to be installed will carry storm drainage water discharged from an existing town street ("Public" Water) or streets dedicated for public street purpose and accepted for maintenance by the town.

b. The property owner(s) will furnish the town without cost a duly executed good and sufficient easement, conveying to the town such perpetual right-of-way determined by the Administrator and necessary for the installation and maintenance of the storm drain, the form and sufficiency of such easement to be determined by the Town Attorney. The town will not be responsible for any shrubs, trees or structures within the right-of-way or easement and permanent structures may not be built over the right-of-way.

c. At the time of the property owner's application to the town, the storm drain system to be installed is to be located on property on which a residential, commercial, or industrial building has existed for a period of 60 months and the desirability or necessity for such installation is not due to a planned expansion or modification of such existing building nor to an expansion or modification made to such existing building within a 60 month period prior to the date of such application.

d. The installation of the storm drainage system shall extend throughout a dedicated easement to a natural watercourse or existing storm drain or across the entire lot in the event there is no natural water course or existing storm drain on the property.

e. The pipe, size, alignment, grade, length, discharge point, structural accessories (such as manholes, headwalls, catch basins, junction boxes) and other specifications shall be as determined by the Administrator.

2. In the event the pipe to be installed does not exceed the equivalent of 48" in diameter, the town will furnish the necessary labor and equipment or cost thereof, to install the storm drain and the property owner(s) shall furnish all required pipe and all materials for structural accessories as specified by the Administrator. The town will purchase on behalf of the property owner(s) such pipe and materials upon the property owner(s) depositing in cash the cost of the same. The following conditions shall apply:

a. Cost for each property owner shall be determined by dividing the total cost of materials by the total footage of property owners adjoining the proposed pipe location and multiplying the result by the footage of each individual owner to determine his/her share of the cost.

b. Where the size of the pipe to be installed exceeds 48" in diameter, the town shall determine the most feasible method of improving the ditch with methods such as, but not limited to piping, paving banks, culverts; concrete lining, rip rap, etc.

c. In such cases where the size of the pipe exceeds 48" in diameter, the property owner(s) share of the cost shall not exceed the cost of all materials and accessories for the installation of a pipe 48" in diameter.

3. It shall be the policy of the town to improve sections of open ditch in sufficient length as determined by the Administrator.

4. The storm drainage within publicly dedicated easements shall be the entire and sole property of the town upon completion.

5. If the property owner(s) desires that the town participate in the installation of a storm drain, such property owner(s) shall execute and deliver to the town a written application for such participation, together with a non-refundable application fee to cover the cost of processing the application.

6. Any construction to be done by the town under Section 12.5.7.B.2, above, of this policy will be done on a low priority basis and shall be done on a scheduled basis so as not to interfere with other public works projects of the town and as budgeted funds are available. Projects will normally be budgeted in subsequent fiscal year(s).

7. Storm drainage crossing private property which does not carry storm drainage from an existing town street or streets dedicated for public street purposes and accepted by the town for maintenance is the responsibility of the property owner(s) and the town; therefore, will not participate in the installation.

C. Roadside Ditch Pipe: Once driveway or roadside ditch pipe is bought and installed by a property owner abutting a street, the material remains the property of the property owner. If the pipe is determined by the town to need replacing for any reason, the town will remove the pipe from the ditch and leave it on site for the property owner to dispose of. The abutting property owner will not be charged for any pipe size increase nor will owner be given any credits.

12.5.8 ILLICIT DISCHARGES AND CONNECTIONS

A. Applicability: Notwithstanding the provisions of Section 12.5.1.A above, the following provisions for illicit discharges and connections to the Town of Wake Forest stormwater system shall apply to all areas within the jurisdiction of this ordinance.

B. Illicit Discharges: No person shall cause or allow the discharge, emission, disposal, pouring, or pumping directly or indirectly to any stormwater conveyance, the waters of the State, or upon the land in manner and amount that the substance is likely to reach a stormwater conveyance or the waters of the State, any liquid, solid, gas, or other substance, other than stormwater except as provided for in paragraph 1, below.

1. Permitted Discharges: Non-stormwater discharges associated with the following activities are allowed, provided that they do not significantly impact water quality:

a. Water line flushing;

b. Landscape irrigation;

c. Diverted stream flows;

d. Rising ground waters;

e. Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20));

f. Uncontaminated pumped ground water;

g. Discharges from potable water sources;

h. Foundation drains;

i. Air conditioning condensation;

j. Irrigation water;

k. Springs;

l. Water from crawl space pumps;

m. Footing drains;

n. Lawn watering;

o. Individual residential car washing;

p. Flows from riparian habitats and wetlands;

q. Dechlorinated swimming pool discharges;

r. Street wash water; and

s. Other non-stormwater discharges for which a valid NPDES discharge permit has been approved and issued by the State of North Carolina.

2. **Prohibited Substances:** Prohibited substances include but are not limited to: oil, anti-freeze, chemicals, animal waste, yard debris, paints, garbage, and litter.

3. **Spills:** Spills or leaks of polluting substances released, discharged to, or having the potential to released or discharged to the stormwater conveyance system, shall be contained, controlled, collected, and properly disposed. All affected areas shall be restored to their preexisting condition. Persons in control of the polluting substances immediately prior to their release or discharge, and persons owning the property on which the substances were released or discharged, shall immediately notify the (title of the individual in charge of managing accidental hazardous material releases in the local jurisdiction, such as a municipal Fire Chief) of the release or discharge, as well as making any required notifications under state and federal law. Notification shall not relieve any person of any expenses related to the restoration, loss, damage, or any other liability which may be incurred as a result of said spill or leak, nor shall such notification relieve any person from other liability which may be imposed by State or other law.

C. Prohibited Connections: Connections to a stormwater conveyance or stormwater conveyance system that allow the discharge of non-stormwater, other than the exclusions described in Section 12.5.8.B.1 above, are unlawful. Prohibited connections include, but are not limited to: floor drains, waste water from washing machines or sanitary sewers, wash water from commercial vehicle washing or steam cleaning, and waste water from septic systems.

D. Amortization of Prohibited Connections

1. Where such connections exist in violation of this section and said connections were made prior to the adoption of this provision or any other ordinance prohibiting such connections, the property owner or the person using said connection shall remove the connection within one year following the effective date of this ordinance.

2. However, the one-year grace period shall not apply to connections which may result in the discharge of hazardous materials or other discharges which pose an immediate threat to health and safety, or are likely to result in immediate injury and harm to real or personal property, natural resources, wildlife, or habitat. The Administrator shall designate the time within which such connections shall be removed. In setting the time limit for compliance, the Administrator shall take into consideration:

   a. The quantity and complexity of the work,

   b. The consequences of delay,

   c. The potential harm to the environment, to the public health, and to public and private property, and

   d. The cost of remedying the damage.

12.6 WATER SUPPLY WATERSHED PROTECTION REGULATIONS

12.6.1 WATER SUPPLY WATERSHED PROTECTION OVERLAY (FALLS LAKE, RICHLAND CREEK AND SMITH CREEK)

A. **Applicability:** The following regulations shall apply to all parcels or portions of parcel that fall within designated watershed areas as noted on the official zoning map. Where the standards of these regulations differ from the base district (e.g., density, maximum impervious surface) these regulations shall take precedence.

B. **Authority:** These regulations are adopted pursuant to NCGS 143-214.5, as amended, and the Water Supply Watershed Protection Rules established by the North Carolina Environmental Management Commission.

C. **Surface Water Classification:** The regulations of this section apply according to the surface water classification of the water supply watershed established by NC DWQ.

   1. **Water Supply IV (WS-IV) Surface Waters:** WS-IV waters in the jurisdiction of the Town of Wake Forest include Falls Lake and Richland Creek. WS-IV waters are used as sources of water supply for drinking, culinary, or food processing purposes where a WS-I, II or III classification is not feasible.WS-IV waters are generally in moderately to highly developed watersheds or Protected Areas.

   2. **Water Supply II (WS-II) Surface Waters:** WS-II waters in the jurisdiction of the Town of Wake Forest include Smith Creek. WS-II Waters are used as sources of water supply for drinking, culinary, or food processing purposes where a WS-I classification is not feasible. WS-II waters are generally in predominantly undeveloped watersheds. All WS-II waters are designated as High Quality Waters (HQW) by supplemental classification.

D. **Specific Standards by Water Supply Watershed Area:** The following standards shall apply to all mapped watershed areas and shall take precedence over the underlying zoning district standards. In each watershed area the applicant may choose whether to abide by the standards for the Low Impervious Surface Option or the High Impervious Surface Option as outlined in the tables below:

1. Falls Lake Water Supply Watershed (Class WS-IV)			
Development Type	Location Classification	Maximum Density	Maximum Impervious Surface Coverage
Single Family Residential Development	Critical Area (FL-CA)	1 unit/2 acres	6%
	Watershed Management Area (FL-WMA)	1 unit/acre	12% w/o municipal water & sewer OR 24% with municipal water & sewer
All Other Development	Critical Area (FL-CA)	Follows base zoning	6%
	Watershed Management Area (FL-WMA)	Follows base zoning	12% w/o municipal water & sewer (Low Impervious Surface Option); 24% with municipal water & sewer (Low Impervious Surface Option): OR 70% (High Impervious Surface Option)*

2. Richland Creek Water Supply Watershed (Class WS-IV)			
Development Type	Location Classification	Maximum Density	Maximum Impervious Surface Coverage
Single Family Residential Development	Critical Area (RC-CA)	2 units/acre	24% (Low Impervious Surface Option)
		Follows base zoning	50% (High Impervious Surface Option)*
	Watershed Management Area (RC-WMA)	Follows base zoning	70% (High Impervious Surface Option)*
All Other Development	Critical Area (RC-CA)	Follows base zoning	24% (Low Impervious Surface Option)
			50% (High Impervious Surface Option)*
	Watershed Management Area (RC-WMA)	Follows base zoning	70% (High Impervious Surface Option)*

3. Smith Creek Water Supply Watershed (Class WS-II)			
Development Type	Location Classification	Maximum Density	Maximum Impervious Surface Coverage
Single Family Residential Development	Critical Area (SC-CA)	1 unit/2 acres	6%
		1 unit/2 acres	24% (High Impervious Surface Option)*
	Watershed Management Area (SC-WMA)	1 unit/acre	12% (Low Impervious Surface Option) 30% (High Impervious Surface Option)*
All Other Development	Critical Area (SC-CA)	Follows base zoning	6%
			24% (High Impervious Surface Option)*
	Watershed Management Area (SC-WMA)	Follows base zoning	12% (Low Impervious Surface Option) 30% (High Impervious Surface Option)*

** All high impervious surface options require municipal water and sewer service*

E. Watercourse Buffers (Minimum Each Side): See Section 12.7

F. Exceptions: All land in the Watershed Protection Overlay Districts shall be developed in accordance with the requirements of this section except for the following:

1. Development existing prior to the date indicated for each water supply watershed in the table below is exempt from these requirements, but expansions to structures, other than single-family development, shall be treated as new development and meet the requirements of this section. In these instances, the built-upon area of the existing development is not required to be included in the density or impervious surface area calculations for the expansion.

Water Supply Watershed	Date
Falls Lake Water Supply Watershed	July 1, 1993
Richland Creek Water Supply Watershed	April 1, 2005
Smith Creek Water Supply Watershed	July 1, 1993

2. Redevelopment or reconstruction of existing development is allowed if the rebuilding activity does not have a net increase in built-upon area or provides

equal or greater storm water control than the previous development as allowed by this section, except that there are no restrictions on single-family residential development.

3. A deeded single-family lot owned by an individual prior to the date indicated for each water supply watershed in the table in Section 12.6.1.F.1 above, provided it is developed for single-family use.

4. A non-conforming lot of record, not contiguous to any other lot owned by the same party, provided it is developed for single-family use.

5. Any lot or parcel created as part of a family subdivision on or after the date indicated for each water supply watershed in the table Section 12.6.1.F.1 above, provided it is developed for one single-family detached residence and if it is exempt from the subdivision regulations.

G. Calculation of Impervious Area: For the purpose of calculating the impervious surface area, total project area shall include total acreage in the tract on which the project is to be developed. Impervious surface area includes any material which reduces and prevents absorption of storm water into previously undeveloped land such as roads, parking lots, paths, and recreation facilities such as tennis courts. Impervious surface area does not include wooden slatted decks, the water area of a swimming pool, or pervious or partially pervious paving material to the extent that the paving material absorbs water or allows water to infiltrate through the paving material and underlying substrate. Other pervious materials may be excluded from the calculation of impervious area as provided by the North Carolina environmental Management Commission Manual as amended.

H. Prohibited Uses: The following uses are prohibited in the Water Supply Watershed Protection Overlay Districts:

1. Processing of mineral products;

2. Lumber mills and saw mills;

3. Processing of animal and vegetable products;

4. The storage of toxic and hazardous materials unless a spill containment plan is implemented;

5. Landfills and discharging landfills;

6. Sites for land application of sludge/residuals or petroleum contaminated soils;

7. Discharges of sewage, domestic wastewater, industrial wastes, non-process industrial wastes, or other wastes except as permitted by the Division of Environmental Health, N.C. Department of Environment, Health and Natural Resources or successor authority;

8. Any use determined by the Town of Wake Forest to be detrimental to the quality of water in water supply watersheds by posing a threat of run-off, leaching or other types of pollution.

I. Hazardous Materials

1. Existing and new industrial development shall maintain an inventory of all hazardous materials used and stored on the premises; and, prepare a spill/failure containment plan and implement safeguards against contamination; and, encourage waste minimization and the appropriate recycling of materials.

2. New industrial development shall incorporate adequately designed, constructed and maintained spill containment structures if hazardous materials are used, stored or manufactured on the premises.

12.6.2 IMPERVIOUS SURFACE AVERAGING

A. Purpose: Impervious surface averaging allows development plans for 2 noncontiguous parcels to be submitted together and treated as a single project in order to meet the requirements of this section. This option is intended to enhance water supply watershed protection and provide greater development flexibility for properties in Water Supply Watershed Protection Overlay Districts by allowing the transfer of impervious area "credits" across parcels.

B. Limitations: In order to qualify for an impervious surface averaging allowance:

1. All other requirements of this ordinance must be met;
2. The property from which the impervious area credits are taken must not have been used in the calculation of impervious area allowance for an existing or approved development project;
3. No parcel for which a watershed variance has been granted, or would be required, may be included as a part of a parcel pair; and
4. The development proposal for the parcel pair shall conform to the intent and requirements of this section, shall be consistent with the orderly and planned distribution of development throughout the community, and shall assure protection of the public interest.

C. Location

1. Parcels from which development "credits" are taken must be located in a Watershed Protection Overlay District.
2. Parcels to which development "credits" are applied must be located within the same water supply watershed as the paired-parcel.

D. Combined Impervious Surface Area Limit: The total amount of development (impervious surface area) allowed for the paired parcels taken together cannot exceed the amount of development that would be allowed if the parcels were developed separately.

E. Overall Density Limit: Overall density of the paired-parcel, averaged-impervious surface development, calculated either by dwelling units per acre or built upon area shall not exceed the density that would be allowed if the parcels were developed separately.

F. Runoff Volume: Peak flow must be controlled on the developing lot or project using the acreage or area of the developing lot or project only, so as to minimize drainage impact on downstream properties.

G. Stormwater Flow: Plans shall be designed to:

1. Minimize stormwater runoff impact to the receiving waters by minimizing concentrated stormwater flow;
2. Maximize the use of sheet flow through vegetated areas;
3. Minimize impervious surface areas;
4. Locate development away from surface waters and drainage ways to the maximum extent practicable; and

5. Where concentrated flow is unavoidable, convey stormwater from developed areas by vegetated swales to the maximum extent practicable.

H. Procedure for Approval

1. An impervious surface averaging allowance shall be conveyed as part of a Development Permit, in accordance with Section 15.6.1. Only owners of both of the paired parcels may submit an application for a development using an impervious surface averaging allowance.
2. Included with the Development Permit application shall be a site plan, registered plats/sealed boundary survey for both properties, a description of both properties, appropriate calculations and documentation of the proposed impervious surface averaging agreement, and documentation indicating the intent to convey the undeveloped parcel(s) or portion(s) thereof to the town.
3. If an impervious surface averaging allowance is granted as part of a Development Permit, no change in the development proposal authorized for either parcel shall be made unless the impervious surface averaging allowance is amended and reapproved by the Administrator.
4. Before a Building Permit is issued, the undeveloped parcel(s) or portion(s) thereof shall be deeded (fee simple and at no cost) to the Town of Wake Forest and the town shall place a permanent conservation easement on the same, as provided under NCGS 121-35, granted to the town, a land conservation organization, or other entity capable of providing for the ongoing maintenance of the undeveloped property. No such agreement shall be accepted without approval of the Town Attorney as to the legal sufficiency of the documents involved.
5. Once ownership of such land is conveyed, a plat showing the properties and conservation easements involved in the development, and outlining the impervious surface averaging requirements associated with the parcel pair must be reviewed, approved, and recorded prior to the issuance of the building permit.

I. Agreements Shall Continue Indefinitely: Applicants shall agree to bind themselves and their successors in title, individually and collectively, to maintain the pattern of development proposed for so long as the requirements of this section are applicable. Parties to enforcement of such agreement shall include the town.

12.7 WATERCOURSE (RIPARIAN) BUFFER AREAS

It is the intent of this section to seek to maximize retention of the natural beauty of vegetation along creeks, streams, rivers, and lakes, and other bodies of water while simultaneously providing for the retention of surface water run-off from areas adjacent to these natural and/or built features, resulting in a net reduction of pollutants that enter these water features.

12.7.1 ESTABLISHMENT OF BUFFERS

A. Applicability: All protected drainageways and surface waters shall have riparian buffers directly adjacent to such surface waters of the width specified in 12.7.2 below. When multiple watercourse buffer standards apply, the more stringent standard shall dictate.

B. Location of Buffers

1. For the purposes of this section, intermittent streams, perennial streams, upper watershed drainageways that drain more than 5 acres, water supply

impoundments, lakes, ponds and wetlands shall be deemed to be present if the feature is indicated on the most recent versions of the following:

a. United States Geological Survey 1:24,000 scale (7.5 minute quadrangle) topographic maps;

b. A soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture;

c. The North Carolina Division of Water Quality (NCDWQ) identification methodology for determination of perennial and intermittent streams; or

d. Other site-specific evidence.

2. Wetlands may also be identified, as either a bordering or isolated wetland, using the 1987 Corp of Engineers technique and/or supplemental Corps-approved methodology.

3. In order to determine the amount of land drained by an upper watershed drainageway, USGS or Wake County topographic maps may be used.

4. Where obvious conflicts between actual field conditions and USGS and county soil survey maps exist, appeals may be made to the Administrator or, for appeals related to Neuse River Basin buffer requirements, the North Carolina Division of Water Quality.

5. All surface waters shall be determined by a qualified professional using the most recent version of Identification Method for the Origins of Intermittent and Perennial Streams and verified by qualified Town Staff and/or the NC Division of Water Quality.

C. Buffer Measurement: The width of each required riparian buffer shall be measured perpendicular to the banks of the protected drainageway, beginning at the most landward limit of the top of bank.

12.7.2 WATERCOURSE BUFFER TABLES

A. General Buffers	The following watercourse buffer standards shall apply for all development projects.		
Surface Water Features	Zone 1 Buffer	Zone 2 Buffer	Additional Standards
1. Intermittent and Perennial Streams (not subject to Neuse River Buffer Rules)	30 ft	20 ft	See Section 12.7.3
2. Wetlands	10 ft	Not required	

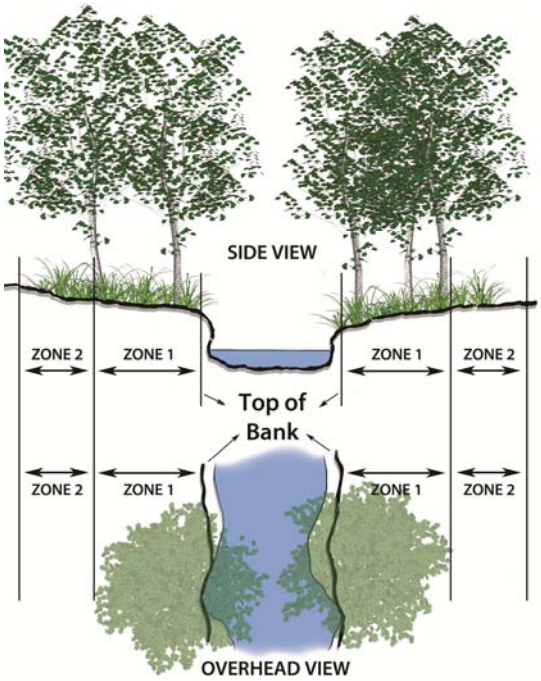
B. Watershed Protection District Buffers	When located in the Falls Lake, Richland Creek or Smith Creek Water Supply Watersheds *(both the Critical Area & Watershed Management Area)*, the following watercourse buffer standards shall apply.		
Surface Water Features	Zone 1 Buffer	Zone 2 Buffer	Additional Standards
1. Intermittent Stream	50 ft	Not required	All buildings and structures shall be set back a minimum 10 ft from the edge of any required buffer. See Section 12.6 and 12.7.3
2. Perennial Stream (w/ Low Impervious Surface Option)	50 ft		
3. Perennial Stream (w/ High Impervious Surface Option)	100 ft		
4. Upper Watershed Drainageway (drains more than 5 acres)	25 ft		
5. Water Supply Impoundment	100 ft		
6. WS-II Streams (Smith Creek), WS-III & WS-IV Streams (Falls Lake & Richland Creek)*	100 ft		

** Excludes tributaries*

C. Neuse River Basin Buffers	When located in the Neuse River Basin, the state regulations for water management as outlined in 15 A NCAC 2B.0233 shall apply.		
Surface Water Features	Zone 1 Buffer	Zone 2 Buffer	Additional Standards
All intermittent streams, perennial streams, water supply impoundments, lakes and ponds	30 feet min.	20 feet min.	All buildings and structures shall be set back a minimum 10 ft from the edge of any required buffer. See Section 12.7.3

D. Delineation of Buffer Zones

1. **Zone 1:** Zone 1 begins at the top of bank for intermittent streams and perennial streams and extends landward on all sides of the water body. For all other water bodies, Zone 1 begins at the top of bank or mean high water line. Zone 1 is an undisturbed area of vegetation.
2. **Zone 2:** Zone 2 begins at the outer edge of Zone 1 and extends landward. Zone 2 consists of a stable vegetated area that may be graded and revegetated provided that the health of vegetation in Zone 1 is not compromised.



12.7.3 WATERCOURSE BUFFER STANDARDS

A. Permitted Uses in Watercourse Buffers: All required buffers shall remain natural and undisturbed except as allowed by NRRB Rules, as amended, or as may be necessary to accommodate any of the uses permitted in 15 A NCAC 2B.0233. These activities shall minimize built-upon surface area, direct run-off away from the surface waters and maximize the utilization of best management practices (BMP's).

B. Additional Neuse River Buffer Standards: The Neuse River regulations of this section and 15 A NCAC 2B.0233 shall not apply to riparian buffer areas with existing and ongoing uses established as of July 27, 1997. Existing forest vegetation of any width present after this date must be protected and maintained in accordance with the Neuse River regulations of this section and 15 A NCAC 2B.0233.

C. Buffers to be Shown on Plans: All required watercourse buffers shall be shown on all approved site plans and subdivision plans. Where designated by the Administrator, the placement of signs may be required to relay the buffer protection requirements to the public.

D. Exclusion of Watercourse Buffer Areas from Lots: Single-family lots created through a site and/or subdivision plan shall not be platted into a watercourse buffer area except through the approval of the Administrator when all of the following conditions are met:

1. The subdivision is limited in size and has no homeowners association;
2. There is no other reason for the formation of a homeowners association (e.g., covenant, other common areas, engineered stormwater control structures);
3. The buffer is placed in a permanent conservation or other legal instrument dedicated to the town or other approved conservation or governmental entity (required documents must be provided prior to recordation of the plat for the impacted area).

13 NONCONFORMITIES

13.1 PURPOSE AND APPLICABILITY

The purpose of this section is to regulate and limit the continued existence of uses and structures established prior to the effective date of this ordinance (or any subsequent amendment) that do not conform to this ordinance. Any nonconformity created by a change in the classification of property or the text of these regulations shall also be regulated by the provisions of this section. The provisions of this chapter are intended to limit substantial investment in nonconformities and to bring about their eventual elimination and/or lessen their impact upon surrounding conforming uses in order to preserve the integrity of the area in which a nonconformity is located.

13.1.1 APPLICABILITY MATRIX

The following table summarizes the primary requirements that shall be met when there are changes to existing development and/or to nonconforming structures or uses. A ✓ indicates that compliance with all applicable standards is required.

	2.2 Dimensional Standards	Ch. 5 Building Design Standards	6.11 Sidewalks	Ch. 8 Tree Protection & Landscaping	8.4 Buffers & Screening	8.5 Street Tree Planting	8.6-8 Parking Lot Landscaping	Ch. 10 Outdoor Lighting	Ch. 11 Signs
Existing Development									
Change of Use (From Residential to Non-Residential)		✓	✓	✓	✓	✓	✓	✓	✓
Parking Area Expansion									
Less than 12 spaces or <40% of Paved Area							✓*(a)*	✓*(a)*	
Expansion of ≥ 40% of Paved Area or 12 spaces or more			✓	✓	✓	✓	✓	✓	✓
Building Expansion/Reconstruction									
< 50% of Existing Floor Area	✓*(a,b)*	✓*(a)*						✓*(a)*	✓
≥ 50% of Existing Floor Area	✓*(a,b)*	✓*(c)*	✓	✓	✓	✓	✓	✓	✓

(a) For expanded/reconstructed portion only

(b) Exception: Maximum front setbacks should be met to the extent practical as determined by the Administrator.

(c) *For expansions, reconstruction areas and all other walls facing public streets*

13.2 GENERAL PROVISIONS

13.2.1 APPEALS AND MODIFICATIONS

A. The Board of Adjustment shall hear and decide appeals from any land owner (i) to make a change in use of a nonconforming use to a different, less-intense nonconforming use; (ii) to make a change in location of a nonconforming use of land to another location on the same property; or (iii) allow the replacement of a nonconforming use.

B. The Board of Adjustment may only grant a change for a nonconforming use or replacement of a nonconforming structure which has been destroyed after having first held a public hearing and having determined that:

1. Said change will be more suitable and appropriate for the lot(s) on which it is located than the existing situation; and,

2. The proposed change will have a less harmful effect than the existing situation on the properties surrounding the lot(s) in question; and,

3. The decision to grant the change will be in harmony with the general purpose and intent of this ordinance and will not be injurious to the neighborhood or otherwise be detrimental to the public welfare.

C. The Board of Adjustment, in granting such changes, may prescribe appropriate conditions and safeguards in conformity with this ordinance. Violation of such conditions and safeguards when made a part of the terms upon which the change was granted, shall be deemed a violation of this ordinance and shall be subject to enforcement provisions a prescribed per Chapter 16, Violations and Penalties.

13.2.2 DISCONTINUANCE

A nonconforming use shall be presumed discontinued when any of the following has occurred:

A. The owner has indicated intent, in writing to the Administrator, to abandon the use.

B. A conforming use has replaced the original nonconforming use.

C. The building or structure housing the nonconforming use has been removed.

D. The owner has physically changed the building or structure or its permanent equipment in such a way as to indicate clearly a change in use or activity to something other than the nonconforming use.

E. The property, structure or use has been vacant or completely inactive for 365 days.

13.3 NONCONFORMING PLANS

13.3.1 APPROVED PLANS

A. Previously Approved Plans Grandfathered: Any plan (including but not limited to master plans, preliminary plats, final plats, conditional district plans, special use permit plans) for the development of property and/or construction of a building which has received final approval by the Town of Wake Forest for development and/or construction, but does not conform to this ordinance, may be developed and/or constructed in accordance with the rules and regulations, including any conditions imposed upon approval, that were in place prior to the effective date of

this ordinance. Any plan approved prior to the adoption of this ordinance, but which conforms to its provisions, shall be administered, interpreted, amended and implemented in accordance with the provisions of this ordinance.

B. May Choose New Ordinance: A property owner with an approved site specific plan as identified above may elect to develop such property and/or construct such building in accordance with the terms and provisions of this ordinance in lieu of the rules and regulations upon which the plan was approved. The Administrator shall notify the property owner in writing of any additional required procedures or modifications which may be necessary in order for the plan to conform to the ordinance.

C. Amendments or Modifications of Previously Approved Plans: Any amendment or modification to an approved site specific plan, which would have required approval pursuant to the ordinance, the rule or regulation by which the plan was originally approved, shall be reviewed and considered in accordance with the terms and provisions of this ordinance as if it were an amendment or modification to a plan originally approved under this ordinance.

13.3.2 VESTED RIGHTS

This section does not prohibit the exercise of any vested right established by common law ordinance or statute.

13.4 NONCONFORMING LOTS

13.4.1 DEFINITION AND APPLICABILITY

A nonconforming lot is a lot of record that does not meet the dimensional requirements of Chapter 2 for the land development district in which it is located. A nonconforming vacant lot of record is one that was recorded by plat or description in the Office of the Register of Deeds of Wake County prior to the adoption of this chapter or prior to the time that the lot was brought into the town's jurisdiction. This definition shall not be interpreted to include recorded lots that were in violation of any prior subdivision regulations of the Town of Wake Forest and which will remain in violation.

13.4.2 STANDARDS

A. Lot May Be Developed: Except as provided in Sections 13.4.2.B and C below, a nonconforming vacant lot may be developed for any of the uses permitted by these regulations in the district in which it is located, provided that any use and/or structure meets all applicable yard and setback requirements for the district in which the lot is located. A variance shall not be required for substandard lot width or lot size for such lots of record.

B. Lots to Be Combined, If Possible: A nonconforming vacant lot shall not be developed if it can be combined with an adjoining lot owned by the same person on or after the effective date of these regulations in order to create a single conforming or substantially conforming lot. For the purposes of this section, "adjoining" shall be deemed to mean the sharing of one or more common lot lines and access to both lots can be provided by the same street without crossing that street. All other minimum requirements for the particular land development district and proposed use must be met or a variance obtained from these requirements through an action of the Board of Adjustment. This shall include meeting the requirements for additional lot size for increased densities of residential development (duplexes, multi-family dwellings, etc.).

C. Exceptions for Previously Approved Plats: A nonconforming lot may be developed if, at the effective date of this ordinance, the lot is located in (i) a subdivision that had received preliminary plat approval; or (ii) a subdivision that had received final plat approval.

D. Existing Structures on Non-Conforming Lots: Any structure on a nonconforming occupied lot may be occupied, without expansion, by a conforming use or may be improved or expanded in accordance with the standards listed in this section. Structural alterations or remodeling of structures on nonconforming lots required by an authorized public official shall be permitted. Routine maintenance shall also be permitted so long as no expansion of the nonconformity occurs as a result of the maintenance.

E. Expansion of Structures: Any improvement or expansion of any structure on a nonconforming occupied lot must comply with all other minimum requirements of this ordinance or a variance must be obtained from these requirements through an action of the Board of Adjustment. This shall include meeting the requirements for additional lot size for increased densities of residential development (duplexes, multi-family dwellings, etc.).

13.5 NONCONFORMING USES & STRUCTURES

13.5.1 DEFINITION AND APPLICABILITY

A. Nonconforming Use: A nonconforming use is a use which was once a permitted use on a parcel of land or within a structure, or which precedes any ordinances, but which is now not a permitted use of that parcel according to Chapter 2 of this ordinance. This definition includes open uses of land (e.g., storage yards and golf driving ranges) as well as the structures that contain nonconforming uses. The nonconformity may result from the adoption of this ordinance or any subsequent amendment.

B. Nonconforming Structure: A nonconforming structure does not conform to dimensional, design, locational, or other requirements of this ordinance. The nonconformity may result from adoption of this ordinance or any subsequent amendment.

13.5.2 STANDARDS FOR NONCONFORMING USES

A. Continuation: Any legally established nonconforming use may be continued subject to the standards listed in this section. However, once a nonconforming use is made conforming, it may not later be used for any nonconforming use or expanded in violation of this ordinance.

B. Extension of Use: Any non-conforming structure or non-conforming use of land or structure, shall not hereafter be enlarged or extended in any way which serves to increase the nature of non-conformity, except where the non-conforming use is a residential structure used exclusively for dwelling purposes, said structure is a permitted use and the proposed addition shall conform to all zoning requirements; and the total area of the addition shall be limited to 25% percent of the area of the original non-conforming structure; and shall be used solely for residential purposes.

C. Discontinuance of 1 Year: A nonconforming use of a structure that is discontinued for a continuous period of more than one year may not be reestablished. All subsequent uses of the structure and site must be in conformance

with the particular regulations for the land development district in which the property is located.

13.5.3 STANDARDS FOR NONCONFORMING STRUCTURES

A. Continuation: Any legally established nonconforming use or structure may be continued subject to the standards listed in this section. However, once a nonconforming use or structure is made conforming, it may not later be used for any nonconforming use or expanded in violation of this ordinance. Should any non-conforming structure or use of land or structure be moved for any reason for any distance, whatever, it shall hereafter conform to the regulations for the district in which it is relocated.

B. Repairs and Modernization: Repairs and modernization of any nonconforming structure are permitted provided that such repairs or modernization shall in no way serve to augment the nature of non-conformity. Nothing in this ordinance shall be construed so as to prevent the strengthening or restoring to a safe condition any building or part thereof declared to be unsafe by any public official charged with protecting the public safety, health and welfare pursuant to orders of such official.

C. Damage or Destruction

1. Should a non-conforming structure or non-conforming portion of a structure be destroyed by any means to an extent of more than 50% of its replacement cost at the time of destruction, it shall not be reconstructed except in conformity with the provisions of this ordinance.

2. The above requirement does not apply to single-family dwellings and accessory buildings or structures located in any historic district, designated as a local landmark, or individually listed on the North Carolina study list or the National Register of Historic Places. Structures meeting these classifications may be reconstructed as long as such reconstruction does not increase the nonconformity of the original structure.

D. Manufactured Homes: No Class C manufactured home shall be removed for more than 48 hours and replaced unless its lot and stand conform to the requirements of this ordinance.

E. Nonconforming Structures within a Floodway or Flood Fringe: Any non-conforming structure wholly or partly within a Special Flood Hazard Area may be flood-proofed according to methods and specifications set forth in the publication of the Office of the Corps of Engineers, U. S. Army, entitled Flood-proofing Regulations, a copy of which shall be kept on file in the Office of the Town Clerk.

13.5.4 STANDARDS FOR NONCONFORMING ACCESSORY USES AND STRUCTURES

No nonconforming accessory use or accessory structure shall continue after the principal use or structure is terminated by abandonment, damage, or destruction unless such accessory use or structure is made to conform to the standards for the zoning district in which it is located. No nonconforming accessory use or structure shall become or replace any terminated principal nonconforming use or structure except as permitted in Section 13.5.3.C.2 above.

13.6 NONCONFORMING MANUFACTURED HOME PARKS

Manufactured home parks existing at the time of the adoption of this ordinance shall not be allowed to expand or increase in any manner unless such expansion meets fully the requirements set forth in this ordinance.

13.7 NONCONFORMING SIGNS

A non-conforming sign is one that was established prior to effective date of this ordinance or by subsequent amendment thereto, but does not conform to the sign regulations in Section 11.

13.7.1 REGULATIONS

A. No enlargement, extension or structural alterations of any non-conforming sign or part thereof is permitted unless in conformance with the regulations found herein. Removal of a non-conforming sign, except for normal maintenance, will require that sign to conform if it is replaced.

B. If the non-conforming sign is damaged 50% or more of its assessed value, such signs may be reconstructed only in compliance with the regulations found herein.

C. Nothing in this ordinance shall prevent the normal maintenance of an existing non-conforming sign.

13.7.2 DISCONTINUANCE

All non-conforming signs created as a result of the passage of this ordinance shall be allowed to remain in place in accordance with this section. Signs erected after the passage of this ordinance shall conform to the standards set forth herein.

14 ADMINISTRATIVE AGENCIES

14.1 THE ADMINISTRATOR

The various provisions of this ordinance shall be administered under the general direction of the Town Manager and under the specific direction of the Town of Wake Forest Planning & Inspections Department, the Town of Wake Forest Public Works Department, the Town of Wake Forest Engineering Department, and the City of Raleigh Public Utilities Department. For the purposes of this ordinance, the Planning Director, the Director of Public Works and Utilities, the Director of Engineering, and their subordinate staffs are collectively referred to as the Administrator. The Planning & Inspections Department will serve as the "gatekeeper" for all development applications and will advise applicants on appropriate personnel to contact.

14.1.1 POWERS AND DUTIES

The Administrator shall have the following powers and duties, to be carried out in accordance with the terms of this ordinance:

A. To maintain a record of all permits and approvals on file and to make copies available to interested parties.

B. To review all applications for land development for compliance with the terms of this ordinance.

C. To provide the Wake Forest Board of Commissioners, the Planning Board, Board of Adjustment, the Historic Preservation Commission and the Design Review Board with reports and recommendations regarding matters before these bodies, either as required by this ordinance, other laws or regulations or at the request of the body.

D. To enforce compliance with the terms of this ordinance, unless otherwise specified.

E. To review all development plans for compliance with street and utility requirements of the Town of Wake Forest.

F. To administer the sedimentation and erosion control program for the town.

G. To administer the floodplain management program for the town as follows:

1. Review all floodplain development applications and issue permits for all proposed development within Special Flood Hazard Areas and Future Conditions Flood Hazard Areas to assure that the requirements of this ordinance have been satisfied.

2. Advise permittee that additional Federal or State permits (Wetlands, Endangered Species, Erosion and Sedimentation Control, Riparian Buffers, Mining, etc.) may be required, and require that copies of such permits be provided and maintained on file with the floodplain development permit.

3. Notify adjacent communities and the North Carolina Department of Crime Control and Public Safety, Division of Emergency Management, State Coordinator for the National Flood Insurance Program prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency (FEMA).

4. Assure that maintenance is provided within the altered or relocated portion of said watercourse so that the flood-carrying capacity is not diminished.

5. Assure that maintenance is provided within the altered or relocated portion of said watercourse so that the flood-carrying capacity is not diminished.

6. Obtain actual elevation (in relation to mean sea level) to which all new and substantially improved structures and utilities have been floodproofed, in accordance with Section 15.7.3.E.2.

7. Obtain actual elevation (in relation to mean sea level) of all public utilities in accordance with Section 15.7.3.E.2.

8. When floodproofing is utilized for a particular structure, obtain certifications from a registered professional engineer or architect in accordance with Section 15.7.3.E.2 and Section 12.4.2.B.2.

9. Where interpretation is needed as to the exact location of boundaries of the Special Flood Hazard Areas or Future Conditions Flood Hazard Areas (for example, where there appears to be a conflict between a mapped boundary and actual field conditions), make the necessary interpretation. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in this ordinance.

10. When Base Flood Elevation (BFE) data has not been provided, obtain, review, and reasonably utilize any Base Flood Elevation (BFE) data, along with floodway data or non-encroachment area data available from a Federal, State, or other source, in order to administer the provisions of this ordinance.

11. When Base Flood Elevation (BFE) data is provided but no floodway nor non-encroachment area data has been provided, obtain, review, and reasonably utilize any floodway data or non-encroachment area data available from a Federal, State, or other source in order to administer the provisions of this ordinance.

12. When the lowest ground elevation of a parcel or structure located within Zone AE is above the Base Flood Elevation (BFE), advise the property owner of the option to apply for a Letter of Map Amendment (LOMA) from FEMA. Maintain a copy of the Letter of Map Amendment (LOMA) issued by FEMA in the floodplain development permit file.

13. Permanently maintain all records that pertain to the administration of this ordinance and make these records available for public inspection.

14. Make on-site inspections of work in progress. As the work pursuant to a floodplain development permit progresses, the floodplain administrator shall make as many inspections of the work as may be necessary to ensure that the work is being done according to the provisions of the local ordinance and the terms of the permit. In exercising this power, the floodplain administrator has a right, upon presentation of proper credentials, to enter on any premises within the jurisdiction of the community at any reasonable hour for the purposes of inspection or other enforcement action.

15. Issue stop-work orders as required. Whenever a building or part thereof is being constructed, reconstructed, altered, or repaired in violation of this ordinance, the floodplain administrator may order the work to be immediately stopped. The stop-work order shall be in writing and directed to the person doing the work. The stop-work order shall state the specific work to be stopped, the specific reason(s) for the stoppage, and the condition(s) under which the work may be resumed. Violation of a stop-work order constitutes a misdemeanor.

16. Revoke floodplain development permits as required. The floodplain administrator may revoke and require the return of the floodplain development permit by notifying the permit holder in writing stating the reason(s) for the revocation. Permits shall be revoked for any substantial departure from the approved application, plans, or specifications; for refusal or failure to comply with the requirements of State or local laws; or for false statements or misrepresentations made in securing the permit. Any floodplain development permit mistakenly issued in violation of an applicable State or local law may also be revoked.

17. Make periodic inspections throughout all special flood hazard areas within the jurisdiction of the community. The floodplain administrator and each member of his or her inspections department shall have a right, upon presentation of proper credentials, to enter on any premises within the territorial jurisdiction of the department at any reasonable hour for the purposes of inspection or other enforcement action.

18. Follow through with corrective procedures of Chapter 16.

19. Review, provide input, and make recommendations for variance requests.

20. Maintain a current map repository to include, but not limited to, the FIS Report, FIRM and other official flood maps and studies adopted in accordance with Section 12.4 of this ordinance, including any revisions thereto including Letters of Map Change, issued by FEMA, and to notify the State and FEMA of mapping needs.

21. Coordinate revisions to FIS reports and FIRMs, including Letters of Map Revision Based on Fill (LOMR-F) and Letters of Map Revision (LOMR).

H. To administer the stormwater management program for the town as follows:

1. To review and approve, approve with conditions, or disapprove applications for approval of plans pursuant to this ordinance.

2. To make determinations and render interpretations of this ordinance.

3. To establish application requirements and schedules for submittal and review of applications and appeals, to review and make recommendations to the Town of Wake Forest on applications for development or redevelopment approvals.

4. To enforce the provisions of this ordinance in accordance with its enforcement provisions.

5. To maintain records, maps, and official materials as relate to the adoption, amendment, enforcement, or administration of this ordinance.

6. To provide expertise and technical assistance to the Town of Wake Forest Board of Commissioners and Planning Board, upon request.

7. To designate appropriate other person(s) who shall carry out the powers and duties of the Stormwater Administrator.

8. To take any other action necessary to administer the provisions of this ordinance.

I. Such additional powers and duties as may be set forth for the Administrator elsewhere in this ordinance and other laws and regulations of the town.

14.2 BOARD OF COMMISSIONERS

14.2.1 POWERS AND DUTIES

The Town of Wake Forest's Board of Commissioners shall have the following powers and duties to be carried out in accordance with the terms of this ordinance.

A. To conduct any and all business in accordance with their Charter and North Carolina General Statutes.

B. To amend the Community Plan and other plans as necessary.

C. **UDO Decisions:** The Board of Commissioners shall render final decisions regarding the following permits types (see also Chapter 15):

1. Major Site Master Plans (15.8.2)
2. Subdivision Master Plans/TND (15.9.2)
3. Special Use Permits (15.10)
4. Designation of Historic Landmarks/Districts (15.11.1)
5. Text Amendments (15.14)
6. Map Amendments/Rezoning (15.14)
7. Conditional District (15.15)
8. Vested Right (15.16)

14.3 TECHNICAL REVIEW COMMITTEE

14.3.1 POWERS AND DUTIES

The Town of Wake Forest's Technical Review Committee shall have the following powers and duties to be carried out in accordance with the terms of this ordinance.

A. To assist in the establishment of technical requirements for all applications, including: submission schedules, size and number of drawings, type of media, etc.

B. To interpret the most appropriate construction details and standards consistent with the intent of the UDO.

C. **UDO Review:** The Technical Review Committee shall serve as the reviewing entity only for the following permit types (see also Chapter 15):

1. Minor Site Master Plan (15.8.1)
2. Major Site Master Plan (15.8.2)
3. Minor Subdivision (15.9.1)
4. Subdivision Master Plan/TND (15.9.2)
5. Final Plat (15.9.4)

D. **UDO Decisions:** The Technical Review Committee shall render final decisions regarding the following permits types (see also Chapter 15):

1. Site Construction Plans (15.8.3)
2. Subdivision Construction Plans (15.9.3)

14.3.2 MEMBERSHIP

A. The Technical Review Committee shall be chaired by the Planning Director (or their designee) and shall consist of members of technical staff and representatives of various town departments as selected by the Committee Chair on a project-by-project basis.

B. The necessary number of members needed to conduct business will be established by the Committee Chair on a project-by-project basis according to the needs of the application(s) being considered. In general, at least 3 members of the Technical Review Committee will need to be present to conduct sufficient review;

1. One planner to assess compatibility with the comprehensive plan and compliance with the UDO,

2. One engineer to assess the provision of roads and adequate stormwater infrastructure.

3. One engineer to assess the provision of adequate utilities and fire protection, and

4. If applicable, 1 representative from the City of Raleigh Public Utilities Department should also be present to assess the provision of water and sewer service.

C. Representatives from the following Departments may also serve as members of the Technical Review Committee upon request of the Committee Chair:

1. Planning and Development

2. Engineering

3. Inspections

4. Parks and Recreation

5. Public Works

6. City of Raleigh Public Utilities Department

7. Fire Department or other fire prevention representative

8. Police Department

D. In addition, the Committee Chair, or other Technical Review Committee members, may request at their discretion one staff representative and/or elected official from the following to assist in an ex-officio capacity only:

1. The Board of Commissioners

2. The Planning Board

3. The Town Attorney

4. Other Town of Wake Forest Departments

5. Wake County Board of Commissioners

6. NCDOT

7. Other NC State and/or Federal Agencies

E. In addition, at the request of the Committee Chair, applicant(s) shall attend a meeting.

14.4 PLANNING BOARD

14.4.1 POWERS AND DUTIES

The Town of Wake Forest's Planning Board shall have the following powers and duties to be carried out in accordance with the terms of this ordinance.

A. To perform studies and surveys of the present conditions and probable future development of the town and its environs, including but not limited to, studies and surveys of land uses, population, traffic, parking, annexation, expansions of extraterritorial jurisdiction, etc.

B. To formulate and recommend to the Board of Commissioners the adoption and amendment of a comprehensive plan and other plans as necessary.

C. To initiate proposals for amendments to the Unified Development Ordinance based upon the findings and recommendations delivered in such studies and adopted plans.

D. To determine whether specific proposed developments conform to the principles and requirements of the adopted comprehensive plan for growth and improvement of the town.

E. To interpret the zoning district boundaries when the street or property layout existing on the ground is at variance with that shown on the Official Zoning Map.

F. **UDO Review:** The Planning Board shall review and make recommendations regarding the following permit types (see also Chapter 15):

1. Major Site Master Plans (15.8.2)

2. Subdivision Master Plans/TND (15.9.2)

3. Special Use Permits (15.10)

4. Text Amendments (15.14)

5. Map Amendments/Rezoning (15.14)

6. Conditional District (15.15)

7. Vested Right (15.16)

G. The Planning Board shall also have any additional powers and duties as may be set forth in NCGS 160A-361 as amended, or at the direction of the Board of Commissioners.

14.4.2 MEMBERSHIP AND QUORUM

A. The Planning Board shall consist of 9 members. A quorum of 5 members shall be necessary to transact business.

B. The Wake Forest Board of Commissioners shall appoint members from a list of qualified applicants who have submitted an advisory board application. A minimum of 5 members shall reside in the corporate limits and a minimum of 1 member shall reside in the extra-territorial planning jurisdiction (ETJ). The town resident members shall be appointed by the Wake Forest Board of Commissioners and the ETJ resident members shall be appointed by the Wake County Board of Commissioners after a recommendation of the Wake Forest Board of Commissioners. The representatives of the extraterritorial area shall have equal rights, privileges, and duties with the other members of the Planning Board.

C. Vacancies shall be filled by the Wake Forest Board of Commissioners or the Wake County Board of Commissioners, as applicable, as they occur.

D. Town members shall serve 3-year terms and ETJ members shall serve 2-year terms. No member shall serve more than 2 full consecutive terms. Once a member has served 2 full consecutive terms, the member must be off the planning board for a minimum of one year before being eligible to serve again. This term limit requirement may be waived by the Board of Commissioners according to the provisions of Section 14.11. The Board of Commissioners may also remove members of appointed boards/commissions who are in violation of the attendance policy set out in Section 14.10.

E. Officers shall be elected in accordance with the adopted rules of procedure.

14.5 BOARD OF ADJUSTMENT

14.5.1 POWERS AND DUTIES

The Town of Wake Forest's Board of Adjustment shall have the following powers and duties to be carried out in accordance with the terms of this ordinance.

A. To hear and decide appeals where it is alleged by the appellant that there is error in any order, requirement, permit, decision, determination, or refusal made by the Zoning Enforcement Officer or other administrative officials in the carrying out or enforcement of any provision of this ordinance. A concurring vote of 4 members of the Board shall be necessary to reverse, wholly or partly any order, requirement, decision, permit, determination or refusal.

B. To authorize upon appeal, in specific cases, such variances from the terms of this ordinance as will not be contrary to the public interest where, owing to the special conditions, the following written findings are made:

1. That there are practical difficulties or unnecessary hardships in the way of carrying out the strict letter of the ordinance;

2. That the variance is in harmony with the general purpose and intent of the ordinance and preserves its spirit; and,

3. That the granting of the variance secures the public safety and welfare and does substantial justice.

C. **UDO Decisions:** The Board of Adjustment shall render final decisions regarding the following permit types (see also Chapter 15):

1. Appeal of Administrative Decisions (15.12)

2. Variances (15.13)

D. The Board of Adjustment shall also have any additional powers and duties as may be set forth in other laws and regulations or at the direction of the Board of Commissioners.

14.5.2 MEMBERSHIP AND QUORUM

A. The Board of Adjustment shall consist of 5 members. A quorum of 4 members shall be necessary to transact business. The Wake Forest Board of Commissioners shall appoint members from a list of qualified applicants who have submitted an advisory board application. A minimum of 3 members shall reside in the corporate limits and a minimum of 1 member shall reside in the extra-territorial planning

jurisdiction (ETJ). The town resident members shall be appointed by the Wake Forest Board of Commissioners and the ETJ resident members shall be appointed by the Wake County Board of Commissioners after a recommendation of the Wake Forest Board of Commissioners. The representatives of the extraterritorial area shall have equal rights, privileges, and duties with the other members of the Planning Board.

B. Vacancies shall be filled by the Wake Forest Board of Commissioners or the Wake County Board of Commissioners, as applicable, as they occur.

C. Town members shall serve 3-year terms and ETJ members shall serve 2-year terms. No member shall serve more than 2 full consecutive terms. Once a member has served 2 full consecutive terms, the member must be off the planning board for a minimum of one year before being eligible to serve again. This term limit requirement may be waived by the Board of Commissioners according to the provisions of Section 14.11. The Board of Commissioners may also remove members of appointed boards/commissions who are in violation of the attendance policy set out in Section 14.10.

D. Officers shall be elected in accordance with the adopted rules of procedure.

14.6 HISTORIC PRESERVATION COMMISSION

14.6.1 POWERS AND DUTIES

The Historic Preservation Commission of Wake Forest shall have the following powers and duties to be carried out in accordance with the terms of this ordinance and NCGS 160A, Article 19 Part 3C:

A. Undertake an inventory of properties of historical, pre-historical, architectural, archaeological, and/or cultural significance.

B. Recommend to the Board of Commissioners, individual buildings, structures, sites, areas, or objects within its zoning jurisdiction to be designated by ordinance as "historic landmarks", and areas within its zoning jurisdiction to be designated by ordinance as "historic districts".

C. Recommend to the Board of Commissioners that designation of any area as a historic district or part thereof, or of any building, structure, site, area, or object as a historic landmark, be revoked or removed for cause.

D. Review and act upon proposals for alteration or demolition of designated landmarks; for alteration, demolition, or new construction within historic districts; and for demolition of any historic structure within the corporate limits and extraterritorial jurisdiction of the Town of Wake Forest as described in Section 15.11.4.

E. Report violations of this ordinance or other ordinances affecting historic landmarks and properties within historic districts to the local official responsible for enforcing the ordinance.

F. Act as, establish, or designate, a group, body, or committee to give advice to owners of historic landmarks or property within a historic district concerning the treatment of the historical and visual characteristics of their property, such as gardens and landscape features, minor decorative elements, and for the informal review of major additions and new construction.

G. Conduct an educational program on historic landmarks and districts within the town and/or other topics related to historic preservation.

H. Publish information, or otherwise inform the public about any matters pertinent to its purview, duties, organization, procedures, responsibilities, functions, or requirements.

I. Cooperate with state, federal and other local governments in pursuing the purposes of this ordinance. The Board of Commissioners, or the Historic Preservation Commission when authorized by the appropriate local governing body, may contract with the State, or the United States of America, or any agency of either, or with any other organization, provided the terms are not inconsistent with state or federal law.

J. Communicate with other boards or commissions in Wake County, agencies of the County, other governmental units, or other resources to offer or request assistance, aid, guidance, or advice concerning matters under its purview or of mutual interest.

K. Prepare and recommend the official adoption of a historic preservation element as part of the town's comprehensive plan at the request of the Board of Commissioners.

L. Accept funds to be used for preservation purposes that are granted to the Historic Preservation Commission by private individuals, organizations, and governing bodies or their agencies.

M. Acquire by any lawful means the fee or any lesser included interest, including options to purchase, to any historic buildings or structures, land to which historic buildings or structures may be moved, or properties located within historic districts; hold, manage, preserve, restore and improve the interest; and exchange or dispose of the interest by public or private sale, lease, or otherwise, subject to covenants or other legally binding restrictions which will secure appropriate rights of public access and promote the preservation of the property. All lands, buildings, structures, sites, areas, or objects acquired by funds appropriated by the Board of Commissioners shall be acquired in the name of the Town of Wake Forest unless otherwise provided by the Board of Commissioners.

N. Restore, preserve and operate such historic properties.

O. Negotiate at any time with the owner of a building, structure, site, area or object for its acquisition or its preservation when such action is reasonably necessary and appropriate.

P. Take steps during the period of postponement of demolition or alteration of any historic landmark or property to ascertain what the local governing body can or may do to preserve such property including consultation with private civic groups, interested private citizens, and other public boards or agencies, and including investigation of potential acquisition by the Board of Commissioners when the preservation of a given historic property is clearly in the interest of the general welfare of the community and such property is of certain historic and architectural significance.

Q. Propose to the Board of Commissioners changes to this or any other ordinance and propose new ordinances or laws relating to historic landmarks and districts or relating to a total program for the protection and/or development of the historic resources of the Town of Wake Forest and its environs.

R. **UDO Review:** The Historic Preservation Commission shall review and make recommendations regarding the following permits types (see also Chapter 15):

1. Designation of Historic Landmarks/Districts (15.11.1)

S. **UDO Decisions:** The Historic Preservation Commission shall render final decisions regarding the following permits types (see also Chapter 15):

1. Certificates of Appropriateness Major Works (15.11.3)

2. Certificates of Appropriateness Demolition of Historic Structures (15.11.4)

T. The Historic Preservation Commission shall also have any additional powers and duties as may be set forth for in other laws and regulations or at the direction of the Board of Commissioners.

14.6.2 MEMBERSHIP AND QUORUM

A. The Wake Forest Historic Preservation Commission shall consist of 9 members. A quorum of 5 members shall be necessary to transact business.

B. The Wake Forest Board of Commissioners shall appoint all members. A majority of the members of the Commission shall have a demonstrated interest, competence, or knowledge in historic preservation.

C. All members shall reside within the jurisdiction of the Town of Wake Forest. Vacancies shall be filled by the Wake Forest Board of Commissioners as they occur.

D. The Commission may appoint one or more additional ex officio (non-voting) members as they deem appropriate. Such members are not required to live within the jurisdiction of the town.

E. All members shall serve 3 year terms. No member shall serve more than 2 full consecutive terms. Once a member has served 2 full consecutive terms, the member must be off the commission for a minimum of 1 year before being eligible to serve again. This term limit requirement may be waived by the Board of Commissioners according to the provisions of Section 14.11.

F. Officers shall be elected in accordance with the adopted rules of procedure. The Board of Commissioners may also remove members of appointed boards/commissions who are in violation of the attendance policy set out in Section 14.10.

14.7 DESIGN REVIEW BOARD

14.7.1 POWERS AND DUTIES

The Town of Wake Forest's Design Review Board shall have the following powers and duties to be carried out in accordance with the terms of this ordinance.

A. To review plans that require additional discretionary review according to the terms of the ordinance.

B. **UDO Decisions:** The Design Review Board shall render final decisions regarding the following (see also Chapter 15):

1. Major Architectural Design Review (15.8.5)

2. Appeals from staff for Minor Architectural Design Review (15.8.4.G)

C. The Design Review Board shall also have any additional powers and duties as may be set forth for in other laws and regulations or at the direction of the Board of Commissioners.

14.7.2 MEMBERSHIP AND QUORUM

A. The Wake Forest Design Review Board shall consist of 5 members. A quorum of 3 members shall be necessary to transact business.

B. The Wake Forest Board of Commissioners shall appoint all members. At least 2 members shall be from the planning or design professions, having specific training in architecture, landscape architecture, urban design, or a similar design field. To the extent practical, the board shall represent a cross section of community interests, with all members having experience, training, or a demonstrated interest in design, construction, preservation, or planning for buildings, site design, or landscaping.

C. Vacancies shall be filled by the Wake Forest Board of Commissioners as they occur.

D. All members shall serve 3-year terms. No member shall serve more than 2 full consecutive terms. Once a member has served 2 full consecutive terms, the member must be off the Design Review Board for a minimum of one year before being eligible to serve again. This term limit requirement may be waived by the Board of Commissioners according to the provisions of Section 14.11. The Board of Commissioners may also remove members of appointed boards/commissions who are in violation of the attendance policy set out in Section 14.10.

E. Officers shall be elected in accordance with the adopted rules of procedure.

14.8 MEETINGS AND GENERAL PROCEDURES

14.8.1 ALL MEETINGS TO BE OPEN

All meetings of elected or appointed bodies under this ordinance shall be open to the public in accordance with G.S. 143-318 (Meetings of Public Bodies) and shall be conducted in accordance with the procedures set forth in these regulations and rules of procedure adopted by the respective bodies and approved by the Board of Commissioners.

14.8.2 RULES OF PROCEDURE

All boards/commissions shall adopt formal rules of procedure consistent with the level of decision-making vested with that board/commission (e.g., advisory review, quasi-judicial). Any adopted rules of procedure shall be kept on file at the Planning Department and shall be made available to the public.

14.8.3 MINUTES

Accurate minutes of each meeting and any collected audio/visual recordings shall be maintained by each elected or appointed board/commission set out in this chapter, showing the vote of each member on each question, or if absent or failing to vote, indicating such fact. Each elected or appointed board/commission set out in this chapter shall keep records of its examinations and official actions. All of these minutes and records shall be filed in the office of the Town Clerk for the public record. At the discretion of the Administrator, audio/video records of each meeting will be made available through the Town of Wake Forest web site.

14.8.4 MEETINGS

A. All bodies authorized under this ordinance shall meet at regularly scheduled times and at such other times as determined by the chairman as provided for in the rules of procedure.

B. Special meetings may be called at any time by the chairperson or by request of a majority of members of the board.

14.9 STAFF

The Administrator or their designee shall serve as staff to the various boards and commissions as outlined in this chapter. In addition, the Town Attorney may provide legal and procedural assistance when requested.

14.10 ATTENDANCE POLICY

All members shall attend board/commission meetings on a regular basis. If any member does not attend at least 75% of the meetings in one calendar year, he/she may be replaced at the discretion of the Board of Commissioners. Any member of the individual boards and commissions set out in this chapter shall notify the other members of his/her respective board/commission in the event that he/she will be unable to attend.

14.11 WAIVER OF TERM LIMIT REQUIREMENTS

The Board of Commissioners may, by a majority vote, waive any of the term limit requirements for the individual boards and commissions set out in this chapter, for reasonable cause including but not limited to a lack of sufficiently qualified and willing candidates to replace outgoing term-limited members.

15 ADMINISTRATION

15.1 PURPOSE AND INTENT

In order to establish an orderly process to develop land within the jurisdiction of the Town of Wake Forest consistent with standard development practices and terminology it is the purpose of this chapter to provide a clear and comprehensible development process that is fair and equitable to all interests including the petitioners, affected neighbors, Town Staff and related agencies, and the Board of Commissioners.

15.2 GENERAL PROVISIONS & APPLICABILITY

The provisions of this chapter shall be applicable to all development activity under the jurisdiction of the Town of Wake Forest.

15.2.1 NO CONSTRUCTION TO COMMENCE WITHOUT PERMIT

No land shall be used or occupied and no structures shall be erected, moved, extended, or enlarged, nor shall any timbering, clearing and grubbing, or filling of any lot for the construction of any building be initiated until the Administrator has issued an appropriate permit which will certify that the proposed work is in conformity with the provisions of this ordinance.

15.2.2 FEES & INSPECTIONS

A. The Town of Wake Forest Board of Commissioners is authorized to establish fees to be charged by the town for the administration of the regulations in this ordinance. The town shall adopt as part of their annual budgeting process, a schedule of fees for applications and processing for permits as specified in this ordinance.

B. Agents and officials of the town are authorized to inspect land-disturbing activities to ensure compliance with this ordinance, or rules or orders adopted or issued pursuant to this ordinance, and to determine whether the measures required in approved development plans are being appropriately followed. Notice of the right to inspect shall be included in the certificate of approval of each Plan.

15.2.3 DEVELOPMENT REVIEW PROCESS

See Appendix A – Typical Development Review Process Chart for more information regarding the timing of required applications/approvals.

15.2.4 PERMIT/PROCESS TYPE

Permit/ Process Type	Section	Permit/ Process Type*	Reviewing Agency	Public Notice (15.3)	Approving Agency	Appeal Process	Permit Validity Period	Permit Extension
Development Permit	15.6.1	Administrative	Admin	N/A	Admin	BOA	1 year	1 year
Temporary Use Permit	15.6.2	Administrative	Admin	N/A	Admin	BOA	See 4.7	See 4.7
Certificate of Compliance	15.6.3	Administrative	Admin	N/A	Admin	BOA	N/A	N/A
Modification of Setbacks	15.6.4	Administrative	Admin	N/A	Admin	BOA	N/A	N/A
Tree Clearing Permit	15.7.1	Administrative	Admin	N/A	Admin	BOA	1 year	Re-submit
Land Disturbance Permit	15.7.2	Administrative	Admin	N/A	Admin	BOA	2 years	1 year
Floodplain Development Permit	15.7.3	Administrative	Admin	N/A	Admin	BOA	1 year	Re-submit
Site Master Plan (Minor)	15.8.1	Administrative	Admin/TRC	N/A	Admin	BOA	2 years	1 year
Site Master Plan (Major)	15.8.2	Quasi-Judicial	Admin/TRC, & PB	Levels 1, 2, 4 & 5	BOC	Superior Court	2 years	1 year
Site Construction Plan	15.8.3	Administrative	Admin/TRC	N/A	Admin/TRC	BOA	2 years	1 year
Architectural Design Review (Minor)	15.8.4	Administrative	Admin	N/A	Admin	DRB	1 year	N/A
Architectural Design Review (Major)	15.8.5	Quasi-Judicial	Admin	Levels 1, 2, 4 & 5	DRB	Superior Court	1 year	6 months
Subdivision (Minor)	15.9.1	Administrative	Admin/TRC	N/A	Admin	BOA	30 days to file Plat	Re-submit
Subdivision Master Plan/TND (Major)	15.9.2	Quasi-Judicial	Admin/TRC, & PB	Levels 1, 2, 4 & 5	BOC	Superior Court	2 years	1 year
Subdivision Construction Plan (Major)	15.9.3	Administrative	Admin/TRC	N/A	Admin/TRC	BOA	2 years	1 year
Final Plat (Major/Minor Subdivisions & Site Plans)	15.9.4	Administrative	Admin/TRC	N/A	Admin	BOA	30 days to file Plat	Re-submit
Special Use Permit	15.10	Quasi-Judicial	PB	Levels 1, 2, 4 & 5	BOC	Superior Court	2 years	1 year
Designation of Historic Landmarks/Districts	15.11.1	Legislative	HPC	Levels 1, 2 & 3	BOC	Superior Court	N/A	N/A
Certificate of Appropriateness – Minor Works	15.11.2	Administrative	Admin	N/A	Admin	HPC	1 year	1 year
Certificate of Appropriateness – Major Works	15.11.3	Quasi-Judicial	Admin	Levels 1 & 3	HPC	BOA	1 year	1 year
Certificate of Appropriateness – Demolition of Historic Structures	15.11.4	Quasi-Judicial	Admin	Levels 1 & 3	HPC	BOA	1 year	1 year
Appeal of Administrative Decision	15.12	Quasi-Judicial	BOA	Levels 1 & 2	BOA	Superior Court	30 days to Appeal	N/A
Variance	15.13	Quasi-Judicial	BOA	Levels 1, 2 & 4	BOA	Superior Court	30 days to Appeal	N/A
Text Amendment	15.14	Legislative	PB	Levels 1, 2 & 4	BOC	Superior Court	N/A	N/A
Map Amendment (Rezoning)	15.14	Legislative	PB	Levels 1, 2, 3 & 4	BOC	Superior Court	N/A	N/A
Conditional District	15.15	Legislative	PB	Levels 1, 2, 3 & 4	BOC	Superior Court	May be rescinded after 2 years	N/A
Vested Right	15.16	Legislative	PB	Levels 1 & 4	BOC	None	2 years or up to 5 years	N/A

Admin – Administrator (14.1) | BOC – Board of Commissioners (14.2) | TRC – Technical Review Committee (14.3) | PB – Planning Board (14.4) BOA – Board of Adjustment (14.5) |HPC – Historic Preservation Commission (14.6) | DRB – Design Review Board (14.7) | Superior Court of North Carolina

**All Legislative and Quasi-Judicial Permit/Process Types shall require a public hearing according to the provisions outlined in this chapter for each process.*

15.2.5 COMPLETENESS REVIEW

A. Sufficiency to be Determined by Administrator: All applications shall be sufficient for processing before the Administrator is required to review the application. An application shall be sufficient for processing when it contains all of the information necessary, in accordance with the appropriate development permit checklist, to decide whether or not the development as proposed will comply with the requirements of this ordinance. The Administrator will prepare and disseminate appropriate checklists for use by applicants in their submission. These checklists are part of the Wake Forest Specifications Manual and are made a part of this ordinance by reference.

B. Application Information: The presumption shall be that all of the information required in the application forms is necessary to satisfy the requirements of this section. However, it is recognized that each application is unique, and therefore more or less information may be required according to the needs of the particular case.

C. Evidence of Authority: The Administrator may require an applicant to present evidence of authority to submit the application.

D. Application Deadline: Applications sufficient for processing shall be submitted to the Administrator in accordance with the published calendar schedule. Schedules indicating submittal dates shall be developed each year and made available to the public.

15.3 PUBLIC NOTIFICATION

The following procedures have been established for development applications/petitions that require notification of the public prior to consideration and/or approval.

15.3.1 LEVEL 1 – SUNSHINE LIST

A notice of the pending application/meeting shall be posted in a prominent location in Town Hall and on the town's web site, and a notice of such meeting shall be mailed, e-mailed, or delivered to each person and media provider that has filed a written request for notice with the Town Clerk. This notice shall be posted and mailed, e-mailed, or delivered at least 48 hours before the time of the meeting. Notices shall be distributed by email. Non-media members of this list shall be charged an annual fee (as set in the fee schedule) to receive all notices by mail. Members of this distribution list must renew their participation in this distribution on an annual basis.

15.3.2 LEVEL 2 – GENERAL NOTICE IN NEWSPAPER

A notice shall be published in a newspaper of general circulation in the town once a week for 2 successive weeks. The first publication shall appear no less than 10 days or more than 25 days prior to the date fixed for the public hearing. The notice shall include the time, place and date of the hearing/meeting and include a description of the property and the nature of the proposal.

15.3.3 LEVEL 3 – NOTIFICATION TO AFFECTED PROPERTY OWNERS

A. Mailed Notice: The owners of all property affected by a pending action (e.g., new overlay district) shall be notified of the hearing/meeting by first class mail. Such notification shall be postmarked at least 10 but not more than 25 days prior to the date to the meeting at which the matter is to be heard.

B. Published Notice – Full Community Notification: As an alternative, to the mailed notice requirements in the above paragraph, the town may elect to serve notice through a full community notification for pending actions that affect at least 50 properties with at least 50 different property owners. The town shall publish notice of the hearing/meeting in a newspaper of general circulation in the town. Two advertisements shall be published in separate calendar weeks. Each advertisement shall not be less than one-half of a newspaper page in size. The advertisement shall only be effective for property owners who reside in the area of general circulation of the newspaper which publishes the notice. Property owners who reside outside of the newspaper circulation area, according to the address listed on the most recent property tax listing for the affected property, shall be notified by first class mail.

C. Posted Notice: In addition to providing mailed notice or published notice, as required in paragraphs A and B above, the applicant shall place a sign in a prominent location on the subject property(ies) or on an adjacent public street or highway right-of-way with a notice of the pending action and a phone number and email address to contact for additional information.

D. Additional Requirements for Third Party Re-Zonings: Except for a town-initiated zoning map amendment, when an application is filed to request a zoning map amendment and that application is not made by the owner of the parcel of land to which the amendment would apply, the applicant shall certify to the Board of Commissioners that the owner of the parcel of land as shown on the county tax listing has received actual notice of the proposed amendment and a copy of the notice of public hearing. The applicant shall certify that proper notice has been provided in fact, and such certificate shall be deemed conclusive in the absence of fraud. If notice cannot with due diligence be achieved by personal delivery, registered or certified mail, or by a designated delivery service authorized pursuant to 26 U.S.C. §7502(f)(2), notice may be given by publication consistent with G.S. 1A-1, Rule 4(j1). This applies only to an application to request a zoning map amendment where the application is not made by the owner of the parcel of land to which the amendment would apply.

15.3.4 LEVEL 4 – NOTIFICATION TO ADJACENT PROPERTY OWNERS

The owners of property within 100 feet on all sides of the subject property (not including street rights-of-way that are less than 100 feet in width) shall be notified of the hearing/meeting by first class mail. Such notification shall be postmarked at least 10 but not more 25 days prior to the date of the meeting at which the matter is to be heard. In addition, a sign shall be prominently posted on the subject property(ies) or on an adjacent public street or highway right-of-way with a notice of the pending action and a phone number and email address to contact for additional information.

15.3.5 LEVEL 5 – NEIGHBORHOOD MEETING

The applicant shall conduct a neighborhood meeting where required prior to any public hearing or review by an approving board or commission. This meeting will allow the applicant to explain the proposed project and to be informed of the concerns of the neighborhood. A summary of the meeting in the form of meeting notes or minutes along with a list and contact information for all attendees shall be submitted to the approving board or commission for their review at all subsequent approvals hearings. If no public hearing is required as part of the application review, the meeting summary shall be submitted to the Administrator as part of their technical review.

15.4 APPLICATION REQUIREMENTS

The following general standards for various applications have been identified as a means to create a hierarchy of submissions for various permits and procedures. It is the expressed intent of this ordinance to limit the required information to only that data/information that is necessary to render an informed decision by the reviewing agency at a particular stage. In this manner, the town has determined that it is both inappropriate and unnecessary to require a full set of architectural or engineering drawings for review by the various review and decision-making boards unless the application is such that a specific level of detail is necessary (e.g., floodplain/stormwater variance). The Application Checklists in the Manual of Specifications, Standards and Design are intended to provide further guidance to applicants as to the necessary level of detail for certain permit/process types. Permits/processes for which additional detail is included in these Application Checklists are marked with an asterisk (*) in the table below.

Permit/ Process Type	Section	Existing Conditions Map (15.4.1)	Sketch Plan (15.4.2)	Master Plan (15.4.3)	Construction Plans (15.4.4)	As-Built Drawings (15.4.5)	Final Plat (15.4.6)	Building Elevations (15.4.7)
Development Permit *	15.6.1		X*(a)*					
Temporary Use Permit	15.6.2		X*(a)*					
Certificate of Compliance	15.6.3	See Administrator						
Modification of Setbacks	15.6.4		X					
Tree Clearing Permit *	15.7.1	X*(a)*			X			
Land Disturbance Permit*	15.7.2	X			X			
Floodplain Development Permit *	15.7.3	X*(a)*			X	X		
Stormwater Permit *	15.7.4	X(a)			X	X		
Site Master Plan (Minor) *	15.8.1	X		X				
Site Master Plan (Major) *	15.8.2	X		X				
Site Construction Plan *	15.8.3	X			X	X*(a)*		
Architectural Design Review (Minor) *	15.8.4		X*(a)*					X
Architectural Design Review (Major) *	15.8.5		X*(a)*					X
Subdivision (Minor) *	15.9.1						X	
Subdivision Master Plan (Major) *	15.9.1	X	X	X				
Subdivision Construction Plan (Major) *	15.9.2	X			X	X*(a)*		
Final Plat (Major/Minor Subdivisions & Site Plans) *	15.9.3					X*(a)*	X	
Special Use Permit	15.10	X*(a)*		X				
Designation of Historic Landmarks/Districts	15.11.1		X*(a)*					
Certificate of Appropriateness (Minor Works)	15.11.2		X*(a)*					X*(a)*
Certificate of Appropriateness (Major Works)	15.11.3		X *(a)*					X *(a)*
Certificate of Appropriateness (Demolition of Historic Structures)	15.11.4		X *(a)*					
Appeal of Administrative Decision	15.12	See Administrator						
Variance	15.13	See Administrator						
Text Amendment	15.14	See Administrator						
Map Amendment (Rezoning)	15.14	See Administrator						
Conditional District	15.15	X	X*(a)*	X				
Vested Right	15.16		X*(a)*	X				

**Additional detail provided in the MSSD Application Checklists* *X - Required | X(a) - as needed*

15.4.1 EXISTING CONDITIONS MAP

An existing conditions map is intended to identify existing developed conditions and natural features including, but not limited to, the following:

A. Existing Developed Conditions of Property

1. Rights of way
2. Existing structures with built year & historical significance;
3. Cemeteries;
4. Bridges or culverts;
5. Utilities (water & sewer, drainage, storm water, electrical, cable, fiber optics, etc.);
6. Driveways & curb cuts;
7. Sidewalks, surface parking & loading areas;
8. Public and private streets with pavement width;
9. Any known contaminated soils or hazardous materials;
10. Existing & proposed easements including but not limited to, electric, water, sewer, storm, drainage, private streets, gas, or other service related easements including location, width & purpose.

B. Existing Natural Features of Property

1. Forest stands or trees of a uniform size and species;
2. Specimen trees of varying sizes and species, particularly free standing or open-grown or field grown trees;
3. Previously documented rare or protected species' habitats.
4. Riparian & watershed boundaries/buffers, wetlands, watercourses with name and direction of flow;
5. State & federal reports regarding wetlands and stream buffer delineations;
6. Special flood hazard areas;
7. Wood line & vegetation type with location of all specimen trees;
8. Soils map;
9. Existing contour lines at a minimum of 2 foot contour intervals.

C. Identification of the above features on a site prior to the advanced preparation of development plans enables the reasonable and practical planned preservation of existing and environmentally sensitive areas. This requirement provides the town and the applicant the ability to evaluate the proposed development in order to preserve vegetation, to improve the appearance of the development proposed and to encourage the use of the existing forest and tree canopy, specimen trees, and significant vegetation to satisfy the requirements of this ordinance.

15.4.2 SKETCH PLAN

The Sketch Plan shall show in simple sketch form the shape and dimensions of the lot on which the proposed building or use is to be constructed or conducted; proposed

layout of existing and proposed streets, existing or proposed lot(s) layout, building(s) location and size, nature of land use, parking areas and means of ingress/egress, environmental conditions (i.e. Special Flood Hazard, wetlands, etc.); civic spaces and other features in relation to existing conditions based upon the size of the tract proposed for development. Sketch Plans shall be reviewed as binding documents for Certificates of Unified Development Ordinance Compliance (15.6.3), but shall be used for non-binding review for all other development application processes in which a Sketch Plan is required. All plans shall be submitted at a scale not less than 1 inch = 50 feet (for Site Plans) or 1 inch = 200 feet (for Subdivisions) unless otherwise authorized by the Administrator.

15.4.3 MASTER PLAN

The Master Plan is intended to provide a detailed two-dimensional drawing that illustrates all of the required site features including buildings, parking areas, streets locations, street sections, rights-of-way, property lines and setbacks, required or proposed watercourse buffers, site landscaping and lighting (in conceptual form), and all related development calculations (e.g., density, proposed building areas, number of parking spaces, estimate impervious surface) in sufficient detail to show compliance with this ordinance. Detailed engineering drawings such as subsurface utilities (e.g., water and sewer) and on-site stormwater facilities are not required for Master Plans, except that horizontal water and sewer locations shall be indicated as required by the City of Raleigh Public Utilities Department. All plans shall be submitted at a scale not less than 1 inch = 50 feet (for Site Plans) or 1 inch = 200 feet (for Subdivisions) unless otherwise authorized by the Administrator.

15.4.4 CONSTRUCTION PLANS

Construction Plans shall constitute a full and complete set of engineered drawings necessary for final permitting and construction. All plans shall be submitted at a scale not less than 1 inch = 50 feet unless otherwise authorized by the Administrator. All streets, utilities, and stormwater, and other infrastructure systems shall be designed and constructed in accordance with the adopted Town of Wake Forest Manual of Specifications and City of Raleigh Public Utilities Department requirements where appplicable.

15.4.5 AS-BUILT DRAWINGS

The "as built" plans shall show the final design specifications for all public infrastructure. For stormwater infrastructure this shall include, but is not limited to, the as-built basin volumes, slopes, inverts and tops of stormwater pipes, manholes, catch basins, BMP's installed, and a notarized operation and maintenance agreement for BMP's. The designer of the infrastructure shall certify, under seal, that the installed infrastructure is in substantial compliance with the approved plans and designs and with the requirements of this ordinance. A final inspection and approval by the Administrator shall occur before the release of any performance securities.

15.4.6 FINAL PLAT

The final plat shall be prepared by a professional land surveyor, licensed to practice in the State of North Carolina and shall be drawn to a scale no less than 1 inch = 100 feet, and shall meet the requirements of NCGC 47-30. The final plat shall constitute an accurate survey of the entire phase as shown on the approved plan and shall include all the relevant notes and certifications.

15.4.7 BUILDING ELEVATIONS FOR DESIGN REVIEW

In order to reasonably evaluate the building, it is necessary to submit scaled drawings of each elevation visible from a public street or civic space. These drawings should be in color and should accurately represent the building heights, floor levels, and building materials. In addition, the Administrator may require up to 3 drawings from different perspectives that will show how the building fits into the context of the block.

15.5 GENERAL REQUIREMENTS FOR QUASI-JUDICIAL HEARINGS AND DECISIONS

A quasi-judicial decision is a process that involves the finding of facts regarding a specific application of an ordinance and the exercise of discretion when applying the standards of the ordinance. Quasi-judicial decisions include decisions involving variances, special use permits, and appeals of administrative determinations. In accordance with G.S. 160A-393, decisions on the approval of site plans and subdivisions are quasi-judicial in nature if the ordinance authorizes a decision-making board to approve or deny the application based on one or more generally stated standards requiring a discretionary decision on the findings of fact to be made by the decision-making board. As a result the following standard procedures shall be incorporated as appropriate.

15.5.1 STANDARDS FOR CONDUCT OF QUASI-JUDICIAL HEARINGS

A. Contact with Decision-Making Board Members: Contact with any members of a decision-making board prior to the public hearing by any individual regarding the matter is prohibited.

B. Conflicts of Interest: A member of the decision-making board shall not participate in or vote on a quasi-judicial matter in a manner that would violate affected persons' constitutional rights to an impartial decision maker. Impermissible conflicts include, but are not limited to, a member having a fixed opinion prior to hearing the matter that is not susceptible to change, a close familial, business, or other associational relationship with an affected person, or a financial interest in the outcome of the matter. If an objection is raised to a member's participation and that member does not recuse himself or herself, the remaining members shall by majority vote rule on the objection.

C. All Participants to be Sworn In: All participants in the public hearing shall be duly sworn in prior to the submission of any testimony.

D. Competent Evidence Required: All decisions shall be based on competent evidence entered in as part of the record. The term "competent evidence," as used in this subsection, shall not preclude reliance by the decision-making board on evidence that would not be admissible under the rules of evidence as applied in the trial division of the General Court of Justice if (i) the evidence was admitted without objection, or (ii) the evidence appears to be sufficiently trustworthy and was admitted under such circumstances that it was reasonable for the decision-making board to rely upon it. The term "competent evidence," as used in this subsection, shall not be deemed to include the opinion testimony of lay witnesses as to any of the following:

1. The use of property in a particular way would affect the value of other property.

2. The increase in vehicular traffic resulting from a proposed development would pose a danger to the public safety.

3. Matters about which only expert testimony would generally be admissible under the rules of evidence.

E. Cross-Examination Permitted: The cross-examination of witnesses submitting testimony shall be permitted upon request.

15.5.2 STANDARDS FOR DECISIONS

Each decision-making board under the provisions of this section shall ensure that the rights of petitioners have not been prejudiced because of the decision-making body's findings, inferences, or conclusions. In addition such decision shall not be:

A. In violation of constitutional provisions, including those protecting procedural due process rights.

B. In excess of the statutory authority conferred upon the town or the authority conferred upon the decision-making board by ordinance.

C. Inconsistent with applicable procedures specified by statute or ordinance.

D. Affected by other error of law.

E. Unsupported by substantial competent and material evidence in view of the entire record.

F. Arbitrary and capricious.

15.5.3 RECORD OF DECISION

A. The following shall become part of the official record of decision:

1. Documents and exhibits submitted to the decision-making board

2. Meeting minutes

B. Transcript of Audio/Video of Meetings: Any party may request, at their expense, a transcript of the proceedings from any recorded audio/video.

15.6 ADMINISTRATIVE PERMITS

15.6.1 DEVELOPMENT PERMIT

A development permit indicates compliance with the provisions of the unified development ordinance and shall be required for the construction or development of any new use within the land development jurisdiction of the Town of Wake Forest, and any other site improvement as indicated in the UDO. In addition to new uses, a development permit shall be required for expansions of existing uses, changes of use, any uses permitted with special conditions (Chapter 3) and any signage requiring a permit (Chapter 11).

A. Process Type: Administrative

B. Pre-Application Procedure: No meeting is required but applicants are encouraged to call or visit the Administrator prior to requesting a Development Permit to determine what information is required for the application.

C. Required Application Information: Sketch Plan (15.4.2) and any other relevant information to show compliance (may be waived by Administrator as appropriate)

D. Determination of Compliance: Once an application containing all needed elements is submitted, the Administrator shall review the application and approve or deny it based on compliance with the land development standards contained in this ordinance.

E. Public Notification: N/A

F. Appeals: Appeals of the decisions of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12.

G. Permit Validity: Upon the approval of the Development Permit, the applicant shall have one year to obtain a building permit or otherwise begin the permitted use. Failure to secure building permits for the permitted work within this time shall render the compliance void. Upon issuance of a building permit, the Development Permit shall remain valid as long as a valid building permit exists for the project. Any change to the approved plans that has not been authorized by the Administrator shall invalidate the Development Permit and any subsequent building permits.

H. Permit Extension: The Administrator may grant 2 extensions of this time period of up to 6 months upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

I. Limitation on Administrative Discretion: The Administrator has no discretion to modify any requirements found in Chapter 3.

15.6.2 TEMPORARY USE PERMIT

A Temporary Use Permit is required for uses permitted in accordance with Section 4.7 prior to the commencement of any use or activity.

A. Process Types: Administrative

B. Pre-Application Procedure: No meeting is required but applicants are encouraged to call or visit the Administrator prior to requesting a Temporary Use Permit to determine what information is required for the application.

C. Required Application Information: Sketch Plan (15.4.2) and any other relevant information to show compliance (may be waived by Administrator as appropriate)

D. Determination of Compliance: Once an application containing all needed elements is submitted, the Administrator shall review the application and approve, approve it with conditions, or deny it based on compliance with the land development standards contained in this ordinance.

E. Public Notification: N/A

F. Appeals: Appeals of the decisions of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12.

G. Permit Validity: See Section 4.7

H. Permit Extension: See Section 4.7

15.6.3 CERTIFICATE OF COMPLIANCE

Issuance of a certificate of compliance shall be required prior to the occupancy or use of any new construction and re-occupancy or re-use of any renovation/rehabilitation in the Town of Wake Forest. Certificates of compliance insure that a completed development project has complied with all the applicable requirements of this ordinance and all other applicable federal, state and local regulations. Certificates of compliance must be signed by the Administrator to certify compliance with applicable regulations.

A. Process Type: Administrative

B. Pre-Application Procedure: Not required

C. Required Application Information: None

D. Determination of Compliance: Upon receipt of the request for a certificate of compliance, the Administrator shall inspect the project site for compliance with the approved site plan or subdivision plan and the applicable standards of this ordinance. The applicant shall be notified of any deficiencies in the building(s) or site that prevents the issuance of the certificate of compliance or the certificate shall be issued.

E. Public Notification: N/A

F. Appeals: Appeals of the decisions of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12.

G. Permit Validity: N/A

H. Permit Extension: N/A

15.6.4 ADMINISTRATIVE MODIFICATION OF SETBACKS

In keeping with the purpose of these regulations to accomplish coordinated, balanced, and harmonious development in a manner which will best promote the health, safety, and general welfare while avoiding undue and unnecessary hardships, on approval by the Town Manager, the Administrator is authorized to approve certain requests for deviation from dimensional standards.

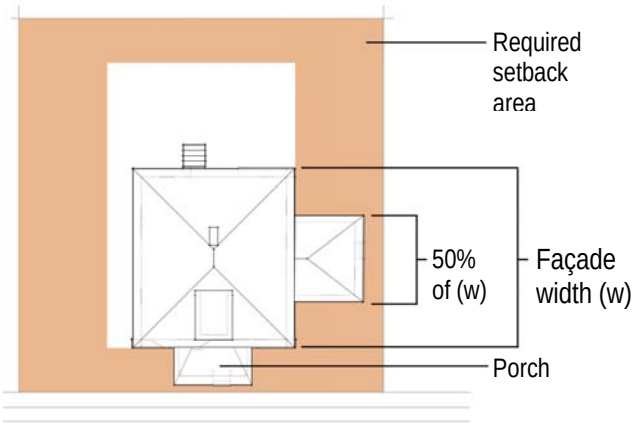
A. Process Types: Administrative

B. Pre-Application Procedure: Not required

C. Required Application Information: Sketch Plan (15.4.2) and any other relevant information to demonstrate undue and unnecessary hardship.

D. Conditions for Modification of Setbacks: Requests for deviation from required setbacks set forth in this ordinance by up to 10% of the required setbacks or 24 inches, whichever is greater, may be considered upon determination that one or more of the following conditions exists:

1. There are site or structural conditions that preclude strict adherence to the setback requirements, such as, but not limited to: the lot does not meet the dimensional standards established for the zoning district in which it is located; the lot has topographic limitations that require placement of the structure into the required setback area; or the structure is physically in line with an existing, legally established wall or walls of a principal structure already within the minimum setback area.
2. The part of the proposed structure that would encroach into the minimum setback area is less than 50% of the width of the affected building facade(s), provided the part of the structure that would encroach into a front setback shall either be open (such as a porch or screen room) or not subject to occupancy (such as a chimney).
3. The part of the proposed structure



that encroaches into the minimum setback area is necessitated by a life-safety code, flood hazard reduction, Americans with Disabilities Act standard, or other public safety code requirements.

4. The proposed structure will allow the preservation of significant existing vegetation.

5. A good faith error was made in the location of a building foundation not exceeding 1 foot due to either field construction error or survey oversight.

E. **All Decisions to be in Writing:** Prior to rendering a decision, the Administrator shall notify the Town Manager in writing of any minor deviation for approval.

F. **Administrative Authority is Permissive Only:** The authority given to the Administrator to grant such modification shall be construed to be permissive and not mandatory and the Administrator may decline to make such modification. In the event this occurs, the applicant shall have the right to submit an application to the Board of Adjustment to grant a variance to these requirements in accordance with Section 15.13. Nothing in this section shall be construed as limiting the Administrator's duties and rights under this chapter, or an applicant's right to appeal the decision of the Administrator to the Board of Adjustment.

G. **Public Notification:** N/A

H. **Appeals:** Appeals of the decisions of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12.

I. **Permit Validity:** N/A

J. **Permit Extension:** N/A

15.7 ENVIRONMENTAL PROTECTION PERMITS

15.7.1 TREE CLEARING PERMIT

Pursuant to NCGS 160A-458.5(c)(1), prior to the commencement of any vegetation clearing or removal on any undeveloped property, the owner (or authorized agent) of such property must obtain a Tree Clearing Permit or demonstrate exemption from the requirements of this section as provided for in Section 15.7.1.A, below. For the purposes of the section, "undeveloped properties" shall include any property within the town's jurisdiction that is not subject to an approved site and/or subdivision plan.

A. **Exemptions:** A Tree Clearing Permit shall not be required for the activities listed below.

1. Normal forestry activities taking place on property that is taxed under the present-use value standard or conducted pursuant to a forestry management plan prepared or approved by a forester registered pursuant to Chapter 89B of the North Carolina General Statutes, and provided such activities are accomplished in compliance with this ordinance.

2. Properties with a town-approved site and/or subdivision plan, provided such plan has not expired and that any clearing or vegetation removal is done in strict accordance with the approved site and/or subdivision plan.

3. The removal of vegetation by public or private agencies within the lines of any public street rights-of-way, utility easements, or other town property, as may be necessary to ensure public safety, to obtain clear visibility at driveways or intersections, to perform authorized field survey work, or to preserve or enhance the symmetry and beauty of such town property.

4. The town-initiated or approved removal of any vegetation which is in an unsafe condition, constitutes a nuisance or noxious weed, or which by its nature is injurious to sanitary sewers, electrical power lines, gas lines, water lines, stream or conveyance channels, or other public improvements, or vegetation which is infected with any injurious fungus, insect, or other pest.

5. The removal of vegetation on a lot of record, less than 5 acres in size and zoned and/or used for residential purposes, provided such vegetation is not a portion of a required streetyard or other required riparian or landscaping buffer.

B. Process Type: Administrative

C. Permit Required Before Any Land Disturbing Activity: No such land-disturbing activity shall take place until plans for vegetation clearing activity have been reviewed and approved in accordance with the procedures set forth below.

D. Pre-Application Procedure: Applicants are encouraged to meet with the Administrator prior to submitting an application for a Tree Clearing Permit. The purpose of this meeting is to discuss the project, the proposed design strategies, and to answer questions of the applicant regarding the application and schedules for review.

E. Required Application Information: Existing Conditions Map (15.4.1), Sketch Plan (15.4.2) (may be waived by Administrator as appropriate) & Construction Plans (15.4.4) (may be waived by Administrator as appropriate).

F. Determination of Compliance: Following submittal of the application the information shall be reviewed by the Administrator for compliance with the requirements of this ordinance. Provided the application is complete, applications shall be reviewed and acted upon by the staff and notice given the applicant within 30 days of receipt of the application.

G. Public Notification: N/A

H. Appeals: Appeals of the decision of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12 within 30 days after receipt of written notice of disapproval or conditional approval that is unsatisfactory to the applicant.

I. Permit Validity: An approved Tree Clearing Permit shall be valid for a period of not more than one year.

J. Permit Extension: Renewal of an expired Tree Clearing Permit shall require the same application procedure as the initial permit. No further development activity is to be performed until the new permit is issued. Any significant changes to the plan must be re-submitted and re-reviewed.

15.7.2 LAND DISTURBANCE PERMIT (EROSION AND SEDIMENTATION CONTROL)

A Land Disturbance Permit is required to assure that land-disturbing activity undertaken in the Town of Wake Forest does not result in accelerated erosion and sedimentation. No land-disturbing activity shall take place until plans for controlling erosion associated with the activity have been reviewed and approved in accordance with the procedures set forth below.

A. Process Type: Administrative

B. Pre-Application Procedure: Prior to applying for a land disturbance permit and submitting plans, the applicant is required to meet with the Administrator. The

purpose of this meeting is to discuss the project, the proposed land development strategies, and to answer questions of the applicant regarding the application and schedules for review.

C. Required Application Information: Existing Conditions Map (15.4.1) & Construction Plans (15.4.4)

D. Determination of Compliance: Following submittal of a soil erosion and sedimentation control plan and accompanying data, the application shall be reviewed by the Town of Wake Forest Department of Engineering for compliance with the requirements of this ordinance. Provided the plan is complete, applications shall be reviewed and acted upon by the staff and notice given the applicant within 30 days of receipt of the application. Any plan submitted for a land-disturbing activity for which the North Carolina Environmental Policy Act requires an environmental document must be deemed incomplete until a complete environmental document is available for review. The Administrator must promptly notify the person submitting the plan that the 30 day time limit for review of the plan will not begin until a complete environmental document is available for review. Denial of the application must specifically state in writing the reasons for denial. If an application has been disapproved, the applicant has 12 months to submit revised plans addressing the reasons for disapproval or the plan is deemed null and void.

E. Public Notification: N/A

F. Appeals: Appeals of the decision of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12 within 15 days after receipt of written notice of disapproval or conditional approval that is unsatisfactory to the applicant. Appeals of the decision of the Board of Adjustment may be taken to the North Carolina Sedimentation Control Commission as provided in NCGS 113A-61(c).

G. Permit Validity: When work under a land disturbance permit is not completed within 2 years following the date of issuance of the land disturbance permit, the land disturbance permit shall be deemed expired.

H. Permit Extension: Permits may be renewed in one year increments until the project is complete. The appropriate renewal fees shall apply. Any significant changes to the plan must be re-submitted and re-reviewed.

15.7.3 FLOODPLAIN DEVELOPMENT PERMITS

No approval shall be granted for construction in an area designated as a Special Flood Hazard Area by the flood insurance rate maps, as provided by the Federal Emergency Management Agency without the issuance of a floodplain development permit. Because Special Flood Hazard Areas are determined by FEMA and State requirements, if activities are permitted in Special Flood Hazard Areas at the State or Federal level, then they are exempt from the requirements of this section.

A. Process Types: Administrative

B. Permit Required Before Any Land Disturbing Activity: No such land-disturbing activity shall take place in areas designated as Special Flood Hazard areas until plans associated with the activity have been reviewed and approved in accordance with the procedures set forth below.

C. Pre-Application Procedure: Applicants are encouraged to meet with the Administrator prior to submitting an application for development in the designated flood hazard area. The purpose of this meeting is to discuss the project, the

proposed design strategies, and to answer questions of the applicant regarding the application and schedules for review.

D. Required Application Information: Existing Conditions Map (15.4.1) (may be waived by Administrator as appropriate), Construction Plans (15.4.4), & As-Built Drawings – upon completion (15.4.5)

E. Additional Information Required for Floodplain Development Permits: The following specific items/information shall be presented to the Administrator in an application for a floodplain development permit:

1. Plan Information Requirements

a. A plot plan drawn to scale which shall include, but shall not be limited to, the following specific details of the proposed floodplain development:

i. The nature, location, dimensions, and elevations of the area of development/disturbance; existing and proposed structures, utility systems, grading/pavement areas, fill materials, storage areas, drainage facilities, and other development;

ii. The boundary of the Special Flood Hazard Area or Future Conditions Flood Hazard Area as delineated on the FIRM or other flood map as determined in Section 12.4.1.C, or a statement that the entire lot is within the Special Flood Hazard Area or Future Conditions Flood Hazard Area;

iii. Flood zone(s) designation of the proposed development area as determined on the FIRM or other flood map as determined in Section 12.4.1.C;

iv. The boundary of the floodway(s) or non-encroachment area(s) as determined in Section 12.4.1.C;

v. The Base Flood Elevation (BFE) or Future Conditions Flood Elevation where provided as set forth in Section 12.4.1.C;

vi. The old and new location of any watercourse that will be altered or relocated as a result of proposed development;

vii. Certification of the plot plan by a registered land surveyor or professional engineer.

b. Proposed elevation and method thereof, of all development within a special Flood Hazard Area or Future Conditions Flood Hazard Area including but not limited to:

i. Elevation in relation to mean sea level of the proposed reference level (including basement) of all structures;

ii. Elevation in relation to mean sea level to which any non-residential structure in Zone AE, A or X (Future) will be flood-proofed; and

iii. Elevation in relation to mean sea level to which any proposed utility systems will be elevated or floodproofed;

c. If floodproofing, a Floodproofing Certificate (FEMA Form 81-65) with supporting data and an operational plan that includes, but is not limited to, installation, exercise, and maintenance of floodproofing measures.

d. A foundation plan, drawn to scale, which shall include details of the proposed foundation system to ensure all provisions of this ordinance are met. These details include but are not limited to:

i. The proposed method of elevation, if applicable (i.e., fill, solid foundation perimeter wall, solid backfilled foundation, open foundation on columns/posts/piers/piles/shear walls);

ii. Openings to facilitate equalization of hydrostatic flood forces on walls, when solid foundation perimeter walls are used in Zones A, AE and X (future);

e. Usage details of any enclosed areas below the regulatory flood protection elevation.

f. Plans and/or details for the protection of public utilities and facilities such as sewer, gas, electrical, and water systems to be located and constructed to minimize flood damage.

g. Copies of all other Local, State and Federal permits required prior to floodplain development permit issuance (Wetlands, Endangered Species, Erosion and Sedimentation Control, Riparian Buffers, Mining, etc.).

h. Documentation for placement of Recreational Vehicles and/or Temporary Structures, when applicable.

i. A description of proposed watercourse alteration or relocation, when applicable, including an engineering report on the effects of the proposed project on the flood-carrying capacity of the watercourse and the effects to properties located both upstream and downstream; and a map (if not shown on plot plan) showing the location of the proposed watercourse alteration or relocation.

2. Certification Requirements

a. Elevation Certificates

i. An Elevation Certificate (FEMA Form 81-31) is required prior to the actual start of any new construction. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of the elevation of the reference level, in relation to mean sea level. The floodplain administrator shall review the certificate data submitted. Deficiencies detected by such review shall be corrected by the permit holder prior to the beginning of construction. Failure to submit the certification or failure to make required corrections shall be cause to deny a floodplain development permit.

ii. All residential dwellings to be constructed in or within 10 feet (linear) of the Special Flood Hazard Area and Future Conditions Flood Hazard Areas will be required to have the footing pinned by a professional land surveyor prior to construction. In addition, a survey will be required at the foundation and flooring system inspection showing the elevations at the corners of the dwelling unit.

iii. A final as-built Elevation Certificate (FEMA Form 81-31) along with a final registered survey of the property is required after construction is completed and prior to Certificate of Compliance/Occupancy issuance. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of final as-built construction of the elevation of the reference level and all attendant utilities. The

floodplain administrator shall review the certificate data submitted. Deficiencies detected by such review shall be corrected by the permit holder immediately and prior to Certificate of Compliance/ Occupancy issuance. In some instances, another certification may be required to certify corrected as-built construction. Failure to submit the certification or failure to make required corrections shall be cause to withhold the issuance of a Certificate of Compliance/Occupancy.

b. **Floodproofing Certificate:** If non-residential floodproofing is used to meet the regulatory flood protection elevation requirements, a Floodproofing Certificate (FEMA Form 81-65), with supporting data and an operational plan, is required prior to the actual start of any new construction. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of the floodproofed design elevation of the reference level and all attendant utilities, in relation to mean sea level. Floodproofing certification shall be prepared by or under the direct supervision of a professional engineer or architect and certified by same. The floodplain administrator shall review the certificate data and plan. Deficiencies detected by such review shall be corrected by the applicant prior to permit approval. Failure to submit the certification or failure to make required corrections shall be cause to deny a floodplain development permit. Failure to construct in accordance with the certified design shall be cause to withhold the issuance of a Certificate of Compliance/Occupancy.

c. If a manufactured home is placed within Zone A, AE or X (Future) and the elevation of the chassis is more than 36 inches in height above grade, an engineered foundation certification is required per Section 12.4.2.B.3.

d. If a watercourse is to be altered or relocated, a description of the extent of watercourse alteration or relocation; a professional engineer's certified report on the effects of the proposed project on the flood-carrying capacity of the watercourse and the effects to properties located both upstream and downstream; and a map showing the location of the proposed watercourse alteration or relocation shall all be submitted by the permit applicant prior to issuance of a floodplain development permit.

3. **Certification Exemptions:** The following structures, if located within Zone A, AE or X (Future), are exempt from the elevation/floodproofing certification requirements specified above:

a. Recreational Vehicles meeting requirements of Section 12.4.2.B.5; and

b. Accessory Structures less than 150 square feet meeting requirements of Section 12.4.2.B.6.

F. **Determination of Compliance:** Following submittal of the application and accompanying data, the information shall be reviewed by the Administrator for compliance with the requirements of this ordinance. Provided the application is complete, applications shall be reviewed and acted upon by the staff and notice given the applicant within 30 days of receipt of the application. An approved Floodplain/Watershed Development Permit shall include the following information:

1. A description of the development to be permitted under the floodplain development permit.

2. The Special Flood Hazard Area or Future Conditions Flood Hazard Area determination for the proposed development per available data specified in Section 12.4.1.C.
3. The regulatory flood protection elevation required for the reference level and all attendant utilities.
4. The regulatory flood protection elevation required for the protection of all public utilities.
5. All certification submittal requirements with timelines.
6. A statement that no fill material or other development shall encroach into the floodway or non-encroachment area of any watercourse, as applicable.
7. The flood openings requirements, if in Zones A, AE or X (Future)

G. Public Notification: N/A (Except as required by State or Federal Agencies)

H. Appeals: Appeals of the decisions of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12.

I. Permit Validity: Floodplain development permits shall be valid for one year. Failure to initiate construction, or otherwise begin the permitted use, within this time period shall render the permit void.

J. Permit Extension: Renewal of an expired floodplain development permit shall require the same application procedure as the initial permit. No further development activity is to be performed until the new permit is issued.

15.8 SITE PLANS/DESIGN REVIEW

15.8.1 SITE MASTER PLAN (MINOR)

A. Applicability: The Minor Site Plan process shall apply to development applications which include less than 100 residential dwelling units and which do not require an Enhanced Transportation Impact Analysis according to Section 6.11.1.

B. Process Type: Administrative.

C. Pre-Application Procedure: No meeting is required, but applicants are encouraged to call or visit the Administrator to determine what information is required for the application.

D. Required Application Information: Existing Conditions Map (15.4.1) & Master Plan (15.4.3).

E. Determination of Compliance: Once an application is deemed complete by the Administrator, the Administrator and Technical Review Committee shall review the application and approve, deny, or approve with conditions the Minor Site Plan based on compliance with the standards contained in this ordinance. All decisions shall be in writing. Following an approval or approval with conditions, the applicant shall be directed to proceed to the preparation of a Site Construction Plan (15.8.2). If the Administrator disapproves or approves conditionally the plan, the reasons for such action shall be stated in writing by the Administrator, and the applicant may make changes and submit a revised plan for consideration in accordance with the procedures set forth in this section.

F. Public Notification: None required.

G. Appeals: Appeals of the decisions of the Administrator or TRC shall be heard by the Board of Adjustment in accordance with Section 15.12.

H. Permit Validity: Approval of a Site Master Plan shall be valid for 2 years from the date of approval. A Site Construction Plan shall be presented for approval prior to the end of this 2 year period.

I. Permit Extension: The Administrator may grant a single extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant. If an extension is denied, or a Site Construction Plan is not presented for approval within a granted extension period, the applicant may reapply for a Site Master Plan using the same process as if the application was being considered for the first time.

15.8.2 SITE MASTER PLAN (MAJOR)

A. Applicability: The Major Site Plan process shall apply to all development applications which include 100 or more residential dwelling units and to all development applications which require an Enhanced Transportation Impact Analysis according to Section 6.11.

B. Process Type: Quasi-Judicial (See also 15.5)

C. Permit Required Before Any Land Disturbing Activity: No such land-disturbing activity shall take place until a Site Master Plan has been approved.

D. Pre-Application Procedure: It is required that every applicant for a Site Master Plan permit meet with the Administrator in a conference prior to the submittal of an application. The purpose of this conference is to provide clarification and assistance in the preparation and submission of plans for approval. It is recommended that the applicant provide a Sketch Plan (15.4.2) to the Administrator prior to or at the pre-application conference. The provision of a sketch plan will allow the Administrator an opportunity to review the proposal before the applicant expends funds on the preparation of a detailed Site Master Plan.

E. Required Application Information: Existing Conditions Map (15.4.1) & Master Plan (15.4.3).

F. Determination of Compliance: The Technical Review Committee shall review the plan to ensure that it is complete. The Administrator shall prepare a report and recommendation on the application, and schedule the matter for a joint public hearing before the Planning Board and Board of Commissioners at the next available, regularly scheduled meeting.

G. Public Notification: Level 1, 2, 4 & 5 required.

H. Public Hearing: The Planning Board and Board of Commissioners shall hold a joint public hearing on the proposal. The applicant and other property owners likely to be affected by the application shall be given an opportunity to be heard.

I. Delivery of Planning Board Recommendation: If the Planning Board is able to reach a recommendation without further deliberation, the Planning Board shall submit a recommendation on the matter and refer it to the Board of Commissioners for their consideration at their regularly scheduled meeting directly following the public hearing. If the Planning Board determines that further deliberation on the matter is required, the Planning Board shall deliver its recommendation to the Board of Commissioners within 45 days of its first

consideration on the matter. If no recommendation is received from the Planning Board within 45 days of it first consideration on the matter, the Board of Commissioners shall proceed in its consideration of the matter without a recommendation from the Planning Board.

J. Decisions/Findings of Fact: The Board of Commissioners shall approve, deny or approve with conditions the Site Master Plan. No Site Master Plan approval shall be granted unless it complies with the following findings of fact:

1. The plan is consistent with the adopted plans and policies of the town;
2. The plan complies with all applicable requirements of this ordinance;
3. There exists adequate infrastructure (transportation and utilities) to support the plan as proposed; and
4. The application will not be detrimental to the use or development of adjacent properties or other neighborhood uses.

K. Review Period: The Board of Commissioners shall take action (approve, deny, or approve with conditions) within 65 days of the delivery of the Planning Board recommendation. Should the Board of Commissioners fail to act on the Site Master Plan within the prescribed period, the application shall be considered approved.

L. Decisions: If the Board of Commissioners approves the Site Master Plan, the applicant will be directed to proceed to the preparation of a Site Construction Plan (15.8.2). If the Board of Commissioners disapproves or approves conditionally the plan, the reasons for such action shall be stated in writing by the Administrator and entered in the records of the Board, and the applicant may make changes and submit a revised plan for consideration in accordance with the procedures set forth in this section.

M. Appeals: An appeal from the decision of the Board of Commissioners regarding a Site Master Plan may be made by an aggrieved party and shall be made to the Superior Court of Wake County in the nature of certiorari. Any such petition shall be filed with the clerk of the superior court within 30 days after the decision of the Board is filed with the Town Clerk, or after a written copy thereof is delivered to every aggrieved party who has filed a written request for such copy with the secretary or chairman of the Board at the time of its hearing of the case, whichever is later. The decision of the Board may be delivered to the aggrieved party either by personal service or by registered mail or certified mail return receipt requested.

N. Permit Validity: Approval of a Site Master Plan shall be valid for 2 years from the date of approval. A Site Construction Plan shall be presented for approval prior to the end of this 2 year period.

O. Permit Extension: The Board of Commissioners may grant a single extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant. If an extension is denied, or a Site Construction Plan is not presented for approval within a granted extension period, the applicant may reapply for a Site Master Plan using the same process as if the application was being considered for the first time.

15.8.3 SITE CONSTRUCTION PLAN

A. Process Type: Administrative

B. Pre-Application Procedure: No meeting is required but applicants are encouraged to call or visit the Administrator to determine what information is required for the application.

C. Required Application Information: Existing Conditions Map (15.4.1), Construction Plans (15.4.4) & As-Built Drawings (15.4.5) (may be waived by Administrator as appropriate).

D. Determination of Compliance: The Site Construction Plan shall be reviewed by the Technical Review Committee for compliance with the requirements of this chapter and for conformity with the approved Site Master Plan, if applicable. Provided the application is complete, applications shall be reviewed by the committee and written review comments will be given to the applicant within 45 days of receipt of the Site Construction Plan.

E. Public Notification: N/A

F. Appeals: Appeals of decisions of a member of the Technical Review Committee shall be heard by the Board of Adjustment in accordance with Section 15.12. An appeal must be made in writing by the applicant within 30 days of the receipt of the committee member's comments.

G. Permit Validity: Approval of a Site Construction Plan shall be valid for 2 years from the date of approval. A Final Plat (See Section 15.9.4) shall be recorded prior to the end of this 2 year period.

H. Permit Extension: The Administrator may grant a single extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.8.4 ARCHITECTURAL DESIGN REVIEW (MINOR)

A. Applicability: Any application not reviewed by the Design Review Board, as outlined in Section 15.8.5.A, will be reviewed by the Administrator for architectural design compliance with the standards of this ordinance.

B. Process Types: Administrative

C. Pre-Application Procedure: No meeting is required but applicants are encouraged to call or visit the Administrator to determine what information is required for the application.

D. Required Application Information: Sketch Plan (15.4.2) (may be waived by Administrator as appropriate) & Building Elevations for Design Review (15.4.7).

E. Determination of Compliance: Once an application containing all needed elements is submitted, the Administrator shall review the application and approve or deny it based on compliance with the land development standards contained in this ordinance.

F. Public Notification: N/A

G. Appeals: Appeals of the decisions of the Administrator shall be heard by the Design Review Board in accordance with the procedures set out for Major Architectural Design Review in Section 15.8.5.A through 15.8.5.L.

H. Permit Validity: Upon the approval of the application, the applicant shall have one year to obtain a building permit. Failure to secure building permits within this time

shall render the compliance void. Any change to the approved plans that has not been authorized by the Administrator shall invalidate the approval and any subsequent building permits.

I. Permit Extension: N/A.

15.8.5 ARCHITECTURAL DESIGN REVIEW (MAJOR)

A. Applicability: The Major Architectural Design Review process shall apply to the following:

1. RA-HC District: All development 6,000 square feet or greater in gross floor area (not in a Historic Overlay District – already covered by 15.11);
2. All Districts Except RA-HC: Non-residential development or expansion 10,000 square feet or greater in gross floor area;
3. All mixed-use or non-residential projects in the UR, RMX, NMX, or UMX Districts;
4. All projects involving civic/institutional building types according to the provisions of Section 5.4;
5. Multifamily developments containing 8 or more units; and
6. Appeals from a decision of the Administrator in a Minor Architectural Design Review.

B. Process Types: Quasi-Judicial (See also 15.5)

C. Pre-Application Procedure: No meeting is required but applicants are encouraged to call or visit the Administrator to determine what information is required for the application.

D. Required Application Information: Sketch Plan (15.4.2) (may be waived by Administrator as appropriate) & Building Elevations for Design Review (15.4.7)

E. Determination of Compliance: The Administrator shall review the application to ensure that it is complete, prepare a report and recommendation on the application, and schedule the matter for a public hearing before the Design Review Board.

F. Public Notification: Levels 1, 2 & 4 required. Level 5 optional.

G. Public Hearing: The Design Review Board shall hold a hearing on the proposal. The applicant and other property owners likely to be materially affected by the application shall be given an opportunity to be heard.

H. Decisions/Findings of Fact: Following the public hearing the Design Review Board may approve, deny or approve with conditions the application. The application shall not be approved unless it complies with the following findings of fact:

1. The plan is consistent with the adopted plans and policies of the town;
2. The plan complies with all applicable requirements of this ordinance;
3. There exists adequate infrastructure (transportation and utilities) to support the plan as proposed;
4. The proposed plan conforms to the character of the neighborhood, considering the location, type and height of buildings or structures and the type and extent of landscaping on the site; and

5. The application will not be detrimental to the use or development of adjacent properties or other neighborhood uses.

I. **Review Period by Design Review Board:** Applications for Major Design Review shall be acted upon (approved, approved with conditions or denied) within 65 days after a complete application is submitted, otherwise the application shall be deemed approved and a permit shall be issued. An extension of time may be granted by mutual consent of the Design Review Board and the applicant.

J. **Appeals:** An appeal from the decision of the Design Review Board regarding a Major Design Review application may be made by an aggrieved party and shall be made to the Superior Court of Wake County in the nature of certiorari. Any such petition shall be filed with the clerk of the superior court within 30 days after the decision of the Board is filed with the Town Clerk, or after a written copy thereof is delivered to every aggrieved party who has filed a written request for such copy with the secretary or chairman of the Board at the time of its hearing of the case, whichever is later. The decision of the Board may be delivered to the aggrieved party either by personal service or by registered mail or certified mail return receipt requested.

K. **Permit Validity:** Upon the approval of the application, the applicant shall have one year to obtain a building permit. Failure to secure building permits for the permitted work within this time shall render the compliance void.

L. **Permit Extension:** The Administrator may grant a single extension of this time period of up to 6 months upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.9 SUBDIVISIONS

15.9.1 SUBDIVISION (MINOR)

A. **Applicability:** The minor subdivision review process is required for those divisions of land into 3 or fewer lots which do not require dedication of public utilities and/or public streets (See Chapter 6: Subdivision and Infrastructure Standards). No more than 2 minor subdivisions of the same parent tract may be accepted for processing or approval as a minor subdivision within any 5 year period. Lots created as a result of a minor subdivision approval shall not be subdivided again through a minor subdivision process for a period of 5 years from the date of approval. Such re-subdivisions must go through the major subdivision process as outlined in Sections 15.9.2 through 15.9.4.

B. **Process Types:** Administrative

C. **Pre-Application Procedure:** It is required that every applicant for a Minor Subdivision meet with the Administrator prior to the submittal of an application. The purpose of this meeting is to provide clarification and assistance in the preparation and submission of plats for approval. It is recommended that the applicant provide a Sketch Plan (15.4.2) to the Administrator prior to or at the pre-application meeting. The provision of a sketch plan will allow the Administrator an opportunity to review the proposal before the applicant expends funds on the preparation of a detailed Minor Subdivision Plan.

D. **Required Application Information:** Final Plat (15.4.6) by a professional land surveyor

E. Determination of Compliance: Once an application is submitted and deemed complete, the Administrator shall review the application and approve or deny it based on compliance with the land development standards contained in this ordinance within 30 working days of its submittal.

F. Public Notification: N/A

G. Appeals: Appeals of the decisions of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12. An appeal must be made in writing by the applicant within 30 days of the receipt of the Administrator's decision.

H. Permit Validity: Upon approval of a plat for a Minor Subdivision, said plat shall be signed in the appropriate place by the Administrator and the owner(s). Minor subdivision plats that have been granted approval shall be recorded within 30 days following approval or the approval becomes invalid. A plat for minor subdivision must be recorded in the office of the Register of Deeds of Wake County.

I. Permit Extension: N/A

15.9.2 SUBDIVISION MASTER PLAN/TND (MAJOR)

A. Applicability: The Subdivision Master Plan review process is required for those divisions of land into 4 or more lots, or which require dedication of public utilities and/or public streets (See Chapter 6: Subdivision and Infrastructure Standards).

B. Process Types: Quasi-Judicial (See also 15.5)

C. Permit Required Before Any Land Disturbing Activity: No such land-disturbing activity shall take place until a Subdivision Master Plan has been approved.

D. Pre-Application Procedure: It is required that every applicant for a Subdivision Master Plan permit meet with the Administrator prior to the submittal of an application. The purpose of this meeting is to provide clarification and assistance in the preparation and submission of plats for approval. It is required that the applicant provide a Sketch Plan (15.4.2) to the Administrator at least 7 days prior to or at the pre-application meeting.

E. Required Application Information: Existing Conditions Map (15.4.1), Sketch Plan (15.4.2) & Master Plan (15.4.3).

F. Determination of Compliance: The Technical Review Committee shall review the plan to ensure that it is complete. The Administrator shall prepare a report and recommendation on the application, and schedule the matter for a joint public hearing before the Planning Board and Board of Commissioners at the next available, regularly scheduled meeting.

G. Public Notification: Level 1, 2, 4 & 5 required.

H. Public Hearing: The Planning Board and Board of Commissioners shall hold a joint public hearing on the proposal. The applicant and other property owners likely to be materially affected by the application shall be given an opportunity to be heard.

I. Delivery of Planning Board Recommendation: If the Planning Board is able to reach a recommendation without further deliberation, the Planning Board shall submit a recommendation on the matter and refer it to the Board of Commissioners for their consideration at their regularly scheduled meeting directly following the public hearing. If the Planning Board determines that further

deliberation on the matter is required, the Planning Board shall deliver its recommendation to the Board of Commissioners within 45 days of its first consideration on the matter. If no recommendation is received from the Planning Board within 45 days of it first consideration on the matter, the Board of Commissioners shall proceed in its consideration of the matter without a recommendation from the Planning Board.

J. Decisions/Findings of Fact: The Board of Commissioners shall approve, deny or approve with conditions the Subdivision Master Plan. No Subdivision Master Plan approval shall be granted unless it complies with the following findings of fact:

1. The plan is consistent with the adopted plans and policies of the town;
2. The plan complies with all applicable requirements of this ordinance;
3. There exists adequate infrastructure (transportation and utilities) to support the plan as proposed; and
4. The application will not be detrimental to the use or development of adjacent properties or other neighborhood uses.

K. Review Period: The Board of Commissioners shall take action (approve, deny, or approve with conditions) within 65 days of the delivery of the Planning Board recommendation. Should the Board of Commissioners fail to act on the Subdivision Master Plan within the prescribed period, the application shall be considered approved.

L. Decisions: If the Board of Commissioners approves the Subdivision Master Plan, the applicant will be directed to proceed to the preparation of a Subdivision Construction Plan (15.8.2). If the Board of Commissioners disapproves or approves conditionally the plan, the reasons for such action shall be stated in writing by the Administrator and entered in the records of the Board, and the applicant may make changes and submit a revised plan for consideration in accordance with the procedures set forth in this section.

M. Appeals: An appeal from the decision of the Board of Commissioners regarding a Subdivision Master Plan may be made by an aggrieved party and shall be made to the Superior Court of Wake County in the nature of certiorari. Any such petition shall be filed with the clerk of the superior court within 30 days after the decision of the Board is filed with the Town Clerk, or after a written copy thereof is delivered to every aggrieved party who has filed a written request for such copy with the secretary or chairman of the Board at the time of its hearing of the case, whichever is later. The decision of the Board may be delivered to the aggrieved party either by personal service or by registered mail or certified mail return receipt requested.

N. Permit Validity: Approval of a Subdivision Master Plan shall be valid for 2 years from the date of approval. Subdivisions may be phased according to a schedule established by the applicant. If the approved Subdivision Master Plan provides for multiple phases within the subdivision, a Subdivision Construction Plan approval for any one phase shall extend the Subdivision Master Plan approval for all other phases for a period of 2 years from the date of the Subdivision Construction Plan approval for that phase. If a Subdivision Construction Plan approval has not been obtained prior to the end of this 2 year period, the Subdivision Master Plan approval shall become void.

O. Permit Extension: The Board of Commissioners may grant a single extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited

to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.9.3 SUBDIVISION CONSTRUCTION PLAN (MAJOR)

A. Process Type: Administrative

B. Pre-Application Procedure: No meeting is required but applicants are encouraged to call or visit the Administrator to determine what information is required for the application.

C. Required Application Information: Existing Conditions Map (15.4.1) & Construction Plans (15.4.4)

D. Determination of Compliance: The Subdivision Construction Plan shall be reviewed by the Technical Review Committee for compliance with the requirements of this chapter and for conformity with the approved Subdivision Master Plan. Provided the application is complete, applications shall be reviewed and acted upon by the committee and notice given the applicant within 30 days of receipt of the Final Plat

E. Public Notification: N/A

F. Appeals: Appeals of a decision of a member of the Technical Review Committee shall be heard by the Board of Adjustment in accordance with Section 15.12. An appeal must be made in writing by the applicant within 30 days of the receipt of the committee's decision.

G. Phasing: Subdivision Construction Plans for phased subdivisions shall be reviewed and recorded individually in accordance with the schedule presented by the applicant during the Subdivision Master Plan approval.

H. Permit Validity: Approval of a Subdivision Construction Plan shall be valid for 2 years from the date of approval. A Final Plat shall be recorded prior to the end of this 2-year period.

I. Permit Extension: The Administrator may grant a single extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.9.4 FINAL PLAT (MAJOR/MINOR SUBDIVISIONS & SITE PLANS)

A. Process Types: Administrative

B. Improvements to Be Installed or Guaranteed: All required infrastructure improvements shall be either installed or financially guaranteed in accordance with Section 6.12.

C. As-Builts Required: Upon completion of a project, and before a Final Plat shall be approved (unless financially guaranteed), the applicant shall certify that the completed project is in substantial accordance with the approved plans and designs, and shall submit actual "as built" plans (15.4.5) for all public infrastructure after final construction is completed.

D. Required Application Information: As-Built Drawings (15.4.5) & Final Plat (15.4.6) by a professional land surveyor.

E. Determination of Compliance: The Final Plat shall be reviewed by the Administrator for compliance with the requirements of this chapter and, in the case of major subdivisions, for conformity with the approved Subdivision Construction Plan. Provided the application is complete, applications shall be reviewed and acted upon by the committee and notice given the applicant within 30 days of receipt of the Final Plat. If the Administrator has not completed review in this time period, the applicant may seek final approval from the Board of Commissioners at their next meeting.

F. Public Notification: N/A

G. Appeals: Appeals of the decisions of the Administrator shall be heard by the Board of Adjustment in accordance with Section 15.12. An appeal must be made in writing by the applicant within 30 days of the receipt of the Administrator's decision.

H. Effect of Approval: The approval of a Final Plat does not constitute acceptance for maintenance or other purposes of improvements in rights-of-way, such as utility lines, street paving, drainage facilities or sidewalks. Such improvements, when located within the corporate limits of the Town of Wake Forest, may be accepted only by action of the town following inspection and approval. Land designated as public open space or a park on a plat shall be considered to be offered for dedication, but not accepted until the Board of Commissioners has by expressed action done so.

I. Phasing: Final plats for phased subdivisions shall be recorded in accordance with the schedule presented by the applicant during the Subdivision Construction Plan approval.

J. Permit Validity: Final plats that have been granted approval must be recorded within 30 days following approval or the approval becomes invalid. No lots in a subdivision shall be sold prior to approval by the town and recording of the Final Plat for the subdivision.

K. Permit Extension: None.

15.10 SPECIAL USE PERMITS (SUP)

Special uses are land uses that are generally compatible with the land uses permitted by right in a zoning district, but which require individual review of their location, design, and configuration so as to evaluate the potential for adverse impacts on adjacent property and uses. Special uses ensure the appropriateness of the use at a particular location within a given zoning district. Applications requiring a Special Use Permit are noted in Section 2.3 & Chapter 3.

15.10.1 APPLICATION PROCEDURES

A. Process Type: Quasi-Judicial (See also 15.5)

B. Pre-Application Meeting: Every applicant for a Special Use Permit is required to meet with the Administrator in a pre-application conference prior to the submittal of a formal application. The purposes of this conference are to provide additional information regarding the review process and assistance in the preparation of the application.

C. Required Application Information: An application for a Special Use Permit may be filed by the owner of the property or by an agent specifically authorized by the owner to file such application. Each application for a Special Use Permit shall contain, at a minimum, an Existing Conditions Map (15.4.1) (may be waived by Administrator as appropriate) and Master Plan (15.4.3). Other information necessary to show that the use or structure complies with the standards set forth in this ordinance shall also be provided.

D. Determination of Compliance: The Administrator shall review the application to ensure that it is complete, prepare a report and recommendation on the application, and schedule the matter for a public hearing before the Planning Board.

15.10.2 REVIEW BY PLANNING BOARD

A. Public Notification (Prior to Planning Board): Level 1, 2, 4 & 5 required.

B. Review by Planning Board: The Planning Board shall conduct a public hearing, either jointly with the Board of Commissioners or in a separate hearing. The applicant and other property owners likely to be materially affected by the application shall be given an opportunity to be heard. Following the hearing, the Planning Board shall make a recommendation to the Board of Commissioners regarding whether to approve, deny or approve with conditions the Special Use Permit.

C. Delivery of Planning Board Recommendation: If the Planning Board is able to reach a recommendation without further deliberation, the Planning Board shall submit a recommendation on the matter and refer it to the Board of Commissioners for their consideration at their regularly scheduled meeting directly following the public hearing. If the Planning Board determines that further deliberation on the matter is required, the Planning Board shall deliver its recommendation to the Board of Commissioners within 45 days of its first consideration on the matter. If no recommendation is received from the Planning Board within 45 days of it first consideration on the matter, the Board of Commissioners shall proceed in its consideration of the matter without a recommendation from the Planning Board.

15.10.3 CONSIDERATION BY BOARD OF COMMISSIONERS

A. Public Notification: If a separate public hearing is held for the Board of Commissioners to receive the Planning Board recommendation and/or deliberate on the Special Use Permit application, the same public notification procedures shall be followed as are required for the Planning Board hearing on the matter. (See Section 15.10.2.A)

B. Consideration by the Board of Commissioners: Following receipt of a recommendation from the Planning Board, or after 45 days from the Planning Board hearing if no recommendation is received, the Board of Commissioners shall conduct a public hearing on the matter. Upon reviewing all of the pertinent information, the Board of Commissioners may approve, deny or approve with conditions the Special Use Permit.

C. Review Period: The Board of Commissioners shall take action (approve, deny, or approve with conditions) within 65 days of the public hearing on the matter. Should the Board of Commissioners fail to act on the Special Use Permit application within the prescribed period, the application shall be considered approved.

D. Findings of Fact: In addition to determining that the application meets all other requirements of this ordinance (no variances are permitted) the Board of Commissioners must find the following in order to grant approval of a Special Use Permit:

1. The proposed special use conforms to the character of the neighborhood, considering the location, type and height of buildings or structures and the type and extent of landscaping on the site.
2. The proposed use will not cause undue traffic congestion or create a traffic hazard.
3. Adequate utilities (water, sewer, drainage, electric, etc.) are available for the proposed use.
4. The proposed use shall not be noxious or offensive by reason of vibration, noise, odor, dust, smoke or gas.
5. The establishment of the proposed use shall not impede the orderly development and improvement of surrounding property.
6. The establishment, maintenance or operation of the proposed use shall not be detrimental to or endanger the public health, safety or general welfare.
7. The application will not substantially injure the value of adjoining or abutting property.
8. The proposed use is consistent with the officially adopted plans and policies of the town.

D. Additional Standards for Special Uses in Floodplain Hazard Areas: Applications for Special Use Permits in the Special Flood Hazard Areas and Future Conditions Flood Hazard Areas shall be subject to the following additional standards of review:

1. The Board of Commissioners shall determine the specific flood or erosion hazard of the site and shall evaluate the suitability of the proposed use in relation to the flood hazard.
2. In passing upon such applications, the Board of Commissioners shall consider all technical evaluations, all relevant factors, all standards specified in other sections of this ordinance and:
   - **a.** The danger that material may be swept onto other lands to the injury of others.
   - **b.** The danger to life and property due to flooding or erosion damage.
   - **c.** The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions
   - **d.** The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.
   - **e.** The importance of the services provided by the proposed facility to the community.
   - **f.** The necessity to the facility of a waterfront location, where applicable.
   - **g.** The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

h. The compatibility for the proposed use with existing development anticipated in the foreseeable future.

i. The relationship of the proposed use to the comprehensive plan and floodplain management program for that area.

j. The safety of access to the property in times of flood for ordinary and emergency vehicles.

k. The expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site.

l. The costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, and streets and bridges.

E. Additional Conditions: The Board of Commissioners may place conditions on the use as part of the approval to assure that mitigation measures are associated with the use. The conditions shall become part of the Special Use Permit approval and shall be included in the final site plan application.

15.10.4 EFFECT OF DECISIONS

A. Appeals: An appeal from the decision of the Board of Commissioners regarding a Special Use Permit application may be made by an aggrieved party and shall be made to the Superior Court of Wake County in the nature of certiorari. Any such petition shall be filed with the clerk of the superior court within 30 days after the decision of the Board is filed with the Town Clerk, or after a written copy thereof is delivered to every aggrieved party who has filed a written request for such copy with the secretary or chairman of the Board at the time of its hearing of the case, whichever is later. The decision of the Board may be delivered to the aggrieved party either by personal service or by registered mail or certified mail return receipt requested.

B. Permit Validity: Special Uses that have been granted approval must begin site development within 2 years following approval or the approval becomes invalid..

C. Permit Extension: The Board of Commissioners may grant 1 extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.11 HISTORIC PRESERVATION

The historical heritage of the Town of Wake Forest is a valuable and important asset. By listing and regulating historic districts and landmarks, acquiring historic properties, and imposing delays in the demolition of historic structures, the Town of Wake Forest seeks:

- To safeguard the heritage of the town by preserving districts and landmarks therein that embody important elements of its culture, history, architectural history, or pre-history; and

- To promote the use and conservation of such districts and landmarks for the education, pleasure, and enrichment of the residents of the town, the County and the State as a whole; and
- To preserve property values and promote the general welfare of its citizens.

15.11.1 DESIGNATION OF HISTORIC LANDMARKS/HISTORIC DISTRICTS

Upon complying with the required designation procedures set forth herein, the Board of Commissioners may adopt and from time to time amend or repeal an ordinance designating one or more local historic landmarks and/or districts. No property shall be recommended for designation as a landmark or included in a historic district unless it is deemed and found by the Historic Preservation Commission to be of special significance in terms of its historical, pre-historical, architectural or cultural importance, and to possess integrity of design, setting, workmanship, materials, feeling and/or association.

A. Process Type: Legislative.

B. Inventory of Possible Landmarks: As a guide for the identification and evaluation of landmarks, the Historic Preservation Commission shall maintain an inventory of properties of historical, architectural, pre-historical and cultural significance within the land development jurisdiction of the town.

C. Applicants: An application for the designation of property or properties as a historic landmark or district may be submitted by any of the following:

1. The Historic Preservation Commission,
2. The Board of Commissioners,
3. The Planning Board,
4. The Planning Department, and/or
5. Any resident within the land use jurisdiction of the town.

D. Required Application Information: Each application for designation as a historic landmark or district shall contain, at a minimum a Sketch Plan (15.4.2) that describes the boundaries of the proposed landmark or district and its particular historical, pre-historical, architectural or cultural significance.

E. Opportunity for Comment from the North Carolina State Historic Preservation Office (SHPO)

1. Once a complete application is submitted, the Administrator shall prepare a report on the historic, architectural, pre-historical, educational or cultural significance of each building, structure, site, area or object proposed for designation or acquisition. Such report and application shall be forwarded to the State Historic Preservation Office.
2. The State Historic Preservation Office shall be given an opportunity to review and comment upon the substance and effect of the designation of any landmark. All comments will be provided in writing. If the State Historic Preservation Office does not submit its comments to the Historic Preservation Commission within 30 days following receipt by the department of the report, the Historic Preservation Commission and the Board of Commissioners shall be relieved of any responsibility to consider such comments.

F. Creation of Ordinance for Designation

1. Once a potential landmark or district has been identified, the Administrator shall draft an ordinance for the designation of said property as an official local historic landmark or district.
2. The ordinance shall describe the property designated in the ordinance, the name or names of the owner or owners of the property, those elements of the property that are integral to its historical, architectural or pre-historical value, including the land area of the property so designated and any other information the governing board deems necessary.

G. Public Notification: Level 1, 2 &3 required. Level 5 optional.

H. Public Hearing and Decision by the Board of Commissioners: The Historic Preservation Commission and the Board of Commissioners shall hold a joint public hearing (or separate public hearings) on the proposed ordinance. Following the public hearing(s), the Board of Commissioners may adopt the ordinance as proposed, adopt the ordinance with any amendments it deems necessary, or reject the proposed ordinance.

I. Post-Adoption Procedures

1. Upon adoption of the ordinance the owners and occupants of each landmark shall be given written notification of such designation insofar as reasonable diligence permits.
2. One copy of the ordinance and all amendments thereto shall be filed by the applicant in the offices of the Register of Deeds and the Tax Supervisor of Wake County.
3. A second copy of the ordinance and all amendments thereto shall be kept on file in the office of the Town Clerk and be made available for public inspection at any reasonable time.
4. A third copy of the ordinance and any amendments thereto shall be given to the building inspector for the town.
5. The fact that a building, structure, site or area has been designated a landmark shall be clearly indicated on all tax maps maintained by Wake County for such period as the designation remains in effect.
6. The designation and any recorded restrictions upon the property limiting its use for preservation purposes shall be considered by the tax supervisor in appraising it for tax purposes.
7. A suitable sign for each property designated as a landmark may be placed on the property at the owner's consent; otherwise, a sign may be placed on a nearby right-of-way.

15.11.2 CERTIFICATE OF APPROPRIATENESS – MINOR WORKS (MINOR COA)

A. Applicability: Minor works are those exterior changes that do not involve substantial alterations, additions or removals that could impair the integrity of the property and/or historic district as a whole.

B. Process Type: Administrative

C. Pre-Application Meeting: No pre-application conference is required prior to applying for a Minor Certificate of Appropriateness. Applicants are strongly encouraged to call or visit the Administrator prior to submitting an application to determine what information is required for the application.

D. Required Application Information: Sketch Plan (15.4.2) and Building Elevations for Design Review (15.4.7) (each may be waived by Administrator as appropriate).

E. Determination of Compliance: Once an application containing all needed elements is submitted, the Administrator shall review the application and approve or deny it based on compliance with the standards contained in this chapter and in any applicable Historic District Guidelines.

F. Public Notification: N/A

G. Appeals: Appeals of the decisions of the Administrator shall be heard by the Historic Preservation Commission (15.11.3 below).

H. Permit Validity: One year

I. Permit Extension: The Administrator may grant 1 extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.11.3 CERTIFICATE OF APPROPRIATENESS – MAJOR WORKS (MAJOR COA)

A. Applicability: Any exterior change that does not qualify for a Minor COA according the provisions of Section 15.11.2.A.

B. Process Type: Quasi-Judicial (See also 15.5)

C. Pre-Application Meeting: It shall be the policy of the Historic Preservation Commission, in regard to applications involving new construction or extensive alterations and/or additions to existing structures, that a sub-committee of the commission or Town Staff shall be available to meet with persons involved in planned or pending applications in order to advise them informally, at an early stage in the development process. This advice shall be on the Historic District Design Guidelines, the nature of the area where the proposed project will take place and other relevant factors. In giving such advice, the members of the sub-committee or staff, collectively and individually, shall refrain from any indication of approval or disapproval. Advice or opinions given by any member of the sub-committee at such an informal meeting shall not be considered official or binding upon the commission.

D. Required Application Information: Each application for a Major Certificate of Appropriateness shall contain a Sketch Plan (15.4.2) and Building Elevations for Design Review (15.4.7) (each may be waived by Administrator as appropriate). Other information necessary to show that the use or structure complies with the standards set forth in this ordinance and the Historic District Design Guidelines shall also be provided.

E. Determination of Compliance: The Administrator shall review the application to ensure that it is complete, prepare a report and recommendation on the application, and schedule the matter for a public hearing before the Historic Preservation Commission.

F. Public Notification: Level 1 & 3 required.

G. Public Hearing: The Historic Preservation Commission shall hold a hearing on the proposal. The applicant and other property owners likely to be materially affected by the application shall be given an opportunity to be heard.

H. Commission Review: Following the public hearing the commission may approve, deny or approve with conditions the application for a Major Certificate of Appropriateness. No Major Certificate of Appropriateness shall be granted unless the commission finds that the application complies with the Secretary of Interior's Standards for Rehabilitation and the Wake Forest Historic District Design Guidelines.

I. Findings of Fact: The action on an application must be supported by specific findings of fact indicating the extent to which the application is or is not congruous with the special character of the historic district or property.

J. Review Period by Commission: Applications for Certificates of Appropriateness shall be acted upon within 180 days after a complete application is filed, otherwise the application shall be deemed approved and a certificate shall be issued. An extension of time may be granted by mutual consent of the commission and the applicant.

K. Appeals: According to the provisions of NCGS 160A – 400.9(e), an appeal from the decision of the Historic Preservation Commission regarding a Major Certificate of Appropriateness application may be made in the nature of certiorari by an aggrieved party to the Board of Adjustment in accordance with Section 15.12 of this ordinance within 30 days of the decision of the commission.

L. Permit Validity: One year

M. Permit Extension: The Administrator may grant 1 extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.11.4 CERTIFICATE OF APPROPRIATENESS – DEMOLITION OF HISTORIC STRUCTURES

A. Applicability and Authority: A Certificate of Appropriateness, approved and issued by the Historic Preservation Commission subject to the provisions below, is required prior to the demolition, removal or destruction of any of the following historic structures:

1. **Locally Designated Historic Structures:** All locally designated historic landmarks or properties within a historic district pursuant to the authority granted in NCGS 160A-440.14, and

2. **Other Historic Structures:** All other historic structures located within the corporate limits and extraterritorial jurisdiction of the Town of Wake Forest pursuant to the authority granted in Session Law 2007-66, House Bill 827 ratified June 7, 2007 by the General Assembly of the State of North Carolina. Such structures shall include those which are:

   a. Designated as a State or national landmark;

   b. Individually listed in the National Register of Historic Places;

   c. Individually identified as a contributing structure in a historic district listed in the National Register of Historic Places;

d. Certified or preliminarily determined by the Secretary of the Interior as contributing to the significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

e. Individually listed in the State inventory of historic places;

f. Individually listed in the county Register of Historic Places; or,

g. Individually listed in the Town of Wake Forest local inventory of historic places, as per Section 15.11.1.B above.

B. Process Type: Quasi-Judicial (See also 15.5)

C. Pre-Application Meeting: No meeting is required but applicants are encouraged to call or visit the Administrator to determine what information is required for the application.

D. Required Application Information: Each application shall contain a Sketch Plan (15.4.2) designating the extent of the proposed demolition, removal or destruction of historic structures.

E. Determination of Compliance – Locally Designated Historic Structures: For applications regarding "locally designated historic structures" as outlined in Section 15.11.4.A.1 above, the Administrator shall review the application to ensure that it is complete and schedule the matter for a public hearing before the Historic Preservation Commission.

F. Determination of Compliance – Other Historic Structures: For applications regarding "other historic structures" as outlined in Section 15.11.4.A.2 above, the Administrator shall review the application to ensure that it is complete and assign a Demolition Approval System Score (DASS) as described below. If, according to the DASS table below, a Certificate of Appropriateness is required to authorize the demolition, removal or destruction of a designated landmark or a building, structure or site within a historic district, the Administrator shall schedule the matter for a public hearing before the Historic Preservation Commission.

Demolition Approval System Score (DASS)

DASS Tier	Criteria for Assignment of Tier Category*	Required Action
Tier 1	• Appears on the Historic Building Survey Map of the town; OR • Located in an area on the state study	Staff shall determine if property is located in an area that is a potential historic district or if the property is a potential for listing on the state study list. If either is

	list as a potential historic district	true an application for a COA shall be filed by the applicant for review by the HPC. The HPC shall grant a COA authorizing demolition or may order a delay of up to 365 days before demolition may commence. If neither is true (i.e. the site is not in a potential historic district and is not a potential for listing on the state study list) no COA is required and the demolition may proceed without delay.
Tier 2	• Certified or preliminarily determined by the Secretary of the Interior as contributing to the significance of a district preliminarily determined by the Secretary to qualify as a registered historic district; OR • Designated as "non-contributing" in a National Register historic district; OR • Individually listed in the state study list; OR • Individually listed in any county or local inventory of historic buildings or sites	An application for a COA shall be filed by the applicant for review by the HPC. The HPC shall grant a COA authorizing demolition or may order a delay of up to 365 days before demolition may commence.
Tier 3	• Individually designated landmark; OR • Individually listed in National Register; OR • Designated as "contributing" in a National Register historic district	An application for a COA shall be filed by the applicant for review by the HPC. The HPC shall grant a COA authorizing demolition or may order a delay of up to 365 days before demolition may commence. (A Tier 3 DASS score will likely result in an automatic delay of 365 days.)
None	• None of the above criteria apply.	No delay of demolition. No COA required.

** A property shall be classified in the highest Tier Category for which it meets the criteria.*

G. Public Notification: Level 1 & 3 required.

H. Public Hearing: The Historic Preservation Commission shall hold a hearing on the proposal. The applicant and other property owners likely to be materially affected by the application shall be given an opportunity to be heard.

I. Commission Review – Locally Designated Historic Structures: An application for a Certificate of Appropriateness authorizing the demolition, removal or destruction of a "locally designated historic structure," as outlined in Section 15.11.4.A.1 above, may not be denied or delayed except as provided below:

1. The effective date of such a certificate may be delayed for up to 365 days from the date of approval. The period of delay should be reduced by the Historic Preservation Commission if it finds that the owner would suffer extreme hardship or be permanently deprived of all beneficial use or return from such property by virtue of the delay.

2. During the delay period the commission shall negotiate with the owner in an effort to find a means of preserving the building, structure or site.

3. If the Historic Preservation Commission finds that a building, structure or site has no special significance or value toward maintaining the character of a district, it shall waive all or part of such period of delay and authorize earlier demolition or removal.

4. If the Historic Preservation Commission has voted to recommend the designation of a landmark or the designation of an area as a historic district, and final designation has not been made by the Board of Commissioners, the

demolition or destruction of any building, structure or site in the proposed district or of the designated landmark may be delayed by the commission for up to 365 days after the Board of Commissioners takes final action on the designation.

5. An application for a Major Certificate of Appropriateness authorizing the demolition of a building, structure or site determined by the State of North Carolina's Historic Preservation Officer as having statewide significance as defined in the criteria of the National Register of Historic Places may be denied except where the Historic Preservation Commission finds that the owner would suffer extreme hardship or be permanently deprived of all beneficial use or return by virtue of the denial.

J. Commission Review – Other Historic Structures: An application for a Certificate of Appropriateness authorizing the demolition, removal or destruction of "other historic structures" as outlined in Section 15.11.4.A.2 above, shall be evaluated by the Commission based on 4 standards which will be weighed using a point scale of 0 to 2, where 0 means that the structure does not meet the standard, 1 means the structure moderately meets the standard, and 2 means the structure significantly meets the standard. A total score of 4 or greater will result issuance of a COA with an order for delay of demolition for 365 days from the date of the COA. A total score of less than 4 may result in the issuance of a COA with a delay of less than 365 days or no delay of demolition. The standards are as follows:

1. Architectural Integrity

a. The structure has maintained the integrity of its original architectural form.

b. Changes made to the structure over 50 years ago have gained historic significance.

2. Architectural Style

a. The structure has a distinctive architectural style.

b. It has superior craftsmanship.

c. The structure is the last or oldest example of a certain building type.

d. It is one of a cluster of buildings that are significant as a group.

3. Cultural Significance: The structure is culturally significant due to factors such as its historic use, an event, a person, a builder, or an architect associated with the structure.

4. Structural Integrity

a. The structure will be given a score of 2 points for structural integrity unless the applicant has provided an engineer's report stating otherwise.

b. Said report will be paid for by the applicant using a structural engineer recommended by the State Historic Preservation Office.

c. The structural components – roof, wall, floor, and foundation systems will each have a value of ½ point.

d. If the report states that a system is structurally unsound the score of 2 will be reduced by ½ point per system rated at 50% or more unsound.

K. Commission Decision and Findings of Fact: The action on an application must be supported by specific findings of fact indicating the extent to which the application meets the provisions above. The Commission may choose to include

previous documented time spent in the search for an alternative to demolition, such as moving the structure, as part of any required delay of demolition.

L. Review Period by Commission: Applications for Certificates of Appropriateness shall be acted upon within 180 days after a complete application is filed, otherwise the application shall be deemed approved and a certificate shall be issued. An extension of time may be granted by mutual consent of the commission and the applicant.

M. Immediate Demolition – Other Historic Structures: For applications regarding "other historic structures" as outlined in Section 15.11.4.A.2 above, the applicant may avoid a delay in demolition imposed by the HPC if the State Building Inspector orders the immediate demolition of the structure, or if the applicant makes a claim of unsafe conditions according to the following provisions.

1. Any application for demolition of a Tier 2 or 3 structure must include documentation as to the condition of the property to support a claim of unsafe conditions.
2. This documentation shall be in the form of a report from a structural engineer recommended by the State Historic Preservation Office and paid for by the applicant. This report shall specifically address the roof, wall, floor, and foundation systems rated as a percentage structurally unsound.
3. If the structure to be demolished is an accessory structure, a similar report from the town building inspector may be submitted for the engineer's report although the HPC may require that the applicant return with an engineer's report at the applicant's expense.
4. The HPC may also require an engineer's report for any Tier 1 property at their discretion and at the applicant's expense based on the considerations of the specific site.
5. A structure found to be unsafe shall not automatically be issued a COA with no delay of demolition. The COA may be issued with a delay of demolition and an order for stabilization or shoring in order to avoid demolition by neglect.

N. Salvage of Materials – Other Historic Structures: For applications regarding "other historic structures" as outlined in Section 15.11.4.A.2 above, the applicant shall make all materials available to salvagers prior to demolition according to the provisions below.

1. Such materials may be sold to a salvage company or any other interested party, donated to "Habitat for Humanity" or similar organizations, given away to individuals, businesses, or other organizations, or any combination thereof.
2. The applicant must publically advertise, at least 2 weeks prior, a date and time for any interested materials salvager or other interested parties to visit the building to be demolished and arrange to acquire any desired salvage materials. The requirement of advertising may be waived by staff or the HPC when the salvage is handled in another acceptable manner or the potential salvage is of minimal value.
3. The applicant shall time the collection of materials in a logical manner, such as doors, windows, fireplace surrounds and mantels, cabinets, fixtures, etc will be collected prior to wood flooring, although carpets could be collected early.
4. At the time the salvaged materials are collected the applicant or his agent must be on site to assure that materials are not damaged in the acquisition of other materials.

O. Appeals: According to the provisions of NCGS 160A – 400.9(e), an appeal from the decision of the Historic Preservation Commission regarding a Major Certificate of Appropriateness application may be made by an aggrieved party in the nature of certiorari to the Board of Adjustment in accordance with Section 15.12 of this ordinance within 30 days of the decision of the commission.

P. Permit Validity: One year

Q. Permit Extension: The Administrator may grant 1 extension of this time period of up to one year upon submittal by the applicant of sufficient justification for the extension. Sufficient justification may include, but is not limited to, delays in other outside agency permits, financing institution delays, or other similar reasons beyond the control of the applicant.

15.12 APPEALS OF ADMINISTRATIVE DECISIONS

15.12.1 APPLICABILITY

This process is hereby established to provide an appeal process for the following:

A. Parties aggrieved by any order, requirement, decision or determination, made by an administrative officer charged with enforcing the provisions of this ordinance, and,

B. Parties aggrieved by the decision of the Historic Preservation Commission regarding Major Certificates of Appropriateness according to the appellate procedure outlined in NCGS 160A – 400.9(e).

15.12.2 FILING PROCEDURES

A. Process Types: Quasi-Judicial (See also 15.5)

B. Filing Procedure: An appeal of an administrative decision may be taken by any person aggrieved (or by their authorized agent), or by any officer, department or board of the town, to the Board of Adjustment. Such an appeal shall be made within 30 days of the receipt by such aggrieved party of the written notice of decision from the Administrator, or in the case of an office, department or board of the town, within 30 days of the filing of the written notice with the Town Clerk.

C. Stay of Proceedings: The filing of an appeal shall stay all proceedings in furtherance of the contested action unless the Administrator certifies that, in his/her opinion, by reason of facts stated in the certification, such a stay would cause imminent peril to life and property. In such a case, proceedings shall not be stayed except by restraining order or preliminary injunction granted by the Superior Court of Wake County in accordance with Rule 65 of the North Carolina Rules of Civil Procedure.

D. Required Appeal Application Information: Such relevant information as may reasonably allow the Board of Adjustment to understand the basis for the applicant's appeal. The Administrator shall similarly prepare a report detailing the regulations and interpretation behind the matter being appealed and their reason for their decision.

E. Public Notification: Level 1 & 2 required.

15.12.3 FORMAL REVIEW

A. Upon receiving the application, the Board of Adjustment shall conduct a public hearing on the appeal. Any party may appear in person or be represented by an agent at the hearing.

B. After conducting the public hearing, the Board of Adjustment shall adopt an order reversing or affirming, wholly or in part, or modifying the order requirements, decision or determination in question. It shall take a 4/5ths vote of the Board of Adjustment to reverse or modify the contested action.

C. The Board of Adjustment, in making its ruling, shall have all the powers of the Administrator from whom the appeal is taken, and may issue or direct the issuance of a permit.

D. The decision of the Board of Adjustment must be in writing and permanently filed in the minutes of that reviewing body as a public record. All findings of fact and conclusions of law must be separately stated in final decisions or orders of the Board of Adjustment, which must be delivered to parties of interest by certified mail.

15.12.4 APPEALS

A. Any appeal from a decision of the Board of Adjustment may be made by an aggrieved party and shall be made to the Superior Court of Wake County in the nature of certiorari. Any such petition shall be filed with the clerk of the superior court within 30 days after the decision of the Board is filed with the Town Clerk, or after a written copy thereof is delivered to every aggrieved party who has filed a written request for such copy with the secretary or chairman of the Board at the time of its hearing of the case, whichever is later. The decision of the Board may be delivered to the aggrieved party either by personal service or by registered mail or certified mail return receipt requested.

B. Any appeal from a decision relating to sedimentation and erosion control shall be made to the North Carolina Sedimentation Control Commission.

15.13 VARIANCES

15.13.1 APPLICABILITY

A. **Purpose:** The variance process administered by the Board of Adjustment is intended to provide limited relief from the requirements of this ordinance in those cases where strict application of a particular requirement will create a practical difficulty or unnecessary hardship prohibiting the use of the land in a manner otherwise allowed under this ordinance.

B. **Sufficient Grounds for Variance:** It is not intended that variances be granted solelyto remove inconveniences or financial burdens that the requirements of this ordinance may impose on property owners in general or to increase the profitability of a proposed development, although such factors can be taken into consideration.

C. **Use Variances Not Permitted:** In no event shall the Board of Adjustment grant a variance which would allow the establishment of a use which is not otherwise allowed in a land development district or which would change the land development district classification or the district boundary of the property in question.

D. Authority Limited to this Ordinance/Conflicts with other Laws Prohibited: In no event shall the Board of Adjustment grant a variance which would conflict with any state code unless otherwise authorized by laws and regulations.

15.13.2 FILING PROCEDURES

A. Process Types: Quasi-Judicial (See also 15.5)

B. Pre-Application Procedure: Every applicant for a variance is strongly encouraged to meet with the planning department in a pre-application conference prior to the submittal of a request for a variance. The purposes of this conference are to provide additional information regarding the review process and assistance in the preparation of the application.

C. Filing Procedure: An application for a variance may be filed by the owner of the property or by an agent specifically authorized by the owner to file such application.

D. Required Application Information: All information relevant to describing the applicant's request to the Board of Adjustment.

E. Public Notification: Level 1, 2 & 4 required.

F. Determination of Compliance: Staff shall review an application for a variance to determine if it is complete. If an application is complete, the Administrator shall schedule the matter for consideration at a meeting of the Board of Adjustment. The Administrator shall prepare a staff report regarding the submitted variance application.

15.13.3 FORMAL REVIEW

A. Action by the Board of Adjustment

1. Upon receipt of the request for a variance from the Administrator, the Board of Adjustment shall hold a quasi-judicial hearing on the request.
2. After conducting the hearing, the Board of Adjustment may: deny the application; conduct an additional public hearing on the application; approve the application; or approve the application with additional conditions. A concurring vote of four-fifths of the members of the Board of Adjustment shall be necessary to grant a variance.
3. A decision by the Board of Adjustment shall be made within 45 days of the date of the hearing.
4. Any approval or denial of the request shall be accompanied by written findings of fact supporting the conclusion that the variance meets or does not meet each of the standards set forth below.

B. Standard of Review: The Board of Adjustment shall not grant a variance unless and until it makes all of the following findings:

1. That there are practical difficulties or unnecessary hardships in the way of carrying out the strict letter of this ordinance such that if the applicant complies with the provisions of the ordinance, the property owner seeking the variance will be denied reasonable and significant use of his property.
2. That the variance is in harmony with the general purpose and intent of this chapter and is the minimum necessary to afford relief.
3. That the public safety and welfare have been assured and substantial justice has been done.

C. Additional Standards for Floodplain, Watershed and Stormwater Regulation Variance Requests: Variances from the standards set forth in this ordinance for flood damage prevention, watershed protection and stormwater regulation may be granted subject to the following additional provisions:

1. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result or when the variance will make the structure in violation of other federal, state or local laws.

2. Variances shall only be issued upon:

a. A determination that the variance is the minimum necessary, considering the flood hazard, to afford relief;

b. A showing of good and sufficient cause;

c. A determination that failure to grant the variance would result in exceptional hardship; and,

d. A determination that the granting of a variance will not result in a substantial increase in flood heights, additional threats to public safety, extraordinary public expense, create nuisance, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.

3. In passing upon variances, the Board of Adjustment shall consider all technical evaluations, all relevant factors, all standards specified in other sections of this chapter and:

a. The danger that material may be swept onto other lands to the injury of others.

b. The danger to life and property due to flooding or erosion damage.

c. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

d. The importance of the services provided by the proposed facility to the community.

e. The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

f. The compatibility of the proposed use with existing and anticipated development.

g. The relationship of the proposed use to the land development plan and flood damage prevention program for that area.

h. The safety of access to the property in times of flood for ordinary and emergency vehicles.

i. The expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site.

j. The costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, and streets and bridges.

4. Any applicant to whom a variance from the floodplain development regulations is granted shall be given written notice. This notice shall specify the difference between the base flood elevation and the elevation to which the structure is to be built and contain a written statement that such construction below the Base

Flood Elevation increases risks to life and property, and that the issuance of a variance to construct a structure below the Base Flood Elevation will result in increased premium rates for flood insurance up to $25 per $100 of insurance coverage. Such notification shall be maintained with a record of all variance actions. Variances records shall be provided to the Federal Emergency Management Agency upon request.

D. Additional Conditions: In granting any variance, the Board of Adjustment may attach such conditions to the approval as it deems necessary and appropriate to satisfy the purposes and objectives of this ordinance. The Board of Adjustment may also attach conditions in order to reduce or minimize any injurious effect of such variance upon other property in the neighborhood and to ensure compliance with other terms of this ordinance. Such conditions and safeguards must be reasonably related to the condition or circumstance that gives rise to the need for a variance.

15.13.4 APPEALS

An appeal from the decision of the Board of Adjustment regarding a variance request may be made by an aggrieved party and shall be made to the Superior Court of Wake County in the nature of certiorari. Any such petition shall be filed with the clerk of the superior court within 30 days after the decision of the Board is filed with the Town Clerk, or after a written copy thereof is delivered to every aggrieved party who has filed a written request for such copy with the secretary or chairman of the Board at the time of its hearing of the case, whichever is later. The decision of the Board may be delivered to the aggrieved party either by personal service or by registered mail or certified mail return receipt requested.

15.14 TEXT AMENDMENTS AND REZONINGS

The Board of Commissioners may from time to time amend any part of the text of this ordinance or amend the Zoning Map of the town.

15.14.1 APPLICATION PROCEDURES

A. Process Types: Legislative

B. Applicants: Map or text amendments may be submitted by any of the following:

1. The Board of Commissioners,
2. The Planning Board,
3. The Planning Department, and/or
4. Any resident or property owner within the land use jurisdiction of the town.

C. Pre-Application Procedure: Before filing a petition of an amendment, an applicant (if an owner requesting a map amendment) shall meet with the Administrator to discuss the proposed amendment or request and to become more familiar with the applicable requirements and approval procedures of the town.

D. Content of Application: A petition for an amendment to the town's official zoning map or text shall be filed on a form provided by the Administrator. Such a petition shall contain all the information required on the form and must be determined to be complete by the Administrator prior to advancing it through the review process.

E. Determination of Compliance: Staff shall review an application for amendment to determine if it is complete. If an application is complete, the Administrator shall

schedule the matter for consideration at a meeting of the Planning Board. The Administrator shall prepare a staff report and recommendation on the matter.

15.14.2 REVIEW BY PLANNING BOARD

A. Public Notification (Prior to Planning Board): Level 1, 2 & 4, as defined in Section 15.3, are required for all amendments to the UDO. Level 3 is required for all amendments to the UDO that involve a specific parcel of land. Such actions include, but are not limited to, map amendments (rezonings), amendments to zoning district boundaries, and the application of new overlay zones. A Level 5 notification is optional (recommended for Map Amendments).

B. Level 3 Notification for Large Scale Amendments: If the land development map amendment includes 50 or more properties, owned by at least 50 different property owners, the town may elect to utilize the expanded published notice provisions found in NCGS 160A-384, as outlined in Section 15.3.3.B of this chapter.

C. Public Hearing: The Planning Board shall conduct a public hearing, either jointly with the Board of Commissioners or in a separate hearing, and receive public input on the proposed amendment. Following the hearing to receive public input on the amendment, the Planning Board shall make a recommendation to the Board of Commissioners regarding whether to approve or deny each proposed amendment.

D. Delivery of Planning Board Recommendation: If the Planning Board is able to reach a recommendation without further deliberation, the Planning Board shall submit a recommendation on the matter and refer it to the Board of Commissioners for their consideration at their regularly scheduled meeting directly following the public hearing. If the Planning Board determines that further deliberation on the matter is required, the Planning Board shall deliver its recommendation to the Board of Commissioners within 45 days of its first consideration on the matter. If no recommendation is received from the Planning Board within 45 days of it first consideration on the matter, the Board of Commissioners shall proceed in its consideration of the matter without a recommendation from the Planning Board.

E. Effect of Planning Board Recommendation

1. **Recommendation for Approval:** If the Planning Board makes a favorable recommendation, the matter shall proceed to a public hearing before the Board of Commissioners.

2. **Recommendation for Denial:** If the Planning Board makes a negative recommendation, the petitioner may, within 45 days of the Planning Board's decision, request that a public hearing be held by the Board of Commissioners on the matter. This appeal process does not apply to amendments initiated by the Board of Commissioners or planning department. These amendments go immediately to the Board of Commissioners following a recommendation by the Planning Board.

3. **Effect of Recommendation for Denial:** A 3/4 majority vote by the Board of Commissioners shall be required to amend this ordinance when the Planning Board recommends against such amendment.

15.14.3 PROTEST PETITIONS (REZONINGS ONLY)

A. Qualification of Protest: In accordance with NCGS 160A-385(a)(2), a valid protest petition against a zoning map amendment (rezoning) must be signed by the

owners of either 20% or more of the area included in the proposed change, or 5% of a 100-foot-wide buffer extending along the entire boundary of each discrete or separate area proposed to be rezoned. A street right-of-way is not to be considered in computing the 100-foot buffer area as long as that street right-of-way is 100 feet wide or less.

B. Effect of Protest Petition of Board of Commissioners Vote: With a valid protest petition, the amendment shall not become effective except by favorable vote of 3/4 of all the members of the Board of Commissioners.

C. Duly Signed Petition Required: No protest against any proposed amendment shall be valid or effective unless it is on a form provided by the town actually bearing the signatures of the required number of property owners and stating that the signers do protest the proposed change or amendment. All such petitions shall be filed in the office of the Town Clerk for validation at or before 12:00 noon not less than 2 working days prior to the date of the hearing (for example, petitions must be received by Friday at noon to be accepted for a meeting on the following Tuesday evening).

D. Withdrawal of Protest Petition: Any qualified property owner who signed the protest petition may withdraw their protest against a proposed zoning amendment any time prior to the meeting at which the rezoning will be considered.

15.14.4 CONSIDERATION BY BOARD OF COMMISSIONERS

A. Public Notification: If a separate public hearing is held for the Board of Commissioners to hear public input, receive the Planning Board recommendation, and/or deliberate on the map or text amendment, the same public notification procedures shall be followed as are required for the Planning Board hearing on the matter. (See Sections 15.14.2.A through 15.14.2.C)

B. Consideration by the Board of Commissioners: Following receipt of a recommendation from the Planning Board, or after 45 days from the Planning Board hearing if no recommendation is received, the Board of Commissioners shall conduct a public hearing on the matter. Upon reviewing all of the pertinent information, the Board of Commissioners may:

1. Adopt the proposed amendment.
2. Adopt the proposed amendment with modifications.
3. Reject the proposed amendment.
4. Refer the proposed amendment back to the Planning Board for further consideration.

15.14.5 PLAN CONSISTENCY

In accordance with G.S. 160A-383, all such amendments shall be made in accordance with the Community Plan and any other officially adopted applicable plan. The Planning Board shall advise and comment on whether the proposed amendment is consistent with any comprehensive plan that has been adopted and any other officially adopted plan that is applicable. Prior to adopting or rejecting any zoning amendment, the Board of Commissioners shall adopt a statement describing whether its action is consistent with the adopted comprehensive plan and explaining why the Board of Commissioners considers the action taken to be reasonable and in the public interest.

15.14.6 WAITING PERIOD FOR SUBSEQUENT APPLICATIONS

A. After an application for an amendment has been approved or denied by the Board of Commissioners, there shall be a 6 month waiting period before an application shall be considered on the same issue.

B. This waiting period may be waived by the Board of Commissioners (three-fourths vote required) if it determines that there have been substantial changes in conditions or circumstances which may relate to the request.

15.14.7 APPEALS

An appeal from the decision of the Board of Commissioners regarding a map or text amendment may be made by an aggrieved party and shall be made to the Superior Court of Wake County in the nature of certiorari. Any such petition to the Superior Court shall be filed with the court no later than 30 days after the Board of Commissioners delivers its decision.

15.15 CONDITIONAL DISTRICTS (CD)

Conditional Districts (CD) (see Section 2.6) are districts with conditions voluntarily added by the applicant and approved in a legislative procedure by the Board of Commissioners in accordance with G.S. 160A-382. Conditional Districts provide for orderly and flexible development under the general policies of this ordinance without the constraints of some of the prescribed standards guiding by-right development. This Conditional District may be used in any district but is not intended to relieve hardships that would otherwise be handled using a variance procedure.

15.15.1 APPLICATION PROCEDURES

A. Process Types: Legislative

B. Applicant and Property: Conditional District classification shall only be considered upon the request of the owners and/or their representatives of all the property to be included in the specific Conditional District request. A Conditional District shall consist of land under unified control which may be planned and developed as a single development or as an approved programmed series of development phases by multiple developers. "Unified control" means that all land to be included within a Conditional District shall be owned or otherwise under the legal control of the applicant for a Conditional District. The applicant shall be legally capable of providing a commitment to the town that the Conditional District development will comply with all documents, plans, standards and conditions ultimately approved by the town.

C. Fair and Reasonable Conditions: Within an approved Conditional District, no use shall be permitted except pursuant to the conditions imposed by the applicant on the Conditional District in the approval of the rezoning. The Board of Commissioners and the applicant may mutually agree to additional reasonable and appropriate conditions or safeguards to serve the purpose and intent of this section, and to preserve public welfare, and justice. The provisions of the Conditional District Master Plan shall replace all conflicting development regulations set forth in this ordinance which would otherwise apply to the development site. The Planning Board may recommend and the Board of Commissioners (with mutual approval of the applicant) may attach reasonable and appropriate conditions including, but not limited to, the location, nature, hours of operation, and extent of the proposed use(s). Conditions and site-specific standards shall be limited to those that address conformance of the development and use of the site to this ordinance and officially

adopted plans and those standards and conditions that address the impacts reasonably expected to be generated by the development and use of the site. The applicant will have a reasonable opportunity to consider and respond to any conditions and site-specific standards proposed by either the Planning Board or the Board of Commissioners prior to final action. In accordance with G.S. 160A-382(b)

D. Content of Application: A Conditional District shall consist of the Existing Conditions Map (15.4.1), a Sketch Plan (15.4.2) (may be waived by Administrator as appropriate), and Master Plan (15.4.3); as well as any other plans, drawings, renderings, elevations, maps and documents specifically included as development documents for approval by the Board of Commissioners. The Conditional District Master Plan, is a site specific that is a condition of the Conditional District rezoning. In addition to those items required for Master Plans in Section 15.4.3, a Conditional District Master Plan shall, at a minimum, illustrate the following:

1. The underlying zoning districts and a full list of proposed uses consistent in character with those zoning districts. Such use classifications may be selected from any of the uses, whether permitted, by right or with supplemental standards, allowed in the general zoning district upon which the Conditional District is based. Uses not otherwise permitted within the general zoning district shall not be permitted within the Conditional District;
2. General traffic routes (external and internal) to and from the development with major access points identified;
3. Tabular data, including the range and scope of proposed land uses, proposed densities, floor area ratios and impervious surface ratios as applicable to development type; and land areas devoted to each type of general land use and phase of development;
4. A proposed development schedule if the project is to be phased.

E. Exception for Conditional Districts with Use Limitations Only: If an applicant proposes a Conditional District which meets the following criteria, no Conditional District Master Plan shall be required in the application:

1. The only proposed deviation in use from the underlying zoning is to impose additional limitations on the uses that will be allowed in the Conditional District.
2. No other deviations from the standards of the underlying zoning are proposed in the Conditional District.

15.15.2 FORMAL REVIEW

A. Public Notification: (Prior to Planning Board): Level 1, 2, 3 & 4 required.

B. Procedure: The procedure for approval of a Conditional District shall follow the procedure for review of Text & Map Amendments (Rezonings) as outlined in Sections 15.14.2 through 15.14.7.

15.15.3 EFFECT OF APPROVAL/CHANGES

The applicant may proceed with development only after approval of the Conditional District Master Plan by the Board of Commissioners, followed by approval of any necessary Site Plans or Subdivision Plats, except that all subsequent approvals shall be

completed by the Administrator. The development and use of all land within the Conditional District shall be in keeping with the approved Master Plan and all applicable provisions therein.

A. Final Approval by Stages: If so reflected on the Master Plan, the Board of Commissioners may allow the phasing of final development. Each phase of development shall adhere to all applicable provisions and standards of this section and the applicable Conditional District Master Plan.

B. Substantial Changes: Any substantial change to a Master Plan as noted below shall be reviewed by the Planning Board and approved or denied by the Board of Commissioners as an amended Conditional District. The following changes to a Conditional District Master Plan shall require approval by the Board of Commissioners:

1. Land area being added or removed from the Conditional District.
2. Modification of special performance criteria, design standards, or other requirements specified by the enacting ordinance.
3. A change in land use or development type beyond that permitted by the approved Conditional District Master Plan.
4. When there is introduction of a new vehicular access point to an existing street, road or thoroughfare not previously designated for access.
5. When there is an increase in the total number of residential dwelling units originally authorized by the approved Conditional District Master Plan.
6. When the total floor area of a commercial or industrial classification is increased more than 10% beyond the total floor area last approved by Board of Commissioners. Changes of less than 10 percent may be approved by the Administrator.
7. Any change which alters the basic development concept of the Conditional District Master Plan.

C. Other Changes: All other changes to a Conditional District Master Plan shall receive approval from the Board of Adjustment.

D. Rescission of Conditional Districts: The Applicant shall secure a valid building or construction permit(s) within 2 years from date of approval of the Conditional District unless otherwise specified. If such project is not complete or a valid building or construction permit is not in place at the end of the 2-year period, the Administrator shall notify the applicant of either such finding. Within 60 calendar days of notification, the Administrator shall make a recommendation concerning the rescission of the Conditional District to the Board of Commissioners. The Board of Commissioners may then rescind the Conditional District, or extend the life of the Conditional District for a specified period of time. The rescission of a Conditional District shall follow the same procedure as was needed for approval.

15.16 VESTED RIGHT

15.16.1 PURPOSE AND APPLICABILITY

The zoning vested right is a right which must be requested by the applicant at the time of submittal and is established pursuant to NCGS 160A-385.1 to undertake and complete the development and use of property under the terms and conditions of an approved site specific development plan. Obtaining a zoning permit or subdivision

construction plan approval through the vested rights procedure gives the applicant the right to start construction of the development as approved and an additional 2 years, or up to 5 years to begin and/or complete work as appropriate.

15.16.2 VESTED RIGHT PROCEDURES

A. Process Type: Legislative

B. Pre-Application Procedure: The applicant shall meet with the Administrator prior to submitting an application to inquire about specific zoning requirements and obtain the proper application forms. The applicant shall be advised of all necessary information and requirements of the vested rights procedure.

C. Required Application Information: Sketch Plan (15.4.2) (may be waived by Administrator as appropriate) and Master Plan (15.4.3)

D. Determination of Compliance: The Administrator shall review the application and accompanying site plan for compliance with the requirements of this chapter and other applicable regulations and schedule the matter for a public hearing before the Board of Commissioners.

E. Public Notification: Level 1 & 4 required.

F. Public Hearing: The Planning Board and Board of Commissioners shall hold a joint public hearing on the proposal. The applicant and other property owners likely to be materially affected by the application shall be given an opportunity to be heard.

G. Delivery of Planning Board Recommendation: If the Planning Board is able to reach a recommendation without further deliberation, the Planning Board shall submit a recommendation on the matter and refer it to the Board of Commissioners for their consideration at their regularly scheduled meeting directly following the public hearing. If the Planning Board determines that further deliberation on the matter is required, the Planning Board shall deliver its recommendation to the Board of Commissioners within 45 days of its first consideration on the matter. If no recommendation is received from the Planning Board within 45 days of it first consideration on the matter, the Board of Commissioners shall proceed in its consideration of the matter without a recommendation from the Planning Board.

H. Board of Commissioners Decision: Following a public hearing, the Board of Commissioners shall take one of the following actions:

1. Approve the vested rights request. The Administrator is then directed to issue a vested rights zoning permit.
2. Approve the vested rights request subject to conditions which are necessary to protect the public health, safety and welfare. The Administrator is then directed to issue the vested rights zoning permit subject to the changes in the site plan to be made by the developer.
3. Table the vested rights request pending the submittal of additional information.
4. Deny the vested rights request.

I. Appeals: None

15.16.3 VESTED RIGHT DURATION – EFFECT OF APPROVAL

A. Maximum Term: A zoning right that has been vested as provided in this section shall remain vested for a period of 2 years, or up to 5 years as approved by the Board of Commissioners.

B. Building Permit/Preliminary Plan Required: Upon issuance of a building permit/preliminary plan approval, the expiration provisions for those permits shall apply, except that they shall not expire or be revoked because of the running of time while a zoning vested right under this section is outstanding. A zoning vested right shall terminate at the end of the applicable vesting period with respect to buildings and uses for which no valid building permit applications have been filed.

C. Town May Terminate Vested Rights Early: The town may terminate the zoning vested rights upon payment to the affected landowner of compensation for all costs, expenses and other losses incurred by the landowner, including, but not limited to, all fees paid in consideration of all financing and all architectural, legal and other fees incurred after approval by the town.

D. State or Federal Regulation Not Bound by Vested Right: The zoning vested right may be terminated upon the enactment or promulgation of a state or federal law or regulation that precludes development as contemplated in the site specific development plan. In such a case the Board of Commissioners may, by ordinance, after notice and a hearing, modify the affected provisions upon a finding that the change in state or federal law has a fundamental effect on the plan.

E. Shall Run with the Property: A zoning vested right is not a personal right but shall attach to and run with the applicable property. After approval of a site specific development plan, all successors to the original landowner shall be entitled to exercise such right while applicable.

F. Vested Right Not Exclusive: Nothing in this section shall prohibit the revocation of the original approval or other remedies for failure to comply with applicable terms and conditions of the approval or this ordinance.

16 VIOLATIONS & PENALTIES

16.1 COMPLAINTS REGARDING VIOLATIONS

16.1.1 COMPLAINTS REGARDING VIOLATIONS

Whenever a violation of this ordinance occurs, or is alleged to have occurred, any person may file a written complaint. Such written complaint shall include a detailed description of the cause and basis for the alleged violation and shall be filed with the Administrator who shall establish a record of such complaint, investigate in a timely manner, and take appropriate action as provided by this ordinance.

A. Unless specifically set forth otherwise in this ordinance, or prohibited by law, the Administrator is hereby authorized to enforce the provisions of this ordinance.

B. The Administrator may enter any building, structure or premises as provided by law, to perform any duty imposed upon them by this ordinance.

16.1.2 NOTICE OF VIOLATION; OPPORTUNITY TO CURE

A. Whenever the Administrator has reasonable cause to believe that a person is violating any of the provisions of this ordinance or any plan, order, or condition issued pursuant to this chapter, that official shall immediately notify that person of the violation.

B. Such notice of violation shall be in writing and shall be served in any manner permitted by NCGS Section 1A-1, rule 4(j). If notice cannot with due diligence be achieved by personal delivery, certified mail, registered mail, USPS signature confirmation, or by a designated delivery service pursuant to 26 U.S.C. Section 7502(f)(2), notice may be given by publication consistent with NCGS Section 1A-1, rule 4(j1).

C. If the violator cannot be ascertained, then the notice of violation shall be sent to the owner of record and to the property address on which the violation occurs.

D. **Notice of Stop Work/Operation/Activity:** If, in the opinion of the Administrator, work or activity is in progress in violation of this ordinance and can be reasonably halted until a notice of violation may be delivered in accordance with this section, a notice may be posted on-site or hand delivered to the apparent responsible party on-site. Such notice shall stay all further work or activity on the site in violation of this ordinance.

E. The notice of violation shall include an opportunity to correct the violation within 10 days of receipt of such notice, before any civil penalties are incurred.

F. Upon receipt of a written request for an extension of time to correct the violation from the alleged violator or the property owner within 10 days of the receipt of the notice of violation, the Administrator charged with the duty of enforcing the regulations being violated may grant a single written extension of time, not to exceed a period of 30 days from the last date such written request could be timely made, in which the alleged violator may cure or correct the violation before the town pursues penalties or other relief.

G. The alleged violator or property owner may seek an appeal to the notice of violation from the Administrator through the Board of Adjustment within 30 days of receipt of the initial notice of violation. In the case of an appeal, the alleged violator or property owner shall notify the Administrator of their intent to appeal the notice of

violation. At that time the Administrator shall grant in writing an extension of 30 days from the delivery of the notice of violation to allow the alleged violator or property owner to appeal the notice.

16.2 SPECIFIC TYPES OF VIOLATIONS

16.2.1 EROSION AND SEDIMENTATION CONTROL VIOLATIONS

A. Any person engaged in land-disturbing activity, who fails to file a plan in accordance with the erosion and sedimentation control regulations of this ordinance, or who conducts a land-disturbing activity except in accordance with provisions of an approved plan will be deemed in violation of the erosion and sedimentation control regulations of this article.

B. Uncovered areas which resulted from land-disturbing activities, and exceed half an acre (21,780 sf), and are subject to continued accelerated erosion, and are causing off-site damage from sedimentation, shall constitute a violation and must be provided with a ground cover or other protective measures, structures, or devices sufficient to restrain accelerated erosion and control off-site sedimentation.

16.2.2 FLOOD DAMAGE PREVENTION VIOLATIONS

A. Violations to be Corrected: When the Floodplain Administrator finds violations of Section 12.4 of this ordinance, or any other applicable state and local laws, it shall be his or her duty to notify the owner or occupant of the building of the violation. The owner or occupant shall immediately remedy each of the violations of law cited in such notification.

B. Actions in the Event of Failure to Take Corrective Action: If the owner of a building or property shall fail to take prompt corrective action, the Floodplain Administrator shall give the owner written notice, by certified or registered mail to the owner's last known address or by personal service, stating:

1. That the building or property is in violation of the flood damage prevention provisions of this ordinance;

2. That a hearing will be held before the Floodplain Administrator at a designated place and time, not later than 10 days after the date of the notice, at which time the owner shall be entitled to be heard, in person or by counsel, and to present arguments and evidence pertaining to the matter; and

3. That following the hearing, the Floodplain Administrator may issue an order to alter, vacate, or demolish the building; or to remove fill as appears appropriate.

C. Order to Take Corrective Action: If, upon a hearing held pursuant to the notice prescribed above, the Floodplain Administrator shall find that the building or development is in violation of the flood damage prevention provisions of this ordinance, he or she shall issue an order in writing to the owner, requiring the owner to remedy the violation within a specified time, not less than 60 calendar days nor more than 180 calendar days. Where the Floodplain Administrator finds that there is imminent danger to life or other property, he or she may order that corrective action be taken in such lesser period as may be feasible.

D. Appeal: Any owner who has received an order to take corrective action may appeal the order to the Board of Adjustment by giving notice of appeal in writing to the Floodplain Administrator and the clerk within 10 days following issuance of the final order. In the absence of an appeal, the order of the Floodplain Administrator

shall be final. The Board of Adjustment shall hear an appeal within a reasonable time and may affirm, modify and affirm, or revoke the order.

E. Failure to Comply with Order: If the owner of a building or property fails to comply with an order to take corrective action from which no appeal has been taken, or fails to comply with an order of the Board of Adjustment following an appeal, the owner shall be guilty of a misdemeanor and shall be punished at the discretion of the court.

16.2.3 STORMWATER MANAGEMENT VIOLATIONS

A. General: Any failure to comply with an applicable requirement, prohibition, standard, or limitation imposed by Chapter 12 of this ordinance shall constitute a violation of this ordinance.

B. Each Day a Separate Offense: Each day that a violation continues shall constitute a separate and distinct violation or offense.

C. Responsible Persons: For the purposes of this article, responsible person(s) shall include but not be limited to:

1. **Person Maintaining Condition Constituting Violation**: An architect, engineer, builder, contractor, developer, agency, or any other person who participates in, assists, directs, creates, causes, or maintains a condition that constitutes a violation of this ordinance, or fails to take appropriate action, so that a violation of this ordinance results or persists.

2. **Responsibility For Land or Use of Land**: The owner of the land on which the violation occurs, any tenant or occupant of the property, any person who is responsible for stormwater controls or practices pursuant to a private agreement or public document, or any person, who has control over, or responsibility for, the use, development or redevelopment of the property.

16.2.4 LANDSCAPING VIOLATIONS

The failure to comply with the landscaping and maintenance requirements of Chapter 8 of the UDO, or the unauthorized disturbance, damage, removal or excessive pruning of vegetation within any required buffers, tree save areas, streetscapes, vehicular use areas, or other landscape areas required by this section, or by a zoning condition, shall constitute a violation of this ordinance.

A. The authority to determine whether the regulations of this ordinance have been met shall rest with the Administrator. Appeals of a decision of the Administrator shall be taken to the Board of Adjustment according to the provisions of Section 15.12.

B. Notice of violation shall be sufficient if directed to the developer, owner(s), the agent of the owner(s), or the contractor, and left at his/her known place of business or residence. The notice of violation shall state the specific violation, indicate the remedy and time period for correcting the violation and, whether fines and/or civil penalties are due.

C. Failure to comply within the time period specified by the notice authorizes the Administrator to initiate any civil or criminal action.

16.2.5 ILLEGAL SUBDIVISIONS / SALES OF LAND

Any person who, being the owner or agent of the owner of any land located within the territorial jurisdiction of the Town of Wake Forest, subdivides his land in violation of this ordinance or transfers or sells land by reference to, exhibition of, or any other use or a plat showing a subdivision of the land before the plat has been properly approved under the terms of this ordinance and recorded in the office of the Wake County Register of Deeds, shall be guilty of a misdemeanor. The description by metes and bounds in the instrument of transfer or other document used in the process of selling or transferring land shall not exempt the transaction from this penalty. The town, through its attorney or other official designated by the Wake Forest Board of Commissioners, may seek to enjoin an illegal subdivision, transfer, or sale of land by action for injunction. Further, violators of this ordinance shall be subject upon conviction, to fine and/or imprisonment as provided by this chapter.

16.2.6 SUMMARY REMOVAL OF SIGNS

A. Pursuant to NCGS 160A-193, the Administrator shall have the authority to summarily remove, abate, or remedy a sign or sign structure which the building inspector has determined to be dangerous or prejudicial to the public health or safety.

B. The expense of the action shall be paid by the sign owner or if the sign owner cannot be ascertained, by the property owner, and if not paid, there shall be a lien placed upon the land or premises where the violation arose, and it shall be collected as a money judgment.

C. The Administrator shall have the authority to remove summarily any signs or sign structures prohibited under Section 11.11.

16.2.7 UNAUTHORIZED DEMOLITION OF HISTORIC PROPERTIES

In addition to penalties authorized elsewhere, any demolition of structures subject to these regulations, in violation of the COA, or undertaken without compliance with this process shall be prohibited from submitting redevelopment plans for the property for 48 months from the date of notice of the violation. The length of the delay may be shortened at the discretion of the Administrator, depending on the specific circumstances of the site, structure, and violation.

16.2.8 DEMOLITION BY NEGLECT OF HISTORIC PROPERTIES

Demolition by neglect of any designated historic landmark or property located within a historic district shall constitute a violation of this ordinance. Owners of historic properties and structures shall have the responsibility to preserve those properties and structures against decay, deterioration, and structural defects and to correct conditions that would compromise those properties' and structures' long-term integrity.

A. For the purposes of this ordinance "demolition by neglect" shall mean the failure by the owner or other responsible person with legal control of any building or structure (including walls, fences, light fixtures, steps, pavement, paths, outdoor signs, or any other appurtenant feature), to keep the building or structure free of decay, deterioration, and structural defects to such a degree that the structural integrity or habitability of the structure may be threatened. Demolition by neglect shall also include the failure of such owner, or other responsible person to repair, upon written notice of violation of this ordinance by the town, such exterior features as are found to be deteriorating, or to correct any condition contributing to deterioration, including but not limited to the following defects:

1. Deterioration of exterior walls, foundations, or other vertical supports that cause leaning, sagging, splitting, listing, or buckling.
2. Deterioration of flooring or floor supports, roofs, or other horizontal members that cause leaning, sagging, splitting, listing, or buckling.
3. Deterioration of external chimneys causing leaning, sagging, splitting, listing, or buckling.
4. Deterioration or crumbling of exterior plasters or mortars.
5. Ineffective waterproofing of exterior walls, roofs, and foundations, including broken windows or doors.
6. Defective protection or lack of weather protection for exterior wall and roof coverings, including lack of paint, or weathering due to lack of paint and/or other protective coverings.
7. Rotting, holes, and other forms of decay.
8. Deterioration of exterior stairs, porches, handrails, window and door frames, cornices, entablatures, wall facings, and architectural details that causes delamination, instability, loss of shape and form, or crumbling.
9. Heaving, subsidence, or cracking of sidewalks, steps, or pathways.
10. Deterioration of fences, gates, and/or accessory structures.
11. Deterioration of any exterior feature so as to create, or permit the creation of, any hazardous or unsafe conditions to life, health, or other property.

B. Determination of Neglect: Once the possibility of neglect comes to the attention of the Administrator, Town Staff will investigate. If staff determines that a "demolition by neglect" violation has occurred, or is in danger of occurring, notice will be given to the Historic Preservation Commission (HPC). The HPC shall call a public hearing. Written notice of such public hearing shall be mailed by first class mail to the owner, and any other responsible person with legal control of the structure, not less than 10 days prior to the date of the hearing. If the HPC determines at the public hearing that a state of "demolition by neglect" exists then it will issue a finding of such condition and either issue a Certificate of Appropriateness (COA) for minor repairs, if appropriate, and/or order that an application for a COA be submitted for repairs requiring a separate hearing before the HPC. Any required time limit for repairs will automatically be adjusted, as needed, to allow the normal COA process.

C. Notice of Violation: When the Historic Preservation Commission finds that a state of "demolition by neglect" exists, a "Notice of Violation" will be sent to the property owner, according to standard town procedures. If an order to submit an application for a COA has been issued by the HPC the "Notice of Violation" will include a statement to that fact and the time allowed for compliance will be appropriately adjusted.

D. Safeguards from Undue Economic Hardship:

1. When a claim of undue economic hardship is made owing to the effects of this article, the Administrator shall notify the Hardship Review Committee (HRC) which shall be made up of the finance director, the planning director and the inspections director or their designees. The HRC shall schedule a hearing on the claim within 15 business days of receipt of the petition by the Administrator.

2. The petitioner shall present the information required by the HRC to determine if an undue economic hardship owing to the effects of a "demolition by neglect" finding has occurred. In the event that any of the required information is not reasonably available to the owner and/or parties in interest and/or cannot be obtained by the owner, the owner shall describe the reasons why such information cannot be obtained. The minimum necessary evidence shall include, but is not limited to:

a. Nature of ownership (individual, business, or non-profit) or legal possession, custody, and control.

b. Financial resources of the owner and/or parties in interest.

c. Estimated cost of repairs.

d. Assessed value of the land and improvements (existing).

e. Real estate taxes for the previous 2 years.

f. Amount paid for the property, date of purchase, and party from whom purchased, including a description of the relationship between the owner and the person from whom the property was purchased, or other means of acquisition of title, such as by gift or by inheritance.

g. Annual debt service, if any, for the previous 2 years.

h. Any listing of the property for sale or for rent, the price asked, and offers received, if any.

3. In addition, for all income-producing properties, the owner and/or parties in interest must also provide the following:

a. Annual gross income from the property for the previous 2 years.

b. Itemized operating and maintenance expenses for the previous 2 years, including proof that adequate and competent management procedures were followed.

c. Annual cash flow, if any, for the previous 2 years.

4. Within 10 business days after the hearing the Hardship Review Committee shall cause to be made a finding of undue or no undue economic hardship and shall provide a copy of the decision to the Administrator and the Historic Preservation Commission. In the event of a finding of no undue economic hardship, the Administrator shall cause to be issued an order for such property to be repaired within the time specified.

5. In the event of a finding of undue economic hardship, the finding may be accompanied by a recommended plan to relieve the economic hardship. This plan may include, but is not limited to the following: property tax relief as may be allowed under North Carolina law, loans or grants from the city, the county, or other public, private, or nonprofit sources, acquisition by purchase, building code modifications, changes in applicable zoning regulations, or obtaining a variance proving sufficient to mitigate the undue economic hardship. The Hardship Review Committee shall report such finding and the recommended plan to the Administrator who will then cause to be issued an order for such property to be repaired within the time specified, and according to the provisions of the recommended plan.

6. Findings made by the Hardship Review Committee may be appealed to the Historic Preservation Commission and shall be heard at its next meeting, within

the limitations of its procedures for applicable deadlines. Decisions of the Historic Preservation Commission may be appealed to the Board of Adjustment.

16.3 PENALTIES FOR VIOLATION AND ENFORCEMENT MECHANISMS

16.3.1 LIABILITIES FOR VIOLATIONS

Pursuant to NCGS §160A-175, any person who erects, constructs, reconstructs, alters, repairs, converts, or maintains any building, structure, sign or sign structure or develops, grades or otherwise alters property in violation of this ordinance, and any person who uses any building, structure, sign or sign structure or land in violation of this ordinance shall be subject to civil and/or criminal penalties.

16.3.2 CIVIL PENALTIES; CIVIL CITATIONS FOLLOWING A NOTICE OF VIOLATION

A. Following the delivery of a notice of violation according to the provisions of 16.1.2, if the alleged violator or property owner does not correct the violation within 10 days, or up to an additional 30 days if an extension is granted in writing by the Administrator or as provided herein, a citation shall be issued in accordance with the town's Comprehensive List of Fees and Charges.

B. If the Administrator notifies a party of a violation, and that violation is remedied but is subsequently reestablished, in whole or in part, within a period of 180 days thereafter, a new notice of violation shall not be reissued. Rather, this shall be considered a continuation of the same violation and the town shall have the ability to immediately issue citations with monetary penalties as if the cessation had never occurred.

16.3.3 PENALTIES FOR UNLAWFUL GRADING, FILLING AND CONSTRUCTION ACTIVITIES

A. Any person who violates any of the erosion and sedimentation control provisions this ordinance and/or who initiates land-disturbing activity except in accordance with the terms, conditions and provisions of an approved erosion control plan, shall be subject to a civil penalty according to the town's Comprehensive List of Fees and Charges.

B. Any person who fails to submit an erosion control plan for approval in accordance with Chapter 12 of this ordinance shall be subject to a single, non-continuing civil penalty according to the town's Comprehensive List of Fees and Charges.

C. Anyone who violates a stop work order issued by the Administrator shall be subject to a civil penalty according to the town's Comprehensive List of Fees and Charges.

D. Each day of a continuing violation of a stop work order issued by the Administrator shall constitute a separate violation.

E. Fines will be determined by considering the degree and extent of harm caused by the violation and the cost of rectifying the damage, the amount of money the violator saved by noncompliance, whether the violation was committed willfully and the prior record of the violator in compliance or failing to comply with grading and filling control standards.

F. The town may require a person who engaged in a land-disturbing activity and failed to retain sediment generated by the activity, as required by G.S. 113A-57 (3), to restore the waters and land affected by the failure so as to minimize the detrimental effects of the resulting pollution by sedimentation. This authority is in addition to

the civil or criminal penalties or injunctive relief authorized elsewhere in this chapter.

G. Notice of violation of a stop work order issued by the Administrator shall be sufficient if directed to the property owner, the agent of the owner, or the contractor in a manner authorized under NCGS Section 1A-1, rule 4(j).

16.3.4 PENALTIES FOR FLOOD DAMAGE PREVENTION VIOLATIONS

Violation of the provisions of the flood damage prevention provisions of this ordinance or failure to comply with any of their requirements, including violation of conditions and safeguards established in connection with grants of variance or special exceptions, shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall, upon conviction thereof, be fined not more than $50.00 or imprisoned for not more than 30 days, or both. Each day such violation continues shall be considered a separate offense. Nothing herein contained shall prevent the Town of Wake Forest from taking such other lawful action as is necessary to prevent or remedy any violation.

16.3.5 PENALTIES FOR STORMWATER VIOLATIONS

The remedies and penalties provided for violations of this ordinance, whether civil or criminal, shall be cumulative and in addition to any other remedy provided by law, and may be exercised in any order.

A. Withholding of Certificate of Occupancy: The Administrator or other authorized agent may refuse to issue a certificate of occupancy for the building or other improvements constructed or being constructed on the site and served by the stormwater practices in question until the applicant or other responsible person has taken the remedial measures set forth in the notice of violation or has otherwise cured the violations described therein.

B. Disapproval of Subsequent Permits and Development Approvals: As long as a violation of this ordinance continues and remains uncorrected, the Stormwater Administrator or other authorized agent may withhold and/or disapprove any request for permit or development approval or authorization provided for by this ordinance.

C. Injunction, Abatements, Etc.: The Stormwater Administrator, with the written authorization of the Town of Wake Forest Board of Commissioners, may institute an action in a court of competent jurisdiction for a mandatory or prohibitory injunction and order of abatement to correct a violation of this ordinance. Any person violating this ordinance shall be subject to the full range of equitable remedies provided in the General Statutes or at common law.

D. Correction as Public Health Nuisance, Costs as Lien, etc.: If the violation is deemed dangerous or prejudicial to the public health or public safety and is within the geographic limits prescribed by NCGS 160A-193, the Stormwater Administrator, with the written authorization of the Town of Wake Forest Board of Commissioners, may cause the violation to be corrected and the costs to be assessed as a lien against the land or premises where the violation occurred or such other property allowed under NCGS 160A-193(b).

E. Stop Work Order: The Stormwater Administrator may issue a stop work order to the person(s) violating this ordinance. The stop work order shall remain in effect until the person has taken the remedial measures set forth in the notice of violation or has otherwise cured the violation or violations described therein. The stop work

order may be withdrawn or modified to enable the person to take the necessary remedial measures to cure such violation or violations.

16.3.6 PENALTIES FOR LANDSCAPING AND MAINTENANCE VIOLATIONS

A. Fines and Stop Work Orders: Fines, stop work orders, and delays in approvals shall apply for disturbing, damaging, removing, excessively pruning, and/or destroying protected vegetation, specimen trees, buffers, streetyards, Tree Save Areas or other landscaped areas as required by this section on private and public property. The table below indicates what type of enforcement mechanism shall be applied in different development scenarios.

Type of Violation		Type of Penalty			
		Payment of Fines	3 Year Delay in Approvals	5 Year Delay in Approvals	Replacement of Vegetation from Protected Areas
Exempt Property	Any existing vegetation removed from protected areas		●		●
Non-Exempt Property	Less than 75% of existing vegetation removed from protected areas	●	●		●
	75% or more of existing vegetation removed from protected areas	●		●	●

B. Calculation of Fines:

1. Fines shall be calculated according to the Comprehensive List of Fees and Charges, based on the square footage of the Critical Root Zone occupied by the damaged or removed vegetation within any areas required to be protected under this section, including but not limited to: Tree Save Areas, riparian buffer zones, buffers, streetyards, vehicular use areas, and other landscape areas. In determining the amount of the fine, the Administrator shall consider the degree and extent of harm caused by the violation, the cost of rectifying the damage, and whether the violation was committed willfully. Payment of these fines shall be made to the town at a time deemed appropriate by the Administrator.

2. A base fine per tree for any tree excessively pruned shall be applied in addition to the replacement of plant material using the "inch for inch" standard as determined by the Administrator.

16.3.7 CIVIL PENALTIES; RECOVERY OF CIVIL PENALTIES

The town may recover penalties in a civil action in the nature of a debt if the offender does not pay the penalty within 72 hours after being provided with a citation pursuant to Section 16.3. In addition, failure to pay the civil penalty within 72 hours may subject the violator to an additional citation and/or criminal charges after being provided with a citation pursuant to Section 16.3.

16.3.8 CRIMINAL PENALTIES

Pursuant to NCGS §14-4, any person, firm, or corporation convicted of violating the provisions of this ordinance shall, upon conviction, be guilty of a misdemeanor and shall be fined an amount consistent with the General Statutes.

16.3.9 INJUNCTIVE OR OTHER RELIEF

A. In addition to, in combination with, or in lieu of, the other remedies set forth in this chapter, the Administrator, in the event of a violation of this ordinance, may request that the Town Attorney institute in a court of competent jurisdiction, an injunctive action, mandamus action, or other appropriate proceeding necessary to abate or prevent the violation and/or the completion or occupation of such building or structure, or use of land.

B. The institution of an action for injunctive or other relief under this sub-section shall not relieve any party to such proceeding form any civil or criminal penalty prescribed by this chapter for violations of this ordinance.

16.3.10 EQUITABLE REMEDY

In addition to the civil penalties set out above, any provision of this ordinance may be enforced by an appropriate equitable remedy issuing from a court of competent jurisdiction. The Administrator may apply to a judicial court of law for any appropriate equitable remedy to enforce the provisions of this ordinance. It is not a defense to the Administrator's application for equitable relief that there are other remedies provided under general law or this ordinance.

16.3.11 ORDER OF ABATEMENT

In addition to an injunction, the Administrator may apply for and the court may enter into an order of abatement as part of the judgment in the case. An order of abatement may direct any of the following actions:

A. Buildings or other structures on the property be closed, demolished, or removed;

B. Fixtures, furniture or other moveable property be moved or removed entirely;

C. Grass and weeds be cut or the property otherwise maintained;

D. Improvements alterations, modifications or repairs be made; or

E. Any other action be taken that is necessary to bring the property into compliance with this ordinance.

16.3.12 EXECUTION OF COURT DECISIONS

A. Failure to Comply with an Injunction or Order of Abatement: If the defendant fails or refuses to comply with an injunction or with an order of abatement within the time allowed by the court, he may be cited for contempt and the town may execute the order of abatement. The town shall have a lien on the property for the cost of executing an order of abatement, in the nature of a mechanic's or materialman's lien.

B. Cancellation of an Order of Abatement: The defendant may secure cancellation of an order of abatement by paying all costs of the proceedings and by posting a bond for compliance with the order. The bond must be given with sureties approved by the Clerk of Superior Court in an amount approved by the judge before whom the matter was heard and shall be conditioned on the defendant's full compliance with the terms of the order of abatement within the time fixed by the judge. Cancellation of an order of abatement does not suspend or cancel an injunction issued in conjunction with the order.

16.3.13 REVOCATION OF PERMITS

In the event of a violation of any regulation of this ordinance, the Administrator may stop any development of, use of, or activity on property by the revocation of applicable permits. The Administrator may revoke any permit (e.g. Building Certificate of Occupancy) by written notification to the permit holder when violations of this ordinance have occurred. Permits may be revoked when false statements or misrepresentations were made in securing the permit, work is being or has been done in substantial departure from the approved application or plan, there has been a failure to comply with the requirements of this ordinance, or a permit has been mistakenly issued in violation of this ordinance.

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17 DEFINITIONS

17.1 INTENT

For the purpose of interpreting this ordinance, certain words, concepts, and ideas are defined herein. Except as defined herein, all other words used in this ordinance shall have their everyday meaning as determined by their dictionary definition.

17.2 RULES OF CONSTRUCTION

The words and phrases in this chapter shall have their customary meanings or shall be as defined in a standards dictionary, except for the specific words and phrases defined in this chapter.

- Tense. Words used in the present tense include the future tense.
- Number. The singular number includes the plural number and the plural number includes the singular number.
- Person. The word "person" includes a firm, association, partnership, trust, company, corporation or any other entity usually defined in legal usage as a person.
- Shall and May. The words "shall," "must," and "will" are mandatory in nature. The word "may" is permissive in nature.
- Used or occupied. The words "used" and "occupied" include the words "intended, designed, or arranged to be used or occupied."
- Lot. The word "lot" includes the words "plot" and/or "parcel."
- Structure. The word "structure" includes the word "building."
- On the Premises Of. The phrase "on the premises of," as applied to accessory uses or structures, shall be interpreted to mean "on the same lot."
- The parenthetical notation "*(Floodplain Development)*" shall indicate defined terms that apply only to the application and administration of the Flood Damage Prevention provisions of this ordinance.
- LBCS – American Planning Association Land-based Classification Standards
- NCGS – North Carolina General Statutes
- NAICS – North American Industrial Classification System

17.3 USE DEFINITIONS

ACCESSORY USE OR STRUCTURE A use or structure that is clearly incidental to and customarily found in connection with a principal building or use, is located on the same parcel and serves a principal building or use, and is subordinate in area, extent and purpose to the principal building or principal use served.

ADULT ESTABLISHMENT Any establishment having a substantial portion of materials or entertainment characterized by an emphasis on sexual activities, anatomical genital areas, or the female breast as listed and defined in NCGS, Section 14.210.10 (or any successor thereto).

AIRSTRIP A paved surface used for take-off and landing of aircraft.

ALCOHOLIC BEVERAGE SALES STORE The retail sales of beer, wine, and/or other alcoholic beverages for off-premise consumption as a primary use.

ALLEY A public way which affords only a secondary means of access to abutting property

and is not intended for general traffic circulation.

AMUSEMENTS, INDOOR Establishments that provide commercial recreation activities completely within an enclosed structure such as video arcades, skating rinks, roller rinks, shooting ranges, bowling alleys, and billiards/pool halls.

AMUSEMENTS, OUTDOOR Establishments that provide commercial recreation activities primarily outdoors such as miniature golf establishments; go-cart facility; theme parks, carnivals, fairgrounds, and midways; paintball parks; and water rides.

ANIMAL PRODUCTION Industries in the Animal Production subsector raise or fatten animals for the sale of animals or animal products. The subsector comprises establishments, such as ranches, farms, and feedlots primarily engaged in keeping, grazing, breeding, or feeding animals. These animals are kept for the products they produce or for eventual sale. The animals are generally raised in various environments, from total confinement or captivity to feeding on an open range pasture. Establishments primarily engaged in the farm raising and production of aquatic animals or plants in controlled or selected aquatic environments are included in this subsector.

ATM Computerized, self-service machines used by banking customers for financial institutions, including deposits, withdrawals and fund transfers, without face-to-face contact with financial institution personnel. These machines may be located at or within banks, or in other locations.

BACKYARD PENS/COOPS The long-term keeping of fowl, rabbits, and other similar small creatures in backyards as accessory uses to existing residential structures.

BANKS, CREDIT UNIONS, FINANCIAL SERVICES Establishments that engage in financial transactions that create, liquidate, or change ownership of financial services. Banks, credit unions, and savings institutions may perform central banking functions, accept deposits, and lend funds from these deposits. In addition to banks and credit unions, financial services institutions may include: credit agencies, trust companies, holding companies, savings and loan institutions, check cashing services, securities/commodity contract brokers and dealers, security and commodity exchanges, vehicle finance (equity) leasing agencies, and investment companies.

BAR/TAVERN A business where alcoholic beverages are sold for on-site consumption, which are not part of a larger restaurant. Includes bars, taverns, pubs, and similar establishments where any food service is subordinate to the sale of alcoholic beverages. May also include beer brewing as part of a microbrewery and other beverage tasting facilities.

BED AND BREAKFAST HOMES (UP TO 8 ROOMS) A private home containing not more than 8 guest rooms that offers bed and breakfast accommodations to guests.

BOARDING OR ROOMING HOUSE (12 OR LESS PERSONS) A detached residential structure that has been converted for use as group living quarters for no more than 12 people.

BUSINESS SUPPORT SERVICES These establishments provide any of the following: document preparation, telephone answering, telemarketing, mailing (except direct mail advertising), court reporting, and steno typing. They may operate copy centers, which provide photocopying, duplicating, blueprinting, or other copying services besides printing. They may provide a range of support activities, including mailing services, document copying, facsimiles, word processing, on-site computer rental, and office product sales.

CEMETERY A parcel of land used for internment of the dead in the ground or in mausoleums.

CHILD/ADULT DAY CARE CENTER (MORE THAN 8 PERSONS) An individual, agency, or organization providing supervision or care on a regular basis for children or adults who are not related by blood or marriage to, and who are not the legal wards or foster children of, the supervising adults; and who are not residents in the center; designed and approved to accommodate more than 8 children or adults at a time based on State regulations; not an accessory to residential use.

CHILD/ADULT DAY CARE HOME (8 OR LESS PERSONS) Supervision or care provided on a regular basis as an accessory use within a principal residential dwelling unit, by a resident of the dwelling, for no more than 8 children (no more than 5 of which may be of pre-school age).

CIVIC MEETING FACILITIES Not-for-profit membership organizations such as alumni associations, booster clubs, scouting organizations, ethnic associations, social clubs, fraternal lodge and veterans' membership organizations primarily engaged in promoting the civic and social interests of their members. The uses often include meeting and storage facilities.

COLLEGE/UNIVERSITY Junior colleges, colleges, universities, and professional schools with physical structures (excluding online and remote programs). These establishments furnish academic or technical courses and grant degrees, certificates, or diplomas at the associate, baccalaureate, or graduate levels in a campus setting in more than one building.

COMMUNITY/CULTURAL CENTER Facilities designed to promote cultural advancement and serve the community such as occasional live theater, dance, or music establishments; art galleries, studios and museums; non-profit civic or fraternal organizations; museums, exhibition, or similar facility; and libraries.

COMMUNITY SUPPORT FACILITY A permanent, stand-alone support facility providing personal assistance to individuals in need; such assistance to individuals may include temporary shelter, food services provisions, counseling, instruction, medical services, and other incidental services. This definition does not include emergency/hazard Shelters or clothing/food collection centers as accessory uses.

CONFERENCE/CONVENTION FACILITY A commercial facility for public assembly including, but not limited to auditoriums, conference facilities, convention centers, exhibition halls, and the like.

CORRECTIONAL INSTITUTION Government establishments generally designed for the confinement, correction, and rehabilitation of offenders sentenced by a court.

DORMITORY A building used as group living quarters for a student body or religious order as an accessory use for a college, university, boarding school, convent, monastery or other similar public, semi-public use.

DRIVE-THRU/DRIVE-IN FACILITY A primary or accessory facility where goods or services may be obtained by motorists without leaving their vehicles. These facilities include drive-through bank teller windows, dry cleaners, fast-food restaurants, drive-through coffee, photo stores, pharmacies, etc. Does not include: Automated Teller Machines (ATMs), gas stations or other vehicle services, which are separately defined.

DRY CLEANING & LAUNDRY SERVICES Coin-operated laundries, dry cleaning pick-up stores without dry cleaning equipment, or dry cleaning stores that do not provide cleaning services to other collection stations or stores.

DWELLING-ACCESSORY A dwelling unit either detached or attached, such as a garage apartment or cottage, located on a lot with an existing single-family dwelling.

DWELLING-DUPLEX A two-unit building that is divided horizontally or vertically, and each unit has a separate entrance from the outside or through a common vestibule.

DWELLING-MULTIFAMILY A building or portion thereof containing 3 or more dwelling units on a single lot where each unit has a separate entrance from the outside or through a common vestibule. A multifamily structure where dwelling units are available for lease or rent for less than one month shall be considered lodging.

DWELLING-SINGLE FAMILY A free standing building designed for and/or occupied by one household. These residences may be individually owned as residences or residences owned by rental or management companies. Also includes factory-built, modular housing units that comply with NC State Building Code.

FAMILY CARE HOME (6 OR FEWER RESIDENTS) A home with support and supervisory personnel that provides room and board, personal care and rehabilitation services in a family environment for not more than 6 resident handicapped persons and is certified by the State of North Carolina. (NCGS 168-21)

FUNERAL HOMES/CREMATORIUMS Establishments for preparing the dead for burial or internment and conducting funerals (i.e. providing facilities for wakes, arranging transportation for the dead, and selling caskets and related merchandise).

GARDEN (COMMUNITY AND PRIVATE) An exterior area for the small-scale production of vegetables and flowering plants for personal or small commercial use. This definition includes community and private gardens. This definition does not include crop production and nurseries.

GAS / FUELING STATION Establishment that primarily retails automotive fuels. These establishments may further provide services such as automotive repair, automotive oils, and/or replacement parts and accessories. Gas stations include structures that are specialized for selling gasoline with storage tanks, often underground or hidden. The sale of food and other items as well as car washes shall be incidental to the gas station.

GENERAL COMMERCIAL – USE GREATER THAN 100,000 SF A use category allowing general commercial premises greater than 100,000 square feet in gross leasable area to be available for the commercial sale of merchandise and prepared foods, but excluding manufacturing.

GENERAL COMMERCIAL A place of business providing the sale and display of goods or sale of services directly to the consumer, with goods available for immediate purchase and removal from the premises by the purchaser.

HALFWAY HOUSES A place where persons are aided in readjusting to society following a period of imprisonment, hospitalization or institutionalized treatment related to a criminal offense.

HEAVY EQUIPMENT/MANUFACTURED HOME RENTAL/SALES Establishments which may have showrooms or open lots for selling, renting or leasing heavy equipment such as buses, trucks, manufactured homes, construction equipment, or boats or marine craft.

HOME OCCUPATION An occupation or profession conducted within a dwelling unit or accessory building by a residing family member that is incidental to the primary use of the dwelling as a residence. Home Occupations are small and quiet non-retail businesses generally invisible from the frontage, seldom visited by clients, requiring little parking, little or no signage, and having only one or two employees and provide services such as professional services, music instruction, and hair styling. Home Occupations include produce stands and day care centers where daytime care is provided to less than 6 children who are not the legal wards or foster children of the attendant adult within an owner-occupied residence.

HOSPITAL A health care facility and related facilities the purpose of which is to provide for care, treatment, testing for physical, emotional, or mental injury, illness, or disability, and overnight boarding of patients, either on a for-profit or not-for-profit basis; but not including group homes.

HOTEL/INN (NO ROOM LIMIT) Establishments providing lodging and short-term accommodations for travelers. They may offer a wide range of services including, overnight sleeping space, food services, convention hosting services, and/or laundry services. Entertainment and recreation activities may also be included. Extended-stay hotels are included in this category. This definition includes "motels."

HOTEL/INN (LESS THAN 20 ROOMS) Any building or group of buildings in which there are fewer than 20 guest rooms used for the purposes of offering public lodging on a day-to-day basis.

INDUSTRY, HEAVY A non-residential use that requires a National Pollutant Discharge Elimination System (NPDES) permit for an industrial or stormwater discharge; or that involves the use or storage of any hazardous materials or substances; or that is used for the purpose of manufacturing, assembling, finishing, cleaning or developing any product or commodity; or that involves the mining or extraction of any minerals, ore, fossil fuels, or other materials from beneath the surface of the earth. Typically the largest facilities in a community, these structures house complex operations, some of which might be continuous (operated 24 hours a day, 7 days a week).

INDUSTRY, LIGHT A non-residential use that involves the manufacturing, assembling, finishing, cleaning or developing any product or

commodity. Facilities are typically designed to look and generate impacts like a typical office building, but rely on special power, water, or waste disposal systems for operation. Noise, odor, dust, and glare of each operation are completely confined within an enclosed building, insofar as practical. This includes medical and testing laboratories. This definition also includes facilities for scientific research, and the design, development, and testing of electrical, electronic, magnetic, optical, computer and telecommunications components in advance of product manufacturing, and the assembly of related products from parts produced off-site, where the manufacturing activity is secondary to the research and development activities. Also included are laundry/dry cleaning plants as principal uses engaged primarily in high volume laundry and garment services, including: carpet and upholstery cleaners; diaper services; dry-cleaning and garment pressing; and commercial laundries.

INTERNET SWEEPSTAKES FACILITIES Any business enterprise where persons utilize computers, gaming terminals, or other electronic machines to conduct games of chance, including sweepstakes, and where cash, merchandise or other items of value are redeemed or otherwise distributed, whether or not the value of such distribution is determined by electronic games played or by predetermined odds. This does not include any lottery approved by the State of North Carolina.

KENNELS, OUTDOOR A use or structure intended and used for the breeding or accommodation of small domestic animals for sale or for the training or overnight boarding of animals for persons other than the owner of the lot, but not including a veterinary clinic in which the overnight boarding of animals is necessary for or accessory to the testing and medical treatment of the physical disorders of animals. (LBCS F2700)

LANDFILL A disposal facility for hazardous or nonhazardous solid waste. These establishments also manage recycling and resource recovery facilities that operate in conjunction with landfills.

LIGHT MANUFACTURING WORKSHOPS The assembly, fabrication, production or processing of goods and materials using processes that ordinarily do not create noise, smoke, fumes, odors, glare, or health or safety hazards outside of the building and are visually undifferentiated from an office building or a residentially-scaled garage. These typically involve the work of artisans or craftsman. May also include beer brewing or other similar facilities as part of a microbrewery and other beverage tasting facilities.

LIVE-WORK UNITS An attached residential building type with a small commercial enterprise on the ground floor and a residential unit above or behind with a common tenant in both spaces (no dual occupancy is permitted).

MANUFACTURED HOME PARK The location of 2 or more manufactured or mobile homes on a parcel of land shall constitute a manufactured home park.

MANUFACTURED HOUSING A structure that: (a) consists of a single unit completely assembled at the factory or of multiple principal components totally assembled at the factory and joined together at the site; (b) is designed so that the total structure (or in the case of a double-wide or triple-wide, each component thereof) can be transported on its own chassis; (c) is over 40 feet long and over 10 feet wide; and, (d) is originally designed for human occupancy and provides complete, independent living facilities for one family when connected to required utilities.

MANUFACTURED HOUSING-CLASS A A manufactured home constructed after July 1, 1998 that meets or exceeds the construction standards promulgated by the US Department of Housing and Urban Development authorized under the National Manufactured Housing Construction and Safety Standards Act of 1974 that were in effect at the time of construction, and has a HUD label attached.

MANUFACTURED HOUSING-CLASS B A double-wide manufactured home constructed to meet or exceed the construction standards promulgated by the US Department of Housing and Urban Development authorized under the National Manufactured Housing Construction and Safety Standards Act of 1974 that were in effect at the time of construction and has a HUD label attached, but does not meet the criteria of a Class A Manufactured Home.

MANUFACTURED HOME-CLASS C A single-wide manufactured home constructed to meet

or exceed the construction standards promulgated by the US Department of Housing and Urban Development authorized under the National Manufactured Housing Construction and Safety Standards Act of 1974 that were in effect at the time of construction and has a HUD label attached.

MATERIALS RECOVERY & WASTE TRANSFER FACILITIES This industry comprises establishments primarily engaged in a) operating facilities for separating and sorting recyclable materials from nonhazardous waste streams (i.e., garbage) and/or b) operating facilities where commingled recyclable materials, such as paper, plastics, used beverage cans, and metals, are sorted into distinct categories.

MEDICAL CLINIC Medical service facilities that provide outpatient ambulatory or outpatient health care such as emergency medical clinics; ambulatory surgical centers; dialysis centers; outpatient family planning services; community health centers and clinics; blood and organ banks; and medical services such as physician's and dentist's offices.

MONOPOLE WIRELESS COMMUNICATIONS TOWER A wireless communication support structure that consists of a freestanding support structure erected to support wireless communication antennas and connecting appurtenances. This term shall not include any antenna that is under 35 feet in height and is owned and operated by a federally licensed amateur radio station operator or is used exclusively for receive only antennas.

NIGHT CLUB A business that operates primarily in the evening hours that principally provides entertainment such as live music, and/or dancing, comedy, etc.

NURSERIES & GARDEN CENTERS Industries in the nursery and garden center subsector grow crops mainly for commercial food and fiber. The subsector comprises establishments, such as farms, orchards, groves, greenhouses, and nurseries, which are primarily engaged in the commercial production of crops, plants, vines, or trees and their seeds.

OPEN AIR RETAIL A retail sales establishment operated primarily in the open air including, but not limited to: farmers market, flea markets, sidewalk kiosks and the like. Uses not included are: car sales, equipment sales, boats sales, and home and garden supplies and equipment.

OUTSIDE OR DISPLAY SALES The sale of goods and products outside of a permanent structure that are clearly related to the function contained in that structure. This includes, but is not limited to, landscape materials, lawn and garden supplies, and produce.

OUTSIDE STORAGE The storage of any material for a period greater than 48 hours, including items for sale, lease, processing and repair (excluding vehicles for sale) outside the principal or accessory buildings on a property.

PARKING LOT/STRUCTURE – PRINCIPAL USE A stand-alone parking lot or structure (deck/garage) that is available for public or private use, but that is not accessory to another use.

PAWNSHOPS Premises operated by a pawnbroker who is engaged in the business of lending money on the security of pledged goods and who may also purchase merchandise for resale from dealers and traders. (Subject to NCGS, Chapter 91A)

PERSONAL SERVICES Cosmetic services such as hair and nail salons, barber shops, clothing alterations, shoe repair, weight loss centers and non-permanent makeup services.

PERSONAL SERVICES, RESTRICTED A personal service establishment that may tend to have a blighting and/or deteriorating effect upon surrounding areas and that may need to be dispersed from other similar uses to minimize its adverse impacts, including check-cashing services and tattooing, piercing, and similar services. These uses may also include accessory retail sales of products related to the services provided.

PERSONAL WIRELESS FACILITY See "Wireless Telecommunications Facility."

POST OFFICE Establishments conducting operations of the United States Postal Service including permanent, contract, and lease stations.

PRODUCE STANDS A temporary open air stand or place for the seasonal selling of agricultural produce by an individual (excludes Open Air Retail).

PROFESSIONAL SERVICES Services provided that make available the knowledge and skills of their employees to sell expertise and perform professional, scientific, and technical services to others such as legal services; accounting, tax, bookkeeping, and payroll services; architectural, engineering, and related services; graphic, industrial, and interior design services; consulting services; research and development services; advertising, media, and photography services; real estate services; investment banking, securities, brokerages; and insurance-related services.

PUBLIC SAFETY STATION Facilities for federal, state and local law enforcement and fire protection agencies, and their accessory uses including office space, temporary holding cells, equipment and evidence storage facilities, and vehicle garages. This definition is not intended to be inclusive of vehicle impoundment lots or state prison facilities.

RACETRACK An outdoor course prepared for horse, dog, automobile, or other vehicle racing.

RECREATION FACILITIES, INDOOR Uses or structures for active recreation including gymnasiums, natatoriums, fitness center, athletic equipment, indoor running tracks, climbing facilities, court facilities and their customary accessory uses. This definition is inclusive of both non-profit and for-profit operations.

RECREATION FACILITIES, OUTDOOR Parks and other open space used for active or passive recreation such as ball fields, batting cages, skateboard parks, playgrounds, greenway trails, driving ranges, tennis courts, riding stables, campgrounds, and golf courses and their customary accessory uses including, but not limited to, maintenance sheds, clubhouses (with or without food service), pools, restrooms, and picnic shelters. This definition is inclusive of both non-profit and for-profit operations.

RECYCLING COLLECTION STATIONS A center for the acceptance by donation, redemption, or purchase, of recyclable materials from the public.

RELIGIOUS INSTITUTION Any facility such as a church, temple, monastery, synagogues, or mosque used for worship by a non-profit organization and their customary related uses for education (pre-schools, religious education, etc.), recreation (gymnasiums, activity rooms, ball fields, etc.), housing (rectory, parsonage, elderly or disabled housing, etc.) and accessory uses such as cemeteries, mausoleums, offices, soup kitchens, and bookstores.

RESIDENTIAL CARE FACILITIES A staffed premises (not a single-family dwelling) with paid or volunteer staff that provides full-time care to more than 6 individuals. Residential care facilities include group homes (NCGS §131D), nursing homes (NCGS § 131E-101), residential child-care facilities (NCGS § 131D-10.2), assisted living residences (NCGS § 131D-2), adult care homes (NCGS §131D-2), retirement housing, congregate living services, assisted living services, continuing care retirement centers, skilled nursing services and orphanages. This term excludes family care homes and halfway houses.

RESTAURANT A retail business selling ready-to-eat food and/or beverages for on or off-premise consumption. Customers may be served from an ordering counter (i.e. cafeteria or limited service restaurant); at their tables (full-service restaurant); and, at exclusively pedestrian-oriented facilities that serve from a walk-up ordering counter (snack and/or nonalcoholic bars). To qualify as a restaurant, an establishment's gross receipts from food and nonalcoholic beverages shall be not less than 30% of the total gross receipts from food, nonalcoholic beverages, and alcoholic beverages.

RIDING STABLES An establishment where horses are boarded and cared for, and where instruction in riding, jumping and showing and/or the hiring of horses for riding is offered.

SCHOOLS – ELEMENTARY & SECONDARY A public or private institution for education or learning including athletic or recreational facilities, which does not include lodging. This institution includes any school licensed by the state and that meets the state requirements for elementary and secondary education.

SCHOOLS – VOCATIONAL/TECHNICAL A public or private institution for education or learning including athletic or recreational facilities, which does not include lodging. These schools offer vocational and technical training in a variety of technical subjects and trades. Training may lead to job-specific certification. (LBCS F6100 and F6140)

SHOOTING RANGE, OUTDOOR A permanently located and improved area that is designed and operated for the use of rifles, shotguns, pistols, silhouettes, skeet, trap, black powder or any other similar sport shooting in an outdoor environment. Shooting range exclude any area for the exclusive use of archery or air guns or enclosed indoor facility that is designed to offer a totally controlled shooting environment and that includes impenetrable walls, floor and ceiling, adequate ventilation, lighting systems and acoustical treatment for sound attenuation suitable for the range's approved use.

SMALL EQUIPMENT REPAIR/RENTAL The repair and/or rental of small equipment as a primary use including televisions, computers, cleaning equipment, vacuum cleaners, and other equipment that can be transported by automobile, small truck/van.

SPORTS ARENA/STADIUM A structure that is open or enclosed and used for games, concerts, and major events and is partly or completely surrounded by tiers of seats for spectators.

STORAGE-OUTDOOR STORAGE YARD The storage of various materials outside of a structure, as a principal use. This includes salvage yards used for the storage and/or collection of any type of equipment.

STORAGE – SELF-SERVICE A building containing separate enclosed storage spaces of varying sizes leased or rented on an individual basis.

STORAGE-WAREHOUSE, INDOOR STORAGE Facilities for the storage of furniture, household goods, or other commercial goods of any nature. Includes cold storage. Does not include warehouse, storage, or mini-storage facilities offered for rent or lease to the general public; warehouse facilities primarily used for wholesaling and distribution; or terminal facilities for handling freight.

STUDIO – ART, DANCE, MARTIAL ARTS, MUSIC Small facilities for individual and group instruction and training in the arts; production rehearsal; photography, and the processing of photographs produced only by users of the studio facilities; martial arts training studios; gymnastics, yoga, and similar instruction; and aerobics and gymnastics studios with no other fitness facilities or equipment.

SWINE FARMS A tract of land devoted to raising 250 or more animals of the porcine species.

TEMPORARY USE A land use on an individual parcel or site established for a limited and fixed period of time for a purpose which may not normally be permitted in a zoning district, or which does not meet all zoning requirements, but which is necessary in special situations.

THEATER, INDOOR MOVIE OR LIVE PERFORMANCE A specialized theater for showing movies or motion pictures on a projection screen or a stage for live performances. This category also includes cineplexes and megaplexes, complex structures with multiple movie theaters, each theater capable of an independent performance.

THEATER, OUTDOOR An establishment for the performing arts with open-air seating for audiences.

THEATER, DRIVE-IN A specialized outdoor theater for showing movies or motion pictures on a projection screen where patrons view movies from their vehicles.

UTILITIES Publicly or privately owned facilities or systems for the distribution of gas, electricity, steam, or water, the collection, treatment and disposal of sewage or refuse; the transmission of communications; of similar functions necessary for the provision of public services. Radio transmission facilities less than 180 feet in height for use by ham radio operators or two-way radio facilities for business or governmental communications shall be deemed accessory uses and not utilities. Utilities are divided into 3 classes:

Class 1: Transmission and collection lines (above and below ground) including electrical, natural, gas, waste water collection/transmission, and water distribution lines; pumping stations, lift stations, and telephone switching facilities (up to 200 sq. ft).

Class 2: Elevated water storage tanks; water and wastewater package treatment plants, telephone switching facilities (over 200 sq. ft), substations, or other similar facilities in connection with telephone, electric, steam, and water facilities.

Class 3: Generation, production, or treatment facilities such as power plants,

water and sewage plants (greater than 0.3 mgd), and landfills.

VEHICLE RENTAL/LEASING/SALES Establishments which may have showrooms or open lots for selling, renting or leasing automobiles, light trucks, motorcycles, and ATVs.

VEHICLE RENTAL/LEASING – MOVING TRUCKS Establishments exclusively for renting or leasing trucks, vans, and trailers for moving furniture and other goods.

VEHICLE SERVICES – MAJOR REPAIR/BODY WORK The repair, servicing, alteration, restoration, towing, painting, cleaning, or finishing of automobiles, trucks, recreational vehicles, boats, large appliances, commercial and industrial equipment and other vehicles as a primary use, including the incidental wholesale and retail sale of vehicle parts as an accessory use. This includes major repair and body work which encompasses towing, collision repair, other body work and painting services, and tire recapping.

VEHICLE SERVICES – MINOR MAINTENANCE/REPAIR The repair, servicing, alteration, restoration, towing painting, cleaning, or finishing of automobiles, trucks, recreational vehicles, boats and other vehicles as a primary use, including the incidental wholesale and retail sale of vehicle parts as an accessory use. Minor facilities providing limited repair and maintenance services. Examples include: car washes, attended and self-service; car stereo and alarm system installers; detailing services; muffler and radiator shops; quick-lube services; tire and battery sales and installation (not including recapping).

VETERINARY SERVICES Establishments that include services by licensed practitioners of veterinary medicine, dentistry, or surgery for animals; boarding services for pets; and grooming.

WHOLESALING AND DISTRIBUTION Establishments engaged in selling merchandise to retailers; to contractors, industrial, commercial, institutional, farm or professional business users; to other wholesalers; or acting as agents or brokers in buying merchandise for or selling merchandise to such persons or companies. This does not include selling to the public. Examples of these establishments include:

- Agents, merchandise or commodity brokers, and commission merchants;
- Assemblers, buyers and associations engaged in the cooperative marketing of farm products;
- Merchant wholesalers;
- Stores primarily selling electrical plumbing, heating, and air conditioning supplies and equipment.

WIRELESS TELECOMMUNICATIONS FACILITY (WTF) A structure, facility or location designed, or intended to be used as, or used to support antennas or other transmitting or receiving devices. This includes without limit, towers of all types, kinds and structures, including, but not limited to buildings, church steeples, silos, water towers, signs or other structures that can be used as a support structure for antennas or the functional equivalent of such. It further includes all related facilities and equipment, including but not limited to cabling, equipment shelters and other structures associated with the site. It is a structure and facility intended for transmitting and/or any form or type of wireless communications or service, including but not limited to commercial radio, television, cellular, SMR, paging, 911, Personal Communications Services (PCS), commercial satellite services, microwave services and any commercial wireless telecommunication service not licensed by the FCC.

WIRELESS TELECOMMUNICATIONS FACILITY (NON-TOWER) A Wireless Telecommunication Facility not located on a structure designed primarily to support an antenna for receiving and/or transmitting a wireless signal.

17.4 DEFINITIONS GENERALLY*

Note – The parenthetical notation "(Floodplain Development)*" shall indicate defined terms that apply only to the application and administration of the Flood Damage Prevention provisions of this ordinance.

1-YEAR, 24-HOUR STORM The surface runoff resulting from a 24-hour rainfall of an intensity expected to be equaled or exceeded, on average, once in 12 months and with a duration of 24 hours

ACCELERATED EROSION Any increase over the rate of natural erosion as a result of land-disturbing activities.

ACTIVE CONSTRUCTION Activities that contribute directly to the building of facilities including land-disturbing activities for roads, parking lots, footings, etc.

ADDITION *(FLOODPLAIN DEVELOPMENT)* An extension or increase in the floor area or height of an existing building or structure.

ADEQUATE EROSION CONTROL MEASURE, STRUCTURE, OR DEVICE A measure, structure or device that controls the soil material within the land areas under responsible control of the person conducting the land-disturbing activity.

ADMINISTRATOR For the purposes of this ordinance, the Planning Director, the Director of Public Works and Utilities, the Director of Engineering, and their subordinate staffs are collectively referred to as the Administrator.

AFFILIATE A person that directly or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control of another person.

ALLEY A minor right-of-way privately or publicly owned, primarily for service or garage access.

AMBER LIGHTING Any non-white color lighting similar to the color of high-pressure sodium lighting and with a temperature rating of less than 2,700 Kelvin.

ANSI STANDARDS Standards published by the American National Standards Institute (ANSI), a private, non-profit organization [501(c)(3)] that administers and coordinates the U.S. voluntary standardization and conformity assessment system. More information is available at www.ansi.org.

ANTENNA A system of electrical conductors that transmit or receive electromagnetic waves or radio frequency or other wireless signals. Antennas may or may not be contained within a radome.

AWNING/CANOPY SIGN Signs integrated into traditional storefront awnings that project over a sidewalk from the building façade.

BASE FLOOD *(FLOODPLAIN DEVELOPMENT)* The flood having a 1% chance of being equaled or exceeded in any given year based on current conditions hydrology.

BASE FLOOD ELEVATION (BFE) *(FLOODPLAIN DEVELOPMENT)* A determination of the water surface elevations of the base flood based on current conditions hydrology as published in the Flood Insurance Study. When the BFE has not been provided in a "Special Flood Hazard Area", it may be obtained from engineering studies available from a Federal or State other source using FEMA approved engineering methodologies.

BASEMENT *(FLOODPLAIN DEVELOPMENT)* Any area of a building having its floor subgrade (below ground level) on all sides.

BERM An earthen mound designed to provide visual interest, screen undesirable views, and/or decrease noise.

BEST MANAGEMENT PRACTICES (BMP) Management and structural practices designed to reduce the quantities of pollutants washed by rain and snow melt into nearby waters.

BONA FIDE FARM PURPOSES Includes the production and activities relating or incidental to the production of crops, fruits, vegetables, ornamental and flowering plants, dairy, livestock, poultry, and all other forms of agriculture as defined in NCGS 106-581.1 and all other purposes described in NCGS 153A-340.b.2.

BORROW Fill material that is required for on-site construction and is obtained from other locations.

BUFFER A combination of physical space and vertical elements, such as plantings or fencing,

used to separate and screen incompatible land uses form each other.

BUFFERYARD The area of a required buffer in which plantings or other screening elements are to be located.

BUILDING Any structure built for support, shelter or enclosure for any occupancy or storage.

BUILDING SETBACK LINE (MINIMUM) See "Setback (Minimum)."

BUILDING FLOOR AREA The gross floor area of an individual structure built for support, shelter or enclosure for any occupancy or storage.

BUILT-UPON AREA (BUA) That portion of a development project that is covered by impervious or partially impervious surface including, but not limited to, buildings; pavement and gravel areas such as roads, parking lots, and paths; and recreation facilities such as tennis courts. "Built-upon area" does not include a wooden slatted deck, the water area of a swimming pool, or pervious or partially pervious paving material to the extent that the paving material absorbs water or allows water to infiltrate through the paving material.

CAMOUFLAGE See "Stealth."

CANOPY TREE Large-growing, shade-producing trees with an expected mature height of 40 feet or greater and an expected mature crown spread of 30 feet or greater.

CARRIER OR WIRELESS CARRIER An entity licensed by the FCC to provide Personal Wireless Service.

CEASE ORDER See "Stop Work Order"

CERTIFICATE OF COMPLETION FOR SOIL EROSION AND SEDIMENTATION CONTROL A certificate issued by the Town of Wake Forest Engineering Department indicating that the permittee has achieved acceptable stabilization in accordance with the approved plan and has completed all work necessary on the site related to soil erosion. All land-disturbance shown on the approved plan is stabilized with permanent ground cover, permanent armor, or impervious surface. All proposed roads, utilities, permanent erosion control devices, and other infrastructure are installed as per approved plans. All temporary sediment control devices required by the approved plan are removed.

CERTIFICATE OF COMPLIANCE FOR PRELIMINARY SOIL EROSION AND SEDIMENTATION CONTROL A certificate issued by the Town of Wake Forest Engineering Department indicating that the erosion control devices shown on the approved plan have been constructed correctly and are operating correctly.

CERTIFIED ARBORIST An individual who has successfully completed the International Society of Arboriculture (ISA) exam process.

CHANGE OF USE For the purposes of this UDO only this term shall mean any alteration in the use of a lot or structure which, in the determination of the Administrator, changes the primary use such lot or property from one use type listed in the Use Table in Section 2.3.3 to another use type.

CHEMICAL STORAGE FACILITY *(FLOODPLAIN DEVELOPMENT)* A building, portion of a building, or exterior area adjacent to a building used for the storage of any chemical or chemically reactive products.

CLEAR-CUTTING The indiscriminate and broad removal of trees, shrubs, or undergrowth.

CO-LOCATION The use of an approved telecommunications structure to support Antenna for the provision of wireless services.

COMMERCIAL IMPRACTICABILITY OR COMMERCIALLY IMPRACTICAL The inability to perform an act on terms that are reasonable in commerce; the cause or occurrence of which could not have been reasonably anticipated or foreseen and that jeopardizes the financial efficacy of the project. The inability to achieve a satisfactory financial return on investment or profit, standing alone, shall not deem a situation to be "commercial impractical" and shall not render an act or the terms of an agreement "commercially impractical".

COMPLETION OF CONSTRUCTION OR DEVELOPMENT No further land-disturbing activity is required on a phase of a project except that which is necessary for establishing a permanent ground cover.

CONSERVATION EASEMENT An easement granting a right or interest in real property that

is appropriate to retaining land or water areas predominantly in their natural, scenic, open, or wooded condition.

CONSTRUCTION PROJECT SIGN A sign identifying the architects, engineers, contractors and other individuals or firms involved with the construction of a building. The name of the building, the purpose of the building, and the expected completion date may be specified.

CORNER LOT A lot which abuts the right-of-way of two streets at their intersection.

CPESC Certified professional in Erosion and Sediment Control. NCDOT Level I-III a/b certification is not required if a CPESC is onsite monitoring installation and has approved design.

CRITICAL ROOT ZONE The circular area of ground surrounding a tree extending from the center of tree to the greater of 1.5 feet per caliper inch DBH of the tree or the dripline (furthest extent of tree canopy).

CURRENT CONDITIONS HYDROLOGY *(FLOODPLAIN DEVELOPMENT)* The flood discharges associated with the land-use conditions existing within the drainage area of a watercourse at the time a flood study of the watercourse was conducted. Current conditions flood discharges and historical flood study information are published in the Flood Insurance Study.

DISTRIBUTIVE ACCESS SYSTEM (DAS) A technology using antenna combining technology generally allowing for multiple Carriers or Wireless Service Providers to use the same set of antennas, cabling or fiber optics.

DEDICATION A gift, by the owner, or a right to use land for a specified purpose or purposes. Because a transfer of property rights is entailed, dedication must be made by written instrument, and is completed with an acceptance.

DEVELOPMENT FLOOR AREA The total building floor area of any construction projects simultaneously developed by a single developer.

DEVELOPMENT Any land disturbing activity which adds to or changes the amount of impervious or partially pervious cover on a land area or which otherwise decreases the infiltration of precipitation into the soil, other than rebuilding activity that does not qualify as redevelopment.

DEVELOPMENT *(FLOODPLAIN DEVELOPMENT)* Any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

DIAMETER AT BREAST HEIGHT (DBH) Standard measure of a tree trunk size, measured 4.5 feet above ground level. If a tree splits into multiple trunks below 4.5 feet, then the trunk is measured at its most narrow point beneath the split.

DIRECTIONAL/IDENTIFICATION SIGNS Public purpose signs designed to identify parking areas, control traffic, provide guidance to special areas and to announce one's arrival into the heart of the community. These signs are solely for the purpose of navigation and do not contain commercial messages.

DISCHARGE POINT That point at which stormwater runoff leaves a tract of land.

DISPOSAL *(FLOODPLAIN DEVELOPMENT)* As defined in NCGS 130A-290(a)(6), the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste into or on any land or water so that the solid waste or any constituent part of the solid waste may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.

DOUBLE FRONTAGE LOT A continuous (through) lot which is accessible from both streets upon which it fronts.

DRAINAGE EASEMENT A 20' wide minimum strip of land reserved for conveyance of stormwater required when the total drainage area exceeds 4 lots or 4 acres, whichever is less, generally located along rear or side lot lines, but may cross lots at such points that will not pose a hazard to persons or property.

DRAINAGEWAY A natural or artificial stream or depression that conveys surface water.

DRIPLINE A vertical line extending from the outer edge of a tree canopy to the ground.

EASEMENT A grant of one or more of the property rights by the property owner for limited use of private land for a public or quasi-public purpose and within which the owner of

the property shall not erect any permanent structures except when authorized by the town.

ELECTRONIC MESSAGE BOARD An electronically generated changeable copy message within a sign frame which does not incorporate any mechanical movement of the sign itself.

ELEVATED BUILDING *(FLOODPLAIN DEVELOPMENT)* A non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.

EMERGENCY/HAZARD SHELTERS A shelter intended to protect occupants from temporary emergencies and hazards.

ENCROACHMENT *(FLOODPLAIN DEVELOPMENT)* The advance or infringement of uses, fill, excavation, buildings, permanent structures or development into a floodplain, which may impede or alter the flow capacity of a floodplain.

ENERGY DISSIPATER A structure or shaped channel section with mechanical armoring placed at the outlet of pipes or conduits to receive and break down the energy from high velocity flow.

ESTABLISHED FARM Means an ongoing agricultural operation including all such operations that qualify for the agricultural use value tax rate.

EROSION The wearing away of land surface by the action of the wind, water, gravity, or any combination thereof.

EXISTING MANUFACTURED HOME PARK OR MANUFACTURED HOME SUBDIVISION *(FLOODPLAIN DEVELOPMENT)* A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) was completed before the original effective date of the floodplain management regulations adopted by the town (May 16, 2006).

EXPRESSWAY An expressway is a divided street or road which serves through traffic with full or full partial control of access and generally with grade separations at intersections; however, infrequent at-grade crossings may be permitted.

FAA The Federal Aviation Administration, or its duly designated and authorized successor agency.

FCC The Federal Communications Commission, or its duly designated and authorized successor agency.

FINISHED GRADE The grade after construction, exclusive of any filling, berming, mounting, or excavating.

FINISHED (HABITABLE) AREA *(FLOODPLAIN DEVELOPMENT)* An enclosed area having more than 20 linear feet of finished interior walls (paneling, etc.) or used for any purpose other than solely for parking of vehicles, building access, or storage.

FLAG POLE LOT A lot not fronting on a public street and where access to the public street is by a narrow private driveway.

FLOOD / FLOODING *(FLOODPLAIN DEVELOPMENT)* A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters; and/or the unusual and rapid accumulation of runoff of surface waters from any source.

FLOOD HAZARD BOUNDARY MAP (FHBM) *(FLOODPLAIN DEVELOPMENT)* An official map of a community, issued by the Federal Emergency Management Agency, where the boundaries of the Special Flood Hazard Areas have been defined as Zone A.

FLOOD INSURANCE *(FLOODPLAIN DEVELOPMENT)* The insurance coverage provided under the National Flood Insurance Program.

FLOOD INSURANCE RATE MAP (FIRM) *(FLOODPLAIN DEVELOPMENT)* An official map of a community, issued by the Federal Emergency Management Agency, on which the Special Flood Hazard Areas, the Future Conditions Flood Hazard Areas, and the risk premium zones applicable to the community are delineated.

FLOOD INSURANCE STUDY (FIS) *(FLOODPLAIN DEVELOPMENT)* An examination, evaluation, and determination of

flood hazards, corresponding water surface elevations (if appropriate), flood hazard risk zones, and other flood data in a community issued by the Federal Emergency Management Agency. The Flood Insurance Study report includes Flood Insurance Rate Maps (FIRMs) and Flood Boundary and Floodway Maps (FBFMs), if published.

FLOODPLAIN / FLOOD PRONE AREA *(FLOODPLAIN DEVELOPMENT)* Any land area susceptible to being inundated by water from any source.

FLOODPLAIN MANAGEMENT *(FLOODPLAIN DEVELOPMENT)* The operation of an overall program of corrective and preventive measures for reducing flood damage and preserving and enhancing, where possible, natural resources in the floodplain, including, but not limited to, emergency preparedness plans, flood control works, floodplain management regulations, and open space plans.

FLOODPLAIN MANAGEMENT REGULATIONS *(FLOODPLAIN DEVELOPMENT)* Any ordinances, building codes, health regulations, special purpose ordinances, and other applications of police power which control development in flood-prone areas. This term describes federal, state or local regulations, in any combination thereof, which provide standards for preventing and reducing flood loss and damage.

FLOODPROOFING *(FLOODPLAIN DEVELOPMENT)* Any combination of structural and nonstructural additions, changes, or adjustments to structures, which reduce or eliminate flood damage to real estate or improved real property, water and sanitation facilities, structures, and their contents.

FLOODWAY *(FLOODPLAIN DEVELOPMENT)* The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

FLOOD ZONE *(FLOODPLAIN DEVELOPMENT)* A geographical area shown on a Flood Hazard Boundary Map or Flood Insurance Rate Map that reflects the severity or type of flooding in the area.

FREEBOARD *(FLOODPLAIN DEVELOPMENT)* The height added to the Base Flood Elevation (BFE) or the Future Conditions Flood Elevation to account for the many unknown factors that could contribute to flood heights greater that the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization on the watershed. The Base Flood Elevation plus the freeboard establishes the "Regulatory Flood Protection Elevation".

FREEWAY A freeway is a divided street or road which serves through traffic with full control of access and with grade separations at intersections.

FUTURE CONDITIONS FLOOD *(FLOODPLAIN DEVELOPMENT)* The flood having a 1% chance of being equaled or exceeded in any given year based on future conditions hydrology.

FUTURE CONDITIONS FLOOD ELEVATION *(FLOODPLAIN DEVELOPMENT)* A determination of the water surface elevations of the 1% annual chance flood based on future conditions hydrology as published in the Flood Insurance Study. This elevation, when combined with the freeboard, establishes the "Regulatory Flood Protection Elevation" in Future Conditions Flood Hazard Areas.

FUTURE CONDITIONS FLOOD HAZARD AREA *(FLOODPLAIN DEVELOPMENT)* The land area that would be inundated by the 1% annual chance flood based on future conditions hydrology.

FUTURE CONDITIONS HYDROLOGY *(FLOODPLAIN DEVELOPMENT)* The flood discharges associated with projected land-use conditions based on Wake Forest's Land Use Management Plan and without consideration of projected future construction of flood detention structures or projected future hydraulic modifications within a stream or other waterway such as bridge and culvert construction, fill, and excavation. Future conditions flood discharges are published in the Flood Insurance Study.

FUNCTIONALLY DEPENDENT FACILITY *(FLOODPLAIN DEVELOPMENT)* A facility which cannot be used for its intended purpose unless it is located in close proximity to water, such as a docking or port facility necessary for the loading

and unloading of cargo or passengers, shipbuilding, or ship repair. The term does not include long-term storage, manufacture, sales, or service facilities.

GREENWAY A linear natural preserve available for free and unstructured recreation to the general public. This term is not meant to be inclusive of required pedestrian/bicycle connections from adjacent development to greenways. The various types of greenways as defined in the Wake Forest Open Space & Greenways Plan are as follows:

Type 1: Sensitive natural area with no formal greenway or trail development.
Type 2: Greenway corridors in a primarily natural state with gravel or dirt trails intended for use by pedestrians only.
Type 3: Corridors located outside floodplains with unpaved multi-use trails that are intended for use by pedestrians and bicyclists.
Type 4: High capacity off-road corridors and/or corridors located within floodplains that are paved for use by a wide variety of user groups including pedestrians, bicyclists, joggers, wheelchairs users, strollers and rollerbladers.

GROUND COVER Any natural vegetative growth or other material that renders the soil surface stable against accelerated erosion.

GROSS LEASABLE AREA The gross building floor area occupied or used by a tenant.

GROUND / FREESTANDING SIGN A sign that extends upward out of the ground, independent of a building, with an integral support structure.

HAZARDOUS WASTE FACILITY *(FLOODPLAIN DEVELOPMENT)* As defined in NCGS Article 9 of Chapter 130A, a facility for the collection, storage, processing, treatment, recycling, recovery, or disposal of hazardous waste.

HEIGHT When referring to a tower or support structure for a Wireless Telecommunications Facility, "height" includes the distance measured from the pre-existing grade level to the highest point on the tower or structure, even if said highest point is an antenna or lightening protection device extending above the support structure. For all other structures and uses, see Section 4.5 – Measurement of Height.

HIGHEST ADJACENT GRADE (HAG) *(FLOODPLAIN DEVELOPMENT)* The highest natural elevation of the ground surface, prior to construction, immediately next to the proposed walls of the structure.

HIGH IMPERVIOUS SURFACE PROJECT Any project that has more than 2 dwelling units per acre or 24% built-upon area (BUA) for all residential and non-residential development.

HIGH QUALITY WATERS (HQW) Those classified as such in 15A NCAC 2B.0101(e)(5) -General Procedures.

HIGH QUALITY WATER ZONES Areas that are within one mile and drain to HQWs.

HISTORIC STRUCTURE *(FLOODPLAIN DEVELOPMENT)* Any structure that is:

- Listed individually in the National Register of Historic Places (a listing maintained by the US Department of Interior) or preliminarily determined by the Secretary of Interior as meeting the requirements for individual listing on the National Register;
- Certified or preliminarily determined by the Secretary of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
- Individually listed on a local inventory of historic landmarks in communities with a "Certified Local Government (CLG) Program"; or
- Certified as contributing to the historical significance of a historic district designated by a community with a "Certified Local Government (CLG) Program.

IMPERVIOUS SURFACE Impervious surface area includes any material which reduces and/or prevents absorption of storm water. This includes but is not limited to, buildings, roads, pavement, gravel surfaces, etc.

LAKE OR NATURAL WATERCOURSE Any stream, river, brook, swamp, sound, bay, creek, run, branch, canal, waterway, estuary, and any reservoir, lake or pond, natural or impounded, in which sediment may be moved or carried in

suspension, and which could be damaged by accumulation of sediment.

LAND-DISTURBING ACTIVITY Any use of the land by any person in residential, industrial, educational, institutional, or commercial development, highway and road construction and maintenance, that results in a change in the natural cover or topography and that may cause or contribute to sedimentation.

LANDSCAPE PLAN A plan illustrating the design and specifications for the preservation of existing vegetation; the placement of any live plant materials such as trees, shrubs, grasses, ground covers, etc.; and the location and design of built features such as berms, fencing, walls, etc.

LARGER COMMON PLAN OF DEVELOPMENT OR SALE Any area where multiple separate and distinct construction or land disturbing activities will occur under one plan. A plan is any announcement or piece of documentation (including but not limited to a sign, public notice or hearing, sales pitch, advertisement, loan application, drawing, permit application, zoning request, or computer design) or physical demarcation (including but not limited to boundary signs, lot stakes, or surveyor markings) indicating that construction activities may occur on a specific plot.

LOT A parcel of land having frontage on a public street or other officially approved means of access.

LOT FRONTAGE The lot width measured at the street right-of-way line from which the lot obtains access.

LOWEST ADJACENT GRADE (LAG) *(FLOODPLAIN DEVELOPMENT)* The elevation of the ground, sidewalk or patio slab immediately next to the building, or deck support, after completion of the building.

LOWEST FLOOR *(FLOODPLAIN DEVELOPMENT)* The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or limited storage in an area other than a basement area is not considered a building's lowest floor, provided that such an enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance.

LOW IMPACT DEVELOPMENT A method of site development and stormwater management that mimics the natural hydrologic functions of infiltration, runoff, and evapotranspiration on a site before development occurs.

LOW IMPERVIOUS SURFACE PROJECT A project that has no more than 2 dwelling units per acre or 24% built-upon area (BUA) for all residential and non-residential development.

MAJOR SUBDIVISION Any subdivision of land into 4 or more lots, or which requires the dedication of public utilities and/or public streets.

MANUFACTURED HOME *(FLOODPLAIN DEVELOPMENT)* A structure, transportable in one or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. This term does not include a "recreational vehicle".

MANUFACTURED HOME PARK OR SUBDIVISION *(FLOODPLAIN DEVELOPMENT)* A parcel (or contiguous parcels) of land divided into 2 or more manufactured home lots for rent or sale.

MARKET VALUE *(FLOODPLAIN DEVELOPMENT)* The building value, not including the land value and that of any accessory structures or other improvements on the lot. Market value may be established by independent certified appraisal; replacement cost depreciated for age of building and quality of construction (Actual Cash Value); or adjusted tax assessed values.

MEAN SEA LEVEL *(FLOODPLAIN DEVELOPMENT)* The National Geodetic Vertical Datum (NGVD) as corrected in 1929, the North American Vertical Datum (NAVD) as corrected in 1988, or other vertical control datum used as a reference for establishing varying elevations within the floodplain, to which Base Flood Elevations (BFEs) shown on a FIRM are referenced. Refer to each FIRM panel to determine datum used.

MARQUEE SIGN Vertical signs projecting from the side of a building or a roof structure which may or may not incorporate changeable type.

MINOR SUBDIVISION Any subdivision of land into 3 or fewer lots which does not require the dedication of public utilities and/or public streets.

MODIFICATION OR MODIFY In reference to Wireless Telecommunication Facilities this term shall mean the addition, removal or change of any of the physical and visually discernible components or aspects of the facility, such as antennas, cabling, equipment shelters, landscaping, fencing, utility feeds, or the color or materials of any visually discernible components, vehicular access, parking and/or an upgrade or change-out of equipment for different, better or more modern equipment. Adding a new wireless carrier or service provider to a telecommunications tower or telecommunications site as a co-location is a modification.

NATURAL EROSION The wearing away of the earth's surface by water, wind, or other natural agent under natural environmental conditions undisturbed by humans.

NCDOT EROSION CONTROL CERTIFICATION A certification required by the DOT for all erosion control projects.

- **Level I: Erosion & Sediment Control/Stormwater Inspector/Installer -** Required for each supervisor of grading contractor installing temporary erosion and sediment control/stormwater devices and/or subcontractor.
- **Level II: Erosion & Sediment Control/Stormwater Site Management -** Superintendent/foreman in charge of grading activities, contractor personnel assigned to conduct NPDES sites inspections and fill out NPDES weekly log.
- **Level III a/b: Design Professionals**

NCGS The North Carolina General Statutes and all rules and orders adopted pursuant to them.

NECESSARY For Wireless Telecommunication Facilities this term shall mean what is technologically required for the equipment to function as designed by the manufacturer such that anything less will result in prohibiting or having the effect of prohibiting the provision of service as intended and described in the narrative of the application for such facility.

NEIGHBORHOOD PARKS Improved space set aside for public use and recreation that is comprised of one or more of the following typologies (as outlined in Section 7.5.1): Park/Greenway, Green, Square, Playground, and Community Garden.

NEW CONSTRUCTION *(FLOODPLAIN DEVELOPMENT)* Structures for which the "start of construction" commenced on or after the effective date of the original version of the community's Flood Damage Prevention Ordinance (May 16, 2006) and includes any subsequent improvements to such structures.

NIER Non-Ionizing Electromagnetic Radiation.

NONCONFORMING SIGN A sign legally established prior to the effective date of this ordinance or subsequent amendment thereto, that does not conform to the sign regulations found herein.

NON-ENCROACHMENT AREA *(FLOODPLAIN DEVELOPMENT)* The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot as designated in the Flood Insurance Study report.

OFFICIAL MAPS OR PLANS Any maps or plans officially adopted by the Wake Forest Board of Commissioners as a guide to the development of the Town of Wake Forest.

OPEN SPACE Those areas set aside and protected from development which may be left in a generally unimproved state.

OWNER The legal or beneficial owner of land, including but not limited to a mortgagee or vendee in possession, receiver, executor, trustee, or long-term or commercial lessee, or any other person or entity holding proprietary rights in the property or having legal power of management and control of the property. "Owner" shall include long-term commercial tenants; management entities, such as those charged with or engaged in the management of properties for profit; and every person or entity having joint ownership of the property. A secured lender not in possession of the property does not constitute an owner, unless the secured lender is included within the meaning of "owner" under another description in this definition, such as a management entity.

PARENT ENTITY An affiliate that directly, or indirectly through one or more intermediaries, controls another person.

PE Professional Engineer License.

PERMIT The approval document allowing land-disturbing activities to be initiated. A project may be developed in phases with separate permits for each phase.

PERSON Any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, interstate body, or other legal entity.

PERSON CONDUCTING LAND-DISTURBING ACTIVITY Any person who may be held responsible for a violation unless expressly provided otherwise by the erosion and sedimentation control regulations of this article, the Act, or any order adopted pursuant to these regulations or the Act.

PERSON RESPONSIBLE FOR THE VIOLATION Examples of this include:

- The developer or other person who has or holds himself out as having financial or operational control over the land – disturbing activity; and/or
- The landowner or person in possession or control of the land when he has directly or indirectly allowed the land-disturbing activity or has benefited from it or he has failed to comply with any provision of the erosion and sedimentation control regulations of this article, the Act, or any order adopted pursuant to these regulations or the Act as imposes a duty upon him; and/or
- The contractor or subcontractor who is authorized to perform land-disturbing work for the landowner.

PHASE OF GRADING One of two types of grading, rough or fine. Grading plans are required to be phased.

PLAT A map or plan of a parcel of land which is to be, or has been subdivided.

POST-FIRM *(FLOODPLAIN DEVELOPMENT)* Construction or other development for which the "start of construction" occurred on or after the effective date of the initial Flood Insurance Rate Map for the area.

PRE-FIRM *(FLOODPLAIN DEVELOPMENT)* Construction or other development for which the "start of construction" occurred before the effective date of the initial Flood Insurance Rate Map for the area.

PRIMARY CONSERVATION AREA Such areas include riparian corridors, special flood hazard areas, unique geological formations, rock outcroppings, rare plants, rare plant communities, rare habitats, wetlands, & prime agricultural areas/farmland.

PRINCIPALLY ABOVE GROUND *(FLOODPLAIN DEVELOPMENT)* At least 51% of the actual cash value of the structure is above ground.

PRIVATE DRIVEWAY A roadway serving 2 or fewer lots, building sites or other divisions of land and not intended to be used for public ingress or egress.

PROJECTING/SUSPENDED SIGN Pedestrian-scaled signs mounted to the side of a building or underside of a balcony or arcade which can be read from both sides.

PROTECTIVE COVER Natural or artificial ground cover of grass, trees, shrubs, or mulch sufficient to reduce erosion potential.

PUBLIC OR COMMUNITY SEWAGE DISPOSAL SYSTEM A sanitary sewage disposal system, regulated by the Division of Environmental Management, North Carolina Department of Natural and Economic Resources, with 3,000 gallons or more design capacity and/or whose effluent is discharged to surface water.

PUBLIC OR COMMUNITY WATER SUPPLY SYSTEM A system serving 10 or more residences or businesses or combination of residences and businesses, including municipal and sanitary district water systems as well as water systems designed to serve particular subdivisions at full development constructed to specifications approved by the Division of Health Services, North Carolina Department of Human Resources.

PUBLIC SAFETY AND/OR NUISANCE *(FLOODPLAIN DEVELOPMENT)* Anything which is injurious to the safety or health of an entire community or neighborhood, or any considerable number of persons, or unlawfully

obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin.

RADOME A housing that contains one or more antennas made from a material that is transparent to radio waves. A radome is expressly not an antenna.

RECREATIONAL VEHICLE (RV) *(FLOODPLAIN DEVELOPMENT)* A vehicle, which is:

- Built on a single chassis;
- 400 square feet or less when measured at the largest horizontal projection;
- Designed to be self-propelled or permanently towable by a light duty truck; and
- Designed primarily not for use as a permanent dwelling, but as temporary living quarters for recreational, camping, travel, or seasonal use.

REDEVELOPMENT Any rebuilding activity other than a rebuilding activity that results in no net increase in built- upon area and provides equal or greater stormwater control than the previous development.

REFERENCE LEVEL *(FLOODPLAIN DEVELOPMENT)* The top of the lowest floor for structures within Special Flood Hazard Areas and Future Conditions Flood Hazard Areas designated as Zone AE, A, A99 or X (Future).

REGULATORY FLOOD PROTECTION ELEVATION *(FLOODPLAIN DEVELOPMENT)* The elevation above mean sea level to which the reference level of all structures and other development located within Special Flood Hazard Areas and Future Conditions Flood Hazard Areas must be protected.

- In "Special Flood Hazard Areas" where Base Flood Elevations (BFEs) have been determined, this elevation shall be the BFE plus 2 feet of freeboard.
- In "Special Flood Hazard Areas" where no BFE has been established, this elevation shall be at least 2 feet above the highest adjacent grade.
- In Future Conditions Flood Hazard Areas this elevation shall be the Future Conditions Flood Elevation plus 2 feet of freeboard.

REMEDY A VIOLATION *(FLOODPLAIN DEVELOPMENT)* To bring the structure or other development into compliance with State and community floodplain management regulations, or, if this is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of the ordinance or otherwise deterring future similar violations, or reducing Federal financial exposure with regard to the structure or other development

RIVERINE *(FLOODPLAIN DEVELOPMENT)* Relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

PARAPET SIGN A building-mounted sign erected upon and completely over any part the roof of a building.

SALVAGE YARD *(FLOODPLAIN DEVELOPMENT)* Any non-residential property used for the storage, collection, and/or recycling of any type of equipment, and including but not limited to vehicles, appliances and related machinery.

SEDIMENTATION The process by which sediment resulting from accelerated erosion has been or is being transported off the site of the land-disturbing activity or into a lake or natural watercourse.

SEEDING Seed, straw and tack, hydroseed, sod, or other approved seeding method.

SETBACK (MINIMUM) A line parallel to the front property line in front of which no structure shall be erected. Setbacks shall be figured from the right-of-way line.

SIGN Any device, fixture, placard or structure that uses any color, form, graphic, illumination, symbol or writing to advertise, announce the purpose of, or identify the purpose of a person or entity, or to communicate information of any kind to the public.

SILTATION Sediment resulting from accelerated erosion which can be settled or removed by properly designed, constructed, and maintained control measures; and which has been transported from its point of origin within the site of a land-disturbing activity; and which has been deposited, or is in suspension in water.

SINGLE-TIER LOT A lot which backs upon a limited access highway, a railroad, a physical barrier, or another type of land use and to which access from the rear is usually prohibited.

SITE PLAN A plan and/or review process for any type of development or building activity on particular parcel or parcels of land.

STABILIZATION The process of restoring a site with ground cover or armor to resist soil erosion from the forces of air, wind, or water.

STOP WORK ORDER A written order to stop work, issued by the Administrator, upon determining that work is being conducted in violation of this ordinance.

STORM DRAINAGE FACILITIES The system of inlets, conduits, channels, ditches, and appurtenances which serve to collect and convey stormwater through and from a given drainage area.

STORMWATER BEST MANAGEMENT PRACTICE MANUAL The Stormwater Best Management Practice Manual approved for use in Phase II jurisdictions by the N.C. Division of Water Quality and certified by this jurisdiction is at least as stringent as the Stormwater Best Management Practice Manual approved for use in Phase II jurisdictions the proper implementation of the requirements of the federal Phase II stormwater program. All references herein to the Stormwater Best Management Practice Manual are to the latest published edition or revision.

STORMWATER RUNOFF The surface flow of water resulting from precipitation in any form and occurring immediately after rainfall or melting.

STREAM An intermittent or perennial surface water subject to US Army Corps of Engineers (Corps) and/or NC Division of Water Quality (DWQ) 404/401 jurisdiction. To confirm jurisdictional status, a formal Corps and/or DWQ response is required (e.g. Jurisdictional Determination).

STREAM CLASSIFICATION The existing or contemplated best usage of streams, pursuant to 15A NCAC 02B .0300, and/or subsequent clarifications, modifications, and addenda.

STREETS A dedicated and accepted public right-of-way for vehicular traffic which conforms to any of the specific street classifications in Section 6.7.2 of this ordinance.

STRUCTURE A walled and roofed building that is principally above ground, a gas or liquid storage tank, or other man-made facilities or infrastructure. For floodplain management purposes "principally above ground" means that at least 51% of the actual cash value of the structure is above ground.

SOLID WASTE DISPOSAL FACILITY *(FLOODPLAIN DEVELOPMENT)* As defined in NCGS 130A-290(a) (35), any facility involved in the disposal of solid waste.

SOLID WASTE DISPOSAL SITE *(FLOODPLAIN DEVELOPMENT)* As defined in (NCGS 130A-290(a) (36), any place at which solid wastes are disposed of by incineration, sanitary landfill, or any other method.

SPECIAL FLOOD HAZARD AREA (SFHA) *(FLOODPLAIN DEVELOPMENT)* The land in the floodplain subject to a 0.2% or greater chance of being flooded in any given year based on current conditions hydrology.

START OF CONSTRUCTION *(FLOODPLAIN DEVELOPMENT)* Includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of the building,

whether or not that alteration affects the external dimensions of the building.

STEALTH OR STEALTH DESIGN A design or treatment such as a Distributed Antenna System or its equivalent that minimizes adverse aesthetic and visual impacts on the land, property and buildings, and other facilities adjacent to, surrounding, and in generally the same area as the requested location of such Wireless Telecommunications Facilities, which shall mean using the least visually and physically intrusive facility that is not technologically or commercially impracticable under the facts and circumstances.

STRUCTURE *(FLOODPLAIN DEVELOPMENT)* A walled and roofed building, a manufactured home, or a gas, liquid, or liquefied gas storage tank that is principally above ground.

STRUCTURAL BMP A physical device designed to trap, settle out, or filter pollutants from stormwater runoff; to alter or reduce stormwater runoff velocity, amount, timing, or other characteristics; to approximate the pre-development hydrology on a developed site; or to achieve any combination of these goals. Structural BMP includes physical practices such as constructed wetlands, vegetative practices, filter strips, grassed swales, and other methods installed or created on real property. "Structural BMP" is synonymous with "structural practice", "stormwater control facility," "stormwater control practice," "stormwater treatment practice," "stormwater management practice," "stormwater control measures," "structural stormwater treatment systems," and similar terms used in this ordinance.

SUBDIVIDER Any person, firm, or corporation who subdivides or develops any land deemed to be a subdivision as herein defined.

SUBDIVISION All divisions of a tract or parcel of land into 2 or more lots, building sites, or other divisions for the purpose of sale, or building development (whether immediate or future) and shall include all divisions of land involving the dedications of a new street or a change in existing streets.

SUBSIDIARY An affiliate that is, directly or indirectly, through one or more intermediaries, controlled by another person.

SUBSTANTIAL DAMAGE *(FLOODPLAIN DEVELOPMENT)* Damage of any origin sustained by a structure during any 1-year period whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred. See definition of "substantial improvement". Substantial damage also means flood-related damage sustained by a structure on 2 separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25% of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT *(FLOODPLAIN DEVELOPMENT)* Any combination of repairs, reconstruction, rehabilitation, addition, or other improvement of a structure, taking place during any 1-year period for which the cost equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

- Any correction of existing violations of State or community health, sanitary, or safety code specifications which have been identified by the community code enforcement official and which are the minimum necessary to assure safe living conditions; or,
- Any alteration of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure.

SUBSTANTIAL PROGRESS For the purposes of determining whether sufficient progress has been made on an approved plan, one or more of the following construction activities toward the completion of a site or subdivision plan shall occur: obtaining a grading permit and conducting grading activity on a continuous basis and not discontinued for more than 30 days; or installation and approval of on-site infrastructure; or obtaining a building permit for the construction and approval of a building foundation. "Substantial progress" for purposes of determining whether an approved plan is null and void is not necessarily the same as "substantial expenditures" used for determining vested rights pursuant to applicable law.

TELECOMMUNICATIONS The transmission and/or reception of audio, video, data, and other information by wire, radio frequency, light, and other electronic or electromagnetic systems.

TELECOMMUNICATIONS STRUCTURE OR SUPPORT STRUCTURE A structure used in the provision of services described in the definition of Wireless Telecommunications Facilities to physically support antennas and other equipment necessary for the provision of wireless service.

TEMPORARY Unless otherwise specified by this ordinance, something intended to, or that does, exist for fewer than 90 days.

TEMPORARY SIGNS Portable signs used to announce or advertise specific events which have a definite beginning and end date/time.

TEN-YEAR STORM The storm water runoff resulting from precipitation of an intensity expected to be equaled or exceeded, on the average, once in ten years, and of a duration which will produce the maximum peak rate of runoff for the watershed of interest under average antecedent wetness conditions.

TOP OF BANK The points in a cross-section where the stream channel makes a transition to flood plain. Top of bank can be identified by a change in the slope of the land, a transition from terrestrial to riparian vegetation, and/or changes in the composition of substrate materials.

TOWER Any structure designed primarily to support an antenna for receiving and/or transmitting a wireless signal.

TOWNHOUSE Residential buildings with 3 or more dwelling units that share a common wall. Each unit has its own entrance and is typically aligned close to a public sidewalk. Such buildings shall be considered multifamily dwellings for the purposes of this ordinance regardless of whether they are built on individual lots or a shared lot.

TRACT All contiguous land and bodies of water being disturbed or to be disturbed as a unit, regardless of ownership.

TWENTY-FIVE YEAR STORM The storm water runoff resulting from precipitation of an intensity expected to be equaled or exceeded on the average, once in 25 years, and of a duration which will produce the maximum peak rate of runoff for the watershed of interest under average antecedent wetness conditions.

UNBUILDABLE AREAS Areas that have highly erodible soils or slopes in excess of 60%.

UNCOVERED The removal of ground cover from, on, or above the soil surface.

UNDERSTORY TREE Small-growing trees with an expected mature height of 20 to 40 feet.

UPPER WATERSHED DRAINAGEWAY A natural or artificial stream or depression that drains more than 5 acres of surface water located within a Water Supply Watershed Overlay District.

VELOCITY The average velocity of flow through the cross section of the main channel at the peak flow of the storm of interest. The cross section of the main channel is defined by the geometry of the channel plus the area of flow below the flood height defined by vertical lines at the main channel banks. Overload flows are not to be included for the purpose of computing velocity of flow.

WALL SIGN Flat signs or lettering which are painted or attached to the wall of a building or structure.

WASTE Surplus soil or earth materials resulting from on-site construction and disposed of at other locations.

WATER SURFACE ELEVATION (WSE) *(FLOODPLAIN DEVELOPMENT)* The height, in relation to mean sea level, of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

WATERCOURSE *(FLOODPLAIN DEVELOPMENT)* A lake, river, creek, stream, wash, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur.

WETLANDS Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wetlands generally include swamps, marshes, bogs, and similar areas. This definition of wetlands is used by the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA) since the 1970s for regulatory purposes in Section 404 of the Clean Water Act.

WINDOW SIGN Flat signs or lettering which are painted or attached to the window of a building or structure. These signs also include retail window displays which are intended to showcase/advertise goods and products to pedestrians on the sidewalk.

WIRELESS CARRIER See "Carrier"

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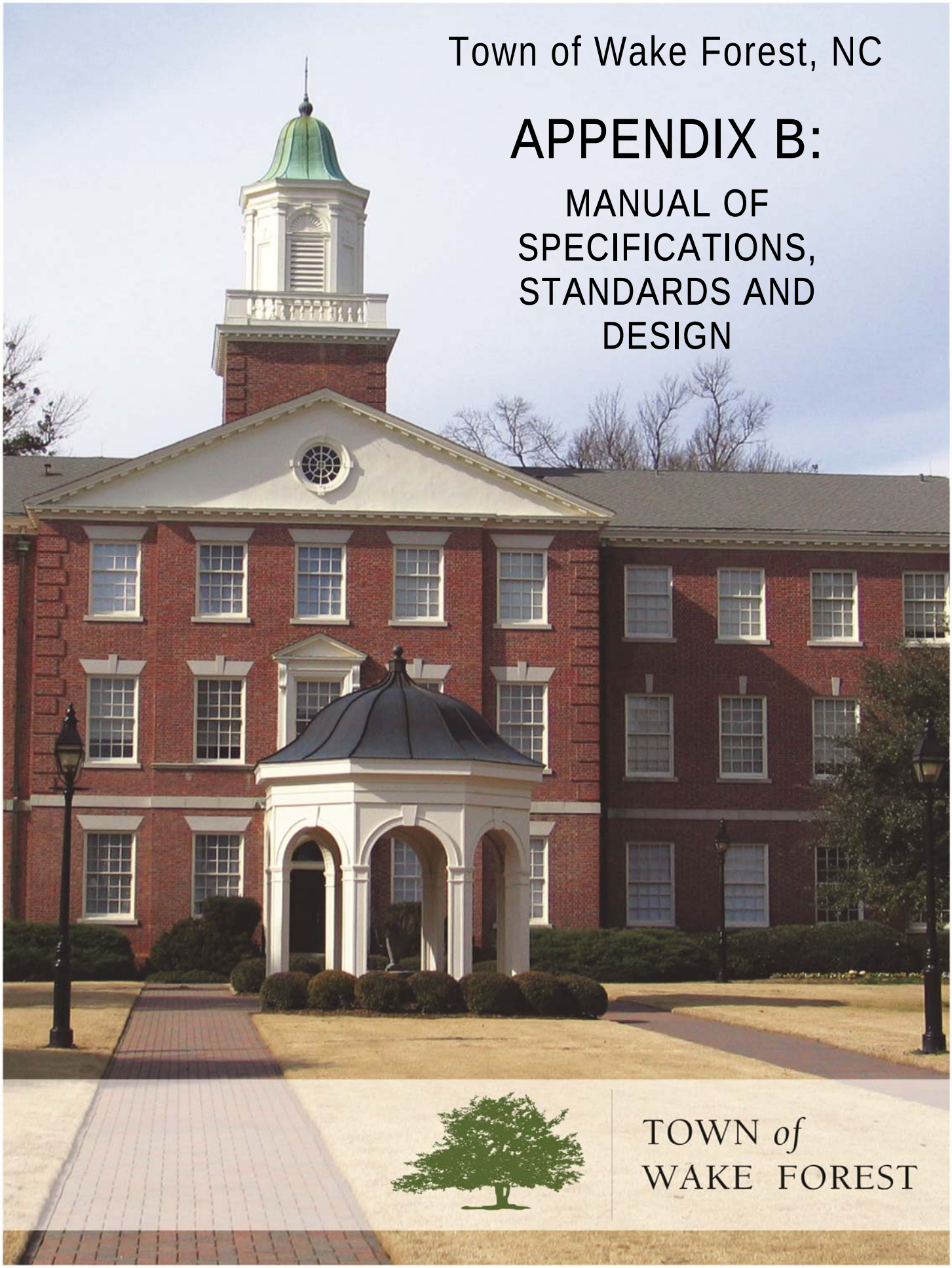
Town of Wake Forest, NC

APPENDIX B:

MANUAL OF SPECIFICATIONS, STANDARDS AND DESIGN



TOWN *of* WAKE FOREST

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1 WATER & SEWER DESIGN

1.1 INTRODUCTION

The provision of water and sewer infrastructure within the jurisdiction of the Town of Wake Forest shall conform to the requirements of the City of Raleigh Public Utilities Handbook and the regulations below.

1.2 SUPPLY AND TREATMENT CAPACITY RESERVATION

1.2.1 STATEMENT OF POLICY

A. A capacity reservation system policy has been established under which anyone developing or improving property in such a manner as to require new or increased water and/or sewer service will purchase a reservation of capacity from the Town at a price calculated to equal as nearly as is possible such person's fair share of the cost of the provision of such capacity.

B. Requests for extensions of the Town's water and sewer systems outside of the corporate limits of the Town shall be subject to the discretion of the Town. The person requesting such extension shall fund such extensions.

C. Developers and other property owners inside and outside of the Town's corporate limits shall be responsible for the cost of all water and sewer lines located on their property.

1.2.2 RESERVATION OF EXISTING CAPACITY

A. Any person may reserve unutilized existing capacity within the Town's water or sewer systems for areas within the Town's corporate limits by paying to the Town the appropriate availability fees prescribed in Section 1.3.1, Calculation of Availability Fees. The Town may, in its discretion, accept reservations for areas outside the Town's corporate limits. Capacity reservations shall be accepted on a first come, first served basis upon receipt by the Administrator of a properly completed application together with payment of the availability fee or security for such payment as provided below.

1. Except as provided in Section 1.2.2.B, payment of the availability fees necessary to secure existing capacity reservations shall be made in full by cashiers or certified check at the time that the application is submitted.

2. Whenever unutilized capacity exists within the water or sewer systems and a person seeks a reservation of existing capacity in an amount not exceeding the lesser of such remaining unutilized capacity or 1,050 gallons per day, then the Town may accept the capacity reservation provided the person making the reservation makes a down payment of 10% of the total availability fees and executes a promissory note to the Town in the amount of the remainder of the availability fee. Such promissory note shall mature upon the earlier of twelve months from the date of its making or when such person applies for an occupancy permit for the affected property.

B. For purposes of this section, "unutilized capacity" refers to that amount of the capacity of the sewage treatment system to adequately treat sewage or the capacity of the water treatment system to adequately provide and/or treat water that remains after subtracting:

1. The portion of the capacity of the sewage treatment system or water treatment system that the Town determines should be reserved to serve customers already connected and,

2. That portion of the total capacity already accounted for by persons holding reservations of existing capacity. The determination of unutilized capacity shall exclude consideration of expected demands and proposed expansions provided for under Section 1.2.6 below, Contractual Authority for Extraordinary Development.

1.2.3 RESERVATION OF FUTURE CAPACITY

A. As the Town approaches exhaustion of the unutilized capacity within its water or sewer system, the Town shall undertake to expand the capacity of the systems. Any person may reserve future capacity in the systems for areas within the Town's corporate limits by paying the applicable availability fee for the amount of capacity reserved. The Town may, in its discretion, accept reservations for areas outside the Town's corporate limits. Future capacity reservations shall be accepted on a first come, first served basis upon submission of a properly completed application together with a cashier's or certified check for the full amount of the availability fee.

B. When the expanded system becomes operational, future capacity reservations automatically become present capacity reservations with the same order of priority.

1.2.4 DETERMINATION OF CAPACITY RESERVED

To determine the amount of water or sewer capacity that should be reserved, the Administrator shall review the proposed development for which the reservation is sought and make a determination based upon the table attached to this policy as Appendix A of this MSSD. If anticipated demand cannot be determined from Appendix A of this MSSD, then the Administrator shall make the determination based upon the best information available. The availability fee may then be calculated in accordance with Section 1.3.1, Calculation of Availability Fees.

1.2.5 TRANSFER OF CAPACITY RESERVATIONS

A. Reservations of existing or future capacity are not transferable from the property with respect to which the reservations were obtained to other property. However, the Town may provide a refund of the amount paid for capacity reservation to the person relinquishing a capacity reservation if another party is available to purchase the relinquished reservation.

B. Persons holding reservations of future capacity shall have first option on purchasing relinquished reservations of existing capacity.

1.2.6 CONTRACTUAL AUTHORITY FOR EXTRAORDINARY DEVELOPMENT

A. In the case of extraordinary development requiring extraordinary reservations of water and/or sewer capacity, rather than charging the developer availability fees based upon Appendix A of this MSSD and the calculations described in Section 1.3.1, Calculation of Availability Fees, the Town may require that studies of the impact of the proposed development on the Town's water and sewer systems be completed to determine more precisely what facilities will be required to meet the demands of the proposed development.

B. For purposes of this policy, the term "extraordinary" shall mean:

1. Any proposed development or capacity reservation which cannot be served or met by the then current plans of the Town for expanding its water and/or sewer capacities or facilities; or

2. Any proposed single non-residential user requesting capacity reservation of 300,000 gallons per day or more in water or sewer capacity. Such contract shall advance the policy stated in Section 1.2.1 of this policy and the payments made

to the Town thereunder shall be based on the actual projected costs of the required capacity and/or facilities. The contract shall not, however, be governed by the other sections of this policy as to the manner in which the policy is carried out and the Town is authorized to make specific agreements with the developer as to terms of payments, security for payment, timing of payment and any other provisions necessary to carry out the intent this policy.

C. Availability fees collected for the reservation of future capacity shall be held in a special fund and expended only for the purchase of additional capacity, the construction of new facilities or the expansion of facilities which provide additional water or sewer system capacity.

1.2.7 RELATIONSHIP OF WATER AND SEWER SYSTEM CAPACITY TO APPROVALS UNDER ZONING, SUBDIVISION AND BUILDING REGULATIONS

A. As provided in the Town's Unified Development Ordinance, zoning map amendments may be granted, preliminary plat and site plan approvals may be obtained, and development and special use permits may be issued without any showing that the Town's water or sewer system will have sufficient capacity when needed to serve the properties for which such approvals or permits are granted. However, with respect to any development (or phase thereof), building or lot that is proposed, intended or required to be served by the Town's water or sewer system, the remaining requirements of this section shall be applicable.

B. No clearing, excavation, construction or other site disturbing work may be undertaken on any lot or tract where one or more new water or sewer connections may be required or where the proposed use of the lot or tract will result in an increased demand on the water or sewer system (as determined in accordance with Appendix A of this MSSD) unless the developer has secured a reservation of existing water or sewer capacity (see Section 1.2.2) or future capacity (see Section 1.2.3) that is sufficient to accommodate the proposed development.

C. Subdivision final plat approval may not be granted unless:

1. The applicant has secured a reservation of existing water and sewer capacity for every lot that is sufficient to accommodate the development proposed or anticipated for that lot; or,

2. The applicant elects to secure reservation on a lot-by-lot basis at the time of issuance of a building permit thereby acknowledging that connection to the Town water and/or sewer system is subject to available system capacity

D. If a building permit is sought for a lot not previously connected to the Town's water or sewer system but with respect to which water or sewer capacity has been reserved with availability fees paid, and the use proposed at the time the building permit is sought will place more or less demand on the water or sewer system (according to Appendix A of this MSSD) than the capacity paid for at the time capacity was reserved, then;

1. If the demand of the proposed use exceeds the capacity reserved, the building permit will not be issued unless and until additional capacity has been reserved and the applicable fees paid;

2. If the demand of the proposed use is less than the capacity reserved, a refund for excess capacity may be sought under Section 1.2.5, Transfer of Capacity Reservations.

E. Whenever:

1. A change in use is made with respect to property that has previously been connected to the Town's water or sewer system, and

2. No building permit is required to accomplish the change in use, and

3. Under the new use a greater demand will be placed on the water or sewer system than was placed on it by the previous user (as determined by Appendix A of this MSSD), then no occupancy permit may be issued for such use until the applicant has purchased additional existing capacity in accordance with Section 1.2.2, Reservation of Existing Capacity.

1.3 LINE, TAP, METER AND AVAILABILITY FEES

The associated cost/rates applicable to line, tap, meter and availability fees shall be based on the current rate schedule adopted by the Wake Forest Board of Commissioners as amended from time to time.

1.3.1 CALCULATION OF AVAILABILITY FEES

A. To calculate the availability fee for a proposed development, the required capacity, as determined under Section 1.2, Supply & Treatment Capacity Reservation, expressed in gallons per day, shall be multiplied by the current rates for both water and sewer based on the current rate schedule adopted by the Wake Forest Board of Commissioners, as amended from time to time. This fee is reviewed annually by the Board of Commissioners.

B. The dollar cost for each gallon per day set forth above may be calculated based upon actual costs to the Town for past expansions of the water or sewer systems, adjusted for inflation and other relevant factors; upon reasonably approximate projected costs for future expansions based upon engineering studies and/or mathematical models; or upon projected costs for purchasing capacity from other systems. Other factors that may be included in such calculations are:

1. Financing methods for existing facilities and the extent to which new users will contribute to the financing of such facilities, and whether new users should be credited for such contribution;

2. The extent to which current users have contributed or will contribute to the new facilities;

3. Extraordinary costs in servicing new development; and

4. The effect of inflation on amounts paid at different times.

C. Calculations for the actual or projected costs of system expansion shall include plant expansion and line expansion (major trunks and outfalls) for new service, but not replacement or repair of existing plant or line facilities unless such replacement or repair is necessary to provide increased capacity, in which case the capacity costs shall be reduced by an appropriate factor representing costs of improvements or repairs necessary to continue to operate the system at the present level of service. Capacity costs shall only include costs to be incurred by the Town for the additional service to be provided. Extensions of the water or sewer systems to reach new development, which are not funded by the Town, are not included in the calculation of capacity cost.

1.3.2 CREDIT AGAINST AVAILABILITY FEES FOR OVERSIZE INSTALLATIONS

A. A developer who extends a water or sewer line may be required by the Town to install an oversized line. Any person required to install an oversized line shall be

entitled to receive a credit against the payment of availability fees in accordance with the provisions of this section.

1. For purposes of this section, an "oversized line" means any line or other element or facility of the Town's water or sewer system that:

a. Is larger than the minimum size line or facility that the Town normally allows to be constructed and

b. Is larger than that necessary to serve the needs of the developer constructing the line or facility. The term "oversized line" shall also include any lateral connection, which a property owner is required to construct which does not serve property of such property owner.

2. The availability fees against which a credit may be taken are those fees that are required to be paid for the development of the property to which or in which the lines are extended. An extension of an oversized water line entitles the developer to credits only against water availability fees, and an extension of an oversized sewer line entitles the developer to credits only against sewer availability fees.

B. The maximum amount of credit which a developer shall be entitled for the extension of oversized lines shall be an amount determined by the Town that reasonably approximates the difference between the actual cost of extending the oversized line and the cost that the developer would have incurred had he been allowed to extend a line that was not oversized. In making this determination, the Town may, among other alternatives, establish a schedule of customary and reasonable costs for extending lines of different sizes and calculate the maximum creditable amount by multiplying the length of the line extended times the per-foot cost differential for the oversized line.

C. If an oversized water line is to be 12-inch diameter, only the first 1000 feet of water line shall be eligible for oversize payment. All water line extensions in excess of 1000 linear feet must be 12-inch diameter in any case and are not eligible for oversize reimbursement.

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2 STORMWATER MANAGEMENT

2.1 INTRODUCTION

The following section has been established to assist developers and engineers with the design, construction and maintenance of stormwater (private and public) infrastructure within the jurisdiction of the Town of Wake Forest. The methods, procedures, design factors, formulas, graphs, and tables presented in this section are intended to establish minimal guidelines for residential, commercial and industrial storm drainage design, and for the solution of drainage problems involving determinations of the quantity of runoff, rate of flow, method of collection, storage, and conveyance of storm water. The Town of Wake Forest believes that the following criteria are sufficient to insure the welfare and safety of the general public and to protect the economic investment of the citizens of our Town.

Alternative design methods may be considered by the Engineer/Designer on a case-by-case basis, however, there should not be extensive variations from the criteria and procedures within this division without the expressed approval of the Town's Engineer.

2.1.1 TOWN'S ENGINEER

The Town's Engineer shall be responsible for interpretation and implementation of the storm drainage design criteria for the Town of Wake Forest. Approval from other applicable agencies may be required.

2.1.2 STORM DRAINAGE POLICY

It is the policy of the Town of Wake Forest that all developed land within the Town Limits has adequate stormwater facilities and controls to ensure the protection and safety of life and property. The Town may accept stormwater management systems for maintenance if the system provides drainage for streets that have been accepted for maintenance by the Town Board and have been designed and constructed in accordance with the provisions of the Stormwater Policy of the Town Code and this manual.

2.1.3 ACKNOWLEDGEMENTS

This division has been prepared by Appian Consulting Engineers, P.A. of Rocky Mount, North Carolina, in cooperation with the Town of Wake Forest, North Carolina. Appian has collected design data from over 10 drainage criteria manuals from throughout the United States. Those manuals were available for use in preparing this division. However, the content of this division is largely derived from the *Drainage Criteria Manual for Montgomery County, Texas*, [Dodson, 1989], and *Elements of Urban Stormwater Design*, [H. Rooney Malcom, P.E., 1989]. These manuals were particularly important because of their format, quality, completeness, and because they represented accepted criteria applied in the area of the Town of Wake Forest.

2.2 STORM DRAINAGE DESIGN

The purpose of this section is to provide a guide for the design of storm drainage systems and structures within the jurisdiction of the Town of Wake Forest.

2.2.1 MINIMUM DESIGN STANDARDS

All storm drainage systems within the jurisdiction of the Town of Wake Forest shall meet all the requirements of the Town of Wake Forest Manual of Specifications, Standards and Design, latest revision. The following shall be considered to be the minimum standards of design for storm drainage systems within the jurisdiction of the Town of Wake Forest.

2.2.2 GENERAL

The design of storm drainage infrastructure within the jurisdiction of the Town of Wake Forest shall be in accordance with the Technical Specifications. The subdivision/development shall provide an adequate drainage system, including necessary open ditches, pipe culverts, drop inlets, bridges, fill-in lots, etc. for the proper drainage of all surface water. The subdivider/developer shall connect to the Wake Forest storm drainage system where available; if not accessible, the subdivider/developer shall provide open drainage ditches necessary to carry the water in a manner approved by the Town's Engineer. The minimum standards of design shall adhere to the following guidelines.

2.2.3 POTENTIAL FLOOD HAZARDS

All subdivisions/development proposals shall be consistent with the need to minimize flood damage. All subdivision/development proposals shall have public utilities and facilities (such as sewer, gas, electrical and water systems) located and constructed to minimize flood damage. All subdivisions/developments shall have adequate drainage provided to reduce exposure to flood hazards.

2.2.4 DESIGN STORM FREQUENCY

All drainage systems components within the Town of Wake Forest's jurisdiction shall be designed to accommodate the frequency storm as follows:

A. Catch basins - 2-year return

B. Parallel storm drainage - 10-year return

C. Ditch-cross drainage - 25-year return

D. Flowing streams not requiring floodway study - 50-year return

E. Flowing streams requiring floodway study - 100-year return

2.2.5 DESIGN METHOD FOR COMPUTING RUNOFF

Storm water runoff calculations shall be computed by the following methods based on the watershed under study:

Table 2.1

Watershed	Method
Less than 50 acres	Rational Method
50 to 640 Acres	SCS and Malcom Method
Larger than 640 Acres with multiple sub-areas	HEC – 1

2.2.6 CALCULATION REQUIREMENTS

All storm water calculations (runoff, pipe, ditch and inlet sizing and detention routing (if required)) shall be submitted with the plans. Calculations shall consider inlet and outlet control, hydraulic grade line and backwater as applicable. The calculation package shall identify the project name and location, name of designer. The calculations shall also bear the seal, date and signature of the designer.

All detention/retention facilities in the Town of Wake Forest shall be designed to attenuate developed condition peak discharges to the existing conditions for the given storm calculation.

2.2.7 PLAN REQUIREMENTS

A. Tributary Areas: Tributary area plans must be included to justify discharges in all cases. Plans shall either show storm drainage calculations or the calculations shall be submitted in a separate package as noted above in Section 2.2.6 above.

B. Plan Submittals: Profiles and cross-sections for existing and proposed drainage courses may be required at the discretion of the Town's Engineer. When required, plans shall include street and/or off-street profiles of drainage ditches/pipe systems included for public maintenance. Profiles shall be same scale as plan view and shall show any water or sewer crossings or parallel lines.

2.2.8 DETENTION / RETENTION BASINS

Where physical, topographic and economic conditions permit, channel improvements downstream of the development are used to prevent increased flooding. When this is not feasible, runoff detention or retention is required in which the storm runoff is detained and released at an acceptable rate through a flow-limiting outlet structure, thus controlling peak downstream flow. Forms of acceptable detention structures are ponds, ditches or swales with flow restrictions, and underground storage systems. As the science develops, other forms of detention may become available. The Town will consider for approval any viable system that is proven by routing to perform the function intended provided the system is maintainable.

On-site detention **may be required** for non-single family residential developments such as apartments, shopping centers, industrial sites and churches. Such facilities are to be owned and maintained by the owner of the development.

A. Detention Basin Design Requirements

1. Post-development runoff may not exceed pre-development runoff. For detention basins/ponds, the exception to this requirement is that if it can be shown, by modeling, that the detention basin peak discharge would coincide with the peak discharge at its confluence with the receiving stream, then the detention basin, at the discretion of the Town's Engineer, may be eliminated. However, if the purpose of the basin is to serve as a Water Quality Pond, the basin may NOT be eliminated.
2. Evaluate the 2-year, 10-year and the 100-year 24-hour storms routed though the facility. (If the same device is used for detention and retention purposes, the 1-year 24-hour storm shall also be evaluated.)
3. Post-development basin release rate may not exceed the rate of the pre-development runoff.
4. Emergency spillway must be designed to carry the 100-year storm event without increased upstream or downstream flooding.

B. Retention Basin (WQ Pond) Design Requirements

1. 10 wide vegetated submerged perimeter shelf at 6:1 or less slope.
2. Emergency drain of pond provided.
3. Permanent pool depth of between 3 and 6 feet.
4. Evaluate the 2-year, 10-year and the 100-year 24-hour storms routed though the facility.
5. Capture the first 1-inch of post-development volume of runoff and release it in 1 to 5 days (draw down).

6. Release rate may not exceed the rate of the pre-development basin conditions.
7. Forebay 20% of total basin volume.
8. Emergency spillway must be designed to carry the 100-year storm event without increased upstream or downstream flooding.
9. 85% average annual removal of total suspended solids.
10. O& M Plan

C. For design methodology of detention/retention basins, see Section 2.9, Detention/Retention Design.

2.2.9 DRAINAGE DESIGN CONSTRAINTS

A. Velocity: Velocity of drainage flow after development shall not exceed that before development upon leaving the development.

B. Erosion Control: The Town of Wake Forest has been delegated as an authority to review and approve erosion control plans by the State. All erosion control plans must be submitted to the Town of Wake Forest for review and approval. Erosion control measures shall be in accordance with the North Carolina Erosion Control Manual, latest revision.

C. Buffer Strip along natural drainage ways: All Neuse River Buffer rules must be followed.

D. Roadside ditch liners: In all subdivisions where there is no C & G, side ditches requiring protection shall be concrete paved. Riprap may be accepted upon approval of Town of Wake Forest Engineering staff.

E. Drainage along subdivision side lot lines: Storm drainage systems shall follow the natural contour of the subdivision lots.

F. Standard improved ditch cross-section: All improved ditches shall have:

1. A minimum 3-foot bottom width,
2. A maximum side slope of 3:1.
3. A minimum longitudinal grade of 0.3%.

G. Rip Rap Filter: Engineering fabric will be required under all riprap. Fabric shall be minimum of 5-ounce needle punched (non-woven) minimum. Filter stone may not be used in lieu of fabric.

H. Limits of Public Ownership and Maintenance Responsibility

1. All drainage easements shall be public to the end of any storm drainage pipe system stilling basin. **All drainage beyond that point shall be carried in drainage easements which are private and will be owned and maintained by the individual property owner**.
2. **The Town of Wake Forest assumes no liability or responsibility for adjudicating disputes between property owners regarding non-publicly generated storm water**.
3. **Drainage easements and dedications**: This shall apply both inside the corporate limits and the ETJ as well as in any development receiving Town water and /or sewer service by contract.

   Where a subdivision/development is traversed by a water course, drainage way, underground storm drain, the subdivider/developer shall dedicate to the Town

(where applicable in accordance with the above) a drainage maintenance easement a minimum of 15-feet wide located paralleling both sides of any water course or drainage channel or 30-feet wide paralleling any storm drainage. Private drainage easement widths shall also correspond to these same criteria. The Town's Engineer may require wider easement widths if the topography along the proposed right-of-way is such that maintenance equipment cannot reasonably operated within the easement.

I. **Pipe Material**: All storm drainage pipes shall be reinforced concrete class III minimum B or C Wall. Cross pipes under streets shall be reinforced concrete or bituminous coated corrugated metal. Pipe systems greater than 72-inches in diameter will be reviewed on a case-by-case basis for material and construction.

J. **Manhole rings and covers**: All storm sewer manhole rings and covers shall be sanitary sewer standard, except that they shall be stamped "storm sewer."

K. **Street Pipe Culverts**: Culverts shall be provided to accommodate all natural water flow and shall be of sufficient length to permit full width roadway construction with the required slopes (fill or cut). The pipe shall be designed in accordance with the Stormwater Management and Design Criteria in this chapter. Cross drains shall be built on straight line and grade and shall be laid with the ends filled and matched to provide joints in conformity with Section 2.2.9.L with a smooth invert. They shall be placed at sufficient depth below the roadbed to avoid dangerous pressure of impact and generally the top of the pipe should be at least 12-inches below the roadbed; however, in a case where the pipe is not more than 12-inches below the roadbed, the pipe shall be reinforced with concrete. The minimum diameter is 15 inches (See Section 2.8.3)

L. **Open Joints in Drainage Pipe**: Where it is deemed necessary by the Town's Engineer, the joint in the bottom 2-inches (of the pipe diameter) shall be left open to permit groundwater infiltration into the pipe system. The pipe shall have a class C bedding conforming to Technical Specification section 02210, paragraph 3.A.7.

M. **Road/Street Foundation Subdrain/Underdrain**: A subdrain will be required in all cases where high water tables may cause problems with subgrade. Parallel or herringbone systems will be used as appropriate.

N. **Precast Catch Basins**: Precast catch basins with weep holes shall generally be required. See standard details 2.50 through 2.61 as applicable.

O. **Flared End Sections**: Flared end sections will be permitted on pipe as follows:

1. On single pipe systems up to a 42" diameter

2. On twin pipe systems up to 18" diameter.

Otherwise, head walls will be used for all larger pipe systems and for all other multi-barrel pipe systems.

P. **Head/End walls**: For Head/End wall construction details, refer to the NCDOT Highway Design BranchRoadway Standard Drawings, latest revision. Standard Drawings are to be used in conjunction with the NCDOT Standard Specifications unless otherwise more restrictive as specified in this manual.

Q. **Combined Sewer Flow**: No storm water drainage shall be discharged into a sanitary sewer.

2.3 HYDROLOGIC ANALYSIS: DETERMINATION OF RUNOFF

The purpose of Sections 2.3 through 2.6 is to establish standard procedures and criteria for the performance of hydrologic analyses in the Town of Wake Forest.

2.3.1 DETERMINATION OF RUNOFF

A. The determination of runoff may be the single most important factor in the planning, design, and construction of drainage facilities. If the estimate of storm runoff is incorrect, the constructed facilities may be undersized or oversized. An improperly designed drainage system may be uneconomical, cause flooding, interfere with traffic, and may be a general nuisance in the affected area. However, determination of runoff can only be approximated using sound engineering processes to represent physical and climatic factors to best model the system.

B. There are many methods currently available to estimate peak flow rates. The Town of Wake Forest will use the Rational Method for watersheds smaller than 50 acres, the SCS and the Malcom Method to develop runoff hydrographs for watersheds greater or equal to 50 acres and less than 640 acres, and HEC-1 for watersheds greater than 640 acres and for watersheds with multiple sub-areas.

2.4 HYDROLOGIC ANALYSIS OF WATERSHEDS SMALLER THAN 50 ACRES

2.4.1 RATIONAL METHOD

For small drainage areas (less than 50 acres in size), the widely used Rational Method provides a useful means of determining peak discharges. The Rational Method represents an accepted method for determining peak storm runoff rates for small watersheds that have a drainage system unaffected by complex hydrologic situations such as ponding areas and storage basins. It is generally recommended that in the Town of Wake Forest that Rational Method be used for areas of less than 50 acres. In situations requiring determination of a complete flood hydrograph, and not just a peak discharge, a method developed by H.R. Malcom [Malcom, Updated] should be utilized. The Malcom method is described in Section 2.5.1 of this manual. Engineers wishing to use an alternative design technique should consult The Town of Wake Forest Town's Engineer prior to design.

A. The Rational Method is based on a direct relationship between rainfall intensity and runoff, and is expressed by the following equation:

$$Q = CiA \qquad \text{(Equation 2.1)}$$

Where,

Q → The peak rate of runoff in cubic feet per second (cfs). Actually, Q is in units of inches per hour per acre. Since this rate of inches-acre/hour differs from cubic feet per second by less than one percent, the more convenient units of cfs are used.

C → The dimensionless coefficient of runoff representing the ratio of peak discharge per acre to rainfall intensity.

i → The average intensity of rainfall in inches per hour for a period of time equal to the time of concentration for the drainage area at the point of interest.

A → The area in acres contributing runoff to the point of interest during the critical storm duration.

B. Basic assumptions associated with the Rational Method are:

1. The frequency or recurrence interval of the peak discharge is equal to the frequency of the average (uniform) rainfall intensity associated with the critical storm duration.
2. The computed peak rate of runoff at the point of interest is a function of the average rainfall intensity during a period of time equal to the time of concentration at that point.
3. The time of concentration is the critical storm duration. This is discussed under Section 2.4.1.D.
4. The ratio of runoff rate to rainfall intensity (C) is uniform during the storm duration.
5. Rainfall intensity (i) is uniform during the storm duration.
6. The contributing area is the area that drains to the point of interest within the critical time of concentration.

C. Rational Method Runoff Coefficient (C)

1. In relating peak rainfall rates to peak discharges, the runoff coefficient "C" in the Rational Formula is dependent on the character of the surface of the drainage area. The rate and volume of runoff that reaches a storm drainage system depends on the relative porosity **(imperviousness)**, ponding character, slope, and conveyance properties of the surface. Soil type, vegetative condition, and the presence of impervious surfaces, such as asphalt pavements and the roofs of buildings, are the major determining factors in selecting an area's "C" factor. The type and condition of the surface determines its ability to absorb precipitation and transport runoff.
2. The rate at which a soil absorbs precipitation generally decreases as rainfall continues for an extended period of time. The soil absorption or infiltration rate is also influenced by the presence of soil moisture before a rain **(antecedent precipitation)**, the rainfall intensity, the depth of the ground water table, the degree of soil compaction, the porosity of the subsoil, vegetation, ground slopes, depressions, and storage. On-site inspections and aerial photographs may prove valuable in evaluating the nature of the surface within the drainage area.
3. The runoff coefficient "C" is difficult to precisely determine. Its use in the Rational Method implies a fixed ratio of runoff rate to rainfall intensity for any given drainage area, which in reality is not the case. A reasonable coefficient must be chosen to represent the integrated effects of infiltration, detention storage, evaporation, retention, flow routing, and interception, all of which affect the time distribution and peak rate of runoff. Proper use of the Rational Method requires judgment and experience on the part of the engineer, especially in the selection of the runoff coefficient.
4. Coefficients for specific surface types can be used to develop a composite runoff coefficient based in part on the percentage of different types of surfaces in the drainage area. This procedure is often applied to typical "sample" blocks

as a guide to the selection of reasonable values of the coefficient for an entire area.

5. Table 2.2 presents recommended values for the runoff coefficient "*C*" for various residential districts and specific surface types for 5 to 10 year frequency storms.

Table 2.2 Rational Method Runoff Coefficients for 5 – 10 Year Frequency Storms

Description of Area	Basin Slope < 1%	Basin Slope 1% - 3.5%	Basin Slope 3.5% - 5.5%
Single Family Residential Districts			
Lots greater than ½ acre	0.30	0.35	0.40
Lots ¼ - ½ acre	0.40	0.45	0.50
Lots less than ¼ acre	0.50	0.55	0.60
Multi-Family Residential Districts	0.60	0.65	0.70
Apartment Dwelling Areas	0.75	0.80	0.85
Business Districts			
Downtown	0.85	0.87	0.90
Neighborhood	0.75	0.80	0.85
Industrial Districts			
Light	0.50	0.65	0.80
Heavy	0.60	0.75	0.90
Railroad Yard Areas	0.20	0.30	0.40
Cemeteries	0.10	0.18	0.25
Playgrounds	0.20	0.28	0.35
Streets			
Asphalt	0.80	0.80	0.80
Concrete	0.85	0.85	0.85
Concrete Drives and Walks	0.85	0.85	0.85
Roofs	0.85	0.85	0.85
Lawn Areas			
Sandy Soil	0.05	0.08	0.12
Clay Soil	0.15	0.18	0.22
Woodlands			
Sandy Soil	0.15	0.18	0.25
Clay Soil	0.18	0.20	0.30
Pasture			
Sandy Soil	0.25	0.35	0.40
Clay Soil	0.30	0.40	0.50
Cultivated			
Sandy Soil	0.30	0.55	0.70
Clay Soil	0.35	0.60	0.80
Bare Soil			
Sandy Soil	0.40	0.50	0.60
Clay Soil	0.60	0.70	0.80
Pond and Lakes	0.98	0.98	0.98

Source: "Drainage Criteria Manual For Montgomery County, Texas," 1989, Revised ACE 1998.

6. Most drainage areas will consist of several different types of development types. In these cases the designer should develop a Composite Runoff Coefficient. The accepted procedure is simply to weight the individual coefficients according to the area taken by each category. The Composite Runoff Coefficient is expressed as the following:

$$C_c = \frac{\sum (C_i A_i)}{\sum A_i} \qquad \text{(Equation 2.2)}$$

Where,

C_c → The Composite Runoff Coefficient (dimensionless).

A_i → The area taken by an individual category of composition.

C_i → The runoff coefficient for the individual area.

7. Adjustment of the "C" value for use with more severe (less frequent) storms can be made by multiplying the runoff coefficient by a **frequency factor**, C_f, which is used to account for antecedent precipitation conditions. The equation now becomes:

$$Q = C_f CiA \qquad \text{(Equation 2.3)}$$

Table 2.3 presents values of C_f. **The product of C times C_f should not exceed 1.0.**

Table 2.3 Rational Method Frequency Factor Adjustment

Frequency of Storm (years)	Frequency Factor (C_f)
≤ 10	1.00
25	1.10
50	1.20
100	1.25

Source: "Urban Storm Drainage Criteria Manual" 1969.

8. Basic assumptions associated with Runoff Coefficients are:

a. Weighted coefficient based on percentage of impervious surfaces and green areas must be selected for each site.

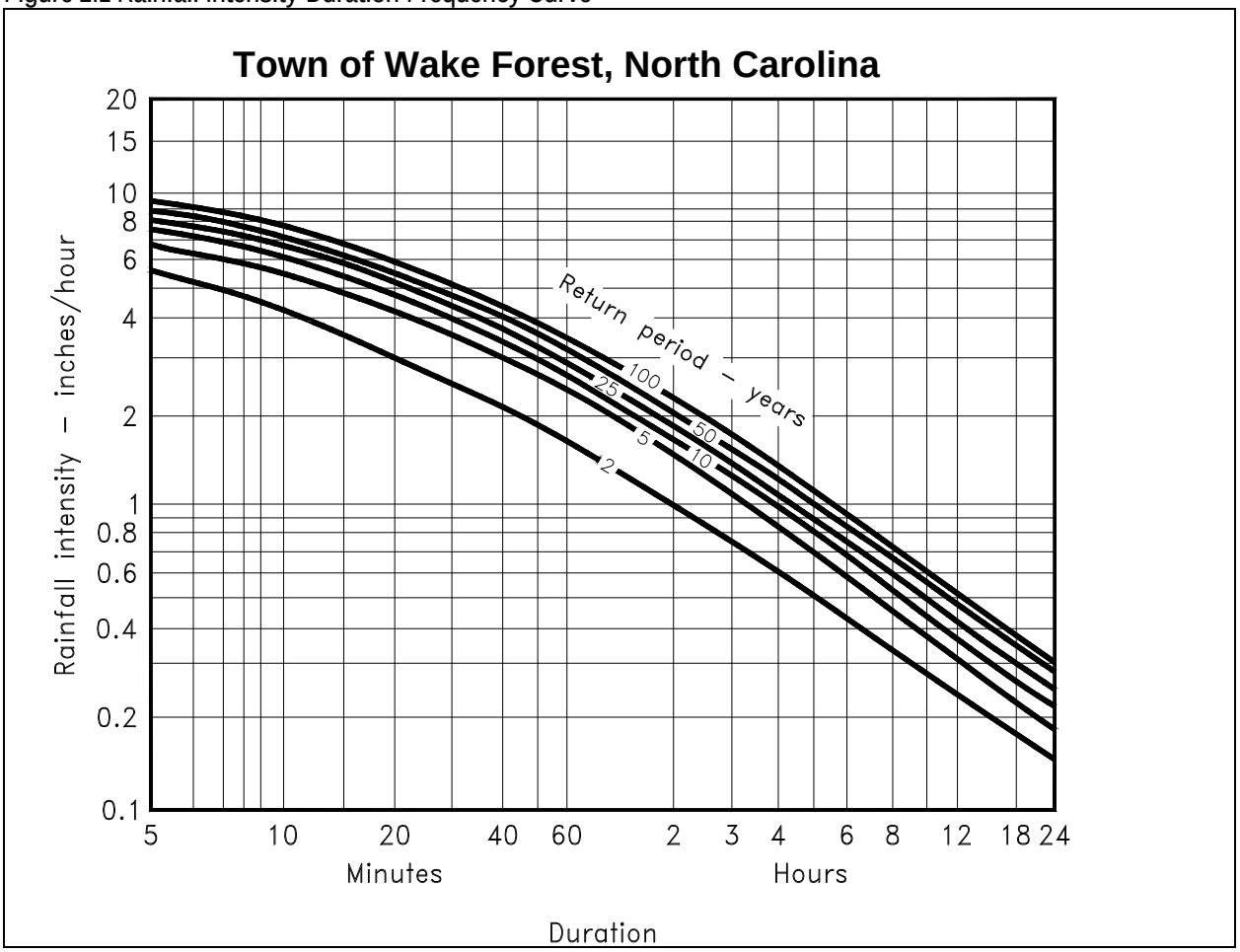
b. Coefficients assume good ground cover and conservation treatment.

c. Sound engineering judgement and experience must be used to determine an accurate and useful Runoff Coefficient.

D. Rational Method Rainfall Intensity (i)

1. **Rainfall intensity** (i) is the average rainfall rate in inches per hour which is considered for a particular basin or sub-basin. The rainfall intensity is determined on the basis of **design rainfall duration** and design frequency of occurrence. The design rainfall duration is equal to the critical time of concentration for all portions of the drainage area under consideration that contribute flow to the point of interest. The **frequency of occurrence** used in design computations is a statistical variable that is established by design standards or chosen by the engineer as a design parameter. It is usually expressed in terms of the average storm recurrence interval in years.

Figure 2.1 Rainfall Intensity-Duration-Frequency Curve



Source: "Elements of Urban Stormwater Design" [Malcom, 1989]

Table 2.4 Rainfall Intensity-Duration-Frequency Table for the Town of Wake Forest

	Return Period →					
Duration	**2 year (in/hr)**	**5 year (in/hr)**	**10 year (in/hr)**	**25 year (in/hr)**	**50 year (in/hr)**	**100 year (in/hr)**
5 minute	5.76	6.58	7.22	8.19	8.96	9.72
10 minute	4.76	5.54	6.13	7.01	7.71	8.40
15 minute	4.04	4.74	5.25	6.03	6.64	7.24
30 minute	2.70	3.28	3.71	4.32	4.80	5.28
60 minute	1.70	2.12	2.41	2.84	3.17	3.50
2 hour	0.95	1.20	1.37	1.62	1.81	2.00
3 hour	0.71	0.89	1.02	1.21	1.35	1.50
6 hour	0.44	0.56	0.65	0.77	0.86	0.96
12 hour	0.26	0.33	0.39	0.46	0.52	0.57
24 hour	0.15	0.19	0.22	0.27	0.30	0.33

Source: "Elements of Urban Stormwater Design" [Malcom, 1989].

2. The **time of concentration** used in the rational equation is the time of concentration for the entire drainage area upstream of the point of interest. The **critical time of concentration** is the time of concentration which results in the maximum peak runoff rate from all or part of the upstream drainage area at the point of interest. This may be equal to or less than the time of concentration. Runoff from a watershed usually reaches a peak at the time when the entire drainage area is contributing. However, the runoff rate may reach a peak prior to the time when the entire upstream drainage area is contributing. In such instances, only the portions of the drainage area able to contribute flow at the point of interest during the critical time of concentration should be used in determining the peak discharge.

3. The time of concentration is based on a relationship between the hydraulic length of the watershed and the height of the most remote point in the watershed above the point of interest. The Kirpich Equation [Bureau of Reclamation, 1974] defines the time of concentration and is expressed by the following equation:

$$t_c = \frac{\left[L^3 / H \right]^{0.385}}{128} \qquad \text{(Equation 2.4)}$$

Where,

t_c → The time of concentration, which is equal to the time it takes runoff to travel from the most remote point in the basin to the point of interest.

L → The hydraulic length of the watershed, which is the overland flow distance from the most remote point in the basin to the point of interest, measured in feet.

H → The height of the fall between the most remote point in the basin and the point of interest. The elevation difference along the hydraulic length, measured in feet.

4. Assuming the time of concentration equals the duration of the storm event in Figure 2.1, The IDF curve can now be used to determine the rainfall intensity, (i). Storms of less than 15 minutes of duration are not considered in standard practice. In Wake Forest, use 5 minutes.

As an alternative, the designer may use an equation to represent the same relationship. For the Town of Wake Forest the rainfall intensity is expressed by the following equation:

$$i = \frac{g}{(h+T)} \qquad \text{(Equation 2.5)}$$

Where,

i → Rainfall intensity (in/hr).

T → Time of duration (minutes)

And the values of g and h for various Storm Events (return periods) are as follows *(For the Town of Wake Forest only):*

Table 2.5 Values for g and h

Storm Event	g	h
2	132	18
5	169	21
10	195	22
25	233	23
50	261	24
100	291	25

Source: "Elements of Urban Stormwater Design," [Malcom,1989]

This equation (Eq. 2.5) applies only when the time of duration is in the range of 5 to 120 minutes. For times of concentration less than 5 minutes, use 5 minutes.

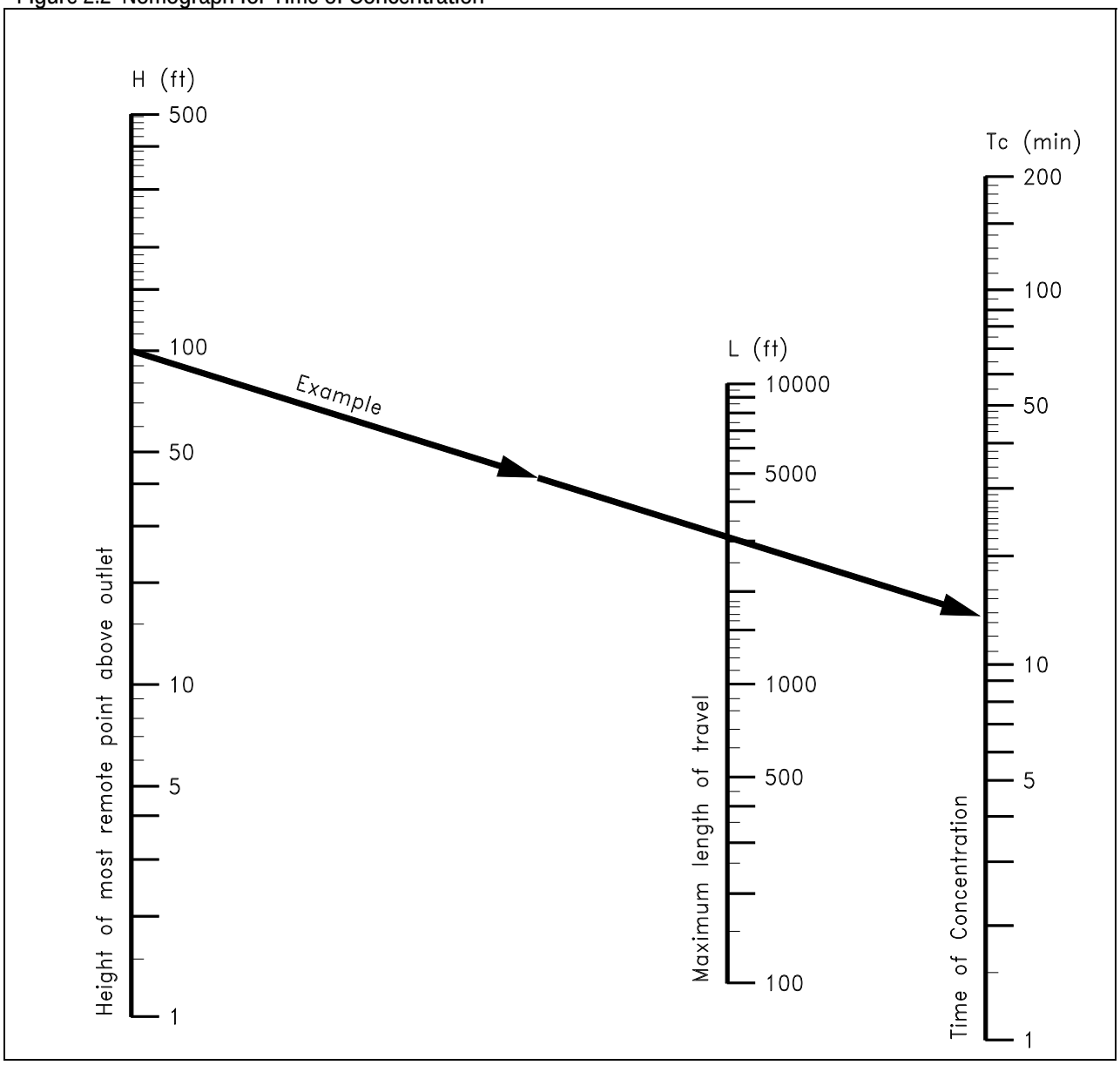
Due to its close proximity to the City of Raleigh, the Town of Wake Forest has chosen to adopt the Rainfall Intensity-Duration-Frequency curves and equations used by the City of Raleigh in lieu of calculating new tables and charts.

E. Rational Method Drainage Area (A)

As mentioned previously, the drainage area used in determining peak discharges is the portion of the area that contributes flow to the point of interest within the critical time of concentration. The boundaries of the drainage area may be determined through the use of topographic maps, supplemented by field surveys where topographic data has changed or where the contour interval is too great to distinguish the direction of flow. A drainage area map shall be provided for each project. The drainage area contributing to the system being designed and the drainage sub-area contributing to each inlet point shall be identified. The boundaries of each drainage area must follow actual drainage divides rather than artificial land divisions as used in the design of sanitary sewers. The drainage divide

lines are determined by pavement slopes, downspout locations, grading of lawns, and many other features that are introduced by the urbanization process.

Figure 2.2 Nomograph for Time of Concentration



Source: "E & S Control Planning and Design Manual," [DEHNR, May 1994 Revised]

Notes:

1. Use nomograph t_c for natural basins with well-defined channels, for overland flow on bare earth, and for mowed-grass roadside channels.

2. For overland flow, grassed surfaces, multiply t_c by 2.

3. For overland flow, concrete or asphalt surfaces, multiply t_c by 0.4.

4. For concrete channels, multiply t_c by 0.2.

2.4.2 OVERVIEW OF RATIONAL METHOD ANALYSIS *[Malcom, 1989]*

The following are the steps to be taken in determining the peak discharge for a particular point of interest:

A. Delineate the watershed contributing to the point of interest, and determine the drainage area in acres. (The terms "watershed" and "drainage area" are synonymous.)

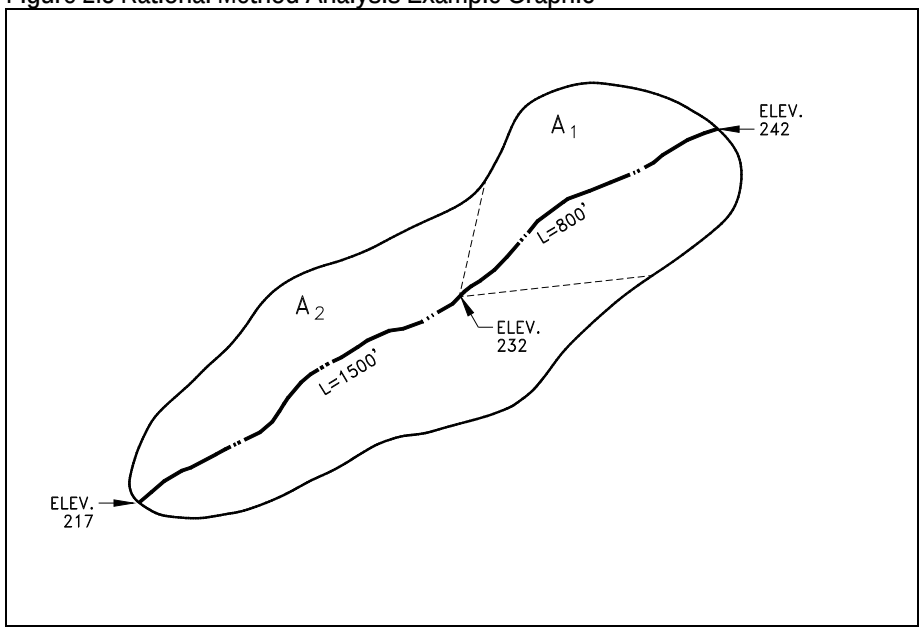
B. Determine the time of concentration for the watershed.

C. Determine the rainfall intensity for the designated return period at the time of concentration.

D. Determine the composite runoff coefficient.

E. Apply the Rational Equation to obtain the peak discharge.

Figure 2.3 Rational Method Analysis Example Graphic



2.4.3 EXAMPLE OF RATIONAL METHOD ANALYSIS

Figure 2.4 Example of Rational Method Analysis

Use the Rational Method to find the 10 year design runoff for the area shown in Figure 2.3.
This is a hypothetical drainage system.

A1 → Basin Area = 5 acres
Multi-Family Residential District, 1% - 3.5%

A2 → Basin Area = 10 acres
Business Neighborhood, 1% - 3.5%

Solution:

1. Time of Concentration:

   Using Equation 2.4 and the given information determine the time of concentration (t_c).

   Area A_1:

$$t_c = \frac{\left[L^3/H\right]^{0.385}}{128} = \frac{\left[800^3/(242-232)\right]^{0.385}}{128} = 7.26 \text{ min}$$

   Area A_2:

$$t_c = \frac{\left[L^3/H\right]^{0.385}}{128} = \frac{\left[1500^3/(232-217)\right]^{0.385}}{128} = 12.83 \text{ min}$$

Therefore, the total time of concentration for the entire basin is 7.26 + 12.83 = 20.09 minutes, use 20 minutes. In lieu of using Equation 2.4 (the Kirpich Equation), Figure 2.2 could have been used to graphically solve for the Time of Concentration.

2. Rainfall Intensity:

   Using Equation 2.5 and the above calculated t_c = 20 minutes, *assuming the time of concentration (t_c) is equal to the duration (T) of the storm,* determine the Rainfall Intensity.

$$i = \frac{g}{(h+T)} = \frac{195}{(22+20)} = 4.64 \text{ inches/hour}$$

In lieu of using Equation 2.5, the IDF curve, Figure 2.1, could have been used to graphically solve for the Rainfall Intensity.

3. Runoff Coefficient:

   Using Equation 2.2, determine the composite "C" factor.

$$C_c = \frac{\sum (C_i A_i)}{\sum A_i} = \frac{(0.65x5)+(0.80x10)}{(5+10)} = 0.75$$

4. Calculate the 10 year design storm peak runoff:

   Using Equation 2.1 and the above solved equations, determine the peak flow runoff.

$Q = CiA$ = 0.75 x 4.64 x 15 = 52.2 cfs

2.5 HYDROLOGIC ANALYSIS OF WATERSHEDS FROM 50 TO 640 ACRES

Hydrological analyses involving watersheds of greater than or equal to 50 acres and less than 640 acres may be completed using the Malcom Method to develop runoff hydrographs.

2.5.1 MALCOM'S METHOD OF HYDROGRAPH DEVELOPMENT

A. Malcom's Method for hydrograph development is useful in the design of facilities which require an analysis over time. This procedure can be used in conjunction with the Soil Conservation Service (SCS) Method (Section 2.5.2.B) or the Rational Method (Section 2.4.1). This methodology utilizes a pattern hydrograph to obtain a curvilinear design hydrograph which peaks at the design flow rate and which contains a runoff volume consistent with the design rainfall. The pattern hydrograph is a step function approximation to the dimensionless hydrograph proposed by the Bureau of Reclamation and the Soil Conservation Service [SCS, 1972].

B. This method is commonly used in designs that require storage areas, detention/retention basin design, ponding areas, or simply when a system needs to be routed in order to determine a peak elevation for any given storm event.

C. This method is based upon the observation that there are three important aspects of the hydrograph on which the design will depend: The peak discharge, the volume of water under the hydrograph, and the shape of the hydrograph. Separate decisions may be made regarding these, and the hydrograph will be determined.

D. Malcom's Method consists of the following equations:

For $t_i \le 1.25T_p$:

$$q_i = \frac{Q_p}{2}\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] \qquad \text{(Equation 2.6)}$$

For $t_i > 1.25T_p$:

$$q_i = 4.34Q_p \exp\left[-1.3\left(\frac{t_i}{T_p}\right)\right] \qquad \text{(Equation 2.7)}$$

$$T_p = \frac{V}{1.39Q_p} \qquad \text{(Equation 2.8)}$$

Where,

Q_p → The peak rate of runoff in cubic feet per second (cfs).

T_p → The time to peak of the design hydrograph, measured from the time of significant rise of the rising limb to the time at which the estimated peak occurs.

t_i → The time of interest at which the flow rate is to be estimated.

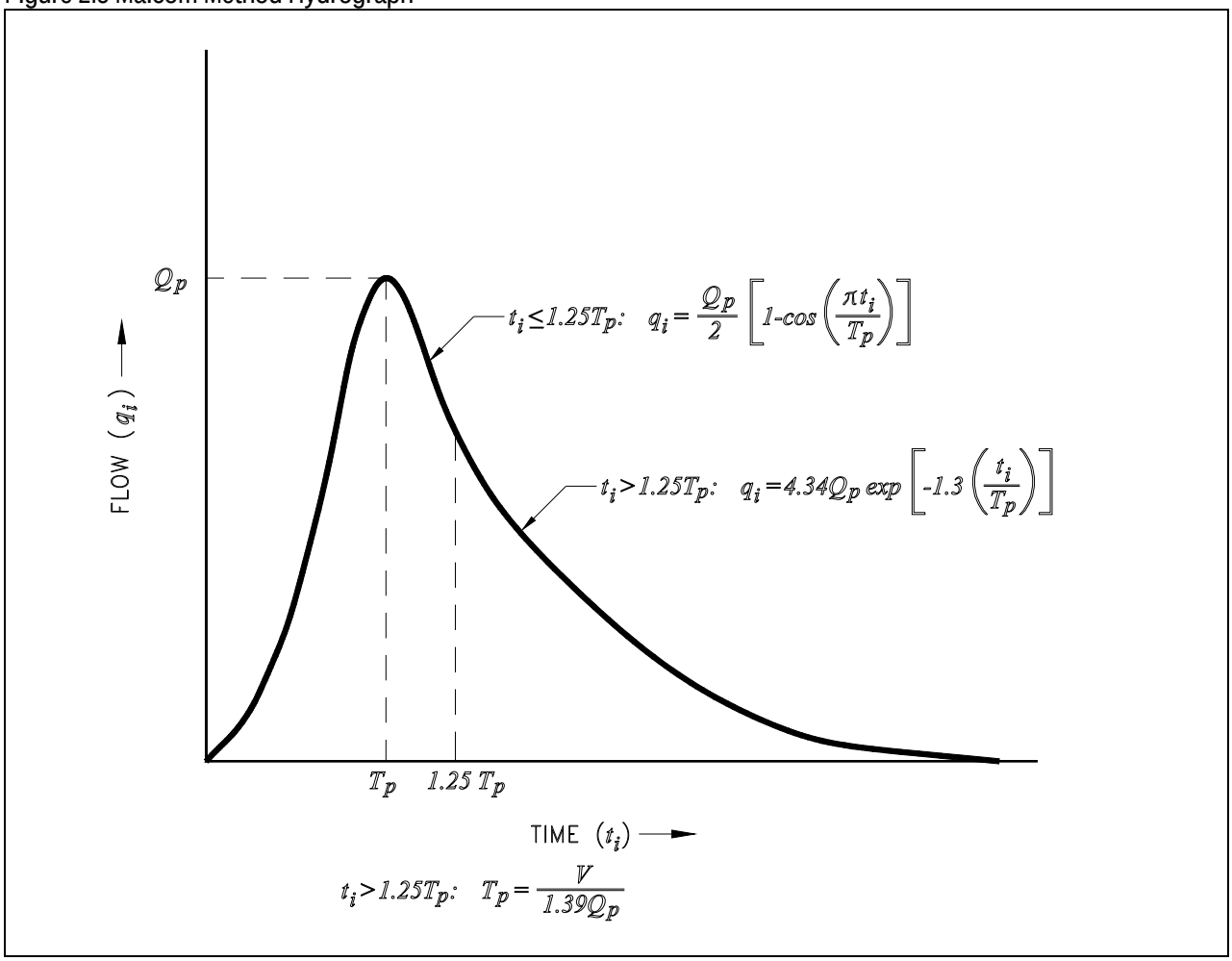
q_i → The flow rate at which the time of interest is to be estimated.

$V \rightarrow$ The total volume of runoff for the design storm in cubic feet.

The argument of the cosine in Equation 2.6 must be expressed in radians, not degrees.

A hydrograph plot which illustrates the parameters involved in the development of hydrographs using the Malcom Method is included as Figure 2.5.

Figure 2.5 Malcom Method Hydrograph



Source: "Drainage Criteria Manual for Montgomery County Texas," [Dodson, 1989]

2.5.2 PEAK FLOW RATES FOR HYDROGRAPH DEVELOPMENT

A. The peak design flow rate (peak rate of runoff) can be calculated using the following equations. In some cases, the Rational Method as discussed in Section 2.4 can be used as long as the designer is able to select parameters that accurately model the time to peak and the peak flow rate.

Figure 2.6 Peak Flow Rates for Hydrograph Development

Return Period	Q_{peak}	
2 Year	$Q_p = 144A^{0.691}$	**Equation 2.9**
5 Year	$Q_p = 248A^{0.670}$	**Equation 2.10**
10 Year	$Q_p = 334A^{0.665}$	**Equation 2.11**
25 Year	$Q_p = 467A^{0.655}$	**Equation 2.12**
50 Year	$Q_p = 581A^{0.650}$	**Equation 2.13**
100 Year	$Q_p = 719A^{0.643}$	**Equation 2.14**
500 Year	$Q_p = 1.70Q_{100}$	**Equation 2.15**

Source: "US Geological Survey, Water Resources Investigation Report 87-4096"

Where,

Q_p → The peak rate of runoff in cubic feet per second (cfs).

A → The area in acres contributing runoff to the point of interest . The area in these equations is to be measured in SQUARE MILES.

B. Total Runoff Volume for Hydrograph Development: The total volume of runoff is dependent on the characteristics of the soil and the degree of urbanization of the area (i.e. percent of impervious cover). Loss rate totals may be estimated using the **SCS Curve Number** methodology developed by the Soil Conservation Service [SCS, 1972].

Figure 2.7 provides graphs for the determination of runoff volume for a given rainfall depth and SCS Curve Number.

The SCS provides information on relating soil group type to curve number as a function of soil cover, land use type and antecedent moisture conditions. The SCS soil classification system uses four groups, as follows:

Group A: deep sand, deep loess, aggregated silts

Group B: shallow loess, sandy loam

Group C: clay loams, shallow sandy loam, soils low in organic content, and soils usually high in clay

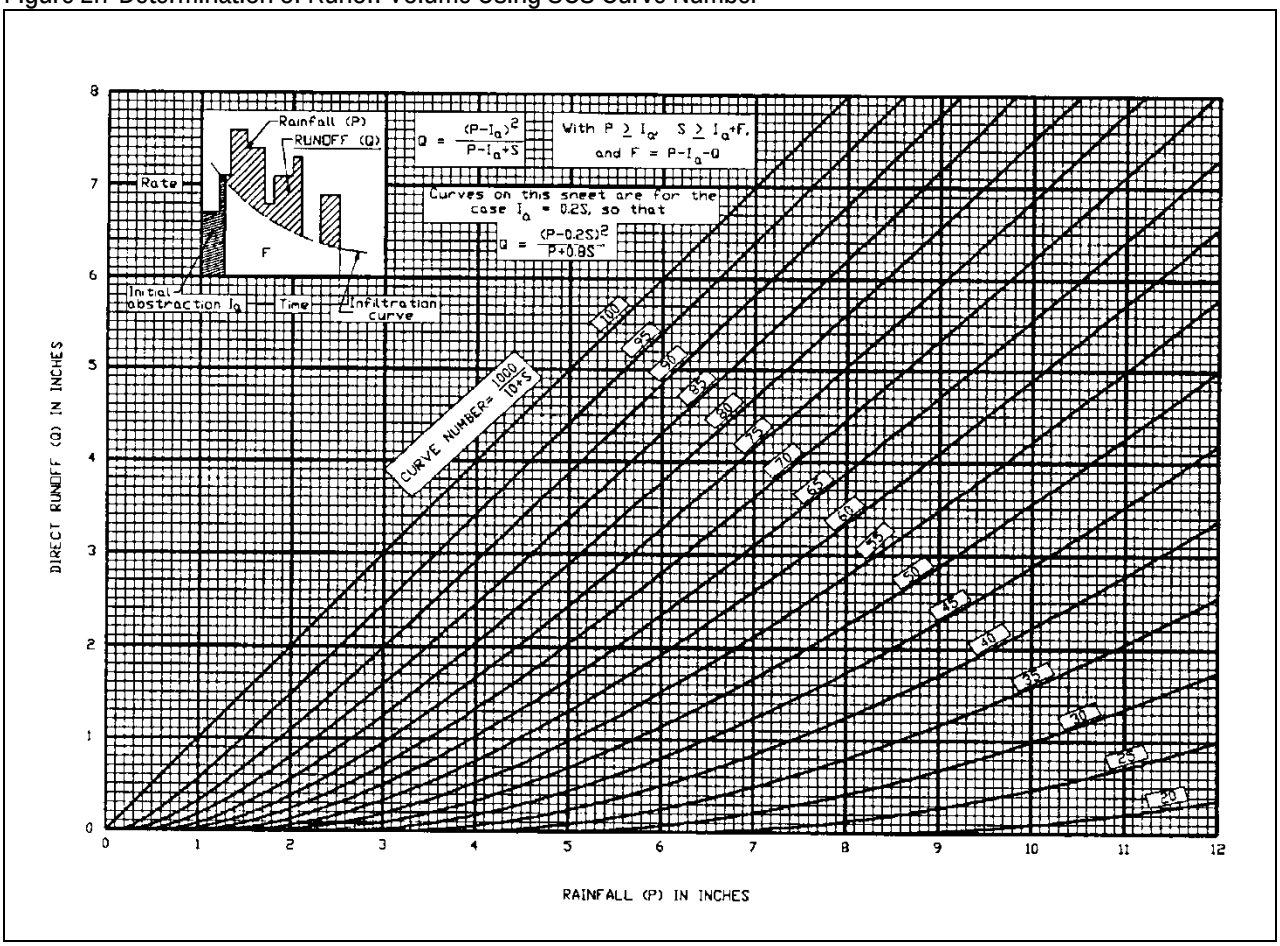
Group D: soils that swell significantly when wet, heavy plastic clays, and certain saline soils

All other factors being equal, Group A soils have the lowest runoff potential and Group D soils have the highest runoff potential.

Usually, the best source of information for determining the SCS soil group for a particular drainage area is the Soil Survey of Wake County, North Carolina [SCS 1970].

Tables 2.7 and 2.8 of this manual list appropriate values for the SCS Curve Number for each of the four SCS soil groups. The tables are also organized according to the SCS cover complex, which consists of three factors: land use, land treatment or practice, and hydrologic condition. For example, the land use for a particular area may be "Row crops". If the land treatment or practice is "Straight row" and the hydrologic condition is "Good", then the SCS Curve Number would range from 67 to 89, depending on the soil group.

Figure 2.7 Determination of Runoff Volume Using SCS Curve Number



Source: "Drainage Criteria Manual for Montgomery County Texas," [Dodson, 1989]

$$S = \frac{1000}{CN} - 10 \qquad \text{(Equation 2.16)}$$

$$Q^* = \frac{(P - 0.2S)^2}{P + 0.8S} \qquad \text{(Equation 2.17)}$$

The Volume of runoff is now found by multiplying runoff depth by the watershed area.

$$V = Q^* A \qquad \text{(Equation 2.18)}$$

Where,

S → Ultimate Soil Storage, measured in inches.

P → Precipitation depth, measured in inches. The depth of precipitation varies from any given Storm Event. To determine inches of rainfall, use Technical Paper Number 40, Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years, [Hershfield, 1961] or the Depth-Duration-Frequency Table 2.6.

Q^* → The runoff depth, measured in inches. The asterisk has been added to distinguish the use of Q^*, which is a depth and the usual use of Q, which is a discharge.

V → The total volume of runoff for the design storm in cubic feet.

A → The area in acres contributing runoff to the point of interest. The area in these equations is to be measured in SQUARE MILES.

Table 2.6 Depth-Duration-Frequency Table for the Town of Wake Forest

	Return Period →					
Duration	2 year (in)	5 year (in)	10 year (in)	25 year (in)	50 year (in)	100 year (in)
5 minute	0.48	0.55	0.60	0.68	0.75	0.81
10 minute	0.79	0.92	1.02	1.17	1.28	1.40
15 minute	1.01	1.18	1.31	1.51	1.66	1.81
30 minute	1.35	1.64	1.85	2.16	2.40	2.64
60 minute	1.70	2.12	2.41	2.84	3.17	3.50
2 hour	1.91	2.40	2.74	3.23	3.61	4.00
3 hour	2.12	2.68	3.07	3.62	4.06	4.49
6 hour	2.65	3.38	3.90	4.62	5.19	5.75
12 hour	3.13	4.02	4.64	5.52	6.20	6.88
24 hour	3.60	4.65	5.38	6.41	7.21	8.00

Source: "Elements of Urban Stormwater Design" [Malcom, 1989].

Table 2.7 Values of SCS Curve Number for Urban and Suburban Areas

Land Use Description	Hydrologic Soil Group A	B	C	D
Residential				
1/8 acre or less average lots (65% impervious)	77	85	90	92
1/4 acre average lots (38% impervious)	61	75	83	87
1/3 acre average lots (35% impervious)	57	72	81	86
1/2 acre average lots (25% impervious)	54	70	80	85
1 acre average lots (20% impervious)	51	68	79	84
Paved parking lots, roofs, driveways, etc.	98	98	98	98
Streets and Roads				
Paved with curbs and storm sewers	98	98	98	98
gravel	76	85	89	91
dirt	72	82	87	89
Commercial & Business Areas (85% impervious)	89	92	94	95
Industrial Districts (72% Impervious)	81	88	91	93
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries, etc.				
good condition: grass cover on 75% or more	39	61	74	80
fair condition: grass cover on 50% to 75%	49	69	79	84

Source: [McCuen, 1982]

2.5.3 OVERVIEW OF MALCOM'S METHOD OF HYDROGRAPH DEVELOPMENT

The following are steps to be taken in developing Runoff Hydrographs:

A. Delineate the watershed contributing to the point of interest, and determine the drainage area in square miles.

B. Determine the peak rate of runoff.

C. Determine the depth of rainfall for the designated storm and calculate the volume of runoff.

D. Calculate the time to peak for the designated watershed and storm.

E. Utilize pattern hydrograph to obtain a curvilinear design hydrograph which peaks at the design flow rate and which contains a runoff volume consistent with the design rainfall.

Table 2.8 Values of SCS Curve Number for Rural Areas

Land Use Description	Hydrologic Soil Group A	B	C	D
Fallow				
Straight Row	77	86	91	94
Row Crops				
Straight Row, Poor Condition	72	81	88	91
Straight Row, Good Condition	67	78	85	89
Contoured, Poor Condition	70	79	84	88
Contoured, Good Condition	65	75	82	86
Contoured and Terraced, Poor Condition	66	74	80	82
Contoured and Terraced, Good Condition	62	71	78	81
Small Grain				
Straight Row, Poor Condition	65	76	84	88
Straight Row, Good Condition	63	75	83	87
Contoured, Poor Condition	63	74	82	85
Contoured, Good Condition	61	73	81	84
Contoured and Terraced, Poor Condition	61	72	79	82
Contoured and Terraced, Good Condition	59	70	78	81
Close-Seeded Legumes or Rotation Meadow				
Straight Row, Poor Condition	66	77	85	89
Straight Row, Good Condition	58	72	81	85
Contoured, Poor Condition	64	75	83	85
Contoured, Good Condition	55	69	78	83
Contoured and Terraced, Poor Condition	63	73	80	83
Contoured and Terraced, Good Condition	51	67	76	80
Pasture or Range				
Poor Condition	68	79	86	89
Fair Condition	49	69	79	84
Good Condition	39	61	74	80
Contoured, Poor Condition	47	67	81	88
Contoured, Fair Condition	25	59	75	83
Contoured, Good Condition	6	35	70	79
Meadow, Good Condition	30	58	71	78
Woods or Forest Land				
Poor Condition	45	66	77	83
Fair Condition	36	60	73	79
Good Condition	25	55	70	77
Farmsteads	59	74	82	86

Source: [McCuen, 1982]

2.5.4 EXAMPLE OF HYDROGRAPH DEVELOPMENT

Figure 2.8 Example of Hydrograph Development

Use Malcom's Method to develop the $Q_{10,24}$ (10 year -24 hour) inflow hydrograph for the following given data.

The basin size is 300 acres (0.469 Square Miles). The composite CN is 80. *This is a hypothetical system.*

Solution:

1. Peak Runoff:
   Using Equation 2.11 and the given information determine the Peak Runoff.

$$Q_{10} = 334A^{0.665} = 334(0.469)^{0.665} = 201.87cfs, \text{ use } 202cfs$$

2. Estimate the Runoff Volume:
   a. Using Table 2.6 determine the depth of rainfall for the 10 year -24 hour Storm.

$$P_{10,24} = 5.38 \text{ inches}$$

   b. Using Equation 2.16, Equation 2.17, Equation 2.18 and the above given information determine the Runoff Volume.

$$S = \frac{1000}{CN} - 10 = \frac{1000}{80} - 10 = 2.5 \text{ inches}$$

$$Q^* = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{(5.38 - 0.2(2.5))^2}{5.38 + 0.8(2.5)} = 3.23 \text{ inches}$$

$$V = Q^* A = (3.23)(300) = 969 \text{ acre-inches}$$

3. Time to Peak:
   Using Equation 2.8 determine the Time to Peak.

$$T_p = \frac{V}{1.39Q_p} = \frac{969ac - in}{1.39(202cfs)} x\left(\frac{1ft}{12in}\right)x\left(\frac{43560\,ft^2}{1ac}\right)x\left(\frac{1\min}{60\sec}\right) = 208.8\min, \text{ use}$$

$$209\min$$

Make sure the equation has consistent units!

4. Compute the Hydrograph:

Known: $Q_{10,24} = 202cfs$

$T_p = 209\min.$

Using Equation 2.6 and Equation 2.7 compute the Runoff Hydrograph.

For $t_i \le 1.25T_p \rightarrow q_i = \frac{Q_p}{2}\left[1 - \cos\left(\frac{\pi t_i}{T_p}\right)\right] = \frac{202}{2}\left[1 - \cos\left(\frac{\pi t_i}{209}\right)\right]$

$$\text{For } t_i > 1.25T_p \rightarrow q_i = 4.34Q_p \exp\left[-1.3\left(\frac{t_i}{T_p}\right)\right] = 4.34(202)\exp\left[-1.3\left(\frac{t_i}{209}\right)\right]$$

Computed Runoff Hydrograph for Example

Time, t (min)	Time, t (hour)	Flow Rate, q (cfs)	Equation Used
0	0.00	0	Equation 2.6
20	0.33	4.53	Equation 2.6
40	0.67	17.71	Equation 2.6
60	1.00	38.37	Equation 2.6
80	1.33	64.64	Equation 2.6
100	1.67	94.17	Equation 2.6
120	2.00	124.32	Equation 2.6
140	2.33	152.37	Equation 2.6
160	2.67	175.82	Equation 2.6
180	3.00	192.55	Equation 2.6
200	3.33	201.08	Equation 2.6
220	3.67	200.62	Equation 2.6
240	4.00	191.23	Equation 2.6
260	4.33	173.75	Equation 2.6
280	4.67	153.63	Equation 2.7
300	5.00	135.65	Equation 2.7
320	5.33	119.79	Equation 2.7
340	5.67	105.77	Equation 2.7
360	6.00	93.40	Equation 2.7
380	6.33	82.48	Equation 2.7
400	6.67	72.83	Equation 2.7
420	7.00	64.31	Equation 2.7
440	7.33	56.79	Equation 2.7
460	7.67	50.14	Equation 2.7
480	8.00	44.28	Equation 2.7
500	8.33	39.10	Equation 2.7
520	8.67	34.53	Equation 2.7
540	9.00	30.49	Equation 2.7
560	9.33	26.92	Equation 2.7
580	9.67	23.77	Equation 2.7
600	10.00	20.99	Equation 2.7
620	10.33	18.54	Equation 2.7
640	10.67	16.37	Equation 2.7
660	11.00	14.45	Equation 2.7
680	11.33	12.76	Equation 2.7
700	11.67	11.27	Equation 2.7
720	12.00	9.95	Equation 2.7
780	13.00	6.85	Equation 2.7
840	14.00	4.72	Equation 2.7
900	15.00	3.25	Equation 2.7
960	16.00	2.24	Equation 2.7
1020	17.00	1.54	Equation 2.7
1080	18.00	1.06	Equation 2.7
1140	19.00	0.73	Equation 2.7
1200	20.00	0.50	Equation 2.7
1260	21.00	0.35	Equation 2.7
1320	22.00	0.24	Equation 2.7
1380	23.00	0.16	Equation 2.7
1440	24.00	0.11	Equation 2.7

For convenience, the computed hydrograph has been based on 20 – minute intervals. The Designer will need to select a time interval that best suits the model. The time interval usually is Tp / 10 rounded to a whole number that contains the Tp. For instance, a Tp = 30 would have a t=3 and a Tp = 45 would have a t=5.

2.6 HYDROLOGIC ANALYSIS OF WATERSHEDS LARGER THAN 640 ACRES

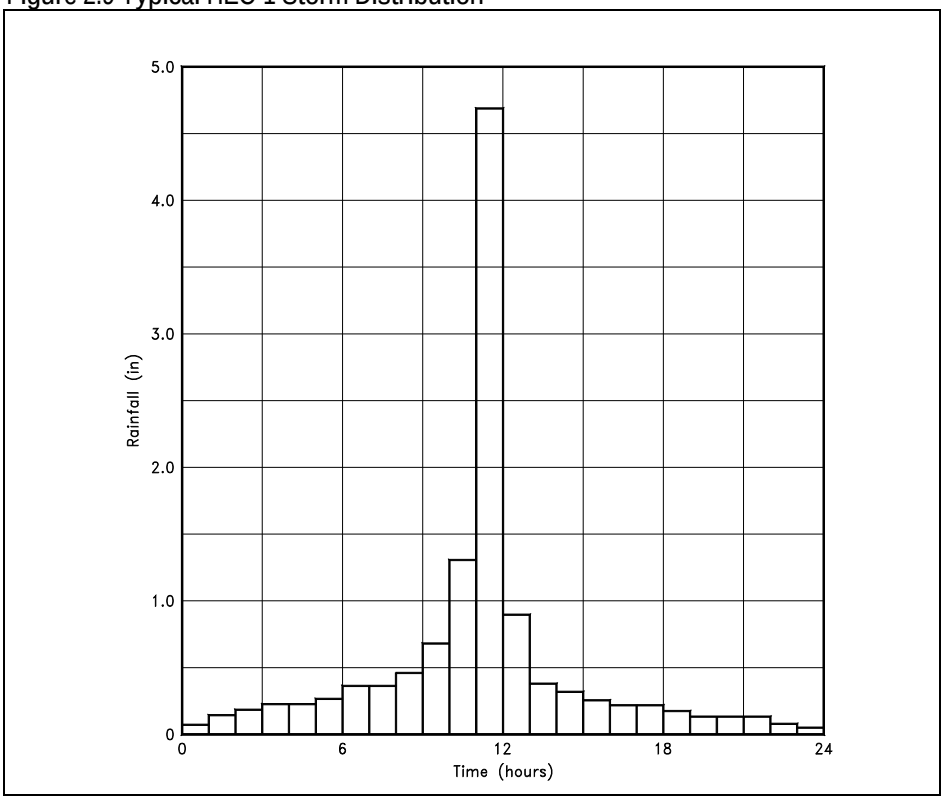
Hydrological analyses of watersheds larger than 640 acres shall be completed using the HEC-1 computer program. A stream network model which simulates the runoff response of a drainage basin can be developed with the HEC-1 computer program through the appropriate combination of runoff and routing computations.

2.6.1 PRECIPITATION DATA

A. Design storm rainfall can be described in terms of area of study, frequency, duration and distribution of intensity with time. The distribution of design rainfall with respect to time is handled by the HEC-1 program by assuming a symmetrical, single-peaked design **hyetograph** (storm distribution). The engineer's choice of storm frequency and duration is dependent upon the physical characteristics and location of the watershed, as well as the study objectives. In most cases, design computations will be based on a 24-hour duration storm event.

B. The HEC-1 program has the capability to modify rainfall hyetographs to account for progressively smaller design rainfall amounts as the area of study increases. The HEC-1 users manual [HEC, 1981] suggests methods for defining storm rainfall depth versus drainage area relationships based on Figure 15 in U.S. Weather Bureau Technical Paper No. 40 [Hershfield, 1961], which presents a means of reducing point rainfall amounts as drainage area increases. Figure 2.9 illustrates the storm distribution computed by HEC-1 for a 24-hour storm event, assuming a 1 -hour computation interval.

Figure 2.9 Typical HEC-1 Storm Distribution



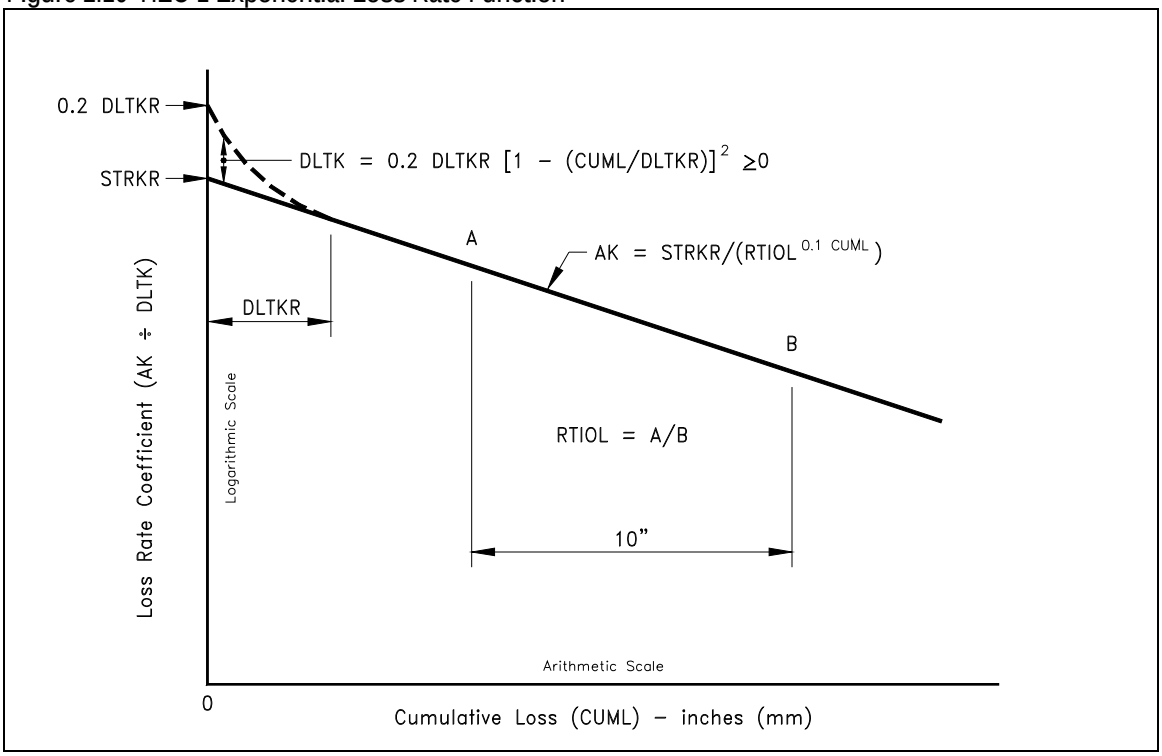
It is often necessary to increment design rainfall hyetographs in intervals of less than one hour to meet the design needs of small drainage areas having short times of concentration. The TP-40 rainfall isopluvial maps are limited to storm durations of 30 minutes or more. Table 3 of TP-40 then provides a method to calculate the rainfall amounts for shorter duration storms based on national average values. To more accurately define quantities on a local basis, the National Weather Service issued Technical Memorandum NWS Hydro-35 [Frederick, 1977]. Thus, both TP-40 and Hydro-35 are used to develop Table 2.2 and Table 2.3 in which rainfall depth vs. duration data are presented for a variety of storm frequencies.

2.6.2 PRECIPITATION LOSS COMPUTATIONS

A. Only a portion of the rainfall which occurs over a watershed during a storm event actually becomes runoff. The remainder is intercepted by infiltration, depression storage, evaporation and other mechanisms. The portion of rainfall which becomes runoff is termed the **excess rainfall**. The difference between the observed total rainfall hyetograph and the excess rainfall hyetograph is termed **abstraction**, or **loss**.

B. The recommended procedure for calculating abstractions in the Town of Wake Forest is the exponential loss rate function contained in HEC-1. This is an empirical method in which the loss rate is determined to be a function of both the rainfall intensity and accumulated losses. The HEC-1 user's manual contains a detailed discussion of the relevant equations and variables [HEC, 1981]. Figure 2.10 illustrates the HEC-1 exponential loss rate function and its parameters.

Figure 2.10 HEC-1 Exponential Loss Rate Function



Source: "Drainage Criteria Manual for Montgomery County Texas," [Dodson, 1989]

Consult the HEC-1 Flood Hydrograph Package: User's Manual [HEC, 1981] for recommended values for the variables to be used with this methodology.

2.6.3 UNIT HYDROGRAPH PROCEDURE

Given the design storm excess rainfall, it is necessary to determine the storm runoff hydrograph at the point of interest utilizing the HEC-1 program. A **unit hydrograph** represents the hydrologic response of a watershed to excess rainfall. The HEC-1 computer program can use several unit hydrograph methods. The Handbook of Applied Hydrology [Chow, 1964] provides a detailed discussion of unit hydrograph theory and application.

2.6.4 ADJUSTMENT FOR PONDING

A ***ponding area*** is an area where runoff is retarded from reaching a watercourse due to obstructions or natural storage. The presence of significant areas of ponding in a drainage sub-area has a pronounced effect on the nature of the runoff hydrograph from that sub-area. Storage in ponding areas tends to cause peak flow rates to be decreased and the time at which the peak flow occurs to be delayed. To account for this effect, an adjustment should be made.

2.6.5 STREAMFLOW ROUTING PROCEDURE

A. As a flood wave passes downstream through a channel or detention facility, it is altered due to the effects of storage and travel time. The procedure for determining how the shape of the flood hydrograph changes is termed ***flood routing***.

B. Flood routing can be classified into two broad but related categories: reservoir routing and open channel routing. ***Reservoir routing*** is generally used to determine the effectiveness of stormwater detention, which reduces downstream peak flow rates. ***Open channel routing*** is a refinement of the description of an area's rainfall-runoff process. It modifies the time rate of runoff due to storage and travel time within the channel and its overbanks. Analysis of areas with very flat overbanks and wide flood plains should include channel routing to determine possible peak discharge attenuation and lagging.

C. The recommended technique for both channel and reservoir routing is the ***Modified Puls*** method. The Modified Puls method is based on the assumption of an invariable discharge-storage relationship and a constant level pool in the storage reach of interest. The HEC-1 program provides a routine for this flood routing technique. The required storage-discharge relationships for this routing technique can be obtained through use of the HEC-2 backwater program for a variety of flow conditions. Care must be taken in developing these storage-discharge relationships with HEC-2. Cross-sections should be provided to adequately define all of the flood plain storage available at various water levels. However, only the effective area of the cross-section should be used to establish the proper discharge-water level relationship. For a detailed discussion of the Modified Puls routing technique and other methodologies, the engineer is referred to the Handbook of Applied Hydrology [Chow, 1964].

2.7 OPEN CHANNEL DESIGN

The purpose of this section is to establish standard procedures and criteria for Open Channel Design for the Town of Wake Forest.

2.7.1 INTRODUCTION

Open channels, where allowed, shall be designed for the peak runoff produced by a 10-year frequency storm. Where applicable, an analysis shall also be provided for the 25-year frequency storm, i.e. roadway overtopping, and for the 100-year frequency storm, i.e. adjacent building structures. The designer's calculations shall include the runoff from the property being developed and the runoff from contributing off-site areas, assuming ultimate development in accordance with the current zoning regulations and the Land Use Plan.

2.7.2 THE MANNING EQUATION

A. The Manning equation is an empirical relationship which relates friction slope, flow depth, channel roughness, and channel cross-sectional shape to flow rate. The friction slope is a measure of the rate at which energy is being lost due to channel resistance. When the channel slope and the friction slope are equal ($S_f = S_o$), the flow is uniform and the Manning equation may be used to determine the depth for uniform flow, commonly known as the normal depth.

The Manning equation is as follows:

$$V = \left(\frac{1.49}{n}\right) R^{2/3} \sqrt{S_f} \qquad \text{(Equation 2.19)}$$

or

$$Q = \left(\frac{1.49}{n}\right) A R^{2/3} \sqrt{S_f} \qquad \text{(Equation 2.20)}$$

Where,

Q → Total discharge (cfs)

V → Velocity of flow (ft/sec)

n → Manning coefficient of roughness (dimensionless), an experimentally determined value which is a function of the nature of the channel lining (Section 2.7.2.B).

A → Cross-sectional area of the flow (ft2)

R → Hydraulic radius of the channel (ft) (flow area/wetted perimeter). Wetted perimeter is the distance along the perimeter of the cross section against which water is flowing. It DOES NOT include the free water surface (Section 2.7.3.G).

S_f → Friction slope, the rate at which energy is lost due to channel resistance. Longitudinal slope of the water surface (feet fall/feet run). If flow is uniform, it is also the slope of the invert of the channel.

The area (A) and the hydraulic radius (R) are written in terms of the depth (y_o). Knowing the discharge (Q), Manning "n" value, and the channel slope (S_o), Equation 2.20 can be solved by trial to find normal depth (y_o).

B. Manning 'n' Values

The Manning "n" value is an experimentally derived constant which represents the effect of channel roughness in the Manning equation. Considerable care must be given to the selection of an appropriate "n" value for a given channel due to its significant effect on the results of the Manning equation. Tables 2.9 through 2.13 provide a listing of "n" values for various channel conditions.

Table 2.9 Manning Roughness Coefficient for Excavated or Dredged Channels

Type of Channel and Description	Minimum	Normal	Maximum
Earth, straight and uniform			
Clean, recently completed	0.016	0.018	0.020
Clean, after weathering	0.019	0.022	0.025
Gravel, uniform section, clean	0.022	0.025	0.030
With short grass, few weeds	0.022	0.027	0.033
Earth, winding and sluggish			
No vegetation	0.023	0.025	0.030
Grass, some weeds	0.025	0.030	0.033
Dense weeds or plants in deep channels	0.030	0.035	0.040
Earth bottom and rubble sides	0.028	0.030	0.035
Stony bottom and weedy banks	0.025	0.035	0.040
Cobble bottom and clean sides	0.030	0.040	0.050
Dragline-excavated or dredged			
No vegetation	0.025	0.028	0.033
Light brush or banks	0.035	0.050	0.060
Rock cuts			
Smooth and uniform	0.025	0.035	0.040
Jagged and irregular	0.035	0.040	0.050
Channels not maintained and brush uncut			
Dense weeds, high as flow depth	0.050	0.080	0.012
Clean bottom, brush on sides	0.040	0.050	0.080
Same, highest stage of flow	0.045	0.070	0.110
Dense brush, high stage	0.080	0.100	0.140

Source: [Chow, 1959]

Table 2.10 Manning Roughness Coefficient for Lined or Built-Up Channels

Type of Channel and Description	Minimum	Normal	Maximum
Metal			
Unpainted Smooth steel surface	0.011	0.012	0.014
Painted smooth steel surface	0.012	0.013	0.017
Corrugated metal	0.021	0.025	0.030
Cement			
Neat, surface	0.010	0.011	0.013
Mortar	0.011	0.013	0.015
Wood			
Planed, untreated	0.010	0.012	0.014
Planed, creosoted	0.011	0.012	0.015
Unplaned	0.011	0.013	0.015
Wood plank with battens	0.012	0.015	0.018
Concrete			
Trowel finish	0.011	0.013	0.015
Float finish	0.013	0.015	0.016
Finished, with gravel on bottom	0.015	0.017	0.020
Unfinished	0.014	0.017	0.020
Concrete on good excavated rock	0.018	0.020	---
Concrete on irregular excavated rock	0.022	0.027	---
Gravel bottom			
sides of Formed concrete	0.017	0.020	0.025
sides of Random stone in mortar	0.020	0.023	0.026
sides of Dry rubble or rip-rap	0.023	0.033	0.036
Brick			
Glazed	0.011	0.013	0.015
in cement mortar	0.012	0.015	0.018
Asphalt			
Smooth	0.013	0.013	---
Rough	0.016	0.016	---
Vegetated lining	0.030	---	0.500

Source: [Chow,1959]

Table 2.11 Manning Roughness Coefficient for Minor Natural Streams

Type of Channel and Description	Minimum	Normal	Maximum
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but some stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of, timber and underbrush	0.075	0.100	0.150
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070

Source: [Chow, 1959]

Note: A "minor stream" is one which has a top width of less than 100 feet at flood stage.

Table 2.12 Manning Roughness Coefficient for Major Natural Streams

Type of Channel and Description	Minimum	Normal	Maximum
Regular section with no boulders or brush	0.025	---	0.060
Irregular and rough section	0.035	---	0.100

Source: [Chow, 1959]

Note: A "major stream" is one with a top width of more than 100 feet at flood stage. The n value is less than that for minor streams of similar description because banks offer less effective resistance.

Table 2.13 Manning Roughness Coefficient for Flood Plains

Type of Channel and Description	Minimum	Normal	Maximum
Pasture, no brush			
Short grass	0.025	0.030	0.035
High grass	0.030	0.035	0.050
Cultivated areas			
No crop	0.020	0.030	0.040
Mature row crops	0.025	0.035	0.045
Mature field crops	0.030	0.040	0.050
Brush			
Scattered brush, heavy weeds	0.035	0.050	0.070
Light brush and trees, in winter	0.035	0.050	0.060
Light brush and trees, in summer	0.040	0.060	0.080
Medium to dense brush, in winter	0.045	0.070	0.110
Medium to dense brush, in summer	0.070	0.100	0.160
Trees			
Dense willows, summer, straight	0.110	0.150	0.200
Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
Same as above, w/ heavy growth of sprouts	0.050	0.060	0.080
Heavy stand of timber, a few down trees, little undergrowth, flood-stage below branches	0.080	0.100	0.120
Same as above, w/ flood stage reaching branches	0.100	0.120	0.160

Source: [Chow, 1959]

2.7.3 OPEN CHANNEL DESIGN

The proper hydraulic design of a channel is of primary importance in insuring that flooding, sedimentation and erosion problems do not occur. The following general criteria should be used in the design of open channels:

A. Design Frequencies for Open Channel Design

1. All open channels in the Town of Wake Forest shall be designed to contain the runoff from 10 year frequency storm. In addition, the channel must be designed to have sufficient freeboard to provide for adequate drainage of lateral storm sewers during the 25-year storm and in some cases even the 100-year frequency storm. For example, when a newly designed open channel is being constructed between two existing structures or adjacent to an existing structure, then the channel section must be evaluated using the 100-year frequency storm. This will ensure that the existing structures are not flooded frequently. In a naturalized area where the newly constructed channel ties into a natural stream or creek, then the channel is to be evaluated using the 25-year frequency storm.

2. In those cases where channel modifications are necessary to control increased flow from proposed development, proposed water surface profiles are restricted such that the 100-year flood profile under existing conditions shall not be increased. If the capacity of the existing channel downstream of the

project is less than the 100-year design discharge, consideration shall be given for more frequent events to ensure that the severity and frequency of downstream flooding are not increased.

B. Required Documentation for Open Channel Designs

The following information must be submitted to the Town of Wake Forest for the design of open channels, but is not limited the following:

1. **Vicinity Map**: A vicinity map of the site and subject reach.
2. **Site Map**: A detailed map of the area and subject reach.
3. **Watershed Map**: A watershed map showing existing and proposed drainage area boundaries along with all sub-area delineations and all areas of existing or proposed development.
4. **Discharge Calculations**: Discharge calculations specifying the methodology and key assumptions used, along with computed discharges at key locations. The designer's calculations shall include the runoff from the property being developed and the runoff from contributing off site areas, assuming ultimate development in accordance with the current zoning regulations and the Land Use Plan.
5. **Hydraulic Calculations**: Hydraulic calculations specifying the methodology used. All assumptions and values of design parameters must be clearly stated.
6. **Plotted Cross-Sections**: Typical existing and proposed cross-sections.

C. Channel Flow Velocities

Excessive flow velocities in open channels can cause erosion and destabilize side slopes, and may pose a threat to safety. Velocities which are too low may allow the deposition of sediment and subsequent channel clogging. Table 2.14 provides desirable average and maximum allowable velocities based on 10-year flow rates.

Table 2.14 Allowable Flow Velocities for Channel Design

Channel Description	Average Velocity (Feet Per Second)	Maximum Velocity (Feet Per Second)
Grass Lined: Predominantly Clay Soils	3.0	5.0
Grass Lined: Predominantly Sand Soils	2.0	4.0
Rip-Rap Lined	5.0	8.0
Concrete Lined	6.0	10.0

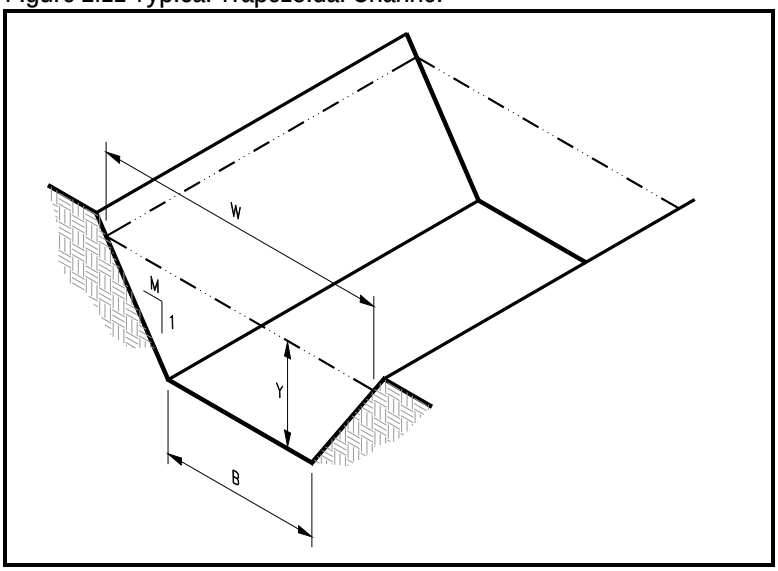
D. Channel Flow-Line Slope: Slope of the channel flow-line (invert) is generally governed by topography and the energy head required for flow. Since flow-line slope directly affects channel velocities, channels should have sufficient grade to prevent significant siltation. However, slopes should not be so large as to create erosion problems. In the Town of Wake Forest, the minimum recommended longitudinal slope shall be 0.5 percent (0.005). The use of flatter slopes must be approved by the Town of Wake Forest Town's Engineer. The maximum channel invert slope will be limited by the maximum flow velocities given in Table 2.14. Appropriate channel drop structures may be used to limit channel invert slopes in steep areas.

E. Channel Side Slope: In grass-lined channels, the normal maximum side slope will be 3 horizontal to 1 vertical (3:1), which is the practical limit for mowing equipment. In some areas, local soil conditions may dictate the use of side slopes flatter than 3:1 to ensure slope stability.

F. Channel Bottom Width: In grass-lined channels, the minimum channel bottom width shall be three (3) feet. In concrete-lined channels, the minimum bottom width shall be two (2) feet.

G. Trapezoidal Channel Design: In trapezoidal design applications, Figure 2.11 and Equations 2.21 through 2.24 help define the variables used to solve the Manning equation.

Figure 2.11 Typical Trapezoidal Channel



Where,

W → Top width of flow, measured in feet.

B → Bottom width of the channel, measured in feet.

y → Depth of flow, measured in feet.

M → Side slope ratio (ft. horizontal / ft. vertical). (For a 2 to 1 side slope, the value of M is 2.)

P → Represents the wetted perimeter.

The following equations are derived geometrically, and the units of the variables are consistent with those given above:

$$A = By + M\,y^2 \qquad \text{(Equation 2.21)}$$

$$P = B + 2y\sqrt{\left(1 + M^2\right)} \qquad \text{(Equation 2.22)}$$

$$W = B + 2M\,y \qquad \text{(Equation 2.23)}$$

$$R = \frac{A}{P} \qquad \text{(Equation 2.24)}$$

H. Manning Roughness Coefficient – Improved Channels: The values of the Manning roughness coefficient listed in Table 2.15 should be used in the design of channel improvements. Alternative values should be discussed with the Town's Engineer.

Table 2.15 Manning Roughness Coefficient for Improved Channels

Channel Cover	"n" Value
Bare Soil	0.025
Grass-Lined	0.040
Rip-Rap Lined	0.070
Concrete Lined	0.013

2.7.4 CHANNEL EROSION CONTROL

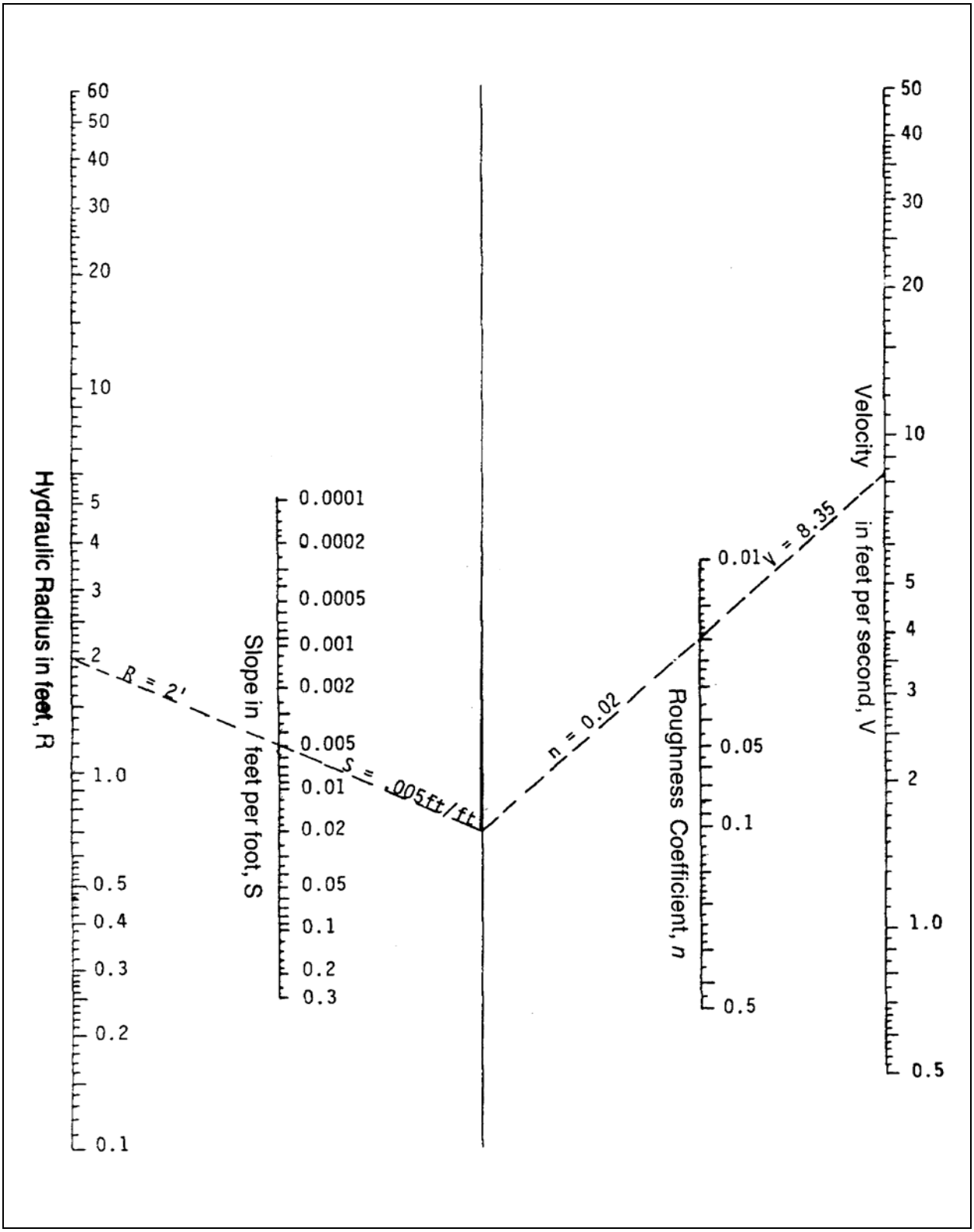
A. Erosion protection is necessary to insure that channels maintain their capacity and stability and to avoid excessive transport and deposition of eroded material.

B. All erosion and sediment control measures shall be designed in accordance with the North Carolina Sedimentation Pollution Control Act of 1973. The Designer is to reference the most recent edition of the Erosion and Sediment Control Planning and Design Manual. This manual contains valuable information and tools for developing plans to minimize soil erosion and prevent sedimentation pollution associated with land-disturbing activities.

2.7.5 DESIGN AIDS

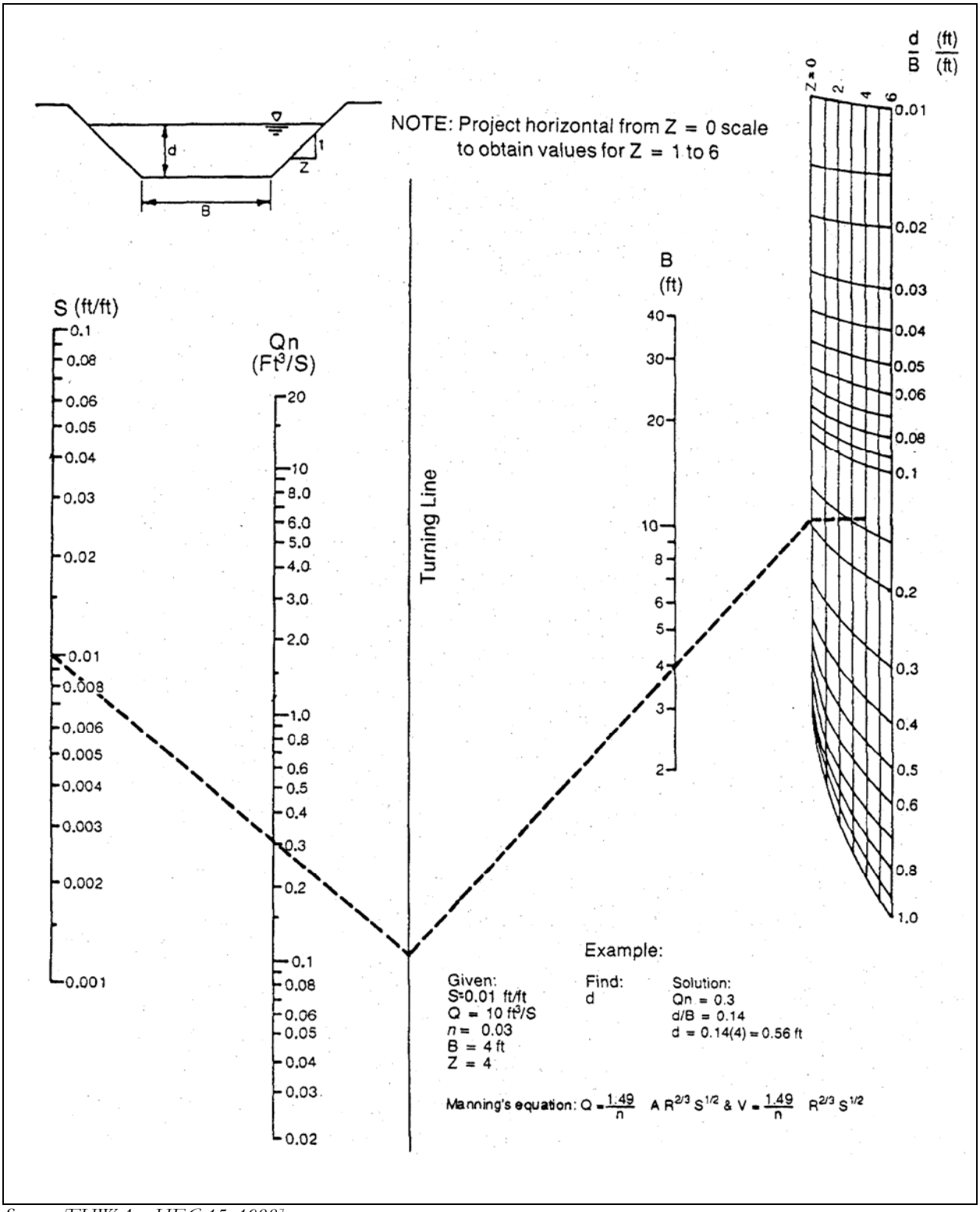
The following will aid in open channel design:

Figure 2.12 Nomograph for Solution of Manning Equation



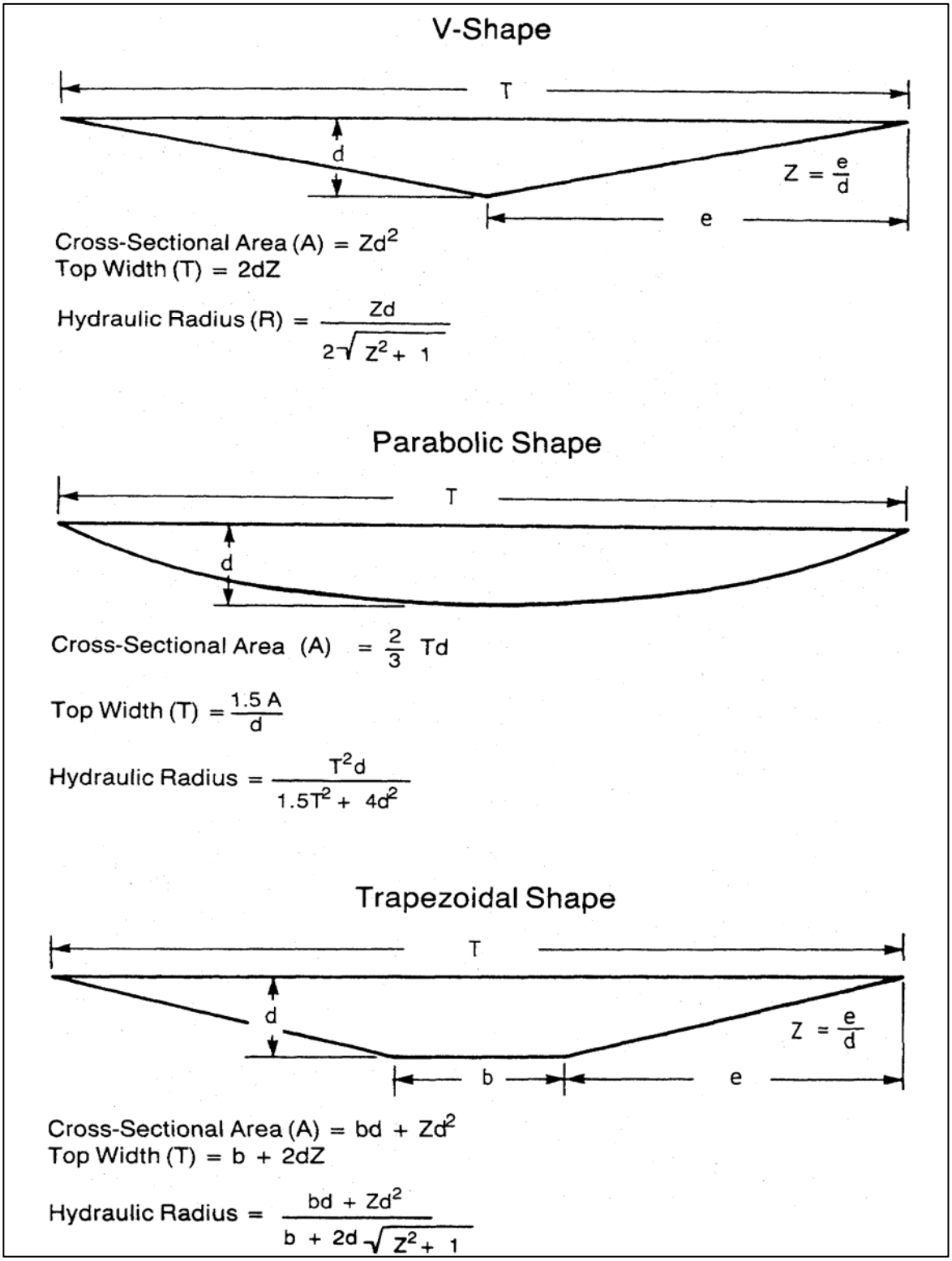
Source: [FHWA – HEC-15,1988]

Figure 2.13 Solution of Manning's Equation for Trapezoidal Channels of Various Slope



Source: [FHWA – HEC-15, 1988]

Figure 2.14 Channel Geometries for V-Shape, Parabolic and Trapezoidal Channels



Source: ["E&S Control Planning and Design Manual," DEHNR, May 1994 Revised]

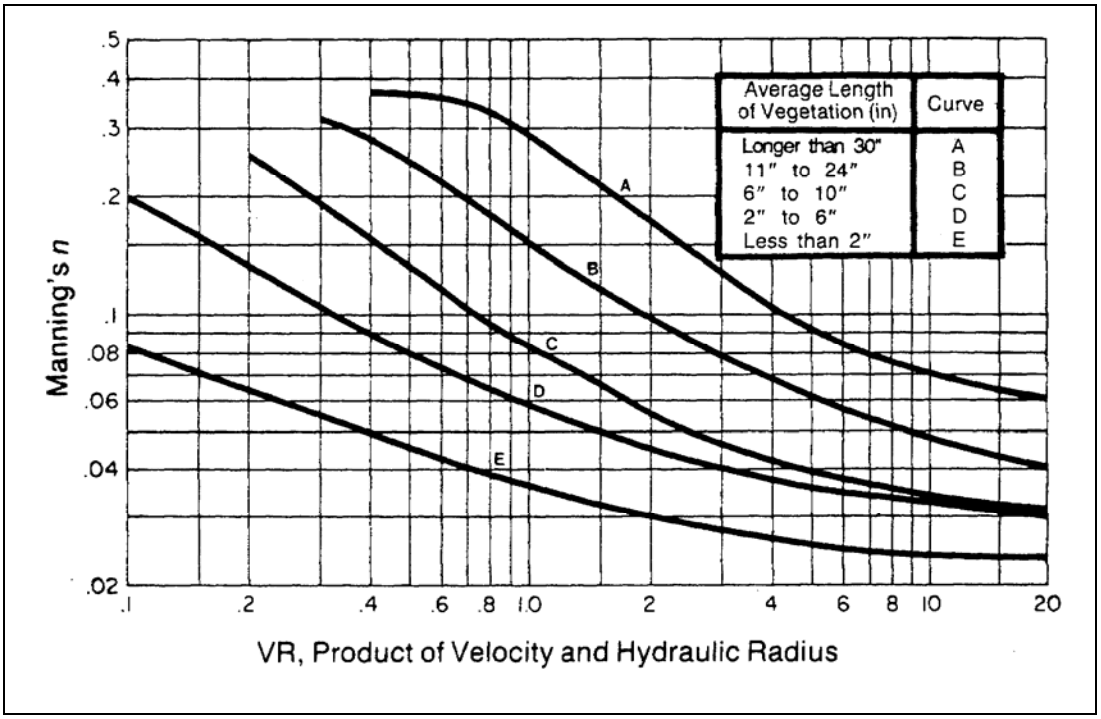
Figure 2.15 Maximum Allowable Design Velocities for Vegetated Channels

Typical Channel Slope Application	Soil Characteristics[2]	Grass Lining	Permissible Velocity[3] for Established Grass Lining (ft/sec)
0-5%	Easily Erodible Non-Plastic (Sands & Silts)	Bermudagrass	5.0
		Tall Fescue	4.5
		Bahiagrass	4.5
		Kentucky bluegrass	4.5
		Grass-legume mixture	3.5
	Erosion Resistant Plastic (Clay Mixes)	Bermudagrass	6.0
		Tall Fescue	5.5
		Bahiagrass	5.5
		Kentucky bluegrass	5.5
		Grass-legume mixture	4.5
5-10%	Easily Erodible Non-Plastic (Sands & Silts)	Bermudagrass	4.5
		Tall Fescue	4.0
		Bahiagrass	4.0
		Kentucky bluegrass	4.0
		Grass-legume mixture	3.0
	Erosion Resistant Plastic (Clay Mixes)	Bermudagrass	5.5
		Tall Fescue	5.0
		Bahiagrass	5.0
		Kentucky bluegrass	5.0
		Grass-legume mixture	3.5
>10%	Easily Erodible Non-Plastic (Sands & Silts)	Bermudagrass	3.5
		Tall Fescue	2.5
		Bahiagrass	2.5
		Kentucky bluegrass	2.5
	Erosion Resistant Plastic (Clay Mixes)	Bermudagrass	4.5
		Tall Fescue	3.5
		Bahiagrass	3.5
		Kentucky bluegrass	3.5

Source: USDA-SCS Modified

NOTE: 1 Permissible Velocity based on 10-yr storm peak runoff.
2 Soil erodibility based on resistance to soil movement from concentrated flowing water.
3 Before grass is established, permissible velocity is determined by the type of temporary liner used.

Figure 2.16 Manning's n Related to Velocity, Hydraulic Radius and Vegetal Retardance



Source: [E&S Control Planning and Design Manual," DEHNR, May 1994 Revised]

Figure 2.17 Retardance Classification for Vegetal Covers

Retardance	Cover	Condition
A	Reed canarygrass	Excellent stand, tall (average 36")
	Weeping lovegrass	Excellent stand, tall (average 30")
B	Tall fescue	Good stand, uncut (average 18")
	Bermudagrass	Good stand, tall (average 12")
	Grass-legume mixture (tall fescue, red fescue, sericea lespedeza)	Good stand, uncut
	Grass mixture (timothy, smooth bromegrass, or orchardgrass)	Good stand, uncut (average 20")
	Sericea lespedeza	Good stand, not woody, tall (average 19")
	Reed canarygrass	Good stand, cut (average, 12-15")
	Alfalfa	Good stand, uncut (average 11")
C	Tall fescue	Good stand (8-12")
	Bermudagrass	Good stand, cut (average 6")
	Bahiagrass	Good stand, uncut (6-8")
	Grass-legume mixture- Summer (orchardgrass, redtop, and annual lespedeza)	Good stand, uncut (6-8")
	Centipedegrass	Very dense cover (average 6")
	Kentucky bluegrass	Good stand, headed (6-12")
	Redtop	Good stand, uncut (15-20")
D	Tall fescue	Good stand, cut (3-4")
	Bermudagrass	Good stand, cut (2.5")
	Bahiagrass	Good stand, cut (3-4")
	Grass-legume mixture- Fall-spring (orchardgrass, redtop, and annual lespedeza)	Good stand, uncut (4-5")
	Red fescue	Good stand, uncut (12-18")
	Cenitpedegrass	Good stand, cut (3-4")
	Kentucky bluegrass	Good stand, cut (3-4")
E	Bermudagrass	Good stand, cut (1.5")
	Bermudagrass	Burned stubble

Modified from: USDA-SCS, 1969. Engineering Field Manual.

2.8 CULVERT DESIGN

The purpose of this section is to establish standard procedures and criteria for Culvert Design for the Town of Wake Forest.

2.8.1 INTRODUCTION

A. Private drainage culverts and public drainage culverts within a subdivision or site development sub-basin shall be designed for the peak runoff produced by a 10-year frequency storm. All cross drainage pipes shall be designed for the peak runoff produced by the 25-year frequency storm, i.e. pipes crossing Town or NCDOT dedicated roadways. Culverts adjacent to existing or proposed building structures shall be designed for the peak runoff produced by the 100-year frequency storm to ensure that the structure will not be flooded by the 100-year frequency storm event.

B. Curb inlets shall be designed for the peak runoff produced by a 2-year frequency storm.

C. The designer's calculations shall include the runoff from the property being developed and the runoff from contributing off-site areas, assuming ultimate development in accordance with the current zoning regulations and the Land Use Plan.

2.8.2 CURB INLET DESIGN

A. The Town of Wake Forest uses the design procedures of Hydraulic Engineering Circular No. 12 (HEC 12), Drainage of Highway Pavements. HEC 12 was designed to analyze flow in gutters and the interception capacity of grate, curb-opening and slotted drain inlets as well as combination inlets.

B. The curb inlet design procedure is based on the standard Town of Wake Forest curb inlet with a 4-foot opening. Inlets capture most of the water entering the pipe system. The following procedure is used to locate inlets, however, other factors shall be considered such as location of the low points, intersections and layout of the pipe system.

1. Determine the maximum gutter flow from the nomograph "Flow in triangular gutter sections" (Section 2.8.6). The known values of:

a. S = Street longitudinal slope,

b. S_x = Street cross slope,

c. T = 8 feet (the maximum allowable spread), and

d. n = Manning's roughness coefficient are used to solve for the gutter capacity, Q.

2. Determine the location of the inlet using the rational formula rearranged such that:

$$A = \frac{Q}{Ci} \qquad \text{(Equation 2.25)}$$

Where,

$Q \rightarrow$ The peak rate of runoff in cubic feet per second (cfs). Actually, Q is in units of inches per hour per acre.

$C \rightarrow$ The dimensionless coefficient of runoff representing the ratio of peak discharge per acre to rainfall intensity (i).

$i \rightarrow$ The average intensity of rainfall in inches per hour for a period of time equal to the time of concentration for the drainage area at the point of interest.

$A \rightarrow$ The area in acres contributing runoff to the point of interest during the critical storm duration.

Locate the first inlet by trial and error using the existing site contours and the proposed designed plan such that the area of the sub-drainage area does not exceed the capacity determined using Equation 2.25. Remember to check the "C" value for the actual area determined.

3. The next inlets are located utilizing Figure 2.19 and 2.20 (Section 2.8.6). Determine the required curb opening length, Lt, and enter in Figure 2.21, with the ratio L/Lt where L is the actual curb opening in feet for Town of Wake Forest standard curb inlets. This will yield the percentage of flow intercepted by each basin. The remainder of this flow shall be considered in determining the location of the next downstream inlet. This procedure is repeated as necessary. The designer is encouraged to use the Catch Basin Design and Data Sheet, Figure 2.21 (Section 2.8.6).

2.8.3 PIPE CULVERT DESIGN - GENERAL

A. Pipe culverts shall be aligned parallel to the longitudinal axis of the channel, as much as possible, to insure maximum hydraulic efficiency and to minimize erosion. In areas where a change in alignment is necessary, the change shall be accomplished upstream of the culvert in the open channel. Appropriate erosion protection shall be provided.

B. Pipe culverts crossing beneath the roadway shall be designed to span from ditch line to ditch line.

C. All pipe culverts are required to have Flared End Sections or Headwall/Endwalls.

D. The minimum pipe culvert diameter shall be 15 inches to minimize clogging and maintenance for all pipe culverts within Town of Wake Forest rights-of-ways and easements.

E. All pipe culverts to be minimum Class III reinforced concrete with minimum pipe cover equal to 2 feet, measured from the proposed finished grade to the top of the pipe.

2.8.4 HYDRAULIC DESIGN OF CULVERTS

A. The Town of Wake Forest uses the design procedures of Hydraulic Engineering Circular No. 5 (HEC 5) for the design of pipe culverts. HEC 5 was designed to analyze flow in pipes using many different variables. These variables, which affect the hydraulic capacity of a culvert, cause the pipe system to function as either an inlet-controlled pipe section or an outlet-controlled pipe section. **Inlet control** means that the discharge in the culvert is limited by the hydraulic and physical characteristics of the inlet alone. These include headwater depth, culvert barrel shape, barrel cross sectional area, and the type of inlet edge. For inlet control, the barrel roughness, length, and slope are not factors in determining culvert capacity.

B. Under **outlet control**, the discharge capacity of the culvert is dependent on all of the hydraulic variables of the structure. These include headwater depth, tailwater depth, barrel shape, cross-sectional area, barrel roughness, slope, and length.

C. In all culvert design, **headwater**, or depth of ponding at the entrance to the culvert is an important factor in culvert capacity. The headwater depth (HW) is the vertical distance from the invert at the culvert entrance to the energy grade line of the approaching flow. Due to low velocities in most entrance pools and the difficulty in determining velocity head in any flow, the energy line can often be assumed be the same as the water surface.

D. For culverts under outlet control, **tailwater depth** is an important factor in computing both headwater depth and the hydraulic capacity of the culvert. If flow in the channel downstream of the culvert is sub-critical, a computer-aided backwater analysis or calculation of normal depth is warranted to determine the tailwater elevation. If the downstream flow is super-critical, tailwater depth is not a factor in determining the culvert's hydraulic capacity.

E. Inlet-Controlled Flow

Under inlet control, the culvert entrance may or may not be submerged. However, inlet-controlled flow through the culvert barrel is free surface flow in all cases. When the culvert inlet is submerged, the most reliable means for determining discharge is with standard empirical relationships. Nomographs which plot headwater vs. discharge for various culvert sizes and shapes under inlet control have been developed on the basis of laboratory research with models and full scale prototypes (Section 2.8.6).

F. Outlet-Controlled Flow

1. The culvert barrel may be full or partially full for culverts with outlet control flow for part or all of the barrel length. Both the headwater and tailwater may or may not submerge the culvert.

2. If the culvert is flowing full, the energy required to pass a given quantity of water is stored in the head (H). From energy considerations it can be shown that H is the difference between the hydraulic grade line at the outlet and the energy grade line at the inlet (expressed in feet).

3. When a given discharge passes through a culvert, stored energy, represented by the total head (H), is dissipated in three ways: A portion is lost to turbulence at the entrance (H_e); a portion is lost to frictional resistance in the culvert barrel (H_f); and a portion is lost as the kinetic energy of flow through the culvert dissipated in the tailwater (H_o). From this, the following relationship is evident:

$$H = H_e + H_f + H_o \qquad \text{(Equation 2.26)}$$

4. The entrance loss (H_e) is determined by multiplying the culvert velocity head by an entrance loss coefficient k_e. Table 2.16 lists values for the entrance loss coefficient.

Table 2.16 Entrance Loss Coefficients for Concrete Pipe Culverts

Type of Structure and Design of Entrance	Coefficient k_e
Projecting from fill, socket end (groove-end)	0.20
Projecting from fill, square cut end	0.50
Headwall or headwall and wingwalls	
Socket end of pipe (groove-end)	0.20
Square-edge	0.50
Rounded (radius = 0.5D)	0.20
Mitered to conform to fill slope	0.70
End section conforming to fill slope	0.50
Beveled edges (33.7 degree or 45 degree bevels)	0.20
Side- or slope-tapered Inlet	0.20

Source: [FHWA, 1985]

5. The exit loss (H_o) is generally set equal to the culvert velocity head and the downstream flow velocity is assumed to be zero. An expression for the friction loss (H_f) is derived from Manning's equation:

$$H_f = \left(\frac{29n^2L}{R^{1.33}}\right)\frac{V^2}{2g} \qquad \text{(Equation 2.27)}$$

Where,

n → Manning's roughness coefficient.

L → The culvert barrel length, measured in feet.

R → The hydraulic radius, measured in feet. (Discussed in Section 2.7.2)

g → The gravitational constant ($32.2\ ft/\sec^2$).

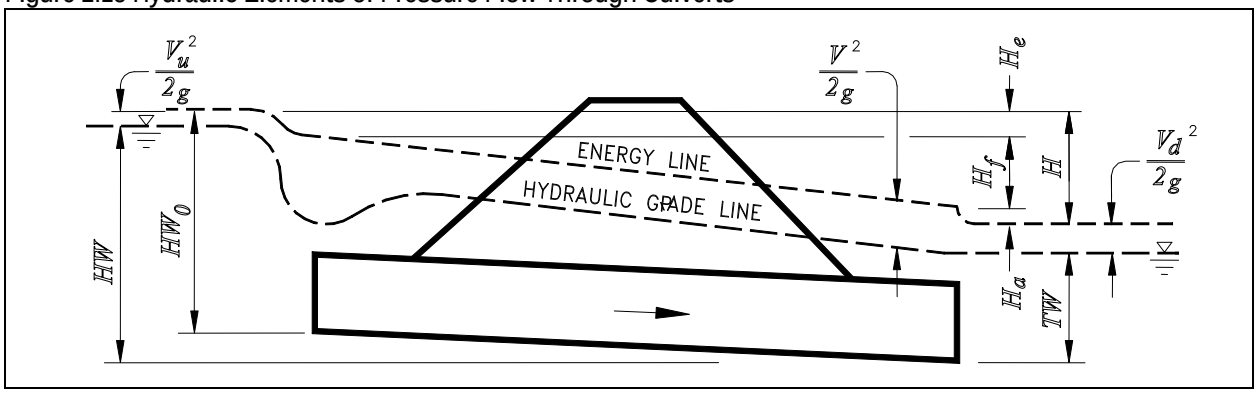
V → The mean velocity of flow in the culvert, measured in $ft/\sec$.

6. Rearranging Equation 2.27 and substituting it into Equation 2.26, it is seen that for full flow:

$$H = 1 + k_e + \left(\frac{29n^2L}{R^{1.33}}\right)\frac{V^2}{2(32.2)} \qquad \text{(Equation 2.28)}$$

7. Equation 2.28 may be solved using the full flow nomographs located in Section 2.8.6. Each nomograph is drawn for a particular barrel shape and material and a single value of Manning's "n" as noted on the respective charts. These nomographs may be used for other values of "n" by modifying the culvert length as directed in the instructions for use of the full-flow nomographs.

Figure 2.18 Hydraulic Elements of Pressure Flow Through Culverts



Source: [FHWA, 1985]

8. Figure 2.18 represents the various hydraulic elements of pressure, or full, flow through a culvert and reveals graphically that the head (H) is equivalent to the vertical distance between the energy grade line at the inlet and the energy grade line at the outlet. It also reveals the following relationship for full flow conditions:

$$H = H_e + H_f + H_o = HW + SL - \frac{V^2}{2g} - TW \qquad \text{(Equation 2.29)}$$

Where,

HW → The headwater depth, measured in feet.

TW → The tailwater depth above the invert of the culvert outlet, measured in feet.

S_o → The culvert barrel slope, measured in feet/feet.

9. If the downstream flow velocity is neglected, Equation 2.29 becomes:

$$H = HW + S_o L - TW \qquad \text{(Equation 2.30)}$$

10. In culvert design it is generally required that the depth of the headwater (HW) be determined. Rearranging Equation 2.30, the following expression for HW is derived:

$$HW = H + TW - LS_o \qquad \text{(Equation 2.31)}$$

11. When the culvert outlet is submerged by the tailwater, the above equation can be solved directly to determine HW. However, when the tailwater is below the crown of the culvert, it becomes necessary to redefine d_2, which is taken as the greater of the following two values:

a. TW

b. $(d_c + D)/2$

Where,

d_c → The critical depth in the culvert as read from the appropriate chart, measured in feet.

TW → The tailwater depth above the invert of the culvert outlet, measured in feet.

D → The height of the culvert, measured in feet.

G. Step by Step Culvert Design Procedure

It is possible by solving complex hydraulic computations to determine the probable type of flow under which a culvert will operate for a given set of conditions. However, such computations can be avoided by determining the headwater necessary for a given discharge under both inlet and outlet flow conditions. The larger of the two will define the type of control and the corresponding headwater depth.

The culvert design procedures presented here are based on information provided in the Federal Highway Administration publication Hydraulic Design of Highway Culverts [FHWA, 1985]. The nomographs included in Section 2.8.6 cover a range of pipe and box culverts commonly used in drainage design. These nomographs correspond to Charts 1 through 15 and 29 through 40 in Hydraulic Design of Highway Culverts, [FHWA,1985].

The following is the recommended procedure for selection of culvert size:

1. **List design data.**

   a. Design discharge (Q), in cfs, with return period.

   b. Approximate length (L) of culvert, in feet.

   c. Slope of culvert (S_o). If grade is given in percent, convert to slope in feet per feet.

   d. Allowable headwater depth, in feet, which is the vertical distance from the culvert invert (flow-line) at the entrance to the water surface elevation permissible in the headwater pool or approach channel upstream from the culvert.

   e. Flow velocities in the channel upstream and downstream of the proposed culvert location.

   f. Type of culvert for first trial selection, including barrel material, barrel cross-sectional shape and entrance type.

2. **Determine the first trial culvert size**.

Since the procedure given is one of trial and error, the initial trial size can be determined in several ways:

   a. Past experience and engineering judgment.

b. By using an approximating equation such as $Q/6 = A$ from which the trial culvert dimensions are determined. "A" is the culvert barrel cross-sectional area and 6 is an estimate of barrel velocity in feet per second.

c. Initially, utilize the inlet control nomographs for the culvert type selected. An HW/D ratio must be assumed, say HW/D = 1.5, along with the given Q to determine a trial culvert size.

d. If any trial size is too large in dimension because of limited height of embankment or availability of size, multiple culverts may be used by dividing the discharge appropriately among the number of barrels used. Raising the embankment height or the use of pipe arch and box culverts with width greater than height should also be considered. Final selection should be based on applicability and costs.

3. Find headwater depth for trial culvert size.

a. Assuming Inlet Control

i. Using the trial size from Step 2, find the headwater depth (HW) by use of the appropriate inlet control nomograph. Tailwater (TW) conditions are to be neglected in this determination. HW in this case is found by multiplying HW/D obtained from the nomographs by the height of culvert (D).

ii. If HW is greater or less than allowable, try another trial size until HW is acceptable for inlet control before computing HW for outlet control.

b. Assuming Outlet Control

i. Approximate the depth of tailwater (TW), in feet, above the invert at the outlet for the design flood condition in the outlet channel.

ii. For tailwater (TW) elevation equal to or greater than the top of the culvert at the outlet, set d_2 equal to TW and find HW by using Equation 2.31.

$$HW = H + TW - LS_o \qquad \text{(Equation 2.31)}$$

iii. For tailwater (TW) elevations less than the top of the culvert at the outlet, find headwater (HW) by Equation 2.31 as in Step b(2) above except that:

$d_2 = (d_c + D)/2$ or TW (whichever is greater)

Note: Headwater depth determined in Step b(3) becomes increasingly less accurate as the headwater computed by this method falls below the value:

$$D + (1 + k_e)\frac{V^2}{2g}$$

c. Compare the headwater depths obtained in Step 3(a) and Step 3(b) (Inlet Control and Outlet Control). The higher headwater governs and indicates the flow control existing under the given conditions for the trial size selected.

d. If outlet control governs and the HW is higher than is acceptable, select a larger trial size and find HW as instructed under Step 3(b). (Inlet control need not be checked, since the smaller size was satisfactory for this control as determined under Step 3(a).

4. **Try additional culvert types or shapes:** Determine their size and HW by the above procedure.

5. **Compute outlet velocities for size and types of Culverts to be considered in selection and determine need for channel protection.**

a. If outlet control governs in Step 3(c) above, outlet velocity equals Q/A_0, where A_0 is the cross-sectional area of flow in the culvert barrel at the outlet. If d_c or TW is less than the height of the culvert barrel, use A_0 corresponding to d_c or TW depth, depending on whichever gives the greater area of flow. A_0 should not exceed the total cross-sectional area A of the culvert barrel.

b. If inlet control governs in Step 3(c), outlet velocity can be assumed to equal mean velocity (V) in open-channel type flow as computed by Manning's equation for the rate of flow, barrel size, roughness and slope of culvert selected.

6. **Record final selection of culvert with size, type, allowed and computed headwater, outlet velocity and economic justification.**

Figure 2.22 provides a Culvert Design Form that may be used to record the culvert computations and related data (Section 2.8.6).

2.8.5 CULVERT EROSION CONTROL

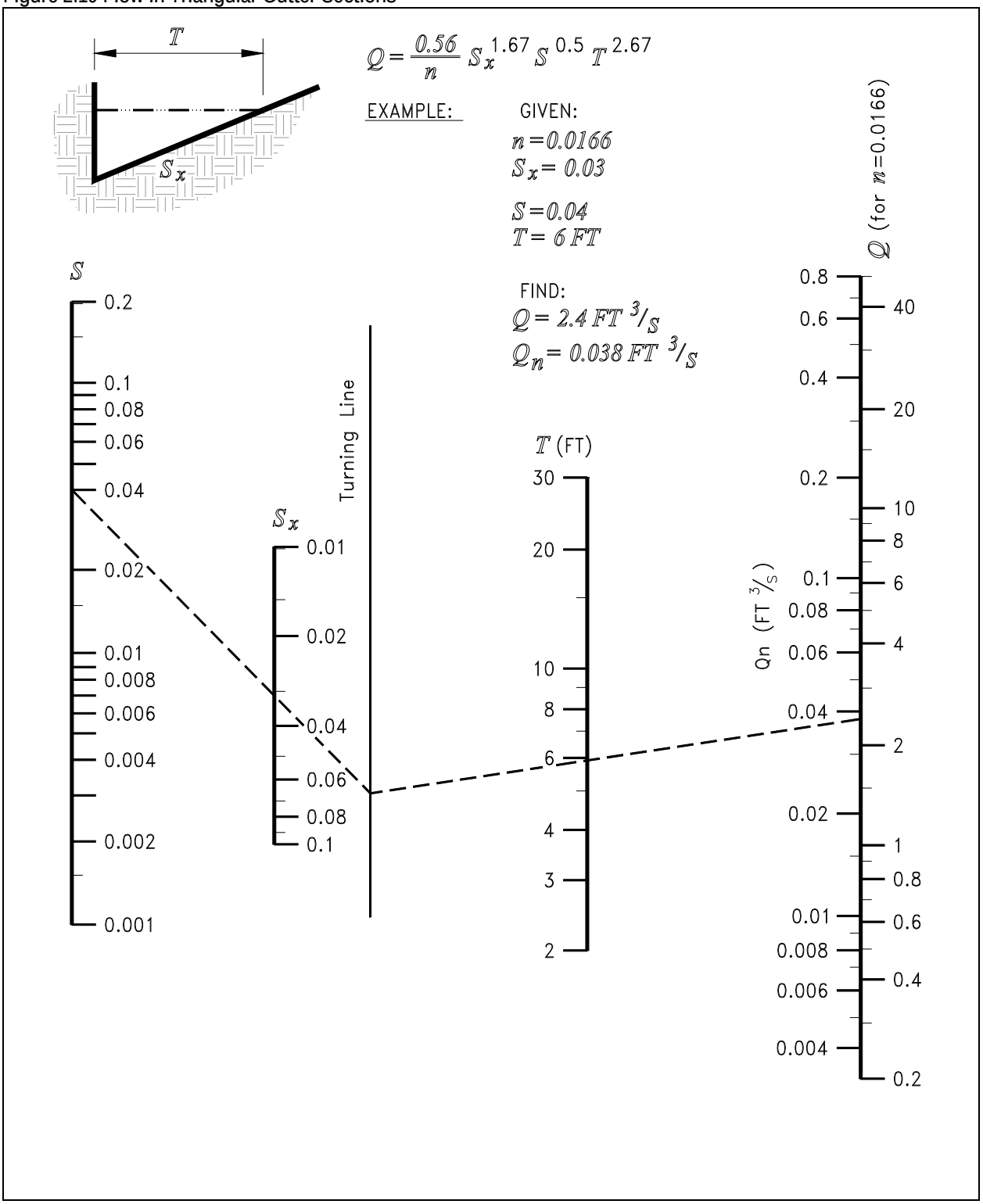
A. Inlet and/or outlet protection is necessary to insure those channels upstream and downstream of pipe culverts maintain stability and to avoid excessive transport and deposition of eroded material.

B. All erosion and sediment control measures shall be designed in accordance with the North Carolina Sedimentation Pollution Control Act of 1973. The Designer is to reference the latest edition of the Erosion and Sediment Control Planning and Design Manual. This manual contains valuable information and tools for developing plans to minimize soil erosion and prevent sedimentation pollution associated with land-disturbing activities.

2.8.6 DESIGN AIDS

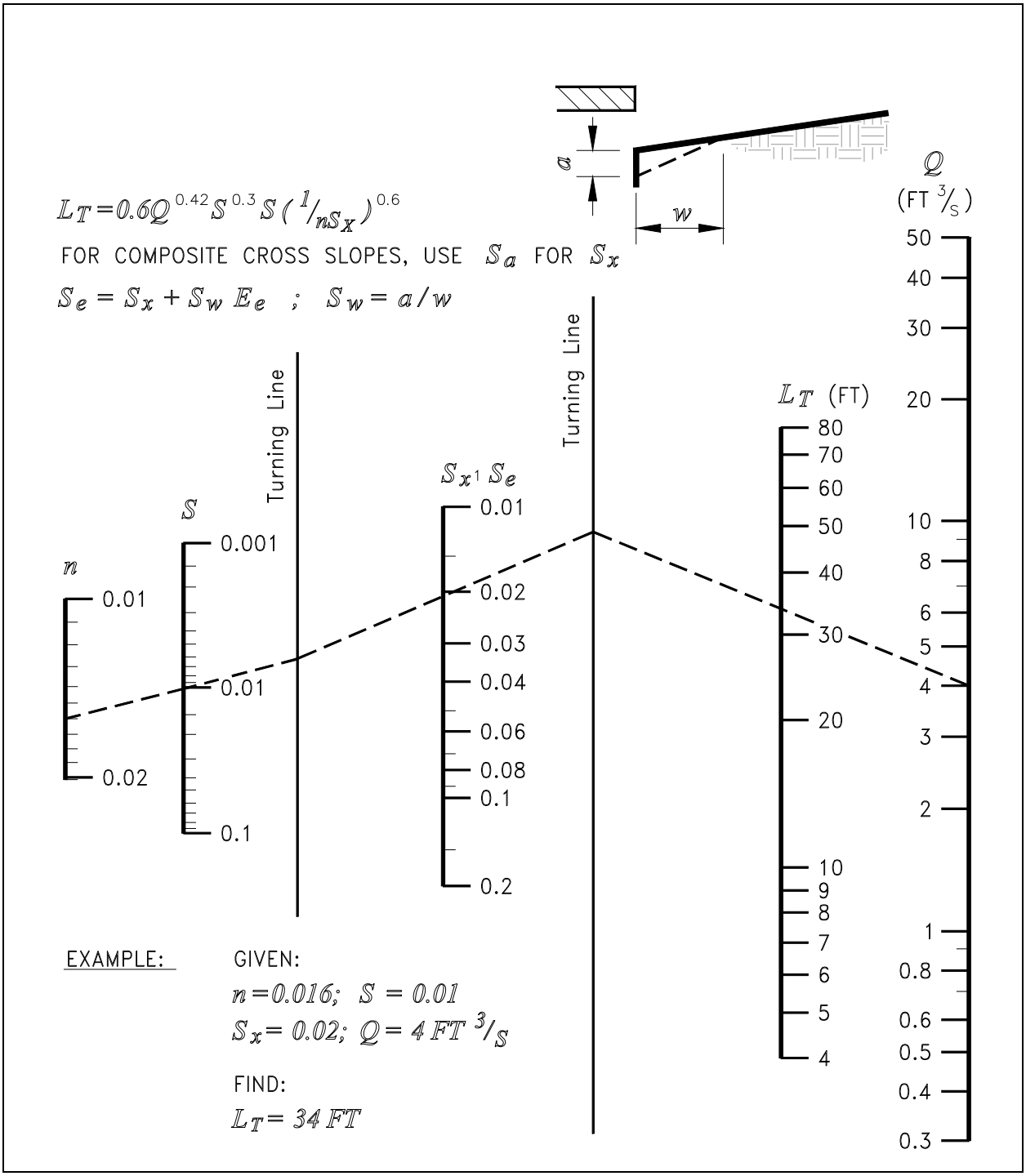
The following charts, tables, figures, etc., will aid in pipe culvert design:

Figure 2.19 Flow in Triangular Gutter Sections



Source: [FHWA-TS-84-202]

Figure 2.20 Flow in Modified Triangular Gutter Sections



Source: [FHWA-TS-84-202]

Figure 2.21 Catch Basin Design Data Sheet

CATCH BASIN DESIGN DATA SHEET

SHEET: /

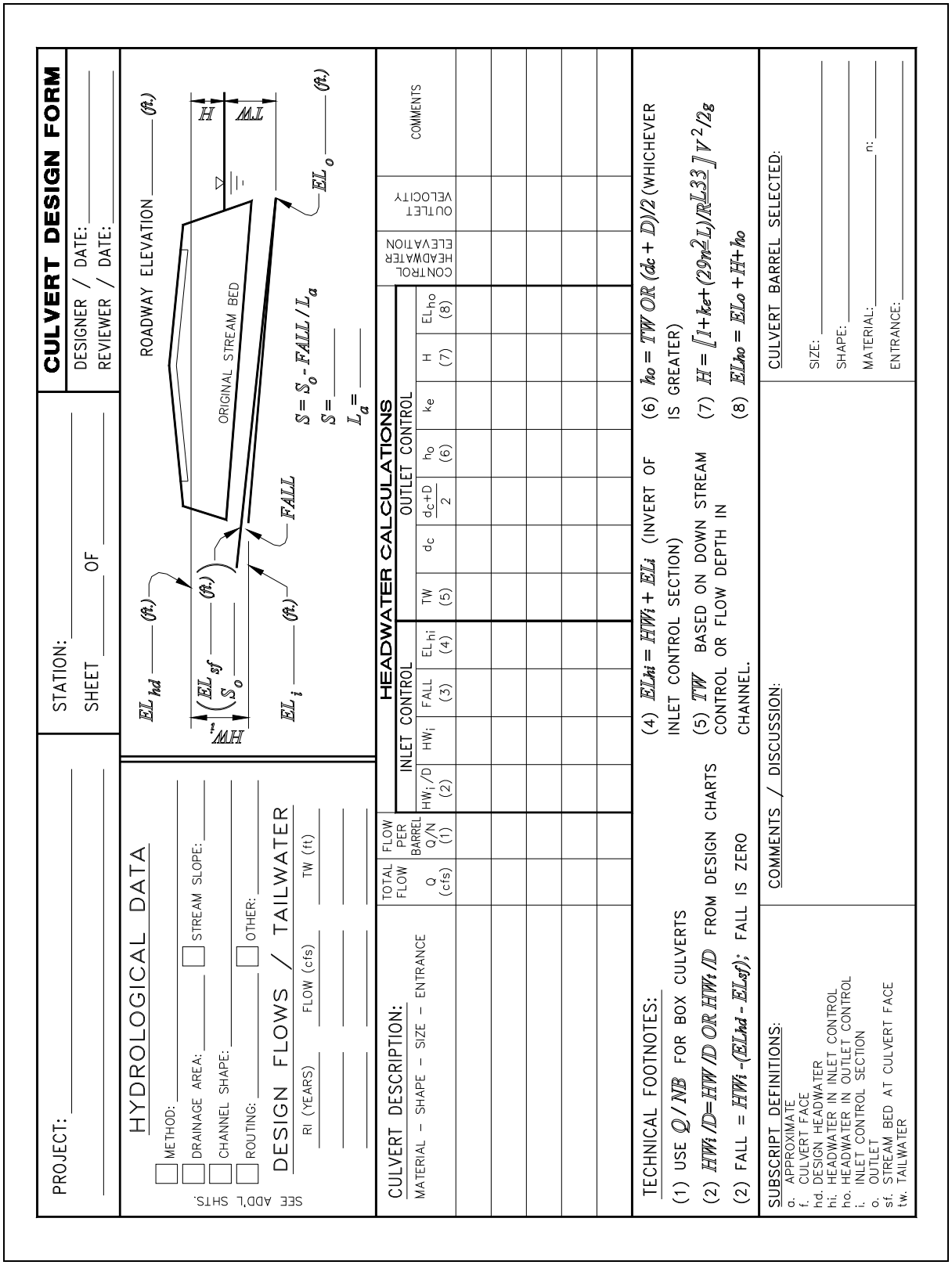
PROJECT:
LOCATION
STORM FREQUENCY: Years

COMPUTED BY: DATE:
CHECKED BY: DATE:

	1	2	3	4	5	6	7	8	9	10	11	12	13	
CATCH BASIN NO.	GUTTER SPREAD	LONGITUDINAL GRADE	MAX. GUTTER FLOW (CFS)	INTERCEPTED FLOW (CFS)	TRIAL COEF. OF RUNOFF	TRIAL INTENSITY (IN.)	DERIVED AREA	LENGTH OF DRAINAGE AREA	HEIGHT ABOVE MOST REMOTE POINT	COEFFICIENT OF RUNOFF	TIME OF CONCENTRATION	ACTUAL INTENSITY (IN.)	MAX. ALLOWABLE DRAINAGE AREA	REMARKS (COLUMN 13 MUST BE W/IN 10% OF COLUMN 7)

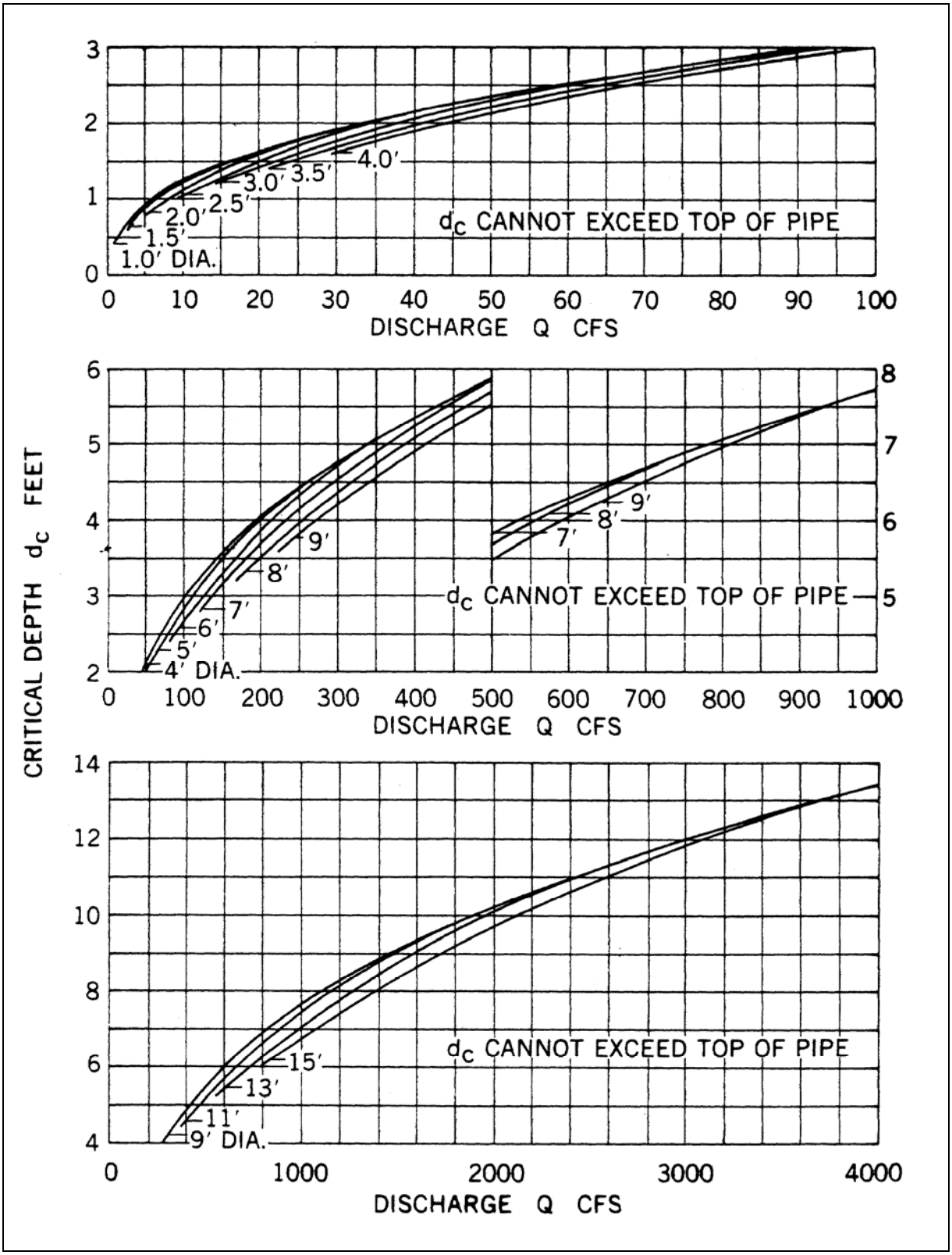
Source: City of Wilmington Technical Standards and Design, [July 1996]

Figure 2.22 Culvert Design Form



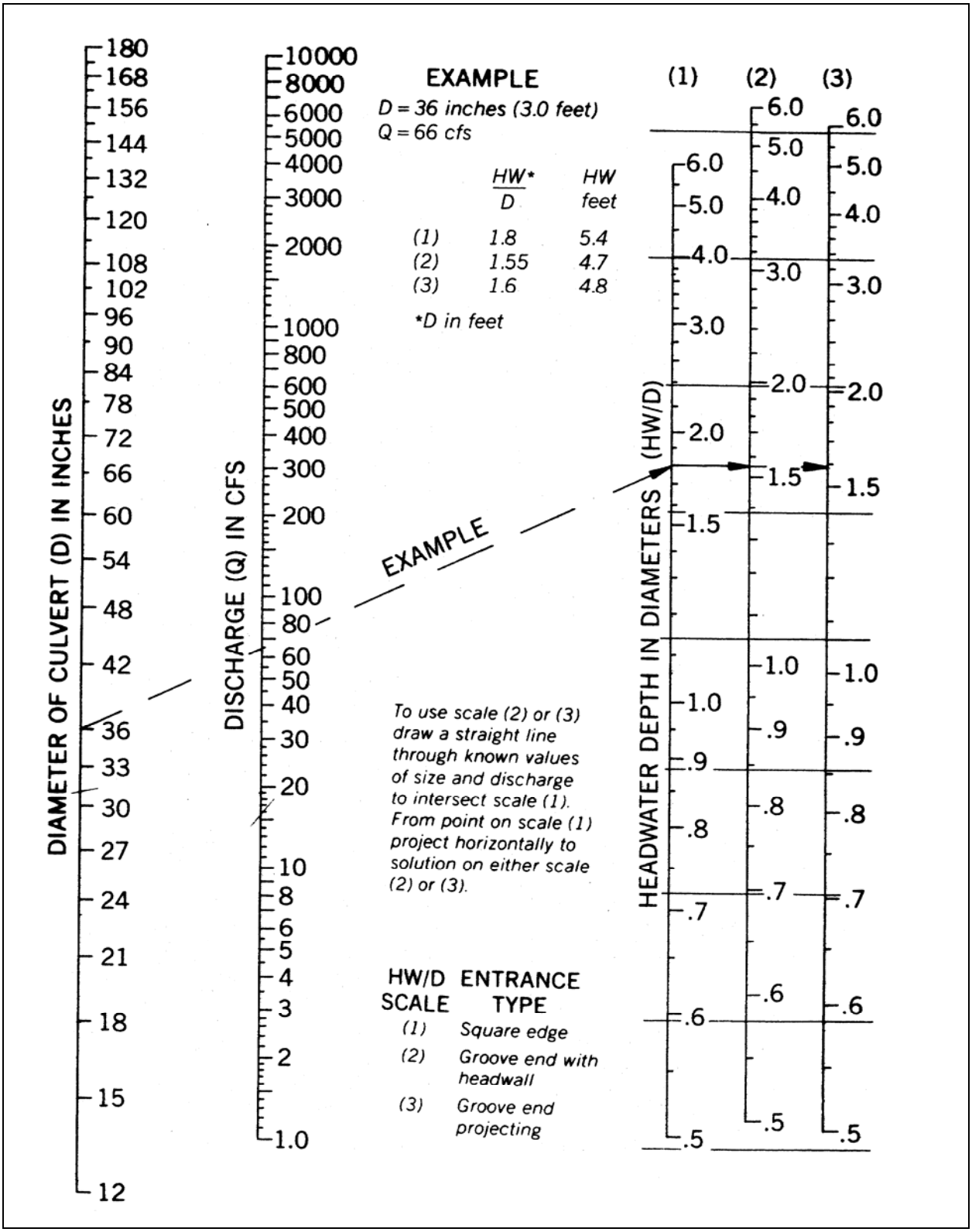
Source: "Drainage Criteria Manual for Montgomery County, Texas," [Dodson, 1989]

Figure 2.23 Critical Depth for Circular Pipe



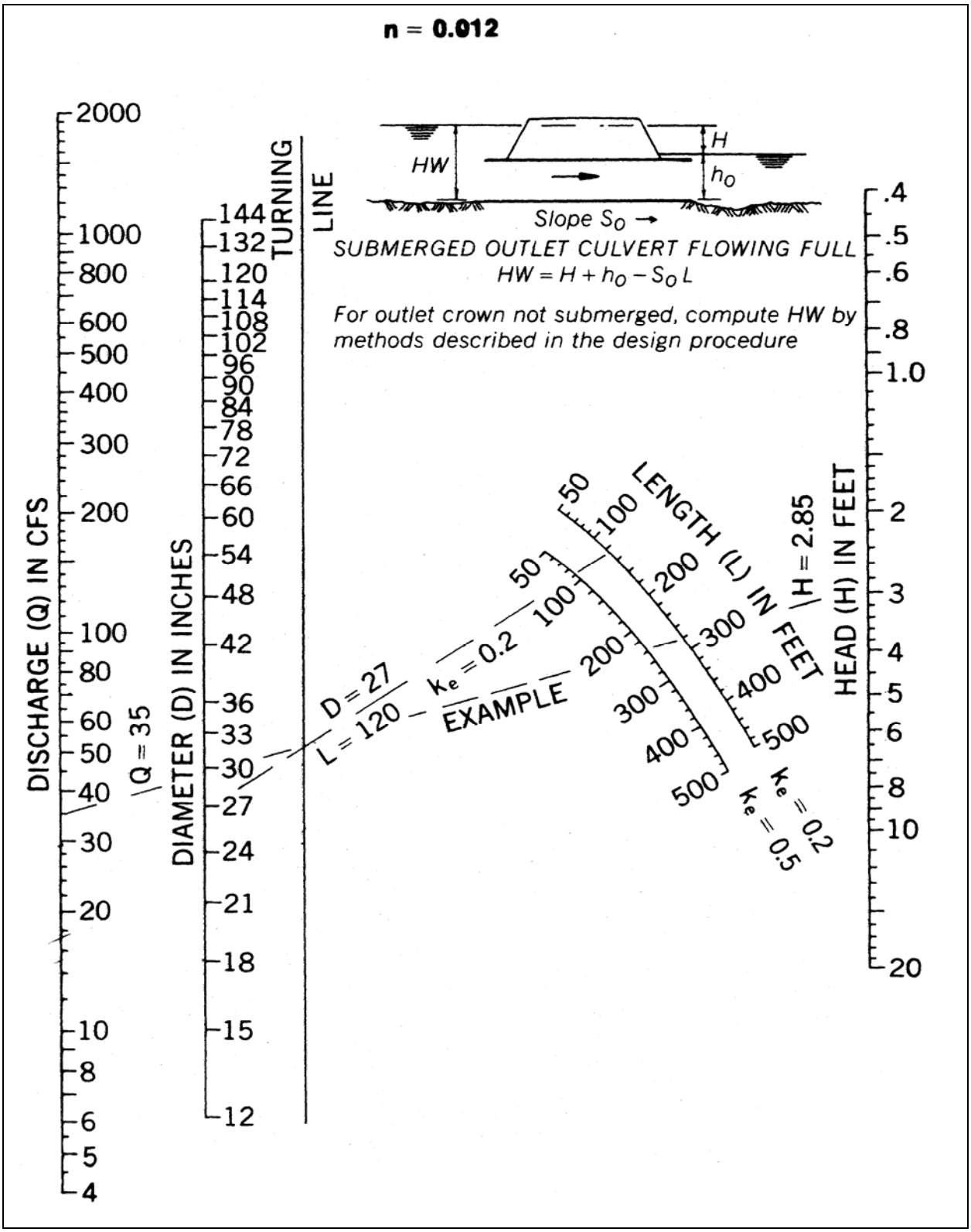
Source: [Bureau of Public Roads, 1963]

Figure 2.24 Headwater Depth for Circular Concrete Pipe Culverts with Inlet Control



Source: [Bureau of Public Roads, 1963]

Figure 2.25 Head for Circular Concrete Pipe Culverts Flowing Full



Source: [Bureau of Public Roads, 1963]

2.9 DETENTION / RETENTION DESIGN

The purpose of this division is to provide a guide for the design of appropriate storm runoff storage facilities within the Town of Wake Forest.

2.9.1 INTRODUCTION

A. The introduction of impervious cover and improved runoff conveyance typically increases peak floods over those for existing conditions. Where physical, topographic, and economic conditions permit, channel improvements downstream of the development are used to prevent increased flooding. When this is not feasible, runoff detention or retention is required in which the storm runoff is detained and released at an acceptable rate through a flow-limiting outlet structure, thus controlling peak downstream flow.

B. All detention/retention facilities in the Town of Wake Forest shall be designed to attenuate developed condition peak discharges to the existing conditions for the given storm of calculation.

C. All retention facilities shall capture the first one (1) inch of runoff.

D. Many different methods may be used in the design of stormwater detention/retention facilities and innovate designs will be considered by the Town's Engineer provided that the maximum permissible discharge and the storage facility requirements are met. In all cases, the design will be routed for confirmation.

E. Designer's Judgement

The fundamental process of engineering design is one in which the designer selects one or more mathematical models to represent a physical system, manipulates the system components to achieve some desired response under loadings of interest, and specifies the system to be constructed in the field. It is the responsibility of the designer to determine which model best fits the given situation. This section provides mere guidelines in the elements of stormwater detention/retention design.

F. Regulations

1. Design and installation of all stormwater detention/retention facilities must comply with all applicable Federal, State, and local laws.

2. The Town of Wake Forest will follow the Division of Water Quality – 401 Wet Detention Basin Design for all detention/retention basins within the Town's jurisdiction. A complete stormwater management plan submittal includes a detention/retention basin worksheet for each basin, design calculations, plans and specifications depicting all basin and outlet structure details, and a fully executed operation and maintenance agreement. (Reference N.C. Department of Environmental Health and Natural Resources, November 1995 and Administrative Code Section: 15 A NCAC 2H .1008)

3. Basins which measure greater than fifteen (15) feet in height and have an impoundment capacity greater than 10 acre-feet are subject to the dam safety regulations set forth in the North Carolina Administrative Code, Title 15A, Subchapter 2K, latest revision.

2.9.2 DESIGN CONSIDERATIONS

A. Location

1. It is recommended that stormwater detention/retention facilities be located on the site from which the runoff to be controlled is generated. However, off-site

facilities are acceptable provided that the land area involved with the facility is delineated and officially recorded at the Wake County Register of Deeds office as a permanent "Stormwater Detention/Retention Easement." The property owner on which the facility is located will also be required to submit to the Town a letter of commitment to the maintenance of the facility. See also Section 2.2.8.

2. In no case shall a habitable structure be located within the detention/retention area of any stormwater storage facility. No utilities (sewer lines, power lines, water lines, etc.) shall be located within or immediately around any detention/retention facility.

B. Safety Considerations: Adequate safety measures such as warning signs, embankment slopes, fences, grates, and other features should be incorporated into the design of the facility wherever appropriate.

C. Maintenance

1. In general, the Town of Wake Forest will only be responsible for maintenance of stormwater detention/retention facilities that serve public facilities such as dedicated public streets and recreational areas. Responsibility for the maintenance of any portion of a facility not designed for flood control will not rest with the Town of Wake Forest, nor will the Town be responsible for any damage that may occur resulting from flooding of the facility.

2. For retention basins, a notarized Stormwater Retention Basin Operation and Maintenance Plan shall be submitted with each basin design. Figure 2.26 is a typical Stormwater Retention Basin Operation and Maintenance Plan that may be modified for the specific facility.

2.9.3 STORMWATER DETENTION / RETENTION PROCEDURE

A. The general procedure in stormwater detention/retention design is:

1. Determine the Pre-Developed and Post-Developed Discharges

2. Determine the Size of the Proposed Detention/Retention Facility

3. Determine the Characteristics of the Proposed Outlet Structure

4. Route the System

Figure 2.26 Typical Retention Basin Operation and Maintenance Plan

Stormwater Retention Basin Operation and Maintenance Plan for
(Project Name)
Wake Forest, North Carolina

I. **Inspect Monthly, or after every runoff-producing rainfall event, whichever comes first:**
- Clear and check the outlet orifice, manhole weir, and outlet pipe of any obstructions.
- Check the basin side slopes; remove trash; repair eroded areas before the next rainfall event.
- Check the vegetative filter for sediment accumulation and erosion. Repair as necessary.

II. **Inspect quarterly:**
- Inspect the collection system (piping, grassed swales) for proper functioning. Check and clear piping for obstructions.
- Replace rip rap at basin outlet structures as necessary.
- Repair broken drainage tiles.
- Repair eroded areas as necessary.

III. **Every six (6) months:**
- Remove accumulated sediment from the bottom of the outlet structure.
- Check basin depth at various points in the basin. If depth is reduced to 75% of original design depth, sediment shall be removed to at least original design depth.
- Reseed grassed swales, including vegetating filter, as necessary.

IV. **General**
- Mow the side slopes, not including normally submerged vegetative shelf, according to the season. Maximum grass height will be 6”.
- Cattails and other indigenous wetland plants are encouraged along the basin perimeter; however, they must be removed when cover the entire surface area of the basin.
- The orifice is design to draw down the basin in two to five days. If drawdown is not accomplished in that time, the system may be clogged. The source of the clogging must be found and eliminated.
- All components of the detention/retention basin system must be kept in good working order.
- Emergency drain device (siphon or pump) will be required in the event that the permanent pool needs to be completely drained.

I, _____, hereby acknowledge that I am the financially responsible party for the maintenance of this retention facility and that I will perform the maintenance for the facility as outlined above.

Signature: _____ Date: _____
Name, Title
Address, Telephone

I, _____, a Notary Public for the State of _____, County of _____, do hereby certify that _____ personally appeared before me this _____ day of _____, _____, and acknowledge the due execution of the foregoing instrument. Witness my hand and official seal,

_____ SEAL:
My commission expires _____

B. Required Submittal Documentation

The following information shall be submitted to the Town's Engineer for the design of all stormwater detention/retention facilities (as listed in checklist in Section 6.5):

1. Vicinity Map
2. Site Plan
3. Grading Plan
4. Runoff Map
5. Runoff Calculations
6. Hydraulic Calculations
7. Soils Report, as applicable
8. Operation and Maintenance Plan, if applicable, (Section 2.9.2.C)
9. Detention/Retention Basin Worksheet, if applicable (Section 6.5)

C. Determine the Pre-Developed and Post-Developed Discharges

1. In most cases, the designer should evaluate the 2-year, 10-year, and 100-year 24-hour storm routed through the facility. Use the method outlined in Section 2.5 or 2.6 for watersheds greater than 50 acres to determine the peak discharge. To determine the peak discharge for smaller watersheds and developments on small sites, the designer should follow the steps outlined in Section 2.4 and exercise engineering judgement to determine the time to peak and which storm best fits the situation.
2. The peak discharge should then be substituted in Equations 2.7 and 2.9 to determine the inflow hydrograph.
3. Also, determine the inflow hydrograph and volume of the first one-(1) inch of runoff (post developed), for this volume of runoff must be captured.

D. Determine the Size of the Proposed Detention/Retention Facility

The maximum allowable release rate from the detention/retention facility during the storm event shall be less than the rate from the watershed under pre-development conditions. For basins, the emergency spillway must be designed to carry the 100-year storm event without increased upstream or downstream flooding.

An approximation of orifice-base detention/retention facilities can be obtained by a gross linearization of the inflow and outflow hydrographs. As such, the storage volume required to reduce Q_p to Q_o can be estimated by the following equation:

$$S = (Q_p - Q_o)\, T_p \qquad \text{(Equation 2.32)}$$

Where,

S → Estimated storage required (cf)

Q_p → Peak discharge of the inflow hydrograph (cfs)

Q_o → Peak discharge of the outflow hydrograph (cfs)

T_p → Time to peak of inflow hydrograph (seconds)

Thus, the designer may design a facility with the storage determined in Equation 2.32 as the preliminary facility for hydraulic storage calculations.

1. Drainage Pipe Detention

If drainage structures are to be designed for use a detention facility, the use of Table 2.17 may be helpful when calculating the cross-sectional area of the partially filled pipes at various depths.

2. Detention/Retention Basins

a. In many cases, the detention/retention storage facility is a natural stream valley or an excavated basin. The basin should also meet the requirements as described in the checklist in Section 6.5:

i. Length to width ratio greater than 3:1

If local topography makes the excavation of a long narrow pond impossible, correctly spaced baffles can lengthen the flow path between the inlet and outlet.

ii. Side slopes no steeper than 3:1

b. A representative set of storage volumes can be computed by applying the average-end-area method vertically from contour to contour. If storage versus stage is plotted on log-log axes, the resulting line is usually straight, suggesting that the reservoir stage-storage function may be adequately represented by a power-curve fit of the form:

$$S = K_s Z^b \qquad \text{(Equation 2.33)}$$

Where,

S → Storage Volume (cf)

Z → Stage (ft) from the bottom of the basin

c. There are two ways to determine the values K_s and b in Equation 2.33. Both ways depend upon the assumption that the logarithm of storage is linear with the logarithm of stage.

i. *<u>Linear-Regression Estimation of Stage-Storage Parameters:</u>*

Determine the linear regression for the natural log of each accumulated volume and stage. In the stage-storage function, the independent variable (x-axis) is $\ln Z$, and the dependent variable (y-axis) is $\ln S$. The value of the exponent, b, is the regression coefficient of the independent variable, (the x-coefficient) . The value of the coefficient, K_s, is the antilogarithm of the intercept (the regression constant).

ii. *Algebraic Estimation of Stage-Storage Parameters:*

After plotting storage versus stage on log-log axes, the designer may select two representative points on the curve, preferably in the upper end of the range of stage, and compute values of K_s and b. Writing the logarithmic form of Equation 2.33 for two points simultaneously yields:

$$b = \frac{\ln\left(\frac{S_2}{S_1}\right)}{\ln\left(\frac{Z_2}{Z_1}\right)}$$

(Equation 2.34)

$$K_s = \frac{S_2}{Z_2^{\,b}}$$

(Equation 2.35)

Table 2.17 Area, Wetted Perimeter, and Hydraulic Radius of Partially Filled Circular Pipe

$\frac{d}{D}$	$\frac{area}{D^2}$	$\frac{wet.per.}{D}$	$\frac{hyd.rad.}{D}$	$\frac{d}{D}$	$\frac{area}{D^2}$	$\frac{wet.per.}{D}$	$\frac{hyd.rad.}{D}$
0.01	0.0013	0.2003	0.0066	0.51	0.4027	1.5908	0.2531
0.02	0.0037	0.2838	0.0132	0.52	0.4127	1.6108	0.2561
0.03	0.0069	0.3482	0.0197	0.53	0.4227	1.6308	0.2591
0.04	0.0105	0.4027	0.0262	0.54	0.4327	1.6509	0.2620
0.05	0.0147	0.4510	0.0326	0.55	0.4426	1.6710	0.2649
0.06	0.0192	0.4949	0.0389	0.56	0.4526	1.6911	0.2676
0.07	0.0242	0.5355	0.0451	0.57	0.4625	1.7113	0.2703
0.08	0.0294	0.5735	0.0513	0.58	0.4723	1.7315	0.2728
0.09	0.0350	0.6094	0.0574	0.59	0.4822	1.7518	0.2753
0.10	0.0409	0.6435	0.0635	0.60	0.4920	1.7722	0.2776
0.11	0.0470	0.6761	0.0695	0.61	0.5018	1.7926	0.2799
0.12	0.0534	0.7075	0.0754	0.62	0.5115	1.8132	0.2821
0.13	0.0600	0.7377	0.0813	0.63	0.5212	1.8338	0.2842
0.14	0.0668	0.7670	0.0871	0.64	0.5308	1.8546	0.2862
0.15	0.0739	0.7954	0.0929	0.65	0.5404	1.8755	0.2881
0.16	0.0811	0.8230	0.0986	0.66	0.5499	1.8965	0.2899
0.17	0.0885	0.8500	0.1042	0.67	0.5594	1.9177	0.2917
0.18	0.0961	0.8763	0.1097	0.68	0.5687	1.9391	0.2933
0.19	0.1039	0.9020	0.1152	0.69	0.5780	1.9606	0.2948
0.20	0.1118	0.9273	0.1206	0.70	0.5872	1.9823	0.2962
0.21	0.1199	0.9521	0.1259	0.71	0.5964	2.0042	0.2975
0.22	0.1281	0.9764	0.1312	0.72	0.6054	2.0264	0.2987
0.23	0.1365	1.0003	0.1364	0.73	0.6143	2.0488	0.2998
0.24	0.1449	1.0239	0.1416	0.74	0.6231	2.0714	0.3008
0.25	0.1535	1.0472	0.1466	0.75	0.6318	2.0944	0.3017
0.26	0.1623	1.0707	0.1516	0.76	0.6404	2.1176	0.3025
0.27	0.1711	1.0928	0.1566	0.77	0.6489	2.1412	0.3032
0.28	0.1800	1.1152	0.1614	0.78	0.6573	2.1652	0.3037
0.29	0.1890	1.1373	0.1662	0.79	0.6655	2.1895	0.3040
0.30	0.1982	1.1593	0.1709	0.80	0.6736	2.2143	0.3042
0.31	0.2074	1.1810	0.1755	0.81	0.6815	2.2395	0.3044
0.32	0.2167	1.2025	0.1801	0.82	0.6893	2.2653	0.3043
0.33	0.2260	1.2239	0.1848	0.83	0.6969	2.2916	0.3041
0.34	0.2355	1.2451	0.1891	0.84	0.7043	2.3186	0.3038
0.35	0.2450	1.2661	0.1935	0.85	0.7115	2.3462	0.3033
0.36	0.2546	1.2870	0.1978	0.86	0.7186	2.3746	0.3026
0.37	0.2642	1.3078	0.2020	0.87	0.7254	2.4038	0.3017
0.38	0.2739	1.3284	0.2061	0.88	0.7320	2.4321	0.3008
0.39	0.2836	1.3490	0.2102	0.89	0.7384	2.4655	0.2996
0.40	0.2934	1.3694	0.2142	0.90	0.7445	2.4981	0.2980
0.41	0.3032	1.3898	0.2181	0.91	0.7504	2.5322	0.2963
0.42	0.3130	1.4101	0.2220	0.92	0.7560	2.5681	0.2944
0.43	0.3229	1.4303	0.2257	0.93	0.7612	2.6061	0.2922
0.44	0.3328	1.4505	0.2294	0.94	0.7662	2.6467	0.2896
0.45	0.3428	1.4706	0.2331	0.95	0.7707	2.6906	0.2864
0.46	0.3527	1.4907	0.2366	0.96	0.7749	2.7389	0.2830
0.47	0.3627	1.5108	0.2400	0.97	0.7785	2.7934	0.2787
0.48	0.3727	1.5308	0.2434	0.98	0.7816	2.8578	0.2735
0.49	0.3827	1.5508	0.2467	0.99	0.7841	2.9412	0.2665
0.50	0.3927	1.5708	0.2500	1.00	0.7854	3.1416	0.2500

d → depth of flow in pipe

D → diameter of pipe

Source: "Concrete Pipe Design Manual," [American Concrete Pipe Association, 1992]

3. Retention Basins

a. *Retention* basins differ from *detention* basins in that retention basins have a permanent storage of water. In addition to the guidelines for detention/retention basins set forth in Section 2.9.3.D.2, retention basins should also be designed to include:

i. 10 ft. wide vegetated perimeter shelf at less than 6:1

ii. Vegetation to permanent pool elevation

iii. Emergency drain provided

iv. Permanent pool depth between 3 and 6 feet

v. Drawdown in 2 to 5 days

vi. First one (1) inch of runoff captured

vii. Forebay 20% of total basin volume

viii. 85% Average Annual Removal of Total Suspended Solids (Table 2.18)

b. To determine the *minimum* surface area at normal pool (SA) for the basin:

i. Determine the total drainage area for the basin (DA).

ii. Calculate the percent impervious area for this watershed.

iii. Estimate a desired normal pool depth.

iv. From Table 2.18, determine the SA/DA ratio for the given watershed.

v. Divide the SA/DA by 100.

vi. Multiply this value by the total drainage area for the basin (DA). This value is the *minimum pond area* at normal pool depth for the given watershed.

c. Table 2.18 provides the ratio (in percent) of the surface area of a given basin (SA) at various normal pool depths to the drainage area of the watershed (DA) at various levels of imperviousness. Intermediate values may be linearly interpolated.

Table 2.18 SA/DA (in Percent) – 85% TSS Removal

Impervious %	3.0 ft.	3.5 ft.	4.0 ft.	4.5 ft.	5.0 ft.	5.5 ft.	6.0 ft.	6.5 ft.	7.0 ft.	7.5 ft.
10%	0.9	0.8	0.7	0.6	0.5	-	-	-	-	-
20%	1.7	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5
30%	2.5	2.2	1.9	1.8	1.6	1.5	1.3	1.2	1.0	0.9
40%	3.4	3.0	2.6	2.4	2.1	1.9	1.6	1.4	1.1	1.0
50%	4.2	3.7	3.3	3.0	2.7	2.4	2.1	1.8	1.5	1.3
60%	5.0	4.5	3.8	3.5	3.2	2.9	2.6	2.3	2.0	1.6
70%	6.0	5.2	4.5	4.1	3.7	3.1	2.9	2.5	2.1	1.8
80%	6.8	6.0	5.2	4.7	4.2	3.7	3.2	2.7	2.2	2.0
90%	7.5	6.5	5.8	5.3	4.8	4.3	3.8	3.3	2.8	1.3
100%	8.2	7.4	6.8	6.2	5.6	5.0	4.4	3.8	3.2	2.6

Source: [NCDNR, Division of Water Quality]

d. The designer may then design a retention basin of greater size than the minimum pond area at normal pool depth for which storage volumes can be computed.

E. Determine the Characteristics of the Proposed Outlet Structure

1. Tentatively size the outlet structures as described in Section 2.8.4. The maximum release rate must be limited to the rate of runoff discharged prior to site development.

2. All outlet devices must be constructed in adherence to current construction standards as described in the Town of Wake Forest's Manual of Standard Designs and Details. Alternative outlets not referred to in this publication may be approved at the discretion of the Town's Engineer. Such approval must be specifically requested upon submittal of the drainage plan.

3. The stage-discharge function represents the most important aspects of the hydraulic performance of the outlet structure in its influence on the outflow hydrograph. The stage-discharge function is derived by hydraulic analysis of the outlet structures, which usually can be considered as orifices and weirs. For a sample of stages throughout the expected range of water level depths in the detention/retention facility, the total outflow downstream of the outlet structure is computed for each value of stage, and stage versus total discharge is plotted.

4. **Weirs**

   Roads, emergency spillways, and manholes are typical examples of weirs. The discharge calculations for weirs can be calculated using the following weir equation, Equation 2.36.

$$Q = C_w L H^{3/2} \qquad \textbf{(Equation 2.36)}$$

   Where,

   Q → Discharge (cfs)

   C_w → Weir coefficient (reference any hydrology book), default value is 3.0.

   L → Length of weir (ft), measured along the crest

   H → Driving head (ft), measured vertically from crest of weir to water surface at a point far enough upstream to be essentially level.

5. **Orifices**

   The flow through orifices, such as culverts and draw-down orifices, can be computed using the following orifice equation:

$$Q = C_d A \sqrt{2gh} \qquad \textbf{(Equation 2.37)}$$

   Where,

   Q → Discharge (cfs)

   C_d → Coefficient of discharge (see Table 2.19)

   A → Cross-sectional area of flow at the orifice entrance (sf)

   g → Acceleration of gravity (32.2 ft/sec2)

h → Driving head (ft), measured from centroid of orifice area to water surface

Table 2.19 Values of Coefficient of Discharge, Cd

Entrance Condition	C_d
Typical default value	0.60
Square-edged entrance	0.59
Concrete pipe, grooved end	0.65
CMP, mitred to slope	0.52
CMP, projecting from fill	0.51

Source: [Malcom, 1989]

F. Route the System

1. Routing of the flood proceeds by time steps. At each step during the passage of the inflow hydrograph through the system, the outflow is computed. The result is a list of values of outflow at stated times – the outflow hydrograph

2. Although there are many routing procedures that are accepted by the Town of Wake Forest, the recommended technique for reservoir routing is the Storage – Indication Method as described in "Elements of Urban Stormwater Design" [Malcom, 1989]. This procedure is based on the continuity principle that states that the rate of change of storage with respect to time is the difference between inflow and outflow:

$$\frac{ds}{dt} = I - O \qquad \text{(Equation 2.38)}$$

Over a time increment,

$$\frac{\Delta S}{\Delta T} = I - O \qquad \text{(Equation 2.39)}$$

3. The incremental change in storage can be estimated as the area of a trapezoidal element:

$$\Delta S_{ij} = (\overline{I} - \overline{O}) \quad \Delta T_{ij} \qquad \text{(Equation 2.40)}$$

Where,

ΔS_{ij} → Change in storage in the time increment i to j

$\overline{I}$ → Average inflow from time i to time j

$\overline{O}$ → Average outflow from time i to time j

ΔT_{ij} → Time increment

4. Equation 2.40 can be manipulated to obtain the following equation:

$$I_i + I_j + \left[\frac{2S_i}{\Delta T} - O_i\right] = \left[\frac{2S_j}{\Delta T} + O_j\right] \qquad \text{(Equation 2.41)}$$

Where,

I_i → Inflow at the beginning of the interval

I_j → Inflow at the end of the interval

S_i → Storage at the beginning of the interval

Sj → Storage at the end of the interval

O_i → Outflow at the beginning of the interval

O_j → Outflow at the end of the interval

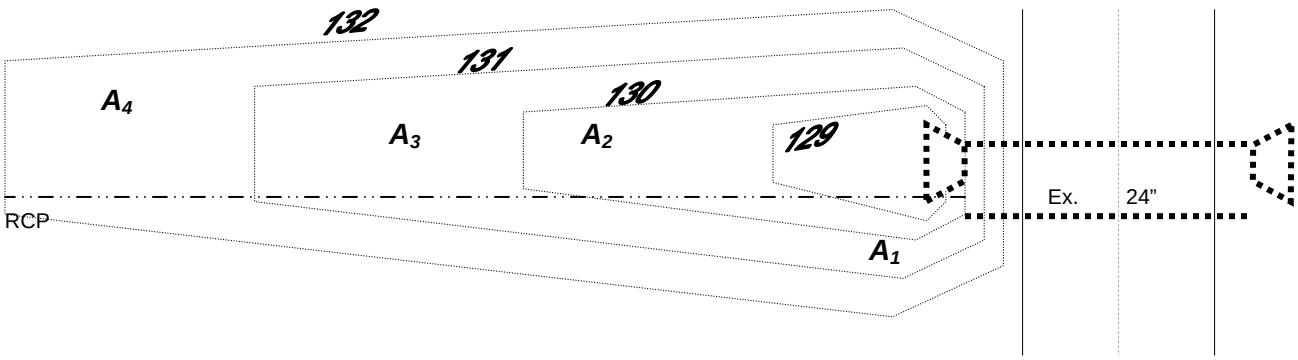
ΔT → Time increment

5. Equation 2.41 fits nicely into tabular form for computations, from which the designer may determine the peak discharge from the storage facility

2.9.4 DESIGN EXAMPLE

Figure 2.27 Drainage System Example

Using the given information, route the proposed system such that the post-development rate of runoff does not exceed the pre-development rate of runoff. This is a hypothetical drainage system.



5. *Known*

- Pre-development Q_{10} = 27.0 cfs (calculated using Eq. 2.3)
- Post-development Q_{10} = 39.0 cfs “ “
- Ex. 24” Inv. In = 128.20 (taken from field topographical map)
- Ex. 24” Inv. Out = 127.98 “ “
- A_1 = 1,250 sf (calculated using existing & proposed topo data)
- A_2 = 4,850 sf “ “
- A_3 = 9,950 sf “ “
- A_4 = 15,000 sf “ “
- Min. Road Elevation = 133.20 (taken from field topographical map)
- Tc of Post-Development = 30 minutes

Solution:

1. *Confirm that the system must be routed,* by determining headwater at existing culvert as described in Section 2.8.4.
   The existing culvert is found to be under inlet control, with a headwater of 7.47 feet. Since the invert of the existing culvert is at elevation 128.20, this means that ponding at the entrance to the culvert would rise to elevation 135.67. Since the roadway elevation is at 133.2, some type of storage or detention is required.

2. *Compute the inflow hydrograph using the post-developed rate of runoff,* as described in Section 2.5.1.

3. *Determine the characteristics of the proposed storage area,* as described in Section 2.9.3.
   For the purpose of this example, the Storage – Indication Method was used.
   a) Enter areas at each contour (stage) into a spreadsheet to obtain incremental and accumulated storage, and compute, by linear regression, the stage-storage function (Equation 2.33).

Figure 2.27 Drainage System Example (continued)

6. REGRESSION TO DETERMINE STORAGE VOLUME

CONTOUR	Z	AREA (sf)	DELTA S (cf)	ACC S (cf)
128.20	0.00	0.00		0.00
			500.00	
129.00	0.80	1250.00		500.00
			3050.00	
130.00	1.80	4850.00		3550.00
			7400.00	
131.00	2.80	9950.00		10950.00
			12475.00	
132.00	3.80	15000.00		23425.00

7. Regression Output

Constant		6.75254893
Std Err of Y Est		0.024679926
R Squared		0.999854867
No. of Observations		4.00
Degrees of Freedom		2.00
X Coefficient(s)	2.4701788	
Std Err of Coef.	0.0210440	

$K_s = e^{6.75254893}$

b

$$S = K_s Z^b \quad \text{(Equation 2.33)}$$

Storage = $856 Z^{2.4701788}$

b) Use Eq. 2.37 to determine the discharge through the culvert.

$$Q = C_d A \sqrt{2gh}$$

C_d → 0.60
A → 3.14 sf
g → 32.2 ft/sec2
h → varies

Elevation	*Discharge (cfs)*
128.20	0.00
128.70	1.67
129.20	6.40
129.70	11.15
130.20	15.12
130.70	18.52
131.20	21.39
131.70	23.91
132.20	26.20
132.70	28.30
133.20	30.25

Figure 2.27 Drainage System Example (continued)

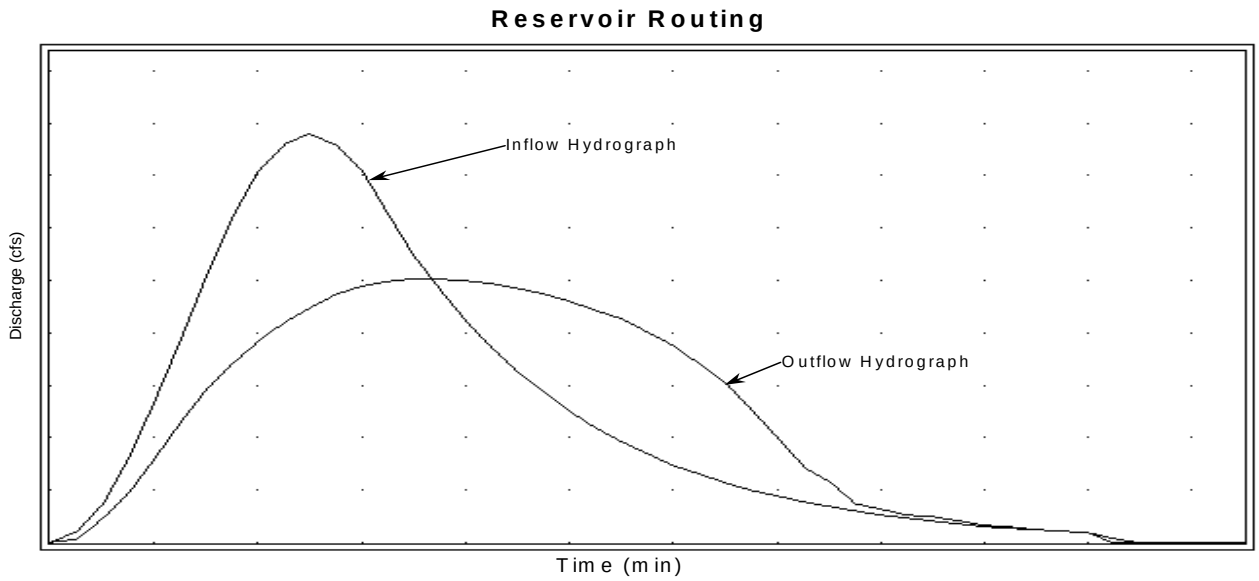
4. *Route the 10-yr storm through the basin*, using Equation 2.41.

Time (min)	***Inflow*** (i) (cfs)	***Inflow*** (j) (cfs)	$\frac{2S_i}{\Delta T} - O_i$ (cfs)	$\frac{2S_j}{\Delta T} + O_j$ (cfs)	***Outflow*** (cfs)
6.00	3.72	8.04	0.09	4.95	2.43
9.00	8.04	13.47	2.29	11.85	4.78
12.00	13.47	19.50	7.89	23.80	7.95
15.00	19.50	25.53	17.69	40.86	11.58
18.00	25.53	30.96	33.33	62.72	14.70
21.00	30.96	35.28	55.87	89.82	16.98
24.00	35.28	38.05	83.72	122.11	19.19
27.00	38.05	39.00	115.04	157.05	21.01
30.00	39.00	38.05	147.25	192.09	22.42
33.00	38.05	35.28	177.14	224.30	23.58
36.00	35.28	31.23	201.71	250.47	24.38
39.00	31.23	27.42	218.48	268.22	24.87
42.00	27.42	24.08	226.91	227.13	25.11
45.00	24.08	21.15	228.12	278.14	25.15
48.00	21.15	18.57	223.33	273.35	25.01
51.00	18.57	16.30	213.59	263.05	24.73
54.00	16.30	14.32	199.81	248.46	24.32
57.00	14.32	12.57	182.84	230.43	23.80
60.00	12.57	11.04	163.61	209.73	23.06
63.00	11.04	9.69	142.74	187.22	22.24
66.00	9.69	8.51	120.83	163.47	21.32
69.00	8.51	7.47	98.85	139.03	20.09
72.00	7.47	6.56	77.24	114.83	18.79
75.00	6.56	5.76	57.08	91.27	17.09
78.00	5.76	5.06	38.88	69.40	15.26
81.00	5.06	4.44	24.16	49.70	12.77
84.00	4.44	3.90	13.73	33.66.	9.96
87.00	3.90	3.43	7.66	22.07	7.21
90.00	3.43	3.01	3.30	14.99	5.85
93.00	3.01	2.64	2.21	9.74	3.77
96.00	2.64	2.32	1.30	7.86	3.28
99.00	2.32	2.04	1.09	6.26	2.59
102.00	2.04	1.79	0.46	5.45	2.49
105.00	1.79	1.57	0.06	4.29	2.12
108.00	1.57	1.38	0.05	3.42	1.69
111.00	1.38	1.21	0.03	3.00	1.48
114.00	1.21	1.06	0.24	2.62	1.19
117.00	1.06	0.93	0.30	2.51	1.10

Max. Inflow

Max. Outflow

Figure 2.27 Drainage System Example (continued)



5. *Confirm that the routed outflow of 25.15 cfs is less than the pre-developed outflow of 27.00 cfs and that routed outflow does not overtop roadway.*

Interpolate between elevations for a discharge of 25.15 cfs in table computed in Step. 3b:

Elevation	***Discharge (cfs)***
131.70	23.91
132.20	26.20

$$\frac{x - 131.70}{132.20 - 131.70} = \frac{25.15 - 23.91}{26.20 - 23.91}$$

$$x = 131.97$$

The maximum elevation of the routed storm is 131.97, which is lower than the existing road elevation of 133.20. Post-development routed discharge does *not* exceed pre-development discharge and the maximum routed elevation is lower than the existing road, therefore, *adequate storage* has been provided.

2.10 INSPECTIONS AND ACCEPTANCE

2.10.1 INSPECTIONS

A. The following items must be inspected during and after installation of storm drainage lines and appurtenances:

1. All boxes and manholes for presence of weep holes, formed inverts, bolted down castings, pipe flushed against inside wall of box, steps and location of steps, proper corbeling of brick/block in accordance with the details and specs, wall thickness and depth of manhole.

2. Pipe for cracks, pipe markings for compliance with specifications (painted and etched).

3. Removal of debris and sediment in both pipe and box.

4. Rip rap outlet protection and filter fabric, stilling basin compliance with plan

5. Manhole casting cover reading "storm drainage."

6. Armor protection of ditches (concrete and/or temporary liners), scour and erosion.

B. All inspections must be scheduled the day prior to when needed. Inspections will be performed in the order received. Every effort will be made to accommodate the time of request, however, this cannot be guaranteed.

C. All inspections that fail are subject to a re-inspection fee according to the town's Comprehensive List of Fees and Charges.

D. Upon completion of construction the developer shall request a warranty inspection. Upon completion of all punch list items, the provision of a set of acceptable record drawings, and the submission of engineer's certifications, a one-year warranty period shall commence.

2.10.2 WARRANTY

A. Warranty and Defects Guarantee:

1. Upon the acceptance of facilities, utilities or streets for permanent maintenance, a one-year warranty for all improvements shall become effective. This warranty must be satisfactory to the Town of Wake Forest. In addition, the subdivider shall provide surety in the amount of 15% of the total construction cost to guarantee the correction of all defects in such facilities, utilities or streets that occur within the warranty period described above.

2. For the purposes of this section, the term "defects" refers to any condition in publicly dedicated facilities, utilities or streets that requires the Town to make repairs to such improvements over and above the normal amount of maintenance that they would require. If such defects appear, the warranty may be enforced regardless of whether the facilities, utilities or streets were constructed in accordance with the requirements of this manual.

B. During the one-year warranty period the developer shall repair any latent defects which occur. At the end of the one-year warranty period the developer shall request a final inspection. Upon successful completion of all warranty items the developer shall be released from maintenance responsibilities for the warranted construction.

C. Warranty repairs to the following common problems shall be as follows:

1. Street pavement trench failures shall be repaired in accordance with the City of Raleigh Public Utilities Handbook.
2. If more than 3 trench failures occur within a longitudinal distance of 800 feet on any segment of a street, the Town shall require a 1-inch overlay once repairs have been completed.
3. Cracks in sidewalk and/or curb and gutter shall be repaired by removing and re-pouring such sections as necessary;
4. All storm sewer systems, ditches and gutters shall be free of debris, dirt or silt;
5. All drainage and street appurtenances shall be in perfect condition and properly exposed.
6. All other defects shall be corrected in accordance with the recommendations of the Town's Engineer or his representative;

D. If a developer fails to complete warranty items, future projects of the developer shall not be reviewed by the Department of Public Works and Utilities. In addition, the Town may take additional legal action against the developer.

2.11 PIPE POLICY – MATERIAL / INSTALLATION

All materials and installation procedures, testing and acceptance of all publicly dedicated drainage infrastructures shall meet the requirements of the Town of Wake Forest Manual on Specifications and Design.

2.11.1 PURPOSE AND DEFINITION

The purpose of this policy is to establish a written standard on the type of pipe to be used in a ditch or tributary carrying storm water run-off from a dedicated public street or from property owned and maintained by the Town (herein "public water") which is either subject to review, maintenance or inspection by the Town or located within either the Town limits of Wake Forest or under its extraterritorial jurisdiction.

2.11.2 PIPE MATERIAL

A. Storm drainage pipe, covered by the definition in paragraph 5.1.1 of this section, shall be reinforced concrete pipe except for the following exemption:

1. Pipe is 12" I.D. or smaller, made of plain concrete, and is to be used in residential drives or roadside ditches. The Town of Wake Forest Engineering staff will determine the size required.
2. Corrugated metal arch pipe may be used where head room, fill and flow conditions of the tributary warrant it with the approval the Town of Wake Forest Engineering staff.

B. All concrete pipe to be used shall be either etched "***RC X***" (where ***X*** represents the class pipe) **<u>or</u>** marked visibly and legibly according to the following:

1. Stamp location: spigot end of pipe on inside.
2. Stamp size stenciled letters: 1-1/2" in height minimum.
3. Code Class 3 Reinforced Concrete: TWF-RC-3
4. Code Plain Concrete: TWF-P
5. Stamp color: fluorescent orange or red.

Unmarked pipe will be allowed only if the manufacturer furnishes a certified statement on the entire shipment and etchings are placed on each pipe joint.

Table 2.20 Storm Drainage Pipe Policy

Location on Drainage Course	Type of Pipe	Installation Requirements	Maintenance Responsibility	Who Pays Pipe & Material Costs	Who Pays Installation Cost
Driveway	RCP or Plain if diameter is 12" ID or under	Owner sets grade, Town checks grade and owner meets conditions of driveway permit	Town will maintain clear flow – owner replaces if pipe is damaged beyond use	Property Owner	Property Owner
Roadside Ditch	RCP or Plain if diameter if 12" ID or under	Per Section 5, Pipe Policy	Town will maintain clear flow – owner replaces if pipe is damaged beyond use	Town except in new Subdivision developments	Town except in new Subdivision developments
Cross Street Culverts	RCP, Reinforced Concrete Box Culvert	Set by Town Public Works & Utilities Director	Town	Town except in new Subdivisions developments	Town except in new Subdivision developments
Off Right-of-way Ditches (carrying public water)	RCP, Conc. Lined channels, gabions, or other approved structure	Set by Town Public Works & Utilities Dir., Storm Drainage Policy, Subdivision Reg., if new development.	Town if installed by the Town pursuant to street drainage policy.	Property Owner	Town if installed under storm drainage policy
			Town if installed by developer under subdivision reg. and accepted by Town.		Owner if installed according to subdivision reg.
Note: All construction and installation of storm drainage structures is subject to the Manual of Specifications, Standards and design of the Town of Wake Forest and the approval of the Town of Wake Forest Engineering staff.					

2.11.3 PLACEMENT OF ROADSIDE DITCH PIPE

The following will apply on all concrete pipe installed in a roadside ditch were the ditch serves the function of draining the roadbed:

A. Bedding shall be in conformity with Section 2.2.9.L, which also stipulates that all but the bottom 2-inch of the pipe joint (as measured across the diameter of the pipe) shall be sealed in accordance with Technical Specification 02700, Storm Drainage, paragraph 10, "Joints."

B. All grades will be set by the owner and checked by the Town.

C. The property owner must apply for a permit and bear cost of installation.

D. Pipe cover shall be a minimum of 6-inches.

2.11.4 PLACEMENT OF OTHER PIPE

All other bedding of storm culverts shall be according to the Technical Specifications.

2.12 APPLICATION PROCEDURE

Application for storm drainage improvements shall be made on forms available from the Public Works and Utilities Department (see sample form below).

Figure 2.28 Sample Storm Drainage Application Form

APPLICATION FOR STORM DRAINAGE PARTICIPATION TO THE DEPARTMENT OF PUBLIC WORKS AND UTILITIES OF THE TOWN OF WAKE FOREST:

The undersigned (the Applicant, whether one or more) hereby makes application to the Town of Wake Forest (the Town) to participate with the Applicant under principles set forth in the Town's Policy regarding installation of storm drainage on private property (the Policy) in the installation of a storm drain crossing the property of the Applicant at:

_____

within the Town corporate limits, and herewith delivers to the Town the non-refundable sum of $50 to cover the Town's cost of processing this Application, which sum the Applicant understands is non-refundable. If the Town constructs the project, the application fee shall apply to the property owner(s) cost. The Applicant does hereby represent as follows:

1. The Applicant has read and is familiar with the Town's Policy, and storm drain, if installed, will carry storm drainage water discharged from an existing Town street or Town streets.
2. The proposed storm drain, if installed, is to be installed in accordance with specifications as approved by the Town.
3. The Applicant acquired ownership to the property on which the proposed storm drain and the proposed easement is to be located as follows:

NOTE: ALL OWNER(S) MUST SIGN!

GRANTOR/GRANTEE		DATE OF DEED	RECORDED	
			BOOK	PAGE NO.
1				
2				
3				
4				
5				
6				
7				
8				

4. In the event the Town agrees to participate with the Applicant in the installation of said proposed storm drain, then prior to such participation the Applicant will execute and deliver to the Town such necessary perpetual easement as specified by the Department of Public Works and Utilities for the installation and maintenance of said proposed storm drain, which easement shall incorporate the terms and conditions under which said storm drain is to be installed and the basis on which the Town shall participate therein.

This _____ day of _____, 20_____
Signature of Applicant(s): (If corporation, must be executed in corporate name by an officer).

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Certified and approved by the Department of Public Works and Utilities.

_____ _____
Director of Public Works and Utilities Date

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3 STREET DESIGN

3.1 INTRODUCTION

The following section has been established to assist developers and engineers with the design of streets (private and public) within the jurisdiction of the Town of Wake Forest. The methods, procedures, design factors, formulas, graphs, and tables presented in this division are intended to establish minimal guidelines for residential and commercial pavement design. The Town of Wake Forest believes that the following design criteria are sufficient to insure the welfare and safety of the general public and to protect the economic investment of the citizens of our Town.

Alternative design methods may be considered by the Engineer/Designer on a case-by-case basis, however, there should not be extensive variations from the criteria and procedures within this division without the expressed approval of the Director of Engineering.

3.1.1 TOWN OF WAKE FOREST TOWN'S ENGINEER

The Town of Wake Forest Engineering staff shall be responsible for interpretation and implementation of the pavement design criteria for the Town of Wake Forest. Approval from other applicable agencies may be required.

3.1.2 TOWN OF WAKE FOREST PAVEMENT POLICY

It is the policy of the Town of Wake Forest that all developed land within the Town Limits has adequate streets and parking lots. The Town may accept roadway systems for maintenance if the system provides pavement sections that have been accepted for maintenance by the Town Board of Commissioners and have been designed and constructed in accordance with the provisions of the Town and this division.

3.1.3 ACKNOWLEDGEMENTS

This division was originally prepared by Appian Consulting Engineers, P.A. of Rocky Mount, North Carolina, in cooperation with the Town of Wake Forest, North Carolina. However, the content of this division is largely derived from the AASHTO Guide for Design of Pavement Structures [AASHTO, 1986] and the Asphalt Pavement Design System [Taylor, 1993]. These manuals were particularly important because of their format, quality, completeness, and because they represented accepted criteria applied in the area of the Town of Wake Forest.

3.2 STREET DESIGN

3.2.1 PAVEMENT DESIGN

A. All pavement thickness shall generally be confirmed by a geotechnical report. However, if a developer wishes, he may design cul-de-sac and local streets using a subgrade CBR one standard deviation to the left of the average of all CBR's determined by geotechnical reports thus far. If, in the opinion of the Town's representative, soils appear weaker or have inherent problems such as a high mica content, the services of a geotechnical engineer shall be required in any case for the design of pavements.

B. Pavement must be designed in accordance with the procedures in Section 3.3, Pavement Design Methods.

3.2.2 VERTICAL ALIGNMENT

A. Grades

1. Unless necessitated by exceptional topography and subject to the approval of the Town's Engineer, street grades shall not exceed eight (8%) percent unless approved by the Town's Engineer. Streets to be maintained by the North Carolina Department of Transportation shall not exceed seven (7%) percent. In all cases, street grades shall not be less than one (1%) percent.
2. Grades approaching intersections shall not exceed five (5%) percent for a distance of at least one hundred (100) feet from the centerline of the intersection.
3. Street grades shall be established wherever practicable in such a manner as to avoid excessive grading, the promiscuous removal of ground cover and tree growth, and general leveling of the topography.

B. Vertical Curves

All changes in street grade shall be connected by a vertical curve having a length of at least 100 feet, or the equivalent in feet, rounded upward to even multiples of 50, of the value of K (given in Table 3.1) times the absolute value of arithmetic difference of the two grades in percent, whichever is greater.

Table 3.1 Minimum K Values

Street Type	**K**	
	Sag	*Crest*
Major Thoroughfare	140	240
Minor Thoroughfare	100	150
Residential Collector	28	28
Local Street & Cul-de-sac	18	18
Frontage Road	18	18

C. **Superelevation:** Superelevation shall only be utilized on major thoroughfares except when widening NCDOT streets. Superelevation for shoulder sections shall not exceed 0.08 feet/foot of width. For curb and gutter sections, superelevation shall not be less than 0.02 feet/foot of width or more than 0.06 feet/foot of width.

D. Grading

Grading and filling shall be undertaken to insure that:

1. The street is centered in the right-of-way.
2. Adequate shoulders and space for future sidewalks are provided.
3. Allowance is made for roadside ditches, curbs and gutters, and storm sewers for street drainage.
4. Cut slopes shall not exceed a ratio of 2:1
5. Fill slopes shall not exceed a ratio of 2:1
6. Ditch front slopes do not exceed a ratio of 4:1 for shoulder sections.

3.2.3 HORIZONTAL ALIGNMENT

A. Curves

1. Where a street centerline deflection of five (5) or more degrees occurs a curve shall be introduced having a radius of curvature of not less than the following:

Table 3.2 Minimum Horizontal Curve Radii

Type of Street	Minimum Radius
Major Thoroughfare	850
Minor Thoroughfare	500
Residential Collector	300
Local Street	200
Cul-de-Sac	150
Frontage Road	150

2. A tangent of not less than one hundred (100) feet shall be provided between reverse curves on all streets.

3.2.4 INSTALLATION OF UTILITIES, STORM DRAINAGE, STREET LIGHTS AND STREET TREES

After grading of street right-of-way is completed and approved and before any base is applied, underground work to be installed such as water mains, sewerage mains and taps shall be installed by the developer and approved by the Administrator and Utilities Director.

3.2.5 DRAINAGE

A. Inlet design and spacing to be designed in accordance with Section 2.8.2.

B. Streets shall be designed so as not to permit storm runoff to cross intersections. Storm drainage structures should be used to avoid storm runoff crossing intersections. Directional arrows must be shown on plans to reflect surface drainage flow. This is particularly important around curb returns.

C. Under no circumstances will penetration of the back of the curb and gutter be permitted (i.e. "cutdowns" for drainage or small pipes) for drainage.

D. On strip paved streets, the absolute minimum shall consist of shoulders graded to allow water to run off the street and collect in such a manner that it will not return in the subsurface to the base of the street. When soil conditions permit and the property owner desires, roadside drainage may consist of water ponding off the strip paved street until it is absorbed in the ground if, in the opinion of the Town's Engineer, said ponding will not adversely affect the life of the street.

3.2.6 STREET SECTIONS

A. Shoulder Sections/Roadside Ditches

1. Width for shoulder/swale section where appropriate is shown on Detail 2.1A. No on-street parking would be permissible for this cross section. This design would only be appropriate for low-density development.

2. The absolute minimum drainage required on strip-paved streets shall consist of shoulders graded to allow water to run off the street and collect in such a manner that it will not return in the subsurface to the base of the street. When soil conditions permit and the property owner desires, roadside drainage may consist of water ponding off the strip paved street until it is absorbed in the ground, if, in the opinion of the Town's Engineer, said ponding will not adversely affect the life of the street.

3. In all subdivisions where there is no curb and gutter, side ditches, which require protection for erosion caused by excessive velocity shall be concrete paved. Riprap ditch liners will not be permitted.

B. Curb and Gutter

1. All curb and gutter shall be constructed according to Standard Detail 2.2 of the Town of Wake Forest Manual of Specifications.
2. The standard 30" curb and gutter section is the preferred type to be used. The 30" concrete valley gutter type may also be used on local and cul-de-sac streets only. Shapes of other curb may be used provided a 6" height is maintained and subject to the approval of the Division Engineer after review on an individual basis.
3. If the street is to be maintained by the Town of Wake Forest, the Public Works Director shall be consulted for approval of the gutter type. Approval will be subject to the terrain factors in the area under study as they relate to potential maintenance problems.
4. The curbs and gutters shall meet the requirements of the Division of Highways of the North Carolina Department of Transportation's Guidelines for Curb Cuts and Ramps for Handicapped Persons.

3.2.7 SIDEWALKS

A. Construction Methods for Brick Sidewalks

1. **Subgrade Preparation**: The subgrade for sidewalks shall be shaped to the proper cross-section and thoroughly compacted by rolling or tamping. Tree roots shall be removed to a depth of 12-inches below subgrade for the full width of the walk. All soft and spongy material shall be removed and replaced with suitable material that shall be compacted in layers not exceeding 6-inches in thickness.
2. **Base**: A 5-inch thick base of stone screenings or sand, well compacted and properly graded to provide drainage according to the standard sidewalk slope, shall be installed. Where the sidewalk is crossed by a driveway, the base shall be increased to 6-inches.
3. **Sidewalk Width & Material**: Except when repairing a non-conforming brick sidewalk, a 5-foot wide sidewalk of paving brick (conforming to ASTM C902) shall be laid to grade with a smooth uniform surface with a slope of ¼-inch per foot toward the street.
4. **Filling Voids**: The voids between the brick shall be filled with a mixture of sand and cement broomed into the voids. The sand-cement ratio shall be 1/3 cement and 2/3 sand well mixed before brooming into the voids. After the voids are well filled, the brick surface shall be cleaned of all excess sand and cement.

3.2.8 MATERIALS TESTING

A. Asphalt, Concrete and Subgrade Testing: Refer to Section 3.4, Subgrade Preparation.

3.3 PAVEMENT DESIGN METHODS

The purpose of this section is to provide a guide for the design of pavement structures for the Town of Wake Forest.

3.3.1 TERMINOLOGY

To fully understand the methods of pavement design that will be outlined in the following sections it is necessary to establish standard terminology. It is noted that many considerations are required to assure that a pavement structure is reliable. For example, material requirements, construction requirements, and quality control will significantly influence the ability of the pavement structure to perform according to design expectations.

A. Standard Definitions

1. **Average Daily Traffic (ADT):** The average daily traffic using the pavement section at full development.
2. **California Bearing Ratio (CBR):** The CBR is the penetration resistance of a soil relative to standard crushed rock.
3. **Design Average Daily Traffic ($\overline{ADT}$):** The average daily traffic over the design life of the pavement.
4. **Pavement Design Life:** All pavement structures for the Town of Wake Forest shall be designed with a 25-year design life.
5. **Soil Support Value (SSV):** This value reflects the structural strength of a particular type of soil.
6. **Structural Number (SN):** The structural number is an abstract number that reflects the structural strength of the pavement required for soil support and traffic loads.
7. **Traffic Growth Factor (G):** This number, typically between 0.00 and 0.07, allows the designer to assume an annual percentage growth rate in the traffic volume and is used to determine the design average daily traffic.
8. **Trip Factor:** The number of vehicles that can be assumed for a particular type of land use. This information is derived from a table of traffic generators of which some of the factors can be modified by the engineer to best model the exact circumstance of the design.
9. **Truck Factor ($\overline{N}$):** This quantity adjusts the design average daily traffic ($\overline{ADT}$) to account for the percentage of single frame and multiple frame trucks expected along a particular pavement section.

3.3.2 STANDARD SUBDIVISION PAVEMENT DESIGN

Shown below are minimum thicknesses of base and surface course to be used for typical residential subdivision design. Pavement design for any other developments, or design for residential subdivisions which differs from the table below, will be reviewed by the Division Engineer on an individual basis according to the Detailed Pavement Design Procedure in Section 3.3.3.

A. Standard Subdivision Pavement Design Table: A design shall be chosen from Group 1 or Group 2 in Table 3.3 below depending on sub-grade soil type.

Table 3.3 Minimum Pavement Sections

GROUP 1 – Good to Excellent		
Sub-Grade Soil Types	Base Course*	Pavement Surface
A-1-a, A-1-b, A-3	7" STBC, Type A or C	2" SA or 1-2
A-2-4, A-2-5, A-3-6	9" STBC, Type A or C	1-1/2" SA or 1-2
A-2-7	8" CABC or STBC, Type B	BST, 1" SA or 1-2
	6" CABC or STBC, Type B	1-1/2" SA or 1-2
	3" BCBC, Type HB	1-1/2" SA or 1-2
	3-1/2" BCBC, Type HB	1" SA or 1-2
		5" Plain Concrete
GROUP 2 – Poor to Fair		
Sub-Grade Soil Types	Base Course*	Pavement Surface
A-4, A-5, A-6, A-7-5,	9" STBC, Type A or C	2" SA or 1-2
A-7-6	8" CABC or STBC, Type B	1-1/2" SA or 1-2
	10" CABC or STBC, Type B	BST, 1" SA or 1-2
	4" BCBC, Type HB	1-1/2" SA or 1-2
	3" BCBC, Type HB	2" SA or 1-2 6" Plain Concrete

***** *No base course shall be placed on muck, pine clay, vegetable matter or other unsuitable material.*

CABC: Aggregate Base Course, No. 7
STBC: Soil Type Base Course
BST: Bituminous Surface Treatment
SA: Sand Asphalt, Type F-1
1-2: Bituminous Concrete Surface Course, Type 1-2
BCBC: Bituminous Concrete Base Course, Type HB

B. Other base courses such as various cement-treated materials may be used in lieu of those shown above. These materials shall be of sufficient thickness to provide equivalent strength. However, any design other than those shown above must be approved prior to use. The total thickness of the pavement structure shall in no case be less than 5".

3.3.3 DETAILED PAVEMENT DESIGN PROCEDURE

A. Pavement Design Life

All pavement structures for the Town of Wake Forest shall be designed with a pavement design life of 25 years.

B. Determine the Design Average Daily Traffic $(\overline{ADT})$

1. From Table 3.4, locate the best description of the land use for which the proposed pavement section will serve and determine the total number of trips per day per unit. Multiply the trips per day per unit by the total number of units using the street at full development. This total number of trips per day is the average daily traffic (ADT) at full development.

Table 3.4 Trips per Day According to Land Use

Description of Land Use	Trips/ Day/ Unit	Unit
Residential		
• Apartments	6.1	Bedroom
• Condominiums	5.1	Bedroom
• Mobile Homes	5.4	MH
• PUD	7.9	Unit
• Retirement Home	3.3	Resident
• Single Family Homes (Low Density)	9.5	Dwelling
• Single Family Homes (Medium Density)	10.0	Dwelling
• Single Family Homes (High Density)	8.2	Dwelling
Commercial		
• Auto Sales	400	acre
• Bank	192	1,000 sf
• Convenience Store	57.5	1,000 sf
• Hotel	10.5	Room
• Industrial Site (light)	5.5	1,000 sf
• Industrial Site (heavy)	1.5	1,000 sf
• Manufacturing	4.0	1,000 sf
• Nursing Home	2.0	Bed
• Office Park	20.6	1,000 sf
• Office Building (general)	12.3	1,000 sf
• Restaurant (Quality)	56.3	1,000 sf
• Restaurant (Sit Down)	164.4	1,000 sf
• Restaurant (Drive In)	5.4	1,000 sf
• Shopping Center (0 to 50,000 sf)	115.8	1,000 sf
• Shopping Center (50,000 to 100,000 sf)	79.1	1,000 sf
• Shopping Center (100,000 to 200,000 sf)	60.4	1,000 sf
• Shopping Center (200,000 to 300,000 sf)	49.9	1,000 sf
• Shopping Center (300,000 to 400,000 sf)	40.4	1,000 sf
• Shopping Center (400,000 to 500,000 sf)	47.6	1,000 sf
• Shopping Center (500,000 to 1,000,000 sf)	34.5	1,000 sf
• Shopping Center (Greater than 1,000,000 sf)	26.5	1,000 sf
• Supermarket	125.5	1,000 sf
• Warehouse	5.0	1,000 sf
Public Facilities		
• Athletic/ Fitness/ Gym	10	1,000 sf
• Community College	1.6	Student
• Golf course	8.9	Acre
• Hospital	16.9	sf
• Library	41.8	sf
• Recreational facility	6.6	Parking Space
• School (primary)	1.0	Student
• School (secondary)	1.4	Student
• University	2.4	Student

Source: Traffic Engineer's Handbook. Institute for Transportation Engineers.

Note: These rates are the latest trip generation rates taken from the Traffic Engineer's Handbook. The latest edition shall apply as revised from time to time.

2. The next step in determining the design average daily traffic is to determine the traffic growth factor (G). This number, typically between 0.00 and 0.07, allows the designer to assume an annual percentage growth rate in the traffic volume. If significant future development is expected to occur along the proposed corridor, then future potential traffic should be accounted for and can be accommodated for by using a percentage increase in traffic volume. If there is no significant future development expected due to saturation or because there are no other possible inlets or outlets, the percent of growth should be close to zero (0). The traffic growth factor shall be obtained from Equation 3.1.

$$G = (1+i)^n \qquad \text{(Equation 3.1)}$$

Where,

G = Traffic growth factor

i = fractional rate of yearly increase, from Table 3.5

n = Design Life of Pavement, years

Table 3.5 Traffic Growth Rate

Facility Description	Estimated Yearly Increase
Dead End Street	0.01
Connector Street	0.02
Subdivision Street	
• Fully Developed	0.005
• 50% Developed	0.04
Industrial Service Road	
• Undeveloped	0.06
• 50% Developed	0.04

Source: "Manual of Specifications," City of Rocky Mount, NC, 1991.

3. The Design Average Daily Traffic ($\overline{ADT}$) shall then be calculated according to the following formula:

$$\overline{ADT} = \frac{ADT + (G \times ADT)}{2} \qquad \text{(Equation 3.2)}$$

Where,

$\overline{ADT}$ = Average Daily Traffic (trips/ day)

G = Traffic growth factor, as described above

C. Determine the Truck Factor: The truck factor adjusts the design average daily traffic ($\overline{ADT}$) to account for the percentage of single frame and multiple frame trucks expected along a particular pavement section. Single frame trucks refer to those trucks with dual wheels on the rear axle, such as delivery trucks. Multiple frame trucks refer to tractor-trailers, semi-trailers, and garbage trucks (which have very high loadings per tire compared to most vehicles). If the designer does not have information to estimate these percentages, 4% single frame trucks (x =0.04)

and 1% multiple frame trucks (y =0.01) may be used. Table 3.6 lists equivalent truck factors for various design average daily traffic quantities at these percentages.

$$\overline{N} = \overline{ADT}\,(0.25x + 0.60y) \qquad \text{(Equation 3.3)}$$

Where,

$\overline{N}$ = Truck Factor

x = Percentage Single frame trucks

y = Percentage Multiple frame trucks

Table 3.6 Equivalent $\overline{N}$ and $\overline{ADT}$ *

$\overline{ADT}$	$\overline{N}$
12,500	200
6,250	100
5,000	80
2,500	40
1,875	30
1,562	25
1,250	20
937	15
625	10
312	5
250	4
187	3
125	2
63	1

*Tabulated values assume 4% single frame and 1% multiple frame traffic.

Source: "Manual of Specifications," City of Rocky Mount, NC, 1991.

D. Determine the Soil Support Value (*SSV*)

1. All pavement thicknesses shall generally be confirmed by a geotechnical report. However, if a developer wishes, he may design cul-de-sac and local streets using a subgrade CBR one standard deviation to the left of the average of all the CBR's determined by geotechnical reports thus far. If, in the opinion of the Town's representative, soils appear weaker or have inherent problems such as high mica content, the services of a geotechnical engineer shall be required in any case for the design of pavements.

2. The designer may choose one of three methods to determine the soil support value (*SSV*).

   a. Measure the CBR of Soils and Calculate the *SSV*

   b. Measure the CBR of Soils to be Used as Fill and Calculate the *SSV*

   c. Assign a *SSV* from the Soil Classification of the County Soil Map

3. **Measure the CBR of Soils and Calculate the *SSV***

   a. This is the most accurate method to determine the actual characteristic of the subgrade base material because it is based on an actual laboratory CBR (California Bearing Ratio) test that has been approved by a soil laboratory.

The CBR test should be performed in accordance with AASHTO designation T193 (latest edition) with the exception that if the required soil compaction density to be used during construction is known, only one specimen needs to be tested at the required density for each soil type.

b. Certification and report of tests performed by an approved soils laboratory shall be submitted to the Town of Wake Forest Engineering Division.

c. Although the following minimum testing is required, a sufficient number of CBR tests shall be made to determine the consistency of the soil conditions in the area to be paved.

i. Soil Borings – Perform soil borings with a maximum spacing of 250 linear feet and with at least four (4) borings in each separate street area and with at least one (1) boring in each soil type area identified in the soil survey map of Wake County, if available. Each boring shall extend at least two (2) feet below the finished subgrade elevation. The Engineer may require more depth as the conditions warrant.

ii. CBR Tests – A CBR test shall be performed on each soil type that will be within two (2) feet of the finished subgrade elevation. If off-site soils are used as fill, CBR tests shall also be performed on each soil type that will occur in the upper two (2) feet below pavement subgrade.

d. The CBR value shall then be substituted in Equation 3.4 to obtain the soil support value (*SSV*).

$$SSV = 5.32\,(\log CBR) - 1.52 \qquad \textbf{(Equation 3.4)}$$

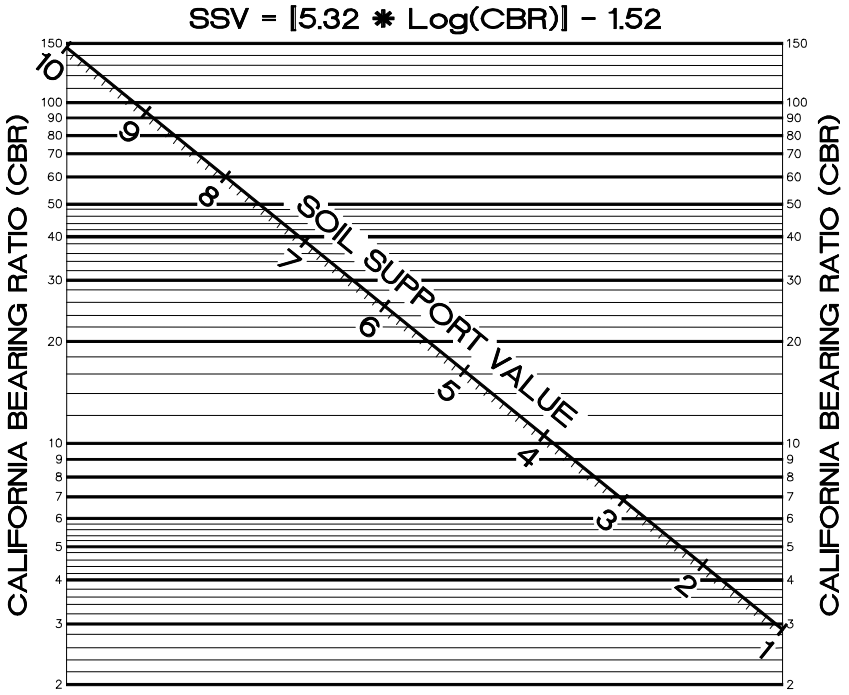
Where,

SSV = Soil Support Value

CBR = California Bearing Ratio (as determined by laboratory report or Figure 3.1)

e. Figure 3.1 can also be use to quickly determine the CBR for the soil in study.

Figure 3.1 Soil Support Values (SSV) per CBR



Source: "Manual of Specifications," [City of Rocky Mount, 1991].

4. **Measure the CBR of Soils to be used as Fill and Calculate the *SSV***

   a. If the characteristics of the existing soils in the area to be paved result in an uneconomical pavement section based on the two preceding methods, the developer may opt to undercut the existing soils to a depth of at least 18 inches below the finished pavement subgrade elevations and backfill with better material. The *SSV* for the proposed pavement section is then determined by performing a CBR test on each soil type used for backfilling (performed in accordance with AASHTO designation T193, latest edition).

   b. The CBR value determined by laboratory testing shall then be substituted in Equation 3.4 to obtain the soil support value (*SSV*).

5. **Assign a *SSV* from Soil Classification of the County Soil Map**

   a. The soil types may be determined by using, if available, the "Soil Survey of Wake County, North Carolina" prepared by the United States Department of Agriculture, Soil Conservation Service. This method is usually more conservative than designs based on actual laboratory data as described in Section 3.3.3.D.3 and will generally require a thicker pavement section.

   b. Locate the project on the soil maps and determine the soil types in the areas to be paved. A copy of the soil survey map with the boundaries of the property and areas to be paved shall be submitted to the Town of Wake Forest Engineering Division.

   c. From the Engineering Index Properties Table determine the AASHTO Classification of the soil types. From this information, use Table 3.7 and/or Figure 3.2 to assign the most appropriate soil support value (*SSV*). The entire

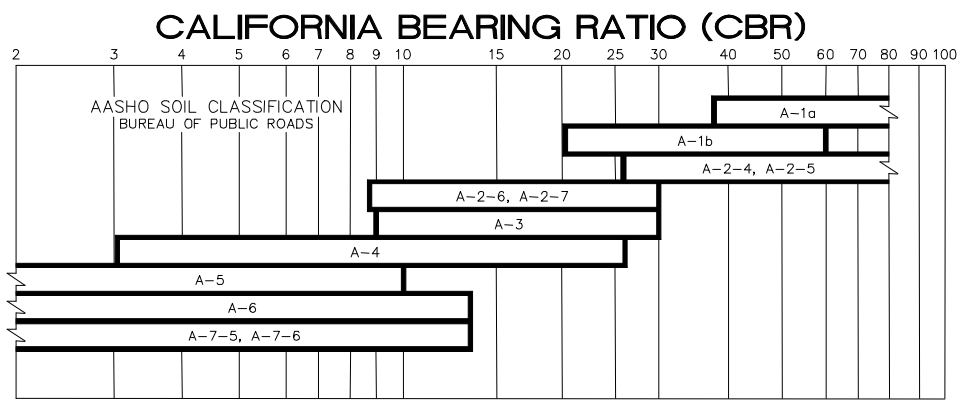
paved area shall be designed using the lowest *SSV* obtained along any portion of the paved area. The CBR value determined from Figure 3.2 shall then be substituted in Equation 3.4 to obtain the soil support value (*SSV*).

Table 3.7 Assigned Soil Support Values (SSV)

AASHTO Soil Classification	Assigned *SSV*
A-1-a	4.2*
A-1-b	4.2*
A-3	3.5
A-2-4	4.2*
A-2-5	4.2*
A-2-6	3.4
A-2-7	3.4
A-4	1.0
A-5	1.0
A-6	1.0
A-7-5	1.0
A-7-6	1.0

*Suggested Maximum *SSV* by NCDOT without CBR Test, although AASHTO Soil Classification indicates higher value.
Source: "Manual of Specifications," City of Rocky Mount, NC, 1991

Figure 3.2 CBR Values per Soil Classification



Source: AASHTO Bureau of Public Roads.

E. Determine the Structural Number (SN)

1. The structural number is an abstract number that reflects the structural strength of the pavement required for soil support and traffic loads. Obtain the structural number (SN) for the given soil support value (SSV) and truck factor ($\overline{N}$) from Figure 3.3 and/or Equation 3.5.

$$SN = \frac{2.41\ (\overline{N})^{0.151}}{(1.14)^{SSV}} \qquad \textbf{(Equation 3.5)}$$

Where,

SN = Structural Number required for the design pavement section

$\overline{N}$ = Truck Factor, see Section 3.3.3.C

SSV = Soil Support Value, see Section 3.3.3.D

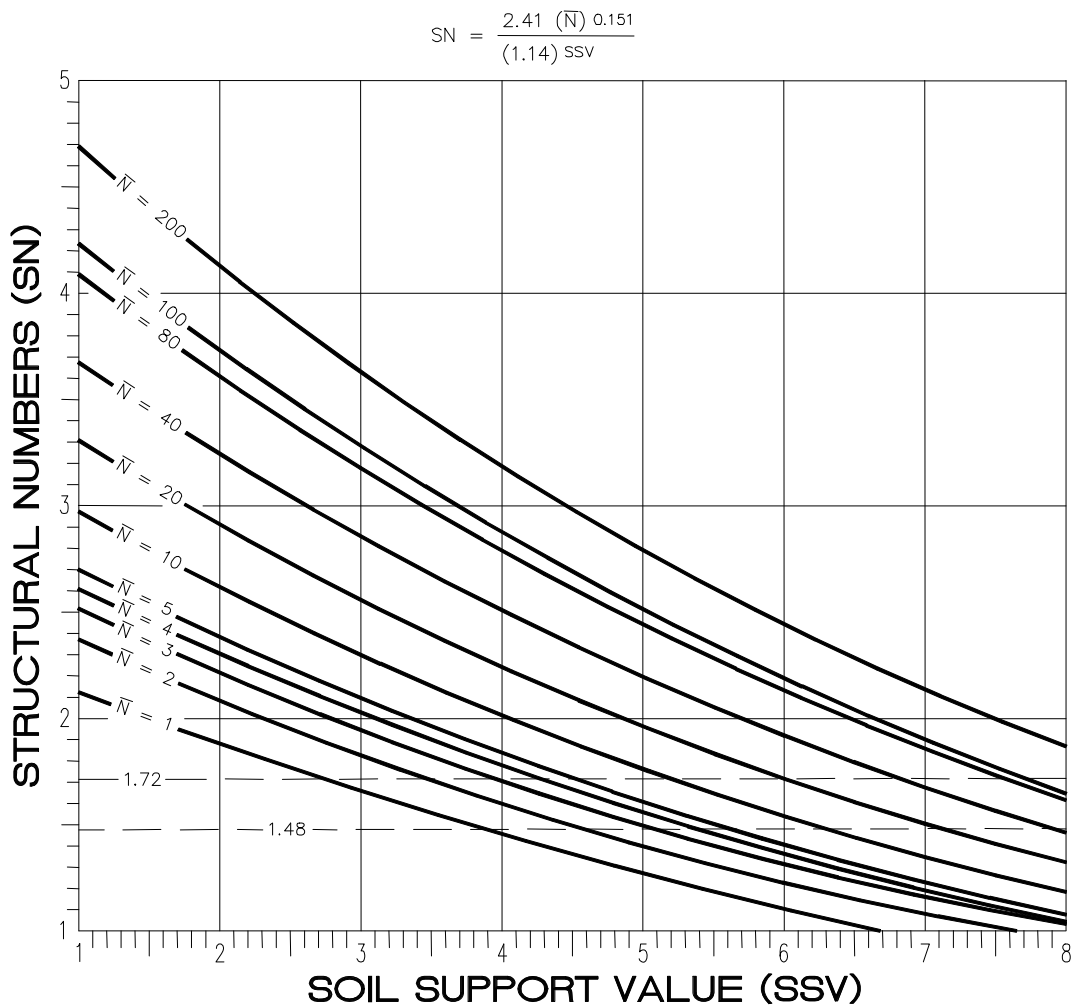
2. The designer should not use a SN below 1.72 for poor to fair subgrade soils nor below 1.48 for good to excellent subgrade soils

a. For collector streets, add 1.0 to the structural number.

b. For minor thoroughfares, add 1.5 to the structural number.

c. For major thoroughfares, add 2.0 to the structural number.

Figure 3.3 Structural Numbers for Pavement Sections



Source: "Manual of Specifications," [City of Rocky Mount, 1991].

F. Determine the Structural Coefficients: From Table 3.8, determine the structural coefficient for each layer in the design pavement section.

Table 3.8 Structural Coefficients for Pavement Design

Permanent Layer	Type of Material	Structural Coefficient per inch of Thickness
Surface Courses	Sand Asphalt	0.40
	Bituminous Concrete Type I-2	0.44
	Bituminous Surface Treatment	0.20*
Binder Course	Bituminous Concrete Type H	0.44
Base Courses	Coarse Aggregate Base Course	0.14
	Bituminous Concrete Type HB	0.30
	Sand Asphalt	0.30

*Bituminous surface treatment. Do not multiply by thickness in calculations.

Source: "Manual of Specifications," City of Rocky Mount, NC. 1991.

G. Select Pavement Thickness to Obtain Required Structural Number

1. Design the pavement section such that the structural number designed is equal to or greater than the number obtained in Section 3.3.3.E. This design may be done by trial and error. However, the minimum pavement section in the Town of Wake Forest is to be 2" I-2 asphalt over 6" CABC for cul-de-sacs and 2" I-2 asphalt over 8" CABC for local streets. Multiply an initial thickness (in inches) of the various components of the pavement section (base course, binder course, and surface course) by the corresponding structural coefficient and sum the results. The total number must be equal to or greater than the structural number obtained in Section 3.3.3.E.

2. The combination of layers and structural coefficients that sum greater than the required structural number is the *minimum* pavement design allowable for the particular area to be paved.

3.3.4 EXAMPLE OF PAVEMENT DESIGN

Figure 3.4 Example of Pavement Design

Design a pavement section for a street accessed by a development consisting of 100 lots in a high density single family residential subdivision. No CBR test is available, however, soils are found to be type A-3 from the county Soil Survey. Assume normal truck loading. Follow the design procedures in this design manual.

Solution:

1. Determine the Design Average Daily Traffic ($\overline{ADT}$):

- Using Table 3.4 for single family homes (high density),

$$ADT = 8.2 \ trips / day / dwelling \times 100 \ dwellings = 820 \ trips / day$$

- Using Table 3.5 for a subdivision street (fully developed) the estimated yearly increase is 0.5%., so i = 0.005, in Equation 3.1.
- The Town requires that all pavement sections be designed for a 25 year design life, so n =25, in Equation 3.1. It follows that:

$$G = (1 + i)^n = (1 + 0.005)^{25} = 1.13$$

- Using Equation 3.2:

$$\overline{ADT} = \frac{ADT + (G \times ADT)}{2} = \frac{820 + (1.13 \times 820)}{2} = 873 \ trips / day$$

2. Determine the Truck Factor, assuming 4% single frame trucks and 1% multiple frame trucks:

$$\overline{N} = \overline{ADT} \ (0.25x + 0.60y) = 873 \ [(0.25)(.04) + (0.60)(0.01)] = 14 \pm$$

3. Determine the *SSV*. Although a CBR is not available, the county soil survey classifies the soils in the area as type A-3. From Table 3.7, for A-3 soils, it is found that:

$$SSV = 3.5$$

4. Determine the Structural Number (*SN*). Substituting the known values into Equation 3.5,

$$SN = \frac{2.41 \ (\overline{N})^{0.151}}{(1.14)^{SSV}} = \frac{2.41 \ (14)^{0.151}}{(1.14)^{3.5}} = 2.27$$

5. Determine Structural Coefficients. Choose an I-2 asphalt layer over a CABC layer over the subgrade for the pavement section. From Table 3.8, I-2 coefficient is 0.44 and CABC coefficient is 0.14.

6. Select pavement thickness to obtain required structural number. Try different sections.

- Try 6" CABC — 6 x 0.14 = 0.84
  2.5" I-2 — 2.5 x 0.44 = 1.10
  1.94 < 2.27, Design *INSUFFICIENT*

- Try 6" CABC — 6 x 0.14 = 0.84
  3.5" I-2 — 3.5 x 0.44 = 1.54
  2.38 > 2.27, Design *SUFFICIENT*

- Try 8" CABC — 8 x 0.14 = 1.12
  3" I-2 — 3 x 0.44 = 1.32
  2.44 > 2.27, Design *SUFFICIENT*

The designer may choose the sufficient pavement section that is preferred. For the given situation, ***choose 3" I-2 asphalt over 8" CABC over compacted subgrade as the design pavement section.***

3.4 SUBGRADE PREPARATION

The purpose of this section is to provide a guide for the subgrade preparation of paved areas within the Town of Wake Forest.

3.4.1 SUBGRADE INSPECTION – CBR TESTING

A. If the soils at the site were tested to obtain the CBR and SSV as described in Section 3.3.3.D.3 and Section 3.3.3.D.4, the soils below the proposed pavement subgrade must be compacted during construction to a density equal to or greater than the density at which the CBR test was performed. Unless backfilling is involved, the upper twelve (12) inches of soil below the proposed pavement section must be compacted.

B. If backfilling is involved, the upper eighteen-(18) inches of soil below the pavement section must be compacted. In this case, in-place density tests must be performed on each paved area in accordance with AASHTO designation T191, T204, T205, T238 (latest edition) by an approved soils laboratory. The test results shall be submitted to and approved by the Town of Wake Forest Engineering Division before the street is paved.

3.4.2 SUBGRADE INSPECTION – PROOFROLLING

A. No pavement shall be placed in the Town of Wake Forest without prior inspection and approval by the Town of Wake Forest Engineering Department. The inspection shall include, but not be limited to, proofrolling the prepared subgrade with a rubber-tired proofroller that has a minimum gross weight of at least 20,000 pounds (10 tons) under the observation of a representative of the Town. The developer shall bear the costs of proofrolling, which must be done within ten (10) days prior to placement of the asphalt. All areas of the subgrade shall be covered by the wheels of the proofroller operating at walking speed (two or three miles per hour).

B. Any areas that rut, or pump excessively under the wheels of the proofroller, shall be repaired by the developer before the street is paved. Should the developer disagree with the Town of Wake Forest Engineering Department about the need for repairs to the subgrade, the developer may hire a registered professional engineer to perform CBR tests on the prepared subgrade. If the registered professional engineer certifies that the subgrade will provide adequate support for the design pavement section and the anticipated loading for the design life of the paved area, the area may be paved without making repairs to the subgrade.

C. All construction and testing of materials shall be in accordance with the Town of Wake Forest Manual of Specifications.

3.4.3 INSPECTONS

A. **Minimum Inspections:** The following shall be the minimum inspections required by the Town:

1. **Proof roll Curb & Gutter** – no base course under C&G except as required by the Geotechnical Report.

   Concrete samples must be taken for slump and strength.

   The initial test (from first ready mix truck) is to be taken after the second yard is dispatched from the mixer and is to consist of the following:

   a. One slump test

   b. Pull, prepare and store 3 cylinders on-site for 24 hours.

c. Temperature

Subsequent tests: after the above tests are pulled from the initial truck, every 5th truck thereafter is to be tested in the same manner as noted above.

2. **Proof roll subgrade** – if stone is used to help stabilize subgrade, the poof roll must be at subgrade elevation. See Section 3.4.2 above for proof rolling procedure.
3. **Crossfall on subgrade** from crown to curb shall be checked with a string line prior to placement of base course.
4. **Base course** shall be proof rolled just prior to placement of asphalt. Crossfall on base course, from crown to curb, shall be checked with a string line prior to placement of asphalt.
5. **Paving lifts**: If more than 2.5 inches of I-2 asphalt is required, asphalt must be placed in **two lifts**, the first lift having a thickness of not less than 1.5 inches. Asphalt cores must be taken to confirm thickness and compaction. See Section 3.4.4, Testing, below.
6. **Sidewalk** forms and subgrade shall be checked prior to pouring. Slump and strength tests shall be required. See Section 3.4.4, Testing, below.
7. All **driveway** forms must be checked prior to pouring. If a ditch and shoulder section is used, culvert inverts must be checked.
8. **Grade and Alignment**: The Town shall not be responsible for ensuring proper grade and alignment.

B. CO Inspections

Before a CO will be granted, the following shall be the minimum inspections required by the Town:

1. Broken Curb & Gutter along frontage
2. Broken Sidewalk where applicable
3. Broken driveway aprons
4. Sewer cleanout set per City of Raleigh standards
5. Water meter box set per City of Raleigh standards
6. Grade right-of-way per standard detail 2.1
7. All temnporary Erosion Control Measures have been removed
8. Adequate ground cover has been established per approval by the Town of Wake Forest Engineering Department

C. Geotechnical Engineering Inspection Services:

1. The services of a Geotechnical Engineer shall be required in all cases where unusual soil conditions have been found during construction such as high water table or springs, or
2. A developer may elect to use the services of a consulting Geotechnical Engineer to perform all inspections of streets. In this case, the Geotechnical Engineer shall be required to guarantee that the street shall perform as required.

D. Inspection Fee: All inspections, which fail, are subject to a re-inspection fee.

E. Inspection Procedure: Warranty, maintenance during warranty period, inspection procedure, repairs, utility cuts, etc. are covered under Section 3.5, Street Policy.

3.4.4 TESTING

A. Concrete Testing: The initial test (from first ready mix truck) is to be taken after the second yard is dispatched from the mixer and is to consist of the following:

1. One slump test
2. Pull, prepare and store 3 cylinders on-site for 24 hours.
3. Temperature

Subsequent tests: after the above tests are pulled from the initial truck, every 5th truck thereafter is to be tested in the same manner as noted above.

B. Asphalt Testing

1. **Compaction**: Testing for asphalt density is to follow NCDOT "Standard Specifications for Roads and Structures," Section 609-9, "Field Compaction Quality Management," latest revision.
2. **Thickness**: The minimum frequency of coring for thickness testing shall be on the basis of test sections consisting of not more than 1500 linear fee of lay down width, exclusive of intersections and irregular areas. The test sample is to be a 6-inch cored sample. The sample is to be numbered and logged for identification purposes.
3. **Contractor's Quality Control System**: Follow NCDOT "Standard Specifications for Roads and Structures," Section 609-5. "Contractor's Quality Control System," latest revision
4. **Mixture and Job Mix Formula Adjustments**: Follow NCDOT "Standard Specifications for Roads and Structures," Section 609-4, "Field Verification of Mixture and Job Mix Formula Adjustments," latest revision.
5. **General**: All other applicable sections of Section 609 of the NCDOT "Standard Specifications for Road and Structures" shall apply relating to Quality Control Plan, mix design, control limits, corrective action, equipment and measurement.
6. **Testing Cost**: Project owner is responsible for cost of testing.

3.4.5 SETUP PERIOD

A. Unless otherwise waived by the Town's Engineer, for all new areas to be paved, the developer shall be required to wait at least six (6) months before the final lift of asphalt is placed. This setup period includes the winter months through February.

B. Existing streets that are to be rebuilt or reconstructed will not be required to meet this setup period and may be paved when the specifications in this manual are met and approved.

3.4.6 MAINTENANCE

For warranty, maintenance during warranty period, inspection procedure, repairs, utility cuts, etc. see Section 3.5, Street Policy.

3.4.7 WARRANTY

Warranty, maintenance during warranty period, inspection procedure, repairs, utility cuts, etc. are covered under Section 3.5, Street Policy.

3.5 STREET POLICY

3.5.1 GENERAL REQUIREMENTS

A. Prior to commencing construction, all approvals including plan approval and all permits and encroachments shall be obtained. Site grading **only** may be performed upon issuance of a grading permit from the Town of Wake Forest. All other construction must await the issuance of all remaining permits. A preconstruction conference must also be held prior to commencing **any** construction.

B. The developer is responsible for the maintenance and repair of streets for twelve (12) months after acceptance by the Town for warranty. At the end of twelve (12) months the Town of Wake Forest will accept permanent responsibility. If a significant failure occurs requiring extensive maintenance during the first year of service, the Town's Engineer shall suspend the twelve- (12) month warranty until the failure is repaired to an acceptable condition.

C. The developer is responsible for the maintenance and repair of all paved areas other than streets.

D. No contractor shall permit mud or construction debris to accumulate in any paved street which is maintained or is proposed to be maintained by the Town of Wake Forest.

E. The final lift of asphalt cannot be laid before 25% of the lots in a subdivision have been developed, but shall be laid before 75% of the lots in a subdivision have been developed.

3.5.2 INSPECTIONS

A. Upon completion of construction, the developer shall request a final inspection. Upon completion of all punch list items, the provision of a set of acceptable record drawings, and the submission of engineer's certifications, a one-year warranty period shall commence.

B. During the one-year warranty period the developer shall promptly repair any latent defects which occur. At the end of the one-year warranty period, the developer shall request a warranty inspection. Upon successful completion of all warranty items the developer shall be released from maintenance responsibilities for the warranted construction.

C. All inspections must be scheduled the day prior to when needed. Inspections will be performed in the order received. Every effort will be made to accommodate the time of request; however, this cannot be guaranteed.

D. All inspections, which fail, are subject to a re-inspection fee.

3.5.3 MAINTENANCE

A. Existing Streets: The Town will assume all maintenance responsibility on all existing paved streets. If an individual owner wishes to pipe an existing roadside ditch and/or install curb and gutter in front of their property, the Town's Engineer shall make a determination whether it is favorable to do so. The Town will at its option install these improvements. If the Town installs these improvements it shall require the owner to pay the full cost of the materials. The Town will cover labor and equipment cost.

B. Existing Strip Paved Streets: The Town shall maintain existing strip-paved streets in the following manner:

1. Streets that have an adequate base and inadequate roadside drainage system shall be resurfaced as required. This maintenance shall be at the sole cost and expense of the Town.

2. Streets that have an inadequate base, but an adequate roadside drainage system shall have the inadequate base replaced and shall be resurfaced as required. If in the judgment of the Town's Engineer, more than one-half of the street surface needs its base replaced, the Town's Engineer may recommend that the street be rebuilt with curb, gutter, and paving to standard Town of Wake Forest specifications. The Board of Commissioners will make the final determination as to whether the street is to be rebuilt with curb and gutter.

3. Streets that have inadequate base and/or inadequate roadside drainage will be resurfaced and drained as required. If, in the judgment of the Town's Engineer, one-half of the street surface needs its base replaced or if adequate roadside drainage cannot be obtained without extensive work, the Town's Engineer may recommend that the street be rebuilt with curb, butter and paving to standard Town specifications.

4. If a new roadside ditch is required and its invert elevation is more than 30" below the elevation of the edge of the finished asphalt surface, the resident may:

   a. Elect to have the ditch remain open, or

   b. Elect to have the ditch piped with the total cost of the piping and appurtenances being assessed against the property in a manner consistent with other street improvement assessments, or

   c. Elect to have curb and gutter and pavement widening installed in accordance with existing assessment policies.

   The Board of Commissioners will make the final determination for which option best meets the interest of the Town and parties involved.

5. Streets that intersect streets that have been petitioned for curb and gutter that also need curb and gutter to adequately drain into the street to be improved shall:

   a. Have curb and gutter installed upon recommendation of the Town's Engineer and upon approval of the Board of Commissioners.

C. Existing Curb & Gutter Streets: All existing public streets that have curb, gutter and paving shall be maintained as required at the sole cost and expense of the Town unless they are on the NCDOT system.

D. Existing Dirt Streets

1. All dirt streets are to be improved at the expense of the abutting property owners or developer. These improvements can be caused by petition, Board of Commissioners order or as a requirement to obtain subdivision approval. Once approved, the Town will thereafter maintain the street at its sole cost and expense.

2. Existing dirt streets accepted by the Town prior to adoption of this policy shall be maintained as a dirt street at the sole expense of the Town.

3.5.4 UTILITY CUTS

A permit will be required for any utility company wishing to excavate or place utilities in the Town right-of-way. Pavement cuts in streets made by the utility company or the Town shall be repaired in either of the following ways:

A. No. 57 stone shall be placed and vibrated on top of pipe to within 8-inches of the pavement surface after which 6-inches of H Binder and 2-inches of I-2 asphalt is placed. All edges shall be over-excavated by 12-inches on each side of the cut and a 2-inch depth of I-2 asphalt and 6-inches of H binder shall be placed in the remaining cut area. All pavement joints shall be tacked and sealed with an approved sealer. See standard detail 2.6.

B. Electric service will not go in until street section is graded at final and approved.

3.5.5 USE OF EASEMENTS – HARD IMPROVEMENTS

All public easements including sewer, water, storm sewer and electric are to remain clear of obstructions. No buildings, fences, trees, shrubs or other obstructions shall be placed in any easement. However, fences may be allowed transversely but not longitudinally across utility easement with an approved encroachment permit. Fences across utility easements shall be required to provide a 12 foot vehicular gate. Driveways, walkways, asphalt and parking lots may be permitted in easements; however, the Town reserves the right to remove such asphalt, concrete, base course and sod as necessary to access its facility in the case of emergency. Pavement or concrete will be replaced with a patch. Sod will be replaced with fescue or rye seeding. The Town will not be responsible for replacing a property owner's sod after repairing a utility line.

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4 EROSION & SEDIMENTATION CONTROLS DESIGN

4.1 INTRODUCTION

The following section has been established to assist developers and engineers with the design, construction and maintenance of required erosion and sedimentation controls.

4.2 LAND DISTURBANCE PERMITS REQUIRED

Prior to commencing construction all approvals including plan approval and all permits and encroachments shall be obtained. Site grading only may be performed upon issuance of a Land Disturbance Permit from the Town of Wake Forest. All other construction must await the issuance of all remaining permits.

4.3 GENERAL REQUIREMENTS

4.3.1 LAND DISTRUBANCE PERMIT NOTES

A. A Land Disturbance Permit is required for projects over 0.50 acre. If multiple lots with land disturbance over 0.50 acre total are either contiguous or non-contiguous in the same subdivision, being taken down by the same builder/owner, a land disturbing permit is required. The cost of the plan review and permit shall be determined according to the town's Comprehensive List of Fees and Charges.

B. If additional acreage is added to an existing permit, revised forms, plans, and any additional fees must be submitted.

C. If ownership of a property has changed a revised Financial Responsibility Ownership form must be submitted.

D. If a property is taken over by the bank, the bank shall contact the town and repair all erosion control measures to town/NCDENR standards. They shall also submit a new Financial Responsibility Ownership form.

E. If a project is not complete within two years, the plans must be renewed at the renewal cost established in the town's Comprehensive List of Fees and Charges. A revised set of plans may be submitted if acreage has already been developed and a certificate of occupancy has been issued.

F. An erosion preconstruction meeting must be held with the town of wake forest prior to start of any work, including installation of erosion control measures, demolition, cutting trees, and grubbing. Call engineering at (919) 435-9443 to set up a meeting. All plans must be signed and copies returned back to the town 1 week prior to preconstruction meeting.

G. The Financial Responsibility Owner, general contractor, grading company, and erosion control installer must be present at the preconstruction meeting.

H. The Land Disturbance Permit and NPDES general stormwater permit will be given out at this meeting.

I. After the preconstruction meeting is held, the contractor can install initial erosion control measures only. This includes but is not limited to construction entrance, silt fence, perimeter diversion ditch, check dams (rock or waddle type), tree protection fence, existing inlet protection, skimmer sediment basins, and sediment traps. Clear only as necessary to install these measures.

J. Cutting trees prior to issuing the permit will not be allowed.

K. Contractor is responsible for E&SC weekly installation and maintenance log including dates of temporary/permanent ground cover, a rain gage, copy of Town of Wake Forest signed plans onsite, revised signed plans, NPDES log, and construction box must be present and easily accessible onsite.

L. Once measures are installed, contractor/Financial Responsibility Owner to call Town of Wake Forest for an initial inspection. If site passes inspection, a certificate of compliance will be issued. The contractor can then being clearing, grubbing, and grading.

M. Contractor to maintain access road for emergencies at all times.

N. Phase project to leave as little ground open as possible.

O. Temporarily seed, straw and tack or hydroseed within 14 days of any phase of grading, including slopes. Seed basins and ditches immediately after construction. Refer to seeding schedule chart in Section 12.3.3.E of the UDO.

P. Prior to removal of temporary measures, town must approve removal. All areas draining to temporary measure must have 75% permanent ground cover.

Q. Town construction inspector will evaluate the site at least once a month. A copy of the inspection form will be emailed to the financially responsible owner. The weekly erosion log and NPDES log must be onsite and available for review.

R. If the site is found out of compliance a notice of violation will be issued giving the contractor/ financially responsible owner 10 working days to remedy the problem. If the situation is not resolved within that time period a fine may be issued according to the town's Comprehensive List of Fees and Charges.

S. If sediment leaves the site a fine may be issued according to the town's Comprehensive List of Fees and Charges. If sediment enters a buffer, stream, or wetland, NCDWQ will be notified and may issue fines.

T. Call the town upon completion for a final erosion inspection. A punchlist may be generated addressing any remaining items. There must be 75% groundcover on the entire site prior to a certificate of occupancy. If the site is found to be in compliance an erosion certificate of completion will be issued.

4.3.2 CONSTRUCTION SEQUENCING

A. A Preconstruction meeting must be held prior to installation of measures and construction. Contact Town of Wake Forest Engineering Department at (919) 435-9443 to set up a meeting. The land disturbing permit will be issued at the meeting, NPDES stormwater permit and plan review.

B. Cutting trees prior to issuing the permit will not be allowed.

C. Installation of initial measures only (silt fence, construction entrance, tree protection fence and sediment basins) must be installed first. No grading or grubbing may take place other than to install the measures.

D. Initial inspection conducted by Town. Please call in for inspection (919) 435-9531 prior to clearing, grubbing or grading. A certificate of compliance will be issued upon approval of initial measures.

E. Grading may now begin. No mass grading is allowed. Please follow the phased sequence of construction outlined on the plans. If the plans need revision, please notify the Town and design engineer prior to starting work. If work is conducted that is not shown on the approved set of plans, it may result in an NOV or fine/violation.

F. Installation of roads for safe access must be established prior to construction of buildings for emergency access purposes.

G. Owner is responsible for inspecting measures weekly and within 24 hours after every ½" of rainfall. A rain gage must be onsite along with a copy of the signed plans per the NPDES Stormwater Permit. A designated subcontractor may be in charge of inspections but must still have proper NCDOT erosion level I/II certification training.

H. An additional erosion measure self inspection must be conducted outlining installation and maintenance of erosion control measures including seeding operations. A chart will be provided for the owner/representative to fill out on a daily basis including date of installation, maintenance and repair. This chart will also include a location to put turbidity levels in NTU's at all outlet points. This chart must be kept onsite at all times.

I. Monthly inspections will be conducted by the Town (at a minimum). The Town will give the owner a copy of the inspection report and notify them of any issues that the site may have.

J. If an NOV is issued, the site issues will need to be addressed as per the NOV (notice of violation) letter but no later than seven calendar days. If the NOV is not addressed, fines may be issued according to the town's Comprehensive List of Fees and Charges.

K. If three NOV's are issued on one construction site to the same owner/contractor, a stop work order will be issued and re-education/training must be conducted and verification of training must be presented to the Town prior to re-starting work.

L. Any mud tracked into the street must be cleaned up immediately. If the mud/dirt is not addressed in a timely manner, the contractor will be assessed a fine according to the town's Comprehensive List of Fees and Charges.

M. If sediment leaves the site into a water course, natural area, or wetland an automatic fine will be issued according to the town's Comprehensive List of Fees and Charges. In addition, NC DWQ will be automatically notified and additional fines may be assessed.

N. Grading prior to issuing the permit or without a permit will result in a fine according to the town's Comprehensive List of Fees and Charges, plus any additional permit review fees.

O. Seed the project as work progresses within 14 calendar days of any phase of grading and within 10 days of final completion.

P. Upon completion the project must be 85% built out to accept erosion control, streets, stormwater, etc., and have 75% permanent grass coverage. A final inspection will be conducted where a punchlist may be generated to aid the contractor in project close out.

Q. Final PE certified As-Builts must be submitted to the Town for stormwater pipes (invert and top elevations, pipe length, and pipe slope), private and public basins, level spreaders, stormwater facilities, greenways/trails, recorded easements, NCDOT acceptance, roadway cores, soil compaction tests, maintenance and operation agreements, etc.

R. A Certificate of Completion will be issued at final project close out when all paperwork has been received and all measures installed/removed as per plan. This certificate will close out the erosion control permit. A temporary certificate of occupancy may be permitted prior to the final certificate of completion. The bond

will be released upon issuance of certificate of completion for the erosion control permit.

4.4 FEES AND INSPECTIONS

4.4.1 FEES

A. Fees for the administration of the Town's erosion and sedimentation control regulations are due upon initial submittal of construction plans. Any resubmittal of a Land Disturbance Permit application shall require the same permit fees as were paid in the original application. Any renewal of a Land Disturbance Permit for a project that is under construction but not completed within two (2) years of the original Land Disturbance Permit issuance shall require fees to be paid based upon the town's Comprehensive List of Fees and Charges.

4.4.2 INSPECTIONS

A. Agents and officials of the Town will monthly (at a minimum) inspect land-disturbing activities to ensure compliance with the Act, this ordinance, or rules or orders adopted or issued pursuant to this article, and to determine whether the measures required in the Plan are effective in controlling erosion and sedimentation resulting from land-disturbing activity. Notice of the right to inspect shall be included in the certificate of approval of each Plan.

B. The Town has the power to conduct such investigations as it may reasonably deem necessary to carry out its duties as prescribed in this article, and for this purpose to enter at reasonable times upon any property, public or private, for the purpose of investigating and inspecting the sites of any land-disturbing activity. No person may refuse entry or access to any authorized representative or agent for the Town who requests entry for purposes of inspections, and presents appropriate credentials, nor may any person obstruct, hamper, or interfere with any such representatives while in the process of carrying out their official duties.

C. A Certificate of Compliance for Preliminary Soil Erosion and Sedimentation Control must be issued indicating that initial soil erosion and sedimentation controls have been installed. This certificate must be issued prior to the approval by the Town of an application for building construction in the Town, in any of the incorporated areas of the Town, or extraterritorial jurisdictional areas of the Town subject to the erosion and sedimentation control regulations of this article.

D. A Certificate of Completion must be issued when inspections indicate that all conditions of the approved land disturbance permit are met and all disturbed areas are stabilized with permanent ground cover, permanent armor, or impervious surface. All proposed roads, utilities, permanent erosion control devices, and other infrastructure has been installed as per approved plans. All temporary sediment control devices required by the approved plan are removed.

E. Once a Certification of Completion is issued on an approved plan involving a proposed public road dedication and a petition for North Carolina Department of Transportation acceptance is submitted to Administrator, notification must be mailed to the North Carolina Division of Highways District 1 Office detailing that the project has been issued a Certification of Completion. This notification should describe the project in detail with publicly dedicated streets described by name and approximate length.

F. Any land disturbing activity will be the responsibility of the individual building lot owners, and failure to control project against off site damage as documented by the Town's authorized representative will be deemed a violation of the erosion and

sedimentation control regulations of this article. A driveway with a minimum 10 foot wide by 30 foot long (with filter fabric underneath) gravel construction pad or equal will be required, in addition to the installation of silt fence on the low sides of the lot and tree protection around the remaining sides, for each building lot when the initial footing inspection is conducted by the Engineering Construction Inspectors. For single family residential lots, the construction entrance shall be a minimum of 12 feet wide by 30 feet long with filter fabric underneath that meets ASTM D 4632 standards and has a 200 pound grab tensile strength. The Town of Wake Forest Department of Engineering will approve the type of silt fence that will be accepted. Seeding and mulching of any applicable disturbed area is required. Areas within 25 feet of the edge of pavement or gravel of the road must be stabilized before the issuance of a Certificate of Occupancy. Each lot must have 75% germinated seed coverage prior to a CO and have positive drainage on all sides. Any erosion or stormwater issues on individual lots will be the responsibility of the builder for a one year period after house is sold.

G. The Town may require written statements, or the filing of reports under oath, with respect to pertinent questions relating to land-disturbing activity.

H. If through inspections the Town determines that significant erosion or sedimentation is occurring as a result of land-disturbing activity, despite application and maintenance of protective measures, the person conducting the land-disturbing activity will be required by the Administrator to take additional protective action.

4.5 VIOLATION FEE LIST

Fees for violations shall be assessed according the town's Comprehensive List of Fees and Charges.

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5 LANDSCAPE DESIGN & INSTALLATION

5.1 INTRODUCTION

The following section has been provided to assist developers and engineers with the design and installation of landscaping and buffers required by the Wake Forest Unified Development Ordinance (UDO).

5.2 OFFICIAL PLANTING LIST

The Urban Forestry Board has been assigned the responsibility to maintain, update, and make publicly available the Official Planting List for the Town Wake Forest. The Official Planting List describes the species of trees, shrubs, and other plant materials which may be planted in order to satisfy the requirements of the UDO. It also provides the appropriate spacing for each species and the specific uses for which credit will be permitted. No species other than those included in the Official Planting List may be planted as street trees without the written permission of the Urban Forestry Board.

5.3 PLANTING DESIGN AND INSTALLATION

Figure 5.1 – Critical Root Zone

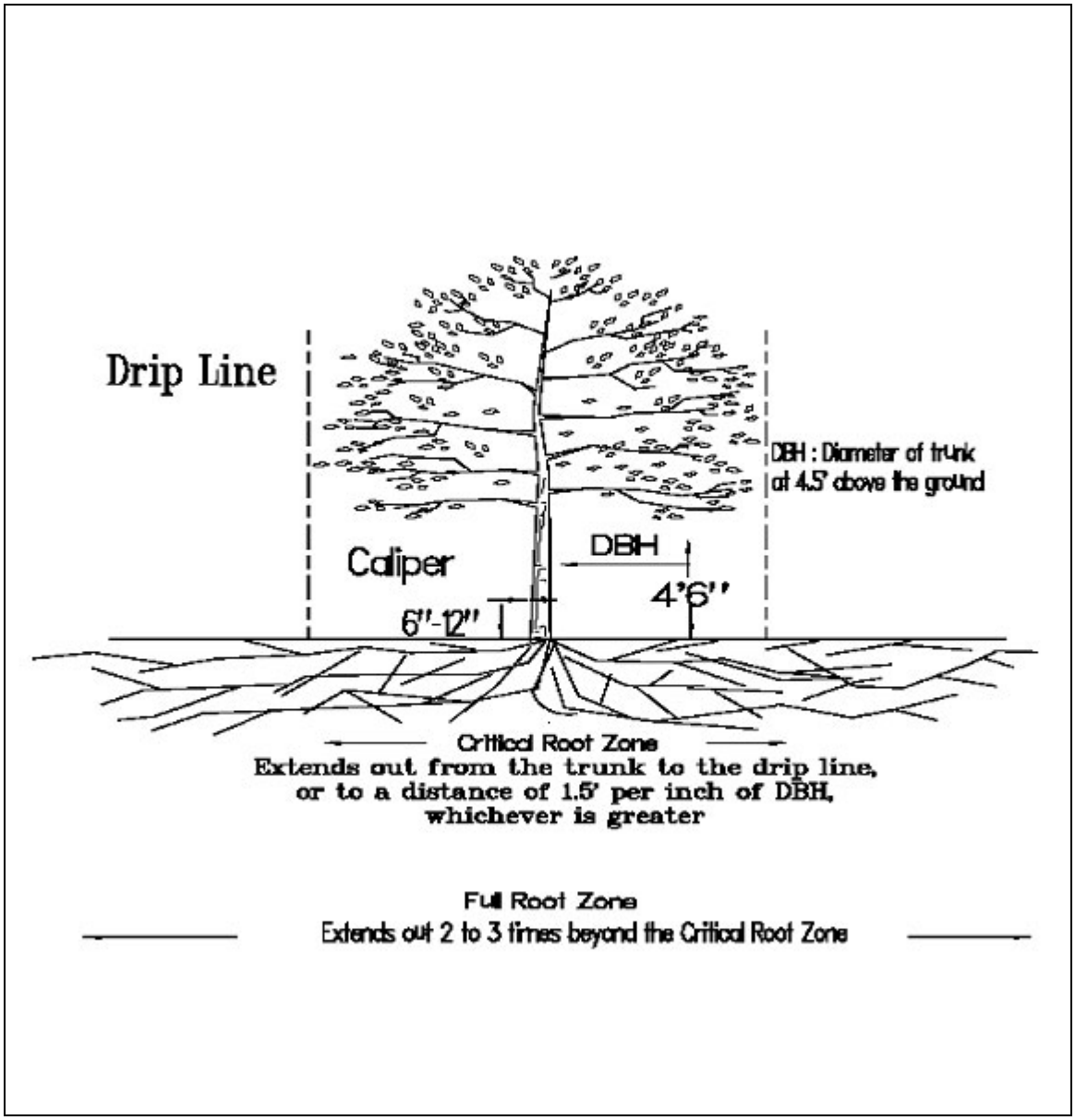


Figure 5.2 – Standard Tree Protection Detail

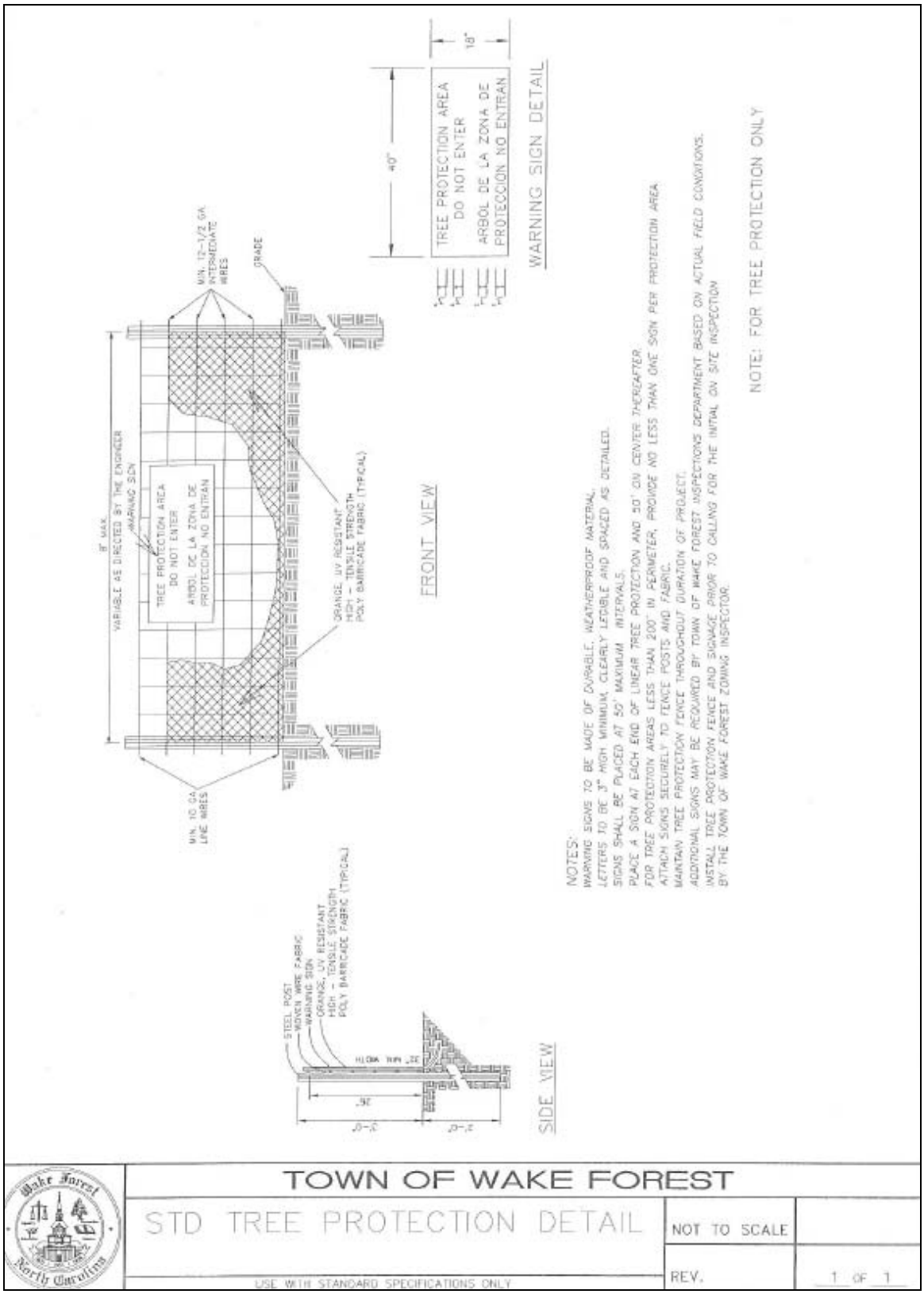


Figure 5.3 – Excavation for Utilities

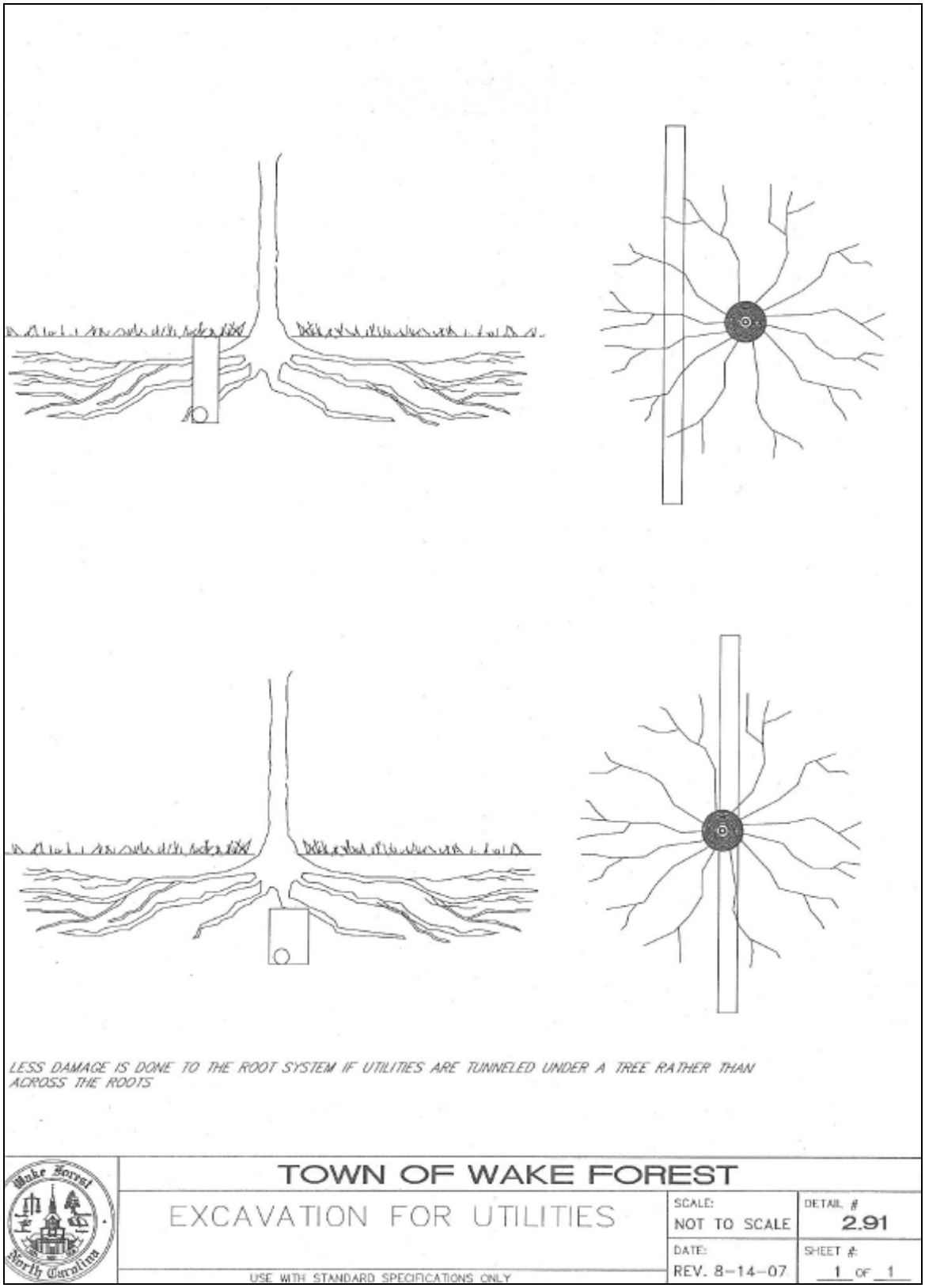


Figure 5.4 – Tree Surgery Detail

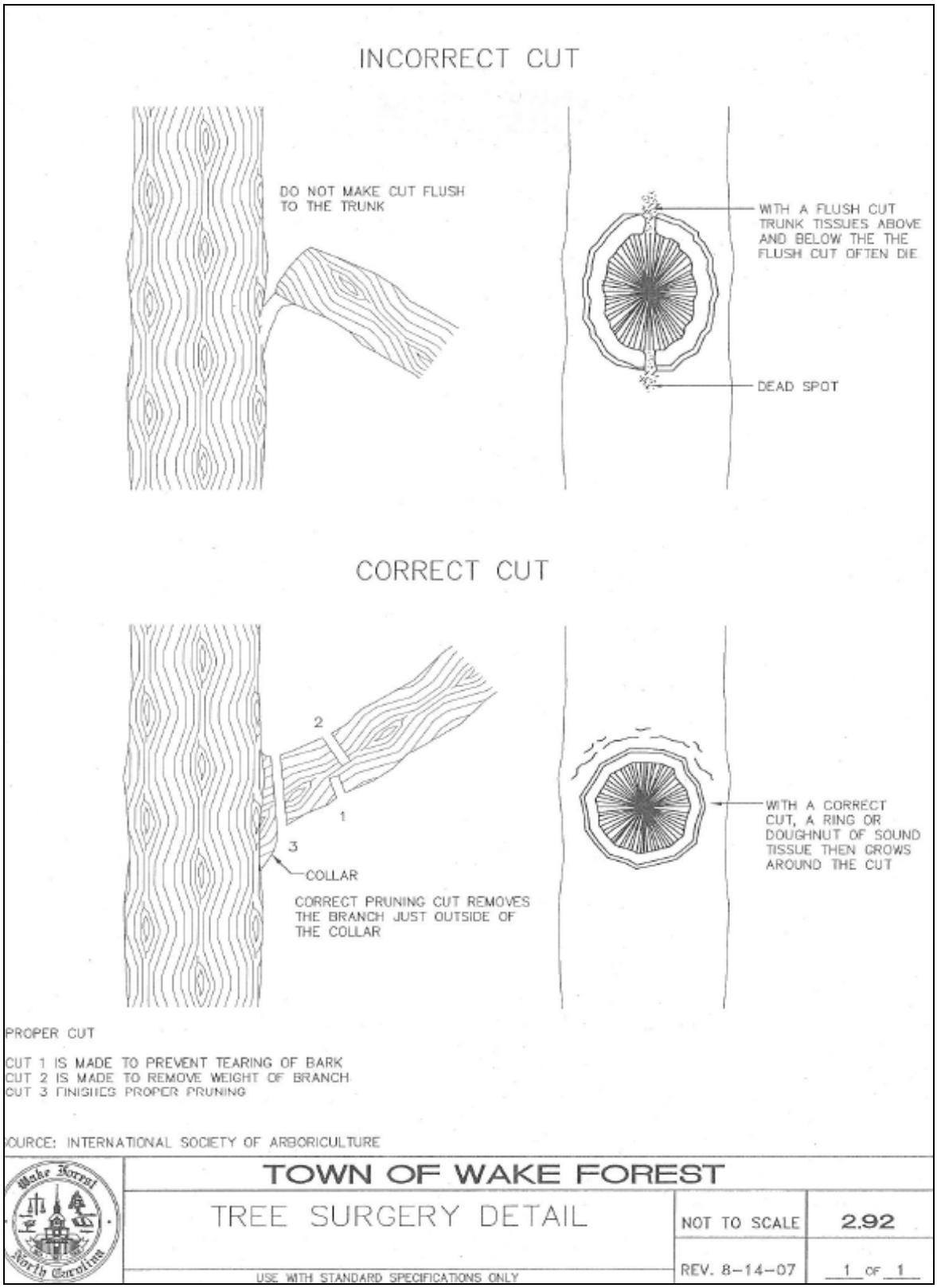


Figure 5.5 – Typical Tree Planting Detail

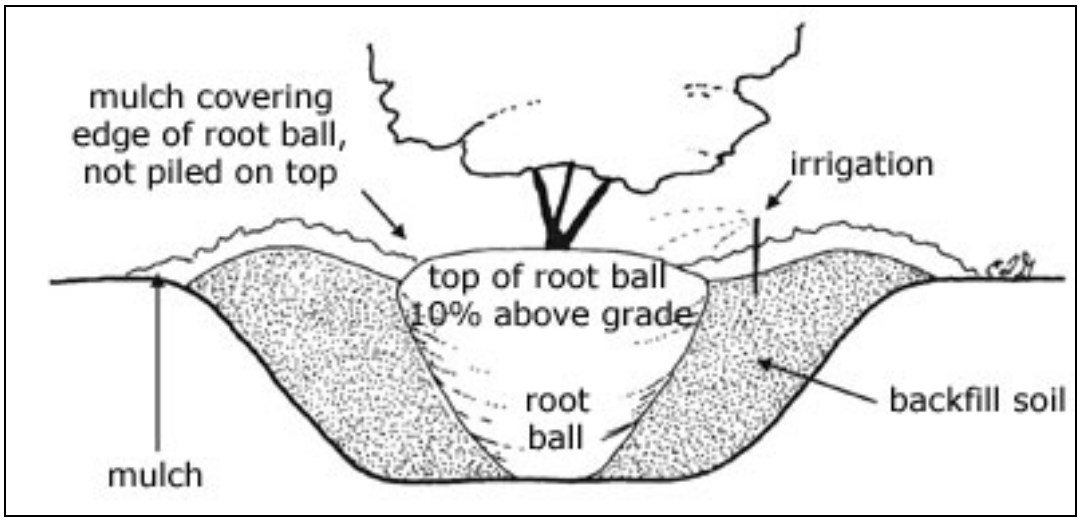


Figure 5.6 – Preferred Staking Methods

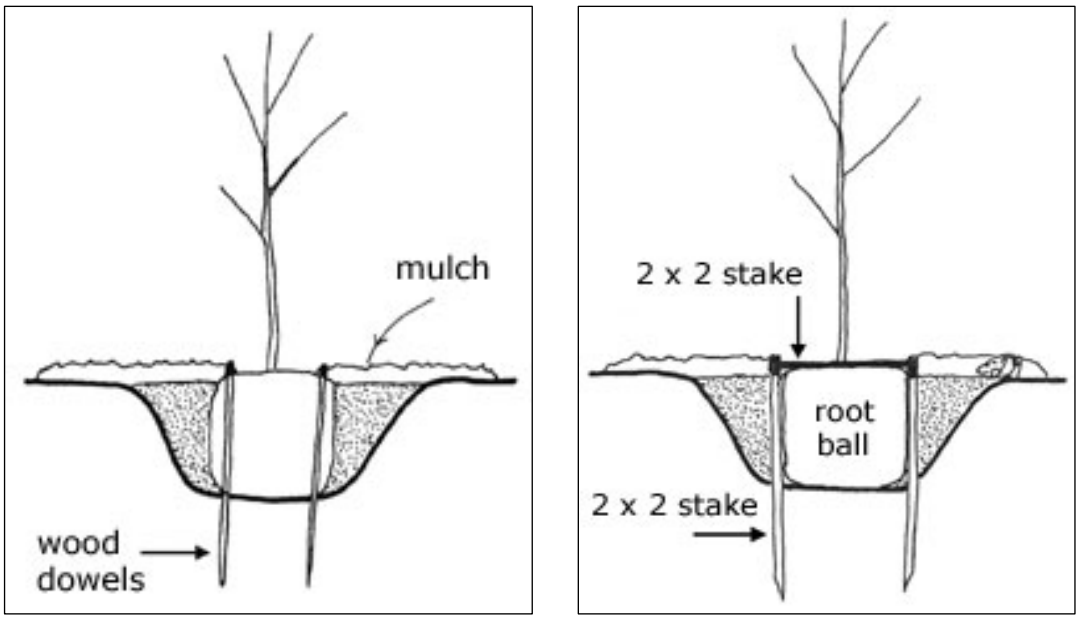


Figure 5.7 – Other Acceptable Staking Method

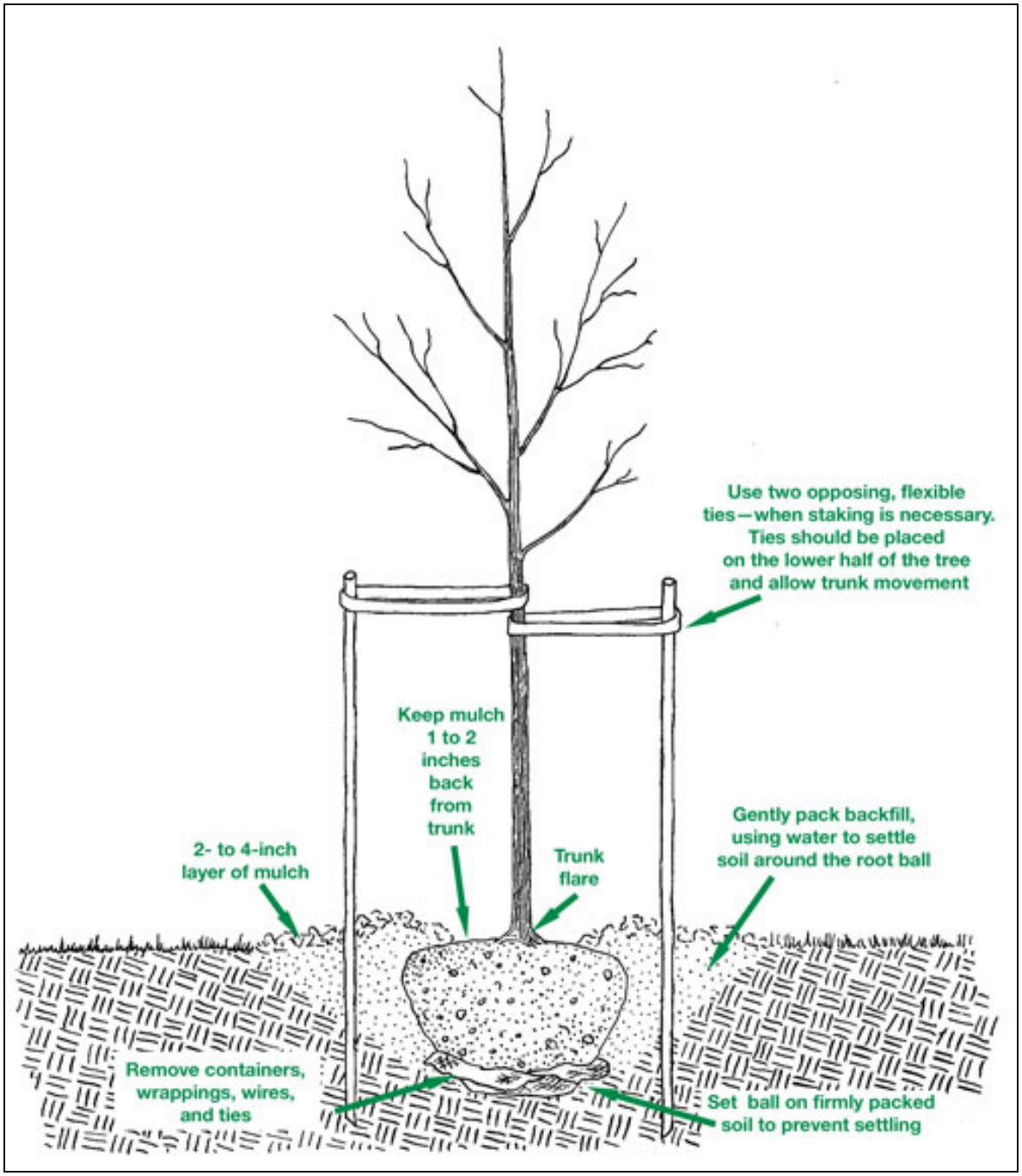


Figure 5.8 – Street Tree Planting Options

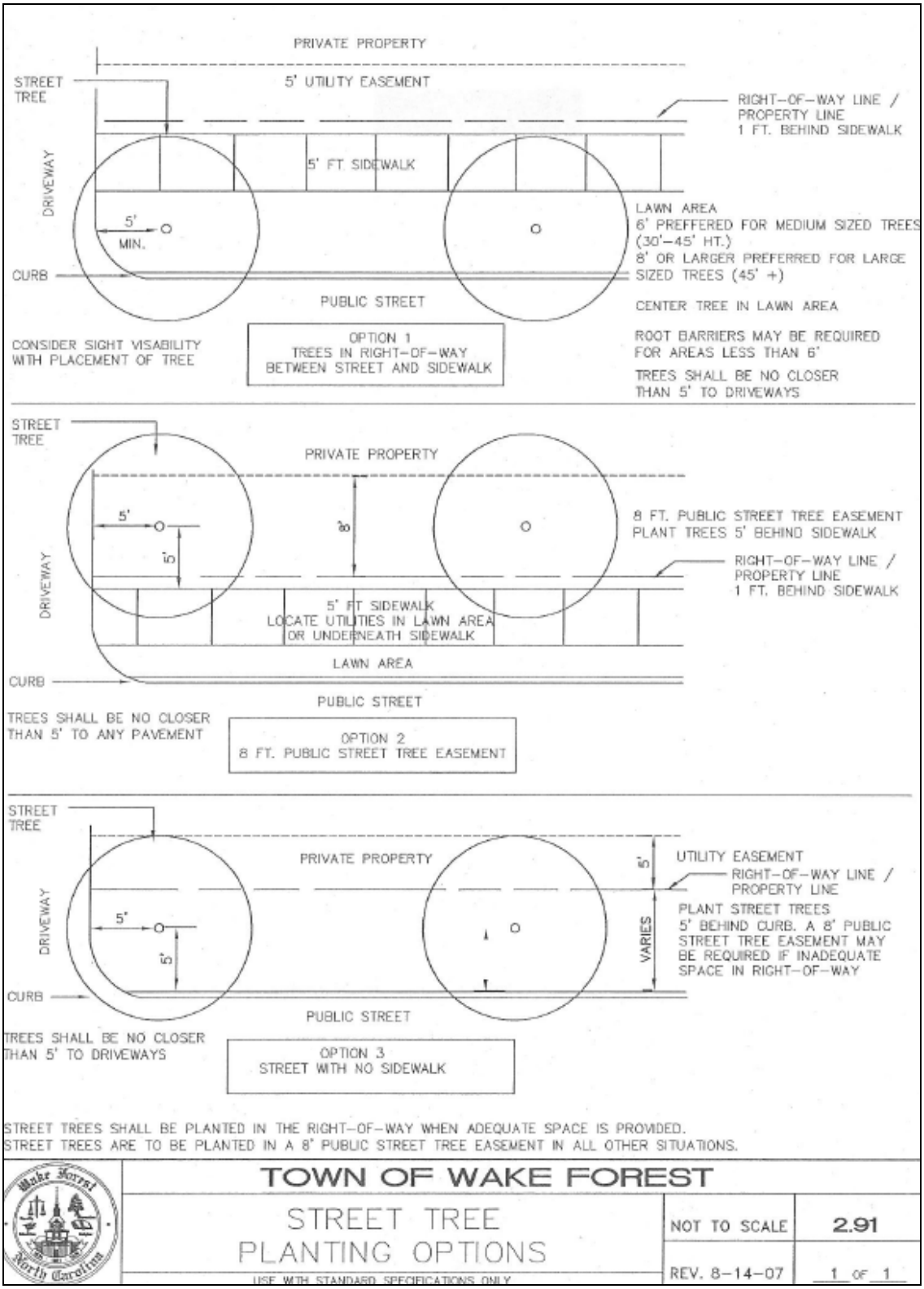
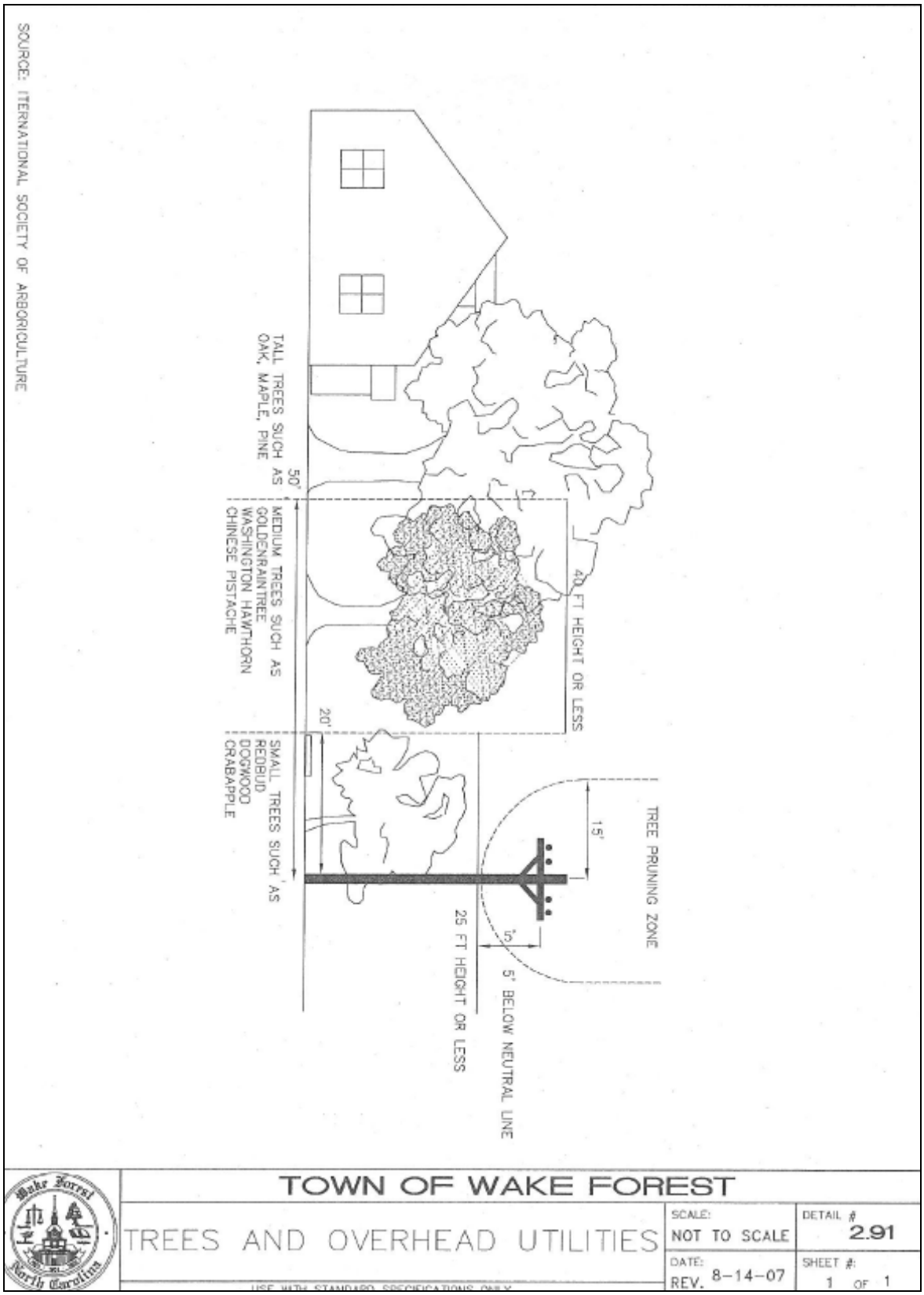


Figure 5.9 – Trees and Overhead Utilities



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6 APPLICATION CHECKLISTS

6.1 INTRODUCTION

The following section has been provided to assist developers and engineers with the preparation of the various applications required by the Wake Forest Unified Development Ordinance (UDO) and the Wake Forest Manual of Specifications.

6.2 DEVELOPMENT PERMIT

6.2.1 GENERAL SUBMITTAL REQUIREMENTS

Each application for a Development Permit shall be accompanied by a plan in duplicate, drawn to scale, one copy of which shall be returned to the owner upon approval. If the property to be developed requires the use of a septic tank, the plan shall be accompanied by a letter of approval from the Wake County Health Department. The plan shall include:

A. The shape and dimensions of the lot on which the proposed building or use is to be constructed or conducted;

B. The location of the said lot with respect to adjacent rights-of-way & easements;

C. The shape, dimensions, and location of all buildings, existing and proposed, on the said lot;

D. The nature of the proposed use of the building or land, including the extent and location of the use, on the said lot;

E. The location and dimensions of off-street parking and loading space and the means of ingress and egress to such space, and

F. Any other information which the Administrator may deem necessary for consideration in enforcing the provisions of this ordinance.

G. If any portion of a lot is in a Special Flood Hazard Area, the application for a development permit shall also include plans drawn to scale showing the nature, location, dimensions, and elevations of the area in question. If an encroachment of the Special Flood Hazard Area is proposed, a Floodplain Development Permit, in accordance with Section 15.7.3 of the UDO, is required as well.

6.2.2 SIGNAGE PLAN

When a Development Permit is required by the UDO for erecting, placing, rebuilding, reconstructing or moving any sign, a Signage Plan shall be submitted with the following plan or plans drawn to scale:

A. The dimensions of the sign.

B. The dimensions of the sign supporting members.

C. The maximum and minimum height of the sign.

D. The proposed location of the sign in relation to the building and/or physical surroundings.

E. The Underwriters' Laboratory label number shall be required prior to erecting any electrical sign.

6.3 TREE CLEARING PERMIT

6.3.1 SUBMITTAL REQUIREMENTS

An application for a Tree Clearing Permit may be filed only by the owner(s) of the property in question or an authorized agent thereof. An application for a Tree Clearing Permit shall be filed with the Administrator and shall be accompanied by a Vegetation Protection Plan that shall include, at a minimum, the following information on a sheet size no larger than 24 by 36 inches at a minimum scale of one inch equals 50 feet:

A. Vicinity map showing the location of the tract at a readable scale;

B. A map of the entire tract, including the property boundary of the entire tract by courses and distances with references to true meridian and the location and dimension of all on-site and adjacent off-site easements (e.g., drainage, utility, public access, aerial utility, conservation, permanent and temporary construction easements);

C. General information about the tract, including but not limited to the owner of the tract; the current zoning of the tract, the area of the tract, and the conditional-use zoning conditions, planned unit development master plan requirements, if applicable;

D. The location and use(s) of all existing building(s) on the tract;

E. The owner, current zoning and present use of all contiguous properties (including property on opposite side of adjoining streets);

F. The general classification of all existing and proposed adjacent roadways and the ultimate right-of-way boundaries associated with these roadways;

G. The location and width of all future/existing buffers and associated vegetation protection areas, including riparian buffers, perimeter buffers and perimeter streetyards;

H. The proposed limits of timbering activities, including the location and extent of all tree protection fencing as required by this section;

I. The Administrator may reduce or waive the requirements for a Vegetation Protection Plan in situations where it can be demonstrated that all vegetation removal will take place outside of required vegetation protection areas.

6.4 LAND DISTURBANCE PERMIT

Required Erosion and Sedimentation Control Plans must contain at least all of the items specified on the Town of Wake Forest Erosion and Sedimentation Control Checklist, including administrative fees, pin number, bonds, a copy of deed/land owner approval, engineering drawings, maps, bonding, basin drainage area, existing soils, one set of calculations showing MUSLE (modified universal soil loss equation), 401/404 signed permits if required, NCDOT Driveway permits, NCDOT easements, property easements/access, and narrative statements as needed to adequately describe the proposed development of the tract and the measures planned to comply with the erosion and sedimentation control regulations of this article. Plan content may vary to meet the needs of specific site requirements. Detailed guidelines for plan preparation may be obtained from the Town of Wake Forest Engineering Department upon request.

6.4.1 SUBMITTAL REQUIREMENTS

Required Information	Completed
Fees – Due prior to 1st review.	
Financial Responsibility Ownership Form	
E&SC Calculations (1 copy)	
Stormwater Calculations (1 copy)	
Stormwater Maintenance and Operation Agreement (due upon completion)	
NCDOT Encroachment/Driveway Permit	
DWQ 401 Permit	
USACOE 404 Permit	
All Plans for Review (see below for minimum requirements)	
Location/Vicinity Map	
Existing and Proposed Contours (including offsite)	
Phased Grading Plan (minimum phases to include "initial," "midway," and "final")	
Boundaries of Land Disturbance (clearly delineated with calculated acreage)	
Soils Area Map	
Drainage Area Delineation Map (existing site and final site)	
Existing Storm Utilities Map (including all utility easements, storm drainage, basins and level spreaders)	
Properties Map (including existing lot lines, lot numbers and surrounding property owners)	
Hydrology Map (including stream centerlines, stream buffers, wetlands and floodplains)	
Temporary Erosion Control Plan	
1. Erosion Control Measure Calculations (including sediment basins, sediment traps, skimmers, ditches, etc.) – must use Revised Universal Soil Loss Equation* and/or Modified Universal Soil Loss Equation** for entire site	
2. Skimmer Basins (required for drainage areas over 5 acres)	
3. Construction Entrance (50 foot minimum)	
4. Silt Fences (metal posts with wire)	
5. Hardware Cloth Outlets (special sediment control fences)	
6. Tree Protection Fencing (with "Do not enter Tree Protection Area" signs in English and Spanish) – required around perimeter of property, at buffer zones, and in tree save areas (around the drip line)	
7. Diversion Ditches	
8. Inlet Protection	
9. Erosion Details per NCDEMLR Erosion and Sediment Control Planning and Design Manual, latest edition	

Permanent Erosion/Stormwater Control Plan	
1. Stormwater Calculations (including pre and post-development peak flow (Q) and percent impervious surface)	
2. Proposed Stormwater Easements (recorded)	
3. Maintenance and Operation Agreement	
4. As-Builts (including length and size of stormwater ponds/bio-cells, level spreaders, storm drainage inverts, tops, grates, slopes, etc.)	
5. Permanent Ditches with Matting	
6. Stormwater Details per NC Division of Water Quality Stormwater Best Management Practices Manual, latest edition	
7. Stabilization Timeframe Chart	

***Revised Universal Soil Loss Equation (RUSLE)**

RUSLE: A = R*K*LS*C*P

Where : A = Longtime average annual soil loss

R = Rainfall runoff factor

K = Soil Erodability Factor

LS = Topographic Factor, where L represents the length and S represents the slope steepness

C = Cover management factor

P = Support practice

****Modified Universal Soil Loss Equation (MUSLE)**

MUSLE: T = 95*(V*Qp)^0.56 *K*LS*C*P

Where T = Sediment yield, tons per storm event

V = volume of runoff, acre-feet

Qp = Peak flow, cfs

K, LS, C, & P are the same as above for RUSLE

6.5 FLOODPLAIN DEVELOPMENT PERMIT

6.5.1 SUBMITTAL REQUIREMENTS

Applications for a Floodplain Development Permit shall be made to the Administrator prior to any development activities located within Special Flood Hazard Areas and shall meet the requirements found in Chapter 15 of the UDO. In addition to a Flood Development Permit, a Letter of Map Revision through the applicable state or federal agency may be required. The following items shall be presented to the Administrator with the Floodplain Development Permit application:

A. A plan drawn to scale which shall include, but shall not be limited to, the following: specific details of the proposed floodplain development:

1. The nature, location, dimensions, and elevations of the area for development/disturbance; existing and proposed structures, utility systems, grading/pavement areas, fill materials, storage areas, drainage facilities, and other development;
2. The boundary of the Special Flood Hazard Area as delineated on the FIRM or other flood map as determined in Section 12.4 of the UDO or a statement that the entire lot is within the Special Flood Hazard Area;
3. Flood zone(s) designation of the proposed development area as determined on the FIRM or other flood map as determined in Section 12.4 of the UDO;
4. The boundary of the floodway(s) or non-encroachment area(s) as determined in Section 12.4 of the UDO;
5. The Base Flood Elevation (BFE) or Future Conditions Flood Elevation where provided as set forth in Section 12.4 of the UDO;
6. The old and new location of any watercourse that will be altered or relocated as a result of proposed development;
7. Certification of the plot plan by a registered land surveyor or professional engineer.

B. Proposed elevation and method thereof, of all development within a Special Flood Hazard Area including but not limited to:

1. Elevation in relation to mean sea level of the proposed reference level (including basement) of all structures;
2. Elevation in relation to mean sea level to which any non-residential structure in Zone AE, A or X (Future) will be flood-proofed; and
3. Elevation in relation to mean sea level to which any proposed utility systems will be elevated or floodproofed.

C. If floodproofing, a Floodproofing Certificate (FEMA Form 81-65) with supporting data and an operational plan that includes, but is not limited to, installation, exercise, and maintenance of floodproofing measures.

D. A Foundation Plan, drawn to scale, which shall include details of the proposed foundation system to ensure all provisions of this ordinance are met. These details include but are not limited to:

1. The proposed method of elevation, if applicable (i.e., fill, solid foundation perimeter wall, solid backfilled foundation, open foundation on columns/posts/piers/piles/shear walls);
2. Openings to facilitate equalization of hydrostatic flood forces on walls, in accordance with Section 12.4.2.B.3.d of the UDO, when solid foundation perimeter walls are used in Zones A, AE and X (future);
3. Usage details of any enclosed areas below the regulatory flood protection elevation.
4. Plans and/or details for the protection of public utilities and facilities such as sewer, gas, electrical, and water systems to be located and constructed to minimize flood damage;
5. Copies of all other Local, State and Federal permits required prior to floodplain development permit issuance (Wetlands, Endangered Species, Erosion and Sedimentation Control, Riparian Buffers, Mining, etc.)

6. Documentation for placement of Recreational Vehicles and/or Temporary Structures, when applicable, to ensure the provisions of Section 12.4.2.B.5 of the UDO are met.

7. A description of proposed watercourse alteration or relocation, when applicable, including an engineering report on the effects of the proposed project on the flood-carrying capacity of the watercourse and the effects to properties located both upstream and downstream; and a map (if not shown on plot plan) showing the location of the proposed watercourse alteration or relocation.

6.6 STORMWATER PERMIT

The purpose of this section is to establish the minimal plan submittal requirements for stormwater plan review and approval.

6.6.1 SUBMITTAL REQUIREMENTS

Two complete sets of site plan drawings and two complete sets of sitework calculations shall be submitted to the Town Engineering Department for review and approval, and shall include:

A. Certification Requirements

The following certifications shall appear on all plans.

1. Designer's Certification

"I hereby certify that, to the best of my ability, this plan has been prepared in accordance with the latest Town of Wake Forest Standards and Specifications for Stormwater Management and Stormwater Policy of the Town Code of the Town of Wake Forest."

Signature:_____
Printed Name and Title:_____
Date:_____Registration Number: _____

2. Owner's/Developer's Certification

"I/We hereby certify that all site construction, drainage and grading will be done pursuant to this plan and that the applicable Stormwater Management conditions and requirements of the Town of Wake Forest, the State of North Carolina and the Federal Government and its agencies are hereby made part of this plan."

Signature:_____
Printed Name:_____
Title:_____Date:_____

B. Checklists of Stormwater Standards and Submittal Worksheet for Dry Detention and Wet Retention Facilities: The checklist and worksheet on the following pages shall be submitted with all plans submitted for Town approval.

C. Additional Requirements: Approval of Stormwater Management Plans and Calculations by the Town of Wake Forest Engineering Department does not complete the Town of Wake Forest review process. All other applicable Town Departments, County, State, and Federal agencies must also approve the plan as warranted. It shall be the sole responsibility of the Owner/Developer/Designer to acquire all applicable approvals.

CHECKLIST FOR STORMWATER STANDARDS
Town of Wake Forest

OFFICE USE ONLY:
File Number:_____
Number of Plan Sets Received:_____
Date of Submittal:_____
Reviewer's Name:_____

Please provide complete documentation and details where applicable. NO PLAN SUBMITTAL will be complete unless all information is filled out completely. Indicate ***"Not Applicable"*** where appropriate.

Name of Development:_____

Owner Information:
Name: _____
Address:_____
_____
Voice Number:_____Fax Number: _____
E-mail address:_____

Developer Information:
Name: _____
Address:_____
_____
Voice Number:_____Fax Number: _____
E-mail address:_____

Designer Information:
Name of Company:_____
Address:_____
_____
Project Designer:_____Registration Number:_____
Voice Number:_____Fax Number: _____
E-mail Address:_____

Plan Requirements (Indicate ***"N/A"*** where appropriate)**:**

Yes	No	N/A	Sheet No.	Description	Remarks
☐	☐	☐	_____	Development Name	_____
☐	☐	☐	_____	Owner	_____
☐	☐	☐	_____	Design Firm	_____
☐	☐	☐	_____	Sealed, Signed and Dated	_____
☐	☐	☐	_____	Sheet Number	_____
☐	☐	☐	_____	Date	_____
☐	☐	☐	_____	Revision Numbers and Dates	_____
☐	☐	☐	_____	Designer's Certification	_____
☐	☐	☐	_____	Owner's/Developer's Certification	_____
☐	☐	☐	_____	North Arrow	_____
☐	☐	☐	_____	Property Lines	_____
☐	☐	☐	_____	Legend	_____
☐	☐	☐	_____	Vicinity Map	_____
☐	☐	☐	_____	Scale	_____
☐	☐	☐	_____	Adjacent Property Owners	_____
☐	☐	☐	_____	Existing Streets, Buildings, etc.	_____
☐	☐	☐	_____	Wooded Limits	_____
☐	☐	☐	_____	Wetland Limits	_____
☐	☐	☐	_____	Easements	_____
☐	☐	☐	_____	Land Use of Surrounding Areas	_____
☐	☐	☐	_____	Original Contours (2-foot intervals)	_____
☐	☐	☐	_____	Actual Field Survey	_____
☐	☐	☐	_____	Town/USGS Topographical Data	_____
☐	☐	☐	_____	Existing Streams, Lakes, etc.	_____
☐	☐	☐	_____	Proposed Contours (2-foot intervals)	_____
☐	☐	☐	_____	Size and Location of Existing Culverts	_____
☐	☐	☐	_____	Size and Location of Proposed Culverts	_____
☐	☐	☐	_____	Submitting Two Set of Plans	_____

Calculation Requirements:

Yes	No	N/A	Sheet No.	Description	Remarks
☐	☐	☐	_____	Development Name	_____
☐	☐	☐	_____	Owner	_____
☐	☐	☐	_____	Design Firm	_____
☐	☐	☐	_____	Sealed, Signed and Dated	_____
☐	☐	☐	_____	Submitting Two Sets of Calculations	_____

Piped Systems:

☐	☐	☐	_____	Designed for 10-yr Storm	_____
☐	☐	☐	_____	Analyzed for 25-yr Storm	_____
☐	☐	☐	_____	Minimum Velocity = 2.5 FPS	_____
☐	☐	☐	_____	Minimum Cover = 2 Feet	_____
☐	☐	☐	_____	Headwall or Flared End Sections	_____
☐	☐	☐	_____	Energy Dissipater Calculations	_____
☐	☐	☐	_____	Evaluation of Downstream System	_____
☐	☐	☐	_____	Catch Basin Designed for 2-yr Storm	_____
☐	☐	☐	_____	Public Easement Terminates at the end of the Stilling Basin or Outlet Protection	_____
☐	☐	☐	_____	Private Easement Begins at the end of the Stilling Basin or Outlet Protection	_____

Open Channel Systems:

☐	☐	☐	_____	Designed for 10-yr Storm	_____
☐	☐	☐	_____	Analyzed for 25-yr Storm	_____
☐	☐	☐	_____	Side Slopes 3 to 1 or flatter	_____
☐	☐	☐	_____	Minimum Bottom Width = 3 Feet	_____
☐	☐	☐	_____	Velocity Check (Liners provided, If Needed)	_____
☐	☐	☐	_____	Evaluation of Downstream System	_____
☐	☐	☐	_____	Public Easement Ends and Private Easement Begins at the Beginning of the Ditch Section	_____

Other Plan Submittals:

☐	☐	☐	_____	Wake Forest Erosion Control	_____
☐	☐	☐	_____	NCDOT	_____
☐	☐	☐	_____	US Army Corps of Engineers	_____
☐	☐	☐	_____	NCDNR, DWQ	_____

SUBMITTAL WORKSHEET FOR DRY DETENTION AND WET RETENTION FACILITIES

The Town of Wake Forest will follow the Division of Water Quality – 401 Wet Detention Basin Design for all detention and retention basins within the Town's jurisdiction. Please provide complete documentation and details where applicable. A complete stormwater management plan submittal includes a detention/retention basin worksheet for each basin, design calculations, plan and specifications showing all basin and outlet structure details, and a fully executed operation and maintenance agreement. An incomplete submittal package will result in a request for additional information and will substantially delay final review and approval of the project. Indicate "Not Applicable" where appropriate if design is a dry detention basin.

I. **Project Information** (please complete the following information):

Project Name: _____

For projects with multiple basins, specify which basin this worksheet applies to:_____

Basin Bottom Elevation	_____	ft.	(average elevation of the floor of the basin)
Permanent Pool Elevation	_____	ft.	(elevation of the orifice invert out)
Temporary Pool Elevation	_____	ft.	(elevation of the outlet structure invert in)
Permanent Pool Surface Area	_____	sq. ft.	(water surface area at permanent pool elevation)
Drainage Area	_____	ac.	(on-site and off-site drainage to the basin)
Impervious Area	_____	ac.	(on-site and off-site drainage to the basin)
Permanent Pool Volume	_____	cu. ft.	(combined volume of main basin and forebay)
Temporary Pool Volume	_____	cu. ft.	(volume detained on top of the permanent pool)
Forebay Volume	_____	cu. ft.	
SA/DA used	_____		(surface area to drainage area ratio)
Diameter of Orifice and Number	____/____	in.	(draw down orifice diameter and number of)

II. **Required Items Checklist**

The following checklist outlines design requirements per the Stormwater Best Management Practices Manual (N.C. Department of Environment, Health and Natural Resources, November 1995) and Administrative Code Section: 15 A NCAC 2H .1008. Initial in the space provided to indicate the following design requirements have been met and supporting documentation is attached. *If a requirement has not been met, attach an explanation of why.*

Applicants Initials	
_____	The temporary pool controls runoff from the 1 inch storm event
_____	The basin length to width ratio is greater than 3:1
_____	The basin side slopes are no steeper than 3:1
_____	A submerged and vegetated perimeter shelf at less than 6:1 is provided
_____	Vegetation to the permanent pool elevation is specified
_____	An emergency drain is provided to drain the basin
_____	The permanent pool depth is between 3 and 6 feet (required minimum of 3 feet)
_____	The temporary pool draws down in 2 to 5 days
_____	The forebay volume is approximately equal to 20% of the total basin volume
_____	Sediment storage is provided in the permanent pool
_____	Access is provided for maintenance
_____	A minimum 30-foot vegetated filter is provided at the outlet
_____	A site specific operation and maintenance (O&M) plan is provided
_____	A vegetation management/mowing schedule is provided in the O&M plan
_____	Semi-annual inspections are specified in the O&M plan
_____	A debris check is specified in the O&M plan to be performed after every storm event
_____	A specific sediment clean-out benchmark is listed (elevation or depth) in the O&M plan
_____	A responsible party is designated in the O&M plan

6.7 SITE PLAN APPLICATIONS

6.7.1 SITE MASTER PLAN

The Site Master Plan is intended to provide a detailed two-dimensional drawing that illustrates all of the required site features including the following information:

A. Existing Conditions Information

1. Existing developed conditions of the property including:

a. Existing structures with built year & historical significance;

b. Cemeteries;

c. Bridges or culverts;

d. Utilities (water & sewer, drainage, storm water, electrical, cable, fiber optics, etc.);

e. Driveways & curb cuts;

f. Sidewalks, surface parking & loading areas;

g. Public and private streets with pavement width;

h. Any known contaminated soils or hazardous materials;

i. Existing & proposed easements including but not limited to, electric, water, sewer, storm, drainage, private streets, gas, or other service related easements including location, width & purpose.

2. Existing natural features of the property including:

a. Forest stands or trees of a uniform size and species;

b. Specimen trees of varying sizes and species, particularly free standing or open-grown or field grown trees;

c. Previously documented rare or protected species' habitats.

d. Riparian & watershed boundaries/buffers, wetlands, watercourses with name and direction of flow;

e. State & federal reports regarding wetlands and stream buffer delineations;

f. Special flood hazard areas;

g. Wood line & vegetation type with location of all specimen trees;

h. Soils map;

i. Existing contour lines at a minimum of two (2) foot contour intervals.

B. General Information

1. Vicinity Map of area showing location of property & existing surrounding site conditions at a scale of not less than 1 inch = 1,000 feet;

2. North arrow on all sheets;

3. Boundaries of the proposed property to be developed;

4. Owner & developers contact information;

5. Layout standards, certificates & details from Section 6.11 of the MSSD.

6. Five paper copies of plans at a scale not less than 1 inch = 50 feet.

7. Administrative fees.

C. Site & Structure Information

1. Site data information (e.g., zoning, land use, wake county tax pin number, setbacks, acreage).
2. Development calculations (e.g., density, lot dimensions, proposed building areas, number & size of structure(s), number of parking spaces, estimated impervious surface area calculations) in sufficient detail to show compliance with the Wake Forest UDO.
3. Buildings, parking areas & driveways on site & adjacent properties;
4. Street and/or right-of-way locations with street sections;
5. Location of sidewalks, pedestrian ways & open space areas;
6. Property lines & setback lines.
7. Watercourse, land use & screening buffer areas.
8. Site landscaping plan (in conceptual form only).
9. Lighting plan (in conceptual form only);
10. Location of all Special Flood Hazard Areas (if applicable).
11. Conceptual location of subsurface utilities. Detailed engineering drawings such as (e.g. water & sewer) & on-site stormwater facilities are not required for Master Plans, except that horizontal water & sewer locations shall be required by the City of Raleigh Public Utilities Department.

6.7.2 SITE CONSTRUCTION PLAN

A Construction Plan is intended to provide a full & complete set of engineered drawings necessary for final permitting & construction that illustrates all of the required site features including the following information:

A. Existing Conditions Information: See 6.7.1.A above for required information.

B. General Information

1. Vicinity Map of area showing location of property & existing surrounding site conditions at a scale of not less than 1 inch = 1,000 feet;
2. North arrow on all sheets;
3. Boundaries of the proposed property to be developed;
4. Owner & developers contact information;
5. Layout standards, certificates & details from Section 6.12 of the MSSD.
6. Five paper copies of plans at a scale not less than 1 inch = 50 feet.
7. Administrative fees.

C. Site & Structure Information

1. Site data table & illustration of:
   a. Zoning & zoning case number;
   b. Proposed land use
   c. Wake county tax pin number

d. Setbacks,

e. Acreage.

f. Watershed & watercourse areas.

2. Development Calculations & Illustration of:

a. Density

b. Lot dimensions

c. Proposed number of buildings their height & size of structure(s),

d. Number of parking spaces required & proposed,

e. Impervious surface area calculations (if applicable)

3. Buildings, parking areas & driveways on site & adjacent properties;

4. Location of sidewalks, pedestrian ways & open space areas;

5. Location & method of garbage containment & disposal;

6. Property lines & setback lines.

7. Location and height of all retaining walls;

8. Watercourse, land use & screening buffer areas.

9. Site landscaping plan (see 6.8 & Chapter 8 of UDO for details).

10. Lighting plan (see Chapter 10 for details).

11. Location & dimensions of all easements on & abutting the property.

12. Location of all Special Flood Hazard Areas (if applicable).

D. Streets & Traffic Control

1. Linear footage of all public streets.

2. Street and/or right-of-way locations with street sections;

3. Provisions & design of all on & off site roadway improvements.

4. All traffic control signage & it's conformance to the MSSD.

5. Plan-profile drawings at a scale of 1 inch = 50 feet showing street grades & cross sections.

E. Utilities

1. Detailed stormwater, grading & erosion control information per the MSSD.

2. Detailed water & sewer information per City of Raleigh Public Utilities.

3. Linear footage of all storm drainage facilities;

4. Tree Save Areas & protection measures.

F. Landscape Plan: When a Site Construction Plan review is required by the UDO, the Construction Plan shall include a detailed Landscape Plan with the following elements:

1. Existing vegetation and landscaping including the location, condition, and diameter at breast height (DBH) of all specimen trees that are 20" DBH and greater and all native flowering trees 8" DBH and greater including their critical root zones; and, any designated Historic or landmark trees;

2. Locations of new planting material with a plant list that includes common and botanical plant names, baseline requirement (canopy or understory), quantity, caliper, height and spacing;
3. Locations and dimensions of planting areas, parking lot islands, streetyards and bufferyards, areas of reforestation, and the location and dimensions of walls, berms, and fencing;
4. The delineation of existing vegetation which is to be maintained or preserved as a Tree Save Area ("TSA") to meet or supplement the requirements of this section including their critical root zones;
5. Locations of waterbodies and required watercourse buffers, overhead and underground utilities, easements, sight triangles, and the limits of land disturbance, clearing, grading, and trenching:
6. All applicable details, specifications, procedures and schedules for new tree and shrub installation, transplanting, tree wells, tree staking, etc.;
7. The location and description of all tree protection measures which are to be utilized;
8. The planting schedule which is to be followed for the installation of all new plant material;
9. All notes and certificates required for any Tree Clearing activity.

G. Landscape Maintenance Plan: The following statement shall be placed on the landscape sheet prior to plan approval. This statement must be individualized based on each site and/or subdivision plan. This should be done by a certified landscape architect.

"The owners of the property and their agents, heirs, or assigns shall be responsible for the installation, preservation, and maintenance of all planting and physical features shown on this plan. Failure to maintain all plantings in accordance with this plan may constitute a violation of this Ordinance and may result in fines. The owners shall be responsible for maintenance of the vegetation, including but not limited to:

1. *Fertilization (optional).*
2. *Pruning within limits (applicant must define limits).*
3. *Pest control.*
4. *Mulching.*
5. *Mowing (if any).*
6. *Protection of the root zones from equipment, construction and related materials, etc.*
7. *Method of irrigation.*
8. *Other continuing maintenance operations."*

6.7.3 FINAL PLAT

See Section 6.9.1 below

6.8 ARCHITECTURAL DESIGN REVIEW

6.8.1 SUBMITTAL REQUIREMENTS

All applications for Architectural Design Review must submit a Sketch Plan and Building Elevations for Design Review to the Administrator and the Design Review Board (if applicable) in accordance with Chapter 15 of the UDO. Building Design Standards for specific Urban Districts and requirements for specific Building Types (Civic/Institutional, Residential, Commercial, & Industrial) can be found in Chapter 5 of the UDO. In addition to these requirements, the submitted application should include the following:

A. General

1. A location map with north arrow, dimensions of site boundaries, acreage, information about ownership and uses, and existing or potential uses of adjacent property;
2. Scaled drawings of the floor plans. Include square footage figures for each floor. Show all proposed door and window locations;
3. One 24" x 36" rendered elevations of each façade indicating heights, floor levels, and materials;
4. Illustrative perspective renderings of the proposed building(s), including at least one eye-level view from a public right-of-way and one view illustrating the character of any adjacent buildings in context;
5. One 18" x 24" color rendering of each façade is required. Rendered elevations should describe location and use of each color and material. Building materials/colors for roof roofing, siding, doors, windows, etc.
6. Administrative fee.

B. Overall Requirements: The application should provide evidence that clearly illustrates the following requirements have been met in the design of the building(s).

1. Varied roof line;
2. Unify individual storefronts in one building while varying the look and providing distinctiveness from storefront to storefront;
3. Facades greater than 100 feet interrupted by recesses, projections, windows, awning, arcades, color, texture, and/or material. All facades visible from the street or adjoining properties feature characteristics similar to the front;
4. Customer entrances featuring one or more – canopies, porticos, arcades, arches, wing walls, and planters;
5. High quality exterior building materials, e.g. brick, stucco, wood, stone tinted/textured decorative concrete masonry units, or similar materials;
6. Colors harmonious with surrounding development and that reflect the traditional concept of the town. Colors should be earth tone, muted, subtle, or neutral colors;
7. Trash containment devices located and/or screened so as not to be visible from streets or other properties. Screening of trash containment areas should match colors and materials used on building;
8. Mechanical and utility equipment located and/or screened so as not to be visible from streets or other properties, including equipment located on the roof.

6.9 SUBDIVSION APPLICATIONS

The purpose of this section is to provide a guide for the preparation of applications for Minor and Major Subdivisions in accordance with Chapter 15 of the UDO.

6.9.1 MINOR SUBDIVISIONS & FINAL PLAT

The following information shall be required in all applications for Minor Subdivisions and Final Plats.

A. Zoning of Tract: Zoning classification on the land to be subdivided and on adjoining land.

B. Boundary: The exact boundary lines of the tract(s) to be subdivided (fully dimensioned by lengths and bearings) and the location of intersecting boundary lines of adjoining lands, with adjacent subdivisions identified by official maps. The square footage and acreage of the resultant lots shall also be included.

C. Monument and Control Corners: The accurate locations and descriptions of all monuments, markers, and control points.

D. Survey Data: Sufficient data to determine readily and reproduce on the ground every straight or curved boundary line, street line, lot line, right-of-way, easement line, and setback line, including dimensions, bearings, or deflection angles, radii, arcs, chords, central angles, and tangent distances for the center line of curved streets and curved property lines that are not the boundary of curved streets. All dimensions shall be measured to the nearest one-hundredth (1/100th) of a foot and all angles to the nearest one-half (½) minute.

E. Elevation Flood Data: Base flood elevation data shall be provided for subdivision proposals greater than fifty (50) lots or five (5) acres, whichever is less.

F. Streets: The widths, and names where appropriate, of all proposed streets and alleys, and of all adjacent streets and alleys, and easements which shall be properly located.

G. Easements: The location of all rights-of-way, easements, and areas to be dedicated to public use with the purpose of each stated.

H. Names and Vicinity Map: The name of the owner, and the surveyor, landscape architect, engineer, and their respective addresses and telephone numbers. Also, the name of the subdivision and a sketch vicinity map showing relationship between subdivision and surrounding areas at a legible scale. The vicinity map should be drawn to a scale of 1" = 800' and a north arrow shown.

I. Building Setback Lines: Minimum building setback lines.

J. Block and Lot Numbers. The blocks numbered consecutively throughout the entire subdivision and the lots numbered consecutively throughout each block.

K. Deed Restrictions on the Property: A statement indicating whether deed restrictions exist, the subject, and location.

L. Date: Date of the survey and plat preparation, a north arrow indicating whether true or magnetic, and graphic scale.

M. Administrative Fees: The appropriate filing fees, as determined by the Board of Commissioners, shall be paid to the Town of Wake Forest, North Carolina for each submittal of an administrative final plat.

N. Required Certificates/Approvals: The certificates and approvals listed below signed, stamped and dated appropriately.

Certificate of Ownership and Dedication
I hereby certify that I am the owner of the property shown and described hereon, which is located in the subdivision jurisdiction of Wake Forest, and that I hereby adopt this plan with my free consent, establish minimum building setback lines, and dedicate all streets, alleys, walks, parks, and other sites and easements to public or private use as noted.

_____
Date Owner(s)

Certificate of Survey and Accuracy
I _____, certify that this plat was drawn under my supervision from (an actual survey made under my supervision) (Deed description recorded in Book _____, Page ____, etc.); (other); that the boundaries not surveyed are shown as broken lines plotted from information found in Book _____, Page ; that this plat was prepared in accordance with G.S. 47_30 as amended. Witness my original signature, registration number and seal this the____day of _____A.D., 20 ___.

_____(Surveyor)

_____ (SEAL OR STAMP)
Registration Number

Approval from Wake County Health Department
If septic tanks are to be installed, a letter from the Wake County Health Department will be required indicating their approval of the subdivision.

_____ _____
Date Approving Authority

Approved for Recording by the Town of Wake Forest
State of North Carolina – County of Wake
I, _____, Review Officer of the Town of Wake Forest, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.

_____ _____
Date Town Clerk

6.9.2 MAJOR SUBDIVISION – MASTER PLAN

The Subdivision Master Plan is intended to provide a detailed two-dimensional drawing that illustrates all of the required site features including the following information:

A. Existing Conditions Information: See 6.7.1.A above for required information.

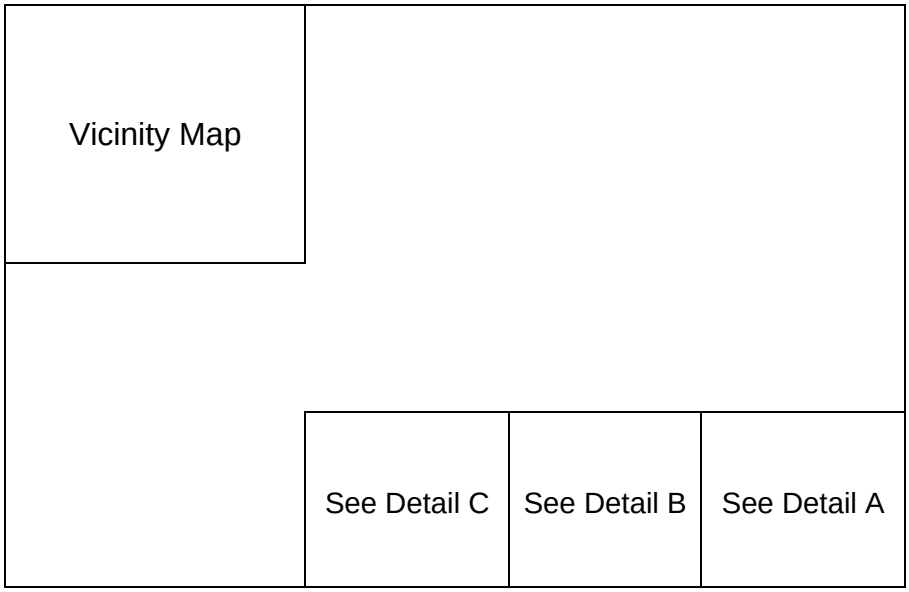
B. General Information

1. Vicinity Map of area showing location of property & existing surrounding site conditions at a scale of not less than 1 inch = 1,000 feet;
2. North arrow on all sheets;
3. Boundaries of the proposed property to be developed;
4. Proposed name of subdivision which shall not have the same spelling as or be pronounced similar to the name of any other subdivision located within the Town's jurisdiction.
5. Owner & developers contact information;
6. Layout standards, certificates & details from Section 6.11 of the MSSD.
7. Five paper copies of plans at a scale not less than 1 inch = 50 feet.
8. Administrative fees.

C. Site Information

1. Site data information (e.g., zoning, land use, wake county tax pin number, setbacks, acreage).
2. Development calculations (e.g., density, lot dimensions, estimated impervious surface area calculations) in sufficient detail to show compliance with the Wake Forest UDO.
3. Street and right-of-way locations with street sections;
4. Location of sidewalks & pedestrian ways.
5. Proposed plans & illustration of parks & open space areas per Chapter 7 & means of ownership & maintenance.
6. Property lines & setback lines.
7. Watercourse, land use & screening buffer areas.
8. Site landscaping plan (in conceptual form only).
9. Lighting plan (in conceptual form only);
10. Location of all Special Flood Hazard Areas (if applicable).
11. Conceptual location of subsurface utilities. Detailed engineering drawings such as (e.g. water & sewer) & on-site stormwater facilities are not required for Master Plans, except that horizontal water & sewer locations shall be required by the City of Raleigh Public Utilities Department.

D. Standard Master Plan Layout



REVISIONS

NO.	DATE	DESCRIPTION

E. Detail A: Standard Title Block

(NAME) SUBDIVISION PHASE (NO.) (REVISION NO.) **Wake Forest, N.C.**		
Owner(s)		
Address		
Phone		
E-mail Address		
NAME OF CONSULTING ENGINEERS	SURVEYED:	APPROVED:
	DRAWN:	DATE:
	CHECKED:	SCALE:

F. Detail B: Planning Board Approval Date

RECOMMENDATION FOR APPROVAL BY THE WAKE FOREST PLANNING BOARD

DATE _____

G. Detail B: Board of Commissioners Approval Date

APPROVAL BY THE WAKE FOREST BOARD OF COMMISSIONERS

DATE _____

6.9.3 MAJOR SUBDIVISIONS – CONSTRUCTION PLAN

The Subdivision Construction Plan is intended to provide a full & complete set of engineered drawings necessary for final permitting & construction that illustrates all of the required site features including the following information:

A. Existing Conditions Information: See 6.7.1.A above for required information.

B. General Information:

1. Vicinity Map of area showing location of property & existing surrounding site conditions at a scale of not less than 1 inch = 1,000 feet;
2. North arrow on all sheets;
3. Boundaries of the proposed property to be developed;
4. Proposed name of subdivision which shall not have the same spelling as or be pronounced similar to the name of any other subdivision located within the Town's jurisdiction.
5. Owner & developers contact information;
6. Five paper copies of plans at a scale not less than 1 inch = 50 feet.

7. Layout standards, certificates & details from Section 6.12 of the MSSD.
8. Administrative fees.

C. Site Information:

1. Site data table & illustration of:
   a. Zoning & zoning case number;
   b. Proposed land use
   c. Wake county tax pin number
   d. Setbacks,
   e. Acreage.
   f. Watershed & watercourse areas.
2. Development calculations & illustration of:
   a. Density
   b. Proposed lot lines, size & dimensions
   c. Impervious surface area calculations (if applicable)
3. Location of sidewalks & pedestrian ways.
4. Proposed plans & illustration of parks & open space areas per Chapter 7 & means of ownership & maintenance.
5. Property lines & setback lines.
6. Location and height of all retaining walls;
7. Watercourse, land use & screening buffer areas.
8. Landscaping & Street Tree plan (see 6.8 & Chapter 8 of UDO for details).
9. Lighting plan (see Chapter 10 for details).
10. Location & dimensions of all easements on & abutting the property.
11. Location of all Special Flood Hazard Areas (if applicable).

D. Streets & Traffic Control

1. Linear footage of all public streets.
2. Street and/or right-of-way locations with street sections;
3. Provisions & design of all on & off site roadway improvements.
4. All traffic control signage & it's conformance to the MSSD.
5. Plan-profile drawings at a scale of 1 inch = 50 feet showing street grades & cross sections.

E. Utilities

1. Detailed stormwater, grading & erosion control information per the MSSD.
2. Detailed water & sewer information per City of Raleigh Public Utilities.
3. Linear footage of all storm drainage facilities;
4. Tree Save Areas & protection measures.

F. Landscape Plan: When a Major Subdivision Construction Plan review is required by the UDO, the Construction Plan shall include a detailed Landscape Plan with the following elements:

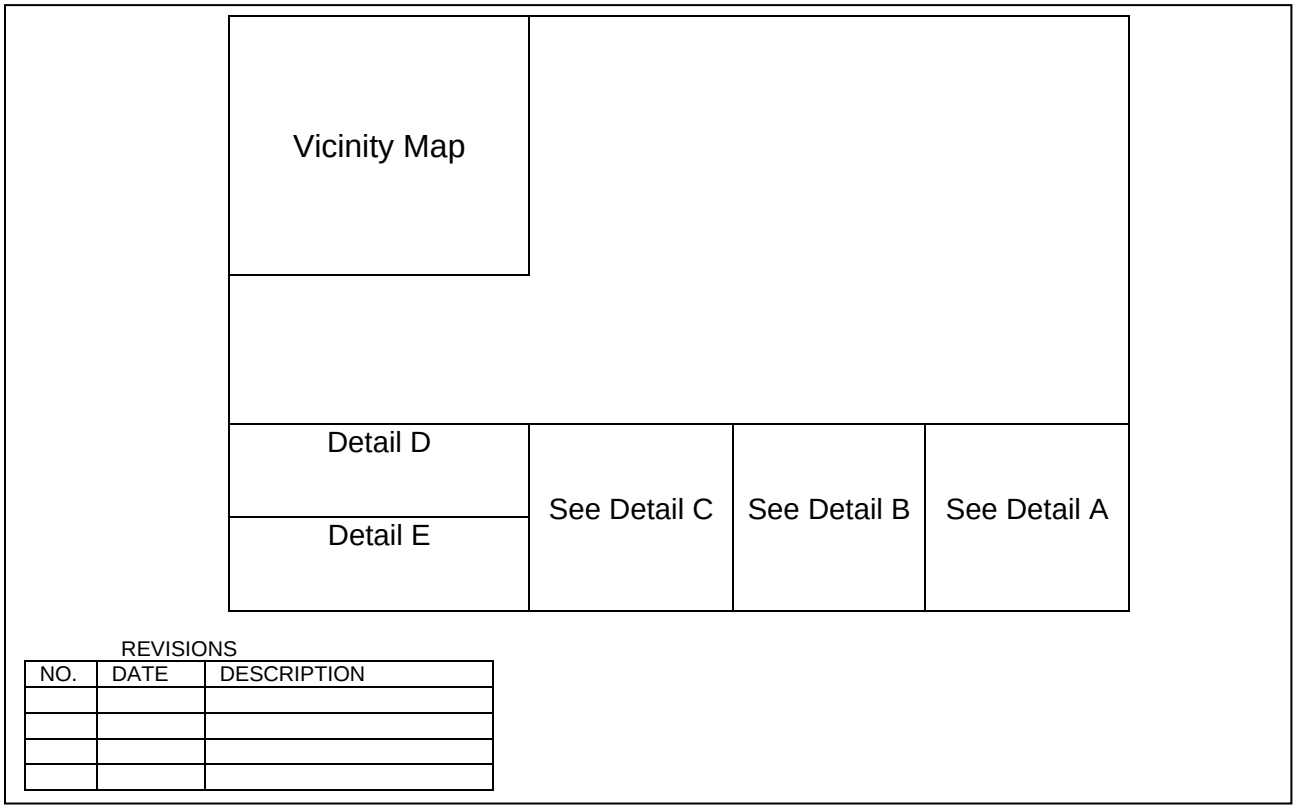
1. Existing vegetation and landscaping including the location, condition, and diameter at breast height (DBH) of all specimen trees that are 20" DBH and greater and all native flowering trees 8" DBH and greater including their critical root zones; and, any designated Historic or landmark trees;
2. Locations of new planting material with a plant list that includes common and botanical plant names, baseline requirement (canopy or understory), quantity, caliper, height and spacing;
3. Locations and dimensions of planting areas, parking lot islands, streetyards and bufferyards, areas of reforestation, and the location and dimensions of walls, berms, and fencing;
4. The delineation of existing vegetation which is to be maintained or preserved as a Tree Save Area ("TSA") to meet or supplement the requirements of this section including their critical root zones;
5. Locations of waterbodies and required watercourse buffers, overhead and underground utilities, easements, sight triangles, and the limits of land disturbance, clearing, grading, and trenching:
6. All applicable details, specifications, procedures and schedules for new tree and shrub installation, transplanting, tree wells, tree staking, etc.;
7. The location and description of all tree protection measures which are to be utilized;
8. The planting schedule which is to be followed for the installation of all new plant material;
9. All notes and certificates required for any Tree Clearing activity.

G. Landscape Maintenance Plan: The following statement shall be placed on the landscape sheet prior to plan approval. This statement must be individualized based on each site and/or subdivision plan. This should be done by a certified landscape architect.

"The owners of the property and their agents, heirs, or assigns shall be responsible for the installation, preservation, and maintenance of all planting and physical features shown on this plan. Failure to maintain all plantings in accordance with this plan may constitute a violation of this Ordinance and may result in fines. The owners shall be responsible for maintenance of the vegetation, including but not limited to:

1. *Fertilization (optional).*
2. *Pruning within limits (applicant must define limits).*
3. *Pest control.*
4. *Mulching.*
5. *Mowing (if any).*
6. *Protection of the root zones from equipment, construction and related materials, etc.*
7. *Method of irrigation.*
8. *Other continuing maintenance operations."*

H. Standard Construction Plan Layout



I. Detail A: Standard Title Block

(NAME) SUBDIVISION PHASE (NO.) (REVISION NO.) **Wake Forest, N.C.**		
Owner(s)		
Address		
Phone		
E-mail Address		
NAME OF CONSULTING ENGINEERS	SURVEYED:	APPROVED:
	DRAWN:	DATE:
	CHECKED:	SCALE:

J. Detail B: Approval Dates*

THESE PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE TOWN OF WAKE FOREST.

Engineering Department	***Date***
Public Works Department	***Date***
Erosion & Sediment Control	***Date***
Fire Prevention	***Date***
Accessibility	***Date***
Planning Department	***Date***
City of Raleigh Public Utilities Department	***Date***

*Provide Detail B on all construction plan sheets.

K. Detail C: Installation Instructions

ALL PUBLIC FACILITIES, INCLUDING UTILITIES, SIDEWALKS, AND HANDICAP RAMPS ARE TO BE CONSTRUCTED ON ALL STREETS AS SPECIFIED BY TOWN STANDARDS. THESE FACILITIES HAVE BEEN APPROVED BY THE TOWN OF WAKE FOREST AND SHALL BE SO INSTALLED UNLESS A CHANGE IS APPROVED BY THE TOWN OF WAKE FOREST.

L. Detail D: Review Engineer Disclaimer

EXECUTION OF THIS CONSTRUCTION PLAT BY THE REVIEW ENGINEER FOR THE TOWN OF WAKE FOREST IN NO WAY LIMITS THE RESPONSIBILITY OF THE OWNER AND ENGINEER OF RECORD WITH REGARD TO COMPLIANCE WITH ALL FEDERAL, STATE, AND LOCAL STANDARDS AND/OR CONDITIONS.

M. Detail E: Owner Certificate

OWNER HEREBY CERTIFIES AND AGREES TO TAKE SUCH ACTION AS MAY BE REQUIRED BY THE TOWN OF WAKE FOREST TO CORRECT ANY ERRORS, OMISSIONS OR NON-COMPLIANCE WITH TOWN STANDARDS AND/OR CONDITIONS DESCRIBED IN THIS CONSTRUCTION PLAT, INCLUDING RE-SUBMISSION OR RE-EXECUTION OF THIS CONSTRUCTION PLAT WITH THE APPROPRIATE CORRECTIONS AND/OR REVISIONS.

_____	_____
Owner	Date

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