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# Preface

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### PURPOSE

This document is intended to establish design and construction requirements and standards for the preparation and submittal of infrastructure improvement plans for subdivision and other site development projects within the [Town of Chapel Hill](#). The designer on any project should use judgment and experience to determine any additional information that may be necessary for review.

These standards are meant to interpret and clarify the [Land Use Management Ordinance](#) and [Design Guidelines](#) of the Town of Chapel Hill. The Town's land use and development policies, as embodied in the [Comprehensive Plan](#), are necessarily discussed in such broad terms as "livability", "public safety", and "variety of housing mix". The Comprehensive Plan contains community-wide goals and objectives which emphasize the existing character of the Town and its neighborhoods. The Land Use Management Ordinance and Design Guidelines deal with the more specific concepts such as types of use, lot sizes, and parking requirements.. However, even these more specific terms can be interpreted in a variety of ways, especially where a specific development in a specific location is being considered. Therefore, the Town of Chapel Hill Engineering Design Manual has been prepared to help people involved with site development in Chapel Hill and its planning jurisdiction to understand, before they begin, what will most likely be acceptable in this jurisdiction. These standards are intended to complement and supplement the general Design Guidelines included in the Comprehensive Plan.

Specific design criteria set forth in this manual provide a ready reference of those practices and techniques acceptable to the Town. We also encourage design professionals to consider site characteristics closely in their design and to seek new and innovative practices and techniques for complying with Town development policies and regulations. Designers are encouraged to offer alternative means of compliance to the design standards contained in this manual in the cases of challenging site characteristics, applicability of improved technology or innovative practices.

Where alternative means of compliance can be shown to conform to applicable policies and regulations, the Town may accept such alternatives in lieu of the standards contained herein. Similarly, where a particular site is characterized by a large number or extent of impediments to developing land in compliance with applicable policies and standards, or where technological changes provide for practices and techniques that better ensure compliance, the Town itself may modify or substitute additional standards for the design standards contained herein.

When there are deadlines for improvements the Manager may allow extensions of deadlines provided these extensions: (1) will not conflict with the intent of these standards and other land development regulations and; (2) include a practical justification for an extension.

The Public Works Engineering Design Manual and Standard Details will be updated as necessary, and the revised pages will be available from the [Town of Chapel Hill Public Works Department](#) and on the Town web site at <http://www.townofchapelhill.org>. It is recommended that any individual using this document contact the Engineering Division with suggested revisions. An errata sheet will be posted when updates are necessary.



### **COMPLIANCE**

Compliance with these standards shall be required at the time property is developed, whenever a major increase in the intensity of use is created as determined by the Town Manager, or whenever a use group change occurs as outlined in the Town of Chapel Hill Land Use Management Ordinance (LUMO).

The Town Manager may exempt modifications to existing developments from individual provisions of these standards; where, in the opinion of the Town Manager, compliance with those provisions would create a practical hardship upon the property owner and where the modification does not increase an existing non-conformity.

# **Chapter 1**

## **Definitions & Abbreviations**

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### 1.1 DEFINITIONS

Access Easement - A permanent easement, which grants the right to the public or specified party to access and/or cross private property.

Best Management Practices – Methods implemented as a way of treating or limiting pollutants and other damaging effects of stormwater runoff in order to meet legislative and North Carolina Administrative Code Requirements.

Bond - A type of surety that guarantees payment and/or performance, and insures against a financial loss.

Borrow - Fill material (soil), which is required for on-site construction and is obtained from off-site locations.

Cash Bond - Performance surety in which cash is deposited with the Town and held in lieu of a performance bond until the bonded work is completed.

Certificate of Occupancy - A permit issued by the Inspections Division, setting forth that a building or structure, complies with the Building Code, its use complies with the zoning ordinance, and that the same may be used for the purposes stated therein.

Contractor/Subcontractor - Individual or firm under contract with another to perform an agreed upon task.

Cross Drainage – Storm water drainage flow under a roadway through a culvert or across abutting parcels.

Curb Ramp - Access for pedestrian traffic at intersection of roadway, driveway or other pedestrian way.

Drainage Easement - A permanent easement, which grants the right of water drainage to pass in open channels or enclosed structures, the same does not obligate the Town to maintain any storm water devices, pipes, or open channels within the easement.

Drainage Maintenance Easement - A permanent easement, which grants to the Town the right to conduct pipe maintenance repairs, alter the typical drainage channel section and/or profile in order to improve water flow, the same does not obligate the Town to maintain any storm water devices, pipes, or open channels within the easement.

EAL Pavement Schedule - A pavement schedule based on an 18-Kip Equal Axle Load.

Easement - A grant of one or more of the property rights for a specific purpose by the property owner to, or for the use by, the public, a corporation, or other entity.

Engineer - A person licensed to practice engineering in the State of North Carolina.



## Chapter 1 - Definitions and Abbreviations

Ephesus/Fordham Form Based Code – A form district intended for a specific area of the Town designated as a focus area in the Comprehensive Plan 2020.

Erosion - The wearing away of land surface by the action of wind, water, gravity, or any combination thereof.

Erosion Control Plan - An erosion and sedimentation control plan.

Fee “In Lieu of Infrastructure Improvements”- A non-refundable payment to the Town to compensate for needed and/or required infrastructure improvements that may be used in the future by the Town to make such infrastructure improvements adjacent to the subject development.

Final Plat - The final map of all or a portion of a subdivision or site, showing the boundaries and location of lots, streets, easements and all other requirements of subdivision regulations.

Formal Street Side Parking – Parallel or angle parking which is adjacent to and contiguous with the travel way of the street and anticipated to occur on a frequent basis.

Grade, Finished - The final elevation of the ground surface after development.

Grading - One of two (2) types of grading, rough or fine.

Ground Cover - Any natural vegetative growth, masonry, paving, riprap or other material, which renders the soil surface stable against accelerated erosion.

Hi-Visibility Crosswalks – A location indicated as an appropriate place for pedestrians to cross a street or vehicular way by marking the crossing location with high visibility crosswalk pavement markings. These crosswalks typically make use of longitudinal or “continental” or “ladder” style pavement markings, which are highly visible to approaching traffic.

Informal Street Side Parking – Parallel parking on a street where parking is anticipated to be on an occasional basis.

Inspector - The Building Inspector, Engineering Inspector, or other representative duly authorized by the Town to inspect public and private infrastructure improvements.

Land Use Management Ordinance (LUMO) – The compilation of regulations that affect land use, including the zoning, the environmental regulations, and other land use regulations.

NC DEQ - [The North Carolina Department of Environment Quality](#)

Pedestrian Access Easement - A permanent easement dedicated to the public to facilitate pedestrian access to adjacent streets and properties.

Performance Bond - A bond for 125 percent of the estimated cost in which the surety company has an obligation to the Town for any additional cost to complete a given project due to the



## Chapter 1 - Definitions and Abbreviations

developer's or owner's failure to properly complete the bonded work. A Letter of Credit from a bank or savings & loan, with a branch in North Carolina, bond, certified check, or cash deposit may serve as a performance bond when bonding infrastructure improvements for the Town.

Plans - The approved plans, profiles, standard details, supplemental plans, and working drawings, which show the location, dimensions, and details of the work to be performed.

Plat - A map of a surveyed parcel of land which is intended to be, or has been, recorded in the Orange County Office of the Register of Deeds.

Preliminary Plat - A map indicating the proposed layout of a subdivision or site showing lots, streets, easements, and other requirements of subdivision regulations.

Preliminary Site Plan Are the initial design phase in preparing the construction design documents. Typically the preliminary plans are schematics and design development drawings that allows the Town and architect/engineer to interact before the design is developed, helping to ensure a mutual understanding of the design objectives, limitations and budget.

Private Drive - A vehicular travel way, centered within an access easement, which serves more than two (2) residential lots or more than 2 principal buildings in a multi-family housing development or other non-single-family residential development. An individual entity or property owners association shall maintain private drives. Street side parking spaces, (parallel and angle), are allowed on private drives. Parallel and angle parking spaces shall not protrude into the primary travel way.

Private Street - A vehicular travel way, permitted in developments where property owner associations exist. Private streets shall undergo the same approval process and meet the same design and construction standards as public streets. Private streets may be approved only by Council action.

Public Street - A vehicular travel way within a dedicated and recorded public right-of-way or public easement.

Sidewalk Easement - A permanent easement, which grants the right for a public sidewalk to be placed and maintained thereon.

Sight Easement - A permanent easement, which grants the Town, the right to maintain an unobstructed view across properties primarily located at street intersections, driveways and sharp horizontal curves in the roadway. (The same does not obligate the Town to maintain such).

Site Plan – A development plan required by virtue of the provisions of the LUMO as a condition for the issuance of a permit for development.

Sketch Plan - A rough sketch map of a proposed subdivision or site, showing streets, lots, and any other information of sufficient accuracy to be used for discussion by owner, developer and/or staff, of the street system and the proposed development pattern.



## Chapter 1 - Definitions and Abbreviations

Slope Easement - A permanent easement, which restricts the degree of slope on property and upon which slope cannot be increased.

Stabilizing Vegetation - Any vegetation that protects the soil against erosion.

Standard Specifications – A general term referring to all provisions and requirements contained herein entitled "Roadway Design and Construction Specifications" and any subsequent addendums or revision thereto.

Street - A vehicular travel-way, which provides a means of access and travel. The term street may include road, avenue, place, way, drive, lane, boulevard, parkway, highway, and any facility principally designed for vehicular and pedestrian traffic.

Stub-out Street - A street, which runs to a property line of adjacent property and is intended to continue into adjacent property at such time as the adjacent property is developed.

Subgrade - That portion of the roadbed prepared as a foundation for the pavement structure.

Substantially Completed - Work has progressed to the point that, in the opinion of the Public Works Director, it is sufficiently completed in accordance with the approved plans and specifications that the improved area can be utilized for its intended purposes.

Surety – A guarantee against loss or damage from one's failure to perform and a physical or financial guarantee for the fulfillment of an obligation. Performance Sureties may be in the form of Standby Letters of Credit, Performance Bonds, Certified Check, or Cash.

Surveyor - A person licensed to practice surveying in the State of North Carolina.

Temporary Construction Easement - A temporary easement, which grants the right for the Town, NCDOT or other public utility provider to encroach upon the temporary construction easement while making improvements to public infrastructure and/or public utilities.

Utilities - Facilities of an agency which, provide the general public with electricity, gas, oil, water, sewage, communications, or rail transportation.

Utility Easement - A permanent easement, which grants to the Town and other public utility providers the right to install and thereafter maintain any and all utilities including, but not limited to; water lines, sewer lines, storm sewer lines, electrical power lines, communication lines, natural gas lines, and cable television systems.

Utility Easement (Private) - A permanent easement, which grants the right to install and maintain a private utility across private property. A Private Utility Easement can be granted to an individual, a utility company, a property owners association or to owners of a specified parcel of land.

Wetlands - Areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support and, under normal circumstances, do support a prevalence of vegetation



## Chapter 1 - Definitions and Abbreviations

typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas as delineated by the US Army Corp of Engineers or certified professional in the field of environmental engineering as approved by the US Army Corp of Engineers.

Working Day - Monday through Friday exclusive of Town holidays.





### 1.2 ABBREVIATIONS

<b>AASHTO</b>	<a href="#"><u>American Association of State Highway and Transportation Officials</u></a>
<b>ABC</b>	Aggregate Base Course
<b>ADT</b>	Average Daily Traffic Count
<b>AIA</b>	<a href="#"><u>American Institute of Architects</u></a>
<b>ANSI</b>	<a href="#"><u>American National Standards Institute</u></a>
<b>APWA</b>	<a href="#"><u>American Public Works Association</u></a>
<b>ASPH</b>	Asphalt
<b>ASTM</b>	<a href="#"><u>American Society of Testing and Materials</u></a>
<b>AWWA</b>	<a href="#"><u>American Water Works Association</u></a>
<b>BC</b>	Back of Curb
<b>BC-BC</b>	Back of Curb to Back of Curb
<b>BST</b>	Bituminous Surface Treatment
<b>CATV</b>	Cable Television
<b>CAP</b>	Corrugated Aluminized Pipe
<b>CB</b>	Catch Basin
<b>CFS</b>	Cubic Feet per Second
<b>C&amp;G</b>	Curb and Gutter
<b>CI</b>	Curb Inlet
<b>CIP</b>	Cast Iron Pipe
<b>CL</b>	Centerline
<b>CMP</b>	Corrugated Metal Pipe
<b>co</b>	Sanitary Sewer Cleanout (Drawings)
<b>CO</b>	Certificate of Occupancy
<b>CONC</b>	Concrete
<b>CPP</b>	Corrugated Plastic Pipe
<b>DE</b>	Drainage Easement
<b>DI</b>	Drainage Inlet
<b>DIP</b>	Ductile Iron Pipe
<b>DME</b>	Drainage Maintenance Easement
<b>DMUE</b>	Drainage Maintenance and Utility Easement
<b>EP</b>	Edge of Pavement
<b>ETJ</b>	Extra Territorial Jurisdiction
<b>ex</b>	Existing
<b>FF</b>	Face to Face



## Chapter 1 - Definitions and Abbreviations

<b>FOC</b>	Fiber Optic Cable
<b>G</b>	Gas
<b>GV</b>	Gas Valve
<b>HYD</b>	Hydrant
<b>HDPE</b>	High Density Polyethylene Pipe
<b>ID</b>	Internal Diameter
<b>JB</b>	Junction Box
<b>LP</b>	Light Pole
<b>LUMO</b>	Land Use Management Ordinance
<b>MSL</b>	Mean Sea Level
<b>MUTCD</b>	<a href="#"><u>Manual on Uniform Traffic Control Devices</u></a>
<b>NC DEQ</b>	<a href="#"><u>North Carolina Department of Environment Quality</u></a>
<b>NC EMC</b>	<a href="#"><u>North Carolina Environmental Management Commission</u></a>
<b>NC DOT</b>	<a href="#"><u>North Carolina Department of Transportation</u></a>
<b>NEC</b>	<a href="#"><u>National Electric Code</u></a>
<b>OD</b>	Outside Diameter
<b>P.C.</b>	Point of Curvature
<b>PDE</b>	Permanent Drainage Easement
<b>PE</b>	Professional Engineer
<b>PED</b>	Pedestal
<b>PH</b>	Phone
<b>PINC</b>	Point of Intersection
<b>P/L</b>	Property Line
<b>PLA</b>	Professional Landscape Architect
<b>PLS</b>	Professional Land Surveyor
<b>PP</b>	Power Pole
<b>ppm</b>	parts per million
<b>PROP</b>	Proposed
<b>psi</b>	pounds per square inch
<b>P.T.</b>	Point of Tangency
<b>P.V.C.</b>	Point of Curvature on Vertical Curve
<b>P.V.T.</b>	Point of Tangency on Vertical Curve
<b>PVMT</b>	Pavement
<b>Qmax</b>	maximum discharge
<b>Qmin</b>	minimum discharge
<b>R/W</b>	Right of Way
<b>RCP</b>	Reinforce Concrete Pipe



## Chapter 1 - Definitions and Abbreviations

<b>SD</b>	Storm Drain
<b>SS</b>	Sanitary Sewer
<b>STD</b>	Standard
<b>TBC</b>	Top Back of Curb
<b>TC</b>	Top of Curb
<b>TCE</b>	Temporary Construction Easement
<b>TST</b>	Temporary Sediment Trap
<b>UDO</b>	Unified Development Ordinance
<b>UE</b>	Utility Easement
<b>VCP</b>	Vitrified Clay Pipe
<b>WCR</b>	Wheel Chair Ramp
<b>WL</b>	Water Line
<b>WM</b>	Water Meter

# **Chapter 2**

## **General Provisions**

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### 2.1 GENERAL

For approval of street design, a North Carolina Registered Professional Engineer must seal all construction plans and revisions submitted to the Engineering and Design Services Division, with the exception that the Town will accept for approval, street designs sealed by a North Carolina licensed design professional (PLS, PLA) in those circumstances allowed by North Carolina General Statutes. A digital copy in drawing file (\*.dwg) format of the "Record Drawing" of the development must be submitted before final acceptance and maintenance of any streets and storm drainage systems. The digital files must be tied to the State Plane Coordinate System.

All proposed public streets shall be designed to become part of the overall street system and be identified as such on all adopted plans. All streets and roads shall align with other designated roadways for continuity in the Town's street system.

All single family residential subdivisions shall be accessed by public streets except those wherein private streets have been approved in accordance with the provision of the Land Use Management Ordinance (LUMO).

If there are any conflicting term or requirements between this manual and the LUMO the LUMO shall govern.

The latest revision of the [NC DOT Standard Specifications for Roads and Structures](#), [NC DOT Design Manual](#), [NC Stormwater Best Management Practices Manual](#), [The NC Erosion and Sediment Control Planning and Design Manual](#), [The AASHTO Policy on Geometric Design of Highways and Streets](#), and the [Manual on Uniform Traffic Control Devices](#) shall apply to all roadway and storm drainage construction unless otherwise specified herein this manual.

Dedication of additional right-of-ways, easements, construction of turn-lanes, roadway widening, or other improvements to existing public streets upon which the property fronts or which provide access to new developments may be required as provided for in the LUMO or the Ephesus/Fordham Form Based Code. In some cases the proposed development may be adjacent to roadways, utilities, drainage systems, etc. in which, a large scale infrastructure improvement project may be needed. In such cases, the Town may elect to collect a fee "In-lieu-of Infrastructure Improvements" to be used on a larger scale improvement project adjacent to the development. This process is encouraged on high volume roads where small piecemeal improvements may result in poor construction methods, impaired ride quality, and excessive inconvenience to the public.

### 2.2 APPEALS

Any decision of the Town Manager made in the administration of the provisions of this Manual may be appealed to the Board of Adjustment in accord with the provisions of Article 4.10 of the LUMO Ordinance.

### 2.3 BUILDING SIGNS

Signage is an important element which contributes to the character of Chapel Hill. The two predominant signage types which most contribute to place making in Chapel Hill are on-site signage (signs used to identify a place of business or a residential building); and wayfinding



elements which are placed in the public realm to provide directional assistance or location information to pedestrians and motorists.

The quantity and quality of all signage should be considered in a comprehensive manner within a development but should also be complementary between neighborhoods.

Building identity signs are generally auto-oriented and intended to be seen from a distance. They are usually located in the top half of the building, closer to the roofline, and are the largest signs in an urban area. Signs should be sized for legibility, but also appropriate to the scale of surrounding buildings. They are intended to identify the name of a building or the name of a major tenant within the building. Building identity signs can also contribute to the identity of the skyline by providing visual interest when they are well-integrated into the building architecture.

### **2.4 ADDRESS NUMBERS**

Address numbers must be a minimum of four (4) inches high and of contrasting color to their background. Reflective numbers are preferred and required on front and rear doors of strip shopping centers.

Distance from the Street:

- When the distance from the street or fire department access lane to the front or address side of the building exceeds twenty-five (25) feet, larger numbers are required;
- Twenty-six (26) feet to fifty (50) feet shall have eight (8) inch numbers;
- Fifty-one (51) to seventy-five (75) feet shall have twelve (12) inch numbers; and
- Greater than seventy-five (75) feet shall have eighteen (18) inch numbers.

Where access by private means of a private road and building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure.

# **Chapter 3**

## **Streets, Parking and Transportation**

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### 3.1 GENERAL

#### Required Access

All development must provide access to publicly maintained vehicular, bicycle, and pedestrian facilities, as defined below:

*Vehicular Access* - access to a street which is approved by the Town as being in compliance with Town standards and/or is currently maintained by the Town or the State of North Carolina.

*Bicycle Access* - access to a street or recreation area/space containing a bikeway (bike lanes, bike paths, bike trail, multi-use paths, multimodal, etc.) or abutment on a street for which bikeways are not required. (Such streets are presumed to be adequate for combined vehicular/bicycle traffic.)

*Pedestrian Access* - access to a street or dedicated recreation area/space containing a pedestrian way (sidewalks or pedestrian trail), or abutment on a street for which sidewalks are not required.

Nothing in the above definition of access shall be deemed to preclude the Town's authority to require improvement of substandard access ways to applicable standards. At a minimum, access ways shall have an engineered all weather surface which will reasonably accommodate routine service vehicles and emergency vehicles.

#### Relationship to Town Plans

Streets, including associated bikeways, sidewalks, trails, multi-use paths, and transit amenities, shall be arranged, designed, and located in conformance with adopted Town plans including but not limited to the Land Use Plan, Mobility and Connectivity Plan, Street Classification Plan, Entranceways Plan, Greenways Plan, Transit Plans, the Ephesus-Fordham Regulating Plan and Small Area Plans.

Some Town plans may include different design guidelines for specific areas of Town.

#### Relationship to Surrounding Access Ways

Streets, including associated bikeways, sidewalks, trails, multi-use paths, and transit amenities, shall be appropriately related to, and coordinated with, surrounding existing and proposed roadways, bikeways, and pedestrian ways and transportation patterns. Roadways, bikeways, and pedestrian ways shall connect where necessary to permit the convenient and safe movement of traffic. While street connections are encouraged, connections to local streets should be designed to minimize their use by through traffic.

To provide convenient access for pedestrians each new development should:

1. Provide walkways with direct access to adjacent developments, neighborhoods, parks, bus stops and street sidewalks or an alternative pedestrian system.
2. Investigate the possibility of using utility easements as connecting trails.
3. Preserve existing trails unless a superior alternative is provided.
4. Install pedestrian signals at intersection and pedestrian islands on roads when warranted.
5. Provide walkways through and from parking areas to buildings, other than drive aisles.
6. Construct walkways along all public streets unless existing conditions dictate





- otherwise.
7. All crosswalks should be clearly marked with paint, thermo-plastic, hi-visibility, or contrasting surface material in compliance with The Manual on Uniform Traffic Control Devices (MUTCD).
  8. Provide bicycle and pedestrian access to adjacent greenways.
  9. Design modifications may be approved based on site specific conditions, neighborhood character and existing infrastructure.

### Extension and Completion of Access Ways

*Extension to Boundaries* - Streets, bikeways, and pedestrian ways to be extended onto adjacent property or into subsequent approved phase(s) of a single development shall be constructed to the common property line or phase boundary. Where necessary to facilitate traffic flow or accommodate emergency vehicles, a temporary turnaround may be required at the end of a street pending its extension. Turnarounds or cul-de-sacs are required for street extensions greater than 150 feet. Extension beyond the boundaries may be required, where right-of-way exists, to create connectivity.

*Improvement of Substandard Access Ways* - Where a development impacts, abuts or contains an existing street, bikeway, or pedestrian way which provides required access but does not meet the standards contained herein, improvement of such access way to applicable standards may be required if the development is expected to increase traffic volume and/or affect the capacity of the existing facility. This may involve off-site improvements of the access way. Partial width access ways shall be prohibited and abutting existing partial width access ways shall be completed to applicable standards.

### Public and Private Access Ways

*Public Access Ways* - Public access ways are streets, alleys, bikeways, and pedestrian ways located within publicly dedicated rights-of-way or easements and accepted for maintenance by the Town of Chapel Hill or the State of North Carolina. Public access ways shall not be accepted for maintenance unless they meet all applicable standards.

*Private Access Ways Providing Required Access* - Private access ways are streets, bikeways, and pedestrian ways located on private property. Where private access ways provide required access, they shall meet all applicable standards. Provision for their continued maintenance shall be approved by the Town Manager and recorded with the Orange County Register of Deeds in a legally valid and binding instrument which describes the properties the private access way serves. The recorded document runs with the land. The maintenance agreement shall apply to all properties which the private access ways serve. It shall contain a provision which, at any such time the private access way is no longer maintained to applicable standards, the Town of Chapel Hill, Orange County, or the State of North Carolina, as appropriate, may provide such maintenance, with the total costs of required maintenance assessed to those properties subject to the agreement.



### **Encroachments in the Public Right-Of-Way**

An encroachment is an installation which is owned by an individual(s) or business entity within the street right-of-way. Generally, an encroachment agreement is required for all installations when a foundation or footing is necessary for the encroachment, any installation above or below grade which may inhibit the public use of the available space in the right-of-way or create potential maintenance difficulties for the Town. Some examples of encroachments are fences, walls, mail box on a foundation, significant landscaping, above ground communication boxes, aerial and underground cable, and private irrigation systems.

The Town Manager or Director of Public Works may approve temporary encroachments after staff review to ensure the public's safety and welfare. To apply for an encroachment the requestor must contact the Engineering & Design Services Division and provide a description of the proposed encroachment including a sketch showing the dimensions with the proposed location. If approved, the applicant must fill out the Encroachment Agreement and attach an 8 1/2 inch by 11 inch exhibit showing the installation and location (see Appendix A for sample). After all signatures the applicant is asked to record the agreement at the Orange County Register of Deeds and send a copy of the recorded document to the Engineering & Design Services Division.

Prior to placement or maintenance of facilities in the public right-of-way in situations where the Town does not issue franchises, the Director of Public Works or designee shall determine, in his/her discretion, the necessity of and type of encroachment, taking into consideration the length of time the facilities will be in the public way and the potential impact on the public way. Facilities for which an encroachment agreement shall be required include monument signs, monument mailboxes, fiber optic cable, irrigation systems, specialty street signs, canopies, specialty pavement structures, and other features.

*Monument mailboxes encroachment.* A monument mailbox is a mailbox with a foundation and/or mailbox that services multiple residences. A monument mailbox encroachment may be granted by the Town's Public Works Department for the owner to construct and maintain a monument sign and/or monument mailbox within the public way.

*Telecommunications encroachment.* A telecommunication encroachment may be granted to construct and maintain equipment which transmits/communicates between points specified by the user and provides services regulated under the Federal Telecommunications Act of 1996 and are not subject to a franchise agreement. This equipment shall be referred to as a telecommunications system. The Town Council may grant a telecommunications encroachment for users proposing to construct and maintain telecommunications system within the public way. Screening for above ground installations may be required.

*Encroachments for other facilities.* The Public Works Department may grant a temporary encroachment to construct and maintain other facilities not included above.



### 3.2 DESIGN CONTROLS AND CRITERIA

#### Street Classifications and Geometric Standards

Street classifications and geometric design standards are outlined in Tables 3.1 and 3.2. Information regarding existing streets and their classifications is available in the Chapel Hill.

All streets within the Town limits are classified primarily by functional and/or operational characteristics, rather than by specific geometric criteria.

The street design standards represent specific interpretations of the general intentions embodied in the [Town of Chapel Hill Land Use Management Ordinance and Design Guidelines as well as the Ephesus-Fordham Form Based Code](#). Because the terrain of Chapel Hill varies from level to hilly, the standards have been written as broadly as possible. The notion of limiting cut and fill within the limits of public safety has been important in developing these standards.

The conscientious designer may occasionally find street design in specific areas could be better accomplished in a manner which does not coincide with every standard in Tables 3.1 and 3.2. In such cases, the Town Manager will consider whether strict adherence to all standards would create significantly undesirable conditions and/or deviation from the standards would produce a significantly better improvement. Similarly, the Town Manager may not allow the use of a standard if public safety considerations dictate otherwise under specific conditions.

The standards in Table 3.2 are presumptive. They are intended to be valid in most cases, but it is understood public interest may be better served in certain unique situations by allowing some flexibility in the standards. New streets should be designed in a manner which balances functional and safety needs with the objective of preserving as much of the existing terrain and vegetation as is practicable.

Streets in Chapel Hill are classified by their functional relationship to through-traffic service and land-access service. The three primary street classifications and functions are:

*Arterial* - Arterial streets function primarily to serve through-traffic movement. Limited land-access service may be accommodated, but traffic controls and street design are intended to provide efficient through-traffic movement.

*Collector* - Collector streets penetrate neighborhoods, public service areas, and districts. They are intended to provide both through-traffic and land-access services in relatively equal proportions, often linking the local street system to the arterial street system.

*Local* - Local streets primarily serve land-access functions. They are intended to accommodate land parcel ingress and egress. Through-traffic movement is difficult and discouraged by traffic controls and street design.

The relationship between functional street classifications is a continuous one, without specific clear-cut boundaries. Streets are classified by the Town's Traffic Engineering Services Manager and Transportation Planning Manager based on technical judgment and observed function of the street. A list of existing street classifications is available from Town's Public Works Department or Department of Planning and Sustainability Department. The list will be updated as new streets are approved by the Town.

By definition herein, a private street is a means of vehicular ingress or egress not publicly



maintained and serves more than two single family lots, or as part of a privately maintained street system approved as part of a Special Use Permit or other Council approval.

The provision of sidewalks on both sides of the street is required; however, subject to staff review, sidewalks can be omitted on one side of new streets where site constraints preclude construction and where there are no existing or anticipated uses which would generate pedestrian trips. Where there are service roads, the sidewalk adjacent to the main road may be eliminated and replaced by a sidewalk adjacent to the service road on the side away from the main road. For rural roads likely to serve development, a shoulder of at least four (4) feet in width, preferably eight (8) feet on primary highways, should be provided. Surface material should provide a stable, walking surface.

**Table 3.1**  
**Geometric Design Standards for Streets and Intersections**



	Arterial 12 Foot Lane			Collector 11 Foot Lane			Local 10 Foot Lane		
	Level	Roll	Hilly	Level	Roll	Hilly	Level	Roll	Hilly
Terrain Type (% Grade)	<8	8-15	>15	<8	8-15	>15	<8	8-15	>15
Vertical Curve "K" Value <sup>1</sup> (Crest/Sag)	55/ 55	45/ 45	40/ 40	40/ 45	28/ 35	20/ 20	28/ 35	20/ 20	15/ 20
Stop	20	14	9	14	9	7	9	7	5
Street Grade (%) (Max./Min.)	4/1	6/1	8/1	4/1	8/1	12/1	5/1	10/1	15/1
Min. Horizontal Street Center-line Radius (ft) *Super-elevated	500 *NA	425 *NA	350 *NA	300 *400	250 *350	200 *300	200 *250	150 *175	100 *100
Typical Shoulder Width for Streets Without Curb and Gutter or Sidewalk (ft.)	12	10	8	10	8	6	8	6	4
Minimum Street Corner Radius at Intersections	40	40	30	30	30	30	20	20	20
	For R/W See Typical Sections			For R/W See Typical Sections			For R/W See Typical Sections		

Figure 3.1 Notes:

1. Vertical Curve "K" Value - Used in computing the minimum length of vertical curve from the formula  $L=KA$  where:  $L$  = Length of Vertical Curve (100 ft.);  $K$  = Design Constant;  $A$  = Algebraic Difference of Connected Grades (%).
2. Street and right-of-way widths will vary depending on specific combinations of utility requirements, sidewalks, traffic lanes, turn lanes, parking lanes, bike lanes, bus pull-offs, multimodal paths, etc. See typical street cross-section drawings for more details.
3. All streets with centerline or one-way crowns should be designed with a 2% cross slope. This does not apply to super-elevation designs on curves.
4. Intersecting streets should be designed to create 90° intersection angles. The minimum allowable angle of intersection is 75° under special conditions.
5. Intersection sight distance criteria and other related information are shown in the standard details.
6. Unless specified herein the American Association of State Highway and Transportation Officials (AASHTO) guidelines and standards will apply where appropriate

**Vertical Alignment** - Streets should be designed to provide gradual grade changes



and to avoid a "roller coaster" effect. Where possible, streets should be designed to avoid deep cuts and fills.

**Horizontal Alignment** - Streets should be designed to provide long curves and to avoid sharp curves at the end(s) of straight sections or flat curves. Compound curves and "S" curves are to be avoided.

**Minimum Street Elevations** - Minimum elevations for crown of arterial street pavements shall be two (2) feet above the one hundred (100) year flood elevation as shown in the Flood Insurance Study Flood Boundary and Floodway Maps and Flood Insurance Report. Streets, bridges, and other similar transportation facilities are permitted in the Resource Conservation District only upon approval of a Special Use Permit or a Subdivision application by the Town Council or by a variance granted by the Board of Adjustment.

**Guardrails and Barriers** - Physical barriers (such as guardrails) should be provided along roadway edges and in medians where warranted due to potential roadway safety hazards such as structures, embankments, ditches, or bodies of water. Refer to NCDOT guidelines. Guardrail shall be constructed within the right of way wherever the Town determines they are necessary. Generally, guardrails will be required if a fill slope is steeper than 3:1 with a fill height greater than eight feet, or as necessary adjacent to bridges and large culverts.

Reflectorized end of road markers (per MUTCD) shall be installed at the end of pavement on all streets or drives which are temporarily dead ended or when a "T" turnaround is installed. The types(s) of barrier(s) required will be determined by the Town.

**Intersections** - Intersections of streets should be designed to minimize the number of potential conflicts among vehicular movements; to give; to coordinate the location and alignment of driveways; to discourage dangerous vehicular movements; to avoid multiple and compound merging and diverging maneuvers; and to provide adequate sight distances, and designed to assure adequate visibility for vehicles and pedestrians using the intersection. Signs, trees, shrubs, etc. should not interfere with these sight lines. The property owner shall dedicate sight line easements as necessary.



Table 3.2 Street Standards

Main Street Classification	Street Sub Classification	Function	Design Speed	Lane Width	Number of Travel Lanes	Turn Lanes	Bike Lanes	Sidewalks	On-Street Parking	Intersection Spacing	Driveway Spacing	Planting Strip
Arterial	Boulevard	Arterial	25-45 mph	12 feet 11' minimum	4 to 6 Lanes (4 lanes typical)	As warranted by traffic volume (minimum 11' width)	5' + 2' Buffer at 35 MPH and greater speeds	Minimum 6' unobstructed; Minimum 10' with 0' setback	Separate, parallel facility; 8' from face of curb	1000'  800' in Business District	500' minimum between driveways	8'
Arterial	Parkway	Arterial	>35 mph	12 feet 11' minimum	4 to 6 Lanes (4 lanes typical)	As warranted by traffic volume (minimum 10' width)	Multi-Use Path; Alternate is 5' with 2' Buffer	6' Unobstructed or Separate parallel multi-use path	No	Minimum 1200'	600' or subject to Engineering Review	8'
Collector	Main Street	Collector	20 to 25 mph	11 feet	2 lanes	As warranted by traffic volume (minimum 10' width)	5'	Minimum 10' unobstructed	Parallel, 8' from face of curb	Not to exceed 400'	50' minimum between driveways	8'
Collector	Avenue	Collector	25 to 35 mph	11 feet	2 to 5 lanes	As warranted by traffic volume (minimum 10' width)	5' with 2' Buffer at 35 mph	Minimum 8' unobstructed	Parallel, 8' from face of curb	400' Minimum Not to exceed 600'	50' minimum between driveways	8'
Local	Local/Subdivision Street	Local Residential	25 mph	11 feet; 9' feet if parking on one side	2 lanes	As warranted by traffic volume (minimum 10' width)	None	Minimum 5' unobstructed	Allowed	100'	Varies subject to Engineering Review	3'
Local (Public or Private)	Local/Subdivision Street	Local Commercial	20 to 25 mph	11 feet	2 lanes	As warranted by traffic volume (minimum 10' width)	Shared – No striped bike lanes	Minimum 10' unobstructed	Minimum 8' from face of curb	Varies subject to Engineering Review	50' subject to Engineering Review	8'

Note: All measurements between driveways and intersections are from edge of pavement to edge of pavement.

Note: Transit Provisions will be determined by transit and as warranted by this manual.

Note: Planting Strip Width may vary if the street is located in the Ephesus Fordham District – Type A, Type B, or Type C Frontage.

Note: Street cross-section elements may vary if the street is located in the Ephesus Fordham District – Type A, Type B, or Type C Frontage. See Ephesus Fordham section of Chapter 3.

Note: On-Street Parking is not allowed within 50 feet of any street intersection.

Note: Sidewalks may be identified as sidepaths or multiuse paths identified in the Greenways/Mobility and Connectivity/or other Town Master Plans. These identified sidepaths must be constructed of concrete, see Town Detail PR-5.00.

Note: Driveway Access      Local Streets – No driveway connection permitted within 50 feet of a street intersection.

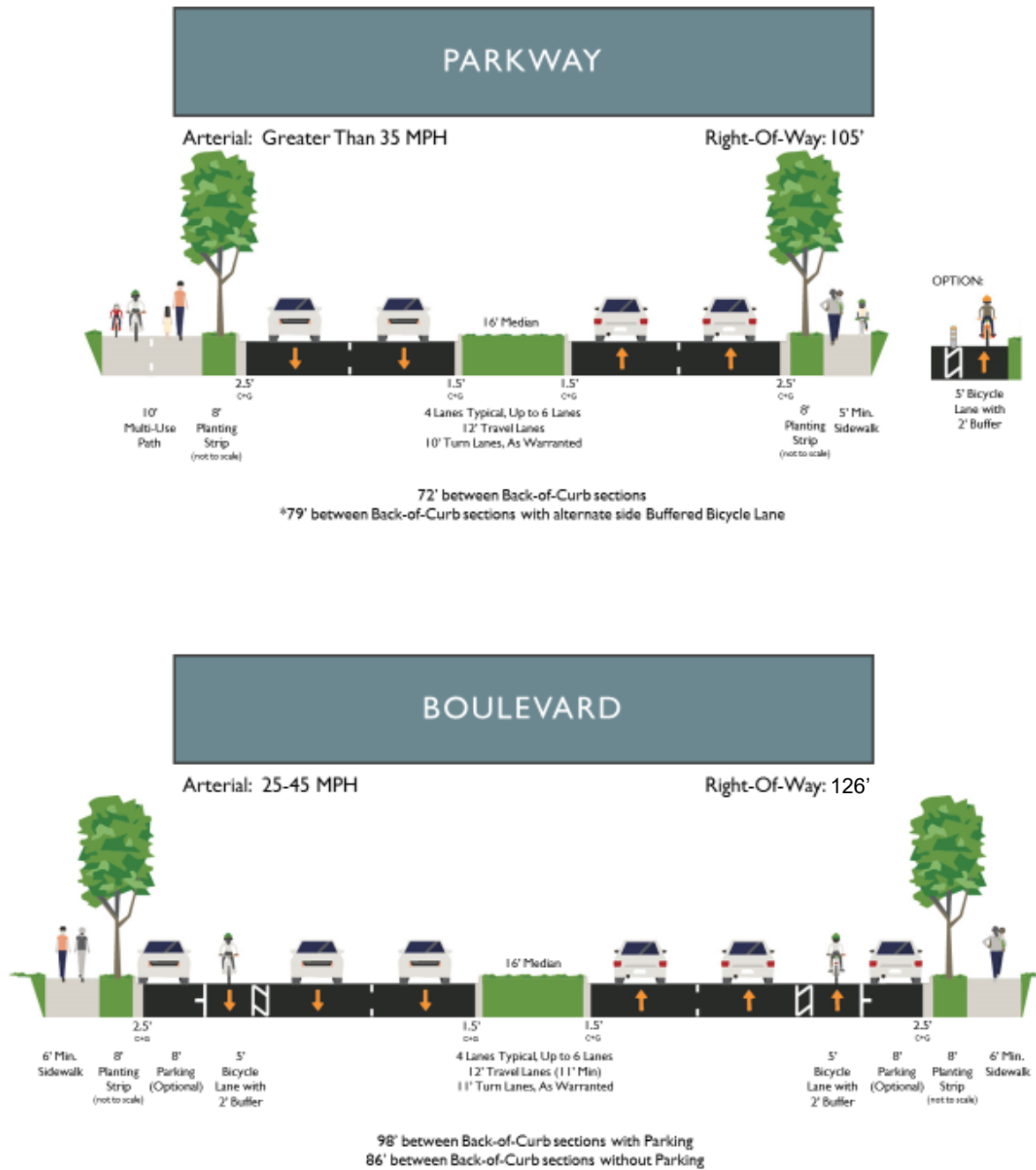
Collector Streets – No driveway connection permitted within 100 feet of a street intersection. Residential driveway access is restricted if driveway access is available on a Local street.

Arterial Streets – No driveway connection permitted within 150 feet of a street intersection. Driveway connections are not allowed on an Arterial Street if access is available from a Collector or Local Street.

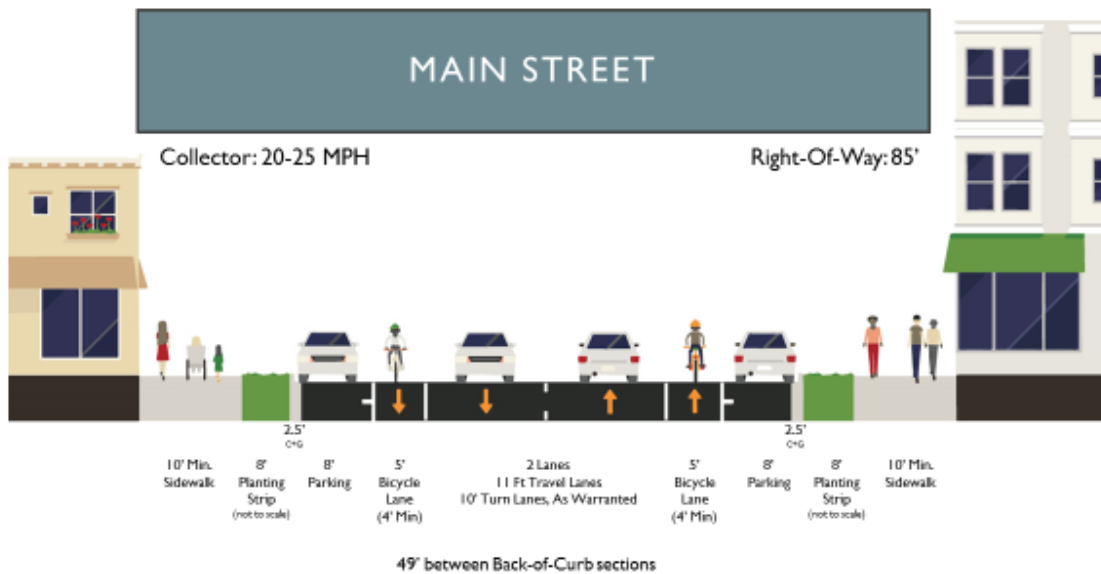
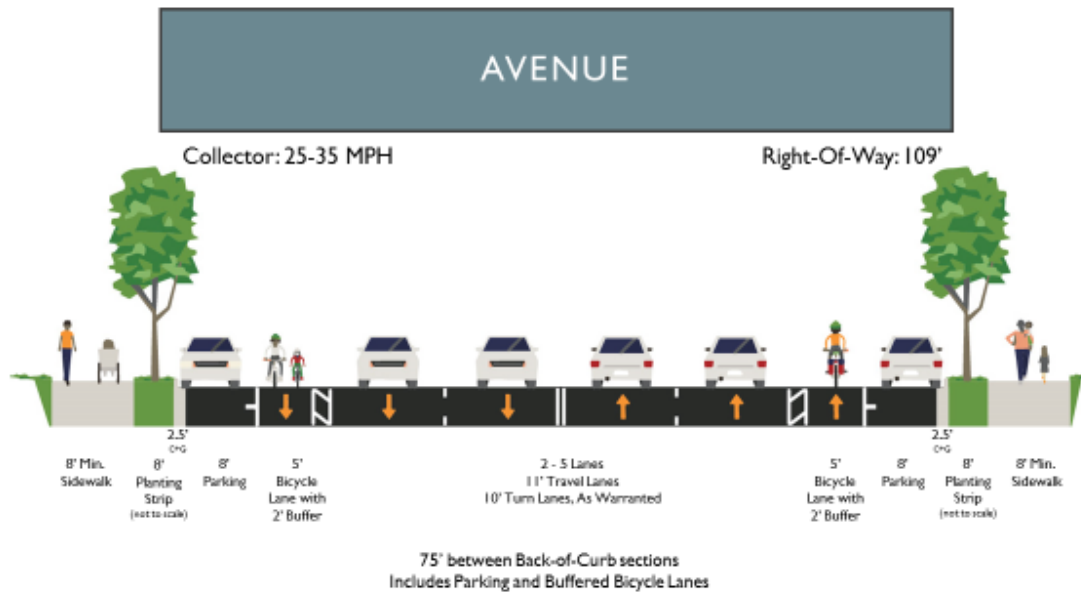




## GRAPHIC STREET SECTIONS









## RESIDENTIAL/SUBDIVISION STREET

Local: 25 MPH

Right-Of-Way: 45'

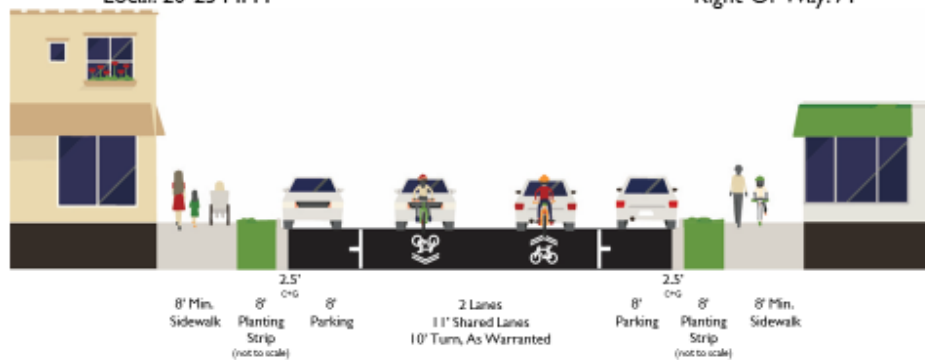


27' between Back-of-Curb sections (Min Width)  
Includes Parking, Curb, and Gutter.

## COMMERCIAL STREET

Local: 20-25 MPH

Right-Of-Way: 71'



39' between Back-of-Curb sections



**Guidelines for Complete Street Installation** *(When the appropriate typical street cross-section cannot be constructed due to physical or right-of-way constraints the following procedure shall be followed for the Town staff to provide a street recommendation.)*

The purpose of this section is to explain how the perspectives of stakeholders interested in or affected by existing or future streets will be incorporated into a process for planning and designing streets in the Town of Chapel Hill. The process is modeled after a planning program for Charlotte's Sphere of Influence. The process described in this section consolidates traffic engineering, traditional city planning, urban design, and transportation planning activities into a sequence of decision-making steps.

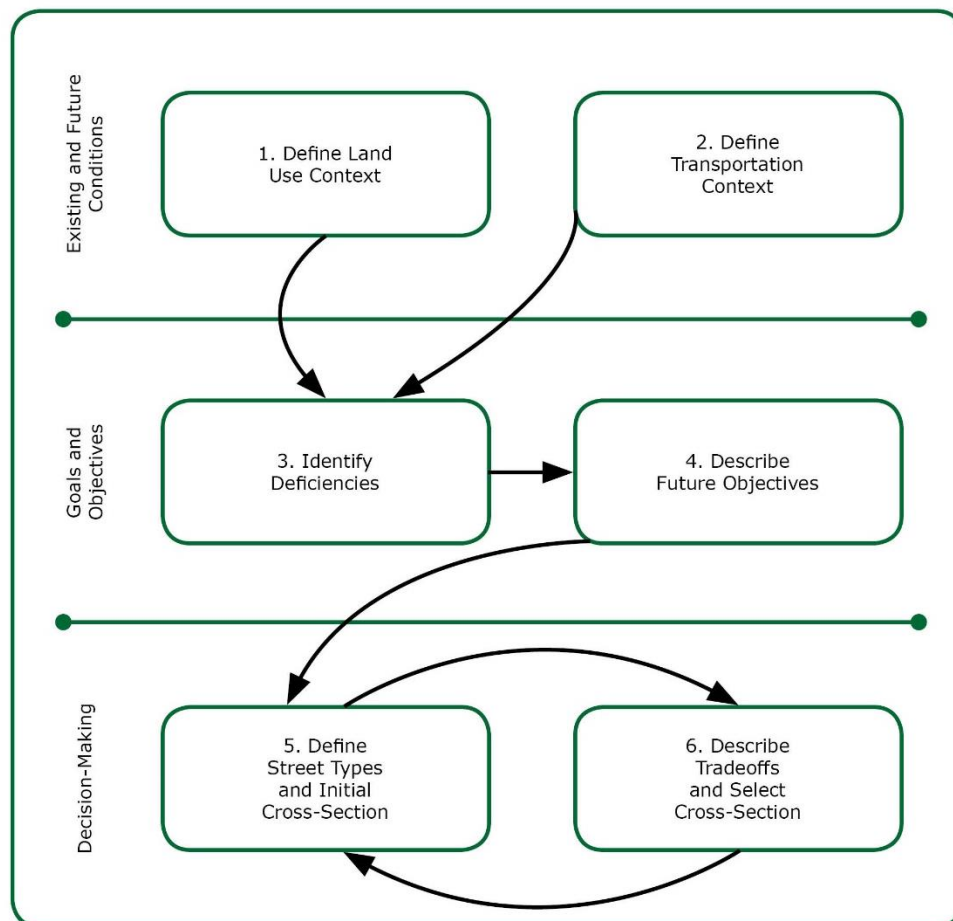
The application of this process for planning and designing streets is intended to support the creation of "more streets for more people" this goal will require the following procedure:

1. Ensuring the perspectives of all stakeholders interested or affected by streets are considered during the planning and design process for existing or future streets;
2. Defining a clear sequence of activities to be undertaken by staff, consultants and other stakeholders\* ( See Figure 3.1)
3. Keeping in mind this process is geared toward what we want to happen in the future than just accepting what happened in the past or exists now;
4. Verifying the inevitable tradeoffs affecting objectives, benefits, costs, and impacts are well documented so the recommendations made by staff, are based on understanding the direct effects on specific modes of travel and/or land use intentions; and
5. Always trying to create more complete streets for all modes of travel, which are noteworthy because of the very effective ways which the adjacent land uses and transportation functions of those streets support each other.

The process described in this section provides flexibility to those involved in the decision-making process, to ensure the resulting streets are appropriately based on the existing and proposed land use and transportation contexts.

\*The stakeholders involved in the preliminary recommendation are: Town of Chapel Hill staff (Public Works Department, Planning and Sustainability Department), property owners abutting the street, and the developer. The public at-large will be provided opportunities to weigh-in during the public hearing process, when applicable.

**Figure 3.1 - Six Step Process for Applying Street Design Guidelines**



Source: City of Charlotte

The six-step process shown above and described below will primarily be applied to planning and designing the "non-local" street types - Boulevards, Parkways, Main Streets, Avenues.

## *Step 1: Define the Existing and Future Land Use and Urban Design Context*

The classification and ultimate design of any street should reflect both the existing and expected future land use contexts.

- What does the area look like today?
- What are today's land use mixtures and densities?
- What are the typical building types, their scale, setbacks, urban design characteristics, relation to street, any special amenities, etc.?
- Are there any particular development pressures on the area (the nature of this may vary according to whether the area is a "greenfield" versus an infill area and this type of information is particularly important in the absence of an area plan)? What, if anything,



can be gleaned from permit data, for example, about the nature of the emerging land use context?

- What are the "functions" and the general circulation framework of the neighborhood and adjacent areas?
- Is there a detailed plan for the area?
- If so, what does the adopted, detailed plan envision for the future of the area?
- Does the plan make specific recommendations regarding densities, setbacks, urban design, etc.?
- Are there any other adopted development policies for the area?
- If so, what do those policies imply for the area?

### *Step 2: Define the Existing and Future Transportation Context*

The transportation assessment should consider both the existing and expected future conditions of the transportation network. The following questions should be addressed by the design team:

- What is the character of the existing street? How does the street currently relate to the adjacent land uses?
- How does the street currently function? What are the daily and hourly traffic volumes? Operating and posted speeds? What is the level-of-service (LOS) for pedestrians? Cyclists? Motorists?
- What are the current design features, including number of lanes, sidewalk availability, bicycle facilities, traffic control features, street trees, etc.?
- What, if any, transit services are provided? Where are the transit stops?
- What is the relationship between the street segment being analyzed and the surrounding network?
- Are there any programmed or planned transportation projects in the area which may affect the classification of the street segment?
- Are there any other adopted transportation policies which may affect the classification of the street segment?

### *Step 3: Identify Deficiencies*

Once the existing and future land use and transportation contexts are clearly defined and understood from an area-wide perspective, the design team should be able to identify and describe any deficiencies which could/should be addressed by the new or modified street.

Deficiencies might include, but are not limited to:

- Gaps in the bicycle or pedestrian network near or along the street segment;
- Insufficient pedestrian or bicycle facilities
- Gaps in the overall street network (this includes the amount of connectivity in the area, as well as any obvious capacity issues on other segments in the area);
- Inconsistencies between the amount or type of transit service provided along the street segment and the types of facilities and/or land uses adjacent to the street;
- Inconsistencies between the existing land uses and the features of the existing or planned street network.



### *Step 4: Describe Future Objectives*

This step synthesizes the information from the previous steps into defined objectives for the street project. The objectives will form the basis for the street classification and design.

In addition to the general intent of providing complete streets, the following issues should be considered in defining specific objectives:

- What conditions are expected to stay the same (or, more importantly, what conditions should stay the same)?
- Would the community and the stakeholders like the street and neighborhood to stay the same or change?
- Why and how would the community and stakeholders like the street and neighborhood to change?

### *Step 5: Recommend Street Classification and Test Initial Cross-Section*

The initial cross-section should be tested against the land use and transportation contexts and the defined objectives for the street project. Any constraints to the provision of the initial, preferred cross-section should also be identified, including:

- Lack of right-of-way,
- Existing structures,
- Existing trees or other environmental features,
- Topography, and
- Location and number of driveways.

This step should also include a recommendation for any necessary adjustments to the land use plan/policy and/or transportation plan for the specific area.

### *Step 6: Describe Tradeoffs and Select Cross-Section*

If the initial, "preferred" cross-section can be applied, then this step is easy: the initial cross-section is the recommended cross-section. In many cases, though, the initial cross-section will need to be refined to better address the land use-and transportation objectives, given the constraints identified in Step 5. Sometimes, the technical team will develop more than one alternative design. In this case, the multiple alternatives should be presented to the stakeholders.

Any refinements to the initial cross- section (or alternatives) should result from a thoughtful consideration of tradeoffs among competing uses of the existing or future public right-of - way. The tradeoffs should be related to the requirements of each group of stakeholders and the variety of design elements which can best accommodate those requirements.

Once the tradeoffs are evaluated, the team should be able to develop a refined cross-section and suggested design treatments. The culmination of all of the previous steps, including any additional stakeholder comments, should provide sufficient rationale to select the design alternative which best matches the context and future expectations for the street project.



### *Final Comments on the Six Steps*

The steps outlined in this section suggest there is a linear process leading to an ideal solution. Realistically, in some instances the process may not follow the exact sequence described above. Some information may not be available or even be applicable for some conditions. The intent, though, is to ensure the existing and future contexts are given adequate consideration, any related plans are modified to reflect the outcome, and all perspectives are considered.

**Appropriate Speed** - Local streets should be designed to discourage excessive vehicular speeds. Traffic calming techniques are encouraged where warranted by conditions. Traffic calming is a broad term representing a variety of measures which can be implemented to create safer streets by improving conditions for pedestrians and bicyclists. [The Institute of Transportation Engineers](#) defines traffic calming as “the combination of mainly physical measures which reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users” (ITE Journal, July 1997).

Traffic calming measures accomplish this by:

1. Slowing the speed of motor vehicles
2. Reducing collision speed and severity
3. Improving safety for non-motorized users of the street
4. Enhancing the street environment
5. Increasing access for all modes of transportation
6. Reducing cut-through motor vehicle traffic

The primary methods for accomplishing these objectives are through speed control measures. Other methods include increasing public education and awareness through traffic safety campaigns, police enforcement, and street parking. Volume control measures also exist but should be considered extraordinary measures used under strictly limited and specifically defined circumstances.

### **3.3 TRAFFIC CONTROL DEVICES**

Where warranted and as necessary for motorist, bicyclist, and/or pedestrian traffic control; traffic signals, signs, and markings shall be provided in accordance with the standards set forth in the latest version of the Manual on Uniform Traffic Control Devices for Streets and Highways. Installation of all traffic control devices shall be approved by the Town Manager and the North Carolina Department of Transportation where applicable.

#### **Traffic Calming Policy (2016) and Procedures**

Traffic calming measures are applicable in residential neighborhoods where speeding vehicles and/or cut-through traffic are the primary concerns, and traditional police enforcement is found to be unfeasible and/or ineffective. Streets must typically be residential in nature for consideration under this policy. The policy is intended to promote traffic calming measures which are appropriately implemented, coordinated with the Town’s key departments including Police, Fire, Engineering and Transit, and are supported by the community. In addition to citizen requests, traffic calming projects can also be identified by Town staff, Town Advisory Boards, and/or the Town Council.

The Staff will identify improvements to the procedures to keep the implementation of the Council’s policy up-to-date. Staff will report on the status of the procedures during the annual update on the Town’s Traffic Calming Program.



The following procedure(s) will be used to identify, evaluate, and implement traffic calming projects in Chapel Hill:

1. A citizen requesting traffic calming improvements will fill out a Request for Traffic Calming Measures form available in the Town Public Works Department and on the Town web site (See Appendix A).
2. Upon receipt of a properly completed request form, the Town's Transportation Management Team will review the initial request to make sure the requested streets for traffic calming measures do not reduce response time for emergency service providers. The Public Works Department will determine an applicable "service area" surrounding the requested traffic calming site(s) and will provide the requesting citizen with a Petition form (See Appendix A) to be signed by interested property owners within the designated service area. The size and extent of the service area will take into consideration the type of traffic calming project being proposed, the layout and type of properties in the vicinity, and the characteristics of the street network surrounding the proposed project site(s). Depending on the circumstances, the service area may include:
  - All properties abutting the proposed street segment to be modified.
  - All properties on adjacent street(s) with ingress/egress only possible via the modified street segment.
  - All properties on adjacent street(s) having alternative points of ingress/egress but will be otherwise affected by the modified street segment.

The Transportation and Connectivity Advisory Board will hear appeals regarding service area boundaries established by Town staff, and will provide recommendations regarding alterations of the boundaries for consideration by the Manager.

3. The Public Works Department will prepare a Petition form including the following items:
  - A map showing the service area
  - A listing of property owners in the service area
  - A preliminary traffic calming plan showing probable devices and their locations

The requesting citizen will obtain signatures on the Petition form. A valid Petition for Traffic Calming Measures must be signed by two-thirds of the property owners within the service area surrounding the requested traffic calming site(s).

4. The requesting citizen will return the Petition form, with **original** signatures, to the Public Works Department at 6850 Millhouse Road, Chapel Hill, N.C. 27516. Email signed petitions from the property owners are also allowed in lieu of original signatures. The email petition must indicate the full name(s) of property owners. Email signed petitions must be returned to the email address [traffic@townofchapelhill.org](mailto:traffic@townofchapelhill.org).
5. The Public Works Department will confirm the Petition signatures concur with land ownership records. Once a Petition is determined to be valid, the Public Works Department will notify the requesting citizen of the petition status.
6. Upon receipt of a valid Petition (as described in Step #3 above), the Public Works Department will gather project site data including traffic volumes, speeds, and accident history. A proposed project plan will be developed using the following procedure:
  - Assess problems and needs





- Identify goals and objectives
- Identify evaluation criteria
- Evaluate alternatives
- Select a proposed plan

The development of a traffic calming plan will include review and evaluation by the Town Fire Department, the Town Police Department, the Town's Transportation Management Team, neighborhood meetings, citizen input, consideration of current Town Policy for Placement of Stop Signs and Assignment of Speed Limits, and evaluation of the types and design criteria of traffic calming measures applicable to site.

The Public Works Department will prepare a cost estimate for the proposed traffic calming project and associated improvements.

7. Traffic calming projects will be prioritized in accordance with the ranking system outlined in the Policy, and will be presented to the Town Transportation and Connectivity Advisory Board for consideration. The Board will review the proposed projects, including the associated traffic data compiled for each project. Based on its review, the Board will provide recommendations to be included with the Town Manager's annual report to the Town Council regarding proposed traffic calming projects
8. In the fall of each year, the Town Manager will prepare and present to the Council a report regarding proposed traffic calming projects. This report will include:
  - A prioritized list of proposed traffic calming projects
  - A summary of the traffic data pertaining to each project
  - Transportation Board review comments and recommendations
  - The Town Manager's recommendations

The Council will receive the Manager's report and recommendations, and may approve projects or refer them for further consideration during annual budget deliberations.

9. If necessary, during the budget development process, the Council will consider the proposed traffic calming projects presented in the Manager's annual report, and will allocate funds for construction as it deems appropriate.
10. Once project funding is approved by the Council, the Public Works Department will prepare construction plans and specifications and an updated cost estimate.
11. When the final project drawings are complete, the Public Works Department will schedule a neighborhood meeting to discuss the plans, estimated costs, and construction procedures/schedule. Each property owner in the service area of the project will be notified when and where the meeting is scheduled.
12. The project will be constructed by Town forces or by private contractor.
13. Town staff will monitor the performance of completed traffic management projects, and will report to the Council and Transportation and Connectivity Board regarding the operation and effectiveness of the traffic calming measures within 12-18 months following



installation. This follow-up report could result in Council action to revise or remove a previously approved traffic management measure.

14. Citizen requests for removal of traffic calming devices will be required to go through the same petition process described previously for installation requests.

**Table 3.3 – Types of Traffic Calming Measures and Design Criteria**

Traffic Calming Device	Street Classification (Intersection)	Average Daily Traffic Volume (ADT) Minimum & Maximum	Street Width (Edge to Edge)	Street Grade or Intersecting Street Grades	Line of Sight (Minimum)	Adjacent On-Street Parking	Posted Speed Limit	Minimum 85 <sup>th</sup> Percentile Speed
Speed Tables	Local or Local Collector	800 - 3000 vpd	25 ft.	4%	360 ft.	Removed	25 mph	35 mph
Pavement Treatments	Local or Local Collector	800 - 3000 vpd	20 ft.	4%	360 ft.	Removed	25 - 35 mph	35 to 45 mph
Semi-Diverter	Local	800 - 1500 vpd	25 ft.	1%	360 ft.	Removed	25 mph	35 mph
Cul-de-sac	Local	800 - 1500 vpd	(Note 1)	(Note 2)	360 ft.	Removed	25 mph	35 mph
Mid-block Closure	Local	800 - 1500 vpd	25 ft.	(Note 2)	360 ft.	Removed	25 mph	35 mph
Forced Turn Channelization	Major Street - Local or Local Collector Minor Street - Local	800 - 1000 vpd	25 ft.	(Note 1)	360 ft.	Removed	25 - 35 mph	35 to 45 mph
Traffic Circle	Major Street - Local or Local Collector Minor Street - Local	800 - 3000 vpd	(Note 1)	1%	360 ft.	Removed	25 - 35 mph	35 to 45 mph
Chicanes	Local Collector	800 - 3000 vpd	(Note 1)	4%	360 ft.	Removed	25 - 35 mph	35 to 45 mph
Chokers	Local or Local Collector	800 - 3000 vpd	(Note 1)	4%	360 ft.	Removed	25 - 35 mph	35 to 45 mph

Note 1: Existing Street conditions must be able to accommodate Emergency vehicle requirements.

Note 2: Existing Street conditions must be able to maintain drainage requirements.

Note 3: The criteria in this table were developed by the Chapel Hill Public Works Department. They are based on accepted traffic engineering practices and similar traffic calming applications in other parts of the country.



### Stopping Sight Distance and Sight Line Triangles at Intersections

Sight line triangles at intersections should be designed to assure adequate visibility for vehicles and pedestrians using the intersection. Signs, trees, shrubs, etc. should not interfere with these sight lines. The developer shall dedicate sight line easements as necessary.

The following table has been adopted from the American Association of State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highways and Streets":

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

**Table 3.4 - Design Intersections Sight Distance Table**

Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (ft)	Design (ft)
15	80	165.4	170
20	115	220.5	225
25	155	275.6	280
30	200	330.8	335
35	250	385.9	390
40	305	441.0	445
45	360	496.1	500
50	425	551.3	555
55	495	606.4	610
Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3 percent or less. For further conditions, the time gap should be adjusted and the sight distance recalculated.			



## Turn Lane Warrants

Additional pavement surfaces to accommodate turning movements shall be required and constructed at intersections to the standards specified below for projects not required to have a traffic impact analysis.

**Table 3.5 - Left Turn Lane Warrants for Two-lane Roadways**

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

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

Source: City of Raleigh Design Manual

## Dead-End Streets

Maximum length shall be no greater than 750 feet or no more than thirty-five (35) dwelling units. Streets designed to be permanently dead-end shall terminate in a paved circular turnaround (cul-de-sac) with a minimum radius of forty-eight (48) feet measured from the center of the turnaround to the face of the curb. Streets designed to be dead-end temporarily (such as in a phased development or where a street is to be extended) can terminate in a paved circular turnaround or a paved "T" turnaround of adequate size to accommodate emergency vehicles which may use the street. Under special circumstances, a 120 foot "T" turnaround may be acceptable as a permanent improvement. Refer to the latest edition of the North Carolina Fire Prevention Code.

A separate, post mounted "Dead End" sign shall be placed at the closest intersection to the dead end. Also, temporary dead end streets expected to be extended in the future shall include a sign located at the temporary dead end stating "This Roadway is Subject to Future Extension".



### Pavement Structural Standards

All streets shall be paved with a minimum structure shown in Table 3.6 or Table 3.7 below or an equivalent design as approved by the Town Manager.

For all public streets, the developer will be required to submit a detailed soils report prepared by a soils engineer, licensed in North Carolina, to establish the suitability of the existing soils for roadway construction. This requirement may be waived if the Town Engineering Inspector's site investigation indicates normal compaction tests would sufficiently guarantee road base suitability.

Based on the results of soils investigations, previously observed conditions, and/or conditions encountered in the field; additional requirements for street construction may include increased pavement and/or base thickness, dewatering drain systems, excavation of unsuitable materials, installation of geotextile materials, and other enhancements as may be deemed necessary to assure streets will not experience premature failure.

The use of the curb and gutter section for street development has been determined to require the least amount of grading, clearing, right-of-way, and maintenance of all alternative roadway sections. Therefore, to preserve the natural environment and to minimize erosion and sedimentation, the Town will typically require the use of curb and gutter roadway section except as noted in the paragraph below.

In areas where poor subsoil drainage and periodic flooding is determined to be a problem by the Town Manager, or in established neighborhoods without curb and gutter streets, the developer may be required to use a roadside swale-type street construction. If curb and gutter is deleted, additional right of way may be required. The design of the swales shall prevent significant erosion which may occur from a ten (10) year storm rate of discharge. Shoulders on arterials shall be paved. On all other roads, shoulders shall be constructed of at least 50 percent gravel and at most 50 percent soil material.

In the event the soil report and/or site investigation indicates roadway construction requirements different from the standards described above, the Town Manager may require the alternative roadway construction design(s) be submitted for approval by the Chapel Hill Public Works Department.

**Table 3.6 – Pavement Design for Good to Excellent Subgrade Soils\***

<b>Functional Classification</b>	<b>Base Stone*</b>	<b>Intermediate Asphalt Course</b>	<b>Surface Asphalt Course</b>
Local Street	ABC compacted to 8"	2 ½" I-19B	1" SF 9.5A
Collector/Arterial Street	ABC compacted to 10"	3" – I19	2" S 9.5B



**Table 3.7 – Pavement Design for Poor to Fair Subgrade Soils\***

<b>Functional Classification</b>	<b>Base Stone*</b>	<b>Intermediate Asphalt Course</b>	<b>Surface Asphalt Course</b>
Local Street	ABC compacted to 10"	2 ½" I-19B	1" SF 9.5A
Collector/Arterial Street	ABC compacted to 10"	3" I-19B	2" S 9.5B

\* Soil types are as defined in the North Carolina Department of Transportation Subdivision Roads Manual

### **Phased Completion of Streets**

The developer shall synchronize the probable completion of houses or other building construction with the completion of utilities, fire hydrants, and streets serving those buildings. The intent is to prevent unreasonable inconvenience to the building occupants from dust, mud, or hazardous conditions and also to avoid unsightly appearance along the access to these buildings.

Therefore, the developer shall complete at a minimum the base course paving of all streets within the development within one year of recording the final plat. If the developer believes for certain reasons his development will take more than one year to "build out" then he should record the final plat for only the phase expected to be completed within one year. The Town Manager may extend this deadline.

Any street failures which occur within the one year warranty period after acceptance of the street by the Town shall be repaired by the developer.

### **3.4 TRAFFIC IMPACT STUDIES**

The Town of Chapel Hill considers the traffic impacts of proposed new development during its review process (except for projects located in the Ephesus Fordham District where a district-wide TIA is in effect). Therefore, the preparation of a traffic impact analysis is typically required to quantify impacts of the proposed development and to identify facility improvements needed to maintain acceptable level of service standards. The developer should coordinate with the Town Traffic Engineer to engage a Town consultant to perform all required TIAs. Under the following circumstances, a traffic impact analysis is typically required:

1. Submittal of a development proposal requesting a change in zoning.
2. Submittal of an application for a major subdivision, special use permit, or site plan review. Typically, a full traffic impact analysis as detailed herein is required for all these development requests. The requirement to prepare a full traffic impact analysis (TIA) may be waived by the Town Manager only if all of the following conditions are met:
  - a. Daily trip generation is less than 500 (or, for a change to an existing property which does not require rezoning, difference in daily trip generation is less than 500); and
  - b. No more than 250 vehicles per day (or, for a change to an existing property not requiring rezoning, no more than 250 vehicles per day difference) access an existing collector or local road; and





- c. The total traffic, including background traffic and additional traffic from proposed new site or redeveloped property does not exceed an average of 150 vehicles per day on any unpaved road; and
- d. The applicant submits a written request for a Traffic Impact Analysis waiver with appropriate supporting documentation including pedestrian/bicycle analysis, if applicable; and
- e. The Town Manager concurs with the request.

When elapsed time or circumstances of the original analysis fall within the parameters presented in the following table, the applicant shall prepare an updated or amended analysis with documentation according to the following specific requirements.

Long Term Analysis may also be waived by the Town Manager based on the site and type of the development. For additional information refer to:

[Guidelines for Traffic Impact Analysis, Town of Chapel Hill, North Carolina Effective Date: October 1, 2001](#)

Original Report Is	Changes to the Original Proposed Development	
	Access Changed* <u>or</u> Trip Generation Increased by > 15%	Access Not Changed <u>and</u> Trip Generation Increased by < 15%
Less than 2 Years Old	Letter Amendment Required: Identify and discuss only items which changed.	Letter Documenting Change (No other reports required)
Greater than 2 Years Old or Study Prepared Prior to TIA Guidelines Approval	New Study	Letter Amendment Required: 1. New local ground counts. 2. New Trip Generation 3. New LOS Analysis 4. Meet all current requirements of this TIA Guideline

\*Changed access includes proposed new access or refinement of general access locations not specifically addressed in original proposed development.

### 3.5 STREET NAMES AND ADDRESSES

Names of streets shall reflect the continuity of streets (i.e., a proposed street in obvious alignment with an existing street or planned as a continuation of an existing street be given the same name as the existing street) and shall be neither wholly nor partially duplicative nor phonetically similar to the name of an existing street within the Town of Chapel Hill.

For approval of new street names and addresses contact the Planning and Sustainability Department (919.969.5066) at least two (2) weeks prior to the submittal of a final plat for recordation.

### 3.6 TRANSIT AMENITIES

Transit amenities including bike parking, lanes and paths, bus shelters and pull-offs, benches, walkways, pull-offs, etc. will be required for areas to be served by the transit system.

The Town will determine which amenities will be required and where they will be located,





based upon transit routes, street classifications, types of development, passenger volumes, and any other pertinent considerations on a case-by-case basis. However, bus pull-offs may be required at bus stops on Collector and Arterial streets as determined by the Town.

### Bus Pullouts

Well placed, carefully designed bus pull-outs offer safe passenger loading and unloading with minimal delays to both transit and other roadway traffic. While serving as a bus stop, they may also be used simultaneously as a schedule layover area.

Multi-lane, one-way streets may have sufficient gaps in the traffic stream to allow all other traffic to pass around a stopped bus. Bus pullouts are generally not appropriate on these roadways.

When a bus pullout is required, it should be placed to allow buses to easily re-enter the traffic flow. The design of a bus pullout should allow through vehicle and bicycle traffic to flow freely without the obstruction of stopped buses. They should generally be placed on the far-side of a signalized intersection so the signal can create gaps in traffic. The pullout length should be increased by 50 feet for each additional single unit bus expected to concurrently use the pullout. Due to the highly concentrated loadings, bus pullouts should generally be constructed of plain doweled concrete pavement.

**Figure 3.2 - Chapel Hill Transit Bus at Pullout**



The following factors should be considered when deciding to incorporate bus pullouts in a design:

1. Buses are expected to layover at the end of a route; or, bus routes intersect and buses have extended stops to allow for transfers.
2. Traffic in the curb lane exceeds 250 vehicles during the peak hour.
3. Posted traffic speed is 35 MPH or greater.
4. Bus volumes are ten or more per peak hour on the roadway.
5. Passenger volumes exceed 20 to 40 boarding's per hour per bus.
6. Average peak-period dwell time exceeds 30 seconds per bus.
7. History of repeated traffic and/or pedestrian crashes at stop location.
8. Right-of-way width is adequate to construct the pullout without adversely affecting sidewalk pedestrian movement.
9. Improvements, such as widening, are planned for a major roadway so the expansion provides an opportunity to incorporate the bus pullout as part of the improvement.

### Bus Shelters



Bus shelters not only provide protection from the elements, they can improve the flow of pedestrian traffic by concentrating waiting passengers in one small area of the right-of-way. At the same time, however, bus shelters can disrupt the streetscape and use a disproportionately large area of the sidewalk, leaving limited space for pedestrians. While the approximate location of bus shelters on the street must always be based upon the safety of passengers and operative feasibility for the bus drivers, the specific placement should always consider the desired typical section of the Street Design Guidelines. Shelters should be placed either as close to the curb as possible or abutting the right-of-way edge to allow for the maximum use of the sidewalk and right-of-way.

Bus shelters can be of many different designs including public art projects. The designs of shelters should take into consideration the relationship between the accessibility for passengers and the use of the street by pedestrians and cyclists.

### 3.7 BICYCLE AND MULTI-USE FACILITIES

#### Bicycle Parking

##### Classification of Bicycle Parking

Long-term parking includes indoor secured bicycle parking spaces with a locker, individually locked enclosure, or supervised area within a building providing protection for bicycles from theft, vandalism and weather.

Short-term parking includes an open air, stationary rack to which a bicycle can be secured with a lock, cable or chain. Racks must be easily usable with both u-locks and cable locks. Racks which support a bicycle primarily by a wheel only and not the frame, such as typical “disk racks,” are damaging to wheels and are not acceptable. Table 3.8 provides general guideline:

##### Location and Design of Bicycle Parking Areas.

1. Parking facilities shall support bicycles in a stable position without damage to wheels, frame or components, so the bicycle, if bumped, will not fall or roll down.
2. Parking facilities shall be securely anchored to the lot surface so they cannot easily be removed and shall be of sufficient strength to resist vandalism and theft.
3. Parking should be located in close proximity to the building’s entrance.
4. Parking facilities should be located in highly visible well-lighted areas to minimize theft and vandalism.
5. Bicycle parking facilities shall not impede pedestrian or vehicular circulation, and should be harmonious with their environment both in color and design. Parking facilities should be incorporated whenever possible into building design or street furniture.
6. Each bicycle parking space shall be at least six feet long by two feet wide. Racks must not be placed close enough to a wall or other obstruction so as to make use difficult. There must be at least 24 inches beside each parked bicycle to allow access. Adjacent bicycles may share this access. An aisle or other space shall be provided for bicycles to enter and leave the facility. This aisle shall have a width of at least six feet to the front or rear of a bicycle parked in the facility.
7. Paving is preferred, not required. Well-draining gravel is the minimum surface treatment in order to avoid mud and dust.



8. Bicycle parking facilities within auto parking areas shall be separated by a physical barrier such as curbs, wheel stops, poles or other similar features to protect bicycles from damage by cars.
9. Ideally, bicycle parking should be under cover to protect bicycles from damaging sun and foul weather.

**Table 3.8 – Bicycle Parking Spaces Required by Use**

USE	Minimum Bike Parking Requirements	Short Term	Long Term
Automobile, trailer, and	N/A	N/A	N/A
Bank	Min 4; 2 additional spaces per every 2,500 sq. ft. of floor area	80%	20%
Business, Convenience Restaurant	Min 4; 2 additional spaces per every 1,000 sq. ft. of floor area	80%	20%
Other convenience business	Min 4; 2 additional spaces per every 2,500 sq. ft. of floor area	80%	20%
Business, general (retail)	Under 100,000 sq. ft. floor area: Min 4; 2 additional spaces per every 2,500 sq. ft. of floor area for 1st 10,000 sq. ft.; then 1 additional space per 5,000 sq. ft.; Over 100,000 sq. ft. floor area: 1 space per 10,000 sq. ft. floor area	80%	20%
Business, office-type	Min 4; 2 additional spaces per every 2,500 sq. ft. of floor area	80%	20%
Clinic	Min 4; 2 additional spaces per every 2,500 sq. ft. of floor area	20%	80%
Dwelling, single-family	N/A	N/A	N/A
Dwelling/Duplex or multi-family	Efficiency	10%	90%
	1 bedrooms	10%	90%
	2 bedrooms	10%	90%
	3 bedrooms	10%	90%
	4 or more bedrooms	10%	90%
1 per 4 dwelling units			
Fraternity or sorority	Min 4; 1 per 3 residents	10%	90%
Group Care Facility	Min 4; 1 per 4 beds	10%	90%
Hospital	Min 8; 1 per 10 beds	20%	80%
Hotel or motel	Min 8; 1 per 15 lodging units	80%	20%
Maintenance and/or	Min 4	20%	80%
Manufacturing, light	Min 4	20%	80%
Mobile home park	N/A	N/A	N/A
Movie Theatre	Min 8; 1 per 50 seats	80%	20%
Personal services	Min 4; 2 additional spaces per every 2,500 sq. ft. of floor area	80%	20%
Place of assembly	Min 8; 1 per 40 seats	20%	80%
Place of worship	Min 8; 1 per 50 seats	80%	20%
Public cultural facility	Min 8; 2 additional spaces per every 5,000 sq. ft. of floor area	80%	20%
Public use facility	Min 8; 2 additional spaces per every 4,000 sq. ft. of floor area	80%	20%
Research activities	Min 4; 2 additional spaces per every 4,000 sq. ft. of floor area	20%	80%
Residence hall	Min 4; 1 per 2 residents	90%	10%
Residential support facility	Min 4; 2 additional spaces per every 5,000 sq. ft. of floor area	10%	90%
Rooming house	Min 4; 1 per 3 lodging units	10%	90%
School, elementary	Min 8; 1 per 10 students	90%	10%
School, secondary, high	Min 8; 1 per 10 students	90%	10%
Shelter	Min 4; 1 per 10 employees	10%	90%
Tourist home	Min 4; 1 per 3 lodging units	80%	20%

### Multi-Use Paths

A multi-use path is a bike/pedestrian way physically separated from motorized vehicular traffic by an open space or barrier and within the street right-of-way, an independent right-of-way or an easement. Multi-use paths provide recreational opportunities and serve as extensions of the transportation system. The designer must use accepted design criteria to provide a safe multi-modal facility. Refer to the [American Association of State Highway and Transportation Officials Guide for the Development of Bicycle Facilities, 4<sup>th</sup> Edition](#) manual for additional information on multi-use trail design.

Width and Clearance – The minimum paved width for all two directional bicycle paths is ten (10) feet. In some cases, it may be necessary to increase the width of the path due to a significant number of pedestrians using the path; or when the path is designed with a horizontal radius less than 95 feet. For horizontal clearance purposes, a minimum of three (3) foot wide graded shoulder must be provided on both sides of the pavement. The minimum vertical clearance should be eight (8) feet. However, a greater clearance may be needed for tunnels.

Grades – Grades greater than 5 percent are undesirable. If, due to the terrain or other considerations, the installation of a 5 percent or flatter grade is shown to be impractical, then a steeper grade may be used for short distances if approved by the Town.

Wayfinding Signage and Marking System - Refer to the [American Association of State Highway and Transportation Officials Guide for the Development of Bicycle Facilities, 4<sup>th</sup> Edition, Section 5.4 – 5.4.3 Pavement Markings, Signs, and Signals](#), for guidance on the development of a multi-use path wayfinding and marking system.

The Shared-Use Path Restriction sign may be installed to supplement a solid white/yellow pavement marking line on facilities which are to be shared by pedestrians and bicyclists in order to provide a separate designated pavement area for each mode of travel. The symbols may be switched as appropriate.

**Figure 3.3 - Shared-Use Path Restriction Sign**



#### Guidance

In cases where two-way operation is permitted on the facility for pedestrians and/or

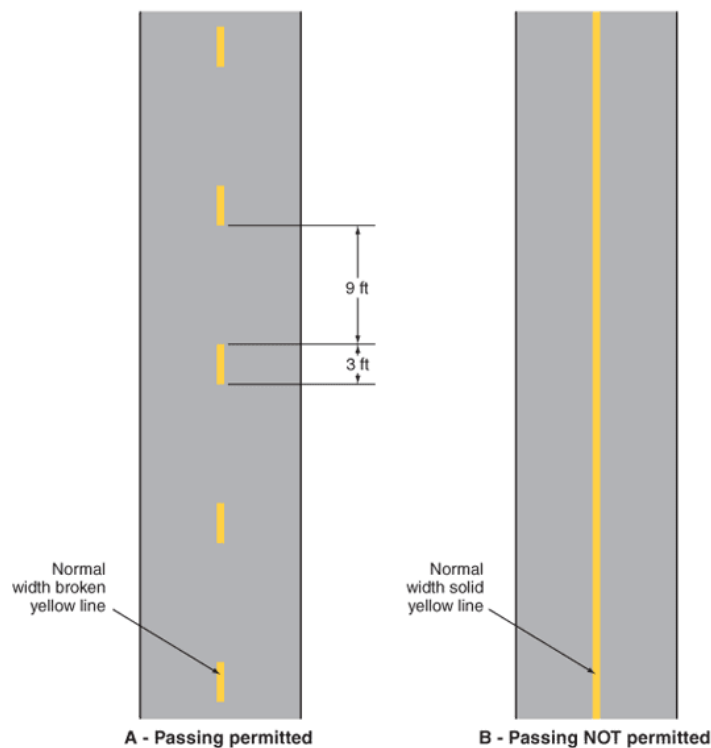


bicyclists, the designated pavement area which is provided for each two-way mode of travel should be wide enough to accommodate both directions of travel for each mode.

### Option

In cases where shared-use paths are of sufficient width to designate two minimum width lanes, a solid yellow line may be used to separate the two directions of travel where passing is not permitted. A broken yellow line may be used where passing is permitted, see Figure 3.4.

**Figure 3.4 - Examples of Center Line Markings for Shared-Use Paths**



Design Speed – The typical design speed for a bicycle path is 20 mph. When the grade exceeds 4 percent, a design speed of 30 mph is advisable

Horizontal Alignment – The typical cross slope is 2 percent for tangent sections. The minimum design radius of curvature shall be derived from the following list:

20 mph.....	95 feet radius
25 mph.....	155 feet radius
30 mph.....	250 feet radius
35 mph.....	390 feet radius

Pavement Design – A hard, all-weather pavement shall be used. A geotechnical report shall be provided by a licensed engineer with a recommendation for a pavement design suitable for bicycles and maintenance vehicles.



### **Bicycle Lane**

A bicycle lane is a portion of a street which has been designated by signs and pavement markings for the exclusive use of bicyclists. Bicycle lanes are typically one-way facilities which carry bicycle traffic in the same direction as adjacent motor vehicle traffic.

Width and Clearance – Five-foot width is standard. Four-foot width may be approved based on site constraints. However, greater width may be required with the presence of on-street parking, narrow lanes for motorized vehicles, unsuitable curb-and-gutter conditions, or high volumes of truck traffic. See Town of Chapel Hill Bike Plan for further discussion of bike lane requirements.

Pavement Design - The surface shall be smooth with a uniform riding surface. For maintenance reasons the bicycle lane should be constructed to the same standards as the adjacent traffic lane.

### **Disability Access**

All public pedestrian facilities shall, to the extent practicable, be continuous and accessible to physically disabled users. Such facilities should be designed to reasonably accommodate users with physical disabilities who require the use of walkers, wheelchairs, scooters, or other such supplemental mobility devices. Pedestrian facilities shall be designed to not include slopes in excess of 1:12 unless flat rest areas are included between steeper segments.

Intersections between motorized vehicle ways and pedestrian ways shall be at grade or connected by means of a ramp with a slope no steeper than 1:12. Ramps and segments of pedestrian ways at intersections shall include detectable warnings in accordance with the requirements of the [Americans with Disabilities Act](#).

## **3.8 DESIGN GUIDELINES FOR THE VISUAL ENVIRONMENT**

The Town of Chapel Hill endorses the standards, scope, and measurement of the National Institute of Building Sciences, Low Vision Design Program and expects designers to refer to the following information and incorporate into projects as appropriate:

[http://c.ymcdn.com/sites/www.nibs.org/resource/resmgr/LVDC/LVDP\\_Guidelines\\_052815.pdf](http://c.ymcdn.com/sites/www.nibs.org/resource/resmgr/LVDC/LVDP_Guidelines_052815.pdf)

### **Low Vision Design**

While the following information isn't all related to "Streets, Parking & Transportation, it is germane to site development, adherence with ADA requirements, and is appropriate for inclusion in this Chapter:

Site Circulation – It is recommended that walkways in the public right-of-way comply with the following:

1. Walkways must not present hazards of tripping and falling due to uneven surfaces or from steps, curbs, and edging that are not clearly visible with change of color, value, and texture. Curbs and other walkway edges should be raised above the walkway pavement a minimum of 4 inches and be of contrasting color or value sufficient to be





- clearly visible to the pedestrian as a pavement boundary. Pavement edge curbs are generally not needed when there are handrails.
2. The approach pathways to public entrances must be easily identified with signs or visual cues such as architectural or landscape features so that approaching persons will be able to locate the entrance.
  3. Stairs and steps should be designed with leading edges (ie, nosings) that clearly contrast in color and value with treads and risers. Where steps cross grades, tapered risers to meet grade may be hazardous to the unwary pedestrian who may be unable to see the edge of the step and/or detect them visually or who may have balance issues. Where possible, tapering should be avoided or, in addition to contrasting edges, use handrails to lead or guide the pedestrian to the full step and riser section of the stairs/steps.
  4. Pavement patterns and color changes that could be mistaken for steps should be avoided where they cross paths of pedestrian travel.
  5. Drains and gratings should be placed to the sides rather than in the pathways in paved pedestrian areas. Gratings bars should run perpendicular to the path of travel and be spaced no more than ½ inches apart.
  6. Avoid lighting placement that shines directly into pedestrians' eyes.
  7. Walkway lighting should be provided to minimize glare. For example, bollard lighting should be directionally downward and overhead, and post lighting should baffled from view by walkers looking at the pathway.
  8. Lighting directed toward the facades and other vertical surfaces of a building or facility is preferable to fixtures directed outward from the eaves, as often is done for security. Careful coordination of lighting is needed to avoid "blinding" closed circuit televisions (CCTV security cameras) on one hand and building occupants on the other, while providing desired building and landscaping lighting for aesthetic purposes.

### **Pedestrian Signals** - [United States Access Board Guidelines \(2011\)](#)

Where pedestrian signals are provided at pedestrian street crossings, they shall include accessible pedestrian signals (APS) and pedestrian pushbuttons complying with sections 4E.08 through 4E.13 of the MUTCD (incorporated by reference, see R104.2). Operable parts shall comply with R403.

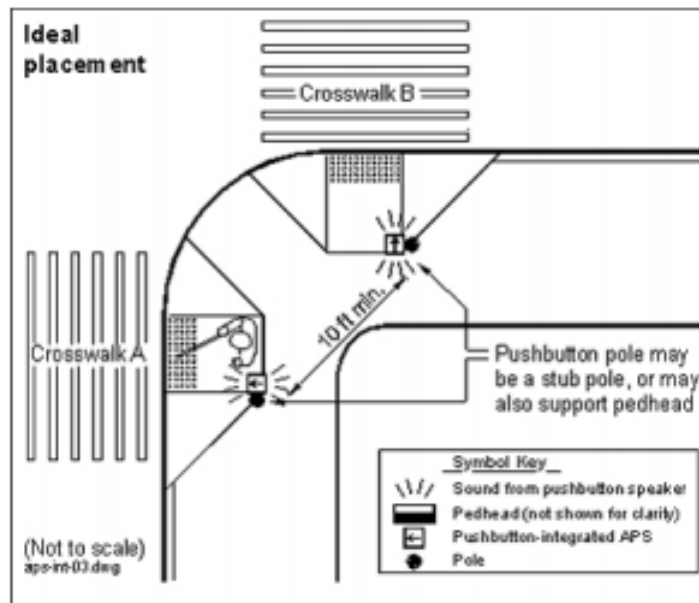
An accessible pedestrian signal and pedestrian pushbutton is an integrated device which communicates information about the WALK and DON'T WALK intervals at signalized intersections in non-visual formats (i.e., audible tones and vibrotactile surfaces) to pedestrians who are blind or have low vision. For improved pedestrian safety APS shall be installed at all signalized intersections with pedestrian amenities.

### **Pedestrian Signal Design Checklist**

1. Proper Location: The functioning of a pushbutton-integrated APS is based on proximity to the crosswalk location. The closer the APS is located to the departure location, the quieter it can be. In addition, the vibrotactile indication and tactile arrow are not usable when located too far back from the street. Figure 3-5 illustrates installation recommendations (within five feet of the crosswalk extended, within ten feet of the curb, and separated by more than ten feet from other APSs on the corner, adjacent to a level landing.
2. Audible tone indicating direction of crossing and "walk" or "don't walk" command.



- a. Volume which responds to ambient/background sounds to remain audible.
3. Accessible push buttons
  - a. Locator tone
  - b. Tactile arrow indicating direction of crossing
  - c. Vibrotactile “walk” signal
4. Braille or verbal information about the name of the street



**Figure 3.5 - Ideal Installation of a Pushbutton-Integrated APS**

Detailed guidelines and resources available in “Accessible Pedestrian Signals: A Guide to Best Practices” at [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_w117a.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w117a.pdf).

For better visibility for pedestrians and drivers “non-standard” large street name signs similar to the sign shown below shall be installed on span wires at all current and future signalized intersections.







### **Detectable Warning Surfaces, [United States Access Board Guidelines \(2011\)](#)**

Detectable warning surfaces complying with R305 shall be provided at the following locations on pedestrian access routes and at transit stops:

1. Curb ramps and blended transitions at pedestrian street crossings;
2. Pedestrian refuge islands;
3. Pedestrian at-grade rail crossings not located within a street or highway;
4. Boarding platforms at transit stops for buses and rail vehicles where the edges of the boarding platform are not protected by screens or guards, and
5. Boarding and alighting areas at sidewalk or street-level transit stops for rail vehicles where the side of the boarding and alighting areas facing the rail vehicles is not protected by screens or guards.

Detectable warning surfaces are not required at pedestrian refuge islands which are cut-through at street level and are less than 1.8 meters (6.0 ft) in length in the direction of pedestrian travel. Detectable warning surfaces are not intended to provide wayfinding for pedestrians who are blind or have low vision. Wayfinding can be made easier by:

1. Sidewalks which provide a clear path free of street furniture;
2. Visual contrast between walking and non-walking areas (e.g., planted borders);
3. Route edges which are clear and detectable by cane;
4. Direct pedestrian street crossings and curb ramps which are in-line with direction of travel;
5. Small corner radiuses which permit pedestrian street crossings to be as short and direct as possible; and
6. Orthogonal intersections which facilitate navigation using parallel and perpendicular vehicle sound cues.

### **Detectable Warning Surfaces Design Checklist**

1. **Dome Size** – The truncated domes shall have a base diameter of 23 mm (0.9 in) minimum and 36 mm (1.4 in) maximum, a top diameter of 50 percent of the base diameter minimum and 65 percent of the base diameter maximum, and a height of 5 mm (0.2 in).
2. **Dome Spacing** – The truncated domes shall have a center-to-center spacing of 41 mm (1.6 in) minimum and 61 mm (2.4 in) maximum, and a base-to-base spacing of 17 mm (0.65 in) minimum, measured between the most adjacent domes.
3. **Contrast** – Detectable warning surfaces shall contrast visually with adjacent gutter, street or highway, or pedestrian access route surface, either light-on-dark or dark-on-light.
4. **Size** – Detectable warning surfaces shall extend 610 mm (2.0 ft) minimum in the direction of pedestrian travel. At curb ramps and blended transitions, detectable warning surfaces shall extend the full width of the ramp run (excluding any flared sides), blended transition, or turning space. At pedestrian at-grade rail crossings not located within a street or highway, detectable warnings shall extend the full width of the crossing. At boarding platforms for buses and rail vehicles, detectable warning surfaces shall extend the full length of the public use areas of the platform. At boarding and alighting areas as sidewalk or street level transit stops for rail vehicles, detectable warning surfaces shall extend the full length of the transit stop.
5. **Placement** – Design for detectable warnings at various intersection and ramp types are described in greater detail: [Access Board's Public Rights-of-Way Accessibility Guidelines](#).

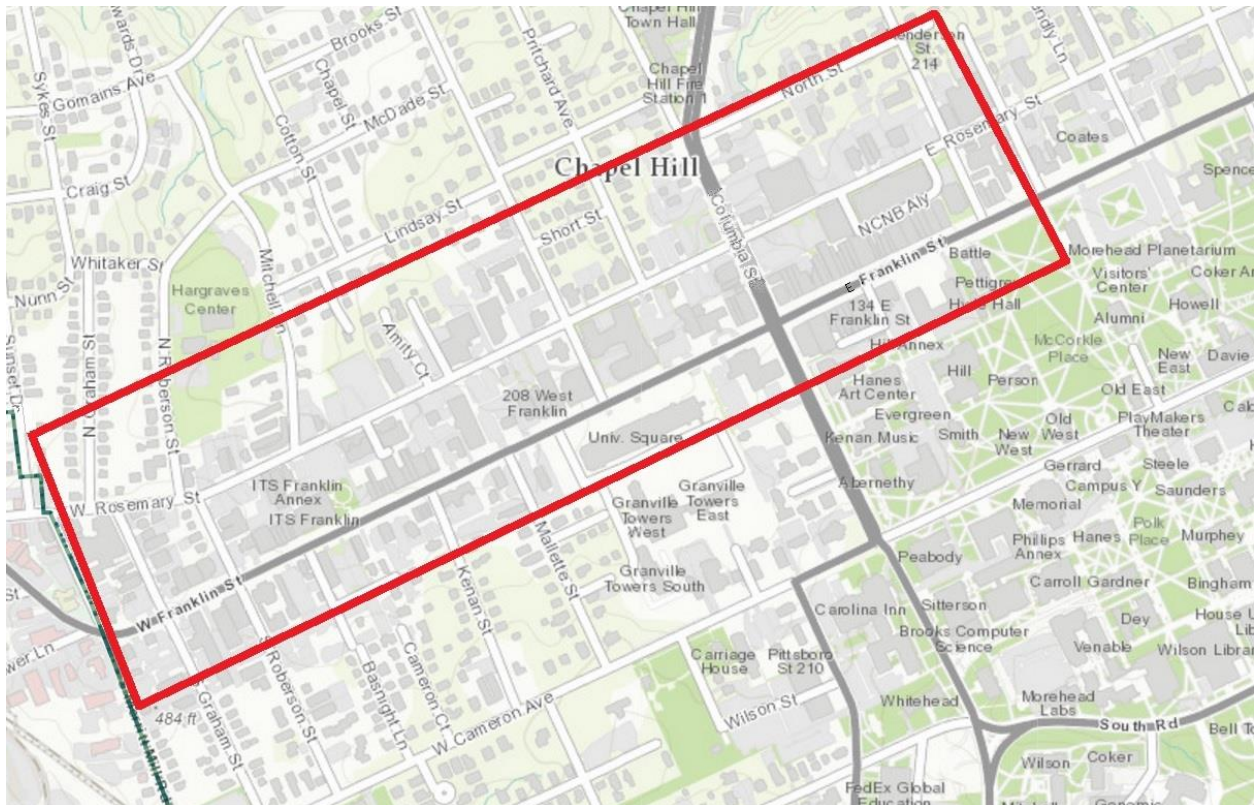


### 3.9 STREET LIGHTING

#### Street Lights and Street Lighting Applicability

A developer may be required to install or upgrade street lights within a public right-of-way as part of the Town's design approval process. The three situations in which these street lighting improvements are typically required include:

1. When new public streets are proposed or existing public streets are improved;
2. When significant development is proposed adjacent to a public street within the Downtown Streetscape Study Area (see map below) where a Street Lighting Master Plan has been adopted calling for the incremental replacement of existing light poles and fixtures. Refer to the Streetscapes section (Chapter 6) for lighting requirements



3. Less commonly, where development is proposed adjacent to inadequately lighted public streets, incremental street lighting improvements may also be required. If there are questions about a specific site, the developer should contact the Town's Public Works Department.

#### Street Lighting Plan Submittal Requirements

Developers should consult with the appropriate utility provider in the development of proposed street lighting plans. Typically a street lighting plan will include the following information:

1. The proposed location of street lights and the underground utility lines and or conduits which will be installed to service them. If work is proposed within the Downtown



- Streetscape Study Area the developer should utilize the standard downtown conduit detail included in the Town's Standard Details.
2. The location of street edge of pavement and/or curb and gutter, sidewalks and all property lines in the area where street lighting is proposed. If other improvements, such as benches or bus stops, are proposed within the public right-of-way, these should also be shown on the plan.
  3. A description and/or detail of the proposed light pole and fixture.
  4. Most commonly selected street light poles and fixtures require a supplemental fee be paid to the utility provider prior to installation. Where these poles and fixtures are placed within the public right-of-way, utility providers require this supplemental fee be paid through the Town as a one-time up front cost. Accordingly, the following note is required to be included on all street lighting plans:
    - a. The developer will be responsible for reimbursing the Town for any and all supplemental fees assessed by the utility provider prior to installation of the proposed light fixtures.
  5. For information about the relative supplemental fees assessed for different types of street light poles and fixtures, developers should contact the utility provider.

### Street Lighting Guidelines

The type of street light pole and fixture selected and the recommended placement of the poles and fixtures will depend on a number of site-specific variables. In the Downtown Streetscape Study Area several different custom poles and fixtures which provide pedestrian level lighting as well as street lighting are required. See Chapter 6, for fixture and pole requirements.

In other areas within the Town, street lighting design is based on street classification and on the uses of adjacent properties, see Figure 3.16. Because these factors vary from site to site, developers should contact the Public Works Department when proposing street lighting in non-residential areas. In residential neighborhoods the standards for pole and fixture selection and street light placement, as described below, are consistent throughout the Town.

The type of street light pole and fixture selected and the recommended placement of the poles and fixtures will depend on a number of site-specific variables. In the Downtown Streetscape Study Area several different custom poles and fixtures which provide pedestrian level lighting as well as street lighting are recommended. Developers can contact the Public Works Department for information about the specific lighting requirements included in the Street Lighting Master Plan for this area.

Street lighting on State roads must be designed and installed in accordance with the NCDOT standards.

The developer, when installing underground electrical and telephone service shall also install at their expense underground terminal facilities for street lighting along public streets according to the standards required by the Illuminating Engineering Society publication Road Lighting; provided however, the average maintained foot-candle (fc) level for outlying and rural roads as defined in said publication shall be no less than three-tenths (0.3) and the uniformity ratio shall be no greater than sixty-four (64). The Town will not take responsibility for any street lighting system until it meets the above standards.

Developer responsibilities include:

1. Installation of streetlights on all local access system roadways (residential and



- commercial), which will be built or improved as part of their development project (.4 fc and 6:1 uniformity).
2. Installation of streetlights on all collector system roadways (residential and commercial), which will be built or improved as part of their development project. (.6 fc and 4:1 uniformity).
  3. Installation of streetlights on all minor thoroughfare system roadways, which will be built or improved as part of their development project. (.9 fc and 4:1 uniformity). If the roadway is built to State standards the street lighting is also subject to State lighting requirements.
  4. Installation of streetlights on all major system roadways, which will be built or improved as part of their development project (1.2 fc and 4:1 uniformity). If the roadway is built to State standards the street lighting is also subject to State lighting requirements.
  5. Installation of streetlights on all secondary system roadways, which will be built or improved as part of their development project. If the roadway is built to State standards, the street lighting is subject to State lighting requirements. The Town may opt to participate in streetlight installations which would close any gaps in the streetlight system created by this requirement.



**Table 3.9 – Street Classification Maintained Foot-Candle Street**

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

## Street Light Pole and Fixture Standards for Residential Streets

The Town's standard residential lighting fixture is a 50, 70, or 110 watt Light Emitting Diode (LED) mounted on a 15' black fiberglass pole. This pole and fixture combination is available from Duke Energy Company and requires that a supplemental fee reimbursement be provided to the Town prior to installation. Comparable pole and fixture combinations are available from other utility providers in areas of Town not served by Duke Energy Company.

Alternatively, LED fixtures mounted on wooden poles at a height of 25' may be acceptable in place of the Town standard fixture. This pole and fixture combination generally does not require a supplemental fee reimbursement. Other fixture and pole combinations, including taller fiberglass poles and/or ornamental fixtures, may be acceptable as long as the developer is responsible for reimbursement of all associated supplemental fees. Developers should contact the Public Works Department if an alternative to the Town standard pole and fixture combination is proposed.

For streets with existing high pressure sodium the Town's standard residential lighting fixture is a 9,500 lumen high pressure sodium "economical traditional" luminaire mounted on a 12' black fiberglass pole. This pole and fixture combination is available from Duke Energy Company and requires a supplemental fee reimbursement be provided to the Town prior to installation. Comparable pole and fixture combinations are available from other utility providers in areas of Town not served by Duke Energy Company.

Alternatively, 9,500 lumen high pressure sodium cut-off lens cobra head fixtures mounted on wooden poles at a height of 25' may be acceptable in place of the Town standard fixture. This pole and fixture combination generally does not require a supplemental fee reimbursement.





Other fixture and pole combinations, including taller fiberglass poles and/or ornamental fixtures, may be acceptable as long as the developer is responsible for reimbursement of all associated supplemental fees. Developers should contact the Public Works Department if an alternative to the Town standard pole and fixture combination is proposed.

### **Street Light Placement Standards for Residential Streets**

The following standards should be used to determine the placement of street lights on residential streets:

1. Street lights should be located approximately 220 feet apart. The Town staff may approve different pole separation if the foot-candle and uniformity requirements are being met with an alternate design, or if separation from street trees is a consideration.
2. Street lights should be located at all public street intersections and at the end of all cul-de-sacs and T-turnarounds.
3. Where possible, all street lights not located at an intersection should be located on or adjacent to a property corner
4. Street lights should be located within the public right-of-way a minimum of three feet behind the curb or edge of pavement
5. On streets with sidewalks on only one side, street lights should be located on the same side of the street as the sidewalk. On all other streets, street lights should be staggered on both sides of the street.
6. On streets where street lights are proposed adjacent to sidewalks they should be located behind the sidewalk unless a tree lawn is provided which permits all parts of the poles to be located a minimum of three feet behind the curb.

## **3.10 STREET SIGNS**

### **Street Signs and Markings Applicability**

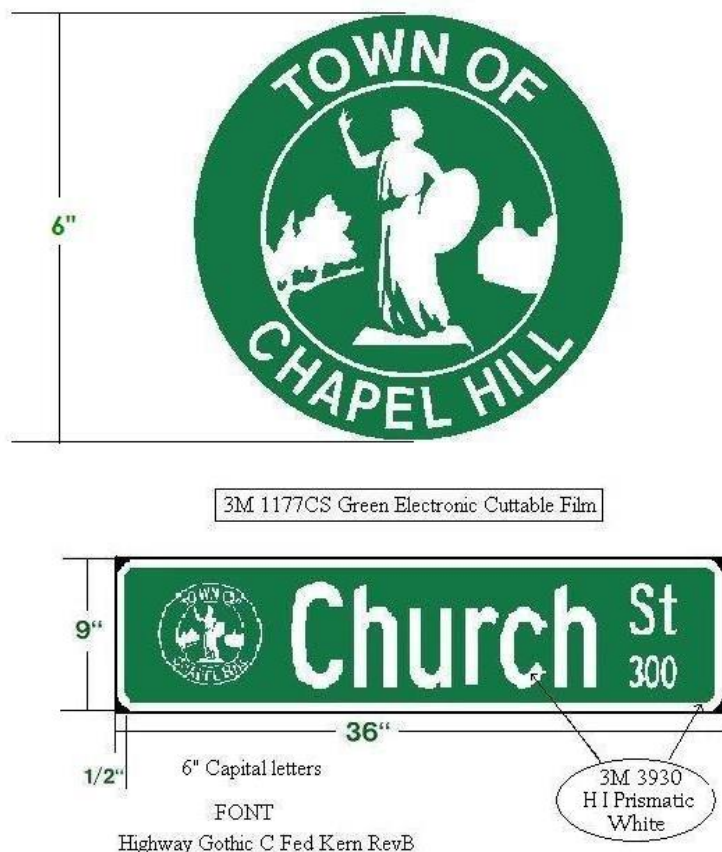
A developer may be required to install or upgrade street signs and markings within a public right-of-way as part of the design review process if the proposed project includes the improvement to or construction of new public streets. The standard Town of Chapel Hill Street Sign Design is detailed in Figure 3.6.

### **Street Name Signs**

Street name signs shall be provided at all street intersections as part of street construction. The location and design of street name signs shall be approved by the Town Manager as in accord with the standards set forth in the Manual on Uniform Traffic Control Devices for Street and Highways.



**Figure 3.6 – Standard Town of Chapel Hill Street Sign Design**



### **Street Signs and Markings Plan Submittal Requirements**

A street signs and markings plan should show the type and location of all proposed street signs (stop signs, speed limit signs, etc.) and the location of all proposed street markings (centerlines, stop bars, crosswalks etc.). This plan should also include the following Town standard notes, where applicable:

1. Prior to the installation of any street signs or markings, the developer will contact the Town's Public Works Department for an on-site approval of the final design and placement.
2. All pavement markings within the public right-of-way will be installed using a thermoplastic material with a minimum thickness of 125 mils.
3. The developer will be responsible for installation of all required street signs and markings and for any repairs to these signs and markings necessary prior to the final acceptance of a new or improved public street for Town maintenance.

### **Street Signs and Markings Standards**

Where warranted by the need to ensure motorist, bicyclist or pedestrian safety and/or to control vehicular, bicycle and pedestrian traffic; traffic signs and markings should be provided in accordance with the standards set forth in the most current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways. All proposed street signs and markings plans should reflect the standards for sign and marking design and placement as set forth in



this manual and should be approved by the Town Manager and, where applicable, NCDOT during the Town's design review process.

Developers can contact the Town's Public Works Department for additional information about the specific design and size requirements for required street signs. Signs which do not meet these design and size requirements will require replacement with approved signs prior to the acceptance of any new or improved public street for Town maintenance.

All pavement markings within the public right-of-way should be installed using a thermoplastic material with a minimum thickness of 125 mils. Pavement markings which do not meet this standard will require replacement with approved markings prior to the acceptance of any new or improved public street for Town maintenance.

### 3.11 PARKING AND LOADING

#### Off-Street Parking

The designer must design off-street parking facilities to provide safe, convenient ingress and egress for vehicular traffic and to minimize conflict with pedestrian movements. Access points should be located to provide the optimum driver sight distance and least disruption to traffic on the public street system.

The number of street and driveway connections permitted to serve a single property or commercial development will be the minimum deemed necessary by the North Carolina Department of Transportation for reasonable service to the property without undue impairment of safety, mobility, and utility of the highway. However, only one combined entrance and exit connection will be permitted where the frontage is less than 100 feet. (Policy on Street and Driveway Access to North Carolina Highways July 2003).

When angle parking abuts a sidewalk, it will be necessary for the designer to provide additional clearance between the sidewalk and the parking space to ensure vehicle overhangs would not decrease the useable area of the sidewalk so to not adversely affect the pedestrian and handicap accessible routes.

#### Geometric Design

The lot layout schedule specifies the minimum standard dimensions for parking spaces and drive aisles, see Table 3.10. All parking spaces should be identified with pavement markings and/or wheel stops. Because of the difficulty of controlling the use of parking spaces, the designer is encouraged to use standard or larger size spaces. If site conditions dictate the necessity of compact spaces, the percentage of compact spaces shall not exceed 20 percent of the total number of spaces.

Typically, no more than ten (10) parking spaces should be arranged side by side without the provision of a landscaped island. The island shall be of sufficient shape and width to provide for landscaping. The minimum width for a landscaped parking lot island is ten (10) feet of pervious soil.





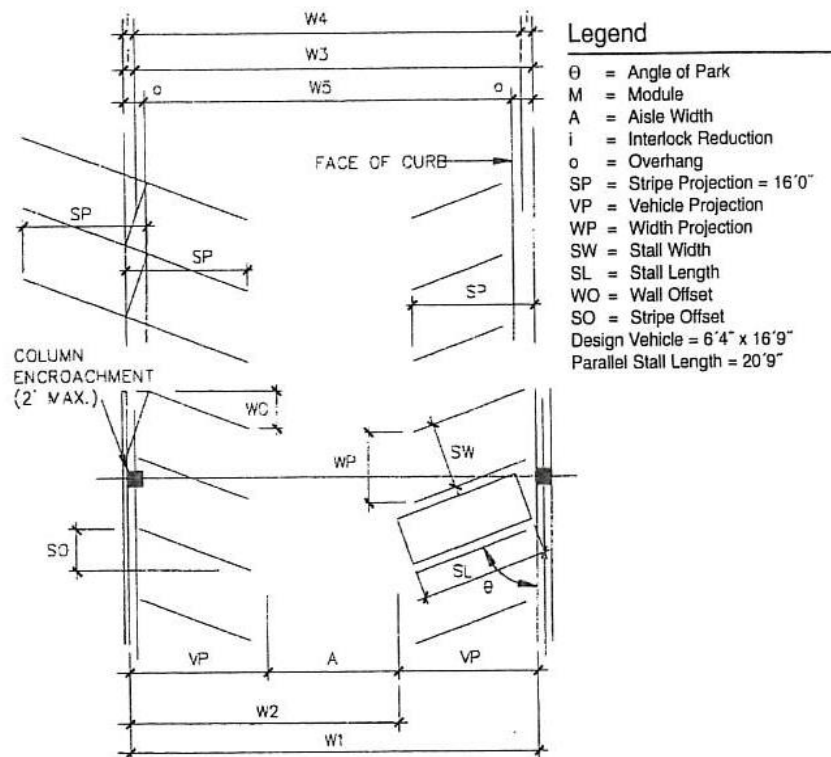
**Table 3.10 - Common Parking Dimensions for 8 foot 6 inch Stalls**

Angle	Base Module W1	Single Loaded W2	Wall to Interlock W3	Interlock to Interlock W4	Curb to Curb W5	Overhang o	Interlock i	Stall Width Projection WP
45°	48'0"	30'4"	45'0"	42'0"	44'6"	1'9"	3'0"	12'0"
50°	49'9"	31'6"	47'0"	44'3"	45'11"	1'11"	2'9"	11'1"
55°	51'0"	32'4"	48'7"	46'2"	46'10"	2'1"	2'5"	10'5"
60°	52'6"	33'6"	50'4"	48'2"	48'2"	2'2"	2'2"	9'10"
65°	53'9"	34'7"	51'11"	50'1"	49'3"	2'3"	1'10"	9'5"
70°	55'0"	35'9"	53'7"	52'2"	50'4"	2'4"	1'5"	9'1"
75°	56'0"	36'11"	54'11"	53'10"	51'2"	2'5"	1'1"	8'10"
90°	60'0"	42'0"	60'0"	60'0"	55'0"	2'6"	0'0"	8'6"

*Dimensions have been rounded to nearest inch.*

*\*Design vehicle = 6'7" x 17'0".*

**Figure 3.7 Common Parking Dimensions**  
COMMON PARKING DIMENSIONS



Source: Urban Land Institute and National Parking Association



### Minimum Module Dimensions

Parking Angle degrees	Module	Vehicle Projection	Aisle
45	48'0"	17'8"	12'8"
50	49'9"	18'3"	13'3"
55	51'0"	18'8"	13'8"
60	52'6"	19'0"	14'6"
65	53'9"	19'2"	15'5"
70	55'0"	19'3"	16'6"
75	56'0"	19'1"	17'10"
90	60'0"	18'0"	24'0"

*Design vehicle = 6'7" x 17'*

*Stall Width (SW) = 8'5"*

### Pavement Standards

The minimum standard pavement design for parking lot drive aisles shall be 8 inches of stone base with a 2 inch asphalt surface course. A heavy-duty pavement section will be required in locations determined to be necessary for emergency & service vehicle access lanes designed for a minimum 80,000 pound vehicle. The minimum heavy-duty section shall be 10 inches of stone base and 3 inches of asphalt surface course. An alternative design may be required if geotechnical information or projected traffic patterns dictate a different design. The pavement design for parking space areas must provide an all-weather, dust-free surface. The pavement design shall be based on traffic patterns, frequency of use, soil conditions, and stormwater drainage. Curbing may be required for stormwater control, or as wheel stops to prevent vehicle overhang into landscaped areas or walkways. Wheel stops are required when other means for identifying parking spaces are not practical.

### Parking Decks

The use of structured parking facilities is encouraged to minimize the amount of land necessary to accommodate cars. Generally, the geometric requirements for parking decks are the same as for surface parking. However, the designer may provide an alternative design based on accepted practices and subject to the approval of the Town Manager. Refer to the National Fire Protection Association for fire design requirements for parking decks. Modifications may be made to the On-Site Parking Lot Layout graphic (Figure 3.7) when a reduction in aisle width in parking decks and other structures compensates for the increase in the stall width.

### Accessible Parking Spaces for the Handicapped

Parking spaces and access aisles for the handicapped shall be on hard or paved surfaces and shall be indicated by pavement markings or other suitable means. The spaces shall be identified with above ground signs as specified in the General Statutes 20-37.6 and 136-30 and the Manual on Uniform Traffic Control Devices.

Standard handicapped accessible parking spaces shall have a 96 inch minimum width and an access aisle adjacent to the space with a minimum width of 60 inches. Van accessible parking spaces shall have a 96 inch minimum width and an access aisle 96 inches wide. The required numbers of spaces are listed in Table 3.11 on the following page.



**Figure 3.11 - Accessible Parking Space Requirements**

TOTAL NUMBER OF SPACES IN LOT	MINIMUM NUMBER OF ACCESSIBLE SPACES
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	two percent (2%) of total
1,001 and over	20 plus 1 for each 100 or fraction thereof, over 1,000
For every six (6) or fraction of six (6) accessible parking spaces at least one shall be a van accessible parking space.	

*Source: 2012 North Carolina Building Code*



### On-Street Parking

The designer must design on-street parking to provide safe and orderly traffic flow on the street. The primary use of the street is the movement of vehicles. On-street parking is considered a secondary use of street space, as are other uses, such as truck loading zones

Parking prohibitions can be warranted on the basis of statutes, traffic capacity, or accident hazard. Statutory prohibitions also apply to on-street parking spaces near fire hydrants, crosswalks, and approaches to intersections.

Parallel and/or angle parking is allowed on Town streets. However, 90-degree (perpendicular) on-street parking is not permitted. Time restrictions may be posted for on-street parking by means of signs or parking meters to regulate the use of parking spaces. On low-volume, low-speed avenues and streets in commercial main street areas, where sufficient curb-to-curb width is available, angled parking may be appropriate. Angle parking should have the dimensions shown in Figure 3.12 for a variety of different angles.

Dimensioning of on-street parking spaces shall take into account driver sight distance, pedestrian patterns and maneuvering area for vehicles. For more information please contact the Town of Chapel Hill Public Works/Engineering Department.

**Table 3.12 - Minimum Dimensions for Head-In Angled On-Street Parking\***

Angle	Stall Width	Stall Depth (perpendicular to curb)	Minimum Width of Adjacent Lane	Curb Overhang
45°	8.5-9.0 feet	17 feet 8 inches	11 feet 4 inches	1 foot 9 inches
50°	8.5-9.0 feet	18 feet 3 inches	13 feet 3 inches	1 foot 11 inches
55°	8.5-9.0 feet	18 feet 8 inches	13 feet 8 inches	2 feet 1 inches
60°	8.5-9.0 feet	19 feet 0 inches	14 feet 6 inches	2 feet 2 inches

*Source: Dimensions of Parking, 4th Edition, Urban Land Institute Notes:*

*\* Typical design vehicle dimensions: 6 feet 7 inches by 17 feet 0 inches. Use 9.0 feet wide stall in commercial areas with moderate to high parking turnover.*

Note: Sharper angles may be approved by the Town

### Loading Space Requirements

Off-street loading spaces shall be designed so a semi-trailer truck (WB 40 design) can use the space by means of one continuous parking maneuver. The off-street loading space shall have a minimum width of 12 feet, a minimum length of 55 feet, and a vertical clearance of 14 feet above the finished grade. A smaller loading space may be used on a case-by-case basis where smaller trucks will be used, or delivery hours will be managed.

## 3.12 GEOMETRIC DESIGN OF DRIVEWAYS

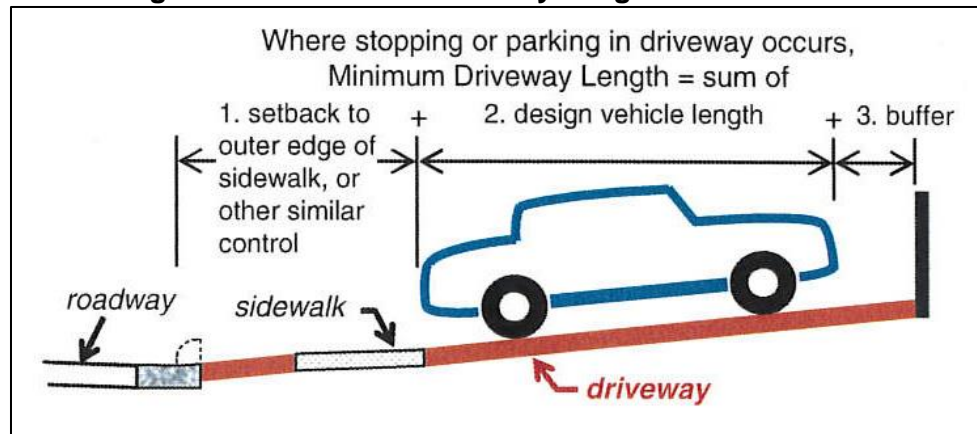
### Minimum Driveway Length Considerations

- Determine the longest vehicle type likely to use the driveway.
- Determine the length of subject vehicle.



- Estimate a front buffer dimension. In the case of a smaller design vehicle (e.g., a P-car), estimate 2 feet. For a larger design vehicle (e.g., a bus or large truck), select 3 feet. If the front buffer area involves a gate which swings outward, there also should be an allowance for the gate.
- Estimate a value for the rear clearance. Where a sidewalk exists, this is the distance from the edge of the traveled way to the far edge of the sidewalk. If no sidewalk exists, allow a minimum of 2 feet.
- Sum these values to determine the minimum driveway length.

**Figure 3.8 - Minimum Driveway Length Considerations**



Source: National Cooperative Highway Research Program (NCHRP) -Report 659

### Minimum Length of Driveway Paving

If the driveway within the private property site is dirt or gravel, how far back from the edge of the traveled way to pave the driveway connection is an issue. The minimum length of driveway paving is 10 feet or to the right-of-way line, whichever is less. However, a greater length may be required.

The objectives of paving the connection to a gravel or dirt driveway some distance back from the traveled way edge include (1) providing a more stable driveway surface "platform" from which to enter or exit the traveled way and (2) minimizing or eliminating the depositing of dirt, gravel, or mud onto the traveled way. Factors which can affect the extent to which debris from such a private driveway are deposited on the traveled way include:

- The distance from the traveled way edge to the beginning of the gravel or dirt surface;
- The grade of the driveway;
- Surface drainage patterns, combined with the amount of precipitation; and
- The volumes and types of traffic using the driveway.

### Driveway Grades Adjacent to Right-of-Way



Maximum allowable grade, by itself, is not a sufficient control. What matters is the difference between successive grades, or the change of grade. The change of grade may create the crests and sags which cause the underside of a vehicle to drag.

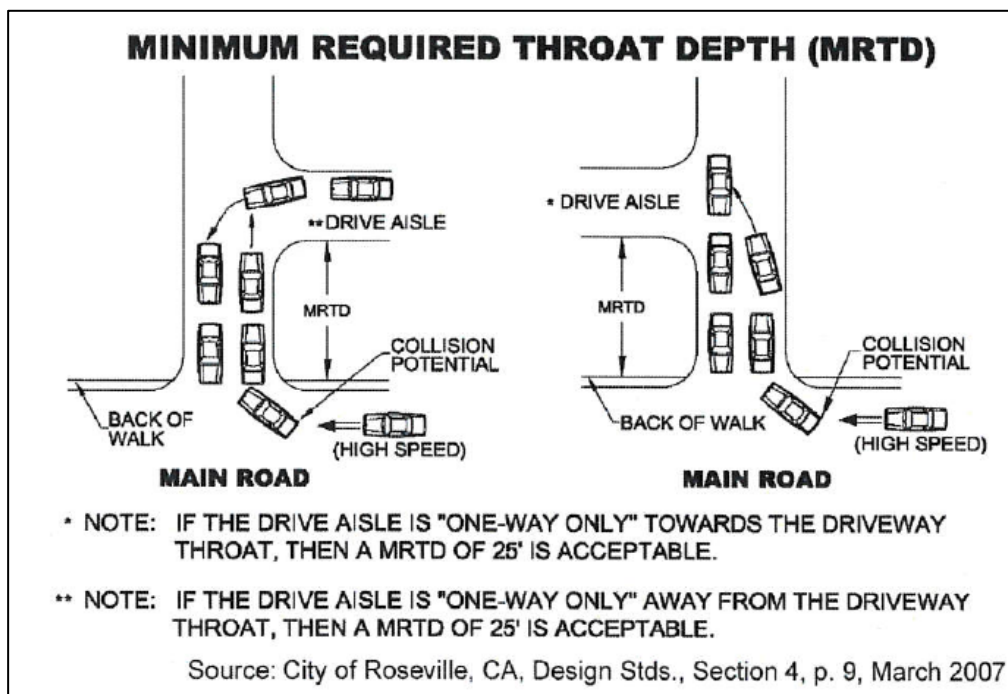
**Table 3.13 - Steepest Allowed Driveway Grades Adjacent to Right-of-Way**

	Commercial	Residential
Grade: maximum from road allowed	10%	15%

### Driveway Minimum Required Throat Depth (MRTD)

The distance between internal drive aisles and the street can affect traffic operation and safety. In order to protect the storage and operational needs of the driveway/street intersection, a protected driveway stem of a sufficient link may be required. The designer should provide 50 foot minimum vehicle storage length (minimum required throat depth) for driveway intersections with the street. Alternate distances may be used if dictated by sight conditions.

**Figure 3.9 – Minimum Required Throat Depth (MRTD)**





### Driveway Grade (Sidewalk Cross Slope), Change of Grade, and Vertical Alignment

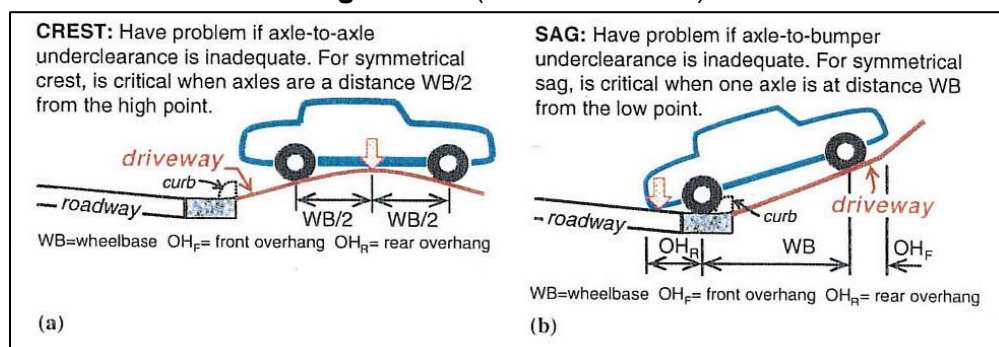
Three types of control for the design of the driveway profile are physical, operational, and drainage:

- Physical controls call for a design which maintains enough clearance so the underside of a vehicle does not drag on the roadway or driveway surface. This control is necessary for all driveways, even ones connecting to an alley. Due to the changes in vertical profile grade often found at driveway entrances, these locations are more vulnerable to hang ups when the undercarriage of the vehicle comes into contact with or “drags” the pavement surface.
- Operational controls dictate vertical alignment for the driveway allowing a convenient and safe entry with minimal conflicts. To achieve this, the changes of gradient must not be too abrupt. This is especially important on driveways which intersect higher volume or higher speed roadways. Operational problems may arise from certain combinations of vertical profiles and vehicles. One problem is vehicle occupant discomfort due to poor vertical alignment such as bumps, steep grades, and abrupt changes in grade. In extreme cases, there may be restricted sight distance which adversely affects safety. In addition, excessive differences in speed between through vehicles and vehicles turning into or out of the driveway from a vertical profile can also increase vehicles' exposure to crashes.
- Drainage requires a profile which does not create undesirable flow patterns. It may be unacceptable for street runoff to flow into the driveway opening and onto private property, and for stormwater run-off to flow from a driveway into the street.

### Physical Vehicle Ground Clearance Control

As Figure 3.10 shows, the underside of a vehicle entering or exiting a driveway can drag on either a crest or a sag alignment with an abrupt change of grade. Any excessive grade change between the cross slope of the roadway and the driveway grade, between the driveway grade and an intersecting sidewalk, or between successive driveway grades can cause a vehicle to drag. Vehicles with low ground clearance and a long wheelbase or overhang can even become lodged (also referred to as “hung up” or “high-centered”) on alignments with sharp grade changes. At best, hang-ups result in some vehicular delay and minor damage to the undercarriage of the vehicle and to the pavement surface. At worst, a crash can occur.

Figure 3.10 (Source: NCHRP)





**Table 3.14 - Minimum Length of Crest Vertical Curve to Accommodate Low-Clearance Vehicle at Driveway Intersection with Street**

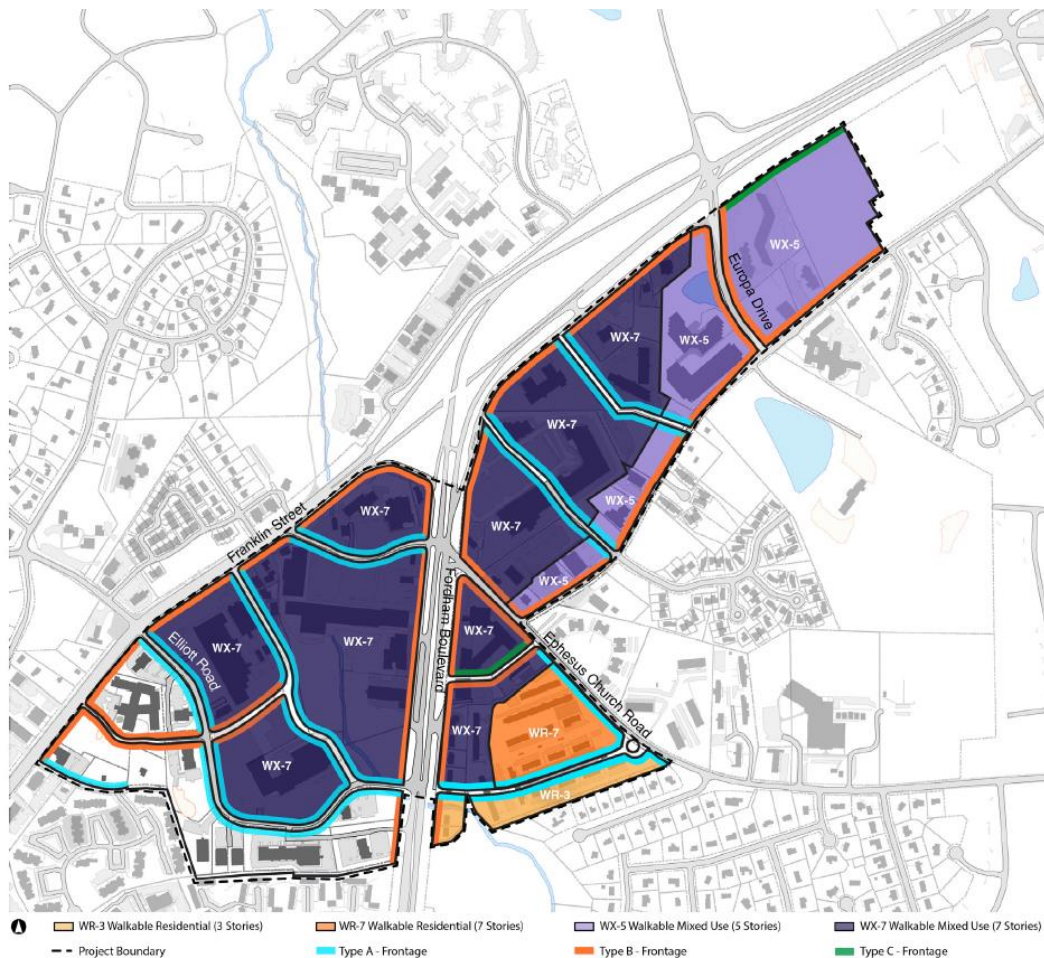
Algebraic Difference (%)	Curve Length	
	Feet	Meters
1	4	1.2
2	8	2.4
3	12	3.7
4	16	4.9
5	20	6.1
6	24	7.3
7	28	8.5
8	32	9.8
9	35	10.7
10	39	11.9



## 3.13 THE BLUE HILL DISTRICT (FORMALLY KNOWN AS EPHESUS-FORDHAM)

The Blue Hill District is identified in Chapel Hill's Comprehensive Plan as an area of focus for economic growth and development and improved transportation conditions. It is located north and east of the University and along the main corridor connecting the Town to Durham. This area is currently characterized by older, suburban shopping strips and traffic patterns that are not conducive to safe pedestrian and bike travel. Given its prominent location, the Blue Hill District has the potential to become a lively, mixed-use district accessible to those who live both within it and nearby. In response to the small area plan, the Town created the Ephesus Fordham Form Based Code as a means of implementing the vision and community goals: "To create a pleasant walking experience, and a mix of commercial uses, upper story residences and offices, bike paths, and sidewalk cafes." It is a prescriptive document guiding the built environment of the district including street typology. To compliment the building elements of the Form Based Code, this section of the manual was created to further define the character of the streets. Additional design criteria will be developed with input from stakeholders and the community.

**Figure 3.11 – Blue Hill District**





Type A With On-Street Parking



| (A) | (B) | (C) | (D) |

Type A Without On-Street Parking



| (A) | (B) | (C) | (D) |

### TYPE A FRONTAGE

#### Building Location

(A) Front setback (min/max)	0' / 10'
Building façade in BTZ (min % of lot width)	80%

#### Streetscape

(B) Sidewalk (min)	10' with 10' minimum clear zone
(C) Tree planting zone (min)	8'
Tree spacing (on center, avg)	40'
(D) On-street parking, where provided (min)	8'

#### Parking Location

Surface parking: Not permitted between building and street

Structured parking: 30' minimum behind front building façade for all floors

Canopy trees are required unless utility conflicts exist, in which case an equivalent or better alternative can be reviewed and approved by the Community Design Commission.



## Type B Frontage



### TYPE B FRONTAGE

Building Location	
(A) Front setback (min/max)	0' / 85'
Building façade in BTZ (min % of lot width)	60%
Pedestrian Way	
(B) Sidewalk (min)	8'
(C) Tree planting zone (min)	8'
Tree spacing (on center, avg)	40'
Vehicular Way	
(D) Parking area (max)	60'
(E) Hedge planting or wall zone (36" min height)	5' (min width)
Streetscape	
(F) Sidewalk or multiuse path not in conjunction with a Town plan (min) OR	6' with 6' minimum clear zone OR
Sidewalk or multiuse path built in conjunction with a Town plan (min)	10' with 10' minimum clear zone
(G) Tree planting zone (min)	8'
Tree spacing (on center, avg)	40'
Parking Location	
Surface parking: 2 bays maximum permitted between building and street	
Structured parking: 30' minimum behind front building façade for all floors	

Canopy trees are required unless utility conflicts exist, in which case an equivalent or better alternative can be reviewed and approved by the Community Design Commission.



## Type C Frontage



### TYPE C FRONTAGE

#### Building Location

Ⓐ Front setback (min/max) 5'

Building façade in BTZ (min % of lot width) n/a

#### Vehicular Way

Ⓑ Parking area (min) Unlimited

Ⓒ Hedge planting or wall zone (36" min height) 5' (min width)

#### Streetscape

Ⓓ Sidewalk or multiuse path not in conjunction with a Town plan (min) 6' with 6' minimum clear zone

OR

Sidewalk or multiuse path built in conjunction with a Town plan (min) 10' with 10' minimum clear zone

Ⓔ Tree planting zone (min) 8'

Tree spacing (on center, avg) 40'

#### Parking Location

Surface parking: No restriction

Structured parking: No restriction

Canopy trees are required unless utility conflicts exist, in which case an equivalent or better alternative can be reviewed and approved by the Community Design Commission.





Figure 3.12 – Blue Hill Street Sections



Arterial with Buffered Bike Lanes			
Right-of-way	Arterial – 117' min, 124' typical Minor Arterial – 93' min, 100' typical	Frontages	Type B (typical)
Median	Landscaped: 9' minimum, 16' preferred + 1.5' mountable curb & gutter Center Turn Lane: 12' minimum	Travel Lanes	Arterial – four 12' lanes Minor Arterial – two 12' lanes
Bike Facilities	Buffered* bike lanes (5' lane + 2.5' curb & gutter, 2'min buffer*) * Buffer required when speed limit ≥ 35mph	Planting Zone	8' planting strip 5' hedge planting strips behind sidewalk
Sidewalks	6' minimum	Parking	No on-street parking



Collector with Bike Lanes – Residential Context			
Right-of-way	73' min	Frontages	Type A (typical)
Median	None	Travel Lanes	Two 11' lanes
Bike Facilities	5' bike lanes min. + 2.5' curb & gutter	Planting Zone	8' tree grates in sidewalk
Sidewalks	10' minimum	Parking	None



Local Street with Sharrows			
Right-of-way	75' min	Frontages	Type A or B (according to code)
Median	None	Travel Lanes	Two 11-12' lanes
Bike Facilities	Shared lane markings (i.e. sharrows)	Planting Zone	Type A - 8' tree grates in sidewalk Type B - 8' planting strip 5' hedge planting strips behind sidewalk
Sidewalks	Type A - 10' minimum Type B - 6' minimum	Parking	8' min (including gutter) 2.5' curb & gutter



Collector with Bike Lanes – Commercial Context			
Right-of-way	85' min	Frontages	Type A (typical)
Median	None	Travel Lanes	Two 11' lanes
Bike Facilities	6' bike lanes adjacent to parking	Planting Zone	8' tree grates in sidewalk
Sidewalks	10' minimum	Parking	2.5' curb & gutter Parallel - 8' min (including gutter) Perpendicular - 18' minimum 60° diagonal - 16' typical



### Elements Overview

#### BUILDING BLOCKS OF GREAT STREETS

There are many different elements working together to create successful streets. They are used in purposeful ways to create experiences for those who use them. For example, variety and transparency provide interest to pedestrians as they walk down the street. Trees provide shade and benches a place to rest or stop and visit. Detail in paving patterns and the intricate design of tree grates

let people know they are somewhere special. These are all tools in the kit of parts that makeup a successful street; one that defines the character of place.

The remainder of this document will utilize the elements below in a way that allows the streets to effectively communicate the values of the district.

	FRONTAGE A	FRONTAGE B	FRONTAGE C	ALT. ACCEPTED*
<b>PAVING</b>				
Sidewalk	•	•	•	
Minor Crossings	•	•	•	A
Major Crossings	•	•	•	A
Bike Lanes	•			
Tree Grates	•	•		
Drainage Grates	•	•		
On-Street Parking	•	•		
<b>LIGHTING</b>				
Street Lighting	•	•	•	
Uplighting	•			A
Traffic Signals	•	•	•	
Pedestrian Signals	•	•	•	
<b>SOUND</b>				
Crosswalk	•	•	•	
Sidewalk Speakers	•			A
<b>FURNISHINGS</b>				
Bus Shelter	•	•	•	
Bike Rack	•	•		A
Waste Collection	•	•	•	A
<b>GREEN INFRASTRUCTURE</b>				
Infiltration Gardens	•	•		A
Site Appropriate Plantings	•	•	•	A

\* A = ALTERNATIVE ACCEPTED WITH PLANNING DEPARTMENT APPROVAL





### PAVING SIDEWALK

FRONTAGE **A**

#### PRODUCT INFO

**MANUFACTURER:**

Endicott Clay Products Co.

**PRODUCT NAME:**

4"x8" Pedestrian/Light Vehicular Pavers  
(ASTM C902)

**PRODUCT #/CODE:**

**COLOR:**

15% Medium Ironspot #46  
70% Dark Ironspot  
15% Manganese Ironspot

**FINISH/TEXTURE:**

Wirecut

**PATTERN:**

45 Degree Herringbone Field  
Soldier Course Manganese Ironspot Edges

#### PLACEMENT:

**Sidewalk:**

Public sidewalks between roadways and building  
facades

#### NOTES:

Depth of Pavers as per manufacturers recommendation  
based on loading requirements.

Herringbone field to have sand swept joints in sand  
setting bed.

Soldier course rowlock edging to have sand swept  
joints in mortar setting bed.

Install pavers in accordance with manufacturer's  
instructions and in proper relationship with adjacent  
construction.





## PAVING CROSSWALKS

### FRONTAGE A

#### PRODUCT INFO

MANUFACTURER:  
Ennis Flint  
PRODUCT NAME:  
DuraTherm Thermoplastic TrafficScape  
PRODUCT #/CODE:  
32W-08 (8')  
COLOR:  
White  
PATTERN:  
Wheels  
8"-12" continuous edge border  
Typical width of 8'

#### PLACEMENT:

CROSSWALK:  
Frontage intersection A/A  
Frontage intersection A/B internal to the district

#### NOTES:

Custom Crosswalk Designs may be implemented at culturally significant intersections as approved by Chapel Hill Planning Staff

Crosswalk widths and placement in relation to intersection must meet all Town of Chapel Hill standards



Example of Acceptable Alternative:  
CUSTOM CROSSWALK DESIGN  
Nascar Hall of Fame Checkered Flag Crossing







### PAVING MINOR CROSSINGS

FRONTAGE A

#### PRODUCT INFO

MANUFACTURER:  
Endicott Clay Products Co.  
PRODUCT NAME:  
4"x8" Heavy Vehicular Pavers (ASTM C1272)  
PRODUCT #/CODE:  
COLOR:  
Dark Ironspot  
FINISH/TEXTURE:  
Wirecut  
PATTERN:  
Running bond brick paver field  
Min 8" Concrete edging bands contain brick field

#### PLACEMENT:

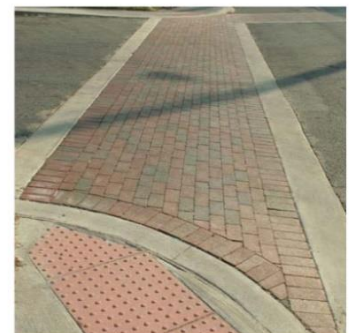
DRIVE CROSSINGS  
Where private drives or alleys cross the sidewalk  
in the public right of way

#### NOTES:

Depth of Pavers as per manufacturers  
recommendation based on loading requirements.

Install pavers in accordance with manufacturer's  
instructions and in proper relationship with adjacent  
construction.

Heavy vehicular rating required for concrete bands





### PAVING BIKE LANES

FRONTAGE **A**

#### PRODUCT INFO

MANUFACTURER:

Ennis Flint

PRODUCT NAME:

PreMark

PRODUCT #/CODE:

N/A

COLOR:

Green

FINISH/TEXTURE:

Wirecut

PATTERN:

Green PreMark shall be used for bike boxes at intersections; bike lane shall be asphalt with white bicyclist symbols at 250'-500' intervals

#### PLACEMENT:

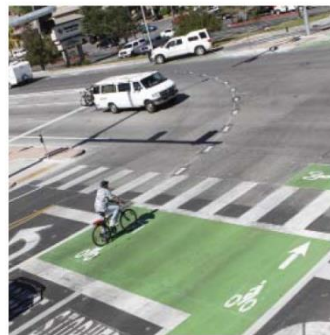
BIKE LANES

Where bike lanes are required as per the

[Chapel Hill Bike Plan](#)

#### NOTES:

Application of markings to meet manufacturer's specifications





### PAVING TREE GRATES

FRONTAGE **A**

#### PRODUCT INFO

MANUFACTURER:  
Iron Age Designs  
PRODUCT NAME:  
6' Square Oblio Tree Grate  
PRODUCT #/CODE:  
OX72-72I99TG  
COLOR:  
N/A  
FINISH/TEXTURE:  
Raw Cast Iron  
PATTERN:  
Oblio

#### PLACEMENT:

Tree Planting Zone  
Around street trees not located in planters or  
infiltration gardens

#### NOTES:

18" concrete band to surround tree grate

Sistemalux Basik LED Walkover Light Fixture to be  
installed within all tree grate as per manufacturer's  
specifications.

All tree grates to be ADA compliant







### PAVING DRAINAGE GRATES

FRONTAGE A

#### PRODUCT INFO

MANUFACTURER:  
Iron Age Designs  
PRODUCT NAME:  
5" Oblio Heel Proof Trench Drain  
PRODUCT #/CODE:  
OM5-20I21HP  
COLOR:  
N/A  
FINISH/TEXTURE:  
Raw Cast Iron  
PATTERN:  
Oblio

#### PLACEMENT:

Drainage Areas:  
Trench Drains to be placed as needed for drainage.  
Suggested locations include on-street between asphalt drive aisle and bike lanes and connecting curbs and infiltration gardens.

#### NOTES:

All trench drains to be installed as per manufacturer's specifications.

All trench drains to be ADA compliant.

Not for installation in the public right-of-way unless approved by the Town.





### LIGHTING STREET LIGHTING

FRONTAGE A

#### PRODUCT INFO

**MANUFACTURER:**  
Sternberg Lighting  
**PRODUCT NAME:**  
Solana Post Top - Large with Intellistreets  
14' Round Straight Steel Pole  
**PRODUCT #/CODE:**  
SL760  
RSS14F400  
**COLOR:**  
Black  
**FINISH/TEXTURE:**  
Urban Black Matte Powder Coat  
**PATTERN:**  
Maximum 60' spacing in opposite arrangement  
along street length

#### PLACEMENT:

**Planting Zone:**  
Lights to be installed in line with trunks of  
street trees along length of street (typ. 2'-6" from  
back of curb)

#### NOTES:

Intellistreets models to be used to increase energy  
efficiency and allow for built in speakers for  
announcements and music

Intellistreets digital banner to be installed every  
corner and mid-block.

Energy Efficient LEDs





### LIGHTING UPLIGHTING

FRONTAGE A

#### PRODUCT INFO

MANUFACTURER:  
Bega  
PRODUCT NAME:  
In-ground Luminaire  
PRODUCT #/CODE:  
77 055  
COLOR:  
3000 K colour temperature  
FINISH/TEXTURE:  
Stainless Steel  
PATTERN:  
5.7" round

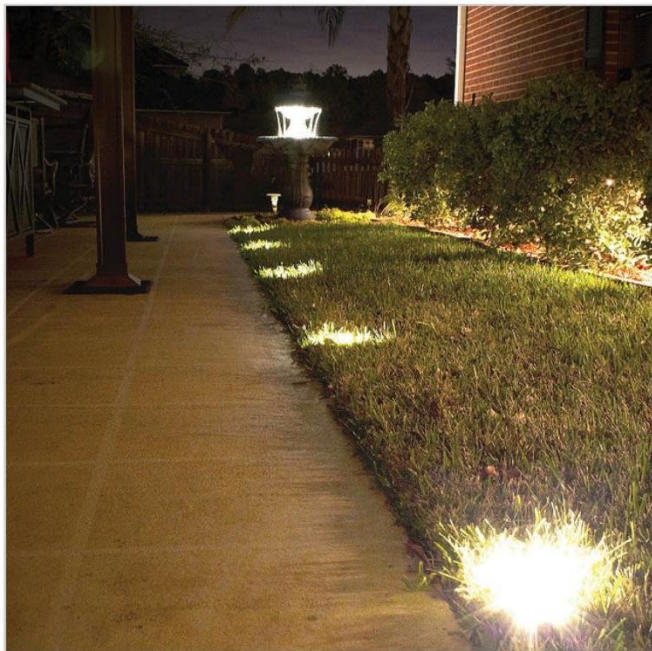
#### PLACEMENT:

Planting beds:  
Position to uplight trees (not in tree grates) and  
buildings as needed to provide adequately lit  
spaces

#### NOTES:

Lights to be installed as per manufacturer's  
specification

(Developer option)





### LIGHTING TRAFFIC SIGNALS

FRONTAGE A

#### PRODUCT INFO

**MANUFACTURER:**

Millerbernd (or approved equivalent)

**PRODUCT NAME:**

Single Arm mast arm traffic signal

**PRODUCT #/CODE:**

N/A

**COLOR:**

Black

**FINISH/TEXTURE:**

Black wet paint

**PATTERN:**

Smooth cylindrical shape; no square or octagonal shapes permitted.

Arm extension should have an arching shape

#### PLACEMENT:

**Intersections:**

Where street lights are required according to city and state regulations

Location of mast arm poles will be determined by pedestrian and vehicular circulation patterns at each intersection

#### NOTES:

Mast arm poles to be custom designed at each intersection based on conditional requirements.

Pedestrian signals will be placed at base of mast arms







### LIGHTING PEDESTRIAN SIGNALS

FRONTAGE A

#### PRODUCT INFO

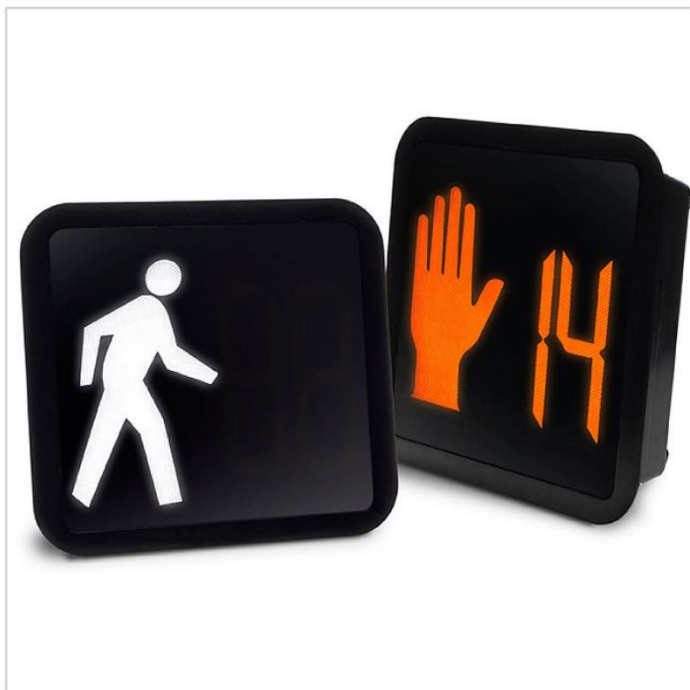
MANUFACTURER:  
GE (or approved equivalent)  
PRODUCT NAME:  
GE LED Countdown Pedestrian Signal  
PRODUCT #/CODE:  
PS7-CFF1-27A-023  
COLOR:  
Black  
FINISH/TEXTURE:  
Polycarbonate  
PATTERN:

#### PLACEMENT:

Intersections:  
Where street lights are required according to city  
and state regulations

#### NOTES:

Pedestrian signals shall meet all requirements of  
applicable codes.



Mike Ganiecki





### SOUND PEDESTRIAN SIGNALS

FRONTAGE A

#### PRODUCT INFO

MANUFACTURER:  
Pelco (or approved equivalent)  
PRODUCT NAME:  
Intellicross Accessible Pedestrian Signal  
PRODUCT #/CODE:  
SE-2900-PXX5" X 7 3/4" STANDARD  
COLOR:  
Flat Black  
FINISH/TEXTURE:  
Polycarbonate  
PATTERN:  
N/A

#### PLACEMENT:

Intersections:  
All signalized pedestrian crossings should

#### NOTES:

Pedestrian signals shall meet all requirements of applicable codes.

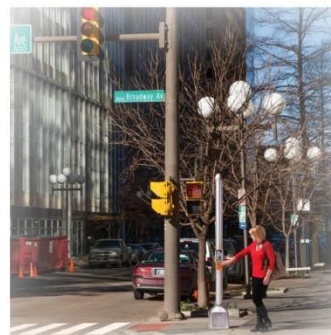
Vibrating button when signal has been sent

Auditory street information communicated when walk sign engaged

Auditory signals become more prominent when ambient sound is present

Cuckoo sound used for North South crossings

Chirp chirp sound used for East West crossings





### FURNISHINGS BUS SHELTER

FRONTAGE A

#### PRODUCT INFO

MANUFACTURER:  
Landscape Forms (or approved equivalent)  
PRODUCT NAME:  
4'x12' Connect Shelter  
PRODUCT #/CODE:  
N/A  
COLOR:  
Silver  
FINISH/TEXTURE:  
Silver Metallic Powdercoat  
PATTERN:  
N/A

#### PLACEMENT:

Transit Stops:  
As required as per transit authority plans

#### NOTES:

Solar LED lighting with LED driver and 6 VDC batteries for dusk to dawn operation. 12ft shelter:  
(20) 6v batteries wired in series and parallel to form a 12v 72Ah battery.

All Rear Glass

Install as per manufacturer's specifications





### FURNISHINGS BIKE RACK

FRONTAGE A

#### PRODUCT INFO

**MANUFACTURER:**

Froms + Surfaces

**PRODUCT NAME:**

Twist Bike Rack

**PRODUCT #/CODE:**

N/A

**COLOR:**

Silver & Blue

**FINISH/TEXTURE:**

Silver Texture Powdercoat

Azure Texture Powdercoat

**PATTERN:**

Silver texture powdercoat bike racks shall be used along streetscape

Azure texture powdercoat must be used at intersections, plazas, parks, and major

#### PLACEMENT:

Planting zone and/or adjacent to building:

Groupings of 3 bike racks shall be spaced no more than 200' apart along the length of the street

#### NOTES:

Surface mount with embedded tamper-resistant anchors.

Alternative installations may be considered by the Town.







### FURNISHINGS WASTE COLLECTION

FRONTAGE A & B

#### PRODUCT INFO

**MANUFACTURER:**  
SiteScapes (or approved equivalent)  
**PRODUCT NAME:**  
Cambridge Trash Receptacle  
**PRODUCT #/CODE:**  
CM2-1002-SF (Trash)  
CM2-1001-SF (Recycling)  
**COLOR:**  
Silver  
**FINISH/TEXTURE:**  
Stainless Steel  
**PATTERN:**  
Recycling containers shall have blue recycling symbol

#### PLACEMENT:

Along street frontage where big belly waste receptacles are not required:  
The Cambridge trash and recycling receptacles must be located within 5' of all benches and shall be spaced so there is no more than 200' between any 2 waste receptacles.

#### NOTES:

All trash receptacles must be placed with a recycling receptacle either directly adjacent to the trash receptacle or separated by no more than 10'.

Dome top should be used for recycling. Ash tops may be used for trash receptacles.





## LANDSCAPE PLANT LIST

## FRONTAGE A

### TREES

S = Street

Scientific Name	Common Name	S	Caliper (min)	Ht (min)	Light
<i>Magnolia x soulangeana</i>	Saucer Magnolia	•	2"	6'	sun / part shade
<i>Quercus bicolor</i>	Swamp White Oak	•	3"	12'	sun / part shade
<i>Quercus falcata var. Pagodifolia</i>	Cherrybark Oak	•	3"	12'	sun / part shade
<i>Quercus shumardii 'Panache'</i>	Panache Shumard Oak	•	3"	12'	sun / part shade

### SHRUBS

I = Island (street parking)  
H = Hedge  
R = Raised Planter

Scientific Name	Common Name	I	H	R	Ht (min)	Light
<i>Euonymus kiautschovicus 'Manhattan'</i>	Manhattan Euonymus		•		24"	sun / part shade
<i>Itea virginica 'Merlot'</i>	Merlot Sweetspire	•			24"	sun / part shade
<i>Loropetalum chinensis 'Shang-White'</i>	Emerald Snow Fringeflower		•		24"	sun / part shade
<i>Myrica cerifera 'Don's Dwarf'</i>	Don's Dwarf Waxmyrtle	•	•		24"	sun / part shade
<i>Thuja occidentalis 'Hetz Midget'</i>	Hetz Midget Arborvitae	•	•		24"	sun / part shade

### GRASSES / PERENNIALS

I = Island (street parking)  
R = Raised Planter  
B = Bio-infiltration Garden

Scientific Name	Common Name	I	R	B	Size (min)	Light
<i>Acorus calamus</i>	Sweet Flag			•	1 gal	sun
<i>Bouteloua gracilis 'Blonde Ambition'</i>	Blonde Ambition Blue Grama Grass	•			1 gal	sun
<i>Cotoneaster 'Emerald Carpet'</i>	Willow Leaved Cotoneaster	•			1 gal	sun
<i>Equisetum hyemale</i>	Horsetail			•	1 gal	sun
<i>Juncus inflexus 'Blue Arrows'</i>	Blue Arrows Rush			•	1 gal	sun
<i>Juncus effusus</i>	Common Rush			•	2" pot	sun
<i>Muhlenbergia lindheimeri</i>	Lindheimer's Muhly	•			1 gal	sun
<i>Panicum virgatum 'Shenandoah'</i>	Shenandoah Switch Grass	•			1 gal	sun / part sun
<i>Rhynchospora colorata</i>	Whitetop Sedge			•	1 gal	sun / part shade
<i>Schizachyrium scoparium 'Prairie Munchkin'</i>	Dwarf Little Bluestem		•		1 gal	sun
<i>Sorghastrum nutans</i>	Indian Grass			•	1 gal	sun
<i>Sporobolus heterolepis 'Tara'</i>	Dwarf Prairie Dropseed	•	•		1 gal	sun
<i>Sporobolus heterolepis</i>	Prairie Dropseed	•			1 gal	sun



### PAVING SIDEWALK

FRONTAGE **B**

#### PRODUCT INFO

MANUFACTURER:  
Endicott Clay Products Co.  
PRODUCT NAME:  
4"x8" Pedestrian/Light Vehicular Pavers  
(ASTM C902)  
PRODUCT #/CODE:  
N/A  
COLOR:  
Manganese Ironspot  
FINISH/TEXTURE:  
Wirecut  
PATTERN:  
Concrete Field with Soldier Course of  
Manganese Ironspot Edging

#### PLACEMENT:

SIDEWALK:  
Public sidewalks between roadways and building  
facades

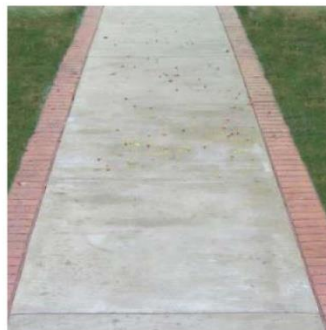
#### NOTES:

Depth of Pavers as per manufacturers recommendation  
based on loading requirements.

Concrete field to be installed at a depth and profile  
based on loading requirements.

Soldier course rowlock edging to have sand swept  
joints in mortar setting bed.

Install pavers in accordance with manufacturer's  
instructions and in proper relationship with adjacent  
construction.





### PAVING MAJOR CROSSINGS

FRONTAGE B

#### PRODUCT INFO

MANUFACTURER:  
Ennis Flint  
PRODUCT NAME:  
DuraTherm Thermoplastic TrafficScape  
PRODUCT #/CODE:  
32W-08 (8")  
COLOR:  
White  
PATTERN:  
Wheels  
8"-12" continuous edge border  
Typical width of 8'

#### PLACEMENT:

CROSSWALK:  
Frontage intersection B/B  
Frontage intersection A/B external to the district

#### NOTES:

Custom Crosswalk Designs may be implemented at culturally significant intersections as approved by Chapel Hill Planning Staff

Crosswalk widths and placement in relation to intersection must meet all Town of Chapel Hill standards



Example of Acceptable Alternative:  
CUSTOM CROSSWALK DESIGN  
Nascar Hall of Fame Checkered Flag Crossing







### PAVING MINOR CROSSINGS

FRONTAGE B

#### PRODUCT INFO

MANUFACTURER:  
Endicott Clay Products Co.  
PRODUCT NAME:  
4"x8" Heavy Vehicular Pavers (ASTM C1272)  
PRODUCT #/CODE:  
COLOR:  
Dark Ironspot  
FINISH/TEXTURE:  
Wirecut  
PATTERN:  
Running bond brick paver field  
Min 8" Concrete edging bands contain brick  
field

#### PLACEMENT:

DRIVE CROSSINGS  
Where private drives or alleys cross the sidewalk  
in the public right of way

#### NOTES:

Depth of Pavers as per manufacturers  
recommendation based on loading requirements.

Install pavers in accordance with manufacturer's  
instructions and in proper relationship with adjacent  
construction.

Heavy vehicular rating required for concrete bands







## LANDSCAPE INFILTRATION GARDENS

FRONTAGE B

### PRODUCT INFO

MANUFACTURER:  
Custom  
PRODUCT NAME:  
Infiltration Garden  
PRODUCT #/CODE:  
N/A  
COLOR:  
N/A  
FINISH/TEXTURE:  
Concrete  
PATTERN:  
Concrete curbs surround a linear planting area that incorporated modified soils and specific plantings for stormwater treatment  
Raised concrete curb with breaks for stormwater collection

### PLACEMENT:

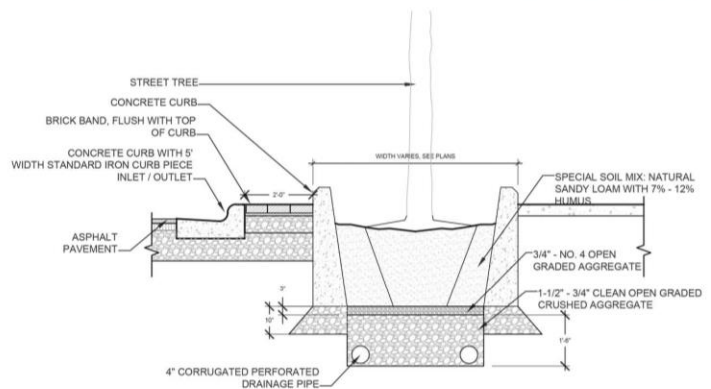
PLANTING ZONE  
Continuous for length of street providing breaks where pedestrians and access is required  
Used at bulb-outs where pedestrians do not cross street

### NOTES:

Infiltration gardens shall receive all stormwater for length of street

Stalite shall be the standard planting medium for infiltration gardens

Outside public right-of-way only  
(Optional)





### PAVING SIDEWALK

FRONTAGE **C**

#### PRODUCT INFO

MANUFACTURER:

PRODUCT NAME:

Concrete Sidewalk

PRODUCT #/CODE:

N/A

COLOR:

N/A

FINISH/TEXTURE:

Wire brush finish

PATTERN:

Minimum width of 6' with score joint 8" from each edge of walkway running parallel from walkway edge with control joints spaced at intervals equal to the distance between the 2 score joints

#### PLACEMENT:

SIDEWALKS/MULTI-USE PATHS:

Along street to allow for pedestrian movement; may also be used for bicycle circulation if path is installed at a width appropriate for a mixed use path.

#### NOTES:

Concrete must be a minimum of 3000PSI

Concrete field to be installed at a depth and profile based on loading requirements.

Saw cut all joints, tool joints not permitted



