

Town of Hope Mills

CHAPTER 4: ACCESS AND CIRCULATION

4.1 PURPOSE

The purpose of this section is to supplement standards in accordance with the Town of Hope Mills Code or Ordinances (and/or) shown or specified within the Town of Hope Mills Standard Details and Notes.

4.2 STREETS AND ALLEYS

4.2.1. GENERAL

- A. The intent of this subsection is to provide uniform policy to applicants by recommending ranges of values for critical street and alley dimensions. Design uniformity provides a high probability of operational efficiency, comfort, safety, and convenience for the motorist and pedestrian by meeting motorist/pedestrian expectations. These design concepts were also developed with consideration for economy and environmental quality.
- B. The design values presented in this subsection do not imply that existing streets and alleys not meeting the design values are unsafe, nor does it mandate the initiation of improvement projects to conform with these values.

4.2.2. APPLICABLE STANDARDS

- A. All streets and alleys (private and public) shall be designed and constructed to Town or NCDOT standards, as appropriate.
- B. Town standards shall be applicable to all streets and alleys anticipated to be maintained by the Town and to other streets and alleys to the extent they are required by the Town of Hope Mills Code of Ordinances and are more restrictive than NCDOT standards - provided, however, that Town standards may be varied or waived where private residential streets are being converted to Town-maintained public streets within a municipal service district.
- C. NCDOT standards shall be applicable on all existing State roads, extensions of existing State roads, or roads anticipated to be maintained by the State in the future, except where applicable Town standards are more restrictive.
- D. NCDOT standards may be applied to private streets and alleys except where applicable Town standards are more restrictive.
- E. Where NCDOT standards are applicable, the latest version of the NCDOT "Standard Specifications for Roads and Structures" shall apply, subject to the following substitutions:

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1. "State" or "Commission" shall be replaced by "Town".
2. "Resident Engineer" shall be replaced by "Town Representative."
3. "Sampling and testing by Commission" shall be replaced by the words "sampling and testing by the Town or its duly authorized testing agent".
4. "Inspection by Commission" shall be replaced by "Inspection by Town Representative".

4.2.3. PRIVATE STREETS

- A. Private streets shall be permitted only for on-site access and circulation improvements in nonresidential, multifamily, and mixed-use developments.
- B. The responsibility for maintaining private streets, as well as associated sidewalks and bicycle travelways, shall be vested with a property owners', homeowners', or management association.
- C. Development covenants shall specifically describe operation and maintenance responsibilities of the property owners', homeowners', or management association.

4.2.4. DESIGN FACTORS

The factors identified in the subsection shall be used to determine the design standards applicable to the construction, extension, or improvement of a particular street.

A. Accessway Classification

All accessways shall be classified in accordance with the Town of Hope Mills Code of Ordinances, (and/or) as shown or specified within the Town of Hope Mills standard details.

1. Further Classifications of Local Streets

a. Minor Local Streets

(1) Cul-de-Sac

Cul-de-sacs serve either abutting residential or non-residential land uses and terminate in a turnaround.

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(2) Loop Street

Loop streets serve abutting residential land uses and terminate on the same street from which they originate. Cul-de-sac streets may intersect onto this street.

b. Major Local Streets

(1) Residential Local Street

This is a street whose primary function is to serve an abutting residential land use. Motorists using such streets generally include only residents and their visitors. Use of such streets by large trucks and heavy vehicles is rare, except for occasional use by maintenance and delivery vehicles. Primary design concerns focus on fostering a safe and pleasant environment for the residential community, with convenience to the motorist secondary. Residential streets in new developments may incorporate traffic calming into the initial design. Traffic calming may include curvilinear streets and/or devices such as median islands, chokers, chicanes, roundabouts, etc.

(2) Access Street

These streets serve a dual function of providing access to adjacent property as well as providing through or connecting services between other local streets.

2. Further Classification of Collector Streets

a. Minor Collector Street (Residential)

Classification of a vehicular accessway as a minor collector street depends on appropriate traffic conditions, access conditions, and intersecting street linkages.

- (1)** Traffic conditions apply when the roadway, under immediate or ultimate build-out conditions, collects traffic from more than 150 dwelling units, or accounts for traffic volumes in excess of 1,500 ADT.
- (2)** Access conditions apply when the extent of a development so isolates the remote units of the development from a thoroughfare that access by emergency or service vehicles can be deemed unsafe or uneconomic, or when the ability for residents to reach community travel destinations by means other than access to a thoroughfare can be achieved. Ideally, no residential location is more than one-half mile from a collector street. Access conditions shall also apply where it is deemed reasonable and feasible to interconnect abutting neighborhoods.

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b. Major Collector Street (Non-Residential)

Classification of a vehicular accessway as a major collector street depends on appropriate traffic conditions or access conditions.

- (1) Traffic conditions apply when the roadway, under immediate or ultimate build out conditions, collects traffic volumes in excess of 3,000 ADT.
- (2) Access conditions apply when the extent of a development so isolates the remote units of that development from a thoroughfare that access by emergency or service vehicles can be deemed unsafe or uneconomic. Access conditions shall also apply where it is deemed reasonable and feasible to interconnect abutting development.

B. Traffic Composition

The physical characteristics and performance of different users have a direct impact on geometric design. Although the dimensions and performance of motorized vehicles typically dictate the components of street design, consideration of the characteristics of non-motorized vehicles and pedestrians should be taken into account.

C. Design Vehicle

1. The design vehicle chosen shall dictate the design such that the traveling paths of these vehicles do not conflict with the physical constraints of the street or hinder the other users of the street. The applicable category of design vehicle is generally based upon the classification of the street.
2. Local streets can be subject to both passenger cars and trucks. In particular, minor local streets should be designed for passenger cars and major local streets should be designed to accommodate single-unit trucks.
3. Collector streets should be designed to accommodate single-unit trucks, or in the case of a nonresidential setting, should be designed to accommodate the type of vehicle prevalent to their access purpose.
4. Arterials shall meet the design needs of vehicles specified by NCDOT and Town standards.
5. All streets shall be designed to accommodate the Town's largest Fire Apparatus or Emergency Services vehicle.

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D. Design Speed

1. The design speed chosen for a street shall be based on topography, the adjacent land use, and the classification of the street.
2. All pertinent features of a street, such as width, curvature, grade, sight distance, access points and parking should be related to the design speed.
3. Design speed shall be, at a minimum, 5 MPH more than the intended posted speed limit, or as otherwise required by the Town Representative.

E. Stopping Sight Distance

1. General

- a. Stopping sight distance is measured in the horizontal (plan) and vertical (profile) planes. In both planes, a driver must be offered an unobstructed line of sight to the roadway in front of them.
- b. If this line of sight is impeded by any obstructions, either the obstruction should be moved or the alignment adjusted.

2. Horizontal Stopping Distance

The horizontal stopping sight distance is measured along the middle of the travel lane from the driver to the object.

3. Vertical Stopping Distance

The vertical stopping sight distance is measured along the middle of the travel lane from the driver to the object.

F. Curves

1. Curves shall be designed to establish the proper relationship between design speed and superelevation.
 - a. The minimum radius of curvature is limited by a given design speed and superelevation rate.
 - b. The maximum radius of curvature is limited by the posted speed (85th percentile) and the associated expectations of pedestrians and motorists for the adjacent land use.
2. Horizontal and vertical curves shall be designed concurrently to encourage uniform speed and accent or preserve the significant natural features of the

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land. Refer to the current edition of AASHTO's "A Policy on Geometric Design of Highways and Streets" (the "green book") for more information.

G. Bikeways

Bikeways shall be consistent with the Town of Hope Mills Code of Ordinances (and/or) as shown or specified within the Town of Hope Mills standard details and with the latest version of approved planning document. More information on bicyclist characteristics and bike facilities can be found in AASHTO's "Guide for Development of Bicycle Facilities."

H. Pedestrian Facilities

Pedestrian facilities shall be consistent with the Town of Hope Mills Code of Ordinances (and/or) as shown or specified within the Town of Hope Mills standard details and with the latest version of approved planning document. More information on pedestrian characteristics and facilities can be found in Federal Highway Administration (FHWA)'s "Pedestrian Facilities Users Guide."

4.2.5. INTERSECTION SIGHT DISTANCE AREAS

A. General

All intersection sight distance areas shall comply with the latest version of AASHTO'S "Policy on Geometric Design of Highways and Streets" and/or NCDOT standards, as applicable.

B. Intersection Sight Distance

1. Intersection sight distance is based on conflicts with opposing vehicles rather than with objects located in the roadway.
2. At all vehicular accessway intersections, there is a minor street, driveway, or movement (whose approach may be controlled by some device such as a sign), and a major street or movement (whose approach may not be controlled).The amount of sight distance required at an intersection depends on the type of traffic control device (e.g. stop sign) at the intersection and the speed of the vehicle approaching the intersection.
3. Intersection sight distance is measured in the horizontal (plan) and vertical (profile) planes. In both situations, a driver must be offered an unobstructed line of sight to the roadway they wish to cross or join. The horizontal intersection sight distance is measured along the centerline of the major street between the drivers of the two opposing vehicles.

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4. Conditions may exist that prevent the attainment of desirable sight distance. In such cases, the sight distance shall be obtained to the maximum practicable and additional measures such as warning signs, reduced speed zones, and other traffic controls may be required by the Town Representative.

C. Relationship to Intersection Traffic Controls

1. The driver of the stopped vehicle shall have adequate sight intersection distance to cross or join the approaching traffic flow without adversely affecting the travel speed of the approaching traffic.
2. There are three basic maneuvers that occur at stop controlled intersections:
 - a. To travel across the intersecting roadway by clearing traffic on both the left and the right of the crossing vehicle;
 - b. To turn left into the crossing roadway by first clearing the traffic on the left and then entering the traffic stream with vehicles from the right (this maneuver is similar in nature to that made by the median left turns off the through street); and
 - c. To turn right into the intersecting roadway by entering the traffic stream with vehicles from the left.
3. Where the through street is undivided or divided with a median strip narrower than 20 feet, maneuvers 2.a. and 2.b. are treated as a single operation.
4. Where the median can provide storage for the design vehicle (20 feet wide for a passenger car), maneuvers 2.a. and 2.b. may be considered in two separate phases of operation.
5. The measurement method for determining the sight line for left, right, and through movements from the side street is based on NCDOT values and illustrations.
6. The measurement method for determining the sight line for left turns from the median lane of the through street is based on values listed in AASHTO's "Policy on Geometric Design of Highways and Streets."

D. Objects Allowed in Intersection Sight Distance Areas

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Within intersection sight distance areas, development and landscaping shall be restricted to enable motorists approaching the intersection to see and react to vehicular traffic approaching the intersection from other directions. Any object placed within an intersection sight distance area shall comply with the following:

1. The object located may not significantly obstruct the required visibility of the driver. The driver shall be able to see over, under or around some objects within intersection sight distance areas.
2. Objects 12 inches in diameter and smaller, such as sign posts, may be allowed within sight distance areas if located so as to not substantially restrict the driver's view.
3. Objects such as fire hydrants, utility poles, and traffic control devices are permitted with minimal visual obstruction.

E. Intersection Sight Area Obstructions

The vertical line of sight between a motorist approaching an intersection an object approaching the intersection from other direction is a visual line connecting the driver's eye, which is located 3.5 feet above the roadway surface, with the approaching object, which is located 4.25 feet above the roadway surface. If this line of sight is impeded by any obstructions, either the obstruction should be moved or the alignment adjusted by the Town of Hope Mills (within Town-maintained rights-of-way), NCDOT (within State-maintained rights-of-way), or the property owner, as appropriate.

4.2.6. STREET INTERSECTION DESIGN

A. General

1. See the Town of Hope Mills Code of Ordinances or as shown or specified within the Town of Hope Mills standard details for minimum street intersection spacing standards and median break standards.
2. Whenever possible, streets shall intersect at right angles, as measured by the intersecting street centerlines. The minimum desirable intersection angle is 80 degrees. At no time shall a street intersect any other street at less than 75 degrees.
3. Curb radii shall be designed to satisfy the turning radius of the predominant design vehicle using the roadway. Minimum radii are based on NCDOT standards for Horizontal and Vertical Controls.

B. Turn Bay Tapers

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1. Turn bay tapers shall be straight line at a minimum ratio of 15:1 for posted speeds of 45 miles per hour and more.
2. The minimum turn bay taper allowed is 8:1 for posted speeds below 40 miles per hour.
3. Symmetrical reverse curve tapers are recommended for arterials or collector streets as shown in the details.
4. Storage lengths for the turn bays shall be calculated using NCDOT or other method approved by the Town Representative.

C. Medians

Streets with medians shall be designated to allow for proper turning movements for a SU (single unit truck) design vehicle. AASHTO guidelines and the Town's Subdivision Ordinance should be followed for the actual median design and median opening dimension.

D. ADA Accessibility

ADA Accessibility ADA-compliant sidewalk access ramps shall be provided at all street and non-residential driveway intersections where curb and gutter are provided and where sidewalks and/or greenway trails intersect any street. (See Section 4.4.2.E.)

E. Roundabouts

The Town encourages new and innovative design features within its transportation infrastructure, including roundabouts. A minimum radius of 100 feet from back of curb to back of curb is required.

4.2.7. CUL-DE-SAC DESIGN STANDARDS

A. Maximum Length

The standard maximum length for a cul-de-sac shall be 1400 feet. Requests to extend the length of the cul-de-sac may be made to the Town Representative (see Section 1.3.3.2., Alternative Standards Procedure). Requests may consider the development density, land configuration, as well as all safety concerns.

B. Type of Cul-de-Sacs

The following are the only types of cul-de-sacs permitted.

1. Bulb Cul-de-Sacs

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- a. The length of a bulb cul-de-sac is measured from the last point of alternate access (midpoint of the nearest street providing connectivity or access to the area wide street system—e.g., nearest street [not dead end/cul-de-sac] providing an exit or outlet for a residential subdivision) to the center of the circular cul-de-sac right-of-way or access easement.
- b. Cul-de-sacs greater than 150 linear feet in length shall have a bulb turnaround with a minimum diameter of 96 feet from face-of-curb to face-of-curb per Appendix D of the North Carolina Fire Prevention Code.
- c. A median island may be allowed within the circular turnaround as part of a Low Impact Development (LID) with prior approval from the Town Representative and Fire Chief.

2. Hammerhead Cul-de-Sacs

- a. The length of a hammerhead cul-de-sac is measured from the last point of alternate access (midpoint of the nearest street providing connectivity or access to the area wide street system—e.g., nearest street [not dead end/cul-de-sac] providing an exit or outlet for a residential subdivision) to the farthest point along the dead-end street from the intersecting street.
- b. **Hammerheads are permitted:**
 - (1) On a temporary basis for dead-end streets intended to extend in the future.
 - (2) On a permanent basis only if significant environmental or topographic constraints exist.
- c. Hammerhead design shall be in accordance with Appendix D of the North Carolina Fire Prevention Code.
- d. Driveway entrances are prohibited from being located off the end of a hammerhead, except for utility and emergency services access. There are no exceptions to this requirement.

4.2.8. ROADWAY HORIZONTAL AND VERTICAL ALIGNMENT STANDARDS

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A. Tangent Lengths

1. Collector Streets

- a. Tangent sections shall be of sufficient length to accommodate minimum super elevation runoff lengths as noted in the latest edition of AASHTO's "A Policy on Geometric Design of Highways and Streets."
- b. The minimum tangent length on the stop approach to an intersection of a higher classification shall be 100 feet measured from the edge of the intersecting travel way.

2. Local Streets

- a. Tangent sections shall not exceed 300 feet for minor local streets and 500 feet for major local streets.
- b. The minimum tangent length approaching an intersection is 30 feet measured from the intersecting travel way.

B. Lane Configuration

Tapers shall be used as necessary in street design. Approach tapers are used to shift lanes laterally. The equations used for taper length criteria shall be used as follows: $L=WS^2/60$ for speeds of 40 mph or less and $L=WS$ for speeds of 45 mph or greater where L = Length in feet, S = Speed in mph and W = Lateral offsets in feet.

C. Superelevation

1. Superelevation should not be used on alleys, main streets, or local streets.
2. Superelevation may be allowed on collector streets, minor arterials, and major arterials in accordance with NCDOT specifications.

D. Horizontal Curves

Horizontal curve design shall be consistent with methodologies detailed in the latest edition of AASHTO's "A Policy on Geometric Design of Highways and Streets.", and meet the criteria based on NCDOT standards for horizontal and vertical curve controls.

E. Vertical Curves

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1. General

Vertical curves affect the gradual change between grades of a vertical alignment. The curves should produce a design which provides adequate sight distance, for stormwater runoff drainage, and rider comfort. To meet these criteria, the vertical curves are designed to curve at rates based on NCDOT standards for horizontal and vertical curve controls. The product of the curvature rates and the algebraic difference in adjoining grades is the basis for the minimum length of curves, but should never be less than the minimum lengths based on NDCOT standards for horizontal and vertical curve controls.

2. Crest Vertical Curves

The design of crest vertical curves shall provide sufficient sight distance.

3. Sag Vertical Curves

- a. The rate of vertical curvature should provide a minimum grade of 0.003:1 (vertical: horizontal) within a 50-foot distance from the level point.
- b. Sag vertical curves in cut situations should be avoided to prevent ponding of water.
- c. The minimum allowable length of sag vertical curves, where a street light is in the sag, shall be 20 times the algebraic difference in grades (in percent) for residential local streets and 15 times such difference for cul-de-sacs and loop roads.

F. Grades

1. Street and alley grades shall be established such that drivers can negotiate them in adverse weather.
2. The minimum grade allowed on any street or alley shall be 1%.
3. The maximum grade allowed on a street or alley when approaching an intersection is 5% for the last 100 feet of pavement before the intersection, measured from the edge of the intersecting travel way. The maximum grades otherwise allowed per street classification are based on NCDOT standards for horizontal and vertical curve controls.

4.2.9. CROSS SECTION ELEMENTS

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A. General

1. The elements that compose the cross section of a street or alley should take into account the classification, design speed, traffic volume, traffic composition, and terrain of that street or alley.
2. The elements of the cross section include the roadway (curb and gutter, shoulders, travel way, bike lanes, and parking lanes), the roadside (utility strips, sidewalks, and multi-use paths), and the median area.
3. These elements lend themselves together into determining the required right-of-way or access easement width. Refer to the latest approved Town of Hope Mills planning document for specific right-of-way and cross section requirements.
4. Normal crown for the pavement section shall be 2% (vertical: horizontal). Superelevation should never exceed 4%.

B. Curb and Gutter (Concrete)

1. Concrete curb and gutter shall be required on all streets with a right-of-way or access easement width of at least 50 feet unless the street is part of a Low Impact Development (LID). Classification of a development as low impact shall be determined by the Town Representative.
2. Adequate drainage and edge of pavement protection/reinforcement must be provided.
3. On all public streets, median curb shall be a standard 18-inch mountable curb, and all other curb and gutter shall be a standard 30-inch curb and gutter.
 - a. In developments where the driveway spacing is such that adequate transition from driveway cuts to standard curb cannot be met, roll curb may be allowed with prior authorization from the Town Representative.
 - b. Valley curb shall be prohibited.
4. Roadway stone sub-base shall be extended under the curb and gutter, to a minimum of 6 inches beyond the back of curb.
5. When removing curb and gutter for the installation of a driveway, street turnout, or repair, the concrete shall be removed to the next joint or such that no distance between joints is less than 5 feet.

C. Drainage Channels and Side Slopes

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Streets in Low Impact Developments (LIDs) or where curb and gutter is not required shall comply with the following standards:

1. Right-of-way or access easement width shall be a minimum of 60 feet;
2. Shoulder width shall be a minimum of 5 feet
3. Vertical grade shall be a maximum of 5% and a minimum of 2%;
4. Swales shall carry the 10-year storm in a non-erosive manner;
5. Driveway pipes shall pass the 10-year storm in a non-erosive manner;
6. Driveway pipes shall have flared end sections or headwalls on both ends.

D. Median Sections

1. Raised median sections will be constructed in accordance with the latest version of approved Town of Hope Mills Subdivision Ordinance.
2. Medians shall have sufficient crown (4% minimum) to promote drainage off the median, but shall never be to a cross slope in which sight distance is obstructed.
3. Median plantings shall be selected, installed, and maintained to ensure they will not interfere with sight distance.

E. Utility Strips

Utility strips shall be sufficient to permit the adequate installation and maintenance of sidewalks and utilities, as well as provide sufficient clear distance as defined by NCDOT and the Town. Widths should be no less than 3 feet, with 5 feet preferred.

F. Sidewalks

See Section 4.4. Sidewalks, Greenways, and ADA Accessibility.

G. Greenway/Multi-Use Paths

See Section 4.4. Sidewalks, Greenways, and ADA Accessibility.

4.2.10. TRAFFIC CALMING

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A. General

1. The Town may require the use of traffic calming measures in the design of projects to minimize the negative impacts of vehicular traffic in residential neighborhoods, improve the safety of roads, reduce the need for traffic enforcement, and improve the quality and livability of neighborhoods.
2. All traffic calming devices must be included as part of a development application and shall conform to the Town's standard specifications.
3. The traffic control devices and all related signs and pavement markings shall be maintained by the owner. Traffic control devices may include rumble strips, raised pavement markers or pavement undulations (speed humps) or other devices listed in the Town of Hope Mills Code of Ordinances, or as approved by the Town Representative (see Section 1.3.3.2., Alternative Standards Procedure).

B. Rumble Strip

1. The material used as a part of a rumble strip may be cobblestone, stamped concrete, brick, or rough surface asphalt.
2. A rumble strip may not vary more than 1 inch in height from the pavement elevation.
3. All rumble strips must be located outside any travel way.

C. Pavement Markers

1. The markers must be made of a flexible and durable solid material designed to support vehicular traffic.
2. All pavement markers shall be inlaid flush with the pavement surface.
3. The minimum size of the marker shall be 4 inches by 4 inches
4. The markers must be located outside any travelway
5. All raised pavement markers shall have cube-corner microprism reflectors visible from either direction of travel.

D. Pavement Undulation (Speed Tables)

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1. The surface material for a pavement undulation shall be the same as the adjacent travel way and be consistent with the Town's standard details.
2. All pavement undulations shall be clearly marked with pavement markings or warning signs for each direction of travel.
3. Pavement undulations must be located a minimum distance of 500 feet from a signalized intersection.
4. The Town and/or NCDOT may require the removal of any speed undulation which causes traffic to back up onto a public street.

4.2.11. BICYCLE LANES

Bike lanes shall be incorporated into street design as required by the Town of Hope Mills Code of Ordinances, (and/or) as shown or specified within the Town of Hope Mills standard details and latest approved planning document.

4.2.12. PAVEMENT DESIGN

A pavement design based on site-specific conditions is required for all alleys, streets, and fire lanes. The pavement design shall be in accordance with the following specifications:

- A. The pavement design and traffic analysis shall be signed and sealed by a North Carolina licensed Professional Engineer (NCPE).
- B. All streets maintained by the NCDOT must receive approval of the pavement design from the NCDOT.
- C. Approved pavement design methods include those most current as proposed by NCDOT, AASHTO and the Asphalt Institute MS 1 document. Other design methods will not be accepted. The AASHTO method will require the following parameters:
 1. Use of a terminal serviceability index of 2.0 for collector streets and 2.5 for arterials;
 2. $SO = 0.49$ for flexible pavement or $SO = 0.39$ for rigid pavements; and
 3. A reliability of 98% for arterials and 95% for collectors.
- D. Rigid pavement design shall follow the most current AASHTO Method or the Portland Cement Association Method.

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- E. Pavement design shall be based on subgrade conditions, and projected traffic loading to provide a 20-year design life.
- F. Subgrade conditions shall be based upon corrected soaked CBR values at 0.1-inch penetration per ASTM D1883.
- G. Soil samples used for these CBR tests shall be obtained at intervals not greater than 500 feet. Typically, a subdivision will require a minimum of three soil samples as a part of the pavement design. Larger subdivisions (greater than 100 lots) may require additional soil samples at the discretion of the Town Representative.
- H. Boring logs and scaled drawings designating boring locations with CBR tests and other pertinent data shall be included with the pavement design report.
- I. The pavement design for any public streets or private accessway shall comply with the following standards. For typical residential streets, alleys, and fire lanes the shall have a compacted suitable subbase, stone base course thickness of no less than 9 inches of STBC Type “A” or “C”, or 6 inches of ABC or STBC Type “B” and an asphalt thickness of no less than 2 inches of SF 9.5A ASP Surface Course. Light commercial streets shall have a compacted suitable subbase, stone base course thickness of no less than 8 inches of ABC, an asphalt base thickness of no less than 2-1/2 inches of I 19.0 B, and a surface course of no less than 2 inches of S 9.5B ASP. Heavy commercial streets shall have a compacted suitable subbase, stone base course thickness of no less than 8 inches of ABC, an asphalt base thickness of no less than 2-1/2 inches of I 19.0 B, and a surface course no less than 2 inches of S 9.5C ASP. The stone base course shall extend under the curb and gutter and terminate 12 inches behind the back of curb. See Standard Details & Notes.
- J. Alleys shall be designed to accommodate a garbage truck or larger vehicle.

4.3. SIGNAGE, SIGNALS, AND PAVEMENT MARKINGS

4.3.1. TRAFFIC CONTROL SIGNS

- A. All streets require traffic control signs (e.g. stop and yield signs)
- B. Traffic control signs shall be marked in accordance with the latest revision of the MUTCD.
- C. All specialty traffic control signs and posts must be approved by the Town Representative.
- D. All traffic signs shall be included in the pavement marking plan required in Section 4.3.2.D. below.

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4.3.2. PAVEMENT MARKINGS

- A.** All collector streets and arterials require pavement markings.
- B.** Pavement markings shall be marked in accordance with the latest revision of the MUTCD.
- C.** The pavement markings for all streets, both public and private, and fire lanes shall be thermoplastic in accordance with NCDOT standards. Exception of the use of thermoplastic is granted in the case of private parking stalls.
- D.** A pavement marking plan shall be included in Construction Plan Approval applications.

4.3.3. STREET NAME SIGNS

- A.** Permanent street name signs shall be installed prior to issuance of any Certificate of Compliance/Occupancy for the development or final acceptance of the roadway by the Town.
- B.** Street name signs shall be marked in accordance with the latest revision of the MUTCD and shall comply with the Town's standard specifications.
- C.** All specialty street name signs and posts must be approved by the Town Representative and included in the pavement marking plan required in Section 4.3.2.D. above.

4.3.4. TRAFFIC SIGNALS

A. General

- 1.** The design, installation and construction of traffic signals shall meet the specifications put forth by the NCDOT's "Traffic Management & Signal Systems Unit Design Manual." Special attention shall be given to the areas of these specifications regarding metal poles and preemption control.
- 2.** All control equipment shall be programmed.
- 3.** Where applicable, the traffic signal shall also meet the Town of Hope Mills specifications.

B. Metal Poles

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1. Metal poles with mast arms shall be used, unless determined by the Town Representative to be impracticable.
2. Where applicable, consideration should be given to standard designs of metal poles and mast arms and footings as approved by NCDOT.

C. Preemption Control

1. Emergency vehicle-initiated preemption of traffic signals on the State Highway System must be approved by NCDOT.
2. Official first response emergency vehicles that utilize sirens and red flashing lights to provide services to the public that prevent loss of life and property are the only eligible vehicles. "Official" vehicles are fire-fighting and emergency medical services vehicles owned, operated, and maintained by the emergency response agency or authority.
3. Police vehicles may have access to the preemption system on State-maintained roadways only after approval by NCDOT.
4. All preemption equipment must be on NCDOT's ITS and Signals Qualified Products List (ITSS QPL).
5. NCDOT's Traffic Engineering and Safety Systems Branch manages this QPL and is responsible for assuring the equipment is reliable, cost effective, and compatible with NCDOT and agency requirements.

4.3.5. PEDESTRIAN CROSSWALKS

All locations designated for pedestrian traffic crossing shall be designated as a crosswalk with pavement markings and signage. See Section 4.5, Crosswalks, for additional requirements.

A. Public Streets

The type and placement of signage and markings shall be consistent with MUTCD and NCDOT standard specifications and drawings.

B. Private Streets and Drive Aisles

Private streets and drive aisles, the placement of the signage and markings shall be consistent with MUTCD and NCDOT standard specification and drawings, and shall be constructed of pavers (brick or concrete) or stamped concrete of a contrasting color.

4.4 SIDEWALKS, GREENWAYS, AND ADA ACCESSIBILITY

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4.4.1. GENERAL

- A.** Accessible routes adjacent to and within the site must be identified on the Site Plan Approval application. Certain improvements to existing sites may require the development to be brought into compliance with current ADA standards.
- B.** Construction plans approval applications must provide sufficient spot elevations on the grading plan to show the accessible routes are in accordance with the current ADA requirements and guidelines.

4.4.2. SIDEWALKS

- A.** Sidewalks shall be provided in accordance with the Town of Hope Mills Code of Ordinances, as approved by the Board of Commissioners and/or as shown or specified within the Town of Hope Mills Standard Details and Notes.
- B.** Sidewalks shall be installed at the time of roadway construction or widening, or prior to the Certificate of Compliance/Occupancy, unless otherwise approved by the Town.
- C.** The minimum thickness of a sidewalk shall be 4 inches. A 6-inch depth is required with reinforcement at locations where a driveway crosses a sidewalk, at street intersections (along the length of radius curb returns), at utility (including stormwater) access easements, and in ADA accessible ramps. Sidewalks shall have a uniform slope toward the roadway (cross-pitch) of 2% maximum. The utility strip between the sidewalk and the back of curb shall also slope toward the roadway at a minimum of 2%.
- D.** Sidewalks shall be located as required by the latest approved Town of Hope Mills planning document, with a minimum width of 5 feet. Sidewalks shall be a minimum of 6 feet wide where abutting a curb. Wider sidewalks may be required to comply with greenway and planned pedestrian routes as determined by the latest approved Town of Hope Mills planning document or in the event an existing adjacent sidewalk is wider. See Standard Details & Notes.
- E.** Where sidewalks and/or greenways intersect any section of curb and gutter, an ADA accessible ramp shall be installed.
- F.** No stormwater conveyance (ditch, swale, etc.) or drainage pipe shall drain across the surface of sidewalks.

4.4.3. GREENWAY AND MULTI-USE PATHS

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- A.** Greenway and multi-use paths shall be provided in accordance with the Town of Hope Mills Code of Ordinances, and/or specified within the Town of Hope Mills Standard Details and Drawings, and the latest approved Town of Hope Mills planning document.
- B.** Greenway and multi-use alignment shall be finalized with the Town Representative prior to Preliminary Plat Approval or Site Plan Approval, with full construction plans and all permits provided prior to Construction Plan Approval for any project on which greenways are required.
- C.** Greenways and multi-use paths shall conform to the greenway design standards in the Town of Hope Mills Code of Ordinances. The following additional standards not included shall also apply:
 - 1.** At all drainage crossings a design professional shall provide properly sized drainage pipe with supporting calculations to pass the 10-year, 24-hour storm.
 - 2.** Greenways and multi-use paths shall be located and constructed so as to prevent damage from floodwaters.
 - 3.** When the greenway or multi-use path intersects with a roadway, a 10-foot-wide, 6-inch-thick, reinforced concrete pad will be required extending from the back of curb to the right-of-way line. There shall be an ADA accessible ramp and curb cut. Bollards that collapse or move to allow for authorized vehicle access may be required.
 - 4.** Where the greenway trail intersects a roadway in which a sidewalk is on the opposite side of the road, an ADA accessible ramp will be required on the sidewalk side of the street to allow travel onto the sidewalk from the greenway.

4.5. CROSSWALKS

4.5.1. GENERAL

All locations designated for pedestrian traffic crossings shall be designated as a crosswalk with pavement markings and signage.

4.5.2. PUBLIC STREETS

The type and placement of signage and markings shall be consistent with MUTCD and NCDOT standard specifications and drawings.

4.5.3. PRIVATE STREETS, DRIVE AISLES, AND VEHICLE USE AREAS

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The placement of the signage and markings shall be consistent with MUTCD and NCDOT standard specification and drawings, and shall be constructed of pavers (brick or concrete) or stamped concrete of a contrasting color.

4.6. FIRE LANES

Fire lanes shall be consistent the North Carolina Fire Prevention Code, including adopted appendices, and the Town of Hope Mills Code of Ordinances.

4.7. DRIVEWAYS

4.7.1. GENERAL

- A.** See the Town of Hope Mills Code of Ordinances and/or the NCDOT standard specification for limitations on driveway access and spacing standards for driveways intersections with streets.
- B.** All residential and nonresidential driveway slopes shall be a minimum of 1% except where building codes specifically dictate a minimum (e.g., minimum 2% away from residential structures) and a maximum of 10%. Deviations from the maximum may be permitted by the Town Representative where existing topographic constraints exist. See Section 1.3.3.2. Alternative Standards Procedure.

4.7.2. NON-RESIDENTIAL, MULTI-FAMILY, AND MIXED-USE DRIVEWAYS

- A.** All driveways with parking spaces alongside them shall comply with the aisle width standards in the Town of Hope Mills Code of Ordinances.
- B.** Non-residential driveways must be paved with asphalt, concrete, brick pavers, or an equivalent hard, dustless, and bonded surface material. See the Town of Hope Mills Code of Ordinances, (and/or) the Town of Hope Mills standard details.
- C.** Standard concrete driveway aprons shall be used when the ADT for the driveway is less than 300 vehicles. See Standard Details & Notes.
- D.** Street type turnouts shall be used when the driveway ADT is greater than the above listed conditions or when access by larger trucks must be accommodated. A minimum radius of 30 feet (back-of-curb) shall be used at all street intersections. Lesser radii may be used for street type turnouts where deceleration lanes are provided.

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- E.** The maximum grade allowed when approaching an intersection is 5% for the last 30 feet before the edge of the intersecting travel way unless approved by the Town Representative. See Section 1.3.3.2., Alternative Standards Procedure.
- F.** The maximum allowable width of driveway without a median shall be 40 feet measured from face of curb to face of curb.
- G.** For entrances where medians are proposed, the minimum individual lane width shall be 16 feet. Where dual exit lanes are required, a maximum of 24 feet is allowable. Measurements shall be taken from face of curb to face of curb. Median width shall be sufficient to provide safe pedestrian haven.

4.7.3. RESIDENTIAL DRIVEWAYS

- A.** For purposes of this subsection, “residential driveway” means a driveway serving a single-family detached, single-family attached, duplex, or manufactured home dwelling.
- B.** Residential driveways shall be a minimum of 10 feet and a maximum of 24 feet in width.
- C.** Residential driveways shall conform to the standard detail for concrete driveway aprons. See Standard Details & Notes.
- D.** Driveway aprons in sag locations should be avoided to the maximum extent practicable.

4.8. SURFACING MATERIALS

4.8.1. PORTLAND CEMENT CONCRETE

- A.** Portland cement concrete for curb and gutter, driveways, and sidewalks shall meet the following criteria:
 - 1.** Minimum 28-day compressive strength of 3,000 psi;
 - 2.** A non-vibrated slump between 2.5 and 4 inches;
 - 3.** A minimum cement content of 564 pounds per cubic yards;
 - 4.** An air entrainment of between 5% and 7%; and
 - 5.** A maximum water-cement ratio of 0.532.
- B.** Joint filler shall be a non-extruding joint material conforming to ASTM C1751.

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- C.** Concrete curing agents shall be free from any impurities that may be detrimental to the concrete and meet Section 1026 of the NCDOT Standard Specifications.
- D.** Aggregate for Portland cement concrete shall meet the requirements for fine and coarse aggregate of Section 1014 of the NCDOT Standard Specifications.
- E.** Portland cement and admixtures shall meet the requirements of Section 1000 of the NCDOT Standard Specifications.
- F.** Water for mixing or curing the concrete shall be free from oils, salts, acids, or other products that may have adverse impacts to the finished product.

4.8.2. COURSE STANDARDS

- A.** Aggregate base course shall consist of coarse aggregate produced in accordance with Section 1010 of the NCDOT Standards for either Type A, B, or C aggregate.

B. Superpave Design Criteria

- 1.** Asphalt Concrete Surface Course, Type S 4.75A, SF 9.5A, S 9.5X, and S 12.5X, shall consist of a mixture of coarse and fine aggregates and asphalt cement, and shall meet the requirements in Sections 609 and 610 of the NCDOT Standard Specifications.
 - 2.** Asphalt Concrete Intermediate Course, Type I 19.0X, shall conform to the general, material, and construction specifications of Section 609 and Section 610 of the NCDOT Standard Specifications.
 - 3.** Asphalt Concrete Base Course, Type B 25.0X, shall conform to the general, material, and construction specifications of Section 609 and Section 610 of the NCDOT Standard Specifications.
- C.** Tack coat shall be asphalt or asphalt cement and shall meet the general, material, and construction specifications of Section 605 of NCDOT Standard Specifications.

4.8.3. OTHER

A. Concrete Pavement

Concrete pavement shall meet the general, material, and construction specifications of Section 700 of the NCDOT Standard Specifications.

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B. Stamped Concrete

Stamped concrete is permitted on private access easements.

C. Concrete and Brick Pavers

Concrete and brick pavers are permitted on private access easements.

D. Geotextile Fabric

1. Geotextile fabric may be used to stabilize roadways, subgrades, and slopes, and for other uses as necessary with prior approval from the Town Representative.
2. Areas stabilized with fabric shall be indicated on "as-built" drawings with the manufacturer name and type fabric indicated.