City of Greensboro

SIDEWALK MANUAL

July 2005

This manual was written through coordination of numerous agencies.
Comments/questions may be directed to:

GDOT/Planning
300 W. Washington St.
Greensboro, NC 27402

336-373-2332

Purpose

The City of Greensboro Sidewalk Manual is the primary source for administrative policies, procedures and standards pertaining to sidewalk corridor design and construction. Many sidewalk standards are governed by federal, state or local legislation.

Additional guidance is available in the following documents:

- *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, AASHTO, July 2004.
- *Accessible Public Rights-of-Way Design Guide*, U.S. Architectural and Transportation Barriers Compliance Board, January 2001
- *City of Greensboro Department of Transportation Driveway Manual*, GDOT, August 2004
- *City of Greensboro Roadway and Utility Standard Drawings Manual*, Engineering & Inspections, June 2005
- *Designing Sidewalks and Trails for Access: Best Practices Guide Part 2*, USDOT/FHWA, January 2001

AASHTO
American Association of State Highway and Transportation Officials

GDOT
Greensboro Department of Transportation

USDOT
U.S. Department of Transportation

FHWA
Federal Highway Administration

This Manual will be reviewed regularly to ensure compliance with applicable regulations. All sidewalk construction within the jurisdiction will comply with this Manual.

Intent

The *Greensboro Sidewalk Manual* serves two purposes under the Greensboro Sidewalk Ordinance, effective January 1, 2003:

1. The official governing document for sidewalk design specifications and requirements for areas under the jurisdiction of the City of Greensboro.
2. The administrative policies, procedures, and standards of the City of Greensboro, as applicable to the design and construction of sidewalks.

Policy

The Walkability Policy, adopted by the Greensboro City Council on March 19, 2002 states:

> *"The Greensboro City Council hereby establishes the goal of creating a more walkable Greensboro. This goal will be attained through the following actions:*
>
> *An ongoing City sidewalk construction program targeted to community and transportation system needs, including improving safety and access to needed services and destinations.*
>
> *An ongoing City effort to respond to pedestrian safety, mobility, and access issues through the use of other warranted pedestrian facility improvements, education, and other strategies.*
>
> *Ordinance requirements for development and redevelopment that require sidewalk construction to meet pedestrian safety and access needs and further the City's sidewalk connectivity goals."*

Introduction

Walking is the most basic form of transportation and the sidewalk is the most typical form of infrastructure provided to accommodate it. In general, the ability to reach a destination depends on a person's speed, coordination, endurance, and the types of obstacles, grades and cross-slopes he or she encounters along the way.

Design and construction practices are key in determining the attractiveness, convenience and usability of a sidewalk. Sidewalks are most effective when designed to accommodate the needs of all potential users. Designers must have a clear understanding of the wide range of abilities that occur within the population. This includes children, older people, parents with strollers, pedestrians who have vision impairments, and people using wheelchairs or other assistive devices. Just as a roadway is not designed for one type of vehicle, the design of sidewalks should not be limited to a single type of user. Exceeding minimum standards whenever possible will increase accessibility and overall ease of use.

Attributes of good sidewalk corridor design include:

- Accessibility for ALL users
- Adequate width
- Safety - adjacent traffic or environment not threatening
- Continuity and connectivity - minimum street crossings
- Landscaping
- Buffer space between pedestrians and traffic
- Lighting
- Adequate space for socialization

Accessible facilities are generally considered safer and more convenient for all pedestrians. Well designed pedestrian facilities consider and balance the needs and capabilities of all potential users.

Compliance with State and Federal Standards

ABA
Architectural Barriers Act

ADA
Americans with Disabilities Act

Design guidelines specified in this manual require that sidewalks and pedestrian (and related) features within the public right-of-way be reasonably constructed in accordance with the ADA and North Carolina Administrative Code standards and requirements. In cases where a requirement of this manual is in conflict with state or federal standards relating to sidewalks and accessibility, the more restrictive standard will apply.

Pedestrian facility design and operation must comply with the federal accessibility standards in the *Architectural Barriers Act of 1968, the Rehabilitation Act of 1973 (Section 504),*

and the Americans with Disabilities Act of 1990. Implementing regulation for Title II of the ADA, which covers state and local governments, also addresses "communications and information access," requiring "effective communications" with persons with disabilities. In the sidewalk/street-crossing environment, this would include accessible pedestrian signals, markings, and signage. The MUTCD contains standards that include audible, visual, and vibrotactile features. These standards represent the minimum requirements; designers should use more prudent design parameters whenever possible.

MUTCD
Manual on Uniform Traffic Control Devices

APS
Accessible Pedestrian Signals

ADAAG
Americans with Disabilities Act Accessibility Guidelines

DOJ
Department of Justice

Developing Accessibility Standards for Sidewalks

In 1994, the U.S. Access Board published an Interim Final Rule that contained proposed guidelines for public rights-of-way (proposed Section 14 of the ADAAG, now reserved). However, after receiving public comments, they decided to withdraw the guidelines and focus on a public awareness campaign aimed at the transportation industry. As part of this effort, the U.S. Access Board published *Accessible Rights-of-Way: A Design Guide* to promote accessible sidewalk development (U.S. Access Board, 1999a). In addition, the U.S. Access Board has convened a committee of transportation and disability experts to readdress the issue of sidewalk guidelines and recommend design and technical provisions that can be adopted under the ADA.

The specifications in the ADAAG are based on the needs of the majority of pedestrians with disabilities. However, no environment will ever be accessible to everyone because people with disabilities have a broad spectrum of abilities. The term "accessible" is used in this manual to refer to environments that meet the specifications defined by the U.S. Access Board. Specifications which define "accessible" environments include the current version of the ADAAG, as well as the report of the Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas and the U.S. Access Board's recommendations for sidewalks contained in *Accessible Rights-of-Way: A Design Guide* (U.S. Access Board, 1999a). Additional information is available at www.access-board.gov.

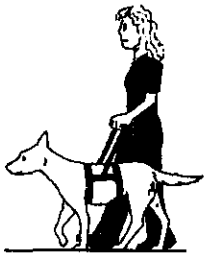
Accessibility Standards for New Construction and Alterations

The U.S. Access Board first published Sections 1 through 9 of the ADAAG in 1991. These guidelines were subsequently adopted by DOJ as the ADA Standards for Accessible Design, which made them enforceable by law. The ADAAG provides specific scoping information and technical requirements for new construction and alterations. Modifications that affect usability are considered alterations under the ADA. For example, resurfacing of a roadway beyond normal maintenance is an alteration. However,

construction limited in scope to a spot repair, such as repainting markings or patching potholes, is considered routine maintenance and does not trigger additional access retrofit requirements (U.S. Department of Justice, 1994a).

Public and private entities that design and construct sidewalks and trails are obligated under the ADA to make them accessible to and usable by people with disabilities. Some references for existing scoping and technical provisions for new construction and alterations applied to the design of pedestrian facilities are:

- Accessible Routes (ADAAG 402);
- Walking Surfaces (ADAAG 403);
- Ramps (ADAAG 405);
- Curb Ramps (ADAAG 406; and
- Detectable Warnings (ADAAG 705).



New Sidewalk

New sidewalks are added in the City of Greensboro in several ways. The first is through plan submittal to the Technical Review Committee. All sites and subdivisions are reviewed to ensure conforming sidewalks and ramps are included in accordance with current ordinances and this manual. This may include reconstruction of existing sidewalk or ramps that do not meet the minimum standards.

Another way is incidental to roadway projects including major reconstructions of existing roads or construction of new roads. This may include reconstruction of existing sidewalk or ramps that do not meet the minimum standards. Wheelchair ramps are included with all types of road construction, including resurfacing.

Priority sidewalk construction projects are developed to complete pedestrian access, improve safety and further the goals of the City of Greensboro Walkability Policy. These projects are targeted towards high need areas and filling strategic gaps in the sidewalk system.

Property owners may also petition the City of Greensboro to have sidewalk installed in their neighborhood. The process is:

- Contact Greensboro Department of Transportation at 373-2332
- GDOT staff will determine if sidewalk is feasible
- GDOT staff will prepare letters and maps for petitioner
- Petitioner is responsible for obtaining signatures of at least 51% of affected property owners and returning to GDOT
- If the petition is successful, GDOT will submit a service request form to Engineering & Inspections for design and construction of sidewalk
- Sidewalk will be installed at no cost to property owners

Existing Sidewalk

The City of Greensboro maintains the physical sidewalk and curb ramps. Residents are encouraged to report problems such as broken or uneven sidewalk to GDOT at 373-2332.

It is the property owner's responsibility for the daily upkeep of the sidewalk. This includes mowing and edging grass, trimming trees and bushes, clearing snow and ice and keeping the sidewalk free of obstructions. Without these housekeeping efforts, the sidewalk could become overgrown with vegetation and no longer provide a safe pedestrian route.

Sidewalk Design

Sidewalk design and construction are among a handful of factors that determine the functionality and ultimately the usage of sidewalks. Well designed sidewalks provide accessibility for all users and enough space to accommodate pedestrian flows at peak times. Spacing from traffic provides a pedestrian environment that is perceived as comfortable, attractive, and safe while meeting appropriate safety requirements. Factors to be considered in design include land use/zoning, roadway/traffic characteristics, and anticipated levels of pedestrian traffic. The sidewalk and buffer width required to meet the design needs of the user can vary based on these conditions. Minimum sidewalk and buffer widths have been developed that provide for user needs and fit within corridor constraints in most circumstances. It is important to remember that the minimum may be exceeded to ensure a good sidewalk corridor is provided versus simply an adequate one.

Required Minimum Width: The minimum allowable width for new sidewalk construction is 5' unless otherwise stated.

Recommended Minimum Width: Width may exceed the required minimum to provide a better pedestrian environment.

Roadway corridor conditions are a dominant determinant of where needed sidewalk and buffer width parameters can be achieved. GDOT balances its review of the user design needs against corridor constraints in determining the required sidewalk design. In some cases, design parameters that would typically be required are not feasible. Modifications in special circumstances are addressed in the *Administrative Exceptions* Section of this manual. If the sidewalk cannot be designed using those recommendations, GDOT will determine an appropriate design specification that is feasible to construct.

Sidewalks

It is important to note that widths required and discussed in this manual refer to the clear, unobstructed, lateral dimension of a sidewalk. The required minimum sidewalk width is 5'.[1] This is consistent with national standards for minimum width. Illustrations of the need for this as the standard are as follows:

[1] *A Note on Street Design Standards and Future Revisions to the Sidewalk Design Guidelines*

These design guidelines are developed under current City of Greensboro Ordinance. The City of Greensboro is working to review and potentially to revise its street design standards. This is intended to include a review of street width and right-of-way requirements, which may include a re-evaluation of sidewalk design guidelines. The outcome of this process will be reflected in future versions of the Sidewalk Manual as appropriate.

Recommended Minimum Sidewalk width:
Local 5'
Collector 5'
Thoroughfare 6'

- A 5' sidewalk width is necessary to allow two adult pedestrians to pass each other in opposite directions without either person having to step off the sidewalk; and
- It is also the minimum necessary width to allow a person in a wheelchair or pushing a stroller to pass a pedestrian traveling in the opposite direction without either person diverting from the sidewalk.

The recommended minimum sidewalk width on **thoroughfares** is 6'. This is consistent with the *AASHTO Pedestrian Facility Guide*, and provides for increased levels of usage and additional buffering from traffic.

Back of Curb
Local 6'
Collector 6'
Thoroughfare 8'

In limited circumstances, **back of curb sidewalk** may be permitted by GDOT at obstruction points where significant physical constraints exist. The required minimum back of curb sidewalk width on local and collector streets is 6'. The required minimum back of curb sidewalk width on thoroughfares is 8', corridor constraints permitting. Sidewalk installed at the back of curb can be especially problematic when dealing with driveway aprons or obstructions such as mail boxes or poles. See *Administrative Exceptions* for additional guidance on when dealing with topography or obstruction issues.

CBD
Central Business District
8' – 16'

In the **Central Business District**, the required minimum width is equal to the lateral dimension between the back of the curb and the face of the adjacent building. This distance varies, but is typically 8 to 16'. Where existing building locations or other immovable objects prevent a width of 8' or more, GDOT may approve a narrower sidewalk when it is necessary to do so based on corridor constraints. In cases where the lateral dimension is greater than 16', a suitable hardscape plan incorporating landscape features must accompany the sidewalk installation. Although a continuous street-side buffer is not required, a street tree/landscape plan indicating locations and sizes of planted areas and plant matter is required when installed.

Pedestrian Overlay
6' – 10'

In other **pedestrian oriented districts** (in areas designated by zoning and/or land use), sidewalk requirements will be established through district level standards. Since the goal within these districts is to enhance the non-motorized forms of transportation, sidewalks will typically be somewhat wider and/or placed on both sides of all streets within the district.

Regardless of street classification, sidewalks constructed along public streets abutting **libraries, government buildings, schools, and other public facilities,** will be constructed to ensure adequate width is provided for ease of pedestrian access. Recommended width should be at least 6' or wider as necessary. This width will generally apply to the entire property frontage. Appropriate transitional tapers are required where sidewalks in this category join other sidewalks. Sidewalks adjacent to city parks, not serving a park entrance or exit, should be evaluated for requirements based on additional conditions. At areas intended as **drop-off / pick-up or other congregation spots at public buildings,** a sidewalk width of 8' is highly recommended.

Public Facilities
6'

Congregation spots
8'

Substandard Sidewalk

Where existing sidewalk is present but does not meet the city standards for width, street buffers and/or the presence of significant obstructions, the City will generally require sidewalk reconstruction to the current standard. This applies to the approval of developments subject to the sidewalk ordinance, as well as to existing sections of sidewalk within City sidewalk construction project limits. Where new sidewalk adjoins existing sidewalk that is less than the width of the new sidewalk, tapers are required to connect to these sidewalks.

Exceeding the minimum

Wider sidewalk widths may be desirable at times to better meet user needs. This may be the case where higher numbers of pedestrians are expected to use the sidewalk at a given time. Factors that may be associated with higher usage levels include locations in commercial districts, along transit routes, at or near areas with high density residential populations, and at points where significant congregation of pedestrians may be expected, such as at schools, near some park facilities, bus stops, drop off points and etc. Other factors for increased width can include the design of existing area sidewalk facilities, the presence of additional right-of-way, high vehicle volumes, or design constraints that require the elimination of the buffer area.

Exceeding the required minimum is generally at the discretion of the designer. In special cases, such as major pedestrian generators, width beyond the minimums noted above may be required to provide for pedestrian circulation, access and safety needs. The AASHTO Guide provides guidance on appropriate facility design parameters where additional width is desirable.

Buffers

Street-side buffer areas are an important element of sidewalk design. Pedestrians generally feel safer and more comfortable where there is physical separation between themselves and adjacent vehicular traffic. In addition, street-side buffers are areas where utilities, signs, fire hydrants, trees, and street furniture can be located without being an obstruction. The required minimum buffer width is 4'. These include that it:

Buffer
aka
Planting Strip
Utility Strip
Buffer Strip
Safety Zone
Grass Strip
Tree Lawn
Furniture Zone
Planter Zone
Planter Strip
Landscape Strip

- increases the safety zone between pedestrians and vehicular traffic, including reducing the likelihood of puddle splashes;
- reduces the likelihood that cars improperly parked over the curb will obstruct the sidewalk;
- reduces the likelihood that plowed snow, trash and recycling cans and yard debris will create episodic sidewalk obstructions; and
- reduces or eliminates the conflict at with driveway aprons

Buffer Width Variations

Additional width will be required when necessary to match design conditions of existing width in the area or to meet the city's design specifications for corridors where the city is in the project development phase of a sidewalk or roadway project.

A wider buffer may be used to reduce conflicts between existing utilities and new sidewalks. A wider buffer may also be used to reduce or eliminate conflict between driveway aprons and sidewalk cross slop requirements.

At least 4'

Additional width may be desirable in some cases such as where high vehicular traffic volume, higher speed limits or prevailing traffic speed, and/or high truck volume percentages are present. The availability of a greater than normal right of way or intent to provide a higher amenity pedestrian environment may also make wider buffers desirable. Such decisions are at the discretion of the designer except as noted above.

See *Administrative Exceptions* for additional discussion on varying width of the buffer to accommodate obstructions.

Corridor Conditions

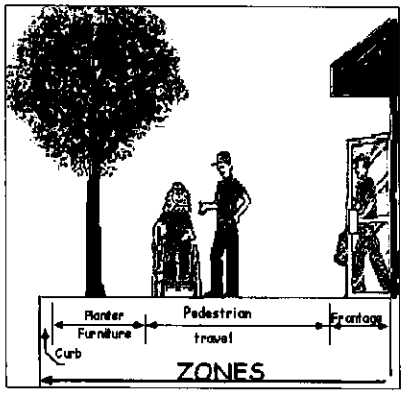
Roadway corridor conditions determine what level of sidewalk design is feasible in a given instance. New street construction typically provides the fewest challenges to effective sidewalk design. The retrofit of existing street environments can pose special challenges. In some cases, design parameters that would typically be required are not feasible. Refer to the *Administrative Exceptions* section for guidance. GDOT will

determine an appropriate design specification that is feasible to construct in the event the designer cannot meet the provisions outlined in this manual.

In instances where immovable objects or other physical barriers limit the ability to provide the minimum street-side buffer and/or sidewalk, it is preferable to maintain the sidewalk minimum width and appropriately adjust the width of the street-side buffer. In some cases, the street-side buffer may be eliminated altogether, though in such cases the sidewalk will be required to comply with standard minimum requirements for back-of-curb sidewalks. In a limited range of cases of obstruction or corridor constraints, sidewalks may be pinched down to a clear unobstructed minimum width of 4' at the point of the obstruction. Reduction of the street-side buffer or sidewalk width will be subject to approval by GDOT.

Clear, unobstructed pinch of 48" for no longer than 24"

Sidewalk Path



Sidewalks are typically constructed parallel to the roadway. The pedestrian travel zone or path is the area of the sidewalk that should be free of all obstacles, protruding objects more than 4" between 27" and 80" from the ground, and any vertical obstructions below 80" hazardous to pedestrians, particularly for individuals with vision impairments. The path should be at least 5' wide or greater to meet the desired level of service. The sidewalk path must never be less than 4'. The zone system depicted in the picture shows the relationship between typical parts of the sidewalk corridor most often associated with downtown areas. It is important to remember pedestrians prefer to keep a shy distance of at least 2' away from walls or fences.

Right-of-Way/Easement

Lack of adequate right-of-way does not preclude construction of a sidewalk.

It is important to consider the availability of right-of-way when planning and designing new sidewalk construction. Insufficient right-of-way may not allow adequate space for sidewalks and street-side buffers if the travel lanes for vehicles comprise the available space. Additional right-of-way or easement may be necessary for proper sidewalk installation, especially in established areas.

Grade

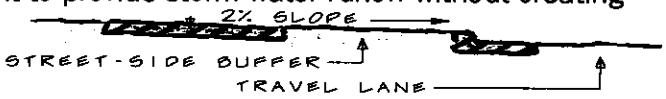
Running slope sustained maximum: 5%

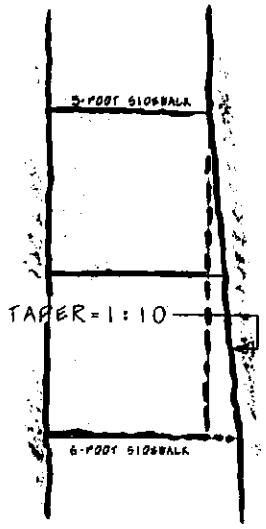
Running slope limited maximum: 8.3%

The grade of the pedestrian access route within a sidewalk shall not exceed the grade established for the adjacent roadway. Ideally, the sidewalk grade should not exceed 5%. However, a grade of 8.3% or more should not exceed 30' in length before a level landing of at least 5' x 5' is provided. Driveway crossings may provide the necessary level landings if properly designed.

Cross-slope

The maximum allowable cross-slope for sidewalks is **2%**. At driveways, curb cuts and crosswalks (marked or unmarked), the maximum allowable cross-slope must be maintained for a minimum width of 4'. Cross-slope should be oriented toward the adjacent roadway and sufficient to provide storm water runoff without creating standing water on the walkway.





Example of a Sidewalk Taper or Horizontal Transition

Vertical Transitions

Curb ramp and driveway transitions should be flush and conform to current ADA guidelines and requirements. Vertical transitions are not allowed.

Tapers (Horizontal Transitions)

Transitional tapers to and from sidewalks of different widths are to be at a maximum rate of 1' of width per 10' of length (1:10) except as approved by GDOT.

Sidewalk Thickness

A minimum thickness (or depth) of 4" of concrete is required for all new sidewalks except as noted. To accommodate the additional loading caused by pedestrian density or by vehicles crossing a sidewalk, a thickness of **6"** is required at wheelchair/crosswalk ramps and at driveways that use a ramp or apron-type access to cross the sidewalk from the adjacent public street.

Construction Methods

The materials and construction methods applied in the placement of all sidewalks within the City of Greensboro for new, retrofit, and repair shall conform to the following standards and specifications:

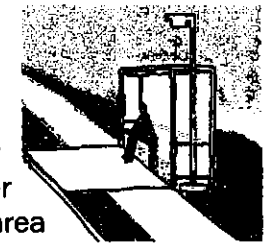
- **Materials**—sidewalks shall be constructed of Portland Cement Concrete (PCC) with a 14-day compressive strength that is not less than 3,000 pounds per square inch (psi).
- **Subgrade preparation**—subgrade shall be thoroughly compacted and finished to a smooth, firm surface, and shall be moist at the time the concrete is placed.
- **Subgrade compaction**—except in areas where it is impractical to use standard type rollers, compaction shall be by means of vibratory hand compactors.
- **Final finish**—surface finish for sidewalks shall be completed by brushing (with brooms) or by another approved method to provide a uniform non-skid surface.
- **Inspections and performance**—sidewalk forms shall be inspected by Engineering and Inspections staff prior to the placement of concrete. Concrete that does not meet *minimum* mixture and strength standards or settles after placement shall be removed and replaced by the installer as directed by the City of Greensboro Engineering and Inspections staff.

- **Alternative materials usage**—use of materials for sidewalks—other than concrete—and the installation methods and preparation must be approved by the City Engineer or designated representative on a case-by-case basis.
- **Wheelchair ramp installation** – refer to City of Greensboro standard 418.
- **Sidewalk/driveway crossings** – refer to City of Greensboro standard 416.

The most current Engineering and Inspections online publications are available at http://www.greensboro-nc.gov/eng-insp/ DesignPubs/Pubs.htm.

Bus Stops and Shelters

Bus stop pads at bus stops, bays or other areas where a lift or ramp is to be deployed will have a firm, stable surface with a minimum clear length of 96" (measured from the back of curb) and a minimum clear width of 60" (measured parallel to the roadway) to the maximum extent allowed by legal or site constraints. An accessible route will connect it to streets, sidewalks or pedestrian paths. The slope of the pad parallel to the roadway will be, to the extent practicable, the same as the roadway. A maximum slope of 2% perpendicular to the roadway allows for water drainage.

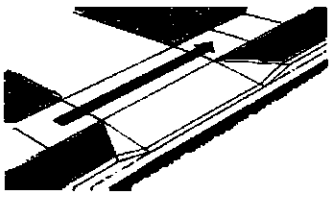


New or replaced bus shelters will be installed or positioned to permit a wheelchair or mobility aid user to enter from the public way and to reach a location, having a minimum clear floor area of at least 30" by 48", entirely within the perimeter of the shelter. Shelters must be connected to the boarding area by an accessible route.

Street Trees

Street trees are an aesthetic treatment in planting strips which provide a more pleasant walking experience and beautify the roadway environment. A sample list of acceptable street trees is included in Appendix A. Consultation with the Urban Forester of the City of Greensboro Planning Department is required to resolve issues relating to necessary dimensional requirements for street tree species. Wider buffer areas than the standard minimums will typically be required for street tree placement.

Sidewalk/Driveway Crossings



Driveway aprons provide the vehicular transition from street to site. The driveway may not have a running slope that exceeds 2% in the location where it is crossed by the sidewalk. Sidewalk design requirements must not be compromised in favor of driveway conflicts. Back of curb sidewalks must not encounter driveway flares that exceed a 10% maximum slope. Excessive driveway slope may make it necessary to meander the sidewalk farther from the street as it crosses the driveway to keep the cross-slope of the sidewalk at 2% or less, while still providing an acceptable transition for vehicles. Another solution would be to reconstruct the drive apron to ensure the sidewalk meets minimum standards. Additional information on driveway construction can be found in the City of Greensboro Driveway Manual or refer to City of Greensboro Standard 416.

Pedestrian Crossings

At some point, pedestrians need to cross streets to continue their journeys. Effective street crossings involve the correct layout of a variety of elements including:

- Information/signs, signals and markings;
- Audible pedestrian signals
- Crosswalks;
- Crossing times;
- Medians;
- Refuge islands and slip lanes;
- Curb ramps;
- Sight lines;
- Traffic patterns; and
- Signal phases.

Crosswalks serve as the pedestrian right-of-way across a street. An intersection crosswalk is defined as the extension of a sidewalk or shoulder across an intersection, whether it is marked or not. Designing for all users is especially important since not all pedestrians have the same abilities. Including both curb and ramp within the crosswalk ensures all users are accommodated.

Curb Ramps

Curb ramps are necessary for access between the sidewalk and the street for people using wheelchairs. Title II of the ADA specifically requires curb ramps for existing facilities, as well as all new construction or altered facilities.

Federal, state and local standards for curb ramps:

- Require compliance with specifications in ADAAG covering surface firmness, stability, and slip-resistance;
- Prohibit the placement of gratings, storm drain, utility and sewer access covers, and similar fixtures on ramps, landings, transitions and portions of the gutter within the pedestrian access route;
- Prohibit grade breaks on ramp runs, blended transitions, landings, and gutter areas within the pedestrian access route;
- Require a flush transition at permitted grade breaks, such as at the top and bottom of ramp runs;
- Prohibit any vertical changes in level on curb ramps, landings and gutter areas within the pedestrian access route;
- Limit the counter slope of the gutter area or street at the foot of the curb ramp or blended transition to 5% maximum;
- Require clear space at least 48" by 48", located beyond the curb line and wholly within crosswalks and out of the parallel traffic travel lane; and
- Require a 5' wide landing if ramp alignment changes direction at the landing.

Curb ramp types are categorized by their structural design and how they are positioned relative to the sidewalk or street. Selecting a curb ramp design most

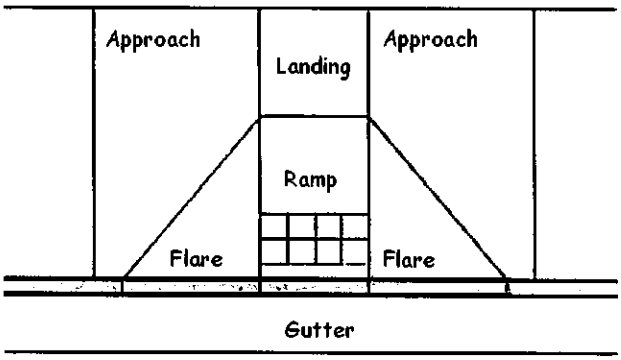
often depends on site conditions. Curb ramp types include perpendicular, diagonal, parallel, combination and depressed corners.

- **perpendicular** - must have a maximum running slope of 8.3%. Requirements specific to perpendicular curb ramps address the cross slope, level landings at the top, and side flares. Sidewalks are permitted to follow the running grade of the adjoining roadway, which determines the cross slope of perpendicular ramps and landings at mid-block crossings. Exceptions are provided for ramps located at mid-block crossings that permit the cross slope of the ramp and landing to be greater than 2% so that the ramp can transition smoothly to the street crossing. Otherwise, maintaining a 2% cross slope at streets with a steeper grade would result in a warped transition from the ramp to the road, which is problematic for wheelchair maneuvering.
- **diagonal** – single curb ramp located at the apex of the corner aligned so that a straight path of travel down the ramp will lead diagonally into the center of the intersection; diagonal to the users' path of travel; and users will be traveling diagonal to the vehicular traffic when they enter the street at the bottom of the ramp. The structure is usually similar to that of perpendicular curb ramps, but can also have the structure of a parallel or combined curb ramp. Because these ramps are diagonal to the path of travel, they are only accessible if a level landing or maneuvering space is provided at the top and bottom of the ramp.
- **parallel** - especially suited to narrow rights-of-way where there is insufficient space for the top landing of a perpendicular curb ramp. In this case, the bottom landing usually serves as the direct connection to the street crossing. Criteria for parallel curb ramps address the running slope, cross slope, level landings at the bottom, and barriers at drop-offs. The slope of the sidewalk, which is permitted to be as steep as the adjacent roadway, will affect the running slope of parallel curb ramps. Thus, a maximum slope of 8.3% may not be achievable due to the road grade. In recognition of this, an exception limits the required length of a parallel ramp to 15', regardless of the slope. The landing required at the bottom of the ramp is not permitted to slope more than 2% in any direction, but an exception is also provided for mid-block crossings where compliance with this specification may be affected by the roadway grade. Where parallel curb ramps do not span the full width of a sidewalk, a barrier is required along the drop-off created by the ramp to prevent tripping hazards.
- **combination** – utilizes the best characteristics of parallel and perpendicular curb ramps. Uses the concept of the parallel ramp to lower the elevation level of the landing and then uses a perpendicular ramp to bridge the remaining elevation gap between the landing and the street. Particularly helpful for enhancing access in problematic situations wither the sidewalk is narrow, has a steep grade or a high curb.
- **depressed corners** – gradually lower the level of the sidewalk and curb to meet the grade of the street with a clear maneuvering space.

However, curb ramps can create a barrier for people with vision impairments who use the curb to identify the transition point between the sidewalk and the street. Because curb ramps eliminate the vertical edge of the curb used by pedestrians

with vision impairments, it is necessary to install detectable warnings to mark the boundary between the sidewalk and street.

- **detectable warning** - a standardized surface feature built in or applied to walking surfaces to warn visually impaired people of hazards on a circulation path provide a distinctive surface of truncated domes detectable by cane or underfoot to alert people with vision impairments of the transition to vehicular ways. These warnings compensate for the sloped surfaces of curb ramps, which remove a tactile cue provided by curb faces. The ADAAG requires detectable warnings on the surface of curb ramps and other locations where pedestrian ways blend with vehicular ways without tactile cues.
- **detectable warning surfaces** - surfaces that feature a distinctive pattern of raised domes to provide a tactile cue detectable by cane or underfoot at the boundary between pedestrian and vehicular routes shall consist of a surface of truncated domes:
  - Aligned in a square grid pattern;
  - Base diameter of 0.9 inches minimum to 1.4 inches maximum, a top diameter of 50% of the base diameter minimum to 65% of the base diameter maximum, and a height of 0.2 inches;
  - Center-to-center spacing of 1.6 inches minimum and 2.4 inches maximum, and a base-to-base spacing of 0.65 inches minimum, measured between the most adjacent domes on square grid;
  - Contrast visually with adjacent walking surfaces (yellow);
  - Extend 24 inches minimum in the direction of travel and the full width of the curb ramp, landing, or blended transition;
  - Located so that the edge nearest the curb line is 6 inches minimum and 8 inches maximum from the curb line for curb ramps and blended transitions; and
  - Located so that the edge nearest a rail crossing is 6 inches minimum and 8 inches maximum from the vehicle dynamic envelope.



Requirements and Rationale for Curb Ramp Installations

Requirement	Rationale
Provide a level maneuvering area or landing at the top of the curb ramp.	Landings are critical to allow wheelchair users space to maneuver on or off the ramp. Furthermore, people who are continuing along the sidewalk will not have to negotiate a surface with a changing grade or cross slope.
Clearly identify the boundary between the bottom of the curb ramp and the street with a detectable warning.	Without a detectable warning, people with vision impairments may not be able to identify the boundary between the sidewalk and the street.
Design ramp grades that are perpendicular to the curb.	Assistive devices for mobility are unstable if one side of the device is lower than the other or if the full base of support (e.g., all four wheels on a wheelchair) is not in contact with the surface. This commonly occurs when the bottom of a curb ramp is not perpendicular to the curb.
Place the curb ramp within the marked crosswalk area.	Pedestrians outside of the marked crosswalk are less likely to be seen by drivers because they are not in an expected location.
Avoid changes of grade that exceed 11% over a 24" interval.	Severe or sudden grade changes may not provide sufficient clearance for the frame of the wheelchair causing the user to tip forward or backward.
Design the ramp so that it does not require turning or maneuvering on the ramp surface.	Maneuvering on a steep grade can be very hazardous for people with mobility impairments.
Provide a curb ramp grade for depressed ramps that can be easily distinguished from surrounding terrain; otherwise, use detectable warnings.	Gradual slopes make it difficult for people with vision impairments to detect the presence of a curb ramp.
Design the ramp with a grade of 7.1 ± 1.2%. Do not exceed 8.33%.	Shallow grades are difficult for people with vision impairments to detect but steep grades are difficult for those using assistive devices for mobility.
Design the ramp and gutter with a cross slope of 2.0%.	Ramps should have minimal cross slope so users do not have to negotiate a steep grade and cross slope simultaneously.
Provide adequate drainage to prevent the accumulation of water or debris on or at the bottom of the ramp.	Water, ice, or debris accumulation will decrease the slip resistance of the curb ramp surface.
Transitions from ramps to gutter and streets should be flush and free of level changes.	Maneuvering over any vertical rise such as lips and defects can cause wheelchair users to propel forward when wheels hit this barrier.
Align the curb ramp with the crosswalk so there is a straight path of travel from the top of the ramp, the center of the roadway and the curb ramp on the other side.	Where curb ramps can be aligned, people using wheelchairs often build up momentum in the crosswalk in order to get up the curb ramp grade (i.e., they "take a run at it"). This alignment may be useful for people with vision impairments.
Provide clearly defined and easily identified edges or transitions on both sides of the ramp to contrast with sidewalk.	Clearly defined edges assist users with vision impairments to identify the presence of the ramp when it is approached from the side.

Administrative Exceptions

Administrative exceptions provide a means of consistent interpretation of applying regulations, ordinances, the sidewalk policy and the standards, requirements and guidelines expressed in this manual.

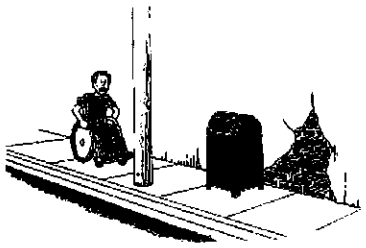
General Guidelines for Application

Administrative exceptions only apply to unusual cases that fall outside the standards outlined in this manual. These controls provide open alternatives to the design criteria. They also permit flexible interpretation and application to appropriately address exceptional situations. These provisions may necessitate additional measures to be implemented in order to accomplish sidewalk installation. Administrative exceptions are not intended to limit hardship or mitigate development costs, but to examine reasonable alternatives to the previously listed standards.

Fixed Objects and Immovable Obstructions

Fixed objects are generally not permitted within the sidewalk. However, placement is acceptable within the right-of-way, preferably located within the buffer between the street and sidewalk for the following items:

- Utility poles
- Street lights
- Street signs
- Fire hydrants
- Cable/telecommunications boxes
- Signal boxes
- Mailboxes



Sidewalk variations and encroachment issues are acceptable in the following situations:

- **Horizontal curve** sections on roadways—in situations where a roadway curves at an angle less than 60 degrees (and where right-of-way/easement is available), the designer is permitted to adjust the curve of the sidewalk to better accommodate pedestrians.
- **Presence of obstructions**—the designer is permitted to alter the sidewalk path by increasing the width of the planting strip to avoid significant obstructions including, but not limited to: transformers, utilities and utility poles, fire hydrants, traffic signal hardware, trees or other significant vegetation, topography.
- **Meanders** - have the tendency to increase trip length as well as create potential sight distance issues for people walking on sidewalks. Sidewalk meandering is discouraged. However, to avoid obstructions, meanders are an acceptable alternative as long as they meet minimum ADA requirements[2].

Utilities—Utility poles, boxes, and equipment such as transformers are common fixtures along public streets. If possible, these should be located in the buffer strip between the sidewalk and the back of curb. Utilities and other obstructions

[2] *Accessible Rights-of-Way: A Design Guide*, U.S. Access Board, 1999

are not permitted to be located within sidewalks except where significant physical constraints exist. Under no circumstances will utilities encroach on the minimum 4' wide clear width of the sidewalk for a distance exceeding 2' nor cause the sidewalk to take multiple meanders to avoid them.

Trees—In some areas it may be necessary for a sidewalk to be diverted to accommodate a significant tree. ADA compliant tree grating will be required at all locations where tree-planting space impacts sidewalk.

Topographic features and environmental conditions—Topography may influence the path and placement of sidewalks or street-side buffers. Features include substantial grades, stream crossings, wetlands and floodplains where construction may be prohibited, or areas requiring significant cut and/or fill. Retaining walls or hand-rails may be necessary to ensure safety of pedestrians. Mitigation can be coordinated through GDOT consultation.

Bridges, underpasses and structures—A required minimum sidewalk width of 7' is required for all bridges, underpasses and similar structures, although 8' is desirable.

Other—Where evidence of other immovable features exists, design standard variations may be warranted. Other immovable features may include—but are not limited to—retaining walls, bridges, tunnels, buildings, drainage structures, and guardrails. Mitigation can be coordinated through GDOT consultation.

Glossary

accessible pedestrian signal - a device that communicates information about the pedestrian WALK phase in non-visual format

accessible route - a continuous, unobstructed path

ADA – Americans with Disabilities Act

ADAAG – Americans with Disabilities Act Accessibility Guidelines

bikeway – generic term for any road, street, path or way which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive us of bicycles or are to be shared with other transportation modes

buffer strip – unpaved area between back of curb and edge of sidewalk; see planting strip, utility strip

channelizing island - a curbed or painted area outside the vehicular path that is provided to separate and direct traffic movement, which also may serve as a refuge for pedestrians

clear – unobstructed

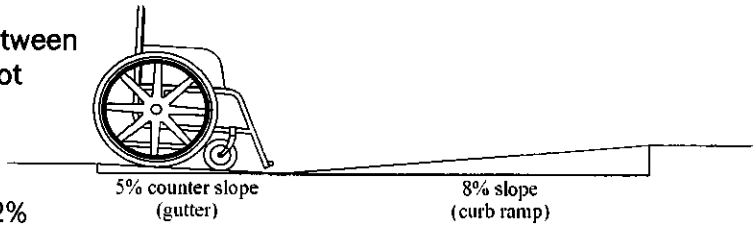
clearances (minimum) - 4' at all points of obstruction along a walkway

collector street – principal function is to carry traffic between local streets and thoroughfares but which may also provide direct access to abutting properties

COG – City of Greensboro

counter slope – change of grade between down slope and upslope. Must not exceed 5%

cross slope - the slope perpendicular to the intended path of travel. Must not exceed 2%



crosswalk - means the part of a roadway ordinarily included within the prolongation or connection of the lateral boundary lines of the adjacent sidewalk at the end of a block, or any part of a roadway indicated for pedestrian crossing by official traffic-control devices

curb line - a line at the face of the curb that marks the transition between the sidewalk and the gutter or roadway

curb ramp - a ramp (preferred 7.1% slope) cutting through a curb or built up to it

curb ramp landings (minimum) - 4' flat landing at each end of a ramp and a 5' wide landing if ramp alignment changes direction at the landing

detectable warning - a standardized surface feature built in or applied to walking surfaces to warn visually impaired people of hazards on a circulation path provide a distinctive surface of truncated domes detectable by cane or underfoot to alert people with vision impairments of the transition to vehicular ways.

detectable warning surfaces - surfaces that feature a distinctive pattern of raised domes to provide a tactile cue detectable by cane or underfoot at the boundary between pedestrian and vehicular routes shall consist of a surface of truncated domes

DOJ – Department of Justice

driveway - access to the street or roadway from a parcel of land

element - an architectural or mechanical component of a building, facility, space, site or public right-of-way

facility - all or any portion of buildings, structures, improvements, elements and pedestrian or vehicular routes located on a site or in a public right-of-way

GDOT – Greensboro Department of Transportation

grade - slope parallel to the intended path of travel - ideally should not exceed 5%.

grade breaks - not permitted on curb ramps, blended transitions, landings, and gutter areas within the pedestrian access route. Surface slopes that meet at grade breaks shall be flush.

gratings - if located in walking surfaces, shall have spaces no greater than ½" wide in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

local street - primary function is to provide access to abutting properties

major thoroughfare street - major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas

minor thoroughfare street - collects traffic from collectors and local streets and carries it to the major thoroughfare system and may be used to supplement the major thoroughfare system by facilitating movement of moderate volumes of traffic within and through urban areas and may also serve abutting property

marked crossing - a crosswalk or other identified path intended for pedestrian use in crossing a vehicular way

NCDOT – North Carolina Department of Transportation

pedestrian access route - an accessible corridor for pedestrian use within the public right-of-way

pedestrian generators - development that given the nature of the intended use attract a measurable amount of pedestrian traffic. Such uses most notably include locations that cater to the youth and elderly as well as education, public services, and recreational activities. Commercial corridors and destinations may also be considered pedestrian generators especially when designed at a walkable scale and along designated transit routes.

planting strip - a buffer used for planting grass, landscaping and/or street trees located between the back of the curb and the sidewalk

ramp - a walking surface that has a running slope greater than 5%

right-of-way—publicly owned land devoted to transportation and utility purposes

roundabout - a circular intersection that has yield control of entering traffic, channelized approaches, counterclockwise circulation, and appropriate geometric curvature to limit travel speeds on the circulatory roadway

running slope - slope parallel to the direction of travel

shared-use path – a bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way, also used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users

side path – paths that generally follow the roadway alignment, set back from the road and separated by a green area, ditch, swale, or trees and sometimes made of materials other than concrete, but otherwise subject to all ADA & COG standards

sidewalk - an improved surface intended to facilitate pedestrian access to or along adjacent streets, properties, or structures, and which is located within the right-of-way of a public street, within the common elements (common area) of a private street, within a sidewalk easement, or along the length of any facade abutting parking areas

slope conversions – 2% = 1:48; 5% = 1:20; 8.33% = 1:12

specified pedestrian destination - Any of the following:

- A public or private elementary school, middle school, or secondary school, or any college or university.
- A park; a recreational or cultural facility; or a public greenway trail, or similar amenity.
- A retail commercial or restaurant facility.
- A public transportation boarding or alighting site, as designated by the operator(s) of a public transportation service.

splitter island - a flush or raised island that separates entering and exiting traffic in a roundabout

strategic pedestrian route - a street, along which planned or established point(s) of pedestrian ingress or egress to a specified pedestrian destination are situated

street-side buffer - street right-of-way area lying between the constructed curb back and the sidewalk for separation of pedestrian and vehicular traffic

tactile - something that can be perceived using the sense of touch

technically infeasible - existing physical or site constraints prohibit modification or addition of elements, spaces, or features that are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide accessibility

thickness - the depth of the concrete for the sidewalk

transition (horizontal) - a continuous change in the width of the sidewalk used to change from one sidewalk width to another

transition (vertical) - a continuous change in the height of the accessible route, typically a curb ramp used to connect the street with the sidewalk

utility strip - a buffer used for the placement of utilities

vertical clearance – objects should not protrude more than 4" into the sidewalk corridor between 27" and 80".

width - the distance perpendicular to the intended path of travel

Appendix A

Sidewalk Ordinance

Greensboro Sidewalk Ordinance

This ordinance amends the Greensboro Development Ordinance, which is Chapter 30 of the Greensboro Code of Ordinances.

AN ORDINANCE AMENDING THE GREENSBORO CODE OF ORDINANCES WITH RESPECT TO ZONING, PLANNING AND DEVELOPMENT

Section 1. That Section 30-2-2, Definitions, is hereby amended by deleting the definition of "Sidewalk" in Subsection 30-2-2.11.

Section 2. That Section 30-2-2, Definitions, is hereby amended by moving the definition of "Green Space" from Subsection 30-2-2.13 to Subsection 30-2-2.7 and placing it in alphabetical sequence.

Section 3. That Section 30-2-1, Definition Index, is hereby amended by changing the ordinance reference for "Sidewalk" from "30-2-2.11" to "30-2-2.12", by changing the ordinance reference for "Green Space" from "30-2-2.13" to "30-2-2.7", and by adding the following in alphabetical sequence:

"City of Greensboro Sidewalk Manual	30-2-2.12
Permanent Dead-End Street	30-2-2.12
Sidewalk Easement	30-2-2.4
Stub Street	30-2-2.12
Through Street	30-2-2.12"

Section 4. That Section 30-2-2.12, Streets and Drives, is hereby amended by adding the following definitions in alphabetical sequence:

"*City of Greensboro Sidewalk Manual*. The administrative policies, procedures, and standards of the City of Greensboro, as applicable to the design and construction of sidewalks.

Permanent Dead-End Street. A street open to traffic at one end and, due to physical or environmental constraints, impracticable to extend beyond its present terminus at the other end.

Sidewalk. An improved surface intended to facilitate pedestrian access to or along adjacent streets, properties, or structures, and which is located within the right-of-way of a public street, within the common elements (common area) of a private street, within a sidewalk easement, or along the length of any façade abutting parking areas.

Specified Pedestrian Destination. Any of the following:

1) A public or private elementary school, middle school, or secondary school, or any college or university.
2) A park; a recreational or cultural facility; or a public greenway trail, or similar amenity.
3) A retail commercial or restaurant facility.
4) A public transportation boarding or alighting site, as designated by the operator(s) of a public transportation service.

Strategic Pedestrian Route. A street, along which planned or established point(s) of pedestrian ingress or egress to a specified pedestrian destination are situated.
Stub Street. A street having one end open to traffic, but which is neither a cul-de-sac street nor a permanent dead-end street.
Through Street. A street that is not a cul-de-sac street and which intersects with at least two other streets that are not cul-de-sac streets."

Section 5. That Section 30-2-2.4, Easements, is hereby amended by adding the following definition in alphabetical sequence:

"*Sidewalk Easement.* An easement which grants to the City Council the right to install and maintain a sidewalk therein, and which grants public access for the use thereof."

Section 6. That Section 30-1-3, Purpose, is hereby amended by adding a new subsection 30-1-3.19 to read as follows:

"30-1-3.19. Sidewalk Purposes.

The sidewalk regulations, adopted and prescribed in this Ordinance, are found by the City Council to be necessary and appropriate to:

(A) Facilitate the movement of pedestrians in an efficient manner;
(B) Provide a safe pedestrian environment;
(C) Provide sidewalks in areas where walking is anticipated throughout the jurisdiction;
(D) Ensure pedestrian connections to schools, parks, shopping facilities, green spaces, and public recreation facilities;
(E) Provide for the coordination of pedestrian facilities within subdivisions with existing pedestrian facilities or planned pedestrian facilities;
(F) Support the adopted Greensboro Walkability Policy; and
(G) Promote public health through the provision of convenient exercise opportunities."

Section 7. That Section 30-6-13.5, Sidewalks, is hereby amended by rewriting subsection (A) and by adding new subsections (B) and (C) to read as follows, and by reordering the existing subsection (B) to become subsection (D).

A. General: Sidewalks shall be installed along public streets which are within or abut a subdivision, and at other locations as specified below.
   1. Required Locations:
      a. Along both sides of new and existing major thoroughfare streets and minor thoroughfare streets, not otherwise subject to lesser requirements.
      b. Along one side of new and existing collector and sub-collector streets, not otherwise subject to lesser requirements, except that upon review by the TRC, both sides may be required where one or more of the following conditions exists:
         i) The current or projected average daily traffic volume is greater than 8,000 vehicles per day.
         ii) The posted speed limit is greater than 35 miles per hour.

iii) The street is a strategic pedestrian route to a specified pedestrian destination located within one-quarter mile, as measured along the street centerline.

iv) Other pedestrian safety, access, or circulation needs are identified.

c. Along one side of new and existing local streets not otherwise subject to lesser requirements.

2. Exempt Locations:

a. Along new and existing local and sub-collector residential streets where, upon review by the TRC, the following conditions are found by GDOT to exist:

i) The proposed development is within an area consisting predominantly of existing single-family residential development, where no sidewalks are present; and

ii) The character and size of the proposed development will not result in substantial additional pedestrian facility needs; and

iii) There are no new pedestrian facilities planned that would provide a pedestrian connection to the proposed development.

b. Along new and existing cul-de-sac streets and permanent dead-end streets, which are eight hundred (800) feet or less in length, and which are not strategic pedestrian routes.

c. Along streets that are North Carolina Department of Transportation controlled access facilities.

B. Extent: Sidewalks required by this Ordinance shall be constructed along that portion of the street or streets which the parcel abuts, for the full length of the property line abutting the street or streets. Where sidewalks are required to be installed on one side of a street, the Technical Review Committee shall determine upon which side the sidewalks are to be installed, based upon criteria specified in the City of Greensboro Sidewalk Manual.

C. Construction Standards: All sidewalks, whether required by this Ordinance or installed voluntarily, shall meet or exceed all applicable standards as specified herein and in the most recent version of the City of Greensboro Sidewalk Manual.

D. In Traditional Neighborhood Districts: All streets in the TN1 Traditional Neighborhood District shall have sidewalks on both sides. Sidewalks on a commercial block or a mixed use block containing first-floor commercial uses shall have a width a minimum of from six (6) to sixteen (16) feet as appropriate to allow adequate room for pedestrians, awnings, streetscape and landscape elements.

Section 8. That Section 30-5-1, Development Standards for All Uses, is hereby amended by adding a new subsection 30-5-1.5 to read as follows:

A. General: Sidewalks shall be installed along public streets which abut a property subject to site plan approval by the Technical Review Committee.

B. Required Locations:

Along the abutting side of major thoroughfare streets and minor thoroughfare streets, not otherwise subject to lesser requirements.

a. Along one side of new and existing collector and sub-collector streets, not otherwise subject to lesser requirements, except that upon review by the TRC, the abutting side may be required where one or more of the following conditions exists:
    i) The current or projected average daily traffic volume is greater than 8,000 vehicles per day.
    ii) The posted speed limit is greater than 35 miles per hour.
    iii) The street is a strategic pedestrian route to a specified pedestrian destination located within one-quarter mile, as measured along the street centerline.
    iv) Other pedestrian safety, access, or circulation needs are identified.
b. Along one side of new and existing local streets not otherwise subject to lesser requirements.

2. Exempt Locations:
    a. Along new and existing local and sub-collector residential streets where, upon review by the TRC, the following conditions are found by GDOT to exist:
        i) The proposed development is within an area consisting predominantly of existing single-family residential development, where no sidewalks are present; and
        ii) The character and size of the proposed development will not result in substantial additional pedestrian facility needs; and
        iii) There are no new pedestrian facilities planned that would provide a pedestrian connection to the proposed development.
    b. Along new and existing cul-de-sac streets and permanent dead-end streets, which are eight hundred (800) feet or less in length, and which are not strategic pedestrian routes.
    c. Along streets that are North Carolina Department of Transportation controlled access facilities.

C. Extent. Sidewalks required by this Ordinance shall be constructed along that portion of the street or streets, which the parcel abuts, for the full length of the property line abutting the street or streets. Where sidewalks are required to be installed on one side of a street, the Technical Review Committee shall determine upon which side the sidewalks are to be installed, based upon criteria specified in the City of Greensboro Sidewalk Manual.

D. Construction Standards. All sidewalks, whether required by this Ordinance or installed voluntarily, shall meet or exceed all applicable standards as specified herein and in the most recent version of the City of Greensboro Sidewalk Manual.

Section 9. That Section 30-3-9, Sureties or Improvement Guarantees, is hereby amended by adding a new subsection 30-3-9.5 to read as follows:

"30-3-9.5 Fee in Lieu of Required Sidewalk Installation.

Where the installation of sidewalk is required by an ordinance of the City, and the City Engineer determines that installation at the time of development would conflict with a city, state, or federal roadway

project planned or programmed to begin construction within four years, the developer shall be required to submit a fee in lieu of such installation. Fees submitted in lieu of required sidewalk installation shall be in an amount of the entire estimated cost of completing the installation, based on current contract unit prices, as approved by the City Engineer. All fees collected by the City pursuant to this subsection shall be deposited in the Street and Sidewalk Revolving Fund and used only for construction of sidewalks on the site, or in the street right-of-way abutting the site, for which the fee is collected. Use of submitted funds to construct said sidewalks shall be coordinated with the appropriate phase of the conflicting roadway project. To the extent that the conflict which necessitated the fee-in-lieu is eliminated by cancellation or alteration of the conflicting roadway project, funds submitted for construction of sidewalks in coordination with said project shall be refunded to the developer."

Section 10. That Section 30-9-11.4, Sections Affected, is hereby amended by inserting a new subsection (D) to read as follows and by renumbering the present subsections (D) through (P) to become (E) through (Q):

"(D) Section 30-5-1.5: Sidewalks (see most recent version of City of Greensboro Sidewalk Manual for guidance)".

Section 11. That Section 30-9-11.4, Sections Affected, is hereby amended by rewriting new subsection (O) to read as follows:

"(O) Section 30-6-13.5: Sidewalks (see most recent version of City of Greensboro Sidewalk Manual for guidance)".

Section 12. That Section 30-5-3.4, Design Standards for Parking, Stacking, and Loading, is hereby amended by rewriting subsection (A), Design, as follows:

"(A) *Design:* Parking facilities shall be designed and constructed to:

1) Allow unobstructed movement into and out of each parking space without interfering with fixed objects or vehicles.
2) Minimize delay and interference with traffic on streets and drives.
3) Maximize sight distances from parking lot exits and access drives.
4) Require all off-street parking spaces in parking lots to have access from parking lot driveways, private drives, or private streets and not directly from public streets."

Section 13. That Section 30-5-5.17, Sandwich Board Signs, is hereby amended by deleting the final sentence of subsection (C), Location.

Section 14. That Section 30-6-13.3 (H)(7), Sidewalks, is hereby deleted.

Section 15. That Table 30-7-1-3, Density Limits in Upper and Lower Randleman Lake Watersheds in Dwelling Units Per Acre & % Built-Upon Area, is hereby

amended, adding a superscript " [1] " following the word "Area" in the title, and inserting the following as Footnote (1), immediately following the table text:

" [1] If, compared to the sidewalk installation requirements effective through December 31, 2002, the sidewalk installation requirements contained in Ordinance Number 02-239, effective January 1, 2003, increase the amount of sidewalk built-upon area, thereby exceeding the maximum built-upon area allowable under the High Density Option or necessitating additional stormwater control, treatment, or mitigation measures, the Technical Review Committee may approve reductions to required street pavement widths, sidewalk widths, driveway widths, or off-street parking area, so as to result in the same built-upon area as under the previous sidewalk installation requirements."

Section 16. That Table 30-7-1-4, Density Limits in Other Water Supply Watersheds in Dwelling Units Per Acre & % Built-Upon Area, is hereby amended, adding a superscript "1" following the word "Area" in the title, and inserting the following as Footnote (1), immediately following the table text:

" [1] If, compared to the sidewalk installation requirements effective through December 31, 2002, the sidewalk installation requirements contained in Ordinance Number 02-239, effective January 1, 2003, increase the amount of sidewalk built-upon area, thereby exceeding the maximum built-upon area allowable under the High Density Option or necessitating additional stormwater control, treatment, or mitigation measures, the Technical Review Committee may approve reductions to required street pavement widths, sidewalk widths, driveway widths, or off-street parking area, so as to result in the same built-upon area as under the previous sidewalk installation requirements."

Section 17. That Table 30-7-2-3, General Watershed Area Performance Scoresheet, is hereby amended, adding the following in numerical sequence, to the accompanying Definitions, Explanations, and Standards:

"2. If, compared to the sidewalk installation requirements effective through December 31, 2002, the sidewalk installation requirements contained in Ordinance Number 02-239, effective January 1, 2003, increase the amount of sidewalk built-upon area, thereby reducing the number of built-upon area points earned, the Technical Review Committee may approve reductions to required street pavement widths, sidewalk widths, driveway widths, or off-street parking area, so as to result in the same built-upon area as under the previous sidewalk installation requirements."

Section 18. All ordinances in conflict with the provisions of this ordinance are repealed to the extent of such conflict.

Section 19. This ordinance shall become effective January 1, 2003.

Other Selected Ordinances

Sec. 16-134. Parking so as to obstruct sidewalk, driveway, etc.

a) It shall be unlawful to park a vehicle so as to obstruct a sidewalk, private driveway, crosswalk, safety zone, or railroad crossing, provided, that where an employee or agent parks a vehicle in violation of this section, then the person who directs such violation shall also be responsible for the violation.
b) It shall be unlawful to park a vehicle within five (5) feet in either direction of a private road, alley or driveway.

Sec. 26-4. Obstructing streets or sidewalks–Generally.

a) It shall be unlawful to obstruct or block any street or sidewalk without a written permit therefore from the city manager or his designee excluding official maintenance and construction activities.
b) A fee of thirty dollars ($30.00) shall be required for permits to block city sidewalks and/or streets. For any event which exceeds three (3) days, a fee of sixty dollars ($60.00) shall be required for a period up to one (1) month and thereafter thirty dollars ($30.00) for each additional month.

Sec. 26-12. Property owners to clean certain sidewalks.

It shall be the duty of the owner or occupant of any store, office or other place of business to keep the sidewalks in front of his place of business clean. If the sidewalks are cleaned between the hours of 6:30 p.m. and 12:00 midnight, the refuse from the same may be swept into the street, but if cleaned during any other period, the refuse shall be taken up and placed in a metal receptacle to be provided by the owner or occupant and disposed of in the same manner as garbage.

Sec. 26-13. Overhanging vegetation; mowing of grass.

a) Every owner and every occupant of any premises shall keep the sidewalk abutting such premises free from overhanging shrubbery, weeds or grass and keep any grass plot adjacent to such sidewalk neatly mowed.
b) Every owner and occupant of any premises shall maintain that area of the street right-of-way between the edge of the traveled roadway or curb line and the adjacent property line in a reasonably safe condition and to remove dangerous trees, plantings, shrubbery, limbs, weeds or other obnoxious growth and accumulations from such area of the street right-of-way.
c) Notwithstanding subsection (b), the city manager, through the department designated by him, may cause the removal of any shrubbery and trees from street right-of-way and may also cause the removal of dangerous plantings and limbs from such right-of-way.

Sec. 26-14. Removal of ice and snow; placement on streets, etc.

a) The owner of every lot abutting a paved sidewalk upon which ice may in any manner accumulate from any source other than snow, hail, sleet and other similar accumulation, shall remove such ice from the sidewalk on or before 10:00 a.m. each day.
b) The owner of every lot abutting a paved sidewalk shall remove snow, hail, sleet and other similar accumulation from such sidewalks within twenty-four (24)

hours after the snow, hail, sleet or other similar accumulation ceases to fall. Where any lot or building on such lot is leased or rented the tenant or lessee thereof shall remove such snow, hail, sleet or other similar accumulation within the time hereinafter set out. In the event a lot or building houses or contains more than two (2) tenants or lessees, the owner of the property, if such manages the property, or if such owner does not manage the property, the manager thereof or person who collects the rent, shall remove the snow, hail, sleet or other similar accumulation within the above time limit. It shall be unlawful for the person charged with the duty to remove ice, snow, sleet, hail or other similar accumulation to fail or neglect to remove same within the time limit.

c) It shall be unlawful for any person to cause to be moved, pushed, scraped, shoveled or thrown any ice or snow from private property into the traveled portion of any street right-of-way in such a manner as to impede the normal movement of traffic on the street.

Sec. 26-16. Drainage across sidewalks prohibited.

a) It shall be unlawful to pour or allow drainage from lots or premises abutting on any sidewalk to be poured on the surface of said sidewalk, surface drainage following unusually hard rains excepted. It shall be unlawful to run, or allow to run, by pipes or otherwise, any sewage, water or liquids of any kind upon any street or sidewalk within the city.

b) Subsection (a) shall not apply to rainwater properly conducted across the sidewalk to the gutter of the street.

Sec. 26-19. Writing on or painting streets or sidewalks.

a) It shall be unlawful for any person to write, paint or place upon any of the streets or sidewalks of the city any words, letters, numbers, pictures or advertisements of any kind. This subsection shall not apply to official traffic devices placed there by local authorities.

b) Under the standards established below, the painting of house numbers on street curbs in residential areas will be permitted. The owner of a residence may apply for a permit from the building inspector for the purpose of painting his house number on the street curb immediately adjacent to his property. Permits will be issued for the purpose of painting house numbers on city-maintained street curbs under the following conditions:
   1) Only the house number, not the complete street address may be painted.
   2) The numbers shall not exceed four (4) inches in height.
   3) The numbers must be painted by the use of a template, no freehand lettering being allowed.
   4) The type of numbers shall be Gothic (single-stroke and vertical) and may not be Old English, Old Roman or anything other than numerical numbers.
   5) The paint shall be an approved durable paint and shall be restricted to black and white colors only.

Sec. 26-26. Parking lot operators to provide curb, fence or other obstruction.

The operators of every parking lot on which automobiles are parked or stored, shall provide a suitable curb, fence, or other obstruction abutting the sidewalk

portion of such lot which will effectively prevent automobiles from being driven across sidewalks at any point other than regular authorized driveways.

Sec. 26-61. Compliance with chapter.
All sidewalks and driveways hereafter laid in the city on street right-of-way by property owners shall conform to the provisions of this chapter. Any sidewalk or driveway constructed according to the provisions of this chapter shall constitute a standard sidewalk or driveway.

Sec. 26-62. Stop work orders.
In case of the failure of the contractor of the property owner laying the sidewalk to conform to the requirements of this chapter, the inspector or other official of the public works department exercising supervision over the work shall have authority to require the immediate stopping of the work. An appeal from any requirement of such inspector or other official may be taken to the city manager.

Sec. 26-63. Removal of defective work.
The city inspector or other official exercising supervision over the work shall have authority to and shall require the removal of any sidewalk or portion thereof laid under the provisions of this chapter which does not conform to the requirements of this chapter. Both the property for which the sidewalk is being laid and the contractor therefore shall be liable for the removal of such defective sidewalk or portion thereof. No property owner or contractor shall neglect or refuse to remove such defective sidewalk or portion thereof and to replace the same with sidewalk constructed according to the requirements of this chapter.

Sec. 26-64. Certificate of completion.
Upon the completion and final inspection of any sidewalk laid under the provisions of this chapter, if the same is approved, the city manager shall issue to the property owner for whom the sidewalk was built a certificate showing such approval if requested by the property owners. No such certificate shall exempt such property owner or his contractor, if any, for liability for the removal of any portion of such sidewalk subsequently found to be defective.

Sec. 26-66. Specifications and requirements for sidewalks and driveways.
All sidewalks and driveways shall be laid and constructed under the specifications and requirements as set out by the city manager and on file in the office of the city clerk, which specifications and requirements are hereby adopted and made a part of this chapter as if set out in full.

Sec. 26-67. Protection when work is stopped.
When work on a sidewalk is stopped before being completed, a board shall be placed at right angles to the sidewalk for the full depth of the concrete, such board to be used as a header for the fresh concrete until the work is resumed, when the board shall be removed.

Sec. 26-68. Cleaning up.
Immediately after the completion of sidewalk construction or repairs, the owner or his contractor shall remove all unused material, refuse and dirt placed by him on

or in the vicinity of the work or resulting from its prosecution. All parking and grass plots adjacent to the portion of such sidewalk where such work was done shall be evenly graded and left in a neat and workmanlike condition.

Sec. 26-69. Removal of unnecessary driveways.
All driveways serving property the use of which has been changed to purposes not requiring driveway facilities, and all driveways now serving business property as a means of ingress and egress, when changed to a use not requiring driveway facilities, shall be removed by the owner of the property, the curbing reset and the sidewalk relaid to the correct grade. In the event the property owner fails to make such change within thirty (30) days after the change in use of the property, the city shall, thirty (30) days after final notice to the property owner by the city manager, proceed with the resetting of the curb and the relaying of the sidewalk. The cost thereof shall be assessed against the property.

Sec. 26-70. Driveways to be carried to property line if curb is removed.
Whenever a driveway location can be ascertained before the curb and gutter are laid on new construction, the curb will be dropped at the location desired subject to the restrictions of this chapter. It shall be the responsibility of the property owner to notify the city manager, in writing, the location of such driveways. In the event that a driveway is desired where the curb is existing, the property owner or contractor must obtain a permit to remove the curb and build the driveway as provided in Section 26-66 and the driveway must then be continued to the property line.

Sec. 26-86. Required.
No sidewalk or driveway shall be laid, except under contract with the city, without a permit therefore.

Sec. 26-87. Application.
Before any sidewalk or driveway on any street is laid by any property owner, the contractor therefore shall file with the permit clerk a written application for the construction of such sidewalk or driveway. Such application shall show the name of the owner of the property abutting such proposed sidewalk or driveway, the location and extent thereof, and the name of the contractor who proposes to construct it.

Sec. 26-88. Persons eligible.
No permit for the construction of any sidewalk or driveway shall be issued except to a person licensed under the provisions of chapter 13 and bonded as required by ordinance.

Appendix A

Street Trees

The following is a list of acceptable street trees that can be grown in the street-side buffer or in other areas near roadways. Augmenting this list is a more detailed reference that specifies tree species and recommended physical conditions. This reference can be found at the following website www.greensboro-nc.gov/forestry/recommended_trees.htm

Canopy	Understory
Bald cypress	**Chinese fringetree**
Taxodium distichum	*Chionanthus retusus*
Chinese elm	**Cornelian cherry dogwood**
Ulmus parviflora	*Cornus mas*
European hornbeam	**Goldenrain tree**
Carpinus betulus 'Columnaris','Fastigiata'	*Koelreuteria paniculata*
Gingko	**Hedge maple**
Ginkgo biloba	*Acer campestre*
Littleleaf linden	**Japanese cornel dogwood**
Tilia spp.	*Cornus officinalis*
London planetree	**Pear**
Platanus x acerifolia	*Pyrus calleryana 'Chanticleer'*
Oak	**Purpleblow maple**
Quercus spp.	*Acer truncatum*
Red maple	**Trident maple**
Acer rubrum	*Acer buergerianum*
Zelkova	
Zelkova serrata	

The minimum planting space required for healthy trees is 6' x 6'. It is recommended to provide an 8' x 10' planting space to allow for the optimum growth of the trees and to reduce the possible conflicts with paved surfaces.