Complete Streets Toolbook

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Complete Streets Toolbook
Creating Complete Streets at the Local Level:
A Toolbook

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Acknowledgements

As we worked with our partners across the state to promote the ideas behind Complete Streets, it became clear that we must convince our local leaders—mayors, city council members, and county council members—of the benefits of Complete Streets for our communities. And we must likewise support our partners and citizens in their efforts to promote Complete Streets.

This handbook does just that. Eat Smart Move More, SC is pleased to present this handbook as a guide to our South Carolina communities as they push for Complete Streets in their cities and towns. We hope it provides the information you need to complete the streets in your neighborhoods.

A very special thanks to all of the communities who have worked tirelessly to complete their streets, and also to the other communities in South Carolina who are endeavoring upon similar opportunities.

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I. Introduction

We’ve all heard, spoken, or thought the following statement in some way: I would walk or bike to work if only it felt safe enough, and if there were continuous sidewalks or bike lanes. The publication of this Complete Streets Toolbook is meant to address this statement by analyzing the history, decision making, and funding sources of transportation facilities within South Carolina. This Toolbook will investigate the impact that these transportation decisions have on the places where we choose to live, work and play, and how these decisions affect the health of ourselves and our children.

a. History of Land Use/Transportation Connection (Pre- vs. Post- WWII)

It can be argued that the increase in separation of land uses has led to further dependency on the private automobile to travel between destinations. However, it could be equally argued that the expansion of the interstate and highway system, which brought increased capacity on our road network, has led us to travel further to reach our destinations.

Leading up to the years following World War II, America was largely a rural nation, with the exception of a few large cities. In 1860, only 100 American cities had populations greater than 10,000, and only 8 of these had populations greater than 100,000. It was not until 1920 that more Americans lived in urban areas than rural ones. New York City, as the largest city in the United States in 1920, had a population of just 5.6 million people. Small towns provided goods and services in a compact setting that served the families of farmers surrounding them. These towns were often developed in a linear pattern along dirt roads that led from the farming fields to businesses concentrated around the town square. Even as early as the 17th century, United States cities of any size or importance were generally planned and laid out in a gridiron pattern where streets intersected at right angles.

Columbia, as the capital of South Carolina, serves as just one example of this type of city planning. At the time, this manner of designing streets simplified surveying and maximized the number of lots along a given road, as lot sizes were principally standardized. Streets, as public rights-of-way, served mainly as public circulation spaces for pedestrians and horses. It was not until the 20th century before the arrival of the private automobile.

Streetcars, or electric trolleys, started the first wave of suburban
development, beginning in the mid-19th century. Often referred to as “streetcar suburbs,” these neighborhoods were located adjacent to existing cities that still provided employment, wares, services, and entertainment. White collar workers and their families were able to move out of the cramped urban environment of large cities into planned neighborhoods. These neighborhoods came to be known as the romantic suburbs for their winding streets, a modified gridiron street pattern, and for the names that they were given, such as Riverside and Llewellyn Park, which conjured up images of the countryside rather than the congested city.

Small towns were developing just beyond the reaches of larger metropolitan areas, most notably at the turn of the 20th century. But as American society continued its shift from an agricultural nation to an urban one with the progress of industrialization, larger towns continued to expand their boundaries. The Village of Euclid, Ohio enacted zoning as a measure to prevent industrial uses on the fringes of the city of Cleveland from locating adjacent to the village’s limits. In the landmark case that began the change in the makeup of cities, Euclid v. Ambler Realty upheld the village’s right to limit the type of development in specified areas, stating that doing so did not constitute a taking. This case became the basis for comprehensive planning and zoning in America, allowing municipalities to establish separate areas for different land use types. Subsequent cases before the Supreme Court upheld separation on the grounds of protecting people from undesirable and unhealthy land uses.

The end of World War II coincided with the beginning of programs and policies that changed the American landscape. In 1934, Congress created the Federal Housing Administration (FHA) and enacted the National Housing Act to stimulate building activity that had “economic soundness”; in other words, the FHA favored new construction in suburban areas over redevelopment in urban ones. During this time, the FHA also introduced the 30-year fixed mortgage supported by the federal government, which put homeownership within the reach of more Americans than ever before. As soldiers began arriving home from the war eager to start families and establish homes of their own, there was great demand for housing but initially few options due to a stressed housing market that was still recovering from the effects of the Great Depression. In 1947, William Levitt broke ground on Levittown, which became the largest private housing development in the United States. On 1,400 acres of potato farms on Long Island, New York, Levitt would build 17,400 single-family houses ranging in price from $7,990 to $9,500, initially offering the homes only to veterans and their families. Levitt’s company streamlined the house-building process, turning it into an assembly-line of twenty-seven steps from start to finish, capable of building thirty houses in a single day. This forever changed the housing enterprise in the United States. Levitt would go on to build two other Levittown’s in New Jersey and Pennsylvania, while other developers copied his model and began building similarly-styled subdivisions throughout the United States. These were affordable to the expanding middle class, all eager to buy into the dream of having “two kids, a house, and a white picket fence.”

However, the building of mass subdivisions alone did not create the suburban landscape inhospitable to all but motorists that many cities are trying to reconcile today. In the 1920s, the federal government began designating an integrated system of roads spanning from north-to-south and east-to-west, known as US Highways. These roadways provided intercity travel and were promoted through published maps and signs installed by the states through which the routes crossed. The end of WWII saw the end of rationing of gasoline and the use of automotive factories to manufacture parts needed for the war. Families could afford to purchase a car for travel, and thus were reducing their dependence on the city streetcar. Then, in 1956 the Federal-Aid Highway Act established the Interstate
Highway System, which led to the construction of the interstates we know today, providing Americans with unhindered mobility.

b. How we got away from good planning:

Since the 1950s, transportation planners and engineers have been concerned with moving vehicles between destinations as directly and quickly as possible. One technique to achieve this goal was to widen travel lanes in order to safely accommodate higher rates of speed. In many cases, however, these expanded lane widths have been applied along roadways where they are least appropriate, such as our city centers. Beginning in the 1950s, downtowns across the country would become deserted in the evenings and on weekends, as families had moved to the suburbs and the retail locations once housed on our main streets soon followed. Additionally, roadways between downtowns and the suburbs were widened to quickly deliver workers to their offices in the mornings and back home to their families in the evenings. Often along these roadways, commercial establishments were built—gas stations, dry cleaners, fast food restaurants, etc.—each with multiple entrances and no access between them. At some point, some cities stopped requiring the installation of sidewalks as part of new road construction, even in new neighborhood developments. Without a safe place to walk and an inhospitable environment between home and nearby destinations, people began relying more and more on their private automobiles for even the shortest trips.

Design considerations of the following elements collectively have created an environment where convenience for the automobile and motorist has been favored over other modes. A brief analysis of these elements is provided below, highlighting the shift away from “good” planning and identifying the decisions that have limited walking, bicycling, and transit as viable transportation modes.
i. Site Design

Building design, siting, and layout of a commercial or office parcel gives consideration to the comfort and ease of travel for the motorist. Vehicle parking is often located next to the roadway, with the building situated at the back of the site. This tradition is frequently followed to give potential clients a perception of safety when visiting commercial and office locations. This siting, however, creates a difficult environment for bicyclists and pedestrians as they must navigate their way from the right-of-way across a vast, treeless parking area to the front of a store. Locating buildings adjacent to the roadway, with entrances at both the front and back, would accommodate pedestrians and bicyclists entering from the corridor, and motorists entering from the rear parking lot.

ii. Street Connectivity

The block size of the pre-Civil War city in America was 800’ by 200’. This is no longer the case, as blocks have grown increasing longer, a fact most apparent in suburban areas across South Carolina. Downtowns still tend to have shorter blocks, as they were developed when walking, trolley service, and horse carriage were the dominant modes of transportation. The smaller block designs are more amenable for bicyclists and pedestrians for various reasons. The frequency of intersections created by shorter blocks encourages lower vehicle speeds, thereby creating a safer environment for pedestrians and bicyclists. Additionally, the street connectivity created from the intersections of shorter blocks allows pedestrians and bicyclists more direct travel between their destinations and encourages motorists to use different routes to their destinations, thus reducing volumes concentrated on a few main roadways.

Most residential neighborhoods do not offer the street connectivity that results from designing street layout using a gridiron street pattern. Neighborhoods now provide one or two entrances to serve hundreds or thousands of residences lining long blocks or short cul-de-sacs. Adjacent neighborhoods often have no connecting streets between them, resulting in the entrances, as the limited access points, serving every vehicle trip made. These access points can often overload the collector roadways by producing too many trips from too few locations. This type of disconnected roadway network has resulted in:

- Limited routes for short, local trips;
- More vehicle miles traveled;
- Increased pollution;
- Hindrance of walking, bicycling, and use of transit;
- Increased demand on major thoroughfares;
- Less environmentally sensitive layout of streets and lots; and
- Lack of sense of community between adjacent neighborhoods.

iii. Parking

Drive past any parking lot 11 months out of the year, and you will likely see more than double the number of empty spaces than cars. Why is this? The short answer is because businesses usually provide enough parking spaces to accommodate shoppers on the busiest shopping day of the year. The Institute of Transportation Engineers’ Trip Generation publication (currently in its 8th edition) has become the source for estimating the number of vehicle trips a given business might generate during the day, as well as identifying the AM and PM peak hour. In addition to this estimate, city zoning and building officials use a widely-adopted calculation to examine square feet...
of office, retail, and other development to determine the number of parking spaces a business is required to provide. Despite the fact that this does not promote the kind of “window shopping” and pedestrian access that would result from shared parking lots between businesses, these traditions of providing excess parking in front of each store along a commercial corridor continue.

iv. Access Management

Access management is about making safety and efficiency an essential part of traffic flow between the road and surrounding land. Most roadways have been designed using techniques that benefit vehicular mobility; that is, accommodating increasing volumes, speed, and movement of vehicles while providing driveways as dedicated access to area businesses. Ensuring customer and delivery truck access has resulted in too many, or too wide, curb cuts and has created an environment that is unsafe for any roadway user—motorist, bicyclist, and pedestrian. The long-standing commercial argument that multiple driveways are needed to maintain economic viability has been disproved through numerous studies, which reveal that the lack of connectivity between adjacent businesses actually limits the number of drive-by customers that might be captured. When customers must re-enter the roadway to patronize adjacent businesses, the likelihood of capturing “window shoppers” is reduced, while the possibility of a collision with a pedestrian, bicyclist, or other motorist increases.

Two current trends that will boost the success of Complete Streets are an increased awareness of environmental issues, as well as an active generation of the aging baby boomers. Complete Streets reduce a community’s impact on the environment, while providing transportation options for an active segment of the population. In America, as well as across South Carolina, there is an increased awareness of the environment and how our habits and decisions can positively or negatively affect area waterways, wildlife, and air quality. Bike to Work Day and Walk to School Day are just two national efforts that get people out of their cars and into their communities, so as to become more physically active and to reduce their impact upon air pollution.

At the same time, people are living longer than previous generations and are remaining active in their retirement years, thus being less likely to move to retirement communities once they are no longer employed full-time. Many cities are seeing an increase in seniors desiring to live downtown and take part in a more urban, active environment: musical performances, theatrical productions, art openings, etc. Cities with strong cultural, housing, and multimodal transportation offerings will be more appealing to an aging population that is educated, seeking to downsize their residences, and pursuing viable transportation options to run errands, visit doctors, and enjoy the amenities of downtown living.
**d. Explanation of Ensuing Chapters**

This Guidebook serves as an introduction to Complete Streets and all the elements that are needed in order to ensure that corridors are safely, efficiently, and contextually accommodating to all potential users: pedestrians, bicyclists, transit riders, and motorists. Chapter II provides an explanation of Complete Streets, the elements that are needed, and the benefits they can provide to a community. Chapter III outlines the cost considerations of retrofitting corridors into Complete Streets. Chapter IV provides statistics about South Carolina, such as fatalities, roadway ownership, and funding. Chapter V describes the various agencies that play a role in transportation planning in South Carolina. The final chapter, Chapter VI, outlines recommendations to accomplishing Complete Streets standards within South Carolina communities: from passing a Complete Streets policy, to setting goals and objectives, to rewriting design manuals.

**e. Toolbook’s Purpose**

Our goal in publishing this Guidebook is to promote the numerous benefits Complete Streets can provide to South Carolina communities: from healthier individuals, to cleaner air quality, to economic redevelopment along retrofitted corridors. By identifying the various elements that make streets truly “complete” and describing the needed amenities to accommodate users of South Carolina’s roadways, we hope to provide a resourceful tool to engineers, planners, elected officials, and residents who desire safe and efficient facilities for bicycling and walking within their communities.
II. What Are Complete Streets?

a. Explanation

The hour of the day during which the greatest number of trips will occur. Usually, a peak hour for the AM and PM can be identified (p. 5).

Access management - The “process of coordinating, planning, designing, and implementing land use and transportation strategies so that the flow of traffic between the road and the surrounding land is efficient and safe” (Atlanta Regional Commission’s Retrofitting Corridors Community Choices Toolkit) (p. 6).

A break in the curb and gutter along a roadway to allow vehicles or bicycles access to adjacent destinations. Curb cuts also provide a smooth transition for pedestrians between the sidewalk and adjacent roadway (p. 6).

When the government acquires or substantially devalues private property without fairly compensating the property owner, it is known as a taking (p. 3).

10 lane roadway without bike lanes, pedestrian crosswalks or signals, street trees, or ample buffer between the roadway and sidewalk. The roadway’s current design is not inviting or safe for pedestrians or bicyclists. Source: www.pedbikeimages.org / Dan Burden
Conventional street design in the United States has centered around the automobile, often lacking facilities for biking or walking. Complete Streets are about reconsidering conventional thought that has dominated street design for the last 50 years. A Complete Street is one that allows pedestrians, bicyclists, transit riders, and motorists of all abilities to safely travel between destinations. In addition to providing facilities for bicyclists, pedestrians, and transit users, Complete Streets encourage sound land use decisions and policies that foster environments that appeal to people traveling by foot and bicycle: minimal building setbacks, wayfinding signs, landscaped corridors, benches and other amenities, etc. The approach of Complete Streets and the ideas and recommendations presented in this manual are not new; it is simply a comprehensive and balanced approach to the planning and designing of roadways.

Elements of Complete Streets should be applied on South Carolina roads as needed. Not every roadway in South Carolina demands every recommended component of a Complete Street. Some streets that could benefit from enhanced bicycle and pedestrian facilities might not require transit facilities if existing or planned bus service is not available. Urban or suburban corridors would benefit more from Complete Streets applications than rural roadways lacking commercial or residential development. The exception to this would be roadways that are frequently used by recreational cyclists traveling longer distances; these roads should be striped with a bike lane or designed with an unobstructed shoulder that is wide enough to provide a safe riding location for bicyclists.
Installing a sidewalk, striping a bike lane, and providing a transit stop along a corridor does not make it a Complete Street. In order for a Complete Street to be successful, the design needs to be comprehensive and functional for each type of user. The following are recommended design considerations and improvements for roadways based on the facility type.

### i. Overall

The elements below address the roadway in its entirety without focusing on a single type of user. These elements are important to a corridor regardless of the type of facility or its function.

#### 1. Establishing roadway’s purpose

Roadways serve different roles and have different functions within our communities. Some serve as the main corridors between downtown and suburban areas, while others feed into residential neighborhoods, and still others serve as centers of commerce and government. A roadway’s purpose should be reflected in its design and layout. Downtown streets lined with office towers, lunchtime eateries, and pedestrians along wide sidewalks function differently than arterial roads with higher speed limits, less mixed uses, and limited on-street parking. Establishing a roadway’s purpose is an important step in identifying what elements of Complete Streets should be incorporated along it.

#### 2. Sense of place

Many of the larger cities throughout South Carolina have distinctive districts that are well-known. In Columbia, these areas are the Vista and Five Points. Greenville has the West End and Main Street. Myrtle Beach has Ocean Boulevard and Kings Highway. Smaller towns across the state have historic main streets with unique architecture and long-standing business establishments. Each of these districts has a unique sense of place and identity. The elements and successes of these districts can be applied along corridors with Complete Streets elements and zoning regulations that encourage context sensitive land use design. Establishing an identity and marketing a community’s roadways can increase the revenues of area businesses while promoting tourism.

### 3. Landscaping

Street trees and landscaping play many important roles in the environment, in local communities, and along corridors. Yet, landscaping is frequently the element that is left out of the construction and maintenance process, often due to funding limitations. When costs are estimated and funding is sought for a roadway improvement project, landscaping should never be omitted. In addition to making streets more attractive, the benefits of trees and landscaping are numerous. The list below is only a partial compilation of the positive impacts that trees and landscaping can have along corridors:

- Vertical elements, to include trees, make corridors feel narrower,
thereby reducing vehicle speeds;
- Trees and landscaping provide natural stormwater management and reduce runoff of pollutants;
- Trees capture carbon dioxide and help mitigate air pollution. Street trees absorb 9 times more pollutants than distant trees;
- Trees dampen street noise;
- Trees create safer walking environments by providing a buffer between vehicles and pedestrians;
- Street trees and landscaping improve commerce. Businesses along landscaped streets experience 20% improvements in sales than urban areas without landscaping;
- Trees lower urban air temperatures and reduce the heat island effect in urban areas;
- Trees shield pedestrians from rain, sun, and heat, creating a more hospitable environment;
- Trees and landscaping soften and shield necessary street features such as utility boxes and light poles;
- The shade from urban street trees can lead to longer pavement life, reducing the frequency of maintenance and repaving;
- Trees and landscaping add value to nearby real estate, both commercial and residential;
- Trees and landscaped corridors alter the perception of time in travel: a treeless environment is perceived to be longer than one that is landscaped.

4. Signage—The two main types of signage that affect the appearance and function of a corridor are wayfinding and business signage. In addition to allowing for easy navigation for tourists and residents, wayfinding signage helps create a sense of place through the use of recurring colors, logos, or emblems. Consideration needs to be given to the appropriate placement of wayfinding signs so that they do not obstruct pedestrian, bicycle, or automotive travel. Business signage along roadways with posted speed limits of less than 35 mph should be pedestrian in scale, smaller in size, and placed lower than signage along corridors with higher posted speed limits.

5. Burying of overhead utilities—When a widening or major overhaul is proposed for a roadway, burying, or “undergrounding” utility lines should also be considered to improve the neatness of the corridor and reduce visual clutter.

6. Establishing billboard standards—Communities within South Carolina do not have much influence regulating billboards within their boundaries, a process made more difficult by a law during the 2006 South Carolina legislative session. This law, H.3381, created a special provision that now makes it very difficult and expensive for a local government to remove a badly placed, non-conforming or unsightly billboard. H.3381 requires compensation to a billboard owner that is based on the sign’s potential earnings and essentially prevents communities from enforcing appearance standards. Communities can, however, limit the placement of new billboards by establishing billboard standards as part of their zoning ordinance.

ii. Pedestrian

The Americans with Disabilities Act (ADA) was signed into law July 26, 1990, providing assurance that a disabled person will have full access to all public facilities throughout the United States. In planning and designing for the new construction or retrofit of pedestrian facilities, the law requires federal adherence to the ADA. As a civil rights law, it is important to comply with the spirit and the letter of the law. Technical details, such as sidewalk width, cross slope, curb cut slope at intersection crossings, detectable warning markings, height and accessibility of pedestrian signals, and the location of street furniture must comply with ADA standards.

Pedestrian amenities along a corridor are important for the convenience of those on foot as well as user safety of all modes.
Improperly located utilities created obstacles for pedestrians and people with disabilities. Source: www.pedbikeimages.org / Dan Burden

The American Association of State Highway and Transportation Officials (AASHTO) provides the most specific guidance for the placement of sidewalks along streets:

“Sidewalks used for pedestrian access to schools, parks, shopping areas, and transit stops and placed along all streets in commercial areas should be provided on both sides of the street. In residential areas, sidewalks are desirable on both sides of the streets but need to be provided on at least one side of all local streets.”

The following are important elements that should be considered when designing a roadway to be safe and accessible for pedestrian users.

Appropriate sidewalk width for downtown location to accommodate pedestrians and outdoor diners. Source: www.pedbikeimages.org / Dan Burden

Bench located within buffer area between the roadway and sidewalk so as not to interrupt pedestrian travel. Source: www.pedbikeimages.org / Dan Burden
1. **Street trees**—The overall benefits of street trees along corridors are numerous, and addressed further in the previous section on landscaping.

2. **Benches**—Benches and other amenities such as waste receptacles along a corridor illustrate to the pedestrian that they are welcomed and expected travelers within the community. Providing benches allows pedestrians to travel at their own pace and to stop and enjoy the scenery. Benches should be located so as not to obstruct the flow of pedestrian traffic along sidewalks. Ideally, benches should be placed at the back of the sidewalk, farthest away from the roadway.

3. **Sidewalks**—In suburban commercial and urban settings, sidewalks should be provided on both sides of the roadway for pedestrian safety and access. The recommended sidewalk widths vary by the context and purpose of the corridor, but should not be less than 5’ in residential areas and not less than 6’ in commercial areas. Along corridors with high pedestrian activity, consideration should be given to providing sidewalks between 6’ and 10’ in width. Wider sidewalks should also be provided along downtown corridors to accommodate higher pedestrian activity, outdoor dining, and sidewalk events in front of businesses. To comply with ADA requirements, the cross slope of sidewalks should not be more than 2 percent.

4. **Pedestrian Buffers**—The distance from the sidewalk to the roadway is known as the **setback distance** and is important to pedestrian safety and comfort. Bike lanes, on-street parking, and planting strips all serve as buffers to protect pedestrians from the roadway, and when combined, maximize the safety of pedestrians. Planting strips, if landscaped with trees that will canopy at mature height, should be 8’ in width to accommodate spreading roots, ensure the health of the tree, and prevent sidewalk bulges and damage. Providing a planting strip greater than 10’ wide is not recommended because it disconnects the sidewalk from the road, increasing the possibility of a collision with a turning vehicle.

The City of Greenville recommends an 8’ planting strip between the roadway and sidewalk along both collectors and arterials.

5. **Crosswalks**—Crosswalks located mid-block and at intersections should be highly visible to motorists to increase the safety of pedestrians. Enhanced pavement markings or textured surfaces, such as brick or stamped concrete are recommended material choices. Mid-block crosswalks should be appropriately signed and should not be installed on roadways with high speed limits. Curb cuts and ramp slope between the sidewalk and crosswalk should meet ADA standards.

6. **Pedestrian Signals**—Pedestrian signals should be located at all signalized intersections in commercial areas, urban centers, and near schools. In addition to these locations, other locations to consider include:

- Along wide streets where the vehicle signal does not provide an adequate pedestrian clearance interval;
- Where split phasing is used; and
- Where pedestrians are unable to view vehicle signals (e.g. ‘T’ intersections).

The two main types of pedestrian signals are the walk/don’t walk (replaced with the international walking man/hand symbols) and the pedestrian countdown signals, indicating the time remaining until the vehicle signal for the street parallel to the pedestrian changes from green to yellow. In areas with high pedestrian activity at crossings of wide streets, countdown signals should always be used for the safety of both pedestrians and motorists.
Although there are five signal phasing alternatives for accommodating pedestrian crossings at signalized intersections, concurrent timing should be appropriate in most applications. The person responsible for signal timing, most often the city traffic engineer or the district traffic engineer with the South Carolina Department of Transportation (SCDOT), should make adjustments to phasing and timing if a need is noted, such as complaints of a short “walk” phase or increase in accidents at a particular intersection. Some intersections throughout cities across South Carolina have been outfitted with audible pedestrian crossing signals that are meant to aid blind or visually impaired pedestrians in crossing signalized intersections. The clicking sound emitted guides the person to the top of the ramp of the opposite corner, helping them safely cross the street.

7. Pedestrian-Actuated Signal—A pedestrian-actuated signal is a push button signal that activates a green signal for the street parallel to the pedestrian and a “walk” signal indicating the pedestrian may safely enter the crosswalk. Push buttons are not required to accompany the pedestrian signal at an intersection;
however, to increase pedestrian safety, many South Carolina cities are installing pedestrian-actuated signals at many of their intersections. Pedestrian push buttons are to be located at the top of the intersection of the two ADA ramps, which should be located on all four corners of the signalized intersection. This location is within reach of a wheelchair pedestrian on a safe, non-sloped surface and provides uniformity across corners of intersections in all cities, making their location predictable.

The striping and signing of bike facilities along urban roadways between major destinations, including transit stops, is important for the safety of the bicyclist as well as the motorist.

iii. Bicycle

1. Facility types

a. Striped bike lane—Striped bike lanes are marked lanes in the travel way that are for use by bicyclists. In addition to providing a safe place for people to bicycle, striped bike lanes offer other indirect benefits. They create a buffer between pedestrians and the travel-way along streets lacking planting strips. Dedicated bike facilities and the presence of bicyclists serve as a traffic calming measure by reducing vehicle speeds between 5 and 15 miles per hour. Striped bike lanes have a negligible effect on vehicle travel times and actually improve traffic flow by regulating vehicle speeds to between 25 and 35 miles per hour, optimal speeds for many urban thoroughfares.

Whereas SCDOT regularly stripes bike lanes as narrow as 4’, many cities throughout the United States that maintain their own roadways will not stripe a bike lane less than 5’ in width. The AASHTO Guide for the Development of Bicycle Facilities recommends providing 4’ bike lanes only in locations without curb and gutter where the area beyond the paved shoulder can provide additional maneuvering width. The Guide recommends a minimum 5’ bike lane measuring from the face of the curb outward along roadways where on-street parking is prohibited. A minimum 5’ bike lane is also recommended in areas with dedicated on-street parking.

A 6” painted stripe should be used to separate the bike lane from the vehicle travel lane, and on roadways with on-street parking, a 4” painted stripe should also be used to separate the bike lane from parked vehicles. Some cities recommend these measurements only for roads with on-street parking. On streets where parking is prohibited, their recommendation to designate a bike lane is an 8” stripe. In areas with infrequently used on-street parking, it is particularly important to stripe both sides of the bike lane to help ensure motorists do not use this space as a travel lane.
Streets as narrow as 44’ can safely accommodate striped lanes for both vehicles (cars and buses) and bicycles, and they can be striped on streets that carry up to 30,000 vehicles per day.

b. **Shared use lane**—A shared use lane is a wider outside lane that is shared between motorists and bicyclists, often in an urban area where the road does not have a shoulder and where there is limited right-of-way. These facilities are used when there is not sufficient roadway width to accommodate a dedicated striped bike lane. The shared lane should be properly marked with a shared lane marking symbol (commonly called a “sharrow”), which is a double chevron symbol situated above a bicycle symbol. Fourteen feet is the recommended outside lane width for accommodating bicyclists and motorists.

c. **Shoulder**—Almost all roadways in South Carolina that are located in urban areas have curb and gutter, meaning that bicycle riding in these locations takes place in a shared-use lane or within a striped bike lane. However, many roads in suburban settings and most roads in rural settings do not have curb and gutter. In these areas a paved shoulder, where available, is the safest place for bicyclists.

In 2003, SCDOT began the first of two campaigns aimed at reducing the number of fatalities on the state’s rural roadways. One of the initiatives of the Crash Reduction by Improving Safety on Secondaries (CRISOS) program is to pave a 2’ shoulder along rural roads with high crash rates and severity. These improvements benefit bicyclists because it provides an area outside the vehicle travel lane in which to ride. The other campaign, Recognize-React-Recover, was initiated in 2009 and is intended to reduce single vehicle run
off-road crashes by installing rumble strips as a way to alert motorists whose attention is averted from the roadway. The goal of the installation of rumble strips to the right of the shoulder line is to make motorist aware of their vehicle’s location in attempt to avoid a crash. The design of the rumble strips have been altered since the first round of installations because of the unsafe and uncomfortable effects that the depth and width have on bicyclists who ride over them.

Even 4-lane rural roadways should have ample shoulder widths if bike lanes are not provided. Source: BikePortland.org / Jonathan Maus

**d. Greenway**—Greenways provide a dedicated, paved route separate from the roadway for use by both bicyclists and pedestrians. In some locations, greenways are located on old railroad beds (often known as Rails–to–Trails conversions) or along such features as canals and utility easements. In areas where greenway facilities are appropriate, the recommended minimum width for greenways to safely accommodate both pedestrians and bicyclists is 10’ with a 2’ graded area on either side. Paths with a heavy volume of users

Rumble strip installed in the middle of a bike lane becomes a riding hazard to bicyclists. Source: pcsc.net / Rachael Kefalos

Cyclists along a greenway. Source: BikePortland.org / Jonathan Maus
should be between 12’ and 14’ wide and should be striped to designate lanes for bicyclists and pedestrians if there often is a mix of users. The presence of a greenway alongside a corridor should not preclude striping a bike lane along a corridor if space allows. Often, a bicyclist will need to access a destination in the same manner a car would; therefore, they would benefit from on-road signals and other traffic control devices.

2. Bike Lanes and Intersections—Accommodating bike lanes at intersections can be complicated. Different road and intersection designs call for different types of striping treatments that would best protect bicyclists from collisions with vehicles. Appropriate signage, stamps, and striping should be used at intersections to alert motorists to the presence of bicyclists and anticipate their maneuvers. The Manual of Uniform Traffic Control Devices (MUTCD) is used as the standard for federally approved signs and markings for bike lanes and other bike facilities.

In regard to roads that allow on-street parking, the parking setback should be 20’ to 30’ to provide more room for bicyclists. Streets that have a transit stop on the near side of the intersection should provide 80’ of clearance to the approach. This treatment applies to channelized, non-channelized, and ‘T’ intersections. When dropping the outside stripe and dotting the inside stripe up to the stop bar, care should be given that excessive width does not appear to motorists as a right-turn lane. If this occurs, consideration should be given to also continue the outside line as a skipped dash up to the intersection. Streets with sufficient width and turn bays should set on-street parking at an appropriate distance back from the intersection to allow for stacking of right-turning vehicles. Where on-street parking ends, the solid striped bike lane should become a double skipped dash line before returning to double solid lines approximately 30’ before the intersection. At the far side of the intersection, the bike lane stripes should resume at the furthest crosswalk stripe, with on-street parking resuming 20’ from the intersection.

3. Installation of bike racks/lockers and parking—A survey of area roadways to determine popular bike routes, heavily used transit routes, and popular destination centers will provide the locations most appropriate for installing secure bike parking. Bike racks should be located at transit stops, starting with downtown locations and expanding outward as funding allows. Popular destination centers, such as shopping malls, commercial and restaurant districts, and businesses serving colleges and universities should have ample bicycle parking. New commercial establishments that are required to meet a city’s parking requirements should also be required to provide parking for bicycles. This issue can be addressed in the city or county’s parking or zoning ordinance. The table below shows an example of a bicycle parking requirement that has been adopted by many cities throughout the United States.

<table>
<thead>
<tr>
<th>Number of Required Parking Stalls</th>
<th>Required Bicycle Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-100</td>
<td>5</td>
</tr>
<tr>
<td>100-150</td>
<td>8</td>
</tr>
<tr>
<td>150-200</td>
<td>10</td>
</tr>
<tr>
<td>Over 200</td>
<td>2 additional spaces for each 50 parking stalls</td>
</tr>
</tbody>
</table>

To supplement this requirement, text similar to the following should
The location of bicycle parking facilities shall be at least as convenient to the main entrance of the primary use as the most convenient automobile parking not reserved for use by people with disabilities.

Racks that support the bicycle at two points along its frame, enable the frame and at least one wheel to be secured, and prevent the wheel from tipping over are recommended features when considering appropriate rack styles. The popular “wave” style racks are not recommended because although the manufacturer intended for bikes to be secured perpendicular to the rack, riders tend to store bicycles parallel so that the frame is supported in two places. This practice reduces the storage capacity of the wave rack below the advertised capacity. The simplest, most cost effective, and most recommended design is the inverted “U” rack.

4. Maintenance—Regular maintenance as it relates to sweeping of bike lanes is imperative for safety and continued use. Broken glass, yard waste, and other road debris often accumulates in the bike lane. Along residential streets without a bagging ordinance for yard debris, residents pile debris in the roadway, often in the area where bicyclists ride. This practice forces bicyclists to travel further into the vehicle lane, which may result in increased conflicts between motorists and bicyclists.

Most transit services in South Carolina operate in medium- to large-sized cities, with no South Carolina city providing the level and frequency of service as such cities in the Northeast and Midwest states. At the same time, providing facilities as part of a Complete Streets initiative for transit operations should be planned with the same level of importance as biking and walking facilities in communities with fixed-route transit service.

Pedestrian infrastructure is an important component of a successful and efficient transit network as many transit users walk to bus stop locations. Therefore, many of the same recommendations for pedestrian infrastructure and facilities will also be presented here.

iv. Transit

1. Bus stop shelters—Shelters equipped with a bench should be provided as a place of refuge from the heat and inclement weather conditions for transit riders waiting at dedicated stop locations.

2. Pedestrian-scale lighting—Lighting that is of appropriate scale for pedestrians should be provided to illuminate transit stops for safety, wayfinding, and aesthetic purposes. Providing similar style lighting along the corridor and across the community will serve as a visually pleasing amenity.

3. Route maps showing frequency of service—An easy-to-navigate
transit system can ensure that riders find their way between destinations. Illustrating the extent and frequency of transit service within an area to residents enables them to become a **choice rider**; that is, residents who have other means of transportation to reach their destinations, but elect to use their community’s transit system.

4. **Waste receptacles**—These should be located at all transit stop locations to help keep the corridor clean and free of litter. The installation of a single type and color of receptacle will contribute to the sense of place along the corridor.

5. **Benches**—Providing benches at all transit stop locations will provide a place of respite for waiting transit riders. Along with shelters, benches create an inviting environment for existing transit users and can serve as a desired amenity for choice riders to use public transit rather than driving their personal vehicle.

6. **Street trees**—Locating street trees at or near bus stop locations provide shade and cooler temperatures for waiting transit riders. More benefits of street trees are listed under the section addressing overall recommendations for corridors.

7. **Secure bike racks**—Transit riders can arrive at stop locations by bicycle and may not need their bicycle once they reach their destination. Providing bike racks at transit stop locations allows transit riders a secure place to lock up their bicycle until they later retrieve it. In downtowns or along heavily travelled corridors, it might be necessary to provide additional racks if it is noted that these amenities experience frequent use.

In recent years, transit service providers in South Carolina have been installing bike racks on their fleets of vehicles, which allow transit riders to bicycle to their final destination once their reach their transit stop. Some transit providers in the state have not installed bike racks on their entire fleet and should explore pursuing available grants to purchase additional racks so that every bus can accommodate bicyclists. Combining mode-shares allow both bicyclists and transit users to maximize the extent of their travel and is a win-win situation for all.

**v. Vehicle**

Recommendations for vehicle facilities along Complete Streets aim to encourage motorists to use a corridor as it was intended and at appropriate speeds. Too often, roads are designed to operate at higher speeds than the posted limit dictates. This tendency occurs because of various design details that include the striping of too-wide lane widths and the lack of substantial landscaping and on-street parking.
1. **What are road diets?**—For years, engineers and planners have been recommending widening roads in order to increase capacity and accommodate an increase in the number of vehicles. What the results have shown, however, is that by increasing capacity, the problem of congestion does not go away. Drivers who would take alternate routes before a roadway was widened return to the newly-widened roadway, and the effect of many drivers taking this same approach results in a traffic problem that is not alleviated. Wide streets also negatively affect the building height-to-width ratio, a key element in establishing a sense of place and creating inviting corridors for all roadway users.

The most common use of a road diet involves reducing the number of through travel lanes for vehicles (usually from 4 lanes to 2 lanes), providing a two-way left turn lane in the center, and striping either on-street parking or bicycle lanes. Providing a two-way left turn lane removes turning vehicles from the travel lane, thereby reducing rear-end collisions and improving overall traffic flow. This type of road diet can successfully be implemented on roadways with volumes as high as 19,000 vehicles per day. Narrowing lane widths to introduce multimodal facilities along a corridor is another road diet method.

2. **Lane widths**—Contrary to wide-held belief, wider travel lanes only marginally increase traffic capacity along roadways. However, they do create barriers for pedestrians, discourage crossings for transit connections, and encourage higher vehicle speeds. AASHTO guidelines allow for a minimum 10’ travel lane along low speed (design speeds of 35 mph or less with **operating speeds** of 25 mph to 30 mph) urban collector streets. Minimum vehicle lane widths should never be used in conjunction with minimum parking and/or bike lane widths. Lower speed urban arterials should be striped as 10’ to 12’ travel lanes, with collectors striped as 10’ to 11’ travel lanes (not including the gutter pan). In any downtown or commercial setting, wider lanes between 13’ and 15’ should only be allowed for short distances to allow for maneuvering by larger vehicles, such as buses.

3. **Parking facilities**—Parking maximums, rather than parking minimums should be established, as many current standards call for an excessive number of parking spaces to be provided for commercial establishments. In cities looking to spur downtown redevelopment, the elimination of parking requirements altogether should be explored.

4. **Appropriate vehicle speeds**—Cities should implement standards that better regulate vehicle speeds to provide a safer environment for bicyclists and pedestrians, and reduce congestion by creating a more uniform traffic flow. In downtown or commercial areas, posted speed limits should not be greater than 35 mph and are recommended to be between 25 mph and 30 mph. The **design speeds** of these roadways should be only 5 mph higher than the posted limit. Many roadways have **posted speed** limits much lower than the intentional or unintentional design speed. The tendency of greater vehicle speed along these corridors results from too-wide lane widths, excessive overall roadway widths, and lack of facilities and amenities that can serve as traffic calming measures. Narrowing lane widths, landscaping, and altering curb lines (such as bulb-outs at intersections) can all help achieve lower vehicle speeds along corridors.
c. Benefits

The benefits of Complete Streets within communities are numerous and have been documented by planners, engineers, state legislatures, non-profit coalitions, state and county health departments, and others. The National Complete Streets Coalition (www.completestreets.com) has published fact sheets on the many direct and indirect benefits Complete Streets provide. Additionally, the State of Minnesota commissioned the state’s Department of Transportation to complete a study of Complete Streets, to include summarizing the benefits of adopting a statewide policy. Some of the benefits touted by the National Complete Streets Coalition and the State of Minnesota are summarized in the sections below.

i. Healthy Communities

National studies have shown that communities that promote and encourage walking and biking are healthier than those who spend little money on pedestrian and bicycle facilities. When people feel they can safely reach their destination and that their trip is visually pleasant, they will often choose biking and walking as their means of travel.

Children who walk or bike to school are usually healthier than children who are driven or take the bus to school. Children do not always have the option to bike or walk to school because they do not live close enough to do so. Implementing Complete Streets on South Carolina roadways, sidewalks and bike lanes give children dedicated, continuous, and safe facilities to travel between school and home. Providing these facilities are in line with the national effort known as Safe Routes to Schools (SRTS), which is dedicated to improving safety and encouraging more children to choose to ride or walk to school.

The Eat Smart Move More, South Carolina (ESMMSC) Coalition is leading the promotion of healthier lifestyles to combat rising obesity rates among residents across the state. The public health community, of which ESMMSC is a part, recognizes that non-motorized travel helps citizens meet recommended levels of physical activity, thereby reducing health care costs. The Coalition’s mission is to “coordinate collaborative and sustainable efforts to support healthy eating and active living” while implementing the state’s Obesity Prevention Plan. In 2007, South Carolina had the 7th highest obesity rate in the nation, with 65% of adults either overweight or obese. Fewer than half of all South Carolinians receive the recommended level of physical activity and less than one quarter consume the recommended amounts of fruits and vegetables.

ESMMSC supports and promotes South Carolina communities adopting Complete Streets policies as a way of providing facilities that will encourage and promote healthier, more active lifestyles for residents.

In 2009, the Center for Disease Control (CDC) released Recommended Community Strategies and Measurements to Prevent Obesity in the United States, a report recommending Complete Streets policy adoption as a strategy of preventing obesity. Additionally, the adoption of Complete Streets policies is a recommendation included in both the National Physical Activity Plan and Solving the Problem of Childhood Obesity Within a Generation: White House Task Force On Childhood Obesity Report to the President, both released in 2010. In 2009, South Carolina had the 13th highest obesity rate in the nation, with over 65% if adults either overweight or obese.

ii. Reducing Congestion

Many elements of Complete Streets can improve vehicle traffic flow, thereby reducing congestion and the negative effects that result from idling and stop-and-go traffic. Almost 50% of all trips
made in metropolitan areas are 3 miles or less, with over one quarter of them one mile or less. Many people choose to drive to nearby destinations because of a perceived lack of safety, disconnectedness of bicycling and walking facilities, and indirect routing of transit service. If a mode shift occurs, that is, if people choose transit or another mode of travel, vehicle congestion along area roads will be reduced. Providing safe facilities for walking and bicycling, and offering a connected transit network, can reduce vehicle congestion while other viable forms of transportation between destinations become as attractive as travel by private automobile.

iii. Cleaner Environment

Reducing congestion along a roadway results in less vehicle idle times, thus reducing smog and ground level ozone, which are both large contributors of greenhouse gases. In South Carolina, transportation emissions account for the majority of nitrogen oxides and volatile organic compounds (VOCs) that are released on hot, sunny days. Other contributors include lawn maintenance equipment, smokestacks, and natural resources, such as pine trees. Metropolitan areas across the state are required to monitor their emissions, and those that do not meet the national standard for the 8-hour Nation Ambient Air Quality are required to enter into an Early Action Plan to implement measures to attain the national standard. Failure to meet these standards can result in the loss of federal funds for transportation projects, as well as significant setbacks to industry and business within a state.

South Carolina Department of Health and Environmental Control (SCDHEC) monitors ground level ozone inside Metropolitan Organizational boundaries. Through encouragement and education, SCDHEC helps these areas reduce their environmental impact. SCDHEC’s Bureau of Air Quality encourages people to reduce vehicle emissions and the consequent negative impacts by driving less, carpooling, taking transit, and combining errands into one trip.

When an area fails to meet the standards set by the federal government through the Clean Air Act, the consequences can ultimately change a community in a positive way. In 1999, the Atlanta area failed to meet the federal air quality standards, and was considered to be in non-attainment. This meant that the Atlanta region would be restricted in receiving federal funding for transportation improvement projects. As a result, the State General Assembly created the Georgia Regional Transportation Authority, whose goal was to improve the region’s mobility, air quality, and land use practices. Atlanta is now taking a more comprehensive and proactive approach to planning and is considering the connections between land use and transportation planning decisions. A high priority is placed on projects that improve the mobility and safety for bicyclists and pedestrians, while promoting more route and mode choices along historically congested corridors.

Providing safe and connected facilities for biking and walking are all that is needed to encourage some people to choose these modes of transportation to reach nearby destinations: their local post office, library, grocery, and place of employment. Complete Streets-designed corridors improve traffic flow by lessening the stop-and-go pace of vehicular traffic, help regulate vehicle speeds to appropriate levels for the corridor’s function, and reduce the number of cars on the road as some motorists become choice pedestrians, bicyclists, and transit riders.

iv. Economic Development and Revitalization

Through landscaping, minimized curb cuts, dedicated facilities for pedestrians and bicyclists, street furniture, and context-sensitive land uses, a corridor can be transformed into an inviting environment that
allows all modes of travel to flow smoothly. All of these amenities can positively impact the economic vitality of roadways and, in turn, benefit their communities. Roadways with established identities and sense of purpose benefit adjacent land uses by providing convenience for patrons. Businesses along corridors that have undergone a reduction in lane widths, striping of bike lanes, and the installation and widening of sidewalks have noted increases in sales and patronage from nearby residents, who enjoy the reduced congestion and increased convenience found along Complete Streets.

Streets serve as a first impression for first-time visitors to a city. Streets lined with overhead utilities, multiple curb cuts, gaps in the sidewalk network, and underutilized parking lots do not provide people with the impression of a hospitable environment or a city that is proud of its community. On the other hand, a city that invests in creating Complete Streets is also showing an investment in its people, air quality, and overall quality of life. Increasingly, business decisions are made with the consideration of what kind of quality of life a community will provide to its employees and their families. Sidewalks, bike lanes, and transit service are important quality of life indicators, and show a community’s commitment to multimodal transportation opportunities and healthy lifestyles.

In order for a Complete Streets corridor to be successful, zoning regulations need to be in place to promote development that encourages walking and bicycling between destinations. Building size, scale, and location create an envelope of safety for pedestrians and bicyclists and provide improved visual interest while walking and biking. It is important to create environments that provide pedestrians with a pleasant walking experience while offering proximity to human activity and a sense of security.

The best way to tackle these issues is through modifications to the zoning ordinances and city and county codes that address siting, setbacks, and other key issues. A line-by-line review of the comprehensive plan, zoning ordinance, subdivision ordinance, and municipal code will often highlight areas where policy is weak in establishing standards that promote the community’s vision as is often set forth in their mission statement.

The following are areas where establishing specific standards and regulations within the above-mentioned codes and ordinances can lead to development that is more bike-able, walkable, and visually pleasing.

i. Zoning Overlays

Encourage a variety of land use types while creating a sense of place through similar or complementary facade materials. Zoning overlays applied in downtowns allow for the mix of residential, office and commercial uses within the same building, block, or defined area. Ground floor commercial uses in mixed-use zoned areas encourage pedestrian activity and add to nearby residential and office occupancy rates.
ii. Signage

Signage should be installed at a pedestrian scale, especially on roadways with lower speed limits (< 35mph).

iii. Entrances

Entrances should be easily identifiable, and when a business is located at an intersection, the entrance should be located at the corner to define the intersection and reduce walking distances from on-site parking located at the rear of the building.

iv. Building Setbacks

Maximum building setbacks should be established as a way to promote biking and walking along corridors. People will more likely bike and walk to their destinations when they feel safe and comfortable doing so. Research shows that buildings located closer to the roadway create an envelope that provides a sense of safety and security, while also creating a visually interesting environment for those on bicycles or on foot.

An increase in temperatures in metropolitan areas compared with rural ones that is caused by development using heat-retaining materials is often referred to as a **heat island effect** (p. 11).

The slope perpendicular to the direction of travel. For sidewalks, the ADA requires a **cross slope** not greater than 2% to ensure safe travel by persons with disabilities (p. 11).

Also known as “ramp slope”, a **curb cut slope** is an example of a cross slope and is calculated as the vertical rise (y) of a ramp divided by its horizontal run (x). Recommended maximum slopes vary from 1:12 to 1:20 (p. 11).

As defined by the United States Access Board for the revised ADA Accessibility Guidelines (ADAAG), **Detectable Warning Markings** are any standardized surfaces featuring built in or applied to walking surfaces or other elements to warn of hazards on a circulation path (p. 11).

The allowable distance back from either the edge of pavement or the edge of the right-of-way for construction. In the area between roadways and sidewalks, the **setback distance** serves as a pedestrian buffer (p. 13).

Local roadways that feed into area arterials are called **collectors** (p. 13).

**Arterials** are roadways that yield a high degree of continuity and capacity to quickly move vehicles between destinations (p. 13).

A **pedestrian-actuated signal** is a push button signal that activates a green signal for the street parallel to the pedestrian and a “walk” signal indicating the pedestrian may safely enter the crosswalk (p. 14).
At signalized intersections, most vehicle through movement occurs simultaneously with the opposing through traffic (northbound with southbound, eastbound with westbound). Split phasing of signal operation provides for a separate green time (phase) for each direction of travel at intersections with offset alignments or heavy turn movements (p. 13).

**Concurrent timing** is when pedestrians receive the “walk” signal concurrently with the street parallel to the pedestrian (p. 14).

The **curb and gutter** are the raised strip of concrete along and channel for water drainage that separates the roadway from the sidewalk and areas beyond the edge of pavement (p. 15).

A **stop bar** is a pavement demarcation at an intersection perpendicular to the travel lane that shows motorists where to stop (p. 18).

A **choice rider** is any person that chooses transit as their form of travel although they have access to a private automobile as their method of reaching their destination (p. 20).

According to the 2001 version of the Green Book, AASHTO defined **operating speed** as the “speed at which drivers are observed operating their vehicles during free-flow conditions” (p. 21).

**Design speed** versus **Posted speed** - The AASHTO Green Book definition for design speed is “a selected speed used to determine the various geometric design features of the roadway”. Generally, this speed is higher than the legal speed limit that will be posted. Great differences between the two lead to stop-and-go traffic and other safety issues for pedestrians and bicyclists as motorists exceed the posted speed limit because they feel safe doing so (p. 21, 21).

### III. Costs

The costs associated with Complete Streets is an issue that is raised early in the discussion process of whether to adopt a Complete Streets policy. A study was conducted for the State of Minnesota Legislature and the findings published in the Fall of 2009 on the feasibility, benefits, and costs of implementing a Complete Streets policy and approach to transportation planning and engineering. This study outlines the potential costs associated with incorporating Complete Streets and identifies ways to reduce the costs by making changes to the planning and engineering phases of roadway construction, widening, and maintenance. The purchase of additional right-of-way is often the most expensive element of roadway improvements. Retrofitting streets as projects arise to accommodate additional modes of travel is the least expensive way of achieving Complete Streets.

Landscaping is an important element of Complete Streets because of the numerous benefits to pedestrians, the environment, an area’s sense of place, and calming vehicle speeds, yet is often reduced or omitted during the construction process as a way to keep project costs low. Elements of Complete Streets, such as landscaping, can be offset through the donations of materials and man hours by local civic organizations, area organizations, and professional societies.
According to SCDOT, nearly one-third of the state’s interstate and primary highways, and one-half of the secondary roads, are currently in mediocre to poor condition. In 2006, South Carolina ranked 4th in pedestrian and bicycle fatalities with 2.89 fatalities for every 100,000 people. This number is a 50% increase from 2004 statistics and 80% higher than the national average of 1.6 fatalities per every 100,000 people. The South Carolina Department of Public Safety’s 2007 Traffic Collision Fact Book states that there were 20 bicyclist fatalities and 109 pedestrian fatalities in South Carolina in 2007. These numbers show an increase of 40% and 38%, respectively, since 2003.

SCDOT owns and maintains 62%, or 41,391 miles, of the State’s 66,238 miles of roads. Nationally, state ownership averages 19% of a state’s total road miles, with the remaining 81% being owned and maintained at the county or municipal level. SCDOT is responsible for maintenance, improvements, and required funding of their roadways, rather than the city or county in which they are located.

Roads built as part of new residential developments are owned and maintained by the city or county in which they are located.
The American Recovery and Reinvestment Act (ARRA), commonly referred to as “stimulus funding,” was passed during the first quarter of 2009 as one of many ways to help jump start the United States economy during the global economic recession. South Carolina was allocated to receive $463 million to be spent on bridges and highways, which was to be divided up in the following manner, as approved by the SCDOT Commission:

- $150 million in resurfacing projects, to be divided equally among the state’s 46 counties, based on each county’s number of eligible roads;
- $19 million for safety improvement projects;
- $56 million for bridge replacement projects;
- $74 million for interstate maintenance projects;
- $14 million for transportation enhancement projects, to be divided equally between the seven engineering districts; and
- $150 million for local projects, of which $44 million must be used on projects selected by the Transportation Management Area, and $106 million to be divided equally among the Congressional Districts.

The $14 million for transportation enhancement projects included a federal requirement that a minimum of 3% of Economic Recovery funds be spent in this way. All of these funds, in turn, were spent on sidewalk facilities. Each of the engineering districts within South Carolina received $2 million to construct new sidewalks or upgrade existing ones to meet Americans with Disabilities Act (ADA) guidelines. No project that required the purchase of right-of-way or the relocation of existing utilities would be considered. Unfortunately, $2 million for each engineering district (which encompasses multiple counties) does not yield very many miles of sidewalk installations or upgrades. As an example, at the time of publication of this resource, Engineering District 1, which covers the Midlands region of South Carolina, was slated to receive sidewalk installations or improvements along 36 roads.

Because South Carolina does not adequately fund transportation, the condition of our roadways is inadequate from a safety and functional standpoint.

It is notable that, on average, newly paved road surfaces can last 15 years before repaving is required.
SCDOT’s Engineering Directive Memorandum 22 (EDM 22) contains the DOT’s recommendations for accommodating bicyclists on South Carolina roadways. According to the Memorandum, bike lanes, the safest of all bicycle facility types, should be “used where the Department desires to provide continuity to other bicycle facilities or designate preferred routes through high demand corridors, such as any of our designated South Carolina bicycle touring routes or a municipality’s bikeway.” The following information summarizes design guidelines from EDM 22.

Shared Use Lane:
- Recommended width: minimum 14’
- No striping or signage required

Paved Shoulders:
- 2’ shoulder on rural roads with Average Daily Traffic < 500 vehicles
- 4’ facility on rural roads with ADT > 500 vehicles
- 6’ facility on rural roads with ADT > 500 vehicles, and either 50 mph speed limit, or heavy vehicle traffic > 5%
- No striping or signage required

Bike Lanes:
- 4’ bike lanes in urban areas with curb and gutter (SCDOT’s standard width)
- 6’ bike lane on roads with heavy vehicle traffic > 5% (recommended)
- Striping and signage required

From a safety and accommodations standpoint, the design standards summarized above do not sufficiently ensure adequate facilities for bicycling as a safe, dependable, and viable form of transportation, not merely a form of recreation. Further, the standards included in the Memorandum are not in line with the minimum guidelines provided from the American Association of State Highway and Transportation Officials (AASHTO) and the Institute of Transportation Engineers (ITE).

The recommendations included in previous sections of this manual come from a variety of sources; AASHTO, ITE, as well as numerous city, county, and state publications on design standards for different facility types (pedestrian, bicycle, transit, and vehicle). The recommended widths, facilities, and amenities were chosen after consideration and comparison of safety for each user type.

As one example of a South Carolina municipality’s recommended bike lane width, the City of Greenville recommends a minimum 5’ bike lane on collector and arterial streets.
e. Annual Funding

The passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991 signaled a major change to allocation of federal funding for transportation projects. As the first federal legislation after the completion of the Interstate Highway System, ISTEA presented an intermodal approach to transportation planning and funding, giving additional control to the country’s Metropolitan Planning Organizations. ISTEA and subsequent transportation legislation, the Transportation Equity Act for the 21st Century (TEA-21) (1998) and the Safe, Accountable, Flexible, Efficient Transportation Equity Act, a Legacy for Users (SAFETEA-LU) (2005), have allocated dedicated funding for transit, bicycle and pedestrian projects and programs. Bicycle and pedestrian projects are funded at a very small percentage compared to highway projects, but SAFETEA-LU provides broader eligibility requirements than previous acts that allow bicycle and pedestrian projects to qualify for traditional “highway” funding. SAFETEA-LU expired in September, 2009, and as of this report’s publication, Congress is offering temporary extensions on the former legislation while working on a draft of the next version of transportation legislation.

Some local governments collect a road maintenance fee to help fund road paving and improvement projects. These fees must be approved by the governing council and are collected as part of the annual vehicle tax. Richland County, for example, assesses a $20 road maintenance fee on each vehicle tax bill.

Another option for funding used by South Carolina counties is instating a voter referendum of a local option sales tax that would specifically fund transportation improvement projects. York, Charleston, and Horry are three counties within South Carolina whose voters have passed a sales tax ranging from ½ cent to 1 cent for a specified length of time to pay for transportation improvement projects on local as well as SCDOT-owned roadways.

South Carolina is considered a “donor state” when it comes to receiving distribution from the federal gas tax (currently at 18.4 cents per gallon). In other words, South Carolina receives less funding from the collected gasoline tax than residents pay in each year. In 2007, South Carolina received only 87.3 cents of every dollar residents paid in federal gasoline tax. These revenues must be matched by the state at 20%, and be used for construction projects, not maintenance.

South Carolina also levies a state tax on gasoline, often referred to as a “user fee,” of 16.8 cents per gallon. This amount is lower than the national average of nearly 26 cents, and only exceeds three other states: New Jersey, Wyoming, and Alaska. The per-gallon user fee does not increase with the rise in fuel costs and has not been increased or adjusted for the rise in inflation since 1987. As a result, South Carolina has the lowest funding per mile of all 50 states.
A state that sends more in tax money (gasoline tax, for example) to the federal government than it gets back in services is called a donor state (p. 30).

Transportation Enhancement Projects are funded as part of the federal Surface Transportation Program. The most recent version of this program requires 10% of overall funding provided to states be spent on transportation enhancement activities. Twelve activities outlined by the Federal Highway Administration are meant to expand mode choice and enhance the transportation experience; however, only 3 of the listed activities are actually multimodal, with the others addressing such topics as welcome centers, outdoor advertising, and transportation museums. This means that bicycle and pedestrian projects must compete with other qualifying transportation enhancement projects for a small share of annually allocated funding (p. 28).

V. The Players

a. Federal Highway Administration

The Federal Highway Administration (FHWA) is a division of the United States Department of Transportation and is responsible for overseeing federal funds used for the construction and maintenance of the National Highway System to ensure that construction standards and contract administration adhere to FHWA requirements. In South Carolina, a majority of roadway projects are administered through SCDOT with FHWA oversight, since federal gasoline tax is used for construction and maintenance.
The South Carolina Department of Transportation (SCDOT), as the owner of 62% of all roadways in South Carolina, is responsible for transportation planning and the allocation of federal funds. The federal transportation planning process is a cooperative effort between SCDOT, Metropolitan Planning Organizations (MPO), Council Of Governments (COG), and transit providers. SCDOT is responsible for providing freight, highway, multimodal, bicycle, pedestrian, and transit planning in addition to serving the needs of motorists. SCDOT also houses the coordinator for the federally required Safe Routes to Schools program.

The state is divided into six engineering districts, with each having its own administrator, and governing engineers for construction, maintenance, traffic, and mechanical engineering.

SCDOT is governed by the Transportation Commission, which is comprised of 7 commissioners, 6 of which are elected by the legislative delegation of the respective engineering districts, with the 7th being appointed by the Governor. The Commission adopts its own rules and serves to make policy for the SCDOT.

On January 14, 2003, South Carolina became one of the first states to embrace Complete Streets, when the SCDOT adopted a resolution that:

“affirms that bicycling and walking accommodations should be a routine part of the department’s planning, design, construction and operating activities, and will be included in the everyday operations of our transportation system, and...that the South Carolina Department of Transportation Commission requires South Carolina counties and municipalities to make bicycling

In July, 2004, SCDOT followed up the resolution with the aforementioned Engineering Directive Memorandum 22. EDM 22 includes guidelines and typical section drawings for bike lanes and paved shoulders on new and existing roadways. The specifics mentioned in this Memorandum are summarized in the previous section under “Current Design Standards”.
c. Metropolitan Planning Organizations (MPOs)

South Carolina has 10 designated Metropolitan Planning Organizations (MPOs) that make transportation policy and ensure that current and future funding for transportation projects and programs are based on a comprehensive, cooperative, and continuing planning process. MPOs are also responsible for evaluating transportation alternatives, developing and updating a long range transportation plans and Transportation Improvement Programs (TIP), and ensuring public participation in the transportation planning process.

MPOs are established in urbanized areas with populations greater than 50,000. The MPOs may expand their planning boundaries to include contiguous areas that are expected to become urbanized within the next 20 years. Transportation Management Areas (TMAs) are federally recognized MPOs whose populations are greater than 200,000, and as such, receive additional federal funding, known as Urban Attributable Funds, above the non-TMA MPOs funding allocations. The five TMAs in South Carolina are:

- Augusta Richmond Transportation Study (ARTS)
- Charleston Area Transportation Study (CHATS)
- Columbia Area Transportation Study (COATS)
- Greenville Pickens Area Transportation Study (GPATS)
- Rock Hill Fort Mill Area Transportation Study (RFATS)

d. Cities and Counties

Cities and counties within South Carolina are required to draft and adopt a comprehensive plan that serves as that government’s vision for the next 20 to 30 years if they wish to enact zoning within their boundaries. The comprehensive plan must be updated every 7 years and must contain certain elements that address accommodations of future growth within the community. The land use and transportation elements of these documents describe current patterns, future trends, and serve as the blueprint for the community to enact its vision for the future.

Periodically, corridor studies, small area plans, and bicycle and pedestrian plans, among others, are completed to provide a more focused analysis of the needs of transportation facilities and adjacent land uses. Often, these studies are adopted into the greater comprehensive plan.

The planning and engineering departments of local governments should work collaboratively to ensure that recommendations that come out of completed studies are designed and constructed following the specifications included in the plan. Often, the concept of an improvement is adopted while the details become unclear and lost along the way. Open communication between planning and engineering departments will ensure that multimodal and context sensitive recommendations are implemented.
VI. Tying It All Together

Implementing Complete Streets is easier if all levels of government responsible for planning, engineering, construction, and maintenance of roadways are applying Complete Streets concepts and principles. Achieving Complete Streets begins with adopting a Complete Streets policy that states the community’s (municipality or county) desire to consistently provide safe and connected facilities for pedestrians, bicyclists, transit users, and motorists. The website of the national Complete Streets Coalition (www.completestreets.org) provides resources to guide planning staff in drafting a policy that clearly states the community’s vision with text that meets the legal requirements of the city or county attorney. Because the policy needs to minimize individual interpretations, using “shall” instead of “should” or “consider” is preferred. A few examples include:

Oregon state law: “Footpaths and bicycle trails, including curb cuts or ramps as part of the project, shall be provided wherever a highway, road, or street is being constructed, reconstructed, or relocated.” This law, commonly referred to as the “bike bill”, was passed in 1971, and therefore the terms for pedestrian and bicycle facilities are outdated. Oregon Department of Transportation’s (ODOT) website states that “footpaths and bicycle trails should be called ‘walkways and bikeways’”. The bike bill applies to ODOT, and cities and counties in Oregon, requiring reasonable amounts of state highway funding be spent on pedestrian and bicycle facilities included in the right-of-way of public roads, streets, and highways open to vehicle traffic.

Chicago Complete Streets Policy: “The safety and convenience of all users of the transportation system including pedestrians, bicyclists, transit users, freight,
and motor vehicle drivers shall be accommodated and balanced in all transportation and development projects and through all phases of a project so that even the most vulnerable—children, elderly, and persons with disabilities—can travel safely within the public right-of-way.”

For Complete Streets, an effective policy should prompt the following changes:

- Restructured procedures;
- Rewritten design manuals;
- Updates to the comprehensive plan and related documents;
- Retrained planners and engineers; and
- Retooled performance measures.

After adoption of the policy by the city or county council, the planning department should draft goals, objectives, and action strategies that further explain the vision of the Complete Streets policy and serve as the roadmap for accomplishing Complete Streets. When drafting these guidelines, it is important to have a clear understanding of the meaning of each, as the proper usage is important.

The following narrative provides an example goal, objectives, and action strategies included in Champaign County Regional Planning Commission’s (CCRPC) Long Range Transportation Plan (LRTP) that was written implementing Complete Streets methods in planning to accommodate future growth in Urbana and Champaign County, Illinois.

**Goal:** All transportation system users in the urbanized area will have access to a network of transportation modes and infrastructure that maximizes connectivity between origins and destinations and promotes the use of both motorized and non-motorized modes of travel between them.

**Objective #1:** Increase the miles of dedicated bicycle facilities and signed bike routes in the metropolitan planning area by 15% by 2014.

**Action Strategy:** Implement recommendations for bicycle facilities found in the Urbana Bicycle Master Plan and Champaign Transportation Master Plan.

**Objective #2:** Provide transit service within ¼ mile of residential development (new or existing) within the transit service area by 2014.

**Action Strategy #1:** Continue the expansion of the transit service area to be coterminous with the urbanized area boundary.

**Action Strategy #2:** Encourage redevelopment and infill development within the existing municipal boundaries.

**Objective #3:** By 2014, ensure that 100% of new development within the municipal boundaries or land annexed into a municipality will provide sidewalks along its roadway frontage through construction or a reservation of land and funds for construction, unless an acceptable alternative pathway is provided. Sidewalk connectivity must be analyzed with each new development proposal.

**Action Strategy:** Continue enforcing zoning and subdivision ordinances requiring new development to construct pedestrian and bicycle facilities.
The America Planning Association published a Best Practices Manual on Complete Streets in the Spring of 2010 that provides specific examples from communities around the country on implementation of policy, rewriting design principles, and the advantages and disadvantages of various approaches.

**Goals** should serve as the general statements of desired outcomes. They should be broadly written but with enough specificity to assess whether progress is being made toward achievement (p. 35).

A subset of goals that provide specific, measurable strategies. **Objectives** should be described in detail and often should include a timeframe for completion. They should not stand alone without a goal (p. 35).

**Action Strategies** are rules or operational actions adopted to implement established goals and objectives (p. 35).

### VII. Cited Resources

The following is a list of studies, manuals, reports, plans, and websites referenced during the research process of writing this Complete Streets Toolbook.


Design and Safety of Pedestrian Facilities: A Recommended Practice of the Institute of Transportation Engineers. Washington, DC: Institute


VIII. Appendices

Photos Courtesy of:
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