

Swamp Rabbit Trail Extension Design Guidelines

City of Greenville, South Carolina

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Stantec's Urban Places
Alta Planning + Design
Overstreet Studio

Overview

Design guidelines serve to supplement the existing zoning and subdivision standards with site- and building-specific tools and techniques for creating beautiful, walkable, urban places of lasting value. They address elements in both the public realm (e.g., infrastructure, streets, public spaces) and the private realm (e.g., parking, buildings) but generally avoid prescriptions, instead providing a range of methods in which a designer can address a particular principle.

These guidelines are intended to address only those elements of the built environment that related to frontage along and access to the trail. There are other general urban design principles and standards that are applicable to general development practices in the broader corridor.

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The following standards and guidelines are referred to in this guide:

National Guidance

- The Federal Highway Administration’s (FHWA) **Manual on Uniform Traffic Control Devices (MUTCD)** defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. <https://mutcd.fhwa.dot.gov/>
- The FHWA **Bikeway Selection Guide** (2019) provides guidance on how to choose a facility type based on roadway characteristics, environmental constraints, and intended design user. The parameters in this guide should be used to select bikeways for future road retrofits and new roads. https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwas18077.pdf
- American Association of State Highway and Transportation Officials (AASHTO) **Guide for the Development of Bicycle Facilities** (2012) provides guidance on dimensions, use, and layout of specific bicycle facilities. AASHTO is expected to release an updated version of this guide in 2020, at which point the newer guide should be used for reference. <https://njdotlocalaidrc.com/perch/resources/aashto-gbf-4-2012-bicycle.pdf>
- The National Association of City Transportation Officials’ (NACTO) **Urban Bikeway Design Guide** (2012) is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs. <https://nacto.org/publication/urban-bikeway-design-guide/>
- **AASHTO: A Policy on Geometric Design of Highways and Streets** (2011) commonly referred to as the “Green Book,” contains the current design research and practices for highway and street geometric design. <https://store.transportation.org/item/collectiondetail/180?AspxAutoDetectCookieSupport=1>
- **The Public Right-of-Way Accessibility Guidelines (PROWAG)** are issued by the US Access Board and enforced under the 2010 ADA Standards and provide standards for pedestrian access routes and ramps, signals, transit stops/shelters, and on-street parking. <https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/proposed-rights-of-way-guidelines>

State & Local Guidance

- **South Carolina Department of Transportation (SCDOT) Roadway Manual** (2017) provides standards for SCDOT roads. The guide shows pre-approved treatments for State-owned roadways. https://www.scdot.org/business/pdf/roadway/2017_SCDOT_Roadway_Design_Manual.pdf
- **Bikeville**, the City of Greenville’s Bicycle Master Plan (2011) contains guidance on design needs of bicyclists, basic bicycle facility types, intersections, and bike parking. The guidelines in this document add to the guidance in Bikeville for application in the Swamp Rabbit Trail Extension Master Plan study area. <https://www.greenvillesc.gov/DocumentCenter/View/1481/Bicycle-Master-Plan-PDF?bidId=>
- The City’s **Trails and Greenways Master Plan** (2007) provides guidance on trail construction and ancillary trail details and amenities. This guidance should be used in choosing treatments for the study area. <https://www.greenvillesc.gov/DocumentCenter/View/293/Trails-and-Greenways-Master-Plan?bidId=>
- **The Greenville Downtown Design Guidelines** (2017) provide general guidance for all sites and buildings in an urban context. These guidelines incorporate that document by reference for all buildings and sites in an walkable, urban context and add trail-specific expectations to complement that facility. <https://www.greenvillesc.gov/DocumentCenter/View/7912/Greenville-Downtown-Design-Guidelines>

Trail User Design Needs

Trail users include pedestrians (including those using mobility devices and pushing strollers) and cyclists. By understanding the unique characteristics and needs of all trail users, a facility designer can provide quality facilities and minimize user risk.

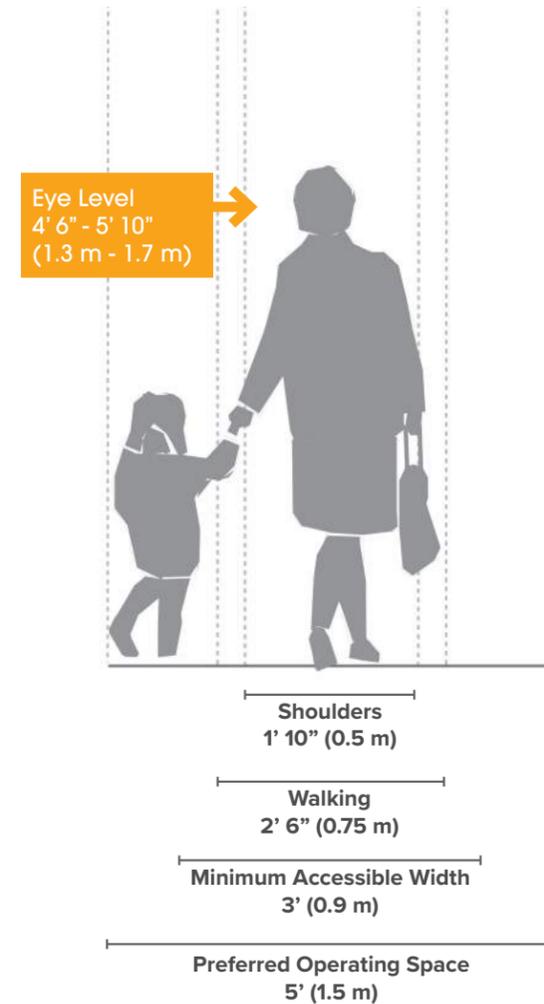
Types of Pedestrians

Pedestrians have a variety of characteristics and the trail network should accommodate a variety of needs, abilities, and possible impairments.

Age is one major factor that affects pedestrians’ physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing.

Pedestrian Characteristics by Age	
Age	Characteristics
0-4	Learning to walk
	Requires constant adult supervision
	Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision
	Poor depth perception
9-13	Susceptible to “darting out” in roadways
	Insufficient judgment
	Sense of invulnerability
14-18	Improved awareness of traffic environment
	Insufficient judgment
19-40	Active, aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street
	Vision loss
	Difficulty hearing vehicles approaching from behind

Pedestrian Dimensions



▲ Source: AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities, Exhibit 2-1. 2004.

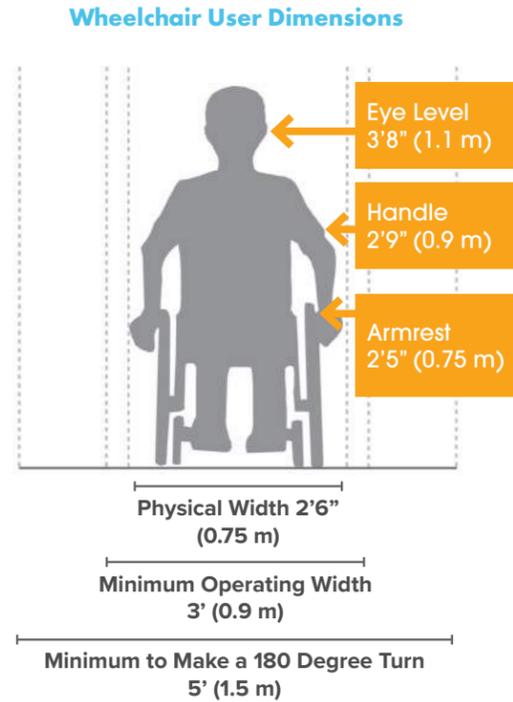
Design Needs of Wheelchair Users

As the American population ages, the number of people using mobility assistive devices (e.g., manual and powered wheelchairs) increases.

Manual wheelchairs are self-propelled devices. Users propel themselves using push rims attached to the rear wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair.

Power wheelchairs use battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on their ability (e.g., joystick control, breath controlled, etc.).

Maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element of accessible design.



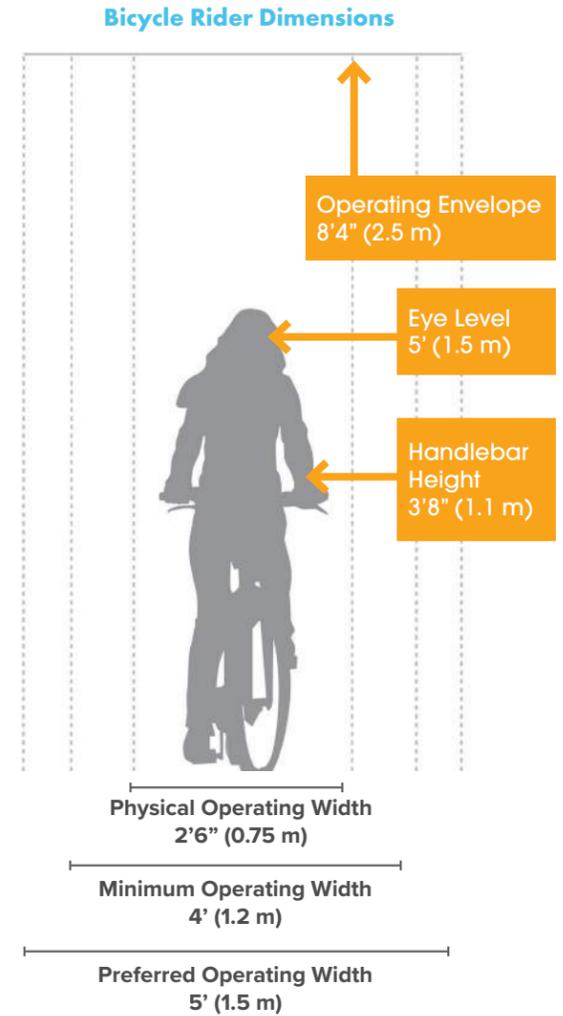
Disabled Pedestrian Design Considerations (AASHTO Pedestrian Guide 2004)		
Impairment	Effect on Mobility	Design Solution
Physical Impairment Necessitating Wheelchair and Scooter Use	Difficulty propelling over uneven or soft surfaces	Firm, stable surfaces and structures, including ramps or beveled edges
	Cross-slopes cause wheelchairs to veer downhill or tip sideways	Cross-slopes of less than two percent
	Require wider path of travel	Sufficient width and maneuvering space
Physical Impairment Necessitating Walking Aid Use	Difficulty negotiating steep grades and cross slopes; decreased stability and tripping hazard	Cross-slopes of less than two percent. Smooth, non-slippery travel surface
	Slower walking speed and reduced endurance; reduced ability to react	At trail crossings, longer pedestrian signal cycles, shorter crossing distances, median refuges, and street furniture
Hearing Impairment	Less able to detect oncoming hazards at locations with limited sight lines	At trail crossings, longer pedestrian signal cycles, clear sight distances, highly visible pedestrian signals and markings
Vision Impairment	Limited perception of path ahead and obstacles; reliance on memory; reliance on non-visual indicators (e.g., sound and texture)	Accessible text (larger print and raised text), accessible pedestrian signals (APS), guide strips and detectable warning surfaces, safety barriers, and lighting
Cognitive Impairment	Varies greatly. Can affect ability to perceive, recognize, understand, interpret, and respond to information	Signs with pictures, universal symbols, and colors, rather than text

Design Needs of Bicyclists

Bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of bicycle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the cyclist). The trail design should consider reasonably expected bicycle types and utilize the appropriate dimensions.

The figure to the right illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility which is why the minimum operating width is greater than the physical dimensions of the bicyclist. Bicyclists prefer five feet or more operating width, although four feet may be minimally acceptable.

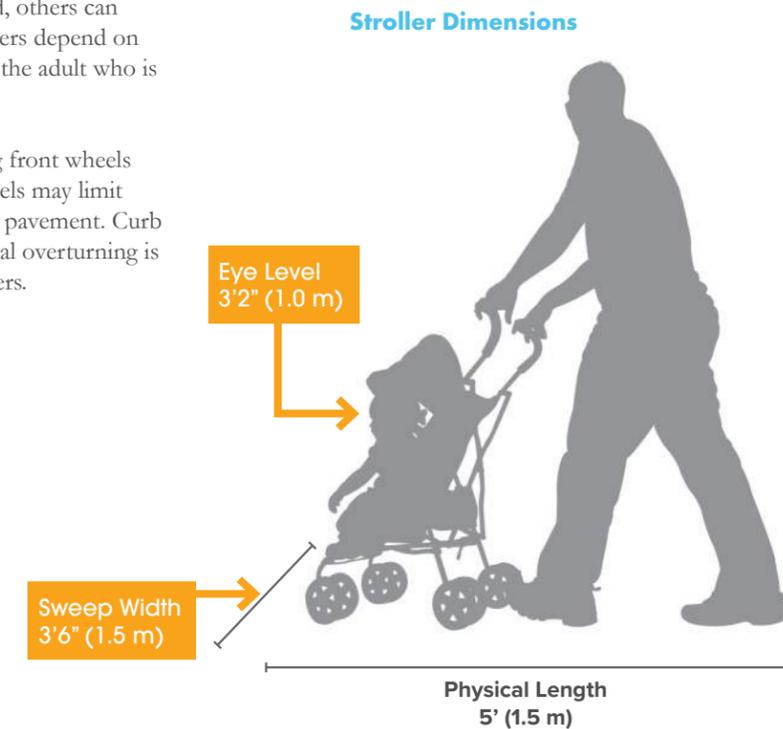
In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. Dimensions for these other types of bicycles and their accessories can be referenced in the AASHTO Guide for the Development of Bicycle Facilities, 4th Edition.



Design Needs of Strollers

Strollers are wheeled devices pushed by pedestrians to transport babies or small children. Stroller models vary greatly in their design and capacity. Some strollers are designed to accommodate a single child, others can carry 3 or more. Design needs of strollers depend on the wheel size, geometry and ability of the adult who is pushing the stroller.

Strollers commonly have small pivoting front wheels for easy maneuverability, but these wheels may limit their use on unpaved surfaces or rough pavement. Curb ramps are valuable to these users. Lateral overturning is one main safety concern for stroller users.



Pedestrian Facilities

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel separated from vehicle traffic. Providing adequate and accessible facilities can lead to increased numbers of people walking, improved safety, and the creation of social space.

Sidewalks and Sidewalk Zones

Typical Application

- Sidewalks should be provided on both sides of urban commercial streets, and should be required in areas of moderate residential density (1-4 dwelling units per acre or higher).
- When retrofitting gaps in the sidewalk network, locations near transit stops, schools, parks, public buildings, and other areas with high concentrations of pedestrians should be the highest priority.
- If pedestrian activity is anticipated, include sidewalks as part of construction (SCDOT).

Design Features

- It is important to provide adequate width along a sidewalk corridor. A pedestrian through zone width of 6 feet enables two pedestrians (including wheelchair users) to walk side-by-side, or to pass each other comfortably.
- In areas of high demand, sidewalks should contain adequate width to accommodate the high volumes of and different walking speeds of pedestrians.
- Appropriate placement of street trees in the furnishing zone (minimum 4 ft width) helps buffer pedestrians from the travel lane and increases facility comfort.
- Minimum sidewalk width is 5 feet (SCDOT).



Parking Lane/ Enhancement Zone

The parking lane can act as a flexible space to further buffer the sidewalk from moving traffic. Curb extensions and bike corrals may occupy this space where appropriate.

In the edge zone there should be a 6" wide curb.

Edge Zone

Furnishing Zone

The furnishing zone buffers pedestrians from the adjacent roadway, and is also the area where elements such as street trees, signal poles, signs, and other street furniture are located. The furniture zone may also be referred to as a buffer.

Pedestrian Through Zone

The through zone is the area intended for pedestrian travel. This zone should be entirely free of permanent and temporary objects. Wide through zones are needed where pedestrian flows are high or expected to be shared with bicycles.

Frontage Zone

The frontage zone allows pedestrians a comfortable "shy" distance from the building fronts. It provides opportunities for window shopping and placing signs, planters, or chairs.

Street Typology

Urban Arterial

Multi-lane streets with high speeds are corridors that must implement thoughtful pedestrian zones. These corridors are often not designed with pedestrian scale and comfort in mind. Laurens Road and Haywood Road are examples of corridors that can improve upon their pedestrian facilities.

Typical Sidewalk Zone Widths by Street Type				
Street Type	Parking Lane/ Enhancement Zone	Furnishing Zone	Pedestrian Through Zone	Frontage Zone
Urban Arterial	Varies	2-8.5 ft	6-8 ft	2-5 ft
Trail Connector	Varies	4-6 ft	6-12 ft	N/A
Neighborhood	Varies	2-5 ft	6 ft	N/A

Note: Design for new roadways or redeveloped areas should use the maximum dimensions in this table.



Urban arterial with enhanced landscaping and wider multi-use path in Peachtree City, GA
Existing urban arterial (Laurens Road at Shoppers Drive)



Urban arterial with storefronts, urban sidewalk amenities, and street trees in Chamblee, GA



Trail Connector

For streets that fit the trail connector typology, such as Airport Road, there is great potential to encourage pedestrian use where it does not already exist. While not all of these corridors may accommodate a full through zone width of 12 feet, they are crucial for contributing to the larger pedestrian network.

Typical Sidewalk Zone Widths by Street Type				
Street Type	Parking Lane/Enhancement Zone	Furnishing Zone	Pedestrian Through Zone	Frontage Zone
<i>Urban Arterial</i>	Varies	2-8.5 ft	6-8 ft	2-5 ft
Trail Connector	Varies	2-6 ft	5-12 ft	N/A
<i>Neighborhood</i>	Varies	2-5 ft	6 ft	N/A



◀ Trail connector in Peachtree City, GA

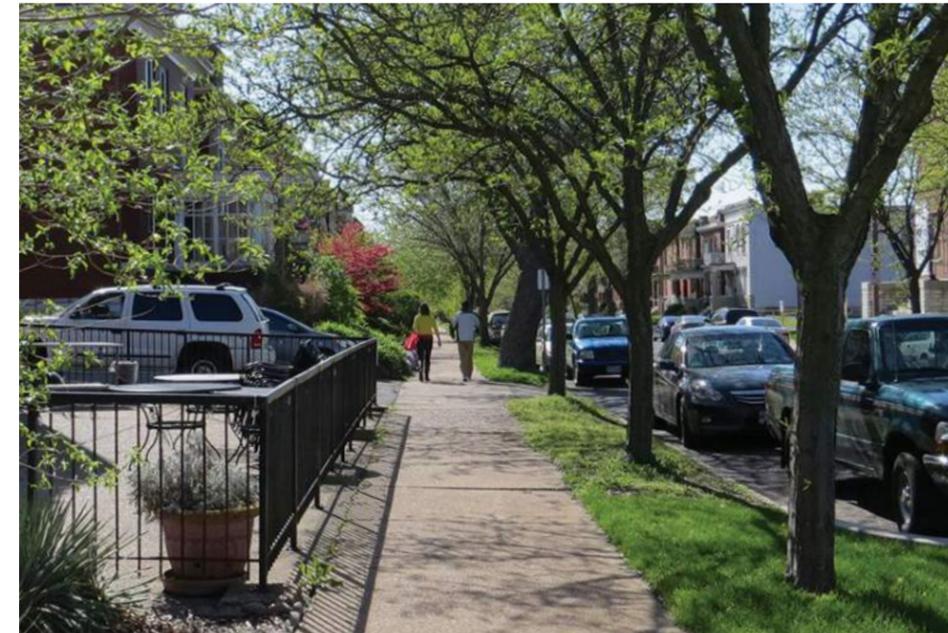


◀ Existing trail connector corridor (Airport Road)

Neighborhood

Sidewalks are not always built into the infrastructure of a neighborhood, but accessibility to and from the home is crucial for expanding the pedestrian network. With this typology, through zone width is close to the minimum as it is more important to have a sidewalk than none.

Typical Sidewalk Zone Widths by Street Type				
Street Type	Parking Lane/Enhancement Zone	Furnishing Zone	Pedestrian Through Zone	Frontage Zone
<i>Urban Arterial</i>	Varies	2-8.5 ft	6-8 ft	2-5 ft
<i>Trail Connector</i>	Varies	2-6 ft	5-12 ft	N/A
Neighborhood	Varies	0-5 ft	5-8 ft	N/A



◀ Neighborhood street precedent



◀ Existing Neighborhood Street (Sycamore Drive)

Bicycle Facilities

Incorporating bicycle facilities into the existing mobility framework must consider the context of where they are placed. There are several types of bicycle facilities, and each as a different combination of suitable conditions.

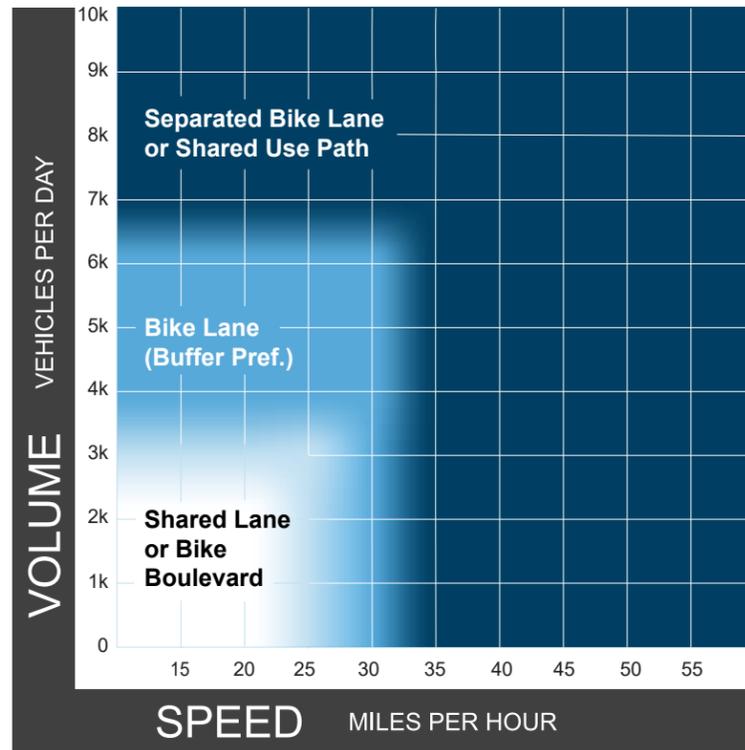
Bicycle Facility Types

Due to different conditions and resources associated with each site, an array of bicycle facility types have been created over time. Guidance on shared lanes, bike lanes, buffered bike lanes, and separated bike lanes is included in Bikeville. Detailed guidance on sidepaths is included because of their relevance to the study area.

Bicycle Facility Selection

When choosing the best bicycle facility for a corridor, safety, vehicular volumes and speed, bicycle traffic, site constraints, and funding constraints are all factors. Oftentimes, the largest site constraints for a bicycle corridor involve retrofitting an existing roadway. Safety must be the first consideration, and existing vehicular traffic data can affect the overall safety and comfort of a corridor.

The graph to the right (provided by the FHWA) shows the range of vehicular volume and vehicular speed appropriate for a range of bicycle facility. As vehicular volume and speed of the roadway rise, so does the need for separation between the bikeway and vehicles. These parameters should be used to select bicycle facilities in the study area.



▲ Source: FHWA Bikeway Selection Guide, 2019

- Notes:
1. Chart assumes operating speeds are similar to posted speeds. If they differ, use operating speed rather than posted speed.
 2. Advisory bike lanes may be an option where traffic volume is <3K ADT.

Sidepaths

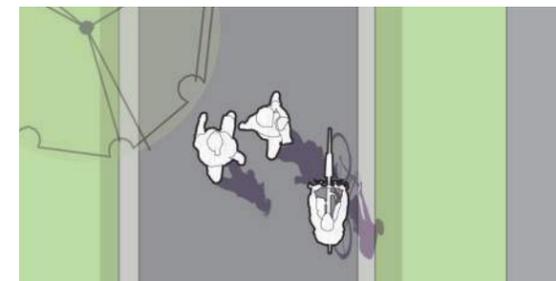
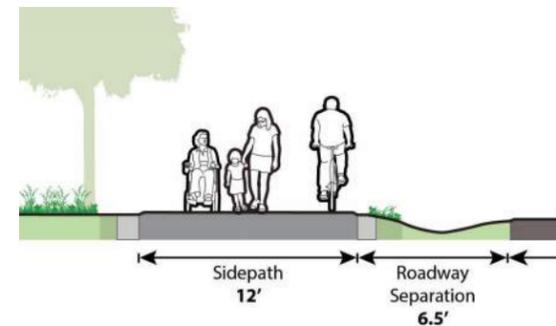
A sidepath is a bidirectional shared-use path located immediately adjacent and parallel to a roadway, typically within the roadway right-of-way. Sidepaths can offer a high-quality experience for users of all ages and abilities as compared to on-roadway facilities in heavy traffic environments, allow for reduced roadway crossing distances and maintain community character.

Typical Application

- The ideal location for sidepaths are roadways with few intersections or driveways
- Within roadway right-of-way
- Used to fill gaps in the network of low-stress local routes such as shared-use paths and bicycle boulevards

Design Features

- 12 feet is the recommended width for mixed pedestrian and bicyclist activity. 10 feet is the recommended width for low traffic paths.
- 8 feet is the minimum width allowed for a two-way bicycle path and is allowed for neighborhood accessways or places with limited space and for limited lengths.

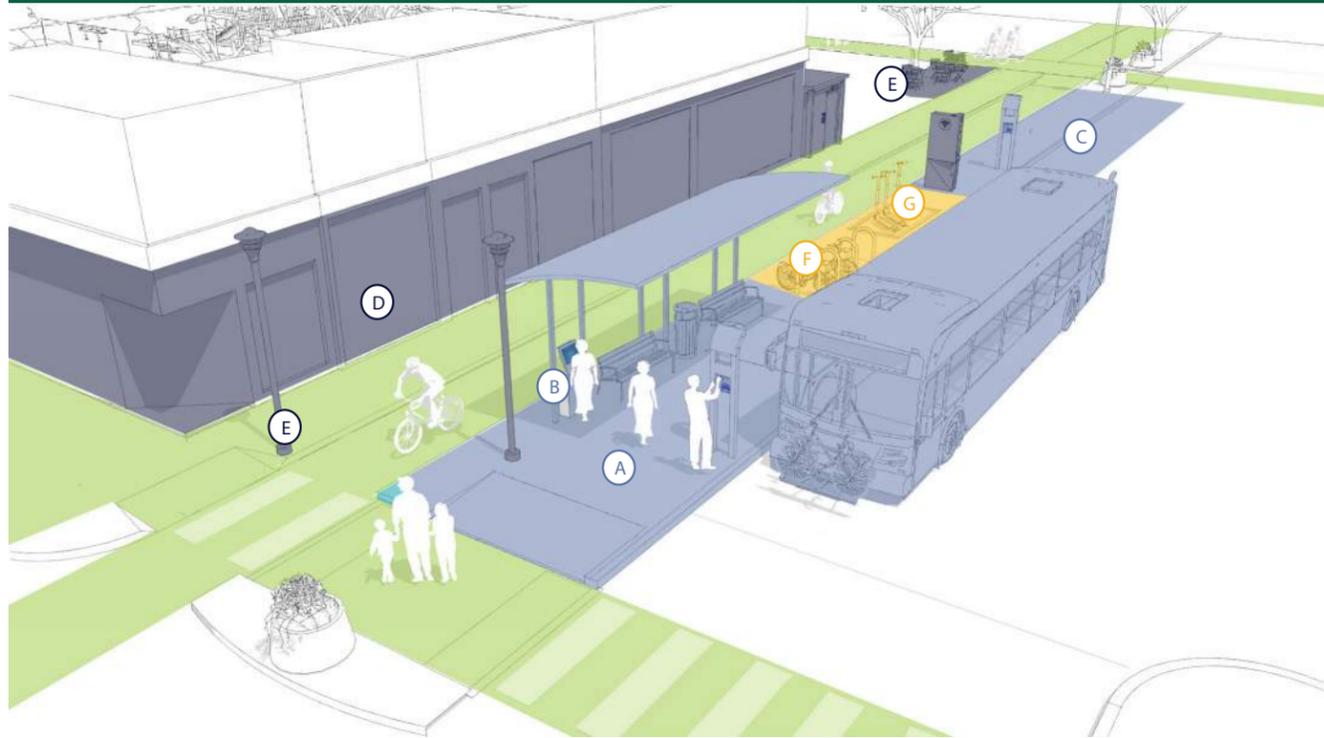


- The preferred minimum roadway separation width is 6.5 feet, with an absolute minimum separation width of 5 feet (AASHTO Bike Guide, 2012, pg 5-11)
- A 3 foot or greater width on each side of the pathway is required by the MUTCD for the installation of signage or other furnishings
- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended
- A sidepath is intended for use by pedestrians and must meet accessibility guidelines for walkways and curb transitions, grade, cross slope, and surface stability (PROWAG)
- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings
- The use of bollards should be avoided when possible. If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.



▲ Diagram cross section and plan view (left) and a sidepath in Granby, Quebec (right)

Mobility Hub Guidance



Minor Mobility Hub

The Minor Mobility Hub demonstrates how new technology can make it more convenient to pair transit with active transportation modes. It includes all of the features to support micro-mobility services plus bus transit service and ride-share pick-up and drop-off. This could be a place to accommodate autonomous vehicle pick-up and drop-off in the future as well as other new technologies that access streets around the trail.

Typical Application

- At existing or new bus stops
- At neighborhood centers
- May be configured as a floating bus boarding island with separated bikeway

Potential Design Features

Transit and Ride-Hailing Services

- (A) Accessible bus boarding area
- (B) Trip planning information that is accessible to all and ticket kiosks to facilitate pre-boarding payment
- (C) Passenger pick-up and drop-off, including ride-hailing companies (e.g. Uber/Lyft)

Amenities

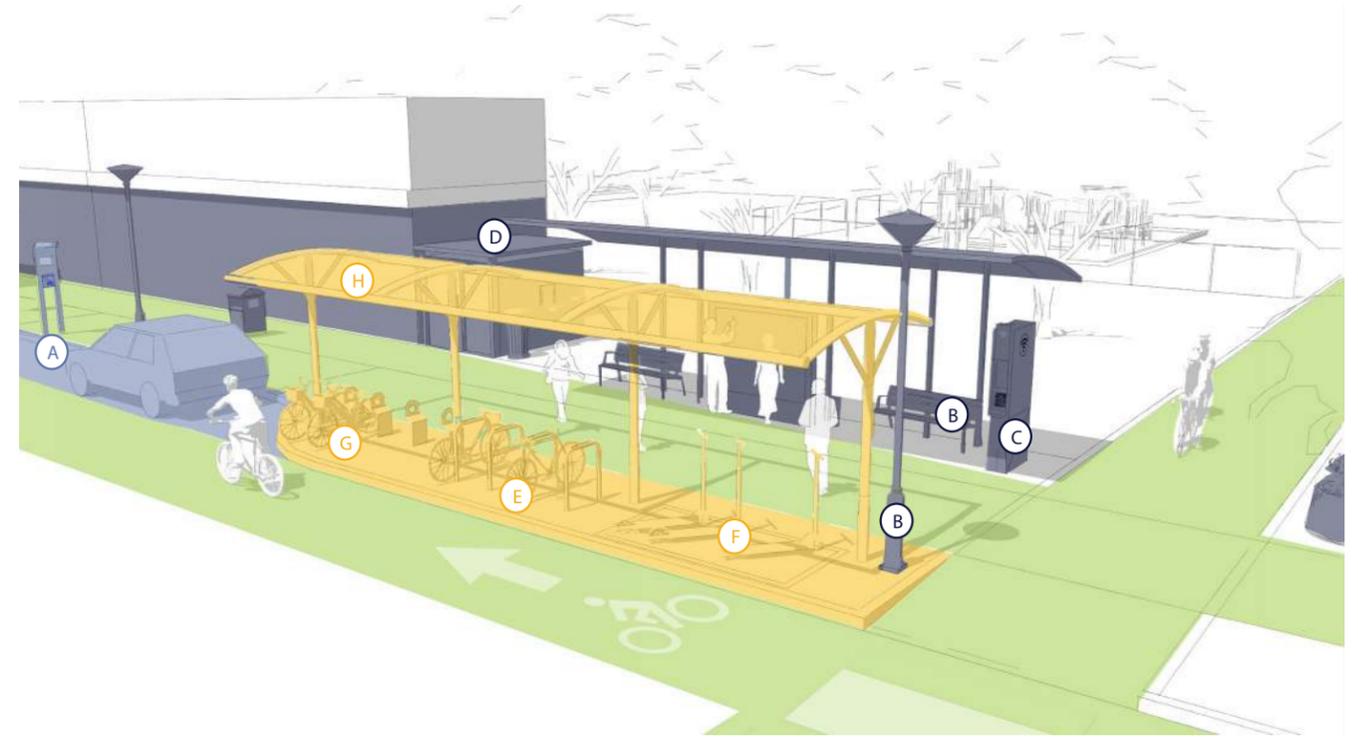
- (D) Retail space for businesses that support trip-chaining, such as bike shops, grocery/convenience stores, delivery lockers, or coffee shops
- (E) Features that enhance sense of place

Parking and Charging Services

- (F) Short-term bike parking
- (G) Designated e-scooter parking and charging

Priority Access

- Comfortable and continuous walkways
- Comfortable and continuous lanes or paths for bicyclists and others using devices like e-scooters
- Safe and frequent road crossings for people walking and biking



Micro Mobility Hub

The key distinction with the Micro Mobility Hub is that it does not include existing transit service. It is a central hub for mini services such as walking, bicycling, bikeshare, scootering, and ride-share. Users will access shared mobility services using personal smart phones or pre-purchased membership. A kiosk or integrated payment option could be provided on-site for accessing shared mini options. Parking for dockless vehicles must satisfy demand.

Typical Application

- Trailheads
- Where an off-street trail intersects an on-street bikeway or pedestrian route
- Along collectors and arterials without transit service
- At neighborhood centers without transit service

Potential Design Features

Ride-Hailing Services

- (A) Passenger pick-up and drop-off area

Amenities

- (B) Features that enhance sense of place
- (C) Wifi availability for people who do not have data to access shared mobility services
- (D) Public restrooms and water stations as appropriate

Parking and Charging Services

- (E) Short-term bike parking
- (F) Designated e-scooter parking
- (G) Bikeshare parking and docks
- (H) Weather protection for bike and micro-mobility parking

Priority Access

- Comfortable and continuous walkways
- Comfortable and continuous lanes or paths for bicyclists and others using devices like e-scooters
- Safe and frequent road crossings for people walking and biking

Intersection Treatments

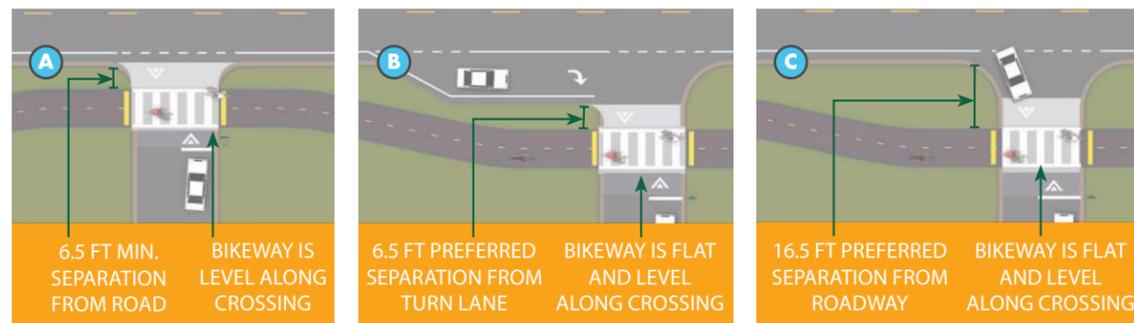
Crossings should be designed to promote awareness, lower speeds, and facilitate proper yielding of motorists to bicyclists and pedestrians. Consistent crossing treatments increase the predictability of pedestrian, bicyclist, and road user behavior through clear, unambiguous right-of-way priority.

Crossing Treatment Selection Matrix

The table below presents a high-level assessment of potential crossing treatment options for a variety of contexts. Enhanced treatments require additional site by site analysis and should be implemented based upon a safety engineering evaluation, identified community need and guidance by the City of Greenville. The evaluation should consider the number of roadway lanes, the presence or lack of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

Legend	Desirable ✓		Engineering Judgment EJ			Not Recommended X							
Street Posted Speed Range	15-25 mph		25-30 mph			30-45 mph							
	2 lane	3 lane	2 lane with median refuge	3 lane	2 lane with median refuge	3 lane	4 lane with median refuge	5 lane	6 lane with median refuge	6 lane with median refuge	6 lane with median refuge		
Marked and Signed Crosswalk*	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
Crosswalk with Yield Lines	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
Raised Crosswalk	✓	✓	EJ	EJ	EJ	EJ	EJ	EJ	X	X	X	X	X
Rectangular Rapid Flashing Beacon Crossing	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
Pedestrian Hybrid Beacon Crossing	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
Full Traffic Signal Crossing	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
Grade Separated Crossing	X	X	EJ	EJ	EJ	X	EJ	EJ	✓	✓	✓	✓	✓

**NOTE: All treatments shall include a marked crosswalk. The "Marked and Signed Crosswalk" line item indicates contexts where ONLY a marked and signed crosswalk is an appropriate treatment.



Sidepath Driveway Crossings

A. Adjacent Sidepath Crossing. Where space is constrained or sight distance is limited, an adjacent crossing can promote visibility of path users.

B. Deceleration Lane. On high-speed roadways, a deceleration lane is recommended to allow motorists to slow down as needed to yield to path users.

C. Separated Sidepath Crossing. Where space is available, a separated crossing provides room for most motorists to yield to path users outside of the flow of through traffic.

Trail Access

All access points should be carefully planned and thoughtfully located. Whether a trail is accessed through a designated trailhead or a smaller, private connection, consistent treatments should be used to make these access points welcoming, comfortable, and traversable for all users.

Public Trailheads & Access Points

Trailheads are entryways to the Swamp Rabbit Trail that will provide a comfortable place to pause for trail users, adequate parking, and amenities such as restrooms, facility maps, and bicycle repair stations. Trailheads should be designed to suit the natural features of the site, circulation patterns of all mobility modes, and provide added features for user comfort, when needed. Scale of the trailhead will vary based on site availability. All elements of the site should proportionately relate to the overall design.

Design Features

- Plantings should provide appropriate visibility and landscape buffers, where needed
- Trailheads should be clearly identified and located in a position so as not to be confused with the entrance to surrounding lots
- Where possible, trailheads should accommodate the admittance of an emergency vehicle, but prohibit the admittance of unauthorized vehicles
- Minimal amenities such as trash receptacles and wayfinding signage are encouraged to contribute to the maintenance and comfort of the site
- A list of trail user responsibilities is encouraged at each entry point
- Trailheads must be accessible to all users and follow ADA guidelines



▲ Typical public trailhead connection

Private Connections

Private connections to the trail system improve connectivity and encourage trail usage. For major developments, these access points should be considered as nodes where people are expected to linger and move slowly, so widening may be desirable. Where there is a significant grade change, ramps must meet ADA standards and should be minimum 10 feet wide where possible given the high volumes of bicyclists on existing sections of the trail. If bicycle access is infeasible due to site constraints, bicycle parking should be available on either side of the grade change. Access points should have wayfinding and regulatory signage that complies with the conceptual design requirements in the City's *Trails and Greenways Master Plan* and the *Bicycle Master Plan*. The design and installation of all connections to the Swamp Rabbit Trail must be approved by the City of Greenville and Greenville County.



▲ Typical private trailhead connection

Typical Trail Access Dimensions

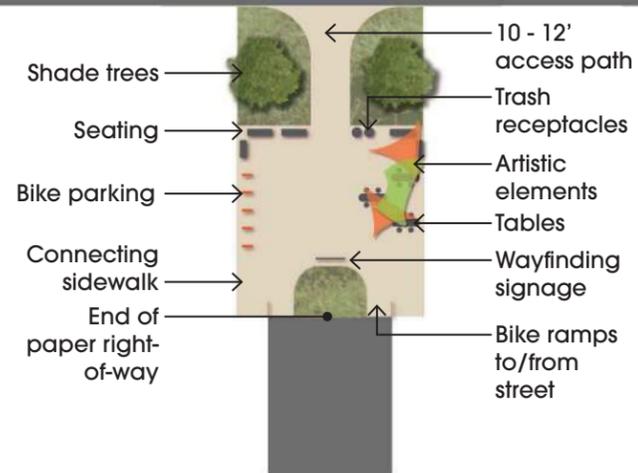
Access Type	Shoulder	Access Path	Clear Zone
Where there is a higher diversity of users types	2 ft min	10 - 12 ft	12 - 14 ft
Where there is a lower diversity of user types (i.e. where bicyclists are expected to dismount)	2 ft min	6 - 8 ft	10 - 12 ft

Trail Access Configurations

The following diagrams demonstrate a handful of trailhead typologies that will appear along the Swamp Rabbit Trail Extension. With full build out there will likely be several additional trailhead configurations based on context. In general, where mixed bicycle/pedestrian users are expected, the access path should be 10-12 ft with 2 ft shoulders. Where bicyclists are anticipated to dismount, the access path should be 6-8 feet wide with 2-foot shoulders.

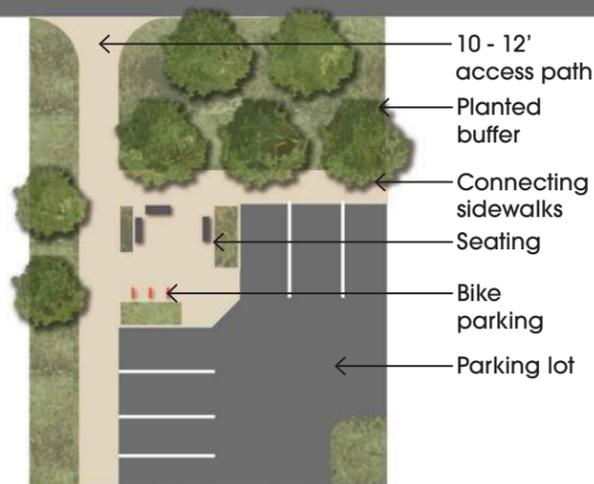
Paper Right-of-Way

This access configuration is appropriate for the quieter neighborhood streets that currently dead-end near the trail.



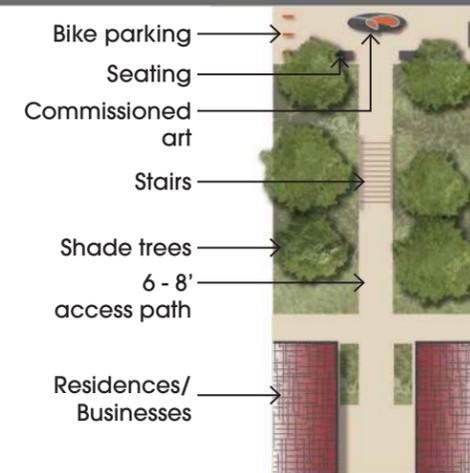
Accessible Parking Lot

Accessible parking lots are places where there is vehicle parking for trail users.



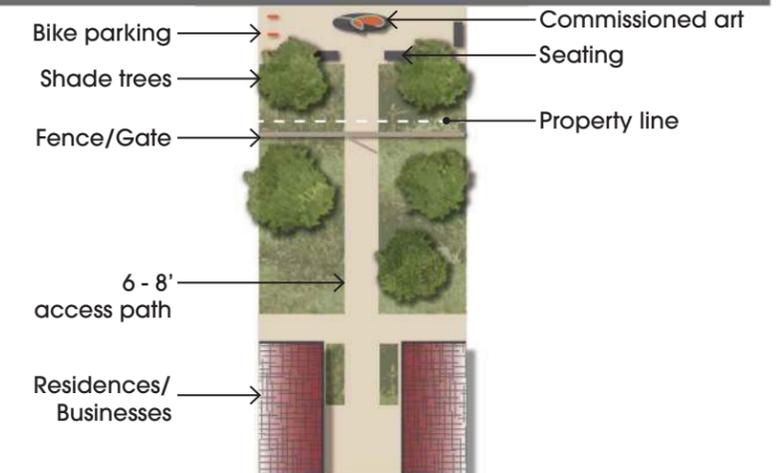
Stair Access

Accessible paths should be prioritized in establishing access to the trail. Stairs should only be added where there are other accessible options nearby.



Gated Access

Gated access may be required for residences and private offices.



Example at Atlanta BeltLine.
Image courtesy of Google

Potential location:
End of Eastland Pl

Potential characteristics of Paper Right-of-Way Access:

- 10 - 12 ft wide access path
- 2 ft min shoulder width
- 12 - 14 ft width of clear-zone
- Shade trees
- Amenities such as trash receptacles, seating, bike parking, and wayfinding signage to be included as appropriate
- Access path may need to be configured as a ramp where grade requires



Example at Big Creek Greenway.
Image courtesy of Google

Potential location:
CU-ICAR

Potential characteristics of Parking Lot Access:

- 10 - 12 ft wide access path
- 2 ft min shoulder width
- 5 - 6 ft wide accessible sidewalks
- Gathering space
- Amenities such as trash receptacles, seating, bike parking, wayfinding signage, and vehicle parking to be included as appropriate
- Access path may need to be configured as a ramp where grade requires



Example at Atlanta BeltLine

Potential characteristics of Stair Access:

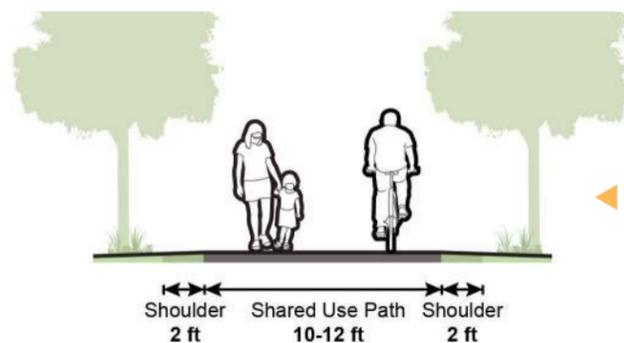
- 6 - 8 ft wide access path
- 2 ft min shoulder width
- Gathering space may be provided as appropriate
- Amenities such as trash receptacles, seating, bike parking, and commissioned art as appropriate



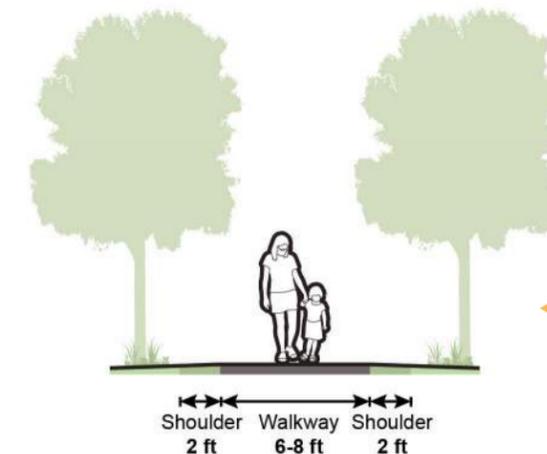
Example at Atlanta BeltLine

Potential characteristics of Gated Access:

- 6 - 8 ft wide access path
- 2 ft min shoulder width
- Gathering space may be provided as appropriate
- Amenities such as trash receptacles, seating, bike parking, and commissioned art as appropriate



Typical section for 10 - 12 ft wide trail access path



Typical section for 6 - 8 ft wide trail access path

Trail Support Infrastructure

Trail support infrastructure includes amenities found along the trail and at some trail access points that enhance placemaking and improve the overall experience for the user. Support infrastructure should be contextually appropriate and build off of the established brand and aesthetics of the existing segments of the Swamp Rabbit Trail. Guidance on wayfinding signage, lighting, seating, trash receptacles, and bike parking can be found in the City's *Trails and Greenways Master Plan (2007)* and *Bicycle Master Plan (2011)*. Additional support infrastructure to be considered for the Swamp Rabbit Trail area is included here.

Swamp Rabbit Trail Pattern Language

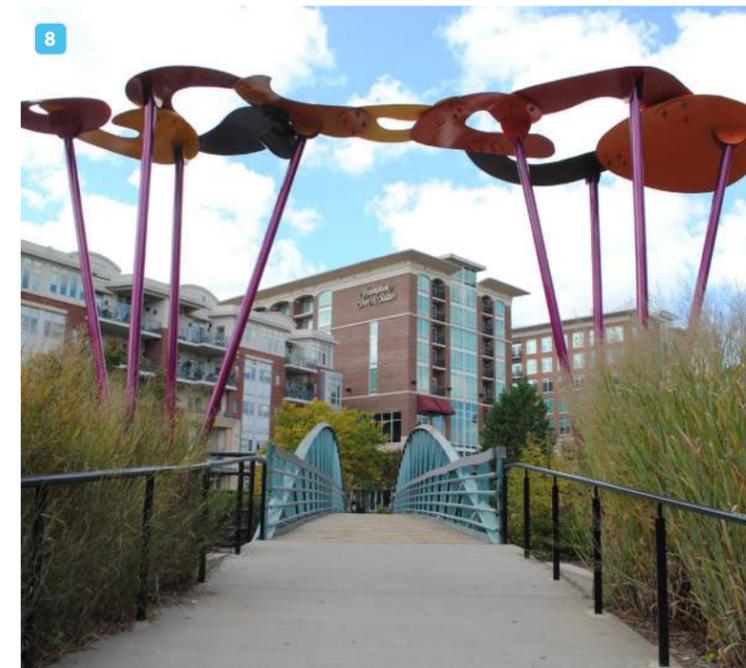
The established brand and aesthetics of the existing trail could be described as 'pattern language'. The trail extension should speak the same language to feel cohesive with the existing system in similar character, high-quality design, and style. There are many distinct neighborhoods, districts, and developments along the trail, especially along the extension where the trail will serve as a 'main street' with buildings interacting with the trail. The trail patterns can change to better represent the unique character of the surrounding area, but should still maintain a cohesive aesthetic representative of the trail as a whole.

Design Features

- **Signage:** A comprehensive system of signage has been developed for the Swamp Rabbit Trail that includes post- and pole-mounted signs and pavement striping, information signs, directional signs, regulatory signs and warning signs. In order to preserve the continuity of the overall trail system, it is critical to continue this branding.
- **Lighting:** There are two basic types of suggested lighting: Pole lighting and Bollard lighting. Pole lighting is typically employed in high use areas such as an esplanade or where a trail meets a parking lot or other urbanized area. The bollards can be used to guide individuals along a trail to a specific location. In general lighting is not appropriate for off-road trails where there is little or no development. (See also the Greenville Trails and Greenways Master Plan)
- **Seating:** There are a variety of seating options along the trail including formal, fixed-seating such as benches and tables, moveable seating, and even informal seating along seat walls and on boulders that are 16-20" in height. Frequent seating is encouraged and should be appropriate to the location with more formalized, more moveable seating options in areas that have active development patterns.
- **Trash Receptacles:** Trash receptacles should be durable and attractive and should be placed at frequent intervals along the trail. At a minimum, they should be placed adjacent to seating areas.
- **Bike Parking:** Bike parking is important for areas that are adjacent to trail-adjacent activities and locations such as restaurants and parks. Bike racks should be areas of potential public art with thematic elements incorporated into their design.



▲ Existing areas where the pattern language changes to represent a unique area (from the top to bottom): the iconic Liberty Bridge in downtown overlooking Falls Park, Linky Stone Park along the trail has creative furniture and public art, and Cleveland Park includes engaging features along the trail and multiple sidepaths feeding into the trail



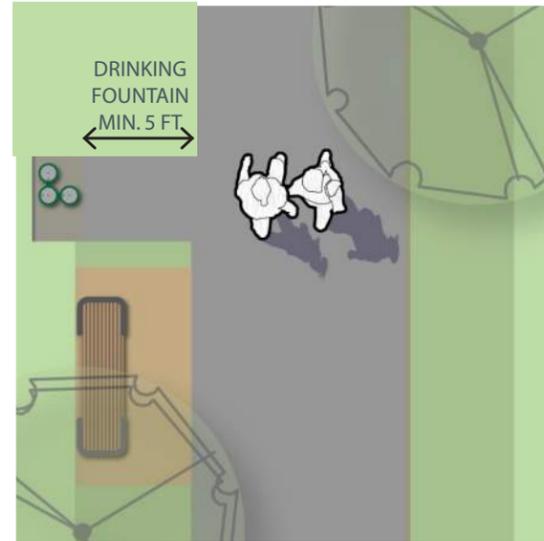
▲ Existing Swamp Rabbit Trail language imagery: 1&2) for a large section of the trail, it is divided by pavement types into walking and biking zones 3&4) signage for the trail is functional for safety and serves as wayfinding 5) furnishings include branded trash receptacles 6) furnishings found along the trail 7) pedestrian-scaled lighting 8) public art 9) public exercise equipment in Cleveland Park

Water Fountains

Access to potable water is crucial to safety and trail enjoyment for multiple user types. Because the Swamp Rabbit Trail traverses many communities and townships, users will range from local recreational users to through-bikers, and ages from youth to active adults. Water access points should be available at all trailheads. Between trailheads, wayfinding signs will lead users to potable water sources that may be accessible through public spaces such as parks, convenience stores, restaurants, and other trail-friendly businesses. As a best practice, spacing for drinking water access for the Swamp Rabbit Trail should be a minimum of 1 mile with a 1/2 mile preferred spacing.

Design Features

- Locate drinking fountains at least 5 feet from trail edge
- Standard, accessible, and dog height bowls should be installed to accommodate all trail users
- Drinking fountains should be placed on a well drained surface (for example: 2% sloped concrete slab, with 3 in gravel strip to prevent erosion)
- Consider the use of durable and vandalism-resistant materials such as steel, or stone
- Ensure the use of “auto-off” features to prevent waste, bowl overflow, and open lines
- Include hose bib connections at water fountain locations for maintenance purposes
- Schedule regular inspections to monitor leaks, clogged drains, cracked pipes, and vandalism



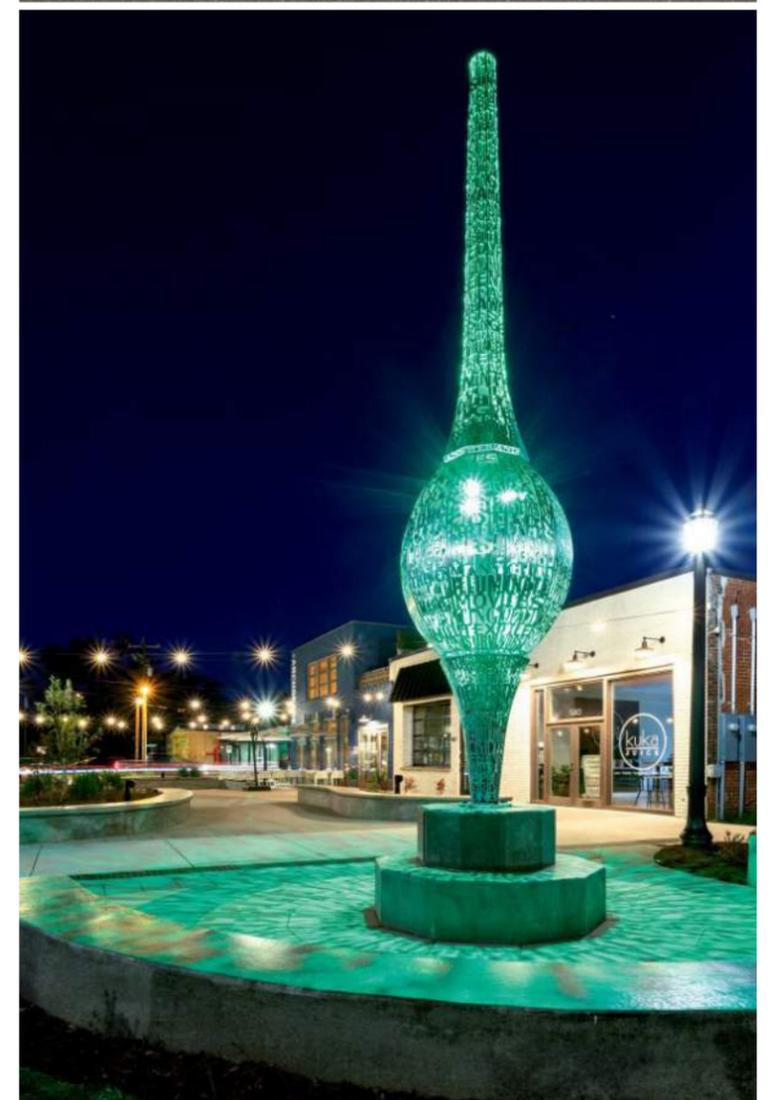
▲ From the top to bottom: Diagram for water fountains along the trail, existing water fountain along the trail, and a conceptual illustration of a potential shade structure along the trail

Public Art - Site Elements

Greenville benefits from a sophisticated and extensive art community that has built public art throughout the community. The Swamp Rabbit Trail extension offers opportunities for additional art installations both along the trail as well as within the larger corridor area. Greenville’s *Arts in Public Places Registry* (available on the City’s website) should be used to find local artists to create art in new development, plazas, and trail access points.

Design Features

- Public art is best utilized in urban areas of the greenway as opposed to backcountry areas
- Generally, public art along the trail is most appropriate in association with infrastructural elements along or in association with the trail such as on bridges, underpasses, and building walls.
- Art features should be limited in scope, scale and placement and should complement, and not detract from, the natural character of trail corridors
- Artistic designs should be durable and maintainable
- Art objects should not pose hazards to users
- For infrastructure and furnishings, generally promote artistic design consistent with the branding scheme in color, shape form and texture
- In some instances where applicable, local—including neighborhood—artists of all ages and cultural groups may participate in a specific art project
- Art may be used to delineate character districts, cultural, community and neighborhood identity
- Proposed art projects should be reviewed for appropriateness and consistency with the trail character and branding



▲ Public art along the Rail Trail in Charlotte, NC and a sculptural, light feature in Decatur, GA

Site and Building Design Guidelines

In general, new construction along the Swamp Rabbit Trail should follow basic urban design patterns that are appropriate to any walkable, urban environment and the frontages along the trail should generally be treated like any other main street, using the unique character, design, and style similar to the existing trail conditions through Downtown Greenville. Many of these features are identified in the Downtown Design Guidelines (2017), specifically the Public Realm Guidelines that address Walls, Fencing and Screening and Private Realm guidelines that address Placement, Massing, Entry, Activated Ground Floor, Articulation, Materiality, Architectural Lighting, Private Outdoor Spaces, Parking Lots, and Parking Structures. In addition to the Downtown Design Guidelines, sites and buildings along the trail shall integrate the following elements into their design.

Site Elements

It is important to organize all site elements to recognize the trail is a public “Main Street” for the community. In many cases, this means that the lots will be considered to have double frontages and will have to provide similar, enhanced treatments on both the street and trail sides of the buildings.

Design Features

- **Block Frontages:** No block frontage as measured from public right-of-way to public right-of-way shall exceed 600 feet. In lieu of a street crossing a pedestrian/trail access may be provided.
- **Trail Setback:** Buildings should be set back a minimum of 20 feet from the trail right-of-way and a fully landscaped vegetated buffer (excluding walkways, benches, and other permitted encroachments) should be provided to create a continuous and unobstructed linear green space that reinforces the pedestrian experience.
- **Encroachments:** Patios, decks and similar outdoor seating areas are encouraged along the trail and may encroach into the vegetated buffer but shall not encroach into the trail right-of-way.
- **Surface Parking:** Locate parking lots away from the trail frontage and provide a vegetated buffer to soften and screen the view. In general, a maximum of 20% of the site’s trail frontage may be occupied by surface lots. Bicycle parking should be provided in the area immediately adjacent to the trail. (See also Downtown Design Guidelines - PRI 9. Parking Lots)
- **Parking Structures:** Locate parking structures away from the trail and setback behind a liner building where practical. At a minimum, set back all such structures at least 50 feet from the trail. (See also Downtown Design Guidelines - PRI 10. Parking Structures)
- **Building Utilities:** Buildings utilities (e.g., exhaust vents, air intakes, grease trap connections, meter banks, utility meters) should not be placed along any trail frontage.
- **Site Utilities:** Site utilities (e.g., transformers, mechanical and electrical equipment, dumpsters, backflow preventers, meter banks) should not be located between the building and the trail and within any trail setback. They should be screened from view or placed in an underground vault.
- **Rainwater Management:** All required rainwater management utilities (e.g., ponds, swales, dry detention) should be placed away from the trail to the greatest extent possible and designed to be an amenity within the study area.

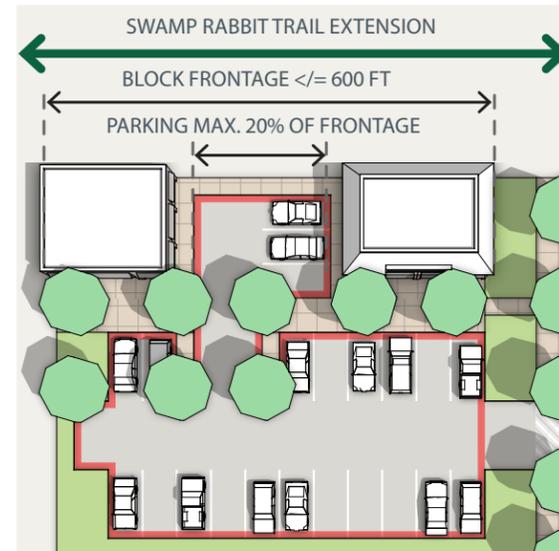


Figure 1: Block Frontages and Surface Parking

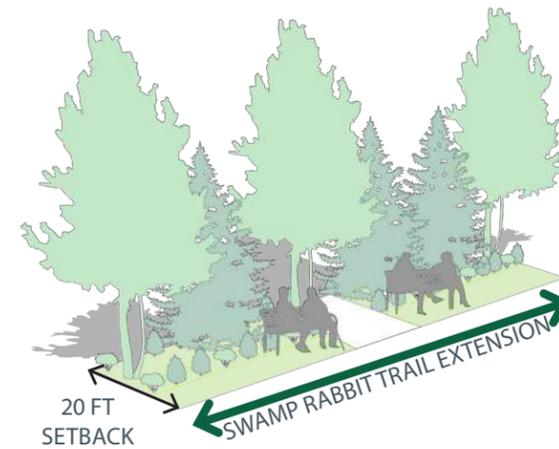


Figure 2: Trail Setback



▲ Precedent imagery of site elements that depict high quality designs and styles for landscaping, lighting, seating, plazas, trash receptacles, and public art: 1) South Riverwalk in Trenton, NJ 2) Quequechan River Rail Trail in Fall River, MA 3) Sugar Creek Greenway in Charlotte, NC 4) North Shore Greenway in Queens, NY 5) Open Hearth Park in Sydney, Canada 6) South Riverwalk in Trenton, NJ 7) Rotary Trail in Birmingham, AL 8) Route 9A West Street Promenade in New York, NY 9) Charles River Greenway in Waltham, MA 10) Riverplace along the Swamp Rabbit Trail in Downtown Greenville, SC

Typical trail-oriented development



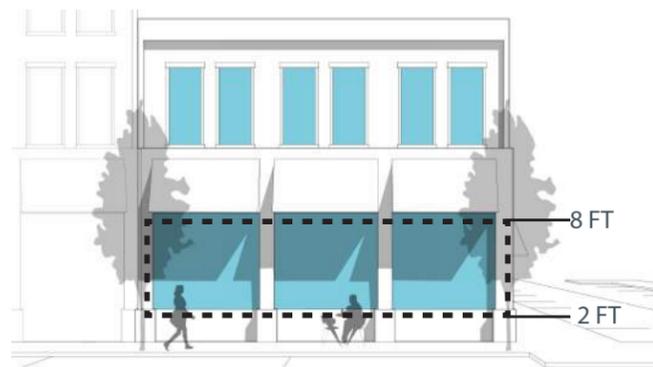
Building Elements

The front door of the trail is a vital opportunity to provide a unique experience with building architecture that is both pedestrian in scale and eclectic in design, providing an ever changing user-experience. The industrial nature of portions of the corridor lend themselves to more modern materials and design configurations whereas other segments closer to the neighborhoods are more appropriate for traditional design elements.

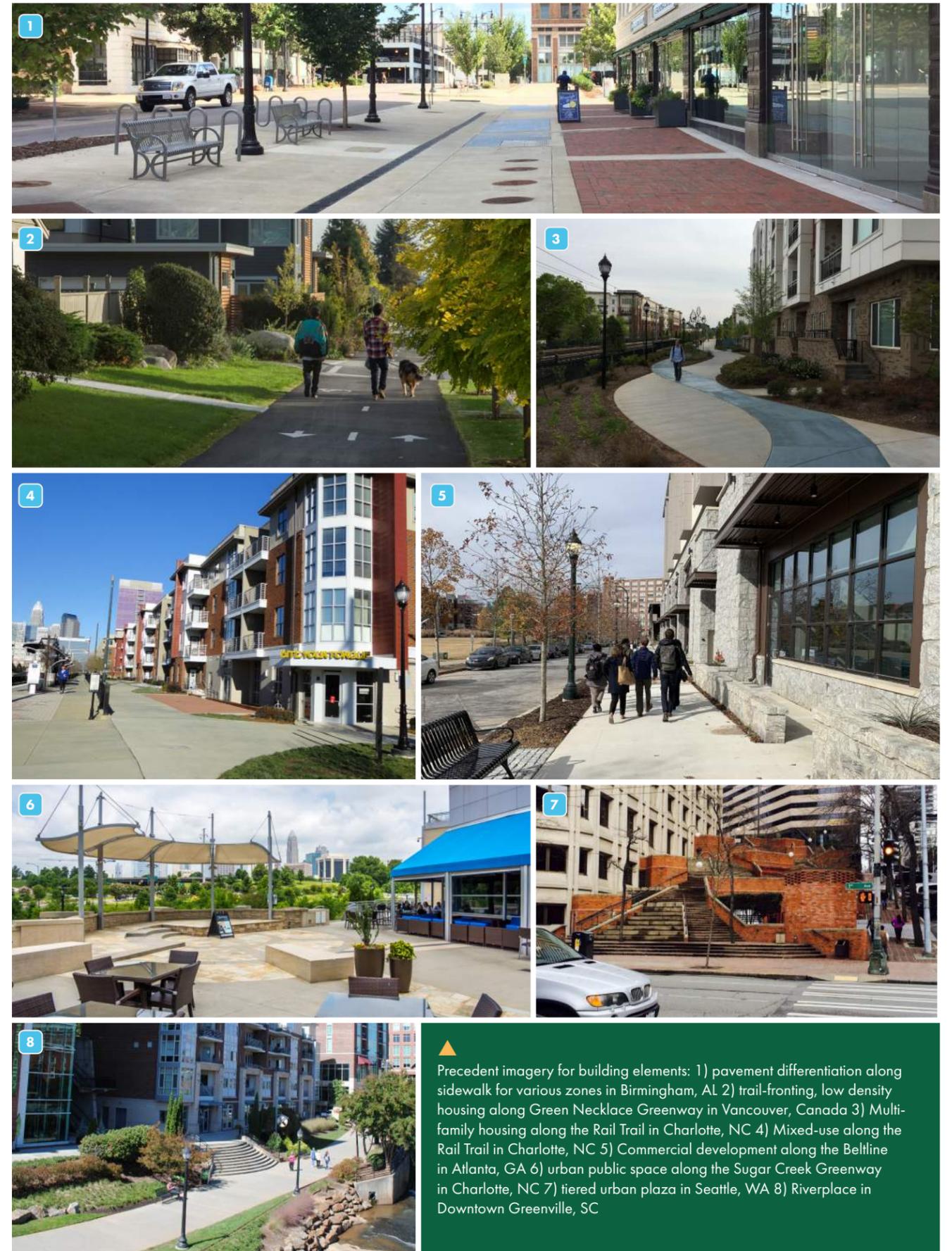
Design Features

- **Trail-facing Buildings and Activity:** Activate the trail by orienting the facades of buildings and buildings entrances to the trail. The ground floor of buildings along the trail should emphasize active uses that are appealing to pedestrians, such as retail, personal services, restaurants, outdoor cafes, and residences. Trail-facing buildings on lots that also front street right-of-way are considered double frontage lots.
- **Building Face Length:** No building should exceed 250 feet in frontage width without a break in the façade. (See also Downtown Design Guidelines - PRI 5. Articulation)
- **Ground Floor Fenestration:** The ground floor of any building adjacent to any pedestrian space should be a minimum of 50 percent clear fenestration and should have a minimum floor-to-ceiling height of 14 feet. (See also Downtown Design Guidelines - PRI 4. Activated Ground Floor) (See Figure 3 for reference)

- **Blank Walls:** Building elevations and site walls greater than 5 feet in height should not have blank wall expanses greater than 20 feet in any horizontal or vertical direction. For blank walls greater than 10 feet, architectural features such as, but not limited to banding, medallions, or similar design features or materials should be provided. Public art elements including murals may be used on existing buildings in lieu of a new facade. (See Murals and Wall Art Installations on the following spread for further guidance.)
- **Entrances:** At least one public entrance should be provided from the trail frontage, where practical. (See also Downtown Design Guidelines - PRI 3. Entry)



▲ Figure 3: Ground floor transparency is critical to encouraging pedestrian activity



▲ Precedent imagery for building elements: 1) pavement differentiation along sidewalk for various zones in Birmingham, AL 2) trail-fronting, low density housing along Green Necklace Greenway in Vancouver, Canada 3) Multi-family housing along the Rail Trail in Charlotte, NC 4) Mixed-use along the Rail Trail in Charlotte, NC 5) Commercial development along the Bellline in Atlanta, GA 6) urban public space along the Sugar Creek Greenway in Charlotte, NC 7) tiered urban plaza in Seattle, WA 8) Riverplace in Downtown Greenville, SC

Parks and Public Spaces

In addition to the linear nature of the corridor, it is important to provide places along the trail that “widen” for recreation and respite. These places should be designed to serve as an active interface between the building(s) and the trail and can include semi-public outdoor patios and intimate courtyards that can be activated through outdoor dining, regular programming, and recreational amenities as well as more public spaces that include seating and watering stations, formal plazas, naturalistic greens, active parks and conservation areas. Each development site should consider some combination of these amenities as their contribution towards a safe, attractive, and active trail frontage. When planning the space, consider the following four qualities identified by the Project for Public Spaces (<https://www.pps.org/article/grplacefeat>) in making a truly great space: accessibility, comfort, sociability, and activities. (See also Downtown Design Guidelines – PUB 10. Publicly Accessible Parks and Plazas)

Typical Application

- Parks and other public spaces should provide visual and physical connections to the trail
- Private development should provide public or semi-public spaces along their trail frontage

Design Features

- Provide clearly visible entries into the public space from the trail.
- Public spaces and parks should connect seamlessly to the trail with few if any changes in elevation or visual transition points aside from signage.
- Delineate the boundary between the trail and publicly accessible private space in ways that distinguish between public and private lands – not to provide physical or visual separation. Low plantings, low transparent fencing, or a change in elevation (e.g., steps, deck) are appropriate.
- Include high-quality lighting to increase the perception of safety and provide an attractive environment
- Provide a wide diversity of comfortable seating considering the use of moveable seating in higher-traffic, more easily surveilled areas
- For publicly accessible, private spaces, consider elements such as art and lighting and regular programming such as live music that provide a unique, authentic experience.
- Ensure that publicly accessible parks and plazas provide adequate opportunities for ongoing user stewardship. This includes implementing Crime Preventing Through Environmental Design principles, especially visibility into and throughout the space, and providing adequate maintenance infrastructure like litter receptacles. (Downtown Design Guidelines – PUB 10. Guidelines 8.8)



▲ Precedent imagery of parks and public space: 1&2) Sugar Creek Greenway in Charlotte, NC 3) Rail Trail in Charlotte, NC 4) Beltline in Atlanta, GA 5) Pepper Place in Birmingham, AL



▲ Murals on existing buildings along the Atlanta BeltLine that help to enliven aging or functionally obsolete structures waiting for their regeneration with trail-supportive uses.



▲ Murals and public art provide opportunities for Instagrammable moments and other micro-tourism opportunities that attract people to beautiful places. Source: Memphis Downtown Commission



▲ Public art can lessen the impact of blank walls, particularly for existing buildings

Murals and Wall Art Installations

Because many existing buildings have firewalls that back up to the trail, it is necessary to provide visual relief to break up their dull aesthetic. Murals and other wall elements such as lighting and improved veneer materials are excellent tools to add beauty and interest. The context of the building and the surrounding area is a critical component to the evaluation of an appropriate location for a mural or other wall art installation.

Design Features

- Blank firewalls are the preferred location for murals and should be utilized whenever possible.
- Murals should not compete with or overwhelm existing architectural features such as windows with trim, moldings, entryways, or similar detailing. Do not engulf key architectural features within murals.
- Murals should avoid creating harsh edges where no architectural features are present to create a natural break in the façade. Mural designs that do not contain harsh edges may be proposed in place of architectural features.
- Murals should be located and sized to engage and encourage pedestrian interaction.
- Context should be considered when proposing a mural. Outside of specific mural districts or projects, proposed murals should be dispersed as to promote greater community presence and neighborhood compatibility.
- The content of each mural or wall installation should generally be non-commercial in nature though some legacy/historic representation of products and services are permitted. Art elements that incorporate relevant geography, history, and character of Greenville are strongly encouraged.
- Building lighting, including variable-color LED installations are encouraged to provide both improved aesthetics and lighting for security.

