



Greenway Criteria and Design Guide



East Coast
Greenway®
ALLIANCE

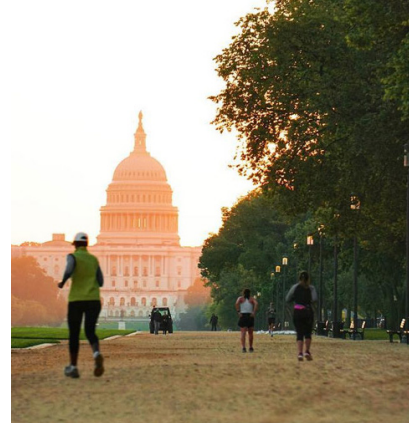


West Ashley Greenway in Charleston, S.C. On the cover: Schuylkill River Trail in Philadelphia.

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Executive Summary



Charles River Bike Path, Boston; Schuylkill River Trail, Philadelphia; National Mall, Washington, D.C.

The *Greenway Criteria and Design Guide* provides information and resources for the planning, design, construction, promotion, and maintenance of local East Coast Greenway segments. This *Guide* defines our vision of a protected, connected series of safe facilities for a continuous non-motorized route from Maine to Florida. Federal, state, and local elected officials, city and regional planners, and local advocates will find requirements for Greenway segment design and construction along with photographs and links to existing best-practice planning and design guidelines. The *Guide* explains allowable on-road facilities and offers a new section on potentially allowable on-road facilities. The *Greenway Criteria and Design Guide* concludes with a list of technical resources and a glossary of common terms and acronyms related to the Greenway.



Neuse River Greenway, Raleigh, NC; Spanish Moss Trail, Beaufort, SC; Overseas Heritage Trail, Florida Keys



East Central Regional Rail Trail, Volusia County, Florida

The East Coast Greenway's permanent route criteria:

- **Traffic separated.** Includes a physical barrier that combines both horizontal spacing and vertical elements to protect trail users from motor vehicles.
- **Firm surface.** Easily navigable by a touring bicycle or wheelchair; may be paved or fine stone dust surface or other natural surface that a touring bicycle can easily and comfortably navigate.
- **Publicly accessible.** Open and free to the public every day of the year. In a few areas, we have incorporated fee-charging ferry service, but we seek crossings that minimize cost and provide frequent service.
- **Wide enough for shared use.** We aim for a 12 foot wide pathway but understand that may not always be achieved initially. In more rural areas, where use may be lower, a narrower width may suffice. All new trails are expected to be designed and built according to best practices (E.g., AASHTO standards for shared-use paths).
- **Avoids steep grades and steps** that prohibit wheelchair access and make bicycle access difficult. See AASHTO guidelines on the acceptable grade of a shared-use path.
- **Integrated recreation and transportation infrastructure.** The trail must route through a town or city center. Connects people to where they work, live, and play.
- **Responsive to new design.** In addition to shared-use path designs, an on-road facility that provides a physical barrier separating users from motor vehicles may also be designated. The term "physical barrier" will be interpreted to include firm, fixed objects such as concrete barriers, planters, guard rail or vehicle railing or bollards. Bicycle lanes separated from motor vehicle traffic by flexible vertical delineators are generally not eligible for designation, although our new design exceptions may allow for designation of such facilities upon further review of the roadway context. In an instance where the facility prohibits pedestrian and wheelchair use, it may be designated as East Coast Greenway provided that there is a parallel facility for pedestrians and wheelchair users which is designated as well.

These criteria are meant as a guide. For questions and guidance, contact us: info@greenway.org



Route Vision

The East Coast Greenway is a north-south trail system linking cities and towns from Maine to Florida. It consists of a spine trail and eight complementary loop routes that connect to the spine. Establishing a safe, traffic-free pathway for users of all abilities as a connection between our eastern seaboard cities is the primary goal of the East Coast Greenway Alliance. Making this route off-road and protected from automobiles is the highest priority, although it is understood that this is a long-term goal.



Greenway bridge over the James River in Richmond, Virginia

Connected.

From the start, our founders designed the Greenway to go where people live, so the route travels through 25 cities — 450 communities in all — and connects locals and visitors all along our nation's most densely populated corridor. Going to the heart of a city or town is an essential part of the East Coast Greenway vision.



Public & Accessible.

Trails should be open and free to the public every day of the year. In a few areas, a fee-charging ferry service has been incorporated into the route, but we seek crossings that minimize cost and provide frequent service. In addition, the route should provide amenities and services that multi-day users will need such as access to lodging, restaurants, markets, bike repair shops, emergency health services, drinking water, public restrooms, picnic areas, and libraries.

Safe for all.

Safety is essential to trails and greenways. This includes being safe from traffic, crime, and discrimination.

Cities across the U.S. and around the world are adopting the concept of Vision Zero, or the commitment to eliminate all traffic fatalities, as the underlying goal that informs transportation planning and policy. Separated and protected bicycle facilities and shared-use paths provide communities a gold-standard design solution to help achieve Vision Zero, by giving cyclists and pedestrians a safe alternative to unprotected or insufficient on-street facilities that put users at physical risk from automobile traffic.



Furthermore, designing these facilities with adequate lighting, maintenance, and access points that have clear emergency location and contact information throughout will help create conditions that deter criminal activity, while also helping trail users feel safe and prepared if an emergency occurs. This feeling of safety in turn encourages more trail use, thereby increasing natural surveillance, further deterring criminal activity with more eyes on the trail (following the principles of Crime Prevention through Environmental Design).

Finally, safety must also be viewed through an equity lens that acknowledges the potential for discrimination of people in public space based on many factors, including but not limited to age, race, gender, physical ability, and socioeconomic status. To combat this, all residents and potential users, especially disadvantaged populations, should have a voice at the table early and often throughout the lifespan of a project's development in order to inform the location, design, operations, and programming of the trail. This will help ensure that everyone can feel welcome and safe, cultivating a sense of collective ownership over the space.

Email us to request a detailed map file of the envisioned East Coast Greenway route by region or the full route: info@greenway.org

Where the Greenway Is Built



Walnut Creek Trail, Raleigh, NC

Sewer easement



American Tobacco Trail, Durham, NC

Rail-to-trail conversion



Hudson River Greenway, New York, NY

Riverfront easement



Tinicum Sidepath, Tinicum Township, PA

Widened sidepath parallel to roadway

Greenway segments are constructed in a variety of contexts and rights-of-way, including rail-to-trail, rail with trail, utility corridors, river/stream/canal banks, along disused forest service roads, adjacent to highways, and within existing right-of-ways on suburban and urban streets.

How the Greenway Is Built



Spanish Moss Trail, Beaufort, SC

Private foundation and county funding



Farmington Canal Heritage Trail, CT

State bond funding



Schuylkill Boardwalk, Philadelphia

Federal grant (former TIGER program)



ECRR Trail, Brevard County, FL

State SUN Trail funding

Learn more about U.S. Department of Transportation pedestrian and bicycle funding opportunities:
www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

Surfaces

A trail's surface should be easily navigable by all users. It may be paved or a fine stone dust surface or other natural surface that a touring bicycle can comfortably navigate. All trails should be planned and designed to comply with the American Disabilities Act, which requires trail surfaces to be firm and stable. Firmness means the surface "does not give way significantly under foot." Stability means surfaces "do not shift from side-to-side or when turning."

Additionally, trails should incorporate green stormwater infrastructure into the design of the trail and its surface where possible. Vegetation helps mitigate flooding and prevent erosion while also improving local biodiversity, adding shade, and enhancing the trail's appearance.

When deciding which surface is suitable for a project, consider the expected volume of users, user groups — pedestrians (walkers, hikers, joggers, runners, bird watchers and dog walkers), cyclists (recreational, commuting and touring), skateboarders, rollerbladers, equestrians, and more — and the geographic context of the trail. Common trail surfaces include asphalt, concrete, crushed stone, and boardwalks.

Developing a maintenance and operations plan during a project's planning and design phase is essential to the safety, function, and life of the facility.

Maintenance is typically conducted by the jurisdiction of ownership, a contractor, or other entity through a maintenance agreement and generally includes the following:

- Inspect for obstructions (fallen trees, limbs, or other encroachments) in the facilities' clear zone and within 6' of its edge.
- Keep surface clear of debris, cracking, potholes, and vegetation. Trim vegetation to provide at least 2' clear zone from the edge of the facility and at least 10' overhead clearance.
- Maintain signs and markings as originally installed; this includes on the facility and at crossings for both facility users and motorists.
- Maintain curb ramps to ensure detectable warning panels have not deteriorated.
- Promptly repair damaged or malfunctioning traffic signals or lights.
- Keep culverts, ditches, and gutters open and in good repair. Keep erosion to a minimum.
- Have a qualified professional inspect structures (bridges and tunnels/underpasses) approximately every two years. Routine maintenance should check safety railings, settlement of approach fills, and condition of deck, drainage, and retaining walls.
- Remove snow and ice from facilities in urban/suburban areas where commuting is common. Consider grooming for nordic skiing or other winter uses such as fat biking.

Surface material investment

It's impossible to accurately list the investment per mile for any given surface material for the entire Greenway corridor. Design and construction prices vary widely by region, and prices fluctuate regularly within regions. More importantly, actual construction costs for a given Greenway segment are dependent on many factors, including right-of-way acquisition, which can add substantially to the cost-per-mile amount.

For broad conceptual purposes, cost ranges for common trail surfaces (not including right-of-way acquisition) are:

- Less expensive:
\$150k - 350k per mile
- Moderately expensive:
\$350k - 750k per mile
- More expensive:
\$750k - 1.5 million per mile



Farmington Canal Heritage Trail, Farmington, Connecticut.

Asphalt

Asphalt trails typically have a longer-term service life with lower required maintenance than a natural surface trail. Asphalt provides a surface that is smooth, quiet, and continuous with no joints, which is more enjoyable for bicycling, skateboard/rollerblading, pushing strollers, and people with disabilities.

Construction considerations:

- **Material type.** Hot mix asphalt, the type of mix used for a state highway, may not be the appropriate mix for a multi-use trail. The asphalt binder specified will depend on the climatic conditions of the region; check with your local DOT for material, gradation, and binder specifications. Porous or permeable asphalt can offer better drainage but can be more expensive up front and require more maintenance.
- **Proper drainage.** Efficient removal of excess water from the trail is important. Surface water runoff should be handled using swales, ditches, and sheet flow. Catch basins, drain inlets, culverts and underground piping may also be necessary. These structures should be located off of the pavement structure.
- **Proper sub-grade thickness & compaction.** Minimum thickness of a high-quality aggregate base should be a minimum of six inches for an asphalt trail. Thicker base courses should be used for poorer quality sub-grade material. Compacted sub-grade should extend a minimum of two feet beyond the edge of pavement. Sub-grade should be compacted to a minimum of 95% of standard Proctor density, AASHTO T 99, and the moisture should be maintained within 3% of optimum. If aggregate base course is used in the pavement section, it should be compacted to a minimum of 95% of modified Proctor density, AASHTO T 180, ASTM D 1557. Depending on the soil conditions, compaction and moisture criteria may vary. After compaction, a soil sterilant and/or root inhibitor should be applied. Consult your landscape architect or geotechnical engineer for site-specific information.
- **Adequate pavement thickness.** Minimum 3"
- **Adequate pavement compaction.** It is recommended the hot mix asphalt be compacted to between 92% and 96% of the Theoretical Maximum Specific Gravity, AASHTO designation T 209, ASTM designation D 2041.



For more information on asphalt trail design:

www.americantrails.org/resources/technical-aspects-of-asphalt-trail-design

AT A GLANCE

Asphalt

Accessibility: preferred

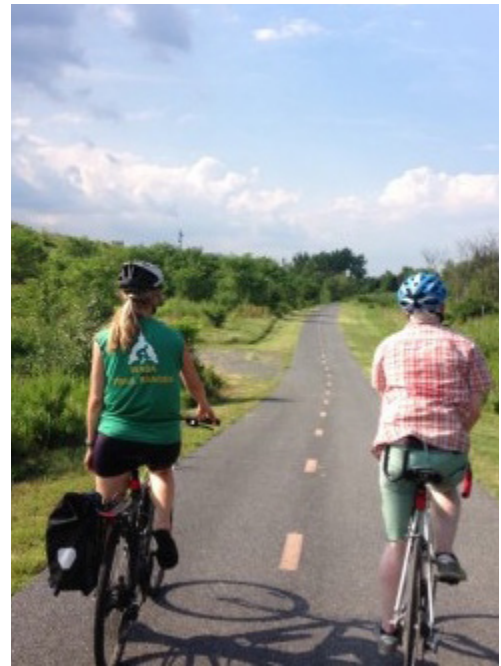
Best for: cyclists (especially commuting), walkers, skateboard & rollerbladers, strollers. Adjacent soft surfaces can accommodate runners and equestrians.

Cost to purchase & install: Moderately expensive

Lifespan: lasts 7-15 years on average, 8 years for permeable

Maintenance: More frequent; avg \$1,900/year per mile. Includes crack patching due to shallow tree roots and frost/freezing cycles. Pavement markings are fairly common (painted center line, user symbols) and should be maintained at least annually. Permeable asphalt will require additional maintenance.

Geographic context: urban, suburban, and rural



Anacostia River Trail, Maryland



Spanish Moss Trail in Beaufort, S.C., top left and bottom; top right, Overseas Heritage Trail, Florida Keys

AT A GLANCE

Concrete

Accessibility: preferred

Best for: cyclists (especially commuting), walkers, skateboard/rollerbladers, strollers. Adjacent soft surfaces can accommodate runners and equestrians.

Cost to purchase & install:
More expensive

Maintenance: Less frequent, suitable for areas prone to flooding.

Lifespan: 25+ years on average

Geographic context: urban, suburban



Permatrak concrete surface on boardwalk along Farmington Canal Heritage Trail, Cheshire, Connecticut

Boardwalk

Boardwalks are typically considered for multi-use trails in areas that are difficult to traverse because of wetlands & waterways or rough conditions, areas prone to flooding, or where a typical trail cross section would adversely impact fragile habitats. Boardwalks allow for continuous drainage and unimpeded stream flow. They generally consist of decking, curbing or railings, and piers.

Construction considerations:

- Common material types: timber, composite, concrete
- Railing Height – 42" measured from the walking surface to be used if surface of boardwalk is 30" above finish grade. Extend boardwalk railing past abutment as needed to protect trail users from fall hazards, min. 6', typ.
- Curb height – 6" from walking surface to be used when boardwalk is less than 30" above finish grade (secondary path only).
- Minimum Rail to Rail Clearance – 12'
- Minimum Above Water Clearance – 12" above anticipated 10 year storm elevation measured from the lowest structural member.

Maintenance considerations:

- Soft wood will rot, twist, and warp while hardwoods will be more durable. Composite can be used but isn't typical in commercial construction: it can warp under heavy traffic and become slippery when wet. Reinforced, pre-cast concrete typically only requires cleaning of debris.
- To avoid slippery conditions, mold & mildew should be removed (1 part bleach to 4 parts water solution can be sprayed on, pressure wash/scrub with a stiff brush, respray with the bleach solution and let dry. Two coats of heavy duty wood sealer should be used every 2-3 years). Another option: Clean the boards if needed as specified, then paint on a marine-grade anti-slip decking product for wooden boards especially prone to becoming slippery. This product contains sand or aggregates suspended in a paint or resin, which you can apply with a paint roller with a thick-nap roller cover.

AT A GLANCE Boardwalks

Accessibility: not preferred (unless concrete), timber can be slippery when wet

Best for: walkers, and cyclists when concrete is used

Cost to purchase & install: More expensive

Maintenance: Less frequent, suitable for areas prone to flooding.

Lifespan: 15 years on average for timber, 50-75 years for reinforced, pre-cast concrete

Geographic context: suburban, rural



Top: Walnut Creek Greenway, Raleigh, North Carolina.

Below: Jack Markell Trail, Wilmington, Delaware



Top: Eastern Trail in Scarborough Marsh, Scarborough, Maine.

Below: West Ashley Greenway, Charleston, South Carolina



AT A GLANCE Natural surface/ crushed stone

Accessibility: not preferred, but if the surface is "firm and stable" and the grade is 5% or lower, unpaved trails meet ADA guidelines

Best for: cyclists (recreational, touring), walkers, runners, equestrians

Cost to purchase & install: Less expensive

Maintenance: More frequent; includes fixing drainage problems, repairing eroded areas, and removing vegetation. Average \$1,000/year per mile

Geographic context: suburban, rural

Natural surface/crushed stone

"Non-paved trail surfaces generally cost about the same as paved because the base preparation and materials are identical. Also the installation is identical (dump truck, paving machine and compactors). Non-paved surfaces need to be accurately graded to avoid standing water. They are not useable during the spring thaw season. They are more prone to erosion than paved surfaces."

—Bill DeSantis, VHB's Director of Bicycle Planning and Design

Construction considerations:

- Common stone types: limestone, sandstone, granite
- Stone dust material shall consist of hard, durable, uncoated particles of rock free from deleterious substances. The rock particles should range in size from dust to 3/8 inch. The stone dust surface will be prepared and placed in accordance with local DOT specifications and meet compaction requirements of 95% of optimum density (AASHTO T-180).
- Crusher fines should be applied over landscape fabric to a depth of 4-6 inches. The preferred geo-textile is a continuous filament non-woven needle-punched engineering geo-fabric.



Hop River Trail in central Connecticut

Maintenance considerations:

- Unpaved trails should be cross-sloped or crowned 2% to 5% per foot where needed to ensure the integrity of the surface. Re-grading may be necessary annually or every few years depending on how the overall surface holds up to re-incorporate loose surface gravel, uproot vegetation growing in the trail as an alternative to chemical control, to reshape the tread surface for drainage, and to regrade and recompact the tread surface for ADA access and public safety.
- Controlling damage caused by vegetation encroachment is manageable with a program of regular, scheduled inspection and preventative maintenance. The 2 foot minimum clear zone on either side of the trail is recommended to be mowed a minimum of 3 times per year, ideally once per month in June, July or August, and in September. Late fall mowing maybe needed for trails being used for nordic skiing. Weed control in the trail corridor can be accomplished by hand pulling, cutting, burning or biological control. Chemical control should be used only as the last resort.

Width



A portion of the American Tobacco Trail in Wake County, N.C., features an asphalt trail with stone-dust shoulder alongside it.

The aim generally is for a 12-foot wide pathway but that may not always be achieved initially. In more rural areas, where use may be lower, a narrower width may suffice. All new trails are expected to be designed and built according to best practices. The East Coast Greenway Alliance follows AASHTO standards for shared-use paths:

"5.2.1 Width and Clearance: The minimum paved width for a two-directional shared use path is 10 ft (3.0 m). Wider pathways, 11 to 14 ft (3.4 to 4.2 m) are recommended in locations that are anticipated to serve a high percentage of pedestrians (30 percent or more of the total pathway volume) and higher user volumes (more than 300 total users in the peak hour). In very rare circumstances, a reduced width of 8 ft (2.4 m) may be used where the following conditions prevail:

- *Bicycle traffic is expected to be low, even on peak days or during peak hours.*
- *Pedestrian use of the facility is not expected to more than occasional.*
- *Horizontal and verticle alignments provide frequent, well-designed passing and resting opportunities.*
- *The path will not be regularly subjected to maintenance vehicle loading conditions that would cause pavement damage."*

Occasionally, providing separate, parallel shoulders or treads alongside a trail for different users may be desirable. For example, a primary, hard-surfaced path (asphalt or concrete) can be provided exclusively for bicyclists, with softer shoulders set aside for pedestrians and equestrians. Single shoulders should be at least 5 feet wide, while dual shoulders (one on each side) should be a minimum of 2 feet wide.

Grade



Riverwalk, Wilmington, DE

Less than 5% grade



American Tobacco Trail, Durham, NC

Less than 5% grade

Trails should avoid steep grades and steps that prohibit wheelchair access and make bicycle access difficult. The ECGA aims to follow AASHTO guidelines on the grade of a shared use path:

5.2.7 Grade - The maximum grade of a shared use path adjacent to a roadway should be 5 percent, but the grade should generally match the grade of the adjacent roadway. . . . Grades steeper than 5 percent are undesirable because the ascents are difficult for many path users, and the descents can cause some users to exceed the speeds at which they are competent or comfortable. . . . Grades on paths in independent rights-of-way should also be limited to 5 percent maximum.

See ADA trail grade table:

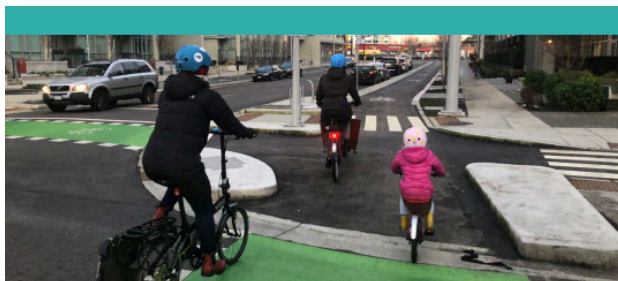
www.access-board.gov/guidelines-and-standards/streets-sidewalks/shared-use-paths/other-resources

Crossings



Border to Boston Trail, Topsfield, MA

Intersection crossing includes a RRFB signal



Don't Give Up at the Intersection

Designing All Ages and Abilities
Bicycle Crossings



May 2019

Crossings should be marked where a trail intersects with a roadway. Crosswalk markings are also preferred where trails cross driveways and railroads. The ECGA follows AASHTO standards for crossings along shared use paths. The guide addresses various types of crossing and intersection designs and the striping and safety features associated with each crosswalk treatment. Whenever feasible, crossing should be complemented by traffic calming features, e.g., curb extensions, medians/islands, raised crosswalks, etc. In general, the more motor vehicle traffic lanes there are to cross, and/or the greater the volume and speed of motor vehicles, the greater the need for robust traffic calming treatments.

For crossings on quiet rural roads with sufficient line-of-sight distances, for instance, a "Trail Crossing" sign and striped crosswalk may be sufficient. For busier suburban and urban crossing situations, physical mid-crossing protection, demand activated signals, and proactive traffic calming treatments may be warranted. This could include "High Intensity Activated Crosswalk" (HAWK) or "Rectangular Rapid Flashing Beacon" (RRFB) signals to alert drivers. More on HAWK signals: mutcd.fhwa.dot.gov/resources/interim_approval/ia11/stpetersburgprpt/intro.htm

Intersections should be well-lit (where trail use is permitted in low-light conditions) and crosswalk timers must be calibrated to allow for comfortable crossing by trail users of all abilities.

See NACTO's intersection design guide (left): nacto.org/publication/urban-bikeway-design-guide/dont-give-up-at-the-intersection/

Bridges



Eastern Trail's John R. Andrews Bridge over the Maine Turnpike

Given the many waterways, highways, train tracks, and other obstacles that must be crossed on the envisioned route of the Greenway, thoughtful bridge design is important. There is no one-size-fits-all bridge design endorsed by the Alliance, as there are a wide variety of bridge types and crossing contexts communities may encounter, from getting over a small creek or canal to spanning major rivers and interstate highways. Bridges can be stand-alone or attached to existing bridges, and they may be new construction or re-purposed bridges no longer open to motor vehicles. Reallocating an automobile lane can be an option. In some circumstances, an underpass may be preferred.

Bridges can be very costly, complicated to design, and a difficult political lift depending on the local circumstances and funding sources available for the crossing. Because of this, it may be preferable to use the strategy of constructing as much of the trail as possible on either side of the gap first, thereby creating pressure on local and regional officials and forcing the issue that this last gap is all that stands in the way from the trail reaching its full potential. The more miles of trail built on either side, the larger the affected region and the greater the number stakeholders there will be that stand to benefit from the bridge's construction.

In general, follow AASHTO or NACTO guidance for bridge design specifications. Ensure that transitions onto and off of bridges is safe, comfortable and intuitive for both pedestrians and

bicyclists. There may be limited crossing options in some areas where the few existing bridges are narrower and deserve special consideration. These bridges should be reviewed on a case-by-case basis, but generally 8' is the minimum width for a shared-use path on a bridge. In some cases with narrow passage, it may help to require that cyclists drastically reduce speeds or dismount and walk their bike across the bridge to reduce conflicts with other bridge users.

When traversing busy roads such as arterials, at-grade design solutions should be prioritized instead of a bridge where possible. Creating a safe, direct, and convenient passage at grade for pedestrians and cyclists across these roads will benefit all users by reducing speeds and encouraging more efficient, multi-modal, and sustainable transportation (see the “Greenway Crossings” section for more guidance). Safe at-grade crossings will provide a more convenient option to trail users, helping them avoid climbing and descending a bridge that might have inconveniently located entrances. This is particularly helpful for those with physical disabilities and issues with mobility. Additionally, at-grade crossings will formalize pedestrian and cyclist crossings that would otherwise still likely occur, despite being illegal and less safe.



Scarborough Marsh Bridge on the Eastern Trail in Scarborough, Maine

Separated On-Road Facilities

In addition to shared-use path designs, an on-road facility that provides a physical barrier separating users from motor vehicles may also be designated. The term “physical barrier” will be interpreted to include firm, fixed objects such as concrete barriers, planters, guard rail, vehicle railing, bollards, and, in appropriate contexts, flexible vertical delineators. In an instance where the facility prohibits pedestrian and wheelchair use, it may only be designated as East Coast Greenway if there is a parallel facility for pedestrians and wheelchair users which is designated as well.

Learn more:

Separated Bike Lane Planning and Design Guide, FHWA:

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bikelane_pdg/page00.cfm

Bikeway Selection Guide, FHWA:

safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

Separated Bike Lane Planning & Design Guide, Massachusetts Department of Transportation:

www.mass.gov/lists/separated-bike-lane-planning-design-guide



Above, Philadelphia's 58th Street Greenway.

Below, two Jones Falls Trail sections in Baltimore, Maryland.



On-Road Designation Exceptions: Context Sensitive Design

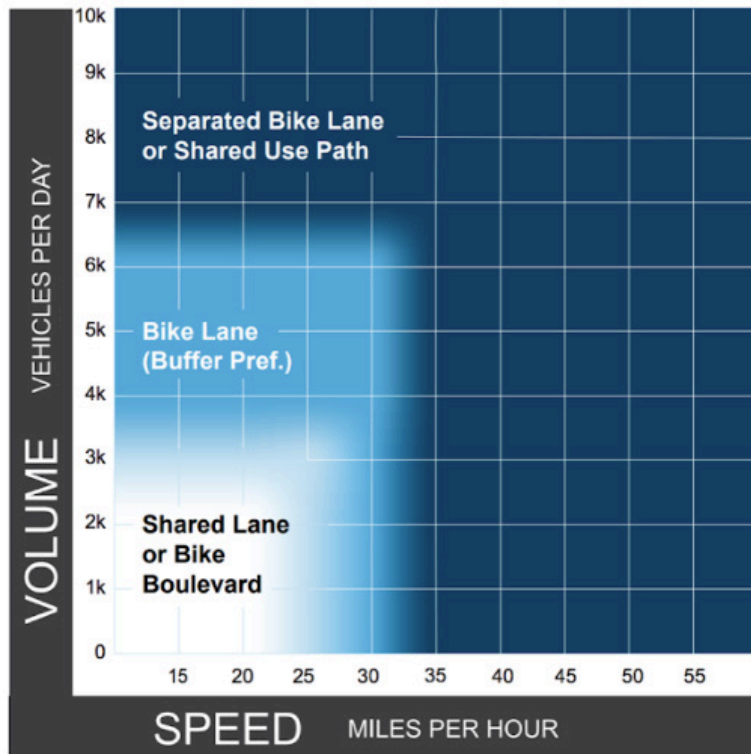
In recognition of emerging innovations and a wide range of facility types in diverse contexts, the East Coast Greenway Alliance has adopted a designation exceptions policy following Context Sensitive Design principles. These facilities are distinct from protected on-road facilities in that there is no physical separation between pedestrians and bicyclists and motor vehicles in shared roadways that are extremely low stress, given other contextual traffic-calming elements.

“Also referred to as ‘Thinking Beyond the Pavement,’ Context Sensitive Design reflects the increasingly urgent need for DOTs to consider highway projects as more than transportation. Context Sensitive Design recognizes that a highway or road itself, by the way it is integrated within the community, can have far-reaching impacts (positive and negative) beyond its traffic or transportation function. The term Context Sensitive Design refers to as much an approach or process as it does to an actual outcome. Context sensitive design asks questions first about the need and purpose of the transportation project, and then equally addresses safety, mobility, and the preservation of scenic, aesthetic, historic, environmental, and other community values. Context sensitive design involves a collaborative, interdisciplinary approach in which citizens are part of the design team.” — U.S. DOT Federal Highway Administration

www.fhwa.dot.gov/resourcecenter/teams/safety/saf_1CSD.pdf

Potential on-road facility exceptions include:

- bicycle lanes protected by flexible delineators (aka Flex Posts),*
- bicycle boulevards,
- historical bridges that span short distances between trail segments.



Top: Pearl Street in Washington, DC, an example of a low-stress shared road that could be considered for designation. Below: separated bike lane with delineators in New Haven, CT.

The inclusion of flexible delineators is a notable update to this *Guide* from previous versions. Please note:

- This does not trigger “automatic” designation or candidacy for designation to any segments that were previously rejected because of the previous definition of “physical barrier.”
- The presence of flexible vertical delineators does not in and of itself mean that there is an appropriate level of separation provided between greenway users and motor vehicles.
- As traffic volume, mix of heavy vehicles/buses, and observed speeds increase, so does the need for an additional buffer or alternative barrier to provide an appropriate level of separation.
- Site-specific experience with local maintenance practices, driver behavior, and issues such as the method of attachment to the roadway are all critical factors in determining the effectiveness of flexible vertical delineators.

The exceptions policy may also include other on-road facility types only when other on-road factors are considered such as average daily traffic volumes, number of travel lanes, lane width, traffic calming measures, etc.

Consideration of on-road facility exceptions for permanent East Coast Greenway designation will only be considered on a case-by-case basis.

Signage



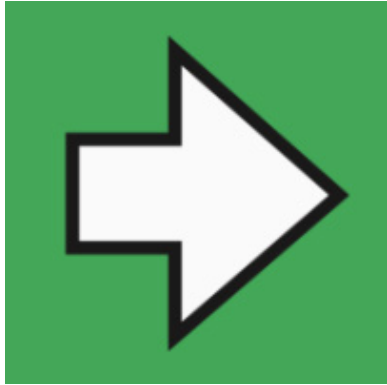
The primary purposes of signing the East Coast Greenway are to establish a unique brand, to inform users that they are on the ECG, and to identify route direction changes, enabling proper wayfinding. Because much of the Greenway is still on road, providing appropriate route signage is crucial to guiding users along the route. Trail signs also serve to raise public awareness of the East Coast Greenway by identifying a given local trail segment as part of the ECG. We want to maximize the presence of our signs along the route while avoiding visual clutter ("sign pollution").

For more information and specifications, see the East Coast Greenway Signage Manual:

greenway.org/signage-manual

Standard Greenway route signs

ECGA stocks 5.5" x 15" signs to mark the route. The standard sign is our preferred model for identifying our route. These signs are made of .063 gauge aluminum with the graphic and text silkscreened onto the engineer grade reflective vinyl sheeting. Signs are pre-drilled with 3/8" holes at intervals permitting mounting on steel u-channel posts or square steel tubes. Brackets or mounting clamps may be used to attach these signs to tubular posts (aka "pipe posts"), which do not have pre-drilled holes for sign installation. These signs may be installed on trail and road segments pending permission.



Standard Greenway arrow plaques

Where appropriate, East Coast Greenway route signs should be used in tandem with directional arrow plaques. The Alliance stocks five types of arrow plaques. Standard-sized directional arrow plaques measure 5.5" x 5.5" and have a bold black outline for visibility. They should be placed directly below the East Coast Greenway standard sign.

Non-standard ECG wayfinding signs

In some circumstances, signs of a different size may be preferred, or partnering agencies may want to incorporate the ECG graphic into other wayfinding signage. The ECGA only stocks the standard route sign, but following consultation with ECGA staff, artwork will be made available to agencies which wish to fabricate non-standard signs in their own sign shops. Sign at right from Cary, North Carolina.



MUTCD-compliant ECG route signs

Chapter 9 of the Manual on Uniform Traffic Control Devices (MUTCD) is specific to traffic control devices for bicycle and pedestrian facilities. Signs and plaques may be demanded in specific states and used to mark the ECG as a bicycle route, or if on shared-use paths, as a bicycle and pedestrian route. The type of MUTCD guide sign that permits the ECGA and partnering agencies to brand a route as the ECG is the M1-8a sign with the addition of the ECG logo, the letters "ECG," or the words "East Coast Greenway." Dimensions of the M1-8a are 18"x18" if installed on road and 12"x12" if installed on greenway.

MUTCD-compliant ECG arrow plaques

Where appropriate, the ECG branded M1-8a signs should be used in tandem with the directional arrow plaques. The range of MUTCD directional arrow plaques to accompany M1-8a are as follows: M5-1, M5-2, M6-1, M6-2, M6-3. State DOTs may and have exempted East Coast Greenway signs to include standard makers when posted on existing MUTCD sign posts.



Mileage signs with icons

The East Coast Greenway Alliance may provide “mileage signs” for installation on trailside kiosks or other structures. This type of sign is great for branding the length and breadth of the Greenway as well as drawing attention to the specific venue. Contact the Alliance if you have an interest in this type of signage.

Informational kiosk

An informational kiosk is a wooden structure, typically field-fabricated of pre-cut pieces of dimensional lumber. Cedar is recommended due to its natural rot resistance. Fasteners should be stainless or galvanized steel. Where required due to local regulations (e.g., hurricane resistance standards), other designs may be implemented.



“Billboard” signs

These types of signage are becoming popular in state and county parks. This example is from just outside of Myrtle Beach, South Carolina.

Bridge identification signs

The East Coast Greenway Alliance strongly encourages the installation of special identification signs to be installed on or adjacent to trail bridges, notifying drivers passing beneath that the bridge overhead is part of the East Coast Greenway. To date, all Greenway bridge ID signs have generally followed MUTCD standards and have been approved and installed by highway maintenance personnel or their contractors.



Top: Signage for bike/pedestrian bridge over I-40 in Durham, North Carolina.

Below: Sign on a highway bridge in Bolton, Connecticut, along the Hop River Trail.



Additional Resources

In addition to consulting with East Coast Greenway Alliance staff members and our website, greenway.org, find additional guidance with these partners.

American Association of State Highways and Transportation Officials (AASHTO)

AASHTO is a nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia, and Puerto Rico. It represents all transportation modes including air, highways, public transportation, active transportation, rail, and water. Its primary goal is to foster the development, operation, and maintenance of an integrated national transportation system. AASHTO guidance is usually the default standard for state DOTs, counties and smaller cities.

Guide for the Development of Bicycle Facilities (2012):

nacto.org/wp-content/uploads/2015/04/AASHTO_Bicycle-Facilities-Guide_2012-toc.pdf

Note: The AASHTO Guide is being updated by Toole Design Group. More info: tooledesign.com/project/update-to-the-aashto-guide-for-the-design-of-bicycle-facilities-2019/

National Association of City Transportation Officials (NACTO)

NACTO emerged in the early 2000s as a response to the one-size-fits-all design guidance offered by AASHTO, especially with respect to urban streets and the need for more robust bicycle and pedestrian facilities. Initially comprised of the transportation officials from the 50 largest cities in the U.S., NACTO has developed best practices design standards for creating safe urban streets that effectively serve all users. Their guidance on designing protected bike lanes is especially useful.

Urban Bikeway Design Guide

nacto.org/publication/urban-bikeway-design-guide/

Urban Street Design Guide

nacto.org/publication/urban-street-design-guide/

Intersection Design Guide

nacto.org/publication/urban-bikeway-design-guide/dont-give-up-at-the-intersection/

Federal Highway Administration (FHWA)

The Federal Highway Administration provides stewardship over the construction, maintenance and preservation of the nation's highways, bridges and tunnels. FHWA also conducts research and provides technical assistance to state and local agencies in an effort to improve safety, mobility, and livability, and to encourage innovation.

Small Town and Rural Multimodal Networks

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/

Separated Bike Lane Planning and Design Guide

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bikelane_pdg/page00.cfm

Incorporating On-Road Bicycle Networks into Resurfacing Projects

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/resurfacing/

Shared-Use Path Level of Service Calculator

www.fhwa.dot.gov/publications/research/safety/pedbike/05138/

Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_networks/

Noteworthy Local Policies That Support Safe and Complete Pedestrian and Bicycle Networks
safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa17006-Final.pdf

Metropolitan Pedestrian and Bicycle Planning Handbook

www.fhwa.dot.gov/planning/processes/pedestrian_bicycle/publications/mpo_handbook/index.cfm

Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/accessible_shared_streets/fhwahep17096.pdf

Guidebook for Developing Pedestrian and Bicycle Performance Measures

www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/performance_measures_guidebook/

Rails-to-Trails Conservancy

Rails-to-Trails Conservancy is a nonprofit organization dedicated to creating a nationwide network of trails from former rail lines and connecting corridors to build healthier places.

Maintenance Practices and Costs of Rail-Trails

www.railstotrails.org/resourcehandler.ashx?id=6336

U.S. Forest Service

Forest Service Trail Accessibility Guidelines (2013):

www.fs.fed.us/recreation/programs/accessibility/FSTAG_2013%20Update.pdf

European Cyclists' Union

Since its formation in 1983, the Union has had one goal: To promote cycling as a sustainable and healthy means of transportation and recreation.

How to keep the costs of a cycle highway low

ecf.com/news-and-events/news/how-keep-costs-cycle-highway-low-a15f15-case-study

Appendix

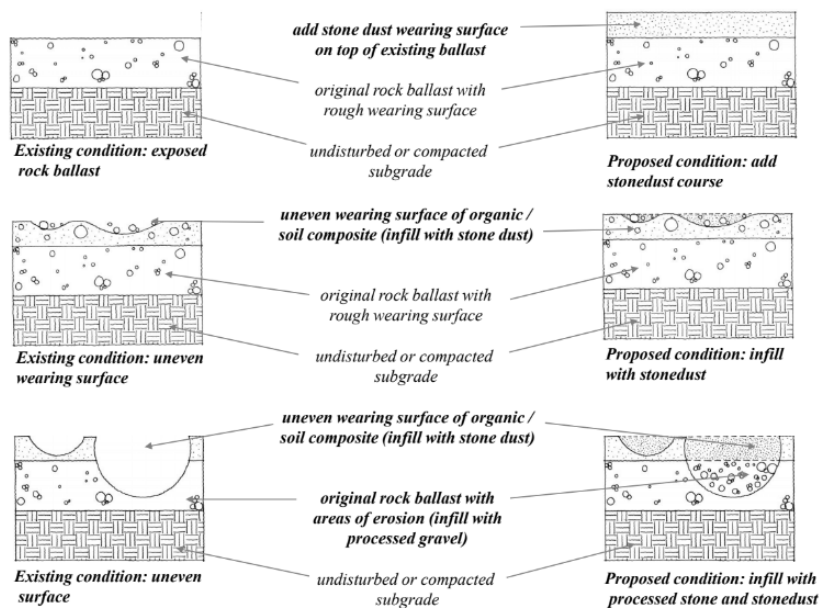
Natural Surface/Crushed Stone Guidance

From "Guide to Rail-to-Trail Design for the Air Line State Park Trail North," by Program of Landscape Architecture Advanced Design Studio, University of Connecticut.

Download full guide: greenway.org/airline-trail-design-doc

Part 5: Trail Surface

The following is a series of details showing the proper construction and repair for trail surfaces. These details are for informational purposes only and are not construction details. Please contact a professional landscape architect or engineer for construction details and specifications.



Stone Dust Specifications

Surface Course	
Sieve Size	Percent Passing by Weight
1/2"	100
1/4"	80 - 100
#10	50 - 85
#40	20 - 45
#200	6 - 12
Crushed Base Course	
Sieve Size	Percent Passing by Weight
1"	100
#4	25 - 60
#200	6 - 12
Pit Run Gravel Base	
Sieve Size	Percent Passing by Weight
2"	100
#200	10 - 15

Glossary & Definitions

East Coast Greenway Specific Usage

- **Alternate route:** not used. See “complementary route”
- **Board of Trustees:** Governing body of the East Coast Greenway Alliance.
- **Complementary route:** On the East Coast Greenway, any route that is not part of the spine route. Formerly referred to as “alternate route.” East Coast Greenway complementary routes must join the East Coast Greenway spine route at two different points to create a loop; one-way spur routes or loops that start and end at the same point on the spine are not permitted. East Coast Greenway Alliance policy allows the Board to create a limited number of complementary routes for particular purposes including scenic, historic, and cultural qualities. As of June 2019 the Greenway has 8 approved complementary routes in ME, MA & RI, NY, NY & NJ, NJ & PA, MD & DC, VA & NC, and FL. These are designated in the same manner as spine segments and are intended to have East Coast Greenway wayfinding signs.
- **Designation:** East Coast Greenway Alliance Board approval of a bike/walk facility to be an official segment of the East Coast Greenway. This includes both spine and complementary route segments. Does not include interim routes.
- **Endorsement:** agreement from a facility’s managing agency that said facility can be a section of the East Coast Greenway.
- **Greenway:** Defined in multiple ways. For East Coast Greenway Alliance, a greenway is a traffic-separated transportation and recreation facility for bicyclists, pedestrians, and other non-motorized users.
- **Greenway Council:** East Coast Greenway Alliance’s volunteer body advising the Board of Trustees on trail and greenway related matters. Previously known as the Trail Council.
- **Inspection:** Using the East Coast Greenway Alliance Inspection Report, a user review of a facility that has been nominated to be an official segment of the East Coast Greenway.
- **Interim route:** routing for the East Coast Greenway that will be replaced in the future by a “permanent” greenway route more appropriate for inclusion in the East Coast Greenway. Typically, interim routes are shared road routes. These routes are developed by the East Coast Greenway State Committees and are intended to be signed to aid in navigating the current, interim travel route.
- **Permanent route:** any East Coast Greenway section considered to be the final routing.

- **Phased designation:** when a trail is constructed in multiple phases, perhaps over a period of several years, the East Coast Greenway Alliance may conduct a phased designation in which, after the first phase of the project is complete, the designation application and endorsement will refer to the entire project, so that as additional sections are built, only inspections, maps, and photos of the new sections will be needed to officially designate those sections.
- **Spine route:** the primary route of the East Coast Greenway which connects the 25 urban centers noted in the East Coast Greenway vision statement, as differentiated from the East Coast Greenway “complementary routes.” The spine route includes both permanent and interim routes.
- **Spur Trail:** The East Coast Greenway Alliance does not allow for spur trails to be designated, which would be one-way, dead-end, out-and-back routes originating and returning to a single point on the East Coast Greenway.
- **Regional Greenway Coordinators:** East Coast Greenway Alliance field staff responsible for promoting route development and other activities within one of East Coast Greenway Alliance’s six regions: New England (ME, NH, MA, RI), Tri-State (CT, NY, NJ), Mid-Atlantic (PA, DE, MD, DC), Virginia & North Carolina, South Carolina & Georgia, and Florida.
- **State Committee:** the volunteer group recognized by East Coast Greenway Alliance as the state-level partner in advocating for development of the Greenway. State Committees nominate trails for designation, have representation on the Alliance’s Greenway Council, and work in tandem with regional trail staff to move trail segments forward.
- **Touring bike accessible:** an East Coast Greenway Alliance term indicating a trail surface suitable for use by bicycles with tires generally 35 mm wide. Usually these are paved trails, but can also be unpaved if the trail surface is properly applied and compacted.

Additional Glossary & Acronyms

- **AASHTO:** American Association of State Highway and Transportation Officials is a national standards-setting body. See also NACTO.
- **Americans with Disabilities Act (ADA):** Law prohibiting discrimination and guaranteeing disabled people access to public facilities.
- **Average daily traffic (ADT):** Average number of motor vehicles on a road passing a specific point both ways in a 24-hour period.
- **Bicycle boulevard:** a low-speed street optimized for bicycle traffic through signage, traffic- calming elements, etc.
- **Bicycle Level of Service (BLOS):** Estimate of bicyclist’s comfort level based on several variables; BLOS ranges from a high of A to a low of F. See also Level of Traffic Stress.

- **Bike Guide:** Common name for the nationally-used AASHTO Guide to the Development of Bicycle Facilities.
- **Bike lane:** A lane on a roadway designated by striping, signing and pavement markings for the preferential use of bicyclists.
- **Bike route:** often marked with signage, a bike route indicates an identified route a bicyclist is permitted to go. Note: bicyclists often have the right to travel on all roads except in limited access situations (i.e. interstate highways, some bridges, etc).
- **BUILD grants:** “Better Utilizing Investments to Leverage Development” discretionary grants program administered by the U.S. Department of Transportation (formerly known as TIGER grants).
- **COG (Council of Governments):** regional governing and/or coordinating bodies that exist throughout the United States. COGs are normally controlled by their member local governments.
- **Complete street:** A street designed and operated to enable safe travel for all users, including bicyclists.
- **Comprehensive (or Comp) Plan:** a document that dictates public policy in terms of transportation, land use, housing, recreation, and utilities. It is the result of a process determining community goals and aspirations in terms of community development.
- **Contraflow:** Travel in the opposite direction of primary traffic. For our purposes, this will refer to a bike lane which flows in the opposite direction of car traffic.
- **Cue sheet:** written travel directions for bicyclists.
- **Curb:** A raised-concrete border forming a part of the gutter at the edge of the road, typically located at the corners of street intersections.
- **Curb radius:** The form of the curved raised-concrete edge joining intersecting curbs.
- **Cycle track:** a bicycle lane physically separated from motor vehicle traffic.
- **Curb ramp or cut:** A ramp leading smoothly from a sidewalk or trail to a street.
- **Cycletrack:** see Separated Bike Lane
- **Easement:** A legal right to use land owned by another, sometimes used for shared-use paths.
- **Gutter pan:** Concrete channel next to the curb for carrying runoff, typically 1-2 feet wide. A bicycle lane which counts the gutter pan as part of its width is inferior and possibly dangerous.
- **HAWK signal:** High-Intensity Activated Crosswalk signals that alert drivers of trail users looking to cross.
- **Lane:** A division of roadway intended for movement of vehicles in a single direction.

- **Level of Service (LOS):** Estimate of the service quality of a road facility under certain operating conditions based on traffic delay and congestion, with A representing the best and F the worst.
- **Level of Traffic Stress (LTS):** Also, Bicycle Level of Traffic Stress (BLTS), a method for classifying streets into four levels, by weighing separation from motor vehicles, traffic speed, traffic volume, and quality of crossings. Also see Bicycle Level of Service.
- **Long-Range Transportation Plan (LRTP):** a document which guides investment in an MPO's transportation system for the next 30 years, updated every 5 years. It informs development of the shorter-range Transportation Improvement Program.
- **Manual of Uniform Traffic Control Devices (MUTCD):** A document with standards for traffic signs, road markings, and signals, published by Federal Highway Administration.
- **Metropolitan Planning Organization (MPO):** a federally mandated and federally funded transportation policy-making organization that is made up of representatives from local government and governmental transportation authorities. Federal law requires the formation of an MPO for any urbanized area with a population greater than 50,000. Federal funding for transportation projects and programs are channeled through this planning process. Also see COG.
- **National Association of City Transportation Officials (NACTO):** a coalition of the Departments of Transportation of 22 of the largest cities in North America, and 17 affiliate member cities. NACTO produces a bicycle design guide widely considered to be more progressive than guidelines provided by the AASHTO bike book and the MUTCD.
- **Pedestrian refuge:** a small section of pavement or sidewalk, completely surrounded by asphalt or other road materials, where pedestrians can stop before finishing crossing a road.
- **Preliminary design:** The initial phase of design drawings and supporting documents, usually prepared to about 30-40 percent completion.
- **Protected bike lane:** see Separated Bike Lane
- **Regional Planning Agency:** see COG Regional Planning Council: see COG
- **Right-of-way (ROW or R/W):** Land owned by a jurisdiction that is used for the road or trail, services and adjacent access areas.
- **Road diet:** Reduction in the number of through travel lanes on a roadway, sometimes to make room for bike lanes.
- **Separated bike lane:** an exclusive facility for bicyclists that is located within or directly adjacent to the roadway and that is physically separated from motor vehicle traffic with a vertical element. The vertical element may be flexible, such as vertical delineators, or firm and fixed, such as concrete bollards or planters, or even non-permanent, such as a row of parked cars. A separated bike lane may also be grade-separated. It can be for one-way traffic or two-way traffic.

- **Shared lane marking (aka “sharrow”):** A pavement marking with a bike symbol and chevrons to indicate the recommended position for bicyclists on the road.
- **Shared roadway:** A roadway that is open to both bicycles and motorized vehicles.
- **Shared-use path:** A paved bikeway physically separated from motorized traffic that may also be used by pedestrians and others.
- **Shoulder:** The paved or gravel part of the roadway that is adjacent to the vehicular lanes of the road and is on the same level.
- **Sidepath:** A shared-use path located next to a roadway.
- **Sidewalk:** The portion of the right-of-way adjacent to the roadway but intended for use by pedestrians, usually made of concrete or asphalt.
- **Signed route:** any route marked with wayfinding signs
- **Statewide Comprehensive Outdoor Recreation Plan (SCORP):** a federally-mandated planning document that identifies outdoor recreation issues of statewide significance and evaluates the supply of and the demand for outdoor recreation resources and facilities in a state. The SCORP provides unified guidance to state and municipal officials as they develop and expand outdoor recreation opportunities for their respective constituents.
- **Striping:** Road surface paint lines, which can be solid or dashed, white or yellow.
- **TIP:** see Transportation Improvement Program
- **Traffic-separated:** physically separated from motor vehicle traffic by a vertical element (e.g., bollards, jersey barriers, flexible delineator posts, or a grade separation) or a horizontal element (e.g., a grassy verge, drainage swale, etc.) providing at least five feet of separation from the edge of traveled way, or if present, road shoulder. If the vertical element is firm and fixed, such a facility may be designated as East Coast Greenway.
- **Traffic calming:** Set of strategies aimed at slowing down or reducing traffic volume.
- **Trail:** see Greenway
- **Transportation Alternatives Program:** that portion of the Federal transportation act that provides funding for pedestrian and bicycle facilities, access to public transportation, environmental mitigation, and more.
- **Transportation Improvement Program, or Plan (TIP):** a federally-mandated list of transportation projects an MPO intends to implement using United States Department of Transportation funds. Also see LRTP.

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