INFO BRIEF

Advancing Trails to Support Multimodal Networks

Pedestrian and Bicycle Information Center
www.pedbikeinfo.org

Introduction and Background

Trails are valued by communities across the country, providing everything from inspiring experiences in open green space to invigorating daily commutes and restorative social connections. Since the early 1990s, America has undergone an historic expansion of all types of trails in every community context. As individual trails have multiplied, they have connected into vast networks crossing local, regional, and state lines. Trail networks have grown to have significant impact on many aspects of our communities, providing economic, health, transport, and social benefits. Like the development of our nation's railroads in the early 19th century, and paved road system of the 20th century, trails have evolved into an important nonmotorized, human powered element of the nation's 21st century transportation network.

Demand for access to and use of trails was growing prior to the onset of the pandemic in 2020. Participation in outdoor recreation and trail activity rose sharply in 2020 (relative to pre-COVID levels) fueled by demand in safer socialization, fitness, and a renewed interest in trail access to parks and other destinations. In November 2021, the **Bureau of Economic Analysis** released economic data for 2020 on outdoor recreation's impact on the U.S. economy. Outdoor recreation now generates $688 billion in economic output, comprises 3 percent of U.S. employees and creates 4.3 million jobs. Of note, outdoor participation soared, especially close-to-home recreation, highlighting the importance of better access to the outdoors for all communities.

This info brief provides a fresh look at the current state of practice for trail development, reflecting new research and showing the growing applications of trails in every type of environment and community. It illustrates the overlapping and intertwined benefits of trails; provides high-level guidance and resources on trail-focused partnerships and planning; and demonstrates the adaptability of trails in a rapidly changing world. This brief also acknowledges barriers to equitable

Source: PBIC Image Library, Adam Coppola Photography

trail development and strategies for planning and implementing trails that distribute benefits equitably.

Modern trail efforts involve numerous stakeholders and organizations working together to achieve their goals. Trail projects are most successful when three key components are fulfilled:

- Public agency buy-in: There is strong support from public agency leadership and staff that will be tasked with planning and implementing the project.
- Planning: There are resources that answer the hard questions of how the project will be built, which constituents it will serve, and how it will be funded, managed, and programmed so it meets the needs of communities.
- Community support: There is a local public support organization that assists with a variety of tasks including advocacy, public outreach, funding, and management, among others.

Having all three components in place will ensure that a project is carried from start to finish. They can also help sustain long-term success after the opening day ribbon has been cut and management responsibilities begin to mount.

Given the multiple components and roles within communities that contribute to trail development, this info brief is for anyone interested in developing trails to advance multimodal networks,

including: people working within transportation planning and engineering, public health, parks and recreation, advocacy, policy, development, economic development and foundation or corporate partners at the State, regional, and local levels.

In this brief, **trail** refers to a public facility, separate from vehicular traffic, serving a variety of user types including people walking, riding bikes, or using micromobility devices such as e-scooters, or assistive devices. These facilities may also be referred to as greenways, shared use paths, or multiuse paths. The information in this brief does not generally refer to rugged hiking, mountain biking, equestrian, ski, or off-highway vehicle trails, but it may apply to some unpaved trails. Not all trails are necessarily accessible.

Benefits of Trails

Trails provide a wide range of significant benefits to communities from environmental preservation to surface transportation network connectivity, improved health equity to economic revitalization, and historic preservation to community identity. Recognition of these far-reaching co-benefits of trails will enhance communities' ability to achieve goals around climate change mitigation, resilience, and provision of green space in urban and rural contexts.

The importance of urban nature and the value gained from preserving and promoting access to green space within populated areas through nonmotorized activities is well understood (Beatley, 2016). Trails consistently perform well when evaluated for health, transportation, social, economic, and environmental benefits. When communities pursue trails for economic and environmental benefits, it is essential that they do so while prioritizing equitable outcomes (CNT, 2020).

Active Transportation Network Connectivity

Trails have the potential to expand on-road bicycle and pedestrian networks and provide off-road connectivity. Safe, appealing nonmotorized connections are vital for communities of all sizes. As trails form a network, connecting to each other— and to community resources, business centers, transit hubs, etc.—there is a significant increase in all the various benefits associated with an individual project. Trails act in a variety of contexts: as regional long distance bicycle highways, community nonmotorized corridors in urban areas, and connectors between rural communities; as a means of handling pedestrian and bicycle traffic along higher speed arterial streets or under limited access freeways; or as safe and accessible routes to schools.

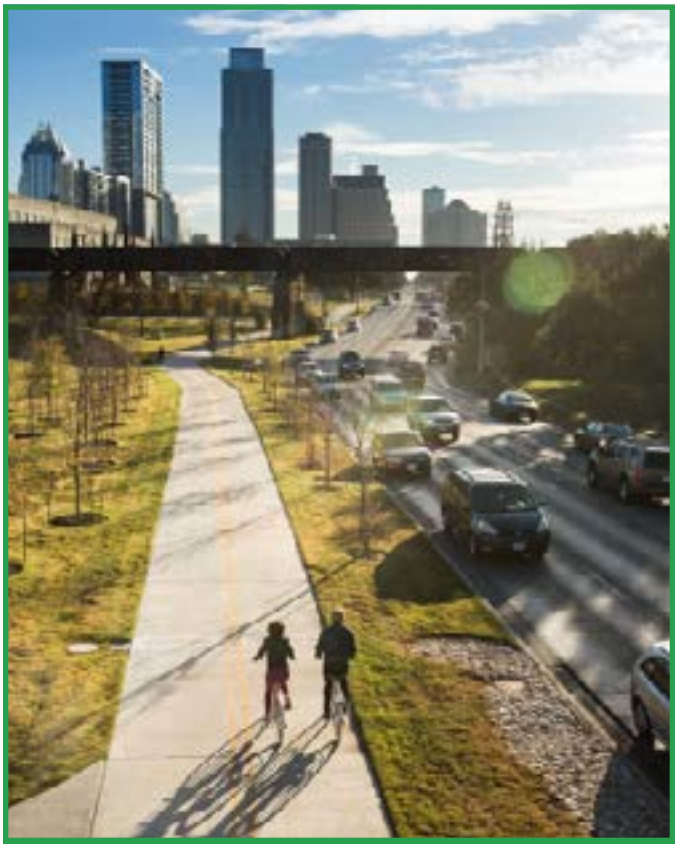
Multiuse trails can be key components of a nonmotorized transportation network within a community, expanding access to jobs and services to those without access to a vehicle. There is some indication that middle to lower income trail users tend to use trails for utilitarian purposes, and that increased trail connectivity would lead to more frequent utilitarian use (Chen et al., 2019). For example, an increase in the rate of commuting-to-work by bicycle was evident with the development of an off-road trail system linking residential areas with major employment centers in Minneapolis, Minnesota (Hirsch et al., 2017).

Intermodal connectivity can improve livability, and expand the reach of multimodal travelers, especially in areas where dense trail and transit networks intersect (Hendricks, 2016). In Salt Lake City, Utah, a multiuse trail that intersected a designated transit-oriented development corridor offered opportunities to create a multimodal trail and transit network within a city (García & Crookston, 2019). In Los Angeles, **transit** makes it possible for residents to explore nature along the West Fork Scenic Bikeway.

The significant value of regional trail systems is being recognized more and more as communities realize the cumulative benefits of linking multiple local segments of trail to create a network. Large scale efforts guided by regional agencies and coalitions include the St. Louis, Missouri, region's **Great Rivers Greenway**, the **Carolina Thread Trail** linking 15 counties in North and

South Carolina, the **Circuit Trails** in the Greater Philadelphia, Pennsylvania, region, and **trails in metropolitan Washington, DC**. Regional trail systems link suburban and rural areas with urban hubs and connect people to natural areas.

Research shows an unmet demand for bicycle connectivity and active transportation options in rural communities. An analysis of National Household Travel Survey data showed residents of certain kinds of rural communities walk and bike at a rate close to the national rate and for some trip types, the mode share exceeds that for residents of cities and inner or outer suburbs (Loh et al., 2012). Many suburban areas and small towns that are less dense and lack safe and connected nonmotorized travel options may especially benefit from a system of off-road biking and walking trails (Buehler et al., 2020; Dickman et al., 2016). Repurposed rail trails can bring new energy to small towns along a route and provide active transportation options in locations where transportation choices are few.



Source: PBIC Image Library, Adam Coppola Photography

Community and Individual Health

The health benefits of trails are numerous, ranging from the creation of community outdoor spaces for social interaction to promoting healthy physical activity to enhancing individual happiness and well-being. Research associates green space access with a multitude of health benefits.

The built environment and active transportation infrastructure can positively impact physical activity (Sallis et al., 2012; Smith et al., 2017). Trails have also been linked to positive increases in physical activity. Trail development in rural communities has been shown to increase walking, creating a positive benefit for those most at risk of poor health outcomes from sedentary lifestyles (Brownson et al., 2000). Physical activity in natural settings has been found to provide quantifiable benefits in mood and self-esteem (Barton & Pretty, 2010). There is also a relationship between nature connectedness and happiness (Capaldi et al., 2014). The more active a trail user is, the higher they rate their own well-being (Smiley et al., 2020). In general, trail development can be a cost-effective health intervention, with the investment in trails returning many measurable and unmeasurable individual and population level health improvements (Abildso et al., 2012; Wang et al., 2004).

However, the health benefits of walking and bicycling facilities are not always equitably distributed. **The Centers for Disease Control and Prevention** identifies the lack of trail resources in underserved communities as a health equity concern. **The National Recreation and Park Association** and others have also identified the need for more parks and recreation facilities in disinvested areas (Rigolon et al., 2021). The COVID-19 pandemic has further underscored the need for accessible and well-designed spaces for outdoor activity and the need to ensure equitable access to those spaces (Penbroke, 2020).

Diversity, Equity, and Inclusion

Trails can support overall community equity and inclusion goals through a strong justice, equity,

diversity, and inclusion focus. In areas where long term disinvestment has occurred, which are often economically attractive for developers, new trails can be leveraged to uplift historically marginalized groups and achieve social and environmental justice goals. Green space and trail planning processes offer opportunities to confront the practices that underlie enduring disparities by elevating voices of those who have been most impacted by injustices (Yañez et al., 2021). Transformative justice in green development recognizes and advances understanding of the history of disenfranchisement and seeks to redistribute control and build wealth in marginalized communities (Anguelovski et al., 2021). "Green reparations," involving the development of green space projects to improve social equity, can be achieved if the community is involved in the process from the beginning and the outcomes for long-standing residents near the trail are centered in the decision-making process (Draus et al., 2020). Trail efforts striving to achieve these benefits include the Joe Louis Greenway in Detroit, Michigan, (see box under Equity Considerations), the Middle Branch Loop in south Baltimore, Maryland, the Circuit Trails in the Philadelphia, Pennsylvania, region, and efforts in Austin, Texas, and **Portland, Oregon**. Chattanooga, Tennessee's extensive greenway network is an example of a community **striving to correct past oversights**. Their network has been praised as a model for revitalization, but the city acknowledges gaps in connectivity which continue to exclude some neighborhoods.

Economic Prosperity

Trails can generate significant economic benefit, providing access to jobs and essential services, community redevelopment, and revitalization. Benefits extend far beyond the early boost from construction activity and can lead to increases in the total economic output of an area. Regional trails can bring economic gains to very rural areas, which may experience an even more defined impact. Economic impacts of trails can be measured differently, from assessing changes in residential property value, to increased sales tax revenue and increased patronage of community businesses from tourism or other trail activity. In a standard economic analysis, measured benefits can be: direct, which are directly attributed to a trail; indirect, as supply chain effects, which are effects on the economy from purchases related to the trail itself; or induced, which are changes in spending patterns in the region. Also

Source: PBIC Image Library, Toole Design Group

called "consumption effects," induced effects are those that spill over into other sectors, such as restaurants, bike shops, local breweries, etc. (Dhongde, 2016; Domanski, 2019). Some studies measure a more narrowly defined economic contribution which quantifies trail based recreational spending, and some measure economic impact which are the net effects of the existence of a trail.

Recently, some have turned to a **social return on investment** (SROI) evaluation to measure the positive externalities and greater economic impact of green space and trails. Social return on investment is a "relatively new way of assessing value created by human activity" that captures extra-financial returns that are not traditionally categorized as economic benefits (Nicholls, 2017). Applying this broader lens is an effort to document the multifunctionality of urban green space, and to quantify the compounding returns derived from health, wellbeing, social, environmental, and other social benefits provided by large-scale built environment changes and improved access to green space.

Climate Change Mitigation and Resiliency

Sustainability and climate change mitigation and adaptation are critical issues for communities across the country. Trails have the potential to provide sweeping environmental benefits for cities and regions. Urban and rural trails can contribute to reduction of heat island effect, carbon sequestration, stormwater and flood mitigation, habitat protection and wildlife corridors, along with improved air, noise, and water quality. Well planned, connected trail networks have the potential to encourage meaningful shifts towards sustainable modes of transportation. The Rails-to-Trails Conservancy's report **Active Transportation Transforms America** describes the important connection between connectivity and mode shift and offers calculations for the number of driven miles avoided and emissions reductions under different scenarios (Bhattacharya et al., 2019). Trails can be an integral part of local and regional resilience strategies and environmental planning.

Trails are also an effective conservation approach. Providing access to natural spaces can increase community engagement in conservation efforts, preserving urban green space and maintaining landscape connectivity while also fostering community-wide conservation culture. Trail planners can take advantage of the opportunity to promote conservation goals by integrating conservation values into the planning process (Courtenay & Lookingbill, 2014).

Strategic co-location of green infrastructure can expand functionality where land is limited. Trail systems can serve as green infrastructure corridors that manage urban flooding. Trees and green space can mitigate water, noise, and air pollution while simultaneously mitigating urban heat effects. Green space reduces urban heat by providing shading and through a process called evapotranspiration, which is the metabolic absorption of air pollutants (Schwab, 2009). A vegetative belt, or a green buffer, can also mitigate noise, alone or as a complement to nonnatural solutions (Van Renterghem et al., 2015). Water quality benefits stem from natural stormwater filtration and capture, which cleans and reduces the amount of water that is handled by the municipal drainage system (CNT, 2020).

Baltimore Greenway Trails Network

The Greater Washington Partnership identified the completion of the Baltimore Greenway Trails Network as an important economic opportunity. They contracted with a firm to evaluate and assess the monetary value of the social, economic, health, and economic benefits of the fully connected trail network. The $28 million project, which will connect 75 neighborhoods within the city, has a stated goal of increasing bicycling and pedestrian connectivity for neighborhoods in the urban core that have historically lacked safe multimodal access to destinations, lifting communities up by connecting residents to opportunity.

Social, Historic, and Cultural Preservation

Great trails are more than infrastructure, they are places and experiences that bring communities together and offer important cultural and social benefits. Trails can promote and enhance social cohesion, contribute to a sense of place and community identity, and offer a record of heritage through historic preservation. Extending across a broad cross section of communities, trails can serve to collectively celebrate the cultural histories and uniqueness of a region. Interactive signage and online guidance can tie trail features to the surrounding area and promote shared understanding and learning by visitors and locals alike. Placemaking features that integrate art, interaction, community identity, and natural beauty along the trail itself can be incorporated into the permanent design or installed temporarily to add variety to the trail experience or activated with programming.

Access to green space is shown to reduce crime and fear in urban areas. Enhanced social cohesion, improved mental health, civic pride, better quality of life and biophilic stress reduction factors are among the contributors to violence reduction in urban settings (Branas et al., 2011; Shepley et al., 2019). Elements like art installations, local businesses, neighborhood parks, and natural areas make a trail and its surrounding community distinctive. This type of placemaking is often a collaborative, ongoing community effort to create moments that make a trail special and useful. Some communities have found that supporting arts and culture through "creative placemaking" has shown promise in resisting displacement and exclusion (Komarek-Meyer, 2019).

Source: Rails to Trails Conservancy, Anthony Le

Trail of Tears

The Trail of Tears is an example of a **National Historic Trail**, which are established by an act of Congress. Honoring the survival of the Cherokee, who were forcibly removed from their homelands in the late 1830s, the iconic trail tells the story of suffering and resilience. The trail retraces the Cherokee peoples' journey over 5,043 miles and nine States and offers outdoor exhibits along the corridor. The trail helps to preserve the culture, history and significance of the Trails of Tears in American history and is a window into the story of native land and the relationships between Indigenous peoples to colonial actors.

Building Support Through Partnerships

Community coalition groups can be key drivers of trail development. Coalitions bring together the public, private, and nonprofit sector to support a project. Due to the unique set of intersecting benefits that trails offer, partnerships around trail building are often formed by cross-disciplinary groups. Recreational clubs, conservation organizations, tourism bureaus, land trusts, active transportation practitioners, health alliances, volunteer and nonprofit organizations, and many others can achieve common goals in supporting a trail project.

Often, trail projects span several jurisdictions or will impact several different interest groups. A strong coalition can also take advantage of the diversity of its members to tackle various components that move trail projects forward.

Broad coalitions can be useful to build support for more politically contentious projects. Inclusive coalitions involve groups representing people living with disabilities, older adults, those whose voices are often not heard, and whose communities have been impacted by ongoing disinvestment. Neighborhood services and housing authorities should also be involved to ensure environmental justice is considered during the trail planning process (Hoover & Lim, 2021).

Public and government agencies are critical to trail building partnerships. Public agencies who may have a hand in trail development can include transportation, land use, and economic development planning, parks and recreation departments, sustainability offices, environmental agencies, stormwater and runoff management, health departments, and others. Agencies have plans, policies, and institutional practices that can influence trail alignments and design features. Collaboration and cooperation is often required across levels of government, especially when a trail may cross jurisdictional boundaries. Utility owners or other government bodies may hold an easement or right-of-way in the land and are already embedded in various processes around the locations in question.

Creating and Maintaining Partnerships

Partnerships around trails should reflect the wide-ranging desires and needs of the people and groups who will use the trail. Engaging with existing groups who are working towards similar goals can help to broaden support and extend the reach of the partnership. Working with those whose goals are different but who care about the area can in some cases strengthen and unite concurrent efforts to improve a community (Noll, 2021).

Robust partnerships require long-term commitment and dedication to accepting complexity and uncertainty. Ongoing working relationships require mutual understanding of the organizational culture, roles, and responsibilities of coalition members and public agency staffers. The coalition should be able to learn from and interact with a wide variety of stakeholders. Upholding local expertise as equally important to practitioners' "expert" knowledge can lead to deeper, more sustainable partnerships. (Hoover & Lim, 2021).

Past observed trail development processes reveal a complex interplay between people in government positions and local groups. Many trail projects rely on motivated community groups for leadership, follow-up, and long-term coordination. Coalitions who understand the landscape of existing plans and policies and who can identify opportunities to build and grow interest have higher chances of success. Even well-formed coalitions face challenges, such as adhering to timelines, unifying around strategies, communicating between disciplines, and creating a shared understanding of priorities (Eyler et al. 2008). Strong coalitions provide the ability to leverage multidisciplinary technical assistance and community knowledge as the project moves towards implementation, and the same groups can be active in managing and promoting the completed trail (Walker et al., 2011).

A formal structure is also important for maintaining partnerships. A coalition's structure may be determined by the nature of the member

Old Fort Trails Project

The Old Fort Trails project in McDowell County, North Carolina, is a community-driven project focused on connectivity, accessibility, and sustainability. The Pisgah National Forest's Grandfather Ranger District is partnering with the G5 Trail Collective, a local nonprofit supporting backcountry trails and People on the Move For Old Fort, a Black-led community collaborative that engages residents in community-building efforts to provide diverse trail experiences for diverse users. **The 2021 proposal for 42 miles of new sustainably constructed trails** (including two new trailhead parking areas and one mile of relocated trail) reflects years of planning and months of public participation and ground-truthing trail locations.

organizations. Memoranda of Understanding are commonly put in place between public agencies, volunteer groups, or other nonprofit groups while public-private partnerships may require a more formal contractual process. Easement or public access agreements may be necessary for landowners or other right-of-way holders.

Building Support

While the overall benefits of trails are myriad, it is important to demonstrate a community-specific need or benefit. Using a combination of existing data, such as health, travel, or socioeconomic data, or infrastructure inventories, or collecting new data through interviews, surveys, audits, or manual counts or observation, a trail advocate can paint a tangible picture of current conditions that can be used to rally local support.

Ability to successfully navigate the political and public perceptions around greenway planning can determine the fate of a trail (Eyler et al., 2008). Producing a simple and appealing narrative establishing the need for the trail and the many benefits to the community at the outset will help keep the story of the trail focused and tailored to the community. Drafting a vision statement and a set of goals for the trail partnership will help with both internal and external understanding. Tying the goals of the trail coalition to goals in community planning documents adds salience for the public. Advance research into the various stakeholders who may be impacted or who may have strong feelings about a change in the public space will help prevent political roadblocks (Flink et al., 2001).

Strategies for working with those who oppose trails include seeking out opportunities for positive steps forward by crafting a clear mission and vision for the trail, identifying allies near the trail, facilitating means of listening, learning and building consensus, and working to communicate directly with groups or individuals who might be unsure or on the fence (Rails-to-Trails Conservancy, n.d.). Walking tours of a potential trail corridor allows for personal connections and an occasion to actively listen and learn from those who express concerns about a new trail (Flink et al., 2001).

Source: PBIC Image Library, Julia Diana

Considerations for Trail Planning

Partnerships that build support for trails are important aspects of trail planning that often begin before the formal planning stage and continue through the implementation phase and beyond. It is often the case that as the trail development process advances, a champion emerges to help lead the effort. This person could be a local resident, agency staff, or an elected official that embraces the vision and motivates others to get involved. As a trail develops from an idea into reality, the decisions made by project leaders and stakeholders will shape the trail—figuratively and literally—well before the final engineering design. This section explores some key considerations for trail planners, engineers, advocacy groups, developers, and others during the planning stage of trail projects.

Equity Considerations

New trail development has been accompanied by deep concern around displacement and gentrification, and alongside this, increased marginalization of communities of color within their own neighborhoods. Where there has been ongoing disinvestment or deindustrialization, high profile, large scale regional trails have been shown to affect property value to a greater degree than smaller scale developments. Trails such as the Atlanta, Georgia, BeltLine and the 606 in Chicago, Illinois, have drawn attention to the fact that protection and preservation of existing communities must take place in the early stages of planning for major trails (Crompton & Nicholls, 2019; Harris et al., 2020; Immergluck, 2009). There are many strategies for resisting the negative effects of displacement, though none are perfectly applicable in every situation; different communities will require and desire different approaches. Multidisciplinary strategies include community land trusts, public land disposition, business tax incentives, inclusionary zoning, affordable housing, rent control, home loan and improvement programs, owner-occupied tax relief, business tax incentives, and job training and creation, including green jobs programs and summer youth employment.

Social inclusion on trails can be a challenge when a new trail is being developed. Trails are public spaces that do not have the same meaning for everyone. Many studies have shown that racialized individuals represent significantly smaller proportions of trail users than White individuals, and there are often issues of cultural and social exclusion that can surround the conceptualization, development, and implementation of new trails. Future trail building can work to alleviate this by co-creating trail space with those who have been traditionally left of out decision-making (Wolch, Byrne, & Newell, 2014). Community ties

Joe Louis Greenway

A group of researchers in Detroit, Michigan, looked the development of the Joe Louis Greenway from the perspective of environmental justice. The planned greenway alignment traverses many neighborhoods in Detroit that have been adversely impacted through policies and practices such as redlining, urban renewal, freeway building, and continued disinvestment. Some of the land being redeveloped is considered "abandoned" urban land, sometimes known as "brownfields." To model a pathway to truly inclusive green revitalization, and to avoid further harms from gentrification, the researchers offered a conceptual framework for green reparations. The central goal of green reparations projects would be to achieve social equity, and to distribute the benefits of green development to areas and populations who have been impacted by systemic and structural racism, disinvestment, and environmental injustice. This form of "just greening" would be a process of working to restore and heal trauma, acknowledge and incorporate history, and bring the benefits of green urban spaces to fruition in partnership with communities (Draus et al., 2020).

are strengthened by meeting the local social and cultural community needs (Vanessa Garrison, GirlTrek - TrailNation Summit - YouTube, n.d.).

Engagement

Equity considerations should also guide the engagement process. Building trust, centering local knowledge, and creating structures of long-term co-governance are essential to inclusive trail planning, particularly in communities that have experienced histories of racialization and disinvestment. Grassroots community organizations should not only be at the table but should share power in decision making from the beginning (Copic et al., 2020; Hoover & Lim, 2021).

People living with disabilities also need to be engaged early since decisions about trail design, surfaces, and amenities can all contribute to accessibility for people who use mobility assistive devices. Travel Oregon partnered with several nonprofits to create an accessible recreation travel guide, which features in-depth reviews of accessible Oregon parks and trails from the perspectives of wheelchair users. The reviewers notice and highlight many small details that can affect the trail experience for people with disabilities, including bathroom facilities and parking areas (Rush & Robison, 2020).

For some communities, public advisory boards have provided a means to obtain ongoing input at various stages in planning and/or implementing projects. Local governments must consider how to include diverse voices in advisory boards, for example by offering stipends, childcare, and offering call-in and online meeting options.

Multimodal Networks

Most transportation networks and land uses in the U.S. are designed for people who use cars. Those who walk or bike often face challenges accessing employment, healthcare, education, and shopping due to incomplete or inadequate networks. Trails can be key links in multimodal networks, providing convenient connections to these destinations via low-stress routes separated from vehicular traffic. The Pedestrian and Bicycle Information Center's (PBIC) **Connected Multimodal Networks** webpage has many resources for the development of multimodal networks.

In recent years, trail planning practices have shifted away from building standalone trails and towards using trails as strategic links to achieve regional multimodal or trail networks. This shift reflects a growing understanding that trails can be much more than recreational facilities. They can help address regional growth issues and

Capital Trails Coalition's Statement on Equitable Trail Development

The statement below was prepared and published by the Capital Trails Coalition, which works on trail development in the Washington, D.C., region.

The Capital Trails Coalition recognizes long-standing and current societal inequities that have their roots in generations of unjust structural barriers, policies, practices, attitudes, language, and cultural messages have disproportionately impacted many minority groups.

Therefore, the Coalition will promote an equitable trails network by analyzing the unique challenges and circumstances impacting specific populations' mobility, safety, and connectivity needs.

The Coalition will use this information to offer and advocate for solutions so that the trail network more effectively serves all residents, including current and potential trail users.

The Coalition will also use this lens proactively to influence its own structure and decision-making framework.

(Source: **Capital Trails Coalition**)

meet the needs of residents who are increasingly voicing support for more walkable and sustainable communities and more transportation options.

Multimodal networks are not limited to cities and metropolitan areas. While barriers related to rural multimodal transportation depend on the specific area, common challenges in rural areas include social isolation of nondrivers, aging populations, high transportation costs, poverty, high rates of diseases related to physical inactivity, and high traffic fatality rates. At the same time, rural areas are experiencing greater demand for transportation alternatives to cars and desire for economic development and opportunity (Litman, 2018). Altogether, these trends suggest that trails can be desirable and beneficial components of the transportation network in rural areas when combined with other supportive modes, policies, and infrastructure.

Route Selection Considerations

Choosing the right route for a trail is a balancing act between practical considerations and community aspirations to make sure it can not only be funded and implemented in a reasonable time, but also that it will be well used by many community members and visitors. The decision involves tradeoffs between access to destinations, user safety and comfort, available right-of-way, topography and physical challenges, and constructability and likely expense. During this network development process, communities often identify local connectors as practical ways to overcome barriers to a fully linked system. These short connection routes (i.e., path accessing a gated community or cul-de-sac, bridge over a railroad track, highway underpass) have the potential to open up many miles of a trail network that have been cut-off due to a physical barrier.

Policy Tools

Federal, State, and local policies fundamentally influence trail projects. At the Federal level, requirements for Americans with Disabilities Act and regulations around floodplain locations can determine various characteristics of a trail. State level land acquisition policies can enable trail expansion, and water quality laws impose constraints on trails located near waterways. Local government policies can also have broad impacts on trail building. Jurisdictions seeking to create a supportive policy environment for trails can start at the local level (Eyler et al., 2008).

Circuit Trails Network as a Regional Connector

The **Circuit Trails** is an **innovative, regional urban trail** network that is connecting people to jobs, communities, and parks in the nine-county Greater Philadelphia-Camden, New Jersey, region. Led by a coalition of dozens of nonprofit organizations, foundations and agencies, the Circuit Trails will encompass 800 miles of trails on both sides of the Delaware River by the time of the project's completion in 2040, and more than 50 percent of the region's population—over 3.1 million people—will live within a mile of the trail network.

Regulatory Strategies

Jurisdictions can control the use and development of land through legislative powers. Master plans with trail development can include provisions for trails and open space (Eyler et al., 2008). Regulatory methods help shape the use of land without transferring or selling the land. The following types of development ordinances can meet the challenges of urban and suburban growth, as well as conserve and protect trails resources:

- Growth management measures
- Performance zoning
- Incentive zoning
- Conservation zoning
- Overlay zoning
- Negotiated dedications
- Reservation of land
- Planned unit development

- Cluster development
- Developer credit for trail construction
- Cultural and historical preservation
- Green and open space provisions
- Development requirements

Development Process

Many local governments use ordinances to require new developments to build or pay for active transportation infrastructure including trails as part of the approval process. It is common for municipal officials to place conditions on the approval of subdivision and land development applications. Through negotiation, a municipality can request the installation of bicycle and pedestrian facilities. Jurisdictions can integrate such policy requirements and other planning elements into its comprehensive plan and/or other adopted plans such as a pedestrian and bicycle and/or trails master plan that will identify the need for these facilities so that developers are aware that the jurisdiction will likely require these facilities when land development applications are made.

Trail-Oriented Development

Like the concept of transit-oriented development, trail-oriented development takes advantage of and leverages infrastructure that supports active ways of getting around in urban or suburban areas. In much the same way that transit-oriented developments aim to build places where people can live, shop, and travel from a string of centralized community centers, trail-oriented development aims to provide a network of local business and housing choices within a web of safe and enticing trails. The Urban Land Institute identifies this trend as the latest phase in the evolution of urban development from car-centric to people-friendly design. Their **2016 report** highlights the Midtown Greenway and other excellent examples of cities using urban trails or greenways as tools for revitalization. The common thread among their case studies and cited research is a focus on trailside zoning. Like any development project that causes an influx of investment in an area, trail-oriented development must be done with the overarching goals of inclusion and prevention of displacement of marginalized communities.

Trails Ordinance in Prince George's County, Maryland

The Prince George's County, Maryland, Code of Ordinances (Section 24-123(A)(6)) states:

Land for bike trails and pedestrian circulation systems shall be shown on the preliminary plan and, where dedicated or reserved, shown on the final plat when the trails are indicated on a master plan, the County Trails Plan, or where the property abuts an existing or dedicated trail, unless the Board finds that previously proposed trails are no longer warranted.

Planning Timelines and Funding Sources

A common challenge is the lengthy process needed to move a trail from idea to reality. This prolonged time horizon can make maintaining interest and momentum difficult. One way to ensure

Midtown Greenway

The first phase of the Greenway in Minneapolis, Minnesota, was opened in 2000, converting a rail line trench into a new neighborhood amenity. The depressed former rail line, however, was not well-connected to communities around the trail. During the next several years, members of the Midtown Greenway Coalition worked to create zoning and land use plans designed to provide enhanced access to the trail. While there are many factors spurring redevelopment along the corridor, the new trail amenity and building design that fronted and activated the trail were key factors in helping create new nodes of positive development along the corridor

(Source: **Active Transportation and Real Estate, The Next Frontier (Urban Land Institute, 2016)**)

trail implementation is to seek out near-term opportunities while also focusing on long-term goals. Demonstration projects that pilot a design can get something on the ground quickly to prove a concept, gather feedback for improvements, and help catalyze further trail development. At the same time, advocates should familiarize themselves with long-range and comprehensive planning timelines in their areas.

The planning timeline and funding opportunities are often considered concurrently since many Federal and State funding sources require listing the project in an official planning document, such as a bicycle and pedestrian master plan or a long-range comprehensive plan. The funding application process often involves generating detailed cost estimates, providing information from an array of stakeholders and government bodies, and conducting mandated impact studies (sometimes years in advance). Some funding applications may also require a preliminary engineering design or concept.

Trail developers need to fund project development phases such as traffic or environmental studies, design, engineering, right-of-way acquisition or easements, site preparation such as grading, drainage, construction, and ongoing maintenance. Common funding sources include the **Transportation Alternatives Set-Aside**, **Recreational Trails Program**, discretionary grants (**RAISE** is a recent iteration), State active transportation funding, or local active transportation funding. Other funding mechanisms include tax increment financing, a local tax bond like an impact fee or a voter approved bond measure, or private foundation donations (Eyler et al., 2008; Flink et al., 2001). See also Federal Highway Administration's (FHWA) **Active Transportation Funding and Finance Toolkit**.

FHWA maintains a spreadsheet of USDOT Pedestrian and Bicycle Funding Opportunities that can be used for bicycle and pedestrian projects, including trails and trail amenities.

Designing for Climate Resilience

Planning and design considerations can help ensure that trails play a role in climate resilience, adaptation, and mitigation, in addition to their contribution to carbon emissions reduction strategies by potentially shifting more trips to walking, biking, and e-assisted devices. Trail corridors present opportunities for green and blue infrastructure intended to help manage water through storage and infiltration (as described in the Benefits section) and opportunities for enhanced emergency response and preparedness. Key considerations for building resilient trails include:

- **Sustainable siting, construction, and maintenance:** Trails must be sited and constructed to accommodate flooding events and reduce costly damage. Materials, surface type, construction and landscaping techniques, and drainage are important considerations for sustainable and resilient trail infrastructure.
- **Contextual design considerations:** Each trail type and its location have unique considerations in terms of the resiliency and emergency response functions they may provide as well as the design considerations. Trails must be universally accessible to accommodate all people and provide lifeline routes for safety, security, and emergency management as well as transportation. Connections and improvements to trails should be designed to accommodate wheel loads associated with emergency vehicles, provide efficient access, integrate areas for staging equipment, and include systems to aid navigation and communication.
- **Green and blue infrastructure integration strategies:** Green infrastructure can restore, connect, and protect natural areas such as wetlands, streams, and floodplains. The nexus between the trail network and surrounding neighborhoods can also provide an opportunity to "bridge" the natural and built environment by extending landscaped areas into surrounding streets, parks, and open space to

Source: PBIC Image Library, Dan Burden

capture stormwater runoff prior to entering waterways.

- **Trails as evacuation routes:** In some cases, trails can serve as key components of critical resiliency systems by providing evacuation routes and accommodating emergency response vehicles and response operations.

Trail Operations, Evaluation, and Programming

Ongoing trail management should be considered in the early stages on planning. It is crucial to assess the maintenance and operational needs and determine which parties will be responsible for these tasks. The many shared management responsibilities around the trail include routine and remedial maintenance, safety, trail user management, trail evaluation and measurement, programming and promotion, and ongoing stewardship. Public events and uses of the trail space, such as volunteer work crews or beautification teams require coordination and administration. Maintenance tasks may include snow and ice removal, vegetation management, trash removal, and facilities upkeep, while operational considerations may include determining the hours of operation, rules for trail users, and procedures for special events.

Trail Users

As emerging micromobility modes such as e-scooters and e-bikes gain popularity, there has been much discussion about whether these modes can safely and comfortably share the trail with people walking and those using traditional bicycles. Increasingly, State and local governments are passing regulation to help clarify and classify emerging micromobility devices and where they can operate. A 2021 **National Conference of State Legislatures report** found that 43 States and D.C. have a legal definition of an e-bike and at least four States specifically allow e-bikes on trails with certain restrictions, while several other States treat e-bikes equal to traditional bicycles and therefore allow or prohibit e-bikes wherever regular bicycles are allowed or prohibited. The Rails-to-Trails Conservancy created a **resource guide** detailing challenges and opportunities associated with micromobility on trails.

Precedents exist for accommodating unique forms of transportation on trails. In some rural areas with cold climates, snow-covered trails become routes for skiers, snowmobiles, and dogsleds during the winter months. Communities planning trails should assess their transportation and recreation needs and determine how their trails can accommodate existing uses and complement multimodal networks.

Trail Evaluation

Managing a trail also requires an understanding of who is using the trail and when, and what is really happening in a dynamic trail environment. Evaluation should include both quantitative and qualitative methods for gathering data about volumes, habits, and needs that can be leveraged in productive ways for the trail system.

A counting system should be comprehensive with a counting program that addresses the physical trail counters and continuously maintains count records. It is important to invest in the trail count infrastructure (i.e., Eco-Counters), data management systems, and staff training. With a commitment to gathering accurate data, trail managers can use the data to monitor regular trail use, evaluate changes to the trail, identify and schedule maintenance needs, make adjustments to signals controlling trail crossings, and plan future trails (Nordback et al., 2018). Mechanisms for collecting feedback directly from trails users to enhance understanding of how the trail is being used and what issues need to be addressed should complement the trail count program. Surveys can reveal issues around perceptions of safety, trail surface quality, and interactions between trail users. Surveys can also help determine trip purposes and route choices, and gather demographic information that is not captured by counts (Shafer et al., 1999). User surveys can also provide feedback on how the trail is valued by users (Keith et al., 2018).

Direct monitoring of trails is also important. Observational data can enhance understanding of how users are interacting with each other and the trail environment. Crash surveillance on trails can be challenging, as bicyclist and pedestrian crashes outside of the motor vehicle environment are often not captured in police reported crash databases. Site observations can identify problems and supplement other forms of data such as hospital records or crowdsourced incident data to create a better picture of trail safety (Jestico et al., 2017).

Bicycle and Pedestrian Count Programs

There are two basic types of counts: continuous counts and short-duration counts (SDCs). At continuous count locations, data is collected 24 hours per day and the counters are intended to remain in place indefinitely. SDCs occur over a limited period, ranging from a few hours to several weeks. Continuous counts and SDCs are both necessary to develop a complete picture of nonmotorized activity. Researchers and practitioners are starting to recognize and explore the potential of emerging data sources collectively referred to as "Big Data." This type of data is typically crowdsourced or uses information generated from GPS-tracking devices—such as smart phones, watches, and fitness trackers—to generate trends and patterns. Technical capacity to process this type of data is also often a concern for many public agencies, as the data management can be cumbersome and require some advanced coding skills. The PBIC Info Brief **Bicycle and Pedestrian Count Programs: Summary of Practice and Key Resources** provides more information about developing and expanding nonmotorized count programs.

Promotion through Communication and Programming

Ongoing communication and promotion can help the public to feel welcome and informed about what is going on around the trail; residents should feel a sense of connection to the trail and continue to value its role in the community. In many cases, a new trail is a small part of a larger trail system and getting buy-in for future segments is important.

Making the most of a new or existing trail means telling its story through cultural happenings, art, history, and nature focused lenses. This requires communicating with the public directly or through the media; programming on-going and special events on the trail; liaising with artists to bring

their work to area; and with sign-makers to produce signage and wayfinding.

Communication and engagement should be handled with cultural competency, context sensitivity, and responsiveness to the social and cultural environments surrounding the trail. Vanessa Garrison of Girl Trek offers that "a network of trails brings a network of people" and discusses how understanding the values and desires of a diverse population is the pathway to authentic inclusion on trails (Vanessa Garrison, GirlTrek - TrailNation Summit - YouTube, n.d.).

Designing Trails

There are many existing references and resources that can help designers create safe, comfortable trails. Accessibility is an important part of trail development because it is key to ensuring that trails are available to all groups, including youth, older adults, and people with disabilities. Because trails can provide both transportation and recreation, designers need to consider which accessibility guidelines apply. Roadway and driveway crossings are key locations in need of attention during the design phase. In some locations, trails and shared use paths may connect to on-street bicycle and pedestrian facilities. Guidance on multimodal networks can help planners consider how trails play a role in regional network connectivity.

Select national level resources are listed here, and **PBIC's Design Resource Index** identifies the specific location of trail-related information in national design manuals and guidance documents from FHWA, American Association of State Highway and Transportation Officials (AASHTO), Institute of Transportation Engineers (ITE), Congress for the New Urbanism (CNU), National Association of City Transportation Officials (NACTO), and the US Access Board.

State and local design guidelines are also critical to consult for local design specifications and regulations, especially for trails in environmentally sensitive contexts such as riparian buffers, or within State parks, for example.

Professional associations such as the Association of Pedestrian and Bicycle Professionals (APBP) and ITE offer a sounding board and local experiences for questions about trail crossings, lighting, tradeoffs for different trail surfaces, edge and centerline markings, transitions between trails and other bicycle facilities, accessible design, designing around or along bridges and underpasses, or long-term management, maintenance, or other context specific issues that may arise in the design phase.

General Trail Guidance

- **Accessibility Guidebook for Outdoor Recreation and Trails**
- **New Mobility Trends in Shared-Use Path Design and Management**
- **Trail Planning, Design and Development Guidelines**
- **Manuals and Guides for Trail Design, Construction, Maintenance, and Operation, and for Signs**
- **PBIC Topic Page: Trails and Shared Use Paths**
- **Transit and Trail Connections**
- **Rails-with-Trails - Best Practices and Lessons Learned**
- **Evaluation of Safety, Design, and Operation of Shared-Use Paths**
- **American Trails – Resource Library**
- **East Coast Greenway Design Guide**
- **FHWA Pedestrian and Bicycle University Course: Module 13: Trails**

Multimodal Network Guidance

- **Guidebook for Measuring Multimodal Network Connectivity**
- **Small Town and Rural Multimodal Networks**
- **Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts**

National Level Road Design Guides

- **Road Design Guide**
- **Urban Street Design Guide**
- **Transit Street Design Guide**
- **Traffic Control Devices Handbook**
- **Manual on Uniform Traffic Control Devices**

Accessibility Guidelines

- **Draft Guidelines: Public Rights-of-Way Accessibility Guidelines and Shared Use Path Guidelines**
- **Standards for Outdoor Developed Areas**
- **Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians**

Bicycle and Pedestrian Design Guidance

- **Guide for the Development of Bicycle Facilities**
- **Guide for the Planning, Design, and Operation of Pedestrian Facilities**
- **Separated Bike Lane Planning and Design Guide**
- **Urban Bikeway Guide**

Additional Resources

Economic resources

The Rails to Trails Conservancy's (RTC) **Active Transportation Transforms America** makes the case for trail return on investment based on benefits from increased biking and walking, improved health, reduced greenhouse gas emission and general economic revitalization, and provides methodologies for calculating and estimating the economic outcomes in these domains.

Examples of SROI evaluations come from the United Kingdom and Australia. A model assessing the combined monetary value of property values, health and wellbeing, flood mitigation, climate change, "quality of place," employment, and tourism found between a two- and almost six-fold benefit from a trail in the United Kingdom (Hunter et al. 2020). A similar **SROI evaluation of open green space** in a suburb of Sydney, Australia showed $10 of value for every $1 invested in parks and sports facilities. (City of Paramatta, 2020).

The **Trail Towns Program** shares lessons learned from successful trail town revitalization projects.

Additional resources can be found through **American Trails** and the **Rails-to-Trails Conservancy**. **Headwaters Economics** is an independent research firm that focuses on land management, outdoor recreation and economic development.

Victoria Transport Policy Institute is a source of a wide variety of free resources with an emphasis on innovative solutions.

Equity resources

The Pennsylvania Environmental Council has an **Inclusionary Trail Planning Toolkit**, which includes multiple case studies and a several resources for participatory public engagement during the development of new trails and green space.

RTC's **Equitable and Inclusive Trails** provides an overview of creating more equitable trails.

Partnership resources

The Oregon Trails Coalition's **Ready, Set, Plan!?** guide provides a model of partnership building that underscores the importance of broad, diverse coalitions built on trust, collaboration, listening and understanding (Noll, 2021).

American Trails' **Factors for maintaining ongoing partnerships around parks and trails** echoes themes of understanding, trust, and inclusion as essential for effective coalitions (21 Partnership Success Factors for Parks and Trails - American Trails, n.d.).

Virginia Department of Transportation's **Community Trail Development Guide** begins by describing the work of connecting community interest to local and State agencies. The guide includes descriptions of the various roles and capacities that have contributed to existing trails in Virginia (Virginia Department of Transportation, 2016).

Outdoor Towns offers several steps for organizing and partnering in their **Towns and Trails Toolkit**.

Interagency agreements

RTC's **trail building management** page offers an overview of approaches to structuring agreements across jurisdictions or agencies, such as MOUs or contracts with easement rights holders.

WeConservePA offers a wide-ranging set of example model policies, documents and agreements oriented towards conservation efforts that cover topics such as land use ordinances, public access and easement agreements.

Evaluation resources

Evaluation of Safety, Design and Operation of Shared Use Paths

RTC has a set of **resources** for establishing and running a count program.

Marketing resources

Trust for Public Lands' article **Secrets of the Private Sector: How parks and recreation agencies can flex their marketing muscles**.

The RTC report **Urban Pathways to Healthy Neighborhoods** details strategies for encouraging trail use.

Funding resources

The Safe Routes Partnership webinar, **Funding your Active Transportation Project**, identifies funding needs and sources.

Trail management resources

American Trails presents an **Introduction to Trail Management** webinar that covers managing both visitors and maintenance.

RTC's **Maintenance Practices and Costs of Rail-Trails** specifically offers an overview of rail trails in particular, but includes information relevant for other trail types.

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