U.S. Department of Housing and Urban Development | Office of Community Planning and Development

Climate Resilience Implementation Guide

Resilient Transportation and Mobility Solutions

Resilient Transportation and Mobility Solutions

The transportation sector accounts for one third of all greenhouse gas emissions in the United States.[i] Transitioning to less carbon-intensive forms of transportation, such as walking, biking, and public transit, is a critical step in enhancing quality of life, protecting public health, improving air quality, and reducing overall emissions. Such re-envisioning of the transportation sector also affords communities opportunities to build resilience to climate change.

In early 2023, the U.S. Departments of Housing and Urban Development (HUD), Energy (DOE), and Transportation (USDOT) and the Environmental Protection Agency (EPA) released **The U.S. National Blueprint for Transportation Decarbonization** identifying key strategies to decarbonize and reduce greenhouse gas emissions.

One of three decarbonization strategies outlined in the Blueprint is **increasing convenience** by implementing system-level design solutions that prioritize accessibility and location-efficiency. This strategy includes **supporting community design and land-use planning at the local and regional levels** to ensure that jobs, schools, and essential services are strategically located near where people live to reduce commutes; increase access to public transit; and improve walkability, bikeability, and quality of life. Actions that communities can take include equitable transit-oriented development (eTOD), location-efficient affordable housing, local zoning reform, safe active transportation improvements, and coordinated housing and transportation planning.

This guide builds on the National Blueprint to identify **actionable strategies for communities to decarbonize their transportation systems** to achieve broader climate change, health, and livability goals. The guide also highlights opportunities for building resilience or adapting to the impacts of natural hazards.[ii] For example, by incorporating green infrastructure into transportation systems to increase resilience to flooding or extreme heat.[iii]

In addition to this guide, HUD developed a Community Resilience Toolkit and a series of Climate Resilience Implementation Guides providing its grantees with step-by-step instructions to implement resilience programs. The Implementation Guides include Resilience Education and Outreach Activities, Single-Family Retrofits, Cool Roofs, Resilient Public Facilities, Nature-based Solutions, and Community-Driven Relocation. To support grantees in this work, HUD hosts a Supporting Local Climate Action webpage with resources on how to use HUD and other funding to build more resilient communities.

COMMUNITY PLANNING AND DEVELOPMENT (CPD) ELIGIBILITY AND FUNDING SOURCES

State and local governments may use Community Planning and Development (CPD) formula programs – including Community Development Block Grants (CDBG) and Section 108 Loan Guarantees – to fund resilience actions. The principal purpose of CPD funding is to benefit low- and moderate-income (LMI) persons.

CDBG funding must meet one of three National Objectives: benefiting LMI persons, preventing slums or blight, or meeting urgent needs. At least 70% of CDBG funding must be devoted to benefiting LMI persons.

Implementation of transportation and mobility solutions can be an eligible project or cost under these CPD-eligible activities categories:

- **Public facilities and infrastructure improvements**, which can be funded using CDBG and Section 108 Loan Guarantees.
- **Public services**, such as recreational services, are eligible Public Services activities under CDBG if they meet National Objective and eligibility requirements.
- **Economic development**, which can be funded using CDBG and Section 108 Loan Guarantees.
- **New housing construction** with HOME.

For more information on HUD funding resources, visit the HUD Community Resilience Toolkit and HUD Exchange.

About the Resilience Action

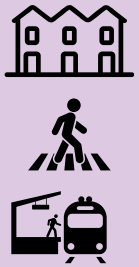
This Implementation Guide provides step-by-step instructions to assist communities in implementing safe active transportation and other multimodal mobility improvements (i.e., improvements that enable community members to travel by various modes, including walking, biking, and public transit) to increase transportation convenience, improve quality of life, reduce greenhouse gas emissions, and enhance resilience, while considering equity and the needs of low- and moderate-income (LMI) communities.

LMI communities are more likely to have been historically underserved or negatively affected by transportation infrastructure investments. These communities are also disproportionately affected by climate change because they are less able to prepare for, respond to, and recover from the impacts of extreme events and natural hazards.[iv]

The improvements highlighted in this guide promote alternative modes of transportation such as walking, biking, and using public transit to improve overall community mobility and access. Many of these improvements also protect communities against climate hazards. They also complement and contribute to broader initiatives, such as transit-oriented development and location-efficient housing and community development.

This guide focuses on three types of mobility improvements: complete streets and green streets, trails and greenways, and mobility hubs.

WHAT IS EQUITABLE TRANSIT ORIENTED DEVELOPMENT (eTOD)?



eTOD promotes affordable housing options near transit and seeks to enable all community members – regardless of income, ethnicity, gender, or ability – to enjoy mixed-use, walkable neighborhoods with ready access to amenities such as local retail, restaurants, parks, healthcare, and employment centers. eTOD complements strategies such as complete streets by encouraging location-efficient housing and making active travel modes and public transportation more viable, thus increasing transportation convenience and mobility.

- **Complete streets** are roadways designed to safely convey travelers by all modes, including vehicle and less carbon-intensive modes such as foot, bike, and public transit. Green streets are complete streets that incorporate green infrastructure elements to help manage stormwater and protect against climate hazards such as extreme heat and inland flooding.
- **Trails and greenways** are walking and biking facilities that are physically separated from roadways, often implemented along roads, railbeds, waterfronts, or inland waterways. Trails and greenways can function as shared-use paths and could also serve as linear parks, providing opportunities for both transportation and recreation. Trails and greenways provide safe options for walking and biking, encouraging community members to choose less carbon-intensive forms of transportation. They also provide opportunities to incorporate green infrastructure to help protect against climate hazards.
- **Mobility hubs** bring multiple modes of transportation into a single location, making it easier for community members to walk, bike, and use shared modes (e.g., public transit, rideshare, micro mobility) to get to where they need to go. Mobility hubs can also serve as multifunctional public spaces (e.g., farmers' markets, cultural centers, cooling centers), providing additional community benefits.

These mobility improvements and other topics are further defined in a glossary at the end of this guide. Implementation resources and funding information are listed before the glossary.

Benefits of Resilient Transportation and Mobility Solutions

Multimodal transportation infrastructure that enables and encourages people to travel without the use of a car (e.g., by walking, biking, using transit or other shared mobility such as bikeshare or scootershare) can provide important **equity**, **environmental**, and **health benefits**. Examples of several of these benefits are highlighted on this page.

Many of these benefits fit into more than one category. For example, implementing green infrastructure can have important environmental benefits while also promoting health and wellbeing in communities by reducing heat islands. Such improvements can be prioritized in LMI communities, which can be at higher risk for extreme heat impacts,[v] and thus also provide important equity benefits.

EQUITY

Equity
Multimodal transportation improvements enhance access and services for community members, including LMI communities and those with accessibility needs.

Affordability
Walking, biking, and using public transit are among the lowest-cost forms of transportation. Decreased transportation costs can increase overall affordability for community members, allowing them to allocate more resources for other household necessities.

Economic Development
Mobility improvements associated with eTOD and bikeways can bring economic benefits to local communities (e.g., increased activity for small businesses).

ENVIRONMENTAL

Reduced Emissions
Safe, connected multimodal infrastructure can improve community members' ability to get around without a vehicle, lowering overall "vehicle miles traveled" and associated greenhouse gas emissions.

Climate Resilience
Complete streets and greenways can be designed to integrate green infrastructure to promote resilience. Using cool or permeable pavement as part of street reconstructions can help reduce the heat island effect. Integrating bioswales or rain gardens can help protect against inland flooding.

HEALTH

Health and Wellbeing
Biking and walking facilities provide opportunities for safe physical activity while reducing congestion and improving air quality.

Recreation
Trails, greenways, and other active transportation infrastructure improvements bring new local outdoor recreational opportunities and amenities.

Safety
Complete streets improvements enhance safety for all roadway users (e.g., designated bike lanes make travel safer for vehicles and bicyclists; high-visibility crosswalks and pedestrian-scale lighting improve safety for pedestrians, including those using wheelchairs or other mobility aids).

Step 1: Determine Transportation and Mobility Needs

1 Determine needs
2 Identify and engage partners
3 Establish goals and assess feasibility
4 Design the mobility solution
5 Implement the program
6 Measure and promote success

Before beginning any new project, review all relevant plans, prior community input, policies, and safety and mobility data to understand community priorities, identify complementary projects, and evaluate transportation network gaps and needs. A wide variety of local and regional planning documents and data could exist. Examples include Consolidated Plans, comprehensive plans, housing development plans, Vision Zero action plans, complete streets policies, or active transportation plans. Relevant data sources could include demographic and other equity-related metrics, locations of key destinations, parcel ownership, bike and pedestrian networks, transit operations (e.g., transit network routes, route frequency, percentage of on-time trips), transit ridership, traffic counts, and safety (e.g., collision).

Review existing travel patterns and other data sources to understand how community members currently travel and where there might be mobility gaps. **Spot gaps** are specific locations that require safety or other improvements, such as a new pedestrian signal or crosswalk to improve a specific crossing location. **Network gaps** are areas where missing infrastructure limits connectivity and access. For example, a bike lane that abruptly ends and does not provide a safe connection to another facility is considered a network gap. Additional gaps can include areas that are at increased risk of impacts from climate change, such as heat islands or flood plains, where mobility improvements could provide additional environmental and equity benefits. Use this data to assess gaps and inform community priorities.

When determining plans and priorities, engage with key stakeholders (e.g., agency partners, community members, businesses, community-based organizations such as transportation advocacy groups, etc.) to supplement your document and data review and help identify mobility priorities and needs (reference Step 2).

Where transportation priorities exist based on prior planning and community engagement efforts, determine which projects/programs address the most critical needs, which projects/programs could be implemented quickly, where existing funding could be used to implement them, or where synergies might exist.

For example, existing street repaving offers an efficient opportunity to implement traffic calming measures, bike facilities, or pedestrian improvements such as high-visibility crosswalks or curb extensions. Planned development also provides opportunities for amenities such as mobility hubs, pedestrian plazas, or greenways.

Where possible, identify opportunities to integrate climate change resilience. For example, integrating permeable pavement, cool pavement, and green infrastructure into transportation projects can improve community resilience to climate impacts by minimizing flooding and reducing the heat island effect.

WHAT IS VISION ZERO?

First adopted in Sweden in 1997, "Vision Zero" aims to eliminate all traffic fatalities and severe injuries. Many local communities have implemented Vision Zero action plans highlighting their strategy to promote safe mobility for all road users.

City of Hoboken

Resilience in Practice
Hoboken, NJ | Implementing Complete and Green Streets

The City of Hoboken began implementing its Complete Streets Policy in late 2010. At the time, it was the second municipality in New Jersey to adopt such a policy. Today, there are some 150 communities in the state that have adopted complete streets policies.

The Complete Streets Policy is integral to other mobility efforts including the City's Bicycle and Pedestrian Plan. The policy functions as a tool to implement the goals and strategies identified in the plan. For example, the City uses its pavement management program to institutionalize complete streets elements – so that each time a street is scheduled to be repaved, the City also implements traffic calming, high visibility crosswalks, curb extensions, and other measures to improve safety for all road users. The City has built dozens of complete streets projects in the 13 years since adopting the policy. The creation of a Green Infrastructure Strategic Plan in 2013 and Street Design Guide in 2019 layered green street elements into the policy.

In 2019, Hoboken adopted its Vision Zero Action Plan to redefine its complete streets program and communicate a more tangible goal: zero traffic deaths and injuries by 2030. At that time, the City also began using its Street Design Guide to streamline the implementation of complete and green streets design elements during annual resurfacing projects. Both the Vision Zero policy and the complete streets program focus on implementing projects that promote multimodal trips and improve safety for all road users, encouraging more people to walk, bike, and take transit. Its Vision Zero Action Plan includes specific performance metrics to measure progress, such as the number of funded projects on the high crash network and at priority intersections close to schools, parks, public housing, and senior buildings.

The City keeps community members informed of progress through an interactive online Vision Zero dashboard it launched in early 2023 and a weekly construction email (with more than 10,000 residents registered for updates) that highlights the complete streets projects underway, along with schedules and locations for the improvement projects, to minimize impacts on residents. The City also regularly solicits residents' feedback through surveys and public events and has a strong social media presence. Most of the City's complete streets projects are funded through the New Jersey Department of Transportation's Municipal Aid Program; larger corridor projects are funded through bonds or other grant sources. The City has used HUD's CDBG funds to supplement other funding sources.

Lessons learned from the City of Hoboken's experience:

- **Start small**. Use pilot programs and quick-build projects to introduce community members to new concepts and let them experience the concepts before making them permanent.
- **Identify in-house staff** who have technical expertise and can serve as champions for the program.
- **Institutionalize complete streets improvements** by converting a pavement program into a complete streets program.
- **Regularly promote project updates and successes** to share the importance of the work with community members.

CPD Considerations: Street improvements (matrix code 03K) are CDBG-eligible activities in eligible LMI neighborhoods.

City of Hoboken

Step 2: Identify and Engage Community Members and Partners

1 Determine needs

2 **Identify and engage partners**

3 Establish goals and assess feasibility

4 Design the mobility solution

5 Implement the program

6 Measure and promote success

Identifying and engaging community members and partners is a critical step in planning or implementing any transportation project. Make sure to engage a variety of stakeholders throughout the process – from needs assessment and prioritization to design, implementation, and evaluation of mobility solutions.

Engage community members early and often.
Community members should have the opportunity to share their priorities as part of the needs assessment, offer feedback on potential design concepts, and provide comments on project or program functionality.

- Consider convening a Technical Working Group made up of agency representatives, leaders of community-based organizations, and local technical experts who can assist with designing and/or promoting the project or program.
- Note that targeted messaging can be important for outreach to organizations representing or comprising LMI community members, who might be most affected by and benefit from such improvements.
- Ensure engagement efforts are accessible to all populations. For example, work with community organizations to expand outreach, schedule engagement events to accommodate LMI community members' schedules, ensure meetings are accessible by public transit, and consider translating materials into languages spoken by the community.

Communicate clearly.
Take extra care to clearly communicate the goals and benefits of your proposed actions and share any trade-offs associated with the improvements. For example, new bike facilities can improve safety for people biking, reduce vehicular traffic, and enhance economic activity, but they also can reduce the availability of parking along a corridor. Clearly communicating these trade-offs, hearing and reviewing resident feedback, and identifying potential solutions are important for building community trust and support. For more information on stakeholder and community engagement, explore the Resilience Education and Outreach Activities Guide.

Identify and consult partners.
Identify which agencies (e.g., planning, transportation, public works, parks and recreation, environmental/sustainability) could have a stake and can lend capacity. Some roadways and corridors have complicated ownership structures; identify and consult all public and private entities that need to be brought into the decision-making process.

Resources

- Best Practices for Meaningful Community Engagement (Groundwork USA)
- Community Engagement Guide for Sustainable Communities (HUD)
- Every Place Counts Leadership Academy (USDOT)
- Pursuing Racial Equity Through Intentional Community Engagement (National League of Cities)
- Meeting People Where They Are (ICMA)

SAMPLE PARTNERS AND COLLABORATORS

Local, State, Federal, and Tribal Governments
- Metropolitan planning organizations
- City departments (planning, transportation, economic development, public works, parks and recreation, sustainability)

Community Organizations
- Residents
- Faith-based and nonprofit organizations
- Neighborhood and homeowner associations
- Transportation advocacy groups
- Environmental justice advocacy groups
- Climate resilience advocacy groups

Business and Industry
- Local businesses
- Utilities

Step 3: Establish Goals and Assess Feasibility

1 Determine needs

2 Identify and engage partners

3 Establish goals and assess feasibility

4 Design the mobility solution

5 Implement the program

6 Measure and promote success

Define the goals.
With input from partners and collaborators, consider which mobility improvements are among the top community priorities, what solutions are likely to gain acceptance from community members, and which locations are best suited for new projects or programs. For example, if your community has an existing complete streets policy or Vision Zero action plan, then implementing complete streets improvements that create a safer environment for people walking and biking might be a priority. For communities facing challenges with extreme heat, projects that improve mobility options while integrating elements such as cool pavement or green infrastructure might be of higher priority. Whatever the situation, make sure to define the goals and objectives of the program or project clearly, based on community input and data.

Assess feasibility.
Once you have defined the goals and objectives, assess the feasibility of proposed solutions by engaging with relevant stakeholders, assessing funding sources, and evaluating potential impacts. HUD strongly encourages grantees to consider environmental review requirements early in their planning; HUD Field and Regional Environmental Officers are available to help design a procedure to document efficient and effective environmental reviews, as applicable. Depending on the scope of the project and associated activities, the environmental review will require varying levels of time and complexity.

Establish metrics.
In addition, consider the metrics you will use to evaluate program or project success, and ensure they are measurable and relevant. Knowing the metrics in advance will inform the design of your program or project so that you can clearly evaluate progress post-implementation. Work with your partners to ensure access to the data necessary to measure progress. Consider establishing a Memorandum of Understanding to allow for data-sharing across agencies, and ensure you have staff resources to analyze the data consistently. Some metrics could require measurements at pre- and post-implementation to monitor success over time. Establish baseline measurements so that you can better measure outcomes post-implementation. Reference Step 6 for more information about measuring success.

CPD PROGRAM REQUIREMENTS

- Ensure and document that the proposed project/program meets required benefits to income-qualified communities, households, or families.
- Consult with public and private agencies to help identify opportunities and barriers to program implementation.
- Ensure that community consultation is consistent with the Citizen Participation Plan.
- All key reporting elements of the CPD formula grant programs are integrated into the HUD Integrated Disbursement and Information System (IDIS).
- Grantees typically create new IDIS projects through the AP-35 Projects screens during the setup of their Annual Action Plan. This is also the best way to ensure that any resilient transportation projects funded through CPD sources will be properly tied to the Action Plan. The matrix code used depends on the specific project and associated Action Plan goal.

Prioritize equity.
Finally, consider how best to incorporate equity and environmental justice into the mobility solutions. Use tools that assess equity, such as the Equitable Transportation Community Explorer, Transportation and Health Tool, Environmental Justice Screening and Mapping Tool, Climate and Economic Justice Screening Tool, Tree Equity Score Analyzer, or the Urban Environment and Social Inclusion Index. Some communities could develop their own equity assessment tools to evaluate how to best reach communities of color and other overburdened communities, including those LMI, who might have historically been left out of the planning process.

Resilience In Practice
Phoenix, AZ | Reducing Heat Island Effects Through Cool Pavement And Cool Corridors

Mobility solutions can include strategies to make alternative forms of transportation (such as walking, biking, and using public transit) more comfortable for community members by reducing the heat island effect. The City of Phoenix faces significant challenges with extreme heat, with temperatures frequently reaching well above 100°F. To help address these challenges, the City established a Cool Pavement Pilot Program in 2020.

The cool pavement adopted in Phoenix is a water-based asphalt treatment applied to existing asphalt pavement, providing a cooling effect. The solution reflects sunlight away from the pavement surface so that it absorbs less heat and leads to lower surface, subsurface, and air temperatures. The City partnered with Arizona State University (ASU) to evaluate the pilot program's impact in 2021. ASU researchers found that the cool pavement treatment led to a 10–12°F reduction in pavement surface temperature. The solution also extends the life of the pavement, leading to lower long-term maintenance costs. Based on the pilot's success, the program was made permanent in 2022.

The pilot program initially targeted nine locations in eight neighborhoods across the city chosen based on data from a County shade assessment study, which identified areas that lacked adequate shade and were most affected by heat. Since then, the program has expanded to 11 additional neighborhoods annually. The City anticipates adding an additional 30-40 miles of cool pavement each year. As cool pavements are relatively new products, the City was not able to rely on significant existing resources to implement the solution. It has been working with the manufacturer and contractors to learn best practices and share lessons learned with partner cities.

The City has other programs that seek to address heat island impacts. The City is implementing a Cool Corridors Program, which plants shade trees and implements active transportation improvements along corridors that serve populations at risk for disproportionate heat exposure. Cool Corridors has been implemented primarily along larger arterial streets, whereas Cool Pavements have primarily been implemented in residential neighborhoods. However, the City is currently evaluating unifying the two programs along one corridor and plans to identify additional opportunities to do so in the future.

The City primarily uses state gas tax revenue and City general funds to implement these programs. It also uses HUD Community Development Block Grant funds to implement active transportation and green infrastructure projects that can complement these larger programs.

Lessons learned from the City of Phoenix's experience:

- **Take the first step**. The pilot program helped the City learn how to implement cool pavement in real-time, as there were limited planning resources available for it to use at the time.
- **Coordinate among departments**. Local governments need to take a multifaceted approach to solve mobility and extreme heat challenges, which requires coordination among multiple parties.
- **Evaluate and communicate program successes, challenges, and trade-offs clearly**. Consistent and clear communication can help build community awareness and support.

CPD Considerations: Street improvements (matrix code 03K) and tree planting (matrix code 03N) are CDBG-eligible activities in eligible LMI neighborhoods.

City of Phoenix Street Transportation Department

Step 4: Design the Mobility Solution

1 Determine needs

2 Identify and engage partners

3 Establish goals and assess feasibility

4 Design the mobility solution

5 Implement the program

6 Measure and promote success

Choosing the right mobility solution depends on the local context, but any solution should focus on improving community members' access to locations without the need for a vehicle. As you design mobility solutions, consider what type of project or program is a priority for your community. For example, if your community already has an established goal or vision such as a complete streets policy, then you might choose to focus on specific safety improvement projects such as protected bike lanes and new pedestrian signals to meet this goal. You can also consider expanding this policy to incorporate green streets elements such as green infrastructure or permeable pavement. If you have a planned eTOD project in a mixed-income area, then implementing a new mobility hub as part of the project could be an effective way to enhance overall community mobility and further encourage the use of sustainable transportation systems.

If you do not yet have an established program, you might consider focusing your efforts on implementing a broader policy or plan to define your community's transportation vision. If you have a set goal but limited funding, you can consider implementing a pilot program or quick-build project to test out the design before implementing the solution more broadly. The solution could be structured as a voluntary or mandatory activity for your community.

Scope of Activity

- Projects are usually tailored in scope and might have only one or limited instances of implementation (e.g., pedestrian improvements along a single corridor).
- Programs are usually broader in scope and might have multiple instances of implementation. Programs can be appropriate when you want a transportation solution to become embedded throughout your community (e.g., a complete streets policy that guides the design of key corridors within a community).
- Pilots or quick-build projects are limited in scope and can serve as a test case for implementing a broader program or permanent project. For example, a community could implement a mobility hub pilot program to identify potential locations, develop a design concept, and implement the solution in a limited number of locations to evaluate success before implementing the solution more broadly. A community could also implement a quick-build of a design concept such as a protected bike lane or cycle track using low-cost materials before restriping the street and making the design permanent.

Breadth of Activity

- Voluntary activities might include the creation of plans or guidelines or informational outreach programs. For example, creating a green streets plan can encourage, but not require, the use of green infrastructure in complete streets improvements.
- Mandatory activities might include the creation or adoption of design guidelines, ordinances, and zoning and building codes or the incorporation of design standards. For example, a community could implement a policy that would require developers to implement bike and pedestrian infrastructure or electric vehicle charging infrastructure as part of their development projects.

Reaching Your Target Audience

As appropriate, consider developing a program that targets mobility solutions in LMI communities, especially those who have been underserved or negatively affected by transportation investments in the past. Use a range of engagement methods – including working with community organizations – to help reach underrepresented community members and ensure they can meaningfully participate in the planning process. If relevant for your area, include information translated into multiple languages spoken in the community.

Resilience In Practice
Pueblo, CO | Improving Access And Mobility Through Mobility Hubs And Trails

Pueblo strives to meet the transportation needs of its residents through multifaceted programs that address both motorized transit and bikeway (e.g., bike lanes, paths, trails, etc.) needs.

For motorized transit, the City of Pueblo currently operates one transit station – the Downtown Pueblo Transit Center – as a centralized mobility hub where several local and regional bus lines converge. The City is also seeking to identify a new transit hub on the east side of the city to improve bus circulation and access. In building its transit network – including new mobility hubs and bus stops – Pueblo seeks to identify areas with the greatest need for transit and other transportation options. Public input plays a significant role in identifying mobility priorities and areas of need.

To improve transit system reliability and reduce wait times, the City is implementing a two-year vanpool pilot program that targets two areas on the south and east sides of the city, helping residents access their places of employment. It is also focused on improving first/last mile connections to and from transit stops. Micro mobility options include electric scooters and bikes, and the City is working to make bike connections to bus stops across the city.

For bikeway programs, the local metropolitan planning organization, Pueblo Area Council of Governments (PACOG), in partnership with the City, is responsible for bike infrastructure planning. In addition to first/last mile planning, PACOG is heavily focused on expanding the 30-mile Pueblo Trail System. PACOG prioritizes new trail projects based on how well they meet regional connectivity and equity goals. Improving connectivity overall is a goal of PACOG projects, particularly given the physical barriers – rivers, railroads, and interstate highways – in the Pueblo area. For example, PACOG is planning a multimodal trail along a future roadway that will connect Pueblo and Pueblo West and will serve as an important alternative transportation option for commuters.

The City uses Federal Transit Administration formula funding, Colorado Department of Transportation funding, and City general funds for mobility hub implementation. The City has used HUD's CDBG funds for sidewalk and gutter projects adjacent to bus stops and other mobility improvements, which requires coordination with City housing and public works departments. Trail projects are often funded through federal grant programs or the state Multimodal Transportation and Mitigation Options Fund.

Lessons learned from the City of Pueblo's experience:

- **Work with your partners and continually share and review best practices**. The City participates in the Colorado Association of Transit Agencies and regularly attends webinars and reviews resources from transit agency peers, the Federal Transit Administration, the Federal Highway Administration, and others to keep up to date on best practices, strategies, and funding opportunities.
- **Coordinate with agencies and departments**. As a smaller city, Pueblo's transportation department works closely with other City departments such as public works and with PACOG to implement new bus stop and multimodal transportation projects, making sure that priorities are aligned.
- **Prioritize community input**. The City regularly solicits public input and comments on proposed and recently implemented improvement projects and uses this input to evaluate their success. Other City departments with established community relationships from previous or current neighborhood planning efforts can help facilitate community engagement.

CPD Considerations: Street improvements (matrix code 03K) and sidewalk improvements (matrix code 03L) are CDBG-eligible activities in eligible LMI neighborhoods.

Pueblo Area Council of Governments

Step 5. Implement the Program or Project

1 Determine priorities

2 Engage partners

3 Establish goals

4 Design the program

5 Implement the program

6 Measure success and promote

The implementation process varies depending on the selected solution. Regardless of the solution:

- **Ensure projects follow established best practices, when available**. Review the implementation resources listed at the end of this guide.
- **Conduct ongoing stakeholder engagement and community outreach** to ensure the solution has broad support. Engagement should not stop during the planning phase but should continue through design, implementation, and evaluation. Explore Step 2 for more resources.
- **Develop strong partnerships** to aid in implementation. A Technical Working Group can provide a structure to regularly check in with project partners during the implementation phase. Following implementation, work with agency partners and community organizations to ensure the projects receive regular maintenance and upkeep. Consider hiring local workers for full-time, part-time, or contract/seasonal positions who can help with implementation. (For some projects, Section 3 hiring requirements could apply, depending on the funding source and cost of the project.) Also ensure projects are maintained as intended (e.g., sweeping, vegetation management, trash removal, etc.).
- **Identify opportunities for coordination with ongoing projects**, such as bikeway improvements that can be completed as part of a scheduled street repaving.
- **Revisit funding sources** to ensure you have sufficient funds in place to implement the project. Work with partners to identify additional funding sources that might be needed.
- **Continually track program/project progress** to ensure you have access to the data you need to measure project outcomes. Review Step 6 for more information.

Step 6: Measure and Promote Success

1 Determine priorities
2 Engage partners
3 Establish goals
4 Design the program
5 Implement the program
6 Measure success and promote

It is important to track progress and report outcomes and successes to demonstrate the value of mobility solutions. Identify and track performance metrics that are relevant, measurable, and accessible.

- **Identify Metrics.** As described in Step 3, based on the goals established, determine what metrics to track and how to measure progress toward those goals. Identify what you will measure, how you will measure it, and who will collect the information. Where possible, draw on existing metrics rather than creating new ones, and enlist community partners where possible to assist in tracking metrics.

  A range of potential mobility, safety, and sustainability metrics could be used to evaluate program or project success. Sample metrics are included in the Measuring Success box on the next page. Several of these metrics would require purchasing equipment or developing programs to track progress. For example, you can install permanent counters to track pedestrians and bicyclists at designated locations. You can track safety metrics as part of a larger Vision Zero effort, if applicable. You can track equity metrics as part of a larger sustainability effort (e.g., the change in tree canopy in a high heat neighborhood).
- **Establish Baselines.** Some metrics can require measurements at pre- and post-implementation to monitor success over time. For example, a program seeking to improve pedestrian and bicyclist safety and reduce collisions will need baseline collision and severity data. Additional metrics related to community engagement can also be measured before (and after) projects or programs are implemented. Baselines should be established during Step 3.
- **Capture Data.** Measure and record project or program data. Determine who will collect it, how they will convey it, and to whom. Where possible, turn qualitative issues into quantitative data so that you can track progress consistently over time.
- **Evaluate the Data.** Determine how often you will analyze and evaluate the data. Some data might be reviewed annually (e.g., changes in vehicle miles traveled) whereas you might review other data more frequently (e.g., monthly new transit riders at a transit stop). Where possible, compare the data to the baseline.
- **Share the Data.** Reporting success is an effective way to solidify public, political, and financial support. Determine how you will share activity results. Think about your audience, delivery method, content/language, timing, and messengers.
- **Reassess the Solution.** The findings from your data should allow you to assess strengths and weaknesses and identify opportunities to modify your program. This could include going back to Step 4 (Design the Mobility Solution) and redesigning aspects of your project or program. You might discover, for example, that you are not reaching your target population or that you need to increase community engagement. Understanding why you have not met your original goals provides an opportunity to tweak your approach and gather additional data for the next program iteration.

  Continue your community engagement and outreach through this process to provide community members with the opportunity to weigh in on program modifications. Strong engagement at every step will help increase transparency and build trust.

Pueblo Area Council of Governments

MEASURING SUCCESS

Mobility metrics
- Number of new transit riders at a transit stop
- Miles of bikeways implemented
- Changes in vehicle miles traveled (VMT)

Safety metrics
- Changes in number of bicyclist severe injuries and fatalities
- Changes in number of pedestrian severe injuries and fatalities
- Changes in number of driver severe injuries and fatalities

Sustainability metrics
- Change in tree canopy coverage
- Number of rain gardens planted or bioswales installed
- Square feet or acres of permeable or cool pavement installed

Equity metrics
- Employment opportunities created
- Number of LMI community members reached
- Change in tree canopy coverage in high heat neighborhoods

Participation and communication metrics
- Number of people who participated in the program or events
- Number of communities reached in primary language
- Number of people who signed up for newsletters

Implementation Resources

Complete Streets

Guide for the Planning, Design, and Operation of Pedestrian Facilities – American Association of State Highway and Transportation Officials (AASHTO)

Guide for the Development of Bicycle Facilities – AASHTO

Design Guides – National Association of City Transportation Officials (NACTO)

Complete Streets in the Southeast: A Tool Kit – National Complete Streets Coalition, Smart Growth America, AARP

Green Streets

Adapting to Urban Heat: A Tool Kit for Local Governments – Georgetown Climate Center

Green Infrastructure Wizard – EPA

Enhancing Sustainable Communities with Green Infrastructure – EPA

Green Streets Handbook –EPA

Land Use and Green Infrastructure Scorecard – EPA

Urban Street Stormwater Guide – NACTO

Trails and Greenways

Americans with Disabilities Act Accessibility Guidelines – U.S. Access Board

Greenways: A Guide to Planning, Design, and Development – The Conservation Fund

Manuals and Guides for Trail Design, Construction, Maintenance, and Operation, and for Signs – Federal Highway Administration

Trail-Building Toolbox – Rails-to-Trails Conservancy

Trail Planning, Design & Development Guidelines – American Trails

Mobility Hubs

Mobility Hubs: A Reader's Guide – Urban Design Studio, City of Los Angeles

Mobility Hub Planning and Implementation Guidebook – Metropolitan Council

Planning and Zoning for Mobility Hubs – American Planning Association

Mobility Hubs – Shared-Use Mobility Center

Mobility Hubs Toolkit – TransitMatters

Additional Resources

HUD Program Resources

HUD Community Resilience Toolkit

HUD Exchange

CDBG Consolidated Plan Data Quick Guide | HUD

Mobility

Active Communities ToolActive Communities Tool | Centers for Disease Control and Prevention

Community Connections Toolbox | USDOT

Complete Streets | USDOT

Complete Streets | Smart Growth America

Quick Builds for Better Streets | PeopleforBikes

Transit-Oriented Development | USDOT

Vision Zero Network

Sustainability

Beating the Heat: A Sustainable Cooling Handbook for Cities | Cool Coalition

Learn About Green Streets | EPA

Funding Resources

Consider the following resources in a search for available funding opportunities:

Grants.gov provides a centralized location for grant seekers to find and apply for federal funding opportunities. Specific federal grant programs include:

- Carbon Reduction Program
- National Electric Vehicle Infrastructure Formula Program
- Reconnecting Communities and Neighborhoods Grant Program
- Rebuilding American Infrastructure with Sustainability and Equity (RAISE)
- Recreational Trails Program
- Safe Streets and Roads for All Grant Program
- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation Formula Program

The Nature Conservancy | Promoting Nature-Based Hazard Mitigation through Federal Emergency Management Agency (FEMA) Mitigation Grants

National Wildlife Federation | Building Resilience through Natural Infrastructure: Barriers and Opportunities within FEMA Hazard Mitigation and HUD CDBG Programs

Glossary

Definitions have been adapted from their indicated source to align with the content of this guide.

Active transportation: A means of getting around that is powered by human energy, primarily walking and biking. (Rails to Trails Conservancy)

Bike lane: A portion of the roadway designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions and facilitate predictable behavior and movements between bicyclists and motorists. (NACTO)

Bike facility: A designated space within the street that is specifically designed for the movement of bicyclists. (NACTO)

Bikeway: A facility (e.g., lane, route, path) primarily for bike travel. (USDOT)

Climate change adaptation: Adjusting to actual or expected future climate. The goal is to reduce risks from harmful impacts of climate change such as sea-level rise, more intense extreme weather events, or food insecurity. (NASA)

Climate change mitigation: Reducing the flow of heat-trapping greenhouse gases into the atmosphere, either by reducing sources of these gases (e.g., burning fossil fuels for electricity, heat, transport) or by enhancing the "sinks" that accumulate and store these gases (e.g., oceans, forests, soil). (NASA)

Complete streets: Streets designed and operated to enable safe use and support mobility for all users. They include people of all ages and abilities, regardless of whether they are traveling as pedestrians, bicyclists, public transit riders, or drivers. (USDOT)

Cool pavement: Paving materials for sidewalks, parking lots, and streets that remain cooler than conventional pavements by reflecting more solar energy and enhancing water evaporation. This not only cools the pavement surface and surrounding air but also can reduce stormwater runoff and improve nighttime visibility. (EPA)

Cycle track, separated bikeway, or protected bikeway: An exclusive bike facility that is physically separated from motor traffic and distinct from the sidewalk. Cycle tracks have different forms, but all share common elements. They provide space that is intended to be exclusively or primarily used for bikes and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. (NACTO)

Equitable transit-oriented development (eTOD): Promotes affordable housing options near transit and seeks to enable all community members—regardless of income, ethnicity, gender, or ability—to enjoy mixed-use, walkable neighborhoods with ready access to amenities such as local retail, restaurants, parks, healthcare, and employment centers. (HUD)

First/last mile: The travel involved between a traveler's origin/destination and a transit station/stop. (American Public Transportation Association)

Green infrastructure: An alternative to piped drainage and water treatment systems, by using vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier urban environments. At the city or county scale, green infrastructure is a patchwork of natural areas that provide habitat, food protection, cleaner air, and cleaner water. At the neighborhood or site scale, green infrastructure can be a stormwater management system that mimics nature and soaks up and stores water. (EPA)

Green street: A stormwater management approach that incorporates vegetation (e.g., perennials, shrubs, trees), soil, and engineered systems (e.g., permeable pavements) to slow, filter, and cleanse stormwater runoff from impervious surfaces (e.g., streets, sidewalks). Green streets are designed to capture rainwater at its source, where rain falls. Green streets are an alternative to traditional streets. (EPA)

Greenway, trail, or shared-use path: Exclusive right-of-way for pedestrians and bicyclists and with minimal cross flow by motor vehicles. Where shared-use paths are called trails, they should meet all design criteria for shared-use paths to be designated as bike facilities. (USDOT)

Heat island: Built-up areas that are hotter than nearby areas. Heat islands can affect communities by worsening summertime peak energy demand, air-conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality. (EPA)

High injury network: the mapping of corridors where high numbers of people have been killed and severely injured in traffic crashes (Vision Zero Network)

Location-efficient housing: Housing, including market-rate, mixed-income, and affordable housing, that benefits from being located in communities near work, schools, services, and amenities and has accessibility to public transit networks. (HUD)

Micro mobility: Small, low-speed, and lightweight vehicles intended for personal use; includes station-based bikeshare systems, dockless bikeshare systems, electric-assist bikeshare systems, and electric scooters. (USDOT)

Mobility hub: A convergence of transportation modes at a single location, bringing together carsharing, bikesharing, and other shared-mobility services close to public transit stops and large residential developments. (Shared-Use Mobility Center)

Multimodal transportation: Considers and accommodates the many ways public transit users get to and from a public transit stop. Those methods include walking, biking, riding feeder public transit systems (e.g., taking the bus to connect to commuter rail at a station), and driving. (USDOT)

Pedestrian plaza or public plaza: An area fully within the public right-of-way that is designated for pedestrians. (New York City DOT)

Quick-build: A type of project led by a city government or other public agency, installed roughly within a year of the start of planning, planned with the expectation that it could undergo change after installation, and built using materials that allow such changes. (PeopleForBikes)

Shared mobility: A transportation service shared among users. Public transit and traditional carpooling and vanpooling are the original forms of shared mobility. Common shared mobility options are carsharing and ridesourcing, as well as micro mobility (transportation modes smaller than a car) such as bikesharing and shared scooters. (EPA)

Stormwater: Water generated from rain and snow melt events that flows over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, which does not soak into the ground. (EPA)

Transit-oriented development: Dense, walkable, and mixed-use spaces connected to transit that support vibrant, sustainable, and equitable communities. Projects can (but do not always) include a mix of commercial, residential, office, and entertainment land uses. (DOT)

Traffic calming: A combination of measures that improve conditions for non-motorized street users. These include physical design and other measures put in place on existing roads to reduce vehicle speeds and improve safety for pedestrians and bicyclists. Traffic calming measures can be implemented at an intersection, street, neighborhood, or area-wide level. (USDOT)

Vehicle miles traveled (VMT): The estimated on-road distance traversed by each trip for a given vehicle type, region, and time period. VMT per capita is calculated as the total annual miles of vehicle travel divided by the total population in a state or in an urbanized area. VMT levels are lower in communities that are more walkable and compact and in communities that have strong public transit systems. (USDOT)

Vision Zero: A strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, equitable mobility for all. First implemented in Sweden in the 1990s, Vision Zero has proved successful across Europe—and is now gaining momentum in major American cities. (Vision Zero Network)

Notes

EPA. 2023. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021. U.S. Environmental Protection Agency (EPA) 430-R-23-002.

National Aeronautics and Space Administration (NASA). 2023. Responding to Climate Change. Mitigation and Adaptation | Solutions – Climate Change: Vital Signs of the Planet (nasa.gov).

EPA. 2021. Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. EPA 430-R-21-0003.

EPA. 2023. Heat Islands and Equity.

Portland State University. 2020, April. Bike Lanes Provide Positive Economic Impact. ScienceDaily.

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