CONTENTS

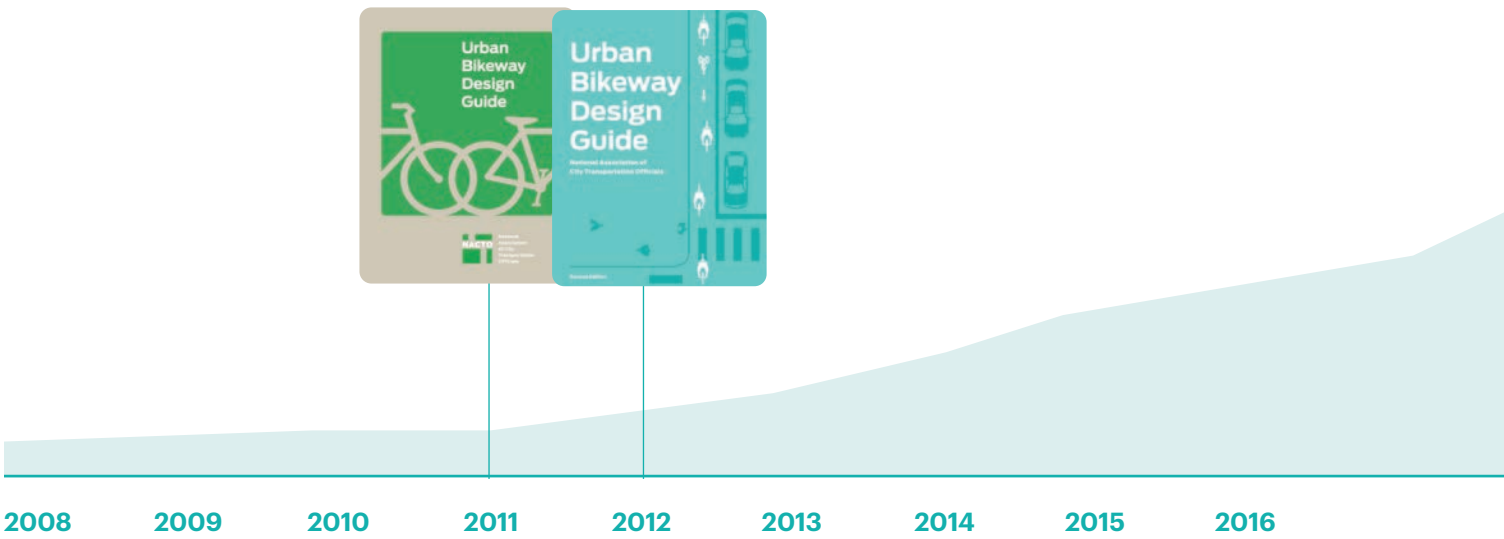
A NEW ERA FOR SAFE, BIKEABLE CITIES

Biking is an increasingly integrated and integral part of city life across North America. Cities are building more places for people to bike, shared micromobility systems are registering record ridership, and people are riding down bike lanes on an increasingly wide variety of mobility devices, including electric bikes, cargo bikes, scooters, and adult tricycles. New, creative street designs are meeting this surge in demand, making biking even more popular and accessible.

We've come a long way since 2009 when cities banded together to develop NACTO's *Urban Bikeway Design Guide*. This first-of-its-kind document–bikeway design guidance developed by cities, for cities–sparked a design revolution nationwide, elevating city ingenuity and values in service of safe, vibrant streets and transportation networks.

The first and second editions of the *Urban Bikeway Design Guide* established a new vision for city streets: safe, accessible, and inviting for people on bikes. This groundbreaking resource documented how cities collaborated to exchange ideas, vet designs, codify best practices, and implement bike-forward street redesigns. It was endorsed by the U.S. Department of Transportation and dozens of local and state governments across North America. NACTO's new guidance gave transportation practitioners permission to experiment, confidence to demonstrate what was possible, and clarity about what to build to improve bikeability. As a result, in the years since the *Urban Bikeway Design Guide* was first published, cities have championed people-centered streets as a critical tool in stemming North America's traffic safety, equity, and climate crises.

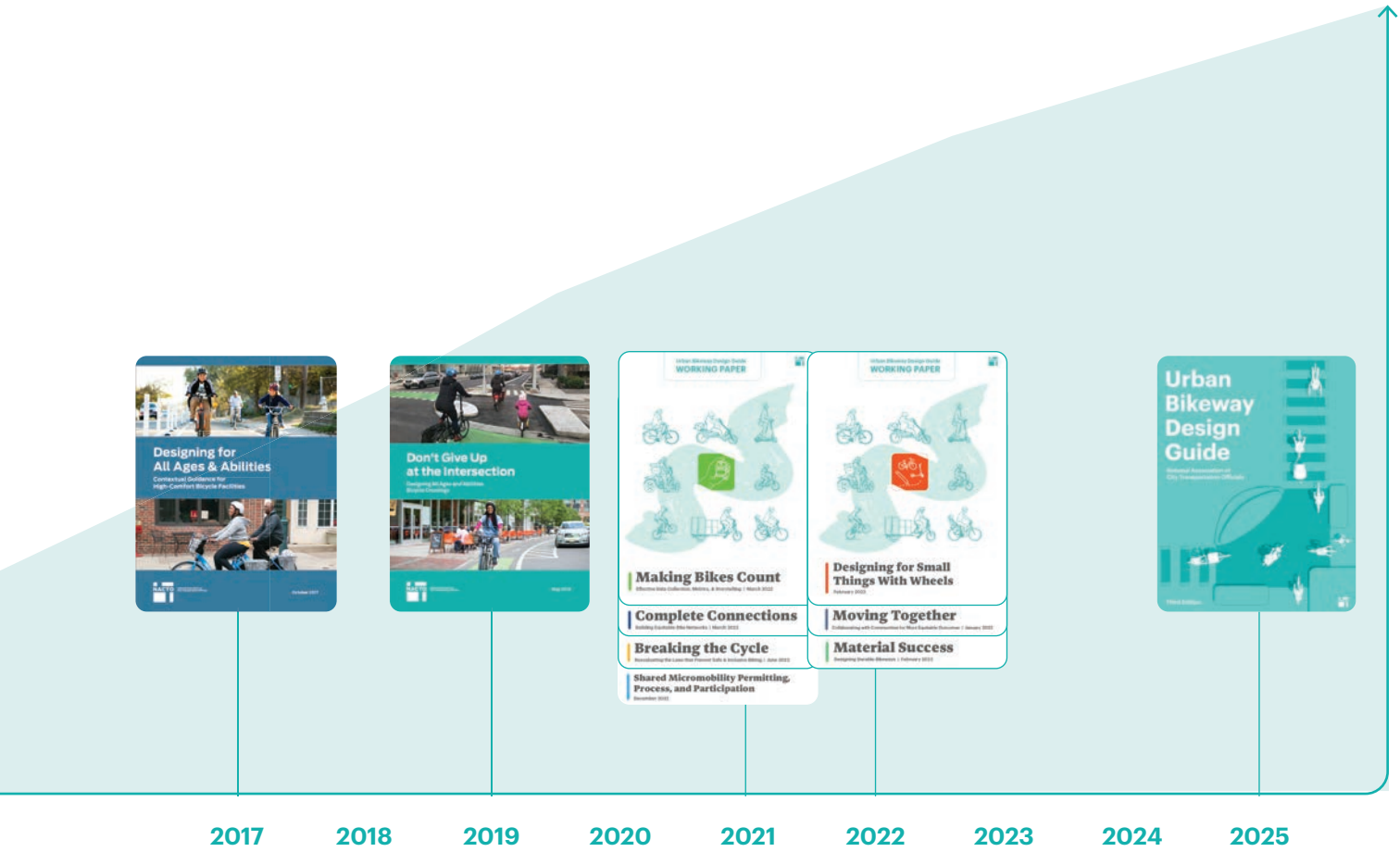
PROTECTED BIKE LANE MILEAGE IN THE US

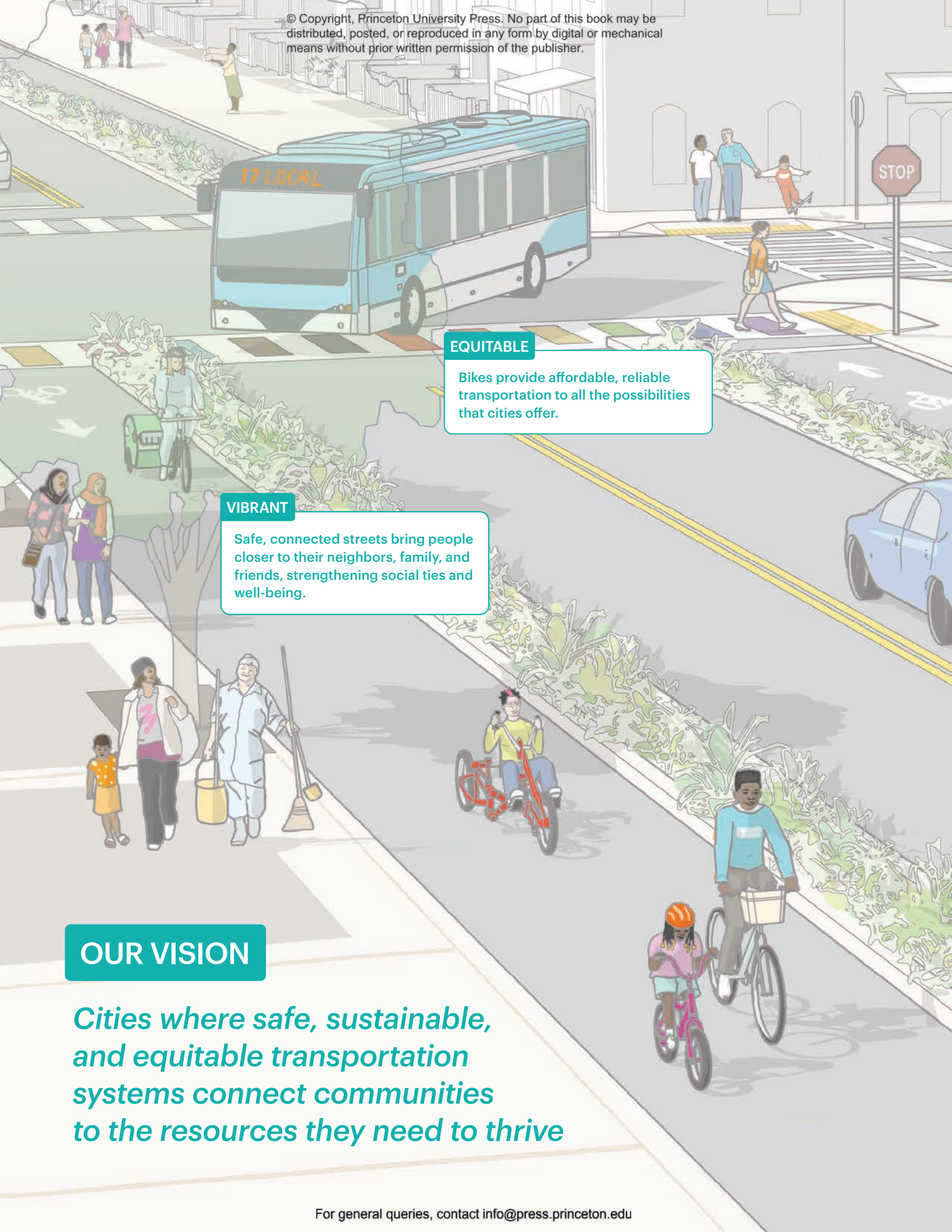


This third edition of the *Urban Bikeway Design Guide* moves beyond illustrating what we *can* do. Instead, it defines what we *must* do to make city streets safe, connected, accessible, and equitable.

It sets new standards for bike network planning, bikeway design, and program and project evaluation to create bikeable cities for people of all ages and abilities. It identifies new practices for integrating faster-moving vehicles, such as e-bikes and scooters, and wide vehicles, such as cargo bikes, into the design process. And it demonstrates how to center equity as the cornerstone of a safe and connected bike network.

What was once groundbreaking is now routine, with millions of people riding bikes and scooters to commute to work and school, meet friends, pick up groceries, or access healthcare. However, there is much more to be done. NACTO and our members are proud of the *Urban Bikeway Design Guide*'s role in transforming streets. With this new edition of the guide, we commit to raising the state of the practice again– and call for policymakers, elected officials, engineers, planners, and community members to join us by committing to help usher in a new era of sustainable, accessible transportation for all– with biking at the fore.





EQUITABLE

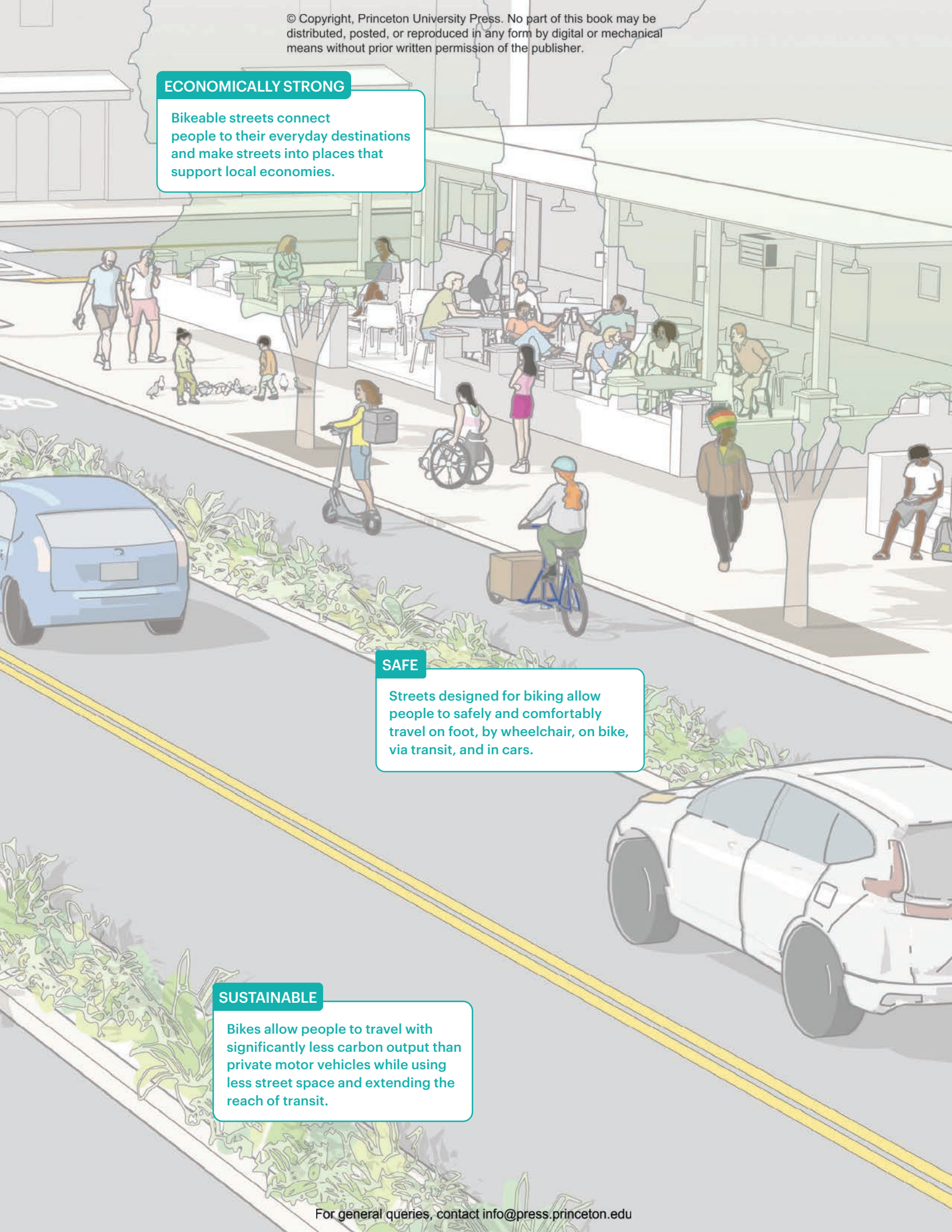
Bikes provide affordable, reliable transportation to all the possibilities that cities offer.

VIBRANT

Safe, connected streets bring people closer to their neighbors, family, and friends, strengthening social ties and well-being.

OUR VISION

Cities where safe, sustainable, and equitable transportation systems connect communities to the resources they need to thrive



For much of the last century, the streets of most North American cities were designed primarily to quickly move people driving in cars, trucks, and SUVs. The human cost of this design approach has been immense. People in the U.S. are far more likely to be killed in traffic crashes than in other industrialized countries.[1] The transportation sector is the largest source of greenhouse gas emissions in the U.S., and 81% of transportation emissions come from passenger cars, trucks, and SUVs.[2]

Importantly, these crises have not affected all communities equally. Black, Latine,[3] and Indigenous pedestrians are more than twice as likely to be struck and killed by a motor vehicle[4] as white pedestrians and more than four times as likely to be killed while riding a bike.[5] Likewise, Black people in the U.S. are exposed to 31% more fine particulate air pollution[6] as compared to white people in the U.S.

In the past two decades, a different vision for our cities has gained momentum. Innovative cities across North America are increasingly designing streets not solely as corridors that move motor vehicles but as vibrant places that safely connect communities to opportunity and to each other.

Washington, DC

Detroit, MI

In this vision, cities have safe, sustainable, accessible, and equitable transportation systems that allow communities to access the resources they need to thrive. These are cities where children can safely travel to school or the park without fear of being hit by a speeding driver, where Black residents are not arrested for biking down the sidewalk on a busy street, or where working parents do not arrive late because of infrequent transit connections. In these cities, jobs, healthcare facilities, supermarkets, and social and cultural institutions are easily accessible without a privately owned motor vehicle. The transportation systems in these cities are multimodal, provide access to people of all ages and abilities, and serve to link neighborhoods–rather than divide them. Streets in these cities make the lives of those who use them safer, healthier, more convenient, and more joyful.

While a high-quality bike network is not the only tool necessary to bring this vision of vibrant and successful cities into reality, it is a crucial one. Streets that are thoughtfully designed to prioritize biking are **safer** for everyone[7]–not just people using bikes, but those walking, riding in motor vehicles, and using other mobility devices. Bikeable streets are also **more sustainable**; even a small shift in mode share from private motor vehicles to bikes and e-bikes can produce a significant drop[8] in carbon emissions, and micromobility devices play a key role[9] in reducing global oil consumption.

When cities build for bikes and other micromobility devices, they build a **more accessible and equitable future**. Buying and maintaining a bike is significantly more affordable than owning a car, which costs an average of more than $12,000 per year,[10] factoring in fuel, maintenance, insurance, and other costs. Owning a bike costs as little as $400 per year.[11] Government rebates for e-bikes as well as income-eligible discounts for bike share systems have made biking even more cost-effective. Research demonstrates[12] that equitable, well-connected bike networks encourage more women and people with low incomes to bike and can also reduce the alarming racial gap[13] in traffic deaths and discriminatory traffic enforcement practices that disproportionately put Black, Latine, and Indigenous communities at risk.

Streets that are thoughtfully designed to prioritize biking are safer for everyone—not just people using bikes, but those walking, riding in motor vehicles, and using other mobility devices.

Investing in bike infrastructure makes smart economic sense for cities. High-quality bike infrastructure can often be built within existing infrastructure with relatively low-cost materials, and can help spur job creation[14] and increased economic activity.[15] It can also make our communities **healthier**[16] and **happier**[17], not only because of the individual benefits to health and well-being that bikes offer, but because safer streets create more opportunities for residents to connect with each other and with the anchors of their community.

Milwaukee, WI

WHAT LEADERSHIP LOOKS LIKE

An impactful leader starts by articulating a broad vision for city streets.

Today's top city leaders recognize the key role that transportation plays in solving current climate, economic, safety, equity, and health challenges.

But true leadership requires more than just a recognition of the importance of transportation. It requires setting a vision, dedicating resources, laying the groundwork for success, and committing political capital, so that when the work gets tough, projects still get done and a city's transportation network reaches its full potential.

An impactful leader starts by articulating a broad vision for city transportation: where streets are safe, transit connects people to their destinations, and biking is accessible to people of all ages, abilities, and backgrounds. In this city, residents can walk out their door, hop on a bike or scooter, ride on safe, well-designed streets, connect to transit, and arrive at their appointments on time and without worry.

To be effective, this vision is codified and repeatedly underscored–in speeches, interviews, policy-setting documents, and in meetings with elected officials, with residents, and, importantly, with the staff entrusted to make their city a great place to walk and bike.

For this vision to be successful, leaders must pave the way not just with broadly stated support but with real resources, structures, and backing when progress gets tough.

For transformative change on city streets and in transportation networks, leaders must provide:

AN ARTICULATION OF WHAT A TRANSFORMATIVE BIKE NETWORK LOOKS LIKE.

A transformative bike network requires high-quality bike infrastructure that is comfortable and inviting for riders of all ages and abilities, designed as part of a connected network, and built equitably so that the neighborhoods that would most benefit from safer, more inviting streets are prioritized.

AN ORGANIZATIONAL STRUCTURE THAT SUPPORTS THE DELIVERY OF HIGH-QUALITY BIKE PROJECTS.

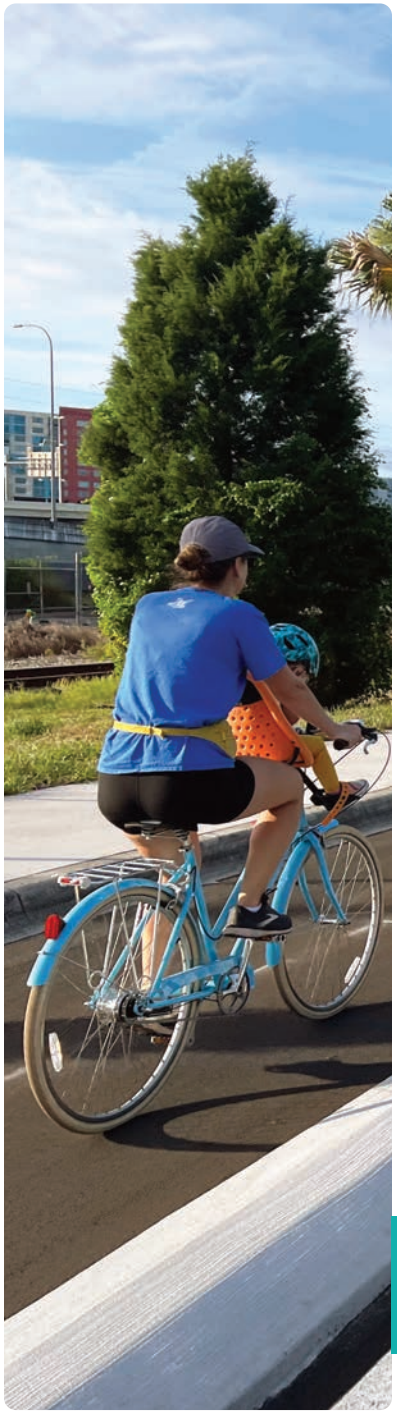
When city agencies are strategically and intentionally organized, with strong coordination and clear hand-offs, they are more likely to deliver projects on time and on budget, scale outputs to meet needs, and solve issues early and quickly.

CLEARLY OUTLINED POLICIES, PRIORITIES, AND COMMITMENTS TO BIKING.

Outlining coherent goals (such as 50% of residents living within a three minute walk of a high-quality bike facility), priorities (safe travel instead of more on-street parking), and policies (e-bike purchase subsidies, reformed traffic laws) can connect an inspiring vision to tangible change on the ground. These policies and priorities also connect biking to other city goals–such as extending the reach of transit, making streets safer for everyone, increasing access to jobs, and reducing greenhouse gas emissions.

RELIABLE AND SUFFICIENT FUNDING TO ACCOMPLISH PRIORITY PROJECTS AND POLICIES.

When agency staff can count on a predictable funding stream, they can efficiently match the resources available instead of chasing one-off projects. Sufficient and reliable funding is key for staff to move from scrambling to thoughtfully engaging all units of city government, contractors, and residents in predictable, carefully planned, year-over-year improvements to city streets.



Tampa, FL

AN INVESTMENT IN STAFF.

Dedicated leaders invest in their staff. They advocate for new positions to meet the city's goals and hire using equitable practices. They support and champion their workforce, from office staff to field staff. They help managers create and use clear, transparent, and accessible processes to deliver projects and develop an inclusive, supportive working environment.

CLEAR DECISION-MAKING PROCESSES.

Clarifying and publishing decision-making processes helps agency staff and community members build alignment, trust, and a shared understanding of how to effectively collaborate and reduces the risk of individual voices canceling or diminishing safety-forward street projects.

RESOURCES FOR COMMUNITY ENGAGEMENT AND COMMUNICATION.

Robust staffing and support for community engagement practices that match neighborhood needs is essential. Agency staff need resources to work alongside residents, helping them understand how they can shape their streets and how citywide priorities can be applied to transportation projects like building transformative bike networks.

A WILLINGNESS TO PIVOT AND RAPIDLY RESPOND.

Pushback is part of the process of making change. Effective leaders listen with openness to community concerns, work to understand the bigger picture, and act nimbly to address concerns and show progress.

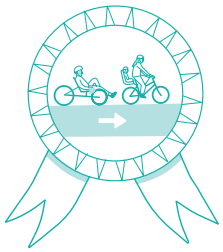
Upgrading streets that have not meaningfully changed in decades is hard and requires real leadership. Residents must be able to tangibly see the positive impacts of safer streets and inviting places to ride–and until then, leaders must commit to working through a process of communication and patience that can be difficult and complicated.

With committed leadership, the end result can be transformative. By building high-quality bike networks–and therefore safer, more equitable, and inviting streets–leaders can connect their residents to opportunity and to each other. Investing boldly, thoughtfully, and comprehensively will enable city leaders to make streets safer, unlock opportunities for their residents, and make their cities healthier and more joyful.

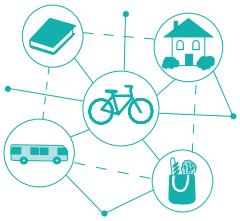
AN EFFECTIVE BIKE NETWORK IS HIGH-QUALITY, CONNECTED, AND EQUITABLE

Biking is a fundamental part of a vibrant, connected, sustainable city. Bikes increase access to cities, expanding opportunities for where people can live, work, and play. The decisions people make about how they travel are informed by the projects and programs cities design and the level of safety, reliability, and affordability those projects and programs provide. We cannot expect a growing number of people to bike unless we provide safe and connected places for them to ride.

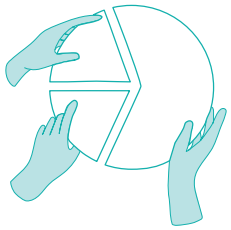
For biking to reach its potential, cities must push beyond piecemeal development of individual bike lanes to plan for and invest in bike networks that are high-quality, connected, and equitable:



High-quality bike infrastructure, from concrete-separated bikeways to traffic-calmed boulevards, is safe and comfortable and accommodates users of **all ages and abilities**. High-quality infrastructure protects riders from vehicular traffic and uses durable materials that require limited maintenance, allowing cities to reconfigure more streets as safe places for everyone.



When bikeways are part of a **connected system** with well-designed intersections, they create a network that makes biking efficient and convenient. Networks that link neighborhoods to each other and to jobs, education, and social, cultural, and transit hubs enable longer and more diverse trips, promote multimodal transportation options, and reduce congestion.



For bike networks to truly serve all communities, they need to be developed **equitably**, offering historically-disinvested neighborhoods access to safe and convenient places to ride that are connected to the professional, personal, and communal opportunities in cities. Doing this work means acknowledging and beginning to address the racial and economic inequities reflected in and caused by our transportation policies. These policies historically and currently marginalize low-income communities, communities of color, immigrant communities, and people with disabilities.

Building an All Ages & Abilities bike network requires careful planning, community consultation, and political leadership dedicated to the hard work of changing decades-old practices on city streets.

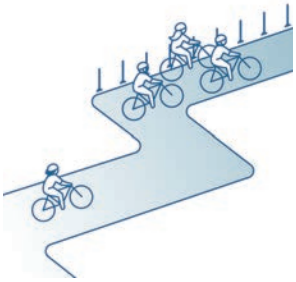
THIS GUIDE PROVIDES THE BLUEPRINT FOR THAT WORK.

2 PLANNING AND DEVELOPING A BIKEABLE CITY

2.1 IMAGINING A FUTURE BIKE NETWORK

IMAGINING A FUTURE BIKE NETWORK

A high-quality, connected bike network provides safe and comfortable links both between and within neighborhoods. This is at the foundation of a safe, sustainable, and equitable transportation system. It means people have the choice to bike to their everyday destinations, whether that is the neighborhood park, the rail station, or the downtown library.



BUILD FOR GROWTH

Biking is the fastest-growing mode of transportation in North American cities, necessitating forward-thinking bike network planning. A robust network should accommodate future cycling demand and give everyone the chance to get where they're going by bike–even if they don't make those trips by bike today.

Equitable bike network development is crucial, extending beyond areas with high bike volumes. Low bicyclist counts often reflect a lack of safe and connected bike infrastructure, particularly in communities that have been historically marginalized. In areas with high existing bike volumes, cities should anticipate further growth as the network expands. Go beyond minimum recommendations for bikeway width, signal time, and protection materials.

COLLABORATE ON A SHARED VISION

A Bike Network Plan establishes a shared vision for bikeable streets, prioritizes streets for change, and sets common design principles. From the outset, community members should join city officials and staff in decision-making. Local expertise can inform discussions about community travel patterns and past engagements with government agencies. This collaboration ensures a bike network tailored to local needs. The shared vision facilitates project-specific collaboration on details like curb use, alignment, and materials.

MEET URGENT SAFETY NEEDS

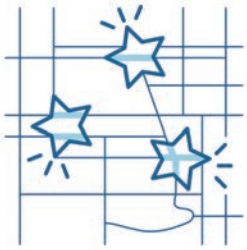
Cities across North America must prioritize safety-oriented redesigns of streets where people riding bikes are at risk. Projects that reduce top speeds, organize roadways, and improve intersection safety should be the norm, not the exception, on major streets. Data-driven analyses should identify high-injury networks and consider socio-demographic data to ensure equity.

INVEST EQUITABLY

Neighborhoods that have endured public disinvestment, highway construction, and redlining require comprehensive infrastructure improvements beyond bikeways. Car-centric streets often lack basic infrastructure for pedestrians and transit riders, despite being hubs for retail, services, and affordable housing. Bikeway projects should be part of a broader investment strategy that includes sidewalks and curb ramps, green stormwater infrastructure, and community outreach and conversations. Do not shy away from spending resources to close physical, economic, and social gaps created by historic disinvestments.

ELEVATE WALKING AND TRANSIT AS COMPLEMENTARY TRANSPORTATION OPTIONS

When developing a bike network, cities must embrace the types of modal choices their residents are already making–as well as the choices they could make with an improved network. People should be able to walk or use public transportation in tandem with or instead of biking, depending on the neighborhood and the trip.



ENSURE SUCCESS

A connected, equitable bike network will take time to implement, but it should not take a generation. Cities should have a meaningful bike network within a decade, with more bikeways built each year. Cities should start funding design and construction contracts, planning for cross-agency collaboration, and developing supportive programs now.

DESIGNING FOR ALL AGES & ABILITIES

Bikeway design must meet the needs of a diverse array of potential bike riders.[2] Across North America, however, many existing bike facility designs provide enough comfort for only the boldest people biking and exclude many who might otherwise ride.

An **All Ages & Abilities** (AA&A) bikeway is one that feels comfortable and provides safety for all current and potential users. AA&A is inclusive of age, ability, type of bike or mobility device, socioeconomic status, race, gender, or any other identity and experience a person may hold. For many people, feeling safe and comfortable goes beyond just physical protection from motor vehicles. High-quality AA&A bikeways can create a sense of safety by helping people feel as though they belong, are safe from potentially dangerous interactions with police officers, and are welcome to use a variety of adaptive bikes and mobility devices.

AA&A bikeways are safe and comfortable for people:

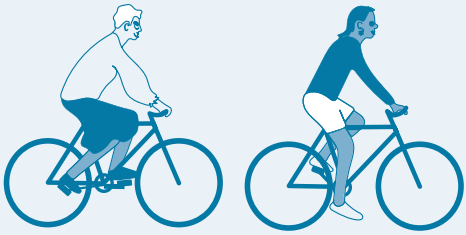
Of all ages, sizes, and physical abilities. On an AA&A bikeway, grandparents and grandkids can ride bikes together. These designs support children and older adults, who sometimes have lower visual acuity and slower riding speeds, and people with disabilities who might use lower-profile or wider three-wheel adaptive bikes. Those with disabilities who are not using bikes or micromobility devices but need to cross or navigate around bikeways are also taken into account.

Of all races and ethnicities. Black and Latine people on bikes are more than four times as likely to be killed in a traffic crash than white people on bikes. Additionally, law enforcement officers issue a disproportionate number of traffic tickets to Black and Latine people on bikes for actions such as biking on the sidewalk. High-quality bike infrastructure makes streets safer and reduces police interactions. Research from Chicago found that major streets with bike lanes had half the number of tickets compared to similar streets without bike lanes.

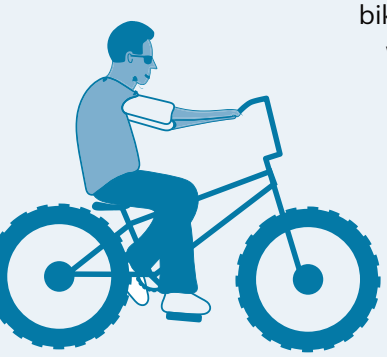
Of all incomes. Low-income bicyclists make up half of all Census-reported commuter bicyclists, relying extensively on bicycles for basic transportation needs such as getting to work. Research shows that unhoused people are given a disproportionate number of bike tickets in some jurisdictions, including for minor issues such as riding helmetless. Basic infrastructure is often deficient in low-income neighborhoods, creating real safety issues for those who bike there.

Of all experience levels and despite past experiences. Bikeways need to be welcoming to people who have little experience biking on urban streets and those who have had previous negative experiences while riding a bike or other micromobility device. AA&A bikeways enable people to feel confident biking–and learn to feel comfortable biking on a wider variety of urban streets.

Of all gender identities and sexual orientations. In most North American cities, people who bike are predominantly male. Surveys reveal that women in particular cite safety and lack of bike infrastructure as core reasons why they choose not to bike. Women and LBGTQ+ people also report regular harassment while biking. High-quality facilities on urban streets create a sense of safety by being well-lit and highly visible to passersby. AA&A bikeways feel safe and welcoming for people of a diversity of gender expressions and experiences.



Working in a variety of industries. Often paid per delivery, workers who deliver on bikes need bike lanes that accommodate faster speeds and a wider range of devices, including e-bikes and cargo bikes. AA&A bikeways are suitably wide and feature intersection designs that enable these workers to get around at pace. People who work using bikes also benefit from infrastructure that limits interactions with police, as every interaction risks time and money lost from a day's work.



Using all types of bikes and micromobility devices. AA&A bikeways are designed for people moving goods or cargo, whose bikes are often wider and longer; caregivers with children on their bikes, who are extra concerned with safety and may require frequent stops; people riding electric scooters or electric bikes, who move faster than many other people on bikes; and people riding adaptive bikes and adult tricycles, whose bikes are larger and slower than other bike facility users.

2.2 PLANNING A BIKE NETWORK

Pittsburgh, PA

A Bike Network Plan conveys the importance of a safe bike network, the intended outcomes of the network, projected outputs, and a clear decision-making rationale. The plan should demonstrate how improving bike connectivity supports broader city goals, including economic activity and recovery, public health gains, and climate change mitigation and adaptation. Transportation equity should be defined, as well as how biking helps achieve an equitable transportation system.

A city's Bike Network Plan should be collaboratively created, engaging residents, community groups, city leaders, and staff within relevant agencies in the process. These critical stakeholders should work together to develop a clear process based on trust and transparency with appropriate outreach at each step of finalizing the plan. Adequate resources to develop the plan, including funding for outreach in historically disenfranchised areas and translation or interpretation of materials, must be identified at the outset.

A Bike Network Plan should be a real blueprint that establishes and communicates objectives even through staff turnover or change among elected officials.

City staff charged with developing the plan must engage directly with residents and adapt the plan based on their input. However, plan iterations should not comprise the goal of a connected, safe, and equitable network. Instead, each should refine the routes to reflect important destinations, geography, topography, demographics, data, policies, and history.

A bike network should emphasize connections to everyday destinations: grocery stores, parks, schools, and other places identified as important to residents. First, work with community members to identify where people are and where they need to go. Then, layer where existing network links exist and, importantly, where there are gaps or barriers. A mature bike network will eventually cover the entire city across a variety of streets and bike facilities.

When planning a bike network, it is vital to collaborate with the area's transit agency and its services. Together, transit agencies and city staff can identify opportunities for biking to support transit goals, such as connecting neighborhoods with major rail or bus stations. This process may reveal a need for bike parking or education about taking bikes on transit. The collaboration will also reveal some conflicts between modal needs. While these conflicts may not be resolved within the final network plan, they should be noted and addressed in project design.

In some cities, a series of neighborhood-level network plans may be more effective than a single citywide plan. Doing so allows for targeted engagement within neighborhoods, often an easier level to engage at than citywide. Neighborhood plans can also be prioritized in areas with historic disinvestment or where more community collaboration is warranted. As those neighborhood plans are developed, agency staff must keep in mind how people on bikes will navigate between neighborhoods to reach key destinations or cross difficult barriers, such as rivers or train tracks.

A Bike Network Plan should be a real blueprint that establishes objectives despite staff turnover or election cycles. While cities should be able to rely on their Bike Network Plan to build out a network over an extended period of time, key projects identified in the plan should also be immediately actionable.

CENTERING EQUITY IN OAKLAND'S BIKE PLAN

In July 2019, the Oakland Department of Transportation (OakDOT) announced Let's Bike Oakland, a citywide bicycle plan unanimously adopted by the City Council to prioritize safe, affordable, and healthy mobility options for all Oaklanders. What made the creation of this bike plan special was its intentional approach to outreach and engagement, seeking to be reflective of the thoughtful participation of the Oakland community. Robust and interactive, the bike plan was designed to put collaboration, accountability, and active listening at the heart of its development.

The OakDOT team, in partnership with local community-based organizations, consultants at Alta Design + Planning, and the Oakland Department of Race and Equity, began by drafting an equity framework to define action steps and ways to measure progress. To ensure consensus, the creation of this framework was accompanied by various workshops. The framework asked who the most vulnerable groups were and how they could best be served to make biking a realistic and viable mode of transportation for all, regardless of background.

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