



PAS MEMO

Local Bicycle Master Planning: Connecting Communities

By Drusilla van Hengel and Collin Chesston

The case for public investment in bicycling is getting stronger every day, as advocacy and peer reviewed literature expands our understanding of the relationships between infrastructure, bicycling activity, economics, and public health.

While recreational bicycling has long enjoyed popularity in the U.S., bicycling for transportation has not been viewed as a mainstream mobility option until relatively recently. In some communities, the view that bicycling represents a legitimate replacement for personal auto trips is still emerging. Using human power to pedal from one location to another for practical reasons is a form of "active" transportation, also sometimes called nonmotorized transportation.

As the evidence builds, planners, policy makers, and engineers around the country are increasingly recognizing that mode shift towards bicycling conveys individual as well as community benefits such as increased safety for all road users, improved air quality, savings on roadway construction and maintenance, and revitalized neighborhoods. As local interest in bicycling grows, some communities are developing bicycle master plans.

A bicycle master plan is an instrumental blueprint for building bikable communities, and the process of creating one is a means of prioritizing active transportation to meet community environmental, health, and fiscal goals. Because bicycle master plans leverage the benefits bicycling for everyone, including those who choose not to ride, they are key strategic documents for enhancing overall community livability.

This *PAS Memo* summarizes some of the recent research on the benefits of bicycling and provides guidance on developing bicycle master plans.

Bicycling Participation

Bicycling is experiencing a revolution. As cities from San Diego to New York and from Seattle to Atlanta expand their bicycle networks with a range of protected and innovative bicycle facilities, bicycles are becoming more prevalent and moving closer to the mainstream. The growing literature is heralding its return from "toy" to respectable transportation status. The bicycle is back as a fun way to move communities towards a stronger economy, better health, and improved safety.

The number of people who bicycle to work has increased steadily since 1990, and now represents approximately 1 percent of all commute trips. In June 2013, the *Christian Science Monitor* reported on League of American Bicyclists' data that showed bicycling rates up 47 percent overall between 2000 and 2011, and up as high as 80 percent in communities that are bicycle friendly (Sherer 2013). Among large cities, the leading bicycling rates of 5.5 percent and 4.1 percent are seen in Portland and Minneapolis, respectively.

OVERALL GROWTH OF BIKE COMMUTING (2000-2011)



Image courtesy League of American Bicyclists, American Community Survey

This trend, in concert with the trend in reduced automobile vehicle-miles traveled and automobile ownership among young Americans, will challenge the way transportation and land-use planners do their work to meet future needs.

Estimating Transportation Investment Benefits and Performance

Compared with automobile-focused projects, investments in so-called "alternative" transportation

such as bicycle facilities have historically been at a disadvantage when it comes to funding and implementation. Traditionally, the value of transportation investments has been measured by their ability to increase motor vehicle capacity and decrease delay. In part, this perspective was a function of widely accepted practices to support the development of national and state highways that serve the mobility of motorists and freight through and between cities. With the passage of the Intermodal Surface Transportation Efficiency Act of 1991, however, a wider variety of federal highway fund investment choices became possible.

Qualifying nonmotorized and transit projects for funding previously limited to highways presented a downstream challenge of how best to select the projects and evaluate their success. Documented community support for these projects became an increasingly important method to argue for funding. In fact, the state of California quickly instituted a requirement that cities must adopt bicycle transportation plans in order to qualify for new statewide Bicycle Transportation Account funds.

In today's competitive funding climate, where highway maintenance needs are eclipsing available funds, support for new transportation projects depends in large part on demonstrating that the costs of their construction are heavily outweighed by their benefits. But methodologies for quantifying relevant benefits and evaluating performance of active transportation projects have been slow to emerge, as these investments support communities in different ways and at different scales from auto-oriented projects. For example, due to the shorter length of bike trips and the relatively small number of trips taken, the surface benefits may appear small compared with a typical roadway project.

Typically, the macroeconomic benefits in economic productivity from highway investments have been measured through the creation of jobs, improvements in passenger and freight mobility, and improved access to land. At the local scale, benefit-cost analyses have assessed direct benefits and costs such as changes in travel time, crashes, vehicle operating costs, agency construction costs, and pollution costs (FHWA 2013). Until recently, planners have been without established methods to justify spending on bicycle facilities and programs. However, current research is showing that the cumulative effects of these "local" projects can be nationally important, due to their direct benefits to users as well as indirect societal benefits (Krizek 2005). The following section describes some of the current research in this area.

Benefits of Bicycling

Although a consistent evaluation framework has yet to emerge, a growing amount of research is examining the impacts of bicycling facilities and bicycle usage. This section provides a brief summary of the existing literature on this topic. Direct benefits of investments in bicycle infrastructure include mobility, health, and safety improvements that accrue to users and society as a whole. Indirect benefits such as decreased air pollution and congestion and increased livability and economic growth also result.

One way to identify research relevant to practitioners is to think about community values and how benefits will speak differently to different stakeholders. While the bicycling industry may seem relevant in some communities, the potential for bicycle tourism might intrigue others. Krizek describes the benefits of bicycling and bicycle facilities as accruing across the categories of mobility, health, safety, decreased externalities such as congestion and air pollution, and livability (2005). This review roughly follows that framework.

The Business of Bicycling

People who ride bikes tend to buy them, along with related equipment and apparel (Alta Planning + Design 2008). These purchases support jobs and manufacturing that amount to a \$6 billion national industry (NBDA 2012). Bicycling also supports the construction trades through the building of places where people ride. Capital investments in bicycling are relatively small, and therefore are returned through use and economic activity in the local economy relatively quickly.

In North Carolina, for example, a \$6.7 million investment in bicycle infrastructure generates \$60 million in bicycle tourism annually (Flusche 2012). Using detailed cost estimates on a variety of projects from 11 cities, Garrett-Peltier (2011) used an input-output model to study the direct, indirect, and induced employment that is created through the design, construction, and materials procurement of bicycle, pedestrian, and road infrastructure. The study concludes that 11.4 jobs are created with each \$1 million spent on cycling projects. Finally, studies of the impacts of bikeway facilities show that they make nearby real estate more desirable, enhancing property values and increasing property and sales tax revenues (Rails-to-Trails Conservancy 2003).

Bicyclists Buy

Not only do bicyclists buy for bicycling's sake, but they also buy to meet their daily needs, as Clifton et al. describe in their 2013 study revealing that cycling customers spend less but buy more often, spending more overall. The New Jersey Bicycle and Pedestrian Resource Center at Rutgers estimates that active transportation-related capital investments, businesses, and events contributed \$497.46 million to the New Jersey economy in 2011, through economic activity generated and jobs supported. In terms of tourist potential, a 2012 study of bicycle-related travel in the State of Oregon revealed that direct expenses of travelers who included bicycle recreation as part of their trips spent \$1.2

million per day on accommodations and food services, motor fuel, event fees, and gear (Dean Runyan Associates 2013). Indirectly, this supported 4,600 jobs.

It's not only famously bicycle-friendly Portland that accommodates these tourists; small towns across the state are exploring how to lure bicycle tourists into town from bicycle-friendly events and infrastructure, including the Oregon Scenic Bikeways. And it's not just Oregon. A University of Colorado study estimated the impact of cycling for out-of-state tourists and active residents of Colorado at \$1 billion (Colorado DOT 2000). The Outdoor Industry Association estimates that 60 million American recreational bicyclists spend \$46.9 billion annually on meals, transportation, lodging, gifts, and entertainment while they travel America's paved and off-road bicycling facilities. Direct and indirect benefits of these expenditures results in \$17 billion in federal, state, and local taxes (Outdoor Industry Foundation 2006).

Community Health Benefits

In addition to job growth and sales benefits of bicycling infrastructure, the act of bicycling itself can offer community benefits through improved public and environmental health and injury prevention. Public health practitioners are increasingly engaging in transportation planning efforts as a means of leveraging the community health benefits of physical activity against future health-care cost and public health trends.

Gotschi (2011) prepared a comparison of Portland's bicycling investment schemes with two types of monetized health benefits: health-care cost savings and value of statistical life savings. The model showed that by 2040, investments in the range of \$138 to \$605 million will result in health-care cost savings of \$388 to \$594 million, fuel savings of \$143 to \$218 million, and savings in value of statistical lives of \$7 to \$12 billion. This type of cost-benefit analysis of investments in bicycling will be instrumental in making the case that local bicycle projects can be a cost-effective way of spending federal funds.

Similarly, de Hartog et al. (2010) asked the question: Do the community benefits of decreased air pollution emissions, decreased greenhouse gas emissions, and increased levels of physical activity outweigh the individual adverse health effects of bicycling such as higher exposure to air pollution and risk of traffic accidents? A quantification of all-cause mortality resulting from a shift from car to bicycling in the Netherlands showed net positive individual and societal gains in life-years from physical activity.

Finally, where bicycling and pedestrian levels are higher, obesity, high blood pressure, and diabetes levels are lower (Alliance for Biking and Walking 2012).

Safety Benefits

The City of New York's landmark 2012 study revealed a 35 to 58 percent decrease in traffic crash-related injuries to all street users subsequent to the installation of cycle tracks. The cities of Portland and Minneapolis have similarly shown an inverse relationship between infrastructure provision and reported collisions.

Conditions demonstrated as conducive to increased safety include separated bike lanes along major streets, bike routes on local streets, and bike paths separated from traffic. Marshall and Garrick's study of 11 years of road safety data (2011) showed that cities with high bicycling rates generally show a much lower risk of fatal crashes for all road users when compared with other cities, suggesting that improving the streets and street networks to better accommodate bicycles may lead to a self-reinforcing cycle that can enhance safety for all road users.

In summary, bicycle infrastructure investments and bicycle use offer fiscal, health, and safety benefits that can help solve many serious problems facing our nation (Alliance for Biking and Walking 2012).

Which Investments Lead to More Bicycling?

Successfully increasing bicycling rates is the result of a complex set of conditions that are cultural, systemic, and programmatic in nature. That is, communities with the most success in increasing the mode share of walking and bicycling deploy a coordinated package of projects, programs, and policies to support active transportation. An Active Living Research Brief summarizes the package (Dill, Handy, and Pucher 2013):

- A network of safe and comfortable routes using a mix of bike lanes, bike boulevards, cycle tracks, and bike paths that connect residents to potential destinations.
- A separation between bicyclists and motor vehicles without making bicyclists travel too far out of their way. This is more effective for encouraging new bicyclists than on-street pavement markings.
- Investments in infrastructure that are supported by promotional programs, such as bike-to-work days and bicycle training, Safe Routes to School programs, and other programs that facilitate bicycling, including bike-sharing systems and accommodating bicycles on buses and trains.
- Policies that make driving more expensive (e.g., higher gasoline taxes and parking fees) and less convenient (e.g., reduced parking supply and reduced speeds) maximize the effectiveness of infrastructure investments in encouraging bicycling.

- Land-use and development policies that help ensure that destinations for daily needs, such as school, work, and shopping, are within convenient bicycling distance from home.

A bicycle master plan is the best place to document the package and track progress towards health, safety, and economic objectives.

Why a Bicycle Master Plan?

More widespread acknowledgment of the benefits of bicycling has generated increased interest in and demand for better bicycling conditions from a wide array of groups, including neighborhood associations, bicycle and pedestrian advocacy organizations, and public health interests. Elected officials are also recognizing that investments in nonmotorized transportation improve community livability while meeting transportation needs in a cost-effective fashion.

Some officials may question the need for a mode-specific plan, pointing instead to general planning requirements to consider multimodal transportation system plans that serve the community. However, these general plans cover bicycling at a very high level, and typically limit the planning effort to collector and arterial streets that are unattractive to the general population for bicycling.

A general transportation planning process can reveal community hopes and aspirations for the bicycle as a viable mode choice. But a bicycle master plan will chart the path to get there by serving as the key resource for facilitating implementation, monitoring, and evaluation.

Without a big-picture plan that connects bicycling facilities into an overall network, the community will lose out on the full benefits of active transportation. Consideration must be given to not only the bikeways themselves, but also the intermodal connectivity, parking, and facilities at the other end of trips, and encouraging riding in the first place. Thinking holistically about the right mix of strategies to improve conditions for bicycling and leverage associated benefits in the context of a bicycle master plan also allows synergies to develop between infrastructure improvements, policy updates, and programmatic elements.

Creating a Plan

The process of crafting a bicycle master plan allows for a comprehensive exploration of actions to improve bicycling conditions and lays the groundwork for the implementation, evaluation, and monitoring of the bicycle transportation system. The master plan should articulate the community's vision and goals for bicycling as part of an integrated transportation network and reflect desired outcomes, such as level of use or mode share, economic vitality, and environmental and public health.

No two bicycle master plans will be exactly alike, but most strive to achieve some combination of the following outcomes:

- Documentation of existing facilities and usage
- Policies that support bicycling
- A connected bicycle network that includes bicycle parking
- Education programs for bicyclists, pedestrians, and motorists
- Encouragement and incentive programs
- Enforcement programs
- Facility and usage performance measures and targets
- Evaluation and monitoring programs
- Design guidelines and engineering standards that recognize the needs of bicyclists
- Financing plans
- Increased public support for bicycling
- Increased levels of bicycling for transportation and recreation



Photo courtesy Drusilla van Hengel.

Early bicycle master plans were typically limited to the mapping of existing and planned bikeways. Over the past 15 years, bicycle master planning has evolved significantly because of increased interest in active transportation. This has led to the production of more thoughtful plans informed by robust data, sophisticated methodologies, and new facility types. Plans today are expected to reflect a true consideration of the bicycle as a legitimate form of transportation.

Engaging with the Public

Engaging in a bicycle master-planning process provides a rare opportunity to explore the full spectrum of ideas for improving bicycling conditions with a broad set of stakeholders, including the public.

It is relatively easy to plot a basic map of the key partners and stakeholders within government agencies and nongovernmental organizations. The next step is to identify stakeholders beyond obvious partners to produce a realistic plan and avoid a potential derailing of the process. The City of Portland developed a model that reflects the realization that a large portion of the population is not comfortable bicycling in conventional facilities (Geller 2005). Broadening the target audience beyond hard-core bicyclists or pedestrian activists to the "interested but concerned" demographic, low-income and minority populations, older adults, youth, and other underrepresented groups is an increasingly important objective. Reaching groups that may never walk or ride a bike but nonetheless have a stake in the plan — such as business, freight, or emergency response interests — is also important.

Four Types of Transportation Cyclists in Portland

By Proportion of Population

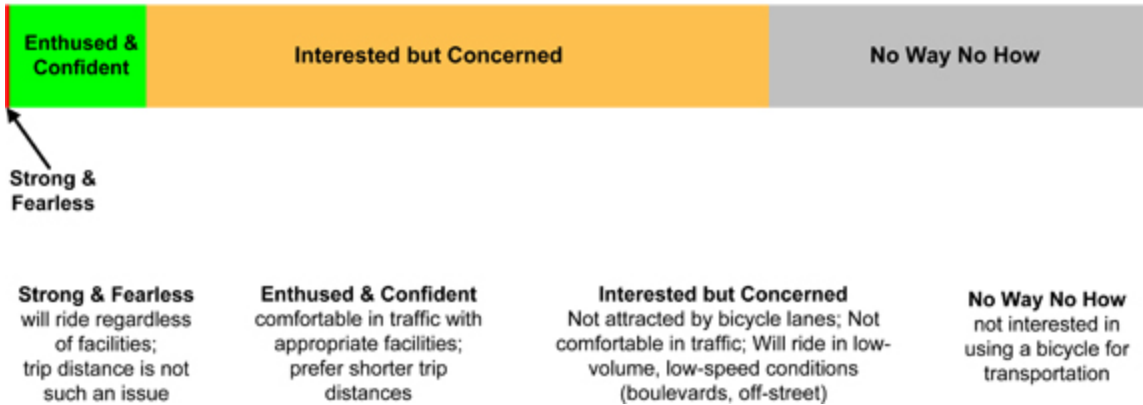


Image courtesy Portland, Oregon, Bureau of Transportation.

Planners must employ both innovative and old-fashioned methods of engagement to reach a sample of a community's population who can fairly represent the aspirations of residents, businesses, and other stakeholders and their future intentions around bicycling. Public engagement and input are particularly useful during these phases of plan development:

- Developing a vision for the plan and aspirations for walking and bicycling within the community
- Formulating goals and objectives
- Collecting information on existing conditions
- Discussing needs and proposed improvements

Typical Plan Elements

The next sections outline the structure of a typical bicycle master plan and briefly describe the basic ingredients of each section or chapter.

Vision, Goals, and Objectives

The vision, goals, and objectives lay the foundation for all plan recommendations. Together, they describe the preferred future of walking and bicycling in a community and guide actions to achieve the desired outcomes through specific policy, project, and program recommendations.

The vision should express the community's aspirations and future intentions around walking and bicycling. It should be simultaneously bold and achievable. A strong vision:

- Describes in a concise, compelling way how walking and bicycling fit into the community's future
- Provides a sense of the desired outcomes
- Establishes a direction for the development of goals and objectives

Goals are broad statements that reflect the accomplishment of the vision, make it more explicit, and help guide future actions. Goals describe the end results to be achieved, such as increasing rates of bicycling or improving the safety of bicyclists. Objectives describe outcomes to achieve each goal. Objectives should be measurable, attainable, realistic, and time-specific. Each plan goal may have several objectives to guide actions toward achieving that particular goal.

Sample Bicycle Master Plan Vision Statements

The Bike 2015 Plan is the City of Chicago's vision to make bicycling an integral part of daily life in Chicago. (**Chicago**)

O'ahu is a bicycle-friendly community where bicycling is a safe, viable, and popular travel choice for residents and visitors of all ages. (**Honolulu**)

We envision a convenient transportation system where people can bike safely to all destinations. (**Knoxville, Tennessee region**)

Eugene is a place where walking and biking are integral to the community's culture, where the city's livability, sustainability, and overall quality of life are enhanced by more people walking and biking, and where these activities are safe, convenient, and practical options for everyone. (**Eugene, Oregon**)

Existing Conditions and Needs Analysis

Data provide the basis for evaluating existing conditions, assessing future needs, identifying opportunities and constraints, and developing recommendations. The fact base for facilities and bicycle usage should be created with community objectives in mind.

As an example, if one of the primary objectives of the plan is to increase the number of youth who ride bikes to school, knowing the location, number, and quality of school bicycle parking facilities will allow for more thoughtful recommendations. Information gathering efforts should be prioritized to answer key questions. Therefore the scope of the plan will influence the data needs.

At a minimum, the following information will be required as inputs for policy, project, and program recommendations:

- Existing plans and policies that affect bicycling
- Existing bicycle facilities and programs
- Planned bicycle facilities and programs
- Activity centers and zoning maps
- Major barriers (rivers, freeways, steep slopes)
- Demographics
- Roadway characteristics (traffic speeds, traffic volumes, pavement conditions, lane widths, and right-of-way)
- Transit stop locations
- Crash data

A growing variety of analytical tools designed to evaluate the current bicycling environment or predict future rates of bicycling can help planners make sense of information. An example of this type of tool is Geographic Information Systems (GIS)-based demand models, which use bicycle use, demographic information, and other data to estimate future rates of bicycling. While these models require a certain amount of baseline GIS data in order to estimate future demand for bicycling, there is a tipping point where more data do not necessarily result in better forecasts. The City of San Diego realized that collecting bicycle and pedestrian counts in a set of targeted locations throughout the city allowed its model to produce the estimates it needed without overstretching its data collection budget.

"Existing conditions" sections or chapters typically use a mix of numbers, maps, photographs, and narrative text to convey the following:

- An assessment of overall bicycle friendliness
- Current levels of bicycling
- Community issues and concerns
- Maps of existing facilities
- An inventory of existing programs and policies relevant to bicycling
- An estimate of future demand for active transportation in the community

Public input and an analysis of existing conditions with an eye toward existing and planned community destinations will set the stage for identifying gaps and needs in the bikeway network. Needs may be articulated in relatively general ways, since the point of identifying existing and future needs is to set planners up for the development of more specific recommendations. For example, the needs assessment may point out that many streets are not currently pleasant environments for bicycling, that current policies create barriers to increased levels of bicycling, or that projections indicate increased demand for bicycling over time.

Plan Recommendations

The planning process will result in high-priority policy changes, projects, and program recommendations. The development of these priorities should be guided by evaluation criteria, which should in turn be based on the mobility, health, safety, and economic goals established early on. By creating a direct link between plan goals and potential actions, evaluation criteria provide a rational explanation by which to judge recommendations. Developing evaluation criteria before discussions of individual plan recommendations promotes efficient exploration of potential options and helps focus the process of creating, selecting, and prioritizing recommendations. Establishing evaluation criteria also increases the legitimacy of recommendations by providing a non-biased methodology for project selection and phasing.

Policies. Policy recommendations designed to improve conditions for bicycling may apply to the sponsoring agency, to other government departments or agencies, or to private-sector actors such as building owners, developers, schools, and companies. Each policy recommendation should be inspired by the vision and work toward the achievement of a specific goal. It is not uncommon for bike plans to include multiple objectives or strategies aimed at increasing the bicycle-friendliness of policy in specific areas such as road maintenance, transportation planning/engineering, land-use planning, and law enforcement.

Sample Policies for Bicycle Planning

Transportation Planning and Engineering

- Work with transit agencies to install bicycle racks on buses and bicycle hooks on trains
- Collect data on walking and bicycling, including regular counts
- Reexamine auto/roadway performance standards such as level of service or volume / capacity ratios
- Collaborate with regional, state, and federal partners to develop transportation models and forecasting tools to accurately predict bicycle travel demand

Land-Use Planning and Development Regulations/ Incentives

- Require bicycle parking and secure bicycle storage for multifamily and commercial developments
- Update the zoning code to encourage a fine-grained mix of land uses
- Include bicycle and pedestrian analyses in traffic impact studies

Law Enforcement

- Work with law enforcement to make sure policies and procedures ensure safety for all roadway users
- Include law enforcement officials in the planning, design, construction, and operation of bicycle facilities

Network and Project Recommendations. When developing infrastructure recommendations, the first step is identifying a set of streets as priority bicycle routes. As a result of the focus on automobiles throughout the U.S., many streets will not currently be well-suited to bicycling. Although making all streets bikable is a good long-term goal, in the short term it makes sense to focus improvements on a connected network of priority bikeways.

Bikeway network planning principles to consider include:

- Create an interconnected network that takes people from where they are to where they want to go and serves key destinations and transit lines. The whole is greater than the sum of the parts.
- Plan for a diverse range of users. Consider variations in physical abilities, perceptions of safety, trip types, and trip purposes of different users.
- Think about the bikeway network as a hierarchy of facility types that serve different functions and appeal to different types of users.
- Balance existing and future demand. Improve conditions where people already ride but also consider areas where people might potentially ride if it were more pleasant.
- Minimize out-of-direction travel.
- Prioritize safety.
- Provide a grid or mesh of bikeways roughly every half-mile (at a minimum).

The size of the previously mentioned "interested but concerned" group has motivated planners and engineers across the country to explore new infrastructure types that better suit this group's needs, including expanded facility types such as bicycle boulevards, buffered bike lanes, and cycle tracks, which are documented in the publically available National Association of City Transportation Officials (NACTO) **Urban Bikeway Design Guide**. This research fundamentally changed the process of developing a bicycle network by creating innovative bicycle facility design guidelines.

Because roadway design significantly impacts the attractiveness of bicycling, recommending updates to overall road design guidelines and engineering standards is increasingly a part of developing and updating active transportation plans. Once the high-priority bikeway network has been identified, planners can work to generate a list of fiscally constrained potential projects to improve safety, convenience, and the comfort of users. Ranking and prioritizing projects in a systematic way, using established evaluation criteria and based on the plan vision, goals, and objectives not only results in smarter investments but also demonstrates that the improvements selected are not simply pet projects of politicians or staff.

Programs. Programs market the positive aspects of bicycling. Enforcement programs remind motorists, bicyclists, and pedestrians of the rules that promote peaceful multimodal coexistence. While local government staff members are familiar with the construction and maintenance of roadways and sidewalks, not every local government has the institutional support or staff experience to implement educational or encouragement programs. It is also more difficult to find operational funding for programs compared with capital funding for infrastructure. Think about who might manage proposed programs and how they might be funded, including potential partnerships with other government agencies, nonprofit groups, and the private sector.

Including educational, encouragement, and enforcement programs in plans is a reflection of recent studies that suggest investing in infrastructure alone is unlikely to produce a significant mode shift

toward bicycling (Douma and Cleaveland 2008; Pucher and Buehler 2011). The European and American cities with the highest nonmotorized mode shares not only have well connected sidewalk and bikeway infrastructure and supportive policies, but have also funded extensive educational, encouragement, and enforcement programs.

Sample Programs

Education and Encouragement Programs

- Safe Routes to School programs
- Bicycling events and contests
- Ciclovía or Open Streets events
- Bike to Work week/month
- Individualized marketing programs
- Bike safety trainings

Enforcement Programs

- Targeted enforcement of bicycle lane encroachment by motor vehicles
- Bicycle lighting enforcement where police officers distribute bike lights instead of issuing citations
- Making citation waivers available to motorists, bicyclists, and pedestrians in exchange for attending a bicycle safety course

Strong analytical tools and stakeholder engagement will result in policies, programs, and projects in the final document that are consistent with community goals, have a high benefit-to-cost ratio, are technically feasible, and will be well supported by stakeholders.

Implementation

Creating an implementation plan is a critical but often overlooked step. It should be detailed, yet easy to use. At a minimum, the implementation plan should include:

- A prioritized list of actions, categorized in a logical way
- An annual work plan specifying when each policy, project, and program contained in the plan will be implemented, and the agency or party responsible for its realization
- A budget

Good bicycle master plans identify immediate as well as longer-term opportunities for improving conditions, and consider how early actions and investments lay a foundation for future improvements. Transforming the phasing plan into a detailed annual work plan provides an added level of detail and accountability.

An understanding of the cost of proposed projects and programs relative to existing and future revenue sources is essential. The budget should be itemized and integrated with the capital improvement program. Going through this process may prompt a re-calibration of priorities.

Evaluation and Monitoring

As more public agencies collect data about bicycling, it has become possible to integrate performance measures and benchmarks into bicycle transportation plans. More extensive data-collection efforts have also stimulated the development of advanced analytical tools. These tools have the ability to provide detailed descriptions of existing conditions, generate more precise projections of current and future demand for walking and bicycling, more clearly articulate the benefits of making improvements, and assist with project evaluation and prioritization.

Performance measures (also sometimes called performance indicators or metrics) are a way to evaluate progress toward plan goals and objectives. Depending on the goal or objective, the measure may be general (i.e., mode share) or specific (i.e., percent of youth receiving bicycle safety education). The existing conditions data points and project selection and prioritization criteria have the potential to be used for detailed monitoring and performance evaluation. Reliable, easily collected performance measures compared over time will provide interesting insights into the effectiveness of particular strategies. For example, every year the city of Portland, Oregon, conducts bicycle counts at more than 150 locations throughout the city. Volunteers count the number of riders they see during peak bike commute hours. This information helps the city understand where people prefer to ride and generates statistics on gender and helmet use.

Action Steps for Planners

As you begin the process of developing or updating your bicycle master plan, explore the following questions within your organization and community:

- What is the budget for the planning and implementation of bicycle facilities and programs?

- Is this the first plan of its type or an update to an existing plan?
- Does your community have an existing bikeway network?
- What level of bicycle accommodations exist in your community?
- Do your community's current policies, regulations, and road design standards reflect current best practices?
- Is there political support for bicycling in your area? If so, to what extent and at what level?
- Do local government agencies have staff expertise in planning and designing for bicyclists?
- What data exist on walking and bicycling infrastructure and rates of walking and bicycling?

Consult with the state bicycle and pedestrian coordinator at your state's department of transportation for current information on available funding sources. If your state, MPO, or county does not provide funding for nonmotorized planning, think strategically about ways to reallocate existing funds or generate new revenue streams at the local level. Parking fees, gas taxes, sales taxes, and property taxes are some common revenue sources for transportation planning at the local level. The communities making the most progress in active transportation conditions are those that reallocate at least some of their existing transportation funding to walking and bicycling, reflecting an understanding that these modes are integral to the health of their community and should be core expenditures.

Before proceeding with an in-depth policy review or existing conditions report, think generally and strategically about the questions above. For communities just beginning to explore opportunities to improve bikability, the plan can be as modest as identifying three to five key bikeway projects. Others may choose to tackle complex or innovative projects, expand education and encouragement programs to new audiences, or rethink existing street standards in a comprehensive fashion. Mature programs will need to challenge themselves and their community to break new ground with innovative facilities or program approaches that match their aspirational goals.

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Additional Resources

As the national advocacy organization for bicycling, the League of American Bicyclists provides resources for education, encouragement, and advocacy. See www.bikeleague.org for information about MAP-21 funding, bicycle-friendly communities, bicycle-friendly businesses, bicycle-friendly universities, and bicycle education.

For a comprehensive guide to developing bicycle master plans, see *Creating Walkable + Bikeable Communities: A User Guide to Developing Pedestrian and Bicycle Master Plans* (Collin [Roughton] Chesston et al., Center for Transportation Studies, Portland State University, Portland, Oregon, 2012), available at <http://otrec.us/project/465/>.

The World Health Organization's Health Economic Assessment Tool for cycling uses the value of statistical life to monetize the reduction of mortality resulting from bicycling. It can be downloaded at www.euro.who.int/en/what-we-do/health-topics/environment-and-health/Transport-and-health/publications/2011/health-economic-assessment-tools-heat-for-walking-and-for-cycling.-methodology-and-user-guide.

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