2020

QUICK-BUILD GUIDE

How to Build Safer Streets Quickly and Affordably

alta

CALIFORNIA BICYCLE COALITION

The California Bicycle Coalition (CalBike) and Alta Planning + Design are excited to share this Quick-Build Guide for quickly and inexpensively creating safe spaces on our streets for people to travel by bike, on foot, on a scooter, by skateboard, or by any other low-impact, low-cost mode of transportation. Making these options available right away is key to our equitable recovery from the economic collapse caused by the pandemic and our ongoing resilience in the face of climate change.

The quick-build method meets the urgency of the moment and the challenge of reduced public budgets. It provides an opportunity to engage residents more inclusively and effectively than is possible with traditional methods. Quick-build safety infrastructure can help to repair neighborhoods impacted by decades of disinvestment.

Quick-build is the tool we need today to advance our vision of safe, equitable streets.

This guide can be used by elected officials, city planners and engineers, and community advocates. It will show you how quick-build condenses the timeline, cuts down planning and engineering costs, and uses inexpensive materials to create safe active transportation infrastructure within months, instead of years.

You shouldn't have to wait decades before your community is a safe place for a child to ride to the park.

These pages will walk you through how to implement quick-build networks, addressing everything you need to know, from engineering tips to political considerations. We hope you'll read it and share it widely, so that everyone will have the tools they need to move us toward a healthier, safer, and more sustainable future.

CalBike advocates for equitable, inclusive, and prosperous communities where bicycling helps to enable all Californians to lead healthy and joyful lives.
www.calbike.org

Alta is a global leader in mobility innovation, helping make positive changes in communities to empower all people to live active, healthy lives. For over 20 years we have been dedicated to connecting people to places by working across disciplines and scale to address social equity, access, and environmental resilience.
www.altago.com

Disclaimer: The design details, recommendations and conclusions in this document are based on case studies from projects throughout North America, Alta project experience, and industry design guidance. Engineering judgment should always be used in roadway design decisions.

01 WHY QUICK-BUILD?

Quick-build is a method to help local governments improve communities for walking, bicycling, and micromobility on a minimal budget and on a compressed timeline, as both planning and building are much less expensive.

Quick-build works to meet mobility needs by helping people to choose active modes more often. Those mobility needs will vary depending on the community, and may include safer crossings, slower streets, an extended bikeway network, or safer routes to transit, schools, and essential workplaces. In every case, people require a safe, connected, and comfortable network for active transportation.

Quick-Build Defined

Quick-build puts bicycle, pedestrian or traffic safety improvements in place using low-cost materials that can be installed quickly. Quick-build projects are flexible and designed to be easily changed or even removed if necessary. Most quick-build projects can be constructed in mere days or weeks and can go from conception to reality within months. Quick-build projects are **not** pop-up or demonstration projects that are intended to be removed after a short period.

Quick-build allows the community to benefit immediately from walking and bicycling safety improvements, with flexibility for public feedback to impact the design while building enthusiasm and support for more permanent infrastructure. Once a project is accepted by a community, quick-builds can last for years if maintained, or rebuilt using more durable materials.

> *"We as transportation experts need to be thinking strategically about whether or not we need to spend three years talking about doing something important, or three weeks to just try something."*
>
> — Warren Logan
>
> *Transportation Policy Director of Mobility and Interagency Relations at Oakland Mayor's Office*

The goal is to offer a series of interim street improvements that create a complete, connected network of physically safe environments for people walking, bicycling, and using micromobility to get safely where they wish to go. Quick-build infrastructure is usually more than a bike lane quickly striped; it should create the kind of comfortable, protected, connected bikeways that have been proven to enable people of all ages and abilities to use active transportation.

Ideally quick-build projects will build off of existing plans that have already been approved and were created with community input. Quick-build becomes a way to implement previously recommended active transportation projects in a relatively short time frame. More extensive, and potentially permanent, improvements can be added over time as the project evolves, based on public input, interest, and use.

Source: Alta (Atlanta, GA)

Real Time Public Engagement

Traditional projects require long periods of outreach for projects that are planned for years in the future. Meetings typically attract more privileged stakeholders with the spare time to engage in the process. Stakeholders change as time passes, requiring more outreach when the project is built according to old plans that may not have the support of new stakeholders.

Quick-build projects are intended to be community-led and, based on real-time feedback, iterative and adaptable. An inclusive planning process which consults and involves the community throughout is essential. While quick-build leverages opportunities for speed and ease of installation, projects should not move forward without consultation, engagement, and open lines of communication with the community members who will be most impacted by a project's creation or by its removal. This is important during planning and implementation—and beyond, and planners should extend the public feedback period into a longer term period of project evaluation.

Re-Allocating Space is Easier

Sometimes it is necessary to reallocate road space from cars to create safer crossings for pedestrians or a protected lane for people on bikes. With quick-build, communities get to see and adjust what works on the ground, rather than in theory. Unlike concrete infrastructure, quick-build street designs can be adapted by adding a planter box, moving bollards, restriping a lane, or even removing a project if necessary. During installation the jurisdiction can say "we are trying this." Evaluation and review becomes part of the process and feedback on a quick-build design can become part of the public input for the eventual project, if the public supports making it permanent. This feedback is usually much better than traditional planning processes, where stakeholders are asked to imagine how it will feel to use a new street alignment based on modeled data, renderings and PowerPoint presentations. This includes the need for curb access for delivery and passenger access. Business managers, delivery people, and other users can see the impact in real time, and planners can adjust the design to accommodate those needs.

Conclusion

Quick-build presents tremendous opportunities to implement projects in compressed timelines and with fewer resources while accommodating and meeting increased demand for walking, bicycling, and micromobility. But quick-build also faces new challenges in planning, outreach, and design. The tools outlined in each chapter of this Guide offer strategies for planners, designers, engineers, policymakers, and advocates on how to achieve success and overcome obstacles in creating quick-build infrastructure.

Source: Alta (Los Angeles, CA)

02 PLANNING FOR QUICK-BUILD

Quick-Build Project Planning

Quick-build can be an effective strategy for quickly building out a complete pedestrian and/or bike network. Building infrastructure fast requires a process that leverages the right resources and secures buy-in from the right people at the right times. For many agencies, fast is not typical and there needs to be confidence in your new process from start to finish. When you're doing things differently, it's important that the whole team understand how to do it well, to inspire confidence in the process from start to finish.

To inspire that confidence in creating quick-build projects, we have compiled guidance for all aspects of the planning process—building your team, defining your project goals, identifying resources, figuring out key network gaps where projects can have the most impact, and engaging the community.

Assembling an administrative team is the first step.

Assemble the Team

Who needs to be at the table?

How does one assemble an administrative team or working group to get a quick-build project off and running? The answer is not simple or formulaic, as the answer differs in as many ways as there are different agency departmental structures and administrations. However, we can provide suggestions of what to keep in mind and what we have seen successful teams do to effectively deliver quick-build projects.

Some of these people need to be at every discussion, others don't. Some need to be consulted, others simply informed. Some are critical, while some are optional. Some may be staff while others are hired consultants. **Build your team for what makes sense in your community for your project**. If you cannot fill a role listed here on your team, due to budget or staffing constraints, mitigate that loss with additional outreach to that department to ensure the project can be implemented smoothly with appropriate buy-in from the role outlined for the "missing seat."

Who's not at the table?

Meaningfully including everyone who needs to have a voice in the process is not easy. Continue to identify who is missing and to create new ways to expand engagement throughout the process. Take a close look at the "table" the team has set to see if the format, messaging, power dynamics, or other factors present unintentional barriers or biases. Leverage the trial period as an opportunity to call attention to the need for broad and inclusive assessment and encourage additional community members, leaders and organizations to participate.

Key Coordinator

Municipal Staff

Community Leaders

Elected Officials

Source: Alta (Glendora, CA)

PERSON	ROLE
AGENCY STAFF	
Key Coordinator	• Champions the value of and need for quick-build facilities to the public and other municipal staff • Keeps project on track, problem solves issues as they arise, maintaining momentum and overall communication among the various stakeholders and participants • Identifies community partners and stakeholders who need to be at the table and helps to ensure they are engaged • Available for feedback and communication from stakeholders, including elected officials, other municipal staff, and community leaders • Stays aware of projects and best practices in other jurisdictions • Identifies opportunities and community needs as they arise • Should be adept at working with underrepresented and marginalized communities
Communications In some agencies, especially smaller ones, this person may be the same as the "key coordinator."	• Helps everyone stay "on message" about the quick-build strategy • Develops online tools for community feedback • Collects and reports on feedback received from the most representative group possible
Transportation Planners	• Understands the jurisdiction's goals, vision, opportunities and challenges when it comes to active transportation • Can interpret code, policy, and other crucial regulations • Can provide helpful information regarding the existing active transportation network and its gaps • Has access to planning tools, such as mapping software, that aid in decision-making
Transportation Engineers Engineering and planning roles may be held by the same staffer.	• Understands traffic patterns, street design, regulations, etc. • Can ensure that facilities meet standards and best practices so they are as safe and navigable as possible • Involved in approval of street plans
Representatives from other departments that will interface with the project	• Understands aspects of the project that others will not (e.g. how trash pickup will be impacted) • Contributes to the indentification of important corridors to include from an equity and connectivity perspective (ex. Health, Economic, Parks, Housing, Planning Departments) • Needs to be informed of projects to provide technical insight and avoid potential conflict once facilities are in place • May be tasked with formal review of street changes (e.g. Fire Department)

Continued

PERSON	ROLE
COMMUNITY LEADERS	
Neighborhood or Community Ambassador or Champion	• Believes in the project and ensures that the community is involved in its planning and installation • Has broad connections and rapport in the community and can bring a variety of voices to the table to speak to community needs and perspectives • Monitors the project after installation and relays feedback to the key coordinator, providing resident perspective and flagging issues • During public engagement you are likely to find this person advocating for a quick-build facility in their neighborhood • This person should receive compensation for their time and local expertise
Local Business Leaders	• Can help share information with local businesses • Will want to understand what types of improvements are planned and what the expected timeline is. • May be able to donate materials that could embellish the project area like picnic tables, chairs, flower pots, etc.
Representatives from community organizations, especially bicycle advocacy organizations	• Leaders of nonprofits, social services organizations, and religious institutions will help to support and improve the project if engaged. • Bicycle advocacy organizations will understand the needs and perspectives of pedestrians and bicyclists in the community and can offer insight as potential future users of these facilities • Can help disseminate information to the bicycle and pedestrian community, gather feedback, and improve future iterations of the project
ELECTED OFFICIALS	
Elected Officials	• Have the power to approve the use of funds or staff, often much more quickly than others can • In some jurisdictions, approve or deny street changes • Receives direct communication from their constituents about needs, challenges and complaints • Can raise the profile of these improvements among their constituents and beyond (or rally against them)

Set and Communicate Project Goals

Once the jurisdiction has organized their administrative team or working group for the quick-build project, they should begin by coming to an agreement about what the goal of their quick-build project is and identifying strategies for communicating those goals with the community. What is their mission statement for these projects? Why is the agency undergoing these projects? What does the jurisdiction need that this infrastructure is providing? As future stages of the quick-build project present difficult decision points about where projects will be located or how or why they are funded, the jurisdiction can return to this mission statement for guidance.

This goal-setting may happen concurrently with determining what resources are available because one may drive the other in enabling the reallocation of funds and staff time and focus. That statement of need will go on to influence the quick-build infrastructure network, but may also influence what resources are available and the political support backing the project.

Many municipalities may have similar goals and needs that inspire quick-build infrastructure, but these may also vary. For example, one city may need to expand their pedestrian or bicycle transportation network to connect jobs, homes and essential services like grocery stores, while another may wish to quickly expand and implement their active transportation network in a more equitable manner than exists currently. Or a jurisdiction may lack sufficient trails or parks and is looking for more space to keep recreational trips local.

Take Stock of Available Resources

As a jurisdiction is working towards building their quick-build team and evaluating what they would like to implement, it's critical to also consider what funding sources are available for quick-build projects so that the team can realistically prioritize which network connections to focus on in the next step of the process.

Agencies should begin by evaluating their existing budget for active transportation facilities and roadway projects as well as existing contracts and on-call consultants. Project managers can sometimes redirect funds allocated for traditional pedestrian and bicycle facilities and contracts to quick-build projects. Existing local budgets for street markings, signs and signals can also contribute to projects that implement quick-build features while rebuilding a street; staff may have flexibility on which streets they use these funds on, as well as how the markings, signs and signals are used. Using local funding and even existing contracts will save time in setting up new contracts.

Resources shouldn't only be considered for planning and design. Because the nature of quick-build is one that may involve design iteration or adjustments, this should also be considered in your budget. Does your jurisdiction have on-call contractors or in-house teams for implementation? What is your procurement process for signs, paint, and other quick-build materials, and what other materials do you have access to? Consider available budget and staff resources for collecting ongoing feedback and data. If a consultant is brought on to facilitate a project, ensure that their scope of work involves ongoing support. If project adjustments are promised in response to feedback, ensure that budget and resources are set aside for these changes.

Take advantage of predictable opportunities. Regular street maintenance provides a good opportunity to make small changes to streets. Know your jurisdiction's repaving schedule so that you can take advantage of this opportunity to add new crosswalks, bike lane buffers, etc. This can save both money and time.

Consider what in-house resources can be used for all stages. There are likely at least some existing resources, knowledge, and labor available within the department or jurisdiction that can contribute to the various stages of a quick-build project. Where possible, identify these options first and plan how they can be used.

Utilize existing contracts where in-house resources are lacking. From data collection to public outreach, many different tasks and skills go into these projects. Some jurisdictions may not have in-house capacity to address all stages of the process. Where possible, use existing on-call contracts for aspects of the quick-build project want to get underway quickly to avoid a new bid solicitation process.

Advocate for more funding for quick-build. Several countries around the world have drastically increased funding for quick-build projects in response to the COVID-19 pandemic. Consider advocating for statewide or federal programs that allocate funds to communities for bike facility quick-build efforts.

Seeking outside funding may introduce a delay in quick delivery of a project, but shouldn't be overlooked if existing funding is scant. Local foundations and philanthropic organizations may have funds available to assist municipalities with these projects, especially if the agency presents the funder with information about how they plan to serve a critical infrastructure need. The Richard King Mellon Foundation gave grants to the nonprofit advocacy group Bike Pittsburgh, which in turn hired engineers to design the city's first striped bike lanes years ago.[1] The business community may also be a source for in-kind donations including materials that can be used for quick-build installations.

Grants are also likely to be available, but will then subject the quick-build project timeline to the grant funding cycle timeline. A slow to start, quick-build project still may serve important critical infrastructure needs and is still more valuable and less expensive than a traditional project or no project at all. In this case, a jurisdiction should still conduct as much planning and design as possible to create a persuasive grant application and also consider whether to implement a minimal infrastructure while they wait for grant funding. The grant funds could be used for a later phase of the quick-build project, upgrading it with more resilient, mid- to longer term materials.

Resources also include staff time and expertise. Successful quick-build programs across the nation have commonly had agency staff contribute to the planning, design and installation of quick-build projects. While these projects are low-cost in construction materials, they do require a high level of coordination to accomplish. Review this quick-build guide and make note of what cannot be accomplished by agency staff from a workload capacity or capability perspective. If your municipality lacks internal staff capacity or experience, consultants can provide this service; however, this cost needs to be considered when evaluating resources.

Decide Where to Build

After you have assembled your team, identified the goals of your quick-build project, and determined the level of resources you have available, the next step is to determine where you will build the project or projects.

Value of the network approach

As you consider how you want your projects to function within your existing transportation system, it is important to see these projects as pieces of a network linking critical destinations. Focus on expanding capacity for bicycle and pedestrian connections locally between neighborhoods, workplaces, grocery stores, hospitals and other essential destinations.

Build on existing plans and data

It is important to consider available data, like crash data or network facility gaps, when selecting a network and identifying projects to complete that network. Existing active transportation plans or transportation chapters of a comprehensive plan may already outline projects or a high priority network for implementation. Tie action to available data and established community plans which have considered key metrics regarding connections, equity, safety, etc. Requests, together with plans, should be considered with the direction detailed below. Also, be sure to include demographic considerations in data analysis. Historically, many transportation investments have benefited more affluent groups at the expense of marginalized populations, usually low-income people of color. Nothing prevents quick-build projects from repeating those inequities except a commitment from you to consider them in your priorities and consciously invest in historically disinvested neighborhoods and communities in ways that respond to community needs.

COVID-19 Consideration

Consider necessary post-COVID-19 adjustments or develop your own priority network. Think about the routes that reach parks, stores, hospitals and other essential community destinations. Think about your existing bicycle and pedestrian network. Are there gaps between routes or parts of the community that are not connected? Even the most recent bike plan will not have prioritized connections to essential businesses like hospitals or testing centers or the COVID-19 realities of social distancing, working from home, transit changes and changes in daily routines. Additional connections may be necessary to replace cancelled or reduced service on transit routes.

If your community has an Active Transportation, Pedestrian and/or Bike Plan, open it up and see where you stand. Established plans that have prioritized equity and engaged the community are the best place to start. In the recommendations, what has been built and what remains to be built? Recommended routes were likely selected because they provide access to destinations such as workplaces and stores, or serve as a direct connection across the community, with a focus on essential community destinations. If a plan has not been developed or if there are not established connections with communities, additional engagement and work may be necessary to plan for an inclusive framework and reflect the true needs of a community and all of its members.

How to Identify Gaps?

When thinking about how to identify gaps in your community, it is helpful to create a framework to classify the different types of gaps. Spot gaps are point-specific locations that lack adequate treatments to accommodate safe and comfortable bicycle and pedestrian travel. Connection gaps are missing segments (around ¼ of a mile or less) where inadequate or no treatments are provided that connect to an otherwise adequate facility. System gaps are where no or only a few facilities provide direct access to a neighborhood, district or specific area. This could also exist where no low-stress facilities provide access to the area. Examples of gaps are below. The impact of some gaps can be reduced through enhanced design.

Spot Gaps

- Transition between facilities (routes, on-road to in-boulevard)
- Intersections and crossings
- Driveways and vehicle access routes
- Transit stops
- Car parking lane
- Sidewalk gaps

Connection and System Gaps

- Standalone facilities (no connecting routes)
- Access to destinations
- High volume, stressful roads
- Neighborhoods with reduced access to parks and open spaces (on per capita basis)

Does a popular street or sidewalk need an upgrade? Do not overlook the opportunity to make a well-used and much needed bicycle facility, path or sidewalk safer and accessible to all. A key goal is to make sure active transportation facilities accommodate new bicyclists and pedestrians, and, in some cases, micromobility users (like e-bike share and e-scooter share). Think about if there are opportunities to improve existing bike lanes. Physically separated bike lanes provide more comfort for people bicycling, creating the conditions where a larger segment of the population will bicycle. Existing painted bike lanes or shared lane routes on collector and arterial roads should be priorities for upgrades to physically separated bike lanes, so that these corridors can become part of the community's low-stress network.

Don't forget intersections! When building a network, we think about corridors, but it is essential that all intersections throughout the corridor are considered to ensure that the treatments are carried through these conflict points.

- How to tie into other existing or new sidewalks or bikeways at intersecting streets
- Space to queue
- Provide access across road to other side streets
- Opportunity to reconfigure signal timing to reduce waiting time

At the end of the day, the network should provide opportunities for people to access daily needs, travel to essential workplaces, and improve their mental and physical health. The network should be made up of high **quality**, low-stress facilities that are **direct**, **connected**, and at a **density** that provides multiple opportunities for people to conveniently travel throughout their community and have direct **access to destinations**.

Address Equity in the network

As part of developing a network, it is important to center equity, specifically considering where the network is and isn't, and who the network is intended to serve. Network development should take into account the initial goals set out for the quick-build project. Public engagement is important to ensure communities are heard. Consider who is, and isn't, at the table making decisions. Is there a way to contribute missing voices? Any new and improved networks should work with the community to ensure that they reflect community needs and culture, and are inclusive of the people of all ethnicities and socioeconomic status that live, work, and have to access services in the community.

Be aware of long-term planning goals

In many cases, these temporary quick-build projects end up informing or even transitioning into permanent facilities. Having a strong sense of the existing network conditions, as well as challenges and goals for the future, is essential for these projects to contribute to future multi-modal transportation systems.

Opportunities: Safe Routes to Schools

Communities should develop networks that are designed to serve school travel. Through a combination of traffic calming, expanded pedestrian travel space, bicycling facilities, other temporary measures and programming, communities should consider how to create environments that support and enable children to walk, scoot, and bike to school.

Stay focused on the network

Don't let isolated project ideas or requests (especially from elected officials or neighborhood groups) sideline the greater goal of building a robust network that can offer connections for both bicyclists and pedestrians. While these recommendations can be a valuable source of information and also a political reality, it is important not to assume these requests should become the priority projects. For one, those who regularly speak with their city council member or other official don't necessarily provide an accurate cross-section of residents or potential users of new facilities. Also, these projects may or may not be in line with the jurisdiction's longer-term planning goals or overall network needs. **All projects should be considered in context of a larger strategy and vision. If they aren't connected to a larger strategic network, new improvements won't serve the greater purpose intended.**

Case Study

Quick-build improvements called for by Mayor London Breed of San Francisco were part of the City's Vision Zero High Injury Network (the 13% of city streets where 75% of traffic crashes occur) and provided key linkages between established bike facilities. Quick-build facilities on these streets included separated bikeways, as well as improvements for pedestrians and transit users.[2]

Continually Engage the Community

Unlike traditional planning projects that include an extensive community engagement process on permanent plans before any elements are built, quick-build projects require a new approach to public outreach. However, this new approach does not mean less community engagement, as robust public input is critical for the success of any quick-build project. Instead, much like the design and implementation of quick-build projects themselves, which may involve temporary and interchangeable materials and strategies, the community engagement process requires a more iterative approach to public outreach. Though untraditional, this iterative process provides long-term opportunities for ongoing, meaningful community engagement.

Quick-build projects allow community members to directly engage with new projects once they are built. People have a chance to experience the designs, rather than merely imagining what they will be like. Rather than coming to a community meeting and weighing in on a rendering, community members have a chance to interact with a design and offer feedback to improve it. Because quick-build projects are designed to be interim, aspects of the design can be removed or changed based on community input. This ongoing process enables community members to help steer the planning, implementation, and evaluation of the network in the long-term, particularly if there is support for making the facilities permanent.

The accelerated timeline associated with quick-build projects requires frequent and clear communication and coordination. Engagement efforts should be ongoing, beginning during the planning phase and continuing through implementation to evaluation. Creating a clear channel for communication, both internally between departments and externally with the public, is key.

Community engagement for quick-build projects requires agencies to rethink and likely restructure their existing community outreach strategies and guidelines. The following steps are best practices gathered from relevant case studies and can be considered when implementing any quick-build project.

Source: Alta (Long Beach, CA)

Source: portland.gov

Best Practices for Ongoing Engagement (Pre-, During, and Post-Implementation)

Pre-Implementation

Identify community partners

Community partners can bring on-the-ground expertise and help you connect with community members quickly, which is critical during accelerated project timelines. This is particularly important for reaching underrepresented or disadvantaged communities who have historically been left out of the planning process. Community partners such as local community-based organizations (CBOs) can help increase the participation of underrepresented groups and ensure the planning process is inclusive of all voices. Local businesses and other nonprofit organizations can also play a role in identifying priorities and getting community members involved in the planning process. Engagement is only the beginning, it is important to ensure the community is an active part of decision making and there are discussions about community needs.

Think about who may oppose the project

Opponents have included local residents, Chambers of Commerce, Business Improvement Districts, commuters, and car lobbyists. Some of the biggest potential for controversy can lie with the businesses whose customers use the street to access their locations. The removal or disturbance of parking spots is often a place of tension, since they perceive that convenient parking is essential to their business. Curbside delivery has competed with bike infrastructure for use of the right of way. Unless businesses are consulted, they are likely to raise concerns to elected officials, which could derail progress. Engage with these stakeholders early and often to determine how to mitigate concerns and solve problems (real or perceived) together.

Case Study

Let's Bike Oakland: 2019 Bike Plan

To develop their 2019 Bike Plan, the City of Oakland partnered with six different CBOs to increase the number of people participating in the planning process and ensure recommended facilities meet the needs of existing and long-term residents. While the Plan is not an example of a quick-build project, the emphasis placed on collaboration, inclusive engagement, and community trust is one that should be implemented during quick-build planning and implementation.

Quick-build projects may be a new investment in some communities, however, it should not be assumed the investment will be welcomed. Community members may see this as another instance of not being listened to or served. They may not trust or understand the intention of the quick-build project. There are communities that have been ignored and underserved by the planning process and who do not historically have the experience or access to local officials or their representatives to have their voices heard. They may not have the time or resources to attend an evening public meeting or may not have access to information publicizing these meetings.

Members of the community where a quick-build project is being implemented must be included throughout the planning process, and the set-up of open lines of communication and engagement is important at the outset. Including community members will build relationships and then there will be a much bigger chance that members will be interested in engaging positively during installation and afterwards.

Case Study

Oakland Slow Streets Feedback Map

The Oakland Slow Streets Feedback Map was developed as part of the City of Oakland's Slow Streets Program created in response to the COVID-19 pandemic. The online interactive web map allows Oaklanders to upvote, downvote, comment, and suggest new Slow Streets for implementation. It also shows community members which corridors have been completed, which corridors are next for implementation, and which corridors are under consideration. Finally, the map links to a separate online survey which gives Oakland residents the opportunity to provide more general feedback about the Slow Streets Program.

Create an online tool

With limited time for virtual or in-person outreach events, creating a central resource for collecting feedback is key. Consider online tools such as surveys and interactive web maps to identify community priorities. Interactive web maps allow community members to make location-specific recommendations by adding comments to specific corridors on a map, which can provide needed detailed information when considering community priorities.

To ensure the outreach process is inclusive of all residents, particularly those who may have trouble using online tools or those without internet access, it is important to complement online engagement tools with more traditional methods of outreach, including mailings and paper surveys.

Case Study

Better Block PDX

Better Block PDX, a volunteer organization in Portland, OR, works to design and implement temporary installations at community-identified friction points throughout the City of Portland. Inspired by the national Better Block Project, the organization invites community members to recommend project ideas in their communities. In partnership with Portland State University's Transportation Research and Education Center (TREC), Better Block PDX releases an annual Request for Proposals (RFP) seeking community ideas for new pop-up projects. Community partners help with the outreach process, ensuring the RFP is accessible to people across the city. The organization also works closely with the Portland Bureau of Transportation (PBOT) on implementation, including permitting and construction. A temporary installation project from 2015 is slated for permanent construction later this year.

Collect feedback

For jurisdictions that already have a pedestrian, bike or active transportation plan, identifying previously prioritized but not yet built corridors is a clear first step when choosing quick-build projects. Collecting community feedback during the pre-implementation phase can help identify new opportunities for quick-build infrastructure within the network approach. Partnering with non-profit organizations or volunteer groups can also help identify community priorities.

During Implementation

Designate an agency representative and notify the community

Because quick-build projects move so rapidly, it is important to have clear and consistent channels of communication between your agency and the public. This involves having a clear and strategic communications plan, a comprehensive notifications process, and a designated agency representative who can serve as the first contact for public inquiries.

Internal

All relevant governmental and non-governmental stakeholders—including traffic or parking enforcement, utilities, sanitation, etc.—that may interact with the project once it's installed should be kept up to date on the project's progress. Communicate to stakeholders that the project will be and/or has been built so that parking tickets are not errantly written, and garbage can still be collected. This will include departments responsible for administering the parking regulations as well as any other roadway construction or permit requirements. The roadway is being temporarily organized in a new manner and the reorganization process likely differed from the standard permitting procedures for a block party or construction.

External

In addition to asking community members to provide feedback on their priorities, public stakeholders should also be notified of implementation plans and timelines and should be given the opportunity to raise questions and concerns related to the project both before and during the project's life. Despite engagement efforts completed during the pre-implementation phase, it's possible that some community members may not be aware of upcoming construction and may react negatively to temporary road closures or other construction impacts. Notifying residents with online engagement tools, hard-copy surveys, and flyers and having a clearly identified human point of contact, will help alleviate this potential issue.

Collect feedback

Community feedback should be encouraged during the implementation phase. By keeping the online survey tool active and providing a clear contact for public comments, community members have an opportunity to provide their feedback on the implementation process, any negative construction impacts, and any first reactions to the new facility. Continuing this clear line of communication can help instill community trust in the planning and implementation process.

Post-Implementation

Collect data

Qualitative

After the facilities are built, community members should be encouraged to provide feedback on their design and function, and suggest improvements or modifications for consideration. This qualitative data can be captured using the existing online webtool, as well as online and hard-copy post-implementation surveys.

This presents an opportunity for the community to shape the future of the facility—both in terms of its design and life span. Like the pre-implementation and implementation phases, community members should also be encouraged to identify opportunities for new and improved facilities which can help build out the network in a way that best meets community needs.

Drones or cameras can be set up to evaluate usage and conflicts in real-time. They can also provide real-time evaluation of a facility without impeding social-distancing requirements of jurisdiction or consultant staff.

Quantitative

In addition to capturing qualitative data through community feedback, collecting quantitative data such as bike and pedestrian counts, changes to travel time, and changes to vehicle speeds can help evaluate the new facility, determine whether improvements should be made, and dictate whether the facility should be made permanent. This data can also help inform future decisions and priorities.

Case Study

Denver Streets Partnership/Spin: Mobility Data for Safer Streets Initiative

Denver Streets Partnership is participating in Spin's Mobility Data for Safer Streets Initiative to measure how people are using the City of Denver's new open streets. To evaluate progress, Denver Streets Partnership is collecting both qualitative and quantitative data using StreetLight Data, Populus, and Strava Metro SaaS platforms, among others. Additional tools include a speed gun for tracking vehicle speeds, a time-lapse camera for measuring street changes, and a bike and pedestrian counter.

Identify opportunities for improvement

Collecting comprehensive qualitative and quantitative data provides the tools needed to properly evaluate new facilities, understand their impacts to existing streets, and determine any needs for improvement. Consistent negative feedback may result in the project's removal. However, a little negative feedback shouldn't end the project – instead, focus on what can be done to make the facility better for all residents and keep in mind that happy users of the facility are typically less likely to comment. Also, work to understand the root of negative feedback, if there is the ability to dig into and understand the core problem, it may be solved with a small adjustment rather than removal of the facility.

Deciding whether to make changes to the facility involves all relevant decision-makers from the initial administrative project team, to approve the changes, including any relevant budget considerations. Any changes to the facility should be done in consultation with the community as part of the continuous community feedback loop. Be transparent about the limits of existing resources and the fact that facilitating changes may require additional resources and time.

Case Study

City of Oakland's Essential Places

The City of Oakland's pandemic response saw the roll-out of 74 miles of slow streets. With quick-build methods, the City used barricades to discourage drivers from turning from fast arterials onto local streets. The locations were chosen based on designated neighborhood bikeways in the adopted 2019 Oakland Bike Plan. While community members largely supported improved safety in their neighborhoods, there was significant feedback that spoke to varying needs across the city.

Many residents responded to slow streets by identifying that their needs were not met in a response that centered the creation of recreational opportunities for those sheltering in place. Many residents were instead focused on getting to work as essential workers. Their needs were for safer crossings and pathways away from their residential street. The City shifted their approach to use quick build for improving crossings of arterial streets to essential places and community resources. Communities also responded critically to the materials used for slow streets, specifically construction barriers and barricades. Through frequent and thoughtful engagement, the City learned that these materials reflected the bus rapid transit construction that has had significant impacts on the neighborhood. The City responded by working to upgrade the materials to planters and artistic implementations that reflected the community.

The City of Oakland's quick build success was in establishing mechanisms for rapid response to critical safety issues and pandemic needs. At the same time, the City also worked to establish ongoing communication with communities, succeeding in responding to feedback by iterating on projects so that they reflected and supported the people they were intended for.

Implement programming elements

Where possible, link infrastructure improvements to non-infrastructure programs that encourage and enable more people to walk, bike, and roll. Examples include bike repair rebates and free or discounted use of bike share. Engage with local bike advocacy groups to assist with messaging for safe riding etiquette and other education and outreach opportunities. Yard signs can be used along the new facility to promote websites offering further information online.

Quick-build facilities offer an opportunity to implement targeted programming efforts to encourage community members to walk, bike, and roll safely. For example, engagement strategies can encourage students to use the new facilities to get to school.

Creating programs to encourage bike or scooter share, such as free or discounted passes, can also encourage people to use the new facilities. This is especially important to ensure that households with fewer resources can also take advantage of increased active transportation options. Jurisdictions have an opportunity to provide additional resources to make their bike and scooter share systems affordable and attractive for all residents.

Case Study

PikeRide, Colorado Springs, CO and nationwide

PikeRide, the City of Colorado Springs' bike share program, is offering free 30-minute rides during the COVID-19 pandemic to encourage users to maintain social distancing measures while traveling or exercising. Detroit, Memphis, Tucson, and other cities offered free monthly bike share passes to residents. Austin and Colorado Springs allowed free bike share trips. In some cities, benefits were targeted specifically at healthcare workers. New York City made one-year memberships free to critical workers. Minneapolis, Glasgow, Boston and Chicago provided free rides for healthcare workers. Moscow made bike rental free for volunteers and couriers.

Source: Alta (Toronto, ON)

03 DESIGNING AND MAINTAINING QUICK-BUILD

In this chapter we shift our focus first to examples of innovative strategies that are quickly forming the foundation of a successful quick-build design methodology. This is followed by physical design strategies for both dedicated and shared roadway spaces. Lastly, we turn to the selection of materials and maintenance considerations that are fundamental components of any capital improvement project.

In a standard design process for a permanent installation, the stages from a 10% drawing to a 100% package may take many months or even years. What exactly is the physical manifestation of a quick-build project and how does it differ from the traditional capital improvement project? Strategic choices made in the conceptual stage have helped jurisdictions reduce requirements for extensive study and investigation and mobilize rapidly for quick-build.

Designing street modifications is a step in the overall quick-build process whether the team is addressing basic design parameters, choosing materials, accounting for new realities at the curbside, or working through technical components at intersections and conflicts zones. These steps can be lengthy in a permanent re-design but quick-build methodology can realize efficiencies in the process. This process includes determining which design treatments should be used and where as well as the appropriate lifespan of the project.

Making strategic choices about the use of available resources and the process needed to implement can also accelerate the process. This includes the internal agency project approval and design process as well as utilizing on-call, indefinite delivery indefinite quantity (IDIQ) or repurposing existing contracts to accelerate the time required for project delivery.

Source: Alta (Toronto, ON)

Quick-Build Methodology

Approval Process

An examination of the current approval process can often highlight opportunities to streamline or quicken the overall design process. In some jurisdictions, these approvals are made by the council, supervisors, or commissioners, while in others, there are transportation boards responsible for these decisions. Sometimes, approvals require studies and meeting a warrant such as for traffic calming treatments. The process may involve several studies and expertise, such as a survey, geotechnical investigation, subsurface utility investigations, arborist reports, and traffic impact studies. The requirements will depend on the jurisdiction and scope of the project.

These assessments have a role. For instance, traffic impact studies inform decision-making for turn lane configurations. However, sometimes the requirements can change depending on scope and urgency, and sometimes with the right champions moving the project forward. As such, an examination and review of the jurisdiction's approval processes for various interventions can realize efficiencies.

Several jurisdictions have demonstrated that it may be possible to narrow the scope of approvals and studies by making strategic design choices, in other cases it may be an option to rely more heavily on engineering judgment. For example, in 2019, San Francisco Municipal Transit Agency was tasked by Mayor London Breed with addressing bike and pedestrian improvements in the city's High Injury Network. The transportation code was amended to allow some street changes to be approved by the jurisdiction's traffic engineer. More significant changes are required to go to a public hearing before the engineer approves them, and there are still many changes that require SFMTA board approval. However, this expedited process has allowed SFMTA's Livable Streets Quick Build program to consistently get projects out in a matter of months, not years.[2]

Toronto, Ontario adopted a similar approach that allowed, in consultation with local city councilors, changes for safety, changes to parking and loading, sightlines, signal timing or adjustments to turn restrictions or through restrictions, as well as enhancements to transit stops while accelerating their cycling network plan in response to the global pandemic. The general manager of transportation services was delegated time-limited authority to enact such modifications and address issues that may arise through modification or removal.

These changes were adopted as part of the city's ActiveTO program, which was enacted to expand quick-build infrastructure in response to the demands of the global pandemic. ActiveTO expands the cycling network by 25 km with the goal of allowing people to move around Toronto safely. This move was made possible by prioritizing the item in Toronto's city council, authorizing the installation of bicycle lanes/cycle tracks and various other ActiveTO projects.

Leverage an Existing Network Plan

As already highlighted in the previous chapter, leveraging an existing bikeways or pedestrian plan can greatly speed up the selection, design and implementation process. In addition to relying on a smoother and faster approval process Toronto's ActiveTO relies on acceleration of the Cycling Network Plan with a focus on key routes, bridging gaps in the network, and mirroring major transit routes.[3] Similarly, the City of Oakland, CA decided to utilize their existing local street bikeway and neighborhood route plans for their Slow Streets program.[4]

Dedicated Staff and Resources

A successful quick-build project involves dedicating the necessary staff and resources to get from start to finish. The City of Austin recognized that, due to the amount of funding approved and a limited time to implement their 2016 Mobility Bond program, a traditional project delivery process was infeasible. The passage of the bond program injected $137 million into bikeways, safe routes to school and sidewalk projects. Core components of the program focused on:

- Planning with available resources in mind for implementation, e.g.. capacity of municipal crews or volunteers
- Doubling of dedicated city design staff through consultant staff augmentation
- Leveraging in-house rapid concept engineering followed by field engineering by agency staff with construction crews:
    - Agency staff serve as coordination / project management / prime contractor of sorts, splitting up work between concrete, markings and signals contract and in-house implementation capacities
    - Field engineering addresses fine grading and makes sure the project is implemented correctly

Thanks to these core components and others, strategic moves Austin has been making diligent progress, and averages three to six-month implementation of even complex projects, which can feature concrete formwork, signal modifications, and innovative features such as protected intersections. Austin has demonstrated that even permanent high-quality concrete work can still be quick-build.

No Reconstruction and Maintain Existing Drainage, Curb and Centerlines

One of the most substantial cost and time saving strategies that has proven very effective in successfully implementing quick-build projects starts from the adoption of a basic position that the project will not include reconstruction and therefore will utilize the existing curb and centerlines. Toronto simplified the design of their quick-build bikeways with the following general assumptions:

- Bikeways repurposed curb lanes along key corridors, resulting in designs that have large buffers and removal of parking
- Centerlines remained in place with minimal changes to street design

Maintenance of Signal Infrastructure.

Another fundamental assumption adopted by many jurisdictions is the decision to minimize the need to make physical signal modifications and to largely retain signal mast arms in place. Physical signal modifications are typically an expensive and time-consuming endeavor and can quickly overwhelm a quick-build scenario. Signal modifications may of course be necessary in limited situations or should certainly be flagged for future updates should an initial quick-build project ultimately be upgraded as a permanent feature.

Leverage Standard Details

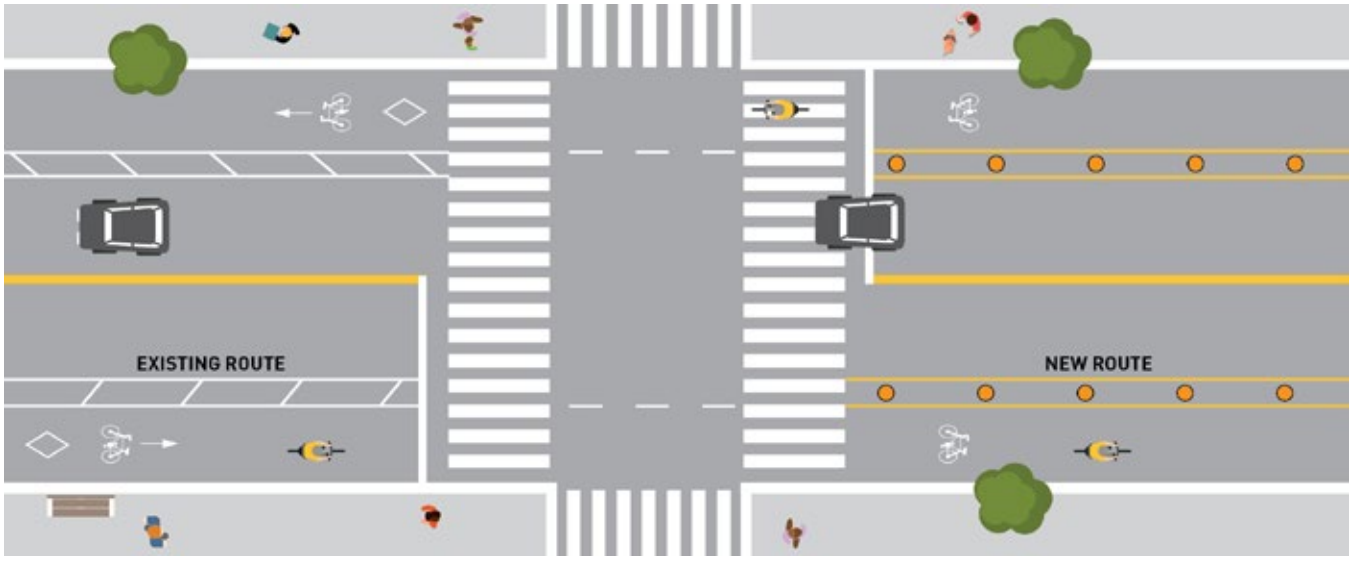
In building these facilities, engineering design issues such as conflicts at the intersection are similar if not the same as for any other major re-build. As such, designing these facilities can lean on established expertise by organizations such as NACTO that have developed design guidance for building active facilities and addressing challenging design issues. The City of Austin adopted a similar approach with their 2016 Mobility Bond Program. To speed up their process the city decided that their quick-build projects would use standard details for items like ADA and bicycle features. Similarly, they decided to leverage Indefinite Delivery Indefinite Quantity (IDIQ) contracts so that projects didn't have to be individually bid.

Familiar and Available Materials

The City of Toronto, ON looked to existing stockpiles or leveraged readily available materials when making material selections for their quick-build projects. Most of the projects in Toronto were focused on rapid installation and therefore were completed with temporary materials that were already used and familiar to the agency (i.e. paint and bollards, concrete separators). The City of Oakland, CA found unique ways to use already familiar materials. For instance, to get around the resources required to create custom signage, several cities have attached available pedestrian, cycling, and traffic calming signage that signals "local traffic only" or "road closed to through traffic" onto construction barricades in order to create soft closures on streets. In the City of Oakland, when a common criticism of slow streets was that the City should be allocating resources for improved testing, the City responded by using slow streets signs and barricades to distribute information on testing with flyers and posters. This approach saves time and money which are both critical factors in working on a quick-build project.

Source: Urban Milwaukee (Milwaukee, WI)

Source: Alta (Toronto, ON)



Source: City of Toronto, ActiveTO

Quick-Build Design – Dedicated Space

This section explores considerations for accommodating expanded spatial needs when adding bike, pedestrian, and other infrastructure to a corridor. First, this is explored through maximizing the operational space. Then, scenarios are described for designing separated bikeways adjacent to other uses. These discussions assume that no bikeway currently exists and adopts the constraints outlined above for accelerated quick-build design including assumptions of no reconstruction, no centerline changes, maintenance of the existing drainage and curb line and maintenance of signal infrastructure. In general, a curb lane is assumed to be repurposed.

In building quick-build facilities, engineering design issues such as conflicts at the intersection may be similar if not the same as for any other more traditional bikeway or streetscape implementation project. An abbreviated list of resources for addressing issues of design have been included below. At the same time, quick-build methods and assumptions can create unique challenges in design. In this section, these unique challenges are addressed for dedicated space and shared space facilities.

Resources:

- NACTO: Don't Give Up at the Intersection (2019)
- NACTO: Urban Bikeway Design Guide (2012)
- FHWA: Separated Bike Lane Planning and Design Guide (2015)
- MnDOT: Demonstration Project Implementation Guide (2019)
- NACTO: Streets for Pandemic Response & Recovery (2020)
- Street Plans Collaborative: Tactical Urbanism Guide Vol 1 & 2, (2012)

Operating Space for Physically Separated Bikeways

When repurposing a narrow parking lane into a bikeway, or converting a wide curb lane into a parking lane/transit stop and bikeway, achieving target widths may not be possible without compromises. Additional space may be obtained from the adjacent lane if surplus width is available, but specific strategies can also be used to maximize on operating space for bicyclists in a more constrained dedicated space.

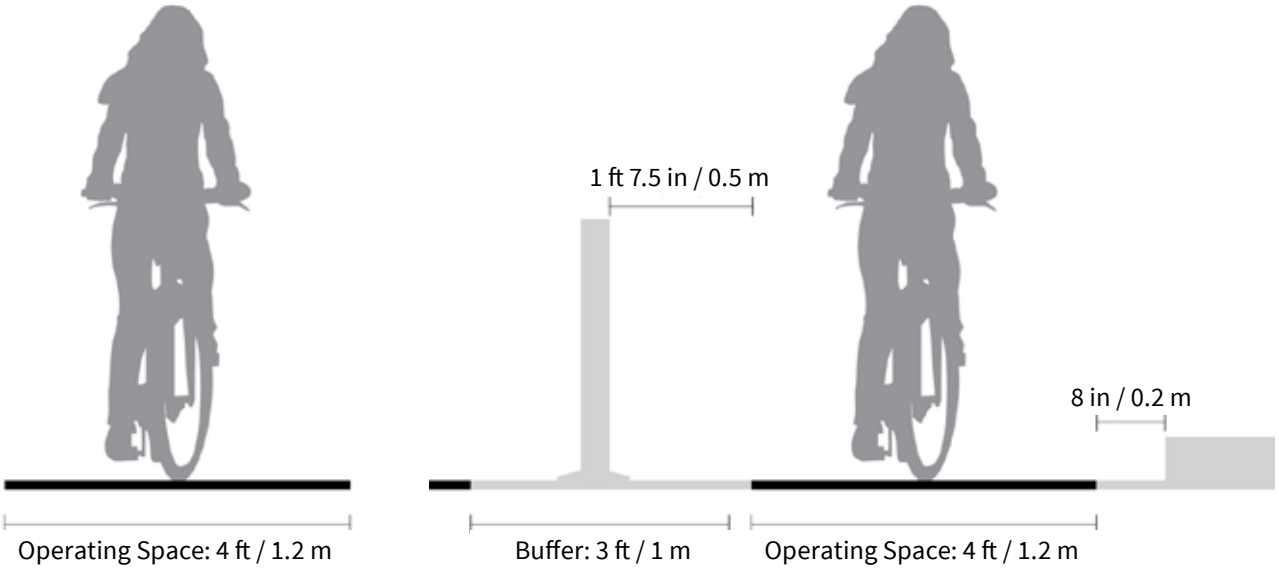
Typical minimum operating space for a bicyclist is 4 ft/1.2 m.

Additional horizontal clearance space is required when the bikeway is designed adjacent to curbs and barriers to protect bicyclists. An additional foot is needed if adjacent to a gutter pan. For instance, 8 in/0.2 m is required as an offset to a full height curb, or generally, at least 8 in/0.2 m from an obstruction 2 to 30 in/50 to 750 mm in height to avoid conflict with pedals.

When adding a separator treatment such as a flexible delineator post, 1 ft 7.5 in/0.5 m of horizontal clearance is required, or generally, 1 ft 7.5 in/0.5 m of clearance from an obstruction over 30 in/750 mm in height to avoid conflict with bicycle handlebars.

Using lower height separator treatments can maximize on operating space and reduce spatial requirements for bikeways. However, at heights below 2 in/50 mm, no pedal conflict is present and minimal to no horizontal clearance is required while a separation is maintained. Flush, mountable, or pedal compatible curb height can help to maximize on space by reducing required horizontal clearances. Lower height separators may also invite vehicle encroachment.

Note, when adjacent to a parking lane, a minimum of 3ft/1.0 m should be provided to avoid dooring conflicts. Strategic placement of separator treatments can maximize space for the bikeway by managing vehicular encroachment.



Source: Alta (Minneapolis, MN)

Source: @kyleplans via Twitter (Halifax, NS)

Separated Bikeway

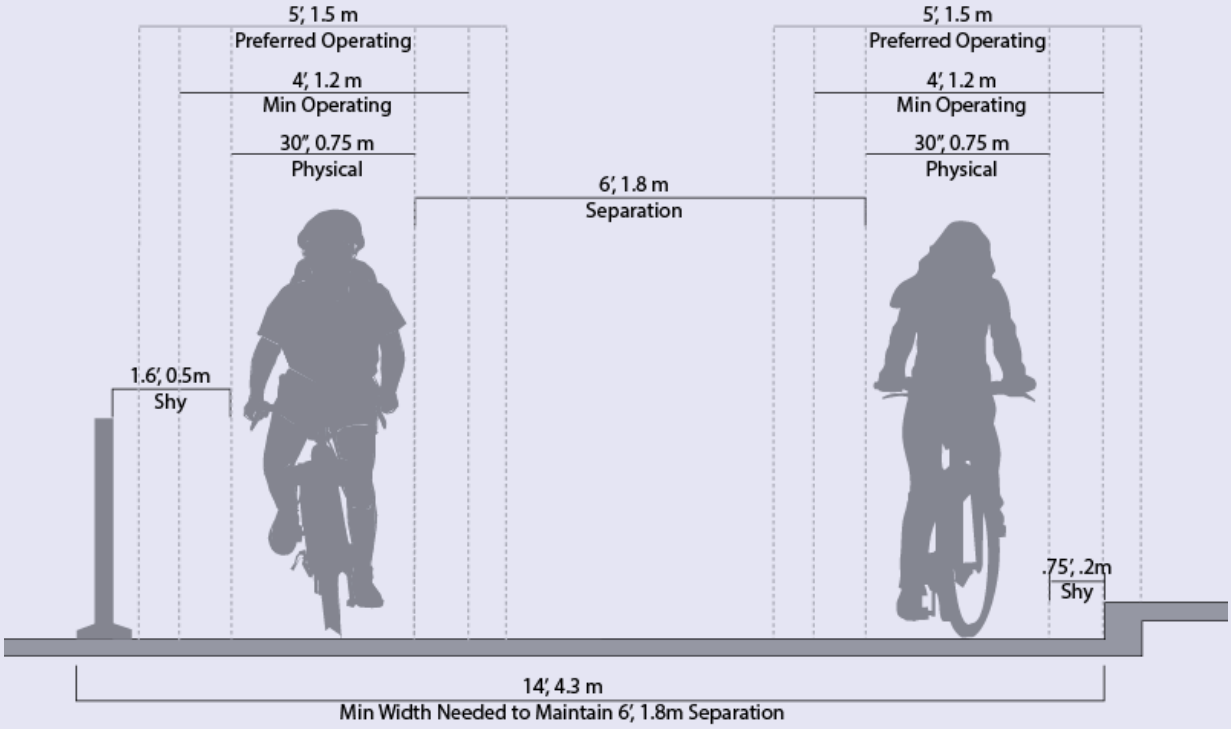
A curb lane repurposed for a bikeway can achieve a wide bikeway with more generous dimensions. A wider buffer could be used for snow storage whereas a wider bikeway can more easily facilitate winter maintenance and allow for side-by side riding, passing and social distancing.

Quick-build projects may need further considerations for how to protect against established driver expectations, ensuring parked and stopped cars do not block or impede on active infrastructure.

Covid-19 Consideration

Widths for Physical Distancing

When developing temporary separated facilities, it is important to consider the width of the facility to allow for passing while maintaining physical distancing. For comfortable operating space and passing, a width of 10-14 ft / 3.0-4.3 m is desirable. Achieving these widths is not always possible but re-allocation of space should aim to maximize bikeway and pedestrian throughways. When wide bikeways are provided, physical separation with the adjacent roadway is necessary to avoid motor vehicles from using the space as a parking or travel lane. Comfortable physical distancing may not be possible in all corridors as each bicyclist may not be able to ride close to the curb or other types of separation. However, it should be noted that providing a bikeway that does not provide space for physical distancing is better than providing no facility.



Separated Bikeway and Parking Lane

Parking is often a contentious issue in quick-build projects for a variety of reasons. Two issues are maintaining on-street parking in order to secure buy-in from businesses or residents and designing for parking to manage conflict points with bicycles.

For parking separated bike lanes, considerations must be made for a minimum 3ft/1.0 m buffer width in the dooring zone as well as setbacks to ensure visibility at driveways and intersections. Widths for the parking lane will depend on its use, where a minimum might be 6.5 ft/2.0 m for passenger vehicles, loading and truck uses may require a width of 8-9 ft/2.4-2.8 m.

Enforceable and clearly communicated rules and processes make for a smoother transition. The steps of altering or removing parking may include covering or changing fee collection devices, bagging or removing signage, and ticketing practices in a way that is clearly communicated to citizens. The type of parking that is being altered or removed is also important to the design and administrative process. If it is timed, pay and display, or loading, this will influence the space required and interaction with a bikeway if it interacts with the facility.

Source: Alta (Toronto, ON)

Source: Alta (Los Angeles, CA)

Source: Alta

Separated Bikeway and Transit Stops

Accommodating transit stops within a quick-build scenario can be accomplished with an island boarding stop. An island boarding transit stop serves users without requiring the vehicle to cross the bikeway, minimizing conflicts between buses and bicyclists and allowing for consistent physical separation for the bikeway along the corridor. The transit stop design will need to accommodate the deployment of wheelchair lifts, noting the required height of the raised platform, and width for the lift to deploy.

Temporary bus stop products have been used in Toronto, New York City, Pittsburgh, Oakland, and Baltimore. They are typically modular, allowing a range of dimensions. An important note is that the length of the raised platform should be at least long enough to serve the front door or rear door, and can be extended to serve all doors.

Source: Alta (Seattle, WA)

Source: Alta (Los Angeles, CA)

Source: Alta (Toronto, ON)

Separated Bikeway and Additional Pedestrian/ Cafe Space

A bikeway may need to temporarily shift and/or narrow to accommodate transit stops, parking, street dining or other pedestrian uses. If additional space is developed at street level for pedestrians, consideration must be given to providing compliant ramps for access as well as viable width for an accessible pedestrian. An extension at sidewalk level can also be created and may be utilized with the furnishing zone as outdoor dining space or a route.

Dedicated Space Transition Zones

One corridor may have transit, businesses, needs for additional pedestrian space and a bicycling facility, as well as restaurants. It is possible to accommodate many uses alongside a bikeway as it is carried through a corridor and tapers in and out. Along one block, transitions can be made, and more and more uses can be accommodated, particularly where there are large existing curb lanes or if there is the possibility to re-allocate significant space through the repurposing and narrowing of lanes.

If a bikeway ends for other uses at the curbside space, provide at least 50 ft/15 m transition area for bicyclists to safely merge into the through lane wherever the bikeway terminates. Consider placing shared lane markings and relevant warning or regulatory signage such as the “Bikes May Use Full Lane” sign. Otherwise, consider using the curbside space for both pedestrians and bicyclists where relevant.

Additional strategies for transitions and managing many uses may include typical curbside management tactics such as identifying off-peak opportunities for loading or finding identifying off-street areas for replacement of parking or curbside pick-up where possible.

Source: Alta (Toronto, ON)

Intersections

Intersections deserve special attention in design. The design and operation of the intersection is of particular importance for achieving a separated bikeway network that reaches to the "all ages and abilities" standard. If the intersection is overlooked it can create a weak point along the separated bikeway and discourage all but the most confident bicyclists.

Whether quick-build or permanent, separated bikeway intersection approaches have the same overall challenges – navigating bicyclists safely through the intersection. Resources for addressing these issues in design are included at the end of the chapter. While a variety of geometric solutions can be considered such as bike boxes and through bike lanes, many quick-build projects have natural opportunities for setback crossings and protected intersection corners.

In general, tightening corners to slow vehicles down and separating modes reduces the opportunity and severity of conflicts at turns. Building better does not have to mean the most complex option, providing improvements in simple design features can go a long way for bicyclist safety and comfort. For more information, see the resources list shown at the start of the chapter, with particular emphasis on NACTO's Don't Give Up at the Intersection.

Source: Alta

Quick-Build Protected Intersection

- Protected intersection corners are effective at improving visibility of bicyclists and managing the potential and severity of conflicts
- Maintaining a single stage pedestrian crossing from the original ramp location without a refuge by marking the crosswalk all the way through will reduce installation requirements

Source: Alta (Los Angeles, CA)

Quick-Build Tightened Corner

- Introducing a simple corner wedge and speed bump will tighten a corner and force vehicles to slow down without any curb work. A speed bump can also address typical concerns with emergency vehicle and truck access
- Be sure to extend separator treatments right up to the crosswalk so that vehicles do not merge with the bicycling facility on approach

Signals

Traffic signal changes are possible in a quick-build scenario and can further improve intersection operations for the comfort and safety of bicyclists. To facilitate a quick-build project, adjustments may need to be made to traffic signal head position, signal detectors, and signal timing/phasing to provide for safe operations. Turn restrictions can be considered to simplify intersection design for bicyclist safety by removing potential conflict points. Restrictions for right turns on red should be considered. Full restrictions on right/left turns may also be considered. If the intersection is actuated, camera based (video and thermal) detection systems are quickly reconfigurable without needing any physical changes beyond possible camera angle adjustments.

Bi-Directional Facilities

Some quick-build bicycling facilities being built are bidirectional. Bidirectional facilities may not be suitable in all corridors, as they have operational issues that require careful design, which impacts the safety of the contra-flow bicycle movement. Bidirectional facilities create more complex bikeway connections, increase risk of conflict at crossings, and, when given appropriate exclusive signal phasing, can increase signal delay. There are instances where a bidirectional facility may be suitable in the quick-build context, whether that is to manage space in order to maintain parking, or on streets with fewer driveways and cross-streets, one-way streets, or for seamless connections with other bikeways. See FHWA and NACTO guidance on bi-directional separated bikeways for further design considerations.

Source: Alta (New York, NY)

Source: Alta (Long Beach, CA)

COVID-19 and the Curbside

The pandemic has brought the curbside to the forefront. With the health crisis, there are several emerging trends within the realm of curbside management:

- Re-allocation of curbside space for bicycling and pedestrian activities and outdoor dining.
- New demands on space due to curbside pick-up and outdoor queues for store access
- New demands on space due to physical distancing
- Increasing demands from existing curbside activities such as loading, delivery, and parking

There is a need to support physical distancing on streets, as people use walking and bicycling to get to their jobs and to stores. There is also a need to re-invest in businesses, where new operations need to be supported including creating space for pick-up and deliveries and pedestrian queues. At the same time, existing needs such as garbage pick-up and ride hailing are still present. Many curbside management strategies are long-term investments, but several can be employed sooner within the quick-build framework, especially in areas of many competing uses and high density.

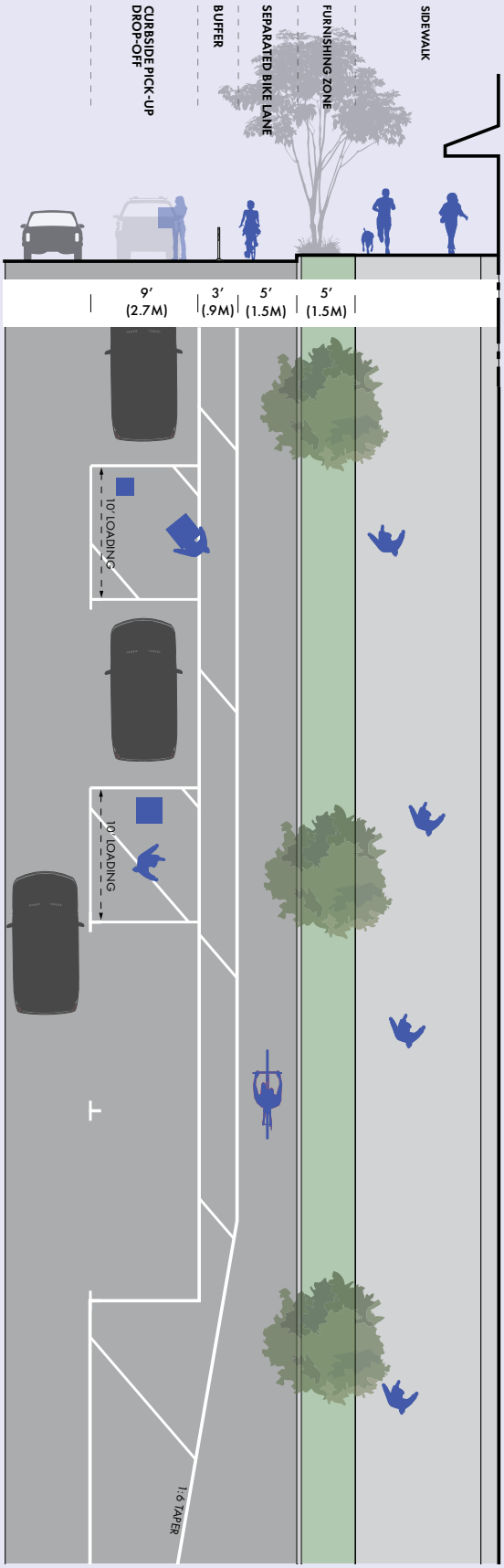
Taking over a curb lane can provide space to accommodate these new demands, but with additional considerations due to the pandemic.

Many jurisdictions have employed a range of strategies to relieve pressure on potentially congested areas and still provide needed services. Some examples include the conversion of parking spaces in front of businesses for curbside pick-up. Some jurisdictions are providing business with signage to accelerate the processes.[5] Others are developing full strategies that include a range of interventions from slow streets to re-purposing curb-lanes for bikeways, queue space, or waiting areas such as Toronto's CurbTO[6] and Vancouver's Room to Queue.[7]

Separated Bikeway and Curbside Pick-up and Drop-off

Consider the operations of pick-up and drop-off, these may require adjustments to a typical design. For instance, if a process involves loading of groceries or items into a car, employees or customers will need space to load into their vehicle. If poorly designed, bike lanes could be blocked by curbside pick-up activities. Larger parking stalls or buffer areas may be warranted to provide additional space for employees or customers to load their vehicles without blocking the bikeway. A larger buffer from the parked vehicle to the roadway will also add to the security of those performing curbside drop-offs. Moreover, at locations with curbside pick-up, frequent crossings of the bikeway may warrant crossing treatments and yield bars to provide clear guidance to bicyclists and pedestrians.

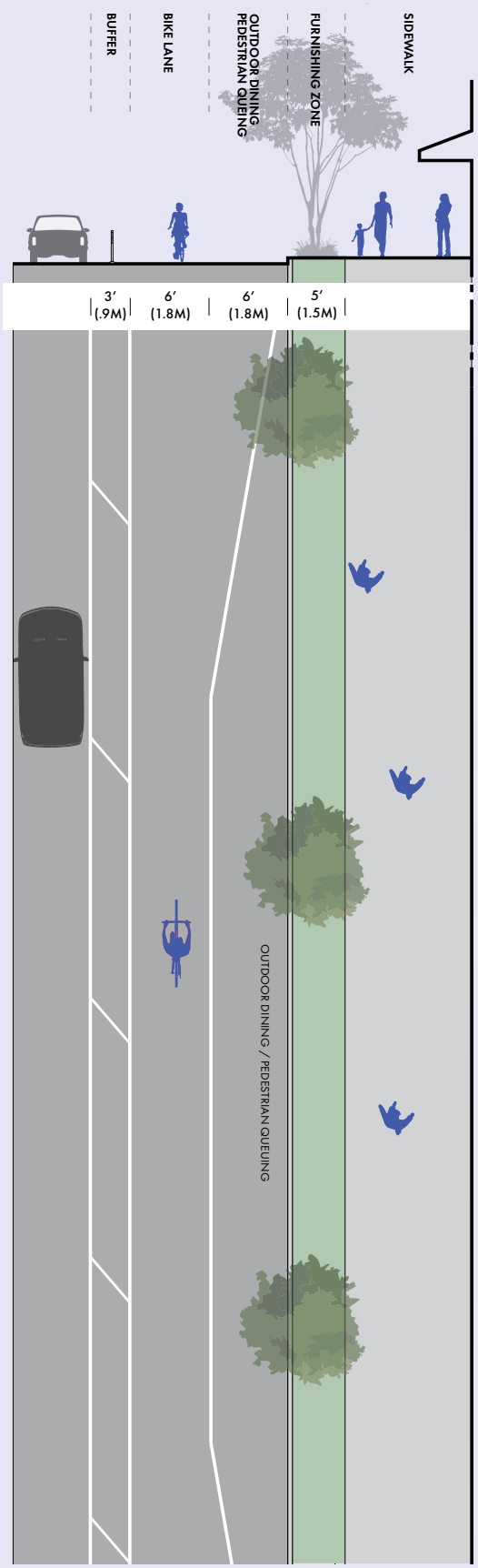
Where bikeways transition from curbside pick-up and drop-off or parking to transit, considerations must be made for transitions and the provision of appropriate boarding and alighting space. Many transit agencies have transitioned to rear boarding only. Where wheelchair lifts are deployed only at the front, the ability to serve both may be required.



Separated Bikeway and Pedestrian/Café Space

A bikeway may need to taper in to accommodate transit stops, curbside pick-up and drop-off, or parking, but it can also taper out from the curb to allow for expanded pedestrian, dining or queueing space. If additional space is developed at street level, a minimum width for an accessible pedestrian route must be provided. If an extension is created with temporary materials to be level with the sidewalk, it may be narrower provided that any clear width in the furnishing zone can be utilized to be at least 4 feet (1.3 m).

Access is an important consideration in any new installation. It is recommended to place any queuing or new facilities within the curb lane, while maintaining the main through pedestrian accessible route on the existing sidewalk which aligns with ramps and is otherwise designed for accessibility. It is also possible to provide compliant ramps to the new pedestrian space by installing rubber ramps available from suppliers.



Source: Alta (Toronto, ON)

Quick-Build Design – Shared Space

Shared space facilities include shared streets, slow streets, and local street bikeways. In building these facilities, engineering design issues are typically similar to a more traditional d project. At the same time, the quick-build framework produces unique considerations. For instance, quick-build temporary facilities may need added emphasis on directional guidance, or management of the capacity of vehicles or users to move or alter materials.

Slow Streets

Slow Streets are a shared facility where traffic volumes and speeds are reduced to a minimum in order to increase the safety and comfort of pedestrians and bicyclists.

Slow streets are typically implemented by keeping the street below a targeted vehicle volume and prevailing speed. To meet these targets, it may be necessary to limit access to local vehicular traffic, emergency services and deliveries through partial or full street closures. It is best to apply slow street elements on roadways that already have low vehicle volume and low to moderate speeds.[8] It is important to keep in mind that slow streets are more than signage, and key elements that make up a slow street are:

- Physical restrictions at street entry points and major intersections to maintain the targeted volume
- Traffic calming interventions that reduce speed to maintain the targeted speed
- Wayfinding and signage for identification and navigation by pedestrians and bicyclists

Covid-19 Consideration

Slow Streets had already become part of the lexicon of means to provide safe spaces for people walking and bicycling. Since the onset of the pandemic, the interest in slow streets has only increased as communities seek greater access to a network of open spaces that connect them to essential destinations. Emergency action to deal with pandemic realities has demonstrated the value of interventions that have long been part of the toolbox but frequently underutilized. Even once the pandemic recedes the slow street and the benefits it provides are expected to continue to play an important role in providing active transportation and open space opportunities. During the pandemic, unique strategies have been realized with how to mobilize quickly to provide signage, and how to use signage to disseminate important information.

Oakland, CA, uses signage for both wayfinding and providing information on COVID-19 testing.

Source: Alta

Traffic Calming and Materials

In addition to placing physical restrictions that limit access at the entry points to a slow street and divert traffic, traffic calming interventions play an important role in reducing overall travel speeds. Traffic calming interventions are specifically used to reduce and enforce the speed of vehicular traffic on streets by physically altering the configuration of the street or by visually changing how drivers perceive the street conditions. Applying speed humps, chicanes, and traffic circles, are just a few traffic calming measures that can be applied to streets. NACTO's Urban Street Design Guide gives further guidance on the use of these traffic calming techniques. In quick-build, these features can be applied with temporary materials.

While a majority of traffic calming improvements are applied as permanent installations, these require a more time intensive design and installation process. However, increased interest and demand for slow, safe streets solutions has prompted awareness of the need for implementation strategies that can be quickly achieved.

The quick-build framework has expanded opportunities to design and install traffic calming elements that can be applied in relatively short time frames. The materials used to fabricate these interventions should allow for quick installation. For example, traffic circles and diverters can be configured using a combination of flex post delineators, rubber curbs, and paint. Prefabricated temporary speed humps and raised crosswalks can also be quickly installed on streets. If these interventions function successfully and are well received by the public, they can potentially be upgraded to permanent applications. Careful attention should be given to the selection of treatments and materials used. Even if effective, treatments can generate public opposition if they are unattractive or are too restrictive.

Photo sources, top to bottom:

Bike/Ped Memphis (Memphis, TN); City of Lakewood, OH; Denverite (Denver, CO); Smart Growth America (South Bend, IN)

Wayfinding and Signage

With more people using slow streets to travel to essential destinations, wayfinding will be a key element in connecting users to these services. Because slow streets are often along local roads and away from major and familiar thoroughfares, signage is important for navigation. Wayfinding signage can be used to both brand a jurisdiction's slow street initiative and give people a clear sense of direction when navigating the slow street network. Signage also gives jurisdictions a unique opportunity to keep residents informed on important issues in their communities. Wayfinding and signage can easily be placed on traffic barricades at street entry points and on existing signs.

With any wayfinding system, the various elements should speak the same design language so that each is recognized as part of a cohesive system. Typically, the development of a wayfinding plan includes the development of a wayfinding sign family and a hierarchy of prioritized destinations vetted through a community engagement process.

Signs

There are three primary signs used - decision, turn, and confirmation. Decision signs communicate route options when more than one potential route is available. Turn signs mark the route to one specific destination at changes in direction. Confirmation signs are placed after a turn movement or intersection to reassure cyclists that they are on the correct route. The ***NACTO Urban Bikeway Design Guide*** provides a robust discussion.

General Placement

Bicycle-oriented wayfinding elements are designed to be legible by the bicyclist while in motion. Care should be taken not to place multiple wayfinding signs too close together so that they obscure each other and to help ensure that information is easily understood.

When two bikeways intersect, the general approach is to place a turn sign prior to the intersection followed by a confirmation sign after the intersection to confirm intended direction. Signs may be placed on existing posts, poles, or other supports as practical, if such supports allow mounting in accordance with the MUTCD.

Per both the MUTCD and AASHTO, the nearest edge of any potential bikeway obstruction including signs and mile markers should be a minimum of two feet from the travelway edge. The lowest sign edge of on-street bicycle signs should be seven feet. For further guidance on wayfinding and signage refer to the MUTCD and AASHTO guide.

Source: Alta (Alameda, CA)

Source: Alta (Toronto, ON)

Maintenance and Materials

The project planning stage should define timelines – is the project intended to be a one-year pilot? Or is the quick-build intended to closely resemble a future permanent facility, with only a minor adjustment to make it permanent? These decisions at the beginning will influence components of the design, including materials and alignment. The materials chosen will need to reflect the required durability and adjustability of the project, where there may be trade-offs between the two. A durable material may be a material that is hard to change, where an easily removable material may require more frequent inspections for damage and repair/replacement. Planters require different considerations for maintenance depending on climate and species. Choose materials based on the capacity to maintain them and then set adjustment and upgrade expectations accordingly.

Typical maintenance activities will need to be accommodated in design. This includes ensuring that widths chosen allow for vehicles in the respective municipality's fleet to access and perform maintenance. After installation is complete, the facilities will need to be monitored to make sure they are working as intended and that they are being repaired as they are worn or damaged.

It is important too to make sure that maintenance practices in response to seasonal weather patterns are taken into consideration during the design process.

Snow Removal and Other Maintenance Procedures

Maintenance for quick-build facilities is similar to that of permanent build with the added benefit of the ability to adjust in response to feedback from maintenance and operations crews.

Typical maintenance concerns relate to snow storage or removal, where it is important to consider the types of equipment available to municipalities and the widths and access. Design should avoid pinch points, providing additional space for equipment through thoughtful placement of temporary materials.

Other maintenance requirements, such as regular refresh of paint and materials will depend on design decisions made at the outset. These may change as a quick-build projects transitions from first iteration to permanent. Other procedures will fit into routine maintenance, such as sweeping of bikeways and pathways, and removal of debris and encroaching vegetation. Access for equipment is an issue to be addressed through design.

Drainage

An additional consideration is maintaining appropriate drainage. This can be done through design limitations that reduce changes to existing drainage infrastructure and chooses materials that do not impede flow. At quick-build transit stops, a solution may be to build the floating platform offset from the gutter and connect it to the sidewalk with a traversable surface to maintain gutter flow. For the winter, results from New York City suggest that modular temporary platforms are suitable for winter conditions.[9]

Source: Alta (Long Beach, CA)

Material Matrix

A material matrix offering numerous quick-action and quick-build materials and elements are presented in Appendix A. These items support projects and price points for a range of project durations and implementation strategies. These material options provide municipalities and agencies the ability to quickly allocate space to expand the bicycle network and serve curbside demands and spatial allocation dependent on time, funding and available staffing. Short-lived items allow for quick installations to extend the network until a more permanent facility can be installed. Other items are more durable and modular which can provide greater comfort, flexibility, and even aesthetic character. Finally, some items may be used for permanent bicycle facilities. Some items need to be installed by professionals with large equipment, while others may be installed with volunteer support. Items with varying durability may be mixed and matched to achieve a project's intent. A "quantity" checklist column is provided to help quantify, collect, and organize necessary items for successful project installations.

The material matrix organizes the materials and elements in four categories - delineators, surface treatments, signage, and other elements supporting the implementation of a safe, equitable, and user-friendly bicycle network. Each item provides information including a material or product description, appropriate project duration, the item's function, implementation strategies and considerations, as well as maintenance considerations.

04 IMPLEMENTING QUICK-BUILD

Depending on the jurisdiction and funding sources, quick-build designs must follow local, state, or federal standards. All facilities must adhere to the regulations and guidance of their state's adopted National or State/supplemental Manual on Uniform Traffic Control Devices (MUTCD), which dictates the design and precedence of signs, striping, and traffic signals. In addition, adopted state highway and street design standards (AASHTO or state design manual) should be reviewed and used for guidance along state highways. State transportation departments also provide state-wide approvals for the FHWA's Interim Approval process. Interim approvals are the regulations set for design features that have not been included in the latest edition of the MUTCD.

Additional guidance can be found in other published works. Common sources for this guidance can include the National Association of City Transportation Officials (NACTO), which has published numerous guides on topics such as bikeway design, transit corridor design, new mobility corridor designs, and multi-modal intersection designs. Any project that is along, or crosses, state ROW shall follow the design standards established in state DOT plans and specifications and AASHTO or the state design manual. If the design deviates from these publications, a design exception approval will be required.

Quick-build projects will require consideration of applicable federal or state environmental review regulations. These laws are intented to ensure that environmental impacts of public projects are disclosed, but allow for exemptions for specific categories of projects that have been determined will not have a significant effect on the environment. In general, quick-build bicycle and pedestrian projects are considered minor alterations of existing streets due to negligible or no expansion of an existing use, and would qualify for an exemption. Quick-build projects will generally not expand the physical area which could contribute to a physical impact to environmentally sensitive resources such as biology, geology, cultural, or historic, etc., nor do they substantially alter the existing use of a street.

Potential Funding Sources

Available funding for quick-build projects varies a lot from one municipality to the next. But here are a few ideas.

- Local and regional funds such as general fund, sales tax revenue, and Air Quality District funds are often the best sources.
- California's **Active Transportation Program** piloted a special quick-turnaround funding in 2020 for quick-build.
- PeopleForBikes has a **small grant program** for infrastructure projects.
- AARP's **Community Challenge grant** could fund a quick-build project.

05 ENDNOTES

1. People for Bikes. *Quick-builds for Better Streets: A New Project Delivery Model for U.S. Cities.* 2016.

2. SFMTA. "Vision Zero Quick-Build Projects." https://www.sfmta.com/projects/7th-street-8th-street-safety-projects

3. City of Toronto Transportation Services. 2020. "Cycling Network Plan Installations: Bloor West." Report for Action to City Council, City of Toronto. https://www.toronto.ca/legdocs/mmis/2020/cc/bgrd/backgroundfile-147511.pdf

4. City of Oakland. 2020. Oakland Slow Streets. April 11 2020. https://www.oaklandca.gov/projects/oakland-slow-streets

5. City of South Bend. "City and Downtown South Bend Offer Curbside Pickup Signs." https://southbendin.gov/2020/04/10/city-and-downtown-south-bend-offer-curbside-pickup-signs/

6. City of Toronto. "COVID-19: CurbTO". https://www.toronto.ca/home/covid-19/covid-19-protect-yourself-others/covid-19-reduce-virus-spread/covid-19-curbto/

7. City of Vancouver. "Making Streets for People Program." https://vancouver.ca/home-property-development/making-streets-for-people-program.aspx

8. NACTO. "Streets for Pandemic Response and Recovery: Slow Streets." https://nacto.org/publication/streets-for-pandemic-response-recovery/emerging-street-strategies/slow-streets/

9. Streetsblog. "Snapping Together a Better Bus Stop." https://usa.streetsblog.org/2018/03/05/snapping-together-a-better-bus-stop/

Appendix A

Materials Selection and Installation Guide

Source: Alta (Glendora, CA)

INSTALLATION

Numerous quick-action and quick-build materials and elements are presented below. The items have been organized into three categories: Delineators, Surface Materials, and Supporting Elements. These items support a range of project durations and implementation strategies to provide municipalities and agencies the ability to quickly allocate space for bicycle and pedestrian activities and serve curbside demands dependent on time, funding and available staffing. Short-lived items allow for quick installations to extend the network until a more permanent facility can be installed. Other items are more durable and modular which can provide greater safety, flexibility, and even aesthetic character. Finally, some items are those used for permanent bicycle facilities. Some items need to be installed by professionals with large equipment, while others may be installed with volunteer support. Items with varying durability may be mixed and matched to achieve a project's intent. A quantity checklist column is provided to help quantify, collect, and organize necessary items for successful project installations.

Items are placed into categories of temporary, quick-build, and permanent installations based upon the material or element's typical project duration. Temporary refers to project durations between one day to three months. Quick-build refers to projects with a typical one to three-year duration. Permanent projects are further differentiated into low (three to five years), medium (five to ten years), and high (ten plus years) duration sub-categories.

Each item includes a description, appropriate project duration, the item's function, implementation strategies and considerations, as well as maintenance considerations. Item descriptions reside under four subheadings—Use, Application, Installation, and Maintenance - defined below.

Use

The Use subheading offers guidance on the item's primary and ancillary uses. Primary uses are those recommended; while, ancillary uses are those for which other materials or elements may be better suited. Ancillary uses are provided knowing that communities may not have the resources or time required to acquire the materials or elements recommended for achieving the purposes described.

Item durability is also described to inform the designs/ installers when making decisions about the materials and elements used to implement projects. High durability describes materials and elements designed to withstand impacts with minimal to no damage and long-term resistance to weathering. This quality makes it less likely to need maintenance or replacement. Moderate durability describes materials designed to withstand some damage and remain functional or have the ability to be repaired and remain useful. This quality often increases maintenance actions or replacement. Low durability describes materials and elements designed to be short-lived or may need replacement when damaged. Items of low durability typically require more frequent maintenance or check-in to confirm the item is still viable as it can be more easily damaged or moved..

Application

The Application subheading offers design guidance for various facility applications including bikeways, bicycle parking, curbside pickup and drop-off zones, curb extensions, crosswalks, mid-block crossings, median islands, traffic circles and roundabouts, road closures, intersections, transit stations, bridges, plazas, and general guidance. Design considerations and guidance on situations for which the material or element is not recommended is also provided. For temporary materials or elements, recommendations for transitioning to more permanent items are offered. (General Note: All materials listed should be applied with ADA accessibility in mind. Refer to MUTCD's Part 6: Temporary Traffic Control for further guidance.)

Installation

The Installation subheading offers practical information on the time and personnel needed to install and uninstall each unit of the material. A summary about how to install the item and the equipment necessary should help installers plan project implementation. The information is general and does not include acquisition, mobilization, or clean up after completion. The time is approximated based on installation of a single unit or smaller application. Time saving may be gained when installing multiple units.

Maintenance

The Maintenance subheading offers information including maintenance frequency, effort to maintain, how to maintain the item's function when installed, and how to maintain the item when damaged.

Maintenance frequency is described as frequent, occasional, and rare. Frequent refers to materials and elements requiring maintenance from daily to monthly. Occasional refers to materials and elements requiring quarterly, bi-annual, or annual maintenance. Rare refers to materials and elements requiring maintenance on an as-needed basis.

Maintenance effort is described as high, medium, and low maintenance activity when maintenance is required. High describes highly involved maintenance activity requiring increased amounts of time, personnel, and/or special equipment requiring trained operators or strenuous physical activity to return the item to its original function. Medium describes moderate maintenance activity typically requiring one or two people expending 30 minutes to 2 hours using common equipment or some reasonable physical activity to return the item to its original function. Low describes maintenance activities requiring a few minutes for one or two people to make simple adjustments to return the item to its original function.

MATERIALS

Traffic Cones

Cone Size: 36”-48” tall

Base Size: 10.5” x 10.5” x 1”

Use

Primary: Quickly designate travel mode & parking separation along corridor segments or temporarily designate space for curbside pick-up, business access lines, or other transitory situations.

Ancillary: Median Island, Curb Extension

Item Durability: Highly durable, designed for 65 mph impacts.

Application

Bikeway: Place along edge of bike lane at 8’ to 20’ (50’ max) intervals

Curb Extension: Not recommended for intersection corners. Place at extension corners and at 8’ to 10’ intervals. Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. No parking sign may be used to prevent auto encroachment.

Median Island: Place at 2’ to 3’ intervals to delineate center median or turn channelizing median. Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Traffic Circle / Roundabout: Place at 2’ to 3’ intervals at circumference of center island. Deploy in conjunction with MUTCD signage. More substantial barriers or elements recommended inside center island.

Delineator Transition: To retain the delineation area for a longer duration, install with doweled-on concrete barrier, or vertical curb.

Source: Alta

Considerations: Only use for short-term projects. Easily moved or knocked down. Reflective cones recommended during day. Strongly recommended for use at night. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60” wide, provide passing space every 200’. Should be detectable to users of long canes and visible to persons having low vision.

Not Recommended: Intersection treatments, roadways with posted speeds over 25mph

Installation

Time: Minutes

Personnel: 1 installer

Uninstall: Minutes

Installation: Set in place.

Equipment: Manual labor

Maintenance

How Often: Frequent

Effort: Low

How to Maintain: Return/replace cone to original location if moved or stolen

Item Maintenance: Repair/Replace when damaged

Traffic Saw Horses

I-Beam Board

Length: 6'-8'

Dimensions: 7.75"H x 1.75"

A-Frame Leg

Dimensions: 28"W x 42"H

Use

Primary: Used for entry point access control (i.e. roadway closures).

Ancillary: Temporary Signage, Median Refuge, Pedestrian Plaza Spaces

Item Durability: Can withstand strong impacts and is coated with a UV stabilized polymer alloy coat for protection from cold weather conditions

Application

Intersections: Locate at the outside edge of travel lane 2' from travel lane edge and 3' from bikeway (2' minimum). Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. Transition to less robust delineation maximum 20' beyond pedestrian crossing.

Median: Locate 2' from travel lane edge. Provide minimum 8' (10' preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Plaza: Place along edge with 2' travel lane buffer and 3' (2' minimum) bikeway buffer. Not for use next to parking.

Closure: Place at end of roadway end to end or in travel &/or parking lanes with MUTCD road closed warning sign. Barriers should be continuous across travel lanes; caution tape may be used to connect barriers. Do not block bicycle facilities. If existing bicycle facilities are shared lanes provide directional bike intersection crossing pavement markings to bike lane openings at edge of travel lanes with 7' (6' minimum) opening in closure blockade.

Considerations: Only use for short-term project. Can be stabilized with sand bags

Not Recommended: Chicanes, Pinch Points, Traffic Circles, Mini-Roundabouts

Source: Alta

Installation

Time: Minutes

Personnel: 2 installers

Uninstall: Minutes

Installation: Set in place

Equipment: Manual labor

Notes: May be installed with informational regulatory or warning signage

Maintenance

How Often: Frequent

Effort: Low

How to Maintain: Return/replace sawhorse to original location if moved or stolen

Item Maintenance: Repair/Replace when damaged

Traffic Control Barricades

Plastic 1” x 8” boards

Length: 4’-8’

Uprights: 1.5” x 1.5” x 63”

Feet: 1.5” x 1.5” x 60”

Riser: 6”

Use

Primary: Used for entry point access control (i.e. roadway closures)

Ancillary: Temporary Signage, Median Refuge, Pedestrian Plaza Spaces

Item Durability: Can withstand strong impacts and is coated with a UV stabilized polymer alloy coat for protection from cold weather conditions

Application

Intersections: Locate at the outside edge of travel lane 2’ from travel lane edge and 3’ from bikeway (2’ minimum). Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. Transition to less robust delineation maximum 20’ beyond pedestrian crossing.

Median: Locate 2’ from travel lane edge. Provide minimum 8’ (10’ preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Plaza: Place along edge with 2’ travel lane buffer and 3’ (2’ minimum) bikeway buffer. Not for use next to parking.

Closure: Place at end of roadway end to end or in travel &/or parking lanes with MUTCD road closed warning sign. Barriers should be continuous across travel lanes; caution tape may be used to connect barriers. Do not block bicycle facilities. If existing bicycle facilities are shared lanes provide directional bike intersection crossing pavement markings to bike lane openings at edge of travel lanes with 7’ (6’ minimum) opening in closure blockade.

Considerations: Only use for short-term projects. Can be stabilized with sand bags

Not Recommended: Chicanes, Pinch Points, Traffic Circles, Mini-Roundabouts

Source: Alta

Installation

Time: Minutes

Personnel: 2 installers

Uninstall: Minutes

Installation: Set in place.

Equipment: Manual labor

Notes: May be installed with informational, regulatory or warning signage

Maintenance

How Often: Frequent

Effort: Low

How to Maintain: Return/replace barricade to original location if moved or stolen

Item Maintenance: Repair/Replace when damaged

Free Standing Delineators

Tube Size: 49.25"H x 7.6"W

Base Size: 20.25" point to point and 17.5" side to side

Use

Primary: Quickly designate travel mode & parking separation along corridor segments or temporarily designate space for curbside pick-up, business access lines, or other transitory situations.

Ancillary: Median Island, Curb Extensions, Bike Parking, Traffic Circles, Roadway Closures

Item Durability: Highly durable, designed for 65 mph impacts

Application

Bikeway: Place along edge of bike lane at 8' to 20' (50' max) intervals

Curb Extension: Place at extension corners and at 8' to 10' intervals. Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. No parking sign may be used to prevent auto encroachment.

Median Island: Place at 2' to 3' intervals to delineate center median or turn channelizing median. Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Traffic Circle / Roundabout: Place at 2' to 3' intervals at circumference of center island. Deploy in conjunction with MUTCD signage. More substantial barriers or elements recommended inside center island.

Plaza: Place along edge with 2' travel lane buffer and 3' (2' minimum) bikeway buffer.

Closure: Place at end of roadway in travel &/or parking lanes at 2' to 3' intervals with caution tape used to connect units. Barriers should be continuous across travel lanes. Deploy with D-2, D-3 or D-16 road closed MUTCD warning signs. Do not block bicycle facilities. If existing bicycle facilities are shared lanes provide directional bike intersection crossing pavement markings to bike lane openings at edge of travel lanes with 7' (6' minimum) opening in closure blockade.

Source: Alta

Considerations: Only use for short-term projects. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60" wide, provide passing space every 200'. Should be detectable to users of long canes and visible to persons having low vision.

Not Recommended: Chicanes, Pinch Points, Parklets

Installation

Time: Minutes

Personnel: 1 installer

Uninstall: Minutes

Installation: Set in place

Equipment: Manual labor

Maintenance

How Often: Frequent

Effort: Low

How to Maintain: Return/replace cone to original location if moved or stolen

Item Maintenance: Repair/Replace when damaged

Water Filled Plastic Barriers

Typical Size: 32”H x 18”W x 72” to 96”L

Empty Weight: Varies, 80lbs to 100lbs

Filled Weight: Varies, 1,000lbs to 1,400lbs

Use

Primary: Used for spatial separation and a barrier for bikeways. Can be used for pedestrian facilities if there are no gaps between each unit.

Ancillary: Median Island, Plaza Spaces, Roadway Closures, Parklets

Item Durability: Plastic material allows material to withstand vehicular impact. Can be filled with water or sand to enhance stability.

Application

Intersections: Locate at the outside edge of travel lane 2’ from travel lane edge and 3’ from bikeway (2’ minimum). Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. Transition to less robust delineation maximum 20’ beyond pedestrian crossing.

Median: Locate 2’ from travel lane edge. Provide minimum 8’ (10’ preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Bridge: Locate at outside edge of travel lane 2’ from travel lane edge and 3’ from bikeway (2’ minimum). Link units together for continuous barrier to 25’ beyond bridge end.

Plaza: Place along edge with 2’ travel lane buffer and 3’ (2’ minimum) bikeway buffer. Not for use next to parking.

Closure: Place at end of roadway end to end or in travel &/or parking lanes with MUTCD road closed warning sign. Barriers should be continuous across travel lanes; caution tape may be used to connect barriers. Do not block bicycle facilities. If existing bicycle facilities are shared lanes provide directional bike intersection crossing pavement markings to bike lane openings at edge of travel lanes with 7’ (6’ minimum) opening in closure blockade.

Considerations: Only use for short-term projects. May need a large truck to transport. May be inappropriate for drought climates, due to water needs. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60” wide, provide passing space every 200’. Should be detectable to users of long canes and visible to persons having low vision.

Source: First Vanguard Rentals & Sales

Not Recommended: Traffic Circles, Chicanes, Pinch Points, Bike Parking

Installation

Time: 20+ minutes placement and to fill with water

Personnel: 2-3 installers

Uninstall: 20+ minutes for removal and release of water

Installation: Set in place per manufacture & regulator agency standards on roadway pavement

Equipment: Forklift/ pallet jack, water source & hose, connection pin (optional), temperature gauge (optional)

Note: Interlocking units (optional)

Maintenance

How Often: Occasional

Effort: Low

How to Maintain: Inspect for damage. Return barrier to original location if moved. Periodically check water level.

Item Maintenance: Repair/Replace when damaged per manufacturer specifications

Climate Considerations: See manufacturer’s specification for freeze prevention. Not recommended for temperatures below 0 degrees Fahrenheit (-18 degrees Celsius).

Note: Repair DOES NOT return plastic to original strength

Planters

Length: 48”

Width: 24”

Height: 25”

Use

Primary: Used for spatial separation and a barrier for bikeways

Ancillary: Median Island, Curb Extension, Plaza Spaces

Item Durability: Can be made from highly durable galvanized steel material or plastic

Application

Intersections: Locate at the outside edge of travel lane 2’ from travel lane edge and 3’ from bikeway (2’ minimum). Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. Transition to less robust delineation maximum 20’ beyond pedestrian crossing.

Median: Locate 2’ from travel lane edge. Provide minimum 8’ (10’ preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Plaza: Place along edge with 2’ travel lane buffer and 3’ (2’ minimum) bikeway buffer. Not for use next to parking.

Closure: Place at end of roadway end to end or in travel &/or parking lanes with MUTCD road closed warning sign. Barriers should be continuous across travel lanes; caution tape may be used to connect barriers. Do not block bicycle facilities. If existing bicycle facilities are shared lanes provide directional bike intersection crossing pavement markings to bike lane openings at edge of travel lanes with 7’ (6’ minimum) opening in closure blockade.

Considerations: Can be complemented with other vertical barriers to enhance visibility and a sense of enclosure. A retroreflective element may be needed for night-time conditions. Planters can be removed during winter months, or set back a minimum of 18” to avoid plow blades. Planters should not obstruct accessibility/ ADA compliance or stormwater flow

Not Recommended: Mini-Roundabout, Traffic Circles

Source: Alta

Source: Dezignline

Installation

Time: 5+ minutes placement

Personnel: 2-4 installers

Uninstall: 15+ minutes

Installation: Set in place. Optional - install watering system, soil and plantings.

Equipment: Forklift/pallet jack. For plantings - skid loader (for soil installation), soil, planting, water source & hose, self-watering system (optional), manual labor.

Note: Available with bicycle lean rail & step. Soil, plantings & manufacturer self-watering system optional, but add to unit weight.

Maintenance

How Often: Occasional

Effort: Medium

How to Maintain: Inspect for damage. Return planter to original location if moved. Regularly water installed plantings.

Item Maintenance: Repair/Replace when damaged

Climate Considerations: See manufacturer’s specification for self-watering system maintenance

Large Planters

Circumference: minimum 24", 30" preferred

Use

Primary: Used for spatial separation and a barrier for bikeways and pedestrian facilities

Ancillary: Bike Corrals, Median Island, Curb Extension, Pedestrian Plaza Spaces, Parklets, (Can be applied to Chicanes and Pinch Points if used with other materials)

Item Durability: Level of durability varies based on material (fiberglass, plastic, concrete)

Application

Intersections: Locate at the outside edge of travel lane- 2' from travel lane edge and 3' from bikeway (2' minimum). Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. Transition to less robust delineation maximum 20' beyond pedestrian crossing.

Median: Locate 2' from travel lane edge. Provide minimum 8' (10' preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Plaza: Needs at least 6' of clear space between bikeway and travel lane. This consists of av2' travel lane buffer, 2' width of object, and 2' min bikeway buffer. Not for use next to parking.

Closure: Place at end of roadway end to end or in travel &/or parking lanes with MUTCD road closed warning sign. Barriers should be continuous across travel lanes; caution tape may be used to connect barriers. Do not block bicycle facilities. If existing bicycle facilities are shared lanes provide directional bike intersection crossing pavement markings to bike lane openings at edge of travel lanes with 6' opening in closure blockade.

Considerations: Can be complemented with other vertical barriers to enhance visibility and a sense of enclosure. A reflective strip may be needed for night-time conditions. Planters can be removed during winter months, or set back a minimum of 18" to avoid plow blades. Planters should not obstruct accessibility/ ADA compliance or stormwater flow

Source: Alta

Installation

Time: 10+ minutes dependent on quantity & optional planting

Personnel: 2-4 installers

Uninstall: 10+ minutes

Installation: Set in place. Optional - install watering system, soil and plantings.

Equipment: Forklift/pallet jack. For plantings - skid loader (for soil installation), soil, planting, water source & hose, self-watering system (optional), manual labor.

Maintenance

How Often: Occasional

Effort: Medium

How to Maintain: Inspect for damage. Return planter to original location if moved. Regularly water installed plantings.

Item Maintenance: Repair/Replace when damaged

Climate Considerations: See manufacturer's specification for self-watering system maintenance

Surface Mounted Flexible Guide Posts

Height: 36”

Weight: 1.5 lbs.

Use

Primary: Used for bikeway separation

Ancillary: Bike Corrals, Median Island, Curb Extension, Pedestrian Plaza Spaces, Parklets, Mini Roundabout, Traffic Circles

Item Durability: Very durable due to plastic material and flexibility

Application

Bikeway: Center in buffer area at 8’ to 20’ (50’ max) intervals

Curb Extension: Place at extension corners and at 8’ to 10’ intervals. Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. No parking sign may be used to prevent auto encroachment.

Median Island: Place at 2’ to 3’ intervals to delineate center median or turn channelizing median. Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Traffic Circle / Roundabout: It is best to use this material as a secondary element for this application. Place at 2’ to 3’ intervals at circumference of center island. Deploy in conjunction with MUTCD signage. More substantial barriers or elements recommended inside center island.

Plaza: Place along the edge at 8’ to 10’ intervals.

Considerations: Can be paired with the planters to enhance the aesthetics and sense of enclosure of the applied space. Delineators may be removed in winter for snow plowing/ removal. Monitor the replacement rate and decide whether a more durable vertical barrier is appropriate or cost effective for the context. Where driveways exist, no delineator post should be placed closer than 10’ to either side of the driveway or intersection. Posts are available in a variety of colors. Posts used where vehicle traffic is allowed should conform to the same colors as roadway striping per context as per MUTCD.

Source: Alta

Installation

Time: 15+ minutes

Personnel: 1-2 installers, dependent on length

Uninstall: 10+ minutes

Installation: Bolt or adhere to pavement per manufacturer’s recommendation

Equipment: Drill, bit, ratchet bit, bolts. Epoxy adhesive optional.

Maintenance

How Often: Occasional

Effort: Medium

How to Maintain: Inspect for damage

Item Maintenance: Repair/Replace when damaged

Climate Considerations: May be removed during winter for snow clearing. May remain in place if location does not inhibit snow clearing.

Impact Resistant Delineator Posts

Circumference: 22"

Height: 33"

Use

Primary: Used for spatial separation and a barrier for bikeways

Ancillary: Median Island, Curb Extension, Pedestrian Plaza Spaces, Mini Roundabout, Traffic Circles

Item Durability: Very durable due to plastic material and flexibility

Application

Bikeway: Center in buffer area at 8' to 20' (50' max) intervals

Curb Extension: Place at extension corners and at 8' to 10' intervals. Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. No parking sign may be used to prevent auto encroachment.

Median Island: Place at 2' to 3' intervals to delineate center median or turn channelizing median. Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. Posts in center of roadway placed on centerline or refuge entries & exits. If messaging is used for posts in the center of the roadway, orient messaging toward oncoming traffic. Deploy in conjunction with MUTCD signage.

Traffic Circle / Roundabout: It is best to use this material as a secondary element for this application. Place at 2' to 3' intervals at circumference of center island. Deploy in conjunction with MUTCD signage. More substantial barriers or elements recommended inside center island.

Plaza: Place along the edge at 8' to 10' intervals.

Considerations: Collapsible profile enables emergency and city service vehicle access. 2' height is less obtrusive than delineator posts, which can improve street aesthetics. A larger diameter size can be utilized to reinforce bicyclist and pedestrian comfort. Bollards are available in a variety of colors

Not Recommended: Bike Parking, Parklet, Chicane

Source: Alta

Installation

Time: 10+ minutes

Personnel: 1-2 installers, dependent on length

Uninstall: 5+ minutes

Installation: Bolt or adhere to pavement per manufacturer's recommendation

Equipment: T-bar, metal pavement sleeves, metal reinforcement screen, epoxy adhesive, manual pump gun

NOTES: NTPEP safety/durability certification. Multiple color options.

Maintenance

How Often: Occasional

Effort: Medium

How to Maintain: Inspect for damage.

Item Maintenance: Repair/Replace when damaged

Climate Considerations: May be removed during winter for snow clearing. May remain in place if location does not inhibit snow clearing.

Modular Barriers

Rail Dimensions: 3"W x 5"H

Rail Length: 4' & 8'

Rail Height: 7"

Rail Clearance Above Grade: 2"

Use

Primary: Used for spatial separation and a barrier for bikeways and pedestrian facilities

Ancillary: Median Island, Curb Extension

Item Durability: Highly durable

Application

Bikeway: Center in buffer area continuously or at 8' to 20' (50' max) intervals

Curb Extension: Locate at outside edge of travel lane 2' min from travel lane edge and 3' from bikeway (2' minimum). Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. May transition to less robust delineation beyond pedestrian crossing.

Median Island: Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. Posts in center of roadway placed on centerline or refuge entries & exits. If messaging is used for posts in the center of the roadway, orient messaging toward oncoming traffic. Deploy in conjunction with MUTCD signage.

Not Recommended: Bike Parking, Parklet, Chicane, Traffic Circles, Mini-Roundabouts

Considerations: For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60" wide, provide passing space every 200'. Should be detectable to users of long canes and visible to persons having low vision.

Source: Dezignline

Installation

Time: Dependent on scale of project

Personnel: 1-2 installers, dependent on length & number of units installed

Uninstall: Dependent on scale of project

Installation: Bolt into pavement

Equipment: Drill, bit, ratchet bit, bolts. Epoxy adhesive optional.

Maintenance

How Often: Occasional

Effort: Medium

How to Maintain: Inspect for damage

Item Maintenance: Repair/Replace when damaged

Climate Considerations: May be removed during winter for snow clearing. May remain in place if rail location does not inhibit snow clearing. Posts &/or ribbons at 25' to 50' intervals will help identify rail location.

Raised Lane Separators

Length: 40"

Width: 12"

Height: 3"

Use

Primary: Used for spatial separation and a barrier for bikeways

Ancillary: Median Island, Curb Extension, Pedestrian Plaza Spaces

Item Durability: Highly durable

Application

Bikeway: Center in buffer area end to end or spaced at 2' to 3' intervals

Curb Extension: Locate at edge end to end. Provide minimum 8' wide (10' preferred) opening for crosswalk/ pedestrian access. No parking sign may be used to prevent auto encroachment.

Median Island: Place at 2' to 3' intervals to delineate center median or turn channelizing median. Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Traffic Circle / Roundabout: Place at 2' to 3' intervals at circumference of center island. Deploy in conjunction with MUTCD signage. More substantial barriers or elements recommended inside center island.

Plaza: Place along the edge at 8' to 10' intervals.

Considerations: Modular spacing may be customized to fit local conditions. Delineator posts may need to be removed for snow plow and removal. Monitor replacement rate and decide whether a more durable barrier is appropriate or more cost effective for the context. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60” wide, provide passing space every 200’. Should be detectable to users of long canes and visible to persons having low vision.

Not Recommended: Bike Parking, Parklets, Chicane

Source: Alta

Installation

Time: 10 minutes

Personnel: 1-2 installers, dependent on length & number of units installed

Uninstall: 10+ minutes

Installation: Bolt or adhere to pavement per manufacturer's recommendation

Equipment: Drill, bit, ratchet bit, bolts. Epoxy adhesive optional

Maintenance

How Often: Occasional

Effort: Medium

How to Maintain: Inspect for damage.

Item Maintenance: Repair/Replace when damaged

Armadillos

Length: 32”

Width: 8.5”

Height: 5”

Use

Primary: Used for spatial separation and a barrier for bikeways

Ancillary: Median Island, Mini-Roundabout, Traffic Circles, Curb Extension, Pedestrian Plaza Spaces, Parklets, Bike Parking, Chicanes

Item Durability: Highly durable, molded plastic can withstand outdoor and chemical elements and won’t chip or break with vehicle impact

Application

Bikeway: Center in buffer area at 3’ to 20’ (50’ max) intervals

Considerations: Install with flexible guide posts

Not Recommended: Pinch Points, Roadway Closures

Installation

Time: 15+ minutes

Personnel: 1-2 installers

Uninstall: 10+ minutes

Installation: Bolt into pavement per manufacturer’s recommendations

Equipment: Drill, bit, ratchet bit, bolts

Note: May be installed parallel, perpendicular or at 135-degree angle with relationship to travel lane

Maintenance

How Often: Occasional

Effort: Medium

How to Maintain: Inspect for damage

Item Maintenance: Repair/Replace when damaged

Climate Considerations: Remove during winter for snow clearing. May remain in place if location does not inhibit snow clearing. Install vertical delineators (with posts &/or ribbons) at 25’ to 50’ intervals to help identify buffer location.

Source: Inhabitat

Plastic Curb Barriers

Length: 72"

Width: 6"

Height: 4"

Use

Primary: Used for spatial separation and a barrier for bikeways

Ancillary: Bike Parking, Parklet, Curb Extensions

Item Durability: Highly durable, high quality plastic material provides resistance from natural elements and tire scuffing

Application

Bikeway: Center in buffer area continuously or at 2' to 10' (50' max) intervals dependent on posted speed limit.

Curb Extension: Locate at outside edge of travel lane 2' from travel lane edge. Provide minimum 8' wide (10' preferred) opening for crosswalk/pedestrian access. May transition to less robust delineation beyond pedestrian crossing.

Considerations: Are available in a variety of materials; plastic, rubber, or concrete. Plastic curb stops are recommended for demonstration projects only. Ensure placement does not interfere with stormwater flow or ADA accessibility. May be removed during winter months. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60" wide, provide passing space every 200'. Should be detectable to users of long canes and visible to persons having low vision.

Not Recommended: Pinch Points, Roadway Closures

Source: Alta

Installation

Time: 15+ minutes, dependent on length & number units installed.

Personnel: 2-3 installers

Uninstall: 15+ minutes, dowels must be cut off & ground flush with pavement

Installation: Installation depends on manufacturer. It can be installed by steel spikes, lag bolts and anchors, or wedge bolts. If unit does not have bottom spacers for stormwater runoff, install with 2' gap at 16' to 20' intervals.

Equipment: Drill, bit, manufacturer recommended dowel, epoxy adhesive

Maintenance

How Often: Rare

Effort: Medium

How to Maintain: Inspect for damage

Item Maintenance: Repair/Replace when damaged

Climate Considerations: Install vertical delineators (with posts &/or ribbons) at 25' to 50' intervals to help identify curb location.

Pre-Cast Concrete Curb Barriers

Length: 3’-8’

Width: 6”-12”

Height: 4”-7”

Weight: Up to 400lbs or more per unit

Use

Primary: Used for spatial separation and a barrier for bikeways and pedestrian facilities

Ancillary: Bike Parking, Curb Extensions, Median Islands

Item Durability: Highly durable, Concrete and welded rebar frame makes this highly durable

Application

Bikeway: Center in buffer area continuously or at 2’ to 10’ (50’ max) intervals dependent on posted speed limit

Curb Extension: Locate at outside edge of travel lane 2’ from travel lane edge. Provide minimum 8’ wide (10’ preferred) opening for crosswalk/pedestrian access. May transition to less robust delineation beyond pedestrian crossing.

Considerations: Allow gaps for stormwater drainage (if channels are not built-in) and pedestrian access along curbs. Delineators may be removed for road resurfacing and snow removal. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60” wide, provide passing space every 200’. Should be detectable to users of long canes and visible to persons having low vision.

Not Recommended: Pinch Points, Roadway Closures, Pedestrian Plaza Spaces, Parklet, Chicanes, Mini-Roundabout, Traffic Circles

Source: Streets Blog Chicago

Installation

Time: 20+ minutes, dependent on length & number units installed

Personnel: 2-3 installers

Uninstall: 15+ minutes, dowels must be cut off & ground flush with pavement

Installation: Dowel onto pavement

Equipment: Skid loader, drill, bit, manufacturer recommended dowel, epoxy adhesive

Maintenance

How Often: Rare

Effort: High

How to Maintain: Return barrier to original location if damage is minor or can be repaired

Item Maintenance: Repair/Replace when damaged

Climate Considerations: Install vertical delineators (with posts &/or ribbons) at 25’ to 50’ intervals to help identify curb location

Concrete Jersey Barriers

Length: 10’-12’

Width: 24”

Height: 32”

Weight: 750 lbs

Use

Primary: Used for spatial separation and a barrier for bikeways. Can be used for pedestrian facilities if there are no gaps between each unit.

Ancillary: Median Island, Bridge, Pedestrian Plaza Spaces, Intersections

Item Durability: Highly durable, concrete and welded rebar frame makes this highly durable

Application

Intersections: Locate at outside edge of travel lane 2’ from travel lane edge and 3’ from bikeway (2’ minimum). Transition to less robust delineation maximum 20’ beyond pedestrian crossing.

Median: Locate 2’ from travel lane edge. Provide minimum 8’ (10’ preferred) opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Bridge: Locate at outside edge of travel lane 2’ from travel lane edge and 3’ from bikeway (2’ minimum). Link units together for continuous barrier to 25’ beyond bridge end.

Plaza: Place along edge with 2’ travel lane buffer and 3’ (2’ minimum) bikeway buffer. Not for use next to parking.

Considerations: Most have forklift notches made for easier transport and placement. Precast options are available in a variety of finishes and colors. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60” wide, provide passing space every 200’. Should be detectable to users of long canes and visible to persons having low vision.

Not Recommended: Pinch Points, Roadway Closures, Median Island, Parklet, Chicanes, Mini-Roundabout, Traffic Circles

Source: Street Plans Collaborative

Installation

Time: 10+ minutes, dependent on length & number units installed

Personnel: 2-3 installers

Uninstall: 10+ minutes

Installation: Set in place per manufacture & regulator agency standards on roadway pavement. If unit does not have bottom spacers for stormwater runoff, install with 2’ gap at 16’ to 20’ intervals.

Equipment: Front-end loader

Notes: Interlocking units (optional)

Maintenance

How Often: Rare

Effort: High

How to Maintain: Return barrier to original location if damage is minor or can be repaired

Item Maintenance: Repair/Replace when damaged

Modular Transit Stop

Dimensions vary based on Transit Stop Design and selected products

Use

Primary: Modular system used to safely transition bike lanes through transit areas

Ancillary: Specifically designed for primary use

Item Durability: Highly durable, highly resistant to inclimate weather, impacts, and heavy loads

Application

Transit Station: Locate and size in accordance with transit authority guidance on roadway side of bikeway. Minimum 8' platform recommended. 8' clear width may be possible by combining the pedestrian access area and the platform. 8' is necessary to deploy and maneuver wheelchairs and mobility assisted devices.

Considerations: Designed to include additional amenities (i.e. canopies, pole signs, bollards, traffic lights, benches). Main modules and ramp can include tactile surfaces for ADA accessibility. Platform should be at least 48" wide with a 4x4' turning radius for ADA accessibility.

Installation

Time: 2+ Hours

Personnel: 2-3 installers

Uninstall: 2+Hours

Installation: Install per manufacturer instructions. Bolt edge units into pavement

Equipment: Manual labor, drill, bit, ratchet bit, bolts

Notes: Transit stop should be accessible per ADA. Ramp must be provided for bike lane on both sides of ADA crossings. Install vertical delineators at the roadway edge or end of platform on side of oncoming traffic.

Maintenance

How Often: Rare

Effort: Medium

How to Maintain: Return station elements to original location if damaged is minor or can be repaired

Item Maintenance: Repair/Replace when damaged

Source: Alta

Temporary Crosswalk Mat

Width: 6' (Recommended)

Use

Primary: Mat used to create temporary crosswalk on roadway

Item Durability: Durability varies based on chosen mat material (See Considerations)

Application

Crosswalks: Mats should extend the entire length of crosswalk

Curbside Pick-up/Drop-off Zones: Place crosswalk pavement markings continuous for the full distance of the zone with applicable MUTCD pavement markings & pedestrian crossing warning signs. Considerations: Black tar paper can be used for a cheaper alternative. A heavy mat material will provide more durability.

Installation

Time: Minutes

Personnel: 2 installers

Uninstall: Minutes

Installation: Apply double stick tape (4" wide minimum) to edges and at 2' intervals maximum to bottom of mat. Set in place. Screw assembly corners & at 2' maximum intervals.

Equipment: Manual labor, drill, bits, screw assembly, double stick tape

Notes: Screw assemblies should consist of a minimum 4" exterior grade screw with flat, flush head & washer with minimum 1" diameter x 3/16" thickness

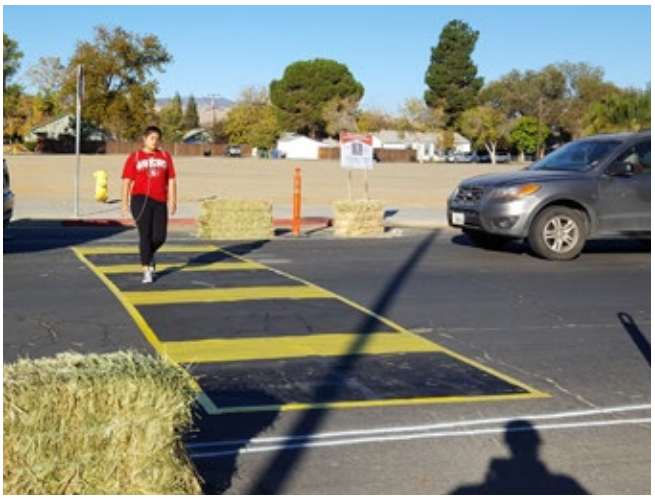
Maintenance

How Often: Occasional

Effort: Low

How to Maintain: Return mat to original location if moved or stolen

Item Maintenance: Repair/Replace when damaged



Source: Alta

Ceramic Markers

Circumference: 4”, 6” & 8”

Use

Primary: Used to establish and reinforce curb extension and plaza conditions

Ancillary: Median Island, Curb Extension, Chicanes

Item Durability: Typically, last 1-5 years

Application

Curb Extension: Place at extension corners and at 2’ to 8’ intervals. Do not place in opening for crosswalk/pedestrian access. No parking sign may be used to prevent auto encroachment.

Median Island: Place at 2’ to 3’ intervals to delineate center median or turn channelizing median. Use in tandem with appropriate vertical delineator. Do not place in opening for crosswalk/pedestrian access. Deploy in conjunction with MUTCD signage.

Considerations: While reflective and non-reflective markers are available; reflective markers are recommended for higher visibility. Should be complimented with other vertical elements where physical protection is required. For ADA purposes, material should not intrude into the temporary pathway. If temporary pathway is less than 60” wide, provide passing space every 200’. Should be detectable to users of long canes and visible to persons having low vision.

Not Recommended: Parklets

Installation

Time: 10+ Minutes, dependent on quantity

Personnel: 1 installer

Uninstall: Minutes with mechanical pry bar

Installation: Clear debris from installation area, power wash if muddy. Apply butyl pad to pavement per manufacturer’s instructions. Adhere ceramic marker to butyl pad in accordance with manufacturer instructions.

Equipment: Butyl pads, ceramic markers, tape measure, straight line rope, field marking paint, manual labor.

Maintenance

How Often: Occasional

Effort: Medium

Item Maintenance: Repair/Replace when damaged

Climate Considerations: May not be appropriate on roadways designated with snow removal

Source: Alta

Temporary Raised Crosswalk

Length varies by manufacturer

Width: 10' (recommended)

Use

Primary: Increase Crossing Safety, Traffic Calming

Item Durability: Highly durable

Application

Intersection: Suitable for local collector streets &, in limited circumstances, arterial streets with posted speeds of 30-35 mph or less, 3,500-4,000 vehicles per day& high pedestrian travel. When parking lanes exist, curb extensions should be used to shorten crossing distance.

Mid-block: May be used on collector streets &/or transit & emergency response routes with posted speeds of 30 mph or less & less than 3,000 average daily vehicles. Speed table top must be designed to support emergency vehicles. Can be installed at the crest of a vertical curve only if there is adequate stopping sight distance or warning signs provided. Crosswalk should be ADA compliant. Where applicable, provide 6' street level bike lane pass through with applicable MUTCD pavement markings & adjacent curb extension crossing refuge (6' minimum length) with vertical protection.

Considerations: Make appropriate provisions to allow 2' gutter space for stormwater conveyance where necessary.

Not Recommended: Posted speeds above 35 mph. ADT above 3,000-4,500 vehicles. Streets wider than 50'. On corridors with large percentages of heavy vehicles.

Installation

Time: 2+ Hours

Personnel: 2-4 installers

Uninstall: 2+ Hours

Installation: Install per manufacturer's instructions.

Equipment: Manual labor, crosswalk units, drill, bit, bolt assembly

Maintenance

How Often: Occasional

Effort: Medium

Item Maintenance: Repair/Replace when damaged

Source: Rosehill Highways

Temporary Speed Cushion

1 Unit:

Length: 6’

Width: 7’

Height: 3”

Use

Primary: Traffic Calming

Item Durability: Highly durable

Application

Location: Suitable for local collector streets with maximum posted speeds of 30 mph or less. Locate at least 150 feet from a non-signalized intersection & 250 feet from a signalized intersection. Install applicable MUTCD signage & pavement markings. Can be installed at the crest of a vertical curve only if there is adequate stopping sight distance or warning signs provided. Install with horizontal spacing wide enough for passenger vehicle, but narrow enough to permit fire trucks and transit vehicles to easily pass.

Considerations: Make appropriate provisions to allow 2’ gutter space for stormwater conveyance where necessary.

Not Recommended: Posted speeds above 30 mph

Installation

Time: 2+ Minutes

Personnel: 2-4 installers

Uninstall: 1+ Hours

Installation: Install per manufacturer’s instructions

Equipment: Manual labor, speed cushion units, drill, bit, bolt assembly

Maintenance

How Often: Occasional

Effort: Low

Item Maintenance: Repair/Replace when damaged

Source: Alta

Stencil

Varies by symbol, refer to MUTCD

Use

Primary: Stencils used to create pavement markings on roadways

Item Durability: Typically, can last 1 day - 1 month (Contractor stencils can last 1-5 years depending on material)

Application

Bikeway: Install per MUTCD guidelines

Considerations: Possibly reusable depending on method of storage. Made in various materials (plastic and metal). Easy to transport and store for reuse.

Installation

Time: 105+ Minutes per marking

Personnel: 2-3 Installers

Uninstall: 5+ Minutes with power washer depending on paint used

Installation: Do not install when temperatures are below 50 degrees Fahrenheit (10 C). Clear debris from installation area, power wash if muddy. Set stencil in place per plans. Install pavement marking per MUTCD guidance. Protect pavement marking installation until paint is dry.

Equipment: Manual labor, stencil, pavement marking application, tape measure, straight line rope, field marking tape, paint roller (dependent on pavement marking application).

Maintenance

How Often: Occasional

Effort: Low

Item Maintenance: Repair/Replace when damaged

Source: Alta

Source: Big Stencil

Pavement Surface Coatings

Various products are available for creating colored or textured pavement surfaces that differentiate pedestrian / bicycle spaces from vehicular space and allow for artistic enhancements. These include acrylic asphalt paints, epoxy acrylic coatings, and pigmented polymer cements.

Use

Primary: Pavement markings, colored surface treatments

Item Durability: Depends on product. Acrylic water based paints will require more frequent reapplication than polymer or epoxy. Applications in vehicular traffic areas (crosswalks, bikeway conflict zones) will wear faster than separated pedestrian or bicycle areas.

Application

Bikeway: Install per MUTCD guidelines

Considerations: Acrylic water-based products not guaranteed durable when power washes are repeatedly required. Epoxy and polymer based products offer greater durability but require professional experience for proper installation.

Installation

Time: Dependent on scale of project

Personnel: 1+ installer

Uninstall: Dependent on scale of project

Installation: Varies depending on product. Acrylic water-based products can be applied like normal paint. Epoxy or polymer based products must be professionally installed.

Equipment: Pavement striping machine, sprayer/roller/brush, epoxy pavement marking paint, tape measure, straight line rope, field marking paint, manual labor, stencil.

Maintenance

How Often: Depends on product used. Acrylic water based products will require more regular reapplication than epoxy or polymer.

Effort: Medium

How to Maintain: Reapply acrylic water based paint as needed

Source: Alta

MMA (Methyl Methacrylate)

Use

Primary: Pavement markings on roadways

Item Durability: Typically, last up 3-5 years or more

Application

Bikeway: Install per MUTCD guidelines

Considerations: Performs well in inclimate areas. Requires professional installation.

Installation

Time: Dependent on scale of project

Personnel: 2-3 installers

Uninstall: Dependent on scale of project

Installation: Do not install when temperatures are below 40 degrees Fahrenheit (10 C) and rising. Clear debris from installation area, power wash if muddy. Apply in accordance with manufacturer instructions. Protect pavement marking installation 10 minutes.

Equipment: MMA materials, tape measure, straight line rope, field marking paint, manual labor, stencil.

Notes: Do not install over existing asphalt residual oils. Install on new asphalt surfaces after 30 days of traffic. Allow new concrete 28 days to cure before MMA installation.

Maintenance

How Often: Rare

Effort: Medium

How to Maintain: Restripe within maintenance schedule or in spot locations where paint has deteriorated to unsafe levels

Source: FHWA

Preformed Thermoplastic Markings and Tape

Use

Primary: Pavement markings on roadways

Item Durability: Typically, last 4-10 years

Application

Bikeway: Install per MUTCD guidelines

Considerations: Performs well in inclimate areas. Requires professional installation. Heat application required to set. Cost varies based on design area and color complexity.

Installation

Time: Dependent on scale of project

Personnel: 1 installer

Uninstall: Dependent on scale of project

Installation: Do not install when temperatures are below 50 degrees Fahrenheit (10 C) and rising. Clear debris from installation area, power wash if muddy. Apply in accordance with manufacturer instructions. Protect pavement marking installation until paint has cured.

Equipment: Heat source/propane torch, Infrared Preformed Thermoplastic Heater, preformed thermoplastic materials, tape measure, straight line rope, field marking paint, manual labor.

Notes: Do not install over existing pavement markings. Pavement marking symbols are best application. Use other material for striping as thermoplastic is too expensive.

Maintenance

How Often: Rare

Effort: Medium

How to Maintain: Install new application within maintenance schedule or where deterioration has reached unsafe levels

Source: FHWA

Source: NACTO

Epoxy Gravel

Use

Primary: Aesthetically pleasing material to visually differentiate pedestrian or accent surfaces within a street.

Ancillary: Pedestrian areas, curb extensions, medians/ buffers.

Item Durability: Typically can last 1-5 years (Not been proven durable where frequent power washes are need)

Application

Intersections & Curb Extensions: Use to differentiate areas within the ROW. Best installed to pedestrian facilities from bikeways & vehicular areas.

Considerations: Not guaranteed durable when power washes are repeatedly required. Not cost-effective for color designs. Requires experience for proper installation.

Installation

Time: Dependent on scale of project

Personnel: 3+ installers

Uninstall: Dependent on scale of project

Installation: Do not install when temperatures are below 50 degrees Fahrenheit (10 C) and rising. Clear debris from installation area, power wash if muddy. Apply in accordance with manufacturer instructions. Protect pavement marking installation until paint has cured.

Equipment: Epoxy primer, paint roller, pea gravel (200 lbs of pebbles/50 SF), trowel, tape measure, straight line rope, field marking paint, manual labor.

Notes: Do not install over existing pavement markings. Pavement marking symbols are best application. Use other material for striping as thermoplastic is too expensive.

Maintenance

How Often: Rare

Effort: Medium

Item Maintenance: Repair/Replace when damaged

Source: Alta

Appendix B

Further Reading

Quick-builds for Better Streets: A New Project Delivery Model for U.S. Cities (2016)

People for Bikes

This concise report introduces nine essential components of Quick-build, including everything from assembling a team and measuring the outcomes. Interviews with quick-build practitioners help to shed light on practices that have them implement projects successfully.

Tactical Urbanist's Guide to Materials and Design (2016)

Street Plans Collaborative

Includes comprehensive materials guide, noting installation considerations, durability, and which materials are appropriate for quick-build as pilot or interim.

Streets for Pandemic Response and Recovery (2020)

NACTO

This guide to adaptive use of streets during a pandemic covers not only quick-build bike infrastructure but also a variety of creative ideas for cities. Clear diagrams and case studies from around the world provide concrete ideas for many types of temporary infrastructure changes.

Urban Bikeway Design Guide

NACTO

The NACTO Urban Bikeway Design Guide offers guidance for cities seeking to improve bicycle transportation in places where competing demands for the use of the right-of- way present unique challenges. Treatments provide cities with state-of-the-practice solutions that can help create complete streets that are safe and enjoyable for bicyclists.

Quick-build Design & Materials Standards (2018)

Burlington Public Works

Burlington, VT operates a quick-build program through their Department of Public Works. While not a COVID-19 initiative, this document details their adopted standards for design and materials of temporary projects and offers an example of how one U.S. city has prepared to execute projects quickly.

Prioritizing cyclists and pedestrians for a safer, stronger recovery (May 2020)

C40 Knowledge Hub

This article includes ideas and considerations for active transportation Quick-build projects in the wake of COVID-19. The authors also highlight examples of pandemic response from cities across the U.S. and around the world.

Incorporating On-Road Bicycle Networks into Resurfacing Projects (March 2016)

Federal Highway Administration

This federal document outlines how cities can install bicycle facilities as part of regular repaving to create a stronger active transportation network. It includes guidance, justifications, and best practices.

Getting to the Curb SF (2019)

WalkSF

Guide for best practices in building protected bike lanes that work for pedestrians and people with disabilities or seniors who rely on easy access to the sidewalk.

Don't Give Up at the Intersection (2019)

NACTO

Provides detailed guidance on intersection design treatments that reduce vehicles-bike and vehicle-pedestrian conflicts and covers protected bike intersections, dedicated bike intersections, and minor street crossings, as well as signalization strategies.

Designing for All Ages and Abilities (2017)

NACTO

Guide for building facilities that meets all ages and abilities criteria – safe, comfortable, and equitable.

SRTS Demonstration Project Guide (2019)

MnDOT

The Demonstration Project Implementation Guide from MnDOT is a resource for the development of short term, low cost, temporary roadway projects that promote Safe Routes to School and active transportation initiatives. The document was released in 2019 and is a collaboration between MnDOT, Minnesota Safe Routes to School, and Alta Planning + Design. The document covers steps for starting a successful project such as the building of a team, consulting stakeholders, and choosing sites and project types. The guide also covers evaluation, installation, maintenance, and removal, taking readers from the beginning to the end of a project with a variety of lists, examples, and tools such as worksheets and checklists.