Community Quick-build and Demonstration Projects

Safe Streets for All

May 2025

oregonmetro.gov

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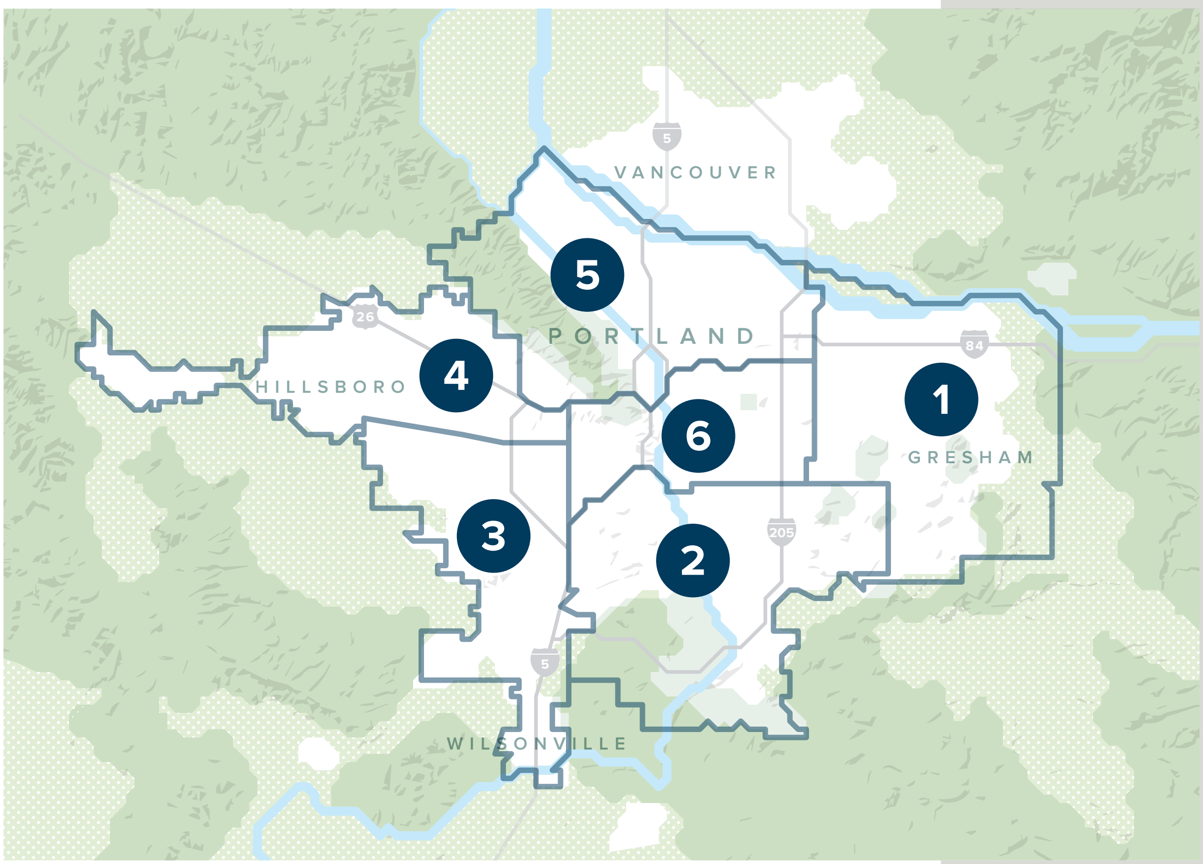


FROM THE DIRECTOR

Our region is facing growing roadway safety challenges. We are not alone, as these challenges are growing across the United States and around Oregon. The impacts are on communities large and small, but they disproportionately affect lower income and communities of color.

The complex nature of solving traffic safety challenges can be daunting, but it is essential that we tackle them collectively and strategically, with a sense of shared purpose and unwavering commitment to eliminating traffic-related deaths and serious injuries. Quick-build and demonstration projects are low-cost, immediate solutions that provide us with powerful tools to address safety concerns in the near term, compared to larger, traditional capital projects.

Our goal is to transform the region into a place where every resident can enjoy the benefits of safe, accessible and reliable transportation, regardless of their background, income, or zip code. Together, we can collaborate to not only make our roadways safer but also work to address historical and current safety inequities that have affected our communities.

Metro has prepared this guide to help advance the use of safety quick-build and demonstration projects in our region. This guide will be used to foster collaboration with regional partners, including state, county and city governments and community advocates, as we collectively work to improve traffic safety. As a regional data provider, we also want to learn what information Metro can provide to support this work.

Together, we can realize a future where death and serious injuries are no longer consequences of using our transportation system, and we look forward to working with you in achieving that vision.

Sincerely,

Catherine Ciarlo

Catherine Ciarlo
Director, Planning, Development and Research Department

Project type: Painted curb extension
Source: City of The Dalles, OR

Project types: Painted curb extension, pedestrian crossing island
Source: City of Alexandria, VA

Contents

Project type: Pedestrian crossing island
Source: City of Long Beach, CA


Project types: Curb extension, high visibility crosswalk
Source: City of Honolulu, HI

Safe System Approach

The Safe System Approach is a systemic road safety framework that seeks to eliminate fatal and serious traffic injuries by creating multiple layers of protection, based on the principle that no traffic death or serious injury is acceptable.

It works through five interconnected elements—safe roads, safe speeds, safe vehicles, safe users, and post-crash care—while emphasizing shared responsibility among all who design, manage, govern, and use transportation systems.

Street design is a core part of the Safe System Approach. Quick-build and demonstration projects provide communities with tools to pilot and implement the safe streets elements quickly and at lower costs than conventional capital projects.

Quick-build and demonstration projects advance safe streets, safe speeds and safe road users by:

Protecting vulnerable road users

- **Physical separation** between modes
- Enhanced **visibility** at conflict points
- Reduced **exposure** for vulnerable road users

Managing traffic speed for safety

- **Visual cues** for appropriate speeds
- **Horizontal deflection** to slow vehicles
- Strategic **narrowing** of streets

Transforming public spaces

- **Reclaiming streets** for people
- Creating **human-scaled** environments
- Adding greenery for **livability**

Why Quick-builds?

Quick-build and demonstration projects provide communities with fast, cost-effective ways to transform streets and address safety concerns. These projects use temporary or easily removed materials to make small changes to streets with impressive safety benefits.

Quick-build projects (1-12 months)

- Use temporary or movable materials that can be adjusted based on performance
- Maintain basic roadway operations while improving safety
- Deliver safety improvements quickly while informing long-term, durable designs

Demonstration projects (1 day - 1 month)

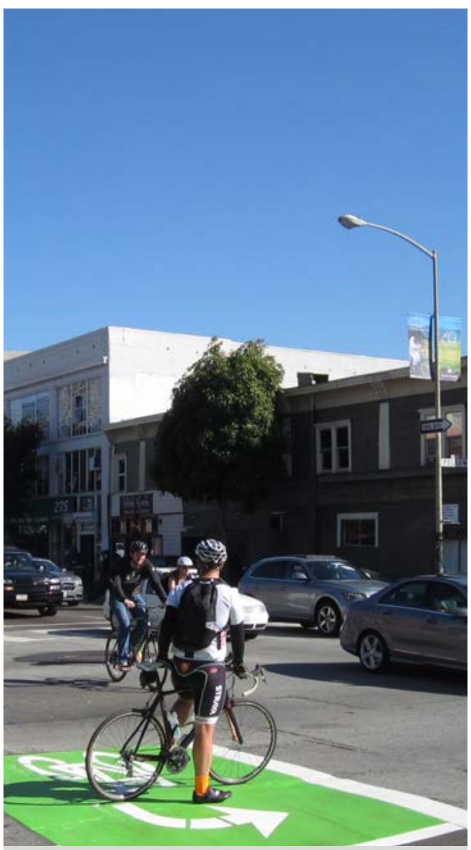
- Focus on public participation and education through direct experience
- Require temporary installations with removable elements
- Can be led by communities with support of the local transportation agencies

This guide draws from proven resources, including Federal Highway Administration (FHWA) safety studies, city transportation evaluations and practical manuals from organizations like National Association of City Transportation Officials (NACTO) and Alta Planning. This guide includes safety statistics, design specifications and implementation techniques from successful projects across North America. These resources provide both the "why" (safety benefits) and the "how" (materials and costs) for projects ranging from one-day demonstrations to multi-year quick-build designs.

Project type: Right turn wedge
Source: City of San Francisco, CA

Project types: Curb extension, high visibility crosswalk
Source: Minnesota Dept. of Transportation

Project type: Partial diverter
Source: City of Portland, OR



Project type: Two-stage turn box
Source: City of San Francisco, CA

How to use this document

This document helps agencies and communities interested in quick-build and demonstration projects address safety concerns and create more walkable and bikeable streets.

Each project type includes a description of characteristics and siting considerations, pictures, safety benefits, installation difficulty and cost range. The materials and resources sections at the end of the document provides additional information.

Description

Each project type includes a description of the features, the elements needed for success, and considerations for implementation. This information is drawn from sources such as the FHWA, municipal reports, and evaluations.

Safety benefits

When known, the expected safety benefits are provided for each project type. Project types without documented safety benefits report on the behaviors and characteristics they influence. These are based on a variety of sources documenting crash reduction factors, case study evaluations, and transportation agency research. You can explore these resources at the end of the document.

Project costs

Project costs are provided to help match quick-build and demonstration solutions to available budgets and scope. Cost ranges account for typical expenses in temporary to interim design implementations, though actual costs will vary based on project scale and local conditions.

**$**$$$ = Less than $5,000
**$$**$$ = $5,000 - $25,000
**$$$**$ = $25,000 - $75,000
$$$$ = Greater than $75,000

Level of Difficulty

The installation difficulty on each project type includes an assessment of the typical level of difficulty and required expertise to install the project. The information is illustrative and dependent on multiple factors and context.

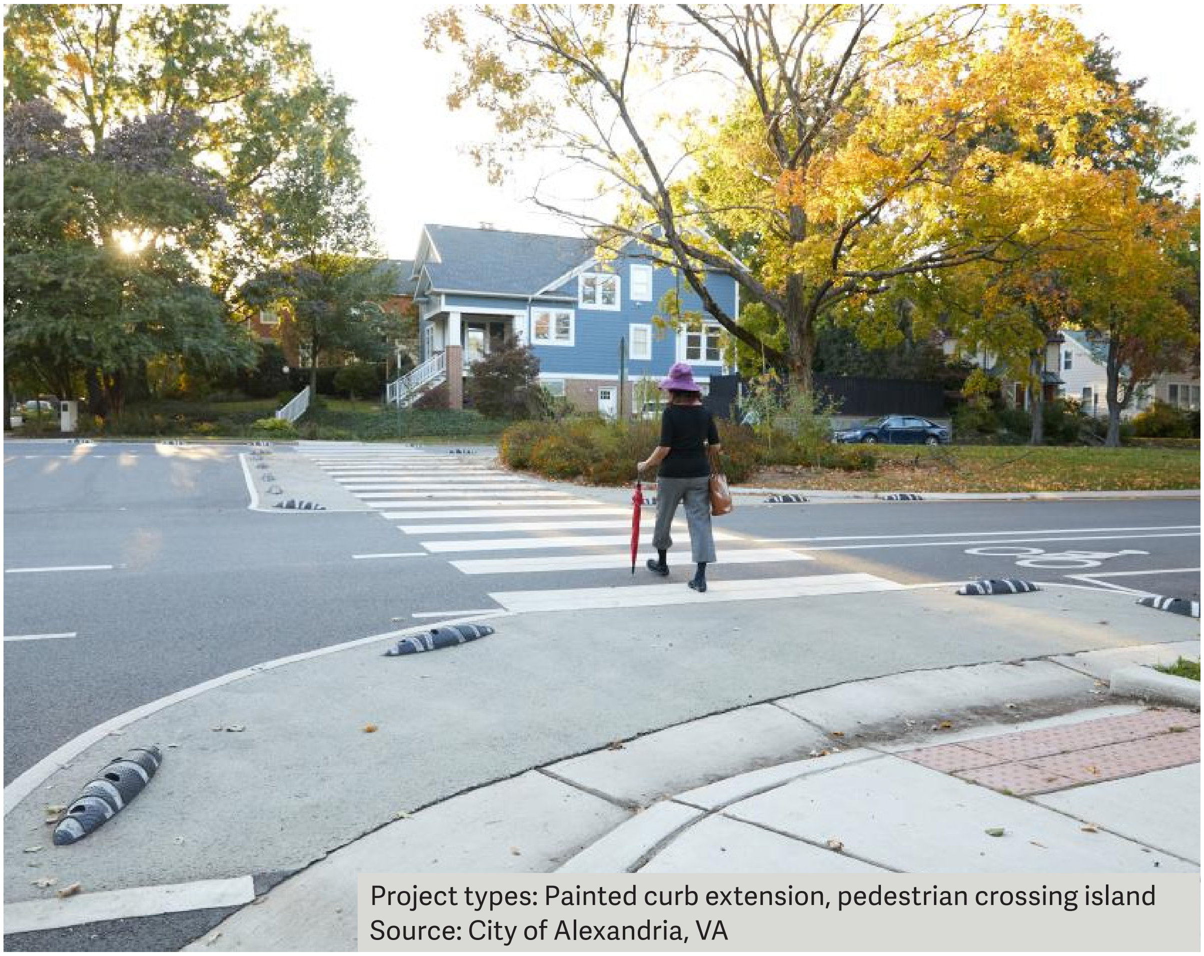
Low - could be installed by a community group in coordination with their local transportation agency, particularly with the owners of the right of way. It uses readily available household tools and materials, that require minimal expertise to handle. This difficulty level typically applies to demonstration type projects.

Moderate - are typically installed by a transportation agency and may involve community in the process. Specialized equipment and expertise needed.

High - are more complex and need to be installed by transportation agencies. Typically requiring larger crews and particular expertise with specialized equipment and materials. More public involvement typically needed.

Project type: Chicanes
Source: City of Cincinnati, OH

Project type: Painted curb extensions
Source: City of The Dalles, OR | Alta



Project types: Painted curb extension, pedestrian crossing island
Source: City of Alexandria, VA

Project type: Full street closure
Source: City of Portland, OR

Pedestrian Safety

Project types in this section:

1. High visibility painted crosswalks
2. Painted curb extensions
3. Pedestrian crossing islands
4. Leading pedestrian intervals

Projects in this section address fundamental design challenges by creating intuitive environments where walking becomes safer by design. These interventions focus on enhancing visibility at conflict points through high-contrast markings and improved sightlines. They provide physical separation between people and vehicles and reduce exposure time for people crossing the street.

Instead of relying on perfect human behavior, these designs create environments that people navigate intuitively and safely. Combining multiple projects, such as painted curb extensions, pedestrian crossing islands and leading pedestrian intervals, provides multiple layers of protection for people crossing. When strategically implemented, these projects transform car-centric roads into human-scaled streets that welcome people of all ages and abilities.

Project types: Painted curb extensions, high visibility crosswalk
Source: California MTC

Project types: Painted curb extension, high visibility crosswalk
Source: Minnesota DOT

High visibility crosswalks

SAFETY BENEFITS

Can reduce pedestrian crashes by 48% and serious/fatal pedestrian crashes by 37%.*

COST $$$$

DIFFICULTY

Low to moderate

QUICK TIP

On multi-lane, high volume roads combine with lighting, daylighting, and pavement markings.

*Source: FHWA

A high visibility crosswalk being painted by a small crew with a high contrast paint.

Source: Strong Towns

A suburban roadway at an intersection with a high visibility crosswalk, enhanced by painted curb extensions, advanced stop bar, and yellow pedestrian crossing sign. Materials used include delineators and traffic paint.

Source: Minnesota Department of Transportation

Description

High visibility crosswalks use bold white lines to clearly define pedestrian crossing areas at intersections and midblock locations. High visibility designs use enhanced marking patterns—including continental, zebra, and ladder designs—that are visible from up to twice the distance of traditional transverse markings, providing greater contrast and improving driver awareness of crossing pedestrians. High visibility crosswalks create a safer environment by increasing driver yielding behavior, and establishing clear right-of-way for vulnerable road users.

High visibility crosswalks are most effective on roadways with speeds of approximately 30 mph or lower and should be considered at all midblock pedestrian crossings and uncontrolled intersections. For multilane roadways with more than 10,000 vehicles per day, additional safety treatments are typically needed beyond just marked crosswalks. The design selection depends on roadway speed, number of travel lanes, lighting conditions, and nearby land uses such as schools, commercial areas, and transit stops.

Painted curb extensions

An intersection of a residential road with a large planted median enhanced by a painted curb extension with “armadillo” curbs and a median curb extension serving as a pedestrian crossing island.

Source: City of Alexandria, VA

Description

Curb extensions, also known as bulb-outs or neckdowns, extend the sidewalk or curb line into the parking lane to reduce pedestrian crossing distances. This treatment encourages slower vehicle speeds and increases driver attentiveness by narrowing the roadway. Curb extensions create a safer environment for pedestrians by providing a larger buffer between the sidewalk and vehicles, improving visibility and reducing exposure time to traffic.

Curb extensions are ideal for areas with high pedestrian activity, such as commercial districts, school zones, and transit stops. Quick-build curb extensions use lower cost materials such as paint, bollards, planters, or tape. Easily removable materials can be used to create a demonstration project that introduces the change to a community. Designs should consider turning radii of larger vehicles like emergency services and buses, while avoiding encroachment into travel lanes or bicycle lanes.

SAFETY BENEFITS

Can reduce serious/fatal pedestrian crashes by 45% and reduce senior injuries by 22%.*

COST $$$$

DIFFICULTY

Low to moderate

QUICK TIP

Use public art to reflect local context and even greater visibility.

*Source: NYC DOT

A common pairing of high visibility crosswalk enhanced by a painted curb extensions with delineators.

Source: City of Honolulu, HI

Pedestrian crossing islands

SAFETY BENEFITS

Can reduce pedestrian crashes by 32 - 46% at crossings and by 39% at unmarked crossings.*

COST $$$$

DIFFICULTY

Low to moderate

QUICK TIP

Reallocate travel lane widths to install a 4 to 6 ft island.

*Source: FHWA

A pedestrian crossing island and high visibility crosswalk made with bollards and paint. A painted curb extension is also present out of frame, further reducing crossing distance.

Source: Strong Towns

A two-way, two-lane road with a pedestrian crossing island of delineators and curbing. Yield to pedestrians signage, advance yield lines, and high visibility crosswalks work well together.

Source: City of Denver, CO

Description

Pedestrian crossing islands, also known as refuge islands, median refuges, or pedestrian safety islands, are dedicated spaces in the center of roadways that allow people to navigate one direction of traffic at a time. Crossing islands on wide, multilane roads can be reinforced with roadway lighting, yield signs, advance yield or stop bars, and curb extensions to achieve impressive safety outcomes.

As a quick-build or demonstration project, crossing islands can be rapidly deployed using temporary materials such as paint, cones, bollards, flexible delineators, modular curbs, and other materials. These kinds of implementation with temporary or movable materials must still adhere to local design standards for emergency and transit vehicle operations and Americans with Disabilities Act compliance.

Leading pedestrian intervals

A four lane road with high visibility crosswalks and leading pedestrian interval signal timing. Traffic signal boxes or cabinets are often adjustable.

Source: City of Portland, OR

SAFETY BENEFITS

Can reduce all serious/ fatal pedestrian crashes by 26% and among seniors by 41%.*

COST $$$$

DIFFICULTY

Low to moderate

QUICK TIP

Use LPIs systemically for corridors or specific areas to improve outcomes.

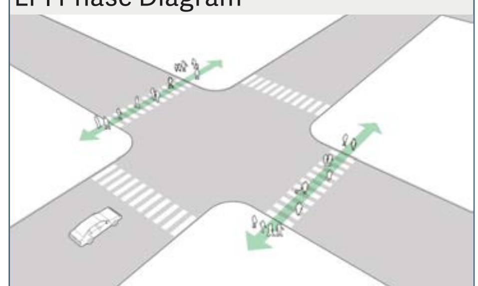
*Source: NYC DOT

Description

Leading pedestrian intervals (LPIs) are traffic signal timing modifications that enhance intersection safety by providing pedestrians a three to seven second head start before parallel vehicle movements receive a green light. This treatment is particularly effective at intersections with high turning volumes, as it helps pedestrians establish their presence in the crosswalk and increase their visibility to turning drivers.

LPI's can be programmed directly on existing traffic signal timing infrastructure. This operational flexibility makes this modification an ideal candidate to coincide with demonstration projects and iterative safety improvements. Agencies should prioritize implementation at intersections exhibiting high pedestrian volumes, documented pedestrian crash patterns, or regular use by vulnerable populations such as children, seniors, and people with disabilities.

LPI Phase Diagram



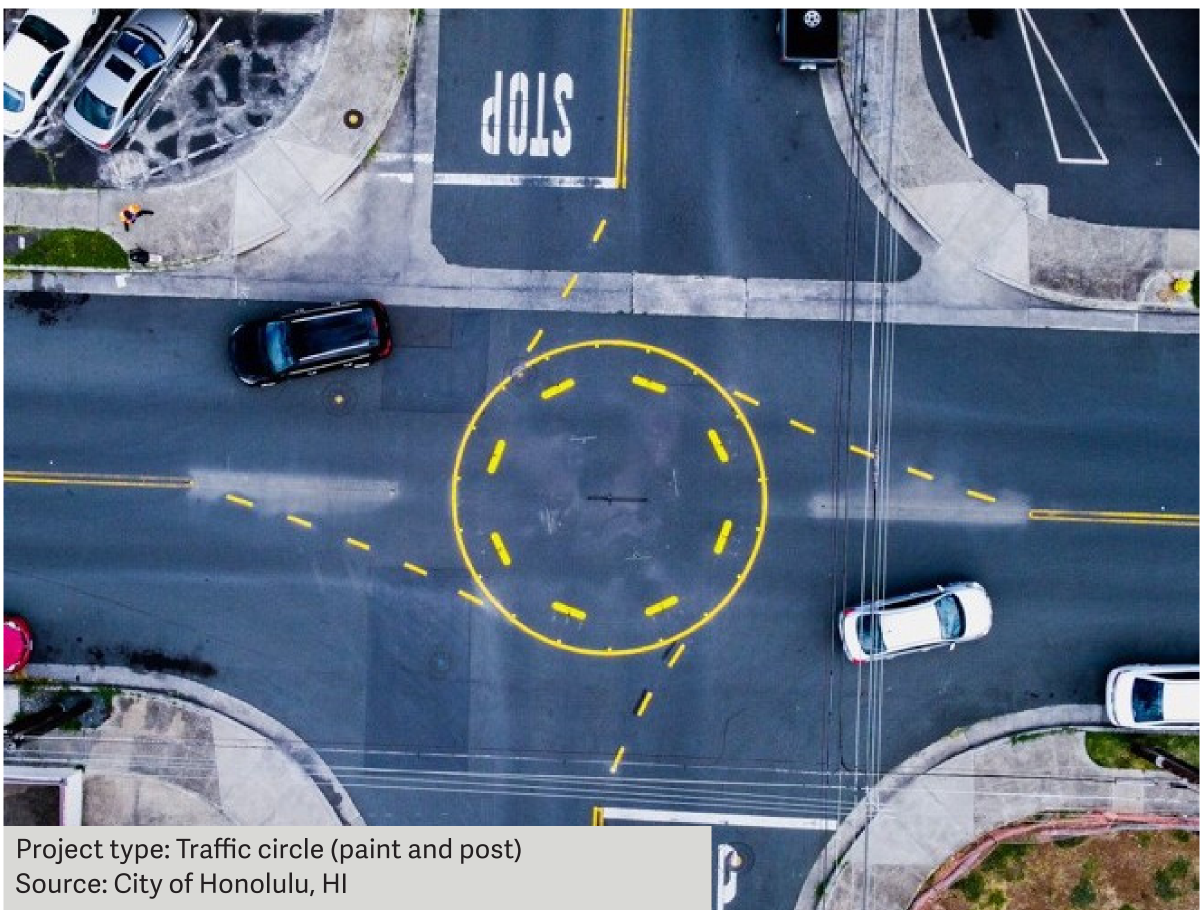
Phase 1: Pedestrians Only

Phase 2: Pedestrians and Vehicles

This improves accessibility by providing more time to cross.

Source: NACTO, Urban Street Design Guide

Project types: Road diet, protected bike lane, pedestrian crossing island
Source: City of Portland, OR



Project type: Traffic circle (paint and post)
Source: City of Honolulu, HI

Traffic Calming

Project types in this section:

1. Road diets
2. Traffic circles (paint and post)
3. Chicanes
4. Diverters
5. Car-free streets
6. Turn calming at intersections

Project types in this section reallocate street space to moderate driver behavior. Each project type works by creating visual and physical cues that guide drivers to reduce speeds and create environments where crashes are both less likely and less severe. Projects focus on narrowing lane widths and arranging intersections to a human-scale, with slower speeds that allow drivers to more easily see people walking and bicycling.

Road diets, traffic circles, chicanes and other project types in this section use the natural responses to physical cues– drivers naturally slow down when streets feel narrower, when they need to navigate around objects, or when the street appears more complex and requires more attention. By addressing the key relationship between speed and safety, these projects create lower stress and more vibrant human-scaled environments.

Project type: Chicane
Source: City of New York, NY

Project type: Partial closure
Source: Chicago Dept. of Transportation

Road diets

SAFETY BENEFITS

Can reduce total crashes by 19-47% in a "4-to-3" lane conversion with center turn lane.*

COST $$$$

DIFFICULTY:

Moderate to high

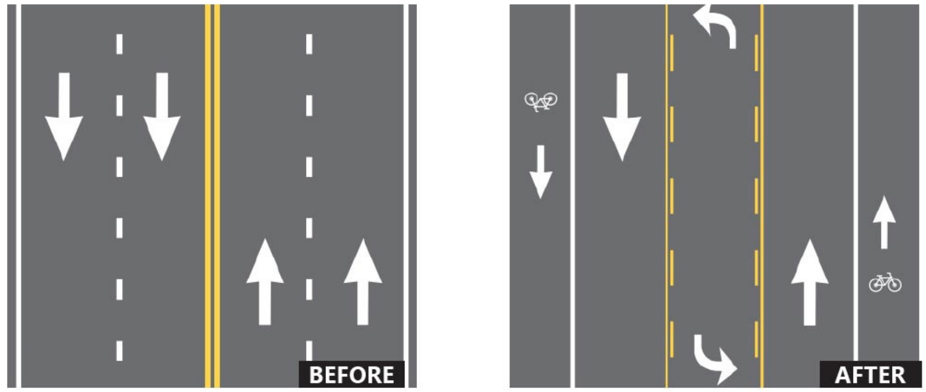
QUICK TIP

Coordinate with planned road repaving to change the striping configuration.

*Source: FHWA

A wide roadway after a road diet with two car lanes, center turn lane, two bike lanes, and curbside parking.

Source: City of Honolulu, HI



Conversion of an existing four-lane undivided roadway to a three-lane roadway consisting of two through lanes and a center two-way left-turn lane (TWLTL).

Source: FHWA, Road Diets

Description

Road diets reallocate street space by reducing travel lanes. The standard "4-to-3 conversion" changes four-lane undivided roads into two through lanes with a center turn lane, creating space for bike lanes, wider sidewalks, and pedestrian refuge islands. This reconfigured roadway minimizes conflict points, improves turning movements, and naturally reduces vehicle speeds through narrower lanes.

Road diets can be implemented fairly quickly by coordinating with scheduled roadway maintenance to adjust final street markings. Communities can learn about road diets with demonstration projects using temporary paint and movable materials. This approach is particularly effective in areas with shops, schools, or residential developments that have high pedestrian activity. The FHWA generally recommends road diets on streets with 25,000 or fewer daily vehicles.

Traffic circles (paint and post)

A residential intersection with a demonstration project of a traffic circle made of modular curbing, posts, and potted plants.

Source: City of South Bend, IN

Description

Paint and post traffic circles replace typical intersections with a central island that vehicles travel around at reduced speeds. Circular intersections have a few variations for different contexts; full roundabouts have multiple lanes and splitter islands, mini-roundabouts feature a slightly raised center island, and neighborhood traffic circles are simpler with just a small central island. Drivers must slow down, yield, and navigate around the center – eliminating dangerous turning collisions by reducing conflict points.

Demonstration projects use highly visible temporary materials like tape, chalk, and planters, while quick-build versions incorporate more durable elements like traffic paint, reflective delineators, and modular curbs. Traffic circles work well in residential areas and lower-volume streets. Enhance traffic calming by pairing with project types, such as a road diets, high visibility crosswalks and pedestrian crossing islands that prepare drivers to slow down before reaching the traffic circle.

SAFETY BENEFITS

Can reduce speeds by 15-24% (4-10 mph decrease) and reduce traffic volumes up to 29%.*

COST $$$$

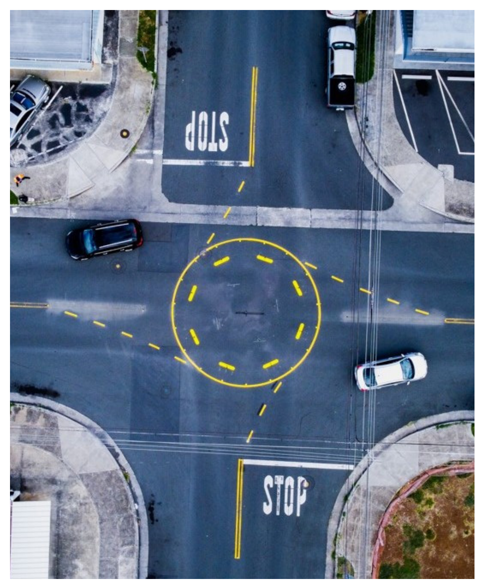
DIFFICULTY

Moderate to high

QUICK TIP

Use community events and activities to educate on new traffic patterns.

*Source: FHWA



An intersection of two, two-lane roads with a traffic circle made of paint and delineators.

Source: City of Honolulu, HI

Chicanes

SAFETY BENEFITS

Can reduce speeds by up to 9 mph with two lanes and up to 19 mph with one lane.*

COST $$$$

DIFFICULTY:

Low to moderate

QUICK TIP

Use mountable materials to accommodate large vehicles.

*Source: FHWA

A chicane demonstration project on a residential street using hay-filled curb, traffic cones, and reflective delineators forming an "S" shape driving path.

Source: Cincinatti Dept. of Transportation

A wide residential street with space reallocated with chicanes marked by street markings and "armadillos" reducing speeds along one travel lane.

Source: City of New York, NY

Description

Chicanes are a traffic calming measures that create an "S" shaped path of travel along the street by alternating curb extensions or lane shifts. They typically include offset curb extensions, islands, or parking that require drivers to navigate a curved path of 45 degree bends. This design naturally reduces vehicle speeds without requiring vertical deflection elements, while maintaining emergency vehicle access and creating opportunities for landscaping or stormwater management features.

As quick-build or demonstration projects, chicanes can be implemented using paint, plastic or rubber bars, flexible delineators, or movable barriers to define the new curb line. They work well on residential and low-volume streets with speeding problems and few large vehicles. Preserving parking and incorporating green elements may increase public support of chicane projects.

Diverters

An intersection modified with a partial diverter limiting vehicle traffic into a residential street. This is defined by concrete planters with a yellow diversion sign and a gap for bicyclists.

Source: City of Portland, OR

Description

Diverters are physical barriers installed at intersections that prevent certain vehicular movements while maintaining bicycle and pedestrian access. They typically consist of diagonal islands and partial closures, strategically placed to redirect through-traffic to designated corridors. Diverters significantly reduce traffic volumes creating calmer neighborhood environments with fewer conflicts, while preserving a connected network for people walking and biking.

As quick-build and demonstration projects, diverters can be implemented using planters, bollards, paint, and other barriers. They work best to reconfigure traffic patterns in an area instead of as a single diversion. Clear advance warning signs and alternate or parallel routes are essential for driver compliance. Community engagement should address concerns about emergency response times, local access, and increased traffic on nearby streets.

SAFETY BENEFITS

Can reduce vehicle volumes by 20% - 70% with diagonal diverters.*

COST **$$**$$

DIFFICULTY:

Low to moderate

QUICK TIP

Installing diverters systemically in an area or corridor reinforces safety benefits.

*Source: FHWA

A diagonal diverter with gaps between concrete planters for a bicyclist to pass through. There is a painted bike symbol and directional signage to highlight the greenway route.

Source: City of Portland, OR

Car-free streets

SAFETY BENEFITS

Eliminates vehicle conflicts by reallocating street space to non-car uses.*

COST $$$$

DIFFICULTY

Low to moderate

QUICK TIP

Work with nearby businesses to activate space with seating.

*Source: FHWA

A closed street segment with a public plaza, shaded seating and planters.

Source: City of New York, NY

A full street closure activated with extended seating. There is street art and a painted bike lane with no car access. This is set in in a highly active pedestrian area in the Central City.

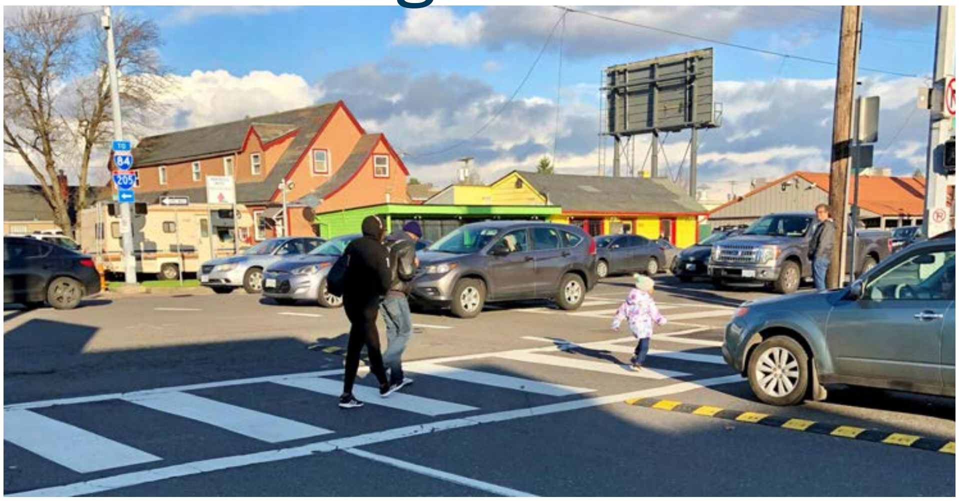
Source: City of Portland, OR

Description

Car-free streets are closures of a street segment to transform them into public spaces, while maintaining pedestrian and bicycle connectivity. Unlike other quick-build treatments with suggested geometry, street closures create flexible canvases that can evolve based on community needs. These spaces can support a variety of uses—from seating areas and gardens to play spaces and cultural events—by eliminating vehicle conflicts and creating safe community gathering spaces.

As quick-build and demonstration projects, street closures start with basic traffic management elements like diverters, planters, and signage to restrict vehicle access. The space then evolves through community-led additions of movable furniture, art installations, and programming activities. Successful implementation requires clear navigation signage for drivers, maintaining emergency access routes, and developing stewardship partnerships with local organizations and businesses.

Turn calming at intersections



An intersection with heavy vehicle and pedestrian traffic enhanced by centerline hardening and left turn calming humps. The materials used should be high durability curbs and bumps with high visibility markings and colors.

Source: City of Portland, OR

Description

Turn calming treatments reduce vehicle turning speeds and improve visibility of people crossing the street. They create turning paths that discourage corner-cutting and encourage safer speeds at crosswalks.

While sharing common materials and installation methods, each variation serves a specific safety purpose:

- Right turn wedges use delineator posts and rubber curbs to create safer turning radii, particularly effective at wide intersections or where many people walking interact with turning vehicles.
- Left turn calming uses rubber speed humps and directional markings to guide drivers through safer turning paths, especially valuable at signalized intersections with permitted left turns.
- Centerline hardening extends the double yellow line into intersections using rubber curbing and posts, preventing corner-cutting during turns while maintaining two-way traffic flow.

SAFETY BENEFITS

Can reduce turning speeds by 13-53% and pedestrian conflicts by 71%.*

COST $$$$

DIFFICULTY:

Moderate to high

QUICK TIP

Apply high contrast paint and position markings to guide cyclists.

*Source: NYC DOT, DC DOT

An intersection with left turn calming, defined by modular curbing and yellow striping.

Source: City of New York, NY

Project types: Floating bus stop island, curbside protected bike lane
Source: City of Portland

Project types: Protected bike lane, curb extensions, two stage turn boxes, high visibility crosswalk
Source: California Bicycle Coalition

Bike Safety

Project types in this section:

1. Protected bike lanes
2. Bike boxes and two-stage turn boxes
3. Bus stop and bike integration

Projects in this section transform high-speed, multi-lane roads into comfortable spaces for people biking, addressing critical safety gaps in the transportation network. These designs use physical protection elements, designated spaces at intersections, and clear navigation cues to create environments where bicycling becomes a safe, accessible option for daily trips. Each project type works by establishing separation between bicyclists and motor vehicles, making interactions more predictable and reducing stress for all users, particularly on arterial roads where traffic volumes and speeds create significant barriers to bicycling.

By addressing the relationship between speed and safety, these projects can support bicycling networks that are comfortable for people of all ages and abilities. Effectiveness increases when paired with complementary quick-build projects like pedestrian crossing islands, high-visibility crosswalks, and traffic diverters that create calm neighborhood connections while maintaining bicycle passage.

Project type: Protected bike lane
Source: City of Burnaby, BC, Canada

Project type: Protected two-way bike lanes

Source: City of Burnaby, BC, Canada

Protected bike lanes

SAFETY BENEFITS

Can reduce crashes by 50% by upgrading a bike lane and reduce crashes by 48% on a 4 lane road.*

COST $$$$

DIFFICULTY:

Moderate to high

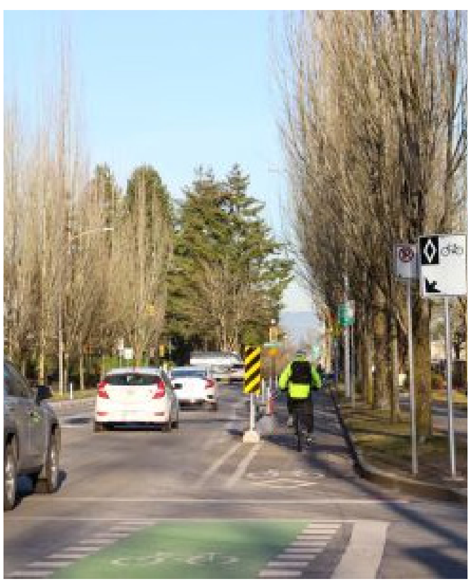
QUICK TIP

Coordinate with repaving and road maintenance to minimize disruption.

*Source: FHWA

An adult riding a bike along a two-way bike route, protected and separated by short modul curbs, plastic dilineators, and car parking.

Source: City of Los Angeles, CA



A one-way, protected bike lane with modular curbs, reflective delineators, and signage. Runs along a two-way, two-lane street.

Source: City of Burnaby, BC, Canada

Description

Protected bike lanes create dedicated bicycle space through physical separation from motor vehicle traffic. Vertical elements like flexible posts, concrete barriers, planters, or parked cars provide a physical buffer between cyclists and moving vehicles. This design significantly improves safety by reducing vehicle-bicycle conflicts and creates comfortable riding environments that attract a broader range of cyclists, including those who might otherwise avoid cycling on busy streets.

As quick-build and demonstration projects, protected bike lanes use combinations of paint, flexible delineators, and movable planters for rapid network expansion. They work best on streets with sufficient width, higher traffic speeds, or multiple travel lanes where standard bike lanes provide inadequate protection. Intersection treatments, such as bike boxes, are critical for maintaining protection through intersections.

Bike boxes and two-stage turn boxes

A large, skewed intersection with a painted bike box in front of waiting vehicles providing bicyiclist clear visibility.

Source: City of Portland, OR

SAFETY BENEFITS

Reduces bicycle-motor vehicle conflicts; increases driver yielding; cyclists report feeling safer.*

COST $$$$

DIFFICULTY

Low to moderate

QUICK TIP

Use high contrast paint for better road user guidance.

*Source: Portland State University

A busy intersection with a cyclist queuing at a bright green, two-stage turn box.

Source: City of San Francisco, CA

Description

Bike boxes and two-stage turn boxes create dedicated spaces at signalized intersections to improve bicycle positioning and turning movements. Bike boxes position cyclists ahead of stopped vehicles at red lights, increasing visibility and allowing cyclists to clear intersections first when signals change. Two-stage turn boxes enable cyclists to make left turns by proceeding straight through an intersection before repositioning for a second crossing phase. These treatments reduce turning conflicts at complex intersections.

As quick-build projects, these treatments can be implemented using colored pavement markings, paint, and thermoplastic symbols to establish clear boundaries. They work best at intersections with significant bicycle traffic, multiple lanes, or where bicycle routes cross major streets. User education is essential as both cyclists and drivers may be unfamiliar with these treatments. Initial enforcement periods can help establish proper use patterns and increase compliance.

Bus stop and bike integration

SAFETY BENEFITS

Can reduce speeding by 8% and reduce bicyclist conflicts by 18% to 43%.*

COST $$$$

DIFFICULTY

Moderate to high

QUICK TIP

Apply colored markings at bus stop/bicycle lane crossings to establish movement patterns.

*Source: FHWA, PBOT

A bike lane is routed up onto the modular floating bus platform with green paint and marked pedestrian crossing.

Source: City of Portland, OR

A one-way arterial road with bike and bus lanes. The bus lane acts as a buffer from standard travel lanes for the bike lane. Colored paint is helpful to communicate dedicated spaces around major intersections and bus stops.

Source: City of Portland, OR

Description

Bus stop bike integration create clearly delineated spaces for bicyclists traveling through bus stops. These designs improve safety for buses, passengers, and cyclists, especially along corridors with high bus and bicycle traffic.

As quick-build and demonstration projects, they use paint, delineators, and modular platforms. Specific designs include:

- Floating islands place the bike lane between the sidewalk and a raised boarding platform where buses stop in their travel lane.
- Bypass lanes guide cyclists to pass stopped buses on the left through a dedicated lane.
- Mixing zones establish clear priority with markings showing when cyclists should yield to buses at their stops.

Success depends on clear markings, signage, and community education that helps users navigate these reconfigured spaces safely.

Project type: Painted curb extension

Source: City of The Dalles, OR | Alta

Project type: Traffic circle

Source: City of Palo Alto, CA

Project type: Traffic circle
Source: City of South Bend

Project type: Full street closure
Source: City of Portland

Materials

Materials in this section are grouped under the following purposes:

1. Street markings
2. Visibility
3. Barrier separation
4. Vertical separation

This section presents flexible, adaptable materials that create safety improvements through quick-build and demonstration projects. These materials are used to establish visual cues, provide physical protection, and manage speeds.

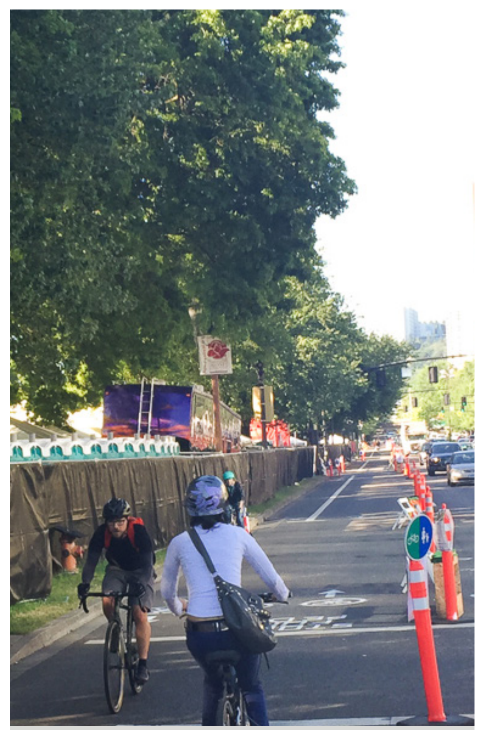
Quick-build and demonstration projects vary through different durability, cost, and installation requirements. Short-term demonstrations typically use temporary or removable materials such as tempera paint and posts. Quick-build projects use more durable and visible materials, including thermoplastic markings and modular curb systems. Site conditions determine materials—on busy arterials, flexible posts may require frequent replacement, making concrete planters more cost-effective despite higher upfront costs.

Cost ranges for materials are illustrative and may vary by location, quantity, and market conditions. Material costs are presented as per-unit estimates.

**$**$$$= Less than $25 per unit
**$$**$$= $25 - $100 per unit
**$$$**$ = $100 - $500 per unit
**$$$**$ = Greater than $500 per unit

A painted curb extension in progress using common paint and rollers, cones, and delineators

Source: Alta Planning+Design



An interim phase of the Better Naito project with a road diet and twoo-way, protected bike lanes.

Source: City of Portland, OR

Street Marking

Tempera Paint Cost: **$**$$$ | Difficulty: Low

Water-soluble paint that can be applied with basic equipment. Creates immediate visual impact for minimal cost. Washes away with heavy traffic within 1-2 weeks or with rain.

Traffic Paint Cost: **$$**$$ | Difficulty: Moderate

Standard acrylic road marking paint. Delivers 3-6 month performance with conventional application equipment. Surface preparation affects longevity and weather conditions limit installation windows.

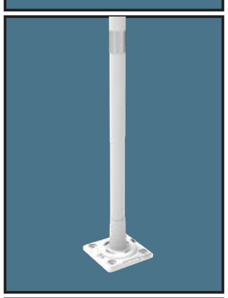
Thermoplastic Cost: **$$$**$ | Difficulty: High

Heat-fused marking material. Provides 2-3 years of consistent performance with excellent nighttime visibility. Cannot be modified without complete removal and requires specialized installation equipment.

Space Separation

Free-Standing Delineators Cost: **$**$$$ | Difficulty: Low

Weighted base traffic control devices. Does not require pavement anchoring and can be positioned immediately. Easily displaced by vehicles and weather, requiring frequent repositioning and routine inspection.



Surface-Mounted Flexible Posts Cost: **$$**$$ | Difficulty: Moderate

Anchored vertical markers drilled into pavement. Create visible separation while maintaining mount-ability for emergency vehicles. Requires frequent maintenance and replacement and winter operations require modified protocols.

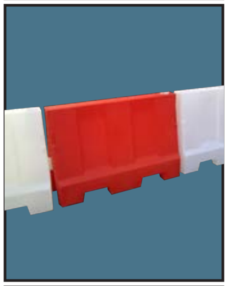
Modular Curb Systems Cost: **$$$**$ | Difficulty: High

Interlocking raised barriers with reflective elements. Provide physical separation while accommodating existing drainage patterns. Installation often requires specialized equipment and sections may loosen over time requiring regular inspection and maintenance.

Barrier Separation

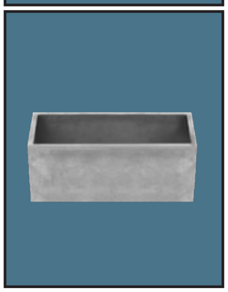
Armadillos Cost: **$$**$$ | Difficulty: Low

Low-profile mountable separators bolted to pavement. Compatible with standard street maintenance operations including sweeping and plowing. May require additional vertical elements for adequate visibility and may present challenges for cyclists.



Water-Filled Barriers Cost: **$$$**$ | Difficulty: High

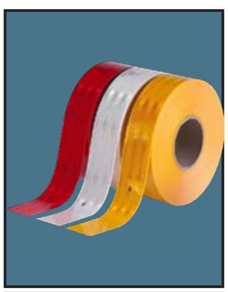
Portable plastic barricades filled on-site. Can be used without drilling or surface damage and easily removed when needed. Empty units require significant storage space and filled units demand heavy equipment for repositioning.



Concrete Planters Cost: **$$$**$ | Difficulty: Moderate

Permanent-grade barriers with vegetation capacity. Provide substantial crash protection and aesthetic improvements. Challenging to modify once placed and may introduce drainage complications if poorly positioned.

Surface Treatment



Reflective Tape Cost: **$**$$$ | Difficulty: Low

Adhesive-backed retroreflective material in roll form. Enhances visibility of any surface without specialized equipment. Adhesion fails in wet or dirty conditions and edges lift with regular vehicle contact.

Colored Surface Coating Cost: **$$**$$ | Difficulty: Moderate

Pigmented acrylic or epoxy surface treatment. Creates continuous visual distinction across larger areas. Effectiveness depends on surface preparation and wears unevenly in high-traffic zones.

Retroreflective Paint Cost: **$$$**$ | Difficulty: High

Specialized paint with embedded glass beads. Dramatically improves nighttime visibility through headlight reflection. Requires precise application technique and beads may dislodge prematurely in high-traffic areas.

Resources

Federal Highway Administration (FHWA) Resources

Guide for Improving Pedestrian Safety at Uncontrolled Crossings

Technical implementation specifications and crash reduction assessment framework for pedestrian crossing treatments.

Road Diet Informational Guide
Lane reconfiguration assessment methodology and documented safety benefits.

Traffic Calming ePrimer
Comprehensive technical framework for traffic calming implementation and safety assessment.

Proven Safety Countermeasures Initiative

Comprehensive safety assessment methodology and crash reduction validation protocols.

Crash Modification Factors Clearinghouse

Standardized safety impact quantification and evaluation protocols database.

Engineering Speed Management Countermeasures

Technical guidance on design approaches to manage traffic speeds.

Developing Crash Modification Factors for Separated Bicycle Lanes
Research quantifying safety benefits of separated bicycle lanes.

Developing Crash Modification Factors for Bicycle-Lane Additions

Research quantifying safety benefits of adding bicycle lanes by narrowing travel lanes.

Crosswalk Marking Selection Guide

Guidance for selecting appropriate crosswalk marking patterns based on context.

Pedestrian Safety Impacts of Curb Extensions
Research on safety benefits of curb extensions for pedestrians.

Municipal Resources

Pedestrian Safety and Older New Yorkers Study, New York City Department of Transportation
Quantifies safety benefits of treatments for vulnerable pedestrians, especially seniors.

Turn Calming Program, New York City Department of Transportation
Evaluation of intersection treatments that slow turning vehicles.

Quick Build Implementation Assessment, New York City Department of Transportation
Material specifications and performance metrics for rapid implementation projects.

Left Turn Calming Pilot Evaluation, Portland Bureau of Transportation
Assessment of traffic calming treatments at intersections.

East Burnside Bus & Bike Lane Evaluation, Portland Bureau of Transportation
Evaluation of transit integration with bicycle facilities.

Quick Build Program, Portland Bureau of Transportation
Implementation framework for rapid deployment safety improvements.

Better Block PDX, Portland State University
Community-led temporary street transformation projects and student proposals.

Vision Zero Safety Initiatives, City of San Diego
Documentation of safety projects and their effectiveness.

Complete Streets, City of Chicago
Evaluation reports and informational pages covering safety benefits of projects.

Vision Zero SF, San Francisco Municipal Transportation Agency
Documentation of safety projects with data points and specific project types.

Resources

Complete Streets, City of Alexandria
Project descriptions, images, and listings of completed/upcoming projects.

Vision Zero Project Map, City of Cincinnati
Map and listing of safety improvement projects.

Mobility Toolkit, City of Long Beach
Guide explaining safety benefits dynamics and implementation strategies.

Complete Streets Project Archive, City of Honolulu
Documentation of complete streets projects with quick-build elements.

Research & Implementation Guides

Evaluation of Bike Boxes at Signalized Intersections (2011), Dill, Monsere, & McNeil
Research on the safety and operational benefits of bike boxes.

Shared-Use Bus Priority Lanes on City Streets (2013), Agrawal, Goldman, & Hannaford
Guidance for implementing and evaluating shared bus-bike lanes.

Safety Evaluation of a Shared Bus-Bike Lane using Video Recorded Conflict Data (2020), Macedo
Research on safety metrics for shared bus-bike lanes.

Shared Bus-Bike Lane Safety Analysis: Assessing Multimodal Access and Conflicts (2022), Chavis, Bhuyan, & Cirillo
Analysis of cyclist safety on shared bus-bike lanes compared to separated facilities.

Design Guide for Low-Speed Multimodal Roadways (2018), National Academies of Sciences, Engineering, and Medicine
Design guidance for facilities supporting multiple transportation modes.

Effectiveness of Two-stage Turn Queue Boxes in Massachusetts (2024)**, Christofa, Ai, Tainter, Ahammed, Cesic, & Remache-Patino
Evaluation of two-stage turn queue boxes for bicyclists.

[Demonstration Project Implementation Guide (2019), Minnesota Department of Transportation]
Resource for planning and implementing demonstration projects.

[Community Road Safety Toolkit, Government of British Columbia]
Comprehensive toolkit with CMFs, project descriptions, and implementation guidance.

[Quick Builds for Better Streets: A New Project Delivery Model for U.S. Cities, National Association of City Transportation Officials]
Framework for rapid implementation of bicycle and pedestrian improvements.

[Quick-Build Guide: How to Build Safer Streets Quickly and Affordably (2020), Alta Planning + Design/California Bicycle Coalition]
Comprehensive guide for quick implementation of safety interventions.

[Demonstration Project Documentation, Smart Growth America]
Cross-jurisdictional analysis of quick-build implementations.

[Tactical Urbanist's Guide to Materials and Design v1, Street Plans Collaborative]
Practical guidance on material selection for demonstration projects.

[Safe and Productive Streets Success Stories, Strong Towns]
Examples and case studies of successful street transformations.

About this guide

This Community Quick-build and Demonstration Projects Guide was developed as part of Metro's Safe Streets for All program, funded through USDOT's Safe Streets and Roads for All program. It showcases safety improvements that can be deployed quickly and cost-effectively to address the region's urgent safety challenges. This guide provides practical information for implementation—helping bridge the gap between planning, community advocacy, and action.

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Please explore Metro's Safe Streets for All website for more transportation guides and tools, as well as how to contact the regional transportation planning team.