

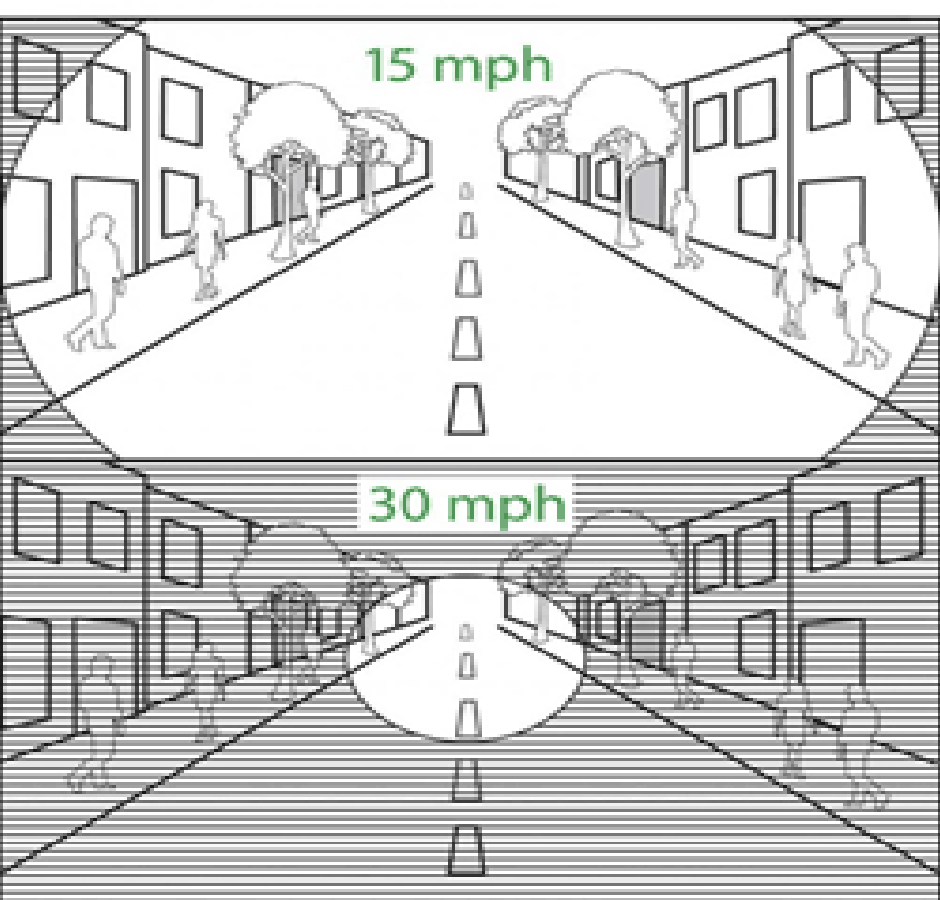


ENGINEERING SOLUTIONS GUIDE FOR SAFE ROUTES TO SCHOOL (SRTS)

[Aysha Cohen](#)

Urban Planner at Nspiregreen
Washington, DC





● If hit by a person driving at:

● Person Survives the Collision

● Results in a Fatality

20 MPH



90%

10%



30 MPH



60%

40%



40 MPH



20%

80%



TROUBLING TRENDS ON THE WAY TO SCHOOL

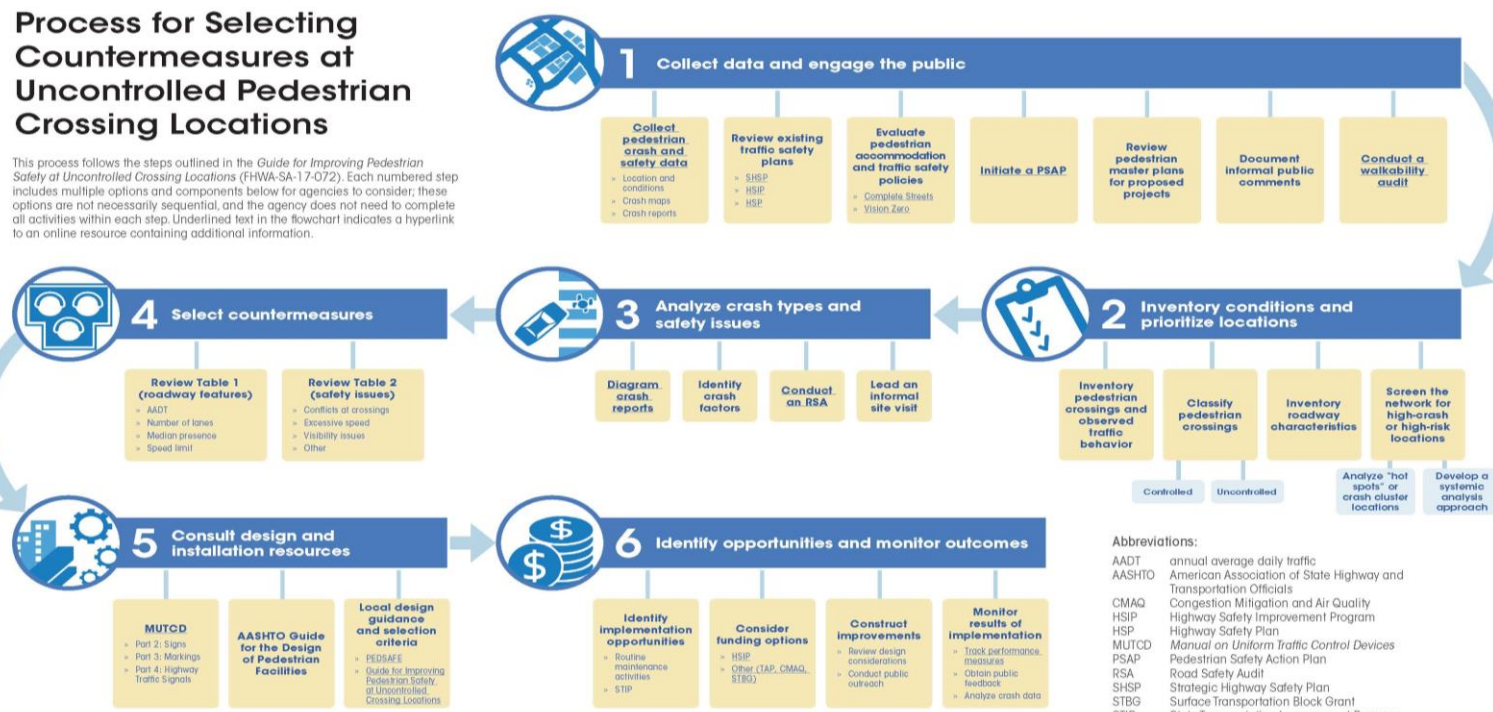


GETTING STUDENTS INVOLVED EVERY STEP OF THE WAY

SANTA ANA, CA

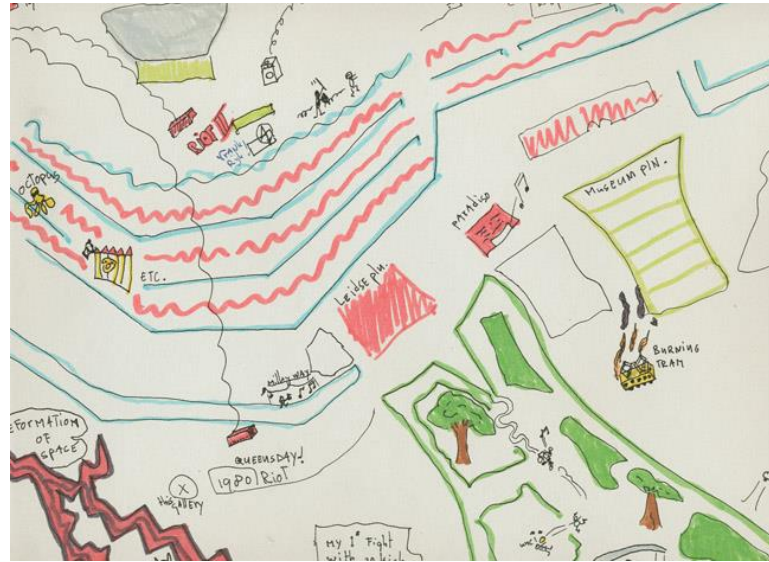
Process for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations

This process follows the steps outlined in the *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* (FHWA-SA-17-072). Each numbered step includes multiple options and components below for agencies to consider; these options are not necessarily sequential, and the agency does not need to complete all activities within each step. Underlined text in the flowchart indicates a hyperlink to an online resource containing additional information.



ENGAGING ALL
AGES, ALL
ABILITIES

PLACE IT!
COGNITIVE MAPS
SOCIODRAMAS
KITCHEN POP-UPS
OPEN DATA

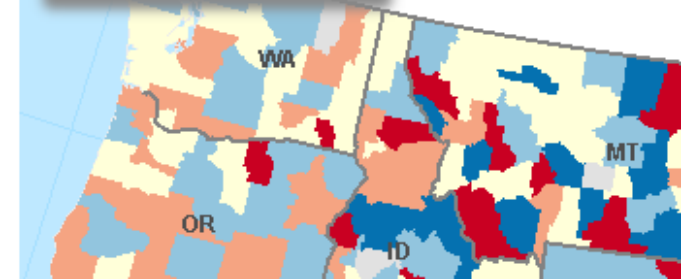


Home > Data Products > Food Environment Atlas >

Go to the Atlas

Fast-food restaurants (% change),

▶ Select Map to Display





PUBLIC ART IN THE RIGHT OF WAY

AUSTIN, TX
SEATTLE, WA
PORTLAND, OR

FHWA Extends Comment Period for Program Updates to May 14

Wednesday, February 3, 2021

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17 “CUT SHEETS” (FACT SHEETS)
ON ENGINEERING SOLUTIONS

ON-STREET PARKING



Pictured Above: New parking sign to consolidate poles with 4 or more signs in Los Angeles, CA | NPR Since 2015, these [parking signs](#) have been piloted in Los Angeles, CA, Oak Park, Illinois, Fargo, North Dakota, and other cities with templates available online.

✓ Treatment Types

High-End Treatments: Parking spaces delineated with thermoplastic paint and consolidated signs for clear pick-up, drop-off, loading, and parking.

Medium to Low-Cost Treatments: Parking spaces delineated with oil or water based paint and consolidated signs for clear pick-up, drop-off, loading, and parking.

Temporary Solutions: Parking spaces delineated with foil-backed traffic tape or paint made of chalk, tempera, acrylic, or cornstarch. Spray chalk and spray paint can also be used with stencils. Consolidated coroplast or homemade signs for clear pick-up, drop-off, loading, and parking.

💡 Safety Considerations

At least 20 feet of parking should be removed on either side of a crosswalk, and curb extensions should be built (see page 19) to remove any blind spots, especially where children cross.



A 63% decrease in crashes with injuries, a 74% to 20% reduction in speeding, and no change in travel speeds was reported in New York City's Prospect Park West after on-street parking was added to protect a two-way bicycle lane. (FHWA, 2018 and NYC DOT, 2020)



Urban



Suburban



Rural



Opportunities for art



Low cost range



Description: On-street parking can help:

- Narrow the crossing width of a street
- Improve air quality by reducing the time cars' engines idle while looking for parking
- Provide a physical buffer between pedestrians, bicyclists and moving traffic

Parking, as well as pick-up and drop-off areas, should have easy-to-read signs and pavement markings.

LADDER CROSSWALKS



Pictured Above: A ladder crosswalk as public art | Little Rock School District via Facebook. Fifth grade students in Little Rock, Arkansas partnered with [local artists](#) to install a ladder crosswalk that uses an optical illusion to appear three-dimensional.

✓ Treatment Types

High-End Treatments: Thermoplastic based paint

Medium to Low-Cost Treatments: Oil or water based paint, reflective inlay tape

Temporary Solutions: Paint made of chalk, tempera, acrylic, or cornstarch. Spray chalk and spray paint can also be used with stencils.

💡 Safety Considerations

Crosswalks should be completed in conjunction with other measures, such as curb extensions, to improve the safety of a pedestrian crossing.

Crosswalks should be visible to motorists, particularly at night, should not be slippery, and should not create trip hazards.

Federal guidance on high-visibility crosswalks can be found in Report No. FHWA-HRT-10-068 and also Section 3B.18 of the MUTCD.



School sites with ladder crosswalks in San Francisco, CA experienced a 37% reduction in crashes. (FHWA, 2014)



Urban



Suburban



Rural



Opportunities for art



Low cost range

MULTI-USE PATHWAYS



Pictured Above: Charlotte Rail Trail | Xavier Wang for the Charlotte Observer



Description: Paved pathways away from the road and out of the path of turning vehicles designed with space adequate for safe use by both pedestrians and bicyclists.

The FHWA advises walkways and shoulders should be separated from traffic. A physical barrier or separation of at least two to three feet between the pathway and traffic helps prevent crashes involving pedestrians.

✓ Treatment Types

High-End Treatments: A multi-use pathway (also known as a Class 1 Shared Use Trail) on both sides of the road and with unimpeded crossings using permeable pavers or boardwalk materials with human-scale lighting, bicycle fix-it stations and parking, water fountains, wayfinding signs, rain gardens, and/or bioswales

Medium Treatments: A multi-use pathway (also known as a Multi-Use Trail) with at grade (sidewalk level) crosswalks, human-scale lighting, wayfinding signs and concrete or asphalt pavement

Low-Cost Treatments: A multi-use pathway on a paved shoulder of an existing roadway with wayfinding signs

💡 Safety Considerations

MUTCD Status: Not a traffic control device, so no MUTCD restriction on its use

Multi-use pathways can provide safe, alternative routes between cul-de-sacs, open space and roadways

🛡️ **88.2% less likely to have pedestrian crashes** on trails with a sidewalk or wide shoulder compared to trails without ([FHWA, 2014](#))



Opportunities for art



Medium to high cost range

CURB EXTENSIONS + CHICANES + CHOKEPOINTS



Pictured Above: A curb extension with a bioswale in King County, WA | MIG, 2015. Together, these 93 curb extensions with bioswales function as [roadside rain gardens](#), featuring native and drought-tolerant plants, are estimated to divert six million gallons of stormwater annually from entering the combined sewer overflow.

✓ Treatment Types

High-End Treatments: Native plants in rain gardens and bioswales to manage stormwater and drought, permeable pavers, curb extensions with street furniture, decorative low fencing, seating, and/or lighting

Medium Treatments: Concrete or brick

Low-Cost Treatments: Flexible delineator posts (flexiposts) and paint

Temporary Solutions: Traffic cones, drums, or other plastic barricades. Paint made of chalk, tempera, acrylic, or cornstarch. Spray chalk and spray paint can also be used with stencils.

💡 Safety Considerations

Emergency access is often improved through the use of curb extensions, as intersections are kept clear of parked cars. Fire engines and other emergency vehicles can climb a curb where they would not be able to move a parked car. In addition, at mid-block locations, curb extensions can keep fire hydrants clear of parked cars and make them more accessible.

🛡️ **A 23-48% reduction in crashes and 2.6 mph reduction in speed** is estimated through these measures, based on reviews of residential areas and in areas where high-speed rural highways transition into rural communities. ([FHWA, 2018](#) and [ITE, 1999](#))



Opportunities for art



Medium cost range

MINI-TRAFFIC CIRCLES



Pictured Above: A mini-traffic circle with street furniture in Seattle, WA | Streetsblog. 80% to 90% of Seattle residents feel their traffic circles have been effective and want to keep them permanently. These [1,200 traffic circles](#) can feature bird houses, benches, signs, and landscaping.



Description: A small circular island used in the middle of an intersection and intended to force vehicular traffic to slow and negotiate around it. When used in a residential area, it can be landscaped for aesthetic or barrier purposes, and may have mountable curbs to facilitate movement of emergency vehicles.

Mini-traffic circles are distinct from roundabouts in that they are designed for low-speed residential streets with one lane of travel.

✓ Treatment Types

High-End Treatments: Native plants in rain gardens and bioswales to manage stormwater and drought, permeable pavers, street furniture, decorative low fencing, and/or lighting

Medium Treatments: Flexible delineator posts (flexiposts), paint, and lighting

Low-Cost Treatments: Flexible delineator posts (flexiposts) and paint

Temporary Solutions: Traffic cones, drums, or other plastic barricades. Paint made of chalk, tempera, acrylic, or cornstarch. Spray chalk and spray paint can also be used with stencils.

💡 Safety Considerations

A network of traffic circles at every intersection of a route is most effective.

A two-foot wide mountable curb allows fire trucks or larger vehicles, such as moving vans, to run over the curb without damaging either the vehicle or the circle.



A 94% reduction in all types of crashes was found in the City of Seattle through repeated studies of mini-traffic circles since the 1990s. Over the last 50 years, only 2 of more than 1,200 traffic circles have been removed due to residents' concerns in the City of Seattle. ([FHWA, 2014](#))



Urban



Suburban



Rural



Opportunities for art



Medium cost range

BICYCLE LANES



Pictured Above: Bicycle lane featuring a first grader's winning design | PBOT



Description: The area of roadway designated for non-motorized bicycle use, separated from vehicles by pavement markings.

MUTCD Section 9C.04 Markings For Bicycle Lanes provides design specifications for the bicycle lane symbol, which must be painted white. Since 1999, however, the City of Portland, OR has been decorating bicycle lanes with recycled thermoplastic and paint. The public library and the Portland Bureau of Transportation (PBOT)'s Bike to Books program involves students in bicycle lane design through an art competition, books, and songs.

✓ Treatment Types

High-End Treatments: Narrowing lanes (see page 16) to accommodate bicycle lanes, thermoplastic paint, wayfinding signs with estimated miles and/or calories burned to destination, wayfinding signs with nearby bikeshare or scooter stations, native plants in rain gardens, and bioswales to manage stormwater and drought

Medium Treatments: Oil or water based paint and/or reflective inlay tape after narrowing lanes (see page 16), wayfinding signs with estimated miles to destination and with nearby bikeshare or scooter stations

Low-Cost Treatments: Oil or water based paint and/or reflective inlay tape within an existing roadway shoulder

Temporary Solutions: Coroplast or homemade wayfinding signs, paint made of chalk, tempera, acrylic or cornstarch. Spray chalk and spray paint can also be used with stencils.

💡 Safety Considerations

Bicycle lanes provide a buffer and greater visibility between motor vehicles and pedestrians.



15% decrease in cars encroaching in adjacent lanes when passing bicyclists ([FHWA, 2014](#))



Urban



Suburban



Rural



Opportunities for art



Medium to high cost range

SIGNAL TIMING MODIFICATIONS



Pictured Above: A hopscotch game within a crosswalk in Baltimore, MD | Graham Coreil-Allen



Description: Traffic signal timing modifications can either reduce pedestrians' waiting times at the crosswalk or extend the time they have to cross through:

- **Timing Modifications:** Adjustments of existing signal timings to more readily accommodate all modes and users of all ages and abilities.
- **Leading Pedestrian Interval (LPI):** Pedestrians' countdown signal begins a few seconds in advance of the light change for cars so that people walking are more visible to drivers making turns.
- **Pedestrian Scramble:** Pedestrians can cross the intersection diagonally or

✓ Treatment Types

High-End Treatments: Pedestrian Scramble (also known as the Barnes' Dance) with crossing guards, public art

Medium Treatments: Leading Pedestrian Interval

Low-Cost Treatments: Signal timing modifications

Temporary Solutions: Crossing guards and traffic control officers to direct pedestrian crossings

💡 Safety Considerations

Ensure visibility of pedestrian countdown timers and signs.

Adjust signal countdown timers for children, elderly pedestrians, and persons with disabilities to account for slower walking speeds, estimated to be three feet per second or slower (MUTCD Section 4E.06).



50% decrease in pedestrian crashes on average in New York City in a study of 244 intersections (FHWA, 2014)



Urban



Suburban



Rural



Opportunities for art



Medium to high cost range

PROTECTED BICYCLE LANES



Pictured Above: A pop-up protected bicycle lane in Minneapolis, MN | Kristina Perkins



Description: An exclusive bike lane separated from vehicle travel lanes, parking lanes, and sidewalks. The bike lane is typically adjacent to the curb and is physically separated from adjacent parking and travel lanes. They can be one-way, two-way, at street level, at sidewalk level, or at an intermediate level.

✓ Treatment Types

High-End Treatments: Narrowing lanes (see page 16) to accommodate one-way or two-way bicycle lanes, thermoplastic paint, wayfinding signs with estimated miles and/or calories burned to destination, wayfinding signs with nearby bikeshare or scooter stations, native plants in rain gardens and bioswales to manage stormwater and drought, exclusive bicycle traffic signal

Medium Treatments: Oil or water based paint and/or reflective inlay tape after narrowing lanes (see page 16), wayfinding signs with estimated miles to destination and with nearby bikeshare or scooter stations

Low-Cost Treatments: Oil or water based paint and/or reflective inlay tape within an existing shoulder of traffic, flexible delineator posts (flexiposts)

Temporary Solutions: Paint made of chalk, tempera, acrylic or cornstarch, coroplast or homemade wayfinding signs, traffic cones, drums, planter boxes, rock quarry slabs, or other barricades. Spray chalk and spray paint can also be used with stencils.

💡 Safety Considerations

MUTCD Status: Not a traffic control device, so no MUTCD restriction on its use



28% injury reduction compared with alternative bicycle routes in Montréal, Quebec. (FHWA, 2014)



Urban



Suburban



Rural



Opportunities for art



Medium to high cost range

THANK YOU!



Learn more:
[Safe Routes Partnership.org > Resources > Webinar > Engineering-Solutions-and-Strategies-SRTS](https://www.saferroutespartnership.org/resources/webinar/engineering-solutions-and-strategies-srts)

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