



# Jersey City Traffic Calming Toolkit

June 2024





# Jersey City Traffic Calming Toolkit

Prepared for:



Prepared by:



## Disclaimer

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# Introduction

The Jersey City Traffic Calming Toolkit is a resource for transportation planners and engineers, as well as for members of the public, to identify and understand the traffic calming measures that may be used to slow motor vehicle speeds on corridors and at intersections throughout Jersey City. We pulled from many sources when identifying potential interventions and we narrowed it down to treatments that are most applicable to Jersey City and the City's context.

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## What is Traffic Calming?

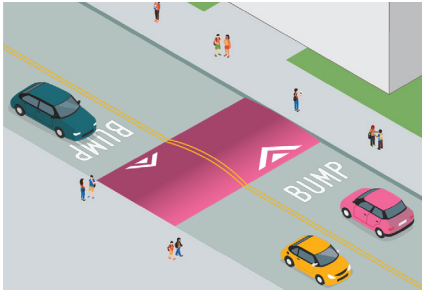
The goal of traffic calming is to slow down traffic speeds, discourage dangerous or aggressive driving and improve safety for all. This is important for all roadway users, but especially for those who walk or roll, or ride bikes or scooters. Through traffic calming efforts Jersey City can continue to strive for and maintain zero deaths on their local streets. Traffic Calming projects may also include improved lighting, greenery, and public art.

Traffic calming can slow motor vehicles in multiple ways:

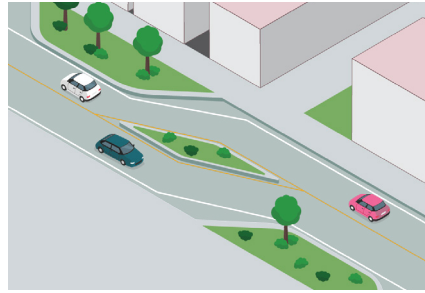
- » **Vertical treatments**, like speed humps and raised intersections, create a change in the height of the roadway that forces a motorist to slow down in order to maintain an acceptable level of comfort.
- » **Horizontal treatments**, like chicanes and traffic circles, prevent a motorist from driving in a straight line by creating a shift in the roadway. This shift forces a motorist to slow the motor vehicle in order to comfortably navigate the measure.

- » **Roadway narrowing**, such as curb extensions, on-street parking, and road diets, reduce the amount of space for motor vehicles. The motorist slows the vehicle to maintain an acceptable level of comfort either along a corridor or when navigating through an intersection.
- » **Routing restrictions**, such as road closures and raised medians, prevent particular vehicle movements at an intersection and are intended to eliminate some portions of cut-through traffic.
- » **Signal timing adjustments**, such as leading pedestrian intervals, signal progressions, and pedestrian scrambles, can limit how quickly motor vehicles can travel along a corridor, as well as provide dedicated crossing time for pedestrians.

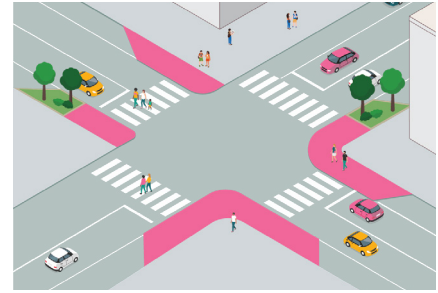
In addition to the different ways that traffic calming treatments slow vehicles, these treatments are also used in different locations – such as along corridors, intersections, and mid-block crossings, and some treatments may only be suitable if certain travel modes – like cyclists and pedestrians – use the corridor. The remainder of the toolkit outlines where different treatments are most applicable.



Vertical treatments



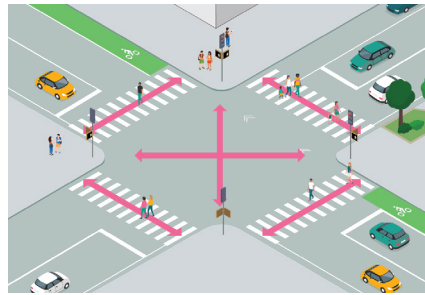
Horizontal treatments



Roadway narrowing



Routing restrictions



Signal timing adjustments

## How to Use this Toolkit

The Traffic Calming Toolkit has two primary sections:

- » **Location Types:** In this section, users can identify which traffic calming treatments could be applicable given the location where the user wants to slow vehicle speeds. Location types include local streets, collector streets, arterial streets, signalized intersections, directional stop control intersections, and multi-way stop control intersections. In addition to considering location type, this section assesses the suitability of the traffic calming treatment given the average or target annual daily traffic and number of vehicle travel lanes.
- » **Traffic Calming Treatments:** This section provides a comprehensive look at each traffic calming treatment in the toolkit. Each treatment is summarized, including the treatment's purpose, description, cost, installation time, applicable locations, speed and volume effects, safety benefits, design guidance, and any additional considerations.

- » To identify what traffic calming treatments may be suitable on a particular corridor or at a particular intersection, start by identifying applicable treatments based on the **Location Type**. Once you have narrowed down the list of applicable treatments, review the **Traffic Calming Treatments** to further clarify what treatment best addresses the speeding or access challenges at your location.

# Location Types

## Local Streets

Local streets primarily serve residential areas and carry low traffic volumes. These streets provide ample access, can exist in any land use setting, involve travel to and from a collector facility, and typically have one lane in each direction.



Lexington Avenue



Van Nostrand Avenue



Bowers Street



Sherman Place



Table 1. Traffic Calming Treatments for Local Streets

Treatment	< 3,000 Daily Vehicles	3,000-10,000 Daily Vehicles	10,000-15,000 Daily Vehicles	Page Reference
Advisory Lanes	●*	×	×	23
Bike Lanes	●	●	▲	24
Chicanes	●*	▲*	×	25
Choker	●*	●*	▲*	26
Curb Extensions	●	●	●	27
Gateways	●	●	●	29
Lateral Shift	●*	●*	▲*	30
Leading Pedestrian Intervals	●	●	●	31
Multi-Way Stops	●*	▲*	×	32
On-Street Parking	●	●	▲	33
Pedestrian Refuges or Median Islands	●	●	●	35
Pedestrian Scramble	●	●	●	37
Plazas and Parklets	●	●	▲	38
Raised Crosswalks	●	▲*	×	39
Raised Intersections	●	▲	×	40
Raised Medians	●	●	●	41
Rectangular Rapid Flashing Beacons	●	●	▲	42
Residential Shared Street	●*	×	×	43
Road Closures	●	×	×	44
Road Diet	●	●	●	45
Roundabouts or Mini Roundabouts	▲	▲	▲	46
Shared Lane Markings (Sharrows)	●	×	×	47
Signal Progression	●	●	●	48
Skinny Street or Queuing Street	●*	×	×	49
Speed Cushions	●	▲*	×	50
Speed Detector Signs	●	●	●	51
Speed Humps	●	▲*	×	52
Speed Tables	●	▲*	×	53
Staggered Crossings	●	●	●	54
Textured Pavement or Crosswalks	●	●	×	56
Traffic Signage and Markings	●	●	●	57
Turn Hardening	●	▲	▲	58

●	The traffic calming measure is recommended for consideration for this type of roadway condition.	×	This traffic calming measure is not recommended for this type of roadway condition.
▲	Engineering judgment of specific localized conditions is needed before considering the traffic calming measure for this type of roadway condition.	*	Recommendation only applies when one lane in each direction. Not recommended when two lanes in each direction.

## Collector Streets

Collector streets are a middle ground – busier than local streets, but generally lower volume and lower speed than arterial streets. Collectors may have wider lanes and possibly a center turn lane, and they provide access to destinations and facilitate inter-neighborhood traffic movement. These streets typically feed into a higher-level street and serve local neighborhood commercial and residential areas.



Carlton Avenue



18th Street



Academy Street



Danforth Avenue

Table 2. Traffic Calming Treatments for Collector Streets

Treatment	< 3,000 Daily Vehicles	3,000-10,000 Daily Vehicles	10,000-15,000 Daily Vehicles	Page Reference
Advisory Lanes	×	×	×	23
Bike Lanes	●	●	▲	24
Chicanes	×	×	×	25
Choker	●*	●*	▲*	26
Curb Extensions	●	●	●	27
Gateways	●	●	●	29
Lateral Shift	●*	●*	▲*	30
Leading Pedestrian Intervals	●	●	●	31
Multi-Way Stops	▲*	▲*	×	32
On-Street Parking	●	●	▲	33
Pedestrian Refuges or Median Islands	●	●	●	35
Pedestrian Scramble	●	●	●	37
Plazas and Parklets	●	●	▲	38
Raised Crosswalks	▲	×	×	39
Raised Intersections	▲	▲	×	40
Raised Medians	●	●	●	41
Rectangular Rapid Flashing Beacons	●	●	▲	42
Residential Shared Street	×	×	×	43
Road Closures	▲*	×	×	44
Road Diet	●*	●*	●*	45
Roundabouts or Mini Roundabouts	●	●	▲	46
Shared Lane Markings (Sharrows)	▲	×	×	47
Signal Progression	●	●	●	48
Skinny Street or Queuing Street	×	×	×	49
Speed Cushions	▲*	×	×	50
Speed Detector Signs	●	●	●	51
Speed Humps	▲*	×	×	52
Speed Tables	▲	×	×	53
Staggered Crossings	●	●	●	54
Textured Pavement or Crosswalks	▲	▲	×	56
Traffic Signage and Markings	●	●	●	57
Turn Hardening	●	▲	×	58

<p>● The traffic calming measure is recommended for consideration for this type of roadway condition.</p> <p>▲ Engineering judgment of specific localized conditions is needed before considering the traffic calming measure for this type of roadway condition.</p>	<p>×</p> <p>*</p>	<p>This traffic calming measure is not recommended for this type of roadway condition.</p> <p>Recommendation only applies when one lane in each direction. Not recommended when two lanes in each direction.</p>
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## Arterial Streets

Arterial streets are about movement. These city streets primarily collect and distribute traffic between collector streets, local streets, and the rest of the arterial system. Arterials are characterized by moderate volume, and they typically have at least two lanes in each direction.



Christopher Columbus Drive



Grand Street



Communipaw Avenue



Jersey Avenue

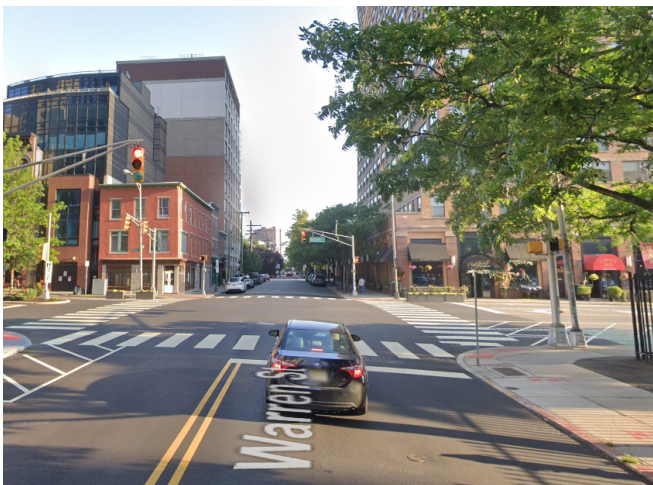
Table 3. Traffic Calming Treatments for Arterial Streets

Treatment	< 3,000 Daily Vehicles	3,000-10,000 Daily Vehicles	10,000-15,000 Daily Vehicles	Page Reference
Advisory Lanes	×	×	×	23
Bike Lanes	▲	▲	▲	24
Chicanes	×	×	×	25
Choker	▲*	▲*	▲*	26
Curb Extensions	●	●	●	27
Gateways	●	●	●	29
Lateral Shift	▲*	▲*	▲*	30
Leading Pedestrian Intervals	●	●	●	31
Multi-Way Stops	×	×	×	32
On-Street Parking	●	●	▲	33
Pedestrian Refuges or Median Islands	●	●	●	35
Pedestrian Scramble	●	●	●	37
Plazas and Parklets	▲	▲	▲	38
Raised Crosswalks	×	×	×	39
Raised Intersections	×	×	×	40
Raised Medians	●	●	●	41
Rectangular Rapid Flashing Beacons	●*	●*	▲*	42
Residential Shared Street	×	×	×	43
Road Closures	×	×	×	44
Road Diet	●*	●*	●*	45
Roundabouts or Mini Roundabouts	●	●	▲	46
Shared Lane Markings (Sharrows)	×	×	×	47
Signal Progression	●	●	●	48
Skinny Street or Queuing Street	×	×	×	49
Speed Cushions	×	×	×	50
Speed Detector Signs	●	●	●	51
Speed Humps	×	×	×	52
Speed Tables	×	×	×	53
Staggered Crossings	●	●	●	54
Textured Pavement or Crosswalks	×	×	×	56
Traffic Signage and Markings	●	●	●	57
Turn Hardening	▲	▲	×	58

●	The traffic calming measure is recommended for consideration for this type of roadway condition.	×	This traffic calming measure is not recommended for this type of roadway condition.
▲	Engineering judgment of specific localized conditions is needed before considering the traffic calming measure for this type of roadway condition.	*	Recommendation only applies when one lane in each direction. Not recommended when two lanes in each direction.

## Signalized Intersections

Signalized intersections are those controlled by a traffic signal. Signalized intersections are generally higher-volume intersections, particularly where there are moderate or high volumes along both of the intersecting streets.



Warren Street & Montgomery Street



Grand Street & Monmouth Street



Fowler Avenue & JFK Boulevard



Garfield Avenue & Neptune Avenue

Table 4. Traffic Calming Treatments for Signalized Intersections

Treatment	< 3,000 Daily Vehicles	3,000-10,000 Daily Vehicles	10,000-15,000 Daily Vehicles	Page Reference
Curb Extensions	●	●	●	27
Gateways	●	●	●	29
Leading Pedestrian Intervals	●	●	●	31
Multi-Way Stops	×	×	×	32
Pedestrian Refuges or Median Islands	●	●	●	35
Pedestrian Scramble	●	●	●	37
Raised Intersections	▲	▲	▲	40
Raised Medians	●	●	●	41
Road Closures	▲	×	×	44
Roundabouts or Mini Roundabouts	●	●	▲	46
Signal Progression	●	●	●	48
Staggered Crossings	●	●	●	54
Textured Pavement or Crosswalks	●	●	×	56
Traffic Signage and Markings	●	●	●	57
Turn Hardening	●	▲	×	58

●	The traffic calming measure is recommended for consideration for this type of intersection.	×	This traffic calming measure is not recommended for this type of intersection.
▲	Engineering judgment of specific localized conditions is needed before considering the traffic calming measure for this type of intersection.	*	Recommendation only applies when one lane in each direction. Not recommended when two lanes in each direction.

## Directional Stop Control

Directional stop control intersections – also sometimes referred to as side-street stop intersections – are intersections where only the minor street approaches have a stop sign. The major street at the intersection is free flow. These intersections typically occur when there is a large difference in vehicle volumes between the intersecting streets.



Stevens Avenue & Fowler Avenue



Seaview Avenue & Princeton Avenue



Clerk Street & Wilkinson Avenue



High Street & Baldwin Avenue



Table 5. Traffic Calming Treatments for Directional Stop Control Intersections

Treatment	< 3,000 Daily Vehicles	3,000-10,000 Daily Vehicles	10,000-15,000 Daily Vehicles	Page Reference
Curb Extensions	●	●	●	27
Gateways	●	●	●	29
Multi-Way Stops	●	▲	×	32
Pedestrian Refuges or Median Islands	●	●	●	35
Raised Intersections	●	▲	×	40
Raised Medians	●	●	●	41
Road Closures	▲	×	×	44
Roundabouts or Mini Roundabouts	●	●	▲	46
Staggered Crossings	●	●	●	54
Textured Pavement or Crosswalks	●	●	×	56
Traffic Signage and Markings	●	●	●	57
Turn Hardening	●	▲	×	58

●	The traffic calming measure is recommended for consideration for this type of intersection.	×	This traffic calming measure is not recommended for this type of intersection.
▲	Engineering judgment of specific localized conditions is needed before considering the traffic calming measure for this type of intersection.	*	Recommendation only applies when one lane in each direction. Not recommended when two lanes in each direction.

## Multi-Way Stop Control

At multi-way stop controlled intersections – sometimes referred to as all-way stop intersections – vehicles on all approaches must stop before proceeding through the intersection. All-way stop intersections are common where two local roads meet, as they are generally included on low-volume, low-speed intersections.



Jersey Avenue & York Street



7th Street & Jersey Avenue



Jersey Avenue & Fifth Street



McAdoo Avenue & Sterling Ave

Table 6. Traffic Calming Treatments for Multi-Way Stop Control Intersections

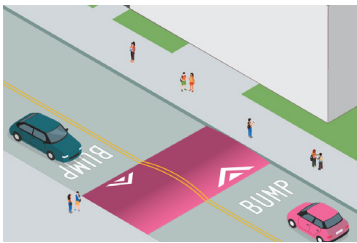
Treatment	< 3,000 Daily Vehicles	3,000-10,000 Daily Vehicles	10,000-15,000 Daily Vehicles	Page Reference
Curb Extensions	●	●	●	27
Gateways	●	●	●	29
Multi-Way Stops	●	▲	×	32
Pedestrian Refuges or Median Islands	●	●	●	35
Raised Intersections	●	▲	×	40
Raised Medians	●	●	●	41
Road Closures	▲	×	×	44
Roundabouts or Mini Roundabouts	●	●	▲	46
Staggered Crossings	●	●	●	54
Textured Pavement or Crosswalks	●	●	×	56
Traffic Signage and Markings	●	●	●	57
Turn Hardening	●	▲	×	58

●	The traffic calming measure is recommended for consideration for this type of intersection.	×	This traffic calming measure is not recommended for this type of intersection.
▲	Engineering judgment of specific localized conditions is needed before considering the traffic calming measure for this type of intersection.	*	Recommendation only applies when one lane in each direction. Not recommended when two lanes in each direction.

# Traffic Calming Treatments

## Treatment Types

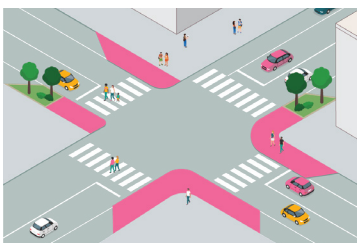
There are many different ways to categorize traffic calming treatments – based on where they are located, what modes they are focused on, and how they improve the quality and experience of travel. Many treatments fall into multiple categories, and these are summarized in **Table 7** on page 22.



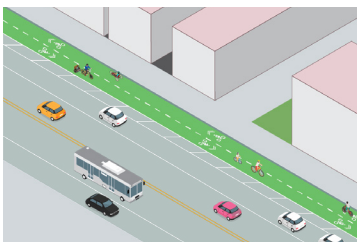
**Corridor Treatments** can be implemented along a street segment or mid-block. They tend to focus on slowing motor vehicles (e.g., speed humps) and providing a designated space for cyclists (e.g., advisory lanes).



**Intersection Treatments** can be implemented where two or more streets meet. These treatments often focus on improving bike and pedestrian crossings (e.g., leading pedestrian interval) and slowing turning vehicles (e.g., turn hardening).



**Pedestrian Treatments** improve the pedestrian experience, through shortened crossing distances (e.g., curb extensions) and dedicated time for pedestrians to cross while motor vehicles are stopped (e.g., pedestrian scramble).



**Bike Treatments** improve bike comfort and safety, generally by providing a dedicated space for cyclists that is separate from motor vehicles (e.g., cycle tracks).



**Placemaking Treatments** treat the street like a destination and focus on how users experience the roadway network beyond just a tool to travel from place to place. Examples of placemaking treatments include parklets, plazas, and road closures.



## Toolkit Section Summary

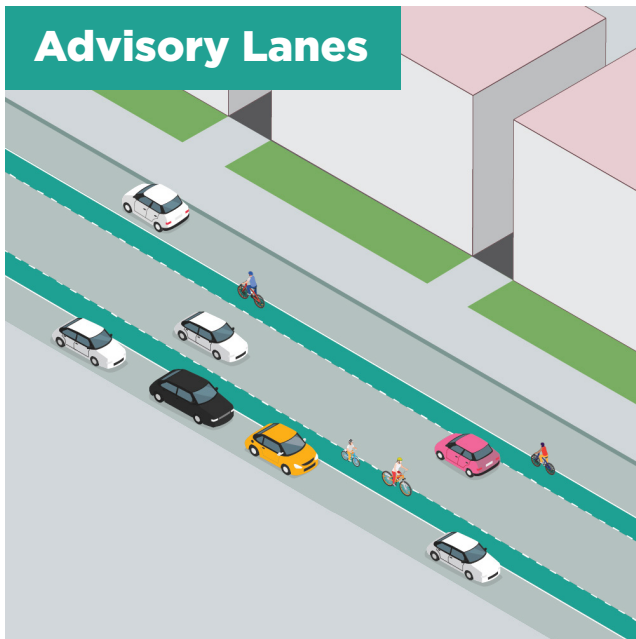
Each treatment in the toolkit is summarized through a set of characteristics. These provide an overview of what the treatment is and how it can be used, key locations for implementation, and the benefits of the treatment. Each characteristic is summarized below:

- » **Purpose** describes what is trying to be achieved by installing the traffic calming treatment.
- » **Description** summarizes what the treatment looks like.
- » **Cost** represents construction and other capital costs, and it is measured as low, medium, or high (depicted as one dollar sign for low cost, two for medium cost, or three for high cost).
  - » **\$** - Could be accomplished through striping, signage, and delineation only or minor pavement modifications.
  - » **\$\$** - Moderate reconstruction of pavement and curbs that may require minor utility or drainage modifications.
  - » **\$\$\$** - Substantial reconstruction of pavement and curbs that will likely require utility relocations, signal equipment modifications, drainage modifications, etc.
- » **Installation Time** notes the time to study and implement the treatment, and it is measured as short-term, medium-term, or long-term (depicted as one clock for short-term, two for medium-term, or three for long-term).
- » **Applicable Locations** lists where a traffic calming treatment may be implemented, relative to the street or intersection type, width, traffic volumes, speed limit, and incline.
- » **Impacts** describes how the treatment will change travel behavior, such as vehicle speeds and volumes, as well as how the treatment will reduce the likelihood of crashes.
- » **Safety Benefits** summarizes how the traffic calming treatment will reduce conflicts between motor vehicles and other road users.
- » **Design Guidance** provides specific dimensions for the traffic calming treatments. However, this information may not be comprehensive, and engineering judgement should be used when designing any street improvement.

JERSEY CITY TRAFFIC CALMING TOOLKIT

Table 7. Traffic Calming Treatment Types

Treatment	Corridor Treatments	Intersection Treatments	Pedestrian Treatments	Bike Treatments	Placemaking Treatments
Advisory Lanes	✓			✓	
Bike Lanes	✓			✓	
Chicanes	✓				✓
Choker	✓				✓
Curb Extensions		✓	✓	✓	✓
Gateways	✓	✓	✓		✓
Lateral Shift	✓				
Leading Pedestrian Intervals		✓	✓	✓	
Multi-Way Stops		✓			
On-Street Parking	✓				
Pedestrian Refuges or Median Islands	✓	✓	✓		
Pedestrian Scramble		✓	✓		
Plazas and Parklets	✓				✓
Raised Crosswalks	✓	✓	✓		
Raised Intersections		✓	✓		✓
Raised Medians	✓				
Rectangular Rapid Flashing Beacons	✓	✓	✓	✓	
Residential Shared Street	✓				
Road Closures	✓				✓
Road Diet	✓				
Roundabouts or Mini Roundabouts		✓			
Shared Lane Markings (Sharrows)	✓			✓	
Signal Progression	✓	✓			
Skinny Street or Queuing Street	✓				
Speed Cushions	✓				
Speed Detector Signs	✓				
Speed Humps	✓				
Speed Tables	✓				
Staggered Crossings		✓	✓		
Textured Pavement or Crosswalks		✓	✓		
Traffic Signage and Markings	✓	✓			✓
Turn Hardening		✓			



**Purpose**

Allow motorists to temporarily enter bike lane to provide sufficient space for oncoming traffic to safely pass on streets with limited width to install dedicated bike facilities.

**Description**

A bike lane with a dashed outside stripe indicating that vehicles may traverse the bike lane, if necessary, but should watch for and yield to cyclists, as with any bike facility.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Local Streets
- » Cartway Width: One- and two-lane streets
- » Traffic Volume: Less than 3,000 daily vehicles
- » Speed Limit: 25 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

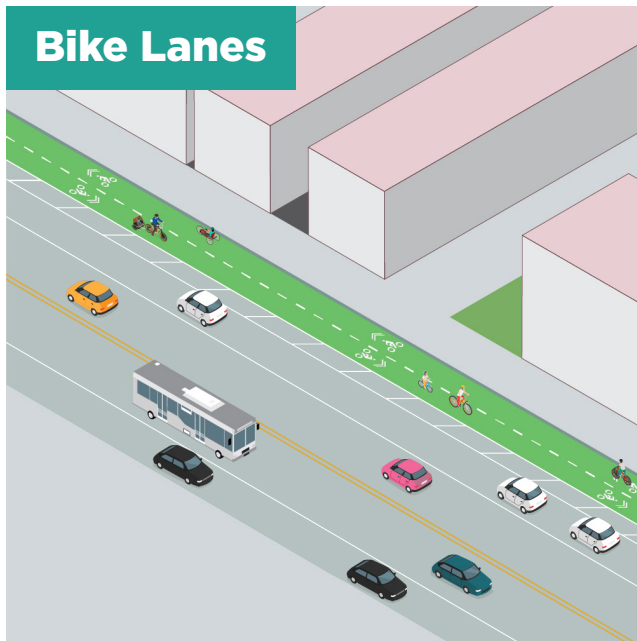
- » Volume Impacts: Bike volumes may increase.
- » Crash Reduction Impacts: Advisory bike lanes have been shown to reduce crashes by 36 – 44%.<sup>1</sup>

**Safety Benefits**

- » Provides designated space for cyclists.
- » Allows vehicles to safely pass when necessary.
- » May have a speed reduction effect on motor vehicles.<sup>2</sup>

**Design Guidance**

- » The minimum width of an advisory bike lane is 6 feet adjacent to parking, or 4 feet curb-adjacent exclusive of gutter. A desirable width is 7 feet.
- » The minimum width of the un-laned 2-way motorist space should be 12 feet between the bike lanes. The maximum width is 18 feet.



**Purpose**

To provide physical separation between cyclists and motorists.

**Description**

Bike lanes provide a separation between vehicles and cyclists that are more accessible to riders of all ages and abilities. Additionally, they narrow the travel lanes and pedestrian crossing distances in many applications. Parking protection is preferred where a buffer can be provided between the parked cars and bike lanes. If parking protection is not possible, flexible delineators, flex curb, and jersey barriers can be used.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Minor arterials, collectors, and local streets
- » Cartway Width: Up to 4 lane cross section
- » Traffic Volume: No limit
- » Speed Limit: 40 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

**Impacts**

- » Volume Impacts: Bike volumes may increase.
- » Crash Reduction Impacts: 8 to 94 percent reduction.<sup>27</sup>

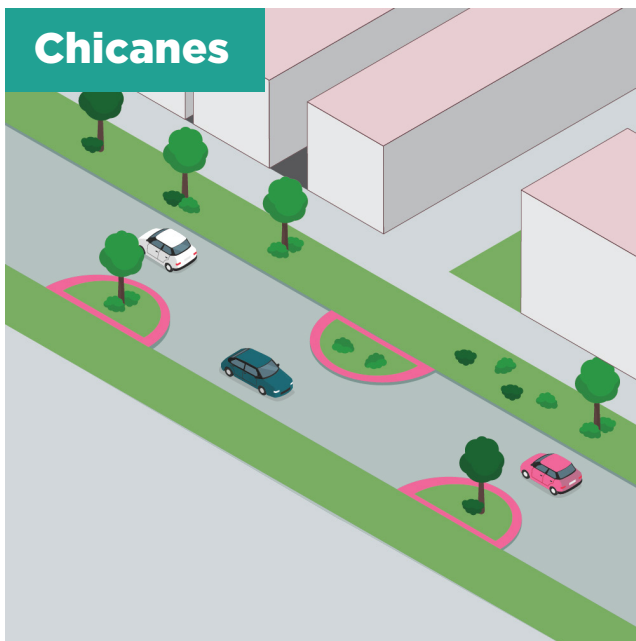
**Safety Benefits**

- » Provides designated space for cyclists.
- » Reduces chance of collisions through physical separation of motorists, cyclists, and pedestrians.

**Design Guidance**

- » On roads with two to four through lanes, one-way directional separated bike lanes are preferred to a two-way separated bike lane on one side of the street as they:
  - » Follow normal traffic flows, whereas two-way separated bike lanes can create unexpected movements.
  - » Result in simpler transitions to other facilities.
  - » Are less likely to need signal modifications.
- » Separated bike lanes can provide different levels of separation:
  - » Flexible delineators offer the least separation and are appropriate as an interim solution.
  - » Raised buffers provide the greatest level of separation from traffic but will often require road reconstruction.
- » On-street parking offers a high-degree of separation but may require raised buffer treatments at intersections.
- » Generally speaking, the implementation of bike lanes in Jersey City should follow the guidance in the bikeway design guide.





**Purpose**

Slow motor vehicles speeds by diverting the path of travel.

**Description**

A series of mid-block curb extensions approximately 50 to 100 feet apart staggered on alternating sides of the street that force vehicles to negotiate an S-shaped or serpentine path of travel.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Local Streets
- » Cartway Width: 40-feet or less
- » Traffic Volume: Less than 3,500 daily vehicles
- » Speed Limit: 35 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

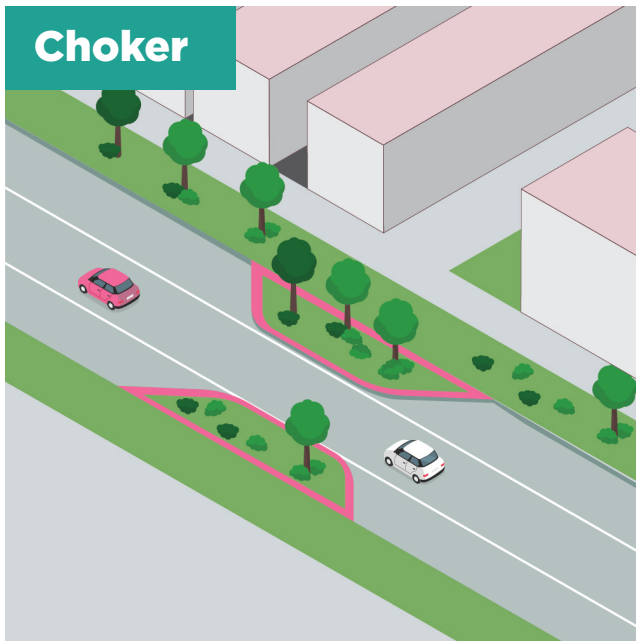
- » Speed Impacts: Chicanes are predicted to reduce speeds by approximately 3 – 9 MPH on approach and 5-13 MPH within the chicane itself.<sup>3</sup>
- » Crash Reduction Impacts: Predicted to reduce vehicle crashes by 29%.<sup>4</sup>

**Safety Benefits**

- » Improves speed limit compliance.
- » Design may increase the amount of sidewalk width, buffer width, or both along corridors.

**Design Guidance**

- » Interim treatments use striping and flexible delineators.
- » Permanent treatments use curb extensions or islands and may include vegetation or street trees
- » Maintain sight lines by landscaping chicanes with lower shrubs and plants less than 3 feet in height.
- » Multiple treatments may be placed on alternating sides of the roadway.
- » Drainage and utility location should be considered when implementing.
- » Additional signage or pavement markings may be needed to ensure drivers are aware of the shift in travel direction.



**Purpose**

Slow motor vehicles speeds by narrowing the path of travel.

**Description**

A mid-block curb extension that results in a narrower street section. In some cases, a choker can be used to form a single bi-directional lane where vehicles must yield to opposing traffic.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: All (arterials, collectors, and local streets)
- » Cartway Width: 48-feet or less
- » Traffic Volume: Up to 15,000 daily vehicles
- » Speed Limit: 40 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

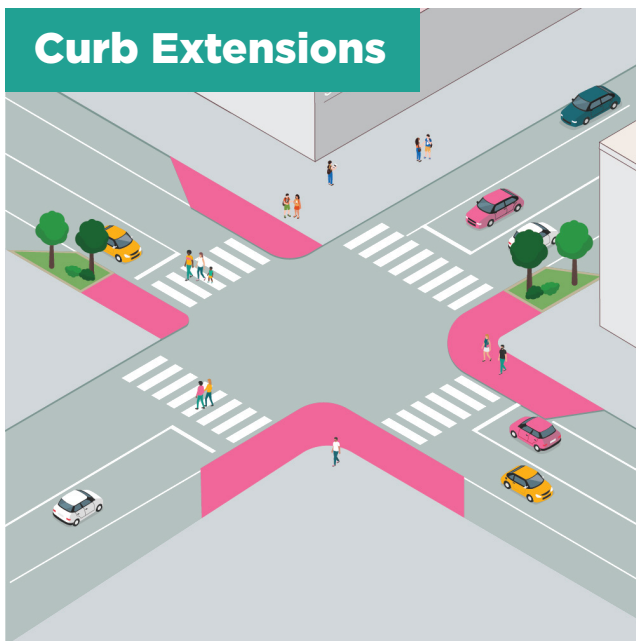
- » Speed Impacts:
  - » Can slow traffic by funneling through narrower street opening.
  - » Predicted to reduce speeds by approximately 3-6 MPH.<sup>5</sup>

**Safety Benefits**

- » Improves speed limit compliance.
- » Design may increase the amount of sidewalk width, buffer width, or both along corridors.

**Design Guidance**

- » Interim treatments use striping and flexible delineators.
- » Permanent treatments use curb extensions or islands and may include vegetation or street trees.
- » Maintain sight lines by landscaping or street trees with lower shrubs and plants less than 3 feet in height.
- » Drainage and utility location should be considered when implementing.
- » Additional signing or pavement markings may be needed to ensure drivers are aware of the narrowing in the street section.



## Curb Extensions

### Purpose

Shorten crossing distances and increase pedestrian comfort and visibility.

### Description

Also referred to as “bump outs” or “neckdowns”, are an extension of the curb line to narrow the street width and shorten the length of the crosswalk at the entrance to a street. Curb extensions reduce the curb-to-curb width, making the intersection more pedestrian-friendly by shortening the crossing distance and improving the visibility of the crosswalk and the intersection. Curb extensions can also tighten curb radii—this means the corner where the sidewalk meets the road is closer to the other side of the street. Using curb extensions can reduce the speed of turning vehicles.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: 48-feet or less
- » Traffic Volume: Less than 15,000 daily vehicles
- » Speed Limit: 40 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

### Impacts

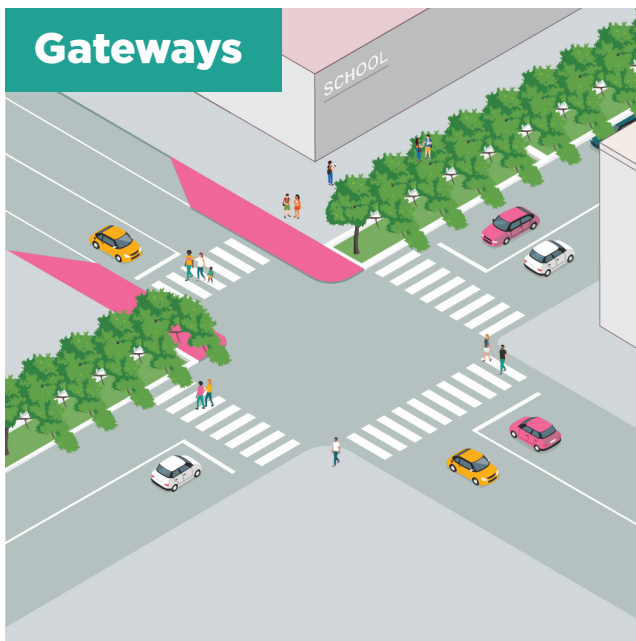
- » Speed Impacts:
  - » Predicted to reduce speeds by approximately 1 – 10 MPH.
  - » Speeds are reduced on the intersection approach and through the intersection area.<sup>6</sup>
- » Volume Impacts: Has limited effect on traffic volumes; access and turns are maintained and traffic speeds are not changed dramatically.<sup>7</sup>
- » Crash Reduction Impacts: Initial research indicates this treatment may be effective at increasing driver yielding and improving pedestrian safety.<sup>8</sup>

### Safety Benefits

- » Shorten crossing distance.
- » Increase visibility between drivers and pedestrians.
- » Crosswalk is more noticeable to drivers.
- » Narrow the roadway to slow through speeds.
- » Reduce vehicular turning speed.
- » Add space for ADA curb ramps aligned with crosswalk.
- » Create physical barrier from parking encroachment on crosswalk.

## **Design Guidance**

- » Limit planting and street furniture height within curb extensions to preserve sight lines less than 3 feet in height
- » Consider adding curb extensions at bus stops to create bus bulbs, which allow buses to load and unload without leaving the travel lane and can improve safety, accessibility, and transit efficiency.
- » Where curb extension installation on one side is infeasible or inappropriate (i.e., no parking lane), this should not preclude installation on the opposite side.
- » Maximum length can vary to accommodate sight lines, manage stormwater, facilitate transit loading, or restrict parking. Minimum length is the width of the crosswalk.
- » Interim treatments use striping and flexible delineators. Permanent treatments use concrete curbing and may include vegetation or green infrastructure.
- » Drainage and utility location should be considered when implementing.



## Gateways

### Purpose

Shorten crossing distances and increase pedestrian comfort and visibility.

### Description

An extension of the curb line to narrow the street width and shorten the length of the crosswalk at the entrance to a street. Gateways reduce the curb-to-curb roadway width, making the intersection more pedestrian-friendly by shortening the crossing distance and improving the visibility of the crosswalk and the intersection via raised peninsulas.

Gateways can also tighten curb radii, which reduces the speed of turning vehicles. Additionally, Gateways serve as a visual cue that a driver is entering a slower speed area.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (arterials, collectors, and local streets)
- » Cartway Width: 48-feet or less
- » Traffic Volume: Less than 15,000 daily vehicles
- » Speed Limit: 40 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5%

### Impacts

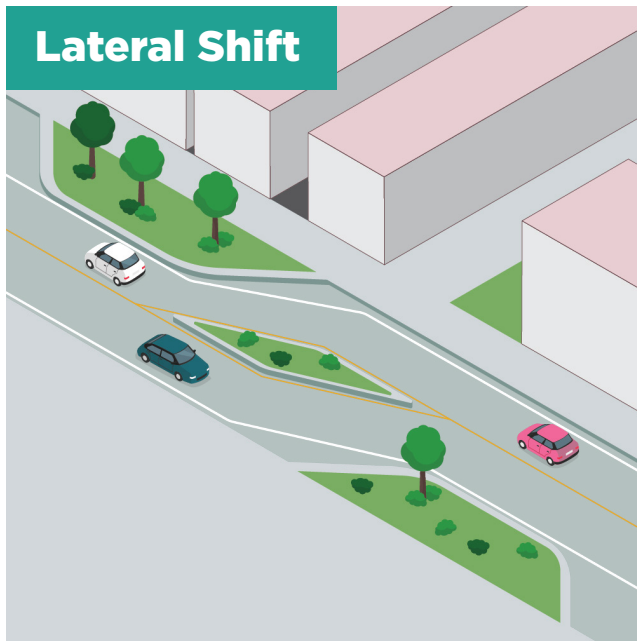
- » Speed Impacts: Speed reductions of 3-13 MPH, with an average of 5 MPH, can be achieved using gateways.<sup>9</sup>
- » Crash Reduction Impacts: Initial research indicates this treatment may be effective at increasing driver yielding and improving pedestrian safety.<sup>10</sup>

### Safety Benefits

- » Shorten crossing distance.
- » Increase visibility between drivers and pedestrians.
- » Crosswalk is more noticeable to drivers.
- » Narrow the roadway to slow through speeds.
- » Reduce vehicular turning speed.
- » Add space for ADA curb ramps aligned with crosswalk.
- » Create physical barrier from parking encroachment on crosswalk.

### Design Guidance

- » Include a curb extension at a minimum to narrow the roadway. Consider including raised crosswalks or raised median as well.
- » Include plantings, public art, bike parking, and seating can also visually “narrow” the roadway.



**Purpose**

Reduce motor vehicle speeds along the street.

**Description**

A realignment of an otherwise straight street that causes travel lanes to shift in at least one direction.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: 48-feet or less
- » Traffic Volume: All
- » Speed Limit: 35 MPH
- » Roadway Grade: Less than 6 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

- » Speed Impacts<sup>11</sup>:
  - » Amount of speed reduction (or the final speed) depends on the length of the alignment shift, as well as the volume and distribution of traffic.
  - » Less effective in reducing vehicle speed (1) when the volume of traffic is significantly higher in one direction than the other or (2) when volumes are so low that the likelihood of a motorist encountering an opposing motorist within the lateral shift zone is low.
  - » Expected speed reduction through a lateral shift is typically less than that observed through a chicane. Lateral shifts are predicted to reduce speeds up to 5 MPH.
- » Volume Impacts<sup>12</sup>:
  - » Amount of traffic diversion depends on the amount of speed reduction, the increased travel time for non-local traffic and the availability of a quicker, alternative route.
  - » As a single installation, there is little traffic diversion from the street.

**Safety Benefits**

- » Improves speed limit compliance.
- » Certain designs increase the amount of sidewalk width, buffer width, or both along corridors.

**Design Guidance**

- » The expected level of speed reduction is determined by how dramatic the lateral shift is. A lateral shift of at least one-lane width is a common target.
- » May require removal of some on-street parking and may, therefore, slightly reduce the accessibility of adjacent property.
- » Attention needed to avoid need to relocate drainage features (catch basins, concrete channels, valley gutters, inlets, and trench drains).
- » Should not require relocation of above- and below-ground utilities.



**Purpose**

Extends crossing time for pedestrians and cyclists at signalized intersections.

**Description**

A 3–7 second head start for pedestrians and cyclists to cross at a signalized intersection. LPIs enhance the visibility of pedestrians and cyclists in the intersection and reinforce their right-of-way over turning vehicles, especially in locations with a history of conflict.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: No limit
- » Traffic Volume: No limit
- » Speed Limit: No limit
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

**Impacts**

- » Volume Impacts: Pedestrian volumes may increase.
- » Crash Reduction Impacts: 13 percent for vehicle-pedestrian crashes.<sup>13</sup>

**Safety Benefits**

- » Increase visibility of pedestrians and cyclists.
- » Increase motorist yielding.
- » More crossing time provided for pedestrians and cyclists.

**Design Guidance**

- » High-visibility crosswalk markings, curb ramps, accessible pedestrian signals, and “No Right Turn on Red” sign (MUTCD R10-11).<sup>14</sup>
- » Typically applied based on crash history and where both pedestrian volumes and turning volumes are high enough to warrant an additional dedicated interval for pedestrian-only traffic.
- » When left-turn phases are present, additional consideration will be necessary for an LPI. This could include having crosswalks on opposite sides of the street show the “Walk” sign at different times.



**Purpose**

Reduce intersection conflicts by requiring all vehicles to stop before proceeding through the intersection.

**Description**

An intersection where all (three or four) roadway approaches are stop controlled. In most cases, but not all, multi-way stop control is used where the volume of intersecting traffic is approximately equal.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Collector and Local
- » Cartway Width: Single lane approaches
- » Traffic Volume: 500 vehicles per hour for an 8-hour period
- » Speed Limit: 40 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

**Impacts**

- » Speed Impacts: Before-after studies show multi-way stop signs do not reduce speeds on residential streets. Unwarranted multi-way stops increased speed some distance from intersections. The studies hypothesizing that motorists are making up the time they lost at the “unnecessary” stop sign.<sup>15</sup>
- » Crash Reduction Impacts: 60 to 72 percent reduction in all crashes.<sup>16</sup>

**Safety Benefits**

- » Provide equal crossing priority for travelers on all approaches.
- » Increase vehicle yielding to other vehicles, cyclists, and pedestrians.

**Design Guidance**

- » If installing primarily to accommodate pedestrians and cyclists, volumes entering from the minor street should average at least 200 vehicles per hour for an 8-hour period to justify the installation. Traffic study required per MUTCD.





**Purpose**

Provide direct access to adjacent land uses, narrow travel lanes, and provide a buffer between the sidewalk and motor vehicles.

**Description**

As a traffic calming measure, on-street parking reduces travel lane width resulting in slower speeds. It can be applied to one or both sides of the roadway and is usually combined with other traffic calming measures, such as chicanes and curb extensions. May include parallel parking, head-in angle parking, or reverse angle parking.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: No limit
- » Traffic Volume: No limit
- » Speed Limit: 35 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: No limit

**Impacts**

- » Speed Impacts:<sup>17</sup>
  - » Can slow traffic by reducing effective travel lane width; typical reduction in speed ranges between 1 and 5 MPH, with reduction of 2 to 3 MPH being the most common.
  - » Most pronounced effect on speed occurs on a narrow two-way street with parking on both sides.
  - » If half or more of the block face is not occupied by parked vehicles, the effect on vehicle speeds lessens and is negligible; the use of corner extensions or chokers could counter the effect of “open” parking spaces.
- » Volume Impacts: Little effect on traffic volumes.<sup>18</sup>
- » Crash Reduction Impacts: Data across studies is variable. Crash Modification Factors range from 0.48 (52 percent reduction in vehicle-pedestrian crashes) to 2.65 (165 percent increase in vehicle-pedestrian crashes).<sup>19</sup>

**Safety Benefits**

- » Increases the friction along a street, generally slowing vehicles.
- » Narrows the effective crossing width for pedestrians.
- » Provide a buffer between moving motor vehicle traffic and pedestrians along a sidewalk and cyclists in protected bike lane.
- » Angle parking reduces “dooring” risk for cyclists (relative to parallel parking). Back-in angle parking is preferred over head-in angle parking for its safety benefits.

## **Design Guidance**

- » Head-in and reverse angle parking requires 17 feet minimum depth. Depth depends on angle of parking stall. Parallel parking requires 7 feet minimum depth, though 8 feet may be preferred for delivery trucks.



### Purpose

Protect pedestrians and cyclists crossing by slowing motor vehicle speeds, increasing motor vehicle yielding, increasing pedestrian visibility, providing a pedestrian waiting area, and allowing two-stage crossings for slower pedestrians.

### Description

A curbed island within the center of a street. This island narrows the travel lanes at that location and can provide a pedestrian refuge area in the center of the street. It also reduces the crossing distance for pedestrians by allowing them to cross half of the street at one time. Crossings can also be staggered using a raised median to improve safety when crossing wider roads.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: Up to 6 lanes
- » Traffic Volume: Up to 15,000 daily vehicles
- » Speed Limit: 40 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: No limit

### Impacts

- » Speed Impacts: Traffic speeds likely to decrease by approximately 1 – 8 MPH.<sup>20</sup>
- » Volume Impacts: Has little effect on traffic volumes.<sup>21</sup> Pedestrian volumes may increase.
- » Crash Reduction Impacts: 32 - 56 percent for vehicle-pedestrian crashes. 46 percent of all crashes.<sup>22</sup>

### Safety Benefits

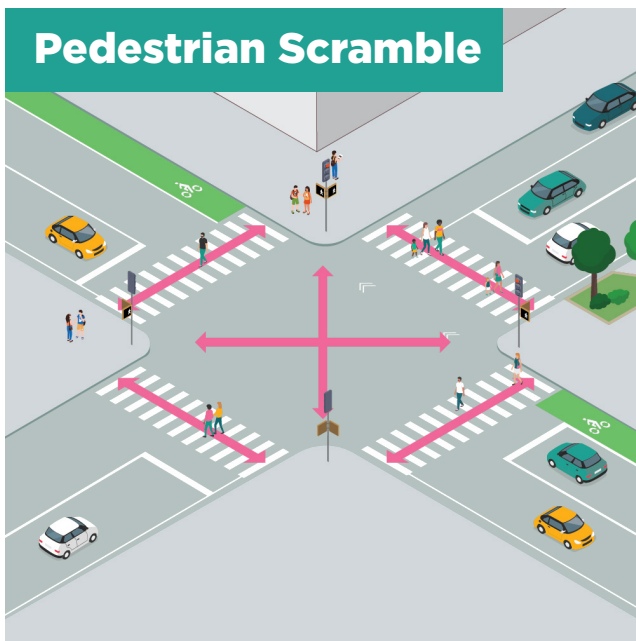
- » Reduces maximum distance and time pedestrians exposed to crash risk.
- » Allow pedestrians to cross the street one direction of travel or fewer lanes at a time.
- » Ease crossing for slower pedestrians (e.g. youth, elderly, and people with disabilities).
- » May slow motorist through speed.
- » May slow motorists turning left.

### Design Guidance

- » Median crossing islands should be a minimum of 6 feet wide. To provide cyclist refuge or for high pedestrian volumes, crossing islands should be a minimum of 8 feet wide. The refuge is ideally 40 feet long and not less than 12 feet in length. Interim use may include striping and flexible delineators.
- » Ramps or island cut-throughs are required for accessibility. They should be the full width of the crosswalk, 5 feet minimum.
- » All medians at intersections should have a “nose” which extends past the crosswalk. The nose protects people waiting on the median and slows turning drivers.

## JERSEY CITY TRAFFIC CALMING TOOLKIT

- » At mid-block locations:
  - » Install advance stop lines on multi-lane approaches.
  - » Install with applicable warning sign (MUTCD W11-1, W11-2, W11-15, or S1-1).<sup>23</sup>
  - » On multi-lane approaches, place “Stop Here for Pedestrians” or “Yield Here to Pedestrians” signs (MUTCD R1-5 series).<sup>24</sup>
- » Mark with a high-visibility crosswalk.



### Purpose

Dedicated time for pedestrian crossings.

### Description

Separate phase in the cycle specifically for pedestrian movements across all crosswalks. It can also support diagonal crossings.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: No limit
- » Traffic Volume: No limit
- » Speed Limit: No limit
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

- » Volume Impacts: Pedestrian volumes may increase.
- » Crash Reduction Impacts: 36 percent reduction in pedestrian crashes.<sup>25</sup>

### Safety Benefits

- » Separates the conflicts between turning vehicles and pedestrians by giving them each a distinct, dedicated phase to move through the intersection.
- » Shortens crossing time for pedestrians crossing two legs, likely increasing pedestrian compliance.

### Design Guidance

- » In order to accommodate pedestrians with vision impairments, the scramble phase should be accompanied by an audible signal to indicate the walk interval.
- » Capacity analyses are recommended prior to implementing.
- » Should be avoided at signals with long cycle lengths due to pedestrian delay and potential non-compliance.



## Plazas and Parklets

### Purpose

Increase pedestrian space and narrow portion of the roadway allocated to motor vehicles.

### Description

Reallocate excess pavement space for plazas and parklets to provide visual cues to drivers that they are entering a pedestrian-friendly area.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: Collector and local streets
- » Cartway Width: No limit
- » Traffic Volume: No limit
- » Speed Limit: No limit
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

- » Volume Impacts: No impact to vehicle volumes.<sup>26</sup> May increase pedestrian and cyclist activity.

### Safety Benefits

- » Increases space dedicated to pedestrians or buffer between pedestrian activity and motor vehicles.

### Design Guidance

- » Parklets should avoid corners and are best placed at least one parking space away from the intersection corner.
- » Parklets have a desired minimum width of 6 feet (or the width of the parking lane). Parklets generally entail the conversion of one or more parallel parking spaces or 3–4 angled parking spaces, but may vary according to the site, context, and desired character of the installation. Where a parklet stretches the length of an entire curb, accessibility and sightlines must be taken into account.
- » Parklets should have vertical elements that make them visible to traffic, such as flexible posts or bollards.
- » Parklets should have a flush transition at the sidewalk and curb to permit easy access and avoid tripping hazards.
- » Plazas can be implemented in conjunction with permanent road closures when used for traffic calming purposes.
- » Emergency services and transit should be consulted.



**Purpose**

Reduce vehicle speeds, increase motorist yielding, and improve cyclist and pedestrian crossing safety.

**Description**

Long, raised speed humps with a flat section in the middle and ramps on the ends. They are sometimes constructed with brick or other textured materials on the flat section. If placed at a pedestrian crossing, it is referred to as a raised crosswalk.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Local
- » Cartway Width: 40-feet or less
- » Traffic Volume: Less than 3,000 daily vehicles
- » Speed Limit: 25 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

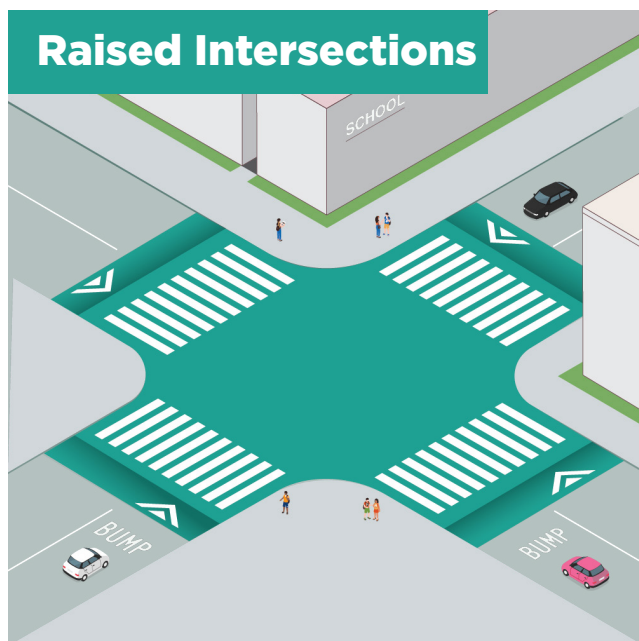
- » Speed Impacts: Single raised crosswalk reduces 85th percentile speeds (i.e. the speed at or below which 85% of vehicles travel) to the range of 20 to 35 MPH when crossing the crosswalk; speed reduction effects decline at the rate of approximately 0.5 to 1 MPH every 100 feet beyond the 200 foot approach and exit of a raised crosswalk; in order to retain slower vehicle speeds over a longer distance, a series of speed tables or raised crosswalks is needed.<sup>28</sup>
- » Volume Impacts: As single installation, there is little traffic diversion from the street; as part of a series, typical volume reductions of 20 percent observed.<sup>29</sup> Pedestrian volumes may increase.
- » Crash Reduction Impacts: 45 percent for pedestrian crashes and 25-33 percent for all crashes.<sup>30</sup> 51 percent for bike-motor vehicle crashes on entrances or exits to streets and driveways.<sup>31</sup>

**Safety Benefits**

- » Increases pedestrian prominence in motorist field of vision.
- » May reduce vehicle speeds and improve motorist yielding.
- » Provides flatter surface for pedestrians with disabilities.

**Design Guidance**

- » Place ramps on each vehicle approach.
- » Raised crossings are often demarcated with different paving materials and additional paint markings.
- » Mark the crossing with high-visibility crosswalk markings.
- » Consider installing with applicable warning sign (MUTCD W11-1, W11-2, W11-15, or S1-1).
- » Raised crossings do not require curb ramps, though truncated domes should be included at each crossing entrance.



### Purpose

Reduce vehicle speeds, increase motorist yielding, and improve cyclist and pedestrian crossing safety.

### Description

The entire intersection, including the crosswalks, is raised 6 inches above the street level to be flush with the sidewalk and curb. Long ramps are provided on all approaches.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: Collector and Local
- » Cartway Width: 40-feet or less
- » Traffic Volume: Less than 10,000 daily vehicles
- » Speed Limit: 35 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

### Impacts

- » Speed Impacts: A single raised intersection reduces 85th percentile speeds to the range of 25 to 35 MPH when crossing the intersection; vehicle speeds away from the intersection have not been shown to change appreciably.<sup>32</sup>
- » Volume Impacts: As a single installation, there is little traffic diversion from the intersection.<sup>33</sup> Pedestrian volumes may increase.

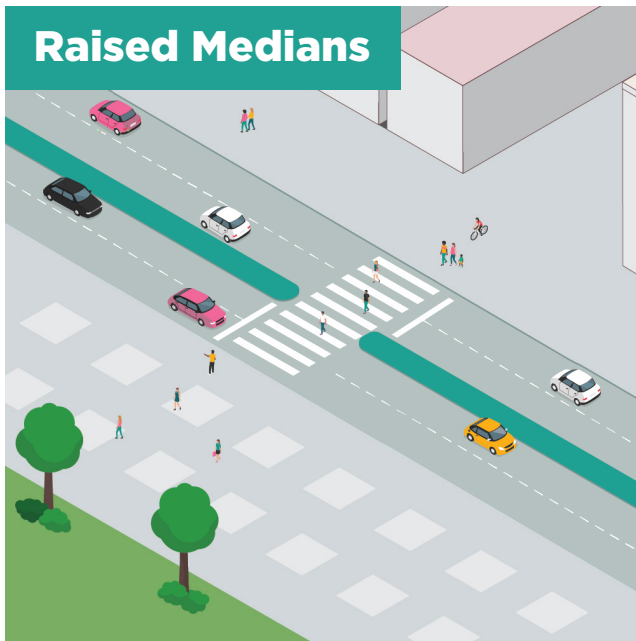
### Safety Benefits

- » Increases pedestrian prominence in motorist field of vision.
- » May reduce vehicle speeds and improve motorist yielding.
- » Provides flatter surface for pedestrians with disabilities.

### Design Guidance

- » Mark the crossing with high-visibility crosswalk markings.
- » Consider installing with applicable warning sign (MUTCD W11-1, W11-2, W11-15, or S1-1).
- » Raised intersections do not require curb ramps, though truncated domes should be included at each crossing entrance.





**Purpose**

Restrict motor vehicle turn movements, reduce head-on collisions, and provide refuge for crossing pedestrians.

**Description**

A curbed island within the center of a street. This island narrows the travel lanes at that location and can provide a pedestrian refuge area in the center of the street. It also reduces the crossing distance for pedestrians by allowing them to cross half of the street at one time.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: Up to 6 lanes
- » Traffic Volume: Up to 15,000 daily vehicles
- » Speed Limit: 40 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: No limit

**Impacts**

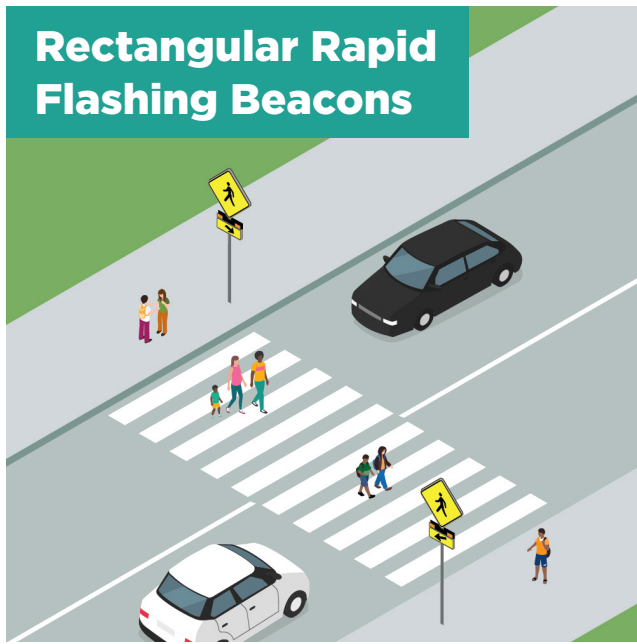
- » Speed Reduction Impacts: 1-8 MPH
- » Crash Reduction Impacts: 32-56 percent of pedestrian crashes and 46 percent of all crashes at raised medians.<sup>34</sup>

**Safety Benefits**

- » Reduce potential conflict points by minimizing motor vehicle left turns and u-turns.
- » If six feet or greater, allow pedestrians to cross one direction of vehicle travel at a time.
- » Reduce pedestrian crossing distance.
- » Reduce vehicular turning speeds.
- » Can improve motorist safety where a continuous raised median replaces continuous two-way center turn lanes.

**Design Guidance**

- » Medians may be landscaped or paved with a material different to that of the roadway.
- » Continuous raised medians require 6 feet width to provide pedestrian refuge or 8 feet width to provide cyclist refuge.
- » Crossings must have ramps or cut throughs to be fully accessible.



## Rectangular Rapid Flashing Beacons

### Purpose

Increase driver yielding to pedestrians and cyclists at mid-block crossings.

### Description

RRFBs consist of two, rectangular-shaped yellow indications, each with a light emitting diode (LED)-array-based light source. RRFBs flash with an alternating high frequency when activated by a user to enhance the visibility of pedestrians and cyclists to drivers at crossings.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: One- and two-lane approaches
- » Traffic Volume: No limit
- » Speed Limit: 40 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

- » Crash Reduction Impacts: 47 percent for vehicle-pedestrian crashes.<sup>35</sup>

### Safety Benefits

- » Increases driver yielding.
- » May increase effectiveness of other safety treatments, such as advance yield markings with "YIELD HERE FOR PEDESTRIAN" signs.
- » More effective than traditional overhead beacons.<sup>36</sup>
- » At multilane crossings, multiple threat crashes still exist.

### Design Guidance

- » Place on both sides of an uncontrolled crosswalk.
- » If pole-mounted, place below a W11-2 (Pedestrian), S1-1 (School), or W11-15 (Trail) crossing warning sign and above a diagonal downward arrow (W16-7P) plaque.
- » May also be used with an overhead-mounted W11-2, S1-1, or W11-15 crossing warning sign, located at or immediately adjacent to an uncontrolled marked crosswalk.
- » If sight distance approaching the crosswalk is limited, an additional RRFB may be installed on the approach with a post-mounted W11-2, S1-1, or W11-15 sign with an AHEAD (W16-9P) or distance (W16-2P or W16-2aP) plaque.
- » Consider other treatments in these locations such as curb extensions, green infrastructure, and high visibility crosswalks.



## Residential Shared Street

### Purpose

Prioritize pedestrian and cyclist movement by slowing vehicular speeds and communicating clearly through design features that motorists must yield to all other users.

### Description

Narrow streets that have raised pavement that is flush with the curb that support a mixing of vehicle, pedestrian, and bike traffic within the street area.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: Local streets
- » Cartway Width: 30-feet or less
- » Traffic Volume: Less than 3,000 daily vehicles
- » Speed Limit: 25 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

### Impacts

- » Speed Reduction Impacts: 1-5 MPH
- » Volume Reduction Impacts: 33 percent reduction in peak hour volumes.
- » Crash Reduction Impacts: 40 percent reduction in crashes on Dutch streets that had been converted to shared streets.<sup>37</sup>

### Safety Benefits

- » Slower traffic speeds reduce severity of collisions.
- » Slower speeds plus pedestrian or bike-centric design disincentivize vehicular traffic.
- » Lack of curbs encourage cautious behavior on the part of all users.

### Design Guidance

- » Shared streets should not have vertical curbs, so that pedestrians can use the entire right-of-way. A lack of curbs encourages cautious behavior on the part of all users, which in turn reinforces slower speeds and comfortable walking and cycling conditions.
- » Motor vehicle speeds should not exceed 15 MPH at any time.
- » Shared street gateway treatments should inform drivers they are entering a shared space. Common ways to do so include:
  - » Narrowing entrances to one lane.
  - » Elevating the street to the pedestrian level.
  - » Using a colored or textured pavement.
  - » Implementing signage notifying drivers of the shared street.
- » Traffic volumes should not exceed 100 vehicles in the peak hour.



### Purpose

Control traffic volumes on residential streets.

### Description

Full or partial road closures use methods to restrict certain vehicular movement including directional diverters, semi-diverters, median barriers, forced turn islands, right turn islands, plazas, etc. These traffic-calming measures are designed to control traffic volumes on residential roadways, and are often used to reduce cut-through traffic.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: Local
- » Cartway Width: Two lane roads
- » Traffic Volume: Less than 3,500 daily vehicles
- » Speed Limit: 35 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

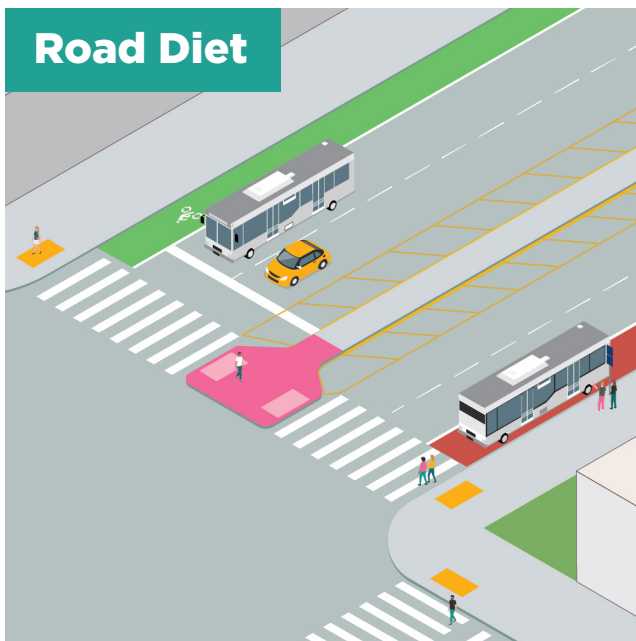
- » Speed Impacts: Eliminates through traffic movements.<sup>38</sup>
- » Volume Impacts: Forces all traffic that otherwise could pass straight through the intersection to divert to another path; produces largest reduction in traffic volume on subject street among all traffic calming measures.<sup>39</sup>

### Safety Benefits

- » Reduces conflicts with nonmotorized road users by restricting vehicle movements.

### Design Guidance

- » The use of these measures does not address speed control.
- » The use of road closures and diversions should be coordinated with fire, police and other emergency services, as well as snow removal, garbage collection, transit, and school bus routes.



### Purpose

Reduce the speed of traffic, reduce crossing distances or provide additional space for other elements of the roadway.

### Description

Modification to the number and use of lanes on a roadway, typically to enhance safety and accessibility by reallocating pavement space to provide space for dedicated bike facilities, left-turn lanes, on-street parking, raised medians, pedestrian refuge islands, curb extensions, sidewalks, and other traffic calming measures along a corridor.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: Up to 4 lane cross-section
- » Traffic Volume: Up to 1,000 vehicles per direction per peak hour
- » Speed Limit: 35 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

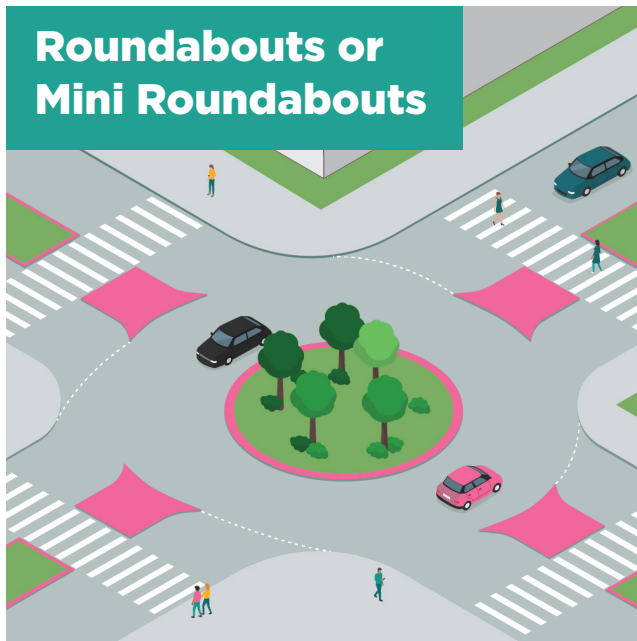
- » Speed Impacts:
  - » Elimination of a travel lane can reduce higher speeds that are achieved through passing.
  - » Road Diets can reduce speeds by 3 to 5 MPH. A greater reduction in speed was observed on corridors with higher traffic volumes.<sup>40</sup>
- » Volume Impacts: Little effect on traffic volumes.<sup>41</sup>
- » Crash Reduction Impacts:
  - » 29 percent for all crashes in urban areas.<sup>42</sup>

### Safety Benefits

- » Increase available space for additional safety infrastructure.
- » May reduce the number of potential conflict points.
- » May slow motor vehicle operating speeds.
- » Reduces crossing distances by eliminating a lane and by adding a pedestrian median island or curb extension.

### Design Guidance

- » Eliminating a travel through lane can make room for a bike lane, turn lanes, wider sidewalks, median island, curb extensions, on-street parking, transit lane, landscaping, or other uses.
- » Road diets are often considered on roadways with up to 24,000 daily vehicles.
- » Lane width of outside travel lanes may be slightly wider to accommodate curbside uses.



**Purpose**

Reduce traffic speeds and conflict points at intersections.

**Description**

Raised circular islands located in the center of an unsignalized intersections that restrict drivers from speeding straight through intersections by forcing vehicles to navigate around the circle more slowly.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Collector and Local
- » Cartway Width: One- and two-lane approach
- » Traffic Volume: Up to 2,500 vehicles per hour for a single lane
- » Speed Limit: 45 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

**Impacts**

- » Speed Impacts:
  - » Traffic speeds within the limits of a traffic circle reduced 1 to 13 MPH.<sup>43</sup>
- » Volume Impacts: As single traffic calming treatment, has wide-ranging effect on vehicle volume; more effective when placed in series.<sup>44</sup>
- » Crash Reduction Impacts: Initial research indicates mini roundabouts can reduce vehicle speeds<sup>45</sup> and crashes.<sup>46</sup>

**Safety Benefits**

- » Reduces motor vehicle through speeds by forcing motorists to maneuver around the island.
- » Eliminates left-turn crashes.
- » Reduces right-turn speed.

**Design Guidance**

- » Use yield rather than stop controls.
- » Install signs to instruct vehicles to proceed to the right of the mini roundabout.
- » May be used with shared lane markings (sharrows) to indicate cyclist usage.
- » May be used with bike lanes if space allows.
- » May also be used with W11-2, W11-2, S1-1, or W11-15 crossing warning sign.
- » May be landscaped with low shrubs or vegetation that does not impede visibility.
- » Aprons should be included to accommodate large, heavy vehicles.



## Shared Lane Markings (Sharrows)

### Purpose

Guide cyclists away from the hazardous “door zone” beside parked cars, and function as positioning cues.

### Description

Road markings used to indicate a shared lane environment for bikes and automobiles.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: Collectors and local streets
- » Cartway Width: one and two-lane roads
- » Traffic Volume: Less than 3,000 daily vehicles
- » Speed Limit: 25 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: Less than 5 percent

### Impacts

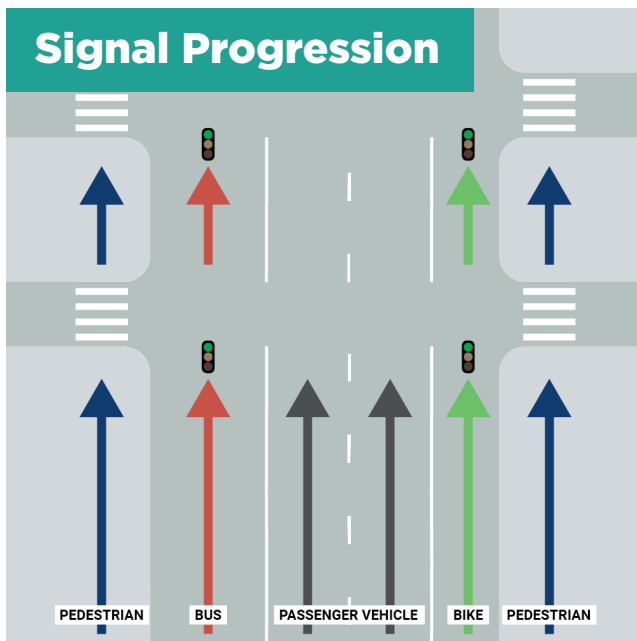
- » Speed Impacts: Reduce vehicle speeds by 1 to 3 MPH.
- » Volume Impacts: May increase bike volumes.
- » Crash Reduction Impacts: Research has now shown a reduction in crashes with installation of sharrows.

### Safety Benefits

- » Alerts motor vehicle drivers to the potential presence of cyclists.
- » Alerts road users of the lateral position cyclists are expected to occupy within the travel lane.
- » Indicates a proper path for cyclists through difficult or potentially hazardous situations, such as railroad tracks.
- » Advertises the presence of bikeway routes to all users.
- » Reduces the incidence of wrong-way cycling.

### Design Guidance

- » The Shared Lane Marking is the bike-and-chevron “sharrow,” illustrated in MUTCD figure 9C-9.
- » A Green-back super sharrow can also be utilized. For more information, see the Jersey City Bikeway Design Guide.
- » Maximum spacing between markings is 250 feet. On some roads, a more frequent spacing, such as every 100 feet is appropriate.
- » Sharrows shall be placed in the center of the travel lane. Placing the sharrow in the center between the wheel tread zone will reduce wear on the marking. The chevron arrows at the top of the marking will point in the direction of travel.
- » Should not be considered a substitute for bike lanes, cycle tracks, or other separation treatments where these types of facilities are otherwise warranted or space permits.



**Purpose**

Set the pace of travel along urban corridors.

**Description**

Coordinated signal timing that is optimized for slower vehicle speeds, creating an uninterrupted flow for cyclists or low vehicle progression speeds for a pedestrian-friendly downtown. Signals may also be timed to coordinate transit headways.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: No limit
- » Traffic Volume: No limit
- » Speed Limit: No limit
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

**Impacts**

- » Speed Impacts: Case studies show it is sometimes possible to substantially reduce speeding opportunities with little or no increase in vehicular delay by lowering cycle length, lowering progression speed, dividing an arterial into smaller “coordination zones” with each zone having its own cycle length, and by abandoning coordination altogether.<sup>47</sup>

**Safety Benefits**

- » Encourages drivers to travel at the speed limit of the signal progression.
- » Discourages speeding through a yellow light.

**Design Guidance**

- » Should be considered in the overall context of the street. Block length, crossing distance, and traffic volume are relevant to the selection of signal progression speeds.
- » Typically applied on corridors with closely spaced intersections (1/4 mile or less), and where there is a desire for platooning.
- » Include cross-street progressions in signal timing planning, especially for streets with high transit or total volume.





**Purpose**

Reduce the speed of traffic, reduce crossing distances or provide additional space for other elements of the roadway.

**Description**

Narrow residential streets that require low motor vehicle speeds and accommodate travel in a bi-directional lane. These types of streets calm traffic as drivers must yield to each other to allow one direction of travel at a time to pass.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Local streets
- » Cartway Width: 36-feet or less
- » Traffic Volume: Less than 3,500 daily vehicles
- » Speed Limit: 25 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

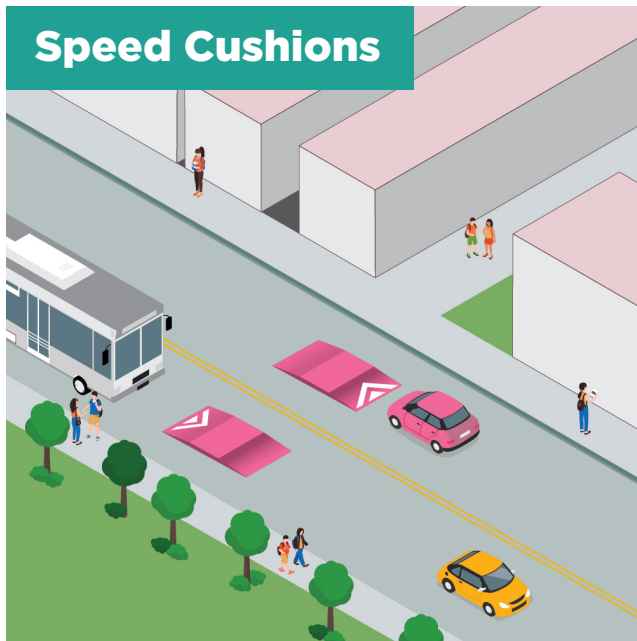
- » Crash Reduction Impacts:
  - » 29 percent for all crashes in urban areas.<sup>48</sup>

**Safety Benefits**

- » Increase available space for additional safety infrastructure for pedestrians or cyclists.
- » May slow motor vehicle operating speeds.
- » May reduce crossing distances if travel lanes are narrowed or eliminated or through provision of a pedestrian median island.

**Design Guidance**

- » Eliminating a travel through lane can make room for a bike lane, turn lanes, wider sidewalks, median island, curb extensions, on-street parking, transit lane, landscaping, or other uses.
- » Lane width of outside travel lanes may be slightly wider to accommodate curbside uses.



**Purpose**

Reduce motor vehicle speeds.

**Description**

Two or more raised areas placed laterally across a roadway with gaps between raised areas. The spacing of the gaps allow emergency vehicles to pass at higher speeds.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Collectors and local streets
- » Cartway Width: Two-lane roads
- » Traffic Volume: Less than 3,500 daily vehicles
- » Speed Limit: 30 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

- » Speed Impacts:<sup>49</sup>
  - » Reduce speeds up to 25 percent.
  - » Single speed cushion reduces vehicle speeds to the range of 15 to 20 MPH when crossing the cushion; speed reduction effects decline at the rate of approximately 0.5 to 1 MPH every 100 feet beyond the 200 foot approach and exit of a speed cushion; in order to retain slower vehicle speeds over longer distance, a series of speed cushions needed.
  - » Average speeds are typically higher than for a speed hump because speed cushion allows a motorist to pass over the cushion with one wheel on the cushion and one wheel off.
- » Volume Impacts:<sup>50</sup>
  - » As single installation, there is little traffic diversion from the street; as part of a series, typical volume reductions of 20 percent observed.
- » Crash Reduction Impacts: A definitive crash reduction estimate has not been established. Research suggests speed humps, tables, and cushions reduce crash severity.<sup>51</sup>

**Safety Benefits**

- » Reduce motor vehicle speeds.
- » May reduce the frequency and severity of crashes for all road users.

**Design Guidance**

- » Install speed humps perpendicular to the flow of traffic.
- » Speed humps and tables can be paved or painted to warn motorists and to be visually pleasing.
- » Speed humps can be placed periodically along a route to reinforce speed control.
- » Well-designed speed humps, tables, and cushions allow vehicles and people riding bikes to proceed over the device at the intended speed with minimal discomfort.
- » Do not install on the curve of the roadway.



## Speed Detector Signs

### Purpose

Alert vehicles to their travel speed in order to increase compliance with the posted speed limit.

### Description

Signs that display the speed of approaching vehicles to alert motorists when they are driving at unsafe speeds.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: No limit
- » Traffic Volume: No limit
- » Speed Limit: No limit
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

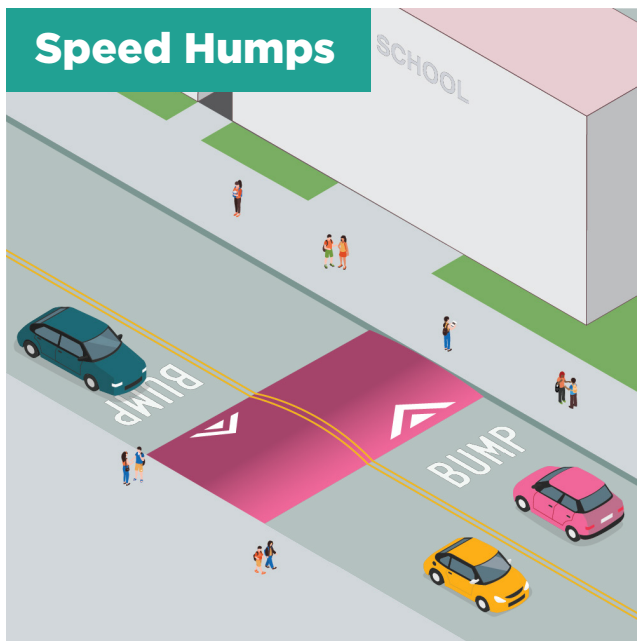
- » Speed Impacts: Across all types of vehicles and different installation locations, the clear majority of studies found reductions in speeds at the Dynamic Speed Feedback Signs (DSFSs) when the DSFSs are activated. Overall, reductions of 4 MPH at the DSFS were estimated for passenger vehicles as a result of DSFS installation, and reductions between 2- to 4 MPH at the DSFS were estimated across all vehicle types in the different contexts assessed.<sup>52</sup>

### Safety Benefits

- » Reduces motor vehicle speeds

### Design Guidance

- » Install in locations with frequent speeding citations or anecdotal speed issues.
- » Ensure speed detector signs are visible to traveling vehicles.
- » Should implemented in conjunction with an enforcement program.



**Purpose**

Reduce motor vehicle speeds.

**Description**

A raised surface within the traveled way designed to reduce speeds by creating a gentle rocking motion that discourages drivers from driving quickly.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: Local residential and local park
- » Cartway Width: 40-feet or less
- » Traffic Volume: Less than 3,000 daily vehicles
- » Speed Limit: 25 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

**Impacts**

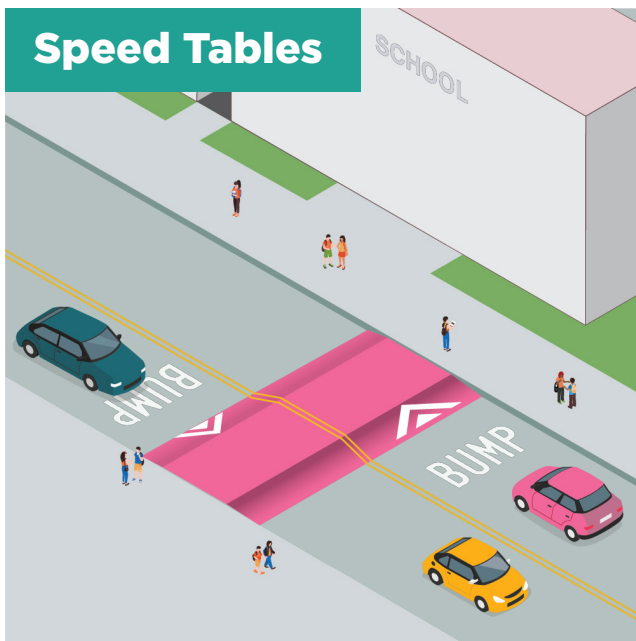
- » Speed Impacts: Single speed hump reduces vehicle speeds to the range of 15 to 20 MPH when crossing the hump; speed reduction effects decline at the rate of approximately 0.5 to 1 MPH every 100 feet beyond the 200 foot approach and exit of a speed hump; in order to retain slower vehicle speeds over longer distance, series of speed humps is needed.<sup>53</sup>
- » Volume Impacts: As single installation, there is little traffic diversion from the street; as part of a series, typical volume reductions of 20 percent observed.<sup>54</sup>
- » Crash Reduction Impacts: 40 – 50 percent reduction across all crash types.

**Safety Benefits**

- » Reduce motor vehicle speeds.
- » May reduce the frequency and severity of crashes for all road users.

**Design Guidance**

- » Install speed humps perpendicular to the flow of traffic.
- » Speed humps and tables can be paved or painted to warn motorists and to be visually pleasing.
- » Speed humps can be placed periodically along a route to reinforce speed control.
- » Well-designed speed humps, tables, and cushions allow vehicles and people riding bikes to proceed over the device at the intended speed with minimal discomfort.
- » Do not install on the curve of the roadway.



## Speed Tables

### Purpose

Reduce motor vehicle speeds.

### Description

Long, raised speed humps with a flat section in the middle and ramps on the ends. They are sometimes constructed with brick or other textured materials on the flat section. If placed at a pedestrian crossing, it is referred to as a raised crosswalk.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: Local residential and local park
- » Cartway Width: 40-feet or less
- » Traffic Volume: Less than 3,000 daily vehicles
- » Speed Limit: 25 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: Less than 5 percent

### Impacts

- » Speed Impacts: Single speed table reduces 85th percentile speeds to the range of 25 to 35 MPH when crossing the table; speed reduction effects decline at the rate of approximately 0.5 to 1 MPH every 100 feet beyond the 200 foot approach and exit of a speed table; in order to retain slower vehicle speeds over a longer distance, a series of speed tables is needed.<sup>55</sup>
- » Volume Impacts: As single installation, there is little traffic diversion from the street; as part of a series, typical volume reductions of 20 percent observed.<sup>56</sup>
- » Crash Reduction Impacts: 45 percent reduction in pedestrian crashes and 25 – 33 percent reduction in all crashes.

### Safety Benefits

- » Reduce motor vehicle speeds.
- » May reduce the frequency and severity of crashes for all road users.

### Design Guidance

- » Install speed humps perpendicular to the flow of traffic.
- » Speed humps and tables can be paved or painted to warn motorists and to be visually pleasing.
- » Speed tables can be placed periodically along a route to reinforce speed control.
- » Well-designed speed humps, tables, and cushions allow vehicles and people riding bikes to proceed over the device at the intended speed with minimal discomfort.
- » Do not install on the curve of the roadway.



## Staggered Crossings

### Purpose

Protect pedestrians and cyclists crossing by slowing motor vehicle speeds, increasing motor vehicle yielding, increasing pedestrian visibility, providing a pedestrian waiting area, and allowing two-stage crossings for slower pedestrians.

### Description

A curbed island within the center of a street. This island narrows the travel lanes at that location and can provide a pedestrian refuge area in the center of the street. It also reduces the crossing distance for pedestrians by allowing them to cross half of the street at one time. In this scenario, the crossings are staggered using a raised median to improve safety when crossing wider roads. In a staggered crossing, each crossing is treated separately, and the traffic signals may not be synchronized between the two.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: Up to 6 lanes
- » Traffic Volume: Up to 15,000 daily vehicles
- » Speed Limit: 40 MPH
- » Roadway Grade: Less than 8 percent
- » Heavy Vehicles: No limit

### Impacts

- » Crash Reduction Impacts: 32 percent for vehicle-pedestrian crashes.<sup>57</sup>

### Safety Benefits

- » Reduces maximum distance and time that pedestrians are exposed to crash risk.
- » Allow pedestrians to cross the street one direction of travel or fewer lanes at a time.
- » Ease crossing for slower pedestrians (e.g. youth, elderly, and people with disabilities).
- » Provide space for additional lighting at the crossing.
- » May slow motorist through speed.
- » May slow motorists turning left.

### Design Guidance

- » Median crossing islands should be a minimum of 6 feet wide. To provide cyclist refuge or for high pedestrian volumes, crossing islands should be a minimum of 8 feet wide. The refuge is ideally 40 feet long.
- » Ramps or island cut-throughs are required for accessibility. They should be the full width of the crosswalk, 5 feet minimum.
- » All medians at intersections should have a “nose” which extends past the crosswalk. The nose protects people waiting on the median and slows turning drivers.
- » At mid-block locations:
  - » Install advance stop lines on multi-lane approaches.
  - » Consider installing with applicable warning sign (MUTCD W11-1, W11-2, W11-15, or S1-1).

- » On multi-lane approaches, place “Stop Here for Pedestrians” or “Yield Here to Pedestrians” signs (MUTCD R1-5 series).<sup>58</sup>
- » Mark with a high-visibility crosswalk.



### Purpose

Notify motorists that they are approaching a pedestrian crossing.

### Description

Concrete pavers, stamped concrete, or decorative pavement is placed at intersections to warn motorists they are approaching a pedestrian crossing.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: Minor collector, local residential and local park
- » Cartway Width: Up to 4 lane cross section
- » Traffic Volume: Up to 10,000 daily vehicles
- » Speed Limit: 45 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

- » Crash Reduction Impacts: 48 percent reduction in pedestrian crashes.<sup>59</sup>

### Safety Benefits

- » Increase visibility of pedestrian crossing.
- » Reduce crashes between pedestrians, cyclists, and motor vehicles
- » Designate pedestrian right-of-way and may reduce pedestrian crossings at unmarked locations.

### Design Guidance

- » Crosswalk location should be convenient for pedestrian access.
- » Consider installing high visibility white thermoplastic on top of decorative crosswalk treatments.



## Traffic Signage and Markings



### Purpose

Delineate where and when different road users may travel along a corridor or through an intersection.

### Description

Signs include posted speed limits, turn prohibitions, commercial vehicle or weight prohibitions, pedestrian crossing ahead, and “yield to pedestrian in crosswalk” in road, flexible signposts. Pavement markings include school crossing, pedestrian crossing, speed limits, warning signs installed with thermoplastic retro-reflective tape.

### Cost



### Installation Time



### Applicable Locations

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: No limit
- » Traffic Volume: No limit
- » Speed Limit: No limit
- » Roadway Grade: No limit
- » Heavy Vehicles: No limit

### Impacts

- » Speed Impacts: Reduction of mean speeds up to 7.4 MPH and reductions of the 85th percentile speeds by up to 9 MPH.<sup>60</sup>
- » Crash Reduction Impacts: 52-68 percent reduction in speed-related crashes.<sup>61</sup>

### Safety Benefits

- » Demarcates where different road users can and should travel within the public right-of-way.
- » Alerts drivers to where pedestrians or cyclists may be present.
- » May reduce delay for pedestrian crossings due to increased motorist yielding.
- » Decreases vehicle speeds whether or not pedestrians are crossing.

### Design Guidance

- » Design considerations vary based on the type of signage or marking installed.
- » Selected treatment design should comply with MUTCD design guidance.



**Purpose**

Reduce motor vehicle turning speed and increase motor vehicle yielding to pedestrians.

**Description**

Turn hardening refers to the use of modular curbs, vertical delineators, and striping at intersections to reduce turning speeds and to prevent “corner cutting.” It emphasizes the separation between travel directions, guides vehicles into the receiving lane, and reduces turning speeds, reducing the conflict zone between turning vehicles and people biking and walking.

**Cost**



**Installation Time**



**Applicable Locations**

- » Street Type: All (Arterials, collectors, and local streets)
- » Cartway Width: All – must have left-turn lane
- » Traffic Volume: Less than 10,000 daily vehicles
- » Speed Limit: 35 MPH
- » Roadway Grade: No limit
- » Heavy Vehicles: Less than 2 percent

**Impacts**

- » Speed Reduction Impacts: 50 percent
- » Crash Reduction Impacts: 18 percent reduction in pedestrian injury and fatal crashes.

**Safety Benefits**

- » Slow left-turning motor vehicles.
- » Guide motor vehicles to wider turning angle for safer and more predictable turns.
- » Increase visibility of pedestrians in crosswalk to turning motorists.
- » Mitigate visibility issues caused by driver blindspots in vehicle windshields and windows.

**Design Guidance**

- » Raise centerline with flexible delineators and separators.
- » Install a rubber speed bump, mountable curb, or flexible delineators and separators along the centerline, on one or both sides of the crosswalk.
- » Paint lane extensions through the intersection with yellow markings.
- » Vertical elements should not be present in the crosswalk.
- » This strategy should be avoided if there is a high percentage of tractor trailers.

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