



# Traffic Calming Toolkit

Neighborhood Traffic Calming Program

Transportation & Mobility Division

October 2022

# Introduction

The City of Hilliard has a multitude of traffic calming countermeasures that can be deployed to slow traffic on local streets as part of the Neighborhood Traffic Calming Program.

The traffic calming countermeasures listed below fall into the categories of pavement marking, signage, vertical deflection, horizontal deflection, vertical elements, education, and enforcement. Within each category, countermeasures are generally listed from least to most expensive. Each countermeasure is listed with a short description, temporary vs. permanent considerations, maintenance considerations, impact to City services, speed and crash reduction effectiveness, and an approximate cost scale. Cost scales are shown in Table 2 below.

The information for speed reductions, crash reductions, and cost scales in this section is based on national traffic calming guidance, as listed in Appendix B. In general, the speed and crash reduction figures in this toolbox come from the *FHWA Engineering Speed Management Countermeasures Desktop References*, and the cost scales come from the *FHWA Traffic Calming ePrimer*. The cost scales represent the cost of a single installation of each traffic calming measure (e.g., a single speed hump). In general, costs will be higher for installations that employ multiple countermeasures or impact drainage. Inflation should also be considered in project costs.

**Table 1: Traffic Calming Countermeasure Cost Scales**

Symbol	Cost Scale
\$	Less than \$6,000 (Low)
\$\$	\$6,000 - \$15,000 (Medium)
\$\$\$	More than \$15,000 (High)

**Table 2: Traffic Calming Countermeasure Summary Table**

	Speed Reduction Effectiveness	Crash Reduction Effectiveness	Maintenance	Impact to City Services	Cost Scale
<b>Pavement Markings</b>					
Center and Edge Line Striping	Low	High	Low	Low	Low
High-Visibility Crosswalks	Low	High	Low	Low	Low
Advanced Yield Markings	Low	Low	Low	Low	Low
Narrowed Travel Lanes	Low	High	High	High	Low
Transverse Bars/Optical Speed Bars	High	High	Low	Low	Low
SLOW Pavement Marking	Low	High	Low	Low	Low
<b>Signs</b>					
Speed Feedback Signs	High	Low	High	Low	Low
<b>Vertical Deflection</b>					
Speed Cushions	High	High	High	High	High
Speed Humps	High	High	High	High	High
Speed Tables	High	High	High	High	High
Raised Crosswalks	High	Medium	High	High	High
<b>Horizontal Deflection</b>					
On-Street Parking	Low	High	Low	Low	Low
Curb Extensions/Bump outs	Low	Low	High	High	High
Chicanes	High	Low	High	High	High
Chokers	Low	Low	High	High	High
Traffic Circles	High	High	High	High	High
Median Islands	High	High	High	High	High
<b>Other Vertical Elements</b>					
Street Trees	High	Low	High	Low	Low
Planter Boxes	High	Low	High	High	Low
Flex Posts/Bollards	High	Low	High	High	Low
<b>Education and Enforcement</b>					
High Visibility Enforcement			Low	Low	High

**Legend**

Low
Medium
High
Unknown



## Pavement Markings

# Center and Edge Line Striping

### Description and Key Safety Features:

Center lines are the yellow lines in the middle of a roadway, while edge lines are white lines that indicate the edge of the traveled way. Center and edge lines can visually narrow a roadway or a travel lane to encourage slower driving speeds.

### Temporary vs. Permanent Considerations:

Paint may be used for a temporary installation. Thermoplastic can be used for more permanent installations.

**Maintenance Considerations:** Low

**Impact on City Services:** Low

**Speed Reduction:** 0-4 mph

**Crash Reduction:** 24%<sup>1</sup>

**Cost Scale:** \$



Source: City of Hilliard  
Location: Hilliard, OH

<sup>1</sup>Elvik, R. and Vaa, T., "Handbook of Road Safety Measures." Oxford, United Kingdom, Elsevier, (2004). [https://www.cmfclearinghouse.org/study\\_detail.cfm?stid=14](https://www.cmfclearinghouse.org/study_detail.cfm?stid=14).

## Pavement Markings

# High-Visibility Crosswalks

### Description and Key Safety Features:

Center lines are the yellow lines in the middle of a roadway, while edge lines are white lines that indicate the edge of the traveled way. Center and edge lines can visually narrow a roadway or a travel lane to encourage slower driving speeds.

### Temporary vs. Permanent Considerations:

Paint may be used for a temporary installation. Thermoplastic can be used for more permanent installations.

**Maintenance Considerations:** Low

**Impact on City Services:** Low

**Speed Reduction:** Unknown

**Crash Reduction:** 19-40%<sup>2</sup>

**Cost Scale:** \$



Source: Toole Design  
Location: Washington, DC

<sup>2</sup> Chen, L., C. Chen, and R. Ewing. "The Relative Effectiveness of Pedestrian Safety Countermeasures at Urban Intersections - Lessons from a New York City Experience." Presented at the 91st Annual Meeting of the Transportation Research Board, January 22-26, Washington, DC, 2012.

## Pavement Markings

# Advanced Yield Markings

### Description and Key Safety Features:

Center lines are the yellow lines in the middle of a roadway, while edge lines are white lines that indicate the edge of the traveled way. Center and edge lines can visually narrow a roadway or a travel lane to encourage slower driving speeds.

### Temporary vs. Permanent Considerations:

Paint may be used for a temporary installation. Thermoplastic can be used for more permanent installations.

**Maintenance Considerations:** Low

**Impact on City Services:** Low

**Speed Reduction:** Unknown

**Crash Reduction:** 11%<sup>3</sup>

**Cost Scale:** \$



Source: Toole Design  
Location: Colorado Springs, CO

<sup>3</sup> Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N. Thirsk, C. Lyon, B. Persaud, J. Zegeer, E. Ferguson, and R. Van Houten. "Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments", National Cooperative Highway Research Program, Research Report 841, Washington, D.C., 2017.  
[https://www.cmfclearinghouse.org/study\\_detail.cfm?stid=487](https://www.cmfclearinghouse.org/study_detail.cfm?stid=487).



*Pavement Markings*

# Narrowed Travel Lanes

## Description and Key Safety Features:

Center lines are the yellow lines in the middle of a roadway, while edge lines are white lines that indicate the edge of the traveled way. Center and edge lines can visually narrow a roadway or a travel lane to encourage slower driving speeds.

## Temporary vs. Permanent Considerations:

Paint may be used for a temporary installation. Thermoplastic can be used for more permanent installations.

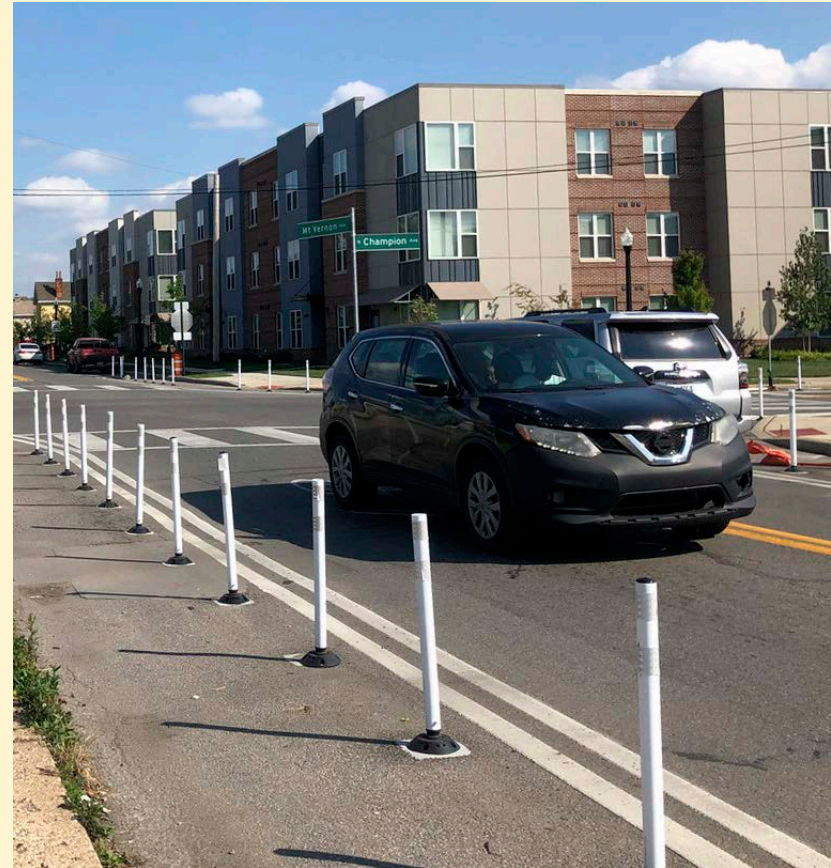
**Maintenance Considerations:** Medium

**Impact on City Services:** Medium

**Speed Reduction:** 0-4 mph

**Crash Reduction:** 27-42%<sup>4</sup>

**Cost Scale:** \$



Source: Toole Design  
Location: Columbus, OH

<sup>4</sup> Abdel-Aty, M.A., C. Lee, J. Park, J.Wang, M. Abuzwidah, and S. Al-Arifi. "Validation and Application of Highway Safety Manual (Part D) in Florida." Florida Department of Transportation. Tallahassee, Florida. (May 2014).  
[http://cmfclearinghouse.org/study\\_detail.cfm?stid=433](http://cmfclearinghouse.org/study_detail.cfm?stid=433).

## Pavement Markings

# Transverse Bars/Optical Speed Bars

### Description and Key Safety Features:

Transverse bars (top right) and optical speed bars (bottom right) are pavement markings that are applied perpendicular to the roadway to increase drivers' awareness of their speed. Transverse bars are often used in ahead of speed humps/tables.

### Temporary vs. Permanent Considerations:

Paint may be used for a temporary installation. Thermoplastic can be used for more permanent installations.

**Maintenance Considerations:** Low

**Impact on City Services:** Low

**Speed Reduction:** 0-7 mph

**Crash Reduction:** 32%

**Cost Scale:** \$

*Note: The crash reduction figure is based on a study of converging chevron markings.*



Source: Toole Design  
Location: Boston, MA



Source: Iowa State University



## Pavement Markings

# SLOW Pavement Marking

### Description and Key Safety Features:

Pavement markings reading “SLOW” can be used in specific contexts, such as school zones, to encourage drivers to slow down.

### Temporary vs. Permanent Considerations:

Paint may be used for a temporary installation. Thermoplastic can be used for more permanent installations.

**Maintenance Considerations:** Low

**Impact on City Services:** Low

**Speed Reduction:** 0-3 mph

**Crash Reduction:** 38%<sup>5</sup>

**Cost Scale:** \$



Source: *New Jersey School Zone Design Guide*, NJDOT

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<sup>5</sup> Lyon, C., B. Persaud, and K. Eccles. "Safety Evaluation of Two Curve Warning Treatments: In-Lane Curve Warning Pavement Markings and Oversized Chevron Signs". Presented at the 96th Annual Meeting of the Transportation Research Board, Paper No. 17-00432, Washington, D.C., (2017).  
[https://www.cmfclearinghouse.org/study\\_detail.cfm?stid=482](https://www.cmfclearinghouse.org/study_detail.cfm?stid=482).

## Signs

# Speed Feedback Signs

### Description and Key Safety Features:

Speed feedback signs digitally display the speed of a motorist as they drive past the sign. These signs are accompanied by speed limit signs so that drivers can see how their speed compares to the speed limit.

### Temporary vs. Permanent Considerations:

Portable signs or trailers can be used for temporary installations. Signs can also be installed in the ground for more permanent installations.

**Maintenance Considerations:** Medium

**Impact on City Services:** Low

**Speed Reduction:** 0-7 mph

**Crash Reduction:** 0-10%

**Cost Scale:** \$-\$\$



Source: Franklin Neighborhood Traffic Calming Program  
Location: Franklin, TN

**Vertical Deflection**

# Speed Cushions

## Description and Key Safety Features:

A speed cushion is made up of multiple rounded bumps that stretch across a roadway, perpendicular to the direction of travel, with narrow gaps in between the bumps. Passenger cars will travel over the speed cushion, while wider vehicles can pass through the speed cushion without their tires traveling directly over it. Speed cushions do not delay wide vehicles, such as fire trucks, as much as speed humps do.

## Temporary vs. Permanent Considerations:

Rubber speed cushions can be bolted into a roadway, which allows for relatively easy removal. More permanent speed cushions consist of asphalt.

**Maintenance Considerations:** Medium

**Impact on City Services:** Medium

**Speed Reduction:** 5-7 mph

**Crash Reduction:** 30-50%

**Cost Scale:** \$-\$\$

*Note: The crash reduction figure is based on a study of speed humps.*



Source: NACTO Urban Street Design Guide



Source: Toole Design  
Location: Kirkland, WA



**Vertical Deflection**

# Speed Humps

## Description and Key Safety Features:

A speed hump is a long, rounded bump that stretches across a roadway, perpendicular to the direction of travel. It can be uncomfortable to travel over the speed hump too quickly, so drivers will slow down as they approach and pass the speed hump. A series of speed humps maximizes speed reduction benefits. Emergency vehicles experience a few seconds of delay as they travel over speed humps.

## Temporary vs. Permanent Considerations:

Rubber speed humps can be bolted into a roadway, which allows for relatively easy removal. More permanent speed humps consist of asphalt.

**Maintenance Considerations:** High

**Impact on City Services:** High

**Speed Reduction:** 5-8 mph

**Crash Reduction:** 30-50%

**Cost Scale:** \$\$



Source: Toole Design

**Vertical Deflection**

# Speed Tables

## Description and Key Safety Features:

A speed table is a trapezoidal shaped bump (flat on top) that stretches along a roadway, similar to a speed hump. Speed tables are generally less effective at traffic calming than speed humps, but they also result in less delay for emergency vehicles. They can be installed as part of a series to maximize speed reduction benefits.

## Temporary vs. Permanent Considerations:

Rubber speed tables can be bolted into a roadway, which allows for relatively easy removal. More permanent speed tables consist of asphalt.

**Maintenance Considerations:** High

**Impact on City Services:** Medium

**Speed Reduction:** 3-9 mph

**Crash Reduction:** 35-95%

**Cost Scale:** \$\$



Source: City of Akron  
Location: Akron, OH



Source: National Association of City Transportation Officials (NACTO)

## Vertical Deflection

# Raised Crosswalks

### Description and Key Safety Features:

A raised crosswalk is an elevated section of roadway, similar in shape to a speed table, that is marked and signed for people to cross. Raised crosswalks are generally less effective at traffic calming than speed humps but result in less delay for emergency vehicles. They can be installed as part of a series to maximize speed reduction and pedestrian safety benefits.

### Temporary vs. Permanent Considerations:

Crosswalk markings can be applied to rubber speed tables, which are then bolted into a roadway for a temporary installation. More permanent raised crosswalks consist of asphalt. Raised crosswalks may require drainage modifications.

**Maintenance Considerations:** High

**Impact on City Services:** High

**Speed Reduction:** 11 mph

**Crash Reduction:** 30-36%<sup>6</sup>

**Cost Scale:** \$\$



Source: [www.pedbikeimages.org](http://www.pedbikeimages.org/) / Dan Burden

<sup>6</sup> Elvik, R. and Vaa, T., "Handbook of Road Safety Measures." Oxford, United Kingdom, Elsevier, (2004). [https://www.cmfclearinghouse.org/study\\_detail.cfm?stid=14](https://www.cmfclearinghouse.org/study_detail.cfm?stid=14).



*Horizontal Deflection*

# On-Street Parking

## Description and Key Safety Features:

The presence of parked cars narrows the available roadway width and can encourage drivers to slow down and be more cautious. Higher use of on-street parking can be encouraged by eliminating no parking zones.

## Temporary vs. Permanent Considerations:

Paint may be used for a temporary or permanent installation. Additionally, materials such as large planters, barrels, or hay bales can be used to simulate parked cars.

**Maintenance Considerations:** Low

**Impact on City Services:** Low

**Speed Reduction:** 1-4 mph<sup>7</sup>

**Crash Reduction:** 52%<sup>8</sup>

**Cost Scale:** \$



Source: City of Hilliard  
Location: Hilliard, OH



Source: Walkable City Rules by Jeff Speck

## Horizontal Deflection

# Curb Extensions/Bump Outs

### Description and Key Safety Features:

A curb extension (or bump out) is a horizontal extension of the sidewalk into the street, resulting in a narrower roadway section. At an intersection, curb extensions can slow turning vehicles. At a crosswalk, curb extensions shorten the crossing distance for pedestrians and make them more visible to motorists.

### Temporary vs. Permanent Considerations:

Temporary curb extensions can be constructed using materials such as paint, flex posts, planters, or straw wattles. Permanent curb extensions typically require new curbs and landscaping.

**Maintenance Considerations:** High

**Impact on City Services:** Medium

**Speed Reduction:** 1-4 mph

**Crash Reduction:** 15%<sup>9</sup>

**Cost Scale:** \$-\$\$\$



Source: [www.pedbikeimages.org](http://www.pedbikeimages.org) / Seth LaJeunesse



Source: [www.pedbikeimages.org](http://www.pedbikeimages.org) / Michael Austin

<sup>9</sup> Federal Highway Administration, Crash Modification Factor for Corner Radius, Right-Turn Speed, and Prediction of Pedestrian Crashes at Signalized Intersections (Washington, DC: 2021) <https://doi.org/10.21949/1521692>.



## Horizontal Deflection

# Chicanes

### Description and Key Safety Features:

A chicane is a series of alternating curves that require motorists to slow down to navigate the curved travel path. Chicanes are less effective when traffic volumes are significantly higher in one direction than the other or when traffic volumes are extremely low.

### Temporary vs. Permanent Considerations:

Temporary chicanes can be constructed using materials such as paint, flex posts, planters, and plastic barricades. Permanent chicanes require new curbs and typically include landscaping as well. Signage should be installed in both temporary and permanent cases.

**Maintenance Considerations:** High

**Impact on City Services:** High

**Speed Reduction:** 3-9 mph

**Crash Reduction:** Unknown

**Cost Scale:** \$\$-\$\$\$



Source: *Imagine Kalamazoo 2025*

Location: *Kalamazoo, MI*



Source: *Scott Wainwright*



**Horizontal Deflection**

# Chokers

## Description and Key Safety Features:

A choker is a traffic calming device that narrows the roadway by using curb extensions. Chokers can allow two vehicles to pass through the choker side-by-side, or they can narrow the roadway so that opposing vehicles must take turns traveling through the choker.

## Temporary vs. Permanent Considerations:

Temporary chokers can be constructed using materials such as paint, flex posts, and planters. Permanent chokers require new curbs and typically include landscaping as well.

**Maintenance Considerations:** Medium

**Impact on City Services:** Medium

**Speed Reduction:** 0-4 mph

**Crash Reduction:** Unknown

**Cost Scale:** \$\$-\$\$\$



Source: Transportation Alternatives / Michael Lydon



Source: Scott Wainwright

*Horizontal Deflection*

# Traffic Circles

## Description and Key Safety Features:

A traffic circle is a raised island in the middle of an intersection. Vehicles entering the intersection slow down to navigate around the circle. Large vehicles may have to turn left in front of the circle.

## Temporary vs. Permanent Considerations:

Temporary traffic circles can be constructed using materials such as paint, flex posts, planters, plastic barricades, and parking stops. Permanent traffic circles typically include new curbs and landscaping. Signage should be installed in both temporary and permanent cases.

**Maintenance Considerations:** Medium

**Impact on City Services:** Medium

**Speed Reduction:** 4 mph

**Crash Reduction:** 39%<sup>10</sup>

**Cost Scale:** \$\$-\$\$\$



Source: Toole Design  
Location: Denver, CO



Source: Toole Design  
Location: Kirkland, WA



## Horizontal Deflection

# Median Islands

### Description and Key Safety Features:

A median island is a raised island located along the street centerline that visually narrows the adjacent lanes. Median islands near neighborhood entrances provide a visual cue to slow down while entering the neighborhood.

### Temporary vs. Permanent Considerations:

A temporary median island can be constructed using materials such as paint, flex posts and planters. Permanent median islands are typically constructed with concrete, and they require new curb and landscaping. At crosswalks, median islands require detectable warning surfaces. Signage should be installed in both temporary and permanent cases.

**Maintenance Considerations:** Medium

**Impact on City Services:** Medium

**Speed Reduction:** 0-9 mph

**Crash Reduction:** 0-44%

**Cost Scale:** \$\$\$



Source: Toole Design  
Location: Seattle, WA



**Other Vertical Elements**

# Street Trees

**Description and Key Safety Features:**

Street trees help create a “closed in” feeling along a street, causing motorists to slow down. They also provide other benefits, such as beautifying the area, providing shade for sidewalks, and cooling the neighborhood in the summer.

**Temporary vs. Permanent Considerations:**

N/A

**Maintenance Considerations:** Medium

**Impact on City Services:** Low

**Speed Reduction:** 1-6 mph

**Crash Reduction:** No change

**Cost Scale:** \$



Source: Toole Design  
Location: Norfolk, VA

*Note: Speed and crash reduction figures are based on studies for general landscaping.*

**Other Vertical Elements**

# Planter Boxes

## Description and Key Safety Features:

Planter boxes can be used to create temporary installations of many different traffic calming countermeasures, such as chicanes, curb extensions, or traffic circles. They beautify a neighborhood and create an opportunity for community members to take ownership of their neighborhood by caring for the plants.

## Temporary vs. Permanent Considerations:

Planter boxes are often used for temporary installations, but some planters may be appropriate for more permanent use.

**Maintenance Considerations:** High

**Impact on City Services:** Medium

**Speed Reduction:** 1-6 mph

**Crash Reduction:** No change

**Cost Scale:** \$

*Note: Speed and crash reduction figures are based on studies for general landscaping.*



Source: DC Department of Transportation (@DDOTDC on Twitter)



## Other Vertical Elements

# Flex Posts/Bollards

### Description and Key Safety Features:

Flex posts can be used to create temporary installations of many different traffic calming countermeasures, such as chicanes, curb extensions, or traffic circles. Flex posts can help to narrow a roadway and provide visual cues to drivers that the roadway has changed.

### Temporary vs. Permanent Considerations:

Flex posts are usually used in temporary installations because of their low cost and ease of installation. Bollards require less maintenance and may be used for more permanent installations.

**Maintenance Considerations:** High

**Impact on City Services:** Medium

**Speed Reduction:** 0-9 mph

**Crash Reduction:** 0-30%

**Cost Scale:** \$



Source: Toole Design

Location: Columbus, OH



Source: [www.pedbikeimages.org](http://www.pedbikeimages.org) / Dan Burden



**Education and Enforcement**

# High Visibility Enforcement

## Description and Key Safety Features:

High visibility enforcement involves officers stationed in a specific area to educate and train drivers. The public is alerted in advance (through the media) of where and when high visibility enforcement will take place. The officers do not focus on writing tickets, but instead focus on making drivers aware of safety issues.

## Temporary vs. Permanent Considerations:

N/A

**Maintenance Considerations:** Low

**Impact on City Services:** Low

**Speed Reduction:** Unknown

**Crash Reduction:** Unknown

**Cost Scale:** \$\$

*Note: The speed and crash reduction of high visibility enforcement depends on the individual agency's program details.*



Source: Noteworthy Practice Booklet – Speed Management, ITE & FHWA  
Location: Oro Valley, AZ