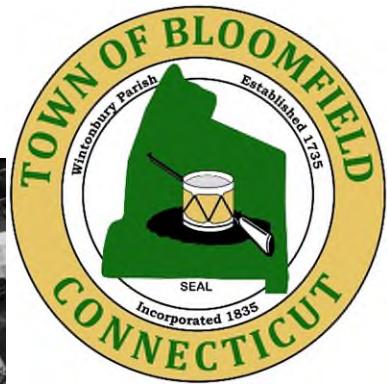


# Town of Bloomfield Traffic Calming Manual

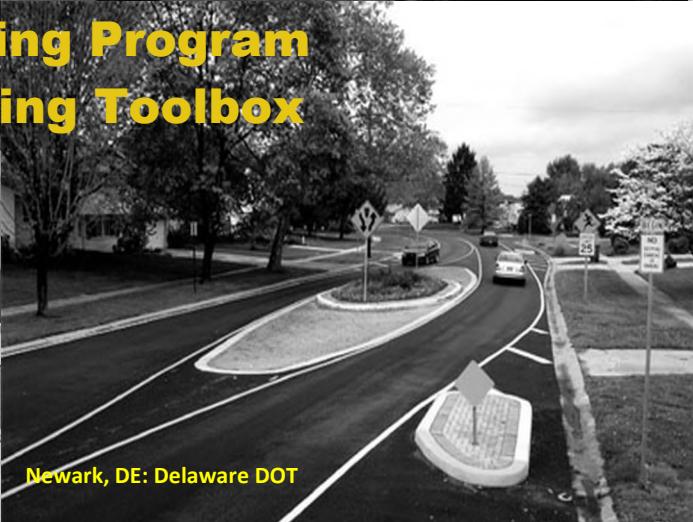


Swarthmore, PA: McMahon Associates

## Traffic Calming Program Traffic Calming Toolbox



Ann Arbor, MI: City of Ann Arbor



Newark, DE: Delaware DOT

Version 2.0 - Adopted: March 2025

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## **Town of Bloomfield Traffic Calming Manual**

### **What Is Traffic Calming?**

Building on the Institute of Transportation Engineers' definition, traffic calming is a methodology that incorporates mainly physical measures to influence motorist behavior to discourage undesirable driving practices thereby reducing the negative effects of motor vehicle use in the street environment and improving conditions for non-motorized street users. The goal of traffic calming is to make streets safer and more comfortable for all users (e.g. pedestrians, bicyclists, transit rides, people with disabilities, motorists, etc.) by implementing measures that encourage drivers to slow down and pay more attention to their surroundings. This helps to minimize conflicts between vehicles and non-vehicular users of the street corridor.

### **What Traffic Calming Is Not:**

#### **Traffic Calming vs Traffic Control:**

Traffic control measures, such as stop signs, traffic signals, do-not-enter signs, etc., are intended to assign motorist right of way priorities or restrictions in otherwise confusing or unsafe situations. Regulatory compliance with most traffic control measures is defined by law and enforced by law officers. Actual compliance generally depends upon the motorist's willingness to comply, concern about their or others' safety, perception of the reasonableness of a particular measure, and concern regarding being enforced upon. Traffic control measures tend to be associated with certain negative travel-related consequences, including increased delay and disruption to continuous traffic flow, increased fuel consumption and vehicle emissions, and increased noise from vehicle deceleration and acceleration. There is a long history of transportation research into traffic control; and traffic control measures should only be implemented where a warrant for a particular measure, based on that research history, exists in a particular circumstance.

Traffic calming is generally self-enforcing. There are relatively few laws relating specifically to traffic calming measures. Rather, traffic calming effectively uses design features and what the driver experiences to encourage the motorist to operate their vehicle in a calm and safe manner. Traffic calming measures are typically designed to keep traffic moving, albeit at a slower speed, which mitigates most of the negatives of traffic control.

**Stop signs**, in particular, are not effective traffic calming measures. Stop signs are a valuable and effective traffic control device when used under the right conditions, as warranted. Stop signs used in a manner that is perceived by drivers as unreasonable, however, can lead to numerous unwanted behaviors and consequences. Research overwhelmingly shows that stop signs are not effective as a speed control device; and, in fact, have been found to aggravate speeding conditions between traffic control locations.

## Traffic Calming vs Complete Streets:

The Capital Region Council of Government Complete Streets Plan states, “ ‘Complete streets’ is a term that refers to streets which accommodate all users regardless of mode, age, or ability.” Complete streets is a framework to guide the planning and design of street corridors and environments to the benefit of all users (e.g. pedestrians, bicyclists, transit rides, people with disabilities, motorists, etc.) in an equitable manner. All of those users typically benefit from traffic calming; and there is a significant overlap between traffic calming and complete streets. Traffic calming measures are often components of complete streets implementations. However, traffic calming measures and traffic calming in general exist and function perfectly fine on their own outside of a complete streets context.

## This Traffic Calming Manual

This Traffic Calming Manual is divided into two parts:

- The **Traffic Calming Program** – which is designed to be a joint effort between the residents and the Town to: identify traffic issues, create and implement strategies to address those issues, and evaluate the effectiveness of the various solutions; and,
- The **Traffic Calming Toolbox** – which provides a toolbox of typical traffic calming measures and their applicability in Bloomfield.

Extensive literature research was conducted by Town staff into the industry standard best practices for traffic calming programs and measures utilized by approximately two dozen municipalities and state agencies in Connecticut and throughout the country. With respect to the programs, the research relied primarily on municipalities of reasonably similar size. The full list of researched municipalities/agencies is in the “References” section at the end of this manual.

## **Town of Bloomfield**

### **Traffic Calming Program - Process Summary**

Below is a brief summary of the steps involved in the Town of Bloomfield Traffic Calming Program Process:

- 1) ***Stakeholder request*** – A request for traffic calming is submitted to the Local Road Safety Committee (LRSC) on the proper form.
- 2) ***Initial assessment / neighborhood information session*** – LRSC performs technical assessment and conducts a neighborhood information session to define the scope and limits of the problem, generally gauge neighborhood interest, and develop priority scoring.
- 3) ***Strategy development*** – LRSC, with appropriate neighborhood involvement, develop a preferred strategy, including cost estimate, for addressing the defined problem.
- 4) ***Neighborhood strategy presentation*** – The strategy development team presents the preferred strategy at a neighborhood open house meeting.
- 5) ***Neighborhood support process*** – Solicitation to determine if the neighborhood adequately supports the proposed traffic calming strategy to move the strategy forward.
- 6) ***Town Council strategy presentation*** – Preferred strategy is presented to the Town Council; Council finalizes priority score and adds project to the Traffic Calming Priority Project List.
- 7) ***Installation of temporary measures (optional)*** – Where appropriate, to evaluate effectiveness/viability before expending funds on a permanent measure.
- 8) ***Funding*** – Identify funding source(s) for measure implementation.
- 9) ***Project implementation*** – Installation of the traffic calming measure.
- 10) ***Evaluation*** – Measure and evaluate the effectiveness of the installed measure.

**Table 1: Effectiveness of Calming Measures at Addressing Identified Issues**

Measure ↓	Identified Issue →	Excess Speed	Cut-Thru Traffic	Vehicle Crashes	Pedestrian Safety	Air/Noise Pollution
<b><i>Lane Deflection / Narrowing</i></b>						
Median Island	◻	◊	◊	■	◊	
Choker (2-way)	◻	◊	◊	■	◊	
Median Island/Choker Combined	◻	◻	◻	■	◊	
Chicane / Lateral Shift	◻	◻	◻	◻	◊	
[Corner] Bump Out	◻	◊	◻	■	◊	
<b><i>Circular Intersections</i></b>						
Traffic Circle	◻	◻	■	◻	◻	
Roundabout / Mini-Roundabout	◻	◊	■	◊	■	
<b><i>Intersection Restrictions</i></b>						
Diagonal Diverter	◻	■	◻	◻	✗	
Median Barrier (target direction)	◻	■	◻	◻	✗	
Forced Turn Island (target dir.)	◻	■	◻	◻	✗	
Half Closure (target direction)	◻	■	◻	◻	✗	
Full Closure (target direction)	◻	■	◻	◻	✗	
<b><i>Vertical Deflection</i></b>						
Speed Hump	■	■	◻	◻	✗	
Speed Table / Raised Crosswalk	◻	◻	◻	■	◊	
Speed Cushion	◻	◻	◻	◻	◊	
Raised Intersection	◻	◻	◻	■	◊	
<b><i>Roadway Narrowing</i></b>						
Road Diet	■	◻	◻	◻	◊	
On-street Parking	■	◻	◊	◊	◊	

Key:    ■ Significant

◊ Indifferent / None

◻ Moderate

✗ Counter productive

◻ Somewhat / Possible

Note: Table 1 assumes proper usage of measures in appropriate circumstances and sequences to address the identified issue(s).

## **Town of Bloomfield Traffic Calming Program**

### **Introduction**

The Town of Bloomfield is committed to the safety and livability of its neighborhoods. This Traffic Calming Program is designed to be a joint effort between the residents and the Town to: identify traffic issues, create and implement strategies to address those issues, and evaluate the effectiveness of the various solutions.

### **Objectives and Guiding Principles**

The intent is to establish a consistent process to address traffic impact concerns within our town. Prudent implementation of traffic calming measures can promote a higher quality of life and active character within the Town's neighborhoods.

#### **Program Objectives:**

- Improve neighborhood livability by mitigating the negative impacts of motor vehicle traffic.
- Making our streets safer and calmer for residents, motorists, bicyclists, pedestrians and transit riders, typically through the inclusion of speed and crash reduction.
- Promote and support pedestrian, bicycle, transit and other transportation alternative uses.
- Enhance the street environment.
- Encourage citizen participation in all phases of traffic calming program activities.
- Make efficient use of Town resources by prioritizing program activities.

#### **Guiding Principles:**

- Traffic calming measures shall be planned and designed in keeping with sound engineering and planning practices.
- Emergency vehicles, bus traffic, and drainage will be accommodated.
- Pedestrian, bicycle and transit access will be encouraged or enhanced where possible.
- Through traffic will be encouraged to use arterial and collector streets rather than local streets.
- Reasonable vehicle access will be maintained; the diversion of traffic to the detriment of traffic conditions on other streets is discouraged.

### **Street Eligibility**

Only Town-maintained streets are eligible for traffic calming strategies under this program. Applicable measures may vary based on the classification and particulars of a street. In addition, to be eligible for the program, a street must have an average daily traffic volume (ADT) of greater than 400 vehicles and the 85% percentile speed (i.e. the speed that 15% of the vehicles are exceeding) on the street in either direction must be at least 10 mph over the posted speed limit. Streets are eligible if they have not been previously assessed for traffic calming or if it has been greater than 5 years since initial assessment or there has been substantial land development in the area or for exceptional circumstances.

## Local Road Safety Committee

A staff committee designated the “Local Road Safety Committee” (LRSC) shall be responsible for overseeing and administering the Program. The LRSC shall consist of representatives of the following departments:

- Police Department in their Legal Traffic Authority (LTA) role;
- Police Department in their Emergency Management role;
- Public Works including Engineering

The department director, with the approval of the Town Manager, shall designate the subject member(s) representing each department. The Chief of each fire district, the Board of Education Facilities Manager, the Town Manager, and up to two members of the Town Council, as designated thereby, shall be notified of and have the opportunity to participate in all proceedings as advisors. The LRSC shall select a chair and a clerk, and shall keep a record of its proceedings which shall be filed with the Town Clerk.

## Traffic Calming Program Process

### Stakeholder Request:

The initial step is for residents or other stakeholders to identify one or more traffic concerns on a particular street, or streets, in their neighborhood; and to inform the Town through a written stakeholder request, using the designated form or by letter addressed to the Town Manager, stating the problems or issues being experienced and requesting traffic calming measures be enacted.

### Initial Assessment and Neighborhood Meeting:

The objective of this step is to define the problem in a manner that properly represents the issues identified by the stakeholders and objectively assess the problem based on the program rating criteria and characteristics of the subject street or streets.

Upon receipt of a stakeholder request, the LRSC will arrange for a general overview assessment of the issues raised (including an eligibility assessment), and the LRSC will also arrange for an open neighborhood meeting to discuss the request. The objectives of the meeting will be to:

- Summarize the traffic calming program and process.
- Inform the attendees of the request and the outcome of the overview assessment.
- Properly define the problem and the strategy area; the strategy area must be large enough to have an appreciable mitigation effect on the street (or reasonable portion thereof) as a whole.
- Identify some typical measures that may be used to address this type of problem.
- Gauge the overall neighborhood interest/support in proceeding with the traffic calming process. (Note: the meeting may be followed up with some sort of process to better gauge support.)
- If desired by the neighborhood, establish a neighborhood stakeholder advisory panel to participate and advise in the process.

If there is not adequate support for continuing, the LRSC may determine to end the process at this point.

Neighborhood residents/stakeholders are important to the process. Whether or not an advisory panel is formed, mechanisms will be put in place to keep the neighborhood informed of proceedings and allow for public comments and questions throughout the process.

Various techniques are available to assist in the defining and assessment of a traffic calming problem, including:

- Stakeholder input, including observations, experiences, needs, values, suggestions, etc.
- Professional observations, and the application of professional standards and methods.
- Environmental concerns, including noise, air pollution, safety, access for all modes of travel, aesthetics, livability, etc.
- Observations of various street-related activities.
- Collection of pertinent data, including crash history, traffic volume, movements, and speed, land use, curb cut location, frequency, and purpose, sight lines, drainage, bus travel, emergency response travel, pedestrian and bicycle accommodations, proximity to typical pedestrian generators, etc.
- Involvement of professional consultants.

The techniques to be used will depend upon the nature, scope, impacts, and other particulars of the identified problem. When the identified problem has been adequately defined and assessed, the LRSC will assign it a preliminary priority score based on the established priority scoring system as set forth on the Traffic Calming Program Priority Scoring Sheet; see Attachment A.

### **Strategy Development:**

(Note: future references to the LRSC will be assumed to include any formed advisory panel as appropriate.) Next, the LRSC will look to the traffic calming “toolbox” of available measures to brainstorm what measures are most appropriate for the mitigation of the defined problem. The group will evaluate the identified measures, individually, in groups, and as alternatives, to develop an appropriate strategy to address and mitigate the problem to the extent possible and practical. Estimated implementation cost will be a factor in strategy development. Once the strategy has been identified, the LRSC will develop a preliminary concept and cost estimate for implementing the strategy and an articulation of how to define success upon implementation.

Also as part of this step, the LRSC will identify what they consider to be the properties that will directly benefit from the strategy in that the negative effects of the identified issue directly affects them, (the “benefitting properties”). In addition, the group will also identify the properties within the area of the neighborhood, including the benefitting properties, determined to have a distinct interest in the strategy implementation, (the “interested properties”).

### **Strategy Presentation Part 1 – Neighborhood:**

Upon completion of the strategy development, the LRSC will arrange for a second open neighborhood meeting to present the developed strategy, the preliminary priority scoring, an overview of the process to develop the strategy, anticipated funding, the possibility of cost sharing, and the anticipated process moving forward. The presentation will highlight the upcoming petition process and the identified benefitting and interested properties. The presenters will entertain questions and feedback from the attendees and via written correspondence. Based on the feedback associated with the meeting, the LRSC may determine to amend the scoring, strategy, or petition areas as appropriate.

## Neighborhood Support

If the final strategy will significantly affect travel, or otherwise involve a significant cost, then the LRSC will conduct a neighborhood support solicitation to gauge appropriate stakeholder support for the strategy. A solicitation requesting a response expressing either support or non-support of the proposed strategy will be sent/made available to the interested properties. The solicitation will identify, or include the means to identify, benefitting parcels and their significance.

Solicitation will occur through direct mailings, Town website announcement, and email blast (if appropriate), or other means as deemed fit by the LRSC. Responses will be to a designated member of the LRSC via letter/card or email. Responses must identify:

- Name of person responding;
- The property address associated with the response;
- The names of all record owners of the property
- That the response represents the position of all record owners of the property; and,
- Whether the subject property owners support or do not support the proposed traffic calming strategy proceeding to implementation.

The LRSC may resend/re-notice the solicitation, or request correction of, or investigate, irregularities in responses, as deemed fit. Responses deemed irregular by the LRSC will be ignored.

In order for the strategy to proceed towards implementation:

- ✓ Greater than 50% of the benefitting properties must respond in support of the measure.
- ✓ Not greater than 50% of the interested properties may respond in non-support of the measure.

In the event that the solicitation results in a strategy passing the first test listed above but not the second test, then the benefitting properties may petition the Town Council to reconsider the matter by submitting such written petition signed by representation of at least 40% of the benefitting properties to the Town Manager in a timely manner; and the Council will consider the matter following a public hearing on the same.

## Strategy Presentation Part 2 – Town Council:

Where the neighborhood solicitation results in affirmative support for the strategy, the next step is presentation of the proposed strategy and related information to the Town Council, with the opportunity for public comment. The Council may request modifications, additional information, or additional steps. The ultimate positive outcome from this Town Council step would be:

1. The Council finalizes the priority scoring for the strategy/project. In the finalization process, the Council may determine to award the project bonus scoring, as provided on the Traffic Calming Program Priority Scoring Sheet, to account for environmental factors, neighborhood factors, timing factors, additional public benefits, etc.; and,
2. The Council approves the project to be added to the Traffic Calming Priority Project List based upon its final priority score. The Traffic Calming Priority Project List is a list of approved projects that is thus populated by the Town Council and is administered by the LRSC.

## **Installation of Temporary Measures (optional):**

The Town may at its discretion install temporary traffic calming measures to evaluate effectiveness and/or viability in selective areas prior to final implementation of permanent traffic calming measures.

## **Funding:**

Project funding is at the discretion of the Town Council. Resources are always limited; it is likely that the total cost of projects on the Traffic Calming Priority Project List will exceed the available funding at any given time. Selecting lower cost alternatives for strategy solutions can only increase the likelihood of a project receiving funding sooner.

Funding could come from various sources, including grants, the Town capital improvement budget, a Town enterprise fund for traffic calming, etc. Regardless of the source(s), the vast majority of funding for a project will originate from public tax revenues. It is incumbent upon the Town to spend these funds wisely and efficiently, and to maximize the public benefit. The project priority ranking will be an important factor in determining the timing and selection of project funding. The Council may also take into account additional considerations such as the costs of various projects in relation to available funding and other relevant matters in determining what projects to move forward at any given time; or they may delegate such decisions to the Town Manager or the LRSC.

## **Project Implementation:**

Once funding has been appropriated for a project, staff will proceed with design and construction of the included traffic calming measures. Procurements associated with project implementation will follow the normal Town procedures.

## **Evaluation:**

Each implemented project will be evaluated by the LRSC for effectiveness, based on the same factors utilized to assess the problem and prioritize the project and realistic expectations for success, using industry standard methods and timing. If the project fails to meet the minimum expectations for success, or if the experienced negatives outweigh the positives, removal may be considered.

# Town of Bloomfield

## Traffic Calming Program

### Priority Scoring Assignment

Criteria	Points	Basis for point assignment
Speed	0 - 40	3 points assigned for every mph greater than 10 mph above the posted speed limit for the 85th percentile speed.
Volume	0 - 30	Local road: 3 points assigned for every 400 ADT above 500. Collector: 3 points assigned for every 600 ADT above 2000.
Crash History	no limit	1 point for local street and .75 point for collector street assigned for each recorded vehicle crash per mile of street length in study area over the past 3 calendar years.
Pedestrian Generators	0 - 16	2/1 points assigned for occurrence of the following within 500/1000 feet of study area: bus route, public recreational facility, library, community center, religious assembly, commercial area. 4/2 points are assigned for each school.
Sidewalk	0 - 14	1 point assigned for each 20% of length of street in the study area that does not have a sidewalk on a particular side of the street. 2 bonus point for each side of the street(s) on which all sidewalk gaps are being closed as part of the project.

#### **Town Council Bonus Points:**

The Town Council may award the project up to **5 bonus points** to account for environmental factors, neighborhood factors, timing factors, additional public benefits, etc. as they see fit.

#### **Scoring Example:**

Scoring a collector street with a study area length of 5000 feet, an 85<sup>th</sup> percentile speed of 11 mph above the speed limit, an ADT of 5400 vehicles per day, 10 vehicle crashes over the past 3 years, a bus route and a park within 500 feet, a school and a church within 1000 feet, sidewalk for 4000 feet on the left side of the street and no sidewalk on the right side; the sidewalk gap on the one side of the street will be closed.

#### Calculations:

Speed:  $3 \times (11 - 5) = 18$  points

Volume:  $3 \times ((5400 - 2000) / 600) = 17$  points

Crash:  $.75 \times (10 / (5000 / 5280)) = 7.9$  points

Ped Gen:  $2 \times (\text{bus route}) + 2 \times (\text{park}) + 2 \times (\text{school}) + 1 \times (\text{church}) = 7$  points

Sidewalk:  $1 \times (((5000 / (5000 \times .2)) \times \text{right side}) + ((1000 / (5000 \times .2)) \times \text{left side})) + 2 \times [\text{bonus}] = 8$  points

**Total Score = 57.9 – round to 58 points**



# Traffic Calming Toolbox

September 2020

## Introduction

Traffic calming is realized through the implementation, individually, in series, or in combinations, of various measures intended to contribute to the achievement of various objectives. This Traffic Calming Toolbox presents 18 of these measures determined to be most applicable to the Bloomfield Traffic Calming Program. The measures are organized into five general groups based on similar mechanisms of achieving traffic calming, resulting in similar characteristics. Descriptions, general cost range, effectiveness, and selection and design considerations are provided for each group/measure.

There is a wealth of research information available on the internet regarding these measures. The 'Reference' section at the end of this manual provides a list of researched municipalities/agencies used for developing this toolbox. Hence, the information provided on each measure in this toolbox is a brief summary to provide a general understanding of the measures and their primary characteristics.

The groups and measures are as follows:

### **Travel Lane Deflection / Narrowing Measures:**

- Median Island
- Choker
- Bump Out
- Chicane
- Lateral Shift

### **Circular Intersection Measures:**

- Roundabout
- Mini-Roundabout
- Neighborhood Traffic Circle

### **Restrictive Intersection Measures:**

- Diagonal Diverter
- Median Barrier
- Forced Turn Island
- Half Closure
- Full Closure

### **Vertical Deflection Measures:**

- Speed Hump
- Speed Table / Raised Crosswalk
- Speed Cushion
- Raised Intersection

### **Roadway Narrowing Measures:**

- Road Diet
- On-street Parking

**Non-Physical Measures:** It is noted that there are a number of non- or minimally- physical measures that can enhance traffic calming efforts. These measures are not specifically covered in this manual; however some more common measures are listed below:

- Neighborhood education sessions
- Targeted speed enforcement
- Radar speed trailer
- Selective signage
- Rumble strips
- High visibility crosswalks and other markings

**Note on speed reduction measures:** It is self-evident that localized measures with a primary purpose of speed reduction (speed humps, for example) are most effective in the immediate vicinity of the measure. The farther away from the measure one gets, the more likely that travel speeds will return closer to pre-installation speeds (all other conditions being similar.) For this reason, such measures typically have to be implemented in a series of measures (could be the same measure, or a combination of measures) to be effective on relatively long straight stretches of roadway. The recommended spacing for speed humps is generally 300 – 500 feet apart. There is much less information on recommended spacing for other measures. The most common recommendation encountered is “not closer than 500 feet,” which provides minimal help. However, it would seem that it can be inferred that as the separation distance increases above 500 feet, the speed reduction effect is going to decrease.

**Cost range groupings:** The cost of roadway infrastructure installations will vary based on numerous factors. For traffic calming measures, these factors can include roadway and right of way widths, vehicle types, drainage, utilities, materials and enhancements used, etc. Costs also change over time due to inflation and fluctuations in economic factors. For these reasons costs are typically given in ranges. For this toolbox, the costs ranges have been assembled into groupings per the Cost Group Key below:

#### **Cost Group Key**

Cost range per single installation is expected to be:

**Very low:** less than \$5,000

**Low:** between \$5,000 and \$10,000

**Moderate:** between \$10,000 and \$50,000

**High:** between \$50,000 and \$100,000

**Very high:** greater than \$100,000



# Traffic Calming Toolbox

September 2020

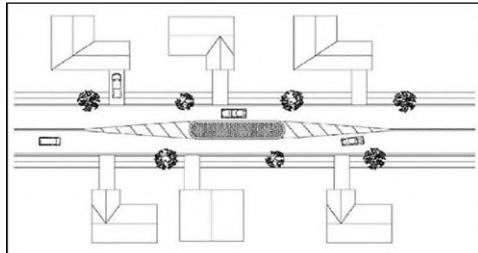
## Travel Lane Deflection / Narrowing Measures

Median Island · Choker · Bump-Out · Chicane · Lateral Shift

### Descriptions:

- **All** – measures that calm traffic through local physical deflection of the course of a travel lane or the perceived or actual narrowing of the effective travel lane.
- **Median Island** – raised island along the street centerline that narrows the travel lanes.
- **Choker** – mid-block narrowing of the roadway through the use of curb extensions or roadside islands.
- **Bump-Out** – (also called curb extension) narrowing of the roadway through curb extensions immediately preceding an intersection.
- **Chicane** – consecutive alternating curves or lane shifts that force a motorist to horizontally shift the travel path. Opposing travel lanes shift together.
- **Lateral Shift** – Using staggered curb extensions and median islands to force a motorist to horizontally shift the travel path. Opposing travel lanes do not shift together.

**Cost Range:** Moderate for all except bump-out, which is moderate to high.



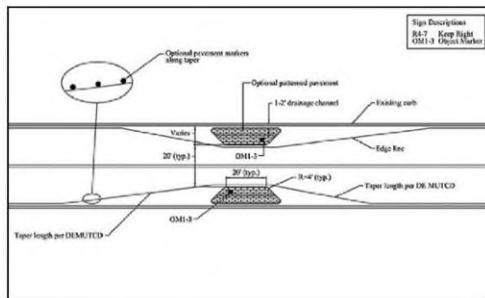
Median Island



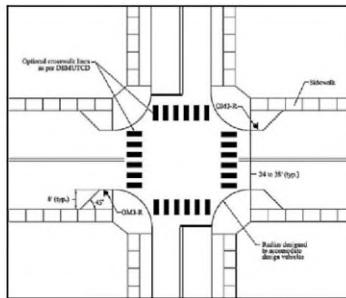
Source: Delaware DOT / James Barrera



Choker

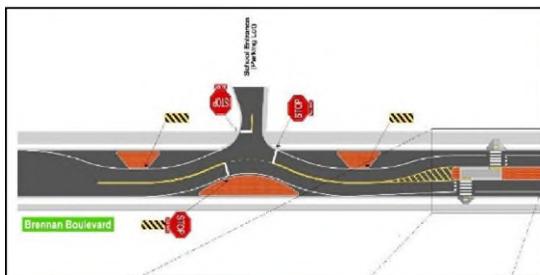


Source: City of Ann Arbor, MI / Delaware Department of Transportation



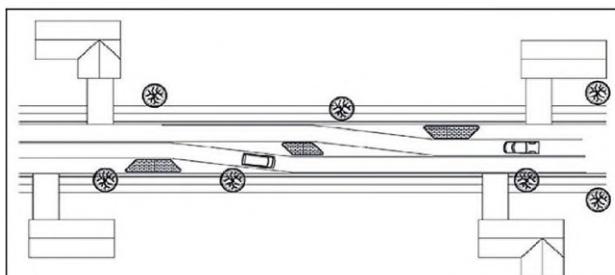
**Bump-Out**

Source: James Barrera / Delaware DOT



**Chicane**

Source: Delaware Department of Transportation)



**Lateral Shift**

Source: Delaware Department of Transportation / Google StreetView

## Applications:

- Measures are generally used to address excess speed issues or for pedestrian crossing locations.
- Measures are applicable for both collector and local streets with a maximum speed limit of 35 mph. Chicanes should be limited to streets with ADT less than 5000.
- Bump-out is applicable for use at intersections; others are appropriate for mid-block locations on straight runs.
- Bump-outs are generally used where there is adjacent on-street parking or wide shoulders.

**Effectiveness:** (See Table 1 at the beginning of the manual)

- **Speed** – Moderate speed reduction for deflection measures; low speed reduction for individual narrowing measures. Two-way chokers require consistent traffic in both directions to be effective. Combining a choker with a median island will greatly enhance speed reduction by choking individual lanes.
- **Volume** – Marginal volume reduction is possible, depending upon speed reduction achieved.
- **Safety** – Bump-outs, chokers, and median islands can provide significant safety enhancement for pedestrians by reducing travel distances across roadways and increasing visibility between pedestrians and vehicles; other safety enhancement potential is low to moderate, and will depend upon location and safety issue being addressed.
- **Pollution** – Little effect on air or noise pollution.
- **Negatives** – Some maintenance concerns; measures that affect the gutter line can create drainage issues.

**Considerations:**

- **Design** – Drainage, driveways, lighting, signage, landscaping, proper configuration (including to deter potential motorist short-circuiting of deflection measures). Bus, fire truck, and other large vehicle turning must be a consideration for bump-outs.
- **Right of way** – Minimal or no additional right of way typically required. On occasion a chicane may require more extensive right of way acquisition.
- **Emergency vehicles** – Will cause some slowing; but easily negotiable. The length of median islands should be set to minimize interference with emergency vehicle travel, unless the overall width between the curb and the median is wide enough to permit an emergency vehicle to safely pass a pulled-over vehicle.
- **Snow plowing/maintenance** – must be properly designed to accommodate snow plowing and other maintenance; generally minimal impact on plowing other than slowing down plows and potential for increased plow and curb damage. Increased maintenance burden is likely, and will depend on design. Landscaping in median islands can be difficult to maintain.
- **Bicycles/pedestrians** – if the volume of traffic warrants, or if no sidewalks exist, bypass measures for bicycles and pedestrians should be considered.
- **Other** – landscaping can help visually break up a long straight section of street and can discourage short-circuiting; landscaping will increase maintenance burden.



# Traffic Calming Toolbox

September 2020

## Circular Intersection Measures

## Traffic Circle · Mini-Roundabout · Roundabout

### **Descriptions:**

- **All** – measures that calm traffic by placing a raised circular island at the center of an unsignalized intersection to create a one-way circular travel path through the intersection; the objective is to not allow motorists to take a straight-line path through the intersection; these measures both reduce speeds and driver frustration by generally keeping all traffic moving at most times.
- **Roundabout** – uses a relatively large center island, and uses splitter islands for approaching and exiting traffic; typical outside travel lane diameters are 80 – 130 feet.
- **Mini-Roundabout** – uses a smaller center island than a roundabout, and uses splitter islands; typical outside travel lane diameters are 45 – 80 feet.
- **[Neighborhood] Traffic Circle** – uses a relatively small center island; typical outside travel lane diameters are 35 – 50 feet.

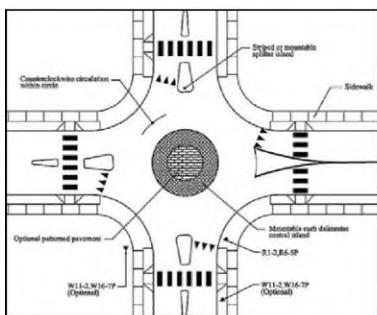
**Cost Range:** Roundabout is very high; mini-roundabout is high to very high; traffic circle is moderate.



### ***Neighborhood Traffic Circle***



Source: Scott Batson



### ***Mini-Roundabout***



Source: Delaware Department of Transportation; Gary Schatz



**Roundabout**

Source: Grant Kaye / Pennsylvania DOT

### **Applications:**

- Crash reduction and/or improving intersection function are often the focus for roundabouts. Traffic circles are often used for excess speed reduction and, to a lesser extent, crash reduction. Mini-roundabouts can be effectively used for all of the above.
- Traffic circles are applicable for use on local residential street intersections only.
- Mini-roundabouts are applicable for higher volume local street and lower volume collector street intersections.
- Roundabouts are applicable for intersections involving higher volume collector streets.
- Traffic circles may not be appropriate for locations with high large vehicle volumes.
- The various volumes of traffic entering the intersection on each leg, and the prevalence of various turning movements can affect the appropriateness of these measures at intersections.

### **Effectiveness:** (See Table 1 at the beginning of the manual)

- **Speed** – Circular intersection measures are effective at significantly moderating speeds in the vicinity of the intersection.
- **Volume** – Circular intersection measures are not intended to reduce traffic volumes; however, they can have some effect to deter large truck and cut-through traffic.
- **Safety** – Circular intersection measures significantly reduce crashes at the intersection, especially injury and fatal crashes.
- **Pollution** – Circular intersection measures reduce both air and noise pollution by keeping traffic moving under most circumstances, thereby reducing idling time and issues associated with stopping and starting.
- **Negatives** – May require an adjustment time for motorists, bicyclists, and pedestrians; cost can be high to very high; impacts of right of way acquisition need to be considered.

## **Considerations:**

- ***Design*** – Evaluation and design can be involved and complex; many factors must be taken into account. Intersection lighting and vertical elements in the center island of roundabouts and traffic circles can be important to alert drivers to the existence of the center island. (The center islands of mini-roundabouts are often designed to be traversable by large vehicles to accommodate left turns.)
- ***Right of way*** – As the size of the traffic circle increases, the likelihood that additional right of way will be required also increases.
- ***Emergency vehicles*** – Roundabouts and mini-roundabouts can effectively handle emergency vehicles of all sizes; neighborhood traffic circles can be problematic for larger vehicles making left turns.
- ***Snow plowing/maintenance*** – Plowing a circle requires some adjustments and extra steps, but is generally easily navigated, though slower speeds are typical and increased plow and curb damage is possible; landscaping increases maintenance burden, and maintaining landscaping in islands can pose additional issues (such as access).
- ***Bicycles/pedestrians*** – Appropriate accommodations are necessary; with respect to bicycles, appropriate accommodations will depend on anticipated volume and experience of riders.
- ***Other*** – Typically offer the opportunity for numerous varied aesthetic enhancements, which also typically increase installation and maintenance costs.



# Traffic Calming Toolbox

September 2020

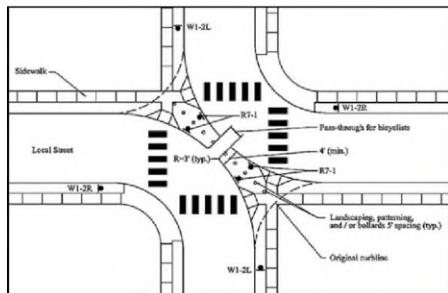
## Restrictive Intersection Measures

### Diversion Barriers · Forced Turns · Half / Full Closures

#### Descriptions:

- **All** – measures that use physical means to restrict two or more traffic movements entering and/or exiting an intersection.
- **Diagonal Diverter** – a raised island or other barrier situated diagonally across the center of an intersection that prohibits any straight-through traffic in either direction.
- **Median Barrier** – a raised island or other barrier along the centerline in one direction through the intersection that prohibits all left turns and straight through traffic in one direction.
- **Forced Turn Island** – a raised triangular shaped island at one side street of the intersection that only allows right turns off-of or onto that street.
- **Half / Full Closure** – a raised island or other barrier that partially or fully blocks off access to or from a side street.

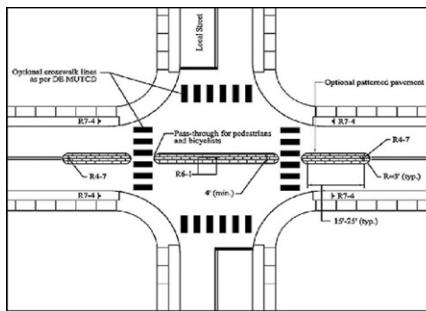
**Cost Range:** Low to moderate for median barrier, forced turn island, and half closure; moderate for diagonal diverter; moderate to high for full closure.



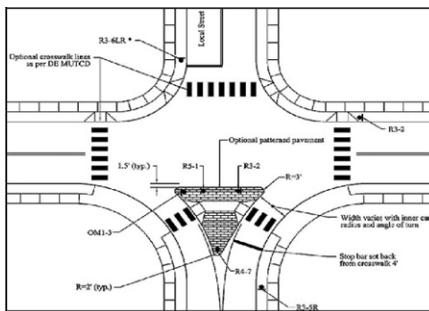
**Diagonal Diverter**



Source: Delaware DOT / Pennsylvania DOT



**Median Barrier**



**Forced Turn Island**

Source: Delaware DOT



*Full Closure*



*Half Closure*

Source: James Barrera

### **Applications:**

- Restrictive intersection measures are only applicable to restrict access to/from local streets with maximum speed limit of 25 mph.
- Restrictive intersection measures are primarily used to deter cut-through traffic.
- Restrictive intersection measures are, by their nature, intended to redirect traffic onto other streets and intersections. Needless to say, this can lead to unintended consequences. Therefore, before any of these measures is proposed as a strategy, a detailed traffic study shall be performed to determine:
  - If the hypothesis for the measure is justified;
  - Where and in what volumes the redirected traffic is likely to go;
  - The effect of the redirected traffic on service levels of affected facilities; and,
  - If the expected benefits outweigh the anticipated negatives.

### **Effectiveness:** (See Table 1 at the beginning of the manual)

- **Speed** – Speed reduction in the restricted travel directions is significant; little to no speed reduction in other directions is achieved.
- **Volume** – Can significantly deter cut-through traffic.
- **Safety** – Unless implemented to address a particular localized safety problem, minimal effect on safety is anticipated.
- **Pollution** – Little effect on air or noise pollution.
- **Negatives** – Reduced traffic volume is redirected to other nearby streets and may create or exacerbate problems on other streets and intersections, and also may increase travel distances; restricts access and/or increases travel time for emergency response vehicles and buses; can create an inconvenience for nearby properties; some evidence that mid-block speeds nearby can increase as a result of these measures.

## **Considerations:**

- ***Design*** – Drainage, driveways, lighting, signage, striping, landscaping, aesthetics, proper configuration (including to deter potential short-circuiting of measures), effects on nearby traffic circulation and intersection performance, buses and emergency vehicles.
- ***Right of way*** – Minimal or no additional right of way typically required.
- ***Emergency vehicles*** – Can cause delays in reaching some properties.
- ***Snow plowing/maintenance*** – Must be properly designed to accommodate snow plowing and other maintenance; will likely alter plow routes; adjustment period for drivers, increased plow and curb damage possible.
- ***Bicycles/pedestrians*** – Bicycle and pedestrian traffic should be safely accommodated past the barrier.
- ***Other*** – Landscaping can improve aesthetics, but will increase maintenance burden. Temporary installations are recommended to evaluate effectiveness and unintended consequences. Increased traffic enforcement may be necessary during temporary installations, as their nature generally allows a motorist to move or drive through them if they choose.



# Traffic Calming Toolbox

September 2020

## Vertical Deflection Measures

Speed Hump · Speed Table · Speed Cushion · Raised Intersection

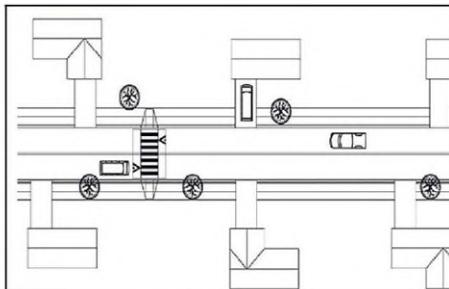
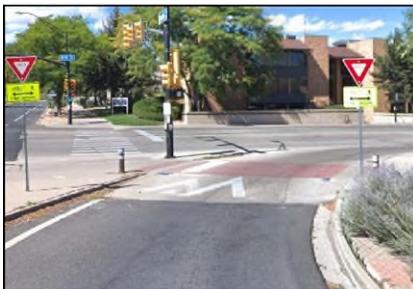
### Descriptions:

- **All** – measures that calm traffic through local physical vertical deflection of the travel lane; typical vertical deflection is 3 – 4 inches high; motorists must slow down to avoid an uncomfortable bump.
- **Speed Hump** – a rounded raised area in the travel lane; typically with a total length in the direction of travel of 12 – 14 feet and constructed of hard rubber; removable for winter.
- **Speed Table / Raised Crosswalk** – a flat raised area with ramps up on either approach; flat top typically 10 – 12 feet long (in the direction of travel) with 6-foot ramps; may be constructed of asphalt if permanent or hard rubber if removable for winter.
- **Speed Cushion** – similar to a speed hump except that gaps are provided for the tire paths of large vehicles, such as fire trucks; removable for winter.
- **Raised Intersection** – flat raised asphalt area encompassing an entire intersection, with ramps on approaching legs similar to a speed table, except longer ramps may be used.

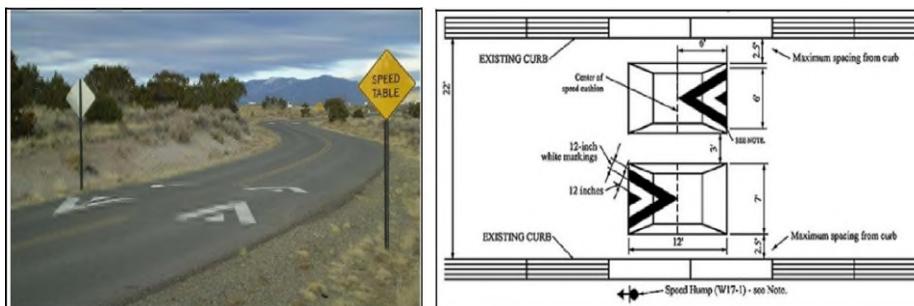
**Cost Range:** speed hump is very low; speed table and speed cushion are low; raised intersections are moderate to high.



**Speed Hump**      Source: Google StreetView / Pennsylvania Department of Transportation

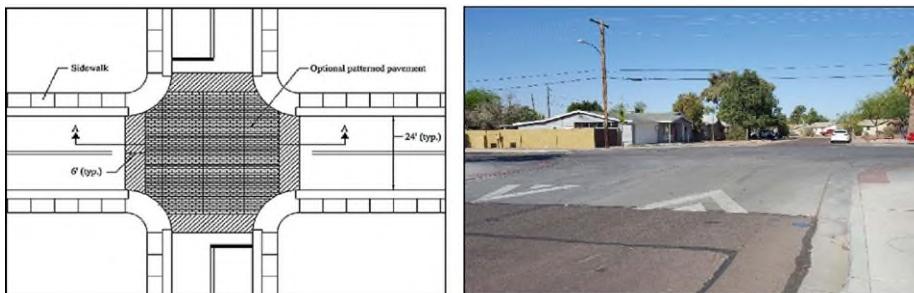


**Speed Table**      Source: Google StreetView / Delaware Department of Transportation



**Speed Cushion**

Source: James Barrera / Delaware DOT



**Raised Intersection**

Source: Delaware Department of Transportation / Chuck Hufine

## Applications:

- Vertical deflection measures are primarily used to reduce excess speeds; and, as a result, can also be effective at reducing cut-through traffic. Raised crosswalks and intersections are also used for pedestrian crossing locations.
- Speed humps are applicable for use on streets with speed limits  $\leq$  30 mph and ADT  $<$  3500 only. Other measures are applicable for all program streets with speed limits  $\leq$  35 mph and under other appropriate circumstances.
- Vertical deflection measures should not be used along roadway curves with a radius of less than 500 feet.
- Speed humps are one of the most effective traffic calming measures at reducing excess speeds and cut-through traffic; however, they are also the measure that typically has the most problematic drawbacks.
- Configuration variations have been used to better accommodate emergency vehicles; but such variations, by nature, will allow aggressive drivers to use the emergency vehicle path when there is insufficient on-coming traffic.

## Effectiveness: (See Table 1 at the beginning of the manual)

- **Speed** – Vertical deflection measures are effective at reducing excess speeds, with speed humps being the most effective, and raised intersections being the least effective. However, the primary data on raised intersections is from 1999 and only involved 3 intersections. It is possible that design adjustments could significantly improve the effectiveness of raised intersections at reducing excess speeds.

- **Volume** – Vertical measures can be effective at reducing cut-through traffic, concurrent with speed reductions.
- **Safety** – Safety enhancement is low to moderate, and will depend upon location. Raised crosswalks and raised intersections can be effective in improving crosswalk safety.
- **Pollution** – Speed humps and, to a lesser degree, other vertical measures can increase air and noise pollution in the immediate vicinity due to vehicle acceleration away from the measure, breaking of large vehicles on approach, and large vehicles going over the measure.
- **Negatives** – all vertical measures have similar negative effects that are typically markedly more pronounced for speed humps and least pronounced for raised intersections (except cost, which is reversed); negatives include increase exhaust and noise, slowing and jostling of emergency vehicles and buses, jostling of other vehicles (which can exacerbate discomfort for some medical conditions), potential drainage issues, winter time issues; benefits are not available during winter time if measures are removed.

### **Considerations:**

- **Design** – drainage, driveways, distance from intersections, road curves, bus and emergency vehicle routes, travel speeds, winter and maintenance operations.
- **Right of way** – typically do not require additional right of way.
- **Emergency vehicles** – Can be a significant concern for emergency vehicle traffic. Emergency response stakeholders must be on-board with any proposed installation.
- **Snow plowing/maintenance** – Speed humps, speed cushions, and, speed tables can interfere with snow plowing and spring sweeping operations. Involvement of Public Works in planning is critical, with the possibility of winter removal considered. Speed cushions, in particular, are problematic for snow plowing and should be removed for the winter.
- **Bicycles/pedestrians** – no issues for pedestrians; where crosswalks are incorporated, speed tables and raised intersections can be beneficial for pedestrians; speed humps decrease the ride comfort for bicyclists, and can be difficult for young riders to navigate; raised intersections should be sized to incorporate crosswalks.



# Traffic Calming Toolbox

September 2020

## Roadway Narrowing Measures

### Road Diet · On-Street Parking

#### Descriptions:

- **Road Diet** – measures that narrow the traveled roadway footprint, including lane width reduction and travel lane removal. Where a travel lane is removed in each direction, it may be necessary to add a continuous left turn lane. Reducing the traveled roadway width typically creates opportunity for enhancement to bicycle and pedestrian facilities (including increase separation between the travel lane and bike/ped facilities), transit facilities, streetscape features, and on-street parking (where desired).
- **On-Street Parking** – allocation of space within the right of way for parking that may be directly accessed from the travel way or may be indirectly accessed via a frontage lane.

**Cost Range:** varies depending upon existing conditions and proposed improvements.



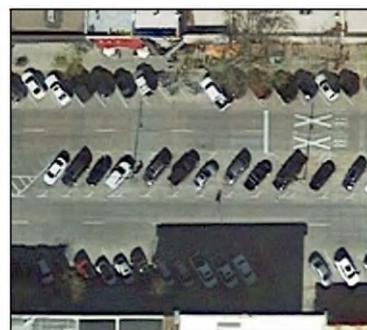
*Road Diet*



Source: Chuck Huffine



*On-Street Parking*



Source: Pennsylvania DOT / Google Earth

### **Applications:**

- Road diets are applicable to any street where the number or width of travel lanes exceed what is necessary or appropriate for the traffic volume and/or contribute to excessive travel speeds for the circumstances.
- [Dedicated] On-street parking can be applicable in areas directly serving commercial, institutional, or some high-density residential uses where sufficient right of way exists or is available.

### **Effectiveness:** (See Table 1 at the beginning of the manual)

- **Speed** – Measures can be effective at reducing speeds under many circumstances; however, speed reduction is only achieved for on-street parking if the parking spaces are being used.
- **Volume** – Marginal volume reduction is possible.
- **Safety** – Road diets generally increase safety, but all modes and aspects of travel must be considered. For on-street parking: proper consideration must be given to bicycle traffic to not decrease safety for cyclists, vehicle speeds in adjacent travel lanes should be appropriate for the parking related activities, and there may be an increase in “fender benders” due to parking activities.
- **Pollution** – Little effect on air or noise pollution.
- **Negatives** – A decrease in manageable traffic volumes may occur for future use. An adjustment period may be needed for new continuous left turn lanes. Increasing the overall road corridor to allow for parking may have a negative effect on aesthetics.

### **Considerations:**

- **Design** – Design considerations will depend on the existing conditions and proposed improvements.
- **Right of way** – Road diets rarely require additional right of way (though, the addition of significant streetscape improvements may create such a requirement); the need for additional right of way for on-street parking will depend on the existing conditions and proposed improvements.
- **Emergency vehicles** – If properly designed, these measures have little effect on emergency vehicle travel.
- **Snow plowing/maintenance** – Road diets have minimal effect on snow plowing or maintenance. On-street parking design needs to properly account for plowing and maintenance; and snow event parking bans need to be heeded and enforced.
- **Bicycles/pedestrians** – Road diets can offer significant opportunity for bicycle and pedestrian enhancements. On-street parking can be a significant problem for cyclists unless proper consideration is given in the design. The design of on-street parking also has to provide sufficient designated opportunities for pedestrians to safely cross the street to limit the incentive for crossing between parked vehicles.

## **Town of Bloomfield - Traffic Calming Manual**

### **References and Resources**

Extensive literature research was conducted by Town staff into the industry standard best practices for traffic calming programs and measures utilized by approximately two dozen municipalities and state agencies in Connecticut and throughout the country. Below is a list of the agencies' whose programs, toolboxes, and other resources were referenced and used for development of this manual:

#### **National and Regional Resources:**

- Federal Highway Administration (FHWA).
- Institute of Transportation Engineers (ITE).
- Institute of Transportation Engineers – New England Section (NEITE)

#### **State DOT Resources:**

- Connecticut Department of Transportation.
- Massachusetts Department of Transportation.
- Pennsylvania Department of Transportation.
- Delaware Department of Transportation.
- Virginia Department of Transportation.

#### **Municipal Resources:**

- South Windsor, CT.
- Madison, CT.
- Newtown, CT.
- Concord, MA.
- Dedham, MA.
- Northampton, MA.
- Orangetown, NY
- Dormont, PA.
- Harrisonburg, VA.
- Alexandria, KY.
- Traverse City, MI.
- Middleton, WI.
- La Crosse, WI.
- Moorhead, MN.
- Glenwood Springs, CO.
- McMinnville, OR.
- Seaside, CA.
- Rochester, NY.
- Mankato, MN.
- Blaine, MN.
- Sparks, NV.
- Alameda, CA.