GASTONIA NC

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City of Gastonia Traffic Calming Policy

November 2025

Originally prepared by HDR, Inc.

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1.0 Introduction

1.1 Purpose and Objectives

Managing traffic speed is essential to creating safer streets for all users, including pedestrians, cyclists, transit riders, and drivers. Vehicle speeds of 30 or more miles per hour increase the likelihood and severity of crashes, and vulnerable road users like pedestrians and cyclists are disproportionately impacted. Traffic calming refers to a set of strategies and physical design interventions aimed at limiting vehicle speeds and improving safety for all road users. Through the implementation of targeted traffic calming measures on city-maintained streets, the City of Gastonia aims to promote a high quality of life by providing a safe and efficient local transportation network.

The purpose of this policy is to provide guidance for implementation of traffic calming measures on city-maintained streets in new developments as well as options for retrofitting existing developments that have safety concerns. The objective of this policy is not intended to be rigid or limiting, but rather to serve as a guide to consistently select, design, and apply effective traffic calming tools in Gastonia. City of Gastonia staff reserve the right to apply professional engineering judgment on a case-by-case basis, which may include deviating from the specific measures outlined in this policy when necessary to address unique site conditions or safety concerns.

It is also noted that this policy is separate and distinct from the City's existing Speed Hump Policy[1].

1.2 Policy User Guide

If you are a **City staff member or Gastonia resident addressing issues in an existing neighborhood**, you should utilize:

- Section 1.0 for policy background and introduction
- Section 2.0 for existing neighborhood traffic calming application process and timeline

If you are a **City staff member or developer planning for a new residential development**, you should utilize:

- Section 1.0 for policy background and introduction
- Section 3.0 for new development traffic calming process and requirements

The City of Gastonia's Traffic Calming Elements toolkit is provided in **Appendix D** which provides more information on the types of traffic calming features that Gastonia may select for implementation.

[1] Gastonia Speed Hump Policy: https://www.gastonianc.gov/images/Speed_Hump_Policy_COUNCIL_APPROVED_5-2025.pdf

2.0 Existing Neighborhoods

The following section outlines the application process and annual schedule for the existing neighborhood applications for traffic calming elements.

2.1 Application Process Overview

The City of Gastonia will follow a six (6) step process for the existing neighborhood applications for traffic calming elements.

Step 1: Resident requests a meeting with the City of Gastonia Traffic Calming Liaison via email to **engineering@gastonianc.gov**.

- Resident and Traffic Calming Liaison discuss the overall application process and annual schedule.
- Resident and Traffic Calming Liaison identify the study area, which will include all properties impacted by the requested traffic calming.
- City of Gastonia provides resident with a list of property addresses within the identified study area.

Step 2: Resident submits a traffic calming application to the City of Gastonia.

- Existing neighborhood traffic calming application is provided in **Appendix A**.
- Applications must be submitted by email to **engineering@gastonianc.gov** or mailed to the City of Gastonia Engineering Department (**P.O. Box 1748, Gastonia, NC 28053-1748**).
- Any questions on the application should be directed to the Gastonia Traffic Calming Liaison.
- Applications must be submitted by the application deadline of July 1st, as outlined in Section 2.2.

Step 3: City of Gastonia reviews all submitted applications utilizing the scoring criteria provided in **Appendix B**. For higher scoring applications, Gastonia staff will identify recommended traffic calming elements to address concerns.

Step 4: City of Gastonia notifies applicants of the status of their application.

- For conditionally-approved applications (a number that will vary each year depending on Gastonia staff time availability and budget), the applicant will be notified and provided a 30-day window to compile and submit a petition of support signed by at least 75% of property owners and/or current residents within study area [petition of support provided in **Appendix A**].
- Residents who submit an application which is not approved are encouraged to evaluate if they meet the requirements of the Gastonia Speed Hump Policy. Unless the resident requests a withdrawal or update to their application, non-approved applications will be

reconsidered in the following calendar year (for up to four years after the original submission). The years since original submission will not be factored into future approvals, and rank of future applications will remain merit-based.

Step 5: Gastonia staff identifies recommended traffic calming deployments.

- Conditionally-approved applications that have submitted the petition of support signed by at least 75% of property owners and/or current residents within the study area are included in this step.
- For the selected locations, traffic calming elements will be recommended for more merited improvements using a combination of the score determined in Step 3 and effective use of available funds. This allows for a process guided by objective scoring, while still allowing Gastonia flexibility to apply professional engineering judgement to proceed with the most impactful projects.

Step 6: Gastonia staff installs traffic calming device(s) identified in recommendations.

2.2 Annual Schedule

The City of Gastonia will follow an annual schedule for the existing neighborhood application process for traffic calming measures.

July 1: Application submittal deadline.

July: Gastonia staff review for score and recommend traffic calming elements.

August: Applicants notified of application status.

30 calendar days after application conditional-approval: Signed petition from 75% of property owners and/or current residents in study area due from conditionally-approved applicants.

September/October: Gastonia staff selects which applications to fund based on the scoring evaluation and funding availability.

2.3 Funding

As of the original drafting date of this policy, Gastonia does not have any funding dedicated to the existing neighborhood traffic calming application process. In establishing this policy, the Gastonia City Council will convene to discuss an annual funding level for this program. This section will be updated accordingly to reflect the allocated funding.

Three (3) categories of funding options are available to property owners requesting traffic calming:

Category I: 100% City funded (based upon availability of City funds each fiscal year)

Category II: 50% City funded, 50% Petitioner funded (receives priority over Category I)

Category III: 100% Petitioner funded (receives overall priority for construction)

3.0 New Developments

3.1 New Development Subdivision Layouts

The City of Gastonia will follow a four (4) step process to determine the required number of traffic calming elements to be included in a new development.

Step 1: As part of the subdivision street plan submission, developers complete and submit the new development subdivision point-based scoring criteria provided in **Appendix C.**

- Any questions on the scoring criteria should be directed to the Gastonia Traffic Calming Liaison via email to **engineering@gastonianc.gov**.
- Supporting documentation used to complete the scoring criteria should be included as an attachment to the submitted scoring criteria (e.g., completed Traffic Impact Analysis that informs the anticipated vehicles per day input).

Step 2: Gastonia city staff reviews the submitted scoring criteria to confirm the accuracy of the applicant's calculated total score.

- If Gastonia city staff verifies the applicant's calculated score after review, that calculated score is the final point total which dictates the number of required traffic calming elements to be installed in the subdivision.
- If Gastonia city staff finds errors with the applicant's score after review, Gastonia reserves the right to reject the application subject to a revision to correct the score.

Step 3: The applicant's engineer and Gastonia city staff meet to discuss site characteristics and appropriate traffic calming element(s) based on the final point total established in Step 2.

- All traffic calming element(s) considered must be suitable for a new development, as outlined in the Gastonia Traffic Calming Toolkit Summary Matrix [**Appendix D]**.
- This step can be waived at the City of Gastonia's discretion. If city staff opt to waive this meeting, applicants will be notified in writing to proceed to Step 4.

Step 4: The applicant submits a plan sheet of the subdivision layout that clearly depicts the type and location of the selected traffic calming element(s) for installation, subject to Gastonia's review and approval.

- All traffic calming element(s) installed must conform to the latest version of City Specifications[2] and Standard Details[3].
- Gastonia city staff will verify that the applicant's submission meets Gastonia's standards and complies with the Traffic Calming Policy.
- If Gastonia city staff cannot verify that the applicant's submission meets City standards or complies with the Traffic Calming Policy after review, city staff rejects the application and provides the applicant with comments from the review process. The applicant makes the necessary revisions and resubmits.

3.2 New Development Impacts to Existing Neighborhoods

In instances where new developments connect to existing neighborhoods and have an adverse impact on existing neighborhoods, the existing neighborhoods are invited to pursue the process to apply for traffic calming elements outlined in Section 2. An adverse impact is defined as 1,000 daily trips, which also aligns with the City Traffic Impact Analysis (TIA) threshold. In order for the neighborhood to pursue the addition of traffic calming elements, the petition signed by at least 75% of property owners and/or current residents in the study area is still required, as outlined in Section 2.

3.3 Funding

The developer is responsible for 100% of the funding of all determined traffic calming elements required for new subdivision layouts (Section 3.1), as well as new development impacts to existing neighborhoods (Section 3.2).

[2] Gastonia City Specifications: https://www.gastonianc.gov/city-specifications-standard-details2/city-specifications2.html
[3] Gastonia Standard Details: https://www.gastonianc.gov/city-specifications-standard-details2/standard-details2.html

Appendix A: Existing Neighborhood Traffic Calming Application & Petition

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EXISTING NEIGHBORHOOD TRAFFIC CALMING APPLICATION PROCESS

We request that the City of Gastonia proceed with the existing neighborhood traffic calming application process.

We have read and understand the application process, as detailed below, and understand that obtaining signatures of support from 75% of the study area property owners and/or current residents [Step 4] does not guarantee a traffic calming project will be funded.

Step 1: Resident requests a meeting with the City of Gastonia Traffic Calming Liaison via email to **engineering@gastonianc.gov**.

Step 2: Resident submits a traffic calming application to the City of Gastonia.

Step 3: The City of Gastonia reviews all submitted applications utilizing the scoring criteria provided in policy **Appendix B**. For higher scoring applications, Gastonia staff will identify recommended traffic calming elements to address concerns.

Step 4: City of Gastonia notifies applicants of the status of their application.

- For conditionally-approved applications (a number that will vary each year depending on Gastonia staff time availability and budget), the applicant will be notified and provided a 30-day window to compile and submit a petition of support signed by at least 75% of property owners and/or current residents within the study area.
- Residents who submit an application which is not approved are encouraged to evaluate if they meet the requirements of the Gastonia Speed Hump Policy. Unless the resident requests a withdrawal or update to their application, non-approved applications will be reconsidered in the following calendar year (for up to four years after the original submission). The years since original submission will not be factored into future approvals, and rank of future applications will remain merit-based.

Step 5: Gastonia staff identifies recommended traffic calming deployments.

- Conditionally-approved applications that have submitted the petition of support signed by at least 75% of property owners and/or current residents within the study area are included in this step.
- For the selected locations, traffic calming elements will be recommended for more merited improvements using a combination of the score determined in Step 3 and effective use of available funds. This allows for a process guided by objective scoring, while still allowing

Gastonia flexibility to apply professional engineering judgement to proceed with the most impactful projects.

Step 6: Gastonia staff installs traffic calming device(s) identified in recommendations.

DISCLAIMERS

1) We understand that only one signature per household will count towards the 75% threshold.

2) We understand that the following three (3) categories of funding are available to property owners requesting traffic calming:

   Category I: 100% City funded (based upon availability of City funds each fiscal year)

   Category II: 50% City funded, 50% Petitioner funded (receives priority over Category I)

   Category III: 100% Petitioner funded (receives overall priority for construction)

3) We understand that the City of Gastonia will install the improvements identified to address the risks and concerns presented in the original application. Installed improvements will be replaced at City expense for a period of 5 years from the original date of installation should a design or maintenance-related issue be identified and/or a street resurfacing occur.

4) We understand that when the street is resurfaced beyond the 5-year time period, the study area will be required to submit another petition at that time to confirm that continued support exists for the re-installation of the improvements. The same study area as originally defined will be required to share in the cost of any re-installation expenses at that time.

5) We understand that the City of Gastonia will not be responsible to add any landscaping features as part of the traffic calming installation, unless streetscaping elements are identified as part of the traffic calming improvement(s).

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EXISTING NEIGHBORHOOD TRAFFIC CALMING APPLICATION

Applicant Name: _____

Phone Number: _____ Email Address: _____

Address: _____

Location of requested project: _____

Description of concern(s): _____

_____

_____

_____

Applicant proposed funding option [check one]:

☐ **Category I:** 100% City funded (based upon availability of City funds each fiscal year)

☐ **Category II:** 50% City funded, 50% Petitioner funded (receives priority over Category I)

☐ **Category III:** 100% Petitioner funded (receives overall priority for construction)

☐ I have met with the Gastonia Traffic Calming Liaison and understand the application and review process for existing neighborhood traffic calming, as outlined in the City of Gastonia Traffic Calming Policy.

☐ I understand that if the City of Gastonia conditionally-approves this application, I will have a 30-day window to compile and submit a petition of support signed by at least 75% of property owners and/or current residents in order to proceed with the traffic calming request process.

☐ [OPTIONAL] I have attached additional supporting documentation to support the information provided in this application (e.g., notated diagram, aerial image(s), testimonials from other residents, etc.)

Signature: _____ Date: _____

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EXISTING NEIGHBORHOOD TRAFFIC CALMING PETITION OF SUPPORT

APPLICANT TO MAKE COPIES OF THIS PAGE AS NECESSARY TO GATHER SIGNATURES FROM AT LEAST 75% OF PROPERTY OWNERS AND/OR CURRENT RESIDENTS IN THE IDENTIFIED STUDY AREA.

Name (Printed): _____

Phone Number: _____ Email Address: _____

Address: _____

Property owner? ☐ Yes ☐ No

Signature _____ Date _____

Name (Printed): _____

Phone Number: _____ Email Address: _____

Address: _____

Property owner? ☐ Yes ☐ No

Signature _____ Date _____

Name (Printed): _____

Phone Number: _____ Email Address: _____

Address: _____

Property owner? ☐ Yes ☐ No

Signature _____ Date _____

Name (Printed): _____

Phone Number: _____ Email Address: _____

Address: _____

Property owner? ☐ Yes ☐ No

Signature _____ Date _____

Appendix B: Existing Neighborhood Traffic Calming Application Scoring Criteria

Category	Criteria		Points	Points
Speeding	Difference between 85th Percentile Speed and Posted Speed Limit (mph)	Less than 5	0	
		5 to 6.9	7	
		7 to 8.9	14	
		9 to 10.9	21	
		11 to 12.9	28	
		13 or more	35	
Crash History	Number of Crashes within the past 5 years	0	0	
		1 to 3	5	
		4 to 5	10	
		6 to 7	15	
		8 to 9	20	
		10 or more	25	
Traffic Volume	Vehicles per Day (vpd)	Less than 500	0	
		500 to 999	5	
		1,000 to 2,499	10	
		2,500 to 3,999	15	
		4,000 or more	20	
Multi-Modal Activity	Sidewalks	Detached Sidewalks and/or Shared Use Paths	0	
		Back-of-Curb Sidewalk (<8 ft width)	2.5	
		No Sidewalk	5	
	Bicycle Facilities	Protected/Buffered Bike Lanes and/or Shared Use Paths	0	
		Unprotected Bike Lanes	2.5	
		Shared Bike Facilities or No Bike Facilities	5	
	# Unique Pedestrian Activity Generators within 0.5 miles of Study Area (Bus stops, schools, hospitals, parks, recreation centers, greenway connection, retail/shopping, etc.)	Zero (0)	0	
		One (1)	2.5	
		Two (2)	5	
		Three (3) or more	10	
		TOTAL SCORE	**/ 100**	

Appendix C: New Development Subdivision Scoring Criteria

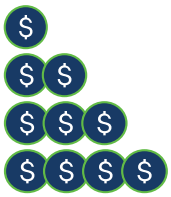
Category	Criteria		Points	Points
Network Geometry	Greatest Distance between Intersections (ft)	Less than 250	0	
		250 – 499	5	
		500 – 799	10	
		800 – 999	15	
		1,000 or more	20	
	Vertical Curvature	Minimal to none (<4% grade)	0	
		Moderate (4-7% grade)	5	
		Significant (>7% grade)	10	
	Horizontal Curvature (ft)	Maximum curve radii <300	0	
		Maximum curve radii 300-500	5	
		Maximum curve radii >500	10	
	Roadway Width, Curb to Curb (ft)	Less than 24	0	
		24-27	5	
		28-31	10	
		32 or more	15	
Anticipated Traffic Volume	Anticipated Vehicles per Day (vpd)	Less than 500	0	
		500 to 999	5	
		1,000 to 2,499	10	
		2,500 to 3,999	15	
		4,000 or more	20	
Multi-Modal Activity	# Unique Pedestrian Activity Generators within 0.5 miles of Study Area (Bus stops, schools, hospitals, parks, recreation centers, greenway connection, retail/shopping, etc.)	Zero (0)	0	
		One (1)	5	
		Two (2)	10	
		Three (3) or more	15	
	Schools within the Study Area	No Schools	0	
		One (1) or More Schools	10	
		TOTAL SCORE		**/ 100**

If total is between 0-34 points	No traffic calming elements required
If total is between 35-59 points	One (1) traffic calming element required
If total is between 60-84 points	Two (2) traffic calming element required
If total is 85 points or greater	At least three (3) traffic calming elements required.

Appendix D: Gastonia Traffic Calming Toolkit

The traffic calming measures described in this toolkit are proven safety countermeasures that reduce crash risk and manage vehicle travel speeds. The measures identified in this toolkit are not meant to exclude other measures that may be available and effective, and the City of Gastonia reserves the right to use engineering judgement to incorporate traffic calming measures outside of those in this list. It is noted that speed limit reduction is not included as a strategy in this toolkit, as generally speaking, reduction of the speed limit alone is not sufficient to significantly reduce vehicle speeds. A best practice is to include physical measures (like those in this toolkit) in addition to a posted speed limit reduction.

Traffic calming measures are divided into five categories, which are each described in their subsequent sections: horizontal deflection, vertical deflection, street width reduction, routing restriction, and non-physical countermeasures. All physical countermeasures are included as part of the FHWA Traffic Calming ePrimer. For each traffic calming element, this toolkit provides a high-level description, including image(s), effectiveness, application and design considerations, and a planning-level cost estimate. Planning-level cost estimates are broken down into the following implementation cost ranges, which are subject to change over time:



Less than $30,000

$30,000 to $59,999

$60,000 to $350,000

More than $350,000

At the end of the document, a summary matrix of the elements is provided. Based on the design and application descriptions of each element, the summary matrix also specifies what roadway functional class(es) each element is potentially appropriate for and whether that is a preferred treatment for existing neighborhoods and/or new developments.

Alignment with the Safe System Approach

The Federal Highway Administration (FHWA) developed a Safe System Roadway Design Hierarchy (January 2024), which is a tool to characterize infrastructure-based countermeasures relative to their alignment with the goal of eliminating fatalities and serious injuries to support implementation of a Safe System Approach (SSA). The tool has four tiers of strategies. Tier 1 strategies are most in alignment with the SSA and should be prioritized when feasible:

- Tier 1: Remove Severe Conflicts
- Tier 2: Reduce Vehicle Speeds
- Tier 3: Manage Conflicts in Time
- Tier 4: Increase Attentiveness and Awareness

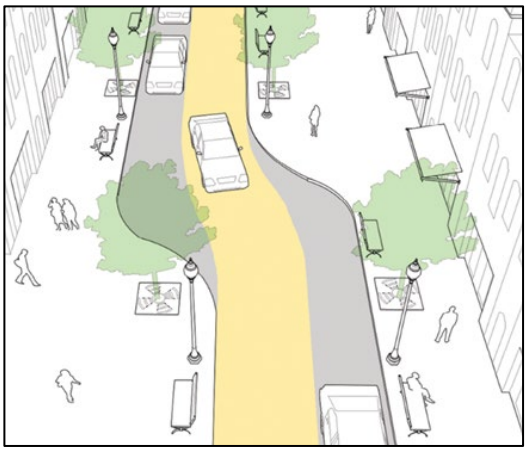
As the strategies presented in this toolkit target traffic calming, each strategy falls under Tier 2. There are several strategies included which also meet the goals of other hierarchy tiers, and as such, this toolkit also indicates the corresponding Safe System Hierarchy tiers that each strategy corresponds to.

Horizontal Deflection

Horizontal deflection leads to slower speeds by changing a straight-line path to a winding path that implies a slower speed of travel to drivers in order to comfortably navigate the roadway feature.

Chicane

A chicane is a series of alternating curb extensions or lane shifts that create a serpentine path, which encourages drivers to slow down as they navigate the curves. It's especially effective on long, straight roads where speeding is common, and it can be designed with landscaping or parking bays for added visual appeal.



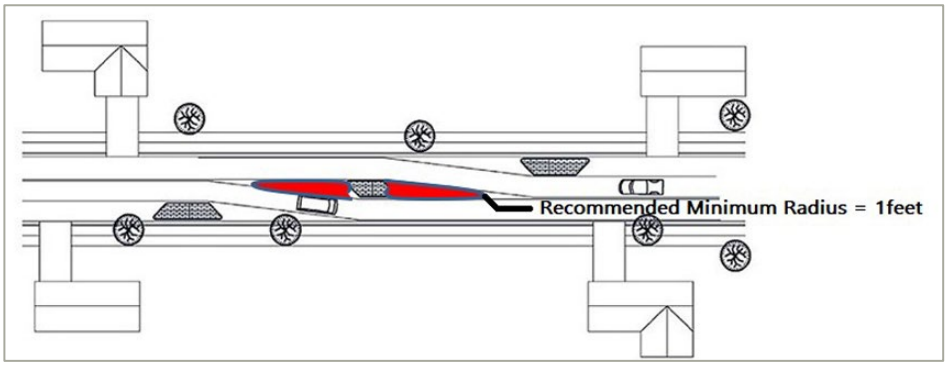
Source: NACTO

Source: FHWA, Scott Wainwright

Effectiveness	3-9 mph speed reduction along a segment, 5-13 mph speed reduction within the chicane (Caltrans).
Application/Design Considerations	• Best suited for locations with relatively low traffic volume and most effective where traffic volumes are relatively balanced in each direction. • Appropriate where speed limit is 35 mph or less. • Not a preferred location for a crosswalk, as driver focus should be on the horizontal deflection. • When shifting traffic, minimum roadway widths and emergency vehicle access must be maintained.
Planning-Level Cost	$
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness

Lateral Shift

A lateral shift involves a single, gentle realignment of the travel lane, typically achieved by offsetting the centerline or curb. This subtle horizontal deflection encourages drivers to reduce speed by disrupting their straight-line path without requiring sharp turns.



Source: Delaware DOT

Source: Caltrans

Effectiveness	5 mph speed reduction (Delaware DOT), typically less effective at reducing speeds compared to a chicane.
Application/Design Considerations	• Best suited for locations with relatively low traffic volume and most effective where traffic volumes are relatively balanced in each direction. • Appropriate where speed limit is 35 mph or less. • Can be a location selected for a pedestrian crossing with a median refuge island. Crossing should include high visibility crosswalk and signing. • When shifting traffic, minimum roadway widths and emergency vehicle access must be maintained.
Planning-Level Cost	$
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness

Mini-Roundabout / Single-lane Roundabout

A **mini-roundabout** is a compact circular intersection, typically marked by painted lines of a small central island, designed for low-speed urban areas where space is limited. A **single-lane roundabout** is a larger, raised circular intersection with yield-at-entry rules and deflected approaches to slow vehicles down. While the design of a mini-roundabout and roundabout varies, both work to slow vehicles down as they navigate through the intersection since they cannot take a straight path through. These designs also reduce the number and degree of conflict angles at an intersection.

Mini-Roundabout

Source: FHWA, Ken Sides

Source: FHWA, Google Street View

Single-lane Roundabout

Source: NCDOT
Source: FHWA, Scott Batson

Source: Google Maps (Gastonia, NC)
Source: FHWA, Chris Tzeng

Design differences between mini-roundabouts and roundabouts are important to understand when determining which is more appropriate for a given intersection. The following table summarizes the common inscribed circle diameter ranges for a mini-roundabout and full-size roundabout per NCHRP Guidance:

Roundabout Configuration	Typical AASHTO Design Vehicle	Common Inscribed Circle Diameter (ICD) Range[a]
Mini-roundabout	SU-30	45 ft to 90 ft
Single-lane roundabout (*non-traversable center island*)	BUS-40	90 ft to 120 ft
	WB-40	100 ft to 130 ft
	WB-62 or WB-67	120 ft to 180 ft

[a] *Assumes 90-degree angles between entries and no more than four legs. List of possible design vehicles is not comprehensive.*

Effectiveness	Mini-Roundabout Single-lane roundabout	Approximate 40% reduction in travel speeds within roundabout compared to 350 feet away from intersection (FHWA)
Application/Design Considerations	Mini-Roundabout	• Best suited for a junction of two local roads or of a local and collector road. • Appropriate where speed limit is 30 mph or less. • Generally best for ADT <10,000 vehicles per day. • Can be designed with traversable center island to allow larger vehicles (or emergency vehicles) to navigate through intersection.
	Single-lane roundabout	• Best suited for locations that need to accommodate higher volumes and/or larger vehicle traffic. • Appropriate for wider range of speed limits, though entry speed limit should not exceed 20-25 mph. • Generally best for ADT 10,000 to 25,000 vehicles per day.
Planning-Level Cost	Mini-Roundabout	$ $ $
	Single-lane roundabout	$ $ $ $
Safe System Roadway Design Hierarchy Tier(s)	Mini-Roundabout Single-lane roundabout	Tier 1: Remove severe conflicts Tier 2: Reduce vehicle speeds

Vertical Deflection

Vertical deflection creates a change in the elevation, which encourages motorists to slow down to comfortably navigate the roadway feature.

Raised Crosswalk

A raised crosswalk is a pedestrian crossing that is elevated to sidewalk level, which creates a vertical deflection that encourages vehicles to slow down and increases visibility of crossing pedestrians.

Source: FHWA, Jeff Gulden

Source: City of Raleigh, NC

Effectiveness	85th percentile speeds reduced to 20-30 mph when vehicles are crossing the raised crosswalk. Speed reduction effect declines by 0.5 to 1 mph for every 100 feet beyond the 200 foot approach and exit of the raised crosswalk (FHWA)
Application/Design Considerations	• Best suited for locations with relatively low traffic volume (ADT< 9,000 vehicles per day) • Appropriate where speed limit is 30 mph or less. • Raised crosswalks should be clearly marked so all roadway users can anticipate it and reduce their speeds appropriately. Crossing should include high visibility crosswalk and signing.
Planning-Level Cost	$
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness

Speed Table / Speed Cushion

A **speed table** is a long, flat-topped vertical deflection that spans the width of the roadway, designed to slow vehicles while allowing smoother passage compared to features like a speed hump. Speed tables can also be offset, with a split down the centerline of the street and each direction's half of the speed table offset longitudinally, in order to allow emergency response vehicles to bypass the speed table (shown in the upper right image below). A **speed cushion** consists of a series of two or more raised sections across the road that slow cars but allow emergency vehicles with wider wheelbases to pass through with minimal disruption.

It is noted that speed humps are not included in this toolkit, as Gastonia has a separate speed hump request process with required design criteria for residential streets with a posted speed limit of 25 mph or less.

Speed Table

Source: FHWA, Austin Brown

Source: FHWA, Jeff Gulden

Speed Cushion

Source: FHWA, Jeff Gulden

Source: City of Charlotte, NC

Effectiveness	Speed Table	85th percentile speeds reduced to 25-35 mph when vehicles are crossing the speed table. Speed reduction effect declines by 0.5 to 1 mph for every 100 feet beyond the 200 foot approach and exit of the speed table (FHWA).
	Speed Cushion	85th percentile speeds reduced to 15-20 mph when vehicles are crossing the speed cushion. Speed reduction effect declines by 0.5 to 1 mph for every 100 feet beyond the 200 foot approach and exit of the speed cushion (FHWA).
Application/Design Considerations	Speed Table	• Best suited for mid-block locations 150 feet from an unsignalized intersection. When placed at an intersection, these become a raised intersection or raised crosswalk. • Should not be placed near a sharp horizontal curve. • Appropriate where speed limit is 30 mph or less. • Generally, best for low volume roads.
	Speed Cushion	
Planning-Level Cost	Speed Table	$ to $$
	Speed Cushion	$ to $$
Safe System Roadway Design Hierarchy Tier(s)	Speed Table	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness
	Speed Cushion	

Street Width Reduction

Street width reduction narrows the roadway through fewer lanes or narrower lanes, which encourages motorists to slow down to comfortably navigate the roadway. An additional benefit of street width reduction is improved safety for crossing pedestrians, as it reduces the crossing distance and overall pedestrian exposure to vehicular traffic.

Curb Extension – Choker

A choker narrows the roadway at a mid-block location, typically by extending the curb or adding raised islands, to slow vehicle speeds and reduce crossing distances for pedestrians. When curb extensions occur at an intersection, these are referred to as a bulb-out.

Source: FHWA, Dan Burden

Source: FHWA, Scott Wainwright

Effectiveness	1-4 mph reduction in 85th percentile speeds (Caltrans).
Application/Design Considerations	• Can be appropriate at all levels of traffic volumes. • Appropriate where speed limit is 35-40 mph or less. • Can be a location selected for a pedestrian crossing, as a choker reduces pedestrian crossing distance. Crossing should include high visibility crosswalk and signing. • When using any strategy to narrow street width, emergency vehicle access must be maintained.
Planning-Level Cost	$ $
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness

Curb Extension – Bulb-out

A bulb-out narrows the roadway at an intersection corner, typically by extending the curb, to slow vehicle speeds and reduce crossing distances for pedestrians. When curb extensions occur at a mid-block location, these are referred to as a choker.

Source: FHWA, Hillary Orr

Source: FHWA, Michael Austin

Effectiveness	1-3 mph reduction in 85th percentile speeds of through vehicles, turning speeds are reduced more significantly (Caltrans).
Application/Design Considerations	• Can be appropriate at all levels of traffic volumes. • Appropriate where speed limit is 35-40 mph or less. • Can be a location selected for a pedestrian crossing, as bulb-outs reduce pedestrian crossing distance. Crossing should include high visibility crosswalk and signing. • When using any strategy to narrow street width, emergency vehicle access must be maintained.
Planning-Level Cost	$ $
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness

Median Island (preferred with Crosswalk Refuge)

A median island narrows the travel lanes, which encourages motorists to slow down. Median islands can often double as a pedestrian crosswalk refuge point if a cut in the island is provided with a marked crosswalk. Where there are mid-block crossings provided, it's desirable to provide a median island crosswalk refuge.

Source: FHWA, Dona Sauerburger

Source: FHWA, Scott Wainwright

Effectiveness	1-8 mph reduction in 85th percentile speeds, depending on the degree of lane narrowing and traffic volumes (Caltrans).
Application/Design Considerations	• Can be appropriate at all levels of traffic volumes. • Appropriate where speed limit is 35-40 mph or less. • Can be a location selected for a pedestrian crossing, as median islands reduce pedestrian crossing distance. Crossing should include high visibility crosswalk and signing. • When using any strategy to narrow street width, emergency vehicle access must be maintained.
Planning-Level Cost	$ $
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness

On-street parking

On-street parking narrows the effective travel lane width, which can reduce vehicle speeds and provide a buffer between moving vehicular traffic and sidewalks.

Source: FHWA, Marshall Elizer

Source: Google Maps (Gastonia, NC)

Effectiveness	1-5 mph reduction in speed, with reductions of 2-3 mph being the most common (FHWA). More effective when the full block is occupied by vehicles and/or used in conjunction with curb extensions.
Application/Design Considerations	• Can be appropriate at all levels of traffic volumes. • Appropriate where speed limit is 35-40 mph or less. • Parallel parking is preferred to angled parking to achieve vehicle speed reduction. • When using any strategy to narrow street width, emergency vehicle access must be maintained.
Planning-Level Cost	$ $
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness

Routing Restriction

A routing restriction limits or redirects vehicle access to reduce cut-through traffic, which often involves higher speeds.

Turning Movement Restrictions (Half/Full Closure)

Turning movement restrictions limit movements in order to reduce conflict points and reduce cut-through traffic. A half closure restricts entry or exit for one direction of travel at an intersection while allowing movement in the opposite direction. A full closure blocks all vehicle movements at an intersection or roadway segment. Both half and full closures can be designed to allow bicyclists and pedestrians to pass through. When deploying any kind of turning movement restriction, other supportive measures like signing and pavement markings are necessary to provide motorists advanced warning of any closures.

Half Closure

Source: FHWA, Jeff Gulden

Source: FHWA, James R. Barrera

Full Closure

Source: FHWA, Dan Burden

Source: Caltrans

Effectiveness	Half Closure	Speed on closed street reduced to zero. Speed on directions maintained likely reduced due to closure islands.
	Full Closure	
Application/Design Considerations	Half Closure	• Half closures are best suited at intersections only. A motorist encountering a half closure placed at a midblock could bypass the measure in the wrong direction instead of turning around and backtracking. • Generally, most appropriate for lower speed locations, 30 mph or less. • When using any strategy to restrict access, emergency vehicle access must be considered and maintained.
	Full Closure	• Full closures can be applicable at intersections or midblock locations. • Generally, most appropriate for lower speed locations, 30 mph or less. • When using any strategy to restrict access, emergency vehicle access must be considered and maintained.
Planning-Level Cost	Half Closure	
	Full Closure	
Safe System Roadway Design Hierarchy Tier(s)	Half Closure	Tier 1: Remove severe conflict Tier 2: Reduce vehicle speeds Tier 4: Increase attentiveness and awareness
	Full Closure	

Non-Physical

Non-physical measures utilize perceptual clues to influence driver behavior without altering the physical roadway geometry.

Streetscaping

Streetscaping enhances the visual and functional quality of a street through landscaping, lighting, street furniture, and other design elements that encourage slower driving and improve the pedestrian experience.

Source: Google Maps (Gastonia, NC)

Source: University of Washington

Effectiveness	No proven statistics regarding speed reduction. Trees narrow a driver's visual field and create rhythm along the street (NACTO).
Application/Design Considerations	• Should only be used on low volume and low speed roads. • Trees can be considered a fixed object in the clear zone. Whenever considering streetscaping as a traffic calming measure, engineering judgement should be used to weigh the potential benefit for traffic calming versus risk for fixed object crash types.
Planning-Level Cost	$
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds

High Visibility & Enhanced Crosswalks

High visibility or enhanced crosswalks use high-visibility and retroreflective pavement markings, signing, and lighting to increase driver awareness and improve pedestrian safety at crossing locations. Rectangular rapid flashing beacons (RRFBs) can be added to non-signalized crossings to increase driver awareness of pedestrian crossings by flashing lights when the system is activated either by push button or permissive detection.

Source: FHWA

Source: FHWA

Effectiveness	No proven statistics regarding speed reduction. Crash reduction: • Intersection lighting can reduce pedestrian crashes up to 40% (CMF ID 4123) • RRFBs can reduce pedestrian crashes up to 47% (CMF ID 9024)
Application/Design Considerations	• Most effective on low speed roads with speed limits of 30 mph or less but can be considered on roads with up to 35 mph speed limits. • RRFBs are most effective when paired with a median island crosswalk refuge and should not be installed on roadways with 4-lanes or more. • High visibility and enhanced crosswalks are most effective when used in combination with street width reduction strategies to reduce pedestrian crossing distance.
Planning-Level Cost	$
Safe System Roadway Design Hierarchy Tier(s)	Tier 2: Reduce vehicle speeds Tier 3: Manage conflicts in time Tier 4: Increase attentiveness and awareness

Traffic Calming Toolkit Summary Matrix

Traffic Calming Element	Segment or Intersection	Functional Classification			Roadway Uses			Planning-Level Cost	Safe System Roadway Design Hierarchy Tier(s)
		Thoroughfare or Major	Collector or Residential Collector	Local or Local Residential	Emergency Route	Existing Neighborhood	New Development		
Chicane	Segment	No	Yes	Yes	Maybe	Yes	Yes	$	2 & 4
Lateral Shift	Segment	Maybe	Yes	Maybe	Yes	No	Yes	$	2 & 4
Mini-Roundabout	Intersection	Maybe	Maybe	Yes	Yes	Yes	Yes	$$$	1 & 2
Single-lane roundabout	Intersection	Yes	Maybe	Maybe	Yes	Maybe	Yes	$$$$	1 & 2
Raised Crosswalk	Both	Maybe	Yes	Yes	No	Yes	Yes	$	2 & 4
Speed Table	Segment	Maybe	Yes	Yes	No	Yes	No	$ to $$	2 & 4
Speed Cushion	Segment	No	Yes	Yes	Yes	Yes	No	$ to $$	2 & 4
Curb Extension – Choker	Segment	Yes	Yes	Yes	Yes	Yes	Yes	$$	2 & 4
Curb Extension – Bulb-out	Intersection	Yes	Yes	Yes	Yes	Yes	Yes	$$	2 & 4
Median Island (*preferred with Crosswalk Refuge*)	Both	Yes	Yes	Yes	Yes	Yes	Yes	$$	2 & 4
On-street Parking	Segment	Yes	Yes	Yes	Yes	Yes	Yes	$$	2 & 4
Turning Movement Restrictions – Half Closure	Intersection	No	Yes	Yes	Maybe	Yes	Maybe	$	1, 2, & 4
Turning Movement Restrictions – Full Closure	Both	No	Maybe	Maybe	No	Yes	Maybe	$$	1, 2, & 4
Streetscaping	Segment	No	Maybe	Yes	Maybe	Yes	Yes	$	2
High Visibility Crosswalk	Both	Yes	Yes	Yes	Yes	Yes	Yes	$	2, 3, & 4