

## MEMORANDUM

August 11, 2025

To: Mike Wilson  
Organization: Western Connecticut Council of Governments (WestCOG)  
From: Sneha Adhikari, Moctar Fall, Carrie Long, Shawna Kitzman, Jim Elliott  
Project: Traffic Calming and Complete Streets Best Practices Toolbox

**Re: Best Practice Review Memorandum**

---

## Introduction

This memorandum provides information about best practices in traffic calming and Complete Streets concepts, programs, and designs to equip the Western Connecticut Council of Governments (WestCOG) with priorities and recommendations for the future *Traffic Calming and Complete Streets Best Practices Toolbox* (Toolbox). The best practices review highlights specific approaches and frameworks for traffic calming and Complete Streets, major types of traffic calming measures, and their specific special considerations such as emergency services, stormwater management, and traffic calming/speed reduction impacts.

## Project Purpose and Approach

Developing Complete Streets and traffic calming guidance for WestCOG requires a shared understanding of the successes and challenges of the current state of practice. Through this process, the project team will identify what is needed for WestCOG member agencies and practitioners to successfully implement traffic calming strategies in their region. Lessons learned elsewhere will be used to help shape local efforts.

This memo is the culmination of what the project team researched on the current state of traffic calming guidance nationally and regionally. Within this memo are key takeaways that should guide the development and implementation of a *Traffic Calming and Complete Streets Best Practices Toolbox*, a summary of current local efforts and programs throughout the country, a summary of traffic calming design measures, and special considerations that may apply.

The memo begins with an overview of *Traffic Calming and Complete Streets Definitions and Frameworks*, introduces relevant *Guidance and Best Practices*, and concludes with a review of *Complete Streets* and *Traffic Calming Measures*. The measures refer to design elements, planning considerations, and other treatments – physical, operational, and programmatic – needed to support safer and more comfortable streets.

The concepts and measures discussed in this document include details about siting considerations, specifications and materials, and limitations that municipalities should consider when evaluating the appropriateness of a measure. Opportunities to support transit and stormwater functions are discussed as well. Findings will inform the development of planning precepts, which will be reflected in the Toolbox.

## Key Takeaways

This section presents key takeaways from the research and focus groups conducted as part of this task. These takeaways will inform the development of the planning precepts and Toolbox.

### 1. Context-Sensitive Design is Fundamental to Complete Streets and Traffic Calming

Selecting appropriate traffic calming measures and safety countermeasures from **the Toolbox will depend on each community's unique needs and each street's given functions and surroundings**. Figure 1 presents an urban-to-rural transect, depicting the different contexts and typical transportation infrastructure and networks; each suited for a unique set of traffic calming and complete streets opportunities.

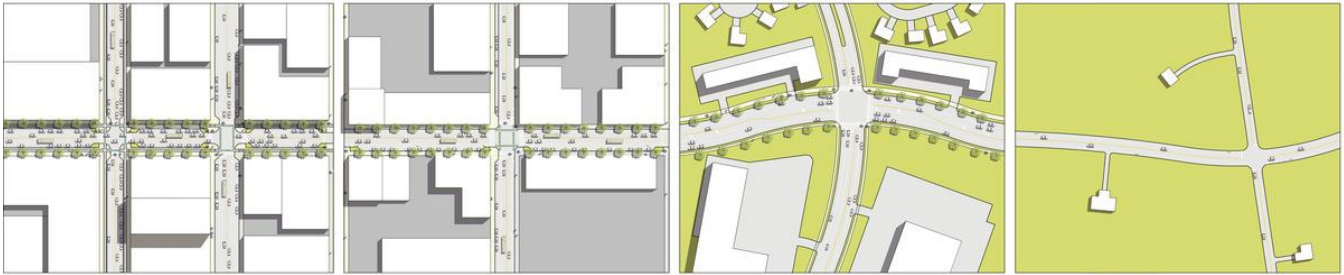


Figure 1 Example of an Urban-to-Rural Transect - Contexts and Treatments (Source: Toole Design)

Scoping, design, and delivery of the Toolbox 'tools' is guided by Context Sensitive Design/Context Sensitive Solutions (CSD/CSS).<sup>1</sup> Context Sensitive Solutions emphasizes a comprehensive understanding of the entire context and factors that contribute to safety, including land use and community considerations. The Toolbox will reference the Federal Highway Administration (FHWA) *Traffic Calming ePrimer* which matches measures to context, including design considerations, cost, and emergency access suitability.<sup>2</sup>

Best practices and national guidance in context sensitive design include specific measures and systemic approaches. *NCHRP 880 Design Guide for Low-Speed Multimodal Roadways*<sup>3</sup> reinforces CSD by emphasizing balanced operational efficiency and safety for mixed-use roadways up to 45 mph, across rural and urban contexts. More than 25 years ago, the Connecticut Department of Transportation (CTDOT) was one of five state DOTs selected by FHWA to pilot the institutionalization of CSS, with findings summarized in *NCHRP 480: A Guide to Best Practices for Achieving Context Sensitive Solutions*.<sup>4</sup> As an example of CSS, CTDOT referenced work with the State Historic Preservation Office (SHPO) in consideration and stewardship of the community and environment.

#### CSS Guiding Principles<sup>4</sup>

**Address transportation needs** with designs that are safe for all users, technically credible, financially feasible, and implementable.

**Be an asset to the community**, approved by stakeholders, sensitive to environmental justice, and reflective of community values.

**Be compatible with the natural and built environment** with minimal impact and aesthetically appropriate designs.

<sup>1</sup> FHWA Publication No: FHWA-RC-BAL-04-0015 – Context Sensitive Design/Context Sensitive Solutions [https://www.fhwa.dot.gov/resourcecenter/teams/safety/saf\\_1CSD.pdf](https://www.fhwa.dot.gov/resourcecenter/teams/safety/saf_1CSD.pdf) | “Context Sensitive Solutions” is often preferred as it reflects a comprehensive approach in which a community considered in all phases and components of a transportation project and not solely the design.

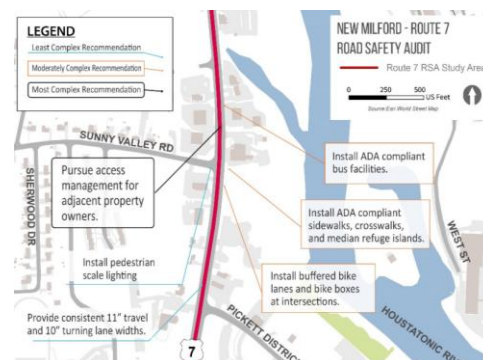
<sup>2</sup> FHWA Traffic Calming primer <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer>

<sup>3</sup> NCHRP 880: Design Guide for Low-Speed Multimodal Roadways <https://nap.nationalacademies.org/catalog/25248/design-guide-for-low-speed-multimodal-roadways>

<sup>4</sup> NCHRP 480: A Guide to Best Practices for Achieving Context Sensitive Solutions [https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_480.pdf](https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_480.pdf)

## 2. Expand and Connect the Active Transportation Network

The WestCOG region is seeing increased demand for walkable communities and safer bicycling connections. Municipalities are tackling efforts to install or repair sidewalks, expand the trail and pathway network, incorporate on-road bicycle facilities, and adopt active transportation plans to promote a strategic vision for multimodal connectivity. These initiatives are supported by WestCOG through local projects (i.e., TIP and STIP) and prioritized in the Regional Bicycle Plan<sup>5</sup>, and supported by the CTDOT through the State's Complete Streets Policy, the Connecticut Active Transportation Plan<sup>6</sup>, and the Connecticut Bicycle and Pedestrian Advisory Board (established as an element of the Connecticut Complete Streets Policy).



**Figure 2 Active Transportation Recommendations from the Route 7 Road Safety Audit (Source: New Milford, CT)**

Figure 2 presents an example of active transportation recommendations for a local project in New Milford, CT. *The Route 7 Road Safety Audit* identified specific safety and connectivity challenges for people walking or biking to the corridor's community destinations, and outlined potential measures and recommendations to enhance access for all modes and especially those traveling on foot or by bike.

**Active transportation is an integral part of Complete Streets.** Specific to the Toolbox, best practices to highlight include prioritizing connections and circulation to local destinations such as schools, areas with aging adults or children, and community hubs. This memo presents a selection of treatment facilities based on the state of the practice and American Association of State Highway Transportation Officials (AASHTO) Guides for the Development of Bicycle Facilities<sup>7</sup> and Pedestrian Facilities<sup>8</sup> as well as examples of facility designs from case studies around the world.

## 3. Transition Zones are a Safety and Placemaking Priority

The WestCOG region has a diversity of community contexts ranging from dense urban cores and cities to more rural and agricultural areas, as well as many small towns. This creates many shifts or transitions between these contexts and, as a result, safety concerns associated with drivers being expected to significantly reduce speeds when approaching and entering new more populous environments. This memo includes design considerations specific to safely transitioning from rural to town contexts. **Transition zones alert drivers to change in the surrounding environment or character** (i.e., approaching the Main Street segment of a scenic road where shops and local services are located).



**Figure 3 Transition from Rural to Main Street with a Roundabout Gateway (Source: Toole Design)**

<sup>5</sup> WestCOG Regional Bicycle Plan <https://westcog.org/wp-content/uploads/2023/06/Final-Bike-Plan-Formatted.pdf>

<sup>6</sup> Connecticut Active Transportation Plan [http://www.ctbikepedplan.org/documents/CTActiveTransPlan\\_01-09-2019.pdf](http://www.ctbikepedplan.org/documents/CTActiveTransPlan_01-09-2019.pdf)

<sup>7</sup> AASHTO Guide for the Development of Bicycle Facilities <https://aashtojournal.transportation.org/aashto-releases-5th-edition-of-comprehensive-bicycle-guide/>

<sup>8</sup> AASHTO Guide for the Development of Pedestrian Facilities <https://store.transportation.org/Item/CollectionDetail?ID=224>

To effectively communicate the change and to slow vehicle speeds appropriately, transition zones begin with a mix of warning signs and pavement treatments well in advance of the change in environment to prepare drivers to decelerate. As drivers approach a new context, the transition zone may feature traffic calming and gateway treatments that physically reduce the comfortable operating speed.

While many traffic calming treatments are applicable in transition zones, roundabouts are a common practice for slowing vehicle speeds while maintaining throughput, and can provide an opportunity to integrate placemaking, planting, and signage to visually welcome people to the new context (Figure 3). The *NCHRP Report 737*<sup>9</sup> and *FHWA Speed Management ePrimer*<sup>10</sup> demonstrate that roundabouts and transverse pavement markings increase speed limit compliance in transition zones by 15-20 percent, with roundabouts showing additional compliance benefits.

#### 4. Evaluate Opportunities for Shared Spaces

Many areas in WestCOG feature candidate streets for **shared spaces where the surface of the roadway is flush and all users—including vehicles and people walking, biking, or rolling—share the right-of-way** (Figure 4). These spaces slow vehicles to a walking pace and pedestrians are given priority. However, shared spaces are most notable for their placemaking and activation benefits as the surface treatment enables the space to function like a public plaza for gathering, socializing, playing, and more.

The shared space concept is a more common street design type and Complete Street/traffic calming solution outside of the U.S., with program-scale installations such as “Home Zone” or “Woonerf” concepts that are specific to local residential areas. This memo references shared space design considerations, best practices from case studies and reference materials, as well as available guidance and recommendations for implementing shared spaces within the specific context of U.S. accessibility requirements and policies.



Figure 4 Shared Spaces in Montreal, QC (Source: Toole Design)

#### 5. Promote Systemic Solutions vs. Spot Treatments

Traffic calming and safety improvement projects have historically been prioritized and addressed with a spot treatment approach; investing in safety improvements based on where crashes occur. While these treatments can be effective, the best practice is to consider a systemic approach. The *FHWA Systemic Safety User Guide*<sup>11</sup> notes that crash locations may vary widely but the contributory factors associated with the crashes are often “*strikingly consistent*.” With this framework in mind, **systemic solutions focus on prioritization techniques and analysis tools to identify and address safety risk factors.**

This means that streets and specific sites may be prioritized for traffic calming solutions even in the absence of reported crashes, but rather because of the safety risk present. This can lead to efficiencies in implementation through project bundling of traffic calming measures (i.e., similar projects on multiple streets, or bundling low-cost measures at the county or regional level).

<sup>9</sup> NCHRP 737: Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways <https://nap.nationalacademies.org/catalog/22670/design-guidance-for-high-speed-to-low-speed-transition-zones-for-rural-highways>

<sup>10</sup> Speed Management ePrimer for Rural Transition Zones and Town Centers <https://highways.dot.gov/safety/speed-management/speed-management-eprimer-rural-transition-zones-and-town-centers>

<sup>11</sup> FHWA Systemic Safety User Guide <https://highways.dot.gov/sites/fhwa.dot.gov/files/2024-07/SystemicSafetyUserGuide.pdf>

# Memorandum Contents

- Introduction..... 1**
  - Project Purpose and Approach ..... 1
  - Key Takeaways..... 2
  
- Definitions and Frameworks..... 6**
  - Complete Streets ..... 6
  - Traffic Calming ..... 9
  - Context-Sensitive Design ..... 13
  - Transition Zones ..... 13
  
- Best Practices and Guidance ..... 15**
  - Best Practices for Traffic Calming and Complete Streets Projects..... 15
  - Speed Management ..... 19
  - Land Use and the Built Environment..... 22
  - Stormwater Management ..... 24
  
- Complete Streets and Traffic Calming Measures ..... 25**
  - Understanding and Identifying Potential Measures ..... 25
  - Special Street Types ..... 299
  - Periodic Measures..... 322
  - Cross-Section Measures ..... 40
  - Other Measures ..... 46
  
- Next Steps .....466**

# Definitions and Frameworks

The following section introduces the frameworks, key terms and definitions, and major concepts associated with **Complete Streets** and **traffic calming**. Key to understanding these approaches and their associated strategies are the concepts of **speed management** and **context sensitive design**.

Both Complete Streets and traffic calming share many of the same principles and objectives. Because of this alignment, the remainder of the memo references designs, treatments, and best practices that are reflective of both concepts without necessarily specifying between the two.



**Figure 5 Complete Street in Northampton, MA (Source: Toole Design)**

## Complete Streets

Complete Streets is an approach to street design that features and facilitates the safety and accessibility of all modes – walking, biking, transit, and vehicles – and people of all ages and abilities<sup>12</sup>. By making spaces more comfortable and convenient for walking, biking, and rolling, Complete Streets can encourage mode shift (i.e., replacing vehicle trips with active transportation), expand and improve connectivity, promote community-oriented spaces, and reduce the negative impacts of the transportation system (i.e., congestion, air and noise pollution, and stormwater concerns).

Figure 6 illustrates a cross-section of a Complete Street with space and features to support all people, regardless of how they choose to travel. Of note, many streets may not have the right-of-way width available to allow for dedicated lanes or physical design elements specific to different modes. In these contexts, communities can advance design, policy, or programming considerations to prioritize safety and convenience for people walking, biking, and rolling.



**Figure 6 Example of a Complete Street, featuring facilities and amenities for people walking, biking, rolling, driving, or taking transit, as well as freight vehicles (Source: Toole Design)**

<sup>12</sup> Complete Streets – Safety Analysis <https://highways.dot.gov/sites/fhwa.dot.gov/files/FHWA-HRT-24-074.pdf>, definition from Complete Streets: A Primer <https://www.congress.gov/crs-product/R47947>

The U.S. Department of Transportation (USDOT) introduces Complete Streets standards and policies<sup>13</sup> with the following definition:

*...Complete Streets “ensure the **safe and adequate accommodation of all users** of the transportation system, including pedestrians, bicyclists, public transportation users, children, older individuals, individuals with disabilities, motorists, and freight vehicles.”*

The Complete Streets approach is continuing to grow as a fundamental part of transportation planning and design, including a growing library of guidance, recommendations, and resources from the USDOT. In addition to national adoption of a national Complete Streets design model and Federal requirements to allocate funding towards Complete Streets activities, national advocacy organizations have prepared templates available to support municipal adoption of Complete Streets policies and programs.

## Complete Streets Principles

The National Complete Streets Coalition outlined ten principles of effective Complete Streets policies:<sup>14</sup>

Principle	Details
1. Establish commitment and vision	A clear statement of intent to create a complete, connected network and consider the needs of all users.
2. Prioritize underinvested and underserved communities	Jurisdictions define their most underinvested and underserved communities and prioritize them throughout.
3. Apply to all projects and phases	Applies to all new projects, retrofit or reconstruction projects, maintenance projects, and ongoing operations.
4. Allow only clear exceptions	Any exceptions must be specific, with a clear procedure that requires high-level approval and public notice prior to exceptions being granted.
5. Mandate coordination	Requires private developers to comply, and interagency coordination between government departments and partner agencies
6. Adopt excellent design guidance	Directs agencies to use the latest and best design criteria and guidelines and sets a time frame for implementing this guidance.
7. Require proactive land-use planning	Consider every project’s greater context, as well as the surrounding community’s current and expected land-use and transportation needs.
8. Measure progress	Establish specific performance measures that match the goals of the broader vision, incorporate equity considerations, and are regularly reported.
9. Set criteria for choosing projects	Creates or updates the criteria for choosing transportation projects so that Complete Streets projects are prioritized.
10. Create a plan for implementation	Includes specific steps for implementing the policy in ways that will make a measurable impact on what gets built and where.

<sup>13</sup> Best Practices Moving to a Complete Streets Design Model: A Report to Congress on Opportunities and Challenges, a report that accompanies the Bipartisan Infrastructure Law (BIL) <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-03/Complete%20Streets%20Report%20to%20Congress.pdf>

<sup>14</sup> The Complete Streets Policy Framework <https://wordpress.smartgrowthamerica.org/wp-content/uploads/2024/08/Complete-Streets-Policy-Framework.pdf>

One of the most common strategies for advancing the principles of Complete Streets is to develop a checklist to be applied whenever the public right-of-way is part of a project (e.g., capital improvement projects, facility repairs, or other maintenance projects). An example of considerations to be incorporated in a Complete Streets checklist is outlined below:

- **Existing pedestrian, bicycle, and transit facilities or accommodations:** note the presence (or lack) of sidewalks, bicycle facilities, transit stops and shelters, bike parking, seating, etc. Some checklists may also include descriptive elements or ratings of current conditions.
- **Existing use or operational data related to walking, biking, or rolling,** with an emphasis on the enablers and barriers to active transportation and accessibility. This may include lighting, perceived safety or level of traffic stress, crossing opportunities, connectivity and other data about usage, crashes, or demand.
- **Existing transit ridership and context:** if any transit service is available, document the existing transit stops or stations, facilities, and amenities in the area. This includes elements like bike parking, park and ride parking lots, or pick-up/drop-off circulation available at key stops.
- **Existing vehicle conditions and facilities,** including a review of crash data, volumes, driveways, parking, and loading or freight needs, as well as any other relevant information.
- **Other existing streetscape features or needs** such as street trees, stormwater management (i.e., bioswales or rain gardens), lighting and public art, or other design elements that influence the experience of walking, biking, rolling, or riding transit.
- **Community points of interest** that could generate active transportation trips or serve as key destinations, with an emphasis on cultural or public spaces and those that are frequented by children, aging adults, and people living with a disability.
- **Relevance to local plans and priorities** – are the potential safety improvements or Complete Street networks or design concepts reflected in local planning documents (examples include a municipal or regional transportation plan, active transportation plan, master plan, or POCD).

From the data included in the checklist, the reviewer can determine if it is necessary to include active transportation or other multimodal design features in the project, and to ensure that these users and their operational needs have been considered. A core aspect of Complete Streets is that planning for pedestrians and bicyclist safety and comfort is the default approach, rather than a use case that must be proven for inclusion.

## Complete Streets in the WestCOG Region

Connecticut enacted a Complete Streets law in 2009 — only the 10<sup>th</sup> state in the country to do so — which required that all users be considered and integrated into public projects on state highways. The Connecticut Department of Transportation (CTDOT) adopted a Complete Streets Policy in 2014 which outlined specific objectives for prioritizing mobility and accessibility for all modes and encouraging alternative modes, and detailed procedures for implementation, such as a project checklist, and measuring performance. In 2023 CTDOT published Complete Streets design criteria to provide specifics on how, exactly, pedestrian, bicycle, and transit facilities and provisions are incorporated into projects.

Across the WestCOG region, Complete Streets ordinances have been adopted in the City of Stamford (2015) and the City of Norwalk (2024) associated with design guidance and process recommendations to support Complete Streets. Beyond the municipalities that have formally adopted policies, many Towns have published plans outlining the importance of a Complete Streets philosophy and its relevance to local traffic safety and accessibility goals.

# Traffic Calming

Traffic Calming refers to the strategic use of self-enforcing measures — physical design elements, educational programs, policies, and more — to reduce speeding, increase driver awareness, and combat other unsafe driving behaviors. These measures make streets feel safer and more comfortable for all users. Traffic calming is often referred to as “self-enforcing” because the designs make speeding uncomfortable; drivers slow down, pay attention, and self-enforce their behavior. The FHWA and the Institute of Transportation Engineers (ITE) offer the following definition and summary of traffic calming:<sup>15</sup>

*“The primary purpose of traffic calming is to **support the livability and vitality** of residential and commercial areas through **improvements in non-motorist safety, mobility, and comfort**. These objectives are typically achieved by **reducing vehicle speeds or volumes** on a single street or a street network. Traffic calming measures consist of horizontal, vertical, lane narrowing, roadside, and other features that use **self-enforcing physical or psycho-perception** means to produce desired effects.”*

## Traffic Calming Measures

The designs and safety concepts associated with traffic calming are reviewed in more detail in this memo. Each measure is introduced alongside a summary of design guidance, applicability, and considerations applicable for the varied context of the WestCOG region. To illustrate the concepts introduced in the definition of traffic calming, Figure 7 provides examples of traffic calming measures installed on local, residential streets across the U.S.



**Figure 7 Raised crossing with stormwater infrastructure in Washington, D.C.; Intersection reconfiguration in Athens, GA; Roundabout in La Crosse, WI; Bike lanes and a speed table in Charlottesville, VA; Yield street in Seattle, WA; Daylighting treatments in Boston, MA**

<sup>15</sup> FHWA Traffic Calming primer <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer>

## Speeds and Speed Management

Traffic calming is inherently intertwined with the concept of “speed management” and the overall goal of reducing speeds and designing streets to be context sensitive. The following section briefly reviews the definitions and frameworks of important speed-related concepts.

- **Speeding** refers to breaking the law by driving above a street’s posted speed limit.
- **Posted Speed** refers to the speed limit, or the maximum lawful speed for a given street. Speed limits can also be statutory, applying to all streets of a given class or (i.e., 25 MPH statutory speed for residential roadways, even if a regulatory sign is not available).
- **Operating Speed** refers to how fast most drivers actually drive on the street. This is often associated with the 85<sup>th</sup> percentile speed, or the speed at which 85% of vehicles travel in free-flow conditions. Operating speed may be higher or lower than the posted speed, often influenced by the design features or context of a street.
- **Design Speed** refers to the maximum speed that vehicles *could* operate given the context and the geometric design of the street. Engineers use designated design speeds in the geometric design processes, particularly for highway settings. Historically, design speed has often been set higher than posted speed, even in urban contexts.
- **Target Speed** refers to the maximum speed vehicles should ideally operate given the street’s context.



**Figure 8 Radar speed sign in Saint Paul, MN (Source: Toole Design)**

Radar speed signs are a speed management and enforcement tool, showing drivers in real time how their operating speed relates to the posted speed limit, often flashing if drivers are speeding.

Historically, there has been significant disconnect between these speed concepts leading to safety issues. Design speed and posted speed contribute to the operating speed, though the design speed tends to be more influential. Consider a residential street designed for vehicles moving at 45 MPH -- it may feel odd to drive along its swooping curves and wide travel lanes at the posted 25 MPH. With traffic calming, the design speed is adjusted to match the target speed through the use of (mostly) physical interventions and treatments that change the geometry of the street and make speeding feel uncomfortable. This helps drivers self-enforce their operating speed to align with the target or posted speed.

This process of identifying a safe target speed given the context of the area and implementing countermeasures to bring the operating speed to appropriate levels is referred to as **speed management**. Some strategies for speed management include geometric traffic calming measures, while others rely on pavement markings, speed limit variations, and speed enforcement strategies<sup>16</sup>. Speed management aims to address speeding and speed-related concerns and to lower the likelihood of severe injuries or fatalities by reducing the frequency and severity of crashes. While speed management often includes the use of traffic enforcement, which can be costly, the self-enforcing nature of traffic calming reduces the need (and associated costs) for law enforcement and allows local police officers to tend to other important public safety needs.

<sup>16</sup> FHWA Speed Management Toolkit [https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/speedmanagementtoolkit\\_final.pdf](https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/speedmanagementtoolkit_final.pdf)

## Traffic Calming and Complete Streets Benefits

Communities benefit from several safety, comfort, accessibility, societal and quality of life benefits in areas with slower speeds. By reducing speed and in some instances volume of traffic, traffic calming and complete streets designs have the capacity to transform the public right-of-way and how streets serve the community.

The speed reduction benefits of traffic calming measures can be a key component of Complete Street design. For example, measures such as curb extensions and median islands can provide safer and more comfortable spaces for pedestrian crossings and for boarding transit. Similarly, a road diet can reclaim right-of-way for bicycle, pedestrian, and transit facilities. In some instances, a shared space can serve all modes and prioritize pedestrians by removing the delineation between modes. However, traffic calming is more specific and intentional in the prioritization of speed management as a key performance measure and objective.

### Safer Streets

Speeding has severe outcomes and implications for safety, and traffic calming measures have proven success in reducing crash frequency and severity. Research shows that the average risk of severe injury for a pedestrian struck by a vehicle reaches 10% at an impact speed of 16 mph, 25% at 23 mph, 50% at 31 mph, 75% at 39 mph, and 90% at 46 mph<sup>17</sup>. Faster speeds are directly linked to more severe – and often fatal – crashes. Speed reduction is especially critical for the most vulnerable community members. Aging adults are much more likely to be killed or seriously injured in the event of a crash, at any speed. Likewise, children and people with certain types of disabilities, such as Autism Spectrum Disorder (ASD) or other Intellectual and Developmental Disabilities (IDD), are exceptionally vulnerable due to the difficulties they have judging gaps in traffic and speeds.

Many crashes occur at intersections, including approximately 40% of crashes on local roads in the WestCOG region.<sup>18</sup> Intersection crashes are disproportionately frequent as people negotiate movement with turning vehicles. To reduce conflicts and provide clarity on where conflicts occur, CTDOT is evaluating “**turn calming**,” a subset of traffic calming specifically focused on reducing the speed of vehicles as they approach and complete a turn, such that the driver is aware of the surroundings, and the turning movement is very deliberate. This includes policies such as “no turn on red” (NTOR) to restrict right turns during red signal phases. CTDOT’s NTOR templates and guidance support implementation at specific intersections.<sup>19</sup> Turn calming can also be physical, such as hardened centerlines to prohibit vehicles from making sweeping left turn movements. A pre/post analysis of hardened centerline installations in Washington, D.C. found overall reductions in conflicts as well as reduced frequency of left-turning vehicles exceeding 15 MPH.<sup>20</sup>



**Figure 9 Raised Intersection in Somerville, MA and Turn Calming in New York, NY (Source: Toole Design)**

<sup>17</sup> AAA Impact Speed and a Pedestrian’s Risk of Severe Injury or Death <https://nacto.org/wp-content/uploads/2011PedestrianRiskVsSpeed.pdf>

<sup>18</sup> Data accessed on the Collision Analysis Summary Tables (CAST) platform <https://www.ctcrash.uconn.edu/dashboards/CAST-MMUCC.html>

<sup>19</sup> CTDOT No Turn on Red (NTOR) Report <https://portal.ct.gov/dmv/-/media/dot/programs/vision-zero/assets/ntor-report.pdf>

<sup>20</sup> The effects of left-turn traffic-calming treatments on conflicts and speeds in Washington, DC <https://pubmed.ncbi.nlm.nih.gov/33334481/>

## Livable Streets

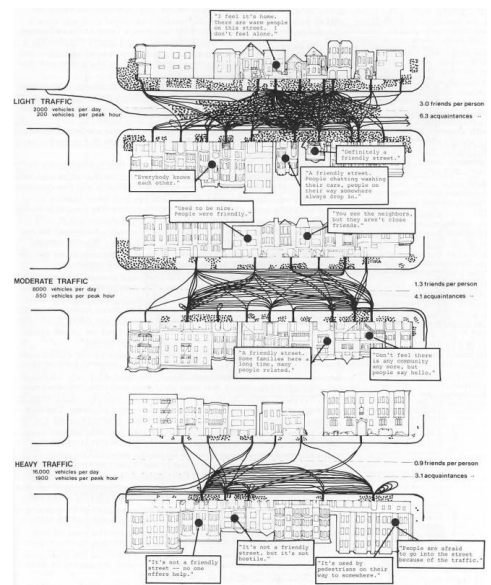
By reducing the speed of vehicles and improving the safety of the street, traffic calming and complete streets can support more welcoming and attractive streets. Many downtown centers incorporate traffic calming priorities as a community and economic vitality approach to activate corridors and encourage foot traffic and gathering. Figure 10 presents a well-known graphic from *Livable Streets*,<sup>21</sup> mapping the interaction of neighbors on streets of different vehicle speeds and volumes (low, medium, and high traffic shown from top to bottom, respectively). On higher traffic streets, people tended to engage in fewer interactions; in contrast, lower volume streets encouraged many more social interactions as well as a greater number of visits to different destinations along the street.

In short: making streets safer and more comfortable for all modes of transportation means that streets are safer and more comfortable for other activities, too. The benefits of traffic calming extend far beyond the significant safety implications; measuring crash reduction should be considered alongside indicators related to the accessibility, social, cultural, economic, and sustainability improvements. A sales tax analysis of 14 active transportation safety improvement projects across the U.S. found positive or neutral economic impacts after the improvements.<sup>22</sup> Metrics include overall increases in sales, wages, hospitality employment, and overall business and economic vitality.

## Resilient Streets

Traffic calming and complete street measures can complement climate resiliency efforts both in terms of mode shift to more sustainable options, as well as directly incorporating stormwater management treatments in the right-of-way. For example, curb extensions or bulbouts and other buffer treatments within the right-of-way can feature rain gardens and bioswales to capture and convey stormwater, as shown in Figure 11. Narrower lanes can reduce the amount of paved (impermeable) surfaces. In addition to stormwater related benefits, these treatments can also reduce heat island effects and mitigate noise pollution due to the steadier and slower vehicle speeds.

Increasingly, many communities in the WestCOG region have experienced flooding and other impacts of a changing climate. Traffic calming and complete street strategies can facilitate the tools to prepare for severe weather events and can help to shift transportation patterns towards lower-impact options such as biking, walking, and transit to reduce the environmental impacts of transportation.



**Figure 10** Appleyard's 1981 *Livable Streets* incorporated a map of societal interactions on streets with Low (top), Moderate, and Heavy traffic. Source: Safe Streets Strategies



**Figure 11** Stormwater Infrastructure in Winchester, VA (Source: Toole Design)

<sup>21</sup> Appleyard, D. 1981. *Livable Streets*. University of California Press

<sup>22</sup> Economic Impacts of Bicycle and Pedestrian Street Improvements <https://www.peopleforbikes.org/reports/the-national-study-of-the-economic-impact-of-street>

## Context-Sensitive Design

Context-Sensitive Design (or Solutions, CSS) is an approach to address the total context within which a transportation facility is planned, implemented, maintained, and operated. CSS recognizes that roadway design can greatly impact the community beyond its traffic or transportation functions.<sup>23</sup>

*“Context sensitive design asks questions first about the need and purpose of the transportation project, and then equally addresses safety, mobility, and the preservation of scenic, aesthetic, historic, environmental, and other community values...”*

*Context sensitive design involves a collaborative, interdisciplinary approach”<sup>13</sup>*

“Context” is a broad concept that encompasses physical elements, such as environmental and land use considerations; functional aspects, including how the corridor operates and is used; and historic and cultural factors, such as community priorities, cultural landmarks, and preservation concerns. Community context is best understood by involving local stakeholders throughout the planning and design process (e.g., residents, business owners, organizations, and agencies).

With this approach, traffic calming measures are evaluated and designed based on the surrounding context of the roadway segment. For example, areas with high pedestrian activity are correlated with curb extensions as part of CSS because these features better allocate space to the safety and mobility of pedestrians.<sup>24</sup> Within the WestCOG region, traffic calming is suitable for practically any built environment, from villages and towns to cities and metro areas, though the specific solutions most appropriate for a given context will vary. Siting recommendations and evaluations will be a theme of the future Toolbox.

## Transition Zones

**Transition Zones** are where drivers gradually lower their speed as the surrounding environment and roadway infrastructure transition from higher-speed and often less dense contexts to lower-speed town or community settings.

Through a mix of signage, pavement markings, and physical traffic calming treatments, drivers are alerted to an approaching change in character and context and eventually welcomed into the new environment (i.e., a Main Street context where drivers should operate around 25 MPH). Transitions are often paired with gateway treatments to visually define the new space and local identity through welcoming and wayfinding design.

*“There needs to be a distinct relationship between the community speed limit and a change in the roadway character.*

*...a change in environment increases awareness.”<sup>15</sup>*

<sup>23</sup> FHWA Context Sensitive Design/Context Sensitive Solutions [https://www.fhwa.dot.gov/resourcecenter/teams/safety/saf\\_1CSD.pdf](https://www.fhwa.dot.gov/resourcecenter/teams/safety/saf_1CSD.pdf)

<sup>24</sup> Speed Management, FHWA Traffic Calming ePrimer <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer/module-2-traffic-calming-basics>

<sup>25</sup> NCHRP 737: Speed Management ePrimer for Rural Transition Zones and Town Centers <https://highways.dot.gov/safety/speed-management/speed-management-eprimer-rural-transition-zones-and-town-centers>

Transition Zones are essential for traffic calming and speed management because drivers do not automatically reduce their speed where lower speeds are needed. Thoughtful design and strategic treatments are required to slow vehicles in advance to create a driving environment that feels comfortable at the lower, target speed. To achieve this, transition zones feature three components or zones, as seen in Engelskirchen, Germany (Figure 12):

- In the **approach zone**, devices are meant to warn drivers to the upcoming area (e.g., speed limit signs/variable message boards showing your current speed, or new pavement colors).
  - ▲ *On an 80 KMH (50 MPH) rural road, signs alerting drivers to the town and posted speeds begin to appear alongside treatments, i.e., a median.*
- In the **transition zone**, traffic calming elements such as lane reductions and medians physically reduce operating speeds.
  - ▲ *In Engelskirchen, the median and buffered sidepath becomes a striped median, then two narrower travel lanes with chicanes.*
- At the entrance to the new context, **gateway treatments** provide a cue to the new operating speed and may be paired with posted signs noting the speed limit where the new operating speed is in effect.
  - ▲ *Approaching town, the roadway features on-street parking and bus stops while the sidepath becomes a separated sidewalk-level bike lane and pedestrian path. Chicanes are more frequent, and textured pavement is introduced. The speed is reduced to 30KMH (around 20MPH) by school areas. The context feels urban and dense with pedestrian activity taking priority over vehicle speed.*

*The drive from the first to last photo was less than 1.5 miles.*

There are various context-specific factors for determining the required distance and design elements required for Transition Zones with the core principle to promote gradual transitions with redundancy in the traffic calming elements used. Transition Zones also consider the built form and how land use and building frontages can similarly alert drivers to a new context and activity.

Transition Zones are very important in the WestCOG region as many major arterials double as a community's Main Street as they pass through small towns and villages. In these areas, the design of the street may shift to accommodate pedestrian and bicycle facilities and amenities, on-street parking, and other streetscape elements, and the speed of passing traffic will need to be reduced to ensure safety for all users.



**Figure 12 Transitioning from Rural to Urban (Source: Google Maps)**

# Best Practices and Guidance

While context, priorities, and specific processes vary throughout the region, Complete Street principles and traffic calming should be foundational for local planning and design projects. There are several best practices and considerations that are transferable to any traffic calming project, even if the scale and context differ.

This section begins with an overview of the best practices in traffic calming processes and designs based largely on national guidance. This is followed by a discussion of distinct opportunities to use traffic calming measures to support the safety and vitality of the surrounding land uses and the built environment. In particular, attention is paid to community points of interest such as schools and transit services where connections for walking and biking are critical. Finally, considerations to support access for emergency services vehicles and integrate stormwater management to reduce runoff are summarized.

## Best Practices for Traffic Calming and Complete Streets Projects

### Project Scoping and Prioritization

Traffic calming and Complete Streets concepts should be considered in all public construction and repair projects that involve the right-of-way, such as new developments, utility or maintenance work, roadway reconstruction, repaving or restriping, and broader transportation plans and visioning projects.

Once the need for a safety or mobility project is identified, scoping should begin with the assumption that active transportation features will be included, rather than assessing whether a project is eligible for them. Municipalities can refer to local policies and the CTDOT Complete Streets Design Criteria for a checklist of relevant considerations and condition data. Scoping should also evaluate any local plans relevant to the street segment to see how the project aligns with planned multimodal networks or broader community visions for the area.

Gaining a good understanding of the context should be supported by frequent community engagement early in the design process. Outreach to local leaders and emergency service providers can serve as trusted community resources and provide safety-focused insights. It is also important to engage the communities most vulnerable to the design of the street (i.e., people who are disproportionately at risk), such as people living with a disability, aging adults, children, and people who cannot or choose not to drive. Engagement efforts can serve to gather feedback about existing conditions as well as input on potential design solutions.

Traffic calming measures should be prioritized based on: crash risk reduction (with a systemic lens to identify and address contributory crash factors), relation to community goals, surrounding context, opportunities to address operational deficiencies and meet target speeds, constructability, and cost.



**Figure 13 Traffic Calming Projects in Somerville, MA, La Crosse, WI and Athens, GA**

## Facility Design and Selection

As traffic calming and Complete Streets projects move from the initial analysis phase into the design phase, consider the following resources which focus on local, residential streets and transition zones to identify appropriate interventions.

### *FHWA Achieving Multimodal Networks*

The *FHWA Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts* report discusses design flexibility found in current national guidance to address common roadway design challenges and barriers.<sup>26</sup> The report focuses on reducing multimodal conflicts so that walking and bicycling are safe, comfortable, and attractive options for people of all ages and abilities. It is particularly salient to the Toolbox project because the first section of the report focuses on traffic calming concepts and designs, while the second half of the report centers on safety improvements towards a Complete Street framework.

Part 1, “Applying Design Flexibility,” presents case studies and recommendations that incorporate flexibility in design criteria and function to achieve context-sensitive solutions. Traffic calming treatments in this section include transition zones, lane reconfigurations, lane narrowing, and intersection geometry changes. Bicycle lanes, pedestrian crossings, bus stops, and bridges are discussed as facilities that can be adapted using flexible design principles. Finally, slow streets are addressed, which are represented as shared space or curbless street designs.

The second section of the report, “Reducing Conflicts,” focuses on specific design considerations to reduce exposure to conflict between roadway users. Guiding principles include safety (eliminating conflicts and providing safer facilities), predictability, coherence, context-sensitivity, accommodation, and comfort. When applicable, the report outlines opportunities to integrate experimental concepts or designs into projects. A selection of the best practices is summarized briefly below:

- **Neighborhood greenways**, a type of “slow street,” are low-speed, low-volume streets designed to carry less than 1,500 vehicles per day at speeds no greater than 25 MPH. On these streets bicycles have priority and vehicle throughput is limited to local traffic as much as possible. Due to this restriction in throughput, neighborhood greenways are best suited for communities with a street grid network or at least parallel options onto which some traffic may be diverted. Wayfinding signage or other design elements help identify these streets as priority bicycle routes.
- **Lane width** is reviewed with 10-foot lanes recommended as preferred widths for streets with posted speeds below 45 MPH. By reducing the width of travel lanes, right-of-way space can be reconfigured to provide dedicated facilities for walking and biking, bikeable shoulders, turn lanes, or expanded buffers/separation between facilities (i.e., marked, raised, or planted medians).
- **Mountable curbs** are introduced as a design concept to slow passenger vehicle turns while maintaining turn radii suitable for large trucks and vehicles. Mountable curbs (also referred to as truck aprons) are designed to be raised enough to discourage cars from traveling over them, with a recommended 3-inch reveal. However, larger trucks, transit, and emergency vehicles can easily drive over the curb without issue. Mountable curbs are often incorporated in roundabouts and bumpouts, especially in more industrial settings.
- **School Zone and Transit Station** improvements are discussed, noting the specific conflicts that arise with bus (and school bus) access points and pick-up/drop-off areas for students and for transit riders.

---

<sup>26</sup> FHWA Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts  
[https://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/publications/multimodal\\_networks/fhwahep16055.pdf](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_networks/fhwahep16055.pdf)

## Small Town and Rural Multimodal Networks

The FHWA *Small Town and Rural Multimodal Networks* report is a resource intended to help small towns and rural communities support safe, accessible, comfortable, and active travel for people of all ages and abilities.<sup>27</sup> The report includes guidance on speed management and traffic calming, recommending that speed management measures are implemented frequently and in concert to create continuous slow conditions along the roadway. It suggests that traffic calming measures should be spaced no more than 300 or 400 ft apart to maintain midpoint speeds of 25 mph.

The report highlights physical measures like speed humps and speed tables, mini roundabouts, pinch points, lateral shifts, and median islands as potential traffic calming measures that may be appropriate for rural settings. On higher speed roadways and high-to-low-speed transition areas, non-physical measures such as speed feedback signs, SLOW or speed limit pavement legends, and speed reduction markings are illustrated in the guide. The report also provides guidance on pedestrian lanes and bike lanes that may provide traffic calming effect by narrowing the travel lanes. Finally, the report includes guidance on the most “urban” part of a small town or rural community (Multimodal Main Streets) and how they could be designed to provide multimodal uses and placemaking. Some scenarios and strategies include repurposing existing two-lane or four-lane sections of Main Streets with median islands, angled parking chicanes, bike lanes, road diets, and streetscape expansion.

One of the design treatments referenced in the report is the concept of advisory lanes. Advisory lanes refer to the striping of a roadway shoulder on an otherwise unmarked roadway and designating the space for biking (Figure 14). Some advisory lanes may also be used by pedestrians; however, this requires that the lanes meet required accessibility regulations. On two-way streets, passing vehicles may need to encroach into the shoulder to pass one another; however, this should be a rare occurrence on low volume streets. To mitigate encroachment, the FHWA report recommends a bidirectional travel lane width between 13.5-16 feet.

Advisory lanes are experimental, and installation requires approval from FHWA (*Request to Experiment*), but they may be a valuable tool for integrating active transportation facilities on local, low volume streets.



**Figure 14 Advisory Lanes. (Copyright 2014 The Dartmouth, Inc. All rights reserved. Reprinted with Permission.)**

## FHWA Traffic Calming ePrimer

The Traffic Calming ePrimer, discussed throughout this memo, presents a thorough review of current traffic calming practice.<sup>28</sup> Module 3 provides a toolbox of traffic calming measures and a screening table that assigns a score based on functional classification and feasibility. Beyond this screening, the module provides a deeper dive of each measure: description, purpose, benefits, issues, and design considerations. Table 1 Traffic Calming ePrimer Measures presents the categories of measures included. Details about the specific criteria and siting for these measures are depicted in Table 2.

<sup>27</sup> FHWA Small Town and Rural Multimodal Networks [https://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/publications/small\\_towns/fhwahep17024\\_lg.pdf](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf)

<sup>28</sup> FHWA Traffic Calming ePrimer <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer>

**Table 1 Traffic Calming ePrimer Measures**

Horizontal Deflection	Vertical Deflection	Street Width Reduction	Routing Restriction
<ul style="list-style-type: none"> <li>Lateral Shift</li> <li>Chicane</li> <li>Realigned Intersection</li> <li>Traffic Circle</li> <li>Mini-roundabout</li> <li>Roundabout</li> </ul>	<ul style="list-style-type: none"> <li>Speed Hump</li> <li>Speed Cushion</li> <li>Speed Table</li> <li>Offset Speed Table</li> <li>Raised Crosswalk</li> <li>Raised Intersection</li> </ul>	<ul style="list-style-type: none"> <li>Corner Extension</li> <li>Choker</li> <li>Median Island</li> <li>On-Street Parking</li> <li>Road Diet</li> </ul>	<ul style="list-style-type: none"> <li>Diagonal Diverter</li> <li>Full Closure</li> <li>Half Closure</li> <li>Median Barrier</li> <li>Forced Turn Island</li> </ul>

Almost all measures may be appropriate for local or residential roadways, and collectors, with the exception of roundabouts. On collector streets caution is recommended for Traffic Circle, Mini-roundabouts, Roundabouts, Diagonal Diverter, and Full Closures. The full summary of these recommendations is shown in Table 2.

**Table 2 ePrimer Traffic Calming Measures and Suitability Matrix (Source: FHWA)**

Category	Traffic Calming Measure	Segment or intersection	Functional classification			Street function	
			Thoroughfare /Major Arterial	Collector (Residential)	Local (Residential)	Emergency Access	Transit Route
<b>Horizontal Deflection</b>	Lateral shift	Segment	3	5	5	5	5
	Chicane	Segment	1	5	5	3	3
	Realigned Intersection	Intersection	1	5	5	5	5
	Traffic Circle	Intersection	1	3	5	3	3
	Mini-roundabout	Intersection	3	3	5	5	5
	Roundabout	Intersection	5	3	1	5	5
<b>Vertical Deflection</b>	Speed Hump	Segment	1	5	5	1	3
	Speed Cushion	Segment	1	5	5	5	5
	Speed Table	Segment	3	5	5	1	3
	Offset Speed Table	Segment	3	5	5	5	3
	Raised Crosswalk	Both	3	5	5	1	3
	Raised Intersection	Intersection	3	5	5	3	3
<b>Street Width Reduction</b>	Corner Extension	Intersection	5	5	5	5	5
	Choker	Segment	5	5	5	5	5
	Median Island	Both	5	5	5	5	5
	On-Street Parking	Segment	5	5	5	5	5
	Road Diet	Both	5	5	3	5	5
<b>Routing Restriction</b>	Diagonal Diverter	Intersection	1	3	3	1	3
	Full Closure	Both	1	3	3	1	1
	Half Closure	Intersection	1	5	5	3	3
	Median Barrier	Intersection	3	5	5	1	3
	Forced Turn Island	Intersection	3	5	5	3	3

Legend:

5 – traffic calming measure may be appropriate

3 – caution; traffic calming measure could be inappropriate

1 – traffic calming measure is likely inappropriate

# Speed Management

Strategies to reduce speeds include design and traffic calming measures, policy changes, operational measures (e.g., signal, posted speeds, or lane restrictions), and enforcement strategies to change driver behavior. The following section presents literature and best practices specific to speed management and traffic calming.

## Speed Management Best Practices

### FHWA Speed Management Toolkit

This toolkit<sup>29</sup> is a package of speed management resources derived from existing speed management guides, informational resources, and research evidence. Section 2 of the Toolkit describes crash- and speed-reducing countermeasures, along with the anticipated effects of implementing these treatments. The list of speeding related crash countermeasures, applicability in the type of area, and effects are shown in Table 3.

**Table 3 Speed Management Countermeasures and Locations (Source: FHWA Speed Management Toolkit)**

	Area Type			Location		Effects		
	Urban	Suburban	Rural	Inter-section	Section	Curve	Crash Red.	Speed Red.
<b>Design and Traffic Calming</b>								
Area-wide Traffic Calming	X	X	X	X	X		X	X
Chicanes	X	X	X		X			X
Full Closure	X	X						X
Gateway Treatment	X	X	X					X
Half Closure	X	X						X
Lateral Shift	X	X	X					X
Mini Traffic Circle	X	X	X	X			X	X
Realigned Skewed Intersection	X	X	X	X			X	X
Reduced Lane Width*			X	X			X	X
Road Diet	X	X			X		X	X
Roundabout	X	X	X	X	Pos.		X	X
Speed Cushions	X	X	X	X				X
Speed Humps	X	X	X	X				X
Speed Tables	X	X	X	X				X
Traffic Calming ( <i>varied</i> )	X	X	X	X	X		X	X
<b>Pavement Treatments, Markings, Signs, and Signals</b>								
Enhanced Curve Delineation						X	X	
Optical Speed Bars/ Converging Chevrons						X		Pos.
Transverse Rumble Strips for Speed Calming						X	X	
<b>Speed Management and Traffic Operations Measures</b>								
Lower Speed Limits on Expressway	X	X	X		X		X	
Protected-only Left Turn Signal Phasing				X			X	
Signal Coordination along a Corridor	X	X		X	X		X	
Variable Speed Limits on Expressway	X				X		X	X
<b>Enforcement and Publicity</b>								
Automated Section Speed Enforcement								
Mobile Speed Camera Enforcement	X	X					X	X
Fixed Speed Camera Enforcement	X	X					X	X
Publicity of Automated Speed Enforcement Cameras	X	X					X	
Speed Display / Feedback Devices	X	X	X		X		X	X

<sup>29</sup> FHWA Speed Management Toolkit [https://safety.fhwa.dot.gov/speedmgmt/ref\\_mats/docs/speedmanagementtoolkit\\_final.pdf](https://safety.fhwa.dot.gov/speedmgmt/ref_mats/docs/speedmanagementtoolkit_final.pdf)

\* Note: In this Toolkit, *Reduced Lane Width* applies to intersection approaches using rumble strips/ painted median.

## USLIMITS2

USLIMITS2 is a model for determining target design speeds to promote safety for all users. This “Expert System” tool, created and made available by the FHWA, uses a series of input variables provided by the user to determine an appropriate speed limit.<sup>30</sup> These include volume, road design, surrounding land use, crash history, operating speed (50<sup>th</sup> and 85<sup>th</sup> percentile speeds are considered), active transportation activity, and available parking.

### *NACTO City Limits: Setting Safe Speed Limits on Urban Streets*

While traffic calming focuses on physical interventions, *City Limits*<sup>31</sup> discusses strategies beyond posted speeds grounded in the Safe Systems approach. Default Speed Limits can be citywide (e.g., 25 MPH) or based on the type of street with exceptions for low density or industrial uses where a higher limit (i.e., 35 MPH) may be appropriate. Slow Zones, or designated areas with slower speeds than similar streets, are often in areas with higher concentrations of vulnerable users. Corridor Speed Limits refer to specific speed limits on major corridors.

## Transition Zones

Transition zones are safety-critical areas for effective traffic calming. The following section reviews guidance and research addressing the transition of roadways between rural contexts and town centers. An important consideration for transition zones is to identify, and design for, the target speed of the roadway to safely reduce vehicle speeds, establish a gateway to the area, and introduce walkable access for people on foot or bike.

### *FHWA Speed Management ePrimer for Rural Transition Zones and Town Centers*

This ePrimer focuses on transition zones for high-speed rural roads that connect and sometimes pass through communities (i.e., small towns and suburban areas). The guide defines the transition zone as “a section of roadway before a motorist enters a community from a less dense rural area, where drivers need to identify an upcoming change in the roadway character, and then complete the necessary speed reduction in preparation for entering the rural community.” The ePrimer defines the transition zone as having two areas:

- **Perception/reaction area:** where drivers are aware of upcoming speed limit changes or changing conditions ahead (however contextual and roadway changes have not yet occurred)
- **Deceleration area:** where drivers are expected to reduce their operating speed to the community’s target speed, as signaled through both posted and traffic calming cues.

The ePrimer introduces case studies with varying guidance on how and where to design transition zones, with a broad estimate of aiming for transition zone target speeds by dividing the overall speed reduction by 50 percent (see example in Table 4).

**Table 4 Determining the Appropriate Transition Zone Target Speed**

	High Speed Roadway	Transition Zone	Community Roadway
<b>Posted Speed</b>	<b>50 MPH</b>		<b>30 MPH</b>
	= (Posted Speed (50 MPH) – Community Roadway Speed (30 MPH)) / 2 = (20 / 2) = <b>10 MPH</b>		
<b>Target Speed</b>		<b>40 MPH</b>	

Similar to other guidelines, the ePrimer provides measures to manage speeds, with specific guidance on which ones may be appropriate at transition zones and within rural communities. Overall, for transition zones, horizontal deflection measures such as lateral shifts, traffic control changes such as horizontal signing (pavement markings), speed feedback signs, and gateway treatments are likely appropriate, whereas vertical deflection measures are not recommended (see Table 5). Within the communities themselves, all traffic calming measures can be considered.

<sup>30</sup> USLIMITS2 model <https://safety.fhwa.dot.gov/uslimits/>

<sup>31</sup> NACTO City Limits <https://nacto.org/publication/city-limits/>

**Table 5 Transition Zone Traffic Calming Measures (Source: FHWA Speed Management ePrimer)**

Category	Traffic Calming Measure	Applicable area within a Small Rural Community	
		Transition Zone	Within Community
<b>Horizontal Deflection</b>	Lateral shift	5	5
	Chicane	3	5
	Mini-roundabout	1	5
	Modern Roundabout	3	3
<b>Vertical Deflection</b>	Speed Hump	1	3
	Speed Cushion	1	3
	Speed Table	1	3
	Raised Crosswalk	1	3
	Raised Intersection	1	3
<b>Roadway Changes</b>	Median Island	3	5
	Road Diet	3	5
	Lane Narrowing	3	5
<b>Traffic Control</b>	Horizontal Signing	5	5
	Speed Feedback Signs	5	5
<b>Gateway Treatments</b>	Gateway Signing	5	5
	Landscaping	5	5

Legend:

5 – traffic calming measure may be appropriate

3 – caution; traffic calming measure could be inappropriate

1 – traffic calming measure is likely inappropriate

### *NCHRP Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways*

This report presents guidance for designing the transition from a high-speed rural highway to a lower-speed section, typically approaching a small town. A transition zone is defined to be a section of road that is continuous with and connects a roadway section with a high posted speed limit to a roadway section with a lower posted speed limit.

Section 2.2 provides existing practice and research, and Section 3.2 provides a summary of international guidelines. The report presents field studies that reviewed roundabouts, transverse pavement markings (TPMs), and welcome signs at community entrances (gateway treatments). Findings from the studies showed roundabouts and TPMs increase the rate of compliance of vehicles traveling at or below the speed limit at the end of a transition zone by 15-20%, respectively, compared to no treatment. Additionally, roundabouts increased the rate of compliance of vehicles traveling within 5 MPH of the speed limit at the end of a transition zone by 11%.

Section 4.4.2 provides a catalog of transition zone treatments, including description, effectiveness, cost, considerations, and installation location. The catalog of treatments include: center island/raised median, roundabout, roadway narrowing, road diet, transverse pavement markings, speed activated sign, rumble strips, colored pavements, welcome sign, and layered landscaping (gateway treatment).

## Land Use and the Built Environment

Context-sensitive design specifically calls for the inclusion of the surrounding land use and built environment into traffic calming and design decisions. Specific to the Western Connecticut context, this includes consideration of historic character, development patterns, and environmental characteristics and conditions. Figure 15 depicts how land use and site planning can work hand-in-hand with traffic calming and network strategies to improve the livability, safety, and connectivity of a community.

In considering land use and the built environment, new development projects may present opportunities to design and create new roads, or to take a fresh look at the network serving an area. While the Toolbox will primarily focus on measures to improve safety and connectivity on existing local streets, municipal partners should be mindful of opportunities to rethink and revise network connections when possible. In areas that are more densely built out this potential may be limited.

The following section outlines considerations to integrate into decision-making and traffic calming measure selection, based on the built environment.



**Figure 15 Concept Design for Network and Land Use Considerations in South Bend, IN (Source: Toole Design)**

## Zoning and Development Considerations

While traffic calming focuses on measures within the right-of-way, communities can support these measures and objectives through zoning overlays and other policies, such as network design, transit-oriented development, and mixed-use neighborhoods, softening of streetscape and frontage standards, reduction of parking minimums, and other site planning considerations.

### *Mixed-Use and Transit-Oriented Development*

Walking and biking activity is often concentrated in areas of higher density and near to community destinations and services. These areas typically feature—and in many municipalities require—sidewalks and may include other facilities or amenities to support walking and biking. Zoning overlays to encourage walkable developments can include streetscape standards that define the types of materials, treatments, and amenities to include within a defined area to make the experience of the area feel safer, more comfortable, and attractive.

To strengthen and build these communities that are denser and more walkable, zoning regulations can encourage development and infill projects that activate transit stops and other community destinations with a mix of land uses. For example, integrating residential, retail, commercial, office, and other uses and services within a neighborhood can facilitate shorter trips that can be accomplished by walking or biking rather than driving. Transit Oriented Development (TOD) is a type of mixed-use development in which the mix of spaces and uses are centered around a transit station or service. The transit element further enables a mode shift from driving by coupling longer-distance transit options with the benefits of having amenities and services accessible within a walkable distance. TOD and mixed-use developments emphasize human-scale experience by integrating traffic calming and Complete Street designs to shift the priority to alternative modes.

### *Access Management*

Access management refers to the design and control of access to roads and adjacent developments through driveways, entrances, and other service access routes. When municipalities lack a strategic approach for the

spacing and design of these accesses, driveways and other curbcuts can cause frequent conflicts between turning cars and pedestrians, bicyclists, and other road users. Access management strategies explore the consolidation of these curbcuts and other access-related designs to limit conflicts and improve safety. Many of the measures used for access management support traffic calming: reducing the speed of turning vehicles and providing priority to people walking and biking.<sup>32</sup>

Three strategies include minimum spacing, zoning regulations, and turning restrictions. Spacing requirements for driveways or entrances help reduce the frequency of curbcuts and turning movements along a corridor. Zoning regulations can require consolidation of access such that drivers enter at one point but can access multiple properties by foot or car without re-entering the roadway. Turn lanes and turning restrictions (both in policy and in design) can reduce the conflicts between roadway users. Each of these strategies helps reduce the frequency of turning movements and can support more attentive interactions between drivers and other roadway users.

### *Parking Minimums*

Municipal zoning regulations often include parking minimums, mandating that developments incorporate a number of parking spaces based on land use. By requiring a minimum number of spaces per individual property, the transportation network and circulation patterns can be complicated by unnecessary access or driveways, oversupply of parking, and induced demand for driving. These issues complicate traffic safety by increasing vehicle volumes and introducing additional conflicts or interruptions for people walking or biking.

Efforts to reduce the amount of parking required on-site is often associated with Complete Streets because it can shift demand for alternative modes and encourage safe access for all users. In the WestCOG region, municipalities are advancing plans and policies that support shared parking arrangements, pay-in-lieu programs to allow developers to contribute financially instead of providing parking (i.e., receiving a waiver on meeting the parking minimum), and creating programs and incentives to encourage alternative modes and parking off-site. As a result, developers can reallocate space towards pedestrian or bicycle amenities, placemaking, and stormwater elements.

### **Community Points of Interest**

Safe Routes to School (SRTS) programs are an established program in various cities, towns, states, and regions with the goal of making safer connections so that students feel comfortable walking, rolling, or riding their bikes to school. In general, traffic calming measures and facilities near schools should provide as much separation as possible between children and motorists, even in low-speed and low-volume environments, with sidewalks preferred over shoulders where space is available.<sup>33</sup>

Many municipalities support Slow Zone programs to prioritize speed reduction and safer mobility proximately to schools. Slow Zones are neighborhood-wide traffic calming efforts to create defined gateways and consolidate traffic calming treatments; these areas often also feature advisory speed limits of 20 MPH.<sup>34</sup> For urban locations, designations may be appropriate near schools, parks, and senior access areas to slow speeds in areas with a high concentration of people who are vulnerable road users.<sup>35</sup> Slow zones can be defined based on geographic boundaries, natural boundaries such as rivers, or and infrastructure boundaries such as railways.<sup>36</sup>

---

<sup>32</sup> FHWA Access Management Benefits [https://ops.fhwa.dot.gov/access\\_mgmt/docs/benefits\\_am\\_trifold.htm](https://ops.fhwa.dot.gov/access_mgmt/docs/benefits_am_trifold.htm)

<sup>33</sup> FHWA Small Town and Rural Multimodal Networks [https://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/publications/small\\_towns/fhwahep17024\\_lg.pdf](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf)

<sup>34</sup> Philadelphia and New Jersey Slow Zones <https://slow-zone-phl.hub.arcgis.com/> | <https://www.nj.gov/transportation/community/srts/pdf>

<sup>35</sup> NACTO City Limits <https://nacto.org/publication/city-limits/>

<sup>36</sup> World Resources Institute Low-Speed Zone Guide <https://www.wri.org/research/low-speed-zone-guide>

## Transit Integration

Transit needs and access should be part of traffic calming design and implementation. In urban settings, transit vehicle drivers are typically trained to navigate narrow settings. Therefore, street width reduction measures as well as horizontal deflection measures can typically be navigated by transit vehicles.<sup>37</sup> Designs can also be modified to meet the needs of transit services. Treatments such as curb extensions can be designed to function as a bus stop, though designs may need to be longer with a larger curb radius where the transit vehicle may be making turns. While some jurisdictions discourage or restrict vertical deflection measures on transit routes, there is precedence of transit routes on roadways with vertical deflection measures. Given the regional differences that might exist in transit agencies across the WestCOG region, it is recommended that transit agencies are included in traffic calming discussions.

## Stormwater Management

Traffic calming measures can be reinforced with green infrastructure to capture runoff and reduce flooding and ponding. These reinforcements can contribute to longevity and resilience to larger weather events. Green infrastructure projects should use native, non-invasive, and drought-tolerant vegetation. It is also important to select plants that can tolerate snow when designing for snowy climates. Some strategies to incorporate green infrastructure for specific traffic calming measures are described below:

- Where there are opportunities to narrow lanes or implement a road diet, reallocated space may be used for bioretention facilities and pervious surfaces. Tree canopy can further buffer pedestrians from motor vehicle traffic.
- Plantings may be integrated with curb extensions and chicanes to provide stormwater retention and/or infiltration areas. Stormwater can be directed into these features by curb inlets or scuppers, or via the crowning of the street when curbs are not present.
- Traffic circles and roundabouts are traffic calming measures and can include low-maintenance, native plantings and stormwater infiltration to control stormwater runoff and filter pollutants through the soil and plant root uptake.
- Street trees and ground cover plants can be used to prevent soil erosion and preserve the soil's permeable qualities. Rain gardens and vegetated bioswales can be planted along paths to collect rainwater using local plants.

The NACTO *Urban Street Stormwater Guide* highlights how integrating stormwater features like permeable pavements, rain gardens, and bioretention planters into bulbouts, sidewalks, and bikeway buffers can enhance both resiliency and traffic calming.<sup>38</sup> It promotes the use of “stormwater street” typologies, such as offset green transitways and permeable shared spaces, which simultaneously manage runoff and create safer, slower environments for all users.



**Figure 16 Green Stormwater Infrastructure (Source: Toole Design)**

<sup>37</sup> FHWA Traffic Calming ePrimer <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer/module-5>

<sup>38</sup> NACTO Urban Street Stormwater Guide <https://nacto.org/publication/urban-street-stormwater-guide/>

# Complete Streets and Traffic Calming Measures

The following section outlines Complete Street and traffic calming measures, tools, and other best practices. Each measure is introduced with design guidance, siting recommendations, and appropriate contexts for application, as well as other considerations such as resiliency, emergency access, and placemaking.

## Understanding and Identifying Potential Measures

The Toolbox will provide guidance on the selection, siting, and design considerations that should be weighed when evaluating traffic calming and Complete Streets measures for use on streets in the WestCOG region. The following section provides a high-level overview of the types of measures and approaches that help to define different measures (Figure 17) based on what they are and how they work.

- **Speed Management**, refers to the measures, devices, and strategies to reduce traffic speeds to a desirable level. Within this category are **traffic control devices** and **traffic calming measures**.
  - » **Traffic control devices** refer signs, signals, and markings as included in the Manual on Uniform Traffic Control Devices (MUTCD). Traffic Control Devices may be featured in traffic calming measures, but are not inherently traffic calming, for example. Examples of traffic control devices that have been discussed in this review include speed feedback signs and gateway signage.
  - » **Traffic calming measures** refer to context-sensitive, self-enforcing measures to improve conditions for all modes and street users, improve the safety of drivers and driver behavior, and reduce speeds to a desirable speed. Within traffic calming, measures are organized based on how they are placed (**special street types**, **periodic** or **cross-sectional measures**) and the tools used to reduce speeds (e.g., vertical and horizontal deflection or lane narrowing).

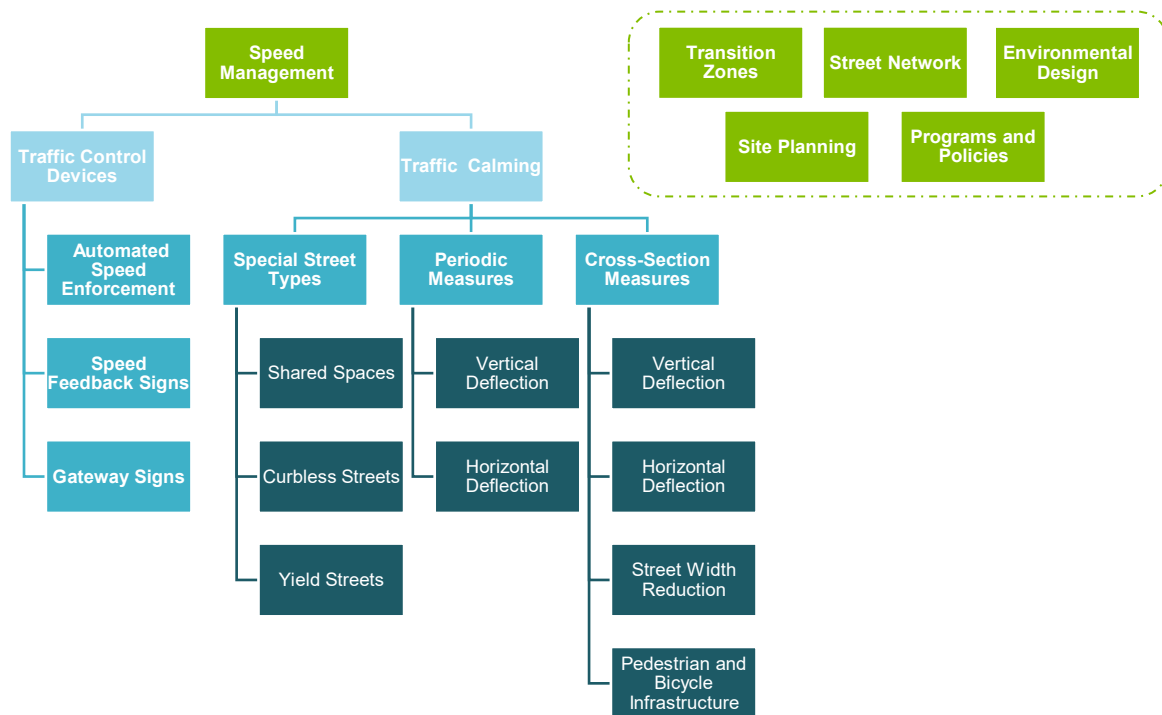


Figure 17 Understanding and Identifying Potential Measures Based on Type

Other concepts that can support traffic calming and Complete Streets, as introduced within this memo, are shown in Figure 17 at the same level as speed management. These items will be reviewed in the Toolbox, but not all will necessarily fall under the umbrella of planning precepts. For example, programs and policies may be referenced to explore opportunities to improve the safety and comfort of streets. Elements include the following:

- **Transition Zones**, as discussed throughout this memo, are a high priority for traffic calming. Beyond the specific measures that may be well-suited for transition zones, this category considers the context and entry sequence of design elements as drivers move from rural or low density/high-speed contexts to transition zones, to core areas.
- **Street Network** refers to opportunities to create street networks that are well connected and direct, with routes that foster redundancy and offer multiple alternative routes.
- **Environmental Design** specifically looks towards design elements that “soften” the street through plants and landscaping, unique and attractive materials, and textures, and creating a sense of enclosure.
- **Site Planning** refers to the immediate surroundings and frontages of the street. For example, promoting setbacks, frontages, and other consistent façade elements that maintain rhythm of the buildings and create a welcoming and comfortable space.
- **Programs and Policies** consider concepts beyond Complete Streets policies alone, and include a broad spectrum of priorities and activities that center on street safety, placemaking, and comfort such as Safe Routes to School, parking reduction strategies or policies, zoning overlays (e.g., TOD or streetscape), transportation demand management programs, and storefront improvement programs.

## Short-term Opportunities for Potential Measures

The measures reviewed in this section focus on design strategies and concepts, and present capital improvements to WestCOG roadways. However, municipalities can take near-term action to make meaningful safety improvements by advancing demonstration projects, pilots, or tactical treatments to quickly deploy safety measures using paint and other simple elements.

A popular example of tactical treatment is to use paint and vertical delineators (i.e., flexposts) to visually extend a curb. With this simple and light treatment, cars are not able to park in the curb extension area, pedestrians are able to safely wait, and crossing distances are shortened. In addition, the paint used to depict the bumpout can be used to incorporate a mural to reflect the community’s identity or character. These projects are also referred to as “quick-build” treatments for the speed of project delivery.

These pilot projects or treatments are effective short-term solutions for two key reasons. First, they demonstrate to the community how the measure works and how to use it. This can help reinforce the benefits of safety treatments to the community and to public works leaders and generate support for similar projects. It is a low-cost way to demonstrate efficacy to make compelling arguments for longer-term and more concrete capital improvements that lead to permanent installations. Many pilots are associated with evaluation studies to gather crash data and community feedback on the designs.

Secondly, and most importantly, quick-build projects allow municipalities to progress safety improvement projects in the near-term and can immediately make roadways safer for people biking, walking, or rolling. While capital improvements may be more effective at reducing the number and severity of crashes long-term, these projects can take years to design and build—while residents face unsafe conditions daily. Pilot projects can improve safety in the near-term until funding or support is secured for next-level designs.

In the following report, design interventions focus on the longer-term solutions. The Toolbox will reference quick-build variations and opportunities for the measures included.

## Organization and Defining Criteria

### *Placement and Siting Types*

Traffic calming measures are organized first according to the ways in which they are used or sited. These include special street types, periodic measures, and cross-section measures, defined as follows:

**Special Street Types**— Measures that alter the surface of the street in such a way that the street operates or functions differently than other streets. This includes shared space and curbless (flush) streets and yield streets.

**Periodic Measures** – Measures that are placed intermittently to reduce speeds, such as speed humps, mini-traffic circles, chicanes, median islands, or speed cushions.

**Cross-section Measures** – Measures that are installed continuously such that they are part of the cross-section of the street. Examples include lane narrowing, lane reconfiguration, two-way restoration, and curb extensions. Installing active transportation facilities is considered part of the cross-section measure category.

### *Design Categories*

Each type of measure is further defined into categories based on how they effectively reduce vehicle speeds:



**Street Width Reduction Measures** – Street width reduction measures narrow the width of the roadway, causing motorists to slow down. These measures include lane reconfiguration (road diet), lane narrowing, and curb extensions or chokers.



**Horizontal Deflection** – Horizontal deflection measures force motorists to slow down by preventing them from driving in a straight path. Examples include chicanes, roundabouts, and median islands.



**Vertical Deflection** – Vertical deflection measures force motorists to slow down by changing the height of the roadway. These include speed humps and speed tables, raised crosswalks, and raised intersections.



**Routing Restriction** – Restricting movements at intersections helps reduce motorists speed and volume. Examples include diagonal diverters, full roadway closures, median barriers, and forced turn islands.

### *Surrounding Context*

For the purposes of this memo, context refers to the following broad categories:



**Urban Core** – high density downtown cores, often featuring gridded street networks and multimodal transportation systems.



**Community Center** – “Main Streets” that serve as active community centers with a mix of land uses, often in towns and small cities; can also refer to the commercial areas in more rural contexts.



**Transition Zone** – the area between a lower density area and a community center, where drivers should be alerted to the changing context and prepare to operate at slower speeds while paying special attention to people walking, biking, or rolling.



**Rural or Residential Areas** – quiet, residential, or rural areas where low volumes of vehicles can lead to excessive speed.

## Outline of Best Practices

The following section focuses specifically on traffic calming measures (a subset of speed management). The measures discussed are presented in Table 6 below.

**Table 6 Table of Measures**

Placement and Siting Types	Design Category	Measures	Page
Special Street Types	Shared Space / Curbless Streets	Shared Space / Curbless Streets	29
	Yield Streets	Yield Streets	31
Periodic Measures	Vertical Deflection	Speed Humps, Cushions, and Tables	32
		Raised Crosswalk	34
		Raised Intersection	35
	Horizontal Deflection	Chicane	36
		Neighborhood Traffic Circle or Mini-Roundabouts	37
		Modern Roundabouts	38
		Median Island	39
Cross-Section Measures	Horizontal Deflection	Curb Extension	40
	Street Width Reduction	Lane Reconfiguration	41
		Lane Narrowing	42
	Routing Restriction	Diagonal Diverter	43
		Closures	44
		Median Barrier/Forced Turn Island	45
Other Measures	Gateway Treatments	Gateway Treatments	46

## Special Street Types

### Shared Space and Curbless Streets

Shared space refers to a design concept in which the street surface is level and all users “share space.” With one level or flush surface, the street lacks the formal channelization of modes —i.e., curbs or physical, vertical delineation between spaces for walking, biking, driving, or parking. This blurs the line between the space that is intended for each mode, and all modes must share the right-of-way through interpersonal or visual coordination. In line with person-to-person negotiation of movement, traffic control devices are limited in shared spaces.

Shared space designs are very context sensitive. Some streets operate by default as shared spaces, such as narrow alleys and service roads in urban contexts, and lower density, low volume roads without defined spaces for walking. In community cores and higher-density contexts, shared spaces may be wider and accommodate more furniture and gathering spaces, using design treatments and textures to specifically designate a pedestrian access route where vehicles cannot travel and incorporating elements to encourage the space to function as a plaza.<sup>39</sup> Shared spaces use many traffic calming measures to reduce car throughput and speeds (i.e., to a walking pace), with an emphasis on gateway treatments to alert drivers to the new context, and with many horizontal treatments such as chicanes.

Low volume, low speed residential streets are often designed without dedicated facilities and all users already share space; adding safety measures and treatments to intentionally define the space as a shared area can be a valuable tool for neighborhoods.<sup>40</sup> Shared spaces function as a paved yard with space for play and for gathering.

Residential shared spaces are especially common outside of the U.S. As one example of these case studies, the U.K. created a Home Zone pilot to evaluate the efficacy and use of shared spaces in residential neighborhoods. Finding that the streets leveraged safety, placemaking, and community benefits, the program expanded to 60 sites.<sup>41</sup>

### Shared Space Policy

Because of how shared spaces are designed to be used, municipalities may require specific language to enable the design considerations necessary for sharing space. Common policies involve pilots or specific design standards.



**Figure 18 All users share space in New Haven, CT, Reykjavik, Iceland, Havre de Grace, MD, Cambridge, MA, and Montreal, QC (Source: Google Maps for MD; Toole Design)**

<sup>39</sup> FHWA Accessible Shared Streets [https://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/publications/accessible\\_shared\\_streets/fhwahep17096.pdf](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/accessible_shared_streets/fhwahep17096.pdf)

<sup>40</sup> NACTO, Urban Street Design Guide <https://nacto.org/publication/urban-street-design-guide/streets/residential-shared-street/>

<sup>41</sup> DVRPC Curbless Streets <https://www.dvrpc.org/reports/16044.pdf>

Pilot projects allow a municipality to install a treatment and evaluate its effectiveness without necessarily approving new design practices. For example, Chicago enacted a policy that defined a shared space pilot with basic principles and specified that “pedestrians have the right-of-way over all other traffic” including authority to cross at any point and time. In some instances, municipalities approve pilot designs as an appendix to a local design guide. In Seattle, the DOT adopted a proposed shared space design as an appendix to the Seattle Right-of-Way Improvements Manual, noting the design was conceptual but met approvals through the DOT and the Department of Planning and Development, and was recognized as a treatment.

More formal approaches to involve design guidance or specific language about what a shared space is in a local ordinance. Ashland, OR adopted a policy that “*on neighborhood streets with relatively low average daily traffic (ADT), use the curb-to-curb area on neighborhood streets as a shared space by moving automobiles, parked cars, and bicycles... emphasize a slower speed environment and provide clear physical and visual indications the space is shared across modes.*” Montgomery County, MD adopted a *Complete and Shared Streets Design Guide* as a supplement to their *Complete Streets Design Guide* in 2024. This Guide outlines measures to define zones without vertical changes and considerations for accessibility, stormwater, and intersecting conventional streets.

### Design Considerations

- Maintain a clear path (also referred to as a Comfort Zone) where vehicles are discouraged and pedestrians can travel unobstructed.
- The street is intended be used by people walking, biking, driving, alongside non-mobility uses such as gathering, sitting and dining, playing, or other gathering and event activities.
- The design of the right-of-way lacks the formal and often vertical separation between mode spaces (i.e., sidewalks and cartways) and instead blurs this delineation so that all users share the space.
- Traffic calming measures are included with a focus on gateways, paving treatments, and horizontal shifts; however traffic control devices and signage are minimized as much as possible.
- Stormwater: Shared spaces can include trees and landscaping to capture stormwater runoff, as well as bioretention areas and changes in pavement material to allow additional capture of stormwater.

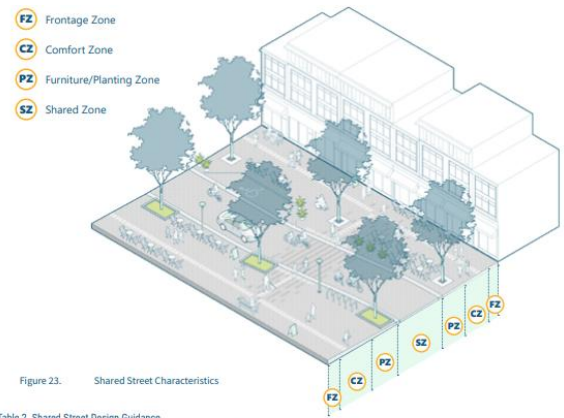


Figure 23. Shared Street Characteristics

Table 2. Shared Street Design Guidance

Item	Design Guidance (Width)	Notes
Total ROW	60' default / 30' min.	
Frontage Zone	7' default / 0' min. (each side)	May be reduced from default where existing ROW is limited, or with consent of fronting property owners.
Comfort Zone	8' default / 6' min. (each side)	May be reduced from default by Design Exception; must adequately meet all Special Considerations (see Section 4); Comfort Zone should provide +2' above Minimum along each side where a fixed object spans 6' or more longitudinal length.
Furniture Zone	6' default / 3' min. (each side)	May be reduced from default by Design Exception; must adequately meet all Special Considerations.
Shared Zone	18' default / 16 min. (bidirectional) 12' default and min. (one way)	Includes drains. Less than 18' only permitted if no large vehicles expected to use the street, other than emergency vehicles. The width across the Shared Zone, measured between fixed objects within the Furniture Zone, must be no less than 20'.
Parking	7' default width, 13' width for accessible spaces	If provided, maximum of 1 side at a time. Consider forming chicanes by alternating which side parking is provided on.

Figure 19 Example from Montgomery County Shared and Curbless Street Design Guide (Source MCDOT)



### Application

Shared spaces are appropriate in low vehicular volume urban core and community center areas where there are a lot of pedestrians, bicyclists, and other roadway users.

### Special Considerations

- ✓ **Emergency Access:** Shared space design can generally be applied along a primary emergency vehicle route.
- ✓ **Transit:** Shared space design can generally be implemented along a bus transit route depending on the scale of traffic calming treatments being applied.

## Yield Streets

Yield Streets are low volume and slow speed streets that allow bidirectional travel but are designed as a single travel lane. As a result, any oncoming vehicles must yield to one another as they travel the street and pass each other. They can provide separate facilities for pedestrians, or be configured as a shared space.

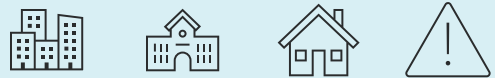
To allow for this negotiation of movement, NACTO recommends to alternate on-street parking or ensure there are other spaces provided to pull over and pass.<sup>42</sup>

### Design Guidance

- A yield street with parking on both sides functions most effectively at 24–28 feet, while yield streets with parking on only one side can be as narrow as 16 feet.
- Regular passing areas should be considered on yield streets narrower than 15 feet in width. The recommended spacing for passing areas is one every 300 feet.<sup>43</sup>
- Stormwater: Opportunity to provide curb extensions with green infrastructure.



Figure 20 Yield Street in Seattle, WA  
(Source: Toole Design)



### Application

Lane narrowing may be appropriate in all contexts, especially in urban and community center areas where there are more pedestrians and bicyclists.

Lane narrowing may be an effective tool at transition zones to communicate a sense of enclosure as they transition to a slower speed area.

### Special Considerations

- ✓ **Emergency Access:** Lane narrowing should consider emergency vehicle access. Emergency vehicles typically need 20 feet of unobstructed space for access.
- ✓ **Transit:** Yield Streets will typically not feature transit service due to the constrained width.

<sup>42</sup> NACTO Urban Street Design Guide <https://nacto.org/publication/urban-street-design-guide/streets/yield-street/>

<sup>43</sup> FHWA Small Town and Rural Multimodal Networks [https://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/publications/small\\_towns/fhwahep17024\\_lg.pdf](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf)

## Periodic Measures

### Speed Humps, Cushions, and Tables

Vertical deflection is one of the most recognized and applied forms of traffic calming because it is a relatively inexpensive yet effective treatment. Speed humps reduce the number of expected crashes by around 40% (i.e., municipalities can expect 40 percent fewer crashes after installing a speed hump) and, when focusing on crashes that result in an injury, speed tables can reduce severe injury-related crashes by more than 90 percent.<sup>44</sup> However, vertical deflection presents two key issues that impact their efficacy. First, DOTs and other agencies report issues with snowplows damaging the raised features. The other issue is more behavioral: vertical deflection may not cause drivers to maintain consistently slower speeds, but instead drivers may slow down for speed humps and accelerate afterwards.

Speed humps, speed cushions, and speed tables are all gradual mounds of asphalt built into the pavement that encourage motorists to slow down.

- **Speed humps** are continuous and maintain the hump height across the roadway cross-section.
- **Speed cushions or speed lumps** are similar to speed humps but include wheel cutouts at set locations to allow larger vehicles such as buses and emergency vehicles to pass without vertical deflection while reducing passenger car speeds. The wheel cutout also allows people riding bicycles to pass through without slowing down.
- **Speed tables** include a longer taper and a flat top for more gradual deflection. Often, speed tables are designed as raised midblock crosswalks or intersections.
- **Speed bumps** are often grouped colloquially with this type of treatment but are not a typical traffic calming design. Speed bumps refer to the more abrupt vertical deflection devices in shopping centers or other community spaces where very slow speeds (e.g., less than 5 MPH) are required.



**Figure 21 Vertical Deflection Examples (from top): Speed Hump in Pittsburgh, PA, Speed Cushion in Kirkland, WA, Speed Table (Raised Crossing) in Eugene, OR, and Speed Bump in Snowhill, MD (Source: Toole Design)**

<sup>44</sup> Engineering Speed Management Countermeasures: A Desktop Reference of Potential Effectiveness in Reducing Crashes [https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/eng\\_ctm\\_crsh\\_14.pdf](https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/eng_ctm_crsh_14.pdf)

## Design Guidance

### Speed Humps

- Speed humps should be about 3 inches in height at their center, and 12-18 feet wide. Speed humps should be installed in a series and generally placed between 150 and 250-feet apart.
- When midblock crossings are present, a speed hump should be placed no more than 50feet ahead of the crosswalk. This ensures drivers do not start speeding as they approach all the crosswalks in the series.
- Speed humps should generally be placed 150-feet from an unsignalized intersection, or 250-feet from a signalized intersection.
- Speed humps should be accompanied with “speed hump” signs (MUTCD W17-1) to provide advance notice to the plow drivers to lift their blades for snow clearance.
- Stormwater: If these and other raised devices will impact existing drainage patterns, additional stormwater design will be needed. Generally, speed humps, speed cushions, and speed tables can be located and designed to mitigate impacts to drainage and other above-ground utilities.

### Speed Cushions or Speed Lumps

- The cutouts in the speed cushions should be positioned such that a passenger vehicle cannot pass it without traveling over a portion of the raised pavement.
- Speed cushions should be the same height as speed humps, and their placement guidance is the same as speed humps.

### Speed Tables

- Speed tables extend across the roadway like a speed hump; however, they have a flat top (typically, 10-foot wide) to accommodate the entire wheelbase of most passenger cars.
- A speed table taper should be no greater than 1:6.



### Application

Speed humps, speed cushions, and speed tables are appropriate in community centers, rural and residential areas. Speed humps are more typical in local roadways and residential areas. Speed cushions and speed tables can more comfortably accommodate larger vehicles and therefore, may be more appropriate in higher volume streets in community centers.

Speed humps, speed cushions, and speed tables should be located to avoid conflict with underground utility access and drainage structures. They should not be placed in front of driveways. They should not be installed if the design speed for the roadway is more than 30 mph.

### Special Considerations

- ✓ **Emergency Access:** Speed humps are generally not appropriate along a primary emergency vehicle route. Speed cushions and speed tables can be designed to accommodate those routes. An emergency vehicle can cross a properly designed speed hump but at a slow speed.
- ✓ **Transit:** Speed cushions and speed tables are more appropriate along bus transit routes and provides a more comfortable experience for bus riders. Speed humps have also been installed along bus routes in some locations.



## Raised Crosswalk

In a raised crosswalk, the crosswalk is raised to the same level as the sidewalk on both sides, requiring motorists to slope up to “sidewalk level” and then back down. The upward slope up movement requires motorists to slow on approach to the raised crosswalk. This treatment improves visibility between pedestrians and motorists, encouraging yielding to pedestrians at the crosswalk. Raised crosswalks can be combined with curb extensions.

### Design Guidance

- Raised crosswalks may be constructed in asphalt or concrete. When constructed in asphalt, concrete or granite edge-line is recommended for longevity of the raised crosswalk.
- Transition slope for the raised crosswalk should be between 8 and 10 percent.
- Pavement markings and signage (W11-2) for raised crosswalks should be installed according to MUTCD 11th Ed.
- Raised crossings should be well marked for drivers and for winter maintenance. There should be no more than a ¼ inch lip to accommodate plow blades.
- A raised crosswalk can serve as a gateway treatment or entry feature to signal to motorists that they are entering an area where they may need to lower their speed.
- Stormwater: If raising a crossing will impact existing drainage patterns, additional stormwater design will be needed.



Figure 22 Raised Crosswalk in Columbia, MD  
(Source: Toole Design)



### Application

Raised crosswalks are recommended for **residential local streets or a collector street** where there is a crosswalk. They can be placed for a crosswalk at midblock location or at an intersection. They are, typically, installed in locations with a curb.

### Special Considerations

- ✓ **Emergency Access:** Raised crosswalks can be implemented in streets that are primary emergency vehicle routes.
- ✓ **Transit:** Raised crosswalks can be implemented on bus transit routes.



## Raised Intersection

A raised intersection raises the roadway to the same level as the sidewalk. This makes it physically more difficult for motorists to go through the intersections at high speeds and encourages motorists to yield to pedestrians and other users at the intersection.

### Design Guidance

- Raised intersections may be constructed in asphalt or concrete. When constructed in asphalt, concrete or granite edge lines are recommended for longevity of the raised intersection.
- Transition slope for the raised intersection should be between 8 and 10 percent.
- Pavement markings and signage (W11-2) for raised crosswalks should be installed according to MUTCD 11th Ed.
- Raised intersection should be well marked for drivers and for winter maintenance. There should be no more than a ¼-inch lip to accommodate plow blades.
- A raised intersection can serve as a gateway treatment or entry feature to signal to motorists that they are entering an area where they may need to lower their speed.
- Stormwater: If raising the intersection will impact existing drainage patterns, additional stormwater design will be needed.



Figure 23 Raised Intersection in Cambridge, MA  
(Source: Cara Seiderman)



### Application

Appropriate for the intersection of collector and local streets and is appropriate for both residential and commercial land-use context.

May also be appropriate at intersections on downtown/Main Street low-speed business district with high pedestrian activity.

### Special Considerations

- ✓ **Emergency Access:** Raised intersections can be implemented in streets that are primary emergency vehicle routes.
- ✓ **Transit:** Raised intersections can be implemented on bus transit routes.

## Chicane

A chicane is a series of alternative curves or lane shifts that force motorists to weave around them and reduce the speed at which a motorist can comfortably travel through the street.

### Design Guidance

- Chicanes can be created with curb extensions that alternate from one side of the street to the other. They may also be implemented using tactical materials such as paint and barriers like flexible delineators or planters to achieve similar effect in the short-term.
- Chicane-like effect can also be achieved by alternating on-street parking from one side of the street to another. This creates a taper in the roadway and forces motorists to shift instead of traveling straight along the street.
- Stormwater: Chicanes created using curb extensions can be places for trees, bioretention, and landscaping.



Figure 25 Chicane in Founex, Switzerland (Source: Toole Design)



Figure 24 Chicane in Seattle, WA (Source: Toole Design)



### Application

Chicanes are typically recommended in **lower volume street** or **local street** if they are closely spaced. They are most effective in reducing speeds if traffic volumes are relatively balanced in each direction.

A chicane achieved by alternating on-street parking may be appropriate in more urban and commercial streets.

### Special Considerations

- ✓ **Emergency Access:** Chicanes are appropriate in locations that provide emergency access as long as traffic volumes allow for vehicles to straddle the centerline.
- ✓ **Transit:** Chicanes can be appropriate along a bus transit route.

## Neighborhood Traffic Circle or Mini-Roundabouts

A neighborhood traffic circle consists of a raised island placed within an unsignalized intersection. The island forces motorists to reduce their speed in order to maneuver through the intersection in a counterclockwise direction. They are smaller than a modern roundabout and typically, do not have clearance for a left-turning truck, emergency vehicle, or bus to circulate counterclockwise unless the island is mountable.

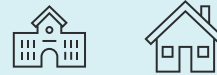
A mini-roundabout is also placed within an unsignalized intersection and is similar to a neighborhood traffic circle. However, they are designed with roundabout design principles where all traffic can circulate counterclockwise around or partially over the center island.

### *Design Guidance*

- The center island of a neighborhood traffic circle or mini-roundabout may be fully non-traversable, partially traversable, or fully traversable. Both are most effective when defined by a raised curb and landscaped area to reduce the open feeling of the street or intersection. It may also be a simple painted area if the circle or roundabout needs to be traversable.
- The intersection approaches to a neighborhood traffic circle do not require splitter island or pedestrian median island. A mini-roundabout does use splitter islands to direct traffic entering the intersection. Splitter islands can be either mountable or at-grade depending on the need to accommodate large vehicles such as trucks, school buses, etc.
- Neighborhood traffic circles are more effective in slowing motorists speed when several are used in a series of intersections along a corridor.
- Stormwater: Designs may provide an opportunity for landscaping or plantings in the center island to capture stormwater runoff.



**Figure 26 Neighborhood Traffic Circle Example**



### *Application*

Neighborhood traffic circles and mini-roundabouts are appropriate in **community center**, and **rural** and **residential** areas.

A neighborhood traffic circle is appropriate at the intersection of two local roads. A mini-roundabout is appropriate where two local roads intersect or where a local road and a collector road intersect.

### *Special Considerations*

- ✓ **Emergency Access:** Neighborhood traffic circles are not appropriate along a primary emergency vehicle route. Mini-roundabouts can accommodate emergency vehicles and can be applied along a primary emergency vehicle route.
- ✓ **Transit:** Generally, a transit route should not include a left turn at a neighborhood traffic circle or a mini-roundabout.

## Modern Roundabouts

A modern roundabout is an intersection design that is often used as a replacement for a signalized intersection. Roundabouts include a center island that forces motorists to reduce their speed and circulate counterclockwise around the island to pass straight through or to make a turn to an intersecting street. A modern roundabout is most effective with one approach lane in each direction and one circulating lane around the center island but can be designed to accommodate additional lanes if needed.

Notably for traffic calming, modern roundabouts are effective at processing higher volumes of traffic which can allow for other lane configuration strategies.

### *Design Guidance*

- The center island of a modern roundabout can be fully non-traversable or partially traversable. A partially traversable roundabout usually has a smaller non-traversable area as well as a mountable area with a truck apron depending based on the size and type of large vehicles that need to maneuver around the intersection.
- A roundabout can be used to signal a change in environment from a higher-speed roadway operation to a lower-speed operation where the community density may be higher with more pedestrian presence.
- Approaches to a modern roundabout should have splitter islands to direct traffic entering the intersection. The splitter island may also serve as a pedestrian median island so that pedestrians have space to wait as they cross the street.
- Providing raised crosswalks at crosswalks around a roundabout is recommended to further reduce motorist approaching speed and provide more visibility and better yielding to pedestrians.
- Stormwater: The center island in a roundabout provides opportunities for trees, bioretention, and landscaping.
- See NCHRP Research Report 1043: Guide for Roundabouts includes guidance on roundabouts<sup>45</sup>



**Figure 27 Modern Roundabout in Woodinville, WA**  
(Source: Toole Design)



### *Application*

Modern roundabouts are appropriate in **urban core, community center, rural, and transition areas**. This treatment may serve as a gateway treatment to alert drivers to a new context and may be implemented in transition zone intersections to signal that a slower moving area is approaching.

A modern roundabout is appropriate at the intersection of two arterial streets or an intersection of an arterial street with a collector street.

### *Special Considerations*

- ✓ **Emergency Access:** A modern roundabout can be applied on roadways that are primary emergency vehicle routes.
- ✓ **Transit:** Modern roundabouts can be implemented along a bus transit route.

<sup>45</sup> NCHRP 1043: Guide for Roundabouts <https://nap.nationalacademies.org/catalog/27069/guide-for-roundabouts>

## Median Island

A median island is a raised island located along the roadway centerline that narrows the travel lane, encouraging motorists to slow their speed.

### *Design Guidance*

- A median may be painted or constructed with temporary materials, but it is most effective when it is defined by a raised curb. Textured pavement may also be applied on a median island where a raised curb is not being implemented.
- At locations with an uncontrolled crosswalk, a median island can serve as a pedestrian crossing island so that pedestrians have space to wait as they cross a multi-lane roadway. This is recommended especially for midblock crosswalks. To allow for an accessible pedestrian refuge, median islands should be at least 6 feet long in the direction of pedestrian travel.
- Introducing a median island can serve as a gateway treatment or entry feature to signal to motorists that they need to reduce their speed, often by creating a lateral shift or chicane in the roadway alignment.
- Stormwater: Drainage calculations should account for potentially flush surfaces on the pedestrian route (if there are crossings present) to ensure standing water does not become an issue. Likewise, the installation of medians may require adjusting the crown of the street to ensure water continues to drain towards the outer curbs, unless green stormwater infrastructure within the median island is the preferable channel. The median island can serve as space for vegetation and landscaping, provided that it does not compromise the sightline of pedestrians and motorists.



**Figure 28 Median Island in Sacramento, CA and Denver, CO (Source: Toole Design)**



### *Application*

Median islands may be placed at midblock or on approach to intersections. They are typically found in urban core and community center areas where there is curbing but can also be appropriate in rural/residential areas and at transition zones.

### *Special Considerations*

- ✓ **Emergency Access:** Median islands are appropriate along primary emergency access routes. They should be designed with a radius to accommodate these vehicles.
- ✓ **Transit:** Bus transit can operate on roadways with median islands, provided that the median curb radius can accommodate them.

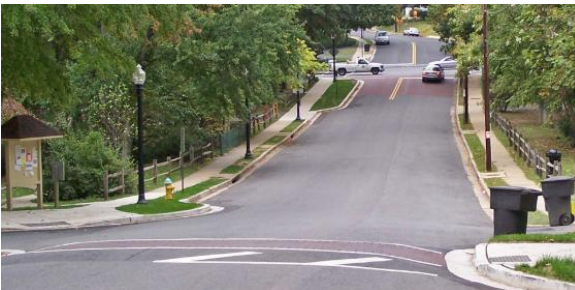
## Cross-Section Measures

### Curb Extension

Curb extensions extend the sidewalk or planting strip into the travel way at the location of a crosswalk on one or both sides. They help reduce vehicle speeds by narrowing the street and creating a “choke” point. Curb extensions can be applied both at midblock or at intersections.

#### Design Guidance

- Curb extensions are recommended treatments for at-grade crosswalks where there is parking, wide shoulders, or other activities along the curb.
- This treatment can bookend the curbside uses such as parking and loading at intersections to improve sight lines between pedestrians and motorists.
- Stormwater: Curb extensions may provide space to plant new street trees, bioretention facilities, and landscaping. If building a curb extension will change existing drainage patterns, additional stormwater design will be needed.
- Tactile Treatments: Curb extensions are popular options to use as demonstration projects for high-visibility, high-impact traffic calming treatments. Curb extensions may be painted, patterned, or have other creative features to incorporate placemaking into the design.



**Figure 30 Example of a Demonstration Project - Curb Extension Treatment (top) and curb extensions in Arlington, VA (Source: Toole Design)**



**Figure 29 Curb Extension in a Residential Area of La Crosse, WI (Source: Toole Design)**



#### Application

Curb extensions are recommended in **urban core** and **community center** areas where there is a desire line for pedestrians to cross the street, especially where there is on-street parking present.

#### Special Considerations

- ✓ **Emergency Access:** Curb extensions can be implemented along a primary emergency vehicle route, provided that the curb radius can accommodate the vehicle turning radius.
- ✓ **Transit:** Curb extensions should be designed to accommodate the appropriate transit vehicle turning radius. Curb extensions can provide more space for bus stop amenities such as bus shelters. If designed to be longer, curb extensions can enable both front and back transit bus doors to open to an accessible landing area so that the bus can stop in-lane instead of pulling in and out of the stop. This decreases the time bus operators spend maneuvering around a bus stop.



## Lane Reconfiguration (Road Diet)

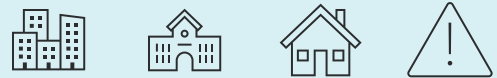
Lane Reconfiguration or Road Diet refers to the removal of motor vehicle lanes from a street’s cross-section, allowing space to be reallocated for various desirable purposes (e.g., wider sidewalks, landscaping, street trees, stormwater infrastructure, bike lanes, parking, etc.). Removing lanes reduces vehicle speeds by visually decreasing and narrowing the roadway. In the typical case of a 4-lane to 3-lane conversion, road diets have been shown to reduce crashes by 19-47%. The FHWA offers a Road Diet Informational Guide for recommended design treatments and configurations depending on the context of the street.<sup>46</sup>

### Design Guidance

- Typically, a road diet is implemented on a roadway with average daily traffic of 20,000 vehicles or less.
- Some agencies have had success with road diets at higher traffic volumes. The goals of the project should inform if road diets are recommended for higher volume roadways. E.g., if the project is primarily focused on making roads and intersections safer for pedestrians, the safety benefits for pedestrians and motorists should be weighed proportionally.
- Consideration of the whole roadway network may also be needed when assessing these design decisions.
- Stormwater: Opportunity to reallocate hardscape surface and pavement with pervious surface or green infrastructure.



Figure 31 Lane Reconfiguration in Athens, GA (Source: Toole Design)



### Application

Lane reconfiguration may be appropriate in all the contexts, especially in **urban** and **community center** areas where there are more people using multimodal options. In **rural** and **transition** zones, where design speeds in may be higher, longer taper lengths are needed when transitioning from an area with multiple lanes to fewer lanes.

Residential areas generally do not have multiple lanes and lane reconfiguration may not be needed. These areas may benefit from other street width reduction measures.

### Special Considerations

- ✓ **Emergency Access:** Work with responders to understand their needs and ensure designs do not cause congestion that would severely impede access along a primary emergency vehicle route or street.
- ✓ **Transit:** There may be opportunities to reallocate space for bus lanes, queue jumps, and enhanced bus stops access.

<sup>46</sup> FHWA Road Diet Informational Guide <https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/rdig.pdf>



## Lane narrowing

Reducing lane widths can reduce vehicle speeds as it visually narrows the roadway. While specific recommendations vary by context, a recent study<sup>47</sup> of lane narrowing found that 9-foot lanes produced crash reductions on roads with posted speeds between 30-35 MPH, and did not impact or increase vehicle crashes in other contexts. This study also reports that the pedestrians and cyclist safety improved, both from reduced vehicle speeds and from the reduction in exposure to conflicts with other users at crossings and in on-street facilities (i.e., allowing for more separation between travel and bicycle lanes, and reducing the distance that pedestrians must cross).

### Design Guidance

- Travel lanes should be narrowed to 10-feet where feasible. 11-foot lanes are most appropriate for outside lanes where buses and other heavy vehicles (e.g., freight trucks) operate. Narrow 9-foot lanes may be considered on local streets in constrained areas with low vehicle volume, such as residential streets with fewer than 250 AADT and few heavy vehicles.<sup>48</sup> Studies of these lanes in some urban environments have not shown detrimental effects.
- Lane narrowing should be especially prioritized at intersections and on approaches to crosswalks where more conflict is expected and slowing vehicle speeds is more important.
- Stormwater: Opportunity to repurpose hardscape surface and pavement after lane narrowing with pervious surface or green infrastructure.
- Physical barriers similar to curb extensions can help visually and physically narrow existing lanes in key areas, encouraging drivers to slow down and providing a safe refuge for pedestrians if needed.



Figure 33 Example of a Lane Narrowing/Bump out treatment in Bethesda, MD (Source: Toole Design)



Figure 32 Lane Narrowing in Denver, CO (Source: Toole Design)



### Application

Lane narrowing may be appropriate in all contexts, especially in urban and community center areas where there are more pedestrians and bicyclists.

Lane narrowing may be an effective tool at transition zones to communicate a sense of enclosure as they transition to a slower speed area.

### Special Considerations

- ✓ **Emergency Access:** Lane narrowing should consider emergency vehicle access. Emergency vehicles typically need at least 16 feet of unobstructed space for access (except at spot locations).
- ✓ **Transit:** In most jurisdictions, 11-foot lanes are considered appropriate for bus access. With lane narrowing, there may be opportunities to expand space for bus stops.

<sup>47</sup> A National Investigation on the Impacts of Lane Width on Traffic Safety. <https://narrowlanes.americanhealth.jhu.edu/>

<sup>48</sup> Operational and Safety Characteristics of Lane Widths. [https://rosap.ntl.bts.gov/view/dot/31091/dot\\_31091\\_DS1.pdf](https://rosap.ntl.bts.gov/view/dot/31091/dot_31091_DS1.pdf)

## 🚫 Diagonal Diverter

A diagonal diverter is a physical barrier placed diagonally across a four-legged intersection. The barrier can reduce traffic volumes by preventing motorists from driving straight through the intersection. They are often used to prevent cut-through traffic on local and residential streets.

### Design Guidance

- Diagonal diverters are only applicable at intersections and not at midblock locations.
- They are most effective when implemented in a group or cluster of diverters or other traffic calming treatments since a single diverter may just increase traffic to other streets in the network.
- A diagonal diverter can be designed with small gaps or openings to allow people riding bicycles to go through the intersection. Pedestrian access should also be provided through the diverter.
- Diagonal diverters are typically built with concrete and may include landscaping. Object markers and other signage are used to enforce the change in geometry.
- Stormwater: Diverters can be built with landscaping or plantings to capture stormwater runoff. They can be designed to maintain existing drainage patterns.



**Figure 34 Diagonal Diverter Example (Source: Toole Design)**



### Application

Appropriate at local and collector streets in urban, community center, and residential settings. They are typically implemented in areas with existing curbs.

### Special Considerations

- ✓ **Emergency Access:** Diagonal diverters are not appropriate along a primary emergency vehicle route as it restricts movements through an intersection.
- ✓ **Transit:** Diagonal diverters are not appropriate along a bus route that passes straight through an intersection without altering the transit route.

## 🚫 Closures

As part of network reconfiguration, it may be beneficial to consider closing select roads to motorists or placing restrictions on the traffic allowed within the space. These decisions should be approached with caution and require significant coordination with the local and emergency response leadership to ensure that closures and the subsequent displacement of traffic does not overly burden parallel routes or concentrate traffic in counterproductive ways.

A closure is a physical barrier that blocks motorists from traveling through the street. Closures can be designed as a half closure or full closure. In a full closure (also called a dead end), vehicle travel is completely blocked to through vehicle traffic. In a half closure, vehicle travel is blocked in one direction on a two-way street.

### Design Guidance

- A half closure should be designed to be longer than a passenger car to deter motorists from going in the wrong way. Typically, half closures extend to the street centerline.
- Implementing a single half or full closure may shift traffic onto other local streets that may not be able to accommodate increased traffic. They should be implemented with the larger street network in mind and are most effective if installed in a group or a cluster of closures or other traffic calming treatments that reduce cut-through traffic.
- Closures should be designed to accommodate people riding bicycles and pedestrians while restricting motorist access.
- Closures are typically built with concrete and may include landscaping but can also be implemented using temporary materials. Object markers and other signage are used to enforce the change in geometry.
- Stormwater: Closures can be built with landscaping or plantings to capture stormwater runoff. They can be designed to maintain existing drainage patterns.



Figure 35 Closure Example (Source: Toole Design)



### Application

Appropriate at local and collector streets in urban core, community center, and residential settings. They are typically implemented in areas with existing curbs.

### Special Considerations

- ✓ **Emergency Access:** Closures are not appropriate along a primary emergency vehicle route as it restricts movements through an intersection.
- ✓ **Transit:** Closures are not appropriate along a bus transit route.

## 🚫 Median Barrier/Forced Turn Island

A median barrier is a raised island along the centerline of a street and continuing through an intersection that prevents left-turn movements from all intersection approaches and also blocks motorists from traveling straight through the intersection from the side street. A forced turn island is a triangular-shaped raised island which channels motorists to make a right turn while blocking through and left movements from side streets.

Both treatments are often used to reduce cut-through traffic from major streets onto local and more residential streets.

### Design Guidance

- Implementing a single median barrier or forced turn island may shift traffic onto other local streets that may not be able to accommodate increased traffic. They should be implemented with the larger street network in mind and are most effective if installed in a series of median barriers or a set of forced turn islands.
- Median barrier and forced turn island should be designed to accommodate people riding bicycles and pedestrians while restricting motorist access.
- Closures are typically built with concrete and may include landscaping but can also be implemented using temporary materials. Object markers and other signage are used to enforce the change in geometry.
- Stormwater: Median barrier and forced turn island can include landscaping or plantings to capture stormwater runoff. They can be designed to maintain existing drainage patterns.



Figure 36 Median Barrier Example (Source: Toole Design)



### Application

Appropriate at local and collector streets in urban core, community center, and residential settings. They are typically implemented in areas with existing curbs.

### Special Considerations

- ✓ **Emergency Access:** Median barrier and forced turn island are not appropriate if they would block access along a primary emergency vehicle route.
- ✓ **Transit:** Median barrier and forced turn island are not appropriate along a bus route that passes straight through an intersection without altering the transit route.

## Other Measures

### Gateway Treatments

Gateway treatments include physical or geometric landmarks that indicate a change in environment from a higher speed roadway to a lower speed residential or commercial district.

#### Design Guidance

- Gateway treatments typically include signage (e.g., speed limit signs, entrance signs to neighborhoods/communities), monuments, pavement markings, change in pavement material, trees, and landscaping to communicate change in environment to a lower speed area. They can also include other traffic calming measures including horizontal and vertical deflection measures to further lower motorist speeds.
- Gateway treatments are most effective when they are implemented in a series starting with smaller interventions like speed limit signage changes and pavement changes and building up to include trees and landscaping as well as other traffic calming measures. This ensures that motorists are able to adjust to a lower speed area gradually and more safely instead of rapidly.
- Gateway treatments have also been used to communicate historic aspects of some towns and streets using elements like monuments and special signage.
- Stormwater: Gateway treatments can include trees and landscaping to capture stormwater runoff. Additional traffic calming treatments can also include plantings to capture stormwater.



Figure 37 Gateway Example in Hilliard, OH



#### Application

Appropriate in urban core, community center, rural and residential areas, and within transition zones. They are typically used in settings where motorists exit from a high-speed arterial roadway towards town centers and residential areas.

#### Special Considerations

- ✓ **Emergency Access:** Gateway treatments can typically be applied along a primary emergency vehicle route depending on the scale of traffic calming treatments being applied.
- ✓ **Transit:** Gateway treatments can typically be implemented along a bus transit route depending on the scale of traffic calming treatments being applied

## Next Steps

The best practices within this memorandum will be used to shape the development of a set of planning precepts for the Traffic Calming and Complete Streets Best Practices Toolbox. Traffic calming designs and concepts, as well as specific considerations for each measure and its suitability in the WestCOG region, will be cross-referenced with feedback from the Project Advisory Committee, input from a series of focus groups with local emergency response and fire professionals, and other relevant local considerations or specifications.