

Metropolitan Research Center



THE UNIVERSITY OF UTAH
DEPARTMENT OF
CITY & METROPOLITAN
PLANNING

Livable Streets and Quality of Life

PREPARED BY

Reid Ewing; Alessandro Rigolon; Justice
Tuffour; Nawshin Tabassum; Grant
Hancock; Faria A. Zinia; & Gavin Schmidt

Prepared for: Salt Lake City Transportation Division



CONTENTS

MRC Report

<i>Executive Summary</i>	3
<i>Ch 1. Correcting the Record on Traffic Calming</i>	6
<i>Ch 2. Impacts of Traffic Calming on Safety</i>	14
<i>Ch 3. Impacts of Traffic Calming on Speeding</i>	24
<i>Ch 4. Impacts of Traffic Calming on Perception of Street Safety</i>	34
<i>Ch 5. Impacts of Traffic Calming on Other Quality of Life Indicators</i>	41
<i>Ch 6. Evidence from Case Studies Across 42 Diverse U.S. Cities</i>	48
<i>Appendices</i>	155

EXECUTIVE SUMMARY

Safer streets are more livable streets: Evidence for Practice, Policy, and Legislature

This report corrects the public record on traffic calming and presents a clear, evidence-based assessment of its impacts on safety, mobility, and quality of life. It was developed in direct response to the “Roadblocks to Quality of Life” report, which makes sweeping claims that traffic calming harms safety, delays travel, worsens environmental conditions, and undermines livability. After a comprehensive review of federal guidance, peer-reviewed research, and real-world case studies from cities across the United States, this report finds those claims to be inaccurate, misleading, and unsupported by credible evidence. Chapter One of this report provides a point-by-point critique, correcting falsehoods in the earlier report, and reaches an unequivocal conclusion: the “Roadblocks to Quality of Life” report is deeply flawed, misleading, lacks credibility, and should not be used to inform public policy. The chapter sets the stage that well-designed traffic calming saves lives, improves safety, and enhances, not diminishes, the quality of life.

Chapters Two through Five of this report follow up with a rigorous systematic literature review, cataloging over 700 empirically published studies, initially sourced from 7,780 studies from Scopus and PubMed on the subject matter. Focusing on safety impacts, Chapter Two finds that across decades of research and dozens of cities, traffic calming consistently reduces crashes, serious injuries, and fatalities - often by large margins. A synthesis of more than 40 high-quality studies shows that traffic calming typically reduces total crashes by 20–60 percent and severe or fatal injuries by 40–75 percent, with the greatest benefits coming from physical, self-enforcing street design measures such as speed humps and cushions, road diets, roundabouts, curb extensions, raised crossings, and pedestrian refuge islands. These safety gains are driven by one central mechanism: lower and more consistent vehicle speeds. Even modest reductions in speed produce disproportionately large reductions in injury severity. Area-wide and corridor-based programs outperform isolated treatments, demonstrating that traffic calming works best when implemented as a coordinated system rather than a one-off response.

Chapter Three examines the impacts of traffic calming on speeds. The report demonstrates that traffic calming reliably reduces dangerous speeding and creates safer, family-friendly everyday streets for all road users. Physical design changes consistently lower both average speeds and the highest, most dangerous speeds (85th percentile speeds), where the drivers are most likely to cause severe harm. Vertical deflection measures produce the largest immediate speed reductions, while horizontal deflection, roadway narrowing, and lane reallocation deliver sustained, corridor-level speed management. When applied across neighborhoods, traffic calming reshapes driver behavior, limits speed rebound, and establishes safer expectations for how streets should function. These outcomes are predictable, repeatable, and well documented - not experimental or far-fetched.

Public perception matters, so Chapter Four evaluated the impact of traffic calming on public perceptions of safety. The evidence shows that traffic-calmed streets are generally perceived as safer, especially by pedestrians, cyclists, families, children, and older adults. Studies consistently find that people feel more comfortable walking, biking, and crossing streets where traffic calming is in place, particularly when

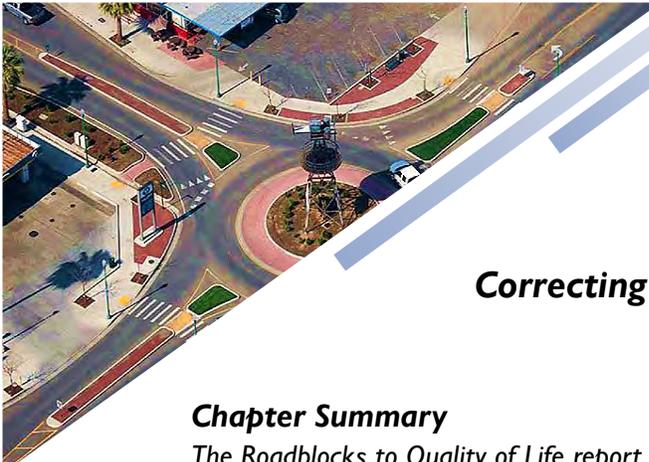
designs physically constrain vehicle behavior and simplify conflicts. Where perceptions are mixed, the issue is almost always design quality, spacing, or unfamiliarity, and not an inherent flaw in traffic calming. Raised crosswalks and road diets show the most consistent positive perception outcomes, reinforcing that streets that are designed to be safer also feel safer and are used more.

Chapter Five reviewed impacts on other quality-of-life indicators (specifically air quality, noise, emergency response, and economic outcomes). Results showed that impacts are mixed, more context-dependent, but they do not undermine the case for traffic calming. For instance, the evidence shows that while poorly designed or isolated measures can increase localized noise or emissions, coordinated, area-wide speed management, roadway narrowing, and well-designed interventions often reduce emissions, lower noise exposure, and improve neighborhood livability. Effects on emergency response times are modest, manageable, and largely avoidable when designs are coordinated with first responders. Moreover, economic impacts are mixed but generally positive, with many residents willing to trade minor inconvenience for greater safety, comfort, and neighborhood stability. The key lesson is clear: quality-of-life outcomes depend on how traffic calming is designed, not on whether it is used.

Finally, real-world case studies from more than 40 U.S. cities, some of the most progressive and livable cities in the U.S., including Arlington, Austin, Bellevue, Boulder, Charlotte, Eugene, Fort Lauderdale, Portland, and Seattle, and multiple Utah communities, confirm that traffic calming works in practice. Cities that conducted before-and-after evaluations consistently reported lower speeds, fewer crashes, and meaningful reductions in serious injuries and fatalities, often alongside increased walking and biking. Practical examples from cities like Austin, Boulder, and Charlotte showed that implemented traffic calming interventions cut dangerous speeding without reducing network capacity – reinforcing the evidence that it “slows traffic to safe speeds (i.e., speed limit) without creating congestion”. Residents reported feeling safer and more comfortable using their streets, and public support grew once benefits became visible. These cities demonstrate that “locally controlled” traffic calming is not a fringe idea meant to restrict mobility or an untested experiment: it is a mature, widely used, and proven public safety strategy that creates streets that work better for everyone.

The evidence is overwhelming. Traffic calming is not a roadblock to quality of life. It is one of its strongest foundations. Leading professional associations that provide guidance for transportation planning in the United States such as the Institute of Transportation Engineers (ITE) and the American Society of Civil Engineers (ASCE), have explicitly endorsed traffic-calmed, safer streets, supported by foundational work like Ewing’s Traffic Calming State of the Practice (1999), published by ITE, and the U.S. Traffic Calming Manual by Ewing and Brown (2009), published by ASCE and supported the U.S. Department of Transportation. Decades of research and real-world practice do not support a debate nor leave room for doubt about whether traffic calming works. That question has already been answered repeatedly and conclusively. The only question now is not if, but where, how, and how fast communities should scale up these life-saving interventions. Legislators and policymakers should reject misleading critiques and rely instead on the extensive, consistent, and credible evidence documented in this report. Safer streets are more livable streets, and traffic calming is one of the most effective tools we have to achieve them.

[Page intentionally left blank]



CHAPTER ONE

Correcting the Record on Traffic Calming

Chapter Summary

The Roadblocks to Quality of Life report presents a misleading and methodologically unsound critique of traffic calming that, if taken at face value, risks undermining evidence-based transportation safety policy. This critique systematically deconstructs the report’s core claims and demonstrates that its conclusions rest on false definitions, inappropriate data use, selective omissions of evidence, and repeated errors of causal inference. Specifically, the report mischaracterizes traffic calming by conflating it with traffic signals and congestion, relies on statistically unreliable commute-time data to manufacture a narrative of delay, ignores decades of federal and peer-reviewed research demonstrating large safety benefits, and misrepresents impacts on air quality and emergency response.

Drawing on established engineering practice, federal guidance, and a robust international evidence base, this critique shows that well-designed traffic calming consistently reduces crashes, injuries, and fatalities while improving pedestrian safety, neighborhood livability, and overall quality of life. The analysis concludes that the Roadblocks to Quality of Life report lacks credibility and should not be used to inform public policy. Instead, policymakers should rely on the overwhelming empirical record showing that traffic calming is not a roadblock to quality of life, but one of its strongest foundations.

1.1. Exposing Deficiencies of the “Roadblocks to Quality of Life” Report

The Roadblocks to Quality of Life report was written by two professors with no education or experience in transportation planning. Their claims contradict the overwhelming body of research and basic professional practitioner standards, rely on misused data or none at all, and incorrectly define the very subject upon which the report is based. The false claims that follow demonstrate the report’s utter lack of credibility.

False Claim #1: Traffic calming means stopping cars and worsening congestion.

The report repeatedly describes traffic calming as stopping traffic with lights, bumps, and obstructions. However, no professional definition equates traffic calming with deliberately causing stops, and traffic signals are not used for traffic calming.¹ Rather, traffic calming slows vehicles to posted speed limits and smooths traffic flow to improve safety.²

¹ FHWA Toolbox; ITE; AARP Livability Fact Sheet; Anaheim, Albuquerque, Greensboro NTMPs

² FHWA Traffic Calming ePrimer

False Claim #2: Commute times are rising and traffic calming is to blame.

The only commuter chart the report shows reveals an increase of just six seconds over the 8 years between 2015 and their most recent data in 2023. The report uses ACS commute data despite it being known to have large margin of error for local analysis³, and it presents correlation as causation without evidence. In fact, UDOT found minimal impact to commute times or network capacity.⁴

False Claim #3: Traffic calming is widespread on commuter streets and intends to cripple travel.

The vast majority of Salt Lake City's traffic calming is on local and collector streets, not arterials. The report argues these projects target commuter corridors, yet they do not.⁵ The FHWA finds that traffic calming reduces average vehicle speeds (toward the speed limit) and has minimal impact on travel times.⁶

False Claim #4: Traffic calming worsens air quality.

This section of the report suggests traffic calming stops traffic. Traffic calming creates steadier, safer, speed-limit traffic.⁷ The report cherry-picks stop-go models that reflect traffic lights rather than traffic calming.

False Claim #5: Road diets increase congestion and danger.

The FHWA and decades of U.S. research have found that road diets reduce crashes significantly without meaningful congestion impacts.⁸ Their dismissal of overwhelming evidence suggests either lack of familiarity or intentional disregard.

False Claim #6: Emergency response is not considered in traffic calming measures.

Salt Lake City already uses modern traffic calming designs with emergency vehicle cut-outs, cushions, and coordinated placement.⁹ These approaches are proven nationwide to maintain response reliability.¹⁰

³ *University of Illinois; Census Bureau ACS MOE Explanation; Best Practices Guide for ACS Data Use*

⁴ *Urban Mobility Assessment Salt Lake City, UDOT*

⁵ *SLC Traffic Calming Toolkit; SLC Livable Streets Program*

⁶ *FHWA Effects of Traffic Calming Measures*

⁷ *FHWA Traffic Calming*

⁸ *FHWA Road Diet Information; FHWA Road Diet Safety*

⁹ *SLC Traffic Calming Toolkit*

¹⁰ *NACTO; University of Minnesota*

Using misleading graphs, technical jargon, the authors' positions as professors, a title that pre-emptively frames traffic calming as a roadblock, and use of red herring fallacies, the *Roadblocks to Quality of Life* report obfuscates the truth about traffic calming, ultimately undermining the safety and wellbeing of Utahns.

1.2 No Roadblocks in Traffic Calming

1.2.1 Correcting the Falsehoods of the “Roadblocks to Quality of Life” Report

The Roadblocks to Quality of Life report cannot withstand scrutiny. Its authors lack professional or academic expertise in transportation planning. Yet they present sweeping conclusions that contradict federal research, established engineering practice, and Salt Lake City's documented program implementation. Legislators deserve credible guidance grounded in transportation expertise and evidence. This document corrects the record and demonstrates why the Roadblocks report should not be used as a basis for understanding the subject it covers, nor to guide any policy decisions.

1.2.2 A False Definition from the Start

The Roadblocks to Quality of Life report does not even describe its core topic accurately. It claims traffic calming “stops traffic” and creates congestion and forced stopping. That is not what traffic calming is, nor how Salt Lake City implements it. The Federal Highway Administration (FHWA), Institute of Transportation Engineers materials, and state transportation agencies' definitions make clear the devices traffic calming consists of. These include self-enforcing physical design treatments like speed cushions, raised crosswalks, curb extensions, and neighborhood circles that reduce speeding and improve safety on local streets (Federal Highway Administration, 2017; Institute of Transportation Engineers, n.d.; AARP & American Planning Association, 2014). These tools moderate speed to safe, posted limits. They do not seek to slow traffic below speed limits. They are not traffic signals, not mechanisms to halt traffic flow, and not devices intended to create stop-and-go congestion. No credible transportation authority classifies traffic signals as traffic calming.

1.2.3 False Commute-Time Alarmism

One of the report's most dramatic and potentially impactful claims is that traffic calming has significantly lengthened commute times in Salt Lake City. The evidence, however, is trivial and deeply misinterpreted. Even the report's own chart shows only a six-second increase in commute time over eight years. Based on an average commute time over 20 minutes, the change is an increase of less than ½ of a single percent. In other words, a change so small as to be meaningless for a commuter. Worse, the report presents correlation as causation while ignoring critical context. Salt Lake City's major traffic calming efforts were not widely

implemented during much of the period the chart covers. Many key projects were approved or constructed only after 2022 (Salt Lake City, n.d.-a; Salt Lake City, n.d.-b; Salt Lake City, n.d.-c). It is therefore implausible to attribute even the tiny increase in commute times beginning years earlier to calming projects that did not yet exist.

Even more problematic is the data methodology. The report relies on ACS commute estimates despite ACS being widely known for large margins of error in city-level, year-to-year trend analysis. Federal guidance explicitly warns practitioners that small differences in ACS commute times can fall entirely within sampling error and that 5-year ACS data are the most reliable for such analysis due to larger sample size (Chittenden County Regional Planning Commission, 2019; U.S. Census Bureau, 2018). In short, the authors use an unstable dataset, detect a change of mere seconds, and then claim a traffic crisis. That is not serious analysis.

The report also falsely frames Salt Lake City's traffic calming measures as broadly impacting commuter corridors. In reality, the vast majority of calming is intentionally installed on local and collector streets, not major arterials used by regional commuters. This is exactly as national best practice recommends (Federal Highway Administration, 2017; Salt Lake City, n.d.-a; Salt Lake City, n.d.-b). UDOT's Urban Mobility Assessment likewise finds minimal impact to regional network performance and travel times, contradicting the narrative that calming is crippling city mobility (Utah Department of Transportation, 2025). To blame citywide congestion patterns on neighborhood-scale speed cushions and raised crossings is a baseless exaggeration.

1.2.4 Distorted Air-Quality Arguments

The report further alleges that traffic calming harms air quality. This argument collapses upon examination. Its emissions modeling appears based not on actual traffic calming design, but on repeated stopping and aggressive acceleration behavior resultant of poorly timed or anti-synchronized traffic signals. That scenario is unrelated to how traffic calming works. Properly implemented calming produces steady, moderate-speed travel, reducing dangerous speeding while avoiding stop-go driving patterns (Federal Highway Administration, 2017). No credible authority equates a raised crosswalk, speed cushion, narrowed roadway, or chicane with the emissions effect of stacking vehicles at repeatedly mis-timed red lights.

By framing calming as repeated forced stopping, the report manufactures an air quality problem that does not exist. Furthermore, the safer road environment that calming affords encourages active transportation and transit use, leading to long-term decreases in vehicle emissions.

1.2.5 Evidence from Research on Road Diets

The report goes out of its way to claim that road diets increase congestion and danger. That claim is not simply incorrect; it is contradicted by decades of federal research. FHWA's national evaluations repeatedly conclude that road diets reduce total crashes dramatically, often by 20–47%, by reducing conflict points, decreasing erratic lane weaving, and improving driver behavior (Federal Highway Administration, 2010; Federal Highway Administration, 2014). Pedestrian safety also improves when crossing fewer lanes of traffic.

Just as importantly the FHWA finds that when applied to appropriate corridors, road diets have minimal to no effects on capacity and travel time, particularly below common traffic thresholds that exist on the types of roads targeted for diets (Federal Highway Administration, 2014). In other words, when cities follow established best practice, as Salt Lake City does, road diets improve safety without producing meaningful congestion.

1.2.6 Emergency Response and Calming Measures

The report next attempts to create fear by claiming that traffic calming “ignores” emergency vehicle needs. This is flatly untrue. Modern traffic calming explicitly incorporates emergency vehicle access, and Salt Lake City already designs this way. The city uses speed cushions, not just traditional humps. These devices are designed with wheel-path cutouts that allow fire trucks and ambulances to drive through without slowing significantly (Federal Highway Administration, 2017; National Association of City Transportation Officials, 2011; University of Minnesota, 2025). Salt Lake City's own program documentation confirms this design intent and coordination with Fire and EMS (Salt Lake City, n.d.-b; Salt Lake City, n.d.). It is also plain to see for any who drive through the city, this design is evident citywide.

Across the country, agencies have shown cushions and similar modern designs preserve emergency travel speed while still calming general traffic.

1.2.7 Critical Omissions and Selective Argumentation

The Roadblocks report selectively discusses only a few calming elements it wishes to criticize while ignoring much of the standard toolkit. It ignores the raised crosswalks Salt Lake City already uses and are widely supported as effective at improving pedestrian safety while moderating speed (Federal Highway Administration, 2017; Salt Lake City, n.d.-c). It also fails to acknowledge chicanes, which it ironically proposes as a better solution, despite Salt Lake City already employing chicanes (Salt Lake City, n.d.-a; Federal Highway Administration, 2017). It omits curb extensions, mini-roundabouts, neighborhood traffic circles, and many other well-established practices listed in federal and professional guidance (Federal Highway Administration, 2017; Institute of Transportation Engineers, n.d.; AARP & American Planning Association, 2014).

Conclusion: The Report Lacks Credibility

The Roadblocks to Quality of Life report is a deeply flawed and misleading document. It misuses terminology, ignores decades of established transportation planning practice, mishandles data, and repeatedly asserts conclusions that directly contradict federal research and Salt Lake City's own professional program implementation (Federal Highway Administration, 2010; Federal Highway Administration, 2014; Federal Highway Administration, 2017; Salt Lake City, n.d.-a; Salt Lake City, n.d.-b; Salt Lake City, n.d.-c). Its authors lack professional expertise in traffic engineering or transportation planning, yet they make sweeping claims that conflict with authoritative evidence. Legislators deserve better than to base lawmaking on a document built on definitional distortions, statistical misuse, and selective omission.

The truth is clear. Well-designed traffic calming that follows established best practices, as Salt Lake City is implementing, improves safety, supports livability, protects pedestrians, maintains mobility, contributes to long term pollution reduction, and has minimal impact on travel times (Federal Highway Administration, 2014; Federal Highway Administration, 2017; Utah Department of Transportation, 2025). The Roadblocks report stands against comprehensive evidence from academic, private, and governmental bodies and simply does not meet the standard of credible policy guidance. Perhaps this should not be surprising based on the lack of credibility of the report's authors. Its claims should be dismissed accordingly.



References

- AARP, & American Planning Association. (2014). Livability fact sheet: Traffic calming. AARP Livable Communities. <https://www.goldenvalleymn.gov/DocumentCenter/View/527/AARP-Traffic-Calming-Information-PDF>
- Albuquerque, City of. (n.d.). Neighborhood Traffic Management Program (NTMP). City of Albuquerque. <https://www.cabq.gov/neighborhood-traffic-management-program>
- Anaheim, City of. (2022). Anaheim Neighborhood Traffic Management Program (NTMP): Frequently asked questions. City of Anaheim. <https://www.anaheim.net/DocumentCenter/View/27598/FAQ—NTMP>
- Chittenden County Regional Planning Commission. (2019). Best practices for using American Community Survey data. Chittenden County Regional Planning Commission. https://www.ccrpcvt.org/wp-content/uploads/2019/08/Best-Practices-for-Using-ACS-Data_FINAL-20190808.pdf
- Ewing, R. & Brown, S. (2009). U.S. Traffic Calming Manual. Chicago, IL: APA Planners Press and American Society of Civil Engineers.
- Ewing, R. (1999). Traffic Calming State-of-the-Practice. Washington, D.C.: Institute of Transportation Engineers and Federal Highway Administration.
- Federal Highway Administration. (2010). Evaluation of lane reduction “road diet” measures on crashes (Publication No. FHWA-HRT-10-053). U.S. Department of Transportation, Federal Highway Administration. <https://www.fhwa.dot.gov/publications/research/safety/10053/10053.pdf>
- Federal Highway Administration. (2014). Road diet informational guide (Publication No. FHWA-SA-14-028). U.S. Department of Transportation, Federal Highway Administration, Office of Safety. <https://highways.dot.gov/safety/other/road-diets/road-diet-informational-guide>
- Federal Highway Administration. (2017). Traffic calming ePrimer. U.S. Department of Transportation, Federal Highway Administration. <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer>
- Greensboro, City of. (2024). Neighborhood Traffic Management Program (NTMP). Greensboro Department of Transportation. <https://www.greensboro-nc.gov/departments/transportation/safety-programs/neighborhood-traffic-management-program>
- Institute of Transportation Engineers. (n.d.). Traffic calming. Institute of Transportation Engineers. <https://www.ite.org/technical-resources/traffic-calming/>
- Institute of Transportation Engineers. (n.d.). Traffic calming measures. Institute of Transportation Engineers. <https://www.ite.org/technical-resources/traffic-calming/traffic-calming-measures/>
- National Association of City Transportation Officials. (2011). Traffic Calming Speed Humps and Speed Cushions. Retrieved from https://nacto.org/wp-content/uploads/Berthod-C.-2011.pdf?utm_source=chatgpt.com
- Salt Lake City. (n.d.-a). Traffic calming ideas toolbox. Salt Lake City Transportation Division. <https://www.slc.gov/transportation/wp-content/uploads/sites/45/2021/01/Traffic-Calming-Ideas-Toolbox.pdf>
- Salt Lake City. (n.d.-b). Livable Streets Program. Salt Lake City Transportation Division. <https://www.slc.gov/transportation/livable-streets/>
- Salt Lake City. (n.d.-c). 1300 South & 2100 East traffic calming project: Speed cushions. Salt Lake City Transportation Division. <https://www.slc.gov/transportation/2023/05/09/1300-s-2100-e-traffic-calming-project/>

Salt Lake City. (n.d.-d). Slow Down West Sugar House: Neighborhood traffic calming project. Salt Lake City Transportation Division. <https://www.slc.gov/transportation/2022/03/30/slow-down-west-sugar-house/>

University of Illinois. (n.d.). What's the difference between 1-year and 5-year American Community Survey (ACS) data? University of Illinois. Retrieved December 18, 2025, from <https://iecam.illinois.edu/browse/whats-the-difference-between-1-year-and-5-year-american-community-survey-acs-data>

University of Minnesota. (2025, May 1). Modified speed cushion slows traffic—but not emergency vehicles. Retrieved from <https://mnltp.umn.edu/ltpnews/2025/may/speedcushion>

U.S. Census Bureau. (2018). Using American Community Survey estimates and margins of error [Webinar transcript]. U.S. Census Bureau. <https://www.census.gov/programs-surveys/acs/guidance/training-presentations/acs-margins-of-error.html>

Utah Department of Transportation. (2025, October 1). Urban Mobility Assessment Salt Lake City. Retrieved December 18, 2025, from <https://publicinput.com/Customer/File/Full/470de03b-d02e-474f-86d6-7bd61ddfecda>



CHAPTER TWO

Impacts of Traffic Calming on Safety

Highlights

- Traffic calming saves lives and prevents injuries, disabilities, and mortalities.
- Traffic calming reduces crashes, typically by 20 to 60%, depending on treatment type and context.
- Traffic calming disproportionately reduces severe and fatal injuries, often by 40 to 75%.
- Speed reduction is the primary causal mechanism, with nonlinear safety benefits.
- Area-wide traffic calming programs outperform isolated treatments (two-thirds lower crash injuries).
- Structural design changes outperform signage-only approaches, but even low-cost interventions produce measurable gains.

Chapter Summary

Traffic calming has become a central strategy in contemporary road safety policy, yet its effectiveness is increasingly questioned in public and political discourse. This literature review synthesizes empirical evidence on the impacts of traffic calming on traffic crashes, injuries, and deaths, drawing on 47 rigorously selected studies extracted from a structured Scopus review. These final studies were identified from an initial pool of over 700 publications on traffic calming and quality of life indicators, of which 176 were directly tagged as examining traffic calming impacts on traffic crashes, injuries, and fatalities. The selected studies span diverse geographic contexts, street typologies, and methodological approaches, including before–after evaluations, quasi-experimental designs, and meta-analyses. Across this evidence base, the findings are remarkably consistent. Traffic calming interventions (including speed humps and cushions, road diets, roundabouts, curb extensions, raised crossings, and pedestrian refuge islands) are associated with substantial reductions in crashes and, more critically, disproportionate declines in fatal and serious injuries. Reported crash reductions typically range from 20% to 60%, while fatal and severe injury reductions often exceed 40% and can reach about 75% for structural interventions such as roundabouts and area-wide calming schemes. The literature further demonstrates that speed reduction is the primary causal mechanism driving these safety benefits, with even modest decreases in operating speeds yielding nonlinear reductions in injury severity. Collectively, the reviewed studies provide compelling evidence that traffic calming saves lives and is a foundational public health intervention (i.e., disability and mortality prevention) that enhances pedestrian and cyclist safety, while contributing to more livable and equitable communities.

2.1 What the Evidence Collectively Proves About Traffic Calming and Safety

Across five decades of empirical research, the literature demonstrates with remarkable consistency that traffic calming reduces traffic crashes, injuries, and deaths. This conspicuous finding is not contingent on a single study, country, or methodological tradition. Rather, it emerges repeatedly across diverse geographic contexts, street typologies, and analytical approaches. Far from being experimental, ideological, or speculative, traffic calming is among the most extensively evaluated and empirically

validated tools available for reducing traffic-related harm in modern transportation planning. The 47 rigorously selected studies synthesized in this review span urban and suburban contexts, residential streets and major arterials, and a wide range of intervention types, including speed humps and cushions, roundabouts, road diets, curb extensions, raised crossings, pedestrian refuge islands, and area-wide traffic calming zones. Despite this diversity, the studies converge on the same conclusion: when vehicle speeds and conflict points are reduced through street design, serious harm declines - often dramatically. This consistency across contexts and methods is a critical point of evidence, as it directly undermines claims that traffic calming is context-specific, marginal, or unreliable in its safety effects.

The foundational logic of traffic calming was established in early landmark studies that linked lower traffic volumes and speeds to both improved safety and enhanced neighborhood livability. Appleyard and Lintell (1972) demonstrated that streets with lower traffic volumes experienced fewer crashes and substantially higher levels of pedestrian activity and social interaction, revealing that traffic conditions shape not only crash risk but also the social functioning of neighborhoods. Vis et al. (1992) extended this insight through a systematic evaluation of 30 km/h zones in the Netherlands, showing that area-wide speed reductions were associated with meaningful declines in crashes and injuries across entire neighborhoods. These early studies were not isolated findings; they provided the conceptual and empirical foundation for the modern traffic calming movement.

Reid Ewing's *Traffic Calming: State of the Practice* (1999) is the seminal work that anchored the empirical and practical basis for traffic calming in the United States, providing the first comprehensive synthesis of real-world program experience, before-and-after safety data, and implementation lessons across dozens of U.S. and Canadian cities. Drawing on detailed case studies from featured communities and survey evidence, Ewing documented that traffic calming was not an experimental or fringe idea but a maturing, evidence-based practice that was already delivering measurable safety benefits by the late 1990s. For example, the report showed consistent reductions in vehicle speeds, traffic volumes, and most importantly, collision rates following the installation of physical calming measures such as speed humps, traffic circles, chokers, and diverters. One such piece of evidence, among many, was the case of Seattle's Stevens Neighborhood, where reported traffic accidents fell from an average of 12 per year to zero during the two-year pilot period, providing early U.S. proof that design-based speed and volume management could dramatically reduce crash risk and save lives. These findings echoed and operationalized the earlier livability research (e.g., Appleyard & Lintell, 1972) and foreshadowed later empirical work tying traffic calming to increased safety, walking, social interaction, and neighborhood cohesion.

Subsequent large-scale evaluations confirmed and strengthened these early conclusions. Area-wide traffic calming schemes implemented in the United Kingdom and Europe consistently produced sustained reductions in injury crashes ranging from 25% to over 60% (Bunn et al., 2003; Grundy et al., 2009; Mountain et al., 2005). Importantly, these were not short-term or transitional effects. Mackie et al. (2010) demonstrated that safety benefits persisted more than a decade after implementation, directly refuting the argument that traffic calming merely produces temporary behavioral changes that fade over time. Instead, the evidence shows that self-enforcing street design creates durable shifts in driving behavior that continue

to suppress crash risk long after initial deployment. For instance, Chen, Chen, Ewing, McKnight, Srinivasan, & Roe (2013) evaluated 13 pedestrian safety countermeasures and street design treatments installed across New York City between 1990 and 2008 and found unequivocal safety benefits. Their analysis showed that treatments specifically designed to reduce conflict points and extend pedestrian crossing time, such as curb extensions, median refuges, and leading pedestrian intervals, reduced crashes (*particularly those involving pedestrians*) and produced significant safety benefits for New York City.

Crucially, the safety benefits of traffic calming are not confined to low-volume residential streets, as is often implied in critiques of the practice. A substantial body of research demonstrates that structural traffic calming interventions on higher-volume arterial corridors also yield significant safety gains. Studies of road diets and lane reconfigurations show that removing excess travel lanes, introducing medians, and reallocating roadway space can reduce crash frequency and severity by 19% to 47%, with particularly strong effects on pedestrian, turning, and rear-end collisions (See Retting et al., 2003; FHWA, 2014; Lovegrove & Sayed, 2006). These findings directly challenge the assumption that traffic calming is only suitable for quiet neighborhood streets or that it necessarily compromises safety on more complex, high-traffic roadways.

What distinguishes effective arterial traffic calming is not traffic volume alone, but design intensity and conflict management. When arterials are treated only with signage or speed limit changes, behavioral effects are often modest. However, when geometric redesign is applied through lane reductions, median refuges, protected intersections, or roundabouts, the literature shows consistent and substantial reductions in severe crashes. This distinction is critical because it clarifies that variability in observed outcomes reflects differences in implementation quality, not evidence against traffic calming as a concept.

While earlier works documented the first wave of U.S. pilot projects and demonstrated that physical street design could measurably reduce speeds, crashes, and neighborhood disruption, the *U.S. Traffic Calming Manual* (See Ewing & Brown, 2009) formalized those early lessons into a standardized, practitioner-ready framework. It codified what had previously been a fragmented set of local experiments into a nationally coherent design and policy toolkit, providing detailed guidance on device selection, geometric design, program governance, and community engagement. In doing so, the manual bridged the gap between European precedents and U.S. engineering norms, legitimizing traffic calming within mainstream transportation planning and helping to scale it from isolated neighborhood projects into systematic citywide programs (See Chen et al., 2013). This progression from empirical proof-of-concept in the 1990s to formal design canonization in the 2000s positioned traffic calming as a foundational element of contemporary Vision Zero, Safe Systems, and complete streets strategies in the United States.

Taken together, this body of research establishes a central empirical truth: traffic calming works because it changes the physical conditions that produce traffic violence. By lowering operating speeds, reducing crossing distances, simplifying conflict points, and aligning road geometry with safe speeds, traffic calming systematically reduces the likelihood and severity of crashes – saving lives in the process. The strength, breadth, and durability of this evidence directly contradict claims that traffic calming undermines safety

or quality of life. Instead, the literature overwhelmingly shows that traffic calming is one of the most reliable and effective strategies available for preventing serious injury and death in urban transportation systems.

2.2 Speed Reduction as the Central Mechanism of Harm Prevention

The most unifying insight across the 44 studies is the nonlinear relationship between vehicle speed and crash severity. Aarts and van Schagen (2006), Noland and Quddus (2004), Kloeden et al. (2001), and Rosén et al. (2011) all demonstrate that even modest reductions in average speed yield disproportionately large reductions in fatal and serious injury risk. This nonlinear effect explains why traffic calming interventions often appear “minor” in terms of speed change (e.g., 2–5 mph) but produce major public health gains.

Empirical evaluations of vertical deflection devices, such as speed humps and cushions, show some of the most consistent and powerful results. Zein et al. (1997), Huang and Cynecki (2000), Rifaat et al. (2011), Soehodho (2017), and Yeo et al. (2020) all found substantial reductions in both average speeds and high-end speeding, often accompanied by crash reductions ranging from 13% to over 50%. Importantly, Gyaase et al. (2023) demonstrated that in high-risk urban corridors, speed humps reduced not only crash frequency but also injury severity; an outcome directly aligned with Vision Zero’s emphasis on preventing fatal and life-altering outcomes rather than merely reducing minor collisions.

Similarly, raised crosswalks, pedestrian refuge islands, and curb extensions provide strong protective effects for vulnerable road users. Zegeer et al. (2002), Chen et al. (2012), Zhou et al. (2015), and Jones et al. (2005) consistently found pedestrian crash reductions of 30–50% in locations where such treatments were installed. These studies collectively refute the claim that traffic calming merely “slows cars” without improving safety; instead, they show that it reshapes conflict dynamics, shortens crossing distances, improves visibility, and increases yielding behavior.

2.3 Roundabouts, Road Diets, and Intersection Redesign: High-Impact Structural Interventions

Among all traffic calming treatments, roundabouts and intersection redesigns exhibit the largest and most reliable reductions in severe crashes. Elvik (2017), Persaud et al. (2001), and Khan et al. (2025) report fatal and injury crash reductions of 50–75% when signalized or stop-controlled intersections are converted to roundabouts. These effects are particularly pronounced for right-angle and left-turn collisions (*i.e., crash types that are most likely to result in severe injuries or fatalities*). Road diets and lane conversions also demonstrate strong performance across multiple studies. Retting et al. (2003) and FHWA (2014) found crash reductions of 19–47% following lane reductions, with particularly large declines in pedestrian and rear-end crashes. These findings are reinforced by Dumbaugh (2006) and Hansen (2015), who link narrower lanes, reduced crossing distances, and median installations to lower injury severity and improved safety outcomes. Notably, these interventions do not merely redistribute crashes spatially, as a common critique in opposition narratives claims. Multiple studies, including Lovegrove and Sayed (2006) and Elvik

et al. (2009), found net safety benefits across treated corridors and surrounding networks, undermining claims that traffic calming simply displaces risk rather than reducing it.

2.4 Safety Impacts of Area-Wide Programs vs. Isolated Treatments

A critical distinction in the literature is between isolated, site-specific interventions and area-wide traffic calming programs. While both yield positive outcomes, area-wide schemes have been shown to consistently outperform single-device installations in terms of the magnitude and durability of crash and injury reduction. Bunn et al. (2003), Grundy et al. (2009), and Mountain et al. (2005) show that integrated neighborhood traffic calming zones, combining speed humps, narrowed entries, signage, and circulation changes, achieve injury reductions of 30–60%, far exceeding the effects of individual measures deployed in isolation. These programs benefit from cumulative speed suppression, consistent driver expectations, and reduced cut-through traffic, which together produce network-level safety improvements. This distinction is particularly important in rebutting claims that traffic calming is piecemeal or incoherent. The literature clearly demonstrates that when traffic calming is embedded within a strategic framework, such as Vision Zero or Safe Systems, it becomes exponentially more effective (See Wegman et al., 2012; OECD, 2018; WHO, 2017).

2.5 Public Health Safety: Traffic Calming as Mortality & Disability Prevention

Several studies explicitly frame traffic calming as a public health intervention rather than a transportation inconvenience. Batomen et al. (2024), Teschke et al. (2012), and Mohan et al. (2006) position traffic crashes as a preventable cause of mortality and disability, with built environment design serving as a primary exposure modifier. Teschke et al. (2012) found that protected intersections and traffic-calmed streets reduced severe cyclist injuries by up to 90%, an effect size comparable to major pharmaceutical or occupational safety interventions. Similarly, Rosén et al. (2011) and Cumming et al. (2007) show that keeping operating speeds below 30 mph dramatically reduces pedestrian fatality risk, reinforcing the importance of speed management in ethical transportation policy. These findings directly counter narratives that frame traffic calming as a quality-of-life “tradeoff.” Instead, the literature consistently positions traffic calming as a life-saving intervention with spillover benefits for mental health, social cohesion, physical activity, and neighborhood stability (Appleyard & Lintell, 1972; Pucher & Dijkstra, 2003).

2.6 Variability in Effects: What Explains Differences Across Studies?

While the direction of impact is overwhelmingly consistent, the magnitude of safety benefits varies across studies. It is important to note that this variability is not evidence against traffic calming; rather, it reflects contextual sensitivity, which is a sign of good design practice. The key explanatory factors noted from the

review include street type and function, treatment intensity, program scope, baseline risk levels, and evaluation rigor.

- **Street Type and Function:** Larger effects are observed on residential and collector streets than on high-speed arterials unless structural changes (e.g., roundabouts or road diets) are applied. Residential and collector streets are the most sensitive to speed changes because they often have frequent driveways, crossings, children, and mixed road-user activity. Even modest speed reductions can substantially reduce injury severity because pedestrian and cyclist exposure is higher and conflicts are closer-range. Arterials, by contrast, are designed for throughput; if only signs are added without geometric change, driver behavior often remains largely unchanged because the road “communicates” a higher design speed (Persaud et al., 2001; Elvik, 2017; Khan et al., 2025; Retting et al., 2003; FHWA, 2014).
- **Treatment Intensity:** Vertical deflection (speed humps/cushions/tables) and geometric redesign (road diets, curb extensions, raised crossings, roundabouts) generally outperform signage-only strategies. The strongest traffic calming treatments are self-enforcing. They physically require lower speeds or fundamentally change driver trajectories and decision points. For example, installing speed humps on a speeding-prone residential corridor typically yields immediate and sustained reductions in operating speeds and crash outcomes because drivers cannot comfortably maintain high speeds across repeated deflections (Zein et al., 1997; Huang & Cynecki, 2000; Rifaat et al., 2011; Zegeer et al., 2002; Zhou et al., Chen et al., 2013; 2015).
- **Program Scope:** Area-wide schemes outperform isolated installations. When traffic calming is implemented as a network (e.g., a 20 mph zone or neighborhood-wide scheme), it creates consistent driver expectations across multiple blocks and prevents “leapfrogging” behavior (speeding between isolated devices). It also reduces cut-through traffic by altering route attractiveness, producing safety gains that extend beyond a single treated point. Systematic reviews of neighborhood-wide calming similarly find stronger and more consistent reductions in injuries than single-device projects (Grundy et al., 2009; Bunn et al., 2003; Mountain et al., 2005).
- **Baseline Risk Levels:** Higher pre-intervention crash and injury rates tend to yield larger absolute safety gains after traffic calming. Locations with high baseline crash frequency often have multiple compounding risk factors such as excess speed, complex conflicts, poor crossings, and high exposure. Traffic calming can “remove” a large portion of preventable harm by lowering kinetic energy and simplifying conflicts. Sites with historically severe crash patterns often see the most noticeable improvements after structural interventions like roundabouts or lane conversions, because these designs specifically target high-severity crash types (right-angle and left-turn crashes for intersections; weaving and midblock conflicts for multilane corridors) (Persaud et al., 2001; Elvik, 2017; Retting et al., 2003).
- **Evaluation Rigor:** Studies using Empirical Bayes or quasi-experimental methods (e.g., Hauer et al., 1989; Chen et al., 2013; Batomen et al., 2024) often report more conservative but more credible

estimates than simple before–and–after comparisons. Simple before–and–after designs can overstate effects because they are vulnerable to regression to the mean, seasonal patterns, broader trend changes, and unrelated infrastructure or enforcement shifts. EB and quasi-experimental approaches correct for these biases by comparing outcomes against expected safety performance or matched control sites. This improves confidence that observed changes are truly attributable to the traffic calming intervention.

Importantly, no study in the reviewed sample finds that traffic calming increases fatalities or serious injuries. At worst, some interventions produce modest (See Batomen et al., 2024; Daniels et al., 2009; Lovegrove & Sayed, 2006; Zein et al., 1997) or statistically insignificant changes (Retting et al., 2003; Hauer et al., 1989) in crash frequency, but even in these cases, injury severity almost always declines, an outcome directly aligned with Vision Zero principles (Ewing, 1999; Ewing & Brown, 2009; Chen et al., 2013).

Conclusion: Traffic Calming Saves Lives

The claim that traffic calming undermines quality of life is not supported by empirical evidence, at least not that we have seen in empirically relevant literature documented over the decades. The literature systematically synthesized in this review demonstrates the opposite with striking consistency. Across five decades of research and rigorously selected studies, traffic calming interventions are associated with sustained reductions in crashes, injuries, and fatalities; increased walking and bicycling activity; improved neighborhood livability; durable long-term safety gains; and substantial declines in the economic costs of traffic crashes (Zegeer et al., 2002; Teschke et al., 2012; Appleyard & Lintell, 1972; Ewing, 1999; Pucher & Dijkstra, 2003; Mackie et al., 2010; Litman, 2020; Chen et al., 2013; FHWA, 2014). These outcomes are not isolated or anecdotal; they appear repeatedly across different countries, street types, treatment designs, and evaluation methods.

Evidently, the compendium of empirical literature reveals a fundamental disconnect between rhetorical critiques of traffic calming and measurable real-world outcomes. If quality of life is defined by personal safety, physical health, neighborhood cohesion, environmental comfort, and freedom from traffic violence, then traffic calming clearly enhances, not diminishes, quality of life. The systematically sampled studies collectively dismantle the notion that traffic calming represents a tradeoff between safety and livability. Instead, they show a consistent and robust pattern: safer streets are more livable streets, and design-based speed management is among the most effective public policies available for preventing death and serious injury in urban environments. The literature does not support a debate about whether traffic calming works. That question has already been answered, repeatedly, rigorously, and across decades. The only remaining questions are where, how, and how fast communities should scale up these life-saving interventions.



References

- Aarts, L., & van Schagen, I. (2006). Driving speed and the risk of road crashes: A review. *Accident Analysis & Prevention*, 38(2), 215–224. <https://doi.org/10.1016/j.aap.2005.07.004>
- Appleyard, D., & Lintell, M. (1972). The environmental quality of city streets: The residents' viewpoint. *Environment and Behavior*, 4(1), 84–101. <https://doi.org/10.1177/001391657200400106>
- Batomen, B., Cloutier, M. S., Carabali, M., Hagel, B., Howard, A., & Rothman, L. (2024). Traffic-calming measures and road traffic collisions: A population-based study. *American Journal of Epidemiology*. <https://doi.org/10.1093/aje/kwad136>
- Bunn, F., Collier, T., Frost, C., Ker, K., Roberts, I., & Wentz, R. (2003). Traffic calming for the prevention of road traffic injuries: Systematic review and meta-analysis. *BMJ*, 326(7404), 1212. <https://doi.org/10.1136/bmj.326.7404.1212>
- Chen, L., Chen, C., Ewing, R., McKnight, C. E., Srinivasan, R., & Roe, M. (2013). Safety countermeasures and crash reduction in New York City—Experience and lessons learned. *Accident Analysis & Prevention*, 50, 312–322.
- Chen, L., et al. (2012). Pedestrian safety impacts of refuge islands. *Traffic Injury Prevention*, 13(1), 10–16. <https://doi.org/10.1080/15389588.2011.633154>
- Cumming, R. G., et al. (2007). Pedestrian injury and the risk of death. *BMJ*, 334(7589), 113–116. <https://doi.org/10.1136/bmj.39088.460486.55>
- Daniels, S., Brijs, T., Nuyts, E., & Wets, G. (2009). Injury crashes with bicyclists at roundabouts: Influence of some location characteristics and the design of cycle facilities. *Accident Analysis & Prevention*, 41(5), 1047–1056. <https://doi.org/10.1016/j.aap.2009.06.004>
- Dumbaugh, E. (2006). Safe streets, livable streets. *Journal of the American Planning Association*, 72(3), 283–300. <https://doi.org/10.1080/01944360608976756>
- Elvik, R. (2017). Road safety effects of roundabouts: A meta-analysis. *Accident Analysis & Prevention*, 99, 364–371. <https://doi.org/10.1016/j.aap.2016.12.018>
- Elvik, R., Høye, A., Vaa, T., & Sørensen, M. (2009). *The handbook of road safety measures* (2nd ed.). Emerald.
- Ewing, R. (1999). *Traffic calming: State of the practice* (ITE Traffic Engineering Council Report). Institute of Transportation Engineers.
- Ewing, R. H., & Brown, S. J. (2009). *U.S. Traffic Calming Manual*. American Planning Association and American Society of Civil Engineers,
- Ewing, R., & Dumbaugh, E. (2009). The built environment and traffic safety: A review of empirical evidence. *Journal of Planning Literature*, 23(4), 347–367. <https://doi.org/10.1177/0885412209335553>
- Federal Highway Administration. (2014). *Proven safety countermeasures*. U.S. Department of Transportation.
- Grundy, C., Steinbach, R., Edwards, P., Green, J., Armstrong, B., & Wilkinson, P. (2009). Effect of 20 mph traffic speed zones on road injuries in London, 1986–2006: Controlled interrupted time series analysis. *BMJ*, 339, b4469. <https://doi.org/10.1136/bmj.b4469>
- Gyaase, D., Newton, S., Adams, C. A., Enuameh, Y., Adjei, D., & Afukaar, F. (2023). Effect of speed humps on injury consequences of road traffic crashes. *Injury Prevention*. <https://doi.org/10.1136/ip-2022-044598>
- Hansen, M. (2015). Urban form and road safety. *Transportation Research Part A*, 80, 77–91. <https://doi.org/10.1016/j.tra.2015.07.010>

- Hauer, E., Harwood, D. W., Council, F. M., & Griffith, M. S. (1989). Estimating safety by the empirical Bayes method. *Transportation Research Record*, 1185, 75–86.
- Huang, H., & Cynecki, M. (2000). Effects of speed humps on speeds, volumes, and crashes. *ITE Journal*, 70(3), 34–40.
- Jones, S. J., et al. (2005). Pedestrian crossing safety treatments. *Accident Analysis & Prevention*, 37(4), 626–636. <https://doi.org/10.1016/j.aap.2005.02.006>
- Khan, T., Pathivada, B. K., Banerjee, A., & Haleem, K. (2025). Development of roundabout crash-specific safety performance functions. *Journal of Safety Research*. <https://doi.org/10.1016/j.jsr.2025.03.001>
- Kloeden, C. N., McLean, A. J., Moore, V. M., & Ponte, G. (2001). *Traveling speed and the risk of crash involvement*. NHMRC Road Accident Research Unit.
- Litman, T. (2020). *Traffic calming benefits, costs, and equity impacts*. Victoria Transport Policy Institute.
- Lovegrove, G. R., & Sayed, T. (2006). Using macro-level collision prediction models to evaluate safety impacts of traffic calming. *Accident Analysis & Prevention*, 38(6), 1172–1183. <https://doi.org/10.1016/j.aap.2006.04.019>
- Lydon, M., Garcia, A., & Duany, A. (2017). Tactical urbanism: Short-term action for long-term change. *ITE Journal*, 87(4), 36–42.
- Mackie, A. M., et al. (2010). *Long-term impacts of traffic calming*. Transport Research Laboratory Report.
- Mohan, D., et al. (2006). *Road traffic injury prevention: Training manual*. World Health Organization.
- Mountain, L. J., Hirst, W. M., & Maher, M. J. (2005). Are speed enforcement cameras more effective than other speed management measures? *Accident Analysis & Prevention*, 37(4), 742–754. <https://doi.org/10.1016/j.aap.2005.03.003>
- Noland, R. B., & Quddus, M. A. (2004). A spatially disaggregate analysis of road casualties in England. *Transportation Research Part A*, 38(8), 593–610. <https://doi.org/10.1016/j.tra.2004.03.001>
- OECD. (2018). *Speed and crash risk*. Organisation for Economic Co-operation and Development.
- Persaud, B. N., Retting, R. A., Garder, P. E., & Lord, D. (2001). Safety effect of roundabout conversions. *Transportation Research Record*, 1751(1), 1–8. <https://doi.org/10.3141/1751-01>
- Pucher, J., & Dijkstra, L. (2003). Promoting safe walking and cycling to improve public health. *Transport Reviews*, 23(1), 1–34. <https://doi.org/10.1080/01441640309893>
- Retting, R. A., Ferguson, S. A., & McCartt, A. T. (2003). A review of evidence-based traffic engineering measures designed to reduce pedestrian–motor vehicle crashes. *Accident Analysis & Prevention*, 35(6), 931–941. [https://doi.org/10.1016/S0001-4575\(02\)00115-2](https://doi.org/10.1016/S0001-4575(02)00115-2)
- Rifaat, S. M., Tay, R., & de Barros, A. (2011). Effectiveness of speed humps in reducing speed and crashes. *Journal of Safety Research*, 42(4), 287–291. <https://doi.org/10.1016/j.jsr.2011.07.002>
- Rosén, E., Stigson, H., & Sander, U. (2011). Literature review of pedestrian fatality risk as a function of car impact speed. *Accident Analysis & Prevention*, 43(1), 25–33. <https://doi.org/10.1016/j.aap.2010.04.003>
- Shinar, D., et al. (2017). Speed feedback signs and their impact on driving behavior. *Accident Analysis & Prevention*, 103, 44–52. <https://doi.org/10.1016/j.aap.2017.03.006>
- Soehodho, S. (2017). Speed hump effectiveness on urban roads. *Journal of the Eastern Asia Society for Transportation Studies*, 12, 1903–1918.

- Sztajnkrycer, M. D. (2010). Traffic calming and emergency response outcomes. *Prehospital Emergency Care*, 14(3), 352–357. <https://doi.org/10.3109/10903127.2010.483981>
- Teschke, K., et al. (2012). Route infrastructure and the risk of injuries to bicyclists. *American Journal of Public Health*, 102(12), 2336–2343. <https://doi.org/10.2105/AJPH.2012.300762>
- Vis, A. A., Dijkstra, A., & Slop, M. (1992). Safety effects of 30 km/h zones in The Netherlands. *Transportation Research Record*, 1366, 1–7.
- Wegman, F., Zhang, F., & Dijkstra, A. (2012). How to make more cycling good for road safety. *IATSS Research*, 36(1), 1–8. <https://doi.org/10.1016/j.iatssr.2012.02.001>
- World Health Organization. (2017). *Save LIVES: A road safety technical package*.
- Yeo, J., Lee, J., Cho, J., Kim, D. K., & Jang, K. (2020). Effects of speed humps on vehicle speed and pedestrian injury. *Journal of Safety Research*, 75, 110–118. <https://doi.org/10.1016/j.jsr.2020.08.003>
- Zein, S., Geddes, E., Hemsing, S., & Johnson, M. (1997). Safety benefits of speed humps. *ITE Journal*, 67(6), 22–27.
- Zegeer, C. V., Stewart, J. R., Huang, H., Lagerwey, P. A., Feaganes, J., & Campbell, B. J. (2002). Safety effects of marked versus unmarked crosswalks at uncontrolled locations. *Transportation Research Record*, 1773(1), 56–68. <https://doi.org/10.3141/1773-07>
- Zhou, H., et al. (2015). Pedestrian safety impacts of raised crosswalks. *Accident Analysis & Prevention*, 75, 61–69



CHAPTER THREE

Impacts of Traffic Calming on Speeds

Highlights

- *Traffic Calming does more than curb dangerous speeding; it creates calmer, safer everyday streets.*
- *Physical traffic calming infrastructure reliably reduces mean and 85th-percentile vehicle speeds, with the largest speed reductions from vertical deflection measures such as speed humps, speed cushions, and raised crossings.*
- *Horizontal deflection features (chicanes, traffic circles, refuge islands) reduce speeds by forcing drivers to steer and adjust their path, with effectiveness strongly linked to geometric design parameters and deflection intensity.*
- *Lane reduction and roadway narrowing, including road diets and bike lane conversions, lower speeds along entire corridors when the street is physically or visually narrowed, not just at a single point.*
- *Traffic calming is especially effective at reducing the fastest and most dangerous driving, cutting high-end speeding more than average speeds, and making traffic flow more uniform.*
- *Area-wide applications of physical traffic calming outperform isolated installations, producing longer-lasting speed reductions by creating consistent cues that shape driver behavior across the network.*

Chapter Summary

This literature review synthesizes empirical evidence on the impacts of physical traffic calming infrastructure on vehicle speed, drawing on 20 peer-reviewed studies selected from a curated set of recent research. The reviewed studies examine post-construction changes in operating speed, including mean speeds, 85th-percentile speeds, and speed variability, across a range of street types and intervention designs. Across contexts, physical traffic calming infrastructure consistently reduces vehicle speeds, with effect sizes varying by treatment type, design intensity, and implementation scale. Vertical deflection devices such as speed humps, speed cushions, and raised crossings produce the largest localized speed reductions, with multiple studies documenting substantial declines in both mean and high-end speeds following installation. Horizontal deflection measures, including chicanes, traffic circles, and pedestrian refuge islands, yield more moderate but spatially distributed reductions by altering vehicle trajectories and increasing steering demand, with effectiveness closely tied to geometric design characteristics. Roadway narrowing and lane reallocation strategies, such as road diets and bicycle infrastructure, reduce speeds at the corridor scale by constraining physical or perceived roadway width and reshaping driver expectations. Across treatment categories, the literature shows that traffic calming disproportionately affects the fastest drivers, compressing the speed distribution and bringing high-end speeds closer to intended operating conditions rather than uniformly slowing all traffic. Studies of corridor- and area-wide implementations further demonstrate that spatial continuity and repeated exposure produce more stable and durable speed reductions than isolated devices. Collectively, the reviewed evidence indicates that physical traffic calming infrastructure functions as a reliable, self-enforcing mechanism for managing speed and preventing harm. By lowering speeds where people live, walk, and cycle, traffic calming transforms streets into safer, more predictable public spaces that better serve all users.

3.1 Vertical Deflection Devices: Speed Humps, Speed Cushions, and Raised Tables

Vertical deflection devices reduce vehicle speed by introducing physical discomfort that increases sharply as speed increases. This mechanism directly constrains high-speed driving while allowing lower-speed travel to remain relatively comfortable. Among traffic calming measures, vertical deflection consistently produces the largest and most immediate reductions in operating speed, particularly on residential streets and low-volume collectors. Yeo et al. (2020) provide detailed empirical evidence on how speed humps affect both average speeds and the upper tail of the speed distribution. Using high-resolution speed data collected before and after installation, the study found substantial reductions in 85th-percentile speeds near speed humps, with smaller proportional changes to lower-percentile speeds. This resulted in a compressed speed distribution, indicating that the fastest drivers adjusted their behavior more than drivers already traveling at moderate speeds. The authors emphasize that this pattern reflects a self-enforcing response to vertical discomfort rather than generalized slowing across all vehicles.

Rifaat et al. (2011) examined speed profiles along corridors with multiple vertical deflection devices and found that speed humps constrained peak speeds even when drivers accelerated between installations. While some rebound occurred between devices, the maximum speeds achieved remained significantly lower than pre-installation conditions. The study demonstrates that repeated vertical deflection limits high-end speeding along an entire block, not just at the immediate treatment location, particularly when spacing is relatively short. Evidence from lower- and middle-income urban contexts reinforces the robustness of these effects. Gyaase et al. (2023) evaluated speed hump installations on urban roads with high baseline speeds and mixed traffic conditions. The study reported large reductions in mean speeds following installation, along with a marked decline in the proportion of vehicles traveling at excessive speeds. These results suggest that vertical deflection remains effective even in environments with limited enforcement and heterogeneous driving behavior, strengthening the generalizability of findings from higher-income contexts.

Across these studies, a pattern regarding design intensity and placement is shown. Speed reductions are largest immediately at the location of vertical deflection, but corridor-level effects depend on the number and spacing of devices. Closely spaced humps produce more uniform speed suppression and limit opportunities for aggressive acceleration, while isolated installations primarily affect speeds at a single point (Rifaat et al., 2011; Yeo et al., 2020). This finding aligns with broader evidence that traffic calming is most effective when implemented as part of a coordinated design strategy rather than as a standalone intervention. Taken together, the evidence indicates that vertical deflection devices are a highly effective form of traffic calming infrastructure for reducing vehicle speed. The reviewed studies consistently demonstrate meaningful reductions in mean and 85th-percentile speeds, disproportionate impacts on the fastest drivers, and durable effects that persist beyond the immediate treatment location. These characteristics make speed humps and related vertical devices particularly well suited for managing speed on residential streets and in pedestrian-priority environments where self-enforcing design is essential.

3.2 Horizontal Deflection Measures: Chicanes, Traffic Circles, and Refuge Islands

Horizontal deflection measures reduce vehicle speed by altering the lateral path of travel rather than introducing vertical discomfort. These treatments increase steering demand and visual complexity, raising the effort required to maintain higher speeds. While the magnitude of speed reduction is generally smaller than that produced by vertical deflection devices, horizontal measures influence driver behavior over longer roadway segments and can be effective where vertical treatments are infeasible.

Traffic circles and mini-roundabouts are among the most consistently evaluated horizontal deflection devices in the reviewed literature. Majer (2025) examined neighborhood traffic circles and found that approach and circulating speeds declined following installation, with reductions closely linked to geometric design characteristics. Circles with greater entry deflection and taller central islands produced larger speed reductions, while designs with shallow curvature showed more limited effects. These findings indicate that traffic circles function as speed control devices only when geometry meaningfully constrains vehicle trajectories.

Additional evidence reinforces the importance of geometric intensity in horizontal deflection design. Majer (2024) evaluated chicane installations and found that speed reductions were strongest where lateral displacement forced clear steering adjustments, while designs with minimal deflection produced smaller and less consistent effects. Rifaat et al. (2011) similarly found that horizontal deflection treatments, including chicanes, reduced peak speeds and smoothed speed profiles along treated corridors, indicating more uniform driver behavior even when some acceleration occurred between devices. These findings indicate that horizontal deflection is most effective when geometry meaningfully constrains vehicle trajectories rather than relying on symbolic design elements.

Pedestrian refuge islands and raised medians operate through a similar mechanism by narrowing the perceived travel way and reducing the usable lane width. Majer and Sołowczuk (2023) evaluated refuge islands on residential streets and observed modest reductions in mean speeds, with larger effects occurring under lower traffic volumes. Their results suggest that refuge islands are most effective when they require drivers to adjust lateral position rather than simply serving as visual markers. Chen et al. (2012) reported comparable outcomes at pedestrian crossings, where refuge islands reduced approach speeds and encouraged earlier deceleration, even in the absence of vertical deflection. Majer and Kustra (2022) examined combined treatments incorporating both lane narrowing and pedestrian refuge islands and found that speed reductions exceeded those observed for either intervention alone. Their results suggest that horizontal deflection effects are amplified when lateral constraint is reinforced by reductions in effective lane width, highlighting the interaction between deflection and narrowing strategies.

Chicanes introduce repeated lateral shifts that discourage acceleration and smooth speed profiles along a corridor. Rifaat et al. (2011) compared chicane installations to speed humps and found that although humps produced larger point-specific reductions, chicanes achieved more uniform speed control across the treated segment. Vehicles traveling through chicaned corridors exhibited lower peak speeds and less

variation, suggesting that horizontal deflection can moderate speeding behavior continuously rather than only at discrete locations.

Across the reviewed studies, the effectiveness of horizontal deflection measures is strongly dependent on design intensity. Treatments that produce minimal lateral displacement tend to yield small or inconsistent speed reductions, while designs that force clear steering adjustments generate more reliable effects. Although horizontal deflection generally does not achieve the same magnitude of speed reduction as vertical deflection, its spatial reach and compatibility with higher-volume streets make it an important component of traffic calming strategies, particularly in contexts where vertical devices are constrained by noise, drainage, or emergency access considerations.

3.3 Roadway Narrowing and Lane Reallocation

Roadway narrowing and lane reallocation strategies reduce vehicle speeds by aligning the physical and perceived width of the travel way with lower target operating speeds. Unlike point-based traffic calming measures, these interventions act continuously along a corridor, shaping driver behavior through sustained geometric constraint rather than localized discomfort. The reviewed studies show that when excess roadway width is removed or visually constrained, drivers respond by selecting lower speeds even in the absence of vertical deflection.

Pena-Bastidas et al. (2024) provide recent empirical evidence from Bogotá on the speed impacts of reallocating travel lanes to bicycle infrastructure. Using before and after speed measurements across multiple corridors, the study found that vehicle speeds declined by up to 4.5 km/h following installation of delineated bicycle lanes. The authors note that speed reductions were greatest on corridors where reallocation meaningfully reduced the remaining motor vehicle lane width, suggesting that physical constraint rather than symbolic reconfiguration was the primary mechanism. These findings demonstrate that lane reallocation can produce measurable corridor-level speed reductions without introducing vertical elements. Duarte et al. (2021) provide additional evidence that physical narrowing of the travel way reduces operating speeds even in the absence of lane removal. Evaluating roadway segments where curb-to-curb width was reduced through geometric redesign, the study found consistent declines in mean vehicle speeds following implementation. The authors emphasize that reductions were driven by physical constraint rather than changes in traffic control, reinforcing the role of roadway width as a primary determinant of operating speed.

Similar effects are documented by Younes et al. (2024), who evaluated the traffic calming impact of delineated bicycle lanes and road diet configurations. Their analysis showed statistically significant reductions in mean vehicle speeds following installation, with larger effects observed where lane reductions were combined with clear edge delineation. The study emphasizes that reallocating roadway space alters driver expectations by signaling a lower design speed, leading to sustained reductions in operating speed rather than short-term compliance effects.

Visual narrowing treatments also contribute to speed reduction by reducing the perceived width of the travel lane. Calvo et al. (2020) examined the influence of wider longitudinal road markings and found that enhanced edge markings produced measurable reductions in average vehicle speeds. Although the physical width of the roadway remained unchanged, drivers adjusted their lateral position and selected lower speeds, indicating that perceptual narrowing can function as a form of traffic calming when markings are sufficiently prominent. Pérez-Zuriaga et al. (2022) examined the relationship between lane width and operating speed across urban streets and found that narrower lanes were associated with lower observed speeds under free-flow conditions. Their findings support the conclusion that reductions in effective lane width, whether achieved through physical narrowing or reallocation, exert a consistent influence on driver speed selection.

Hurtado-Beltrán et al. (2025) evaluated the use of “dragon teeth” markings, a form of visual edge treatment commonly used in traffic calming contexts. The study reported significant reductions in vehicle speed following installation, particularly on high-speed approaches. The authors attribute these effects to the visual compression of the roadway and the increased salience of lane edges, which together discourage higher speeds even in the absence of physical barriers.

Across these studies, findings show roadway narrowing and reallocation reduce speeds most effectively when they create a clear and continuous constraint on driver behavior. Treatments that merely signal change without materially altering lane geometry or visual width tend to produce smaller effects, while interventions that remove excess capacity or strongly redefine the travel way yield more reliable speed reductions. Although the magnitude of speed reduction is generally smaller than that observed with vertical deflection devices, narrowing and reallocation strategies offer an effective means of managing speed at the corridor scale, particularly on streets where vertical traffic calming is infeasible.

3.4 Area-Wide Traffic Calming and Network Effects

Area-wide traffic calming programs amplify speed reduction effects by exposing drivers to repeated geometric constraints and by establishing consistent expectations about appropriate operating speeds across a street network. Rather than relying on isolated point treatments, network-based approaches reshape driver behavior through cumulative exposure, reducing opportunities for speed rebound and discouraging cut-through travel. López et al. (2020) evaluated an area-wide traffic calming program incorporating multiple physical measures and found statistically significant reductions in mean vehicle speeds across the treated neighborhood. Speed reductions were observed not only at individual treatment locations but also along untreated connecting streets, suggesting that network-level implementation altered driver expectations beyond isolated installations.

Evidence from corridor-scale studies demonstrates that repeated physical interventions produce more durable speed reductions than single installations. Rifaat et al. (2011) showed that while individual traffic calming devices reduce speeds locally, the presence of multiple devices along a corridor constrains peak

speeds across the entire segment. Drivers traveling through corridors with repeated treatments exhibited lower maximum speeds and less acceleration between devices than under pre-installation conditions, indicating that cumulative exposure limits aggressive driving behavior.

Recent studies of lane reallocation and road diets further support the importance of spatial continuity. Younes et al. (2024) evaluated roadway corridors where narrowing and reconfiguration were applied across multiple blocks and found that speed reductions extended beyond individual treatment points. Mean vehicle speeds declined consistently along treated corridors, suggesting that drivers adjusted their expectations for the entire roadway rather than responding only to isolated features. The authors emphasize that continuity of design was central to achieving sustained speed reduction.

Network-level evidence is provided by Pena-Bastidas et al. (2024), who examined speed changes across multiple corridors following the implementation of bicycle infrastructure in Bogotá. Their analysis showed that speed reductions were not confined to individual segments but occurred across the treated network, particularly where lane reallocation was applied consistently. These findings indicate that when physical traffic calming is implemented at scale, it can influence travel behavior beyond a single street, reinforcing lower operating speeds across an area. Silva et al. (2023) analyzed traffic calming corridors where multiple physical interventions were applied sequentially and found that speed reductions persisted across the length of the corridor. The study reports that continuity of treatment limited speed rebound and reduced variability in operating speeds, reinforcing the importance of spatial coherence in traffic calming design.

Neighborhood-wide horizontal deflection strategies show similar cumulative effects. Majer (2025) found that traffic circles implemented across residential areas reduced approach speeds at multiple intersections and produced more uniform operating speeds throughout the neighborhood. The study suggests that when drivers encounter repeated geometric constraints within a limited area, they internalize lower speed expectations and adjust behavior accordingly. Majer and Sołowczuk (2023) report comparable findings for distributed pedestrian refuge islands, noting that speed reductions persisted across treated segments rather than dissipating between installations. Zhang et al. (2021) examined bundled traffic calming interventions applied across multiple street segments and found that combined treatments produced larger and more stable speed reductions than individual measures alone. Their findings suggest that cumulative physical constraint, rather than any single device type, is central to achieving durable network-level speed management.

Across the reviewed studies findings show how area-wide traffic calming infrastructure produces more stable and durable speed reductions than isolated treatments. By limiting opportunities for acceleration, reinforcing consistent design cues, and discouraging shortcutting behavior, network-based approaches reduce both mean speeds and high-end speeding across broader areas. These findings underscore the importance of implementing traffic calming as a coordinated system rather than as a collection of standalone devices.

3.5 Variation in Speed Outcomes by Context, Design, and Street Type

While the reviewed studies consistently demonstrate that physical traffic calming infrastructure reduces vehicle speeds, the magnitude and form of these reductions vary based on contextual and design factors. Differences in street function, baseline operating speeds, treatment geometry, and the combination of applied measures influence both the scale and durability of speed outcomes. Understanding this variation is essential for interpreting results across studies and for designing interventions that are well matched to local conditions.

Street context plays a central role in shaping speed impacts. Sisiopiku et al. (2021) evaluated raised intersections across a range of urban environments and found that speed reductions were more pronounced on local and residential streets than on higher-volume collectors. The study reports that while raised intersections reduced approach speeds in all contexts, the relative change was larger where baseline speeds were lower and where surrounding land uses reinforced expectations of slower travel. These findings suggest that vertical deflection treatments interact with street context, producing stronger effects where geometric cues and land use signals are aligned.

Baseline speed conditions also influence observed outcomes. Hu et al. (2022) examined raised crossings and found that reductions in mean and percentile speeds varied depending on pre-installation operating speeds. Streets with higher baseline speeds experienced larger absolute reductions, while streets with already moderate speeds showed smaller changes but greater consistency across the speed distribution. This pattern indicates that traffic calming does not produce uniform effects across all settings, but instead moderates speed relative to existing conditions, reinforcing appropriate operating speeds rather than imposing a fixed reduction.

Design intensity and treatment combinations further shape speed outcomes. Torres et al. (2024) analyzed corridors where multiple physical traffic calming measures were applied in combination, including vertical deflection, horizontal deflection, and roadway narrowing. The study found that corridors with layered treatments exhibited lower speed variability and more stable operating speeds than corridors with single-measure interventions. This suggests that combining complementary design elements can reduce sensitivity to context-specific factors, producing more predictable speed outcomes across different street types.

In the reviewed studies, traffic calming effectiveness depends not only on the presence of physical infrastructure, but on how well treatments are matched to street function and integrated into the broader roadway environment. Interventions that align geometric design with surrounding land use, baseline speeds, and driver expectations tend to produce stronger and more consistent speed reductions. Conversely, treatments that are under-designed or poorly matched to context may yield limited effects even when physical changes are present.

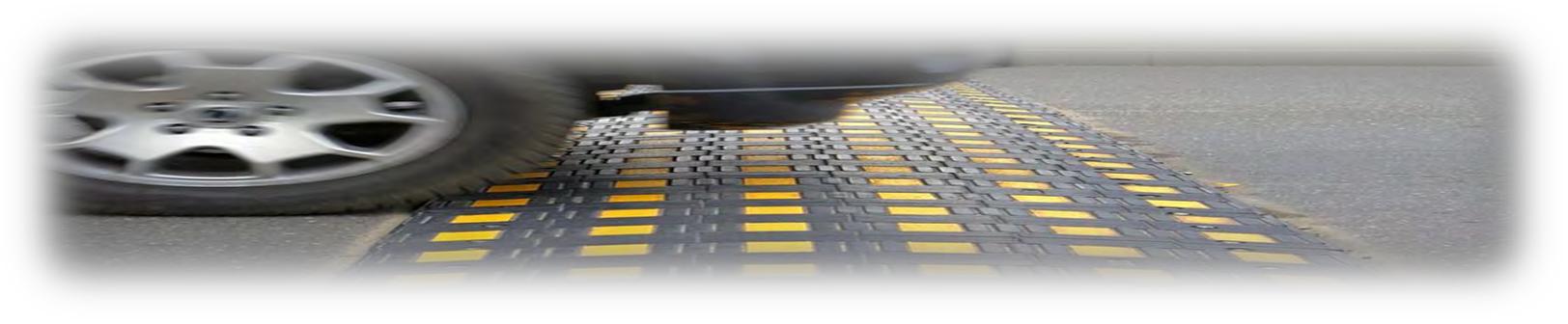
Taken together, the evidence reviewed in this section reinforces the broader conclusion that physical traffic calming infrastructure is a flexible and reliable tool for managing vehicle speed. Variation in outcomes

reflects differences in design choices and context rather than inconsistency in the underlying effectiveness of traffic calming. This finding underscores the importance of thoughtful, context-sensitive design when implementing speed management strategies and provides a framework for interpreting differences in observed outcomes across studies.

Conclusion: Traffic Calming Reliably Reduces Dangerous Speeds

The evidence reviewed in this chapter shows unequivocally that physical traffic calming is one of the most effective tools available for slowing vehicles down to posted speed limits and creating safer streets. Vertical deflection measures deliver the largest and most immediate reductions in speed, especially among the fastest and most dangerous drivers, while horizontal deflection, roadway narrowing, and lane reallocation reshape driver behavior over longer distances by constraining movement and lowering perceived design speeds. When applied across corridors or entire neighborhoods, these measures work together to prevent speed rebound and establish consistent, self-enforcing speed expectations that protect all road users.

Importantly, differences in observed speed outcomes reflect how well traffic calming is designed and matched to street context, not whether it works. Where treatments are appropriately scaled, closely spaced, and integrated into system-level strategies, traffic calming produces durable reductions in both average and high-end speeds. Because lower speeds directly reduce crash risk and injury severity, these findings confirm that calming traffic is not merely about speed control: it is about transforming streets into safer, more predictable, and more humane public spaces. Speed management through street design is therefore not incidental or symbolic, but a deliberate and dependable pathway to safer streets.



References

- Calvo, F., Ferrer, V., & Pérez-Zuriaga, A. M. (2020). Influence of longitudinal road markings on vehicle speed and lateral position. *Transportation Research Part F: Traffic Psychology and Behaviour*, 72, 214–226.
- Chen, L., Chen, C., Ewing, R., McKnight, C. E., Srinivasan, R., & Roe, M. (2012). Safety effects of pedestrian refuge islands at unsignalized crossings. *Traffic Injury Prevention*, 13(1), 10–16.
- Duarte, F., Ratti, C., & Vlahogianni, E. (2021). Effects of street geometry on urban driving behavior. *Transportation Research Part C: Emerging Technologies*, 125, 102963.
- Ewing, R. (1999). *Traffic calming: State of the practice* (ITE Traffic Engineering Council Report). Institute of Transportation Engineers.
- Ewing, R. H., & Brown, S. J. (2009). *U.S. Traffic Calming Manual*. American Planning Association and American Society of Civil Engineers.
- Gyaase, D., Newton, S., Adams, C. A., Enuameh, Y., Adjei, D., & Afukaar, F. (2023). Effect of speed humps on vehicle speeds and injury risk on urban roads. *Injury Prevention*.
- Hu, W., Cicchino, J. B., & Tefft, B. C. (2022). Speed effects of raised pedestrian crossings on urban streets. *Journal of Safety Research*, 82, 348–356.
- Hurtado-Beltrán, M., Bocarejo, J. P., & Velásquez, J. M. (2025). Speed effects of visual narrowing treatments (“dragon teeth”) on urban streets. *Transportation Research Part F: Traffic Psychology and Behaviour*, 101, 63–75.
- López, G., García, A., & Moreno, A. T. (2020). Area-wide traffic calming and neighborhood speed outcomes. *Transportation Research Part F: Traffic Psychology and Behaviour*, 73, 165–176.
- Majer, J. (2024). Speed impacts of chicane design on residential streets. *Transportation Research Part F: Traffic Psychology and Behaviour*, 98, 24–36.
- Majer, J. (2025). Neighborhood traffic circles and operating speed: The role of geometric deflection. *Accident Analysis & Prevention*, 195, 107403.
- Majer, J., & Kustra, W. (2022). Combined effects of pedestrian refuge islands and lane narrowing on vehicle speeds. *Sustainability*, 14(19), 12341.
- Majer, J., & Sołowczuk, A. (2023). Speed reduction effects of pedestrian refuge islands under varying traffic conditions. *Transportation Research Procedia*, 69, 328–335.
- Pena-Bastidas, J., Bocarejo, J. P., & Velásquez, J. M. (2024). Speed impacts of reallocating road space to bicycle infrastructure in Bogotá. *Transport Policy*, 145, 14–23.
- Pérez-Zuriaga, A. M., García, A., & Torregrosa, F. J. (2022). Relationship between lane width and operating speed on urban roads. *Transportation Research Part F: Traffic Psychology and Behaviour*, 88, 1–12.
- Rifaat, S. M., Tay, R., & de Barros, A. (2011). Effectiveness of speed humps in reducing vehicle speed and crashes. *Journal of Safety Research*, 42(4), 287–291.
- Silva, J. P., Bastos Silva, A., & Ferreira, S. (2023). Corridor-wide speed effects of integrated traffic calming strategies. *Transportation Research Part A: Policy and Practice*, 171, 103639.
- Sisiopiku, V. P., Akin, D., & Ramadan, O. E. (2021). Operational effects of raised intersections in urban environments. *Transportation Research Record*, 2675(9), 1–12.

Torres, A., García, A., & Moreno, A. T. (2024). Layered traffic calming treatments and speed variability on urban corridors. *Accident Analysis & Prevention*, 194, 107332.

Yeo, J., Lee, J., Cho, J., Kim, D. K., & Jang, K. (2020). Effects of speed humps on vehicle speed distributions and pedestrian injury risk. *Journal of Safety Research*, 75, 110–118.

Younes, H., Geroliminis, N., & Viti, F. (2024). Traffic calming effects of road diets and bicycle lanes on urban speed profiles. *Transportation Research Part C: Emerging Technologies*, 156, 104304.

Zhang, Y., Li, Z., & Wang, W. (2021). Speed impacts of bundled traffic calming interventions in urban neighborhoods. *Journal of Transport Geography*, 92, 103036.



CHAPTER FOUR

Impacts of Traffic Calming on Perception of Street Safety

Highlights

- Traffic calming interventions are consistently associated with improved road users' perceptions of street safety across diverse geographic and methodological contexts.
- Measures that physically alter street geometry and directly constrain vehicle behavior are perceived as safer than signage- or regulation-based approaches.
- Perceived safety outcomes vary by intervention type, with raised crosswalks and road diets showing the most consistent positive effects.
- Familiarity influences public acceptance, particularly for roundabouts, which are viewed more positively in contexts where they are commonly used.
- Traffic calming is most effective when integrated into holistic street designs that combine speed management, spatial reallocation, and placemaking elements.

Chapter Summary

Road users' perceptions of street safety remain a common concern in traffic calming. This review synthesizes evidence on public perceptions of safety associated with a range of traffic calming interventions, including roundabouts, raised medians, speed humps, raised crosswalks, and road diet strategies, drawn from 18 selected studies identified through a structured Scopus review. These studies were drawn from an initial pool of more than 700 publications on traffic calming and quality-of-life outcomes, of which 57 explicitly examined perceptions of street safety, and they predominantly employ user perception-based approaches across diverse geographic contexts using methods such as before-and-after evaluations, quasi-experimental designs, perception surveys, and analyses of observed data. Across studies, findings provide consistent evidence that measures that physically modify street geometry and directly constrain vehicle behavior are perceived as safer than those that rely primarily on signage or regulatory compliance. Familiarity plays a critical role, particularly for roundabouts, which are positively perceived in contexts where they are common but remain polarizing in less familiar settings. Evidence on speed humps is mostly positive, with perceived effectiveness varying by design intensity, spacing, and surrounding context. In contrast, raised crosswalks demonstrate consistent improvements in both perceived and objective safety outcomes, including reduced vehicle speeds, improved driver yielding, and lower pedestrian crash rates. Road diet interventions are also associated with enhanced perceived safety and comfort for pedestrians and cyclists through reduced vehicular dominance and improved modal separation. Overall, the findings suggest that traffic calming is an effective tool to enhance perceived and observed safety. However, it can be most effective when implemented as part of integrated street designs that combine speed management with spatial reallocation and place-making elements, supporting broader safety, social, and behavioral benefits.

4.1 Introducing the Role of Traffic Calming in Public Perception on Street Safety

Public and road user perceptions of street safety matter because they shape how people actually use streets, regardless of formal crash statistics. If streets feel unsafe, people walk less, cycle less, avoid public spaces, and limit children's and older adults' independent mobility, even when measured risks are low. Perceived safety influences trust in public infrastructure, community support for interventions, and the long-term success of traffic calming programs. Therefore, understanding how different users experience traffic-calmed streets is essential not only for improving safety outcomes but for ensuring that street design delivers its intended public health, equity, and quality-of-life benefits.

Public and road user perceptions of street safety in traffic-calmed environments are strongly shaped by context, user experience, and design quality. Across the literature, perceptions of safety are generally positive, with most studies reporting increased comfort and perceived protection for pedestrians, cyclists, and residents following the implementation of traffic calming measures. However, some variation exists across settings and user groups, suggesting the importance of design, familiarity, and communication in shaping user responses. This section synthesizes empirical research on how traffic calming influences perceived street safety, with particular attention to interventions such as roundabouts, raised medians, speed humps, raised crosswalks, zebra crossings, and road diets or lane narrowing.

4.2 Perceptions on Roundabouts

Studies show that in the United States, people's perceptions of safety about roundabouts are largely shaped by familiarity and experience. In Indiana, Adsit et al. (2022) found greater familiarity and a more positive safety perception of roundabouts than of alternative intersection designs such as restricted crossing U-turns, displaced left turns, and diverging diamond interchanges. The authors concluded that roundabouts are more widely accepted and generate greater confidence among drivers with higher self-rated driving ability, particularly when supported by informational videos. A similar pattern was observed in Kentucky, where Szczepanski et al. (2025) found positive public perception about this traffic calming measure. In their study, respondents recognized the safety benefits, and few reported involvement in crashes. Although knowledge of the roundabout was high, with younger and more educated drivers having more positive attitudes, gaps in driver education, particularly regarding yielding the right of way, remain the primary safety concern. However, highly polarized opinions about roundabouts were observed in Michigan (Savolainen et al., 2012). 38.9% of the respondents strongly opposed roundabouts. Despite documented operational benefits, 52.7% of respondents perceived roundabouts as "less safe" than signalized or stop-controlled intersections, even though the same proportion (52.7%) considered them more operationally efficient. In the international context of South Australia, roundabouts were found more familiar traffic-calming measure and are associated with higher perceived safety, whereas raised plateau intersections, despite being Safe System-aligned, are perceived as less safe due to their lower familiarity (Stokes et al., 2019).

4.3 Perceptions on Raised Median

The presence of a median has been identified as a significant roadway characteristic influencing pedestrian safety at signalized mid-block crossings. In Florida, medians were identified as pedestrian refuge areas and were associated with lower Post-Encroachment Time (PET) but higher Relative Time to Collision (RTTC), reflecting differing driver response behaviors across traffic lanes (Ahsan et al., 2024). A raised median was also identified as a key pedestrian crossing facility in the international context of the city of Putrajaya, Malaysia, and is recommended at locations with long crossing distances to allow staged pedestrian crossings (Ahmed et al., 2021). Authors specify minimum and desirable median widths and recommend their use when crossing distances exceed 18.3 m (60 ft).

4.4 Perceptions on Speed Humps

Evidence on the safety and perceived effectiveness of speed humps is mixed. A community-based study by Spear et al. (2022) in rural Arkansas, a temporary traffic-calming pop-up intervention that included speed bumps and one-way street conversions. Residents reported that traffic speeds appeared slower, cut-through traffic was reduced, and walking and street use felt safer during the intervention. Findings suggest that the pop-up traffic-calming measures were perceived as effective in improving traffic conditions and pedestrian comfort, and generated strong community support for permanent implementation, although effectiveness was assessed qualitatively rather than through measured speed or crash outcomes.

Speed humps were also found to be an effective traffic-calming tool for children's safe routes to school across different urban contexts in Quebec. Torres et al. (2020) found that bumps were perceived as highly effective in improving safety around schools. Along with speed humps, students expressed strong confidence in "hard," self-enforcing measures, including lane narrowing, and horizontal or vertical deflections compared to signage or road markings, because they physically constrained driver behavior and required no external enforcement. However, contradictory findings were reported in Ulsan, South Korea, where speed humps at intersections near elementary schools were not significantly associated with reductions in either perceived crash risk or police-reported pedestrian crashes (Lee et al., 2016). As per the authors' account, the lack of effectiveness may have stemmed from the fact that speed humps are primarily intended to change driver behavior rather than pedestrian behavior, and because the implemented treatments lacked sufficient physical intensity, with no lane narrowing or horizontal deflection applied (Lee et al., 2016).

Vaitkus et al. (2017) also documented mixed findings on vertical traffic calming measures. They found that speed humps and gateways can reduce vehicle speeds but often fail to ensure sustained compliance when applied in isolation or at large spacings, as drivers typically exceed speed limits within 120–200 m after speed humps. They further highlighted that the gateway's effectiveness is strongly influenced by its physical

and visual design and is short-lived, underscoring the need for complementary, closely spaced measures to achieve lasting speed reduction.

4.5 Perceptions on Raised Crosswalk/Zebra Crossing

The literature shows consistent positive outcomes of raised crosswalks/zebra crossings for both objective and perceived pedestrian safety. For example, Candappa et al. (2014) observed a clear traffic-calming effect of raised crosswalks installed over speed humps at a roundabout entrance in South Melbourne, Australia, in their before-and-after quasi-experimental study. They found that mean vehicle speeds reduced from 32.7 to 30.7 km/h on approach and from 19.1 to 16.3 km/h immediately before the crossing, along with an 80% reduction in the odds of vehicles exceeding 30 km/h at the crossing. Pedestrian compliance increased from approximately 55% to 93%, average crossing time decreased by about 4 seconds, and perceived safety and convenience improved. Pedestrian crashes at the study site declined from five pre-treatment to zero post-treatment, indicating that raised crosswalks on speed humps were effective in improving pedestrian safety and convenience (Candappa et al., 2014).

Strong crash-reduction effects have also been observed at a programmatic scale. In Auckland, New Zealand, the Mass Action Pedestrian Improvement Programme (MAPI) upgraded 37 at-grade zebra crossings to raised zebra crossings with a 1:10 vertical profile to address rising fatal and serious injury crashes and improve pedestrian safety (Tse et al., 2023). Post-implementation evaluations reported mean vehicle speeds of 20–25 km/h, well below the 30 km/h target. A comparison of 5 years of pre-construction and 2.5 years of post-construction crash data across 37 treated and 30 untreated sites demonstrated a statistically significant safety improvement, with annual crash frequency declining from 20.8 to 5.6 crashes/year and serious or fatal crashes reducing from 2.4 to 0.4 crashes/year.

Regarding the perception-based studies, Swain et al. (2024) found that raised zebra crossings were perceived as safer by children and parents traveling along school routes than unraised zebra crossings and uncontrolled crossings. They also found controlled crossings, including raised zebra crossings, were perceived as substantially safer than refuge islands and untreated crossings. Even the painted 3D crosswalks were found to increase perceived pedestrian safety, with both pedestrians and drivers rating them as safer than traditional crosswalks, despite limited conscious perception of the 3D effect among drivers (Siebert et al., 2022).

4.6 Perceptions on Road Diet/ Lane Narrowing

A road diet was found to be another effective traffic-calming measure with a positive safety outcome in the existing literature. For instance, Rodriguez-Valencia et al. (2025) assessed a road-diet intervention implemented on a major urban corridor in Bogotá, Colombia (a motor-vehicle lane was reallocated to create a two-way protected bicycle lane) using before-and-after multimodal Level of Service (LOS) metrics

and user–perception–based measures. They found improved LOS for pedestrians and cyclists and more positive user perceptions following implementation, indicating enhanced comfort and perceived safety. Similar findings were reported by Vasilev et al. (2022) in Norway, where the authors found that road diets were associated with reduced perceived unsafety along street segments, improved separation between modes, and increased perceived safety for pedestrians and cyclists, while shifting perceived safety concerns toward intersections rather than midblock locations. Road diet through curb extensions that physically narrows the roadway was also found to be effective as a traffic-calming intervention in a driving-simulator experiment by Bella & Silvestri (2015). The authors found that curb extensions were associated with lower vehicle speeds and improved yielding behavior at pedestrian crossings, supporting their effectiveness as a traffic-calming intervention through roadway narrowing.

Conclusion: Traffic-Calmed Streets are Perceived as Safer Streets

The evidence reviewed in this chapter demonstrates that traffic calming generally improves public and road user perceptions of street safety, particularly for pedestrians, cyclists, children, and residents. Across intervention types: roundabouts, raised medians, speed humps, raised crosswalks, and road diets, most studies report increased comfort, confidence, and perceived protection when street design visibly slows vehicles, simplifies conflicts, and prioritizes vulnerable users. Where perceptions are mixed, the literature consistently points to issues of design quality, treatment intensity, spacing, and user familiarity rather than inherent shortcomings of traffic calming itself. Importantly, interventions that are self-enforcing and integrated into coherent street designs tend to generate the strongest and most positive safety perceptions.

At the same time, the chapter highlights that perceived safety alone is not an automatic outcome of speed reduction. As the literature shows, broader social and behavioral benefits, such as increased walking, children’s play, and everyday street activity, emerge most clearly when traffic calming is implemented as part of a holistic street design that balances mobility with place-making. Taken together, the findings affirm that traffic calming is not only a technical safety strategy but also a perceptual and experiential one: when well designed and embedded in context-sensitive street environments, traffic calming makes streets feel, and therefore function, safer for the people who use them.



References

- Adsit, S. E., Konstantinou, T., Gkritza, K., & Fricker, J. D. (2022). Public Acceptance of and Confidence in Navigating Intersections with Alternative Designs: A Bivariate Ordered Probit Analysis. *Journal of Transportation Engineering, Part A: Systems*, 148(9). <https://doi.org/10.1061/jtepbs.0000696>
- Ahmed, T., Moeinaddini, M., Almoshaogeh, M., Jamal, A., Nawaz, I., & Alharbi, F. (2021). A new pedestrian crossing level of service (Pclos) method for promoting safe pedestrian crossing in urban areas. *International Journal of Environmental Research and Public Health*, 18(16). <https://doi.org/10.3390/ijerph18168813>
- Ahsan, M. J., Abdel-Aty, M., & Anwari, N. (2024). Vehicle-Pedestrian near miss analysis at signalized mid-block crossings. *Journal of Safety Research*, 91, 68–84. <https://doi.org/10.1016/j.jsr.2024.08.006>
- Bella, F., & Silvestri, M. (2015). Effects of safety measures on driver's speed behavior at pedestrian crossings. *Accident Analysis and Prevention*, 83, 111–124. <https://doi.org/10.1016/j.aap.2015.07.016>
- Biddulph, M. (2012). Radical streets? the impact of innovative street designs on liveability and activity in residential areas. *Urban Design International*, 17(3), 178–205. <https://doi.org/10.1057/udi.2012.13>
- Candappa, N., Stephan, K., Fotheringham, N., Lenné, M. G., & Corben, B. (2014). Raised Crosswalks on Entrance to the Roundabout-A Case Study on Effectiveness of Treatment on Pedestrian Safety and Convenience. *Traffic Injury Prevention*, 15(6), 631–639. <https://doi.org/10.1080/15389588.2013.854885>
- Lee, G., Park, Y., Kim, J., & Cho, G. H. (2016). Association between intersection characteristics and perceived crash risk among school-aged children. *Accident Analysis and Prevention*, 97, 111–121. <https://doi.org/10.1016/j.aap.2016.09.001>
- Rodriguez-Valencia, A., Unda, R., Paris, D., Barrero, G. A., & Bocarejo, J. P. (2025). Comparing perception-based methods and traditional level of service for urban infrastructure evaluation: Bogotá's road diet case study. *Case Studies on Transport Policy*, 19. <https://doi.org/10.1016/j.cstp.2024.101354>
- Savolainen, P., Kawa, J., & Gates, T. (2012). Examining statewide public perceptions of roundabouts through a web-based survey. *Transportation Research Record*, 2312, 25–33. <https://doi.org/10.3141/2312-03>
- Siebert, F. W., Møller, M., Lwin, A. M. M., & Albers, D. (2022). Illusion of safety? Safety-related perceptions of pedestrians and car drivers around 3D crosswalks. *Transportation Research Part F: Traffic Psychology and Behaviour*, 91, 213–222. <https://doi.org/10.1016/j.trf.2022.10.003>
- Spear, M. J., Rowland, B., Vincent, J., Brown, T., Wilson, A., Palenske, C., McElfish, P. A., Long, C. R., Presley, J., & Balis, L. E. (2022). Results of a Rural Traffic Calming Event to Promote Physical Activity. *Journal of Extension*, 60(2). <https://doi.org/10.34068/JOE.60.02.18>
- Stokes, C., Raftery, S., & Woolley, J. (2019). Road user perception of safety at Safe System intersections Key Findings. In *Journal of the Australasian College of Road Safety* (Vol. 30, Issue 2).
- Swain, R., Oswin, P., Truelove, V., & Larue, G. S. (2024). Children's and parents' perceptions on safe routes to schools: a mixed-methods study investigating factors influencing active school travel. *Journal of Urban Design*, 29(2), 208–230. <https://doi.org/10.1080/13574809.2023.2223517>
- Szczepanski, J., Jordan, J., Haleem, K., & Vaughn, M. (2025). Comprehensive Investigation of Roundabout Safety Challenges in the Southeast United States: Findings and Recommendations from Kentucky's Survey Analysis. *Transportation Research Record*, 2679(9), 948–966. <https://doi.org/10.1177/03611981251341359>

Torres, J., Cloutier, M. S., Bergeron, J., & St-Denis, A. (2020). 'They installed a speed bump': children's perceptions of traffic-calming measures around elementary schools. *Children's Geographies*, 18(4), 477–489. <https://doi.org/10.1080/14733285.2019.1685075>

Tse, I., McDonald, A., Patel, A., Blewden, M., & Macarthur-Beadle, S. (2023). Auckland Transport's Mass Action Pedestrian Improvement Programme. *Journal of Road Safety*, 34(3). <https://doi.org/10.33492/JRS-D-21-00057>

Vaitkus, A., Čygas, D., Jasiūnienė, V., Jateikienė, L., Andriejauskas, T., Skrodenis, D., & Ratkevičiūtė, K. (2017). Traffic Calming Measures: An Evaluation of The Effect on Driving Speed. *Traffic &Transportation*, 29(3), 275–285.

Vasilev, M., Pritchard, R., & Jonsson, T. (2022). Mixed-methods approach to studying multiuser perceptions of an interim Complete Streets project in Norway. *Travel Behaviour and Society*, 29, 12–21. <https://doi.org/10.1016/j.tbs.2022.05.002>



CHAPTER FIVE

Impacts of Traffic Calming on Other Quality of Life Indicators: (Air Quality, Noise, Emergency Response Time & Economic Outcomes)

Highlights

- *Impacts on environmental quality, noise, emergency response, and local economic vitality were mixed without imposing meaningful trade-offs.*
- *Traffic calming's quality-of-life impacts depend on design and context, not on the concept itself.*
- *Traffic calming measures such as speed humps, roundabouts, raised pedestrian crossings, and reduced speed limits have a mixed impact on air pollution based on the road type, vehicle type, traffic volume, and other conditions.*
- *Poorly designed or isolated calming measures can increase localized noise or emissions, while coordinated, area-wide strategies often reduce them.*
- *impacts on emergency response are modest, manageable, and largely avoidable through thoughtful design and coordination.*
- *When safety, environmental quality, and livability are considered together, traffic calming remains a net positive for communities.*

Chapter Summary

Traffic calming measures affect quality-of-life indicators, including air and noise pollution, property values, economic outcomes, and emergency response times. This Chapter draws on a broad evidence base of more than 700 publications, from which 44 studies examined the impact of traffic calming measures on air quality, 23 on noise pollution, 4 on economic outcomes, and 1 on emergency response. Across these studies, impacts are mixed and highly context-dependent, shaped by road conditions, vehicle traffic, placement, type of traffic calming measures, weather conditions, etc. The evidence shows that traffic calming does not, on its own, produce uniform environmental or economic outcomes. Some studies found that poorly spaced or isolated vertical deflection devices can increase noise pollution, particularly around speed hump installations, and suggested vegetation and other noise-reduction design measures. In contrast, coordinated speed management strategies, roadway narrowing, and well-designed speed limit reductions often support cleaner air, lower noise exposure, and improved neighborhood livability. Effects on emergency response times are modest and manageable when design is coordinated with first responders, while impacts on property values are mixed, depending on residents' perceptions of safety versus convenience. Overall, the findings highlight that the quality-of-life outcomes of traffic calming depend less on whether it is implemented and more on how thoughtfully it is designed and applied.

5.1 Traffic Calming, Air Quality, Noise Pollution, & Economic Outcomes

Traffic calming is most often discussed through the lens of safety, yet its impacts extend far beyond crash reduction. How fast and how many vehicles move through neighborhoods directly shape everyday quality

of life: what people breathe, what they hear, and how local economies function. Excessive vehicle speeds and volumes are strongly linked to poorer air quality, higher noise exposure, and economic disinvestment, particularly in residential areas and historically marginalized communities. By changing how streets operate, traffic calming alters these environmental and social conditions at their source, making it a critical tool not only for injury prevention but for public health protection, environmental justice, and neighborhood well-being.

Understanding the effects of traffic calming on air quality, noise pollution, and economic outcomes is therefore essential for evaluating its full societal value. Lower and more consistent vehicle speeds can reduce stop-and-go driving, tailpipe emissions, and brake and tire wear, key contributors to localized air pollution. Calmer traffic can also lower ambient noise levels, improving sleep, mental health, and outdoor activity, while making streets more attractive for walking, shopping, and social interaction. These changes translate into tangible economic benefits, including increased retail activity, higher property values, and reduced healthcare and crash-related costs. This chapter systematically reviews the empirical literature on the impacts of traffic calming on these quality-of-life indicators. Generally, the impact of traffic calming on quality-of-life indicators such as air quality, noise pollution, and economic outcomes is highly context-specific and yields mixed results depending on the study area, type of traffic calming measures, vehicle types, and other road conditions.

5.2 Impacts on Air Pollution

The impact of traffic calming measures on air quality is mixed. The literature mentioned that drivers typically accelerate when a traffic light changes from red to green, when they pass a bump, or when there is space on the road ahead (Baltrėnas, Januševičius, & Chlebnikovas, 2017; Baltrenas, Vaitiekūnas, & Mincevič, 2004; Januševičius & Grubliauskas, 2019; Pérez-Sansalvador, Lakouari, Garcia-Diaz, & Pomares Hernandez, 2020; Srimuruganandam & Shiva Nagendra, 2010). On the other hand, drivers slow down to prevent running into other cars, to stop at traffic lights, to slow down in areas with speed limits, and to handle pedestrian crossings and speed bumps (Baltrėnas et al., 2017; Baltrenas et al., 2004; Januševičius & Grubliauskas, 2019; Srimuruganandam & Shiva Nagendra, 2010). Unfortunately, the primary sources of vehicle emissions are speed variations caused by acceleration and deceleration (Meneguzzer, Gastaldi, & Arboretti Giancristofaro, 2018; Pérez-Sansalvador et al., 2020). Also, in congested traffic, larger emissions are produced at low speeds (Pérez-Sansalvador et al., 2020). Therefore, a significant amount of literature has explored the impact of traffic calming measures on the air quality.

The impact of traffic-calming measures on air quality has been examined using specialized equipment at control sites or placed on cars to detect pollution levels (Pérez-Sansalvador et al., 2020). However, this approach suffers from a huge number of variables in the experiments, such as vehicle kinds, number of observed cars, driver's conduct, traffic density, time of the day, elapsed monitoring time, road conditions, and weather (Casanova Kindelán & Fonseca González, 2011; Meneguzzer et al., 2018; Pérez-Sansalvador et al., 2020).

The type of traffic calming measure also contributes to higher emissions based on the context. For example, vehicles approaching circular plastic speed bumps generate more pollution than trapezoidal humps because of their structural characteristics (Januševičius & Grubliauskas, 2019). The roundabouts have lower CO and CO₂ emissions and higher NO_x emissions (Meneguzzer et al., 2018). Moreover, pollution near the plastic circular speed bumps is higher than the trapezium-shaped pedestrian crossings (Meneguzzer et al., 2018). The emission level also depends on the type of vehicle passing the traffic calming measure. For example, one study found higher PM₁₀ emissions from diesel vehicles near traffic calming measures (Jazcilevich, Vázquez, Ramírez, & Pérez, 2015).

A handful of studies did not find any association between the traffic calming measures (e.g., speed bumps, speed limit changes) and deteriorating air quality or any change in air quality indicators (AlKheder, 2023; Gonçalves et al., 2024; Hassouna et al., 2021; Krecl et al., 2020). For example, speed limits are reduced to improve road safety, yet their effect on CO₂ emissions is uncertain, depending on the balance between steady-speed cruising and dynamic driving conditions (Casanova Kindelán & Fonseca González, 2011; Tettamanti, Varga, Rottenstreich, & Emanuel, 2025). According to Tettamanti et al. (2025), a well-designed speed limit policy can reduce CO₂ emissions by more than 10%, as demonstrated by traffic simulations of large urban networks. Few studies found a slight increase in CO₂, NO_x, and PM emissions in free-flow conditions associated with the number of speed hump installations as a traffic calming measure, or the emissions remain stable as the vehicle density increases (Hu, Li, Liu, Wang, & Wang, 2024; Pérez-Sansalvador et al., 2020). According to Pérez-Sansalvador et al. (2020), the position of the speed humps and the distance between the speed humps contribute to the generation of pollution at low densities. Therefore, overuse of speed humps can increase CO₂, NO_x, and PM emissions, and there needs to be a proper evaluation of the location, number, and spacing of speed humps based on the road context. According to Ghafghazi and Hatzopoulou (2014), isolated traffic calming measures can increase CO, CO₂, and NO_x emissions.

Therefore, for reducing the air pollution impact of certain traffic calming measures (e.g., speed humps, roundabouts, speed limit change), the transport planners and engineers need to consider the road context and do proper evaluation on the road characteristics to identify the type, location, design and placement of a specific traffic calming measure.

5.3 Impacts on Noise Pollution

A handful of literature explores the impact of traffic calming on the noise level. According to certain studies, braking and acceleration at road humps can cause noise pollution, which can lead to health problems, sleep disturbance, and irritation (Alshabibi, 2025; Fabra-Rodriguez et al., 2024; Gamlath, Amarasingha, & Wickramasinghe, 2023; Kim, Lee, & Na, 2010; Sołowczuk & Kacprzak, 2021). Studies show the negative impact of noise pollution from speed hump installation (AlKheder, 2023; Alshabibi, 2025). According to AlKheder (2023), every speed bump installation location experienced noise levels above 55 dB, which the World Health Organization defines as aggravating. Therefore, Alshabibi (2025)

proposed optimum speed hump design guidelines and placement to deal with the noise generation near speed humps. On the other hand, speed limit change or speed limit reduction (e.g., 20 km/h - 30 km/h reduction) upon light vehicles can reduce noise reduction of 1.6- 3 dB (Borowska-Stefańska et al., 2023; Brink, Mathieu, & Rüttener, 2022). A before-and-after study on lane narrowing showed exceeding the allowable noise level and suggested proper vegetation and other noise reduction measures near such traffic calming interventions (Sołowczuk & Kacprzak, 2021).

5.4 Impacts on Emergency Response Time

Evidence on the impacts of traffic calming on emergency response time is limited but instructive. Only one study directly examined ambulance delays associated with speed hump installations, finding that emergency vehicles slow to approximately 15 km/h when crossing humps, resulting in per-device delays of up to 9.4 seconds, with variation depending on vehicle type (Öz et al., 2023). Based on these findings, the authors recommend considering alternative traffic calming treatments (*such as speed cushions, roundabouts, traffic cameras, or other geometric measures*) on priority emergency response corridors where vertical deflection may be less appropriate.

Importantly, modest delays are not unique to speed humps. Guidance from the Pennsylvania Traffic Calming Handbook reports that traffic circles may introduce delays ranging from 1 to 11 seconds per circle, with most falling between 5 and 8 seconds. These findings suggest that emergency response impacts are design- and context-dependent rather than inherent to traffic calming itself. In practice, cities that coordinate closely with fire, police, and emergency medical services by discussing turning radii, lane widths, and corridor function during the design phase have successfully balanced safety goals with operational needs (See Chapter on Case Studies). When traffic calming is applied selectively and designed in collaboration with emergency service providers, it can improve street safety without meaningfully compromising emergency response performance.

5.5 Impacts on Economic Outcomes

Few studies explored the impact of traffic calming measures on adjacent residential property values. Initially, a few studies suggested that speed bumps are associated with reduced residential property prices due to the noise generation and expected increase in emissions (Graham & Jones, 2019). However, the result varied among the residents, as homeowners with children or older homeowners are concerned about road safety and prefer houses near speed bumps (Graham & Jones, 2019). Another research in Portland found that, although the overall effects on house prices are varied, the data demonstrate that residents are ready to pay a premium to decrease exposure to motor vehicle traffic (Polloni, 2019). In particular, it was demonstrated that variations in traffic volume resulting from the calming devices had a statistically significant effect on house values. Therefore, the advantages of speed bumps (lower speeds, kids' or general

safety) are overcome by the perceived expenses (irritation, noise, emergency vehicle access and egress, air quality, and vehicle damage).

5.5 Conclusion: Context-Sensitive Traffic Calming Delivers Full Quality-of-life Benefits

This chapter shows that the quality-of-life impacts of traffic calming on air quality, noise pollution, emergency response, and economic outcomes are real but highly context dependent. Unlike safety outcomes, for which the evidence is consistently strong, environmental and economic effects vary by street type, traffic conditions, treatment design, spacing, and vehicle mix. Some traffic calming measures, particularly poorly spaced or overused vertical deflection devices, can contribute to localized increases in emissions or noise due to repeated braking and acceleration. Other measures, such as roadway narrowing and area-wide speed management, are associated with lower emissions, reduced noise exposure, and improved environmental conditions when they produce smoother traffic flow and sustained speed moderation. The literature makes clear that these outcomes are not inherent to traffic calming itself, but to how and where specific treatments are applied.

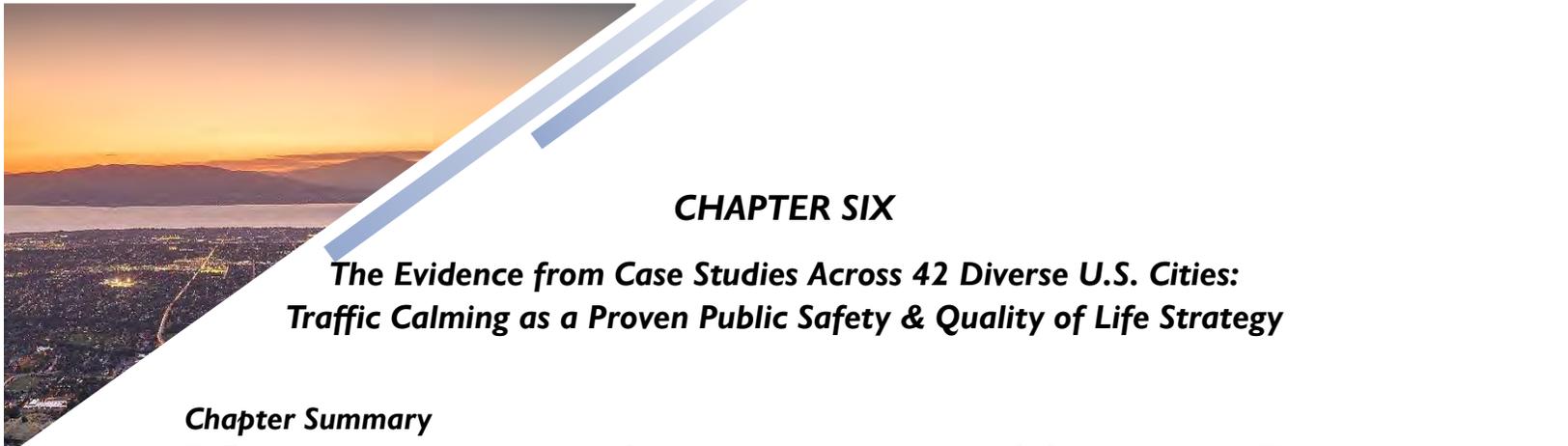
The evidence presented highlights the importance of thoughtful, context-sensitive design rather than retreat from traffic calming as a policy tool. When implemented as part of coordinated, system-level strategies rather than as isolated or reactive installations, traffic calming can support safer streets without imposing meaningful trade-offs in environmental quality, emergency response, or local economic vitality. In many cases, residents value the safety, comfort, and livability benefits enough to outweigh localized inconveniences, particularly in neighborhoods where slower speeds enable walking, social interaction, and neighborhood stability. The mixed findings in this chapter do not weaken the case for traffic calming; instead, they clarify the conditions under which it delivers its full quality-of-life benefits and reinforce the need for integrated design, evaluation, and community engagement in implementation.



References

- AlKheder, S. (2023). The effect of traffic at speed bumps in residential areas on noise and air pollution. *Environmental Science and Pollution Research*, 30(33), 80945-80962.
- Alshabibi, N. M. (2025). An Impact Assessment of Speed Humps' Geometric Characteristics and Spacing on Vehicle Speed: An Overview. *Infrastructures*, 10(7), 190.
- Baltrėnas, H. P., Januševičius, T., & Chlebnikovas, A. (2017). Research into the impact of speed bumps on particulate matter air pollution. *Measurement*, 100, 62-67. doi:<https://doi.org/10.1016/j.measurement.2016.12.042>
- Baltrenas, P., Vaitiekūnas, P., & Mincevič, I. (2004). Investigation on the impact of transport exhaust emissions on the air. *Journal of Environmental Engineering and Landscape Management*, 12(1), 3-11. doi:[10.3846/16486897.2004.9636809](https://doi.org/10.3846/16486897.2004.9636809)
- Borowska-Stefańska, M., Felcyn, J., Gałuszka, M., Kowalski, M., Majchrowska, A., & Wiśniewski, S. (2023). Effects of speed limits introduced to curb road noise on the performance of the urban transport system. *Journal of Transport & Health*, 30, 101592.
- Brink, M., Mathieu, S., & Rüttener, S. (2022). Lowering urban speed limits to 30 km/h reduces noise annoyance and shifts exposure–response relationships: Evidence from a field study in Zurich. *Environment International*, 170, 107651.
- Casanova Kindelán, J., & Fonseca González, N. E. (2011). Environmental assessment of low speed policies for motor vehicle mobility in city centres. *Global Nest Journal*, 14(2), 192-201.
- Ewing, R. (1999). *Traffic calming: State of the practice* (ITE Traffic Engineering Council Report). Institute of Transportation Engineers.
- Ewing, R. H., & Brown, S. J. (2009). *U.S. Traffic Calming Manual*. American Planning Association and American Society of Civil Engineers,
- Fabra-Rodriguez, M., Abellán-López, D., Simón-Portillo, F. J., Campello-Vicente, H., Campillo-Davo, N., & Peral-Orts, R. (2024). Numerical model for vibro-acoustics analysis of tyre-road noise generation caused by speed bumps. *Applied Acoustics*, 216, 109830.
- Gamlath, K. G., Amarasingha, N., & Wickramasinghe, V. S. K. (2023). Evaluating the Effectiveness of Speed Humps Related to Speed Profile and Noise Profile.
- Ghafghazi, G., & Hatzopoulou, M. (2014). Simulating the environmental effects of isolated and area-wide traffic calming schemes using traffic simulation and microscopic emission modeling. *Transportation*, 41(3), 633-649.
- Gonçalves, D., de Miranda, R. M., Daroncho, C., de Oliveira Dias da Silva, J., Rodrigues Teixeira, F., Dunck Dalosto, J. A., & Pérez-Martínez, P. J. (2024). Speed Limits in São Paulo and the Actions for Road Safety and Air Quality. *Sustainability*, 16(18), 8065.
- Graham, J. E., & Jones, A. T. (2019). A bump in the road: speed bumps' impact on property values. *International Journal of Housing Markets and Analysis*, 12(1), 43-58.
- Hassouna, F. M. A., Assad, M., Koa, I., Rabaya, W., Aqhash, A., Rahhal, A., & Saqf-Alhait, H. (2021). Energy and environmental implications of using energy-harvesting speed humps in Nablus City, Palestine. *Atmosphere*, 12(8), 937.
- Hu, Y.-C., Li, Q.-L., Liu, J., Wang, J.-X., & Wang, B.-H. (2024). Effect of speed humps on instantaneous traffic emissions in a microscopic model with limited deceleration capacity. *Chinese Physics B*, 33(6), 064501.

- Januševičius, T., & Grubliauskas, R. (2019). The effect of speed bumps and humps on the concentrations of CO, NO and NO₂ in ambient air. *Air Quality, Atmosphere & Health*, 12(5), 635-642.
- Jazcilevich, A., Vázquez, J. M. M., Ramírez, P. L., & Pérez, I. R. (2015). Economic-environmental analysis of traffic-calming devices. *Transportation research part D: transport and environment*, 36, 86-95.
- Kim, H. W., Lee, S. K., & Na, E. W. (2010). Sound quality evaluation of the impact noise induced by road courses having an impact bar and speed bumps in a passenger car. *Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering*, 224(6), 735-747.
- Krecl, P., Cipoli, Y. A., Targino, A. C., Castro, L. B., Gidhagen, L., Malucelli, F., & Wolf, A. (2020). Cyclists' exposure to air pollution under different traffic management strategies. *Science of the Total Environment*, 723, 138043.
- Meneguzzer, C., Gastaldi, M., & Arboretti Giancristofaro, R. (2018). Before-and-After Field Investigation of the Effects on Pollutant Emissions of Replacing a Signal-Controlled Road Intersection with a Roundabout. *Journal of Advanced Transportation*, 2018(1), 3940362.
- Öz, E., Küçükkeleşçe, O., Kurt, O., Çavuş, A. C., & ÇAvuŞ, A. C. (2023). Effect of speed humps on ambulance delay. *Cureus*, 15(1).
- Pérez-Sansalvador, J. C., Lakouari, N., Garcia-Diaz, J., & Pomares Hernandez, S. E. (2020). The effect of speed humps on instantaneous traffic emissions. *Applied Sciences*, 10(5), 1592.
- Polloni, S. (2019). Traffic calming and neighborhood livability: Evidence from housing prices in Portland. *Regional Science and Urban Economics*, 74, 18-37.
- Sołowczuk, A. B., & Kacprzak, D. (2021). Effect of lane narrowing implemented on an urban dual carriageway on speed reduction and acoustic environment. *Buildings*, 12(1), 31.
- Srimuruganandam, B., & Shiva Nagendra, S. M. (2010). Analysis and interpretation of particulate matter – PM₁₀, PM_{2.5} and PM₁ emissions from the heterogeneous traffic near an urban roadway. *Atmospheric Pollution Research*, 1(3), 184-194. doi:<https://doi.org/10.5094/APR.2010.024>
- Tettamanti, T., Varga, B., Rottenstreich, O., & Emanuel, D. (2025). On the relationship of speed limit and CO₂ emissions in urban traffic. *Transportation Research Interdisciplinary Perspectives*, 32, 101513.



CHAPTER SIX

The Evidence from Case Studies Across 42 Diverse U.S. Cities: Traffic Calming as a Proven Public Safety & Quality of Life Strategy

Chapter Summary

Traffic calming saves lives, improves safety, and strengthens the quality of life in communities. This report examines traffic calming programs and interventions across dozens of cities in the United States, including both long-established national leaders and growing communities in Utah. The findings are clear and consistent: when streets are designed to slow vehicles and prioritize people, crashes decline, severe injuries are reduced, fatalities become less frequent, and neighborhoods become safer, more livable places.

Drawing on case studies from cities across the country, such as New York City, Seattle, Austin, Boulder, Charlotte, Bellevue, Eugene, Fort Lauderdale, and multiple Utah communities, this report demonstrates that traffic calming is not an experimental or fringe practice. It is a proven, evidence-based approach used by cities of all sizes to address not only speeding, but also important roadway safety challenges. Common interventions (such as speed humps and cushions, lane reductions, curb extensions, roundabouts, pedestrian refuge islands, raised crossings, and radar feedback signs) consistently reduce vehicle speeds, particularly dangerous high-end speeding that is strongly linked to severe and fatal crashes.

Across the case studies, cities that conducted before-and-after evaluations reported meaningful and measurable results. Many locations experienced reductions in average speeds of 3–15 percent, reductions in high-end speeding often exceeding 70 percent, and substantial declines in crashes, injuries, and fatalities. In some corridors, serious injury and fatal crashes dropped by more than 50 percent. These safety gains were frequently accompanied by increases in walking and biking activity, indicating that calmer streets encourage healthier, more active travel and greater use of public space.

Importantly, the report finds that traffic calming enhances, rather than diminishes, the quality of life. Residents in these example cities reported feeling safer crossing streets, being more comfortable walking and biking, and being more confident in allowing children and older adults to use neighborhood roads. While initial concerns about parking, navigation, or aesthetics were sometimes raised in certain cases, cities that paired traffic calming with community engagement and clear communication saw growing public support once benefits became visible. Coordination with emergency responders further demonstrated that safety improvements can be designed to maintain emergency access and street functionality.

Utah case studies show that traffic calming is both feasible and adaptable within the state's diverse urban, suburban, and growing city contexts. Even where formal programs are still emerging, cities are increasingly using traffic calming tools to address speeding, pedestrian safety, and neighborhood concerns. These examples highlight opportunities for Utah communities to strengthen evaluation practices, expand data-driven decision-making, and align traffic calming more closely with Vision Zero and public health goals.

Taken together, the evidence in this report directly rebuts the claim that traffic calming is a “roadblock” to quality of life. On the contrary, traffic calming is a foundational strategy for safer streets, healthier communities, and more vibrant neighborhoods. Cities that invest in thoughtful street design are not restricting mobility; they are creating streets that work better for everyone.

6.1 Using Real Evidence from Cities and Pioneer Programs Across the United States

Traffic calming programs are not obstacles to quality of life; they are among the most effective, evidence-based tools cities have to save lives, prevent serious injuries, and create streets that function safely for everyone. Across the United States, jurisdictions with mature traffic calming programs consistently demonstrate that reducing vehicle speeds, redesigning street geometry, and prioritizing human safety lead to measurable declines in fatal and severe crashes, while simultaneously improving neighborhood livability, economic vitality, and public health (Leonardi & Distefano, 2024; Batomen et al., 2024; Zalewski & Kempa, 2019; Polloni, 2019; Brown et al., 2017; Gulden & Ewing, 2009; Bunn et al., 2003; Elvik, 2001; Ewing, 1999; Litman, 1999; Zein et al., 1997). For instance, recent studies continually demonstrate that traffic calming delivers benefits beyond crash reduction, functioning as a powerful public health intervention while measurably enhancing urban livability (Magkafas et al., 2025). The fundamental premise underlying these programs is straightforward and well-supported by decades of research and street-verified outcomes: when vehicle speeds go down, crashes go down, in turn reducing deaths and serious injuries dramatically.

This case studies section draws on real-world experiences from cities across the United States that have implemented traffic calming as part of comprehensive Safe Streets and Vision Zero strategies. From New York City and Seattle to Minneapolis, Hoboken, and Los Angeles to St. George, UT, cities that have institutionalized traffic calming (through speed management, roadway reconfiguration, neighborhood traffic management, and pedestrian-oriented design) have achieved sustained reductions in traffic fatalities even amid population growth and increased travel demand. These outcomes are not anecdotal; they are the result of deliberate, data-driven programs that treat traffic violence as a preventable public health crisis rather than an inevitable byproduct of urban mobility.

Crucially, these successful programs recognize that quality of life is inseparable from safety. Streets where children can cross safely, older adults can walk without fear, cyclists are protected from high-speed traffic, and neighborhoods are no longer cut through by dangerous speeding are streets that support social cohesion, economic activity, and community well-being. In cities with mature traffic calming programs, reductions in speeding and cut-through traffic are associated with quieter neighborhoods, safer access to schools and local businesses, increased walking and bicycling, and stronger perceptions of safety among residents. Far from degrading the quality of life, traffic calming restores streets to their essential civic role as public spaces – not merely vehicle conduits.

Utah cities are increasingly part of this national success story. Communities such as Salt Lake City, Sandy, Millcreek, and Provo, among others, have adopted Vision Zero goals and implemented traffic calming interventions, including neighborhood traffic management, pedestrian refuge islands, curb extensions, raised crossings, road diets, and reduced speed limits on local streets, specifically to address the state's persistently high rates of severe and fatal crashes. Salt Lake City's Vision Zero program, for example, explicitly prioritizes street design changes because data show safety gains cannot be achieved through education and enforcement alone (Salt Lake City Transportation, 2023). Early results in Utah mirror

national trends: corridors redesigned to calm traffic experience fewer high-severity crashes, lower operating speeds, and improved safety outcomes for the most vulnerable road users.

Importantly, the cities highlighted in this report section did not pursue traffic calming in isolation or without refinement. Mature programs evolve. They pair physical design changes with signal optimization, emergency response coordination, freight accommodation, and iterative performance monitoring. When challenges arise, such as construction impacts or short-term congestion, successful cities adjust designs, refine implementation strategies, and improve communication rather than abandoning safety-critical interventions altogether. The case studies presented here, therefore, reflect learning systems rather than static projects. See Appendix for a summary table detailing the specific interventions used by these cities and their measurable outcomes.

This section intentionally focuses on cities with long-standing, institutionalized traffic calming programs because their experiences directly counter claims that such interventions inherently reduce livability. Thus, this study includes all pioneer traffic calming cities identified in Ewing's (2005) *Traffic Calming Practice Revisited*, along with additional cities representing current best practices. On the contrary, these cities demonstrate that when traffic calming is implemented thoughtfully, context-sensitively, and as part of a broader safety framework, it delivers its intended outcomes: lives saved, injuries prevented, neighborhoods stabilized, and streets made safer and more humane. The evidence from these jurisdictions, including those within Utah, shows that the real threat to quality of life is not traffic calming, but the persistence of high-speed, injury-producing streets that prioritize vehicle throughput over human life. Taken together, the following case studies establish a clear conclusion: **traffic calming works**. It is a cornerstone of modern urban safety practice, a proven pathway to achieving zero-fatality goals, and an essential investment in the long-term health, safety, and quality of life of cities and their residents (Georgio, 2025; Lopoo et al., 2024; Brown et al., 2017; Ewing et al., 2005).

6.2 Data Collection Procedure and Outlook of Case Study Regions

The objective of this phase was to generate timely, practice-based evidence on the real-world performance of traffic calming interventions by directly engaging the jurisdictions responsible for their design, implementation, and evaluation. Rather than relying solely on published literature, this phase prioritized applied professional insight and empirical before-and-after evidence to better understand how traffic calming functions in operational settings. To achieve this, we conducted an extensive nationwide outreach effort that included dozens of phone calls, targeted email correspondence, Zoom meetings, and structured interviews with traffic calming program managers, transportation planners, city engineers, public works directors, and county highway officials. These engagements provided critical institutional knowledge and contextual detail, capturing the evolution of programs, specific intervention measures, and post-implementation evaluation outcomes that are often absent from formal reports and academic studies.

In total, more than 42 U.S. jurisdictions were contacted. Out-of-state cities included New York City, NY, Philadelphia, PA, Chicago, IL, Minneapolis, MN, Boston / Boston Region, MA, Cambridge, MA, Corvallis, OR, Austin, TX, Bellevue, WA, Berkeley, CA, Boulder, CO, Charlotte, NC, Dayton, OH, Eugene, OR, Fort Lauderdale, FL, Colorado Springs, CO, Boise, ID, Gainesville, FL, Gwinnett County, GA, Howard County, MD, Montgomery County, MD, Phoenix, AZ, Portland, OR, San Diego, CA, San Jose, CA, Sarasota, FL, Seattle, WA, Tallahassee, FL, West Palm Beach, FL, Arlington, VA, and Hoboken, NJ. Collectively, these jurisdictions represent a diverse cross-section of urban contexts, geographic regions, and levels of traffic calming program maturity.

Case Study Cities and Regions



An additional ten cities within Utah, Sandy, Park City, West Valley City, Millcreek, Ogden, St. George, Cedar City, Provo, Logan, and Cottonwood Heights, were included to provide state-level insight and allow for direct comparison with national best practices. Many of the out-of-state jurisdictions were originally featured in Ewing et al.'s (2005) seminal study, "Traffic Calming Practice Revisited," published in the *ITE Journal*. Re-engaging these pioneer cities offered a rare longitudinal perspective on how traffic calming programs have evolved over time and whether they remain integral to contemporary safety and livability strategies. Others were identified through systematic online searches documenting past or ongoing traffic calming initiatives.

The outreach effort yielded strong participation, with an overall response rate of 89% across all contacted jurisdictions. The documentation, data, and qualitative insights provided enabled the development of a

focused set of case study summaries. Each case study documents the existence and scope of traffic calming programs, details the specific treatments implemented, identifies whether formal before-and-after evaluations were conducted, and summarizes observed safety, operational, and livability outcomes. Together, these case studies provide a grounded, national-scale assessment of how traffic calming strategies are being applied in practice today, how their effectiveness is measured, and what outcomes are achievable through intentional street design. The findings reinforce the role of traffic calming as a durable, evidence-based approach for advancing safety, public health, and people-centered urban environments.

6.3 Traffic Calming Practices and Observed Impacts: Out-of-State Cities

Boulder, CO

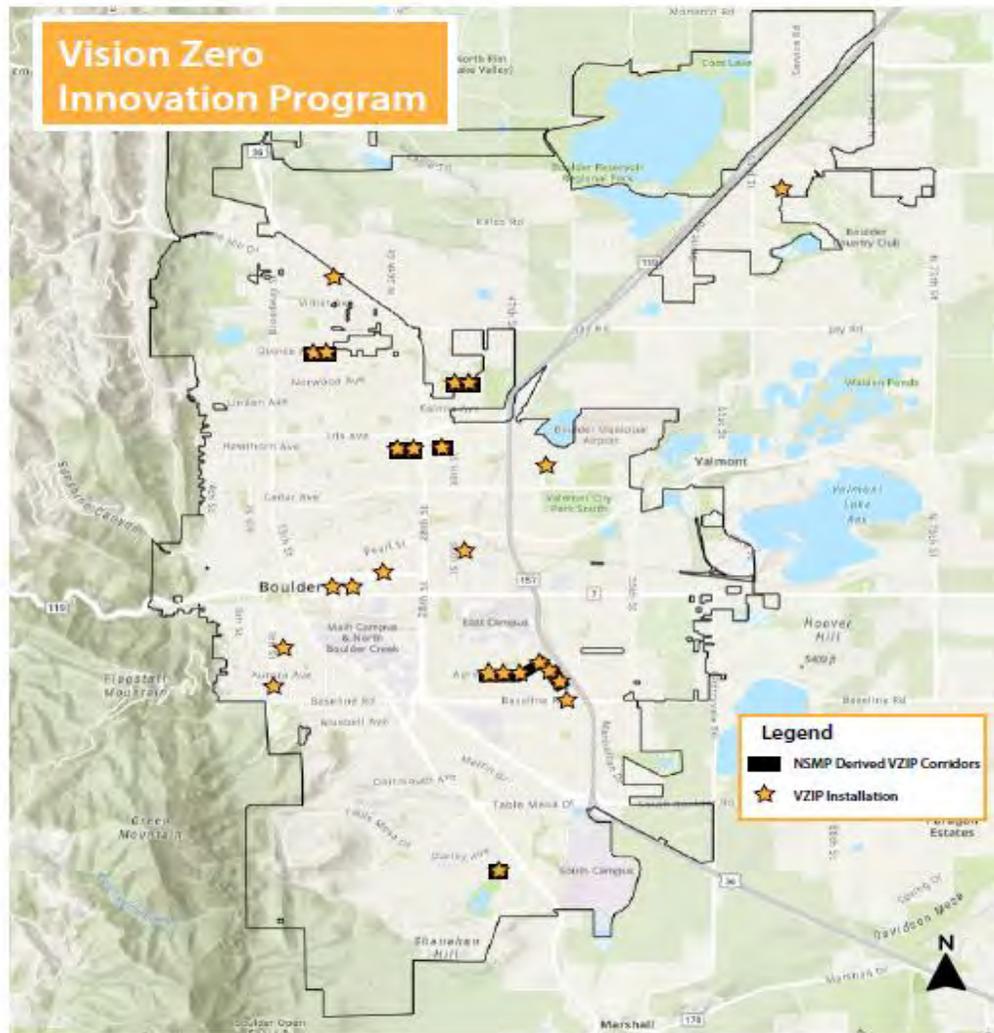
The City of Boulder operates one of the nation's more deliberate and analytically grounded traffic calming programs through its Vision Zero Innovation Program (VZIP). Established in 2014 as part of Boulder's Transportation Master Plan, VZIP serves as a central implementation mechanism for the city's long-standing commitment to street safety. Safety has consistently been a core planning value in Boulder, and the adoption of Vision Zero formalized the community's goal of eliminating all traffic-related fatalities and serious injuries.

At the heart of Boulder's Vision Zero approach is a fundamental principle: traffic deaths and serious injuries are preventable, and no loss of life on the transportation system is acceptable. In aligning with Vision Zero, Boulder joined a growing network of cities nationwide and internationally that recognize traffic safety as a shared responsibility, one that extends beyond individual behavior to include street design, policy decisions, and institutional accountability. Achieving this goal requires a comprehensive strategy that integrates safe street design, targeted enforcement, and strong community partnerships.

Boulder's Vision Zero framework employs both location-specific interventions and system-wide strategies, enabling the city to respond to known safety issues while proactively addressing broader risk patterns across the transportation network. This dual approach enables targeted, data-driven responses to high-risk corridors and intersections, as well as proactive design changes that reduce the likelihood and severity of crashes throughout the city. Through VZIP, Boulder emphasizes iterative testing, evaluation, and refinement of traffic calming treatments, treating street safety improvements as adaptable solutions rather than one-time installations.

In 2020, the Boulder City Council reinforced this commitment by allocating \$250,000 to the Transportation and Mobility (T&M) Department specifically to advance the city's zero-fatality and zero-serious injury objectives. These funds supported the **deployment of a diverse set of traffic calming treatments across 30 locations throughout the city**, including chicanes, curb extensions, hardened centerlines, median islands, pinch points, and a traffic circle. The variety of treatments reflects Boulder's

context-sensitive approach, selecting design solutions tailored to roadway function, surrounding land uses, and observed safety concerns.



VZIP project locations in Boulder City

A defining strength of Boulder’s VZIP program is its rigorous evaluation framework. To assess the effectiveness of implemented projects, the city collected detailed before-and-after data on vehicle speeds and traffic volumes at each location. Performance metrics included changes in average vehicle speeds, 85th percentile speeds, the proportion of vehicles traveling at or above 25 mph, and the proportion traveling at or above 30 mph. Importantly, the evaluation also examined whether post-installation average speeds fell within three miles per hour of the posted speed limit, a benchmark that reflects safe operating conditions consistent with Vision Zero principles.

By systematically pairing physical street design interventions with quantitative performance monitoring, Boulder has developed a transparent and replicable model for implementing traffic calming. The VZIP program demonstrates how cities can move beyond anecdotal claims and instead rely on measurable outcomes to guide decision-making. Boulder’s experience illustrates that when traffic calming is embedded

within a broader Vision Zero framework, supported by political commitment, funding, and data-driven evaluation, it becomes a powerful and credible tool for improving safety and advancing community livability.

Considerations for Emergency Response: The project also considered impacts to emergency response, prioritizing emergency access (*for fire, police, and other emergency response personnel*). They note the critical importance of discussing turning radii and lane width requirements with fire and police departments to ensure compatibility with emergency operations. For example, they reference the *Pennsylvania’s Traffic Calming Handbook*, “traffic circles may incur a delay anywhere from 1-11 seconds per circle, with most delays in the 5-8 second range”. Thus, they highlight the need for design discussions to include navigation expectations and a determination of whether to avoid particular devices on certain emergency response corridors.

There is precedent for close coordination in the development of traffic calming projects in Boulder through the NSMP Complex Projects design process, where treatments (*such as speed cushions*) are designed with accommodations for emergency vehicles like fire trucks. A similar coordination process with first responders was used during the design of VZIP projects.

Chicanes: The chicane installation on Quince Avenue reduced average speeds by 10% and 85th-percentile speeds by 8%, with dramatic drops (over 60%) in the number of drivers exceeding 25–30 mph. This treatment was especially effective in cutting down high-end speeding.

Curb Extensions: Curb extensions were installed at 11 locations and were often paired with other calming elements, resulting in modest average speed reductions of 3–4% and approximately 30% fewer vehicles exceeding 25–30 mph. The most effective site, Aurora Avenue at 35th Street, saw major reductions in speeds and high-end speeding (*up to 94%*).

Traffic Circle: The traffic circle at Aurora Avenue and 35th Street reduced average speeds by 14% and 85th-percentile speeds by 16%, with particularly strong effects on high-end speeders, cutting the number of drivers exceeding 25–30 mph by 77–94%.

Traffic Circle and Curb Extensions at Aurora Avenue and 35th Street

Hardened Centerline: The hardened centerline at Baseline Road and Mohawk Drive significantly improved turning paths, with left-turning drivers crossing after the median increasing from 23% to



91%, thereby enhancing visibility and pedestrian safety. U-turn behavior also improved, albeit to a lesser degree, still demonstrating measurable safety benefits.

Median Island: Median islands alone produced mixed results: one site showed no speed reduction, while another achieved major reductions in high-end speeding (over 90%). When paired with curb extensions, median islands sometimes reduced speeding, though effectiveness varied by street conditions and design.



Chicane and Median Island on Quince Avenue (Left) and Glenwood Drive East of 28th Street (Right)

Pinch Points: Pinch points installed across five locations reduced both average and 85th-percentile speeds by up to 9% and achieved significant decreases in high-speed driving, including a 70% reduction in top speeders on Quince Avenue.

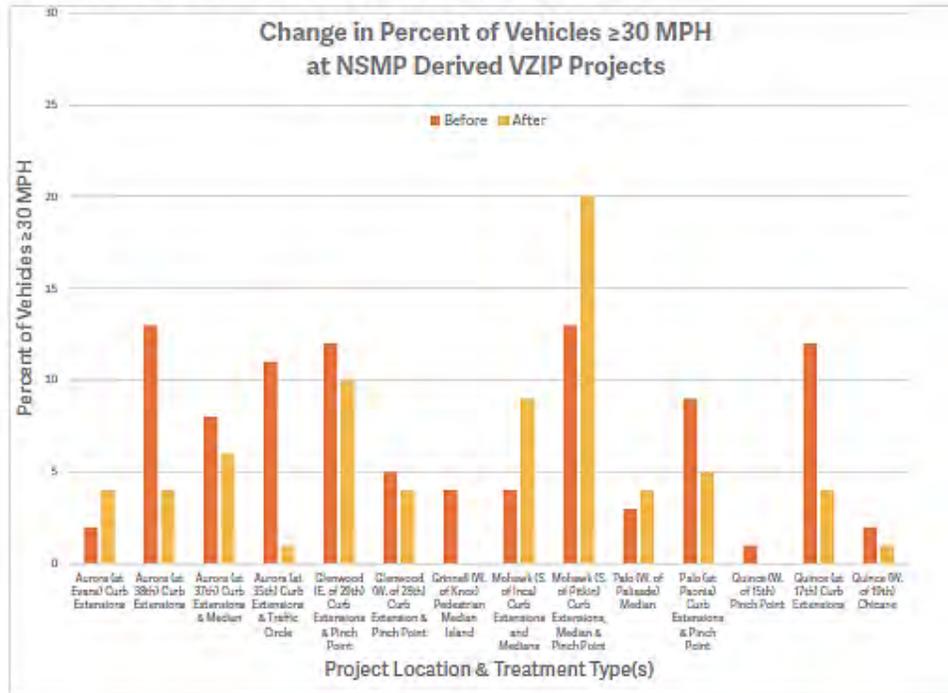
Speed Kidney: The speed kidney on Cherry Avenue, likely the first of its kind in North America, reduced average speeds by 12% and 85th-percentile speeds by 17%, while nearly eliminating high-speed driving with reductions of 90–98%.



Speed Kidney on Cherry Avenue

High-End Speeding Vehicles

Before: Counts conducted between 2018 -2021 / After: 2022 counts



Public Feedback on Traffic Calming Treatments

The project team recognized that upfront and consistent messaging with the community regarding VZIP projects would be critical, given their quick-build nature and the application of new-to-Boulder treatments (such as the speed kidney). Though staff received VZIP project-related phone calls, emails, and resident inquiries through Inquire Boulder (the city’s customer service portal), the majority of VZIP feedback (over 300 comments) was submitted through a Formstack questionnaire on the project webpage. The questionnaire asked commentors to first indicate the project location for which they wanted to provide input and the mode they were using when traveling by the project (walking, biking, driving, or “other”). Commentors were then asked to compare their experience before and after the project was installed, rating their comfort level from “very uncomfortable” to “very comfortable.” Those who did not have “before” experience to draw from were asked to just provide feedback on their current experience at the project site. Of the 318 Formstack comments presented, a few major themes emerged, including concerns regarding impacts to parking, the aesthetics of the VZIP projects and skepticism regarding whether they would be effective.

Quince Avenue: The primary concerns on the Quince corridor regarded the narrowed travel lanes (including concerns with large vehicles navigating the installations and navigating in winter conditions), confusion with how to properly travel through the treatments (and related concerns with pedestrians/bicyclists conflicting with vehicles), and concerns with visual appearance. The most positive feedback themes regarded appreciation for reduced speeds and safer crossing conditions.

Aurora Avenue: The primary concerns on the Aurora corridor regarded larger vehicles navigating the traffic circle, unsafe interactions around curb extensions between vehicles and cyclists, and concerns with project aesthetics. The most positive feedback shared support for enhanced crossing safety, particularly for those accessing High Peaks Elementary School.

Glenwood Drive (Folsom Street to 28th Street): The primary concerns on this segment of Glenwood included confusion with how to properly navigate the installations, concerns with the project aesthetics, and parking removal. The most positive feedback shared support for reduced vehicle speeds and better crossing visibility.

Glenwood Drive (29th Street to 30th Street): The primary concerns on this segment of Glenwood involved the reduced number of parking spaces and confusion with how to properly navigate the installations. The most positive feedback shared support for reduced vehicle speeds and better crossing visibility.

Mohawk Drive: The primary concerns on the Mohawk corridor regarded the anticipated adverse impact to snowplows, concerns with the project aesthetics, and vehicle drivers and cyclists feeling unsafe within the pinch point. The most positive feedback shared support for better crossing visibility.

26th Street and Spruce Street: The primary concern at this intersection involved cyclists feeling constrained navigating the curb extensions. The most positive feedback shared support for reduced vehicle speeds, better crossing visibility, and more protection from vehicles.

Conclusion: Boulder's Traffic Calming Outlook and Quality of Life Impacts

Boulder's Vision Zero Innovation Program demonstrates that traffic calming, when implemented through a data-driven and context-sensitive framework, delivers substantial safety benefits while supporting overall street functionality. Across a wide range of treatments, including chicanes, curb extensions, traffic circles, pinch points, and innovative designs such as the speed kidney, the city achieved consistent reductions in average and high-end vehicle speeds, with many locations experiencing declines in dangerous speeding of 70–90 percent or more. These results directly address the behaviors most strongly associated with severe and fatal crashes, reinforcing Boulder's commitment to the Vision Zero principle that traffic deaths are preventable.

Equally important, Boulder's approach shows that safety improvements can coexist with operational and community needs. Close coordination with emergency responders ensured that traffic calming designs accommodated emergency access. Ongoing public engagement revealed growing support for safer crossings, lower speeds, and improved comfort for pedestrians and cyclists. Although concerns related to aesthetics, parking, and navigation were raised, the overall experience suggests that traffic calming can enhance neighborhood livability and quality of life when thoughtfully designed and evaluated. Boulder's program offers a compelling, replicable model for cities seeking to improve safety, protect vulnerable road users, and create more people-centered streets.

Eugene, OR

Eugene, Oregon, stands out as one of the earliest adopters of traffic calming in the United States, with its initial efforts dating back to the mid-1970s. Influenced by European grassroots movements, most notably the Dutch “living streets” (woonerf) concept, which emerged from Delft, Eugene recognized early on that residential streets should function as shared community spaces rather than high-speed conduits for through traffic. These early experiments were motivated by growing concerns about speeding, cut-through traffic, and declining neighborhood livability, particularly on local streets not designed to carry high volumes or fast-moving vehicles.

Over time, Eugene’s approach evolved from isolated, resident-driven treatments into a comprehensive, city-supported traffic calming program aimed at systematically improving safety and quality of life. While early efforts focused primarily on reducing vehicle speeds and discouraging cut-through traffic, the program gradually expanded to embrace broader livability goals, reclaiming neighborhood streets for walking, biking, social interaction, and everyday community use. In this way, Eugene’s experience closely mirrors a global trajectory in traffic calming practice, transitioning from informal, community-led initiatives to formalized, citywide programs grounded in policy, data, and design standards.

Eugene was among the jurisdictions originally examined in our 2005 research, and the city continues to employ a diverse set of traffic calming tools to address transportation safety and neighborhood quality-of-life concerns. The most commonly used devices are speed humps and speed cushions, which are applied selectively based on clear, context-sensitive criteria. Candidate streets typically include local and neighborhood collector roads where vehicle speeds routinely exceed posted limits, particularly in areas near schools, parks, high-density residential neighborhoods, and other community destinations with high levels of pedestrian and bicycle activity.

The city’s program explicitly avoids a one-size-fits-all approach. Streets with steep slopes are excluded from speed hump and speed cushion treatments due to operational challenges for snowplows and emergency vehicles. Higher-order roadways, such as arterials, are not considered appropriate for these devices. Instead, Eugene evaluates vehicle speeds, traffic volumes, surrounding land uses, and neighborhood context to identify locations where traffic calming can deliver the greatest benefit. Streets with high volumes of speeding traffic, located near community destinations, are typically prioritized, ensuring that limited funding is directed toward corridors with the highest potential for safety and livability returns. Once priority streets are identified, the city conducts outreach to residents living on and near the corridor to gather input and inform project design and implementation.

A defining feature of Eugene’s program is its commitment to data-driven evaluation. The Transportation Planning Department has conducted multiple traffic calming studies using anonymized and aggregated StreetLight data, derived from connected vehicles and devices, to analyze vehicle speeds and volumes across the street network. One such study, conducted between spring 2019 and 2025, employed a quasi-experimental research design comparing traffic-calmed streets, including Bailey Lane, Bogart Lane, Satre

Street, Holly Avenue, Jefferson Street, and 8th Avenue, to carefully selected control streets with similar physical and contextual characteristics, such as Garden Way, Elmira Road, Horn Lane, and 32nd Avenue.

The results provide strong empirical evidence of the effectiveness of traffic calming. Traffic-calmed streets experienced an average 15 percent reduction in 85th-percentile speeds, while control locations saw little to no change, with reductions averaging only about 3 percent. In addition, average daily traffic volumes on traffic-calmed streets declined by an average of 22 percent, with some corridors experiencing reductions of up to 40 percent, compared to an 8 percent reduction at control sites. These findings indicate that Eugene’s traffic calming interventions not only slow vehicles but also meaningfully reduce cut-through traffic, directly addressing the neighborhood concerns that originally motivated the program.



Common types of traffic calming in the City of Eugene

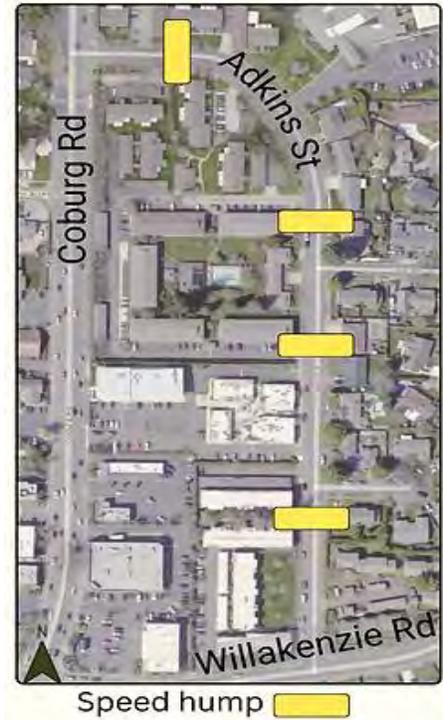


	85th Percentile Speeds			
	Pre-Traffic Calming Streetlight Data	Spring 2025 Streetlight	MPH Change	% Change
Bailey Lane (Coburg to Satre)	30	25	-5	-17%
Bogart Lane (Satre to Willakenzie)	29	24	-5	-17%
Satre Street (Bailey to Western)	29	24	-5	-17%
Van Duyn Street (Western to Harlow)	26	23	-3	-12%
Welcome Way (Candlelight to Royal)	27	25	-2	-7%
Legacy Street (Barger to Avalon)	35	29	-6	-17%
Holly Avenue (Gilham to Norkenzie)	28	23	-5	-18%
Jefferson Street (13th to 24th)	31	28	-3	-10%
8th Ave (Monroe to Garfield)	27	23	-4	-15%

Eugene’s streetlight data – comparing before and after speeds on numerous traffic-calmed streets

A list of other traffic calming projects in the city is provided below, along with examples, project background, and timelines.

Adkins Street Traffic Calming Project: The City of Eugene is considering adding a series of four speed humps to Adkins Street between Coburg Road and Willakenzie Road. In 2024, the city conducted a speed and volume study along Adkins Street and found that it has high traffic volumes for a local street and that most people driving on the street are traveling at least 5 miles per hour over the posted speed limit. Adding speed humps would help address community concerns about roadway safety by reducing speeding along the street. Funding for this project would come from the Traffic Calming fund. The Transportation Planning Team is conducting community engagement in the fall of 2025 to better understand how this project could impact the neighborhood. There will be one in-person tabling event and one online meeting. Construction of speed humps would tentatively happen in 2026, but could shift into 2027.



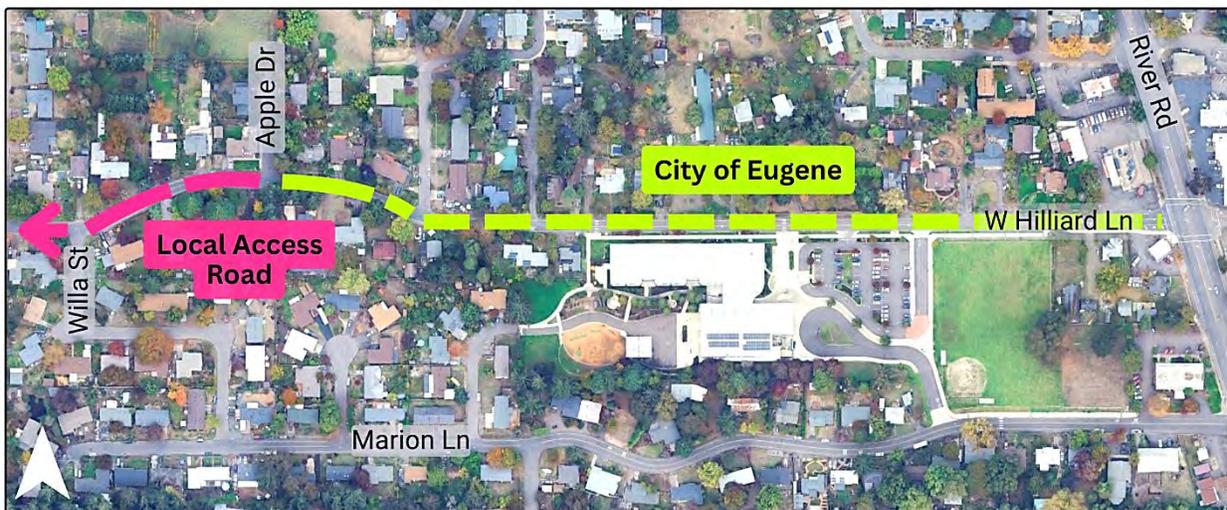
Berntzen Rd Traffic Calming: The City of Eugene is planning a traffic calming project on Berntzen Road in response to neighborhood concerns about speeding traffic. The project is scoped to include a series of speed humps between Marhsall Avenue and Royal Avenue to encourage safe driving behavior and create more comfortable walking access to Petersen Park. The City of Eugene also has plans to add flashing yellow pedestrian beacons to the marked crossing at Berntzen and Royal. Construction is currently expected to take place during Summer of 2025.

Candlelight Dr Traffic Calming Project: The City of Eugene is considering adding a series of seven speed cushions to Candlelight Drive between Royal Avenue and Avalon Street. Speed and volume data from Candlelight Drive show that the street has moderate traffic volumes for a local street and that most people driving on the street are traveling over the posted speed limit. Adding speed cushions would help address community concerns about roadway safety by reducing speeding along the street, particularly near Danebo Elementary School and nearby sports fields. Funding for this project would come from the 2022 Street Bond.

W Hilliard Lane Traffic Calming: The City of Eugene is considering adding a series of four speed humps to W Hilliard Lane between River Road and Apple Drive. In 2024 the city conducted a speed and volume study along W Hilliard Lane and found that it has high traffic volumes for a local street and that most people driving on the street are traveling over the posted speed limit. Adding speed humps would help address community concerns about roadway safety by reducing speeding along the street, particularly in front of River Road Elementary School. Funding for this project would come from the Traffic Calming fund.



This project is focused on the portion of W Hilliard Lane owned by the City of Eugene (between River Road and Apple Drive). W Hilliard Lane between Apple Drive and Fairway Drive is a Local Access Road. Local Access Roads (LARs) are typically older roads that were originally constructed by landowners to access private property, though over time some LARs have come to serve the larger community. LARs are public roads located within city or county right-of-way, but they are not owned or maintained by the city or county. W Hilliard Lane between Fairway Drive and N Park Avenue is owned by Lane County.



The Transportation Planning Team is conducting community engagement in late 2025 to better understand how this project could impact the neighborhood. Construction of speed humps would tentatively happen in 2026 but could shift into 2027.

Hilyard Street Traffic Calming Project: The City of Eugene will be repaving Hilyard Street between 34th Avenue and 40th Avenue. When a street is repaved, it provides an opportunity to add elements to the street that make it safer and more comfortable to walk and bike. Planned additions to Hilyard Street include:

- Speed cushions between 36th Avenue and 40th Avenue;
- New curb ramps where needed;
- Curb extension and crosswalk across Hilyard Street on the north side of 37th Avenue; and
- Replacement of the existing sidewalk on the east of Tugman Park (along Hilyard Street) with a wider shared use path.

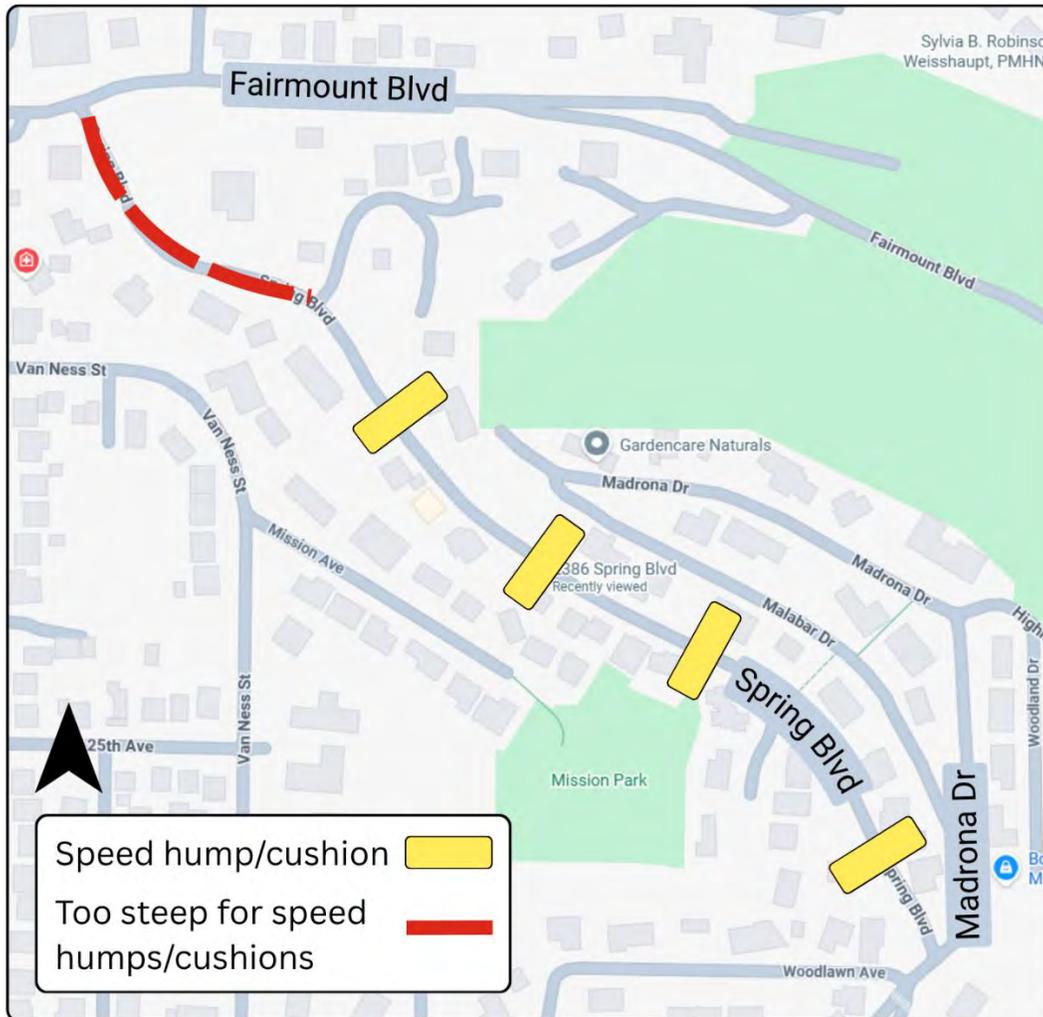
These changes to the street will help address residents' concerns about safety on Hilyard Street, especially for people walking. Funding for this project comes from the 2017 Street Bond and Traffic Calming fund.

Arthur Street Traffic Calming Project: The City of Eugene is considering adding a series of six speed humps to Arthur Street between 18th Avenue and 23rd Avenue. In 2024 the city conducted a speed and volume study along Arthur Street and found that it has high traffic volumes for a local street and that most people driving on the street are traveling over the posted speed limit. Adding speed humps would help address community concerns about roadway safety by reducing speeding along the street. Funding for this project would come from the Traffic Calming fund. The Transportation Planning Team is conducting community engagement in the fall of 2025 to better understand how this project could impact the neighborhood. Construction of speed humps would tentatively happen in 2026 but could shift into 2027.



Speed hump locations are tentative
Speed humps are not to scale

Spring Boulevard Traffic Calming: The City of Eugene is considering adding a series of four speed humps or speed cushions to Spring Boulevard between Fairmount Boulevard and Madrona Drive. Adding speed humps or speed cushions would help address community concerns about roadway safety by reducing speeding along the street. This could be particularly impactful for community members who walk in the area because Spring Boulevard does not have sidewalks. Funding for this project would come from the 2022 Street Bond. The Transportation Planning Team is conducting community engagement in late 2025 to better understand how this project could impact the neighborhood. Construction of speed humps or speed cushions would tentatively happen in 2026 but could shift into 2027.



Conclusion: Eugene’s Traffic Calming Outlook and Quality of Life Impacts

Eugene’s traffic calming program reflects a clear, forward-looking commitment to safety, neighborhood livability, and people-centered street design. Across multiple corridors, the city has consistently relied on data-informed decision-making, using speed and volume studies to identify problem locations and selecting proven interventions, such as speed humps, speed cushions, curb extensions, and pedestrian

beacons. These treatments are strategically focused on local streets experiencing chronic speeding, cut-through traffic, and safety concerns near schools, parks, and residential areas. By pairing traffic calming measures with repaving projects, school access improvements, and pedestrian infrastructure upgrades, Eugene demonstrates how safety interventions can be integrated into routine capital investments, rather than being treated as isolated or temporary fixes.

Collectively, these projects point to a broader quality-of-life vision in which traffic calming is not merely about slowing cars, but about creating streets that feel safer, more comfortable, and more accessible for everyday activities, such as walking, biking, and accessing neighborhood destinations. The emphasis on community engagement, phased implementation, and flexible timelines shows the city's responsiveness to resident concerns and local context. Eugene's ongoing and planned projects demonstrate that traffic calming delivers tangible safety benefits while supporting broader goals of livability, equity, and neighborhood cohesion, reinforcing the idea that well-designed street environments can meaningfully improve daily life without sacrificing mobility or functionality.

Colorado Springs, CO

Colorado Springs' approach to traffic calming is anchored in its long-standing Neighborhood Traffic Management Program (NTMP), a framework established to address persistent speeding and excessive traffic volumes on residential and low-speed collector streets. Designed for roadways with posted speed limits of 30 miles per hour or less, the program reflects the city's recognition that neighborhood streets must prioritize safety, comfort, and quality of life alongside mobility. A defining feature of the NTMP is its resident-driven structure, which empowers community members to request traffic calming evaluations and interventions in response to localized safety and livability concerns.

The City of Colorado Springs explicitly frames traffic calming as a community health and livability strategy, stating that reducing vehicle speeds and volumes makes streets safer for drivers, bicyclists, and pedestrians while enhancing overall quality of life. Within this framework, "Neighborhood Traffic Calming" refers to the use of physical street design features that rely on self-enforcing, physical, and perceptual cues to influence driver behavior, rather than relying solely on enforcement. The program's objectives are clear and multi-dimensional: to reduce speeding and cut-through traffic, reshape travel patterns through street design, promote livability in residential and commercial areas, and improve safety outcomes for vulnerable road users.

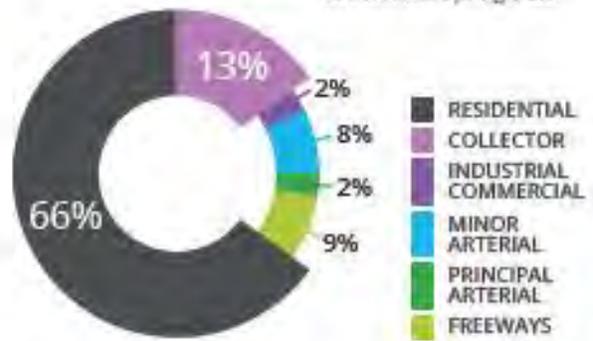
Colorado Springs employs a broad toolkit of traffic calming and traffic management strategies, selected based on street context and documented issues. Commonly used measures include neighborhood entry features, lane narrowing, roadway diets, traffic control signage, chicanes, traffic circles and roundabouts, limited roadway dips, and geometric intersection modifications. In some cases, complementary operational treatments, such as stop sign installations, speed radar trailers, and targeted speed enforcement, are used to reinforce the effectiveness of physical design interventions. This layered approach

allows the city to tailor solutions to neighborhood needs while maintaining consistency with engineering standards.

Street Typologies

Not all streets in Colorado Springs are eligible for traffic calming, and not all traffic calming treatments will be effective on all streets. For the neighborhood traffic calming program, only **residential streets** and **collector streets** are eligible for traffic calming with differences based on total street width. This is a "living document," so future adjustments to eligible streets types are possible, if not likely.

Figure 2.3: Approximate distribution of street typology mileage within City of Colorado Springs, CO.



WHAT ARE OUR STREET TYPES?

Colorado Springs classifies its streets based on its function and its role in our mobility network:



Residential: serve the local needs of the neighborhood and to provide direct access to abutting residential properties.



Collectors: serve the local needs of the neighborhood, provide direct access to non-residential, abutting properties, and, in limited situations, direct access to residential properties.



Industrial Commercial: serve facilities within industrial or commercial areas and to connect such areas with major arterial and collector streets.

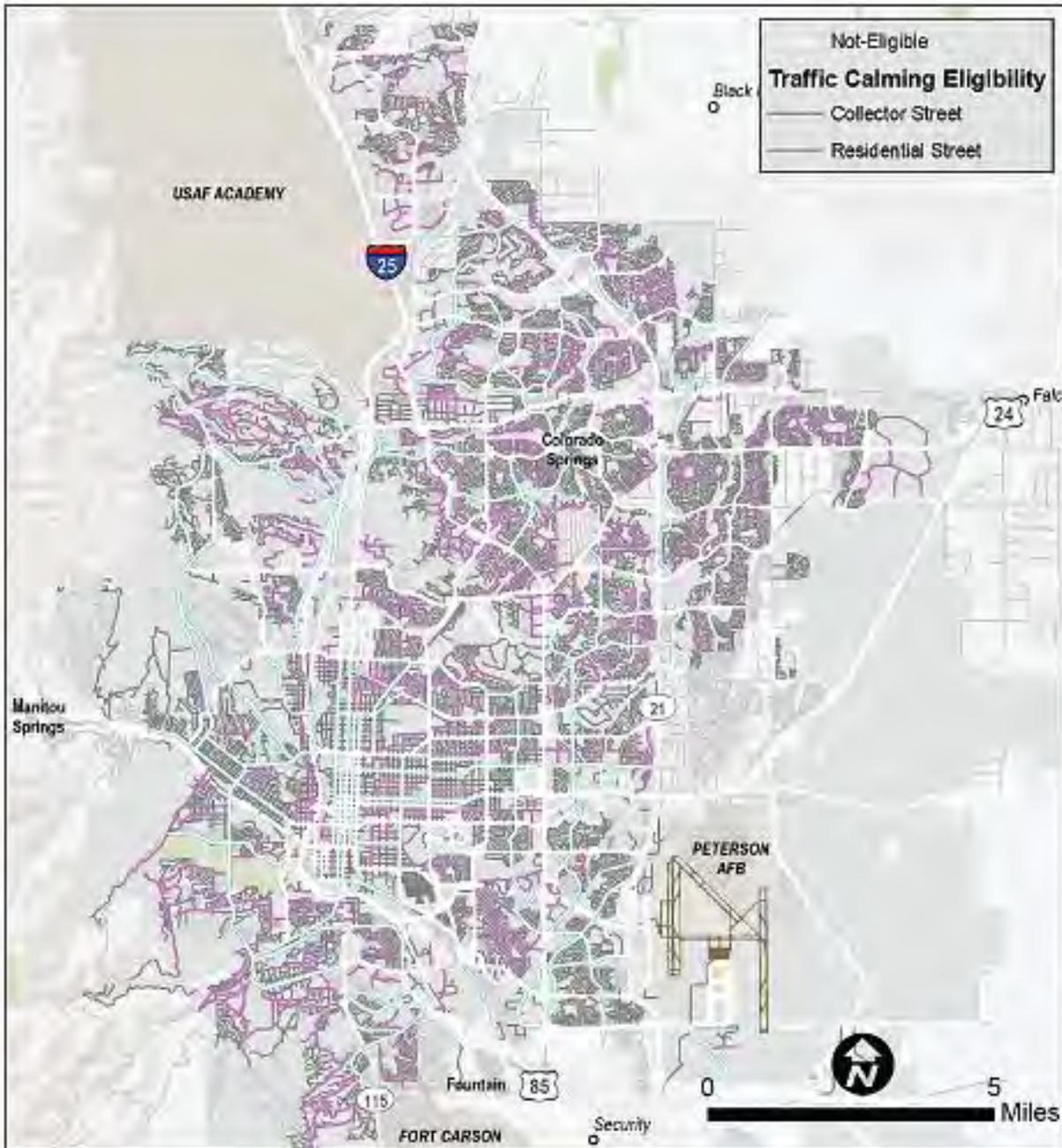
Minor Arterials: carry high volumes of inter- and intra-city traffic which connect major land use elements.

Principal Arterials: Major function is to serve through traffic. The secondary function is to serve abutting properties.

Freeways, Expressways & Parkways: permit rapid and unimpeded movement of traffic through and around the City.

As one of the jurisdictions originally examined in the 2005 study, Colorado Springs has demonstrated program continuity and evolution over time, with multiple interventions yielding substantial, measurable

safety benefits. In 2020, the Traffic and Transportation Engineering Division implemented a roundabout at Printers Parkway and Parkside Drive, where before-and-after analysis showed a 58 percent reduction in total crashes, a 91 percent reduction in injury crashes, and a 13 percent decrease in property-damage-only crashes. Similarly, the city reconfigured traffic signal operations at Academy and Airport Roads to restrict left-turn movements, resulting in a 100 percent reduction in fatalities and a 79 percent reduction in total crashes.



Additional evidence comes from a road diet implemented on Cascade Avenue between Bijou Street and Jackson Street in 2018. The conversion from a four-lane undivided roadway to a two-lane configuration

produced a 50 percent reduction in non-intersection crashes and a 61 percent reduction in crashes at unsignalized intersections. These outcomes highlight the effectiveness of design-based interventions in enhancing safety without compromising overall network functionality.



Left (Printer/Parkside Dr 2019 – before traffic calming) Right (Printer/Parkside Dr 2024 – after traffic calming)

Methods and Treatments: Different streets, in accordance with our Street Typologies, will merit different types of traffic calming measures. Once Traffic Engineering (TE) determines that thresholds are met and traffic calming is warranted, the next step in the process is to determine the most appropriate treatment. This section describes the traffic calming measures that make up Colorado Springs’ “toolbox”. Each treatment is described, its advantages and disadvantages given, and a range of measures, including typical design detail and cost categories, provided. Not all traffic calming treatments apply to every street typology. Engineering judgment will be incorporated into the consideration of any potential design.

Table 3.1: Matrix of traffic calming treatments by street typology.

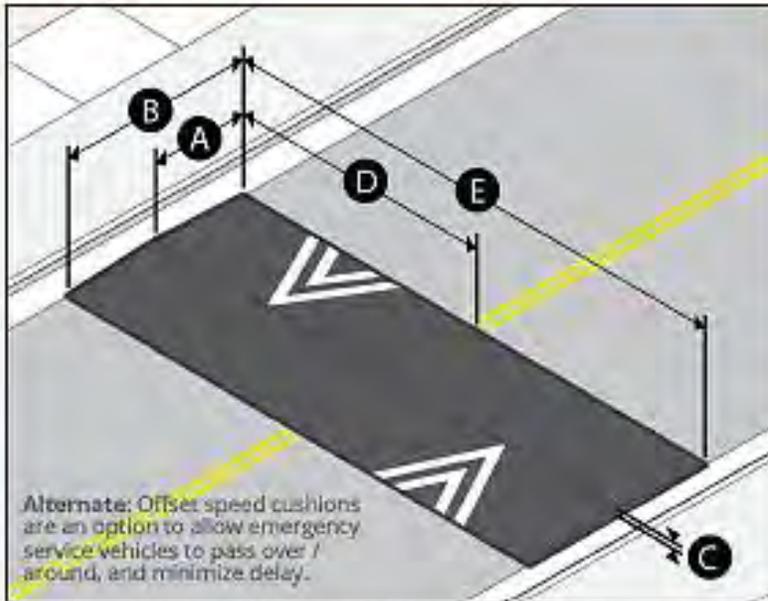
		RESIDENTIAL		COLLECTOR	
		≤ 28 ft.	> 28 ft.	≤ 36 ft.	> 36 ft.
LOW-IMPACT PHYSICAL DESIGN	Speed Hump	●	●	●	●
	Speed Dip	●	●	●	●
	Curb Extension	●	●	●	●
	Choker	●	●	●	●
	Chicane (off-set choker)	●	●	●	●
HIGH-IMPACT PHYSICAL DESIGN	Raised Crosswalk	●	●	●	●
	Raised Intersection	●	●	●	●
	Neighborhood Traffic Circle (mini)	●	●	●	●
	Pedestrian Refuge Island	—	●	●	●
	Median Island	●	●	●	●
	Semi-Diverter / Partial Closure	●	●	●	—
	On-Street Parking	●	●	●	●
	Restriping	—	—	●	●
OTHER	Unique Signage	●	●	●	●
	Streetscaping	—	—	—	●
	Speed Safety Camera (mobile)	—	●	●	●
	Speed Safety Camera (fixed)	—	—	●	●

NOTE: All treatments are site-specific. Measurements assume pavement mat (excluding gutter).

● Recommended — Not Recommended

Speed Hump

SPEED REDUCTION: -6 TO -8 MPH
REDUCTION FACTOR: HIGH



AKA: SPEED CUSHION

Elongated mound in roadway, perpendicular to traffic flow, that uses vertical deflection to slow motorists. Typically 12' to 14' in depth depending upon speed and volume. Typical spacing of 300' to 500'.

TYPICAL DIMENSION RANGE

- A** 6' - 7' } NOT speed bumps!
- B** 12' - 14' }
- C** 3" - 4"
- D** Lane Width
- E** Pavement width



SPEED

Posted Speeds up to 45 MPH

TRAFFIC & VOLUME

(Low - Moderate)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

Truck Transit Steep Grades

COST

(Low)

ADVANTAGES

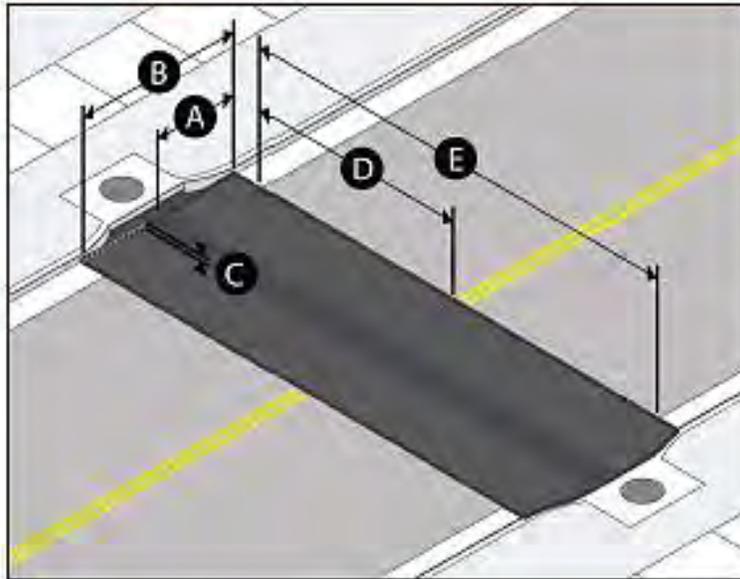
- No impact to bike safety
- Volume reductions up to 20%
- Cushion variation accommodates emergency, transit

DISADVANTAGES

- Noise levels (acceleration after passing over)
- Damage from snow plows (winter)
- Little effect as singular treatment

Speed Dip

SPEED REDUCTION: -6 TO -8 MPH
REDUCTION FACTOR: HIGH



Speed dips are similar in design to speed humps or tables, only depressed (concave).

TYPICAL DIMENSION RANGE

- A** 6' - 7'
- B** 12' - 14'
- C** 2" - 4"
- D** Lane width
- E** Pavement width



SPEED

 Posted Speeds up to 30 MPH

TRAFFIC & VOLUME


 (Low - Moderate)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck  Transit  Steep Grades

COST


 (Low)

ADVANTAGES

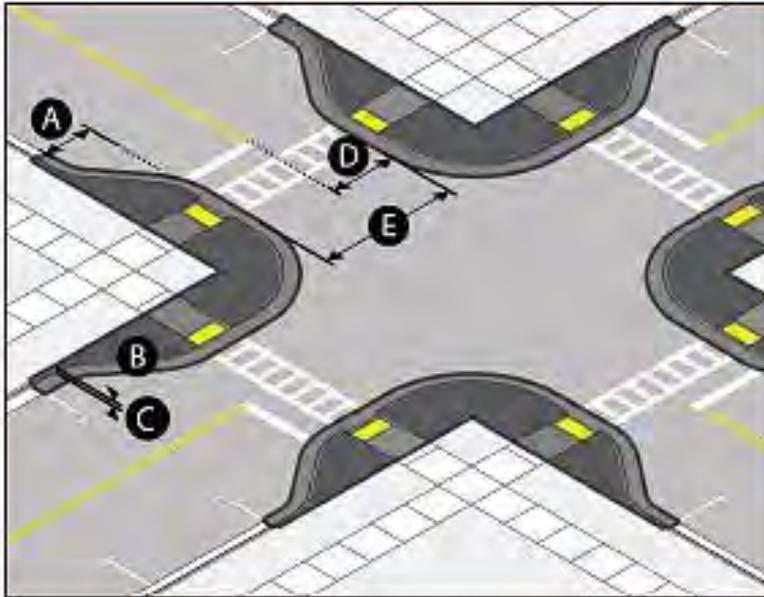
- Suitable for local and collector streets
- Similar benefit to Speed Hump

DISADVANTAGES

- Stormwater considerations (ponding)
- Noise levels
- Sight distance / warning signs needed

Curb Extension

SPEED REDUCTION: -3 TO -4 MPH
REDUCTION FACTOR: MEDIUM



AKA: BULBOUT

Horizontal extension of sidewalk and pedestrian zone into the street at an intersection. Narrows roadway to near the travel lane width. Size, shape, and materials may vary.

TYPICAL DIMENSION RANGE

- A** 8'
- B** 45-degree
- C** 3" - 6"
- D** 10' - 11'
- E** 20' - 22'



SPEED

 Posted Speeds up to 45 MPH

TRAFFIC & VOLUME

 (Low - Moderate)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck ✓
 Transit ✓
 Steep Grades ✓

COST

 (Moderate)

ADVANTAGES

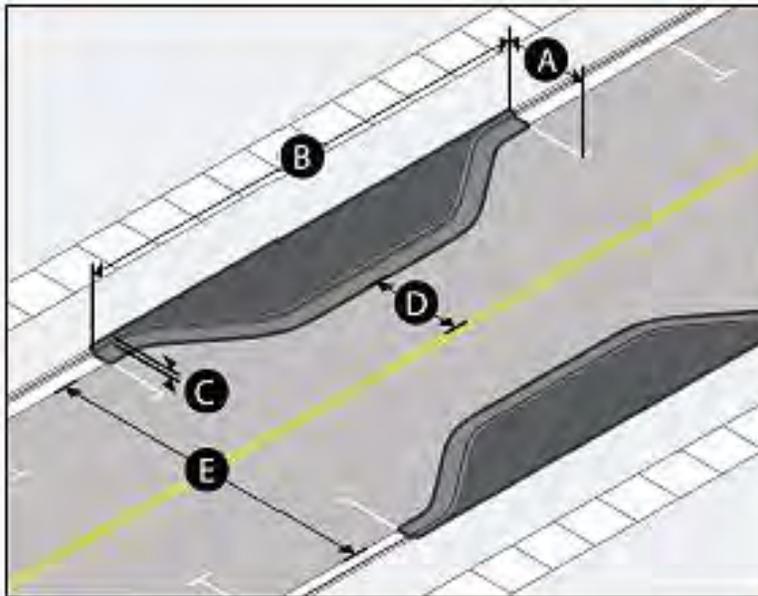
- Slows turning speeds
- Increases pedestrian visibility
- Shortens crossing distances

DISADVANTAGES

- Drainage, utilities relocation considerations
- Difficult for large vehicles
- May require parking removal near intersections

Choker

SPEED REDUCTION: -3 TO -4 MPH
REDUCTION FACTOR: MEDIUM



Narrowing of roadway with paired curb extensions or roadside islands at a midblock location. May be combined with on-street parking or crosswalks.

TYPICAL DIMENSION RANGE

- A** 8' - 10'
- B** 20'+
- C** 3" - 6"
- D** 10' - 12'
- E** Pavement width



SPEED

55 mph Posted Speeds up to 55 MPH

TRAFFIC & VOLUME

(Low)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

Truck ✓ Transit ✓ Steep Grades 8-12% ✗

COST

(Moderate)

ADVANTAGES

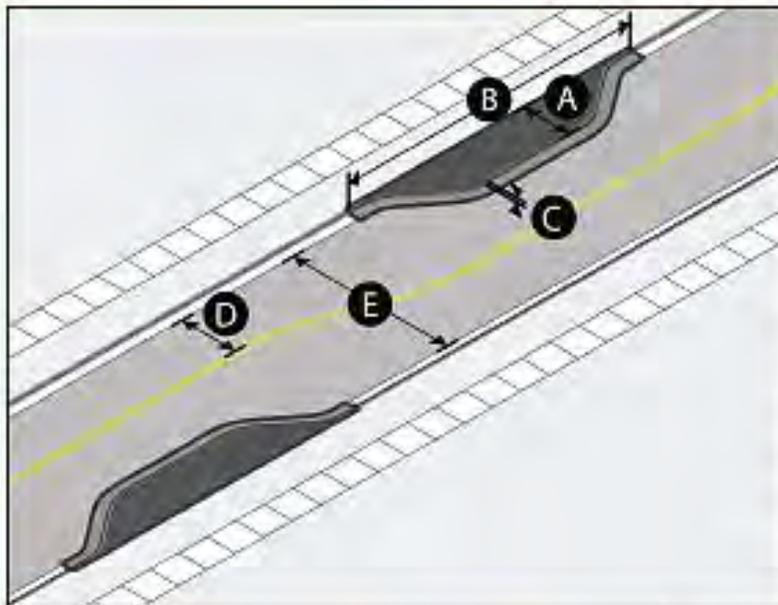
- Mid-block crossing opportunities
- Protection for on-street parking
- Can accommodate dedicated bike facilities

DISADVANTAGES

- Drainage, utilities relocation considerations
- May require parking removal near intersections
- Potential for higher costs

Chicane (off-set choker)

SPEED REDUCTION: -6 TO -9 MPH
REDUCTION FACTOR: HIGH



AKA: LATERAL SHIFT

Alternating curves or lane shifts that force a motorist to steer back and forth. Created with alternating curb extensions; can also be achieved by alternating on-street parking.

TYPICAL DIMENSION RANGE

- A** 8' - 10'
- B** 20'+
- C** 3" - 6"
- D** 10' - 12'
- E** 28' - 36'



SPEED

 Posted Speeds up to 35 MPH

TRAFFIC & VOLUME

   
 (Low)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck  Transit 
~~X~~ ~~X~~ ~~X~~

COST

      
 (Moderate)

ADVANTAGES

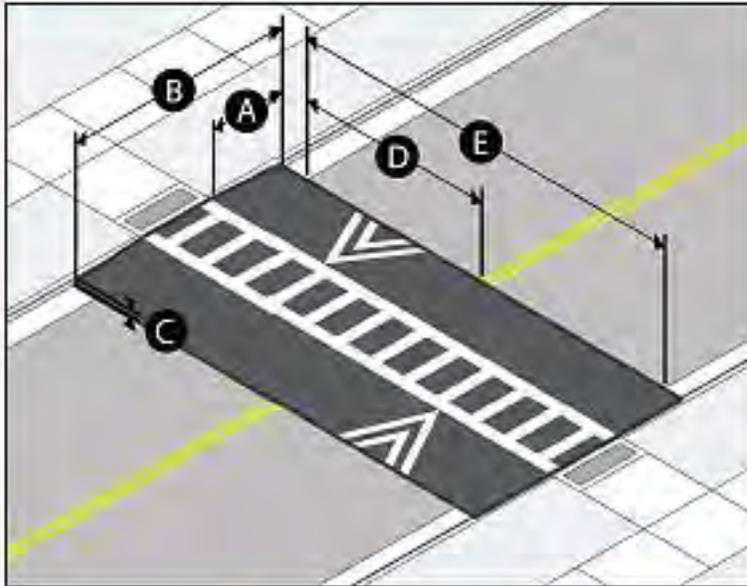
- Urban and suburban-appropriate
- Landscaping creates green space
- Horizontal shift slows traffic

DISADVANTAGES

- Bikes and vehicles must share lane
- Drivers can cut straight paths with poor design

Raised Crosswalk

SPEED REDUCTION: -6 TO -9 MPH
REDUCTION FACTOR: HIGH



AKA: SPEED TABLE

Raised area perpendicular to roadway with pedestrian crosswalk atop, using vertical deflection to reduce vehicle speeds. Height varies based on roadway type. Appropriate at midblocks & intersections.

TYPICAL DIMENSION RANGE

- A** 4" - 6"
- B** 12" - 20"
- C** 3" - 4"
- D** Lane width
- E** Pavement width



SPEED

 Posted Speeds up to 35 MPH

TRAFFIC & VOLUME

   (Low)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck  Transit  Steep Grades

Truck:  Transit:  Steep Grades: 

COST

       (Low)

ADVANTAGES

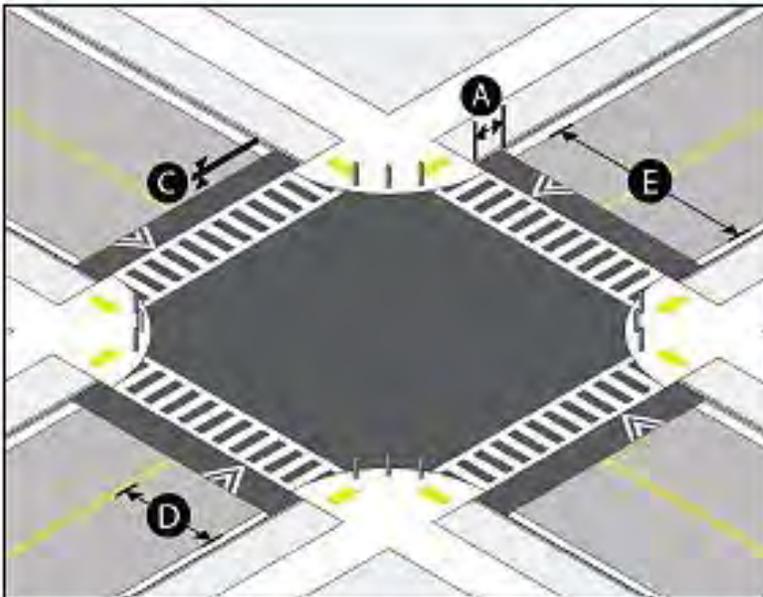
- Improves walkability, and crossing
- Reduces speeds between crosswalks
- Low impacts to bike safety

DISADVANTAGES

- Damage from snow plows (winter)
- Increase in noise
- Traffic may shift to adjacent streets

Raised Intersection

SPEED REDUCTION: -1 TO -2 MPH
REDUCTION FACTOR: LOW



Flat, raised area covering an entire intersection, including crosswalks, with ramps at all approaches. May be accompanied by brick or other decorative materials and textures.

TYPICAL DIMENSION RANGE

- A** 6' - 12'
- B** Intersection width
- C** 3" - 6"
- D** Lane width
- E** Pavement width



SPEED

 Posted Speeds up to 30 MPH

TRAFFIC & VOLUME

 (Low)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck ✓
 Transit ✓
 Steep Grades 8+% ✓

COST

 (High)

ADVANTAGES

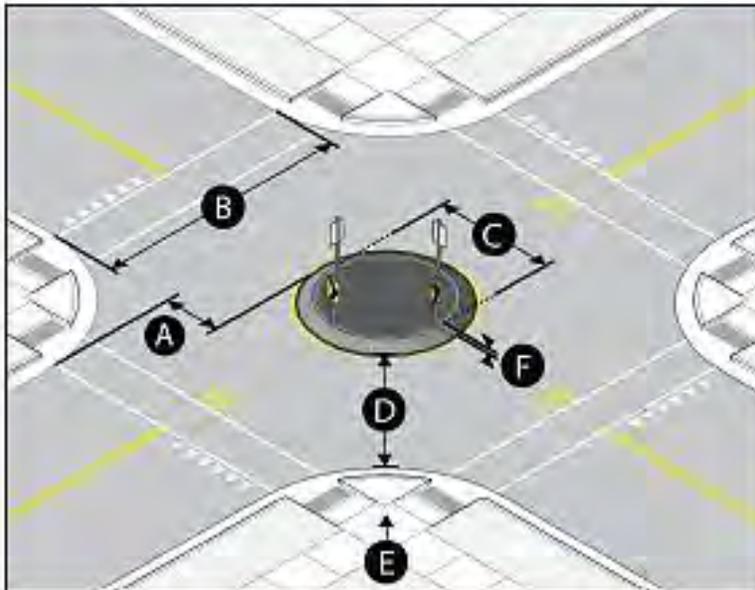
- Improves accessibility
- Residential and commercial-appropriate
- Effectively slows large trucks

DISADVANTAGES

- May lose roadway edge definition
- Drainage / utilities modification necessary
- Potential for higher costs

Neighborhood Traffic Circle (mini)

SPEED REDUCTION: -2 TO -4 MPH
REDUCTION FACTOR: LOW



AKA: MINI ROUNDABOUT

Raised circular island within an unsignalized intersection around which traffic passes. Unlike roundabouts, there is no horizontal deflection on approach; may use Stop or Yield signs instead.

TYPICAL DIMENSION RANGE

- A** 5.5' maximum
- B** 20' - 40'
- C** 9' minimum
- D** 16' - 20'
- E** 10' - 25' radius
- F** 3' - 6'



SPEED

 Posted Speeds up to 30 MPH

TRAFFIC & VOLUME

  
 (Low)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck  Transit 
 X X ✓

COST

      
 (Moderate)

ADVANTAGES

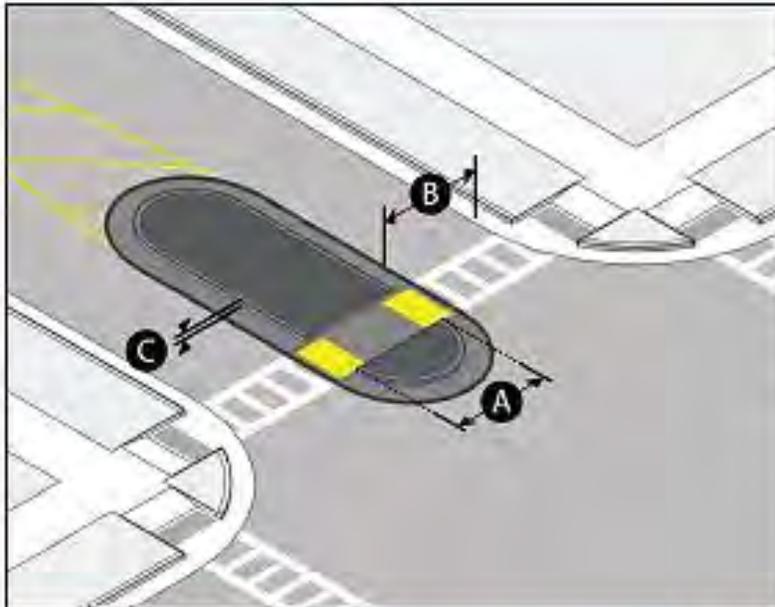
- Urban and suburban-appropriate
- Landscaping creates green space
- Horizontal shift slows traffic

DISADVANTAGES

- Drainage, utilities relocation considerations
- Potential for higher costs
- Large, left-turning vehicles may cut intersection

Pedestrian Refuge Island

SPEED REDUCTION: -3 TO -6 MPH
REDUCTION FACTOR: MEDIUM



Raised island located along the centerline of the roadway at an intersection, with a center cutout for pedestrians to rest while crossing. Islands narrow lane width and reduce pedestrian crossing distance.

TYPICAL DIMENSION RANGE

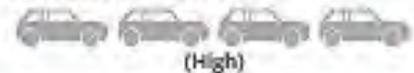
- A** 4' - 10'
- B** 10'+
- C** 3" - 6"



SPEED

 Posted Speeds up to 35 MPH

TRAFFIC & VOLUME



ROUTE TYPES (ADDITIONAL CONSIDERATIONS)



COST



ADVANTAGES

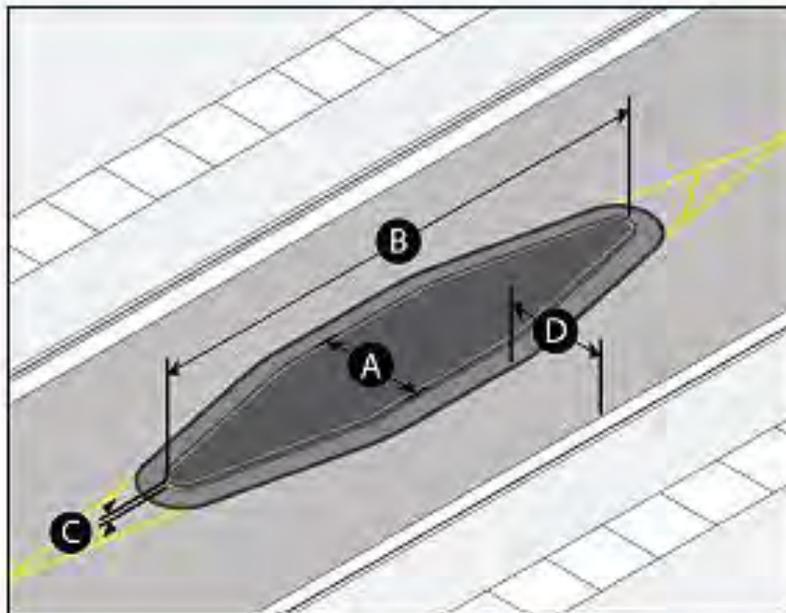
- Increases pedestrian visibility
- Shortens crossing distances
- Raised curb improves nighttime safety

DISADVANTAGES

- Landscaping can increase maintenance costs
- Drainage / utilities relocation considerations
- Turning radius impacts for large vehicles

Median Island

SPEED REDUCTION: -3 TO -6 MPH
REDUCTION FACTOR: MEDIUM



Raised island along a street centerline that narrows the travel lane width at midblock locations. May be a raised curb (preferred) or painted area, and with or without landscaping.

TYPICAL DIMENSION RANGE

- A** 4' - 10'
- B** 20'+
- C** 3" - 6"
- D** 10' - 11'



SPEED

 Posted Speeds up to 35 MPH

TRAFFIC & VOLUME

 (High)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck  Transit  Steep Grades

COST

 (Moderate)

ADVANTAGES

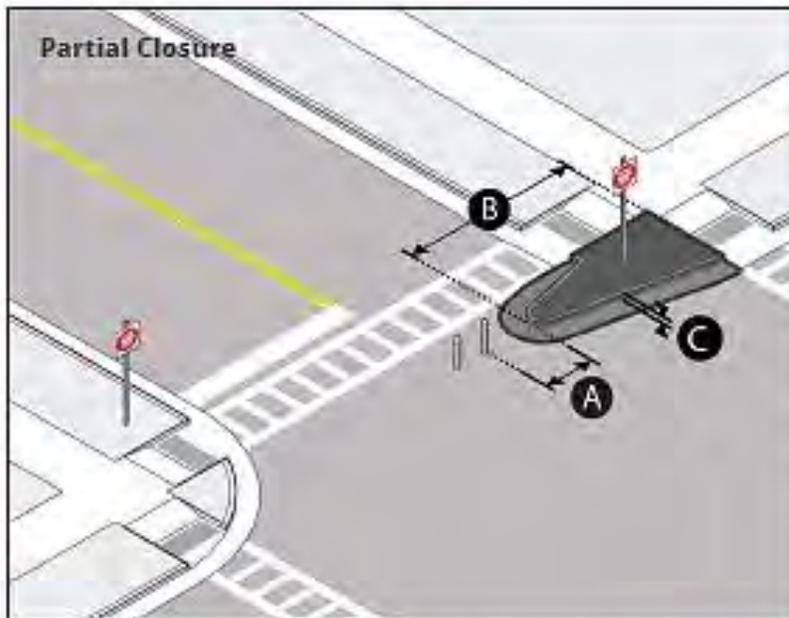
- Raised curb improves nighttime safety
- Reduces vehicle conflict points (turning, or crossover)
- Can function as mid-block refuge island

DISADVANTAGES

- Bikes and vehicles must share lane
- Drainage / utilities relocation considerations
- Damage from snow plows (winter)

Semi-Diverter / Partial Closure

SPEED REDUCTION: -4 TO -6 MPH
REDUCTION FACTOR: MEDIUM



AKA: DIAGONAL DIVERTER

Physical barrier blocking vehicle travel in one direction for a short distance on an otherwise two-way street. May block entering or exiting depending on its placement.

TYPICAL DIMENSION RANGE

- A** 4' - 6'
- B** Up to 12'
- C** 3" - 6"



SPEED

 Posted Speeds up to 35 MPH

TRAFFIC & VOLUME

 (Low)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck  Transit  Steep Grades

COST

 (Low)

ADVANTAGES

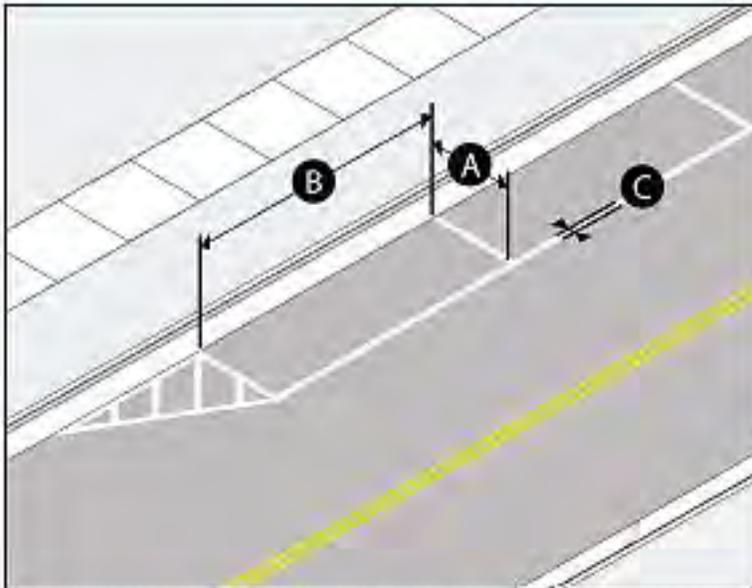
- Improves bike and pedestrian safety
- Lowers volumes for the closed travel lane
- Landscaping creates green space

DISADVANTAGES

- Traffic may shift to adjacent streets
- Impacts property accessibility
- Reduces overall vehicular traffic, while retaining bike & pedestrian access

On-Street Parking

SPEED REDUCTION: -1 TO -5 MPH
REDUCTION FACTOR: LOW



Parking spaces in the roadway located next to travel lanes that increase side friction to traffic flow. May be angled, parallel, or reverse-angled. Alternate along a corridor to mimic a chicane.

TYPICAL DIMENSION RANGE

- A** 7' - 8'
- B** 20'
- C** 6" stripe



SPEED

 Posted Speeds up to 35 MPH

TRAFFIC & VOLUME

 (High)

ROUTE TYPES (ADDITIONAL CONSIDERATIONS)

 Truck ✓
 Transit ✓
 Steep Grades 8+% ✗

COST

      
 (Low)

ADVANTAGES

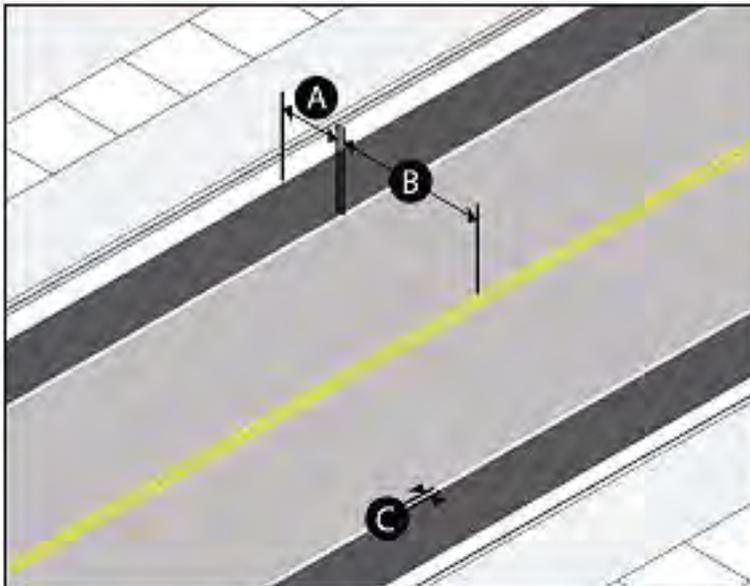
- Speed reduction likely
- Improves property accessibility
- Improves bike / ped safety as buffer from traffic

DISADVANTAGES

- Use engineer's judgment on truck, emergency routes
- Negligible effect without parking demand
- Little impact to vehicle conflicts

Restriping

SPEED REDUCTION: -1 TO -2 MPH
REDUCTION FACTOR: LOW



Reducing the width of a travel lane for use by bicyclists, or parked cars, through pavement markings and/or signage.

TYPICAL DIMENSION RANGE

- A** 5' - 8'
- B** Lane width
- C** 6" stripe



SPEED

 Posted Speeds up to 35 MPH

TRAFFIC & VOLUME



ROUTE TYPES (ADDITIONAL CONSIDERATIONS)



COST



ADVANTAGES

- Reduces pedestrian crossing distance and vehicle speeds
- Reduces conflicts in roadway
- Offsets vehicles from curb

DISADVANTAGES

- Use engineer's judgment on truck routes
- Increased bike-vehicle conflict at intersections
- Congestion impacts from road diet

Conclusion: Colorado Springs' Traffic Calming Outlook and Quality of Life Impacts

Colorado Springs' Neighborhood Traffic Management Program demonstrates a clear, systematic approach to traffic calming that is grounded in engineering judgment, contextual design, and measurable safety

outcomes. By aligning traffic calming treatments with defined street typologies and applying threshold-based decision-making, the city ensures that interventions are both appropriate and effective for their intended context. The program’s flexible “toolbox”, ranging from lane narrowing and roadway diets to roundabouts, chicanes, and geometric intersection changes, allows Colorado Springs to tailor solutions to local conditions while maintaining consistency with technical standards. This deliberate, method-driven framework reinforces traffic calming as a core transportation safety strategy rather than an ad hoc response to complaints. The measurable impacts of this approach highlight its value for both safety and quality of life. Substantial reductions in crashes, injuries, and fatalities across multiple projects demonstrate that well-designed traffic calming can significantly improve safety outcomes on neighborhood and collector streets. At the same time, by reducing speeding and cut-through traffic, these interventions contribute to quieter streets, safer conditions for walking and bicycling, and more livable residential environments. Colorado Springs’ experience illustrates that traffic calming, when applied thoughtfully and systematically, enhances everyday neighborhood life while advancing broader goals of safety, equity, and community well-being.

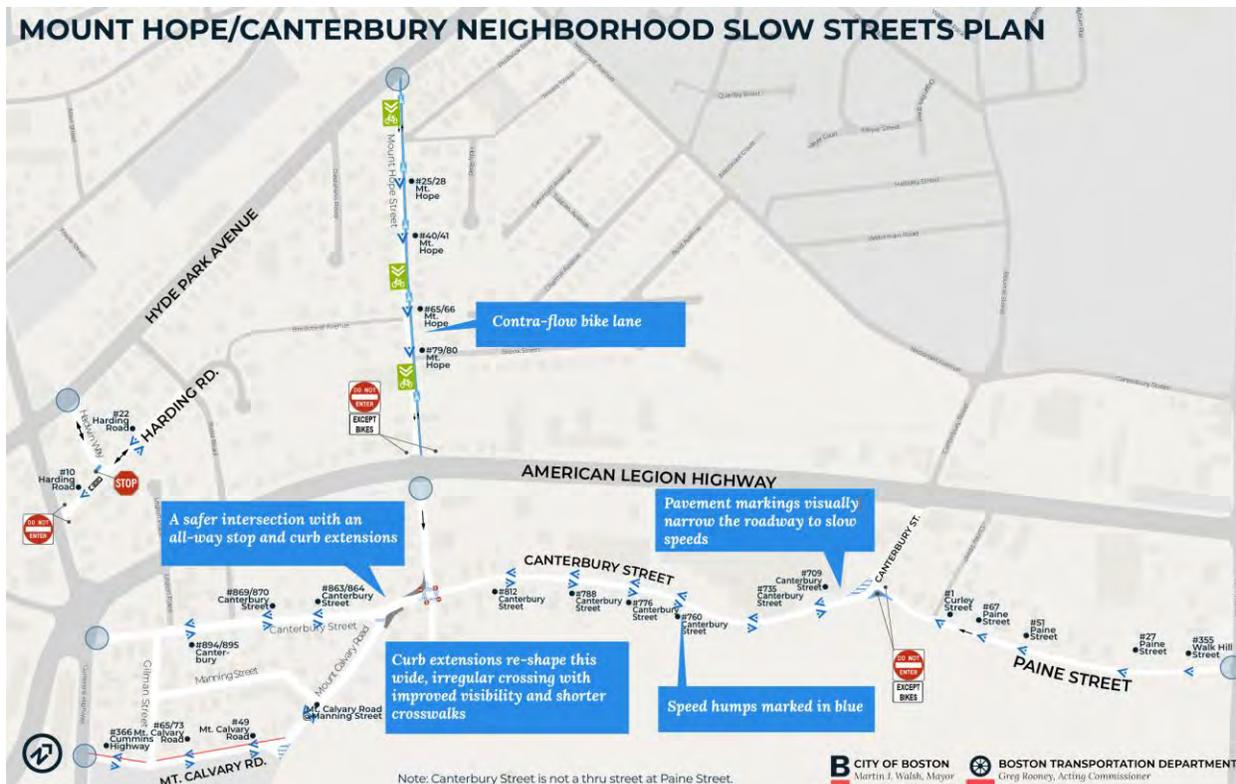
Boston / Boston Region, MA

Boston’s Neighborhood Slow Streets program reflects a long-standing commitment to traffic calming as a tool for enhancing safety, promoting mode shift, and revitalizing neighborhoods. The City of Boston has employed various types of traffic calming measures for many years; however, the city initiated the Neighborhood Slow Streets plan as a comprehensive traffic calming program in 2017 [16]. As part of this program, the city initially identified 15 neighborhoods with higher rates of speeding and crashes to implement various traffic calming measures, including speed humps, raised crosswalks, street direction changes, and parking restrictions [16].

Speed Humps

The city has been installing speed humps as a traffic calming measure. In 2023, Mayor Wu initiated another speed hump program to calm traffic. The city receives speed hump installation requests from the community for neighborhood streets.



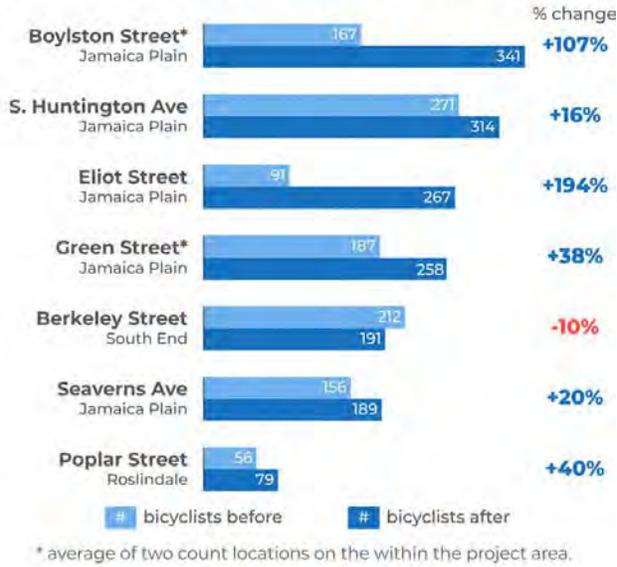


The city initiated another separated bike lanes with speed humps project from 2018 to 2020 for the routes with higher crashes involving pedestrians and bicyclists [17]. In 2022, the city decided to expand the bike network. As a part of the project, the city installed speed humps at the following locations:

- ✓ Boylston Street (Jamaica Plain) Contraflow bike lane and speed humps
- ✓ Green Street (Jamaica Plain) Buffered bike lane and speed humps
- ✓ Seaverns Avenue and Gordon Street (Jamaica Plain) Standard bike lane and speed humps
- ✓ Poplar Street Phase 1 (Roslindale) Contraflow bike lane and speed humps

As a result, the bicycle count for these project areas went up for all five locations (44% on average across all projects). The bicycle volume increased for these project areas. For example, the use of bikes in the contraflow direction increased by an average of 482%. All of these projects had significant drops in the 95th percentile speeds and increased compliance with the 25 mph speed limit (15% increase). However, the motor vehicle volume stayed the same for these roads.

DAILY BICYCLE VOLUMES BY COMPLETED BETTER BIKE LANE PROJECT



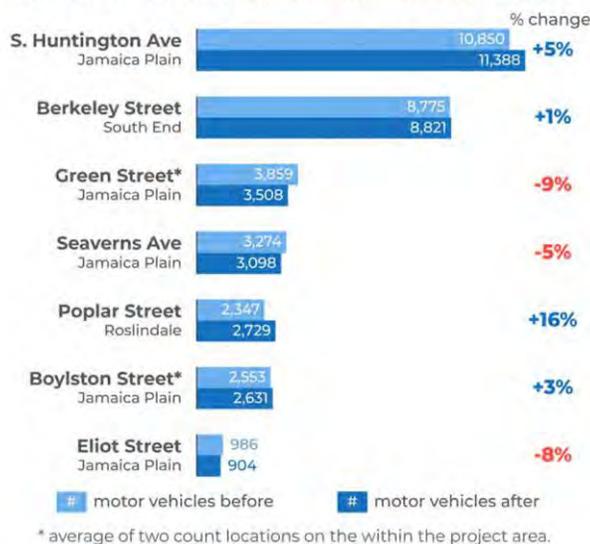
CHANGE IN 95TH PERCENTILE VEHICLE SPEED IN COMPLETED BETTER BIKE LANES PROJECTS



Before-and-after results for the better bike lane projects with speed humps [18]

For example, after the installation of speed humps along with contraflow bike lanes and repaving on Boylston Street (Jamaica Plain), almost 99% of drivers were traveling at speeds of below 25 mph [18]. The city saw a reduction in speeding, an increase in bike use (almost double), and a 5% increase in motor vehicle volume. Similarly, for the Eliot Street project, the city experienced a significant reduction in the 95th percentile speed (from 33 mph to 23 mph), a 194% increase in bicyclist volume, and an 8% decrease in motor vehicle volume [18].

DAILY MOTOR VEHICLE VOLUMES BY COMPLETED BETTER BIKE LANE PROJECT

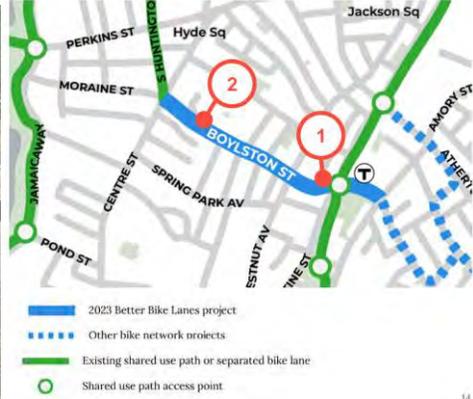


BOYLSTON STREET Jamaica Plain

 **REPAVING**

 **SPEED HUMPS**

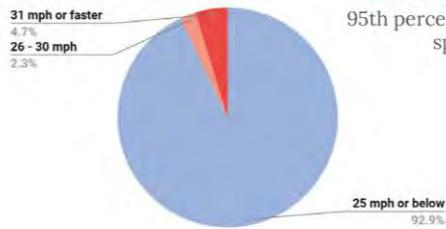
 **CONTRAFLOW BIKE LANE**



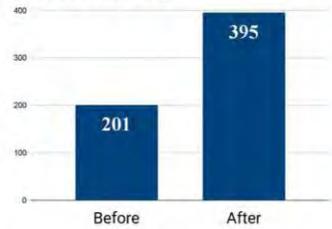
B

14

Before

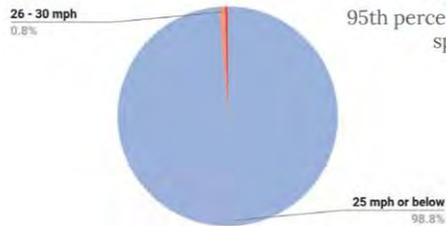


30 mph Bicyclists per day
95th percentile speed

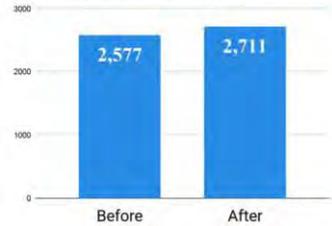


97% increase

After



22 mph Motor vehicles per day
95th percentile speed



5% increase

SEAVERNS AVENUE Jamaica Plain

 **SPEED HUMPS**

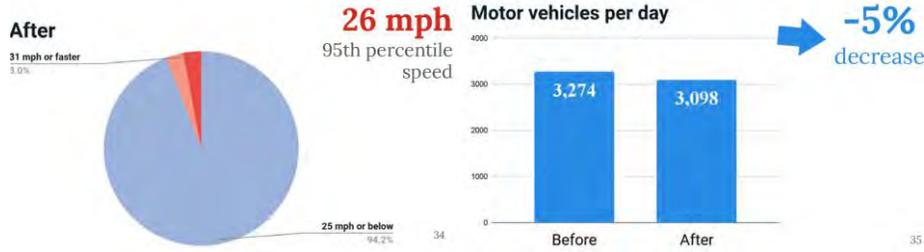
 **SEPARATED BIKE LANE**
(Centre St to City Feed D'way)

 **STANDARD BIKE LANE**
(All other sections)



B

33



GREEN STREET
Jamaica Plain



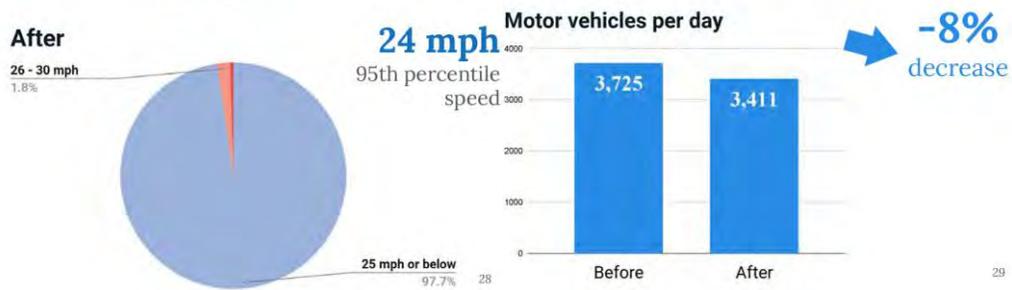
SPEED HUMPS



SEPARATED BIKE LANE
(Woodsley Sq to Lamartine St)



BUFFERED BIKE LANE
(Lamartine St to Centre St)



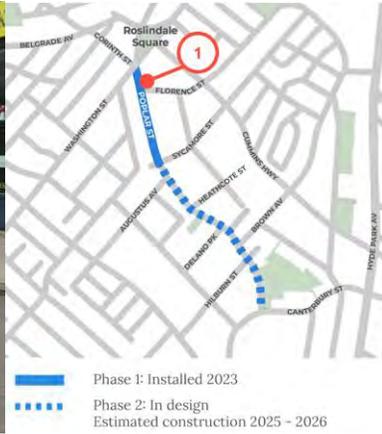
Green Street Before and After Evaluation Results [18]

POPLAR STREET

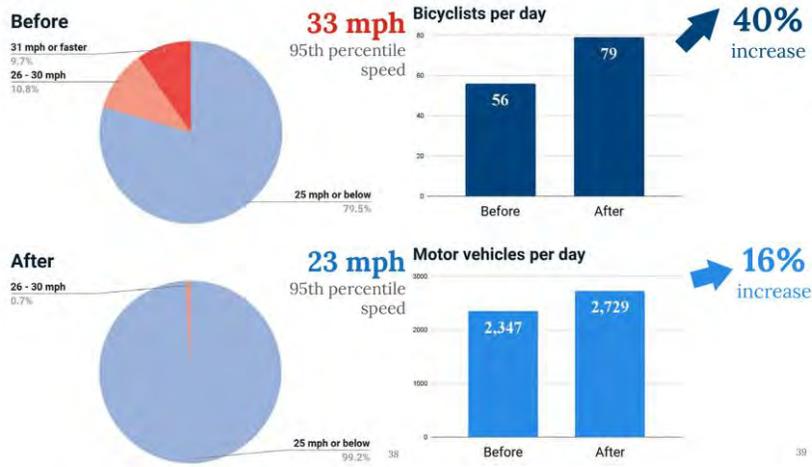
Roslindale

 **SPEED HUMPS**

 **CONTRAFLOW BIKE LANE**



3



Popular Street Before and After Evaluation Results [18]



- SPEED HUMP PLACEMENT NOTES:**
- SPEED HUMP PLACEMENT DIMENSIONS ARE MEASURED FROM THE OUTSIDE EDGE OF THE SIDEWALK CORNER STONE OR END-UP CORNER CURB/SWIRT OF CURB TANGENT.
 - THE CONTRACTOR SHALL CONFIRM IN THE FIELD THAT SPEED HUMPS DO NOT CONTACT WITH ANY SURFACE UTILITY FEATURES SUCH AS MANHOLE OR GAS GATES, HANDHOLES, OR MANHOLE COVERS.
 - WHEN A CONFLICT IS IDENTIFIED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PROMPTLY WITH THE LOCATION AND TYPE OF CONFLICT.
 - THE CONTRACTOR SHALL ADJUST SPEED HUMP LOCATIONS IN THE FIELD TO AVOID CONFLICTS WITH SURFACE UTILITIES OR OTHER FEATURES AS DIRECTED BY THE ENGINEER.



KITTELSON & ASSOCIATES
ONE WASHINGTON SQUARE, SUITE 1401
BOSTON, MA 02108
PHONE: 617.552.8800
FAX: 617.552.8808

DESIGNED BY: M. LEJ
DRAWN BY: M. LEJ
CHECKED BY: J. MAREY
APPROVED BY: J. MAREY

CITY OF BOSTON TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
CITY POINT
SPEED HUMP LOCATION DETAIL
SOUTH BOSTON
AREA: 3
DISTRICT: 3
DATE: 11/20/2011
DRAWING NO. 321-014
SHEET 9 OF 20

The city of Boston's guidelines on speed hump installation

Speed Hump Zone D5-2

Speed Hump Placement Parameters

- Speed Humps should be located at least 100' from a stop-controlled or signalized approach to an intersection
- Speed Humps must be a minimum distance of 1' away from any surface utility access features. The preferred distance is 2'
- Avoid speed humps within the limits of active driveways
 - Preferred: Place 2' away from the driveway cornerstone
 - Alternatively: Align with outside of the driveway edge stone
 - If needed: Place within the limits of the driveway to achieve better spacing overall
- Avoid placing speed humps directly in front of residential walkways of stoop stairs
- Do not place speed humps within the limits of accessible parking spaces or within the 10' loading zone located at the rear of the spot

Sign Placement Parameters

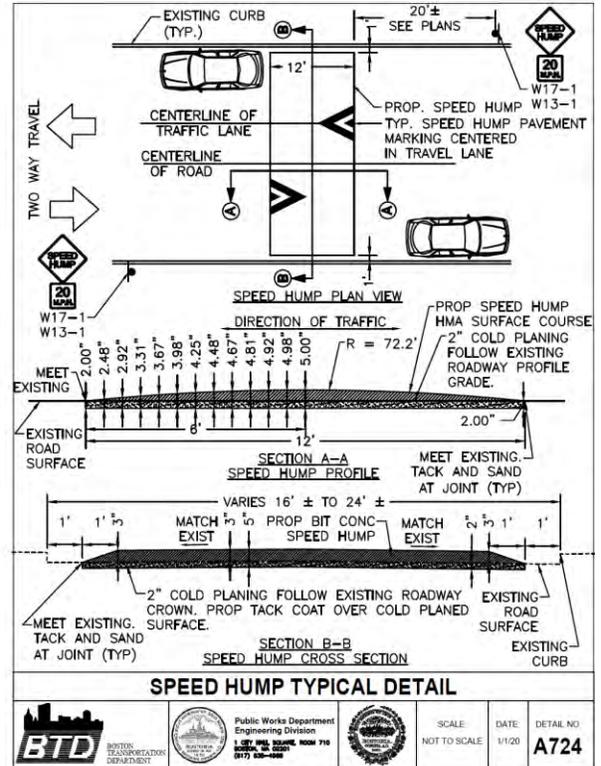
- Add Speed Hump signs (W17-1 above a W13-1) only as directed
 - If a street crosses a major intersection and/or a street that is not eligible for speed humps, place an additional W17-1 at the next speed hump
- Place signs in advance of speed hump using existing posts, utility poles, and light poles where possible
 - 20' in advance preferred, within 30' acceptable
- Mount signs on the right side of the street (preferred)
- Mount signs at a 90-degree angle to the curb
- Existing signs may need to be relocated to accommodate the speed hump signs

General - Utilities

- Utilities: Location of existing utilities are approximate. Contractor is responsible for making field investigations and obtaining information from utility companies and individuals to accurately locate the horizontal location and elevations of all subsurface utilities and structures
- Where an existing utility is found to conflict with the proposed work, the location, elevation, material type, and size of the utility shall be accurately determined without delay by the contractor and the information furnished to the engineer for discussion

Signs and Posts Summary

Code No.	Size	Quantity
W17-1	24" x 24"	8
W13-1	18" x 18"	8
Post	2"	7



BTD BOSTON TRANSPORTATION DEPARTMENT
Public Works Department
Engineering Division
1 CITY POINT BOSTON, MASSACHUSETTS 02110
SCALE: NOT TO SCALE
DATE: 11/20
DETAIL NO: A724

Speed hump installation example (Wellington Hill)

Lane Reconfiguration for Separated Bike Lanes

The city aimed at providing separated bike lanes through lane reconfiguration and experienced reduced pedestrian (-68%), bicycle (-57%), and motor vehicle (-29%) crashes, increased bike volume (+16%), and reduced motor vehicle volume (-21%).

BEFORE:

50 ft crossing
across **four** lanes
of traffic



AFTER:

25 ft crossing
across **two** lanes
of traffic



Clear Corners

Per Boston Transportation Department regulations, drivers are not allowed to park within 20 feet of any crosswalk or intersection.

This 20-foot restriction makes it easier for drivers to see other drivers or people crossing the street. We can install flex posts and pavement markings to mark this space.



Curb extensions

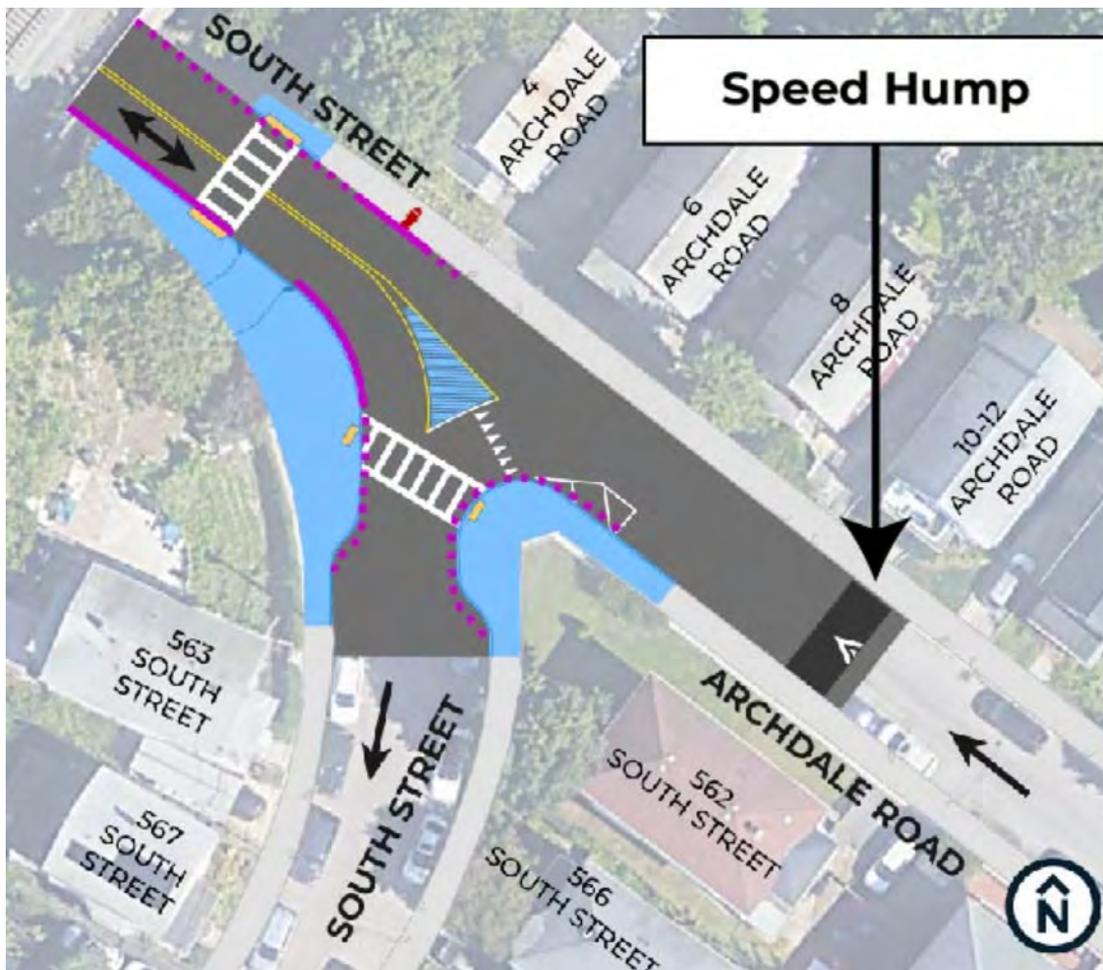
Curb extensions help to create safer crossings. They make crosswalks shorter and pedestrians easier to see.





Curb Extensions, speed hump, and splitter islands

The City is planning to implement curb Extensions, speed hump, and splitter islands at South Street and Archdale Road. However, none of these projects has conducted a publicly available before-and-after evaluation.



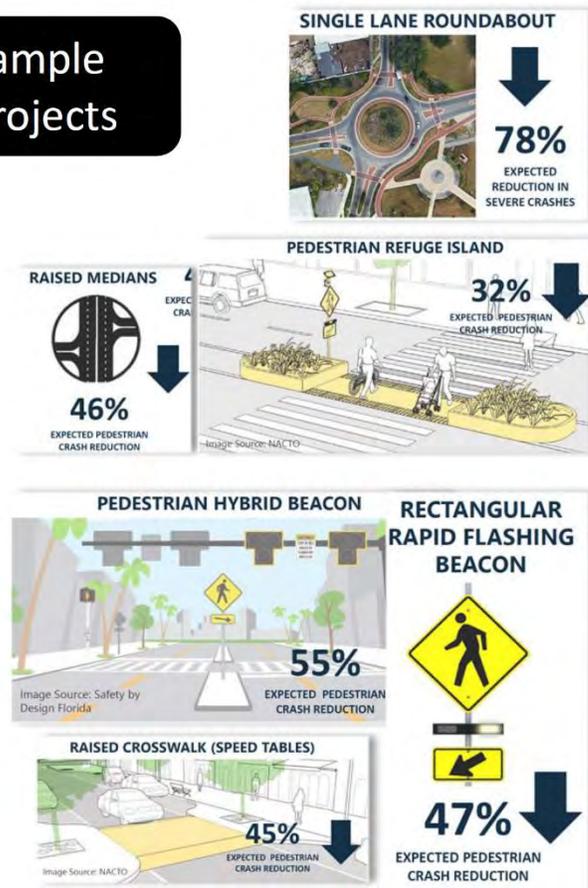
Conclusion: Boston's Traffic Calming Outlook and Quality of Life Impacts

Boston's before-and-after evaluations reveal substantial reductions in speeding, dramatic increases in bicycling, and stable or reduced motor vehicle volumes. In many corridors, nearly all drivers comply with posted speed limits following traffic calming interventions. These outcomes demonstrate that traffic calming enhances, not hinders, quality of life by making streets safer, more comfortable, and more inviting for active travel. Boston's experience reinforces the conclusion that quieter streets support healthier, more vibrant communities.

Gainesville, FL

In 2018, the City Commission of Gainesville adopted a "Vision Zero" resolution, followed by a Vision Zero Action Plan in 2020, to eliminate traffic-related deaths and serious injuries, provide safe and equitable mobility, and prioritize people over traffic. The city invested \$3 million in this effort to make streets safer for all [1]. Most of these Vision Zero programs include providing better and safer active transportation facilities, conducting crash analyses, reducing speed limits, and installing ADA-compliant sidewalks [1]. To achieve these goals, the plan proposes repurposing the lanes from 4 lanes to 2 lanes to provide a two-way cycle track, narrowing the vehicle lanes, installing midblock and minor street high-visibility marked crosswalks, midblock pedestrian refuge islands, and raised crosswalks or speed humps. The plans suggested that these interventions would result in severe crash reductions: single lane roundabout (78%), raised median (46%), pedestrian refuge island (32%), pedestrian hybrid beacon (55%), rectangular rapid flashing beacon (47%), and raised crosswalk (45%).

Sample projects



Lane Repurposing and Resurfacing

Many of these projects involve repurposing lanes and providing active transportation along the road. For example, the City of Gainesville is resurfacing the one-mile stretch of North End Road from 53rd Avenue to 39th Avenue, where the city is also reconfiguring the travel lanes to accommodate bike lanes (4-foot) in both directions



Road resurfacing and reconfiguration to provide bike lanes as a traffic calming measure in North End Road from 53rd Avenue to 39th Avenue

The city has a lane repurposing project currently under construction on NW 6th Street, spanning from NW 7th Avenue to NW 8th Avenue, to provide better multimodal connectivity.



Lane Repurposing at NW 6th Street

SW 43rd Street Resurfacing and Rehabilitation project includes resurfacing the roadway, adding bike lanes and drainage ditches, filling sidewalk gaps to improve safety and improve the quality of life.



SW 43rd Street Resurfacing/Rehabilitation

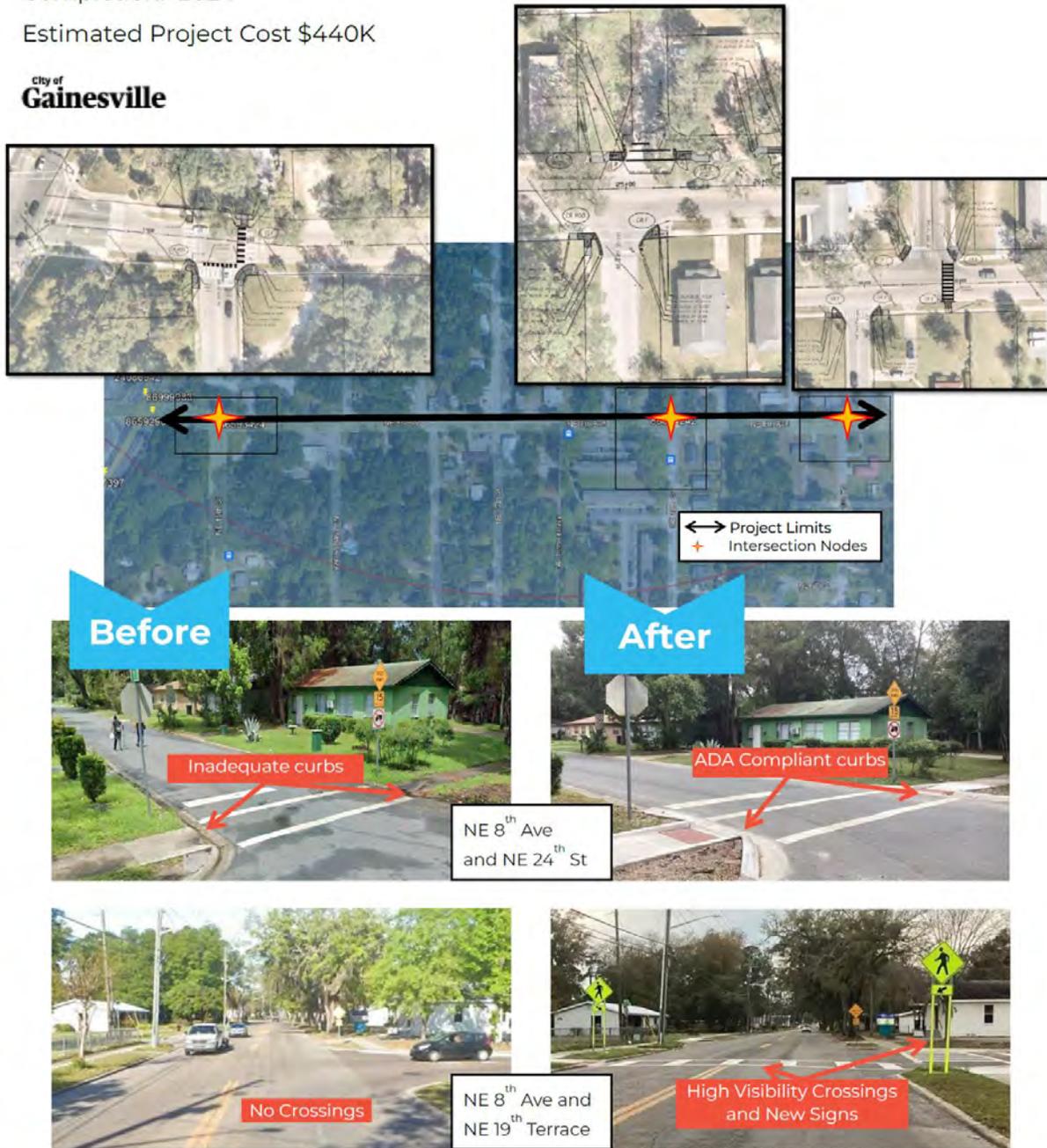
Curb Ramp Retrofit and High-Visibility Pedestrian Crossing

Low-cost pedestrian safety measures have been implemented along NE 8th Ave, where the city has adopted curb ramp retrofits and high-visibility crossings to provide ADA compatibility and a safe road for pedestrians.

Completion: 2024

Estimated Project Cost \$440K

city of
Gainesville



NE 8th Ave Curb Ramps retrofits and High Visibility Crossings

However, currently, none of these projects has a before-and-after evaluation available.

Conclusion: Gainesville’s Traffic Calming Outlook and Quality of Life Impacts

Gainesville’s program demonstrates how traffic calming can be embedded within broader corridor improvement and resurfacing projects to deliver systemic safety benefits. By narrowing travel lanes, repurposing excess capacity for biking and walking, and introducing raised crossings and refuge islands, the city is proactively addressing high-risk conditions before severe crashes occur. While formal before-and-after evaluations are still forthcoming, the city’s reliance on nationally validated crash-reduction estimates and its alignment with Vision Zero best practices signal a strong safety outlook. Gainesville’s experience illustrates how traffic calming investments can simultaneously advance safety, accessibility, and quality of life, particularly for pedestrians, cyclists, and people with disabilities.

Portland, OR

Portland is widely recognized as a national leader in traffic calming, integrating Vision Zero principles into lane reconfigurations, enhanced crossings, speed management, and neighborhood greenways. Portland city passed a Vision Zero resolution in July 2015 and adopted the Vision Zero plan in 2016. The city prioritizes setting safe speed limits in high-crash corridors and uses design interventions to reset driver expectations and reduce crash severity [11]. The following are a few examples of traffic calming in Portland.

Lane Reconfiguration

Portland city has implemented multiple lane reconfiguration projects to slow speeds, improve pedestrian safety, and reduce the number and severity of crashes. For example, on East Burnside Street, the city converted the westbound travel lane to a center turn lane and marked crosswalks with pedestrian islands and signage at three locations (18th, 22nd, and 24th) in October 2014. This lane reconfiguration resulted in reducing vehicle speed, volume, and crash rate initially.





85th Percentile Speed			
<i>Speed at which 85% of people are driving at or below; considered the route's operating speed</i>			
	Before (35 mph posted)	After (30 mph posted)	Change
Westbound	34 mph	32 mph	-5.8%
Eastbound	35 mph	35 mph	0%

Speeders			
<i>Percent of all people driving over 35 MPH</i>			
	Before (35 mph posted)	After (30 mph posted)	Change
Westbound	10.8%	1%	-9.8%
Eastbound	18.4%	11%	-7.4%

East Burnside Traffic Volume			
<i>Number of motor vehicles on E Burnside St in project area</i>			
	Before 6/2013	After 10/2015	Change (%)
2-HR Peak (WB)	2154	1860	- 14
Westbound ADT	8300	8194	- 1.2
Total ADT	16,997	17,359	+ 2.1

Number of Crashes			
<i>Number of motor vehicle, bicyclist, and pedestrian crashes</i>			
	10-Year Annual Average 1/1/04 - 12/31/13	1-Year Post-Project 1/1/15 - 12/31/15	Change (%)
Fatal & serious injury crashes	1.1	0	NA
Ped & bike	2.1	0	NA
All severities, all modes	31.2	30	-3.8

NE Couch Traffic Volumes			
<i>Average of volumes and speeds taken near Floral</i>			
	Before	After	Change (%)
7-9 AM WB Volumes	23	50	+ 117
Daily ADT	429	391	- 8.9
Speeds	20.5	23.25	+ 13.4

Similarly, another lane reconfiguration at Division Street in August 2013 reduced speed, the number of crashes, and improved pedestrian safety while maintaining the traffic flow. One 11-foot travel lane in each way, along with a center turn lane and bike lanes, replaced the two 11-foot travel lanes in each direction. Three pedestrian crossings were also planned at 64th, 68th, and 79th. The results show that there is a 50% reduction in all types of crashes and speed.

BEFORE: Division @ 68th



AFTER: Division @ 68th



Goals	Project Outcomes
CRASHES: Reduce the number of crashes (all modes)	50% crash reduction in the first year, post project. Will continue to collect crash data for 3 years post-project.
SPEEDING: Reduce auto speeds (original 35 MPH posted speed)	56% reduction in speeding
PEDESTRIANS: Improve pedestrian safety	Add three pedestrian islands and marked crosswalks
FLOW: Maintain traffic flow	Traffic volumes unchanged; Transit travel time relatively unchanged

85th Percentile Speed			
<i>85th percentile speed is the speed at which 85% of vehicles are traveling at or below, and it is considered the route's operating speed.</i>			
	Before (5/30/13)	After (10/1/14)	Change (%)
Westbound	40 MPH	34 MPH	- 15
Eastbound	38.5 MPH	34 MPH	- 12

Speeders			
<i>Percent driving over 35 MPH.</i>			
	% Before (5/30/13)	% After (10/1/14)	% Change
Westbound	52	11	- 79
Eastbound	35	23	- 34

Top End Speeders			
<i>Percent driving 45 MPH or higher.</i>			
	% Before (5/30/13)	% After (10/1/14)	% Change
Westbound	1.8	0	- 100%
Eastbound	1	0.5	- 50%

Number of Crashes				
<i>Number of motor vehicle, bicyclist and pedestrian crashes.</i>				
	Annual Ave Pre-Project	1-Year Post-Project	2-Years Post-Project*	Change (%)
All crashes	30	15	N/A	- 50
Fatal & Injury	15.6	8	8.5	- 46
*2-Year Post-Project indicates the annual average of crashes that occurred during the two years following project implementation.				

Enhanced Crossings with Pedestrian Islands

For the locations with raised center medians on the Outer Division Safety project in 2024, the annual average crashes reduced for pedestrians and bicyclists.

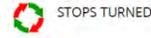
Similarly, for the NE 102nd Ave safety project, the city enhanced six new crossings with pedestrian islands along the corridor, along with other interventions in two phases. The first phase of the pilot program involved pedestrian refuge island marking and replacing road striping with flexible plastic posts for protected bike lanes. The second phase included curb extensions, curb ramps, and a permanent pedestrian island for the project area.

Crashes on SE Division Street segments with raised center medians		
<i>Annual average crashes from SE 80th to 174th avenues where raised center medians were added</i>		
Crash Category	Pre-project (2015 - 2019)	Post-project (2023)
Deadly and serious injury*	3.8	4.0
Pedestrian	6.2	3.0
Bicycle	1.8	0.0
Vision Zero focus	10.4	5.0
All	116.0	29.0

Comparative analysis of crashes on SE Division Street segments with raised center medians					
<i>Change in crash rates from SE 80th to 174th avenues where raised center medians were added</i>					
Crash Category	Before 2015 - 2019	After 2023	Change	Citywide and District change	Relative Change
Pedestrian	6.2	3.0	-52%	-45%	-13%
Vision Zero focus	10.4	5.0	-52%	-5%	-49%
All	116.0	29.0	-75%	-41%	-58%



NE Tillamook/Hancock, 28th Ave to Chavez



Point	Date	Direction	Speed (MPH)	Volume
A	MAR 2021	→	21	252
		←	21	168
D	APR 2013	→	23	392
		←	24	250
E	JAN 2021	→	22	344
		←	23	154
F	JAN 2021	→	22	218
		←	22	181
G	JAN 2021	→	21	384
		←	20	991
H	DEC 2019	→	20	755
		←	19	483
I	OCT 2019	→	22	532
		←	22	753

Bumps Constructed June of 2021

Point	Date	Direction	Speed (MPH)	Volume
A	12/6/21	→	19	258
		←	19	76
I	12/2/21	→	17	474
		←	17	330
F	12/6/21	→	19	316
		←	20	284
4	12/14/21	→	18	416
		←	19	294
5	12/15/21	→	15	1000
		←	14	684
B	12/2/21	→	20	465
		←	21	148
2	12/7/21	→	21	466
		←	22	341
6	12/16/21	→	22	957
		←	21	905
C	12/6/21	→	20	185
		←	19	58
3	12/8/21	→	19	490
		←	20	323

Slow Streets Infrastructure

The city proposed around 100 slow street infrastructure installations in 2021 and 2022. However, the city acknowledged the high maintenance costs of such slow street infrastructures and proposed other traffic calming measures for high-volume streets.

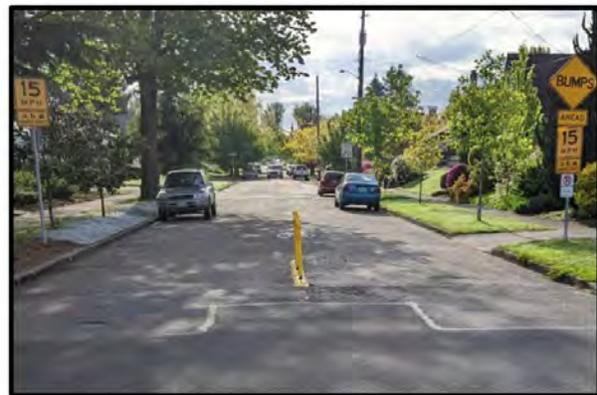


Image shows more permanent Slow Street installations along the NE Sacramento (left) and N Bryant (right) neighborhood greenways.

Conclusion: Portland's Traffic Calming Outlook and Quality of Life Impacts

Portland's before-and-after evaluations consistently show reductions in speeds, traffic volumes, and crash injuries, often exceeding 50 percent, across a wide range of treatments. These outcomes demonstrate the capacity of traffic calming to deliver both immediate and sustained safety benefits at scale. Beyond safety, Portland's interventions enhance walkability, promote active transportation, and reposition streets as shared public spaces. The city's experience provides a strong empirical rebuttal to claims that traffic calming diminishes quality of life; instead, it shows that quieter streets are healthier, safer, and more livable.

Arlington County, VA

Arlington County's traffic calming program exemplifies a flexible, data-driven approach to implementing Vision Zero. The Transportation Engineering Department of Arlington County, VA, is primarily responsible for implementing traffic calming measures in the county under the Vision Zero initiative. The county mainly implements traffic calming measures on the local and neighborhood roads. Most of the initiatives are speed humps, speed cushions, raised crosswalks, chicanes, rumble strips, traffic circles, etc. For busy arterials with high speeds and volumes, the city reduced speed limits for road safety and implemented roadway configurations, including road diets, to provide an active transportation route along the road. The county also has speed cameras in school zones to calm the traffic. For high-speed, high-ADT roads, the county has implemented speed management initiatives, including noiseless rumble strips, optical speed bars, and speed limit markings. To select roads for the implementation of traffic calming measures and identify the proper traffic calming tools, the county conducts a detailed survey of road geometry, road type, Annual Average Daily Traffic (AADT), number of crashes, existing speed limits, and overall safety needs.

Additional traffic calming measures require justification for selecting the location and type of traffic calming tool, which includes a pilot study followed by a before-and-after evaluation of the traffic calming measure. The county prioritizes low-cost traffic calming measures, such as pavement markings, bulb-outs, and flex posts. The county has recently started using temporary tactical speed bumps, as they are more cost-effective, durable, and easier to remove later if needed. The neighborhood street also has Speed cushions. However, the city adopts a road diet for arterials and collectors to provide better biking facilities along the roads. The county always conducts awareness programs and informs the public about any traffic calming initiatives. The following are a few examples of traffic calming in Arlington County, VA.

Tactical Speed Humps

Tactical speed humps are temporary vertical traffic calming devices, consisting of elevated pavement sections that serve as speed humps [12]. Tactical speed humps can reduce driver speed and potentially reduce severe crashes [12]. The county implemented tactical speed humps in three locations- 19th Street, Lang Street, and Queen Street [12]. The vehicle speed was reduced for all three locations after the

implementation (85th percentile speeds decreased from 24 mph to 19 mph, and average speeds decreased from 19 mph to 14 mph)[12].



Site 1: 19th Street



Site 2: S Lang Street

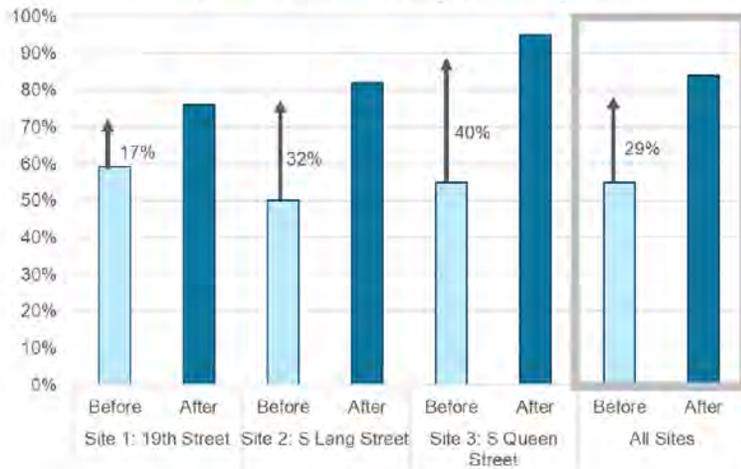


Site 3: S Queen Street

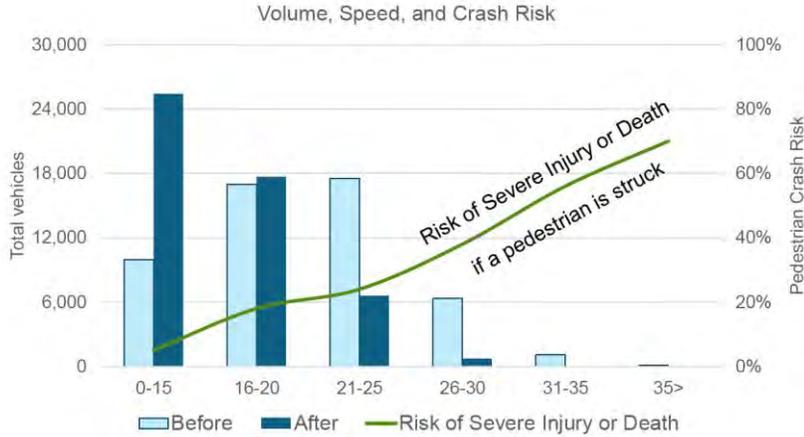
Tactical Speed Humps

Street	Study	Average Speed (mph)	85th % Speed (mph)	# of Drivers Going Over 20 mph	% of Drivers Going Over 20 mph	# of Drivers Going Over 30 mph	% of Drivers Going Over 30 mph
Site 1: 19th Street	Before	19	24	2043	41%	58	1%
	Posted Speed: 20 mph						
	After	16	21	1085	24%	4	0%
	Grade: 10%	% Change	-14%	-11%	-47%	-93%	
Site 2: S Lang Street	Before	20	25	13897	50%	647	2%
	Posted Speed: 20 mph						
	After	15	19	5166	18%	26	1%
	Grade: 3%	% Change	-25%	-24%	-63%	-96%	
Site 3: S Queen Street	Before	19	24	9304	45%	524	2%
	Posted Speed: 20 mph						
	After	11	16	1145	5%	12	1%
	Grade: 5%	% Change	-42%	-33%	-88%	-98%	
All Sites	Before	19	24	25244	45%	1229	2%
	After	14	19	7396	16%	42	0%
	% Change		-26%	-21%	-71%		-97%

Figure 12: Volume, Speed, and Crash Risk



Across all sites, the number of drivers traveling below 20 mph (typically the posted school zone speed limit) increased by 29%



Data citation for Risk of Severe Injury or Death: Tefft, B.C. (2011). Impact Speed and a Pedestrian's Risk of Severe Injury or Death (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety

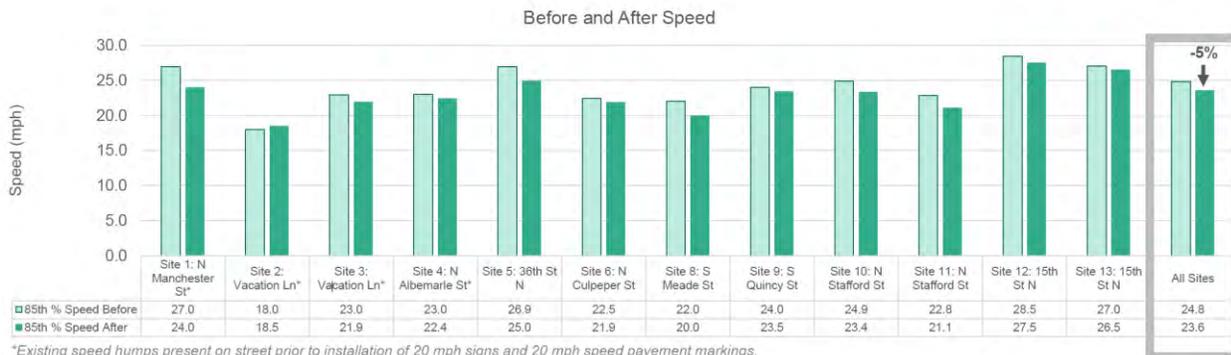
Speed Pavement Markings

The county implemented speed pavement markings at 13 locations, with four locations already having pre-existing speed humps [12]. The 85th percentile speed decreased by 5% across all sites. These speed pavement markings reduced the speed of vehicles that were travelling at 26-30 mph prior to the implementation[12].

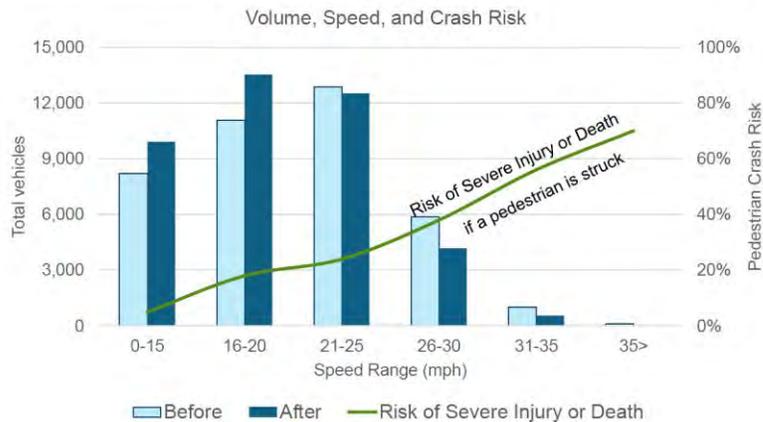
VISION ZERO BEFORE AND AFTER STUDY SITES / SPEED PAVEMENT MARKINGS



VISION ZERO BEFORE AND AFTER STUDY / SPEED PAVEMENT MARKING SUMMARY

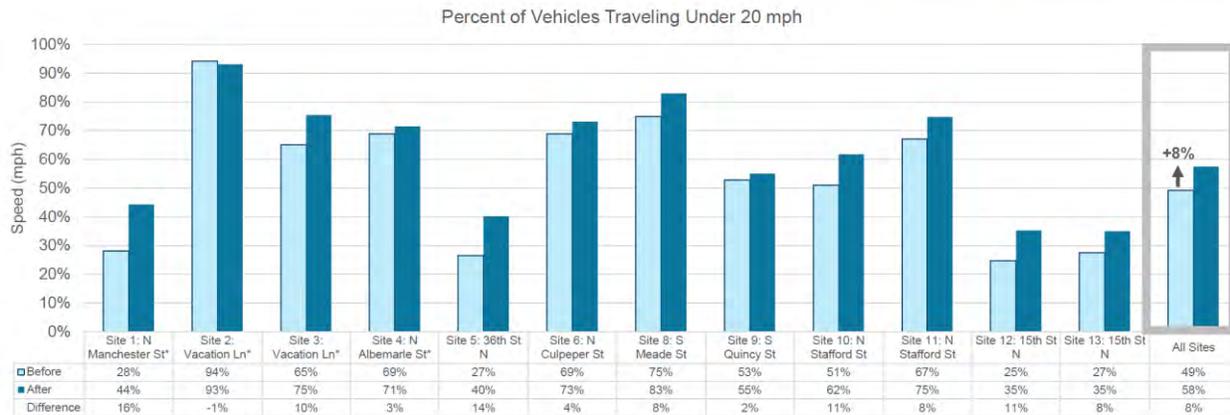


VISION ZERO BEFORE AND AFTER STUDY / SPEED PAVEMENT MARKING SUMMARY



Data citation for Risk of Severe Injury or Death: Tefft, B.C. (2011). Impact Speed and a Pedestrian's Risk of Severe Injury or Death (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety

VISION ZERO BEFORE AND AFTER STUDY / SPEED PAVEMENT MARKING SUMMARY



*Existing speed humps present on street prior to installation of 20 mph signs and 20 mph speed pavement markings.
 • Before data collected November 2023
 • After data collected September 2024

Roadway Reconfigurations

Roadway reconfiguration involves reducing the number of lanes, altering lane widths, repurposing lanes, or a combination of these changes [13]. Between 2018-2022, the county implemented 14 roadway reconfiguration projects [13]. On average, corridors with roadway reconfiguration projects have a 6.45% decrease in 85th percentile vehicle speed and a 3.25% decrease in average vehicle speed [13].

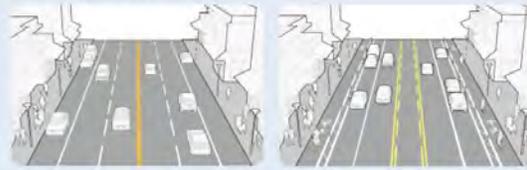


Road before (left) and after (right) four to three lane conversion. Photo of Wilson Boulevard near North Liberty Street.

14 roadway reconfiguration projects

- 1 N Quincy St
- 2 N Veitch St
- 3 Wilson Blvd
- 4 N Military Rd
- 5 Wilson Blvd
- 6 Potomac Ave
- 7 Clarendon Blvd
- 8 Wilson Blvd
- 9 N Lynn St
- 10 Clarendon Blvd
- 11 N Ohio St
- 12 Wilson Blvd
- 13 S Abingdon St
- 14 S Clark St

Example: Four to three lane roadway reconfiguration with separated bike lanes.



Project summaries are provided on the following pages.



Learn more about Vision Zero before/after studies [here](#).

VISION ZERO
ARLINGTON COUNTY

Curb Modifications

Curb modifications are implemented to prevent wider vehicle turns, which facilitates an increase in vehicle speed[12]. Curb modifications have been done at eight intersections for right-turn traffic, which mostly reduced the turn vehicle speed (turning speeds dropped from 11.6 mph to 10.6 mph after curb modification) [12].

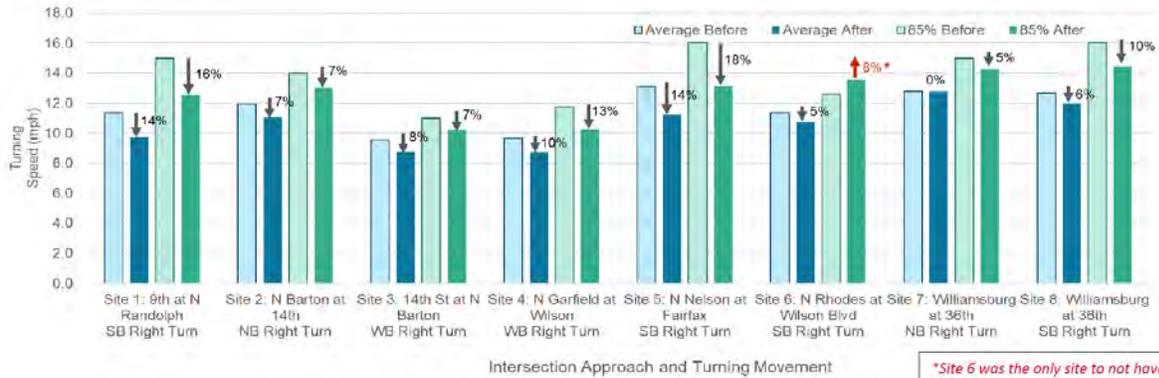


Figure 3: Curb Modifications Right Turning Speed Distribution All Sites

*Site 6 was the only site to not have flex posts installed in the curb modification treatment.

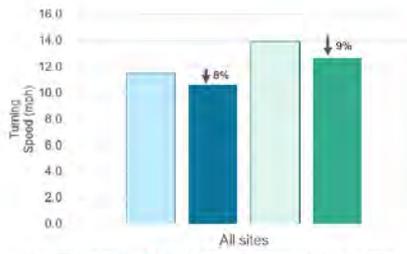


Figure 4: Curb Modifications Right Turning Speeds All

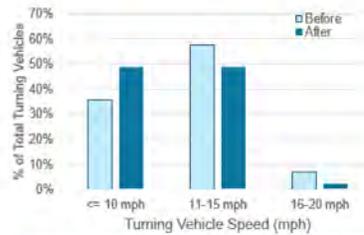


Figure 5: Curb Modifications Right Turning Speed Distribution All Sites

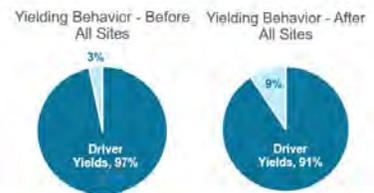


Figure 6: Curb Modification Yielding Behavior

Hardened Centerlines

Hardened centerlines use flexible posts or raised humps installed along the centerline to reduce the left-turn vehicle speed at an intersection[12]. The county implemented hardened centerlines at seven intersections for left-turn traffic, which reduced the average and 85th percentile speeds of left-turning vehicles at five sites[12].

VISION ZERO BEFORE AND AFTER STUDY SITES / HARDENED CENTERLINES



Site 1: Columbia Pike at S Four Mile Run NB Left Turn



Site 2: Fairfax at N Randolph WB Left Turn



Site 3: Fairfax at N Randolph EB Left Turn



Site 4: S Kenmore/24th at Shirlington WB Left Turn



Site 5: S Kenmore/24th at Shirlington SB Left Turn



Site 6: Clarendon at N Rhodes EB Left Turn



Site 7: S Dinwiddie at Columbia NB Left Turn

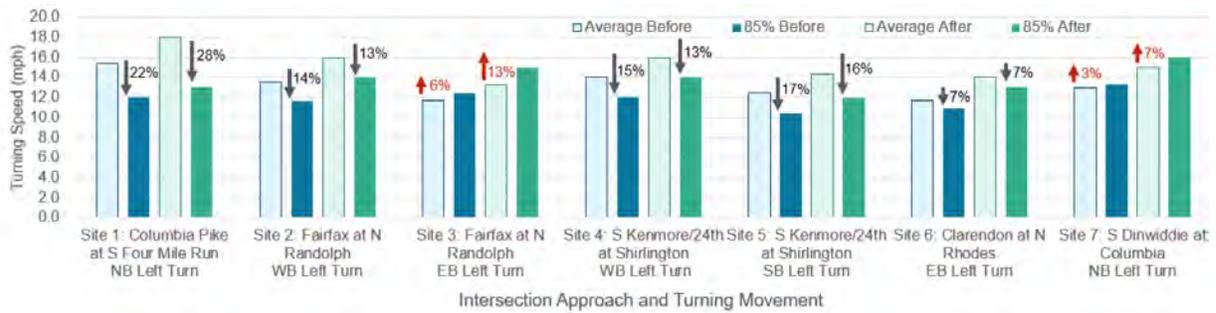


Figure 8: Hardened Centerline Left Turning Speeds by Location

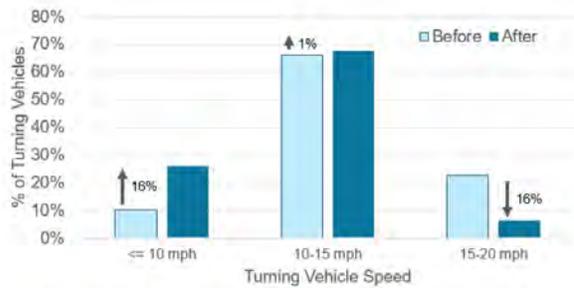


Figure 9: Hardened Centerline Left Turning Speed Distribution All Sites

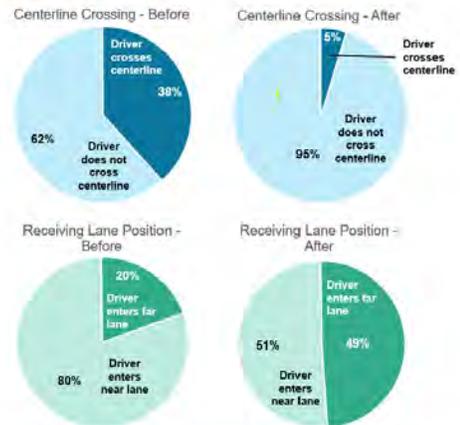
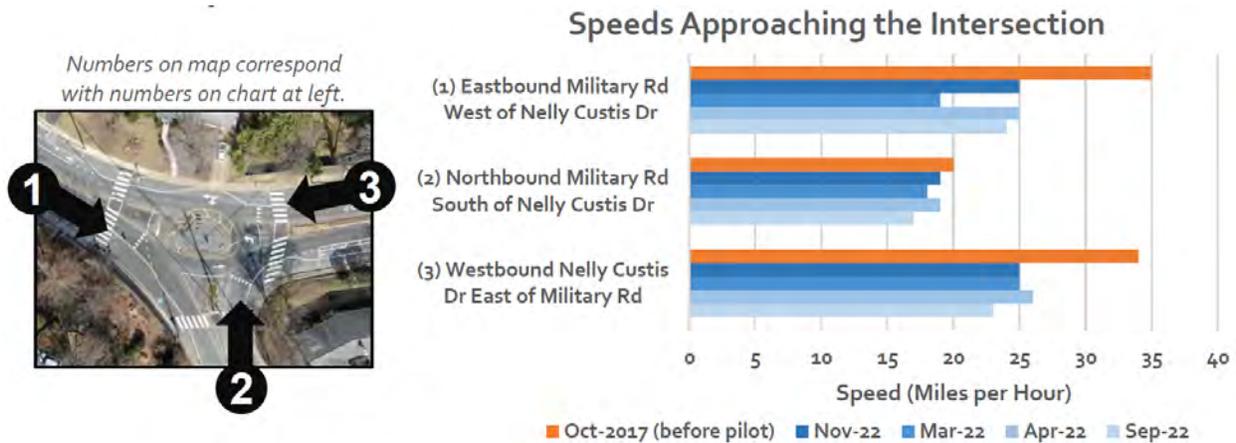
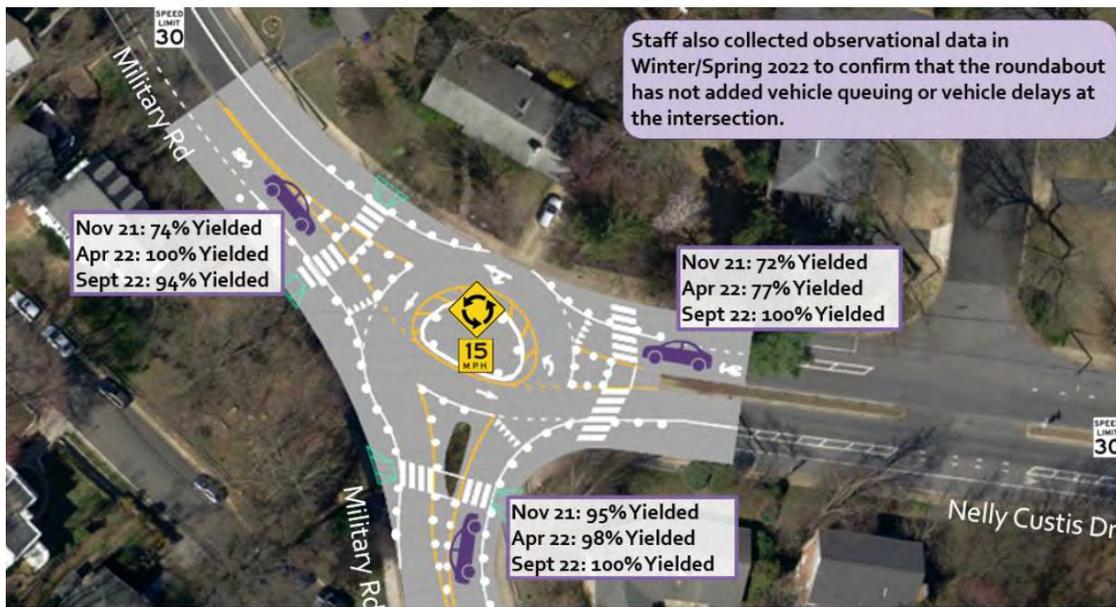
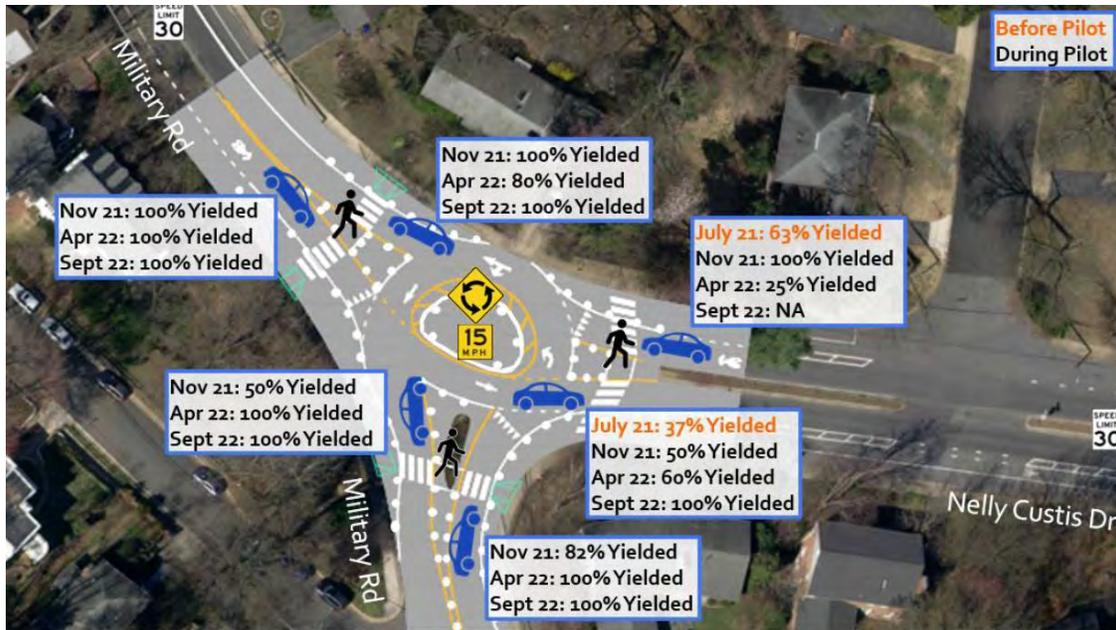


Figure 10: Centerline Crossing and Lane Position

Temporary Roundabout

Temporary roundabouts can be used as a traffic calming measure [14]. For example, at the Military Road & Nelly Custis Drive, after the installation of a temporary roundabout, the vehicle speed approaching the roundabout from all directions reduced [14].





Conclusion: Arlington County’s Traffic Calming Outlook and Quality of Life Impacts

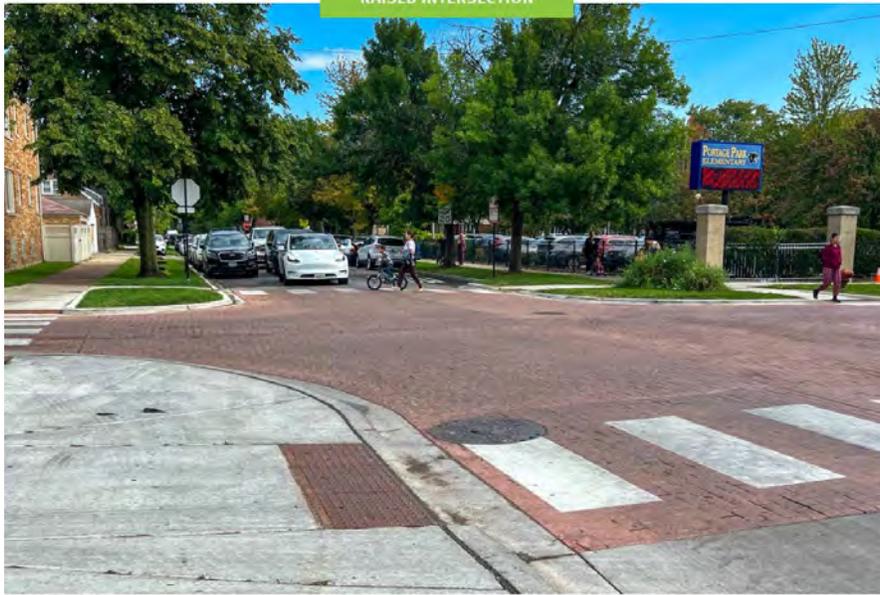
Arlington’s before-and-after studies show consistent reductions in 85th percentile speeds, high-end speeding, and turning conflicts across a wide range of treatments. Tactical speed humps, roadway reconfigurations, and hardened centerlines have proven especially effective in rapidly improving safety outcomes. The County’s emphasis on low-cost, adaptable interventions allows traffic calming to be deployed efficiently while maintaining public trust through evaluation and transparency. These efforts directly enhance neighborhood livability by creating quieter, safer streets for all users.

Chicago, IL

The Chicago Department of Transportation (CDOT) developed the Vision Zero Action Plan in 2017, identifying high-crash corridors as a key priority for implementing safety features [15]. CDOT has been implementing multiple measures, including protected bike lanes, reduced speed limits, curb bump-outs, and bus boarding islands, to reduce vehicle speed and the crash rate. The city initiated a 12.3-mile Neighborhood Greenway project in 2022, which included speed humps, raised crosswalks, a 20 mph speed limit, curb extensions, and contraflow bike facilities[15]. After two years of implementation, there is a 41% decrease in pedestrian crashes along the Neighborhood Greenway project area. For example, Milwaukee Avenue, between Ogden Avenue and Logan Boulevard, experienced a 52% decrease in severe crashes after five years of implementation. Similarly, after a severe bicycle crash at the Long Ave – Belmont to Irving Park in 2022, CDOT established Long Ave as a key cycling route and implemented different safety features, including speed humps, rapid delivery bump-outs, and a contraflow bike lane to calm traffic and establish Long Ave as a key cycling route [15]. After the project implementation, 97% of drivers complied with the 20 mph speed limit on this road [15].



RAISED INTERSECTION



A raised intersection at Long Ave & Berteau Ave provides a safe connection between Portage Park Elementary and the park.

Neighborhood Greenway project

CURB BUMP-OUTS



CONTRAFLOW BIKE LANE



SPEED HUMPS



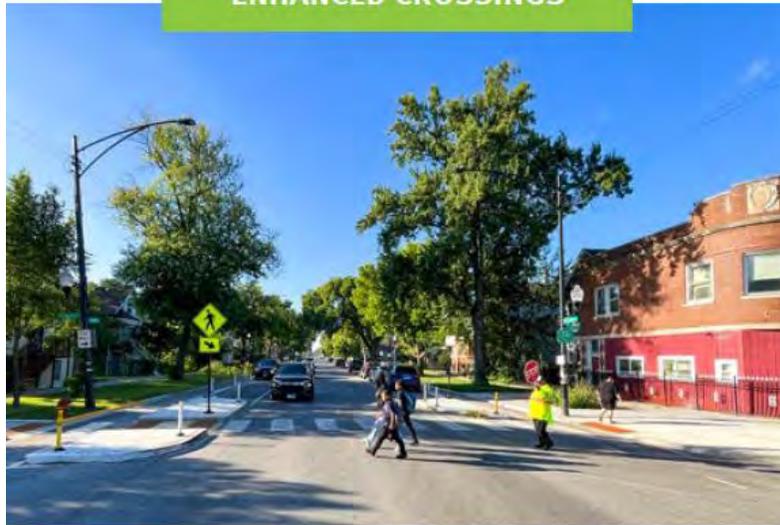
ONE-WAY CONVERSION



Long Ave – Belmont to Irving Park safety improvements

The 79th St – State to Cottage Grove Complete Street project included multiple safety measures, such as curb bump-outs and pedestrian refuge islands, to shorten crossing distances, reduce vehicle speeds, and enhance safety. This project was integrated with another school zone safety project [15]. Similarly, for the Damen Ave – Garfield to 47th project, CDOT implemented the Arterial Resurfacing Program, incorporating complete streets elements to calm traffic and improve safety for everyone. There is a 60% reduction in drivers exceeding the speed limit [15].

ENHANCED CROSSINGS



Damen Ave – Garfield to 47th complete streets project

REFUGE ISLAND



Refuge islands on 79th St allow pedestrians to cross more safely.

SCHOOL ZONE



42 bus bulbs, curb bump-outs, and refuge islands added along the 79th St corridor.

33% reduction in crossing distances along the 79th St corridor.

Safety Measures at the 79th St Corridor

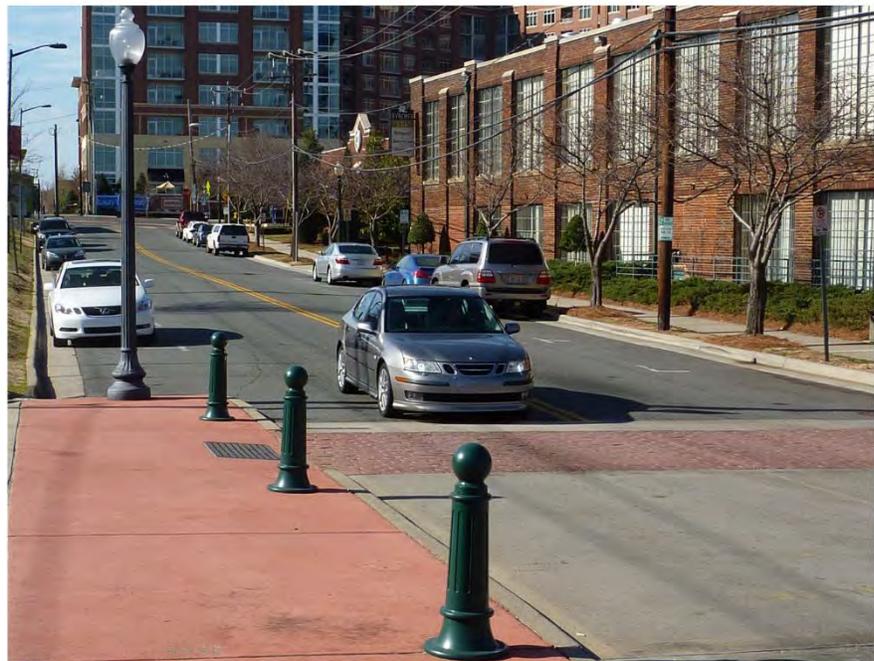
Conclusion: Chicago’s Traffic Calming Outlook and Quality of Life Impacts

Chicago’s projects have delivered striking safety outcomes, including large reductions in pedestrian crashes, severe crashes, and speeding noncompliance. High driver compliance with 20 mph limits on greenways illustrates how design, not enforcement alone, reshapes behavior. Equally notable are the quality-of-life benefits: safer school zones, more inviting neighborhood streets, and improved conditions for walking and biking. Chicago’s experience demonstrates that traffic calming is a powerful tool for advancing equity, safety, and everyday urban livability.

Charlotte, NC

Charlotte's traffic calming history began with the implementation of a formal neighborhood policy in 1997, which established a joint city-resident program aimed at reducing crashes, severe injuries, and speeding. Part of the jurisdictions originally sampled in the 2005 study, the City of Charlotte continues to operate a traffic calming program, renewing its commitment to safer streets in 2019 with the adoption of Charlotte’s Commitment to Vision Zero (CLT Vision Zero). Vision Zero is a collaborative, data-driven initiative that distinguishes itself from traditional road safety approaches by focusing on fatalities and serious injuries and acknowledging human error. Holding the belief that “even one traffic-related death is too many.” Charlotte developed the Vision Zero Action Plan to guide the City’s efforts to reduce traffic fatalities and severe injury crashes to zero by 2030.

The city believes that all traffic – vehicular, pedestrian, bicycle, and e-scooter traffic – benefits from the establishment of a robust “toolbox” of traffic calming measures. Ultimately, the goal of traffic calming is to create a safer and friendlier environment for all street users and provide a happier and higher quality of life for everyone in Charlotte. The city currently offers residents the following solutions that neighborhoods can ask the city to implement to calm traffic on residential streets, including the use of speed limit reduction, speed humps, and multi-way stops. The



program primarily uses speed humps and cushions (nearly 2,000 installed by 2023) to calm the impacts of traffic on local streets.

For instance, the Transportation Department implemented a road diet traffic calming intervention on Plaza Street, extending from Hawthorne Lane to Parkwood Avenue, between 2017 and 2025. They found that traffic speeds (85th percentile) reduced by 9 mph (20% decrease) and 5 mph (12% decrease) on both streets. Moreover, severe crashes, especially those involving left turns on the same roadway, were reduced by 18%, while total crash injuries decreased by 53.9%. Meanwhile, bicycle counts increased by almost 40%. Additionally, Charlotte implemented temporary lane reductions on Kenilworth Avenue and Scott Avenue (using traffic barrels to block the right lane on each street). They found that average speeds had decreased by 10.8% and the percentage of vehicles traveling over 15 mph had reduced by 83%. The City of Charlotte also recently launched the CDOT Vision Zero Dashboard, which includes an interactive crash map to inform users.



Left (Plaza Street 2016 – before traffic calming) Right (Plaza Street 2022 – after traffic calming)



Left (Parkwood Avenue 2020 – before traffic calming) Right (Parkwood Avenue 2024 – after traffic calming)



Lane elimination/reduction traffic calming treatment on Parkwood Ave.

Outcomes

◀ Data collection indicates:

- Consistent usage
 - *Helps to connect our AAA network – growth expected over time*
- Reduction in speeds
- Safer streets



The Plaza: April / May 2020 Bicycle Counts



The Plaza: August / September 2022 Bicycle Counts



Parkwood Ave: August / September 2022 Bicycle Counts



Street Conversion Safety Metrics

◁The Plaza (Central Ave to Parkwood Ave)

- **Traffic Speeds**
 - *Posted Speed: 30 mph (Previously 35)*
 - *May 2017 85th Percentile: 46 mph*
 - *Dec 2021 85th Percentile : 37 mph ($\Delta = -9$ mph, 20% decrease)*
- **Crash Reduction:**
 - *Severe Types: Left-turn same roadway (-18%) and angle (-1%).*

◁Parkwood Ave (N Davidson St to The Plaza)

- **Traffic Speeds**
 - *Posted Speed: 35 mph*
 - *Sept 2019 85th Percentile: 43 mph*
 - *Dec 2021 85th Percentile : 38 mph ($\Delta = -5$ mph, 12% decrease)*
- **Crash Reduction:**
 - *Limited 'after' crash data.*
 - *Project complete Oct 2021.*
 - *Crash data only current up to Dec 2021.*

Conclusion: Charlotte's Traffic Calming Outlook and Quality of Life Impacts

Charlotte's long-standing traffic calming program, reinforced by its Vision Zero commitment, demonstrates how sustained policy alignment and design-based interventions can meaningfully reduce traffic harm. By deploying a robust toolbox (*anchored by nearly 2,000 speed humps and cushions, strategic road diets, and speed limit reductions*), the city has consistently targeted speeding and severe crash risks on residential and neighborhood streets. Measurable outcomes from corridor-level interventions show substantial reductions in operating speeds, severe crashes, and total injuries, while simultaneously supporting safer turning movements and more predictable traffic behavior. Equally important, Charlotte's traffic calming efforts have delivered clear quality-of-life benefits. Increased bicycle activity, reduced high-end speeding, and improved neighborhood safety perceptions signal that quieter streets are not only safer but also more livable.

Austin, TX

October 2025 marked a decade since Austin adopted Vision Zero as official City policy – 10 years of working toward a bold and compassionate goal: that no loss of life or serious injury on our roadways is acceptable. Austin's traffic calming measures aim for zero traffic deaths by focusing on systemic safety, starting with neighborhood "hot spots," then expanding to arterial roads with major speed limit reductions (to 25 mph) and intersection redesigns. Vision Zero is more than just a policy or a brand; it is an ethical commitment, a public health framework, and a growing national movement that Austin has been proud to help lead.

Since becoming one of the early adopter U.S. Vision Zero cities in 2015, the idea has taken root across the country, with hundreds of jurisdictions joining this movement and the federal government adopting a

National Roadway Safety Strategy based on Vision Zero principles. The headwinds Austin faces in achieving zero emissions are numerous: an inherited built environment that historically prioritized speed over safety, uncertainty in federal policies and funding, and the increasing size and weight of vehicles on Austin's roads, among others.

Yet even amid these challenges, Austin has seen real, measurable progress. Where Austin has invested in safety, it has seen fewer crashes, which means more lives are saved and injuries are -prevented. This success is thanks to major infrastructure projects, such as the 29 major intersection safety projects completed since 2016, as well as thousands of smaller improvements, including traffic calming measures, new sidewalk connections, adjusted traffic signal timing, and improved street lighting. These may seem minor, but to the people who rely on them, they make a world of difference.

Austin's Transportation Public Works Division has implemented over 47 speed management projects across the city. These projects range from local streets, including Willow Creek Dr, Hargrave St, Powell Ln, Palace Parkway, Colony Park Dr, Cedar Bend Dr, Heflin Lane, Harrisglenn Dr, Sendero Hills Parkway, Ponciana Dr, Salt Springs Dr, Silvermine Dr, Tillery St, Pearl Retreat Lane, Woodward St, amongst others. Before-and-after studies have been conducted on these streets to evaluate the impacts of street design and traffic calming on improving safety. Some of these measurable outcomes are detailed below with an illustration showing examples as well:

Vision Zero Major Intersection Projects

- 38% reduction in serious injury and fatal crashes
- \$78M annual reduction in crash costs

1. Protected Intersections

- 42% reduction in serious injury and fatal crashes
- \$22M annual reduction in crash costs

2. Traffic Signals with Protected Left Turns

- 51% reduction in serious injury and fatal crashes
- 75% reduction in Left Turn Across Path crashes
- \$102M annual reduction in crash costs

3. Lane Conversions

- 9% reduction in serious injury and fatal crashes
- \$44M annual reduction in crash costs

4. Traffic Calming

- 86% reduction in serious injury and fatal crashes
- 78% reduction in number of vehicles traveling 10+ mph over the speed limit
- \$8M annual reduction in crash costs

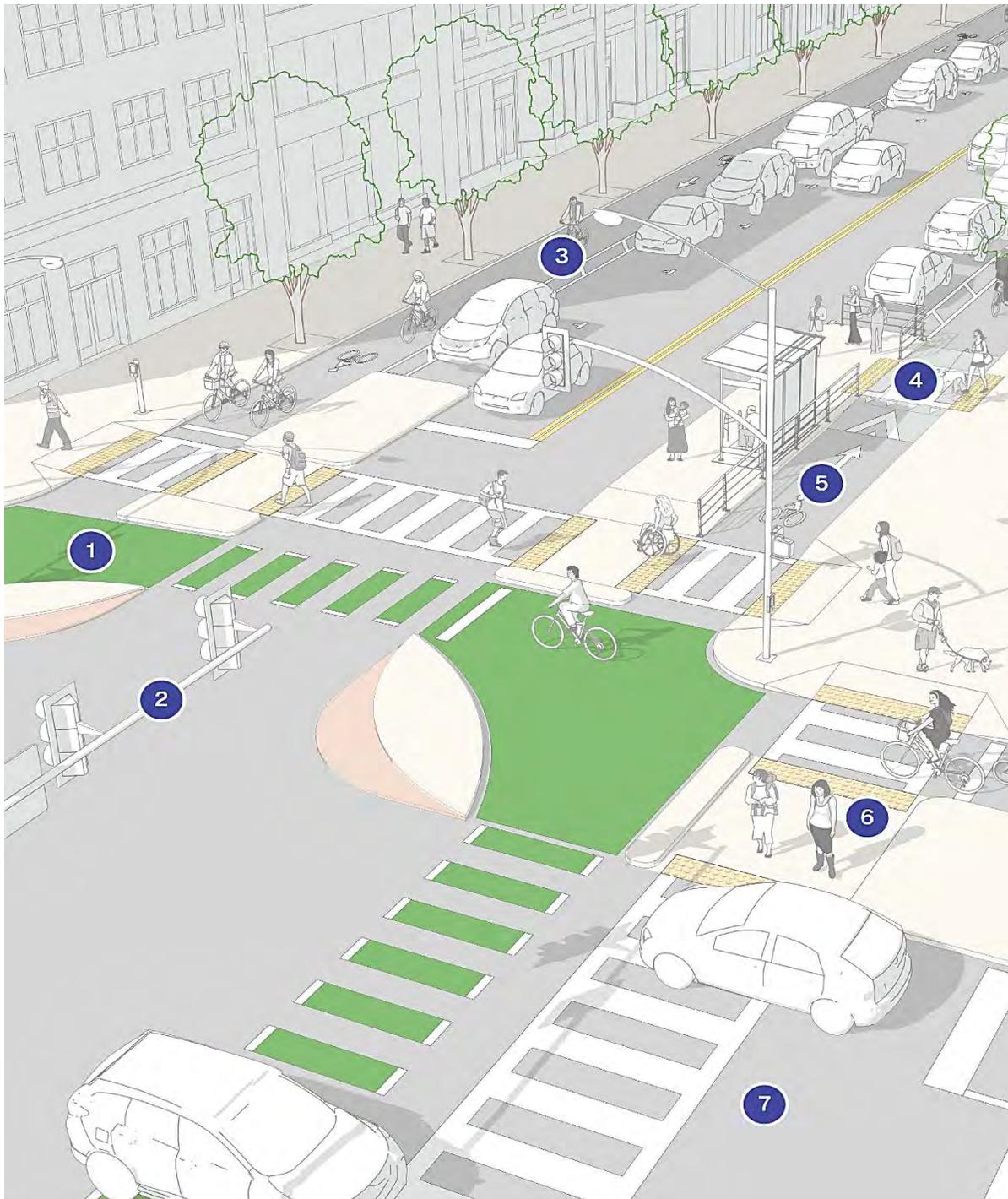


Illustration of the impacts of street design and traffic calming on improving safety

5. Protected Bike Lanes

- 27% reduction in serious injury and fatal crashes
- 24% reduction in bicyclist-involved fatal and serious injury crashes
- \$103M annual reduction in crash costs

6. Pedestrian Crossing Islands

- 27% reduction in serious injury and fatal crashes
- \$17M annual reduction in crash costs

7. Arterial Speed Limit Reductions

- 15% reduction in serious injury and fatal crashes
- \$59M annual reduction in crash costs



Traffic Calming on Bluff Springs Road – combining raised pedestrian islands, lane repurposing, & buffered bike lanes





Austin Monitor

Conclusion: Austin’s Traffic Calming Outlook and Quality of Life Impacts

Austin’s decade-long Vision Zero journey illustrates how traffic calming serves as a central pillar of a systemic, public health-oriented safety strategy. Through an expansive portfolio of interventions, the city has demonstrated that redesigning streets saves lives. The magnitude of Austin’s measurable impacts is striking: traffic calming projects alone yielded an 86% reduction in serious injury and fatal crashes and a 78% reduction in extreme speeding, underscoring the power of self-enforcing street design. Beyond crash reductions, Austin’s investments have produced substantial economic and social returns, with millions of dollars saved annually in crash-related costs and safer conditions for people walking, biking, and driving. These improvements directly translate into an enhanced quality of life, including safer neighborhoods, more accessible streets, and greater confidence in everyday travel. While challenges remain, Austin’s experience confirms that where traffic calming is implemented intentionally and at scale, it delivers outsized safety benefits and advances a more humane, equitable transportation system.

Bellevue, WA

For nearly 40 years, the City of Bellevue has been a leader in neighborhood traffic calming. The main features of Bellevue’s traffic safety program have been education, encouragement, and engineering solutions. This work, in support of Vision Zero and in response to concerns about safety, has been led by Bellevue’s Neighborhood Traffic Safety Services (NTSS) division within the Transportation Department. The NTSS group’s goals include creating a safer roadway environment for all users, enhancing neighborhood livability, and engaging the community to become active participants in the traffic safety process. Since the adoption of Vision Zero and the Federal Highway Administration’s Safe Systems approach to meet the city’s goal to eliminate traffic deaths and serious-injury collisions on city streets (*local streets and arterials, which comprise approximately 64% of the streets in the city’s transportation network*) by 2030, Bellevue has looked to build upon the success of the traffic calming program while also finding new approaches and avenues to advance traffic safety goals.

The City of Bellevue was part of the jurisdictions originally sampled in 2005. Bellevue has installed radar signs at 49 locations throughout the city. One of their before-and-after studies (conducted between 2002 and 2017) showed that radar signs reduced the 85th percentile speeds by an average of 2.9 mph, with reductions of up to 8.4 mph in certain locations. Another study, conducted between 2013 and 2018, showed that the number of high-end speeders (i.e., drivers traveling 40 mph or more) had decreased by approximately 83%. Research has shown that pedestrians involved in collisions with cars going 40 mph or over have a 90% chance of dying. By reducing the volume of high-end speeders, they demonstrated that this traffic calming intervention was a worthwhile investment, especially in areas where pedestrians are present.

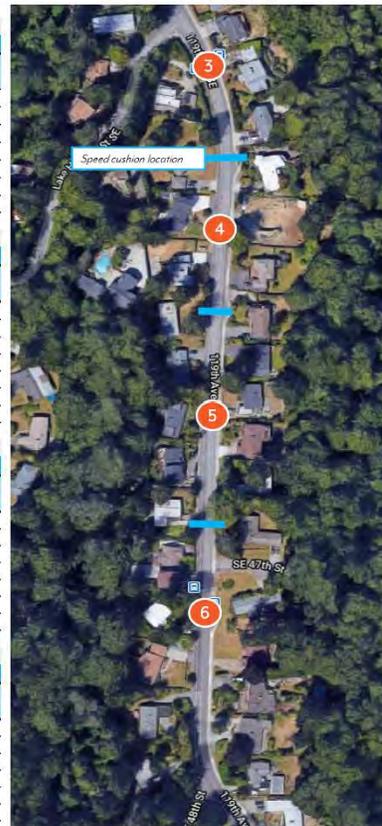
Percentile Speeds Comparison for Locations at Speed Cushions

(3) 119th S-O 4472 Dwy						
Direction	Percentiles	Data Set Speeds (mph)			Reduction (mph)	
		Before	Immediately After	4 Months After	Immediately After	4 Months After
NORTHBOUND	50th	26.2	24.3	24.9	1.9	1.3
	85th	29.4	27.3	28.1	2.1	1.3
	95th	31.8	29.4	30.2	2.4	1.6
SOUTHBOUND	50th	24.9	23.6	23.8	1.3	1.1
	85th	28.2	26.8	27	1.4	1.2
	95th	30.3	29.1	29	1.2	1.3

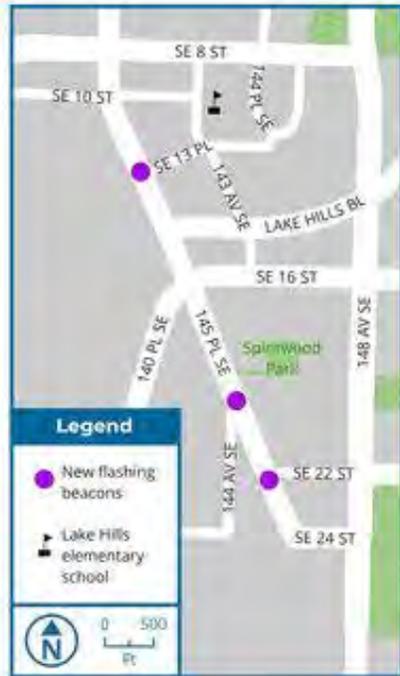
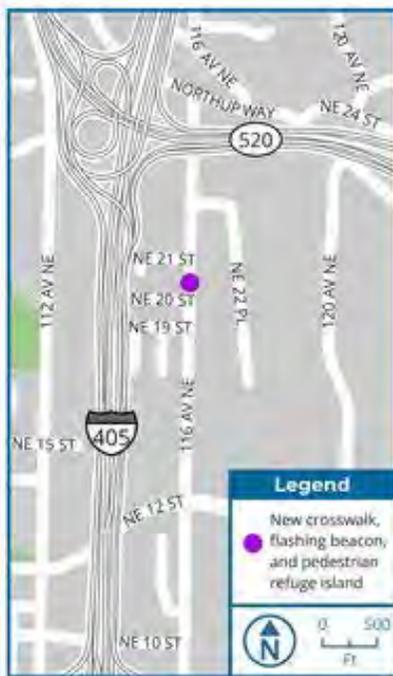
(4) 119th N-O 4535 Dwy						
Direction	Percentiles	Data Set Speeds (mph)			Reduction (mph)	
		Before	Immediately After	4 Months After	Immediately After	4 Months After
NORTHBOUND	50th	29	24.5	25.1	4.5	3.9
	85th	33.2	28.2	28.5	5	4.7
	95th	36.1	30.6	30.9	5.5	5.2
SOUTHBOUND	50th	28	22.9	23.7	5.1	4.3
	85th	31.9	26.6	27.3	5.3	4.6
	95th	34.7	29	29.6	5.7	5.1

(5) 119th (40ft) N-O 4616 Dwy						
Direction	Percentiles	Data Set Speeds (mph)			Reduction (mph)	
		Before	Immediately After	4 Months After	Immediately After	4 Months After
NORTHBOUND	50th	29.6	26.3	26.3	3.3	3.3
	85th	33.8	30.1	30	3.7	3.8
	95th	36.7	32.5	32.4	4.2	4.3
SOUTHBOUND	50th	28.5	22.9	23.9	5.6	4.6
	85th	32.4	26.6	27.8	5.8	4.6
	95th	35.2	29.3	30.4	5.9	4.8

(6) 119th (36ft) N-O 4616 Dwy						
Direction	Percentiles	Data Set Speeds (mph)			Reduction (mph)	
		Before	Immediately After	4 Months After	Immediately After	4 Months After
NORTHBOUND	50th	27.4	25.9	26.5	1.5	0.9
	85th	30.9	29.5	29.9	1.4	1
	95th	33.3	31.9	32.1	1.4	1.2
SOUTHBOUND	50th	26.7	24	24.2	2.7	2.5
	85th	30.4	27.7	27.7	2.7	2.7
	95th	32.9	30.1	30.2	2.8	2.7



Additionally, they installed permanent traffic calming interventions, in the form of speed cushions, in 2013 on two streets (Forest Dr SE, west of Somerset Dr SE & 119th Ave SE, south of Lake Heights St), and measured their effects on collisions in 2019. Their results showed that the number of collisions per year on both streets had reduced from 1.75 to 0.57 (67%) and from 2.25 to 0.83 (-63%), respectively.



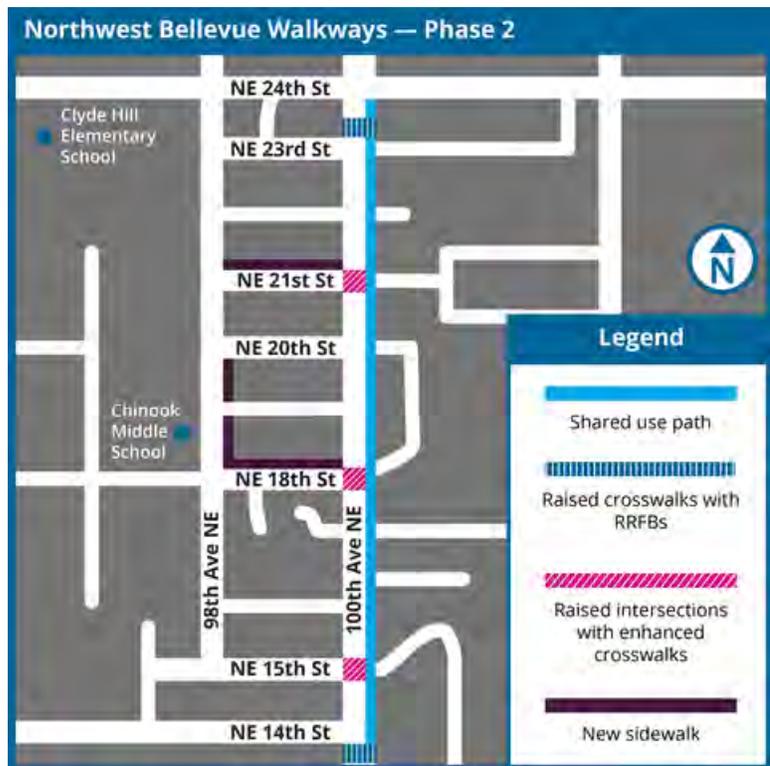
New crosswalk, flashing beacon, and pedestrian refuge island locations

The NTSS group has many projects across the city that are currently underway or have recently been completed, including:

- Eastgate/Tyee Safety Improvements:** A project to improve safety for the Eastgate neighborhood around Tyee Middle School for people to walk and to reduce the speed of drivers. Construction began in June 2019 and was largely completed in early 2020. Project elements included a mini-roundabout at 138th Avenue SE and SE 40th Street and a new sidewalk on the west side of 138th Avenue from SE 40th Street to SE Allen Road. This project addressed concerns about speeding and traffic volumes, as well as the need for safe walking and bicycling in the neighborhood, including routes to and from school.



- NW Bellevue Walkways and Safety Improvements:** A project to build sidewalk and crosswalk connections to/from several schools. In consultation with neighbors, schools and stakeholders, the Neighborhood Transportation Safety Services group developed a traffic improvement strategy for the Northtowne area, along 100th Avenue Northeast, between Northeast 24th and Northeast 14th streets. The project also includes some side streets between 100th Avenue Northeast and 98th Avenue

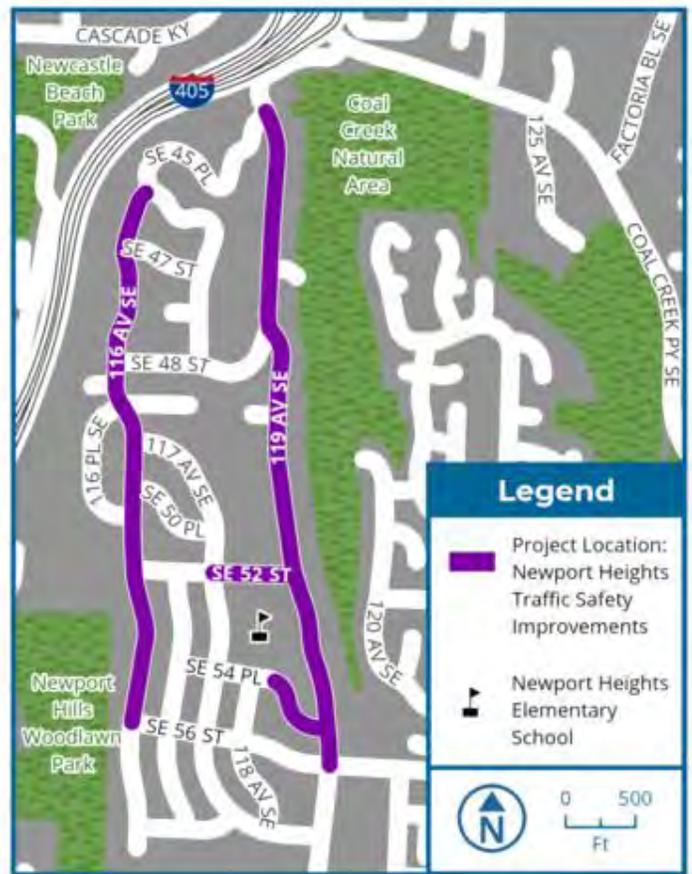


Northeast. The work focuses on addressing concerns about speeding and improving safety for pedestrians and bicyclists in the neighborhood and around nearby schools. Phase 1 of the project, which involved constructing a roundabout at 100th Avenue Northeast and Northeast 10th Street, was completed in the spring of 2021. Construction of a second phase of improvements is projected to begin in 2025 and will include:

Sidewalk on the north side of NE 18th St (98th Ave NE to 100th Ave NE), east side of 98th Ave NE (NE 18th Street to NE 20th Street), north side of NE 21st St (98th Ave NE to 100th Ave NE), Shared use pathway on the east side of 100th Ave NE (NE 14th St to NE 24th St)
 Raised intersections with enhanced crosswalks on 100th Ave NE at NE 15th, 18th and 21st Sts.
 Raised crosswalks with Rectangular Rapid-Flashing Beacons (RRFBs) will be installed on 100th Ave NE at NE 14th St and NE 23rd St.

- **Newport Heights Safety Improvements:**

In 2017, city staff met with members of the Newport Heights Elementary community and neighborhood residents to develop short- and long-term actions to increase traffic safety. The Newport Heights Traffic Safety Improvements project is a series of changes designed to address concerns about speeding and safety for pedestrians and bicyclists, particularly the safety of students walking to school. Neighborhood Traffic Safety Services has constructed several projects in the area to improve traffic safety, with more improvements to come. In Summer 2025, three additional speed cushions will be installed on



119th Avenue SE. The existing speed cushions on 119th Avenue SE significantly reduced high-end speeding and decreased the average speed by up to 5 mph. These cushions will be installed around SE 52nd Street, between the existing cushions, to help reduce speeding in this portion of the street.

- **NE 28th Street Traffic Calming:** project to reduce vehicle speeds on NE 28th St from 164th Avenue NE to Ardmore Park. The City of Bellevue Transportation Department has heard from people in Northeast Bellevue about speeding concerns on NE 28th Street between 164th Avenue NE and Ardmore Park (169th Avenue NE). This portion of NE 28th Street was evaluated against all other requests for traffic calming in the city - a list of 100 locations - and was rated highly for action given vehicle speeds, community support, and proximity to parks and schools



- ***School Zone Beacon Replacement Project:*** A project to construct school zone flashing beacons to increase the visibility of school zones. In summer 2023, Transportation Department engineers inspected all school zone flashing beacons in Bellevue and determined that some of the beacons need to be replaced due to installation deficiencies, maintenance issues, and aging technology. Transportation Department engineers also found reliability issues with the school beacon programming equipment near Bellevue High School.

Conclusion: Bellevue's Traffic Calming Outlook and Quality of Life Impacts

Bellevue's nearly four decades of leadership in traffic calming demonstrate the value of sustained, evidence-based safety programs grounded in community engagement and engineering solutions. Through radar feedback signs, speed cushions, roundabouts, raised crossings, and school-focused safety projects, Bellevue has systematically reduced speeding and collisions across local streets and arterials. Before-and-after evaluations demonstrate consistent reductions in 85th percentile speeds, dramatic declines in high-end speeding, and collision reductions exceeding 60 percent on streets with permanent calming treatments. These safety gains have directly translated into improved neighborhood livability, particularly in areas surrounding schools, parks, and residential neighborhoods. The city's continued expansion of traffic calming under Vision Zero positions it well to achieve its goal of eliminating traffic deaths and serious injuries while enhancing the everyday quality of life for all road users.

Fort Lauderdale, FL

The City of Fort Lauderdale's traffic calming history evolved from reactive responses to cut-through traffic and speeding in neighborhoods, leading to the establishment of a formal Neighborhood Traffic Calming Program (NTCP). This program educates residents and implements solutions such as speed humps and lane narrowing, aligning with broader goals like Vision Zero and Complete Streets to enhance pedestrian/biker safety. The purpose of the Neighborhood Traffic Calming Program is to provide a resource for neighbors who are interested in exploring traffic calming measures within their neighborhoods. The goals of the program are to:

- Educate neighbors on a variety of traffic calming strategies and facilities
- Empower neighbors to seek funding or other opportunities to implement traffic calming strategies
- Increase safety, comfort, and connectivity for people walking and biking
- Create community cohesion by Connecting the Blocks
- Further the goals and objectives of the City’s Vision Plan, Strategic Plan, and Vision Zero Fort Lauderdale

Riverland Road Traffic Calming Project:

Riverland Road between State Road 7 and Davie Boulevard has experienced significant cut-through traffic and increased vehicle speeds, which have caused safety concerns for the many users of the corridor. Past traffic studies, planning analyses and extensive community inputs have demonstrated the need for traffic calming solutions along this segment of Riverland Road. City staff met with residents and, with the help of a consultant team, designed the following traffic



calming improvements at the following locations:

- Raised intersections at SW 35th Avenue, Riverland Terrace, SW 27th Avenue, SW 21st Street, and SW 19th Street
- Raising existing crosswalks on Riverland Road east of Tortugas Lane and Bimini Lane
- Creating a median refuge island for the existing crosswalk at the driveway located at 3901 Riverland Road

The Riverland Road Traffic Calming Improvement Project is being constructed in partnership with the Broward Metropolitan Planning Organization (MPO) and funded through the Transportation Investments Generating Economic Recovery (TIGER) Grant.

Speed Hump Installation Policy: Speed humps are raised areas in the pavement surface that extend across a roadway. Speed humps create a gentle vehicle rocking motion that causes most vehicles to slow to approximately 15 miles per hour (mph) or less at each hump, and approximately 25 mph to 30 mph between properly spaced humps. Speed humps should not be confused with speed bumps that cause discomfort to motorists and a shock to vehicles only at low speeds. The eligibility criteria for speed humps in Ft Lauderdale include neighborhood support and a survey. Neighbor support for the installation of

speed humps shall be documented by a City-conducted notification of all properties with addresses on the road and, when appropriate, the surrounding neighborhood.

A notification will be mailed out to neighbors who would be directly impacted by the installation of speed humps on a City roadway to determine their preference for speed humps. The City utility billing address database will be used to determine who will be notified. The neighbors contacted will be able to respond via the City website or by phone. The City will require 60% of neighbors (property owners and/or occupants) responding as minimum support to progress with the speed hump process, which is the same threshold required for utility undergrounding. If the responses do not meet the minimum support threshold, the City will coordinate with proper entities that requested the installation of speed humps.

Concerning street classification and use, speed humps will not be installed on any "collector" roads that carry more than 6,000 vehicles per day and will not be installed on any higher category roads than "collectors." Speed humps will not usually be installed on any cul-de-sacs; however, because of the differing types of land uses found on some cul-de-sacs, the City Commission may consider the installation of speed humps on a case-by-case basis. Speed humps will be used only on streets with no more than two travel lanes or where the overall pavement width is not greater than 40 feet. In addition, the pavement should have good surface and drainage qualities. Speed humps are generally placed in a series of 250 to 500 feet apart, at property lines, to minimize noise.



Sunrise Boulevard & 15th Street – Traffic Calming Before and After



NE 13th Street – Traffic Calming (Roundabout) Before and After

	CHICANE	CHOKER / PINCH POINT	COLORED PAVEMENT	MEDIAN ISLANDS
SPEED AND VOLUME				
DESCRIPTION	Roadway treatment that creates shifting deviations in the street by the implementation of curb extensions or islands.	Mid-block narrowing of roadway that requires drivers to slow down or yield to each other to maneuver through the area.	Painted or stamped pavement signaling a pedestrian priority. Crosswalks, intersections, and excess pavement areas are appropriate for this treatment.	Raised island most commonly used to separate opposing directions of traffic. Also used for access management.
ADVANTAGES	Traffic calming effects on roadway. Increased potential for landscaping and drainage.	Traffic calming effects on roadway. Potential for a mid-block crossing. Opportunity for landscaping and drainage improvements.	Creates a unique identifier in the community. Art in public places. Community can be engaged in the artwork/pattern design.	Reduced cut-through traffic. Opportunity for landscaping and drainage improvements.
DISADVANTAGES	No separation between bicycle and vehicular traffic. Increased maintenance costs if landscape is added.	If landscaping is added, increased maintenance. Potential loss of on-street parking. Potential impact on roadway drainage.	Stamped pavement may create noise. Increased maintenance costs to keep colors vibrant.	Potential to restrict access to streets. If landscaping is added, increased maintenance. Potential impact on roadway drainage.
COST*	\$\$\$	\$\$\$	\$\$-\$\$\$ (varies on size and treatment)	\$\$
COST*	Local streets. Posted speed limit of 35 mph or lower. Between 450 – 3,500 vehicles per day.	Local streets. Posted speed limit of 35 mph or lower. Between 450 – 3,500 vehicles per day.	All roadway classifications.	All roadway classifications. Posted speed limit of 35 mph or lower. Greater than 450 vehicles per day.
THRESHOLD**	Impacted Street HOA	Impacted Street HOA	HOA	Impacted Street HOA



* Costs: \$ - 99, \$5,000, \$\$ - \$5,001 - \$25,000, \$\$\$ - \$25,001 - \$50,000, \$\$\$\$ - \$50,001+
 ** Roadway classifications can be found on the Broward County Road Jurisdiction map at: https://bcgis.broward.org/BC_Maps/

If you would like this publication in an alternate format, please call (954) 828-4826 or email transportation@fortlauderdale.gov.

TRAFFIC CALMING TOOLBOX



	PAVEMENT MARKINGS & SIGNAGE	RAISED CROSSING	RAISED INTERSECTION	ROUNDBOUT	RUMBLE STRIPS
DESCRIPTION	Pavement surface treatments or roadway signage intended to visually signal to drivers to be alert or to slow down.	A raised area in the roadway for pedestrians crossing.	Raised area for an entire intersection used to reduce vehicle traffic speeds and create additional awareness of pedestrians at the intersection.	Type of circular intersection or junction in which traffic flows almost continuously in one direction around a central island.	Pavement surface treatments intended to cause drivers to experience vehicular vibrations signaling drivers to slow down.
ADVANTAGES	Increased awareness of surroundings.	Traffic calming effects. Improved visibility of pedestrian crossing.	Traffic calming effects. Self enforcing. Improves visibility of pedestrian crossing areas.	Reduced speeds. Reduced severity and number of collisions. Simplifies flow of traffic. Opportunity for landscaping and increased drainage.	Effective at reducing speeds.
DISADVANTAGES	Drivers may not obey without enforcement. Effectiveness lessens with time.	May impact existing roadway drainage.	May impact existing roadway drainage.	May restrict turning movements of larger vehicles. Large footprint may not fit within existing roadway. Increased maintenance costs if landscaping is added.	Vibration noise created may be inappropriate in residential areas.
COST*	\$ (varies on length)	\$\$	\$\$\$\$	\$\$\$\$	\$
THRESHOLD**	All roadway classifications	Local streets. Posted speed limit of 35 mph or lower. Greater than 450 vehicles per day.	Local streets. Posted speed limit of 35 mph or lower. Greater than 450 vehicles per day.	All roadway classifications. Posted speed limit of 35 mph or lower. Greater than 450 vehicles per day.	All roadway classifications
COMMUNITY SUPPORT	HOA	HOA	HOA	HOA	HOA Neighbors within 100' of project



* Costs: \$ = \$0 - \$5,000; \$\$ = \$5,001 - \$25,000; \$\$\$ = \$25,001 - \$50,000; \$\$\$\$ = \$50,001+
 ** Roadway classifications can be found on the Broward County Road Jurisdiction map at: https://bcpjs.broward.org/BC_Maps/

If you would like this publication in an alternate format, please call (954) 828-4826 or email transportation@fortlauderdale.gov.

PEDESTRIAN FACILITY TOOLBOX



	BULB-OUT	CROSSWALK (intersection)	MID-BLOCK CROSSWALK (base)	MID-BLOCK CROSSWALK WITH RRFB	PEDESTRIAN REFUGE ISLAND
DESCRIPTION	A bulb-out or curb extension visually or physically narrows the roadway creating shorter and safer crossings for pedestrians.	A designated space for pedestrians to cross the road at an intersection. It highlights the designated place for pedestrians to cross.	Designated space for pedestrians to cross the street at locations where the nearest signalized intersection is too far to walk to.	Provides greater visibility of pedestrians at a mid-block crossing location by using a Rectangular Rapid Flashing Beacon (RRFB) in combination with pedestrian warning signs.	Protected spaces placed in the center of the street to facilitate pedestrian crossings.
ADVANTAGES	Narrows street width at intersection. Traffic calming effects.	Provides designated location for pedestrians to cross. Increased driver awareness.	May include a pedestrian refuge island.	May include a pedestrian refuge island. Increases driver awareness due to high visibility strobe-like warning when crossing button is pressed by pedestrian.	Creates a shorter distance for the pedestrian to travel at once.
DISADVANTAGES	May impact on-street parking. May impact existing roadway drainage.	May not be visible depending on the type.	May impact existing roadway drainage.	Flashing lights may be bothersome to nearby homes.	May impact on-street parking.
COST*	\$\$\$	\$\$	\$\$	\$\$	\$\$
THRESHOLD**	All road classifications.	All roadway classifications.	All roadway classifications that meet or exceed FDOT criteria and MUTCD warrants.	All roadway classifications that meet or exceed FDOT criteria and MUTCD warrants.	All roadway classifications with a minimum of three lanes of traffic. Should have a width of 6' or greater.
COMMUNITY SUPPORT	HOA	HOA	HOA	HOA Neighbors within 100' of project	Impacted Street HOA



* Costs: \$ = \$0 - \$5,000; \$\$ = \$5,001 - \$25,000; \$\$\$ = \$25,001 - \$50,000; \$\$\$\$ = \$50,001+
 ** Roadway classifications can be found on the Broward County Road Jurisdiction map at: https://bcpjs.broward.org/BC_Maps/

If you would like this publication in an alternate format, please call (954) 828-4826 or email transportation@fortlauderdale.gov.

The city of Ft Lauderdale conducted a traffic study in 2024 to ascertain the impacts of its traffic calming projects on local streets. An example is the implementation of traffic calming measures such as a roundabout, lane narrowing, and median islands on Sunrise Boulevard & 15th Street. The traffic calming study assessed the Before (2022 before installation) and After (2023 after installation), showing that 85th percentile speeds reduced from 40 mph (in January 2022) to 35 mph (in April 2023) – a 13% decrease. Additionally, average speeds reduced from 27 mph to 22 mph (a 19% reduction).

Conclusion: Fort Lauderdale’s Traffic Calming Outlook and Quality of Life Impacts

Fort Lauderdale’s Neighborhood Traffic Calming Program reflects a deliberate shift from reactive problem-solving to a structured, community-centered approach to street safety. Through tools such as speed humps, lane narrowing, raised intersections, roundabouts, and pedestrian refuge islands, the city has addressed cut-through traffic and speeding while aligning local actions with broader Vision Zero and Complete Streets goals. Beyond speed reduction, Fort Lauderdale’s approach emphasizes education, neighborhood empowerment, and community cohesion. By requiring resident support and tailoring treatments to street context, the program strengthens public trust and local ownership of safety outcomes. These interventions enhance walkability, comfort, and connectivity, reinforcing that traffic calming is not merely about slowing vehicles, but about restoring streets as safe, welcoming spaces that improve daily life and neighborhood resilience.

Phoenix, AZ

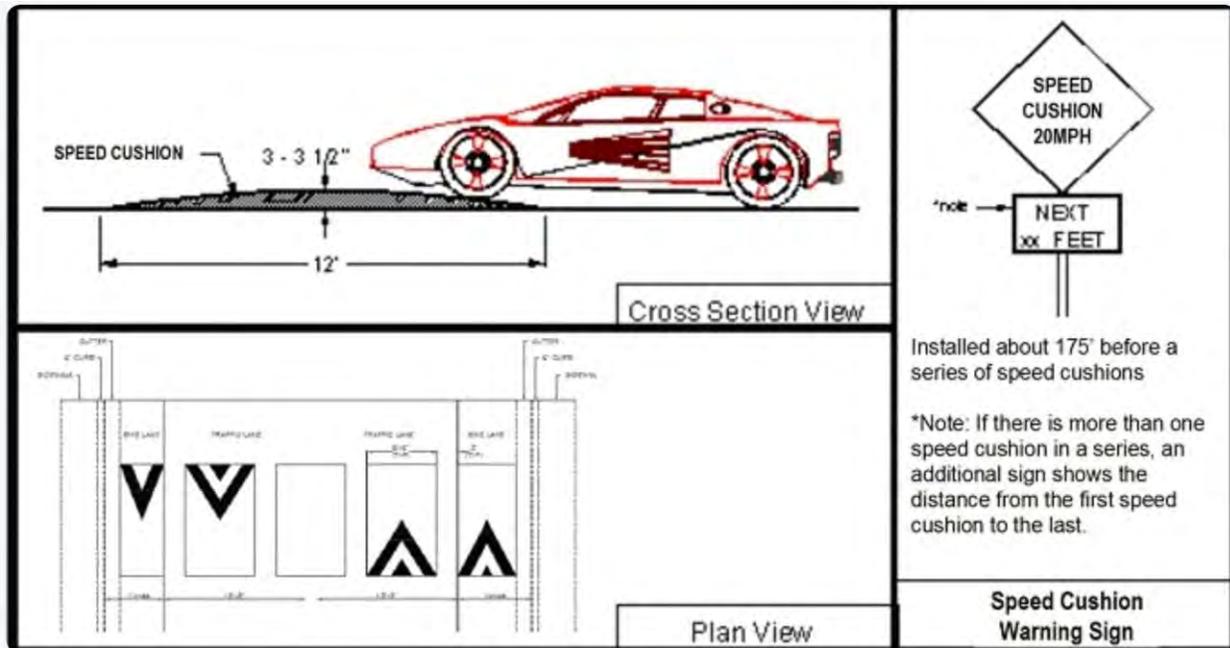
Phoenix’s traffic calming efforts are shaped by an urgent safety context, as the city recorded some of the nation’s highest active transportation fatalities in 2021. In response, the city adopted a Road Safety Action Plan in 2022, incorporating Vision Zero strategies [7]. The city implements Speed Humps and Speed Cushions as a traffic calming measure [8].

Speed Humps

The city acknowledges that the speed humps can reduce average speeds up to 6 mph or more, and are permitted on local streets where the speed limit is 25 mph [9]. However, residents apply for the speed humps and pay a portion of the installation cost [9].

Speed Cushions

The city provides speed cushions only on minor collector streets where the speed limit is at or below 30 mph and the average daily traffic (ADT) is below 10,000 vehicles per day [10].



The city acknowledges a few limitations of speed humps and speed cushion installation. Both of these need to be requested by the residents. The residents also pay part of the installation cost. However, the city does not currently have any before-and-after studies on the changes in speed, volume, or crash rates after the implementation of traffic calming programs.

Conclusion: Phoenix’s Traffic Calming Outlook and Quality of Life Impacts

Although Phoenix currently lacks publicly available before-and-after evaluations, the city acknowledges the potential for reducing speed through vertical traffic calming and continues to expand its programs in response to resident-initiated requests. These measures directly address speeding on streets where vulnerable users are most exposed. Phoenix’s experience highlights both the promise and the limitations of traffic calming when evaluation and funding mechanisms are constrained. Nonetheless, the program represents a critical step toward reclaiming neighborhood streets for safety, comfort, and everyday use.

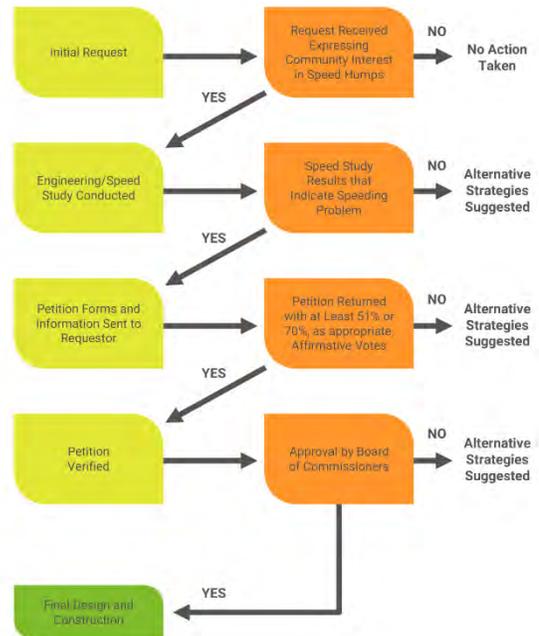
Gwinnett County, GA

Gwinnett County’s traffic calming program reflects a structured, community-driven response to speeding and neighborhood safety concerns. According to the Gwinnett County 2045 Unified Plan, the county acknowledges speeding and accidents as a national concern and identifies pedestrians and bicyclists as the most vulnerable road users [2]. The county identified nine safety measures for providing safe streets for all. The safety countermeasures included: safety edge, corridor access management, medians and pedestrian crossing islands in urban and suburban areas, back plates with retroreflective borders, longitudinal rumble

strips and stripes on two-lane roads, pedestrian hybrid beacon, roundabouts, delineation and friction for horizontal curves, and road diet [2]. The following are a few examples-

Speed Humps

To slow the traffic, Gwinnett County has been installing speed humps on local residential streets with a posted speed limit of 25 mph [3]. The residents are concerned about road safety and apply for the speed humps under this program. These speed humps are typically placed 300-500 feet apart, as it is considered as an effective range in reducing the 85th percentile speed between 25-35 mph [3]. The county mainly provides a flat top speed hump (10-foot tops, six-foot ramps). Moreover, according to Gwinnett County, some of the minor collectors have speed humps too. However, it is currently a community-driven program [4]. The details of the speed hump program can be found in the Speed Hump Program Manual (Gwinnett County Speed Hump Manual)



The County has two criteria for implementing speed humps on residential streets: an 85th percentile speed between 30 mph and 34.99 mph, and a speed above 35 mph. For example, the Gwinnett County Speed Hump Program on Huston Drive, Lawrenceville, GA, implemented a speed hump program with a total estimated cost of \$9,504.00, funded by the 2014 special-purpose local-option sales tax (SPLOST). Before the implementation of the speed hump program, residential roads were set at 25 mph, and the 85th percentile speed was recorded at 40 mph during the 2018 survey. However, after the speed hump program was implemented, the speed at two survey locations (at the midpoints of the speed humps) fell below 25 mph. Similarly, for Holman Road in Hoschton, the 85th percentile combined speed was reduced to 29.65 mph from 42.8 mph after the implementation of speed humps. The county receives approximately 300-350 similar requests for installing speed humps on residential streets. Such road safety interventions are now funded by Safe Streets for All (SS4A) federal funds.

Center Concrete Islands

The county is also modifying the roadway segments and design, including the addition of center concrete islands or center island narrowing on multiple corridors (e.g., Rock Quarry Road, Grayson High School, Hope Hollow Road). For example, Hope Hollow Road is a minor collector residential road with center concrete islands, which keeps the speed limit to 30-35 mph.



Center concrete islands at Hope Hollow Road

Raised crosswalks, chicanes, and rubber mini roundabouts

The city implemented raised crosswalks in the downtown areas. The new SS4A program includes chicanes and rubber mini roundabouts for future projects.

Conclusion: Gwinnett County's Traffic Calming Outlook and Quality of Life Impacts

The County's speed hump program demonstrates clear and compelling safety outcomes, with 85th percentile speeds reduced from the low 40s to below posted limits across multiple corridors. These results underscore the effectiveness of traffic calming in addressing the most dangerous driving behaviors (*i.e., high-end speeding*) through self-enforcing design rather than constant enforcement. Beyond reducing speed, Gwinnett County's approach enhances neighborhood livability by addressing resident concerns directly and reinvesting transportation funding in local streets. The program's strong performance and high demand highlight traffic calming as a scalable, cost-effective tool for improving everyday safety and community well-being.

Howard County, MD

Howard County approaches traffic calming as a data-driven safety intervention, pairing targeted treatments with rigorous before-and-after evaluation. Through radar speed feedback signs, speed humps, and other localized measures, the County focuses on corridors with documented crash patterns,

particularly those involving loss-of-control incidents. The Howard County Department of Public Works, Bureau of Highways – Traffic Engineering, collects and analyzes before-and-after traffic and crash data as part of our evaluation of traffic calming projects. Below are two recent examples:

Installation of solar-powered radar speed feedback signs

In spring 2023, solar-powered radar speed feedback signs were installed on Vollmerhausen Road, Jessup, MD, near a horizontal curve between Golden Rod Path (eastbound) and Keepsake Way (westbound). This

segment had experienced a pattern of single-vehicle, loss-of-control crashes from 2018 to 2023. Since installation, operating speeds have decreased modestly (by approximately 1.5 to 3.5 MPH), but there has been a significant reduction in police-reported crashes, particularly single-vehicle crashes. Only one crash (not involving a single vehicle) has been reported since the signs were installed.



Speed Humps

In summer 2025, speed humps and radar speed feedback signs were installed on Hanover Road as part of a broader traffic calming initiative. While post-construction crash data is not yet available, preliminary speed data from the feedback signs indicate reduced vehicle speeds:

- ✓ Eastbound near 6188 Hanover Road: 26.6 MPH (a reduction of nearly 9 MPH compared to prior measurements about 300 ft north of this location at Shady Lane). This location is downstream of two speed humps.
- ✓ Westbound near 6460 Hanover Road: 31.4 MPH (no prior speed data available for this specific location). This site is upstream of the first westbound speed hump.

Conclusion: Howard County’s Traffic Calming Outlook and Quality of Life Impacts

Early results from Howard County’s interventions show meaningful reductions in operating speeds and dramatic declines in crash occurrence, especially single-vehicle crashes. These findings reinforce the role of speed management in preventing severe outcomes, even when average speed reductions appear modest. By prioritizing empirical evaluation and adaptive implementation, Howard County demonstrates how

traffic calming can deliver measurable safety benefits while maintaining roadway functionality. The program's focus on prevention, not reaction, contributes to safer streets and greater peace of mind for residents.

Montgomery County, MD

Montgomery County's traffic calming program is a core component of its Vision Zero strategy, employing a diverse toolkit that includes speed humps, road diets, pedestrian refuges, hardened turn lanes, and pedestrian hybrid beacons. The County's systematic design standards and extensive evaluations reflect a mature and outcomes-oriented approach. The following are a few examples from the county.

Speed Humps

The county has implemented multiple parabolic speed humps on the neighborhood streets, and flat-top humps are used on higher-classified streets or full-time transit routes, following the speed hump fact sheet [5]. The speed humps are 3 inches high and either 12 feet long (parabolic) or 22 feet long (flat-top). They are designed to be crossed comfortably at 15–20 mph and are usually spaced 500–750 feet apart. [5]. The following table shows the changes in vehicle speed and crashes after the implementation of speed humps on multiple roads in Montgomery County.

Traffic Calming Projects with Recorded Collisions Prior to Treatment										
Project Name	Completion Date	Speeds (MPH)			Time Period Before Treatment	Collisions 3 Years Before Treatment	Collisions Per Month	Time Between Treatment and End of 2014 (months)	Collisions Since Treatment	Collisions Per Month
		Posted	Avg. Before	Avg. After						
Connecticut Ave	July 2007	40	48	40	3 Years	10	0.28	89	6	0.07
Arcola Ave	August 2008	30	42	32	3 Years	3	0.08	76	5	0.07
Fairland Road	July 2009	40	53	42	3 Years	2	0.06	65	0	0.00
Calverton Blvd	July 2009	30	41	35	3 Years	1	0.03	65	2	0.03
Sligo Ave	September 2009	30	34	31	3 Years	1	0.03	63	4	0.06
Carroll Ave	November 2009	25	33	27	3 Years	2	0.06	61	1	0.02
Waring Station Road	April 2012	30	38	34	3 Years	4	0.11	32	3	0.09
Avg. # of Collisions						3.3	0.09		3.2	0.05

Speed decline >= 5mph

Increase in Collisions After Treatment

In traffic calming areas where collisions were recorded within 3 years prior to treatment, average speeds dropped by 6.9 mph. Collisions per month are down 44% in these areas. The only area to see an increase in collisions per month was Sligo Ave.

Source: DOT

Traffic Calming Projects with No Recorded Collisions Prior to Treatment



Project Name	Completion Date	Speeds (MPH)			Time Period Before Treatment	Collisions 3 Years Before Treatment	Collisions Per Month	Time Between Treatment and End of 2014 (months)	Collisions Since Treatment	Collisions Per Month
		Posted	Avg. Before	Avg. After						
Lockwood Drive	July 2009	30	40	30	3 Years	0	0.00	65	2	0.03
Spartan Road	November 2009	30	40	33	3 Years	0	0.00	61	0	0.00
Dale Dr	August 2010	30	39	34	3 Years	0	0.00	52	0	0.00
Prince Phillip Drive	June 2011	30	36	31	3 Years	0	0.00	42	0	0.00
Cedar Lane	May 2012	30	36	30	3 Years	0	0.00	31	1	0.03
Jones Bridge Road	May 2012	30	36	30	3 Years	0	0.00	31	0	0.00
Rainbow Drive	May 2012	25	31	26	3 Years	0	0.00	31	0	0.00
Franklin Ave	August 2012	30	34	33	3 Years	0	0.00	28	0	0.00
Homcrest Road	July 2013	25	36	33	3 Years	0	0.00	17	0	0.00
Galway Drive	August 2013	25	N/A	N/A	3 Years	0	0.00	16	1	0.06
Avg. # of Collisions						0	0.00		0.70	0.01

Speed decline >= 5mph

Increase in Collisions After Treatment

For traffic calming projects with no recorded collisions prior to treatment, the average speed dropped by 5.3 mph. Out of these 10 projects, 3 have recorded a pedestrian collision since the project finished.

Source: DOT

59

Hardened Lane

To reduce turning speed and improve visibility for pedestrians using the crosswalk at the Sam Eig Highway and Diamondback Drive (related to HIN work under S-1), Montgomery County hardened the right turn lane from Sam Eig Highway to Diamondback Drive. [6].



Figure 9 - City of Rockville installing protected bike lane along North Washington Street summer 2023.



Figure 10 – Narrowed right turn lane to reduce right turn speed from Sam Eig Hwy to Diamondback Dr.

Road Diet

During the summer of 2023, the City of Rockville completed a road diet and bikeway project along North Washington Street [6].

Pedestrian Median Refuge

At the intersection of Mannakee Street, the county decided to construct a pedestrian median refuge to calm the traffic as part of a roadway resurfacing project. This intersection improvement included community participation to select the most desirable traffic calming measures for pedestrian safety [6]. The county also implemented another pedestrian refuge island at the Wood Middle School crossing.



Figure 17 - New pedestrian refuge island at Wood Middle School.



Figure 19 - New pedestrian beacon, ramps, and crosswalks in the Woodlin Elementary walk shed.

Pedestrian Hybrid Beacons and Raised Median

The county improved the Crabbs Branch Way from Shady Grove Road to Indianola Drive, a HIN corridor, in Spring 2024. The road improvements included building a raised median to extend the existing pedestrian refuge islands and installing two pedestrian hybrid beacons [6].



Figure 11 – New pedestrian hybrid beacon and extended median installed along Crabbs Branch Way. The corridor was an existing Safe Speed corridor to address vehicle speeds.

Conclusion: Montgomery County's Traffic Calming Outlook and Quality of Life Impacts

Across multiple corridors, Montgomery County has documented substantial reductions in vehicle speeds, crash injuries, and, in some cases, the complete elimination of serious collisions. These results affirm that design-based interventions are among the most effective tools for improving safety on neighborhood and arterial streets alike. Equally important, the County's emphasis on pedestrian protection and community participation highlights the broader livability benefits of traffic calming. By making streets safer and more predictable, Montgomery County's program enhances walkability, accessibility, and overall quality of life.

Boise, ID

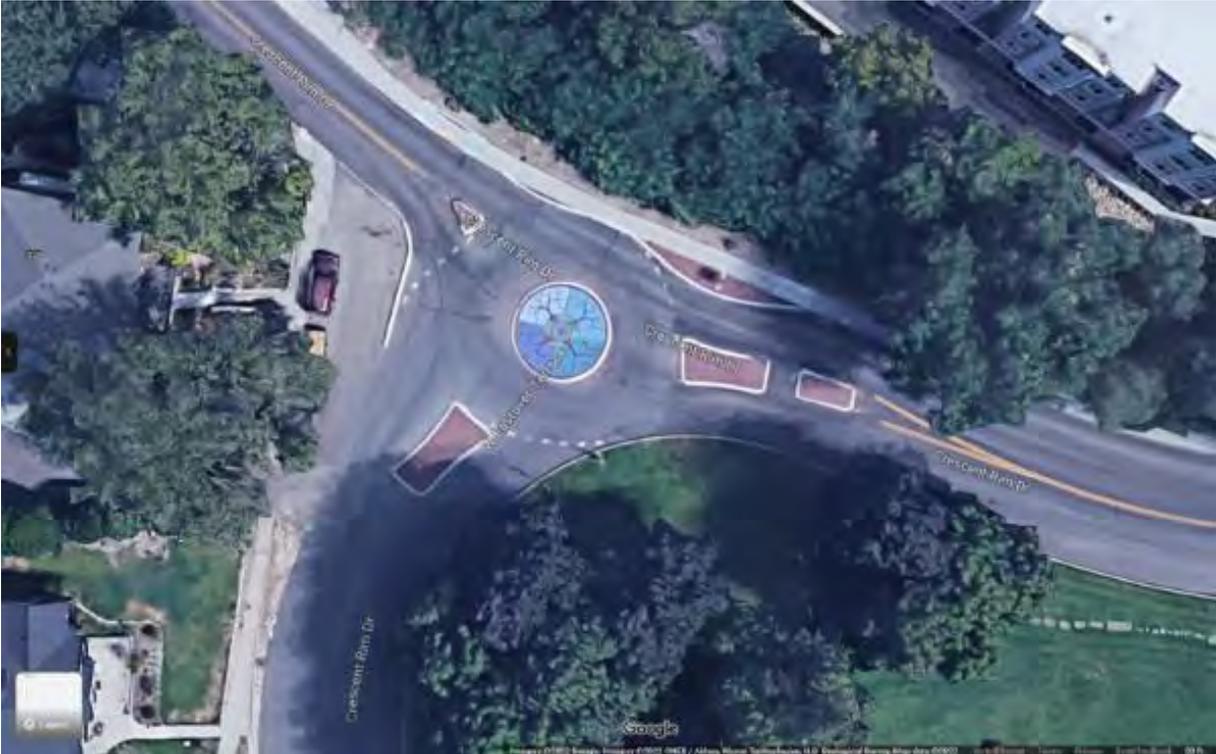
Boise employs a multifaceted traffic calming framework that combines physical infrastructure treatments with community-led behavioral initiatives. Through Ada County Highway District (ACHD) and neighborhood-based programs, the city focuses on reducing vehicle speeds, discouraging cut-through traffic, and improving safety for pedestrians and cyclists on residential and collector streets. Core interventions include speed humps and cushions, radar feedback signs, mini-roundabouts, lane reductions (*also known as road diets*), curb extensions, bulb-outs, and median islands.

One of Boise's most distinctive initiatives is the Neighborhood Pace Car Program, which encourages residents to voluntarily commit to safe driving behaviors such as obeying posted speed limits and yielding to pedestrians. By fostering community buy-in rather than relying solely on enforcement, the program reinforces a shared culture of safety and complements existing physical traffic calming measures. This approach recognizes that lasting speed reductions often require both design changes and behavioral adjustments.

From an institutional standpoint, Boise's traffic calming efforts are notable for their scale and consistency. ACHD has implemented between **100 and 200 traffic calming projects and studies annually since 2001**, demonstrating a long-term commitment to residential speed management. These interventions range from small-scale treatments, such as radar signs and speed cushions, to more transformative designs, including roundabouts, lane reductions, and pedestrian refuge islands. Although performance data before and after this review were not available at the time, a formal data request is pending and is expected to provide robust evidence of safety and speed outcomes.

The residential traffic calming process in Boise is structured, transparent, and community-driven. Under ACHD's updated Residential Speed Management Policy (*adopted December 11, 2024*), residents may request a traffic investigation through phone or the ACHD Connect online portal. Requests trigger a systematic evaluation that includes eligibility screening, traffic safety review, speed and volume analysis, and a neighborhood support survey. Projects move forward only when technical thresholds are met and

sufficient community backing is demonstrated, ensuring that traffic calming investments are both data-informed and publicly supported.



Mini Roundabout at Crescent Rim Dr. / Eastover Terr



TRAFFIC CALMING INSTALLATION

If the **street meets the requirements** and the **neighborhood survey shows enough support**, ACHD will design and schedule the traffic calming installation.



POSSIBLE TRAFFIC CALMING OPTIONS INCLUDE...

- **Vertical Deflection** (Speed Humps and Tables)
 - **Horizontal Shifts** (Medians, Chokers, Lane Narrowing, Chicanes)
 - **Intersection Treatments** (Roundabouts, Mini Roundabouts, Traffic Circles, Diverter, Bulbouts, Raised Intersections, and Raised Crossings)
 - **Vertical Elements** (Street Trees or landscaping only for the purpose of traffic calming may be considered where there is an agreement for others to irrigate and maintain)
- Temporary Materials may be used as approved by ACHD Traffic Engineering to evaluate potential treatments prior to permanent installation.*



(Left) Bulb-outs (Curb Extensions) on Downtown Meridian; (Right) Raised Median on Whitewater Park Blvd

CURB BULBOUTS

Curb Bulbouts extend the curb line out into the parking lane to reduce the width of the street.



CHICANE

A **Chicane** is a series of alternating curves in the path of travel that slows motor vehicles down.





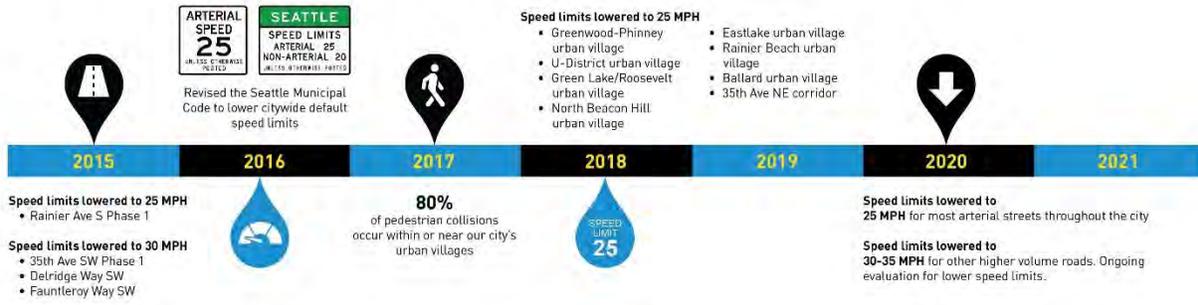
Road Narrowing / Chicanes on Intersection of Irene St. and 23rd near Elm Grove Park

Conclusion: Boise's Traffic Calming Outlook and Quality of Life Impacts

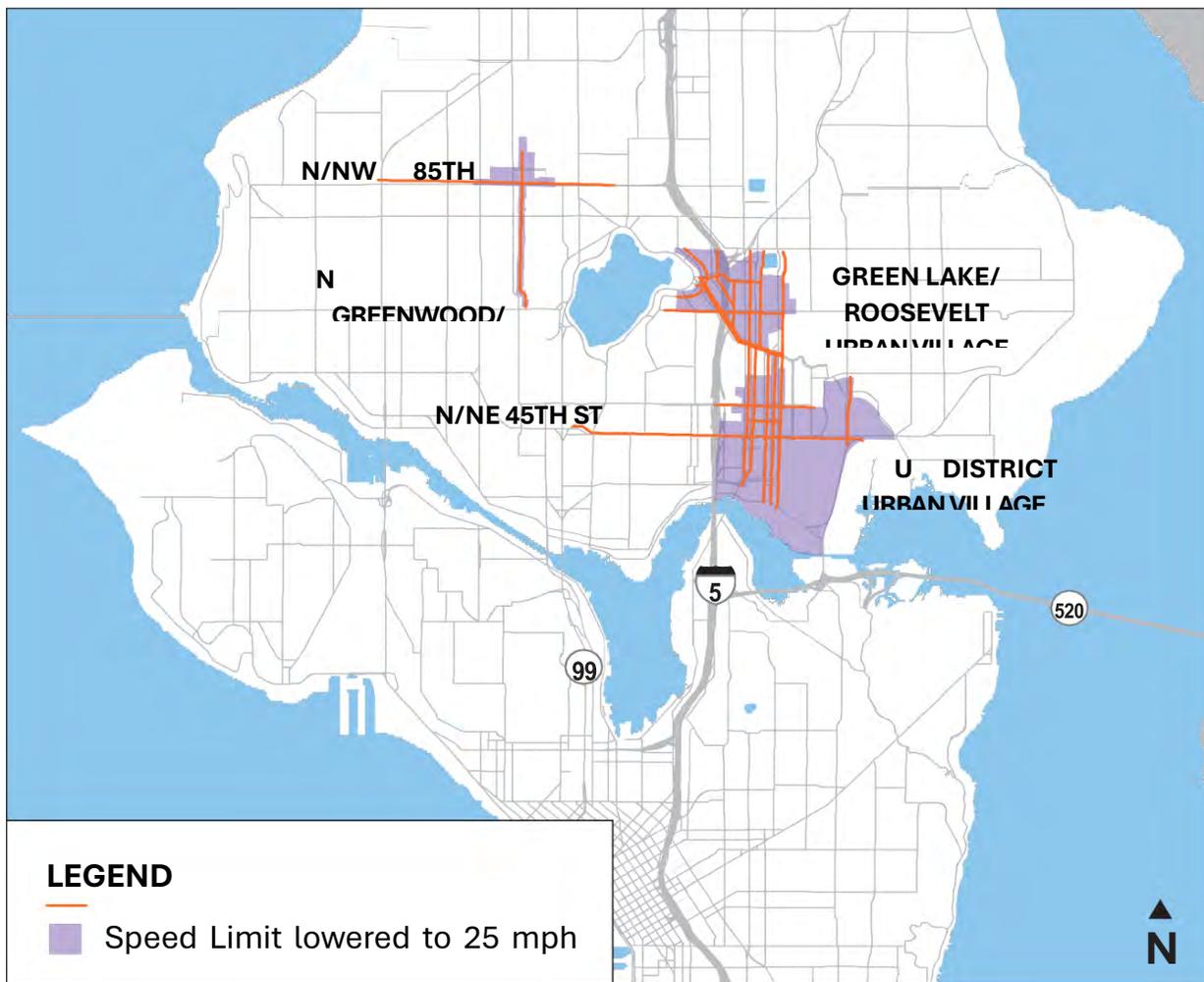
Boise's traffic calming program exemplifies how sustained institutional commitment and community engagement can support safer, calmer neighborhood streets on a larger scale. Through ACHD's centralized roadway management and a well-defined residential speed management process, the city has embedded traffic calming into everyday transportation practice rather than treating it as an exceptional response. While comprehensive before-and-after safety data are forthcoming, the volume and longevity of Boise's traffic calming efforts signal meaningful impacts on speed reduction, neighborhood safety, and quality of life. Programs like the Neighborhood Pace Car initiative further enhance these outcomes by reinforcing social norms around safe driving. Collectively, Boise's model demonstrates that traffic calming is most effective when engineering, policy, and community culture work together, transforming residential streets into safer, more livable public spaces that support walking, biking, and everyday neighborhood life.

Seattle, WA

Seattle has one of the nation's leaders in advanced traffic calming programs, operating under its Vision Zero commitment to eliminate traffic deaths and serious injuries (Seattle Department of Transportation, 2024). Seattle's progressive strategy - starting with low-cost interventions (signage) before implementing more expensive engineering measures. The Seattle Department of Transportation (SDOT) evaluated its speed management efforts under the Vision Zero program and found that lowering speed limits to 25 mph and increasing sign density from 1 to 1 ½ miles to ¼ mile intervals in each direction significantly reduced vehicle speeds and the number of crashes (Seattle Department of Transportation, 2020).



Speed limit case studies conducted by the Seattle Department of Transportation (2020) show that across all case study locations (as indicated in Map 2), total crashes, injury crashes, and high-end speeding declined, with the largest reductions seen in excessive speeding and overall crashes. These improvements occurred without additional enforcement, marketing, signal changes, or roadway redesign—signage changes alone produced measurable safety benefits. Based on these results, SDOT and Mayor Jenny Durkan launched a citywide speed limit reduction program in 2020. Installing reduced speed limit signage costs approximately \$4,000 to \$5,000 per mile.

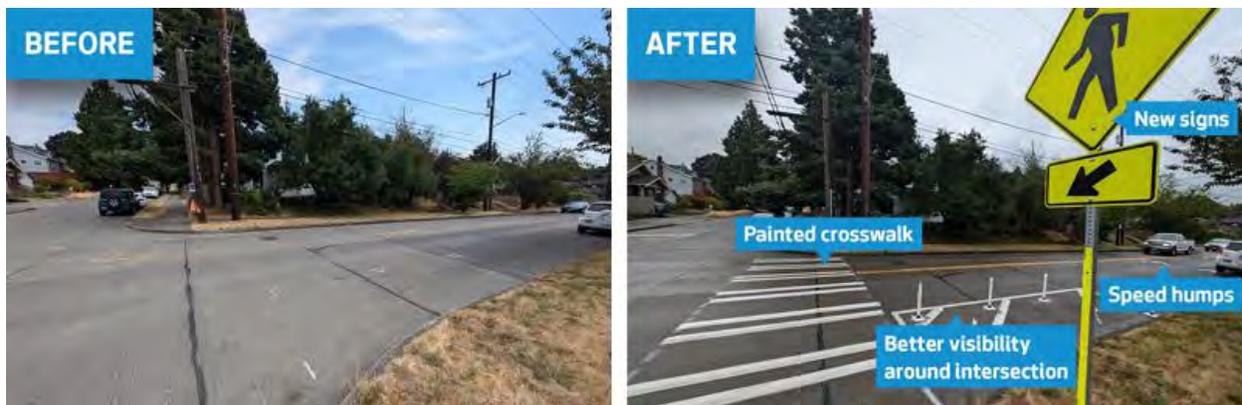


Crashes	All Crashes	Injury Crashes	Speeds	50th Percentile	85th Percentile	40+ MPH Speeders
Before	517	193	Before	25.6 MPH	31.2 MPH	1119
After	403	158	After	23.1 MPH	29.0 MPH	513
% Change	-22%	-18%	% Change	-9.9%	-7.1%	-54.1%

In terms of engineering/traffic calming measures, the city manages separate programs for neighborhood streets and arterials.

Arterial Traffic Calming Programs

To prioritize traffic calming in arterial roads, Seattle City uses a clear, data-driven “priority system” to determine where safety interventions are most needed. The system equally weights three factors: 85th percentile vehicle speeds, crash severity as measured by the High Injury Network, and the City’s Racial and Social Equity Index. Seattle’s arterial traffic calming program for collector, minor arterial, and principal arterial streets is funded at approximately \$800,000 to \$850,000 annually. This budget supports a range of traffic calming measures implemented on arterial roadways throughout the city, including speed cushions, lane narrowing, and enhanced pedestrian crossings such as marked crosswalks, marked crosswalks with Rectangular Rapid Flashing Beacons (RFBs), and pedestrian signals. The program also includes raised crosswalks, which are increasingly common in Seattle, although none have yet been installed specifically through the arterial program. Additional measures include median islands with bicycle cut-throughs, typically used at neighborhood greenway crossings or locations requiring turn restrictions, as well as horizontal deflection achieved through roadway striping to create lateral shifts in traffic alignment.



A 2024 project in NW Seattle shows many traffic calming improvements at an intersection

Speed Cushions

Speed cushions are the most preferred and widely used traffic calming treatment in Seattle’s arterial program because they provide effective speed reduction at a relatively low cost. Each speed cushion costs approximately \$12,000 and is constructed of asphalt with thermoplastic chevron markings; Seattle does not use concrete or stamped patterns. Cushions are typically spaced about 600 feet apart on arterials, which is relatively close spacing intended to achieve operating speeds of approximately 15 mph at the cushions. To accommodate emergency vehicles and transit, Seattle uses modified designs with narrower 5.5-foot-wide cushions instead of the standard 6-foot width, creating wider cutouts that allow wide-wheel vehicles

such as fire trucks and ambulances to straddle the cushions. Speed cushions are commonly installed on two-lane roads with bike lanes and are considered more cost-effective than alternatives such as traffic circles. While program-specific before-and-after studies are ongoing, Seattle's Safe Routes to School program has documented speed reductions of up to 21 percent from speed cushions, reinforcing their role as a high-impact, cost-efficient traffic calming measure.



Speed humps

Raised Crosswalks

Seattle uses raised crosswalks as a traffic calming and pedestrian safety measure, often paired with crossing controls such as Rectangular Rapid Flashing Beacons (RFBs) or full traffic signals. Raised crosswalks are constructed using a variety of materials, including asphalt and concrete, and in some locations feature artistic or community-specific designs. Because of this variation in materials and design treatments, the cost of raised crosswalks can vary widely across projects.

Traffic Signals and RFBs at Crossings

Traffic signals and Rectangular Rapid Flashing Beacons (RFBs) are used in conjunction with raised crosswalks to enhance pedestrian visibility and crossing safety on higher-volume or higher-speed roadways. These devices provide clear visual cues to drivers and help manage yielding behavior at both controlled and uncontrolled crossings. Seattle applies these treatments strategically at key pedestrian locations, particularly where pedestrian demand is high or where speed management alone is insufficient to address safety concerns.

Volume Management and Network Effects

While some traffic calming programs aim to reduce vehicle volumes, Seattle's arterial traffic calming program primarily focuses on speed reduction rather than capacity reduction. Concerns about cut-through traffic diversion are common, but Seattle has observed little evidence of significant rerouting, in part due to limited alternative routes within the city's street network. Potential changes, such as reduced trip-making or shifts to other travel modes, may occur; however, these outcomes are not directly measured within the arterial traffic calming program.

Neighborhood Traffic Calming Programs

At the neighborhood level, Seattle's traffic calming program is focused on local, non-arterial residential streets and is grounded in a proactive Vision Zero framework. Over several decades, Seattle has extensively implemented neighborhood traffic circles and other residential traffic calming measures, resulting in consistently low crash rates on many local streets (Seattle Department of Transportation, n.d.). Because crash frequency is now less effective as a distinguishing factor in these areas, the city has shifted its

prioritization approach away from heavily weighting crash data and toward emphasizing vehicle speeds and traffic volumes. This change allows Seattle to identify locations where speeding and cut-through traffic create safety risks, even when reported crashes are relatively rare. Seattle's neighborhood traffic calming prioritization uses a



multi-factor scoring system that incorporates speed and volume data, injury and property-damage crash information, and contextual analysis of crash patterns, including roadway departure and parked-vehicle crashes that may indicate speeding issues. Infrastructure conditions are also considered, particularly on streets lacking sidewalks or curbs, where vulnerable users face greater risk. In addition, demographic data are included to ensure that communities experiencing disproportionate transportation-related impacts—such as low-income neighborhoods and communities of color—receive appropriate attention. This equity-focused lens supports Seattle's goal of distributing safety investments more fairly across the city.

Common neighborhood-level traffic calming treatments include traffic circles at residential intersections, speed tables, and targeted street improvements designed to slow vehicles and improve pedestrian comfort. These measures are selected based on local conditions rather than a one-size-fits-all approach. By

combining data-driven prioritization with a broad toolbox of proven residential treatments, Seattle's neighborhood traffic calming program has evolved from a reactive, crash-based system into a preventive strategy that emphasizes speed management, equity, and long-term safety outcomes.

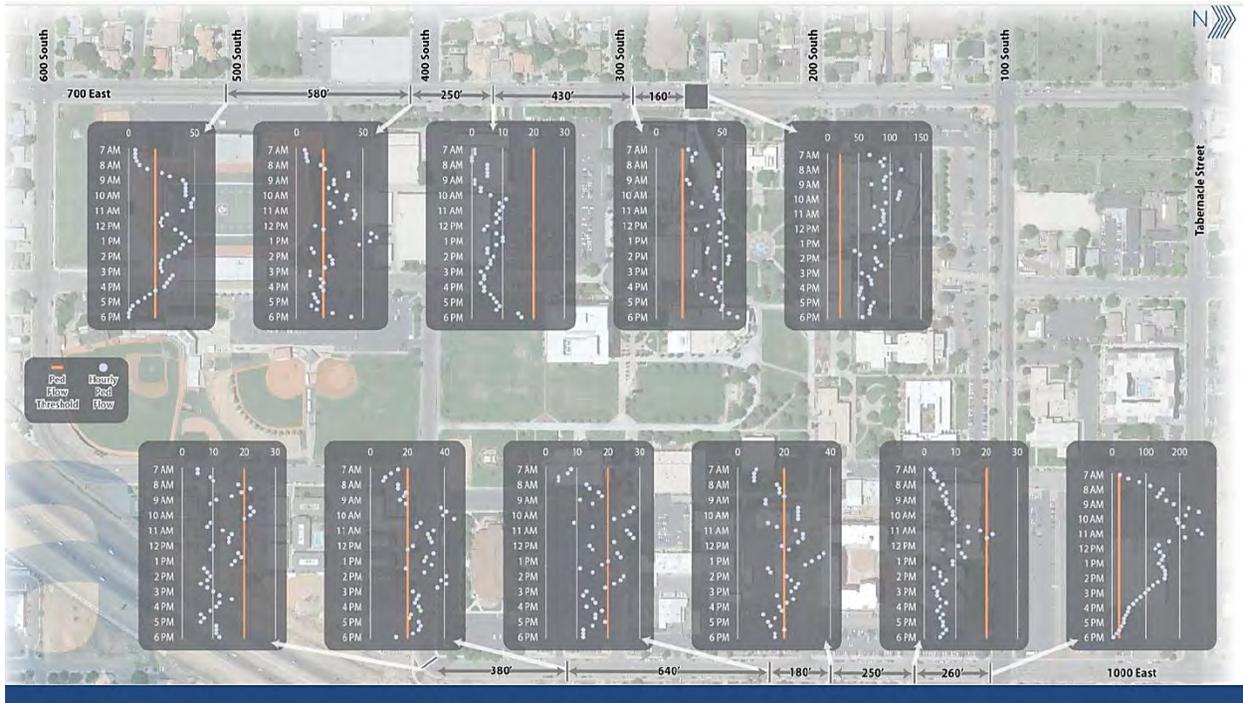
Conclusion: Seattle's Traffic Calming Outlook and Quality of Life Impacts

Seattle's traffic calming program demonstrates a mature, evidence-based approach to achieving Vision Zero by pairing low-cost speed management strategies with targeted engineering investments across both arterial and neighborhood streets. The city's early emphasis on reducing speed limits produced immediate, measurable safety benefits, including a 22% reduction in total crashes, an 18% reduction in injury crashes, and a 54% decline in high-end speeding, all without additional enforcement or roadway redesign. Building on these results, Seattle has established a data-driven prioritization framework that integrates vehicle speeds, crash severity, and equity considerations to inform investment decisions. Seattle's long-standing use of traffic circles, speed tables, and localized street design changes has helped sustain consistently low crash rates, shifting the program's focus from reactive crash response to proactive speed and volume management. By incorporating contextual factors such as sidewalk presence, cut-through traffic, and demographic vulnerability, the city ensures that traffic calming investments not only improve safety but also advance equity and neighborhood livability. Seattle's experience demonstrates that traffic calming, when applied systematically and equitably, is not merely a set of treatments but a foundational strategy for improving quality of life and reclaiming streets as shared public spaces.

6.4 Traffic Calming Practices and Observed Impacts: In-State (Utah) Cities

St. George, UT

St. George, UT, is actively addressing traffic safety concerns resulting from rapid growth, focusing on scaling up safety measures, including the addition of signals, trails, and bike lanes. Recent concerns have highlighted pedestrian safety after fatal incidents, prompting the city to make streets safer for all users through infrastructure and planning. The city of St. George has a traffic calming program and has implemented several traffic calming interventions. Between 2020 and 2025, they implemented traffic calming measures, including lane repurposing and resurfacing, on 700 E. Using 1000 E (*a similar road network with comparable characteristics*) as a control for a before-and-after study, they assessed the impact of traffic calming on vehicle speed and pedestrian flows. The study found that the traffic-calmed street (700 E) had an average speed 3 mph lower and higher hourly pedestrian flows compared to the control street (1000 E). Moreover, St. George has adopted several pedestrian safety strategies, including pedestrian hybrid beacons, activated signals, pedestrian median refuges, overhead school speed limit assemblies, and rapid rectangular flashing beacons.



700 E (The treatment street for traffic calming) 1000 E (The control street with no intervention)

Pedestrian Safety Strategies



- Pedestrian Hybrid Beacon
- Pedestrian Activated Signal
- Pedestrian Median Refuges
- Overhead School Speed Limit Assembly
- Rapid Rectangular Flashing Beacon



Pedestrian safety strategies used in other locations in St. George, UT



Left – (2016 before traffic calming on 700 E) Right – (2022 after traffic calming on 700 E)

Conclusion: St. George’s Traffic Calming Outlook and Quality of Life Impacts

St. George’s experience illustrates how traffic calming can be an effective and adaptive response to rapid growth and rising safety risks in emerging metropolitan areas. As development pressures increased and pedestrian safety concerns became more visible, particularly following fatal incidents, the city took decisive action to rebalance its streets through lane repurposing, resurfacing, and targeted pedestrian safety upgrades. A before-and-after evaluation of traffic calming revealed speed reductions, accompanied by increased pedestrian activity, indicating improved comfort and perceived safety for pedestrians. These outcomes demonstrate that even modest speed reductions can meaningfully change how streets function and who feels safe using them. St. George’s broader toolkit reflects a citywide commitment to safer, more inclusive mobility. Collectively, these interventions support slower speeds, clearer driver expectations, and safer crossings, particularly for vulnerable road users.

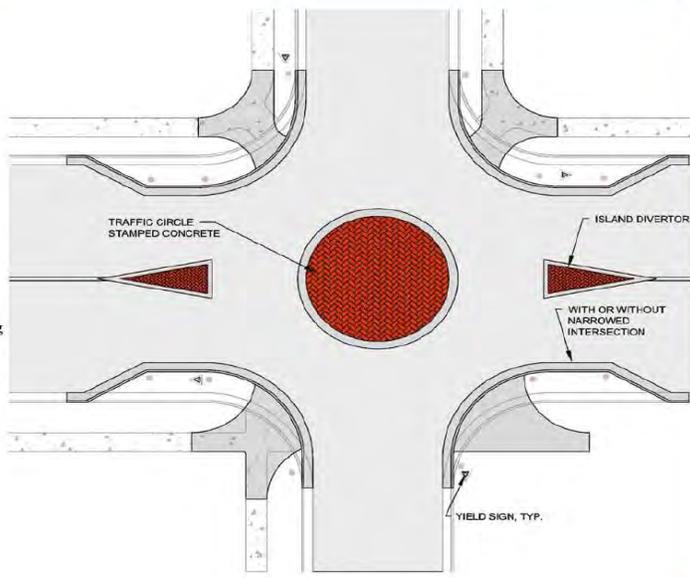
Cottonwood Heights, UT

Cottonwood Heights formally adopted its Traffic Calming Procedure in 2013 in direct response to growing community concerns about speeding, unsafe driving behaviors, and declining neighborhood livability on residential streets. Grounded in the principle that “our streets are not just for cars,” the city acknowledges that many local roadways serve as shared public spaces, particularly in neighborhoods lacking continuous sidewalks—where walking, running, bicycling, and everyday social activities occur alongside vehicle travel. Traffic calming in Cottonwood Heights is therefore framed not only as a safety strategy, but as a quality-of-life investment aimed at reducing excessive speeds, traffic noise, and cut-through traffic while restoring a sense of comfort and safety for all users. The city’s program relies on a resident-driven application process supported by engineering assessments and interagency collaboration, including partnerships with the Greater Salt Lake Municipal Services District (MSD). Commonly deployed measures include driver feedback signs, curb extensions, painted crosswalks, and, where appropriate, speed humps,

often concentrated along corridors such as Wasatch Boulevard and within Safe Routes to School areas. To ensure community buy-in and equitable prioritization, the city requires a high level of neighborhood support (*a 75% approval threshold*) before initiating traffic studies or design work. While formal before-and-after evaluations have not yet been conducted, Cottonwood Heights continues to advance traffic calming through targeted infrastructure investments, including sidewalks and pedestrian and cyclist signals, reinforcing its commitment to safer, more livable neighborhood streets.



TRAFFIC CIRCLE

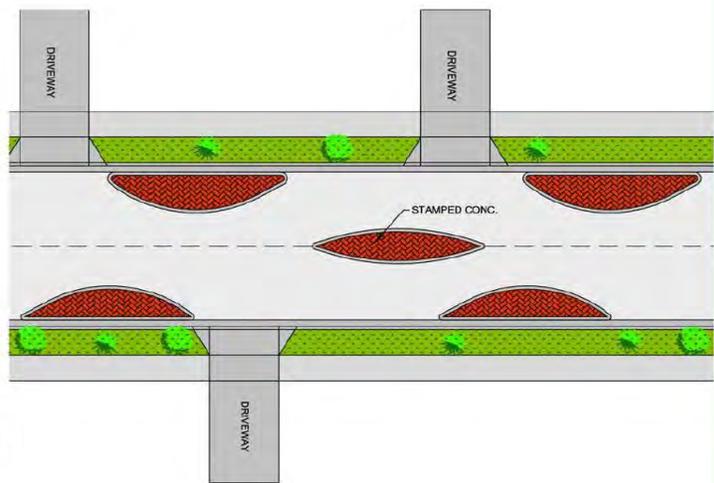
A *traffic circle* is a raised island in the middle of an intersection that forces travelers to decrease speed to safely maneuver in a counter-clockwise position. Yield signs are incorporated with the traffic circles to eliminate unnecessary acceleration and deceleration of vehicles. Allowing constant flow has environmental and noise benefits for the surrounding neighborhood. The combination of a neckdown on all four corners of the intersection will increase the effectiveness of the traffic circle as a traffic calming measure. Traffic circles have been shown to be very effective once the community becomes familiar with using this traffic calming measure. Bike lanes must be discontinued 35-45 feet prior to a traffic circle.

Estimated Cost: \$25,000 - \$30,000 (not including neckdown)





CHICANE

A *chicane* takes a relatively straight roadway section and creates an S-shaped path. The increased meandering of the roadway decreases the speed at which travelers can comfortably negotiate the roadway. This traffic calming measure may also help shorten pedestrian crossing distances, allow unabated access of emergency vehicles and protect parking bays. However, they tend to have higher maintenance costs due to landscaping, may be a factor in head on collisions and can potentially contribute to drainage problems.

Estimated Cost: \$13,500 per pair



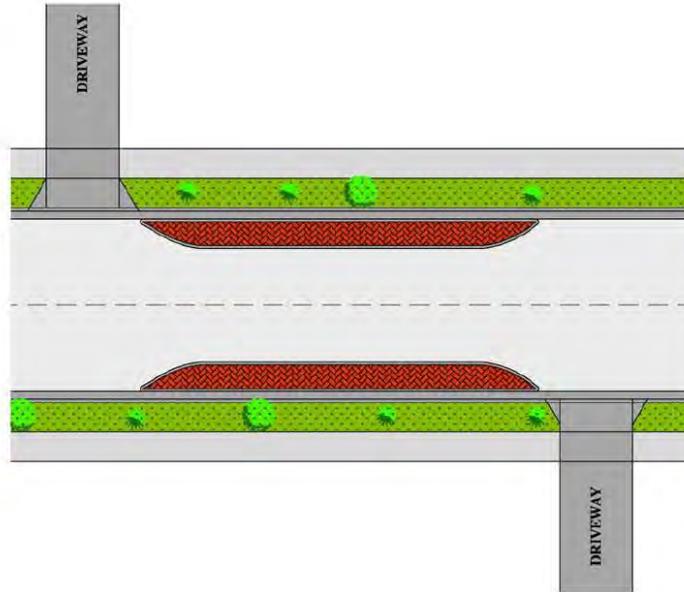


NECK DOWN(CHOKER)



A *neckdown (choker)* is a traffic calming measure intended to decrease traffic speed while still allowing straight through travel. This is achieved by narrowing the roadway, causing the driver to reduce speed to achieve safe passage. A main application of this measure is to improve pedestrian safety by decreasing the street crossing distance. As neckdowns are typically applied at intersections, they tend to reduce the turning speed of vehicles at these locations. One disadvantage is that they reduce available parking on the roadway.

Estimated Cost: \$7,000 - \$10,000 per pair

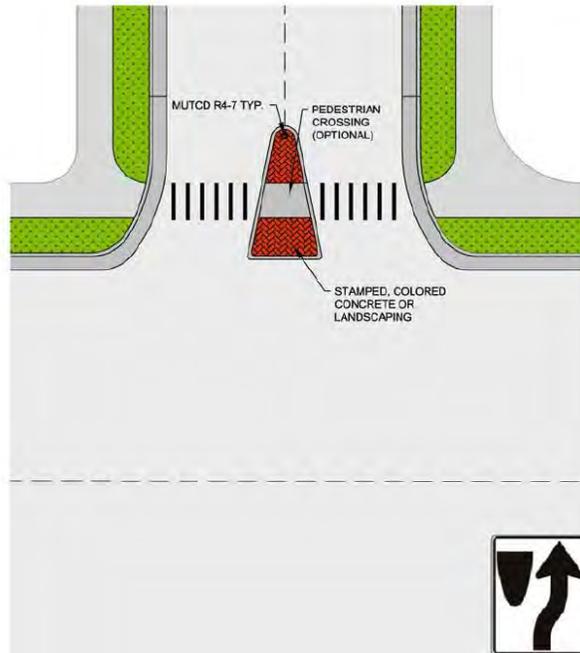


ISLAND DIVERTER



An *island diverter* is a traffic calming measure that is placed at the entrance of a roadway to confine travelers to the correct lane of travel while entering a roadway. Island diverters will decrease speed of traffic entering a roadway and lessen the risk of conflict between opposing traffic. Island diverters can reduce effectiveness of snow plows and improper location can increase emergency response time.

Estimated Cost: \$4,500 Each



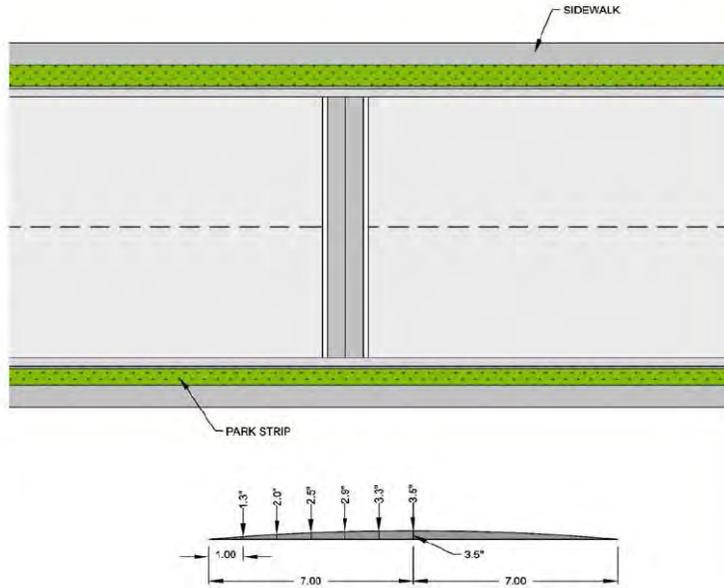


SPEED BUMP



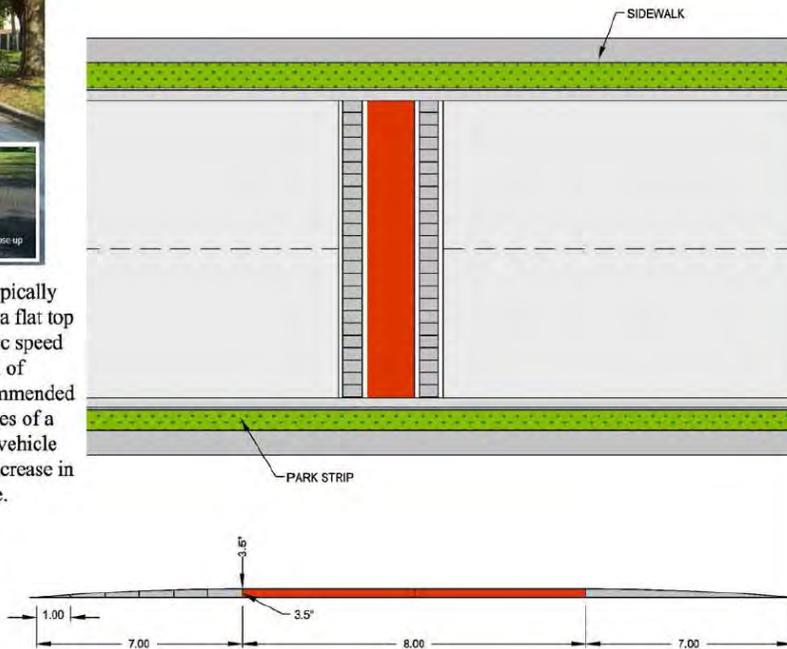
Speed bumps are vertical measures that are generally used to reduce vehicular speed and cut-through traffic. While speed tables are flat in shape, speed bumps are raised sections that are usually parabolic in shape. Speed bumps require both advance warning signs and speed bump signs. Speed bumps effectively reduce the 85th% speed 200 feet near the speed bump. They increase emergency vehicle response time, create conflicts with snow removal, increase noise pollution and can cause a rougher ride than speed tables.

Estimated Cost: \$4,500 each



A *speed table* is a raised section of roadway typically 3.5-inches in height and 22 feet in length with a flat top 8 feet in length. They are used to control traffic speed while attempting to maintain an adequate level of comfort for the traveler. Speed tables are recommended to be constructed of concrete. The disadvantages of a speed table include an increase in emergency vehicle response time, conflicts with snow removal, increase in noise pollution and they can cause a rough ride.

Estimated Cost: \$10,000





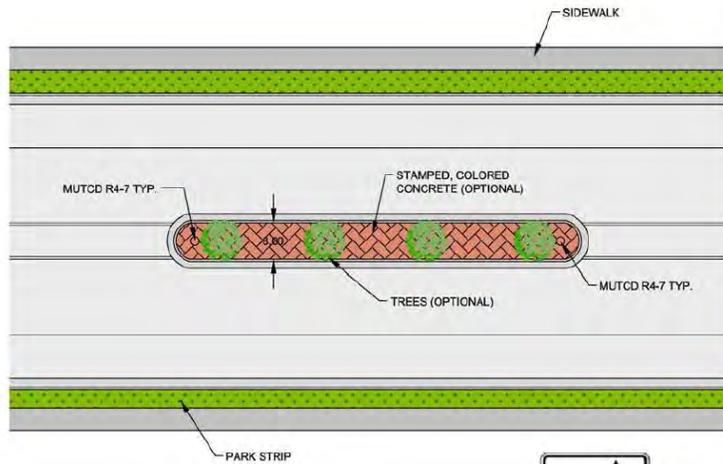
CENTER ISLAND



A *center island* is a traffic calming measure that uses the same principles as a curb wall but is designed for wider roadways. The center island is recommended to be approximately 8 feet wide and can be constructed of colored concrete or landscaped. Concrete ensures low maintenance. Landscaping and trees provide additional traffic calming, but have higher maintenance costs.

Estimated Cost: \$175 per LF

**Cost is for an 8' width. For other widths adjust cost +\$20 per ft.*



MUTCD R4-7

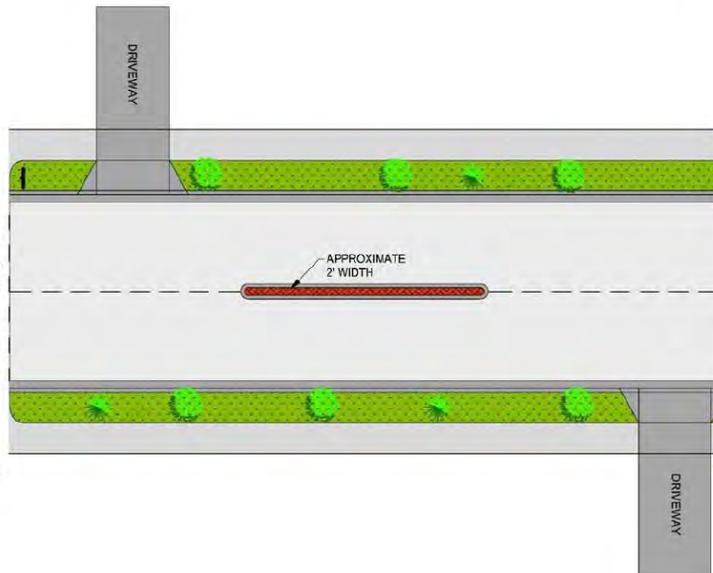


CURB WALL



A *curb wall* is a traffic calming measure on narrow streets to force traffic to maintain the intended path of travel thus reducing conflicts between opposing traffic flow. Proper placement of curb walls inhibits turning vehicles and narrows the real and apparent width of the street. Typically placement of curb walls will be done so as not to interfere with the access to or from any private driveways. All curb walls are recommended to be about two feet wide and to be constructed of concrete. Curb walls should be traversable, allowing emergency vehicles the opportunity to bypass stopped traffic.

Estimated Cost: \$50 per LF



Conclusion: Cottonwood Heights' Traffic Calming Outlook and Quality of Life Impacts

Cottonwood Heights' traffic calming program is rooted in a clear philosophy: streets are shared public spaces, not solely conduits for vehicle movement. Adopted in response to growing concerns about speeding and unsafe driving on residential streets, the city's Traffic Calming Procedure prioritizes neighborhood livability, safety, and resident involvement. By relying on resident-driven applications, rigorous engineering assessments, and partnerships with regional agencies, Cottonwood Heights ensures that traffic calming measures are context-sensitive and locally supported. Tools such as driver feedback signs, curb extensions, painted crosswalks, and targeted corridor improvements, particularly near schools and pedestrian corridors, reflect a proactive approach to managing speed and enhancing safety where people live and travel daily. Although formal before-and-after evaluations are not yet available, the program's structure itself highlights the city's emphasis on accountability, equity, and community trust. Cottonwood Heights' approach demonstrates that traffic calming can strengthen neighborhood cohesion, reduce conflicts between users, and improve everyday quality of life, affirming that safer, calmer streets are integral to healthy, connected, and resilient communities.

Millcreek, UT

Millcreek City has established a formal traffic calming program and policy, signaling institutional recognition of the role street design plays in neighborhood safety and livability. The city has implemented a range of physical traffic calming interventions (*including speed cushions, roundabouts, and median islands*) across its street network to address speeding and improve operational safety. These treatments reflect a growing emphasis on using design-based solutions to influence driver behavior rather than relying solely on enforcement. However, while Millcreek has made tangible investments in traffic calming infrastructure, the Public Works Division noted that the city has not yet conducted systematic before-and-after evaluations to quantify project impacts. As a result, although the presence of these interventions suggests progress toward safer streets, opportunities remain to strengthen the program through data-driven assessment, performance tracking, and outcome-based evaluation to better document safety benefits and guide future investments.

Ogden, UT

Ogden City does not currently operate a formal, standalone traffic calming program, yet it has implemented several traffic calming-related interventions as part of broader transportation and roadway improvement efforts. These include roundabouts and lane reduction projects designed to improve safety, manage speeds, and enhance intersection operations. Such treatments indicate an awareness of traffic calming principles, even in the absence of a codified program framework. According to the Traffic Engineering Department, Ogden has not conducted before-and-after studies to evaluate the safety or operational impacts of these interventions. Without formal evaluation or a dedicated policy structure, traffic calming in Ogden remains project-specific rather than programmatic. Although the Traffic

Engineering Department remains optimistic about opportunities for the city to institutionalize traffic calming practices, develop evaluation protocols, and more systematically integrate safety and livability objectives into future street design decisions.

Provo, UT

Although Provo City does not maintain a formal traffic calming program, it has implemented various traffic calming projects throughout its transportation network. The Public Works Department indicated that several of these interventions have been accompanied by before-and-after studies, demonstrating an interest in evaluating effectiveness even in the absence of a centralized program. Common treatments deployed in Provo include roundabouts, lane reductions, Rectangular Rapid Flashing Beacons (RRFBs), and traffic signal enhancements. These interventions are typically applied in response to specific safety concerns, particularly at intersections and pedestrian crossing locations. Provo's experience suggests a pragmatic, project-driven approach to traffic calming, one that leverages proven tools to address localized issues. The Public Works Department looks to formalize these efforts into a comprehensive traffic calming program.

Logan, UT

Logan City does not currently operate a formal traffic calming program, but has implemented several targeted traffic calming projects to address pedestrian safety and speed management concerns. The Engineering Department reported that the city primarily relies on Rectangular Rapid Flashing Beacons (RRFBs) and curb extensions as its primary traffic calming tools. These treatments have become increasingly central to Logan's safety strategy, particularly in locations with high pedestrian activity. Notably, the city has recently directed a significant portion of its Community Development Block Grant (CDBG) funding toward RRFB installations, underscoring a strong policy focus on improving pedestrian visibility and safety at crossings. Logan is also in the process of developing internal standards to guide when and where these treatments should be applied. This transitional stage positions the city to move from ad hoc implementation toward a more structured, criteria-based traffic calming framework that can support safer and more predictable street environments over time.

References

- Batomen, B., Cloutier, M., Carabali, M., Hagel, B., Howard, A., Rothman, L., Perreault, S., Brown, P., Di Ruggiero, E., Bondy, S. (2024). Traffic-Calming Measures and Road Traffic Collisions and Injuries: A Spatiotemporal Analysis, *American Journal of Epidemiology*, 193(5), 707–717.
- Brown, V., Moodie, M., & Carter, R. (2017). Evidence for associations between traffic calming and safety and active transport or obesity: A scoping review. *Journal of Transport & Health*, 7, Pages 23-37.
- Bunn, F., Collier, T., Frost, C., Ker, K., & Wentz, R. (2003). Traffic calming for the prevention of road traffic injuries: systematic review and meta-analysis. *Injury Prevention*, 9:200-204.
- Elvik, R. (2001). Area-wide urban traffic calming schemes: a meta-analysis of safety effects. *Accident Analysis & Prevention*, 33(3), Pages 327-336.
- Ewing, R., Brown, S., & Hoty, A. (2005). Traffic Calming Practice Revisited. *ITE Journal*.
- Ewing, R. (1999). *Traffic calming: State of the practice* (ITE Traffic Engineering Council Report). Institute of Transportation Engineers.
- Ewing, R. H., & Brown, S. J. (2009). *U.S. Traffic Calming Manual*. American Planning Association and American Society of Civil Engineers,
- Giorgio, N. (2025). Intersection Traffic Calming Treatments: A Comparative Analysis. *UCLA: Institute of Transportation Studies*. Retrieved from <https://escholarship.org/uc/item/0895426k>
- Gulden, F., & Ewing, R. (2009). New Traffic Calming Device of Choice. *ITE Journal*.
- Leonardi, S., & Distefano, N. (2024). Traffic-Calming Measures as an Instrument for Revitalizing the Urban Environment. *Sustainability*, 16(4), 1407
- Litman, T. (1999). *Traffic Calming Benefits, Costs and Equity Impacts*. Victoria Transport Policy Institute.
- Lopoo, L. M., Cardon, E., Souders, S., Kroner Dale, M., & Ngo, U. (2025). An evaluation of a Vision Zero traffic-calming intervention, an urban transportation safety policy. *Journal of Urban Affairs*, 47(8), 3048–3069. <https://doi.org/10.1080/07352166.2024.2314040>
- Magkafas, F., Fountas, G., Anastasopoulos, P., & Basbas, S. (2025). Beyond Speed Reduction: A Systematic Literature Review of Traffic-Calming Effects on Public Health, Travel Behaviour, and Urban Liveability. *Infrastructures*, 10(6), 147; <https://doi.org/10.3390/infrastructures10060147>
- Polloni, S. (2019). Traffic calming and neighborhood livability: Evidence from housing prices in Portland. *Regional Science and Urban Economics*, 74, 18-37
- Salt Lake City Transportation. (2023). Vision Zero SLC. <https://www.slc.gov/transportation/safety/salt-lake-city-vision-zero/>
- Seattle Department of Transportation. (n.d.). Speed humps.
- Seattle Department of Transportation. (2020). SPEED LIMIT CASE STUDIES. <http://data-seattlecitygis>.
- Seattle Department of Transportation. (2024). VISION ZERO ACTION PLAN.
- Zalewski, A., & Kempa, J. (2019). Traffic Calming as a Comprehensive Solution Improving Traffic Road Safety. *IOP Conference Series: Materials Science and Engineering*, 471 062035.

Zein, S. R., Geddes, E., Hemsing, S., & Johnson, M. (1997). Safety Benefits of Traffic Calming. *Transportation Research Record: Journal of the Transportation Research Board*, 1578(1), 3-10. <https://doi.org/10.3141/1578-01> (Original work published 1997).

*Additional references*¹¹

-
- ¹¹ 1. City of Gainesville, *Vision Zero Action Plan 2024-2028*. 2024.
 2. Gwinnett County, *Gwinnett County 2045 Unified Plan*. 2024.
 3. Gwinnett County Government. *Speed Hump Program*. 2025; Available from: <https://www.gwinnettcounty.com/departments/transportation/operationsmaintenanceandplanning/speedhumpprogram>.
 4. Gwinnett County Department of Transportation, *Speed Hump Program Manual*. 2021.
 5. Montgomery County Department of Transportation, *Speed Hump Fact Sheet* 2025.
 6. Montgomery County, *Vision Zero FY2024 Annual Report*. 2024.
 7. Phoenix, C.o., *Road Safety Action Plan*. 2022.
 8. City of Phoenix. *Traffic Calming Options*. 2025; Available from: <https://www.phoenix.gov/administration/departments/streets/requests-services/street-improvement/traffic-calming-options.html>.
 9. City of Phoenix. *Speed Hump Program*. 2025; Available from: <https://www.phoenix.gov/administration/departments/streets/requests-services/street-improvement/speed-hump-program.html>.
 10. City of Phoenix. *Speed Cushion Program*. 2025; Available from: <https://www.phoenix.gov/administration/departments/streets/requests-services/street-improvement/speed-cushion-program.html#accordion-f491f9d0fc-item-65b324fe2e>.
 11. The City of Portland, *Vision Zero Action Plan*. 2016.
 12. Arlington County, *Vision Zero Before After Studies Study Summary*. 2025.
 13. Arlington County. *Roadway Reconfigurations*. 2025; Available from: <https://www.arlingtonva.us/Government/Programs/Transportation/Vision-Zero/Action/Tools-and-Guidelines/Tools/Roadway-Reconfigurations>.
 14. Arlington County, *Safety Pilot Project*. 2025.
 15. Chicago Department of Transportation, *Chicago Traffic Crashes*. 2025.
 16. City of Boston. *Neighborhood Slow Streets*. 2025; Available from: <https://www.boston.gov/departments/transportation/neighborhood-slow-streets>.
 17. The City of Boston, *Impact of Separated Bike Lanes on Traffic Safety*. 2025.
 18. City of Boston, *Better Bike Lanes: Year One Quantitative Evaluation*

APPENDICES

Appendix 1

Summary Table for Cities Contacted for Traffic Calming Data

City	TC Program	Treatments	Before & After Studies	Impact(s)
Bellevue, WA	Yes	Speed cushions; Pedestrian refuge islands; Roundabouts; Radar Signs	Yes	Reduced speeds (<i>up to 8.4 mph</i>) Reduced high-end speeders (-88%) Reduced collisions (-63%)
Charlotte, NC	Yes	Lane reduction; Road diets; Speed Humps & Cushions; Curb Extensions; Road Diets; Median Refuge Islands; Roundabouts	Yes	Reduced speeds (-20%) Reduced collisions (-18%) Reduced crash injuries (-53%) Reduced high-end speeders (-83%) Increased bicycle use (+40%)
Eugene, OR	Yes	Speed Humps; Speed Cushions; Roundabout	Yes	Reduced speeds (-15%) Reduced traffic volume (-22% ADT)
Colorado Springs, CO	Yes	Roundabouts; Lane reduction; Traffic signaling; Roadway Diet; Traffic Control Signage; Chicanes; Traffic Circle/Roundabout; Roadway Dip(limited); Geometric Changes to intersections	Yes	Reduced collisions (-62%) Reduced crash injuries (-75%) Reduced property damage by crash (-50%)
Austin, TX	Yes	Lane conversions; Speed Humps; Traffic Circle/ Roundabout; Bulb-outs	Yes	Reduced serious injuries & crashes (86%) Reduced cyclist-involved fatal crashes (24%) Reduced high-end speeders (-78%) \$103M annual reduction in crash costs
Portland, OR	Yes	Lane reconfiguration, enhanced crossings with pedestrian islands, speed bumps, and slow streets infrastructure	Yes	Reduced crash injuries (- 3.8% to 60%) Reduced 85 th percentile speeds (-5.8%) Reduced speeders (-7 to 10%) Reduced top-end speeders (- 50 to 100%) Reduced traffic volume (- 8.9 AADT%)
Ft Lauderdale, FL	Yes	Roundabout; Bulb-outs; Chicanes; Curb extension; Median islands	Yes	Reduced 85 th percentile speeds (-13%) Reduced average speeds (-19%)
Gwinnett County, GA	Yes	Speed humps Center concrete islands Raised crosswalks, chicanes, and rubber mini roundabouts	Yes	Reduced 85 th percentile speeds (-62%)
Howard County, MD	Yes	Speed Humps; Speed Cushions; Roundabout	Yes	Reduced speeds (-75%)
Montgomery County, MD	Yes	Speed humps, hardened lane, road diet, pedestrian median refuge, pedestrian hybrid beacons, and raised median	Yes	Reduced speeds (-70% to 80%) Reduced crash injuries or zero collisions (-50% to 80%)

Boulder, CO	Yes	Chicanes; Curb extension; hardened centerline; Median islands; Pinch points; Traffic circle	Yes	Reduced speeds (-60%) Reduced high-end speeders (-94%)
Arlington County, VA	Yes	Tactical Speed Humps, Speed Pavement Markings, Roadway Reconfigurations, Curb modifications, Hardened centerlines, Temporary Roundabout	Yes	Reduced 85 th percentile speeds (-6% to 30%) Reduced speeders (-40% to 98%)
Chicago, IL	Yes	Curb Bump-outs, speed humps, raised intersections, enhanced crossings, refuge islands,	Yes	Reduced crashes involving pedestrians (-41%) Reduced speeders (-60%)
Boise, ID	Yes	Speed cushions; Roundabouts; Lane reduction; Bulb-outs; Median islands; Chicanes	Yes	**
Gainesville, FL	Yes	Lane repurposing and resurfacing; Curb ramp retrofit; and high-visibility pedestrian crossing	No	
Boston, MA	Yes	Speed humps, curb extensions, and raised crosswalks	Yes	**
Phoenix, AZ	Yes	Speed humps and speed cushions	No	
St. George, UT	Yes	Lane repurposing; Lane resurfacing; Rapid Flashing Beacons; Pedestrian Median refuges	Yes	Reduced average speeds (-8.5%) Increased hourly pedestrian volume
Cottonwood Heights, UT	Yes	Speed cushions; Roundabouts; Lane reduction; Bulb-outs; Median islands; Chicanes	No	
Millcreek, UT	Yes	Speed cushions; Roundabouts; Median Island	No	N/A
Ogen, UT	No	Roundabouts; Lane Reduction	No	N/A
Provo, UT	No	Rapid Flashing Beacons; Roundabouts; Lane Reduction; Traffic signaling	Yes	**
Logan, UT	No	Bulb-outs; Rapid Flashing Beacons	No	N/A
Sandy, UT	Yes	**	Yes	**

*** Data on the variable is still pending from the jurisdiction*

Park City has a traffic calming program, but has requested to be excluded from this report.

The following cities were contacted, but no response has been received from them to date (Berkeley, Dayton, Cedar City and West Valley)