A Brief Overview of Traffic Calming

Connection to City Goals, Objectives and Strategies

Traffic Calming relates to the following ***City Mobility Plan*** Goals, Objectives and Strategies:

- Goal 1, Objective 1A: 'Safety is the number one priority transportation infrastructure design'
- Goal 1, Strategy 1.2: 'Evaluate and design for safe speeds.'
- Goal 7, Strategy 7.9: "Implement traffic calming measures that discourage speeding and cut-through traffic on residential streets."

Introduction

The Mobility Committee has requested information on traffic calming. Since traffic calming is a large topic with many facets, staff recommends starting with a brief overview and progressively addressing the finer points with future presentations focused on the Mobility Committee queries as needed.

This overview will:

- Broadly define traffic calming
- Explain why traffic calming works
- Cite its key advantages
- Describe its best practices
- Provide links to select traffic calming resources, and
- Cite examples of how it has been shown to reduce crashes.

Traffic Calming Defined

Traffic calming uses street design to communicate proper driving behavior to road users. Technically, traffic calming is for local streets, and speed management is for collector streets and arterials. For this memo, traffic-calming and speed management will be addressed as simply traffic-calming.

Why Traffic Calming Works

Driving involves a high degree of automation, and speed seems to be one of the most automated aspects. The speeds we are comfortable with come from the environmental cues in the road designs we are used to. This is true whether the road designer intended it or not. The more a road looks like a freeway, the more we tend to drive it like a freeway regardless of its speed limit.

Traffic calming uses environmental cues to continually communicate appropriate behavior to the driver. Traffic calming designs can be conscious or unconscious; they can gently nudge towards awareness of proper behavior or jolt the driver to slow down as needed. Traffic calming can help implement context-sensitive solutions by minimizing vehicle travel's negative effects and improving street users' safety and mobility. A major component of context-sensitive solutions is a transportation facility that fits its settings.

Key Advantages

Traffic calming works. Unlike law enforcement and education, which are primarily intervention-driven, traffic calming is effective year-round. It doesn't require a continuing investment of expensive manpower, so its costs are relatively low once implemented. Many traffic calming measures can be built

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quickly and inexpensively as temporary pilot projects or become permanent. For example, San Antonio, Texas, relies almost exclusively upon 'Quick Build' projects to achieve its Vision Zero Traffic Calming goals.

Best Practices

- Traffic calming works best when complementary traffic calming measures are used together.
- Traffic calming can change driving culture when applied throughout the community rather than as a spot treatment. Implementing traffic calming throughout a community within a short period can reinforce this effect.
- Traffic calming at community entryways signals to drivers that they are entering areas where different norms are expected. This can be especially important near freeway ramps, as drivers are more attuned to freeway speeds.

Resources & References

- The U.S. Federal Highway Administration has a Traffic Calming Primer online [Hyper Link], covering basic traffic calming measures. Among other things, the primer addresses the applicability and acceptability of individual measures, the effects of traffic calming measures on Motor Vehicle Speed and Volume, the impact on non-motorized users and emergency vehicles, and costs.

- The FHWA has published Proven Safety Countermeasures [Hyper Link] summarizing the safety benefits, application and considerations of 23 roadway treatments aimed at reducing crashes on a range of roadways. Some, like in the Roadway Departure grouping, are less applicable to Denton Streets.

- The FHWA also runs the Crash Modification Factor (CMF) Clearinghouse [Hyper Link]. The Clearinghouse gathers, judges, and publishes studies measuring the impact of various roadway changes on crashes. The appendix of this memo lists and summarizes the findings of some of the many CMF Clearinghouse-published studies for traffic calming techniques.

- As alluded to earlier, the potential for "Quick Build" traffic calming projects is a distinct advantage for traffic calming. The Association of Bay Area Governments has an online library of quick-build resources [Hyper Link].

Staff is happy to expand on any subtopics listed above as a blurb or presentation.

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SELECTED TRAFFIC CALMING TREATMENT EXAMPLES
[PUBLISHED IN THE FHWA CMF[1] CLEARINGHOUSE]

For Midblock Locations on Collectors and Arterials

1. Add street crossing markings to reduce pedestrian involved crashes of all severities by 18%. [CMF ID 11181]
2. Create a 4-way stop at the intersection of a **Minor Arterial** and **local street** to reduce all injury crashes by 14%. [CMF ID 10534]
3. Create a 4-way stop at the intersection of a **Collector** and **local street** to reduce all injury crashes by 44%. [CMF ID 10528]
4. Create a 4-way stop at the intersection of a **Minor Arterial** and **Collector** to reduce all injury crashes by 68%. [CMF ID 10530]
5. Narrow the width of lanes from 12' to 9' on Minor Arterials and Collectors to reduce all injury crashes by 43%. [CMF ID 8163]
6. Adopt National Association of City Traffic Officials (NACTO) right turn radius standards to reduce pedestrian injuries by 23%. [CMF ID 11216]
7. Convert a 4-lane undivided road to 2-lanes plus a center turning lane reduces injury crashes of all types by 44 percent at unsignalized intersections, by 59 percent at signalized intersections, and by 74 percent between intersections. [CMF IDs 11134, 11129, 11136]
8. Add a raised center median to a Minor Arterial reduce all injury crashes by 29% and all pedestrian involved crashes by 46%. [CMF IDs 9014, 9016, & 175]
9. Install a pedestrian hybrid beacon with advanced yield or stop markings and signs to reduce all pedestrian involved crashes by 57%. [CMF ID 9021]

For Midblock locations on Local streets

10. Drop posted speed from 30 to 25 mph in residential areas to reduce injury crashes by 50%. [CMF ID 8077]
11. Create a 4-way stop at the intersection of two local streets to reduce all injury crashes by 60%. [CMF ID 10532]
12. Adopt National Association of City Traffic Officials (NACTO) corner right turn radius standards to reduce pedestrian injuries at that corner by 15%. [CMF ID 11216]
13. Install transverse rumble strips to reduce all injury crashes by 36%. [CMF ID 139]
14. Install "speed humps" to reduce all injury crashes by 50%. [CMF ID 132]
15. Add a raised cross-walk to a mid-block crossing to reduce all pedestrian injury crashes by 45% and all injury crashes by 30-36%. [CMF ID 135, 136, 137]

For Signalized Intersections on Collectors and Arterials

16. Install a pedestrian hybrid beacon to reduce all pedestrian involved crashes by 37% in an urban or suburban area. [CMF ID 10599]
17. Add a raised center median to reduce all pedestrian involved crashes by 46% in an urban or suburban area. [CMF ID 175]

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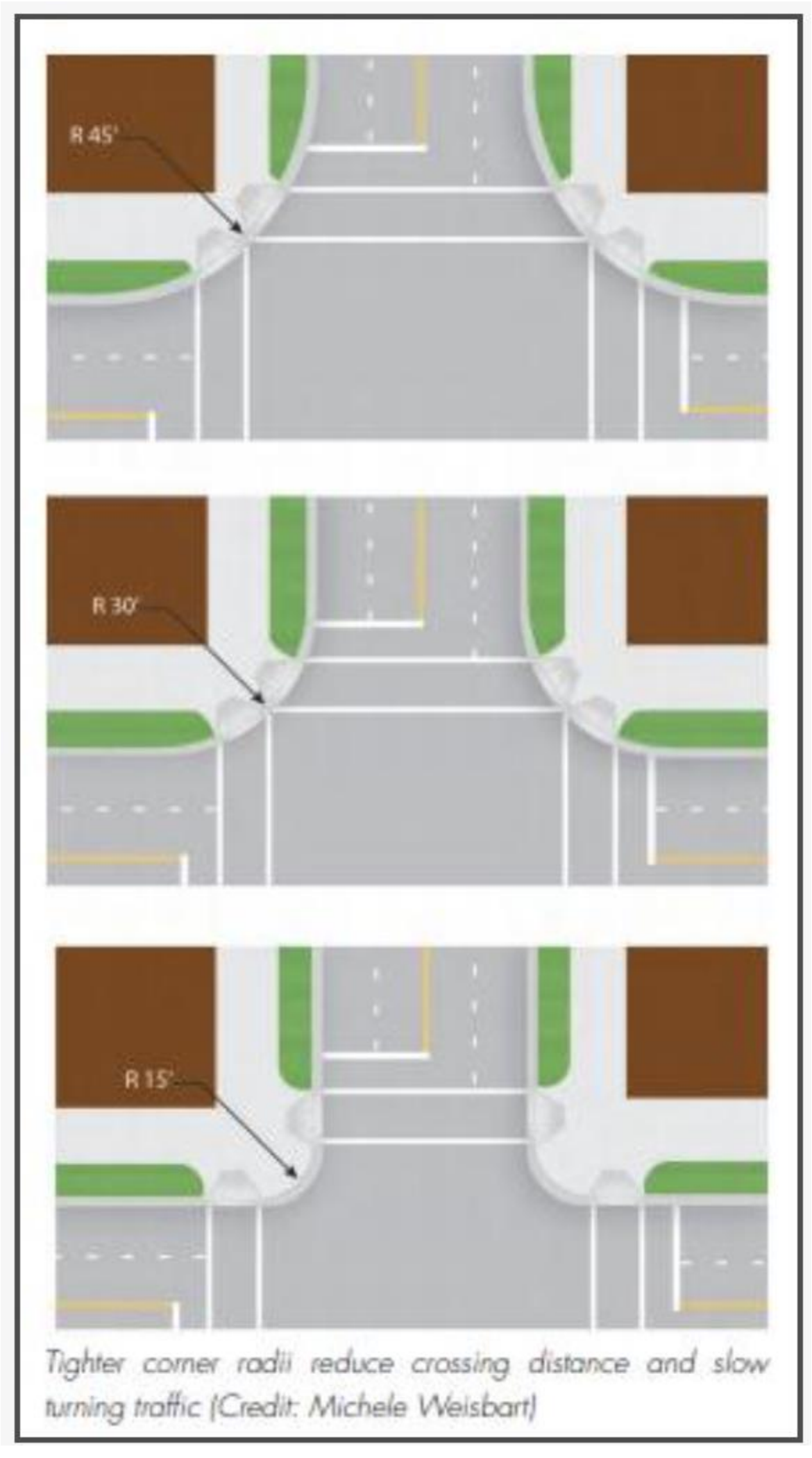
COMMON TRAFFIC CALMING PRACTICES

#	NAME
SELECTED TRAFFIC CALMING EXAMPLES (from 10/2024 Mobility Committee white paper)	
1	Street Crossing Markings
2	4-way stop @ Minor Arterials and Local Streets
3	4-way stop @ Colletors and Local Streets
4	4-way stop @ Minor Arterials and Collectors
5	Narrow Lanes from 12' to 9'
6 & 12	NACTO right turn radius standards
7	4 lane to 3 lane road restriping
8	Raised center median on Minor Arterials
9 & 16	Pedestrain hybrid beacon with advanced markings @ signalized and unsignalized Collectors/Arterials
10	Posted speed of 25 mph in residential areas
11	4-way stop at two local streets
13	Transverse rumble strips
14	Install Speed Humps
15	Raised cross-walk at mid-block crossings
SELECT FHWA "PROVEN SAFETY COUNTERMEASURES" (for suburban/urban crashes & not otherwise above)	
	Speed Safety Cameras
	Variable Speed Limits
	Bicycle Lanes
	Crosswalk Visibility Engancements
	Leading Pedestiran Interval
	Pedestrian Refuge Islands
	Rectangular Rapid Flashing Beacons
	Sidewalks
	Paved/painted shoulders used as a walkways
	Right-turn Deceleration Lanes
	Modern Roundabouts
	Pedestrian Lighting @ Crossings
	Multiple Low-Cost Countermeasures at Stop-Controlled Intersections
	Road Safety Audit
	Elimination of Free-right turn - ramp - "porkchop"
OTHER COMMON TRAFFIC CALMING EXAMPLES	
	Speed Cushions
	Diagonal Street-side Parking
	Chokers - Neckdowns
	Chicanes
	Traffic Circles - Mini roundabouts
	Diverters - Greenway Treatments
	Living Streets - Woonerf
	Street Trees
	Raised Intersections
	10' Lane Widths

1. Street Crossing Markings

6 & 12. NACTO Right-Turn Radii



Tighter corner radii reduce crossing distance and slow turning traffic (Credit: Michele Weisbart)

http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=28

7. 4-lane to 3-lane Restriping

9 & 16. Pedestrian Hybrid Beacon (HAWK) with advanced markings @ signalized and unsignalized intersections

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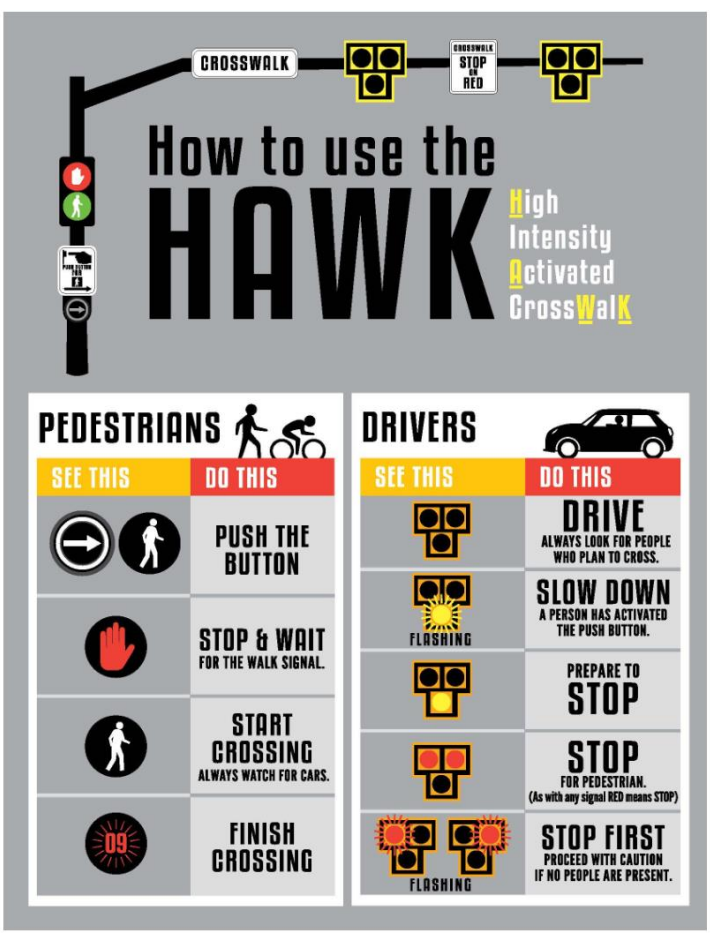
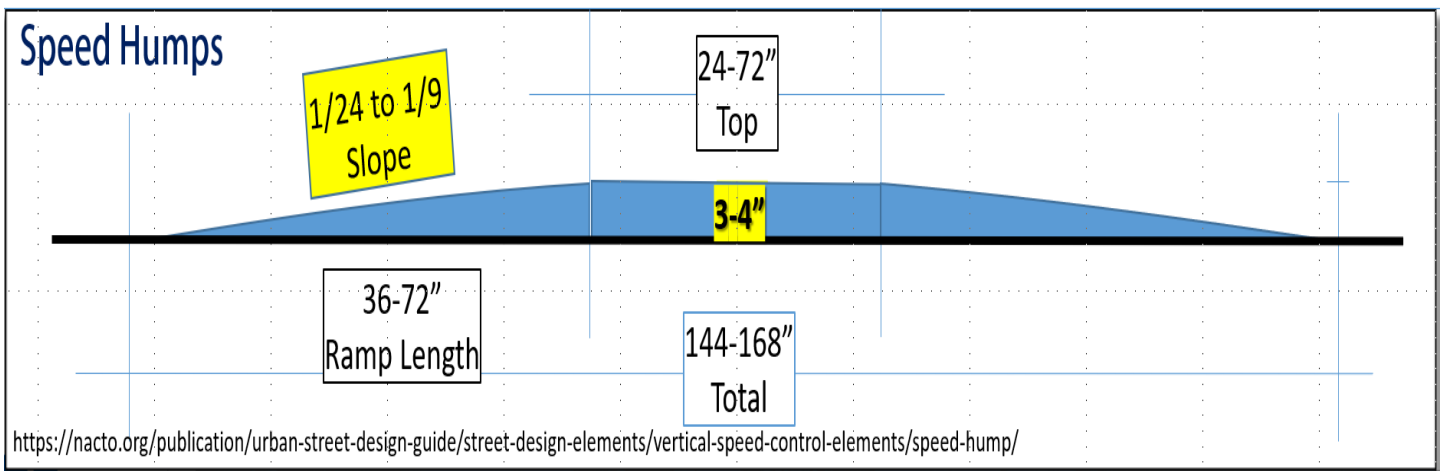
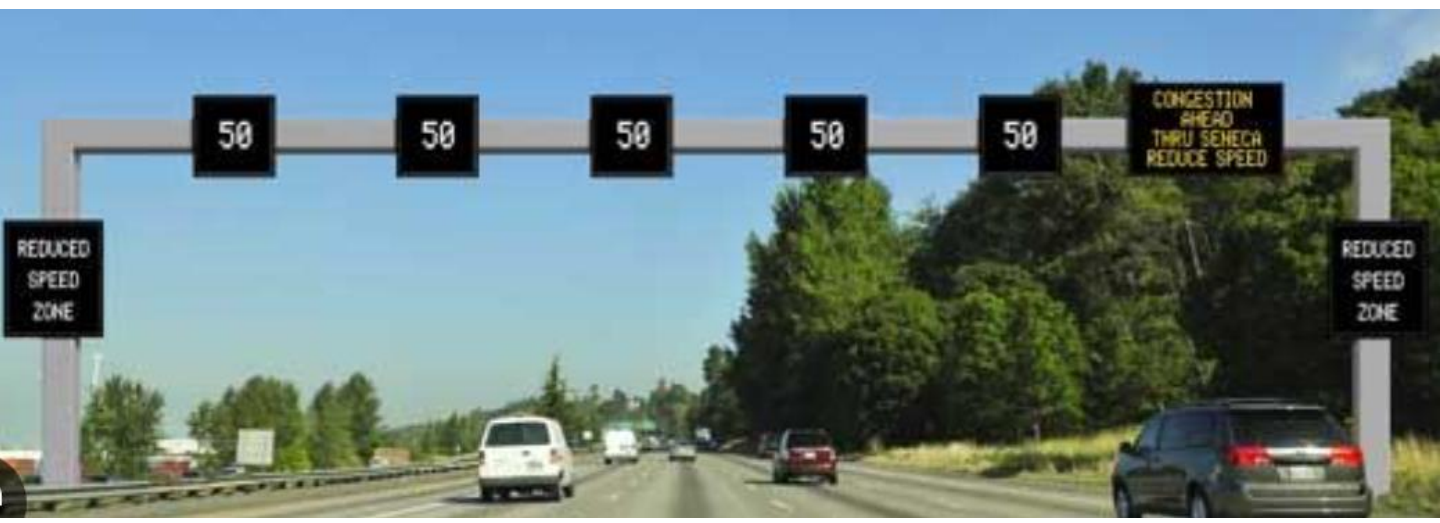


13. Transverse Rumble Strips

14. Speed Humps

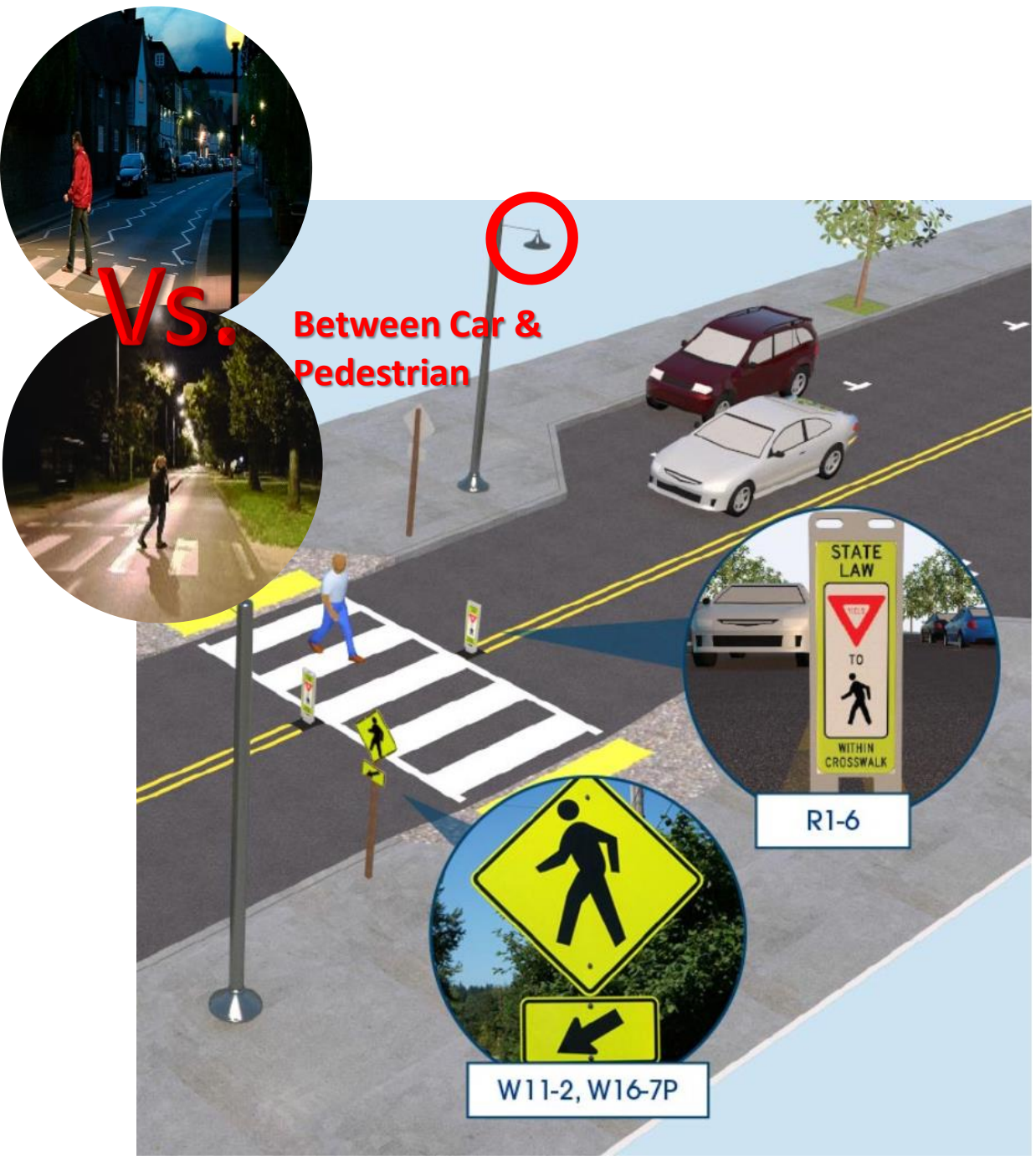


Variable Speed Limits

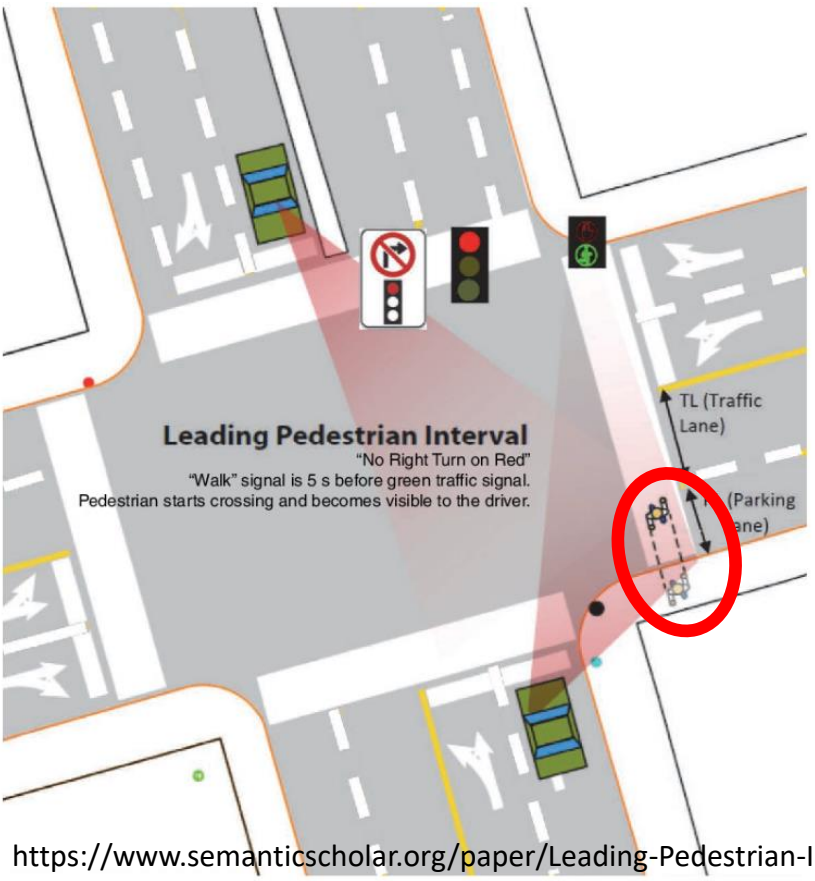


Bike Lanes

Crosswalk Visibility Enhancements

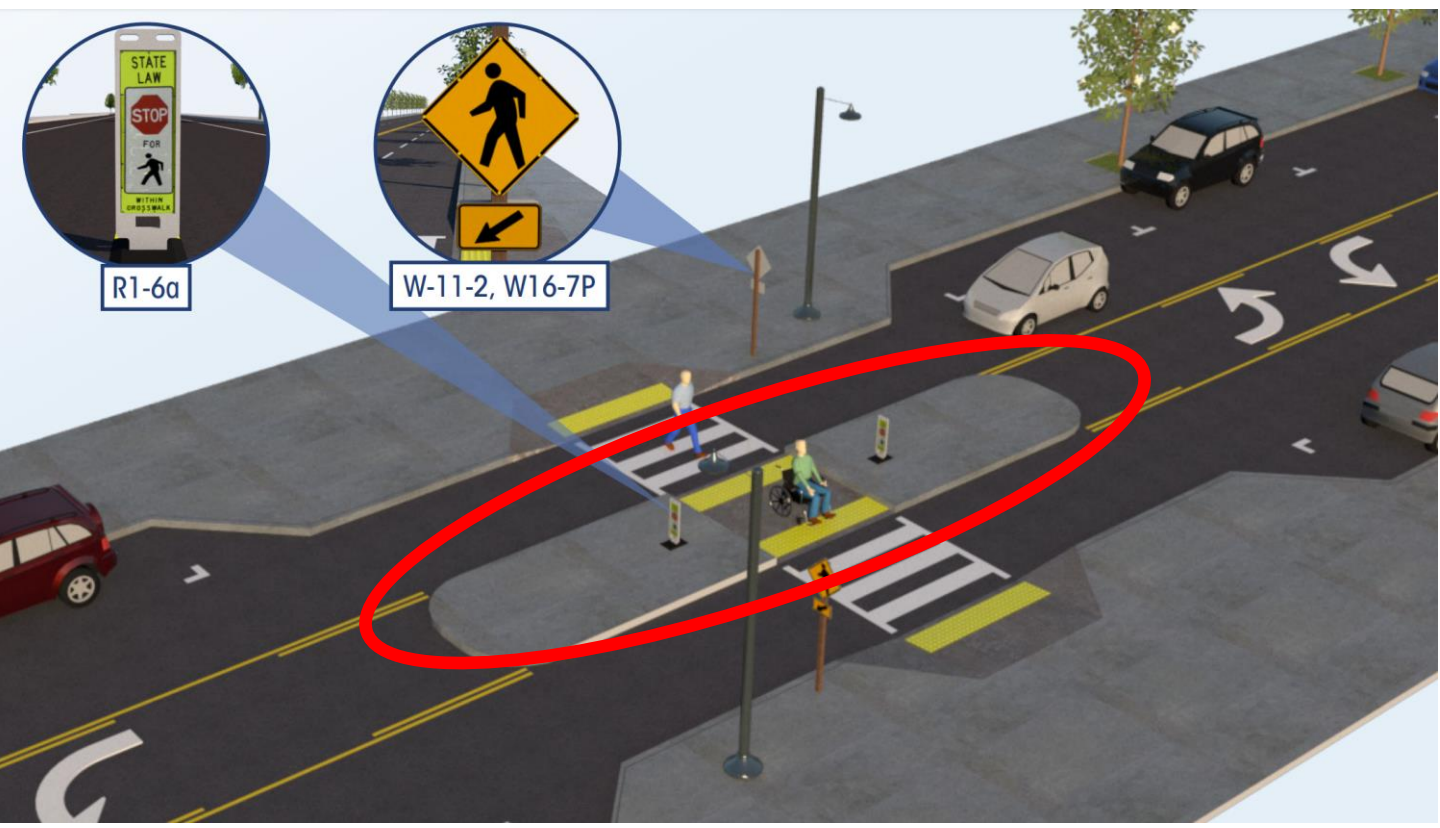


Leading Pedestrian Interval



https://www.semanticscholar.org/paper/Leading-Pedestrian-Interval%3A-Assessment-and-Saneinejad-Lo/03100233a1411341cafb538a9d0fbfcb5752ce1b/figure/0

Pedestrian Refuge Island

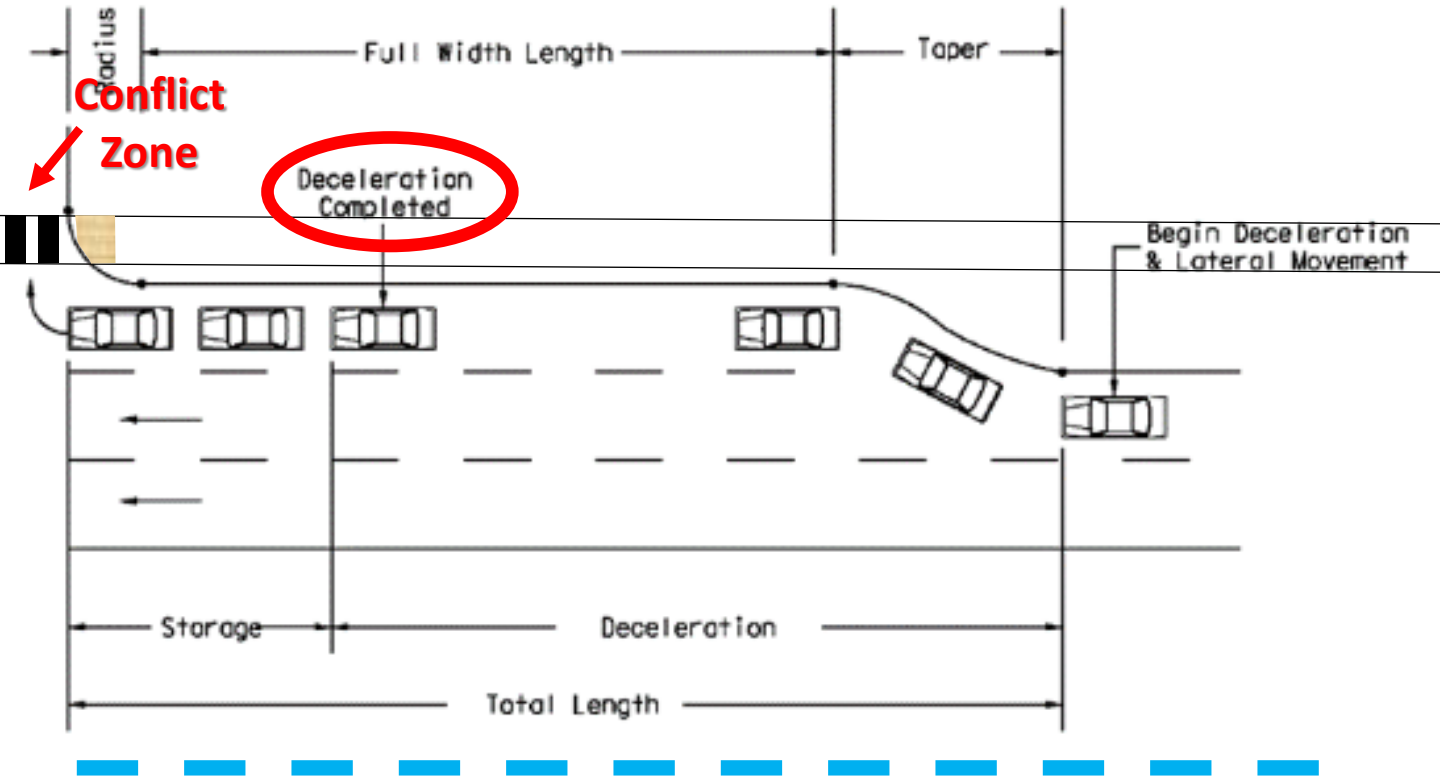


Rectangular Rapid Flashing Beacons

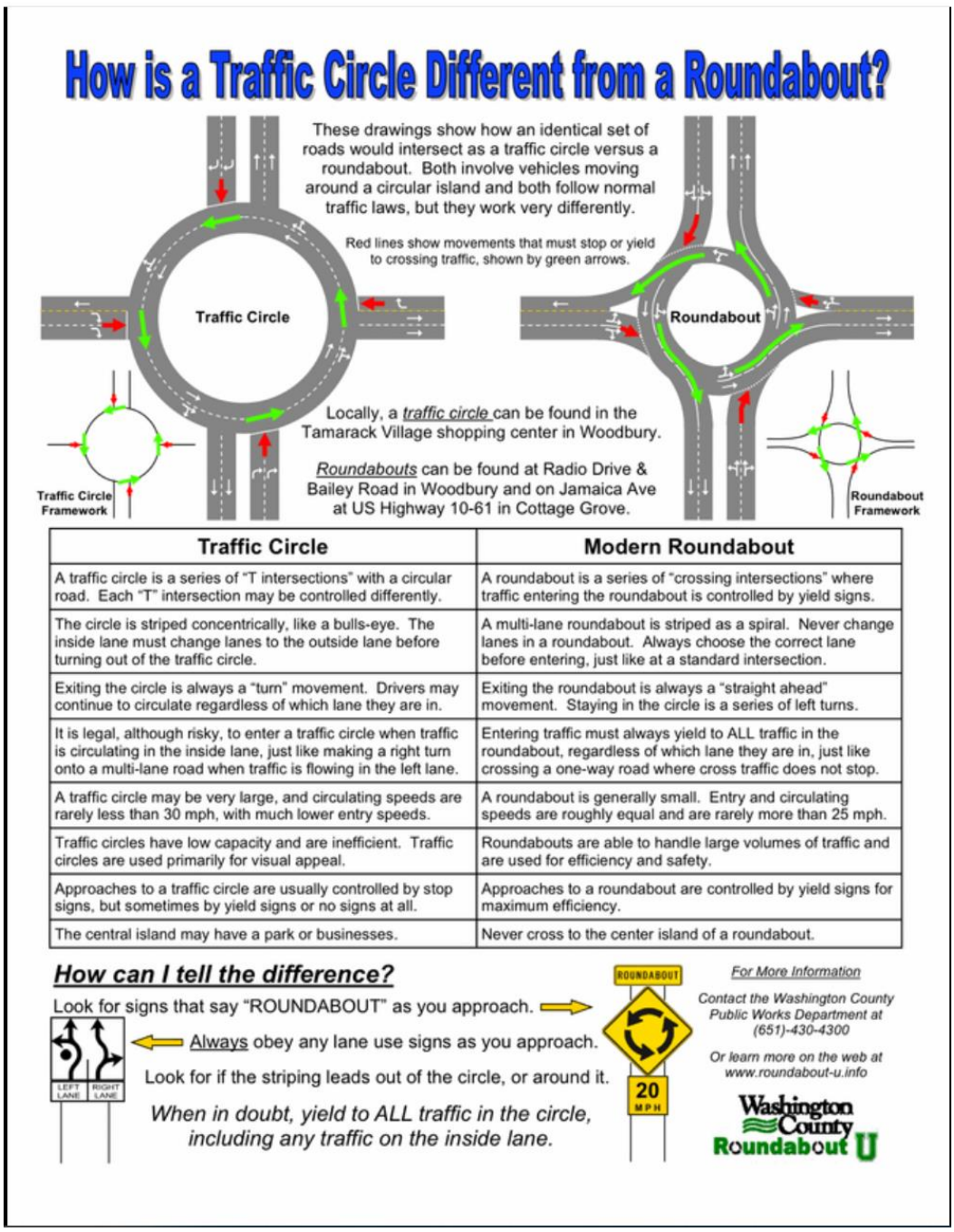
Paved/painted Shoulders used as a Walkways

Paved shoulder used as a walkway. Source: pedbikeimages.org / Burden

Right-turn Deceleration Lanes



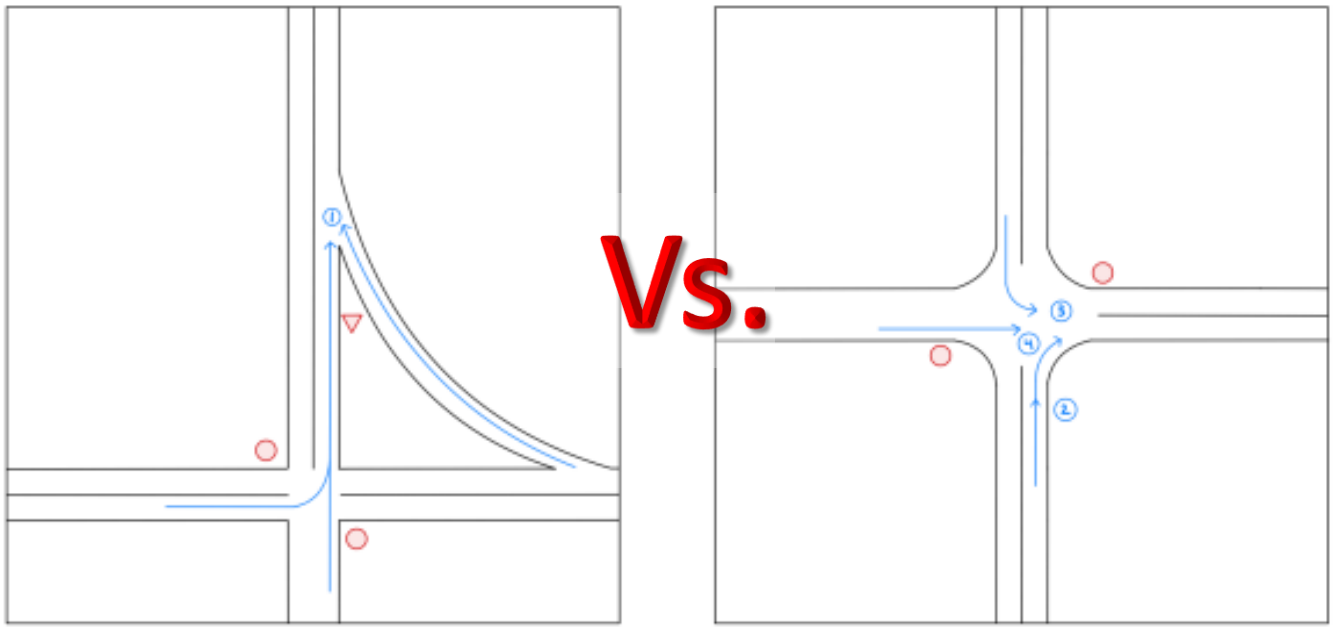
Modern Roundabout



Traffic Circle	Modern Roundabout
A traffic circle is a series of "T intersections" with a circular road. Each "T" intersection may be controlled differently.	A roundabout is a series of "crossing intersections" where traffic entering the roundabout is controlled by yield signs.
The circle is striped concentrically, like a bulls-eye. The inside lane must change lanes to the outside lane before turning out of the traffic circle.	A multi-lane roundabout is striped as a spiral. Never change lanes in a roundabout. Always choose the correct lane before entering, just like at a standard intersection.
Exiting the circle is always a "turn" movement. Drivers may continue to circulate regardless of which lane they are in.	Exiting the roundabout is always a "straight ahead" movement. Staying in the circle is a series of left turns.
It is legal, although risky, to enter a traffic circle when traffic is circulating in the inside lane, just like making a right turn onto a multi-lane road when traffic is flowing in the left lane.	Entering traffic must always yield to ALL traffic in the roundabout, regardless of which lane they are in, just like crossing a one-way road where cross traffic does not stop.
A traffic circle may be very large, and circulating speeds are rarely less than 30 mph, with much lower entry speeds.	A roundabout is generally small. Entry and circulating speeds are roughly equal and are rarely more than 25 mph.
Traffic circles have low capacity and are inefficient. Traffic circles are used primarily for visual appeal.	Roundabouts are able to handle large volumes of traffic and are used for efficiency and safety.
Approaches to a traffic circle are usually controlled by stop signs, but sometimes by yield signs or no signs at all.	Approaches to a roundabout are controlled by yield signs for maximum efficiency.
The central island may have a park or businesses.	Never cross to the center island of a roundabout.

https://www.reddit.com/r/CitiesSkylines/comments/30f5na/traffic_circle_vs_roundabout_and_why_cs_needs/#lightbox

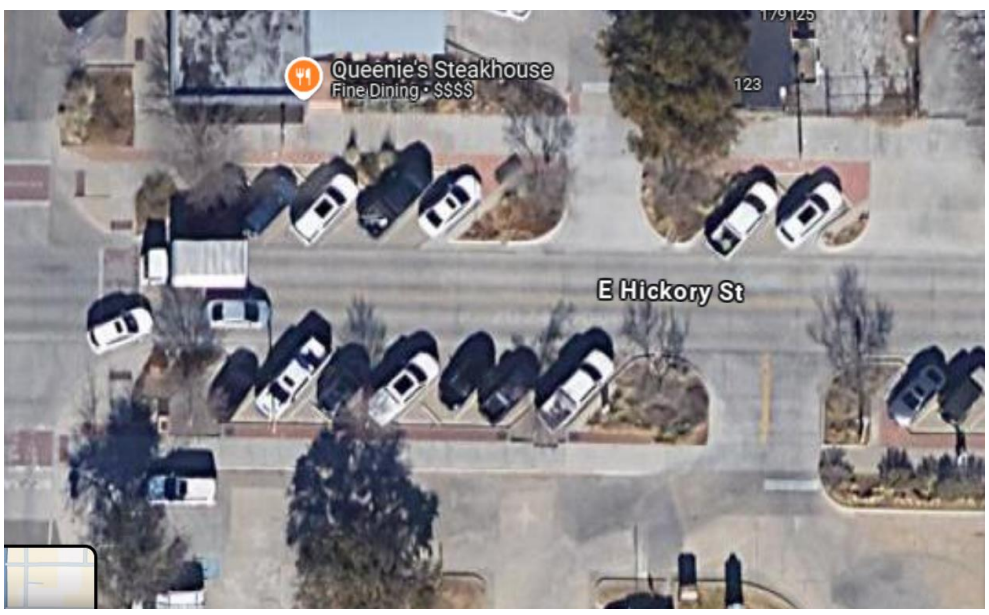
Elimination of Free-Right Turn - Ramp



Speed Cushion

Speed Hump with channels for Large

Diagonal Street-Side Parking



Chokers - Neckdowns

Choker in a residential neighborhood. Source: City of An Arbor,

Chicanes

Chicane on a residential street. Source: NACTO

https://www.smatstraffic.com/2021/08/30/traffic-calming/

Traffic Circles

Mini roundabout in a residential neighborhood. Source: City of Vancouver

Living Street – Woonerf – Shared Street

On these streets users are mixed and must watch for each other (parking lot like)

Bell Creek Park shared street, Seattle, Washington.

Seattle

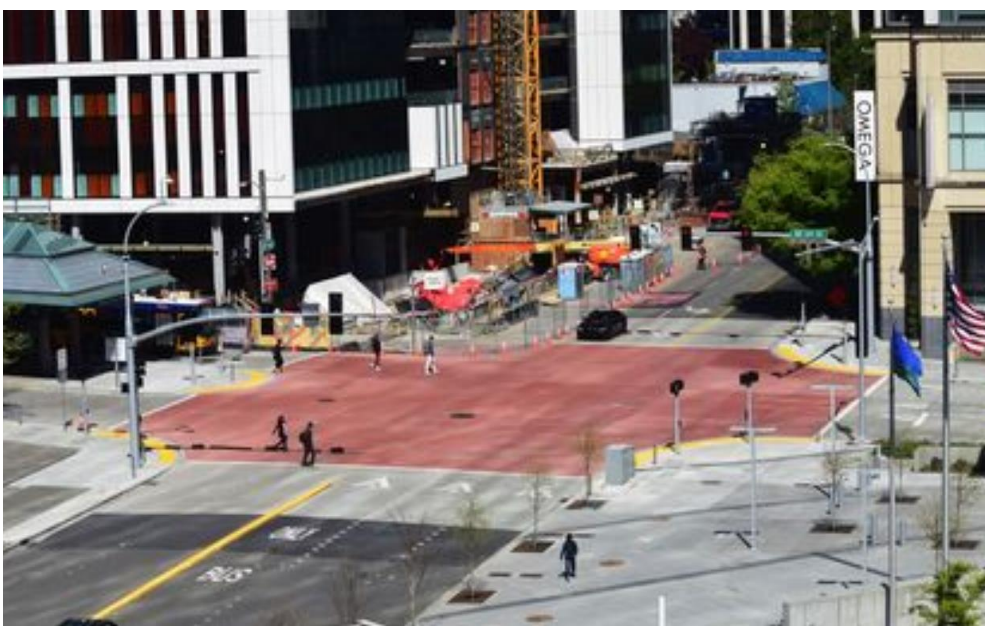
Denver 16th Street Mall https://www.denver.org/things-to-do/attractions/16th-street-mall/

Warf Street Washington DC

https://www.cnu.org/publicsquare/2017/12/08/radical-mixing-cars-and-people-works-planned

Raised Intersection

Hennepin Ave., MN https://streets.mn/2016/05/04/hennepin-avenue-reconstruct-ii-even-better/



Bellevue, WA https://bellevuewa.gov/city-government/departments/transportation/projects/transportation-capital-projects/bellevue-transit-center-raised-intersections

Design Downtown Denton