Washington Transportation Professionals

Forum and Peer Exchange

January 8, 2025 9:00 AM-12:00 PM

Welcome

- Local Technical Assistance Program Update
- Road Diets/Reconfigurations—Rightsizing Roadways for Multimodal Safety and Mobility
- Snow Removal and Multimodal Considerations
- Pedestrian Scale Street Lighting Best Practices

Washington Transportation Professionals

- Formed
  - ✓ Over 40 years ago as the Urban Traffic Engineers Council.
  - ✓ By city traffic engineers and focused on traffic operations.

- Evolution and Growth
  - ✓ All cities, all counties, MPOs/RTPO's, vendors, consultants, nonprofits, & other agencies = Over 400 entities (Over 1000 individuals).
  - ✓ Discuss local agency transportation issues of statewide significance.

- Forums and Peer Exchanges
  - ✓ Facilitated by WSDOT's Local Programs and Active Transportation divisions with help from public agencies, consultants, and vendors.
  - ✓ Looking for relevant topics and presenters.

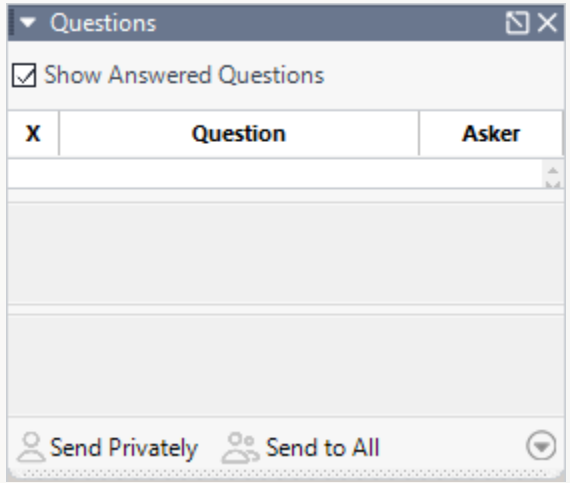
Statewide Participation

- Cities
- Counties
- Tribes
- WSDOT–All regions, WSF, and HQ
- MPOs/RTPOs
- FHWA
- State Agencies—WTSC, CRAB, TIB, DOH, +others
- Transit, Ports, Railroads, and other transportation providers
- Nonprofit Organizations
- Consultants and Vendors

Webinar Logistics

- Show and hide the GoToWebinar screen:
  Press the orange arrow toggle button.

- You are in listen-only mode. Please type comments and questions into the "Questions" box.
  We will read it to the presenter for a response.



Agenda

- Local Technical Assistance Program Update
- Road Diets/ Reconfigurations—Rightsizing Roadways for Multimodal Safety and Mobility
- Snow Removal and Multimodal Considerations
- Pedestrian Scale Street Lighting Best Practices

LTAP Training Needs?

- Training Needs Assessment
- What training and what type of training do you (or your staff/agency) need?

- Receive training notifications via our LTAP training listserv
- Sign up for roughly bi-weekly emails on upcoming trainings

2025 County Safety Program

- Key Information
  - Call for projects is open
  - **Applications due 3/15/25**
  - Funding to be awarded summer 2025
  - 100% funding for all phases authorized prior to 4/30/28
- **Estimated Funds**:
  - $35 million in federal Highway Safety Improvement Program (HSIP) funds
  - $4 million in state Reducing Rural Roadway Departures funds

Road Diets/Reconfigurations: Rightsizing Roadways for Multimodal Safety and Mobility

Rebecca Crowe, Transportation Specialist, FHWA Office of Safety

Mary Heather Ames, Deputy Public Works Director, City of Pasco

Vincent Malong, Engineer II, City of Pasco

Erik Preston, City Traffic Engineer, City of Kent

Celeste Gilman, Strategic Policy Administrator, WSDOT

ROAD DIET

& MYTHBUSTERS

…and Opportunities in 2025

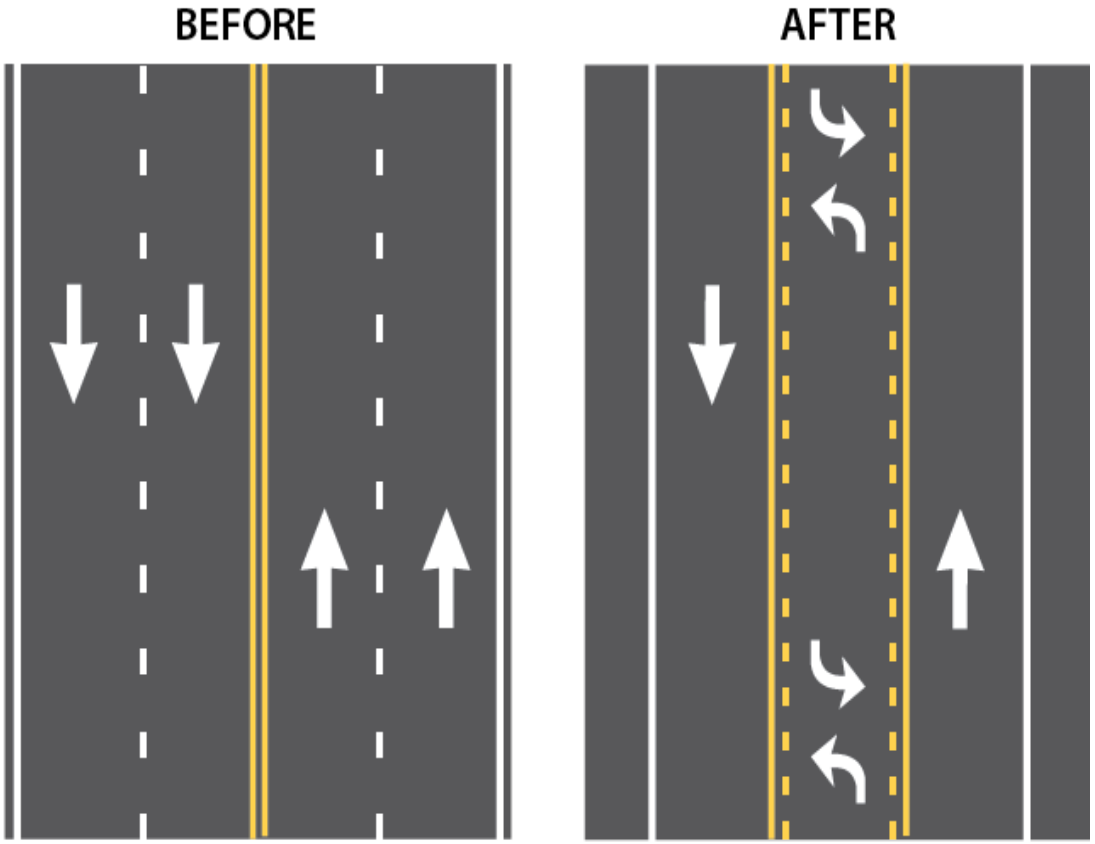
History Lesson

- 1950s and 1960s, focus was roadway expansion to address increased traffic demand
- Two to four-lane widening became the norm

Photo: Terance L. McNinch

Photo: Randy Dittberner, VDOT

What is a “Road Diet”?



Reconfiguring the existing cross section (travel lanes) and utilizing the space for other uses such as bike lanes, parking, transit stops, etc.

A ***typical*** Road Diet converts an existing four-lane undivided roadway to two through lanes and a center two-way left-turn lane (TWLTL)

ROAD DIET

A Typical Road Diet

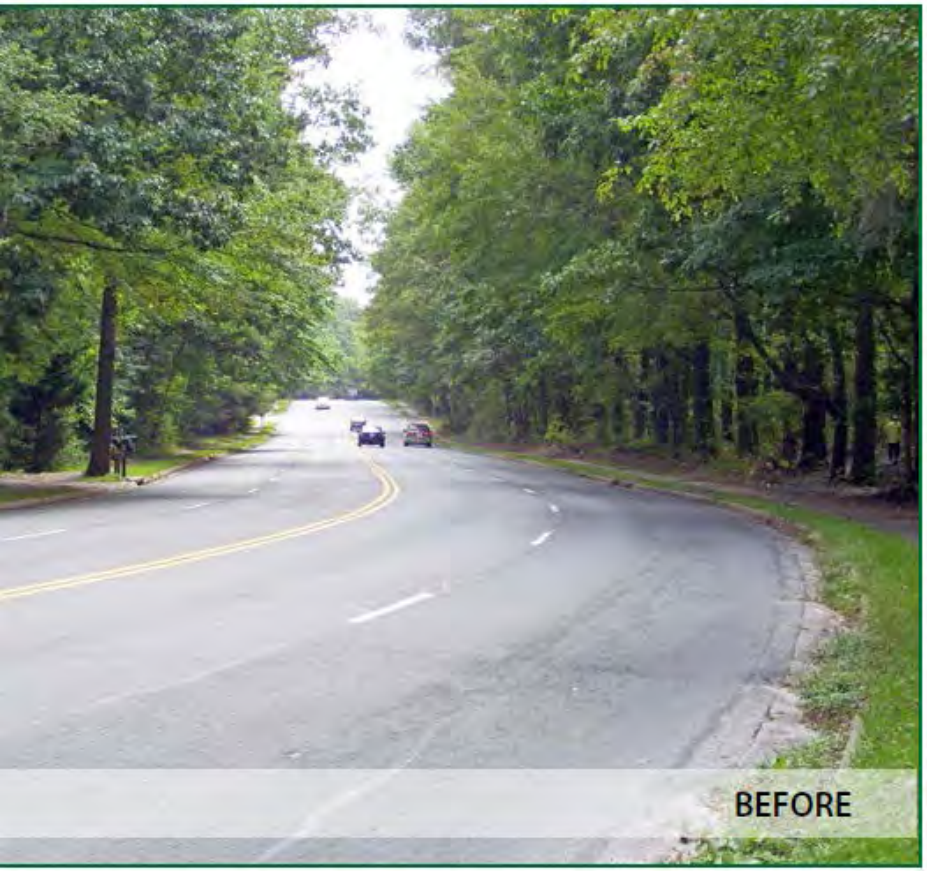
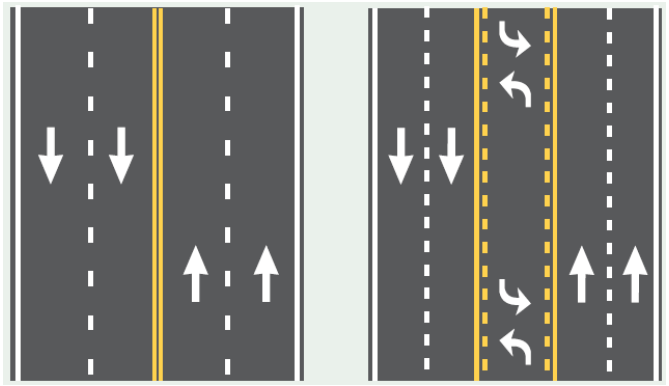


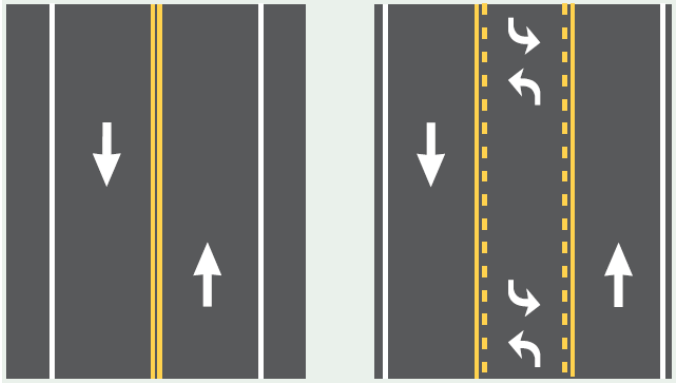
Photo Source: Virginia DOT

Other Reconfigurations

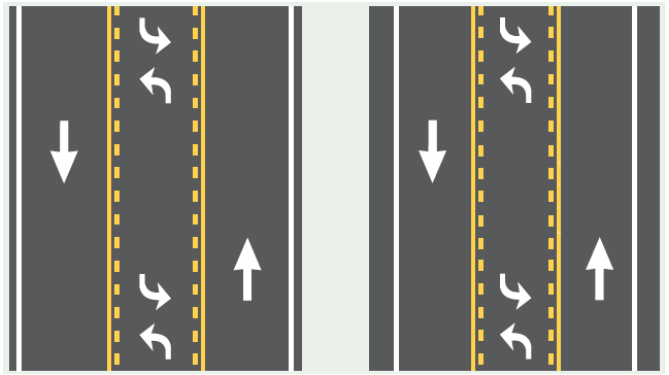
4-Lane to 5-Lane



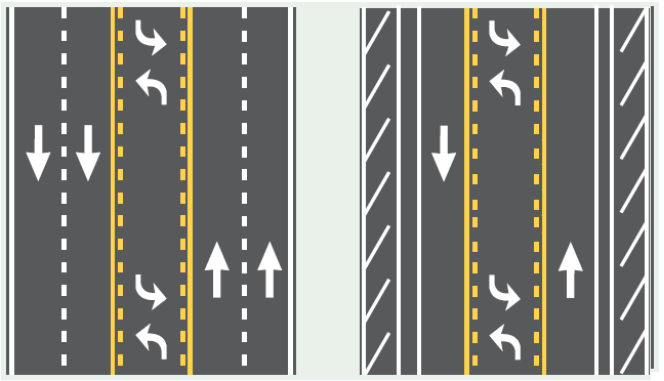
2-Lane to 3-Lane



3-Lane to 3-Lane

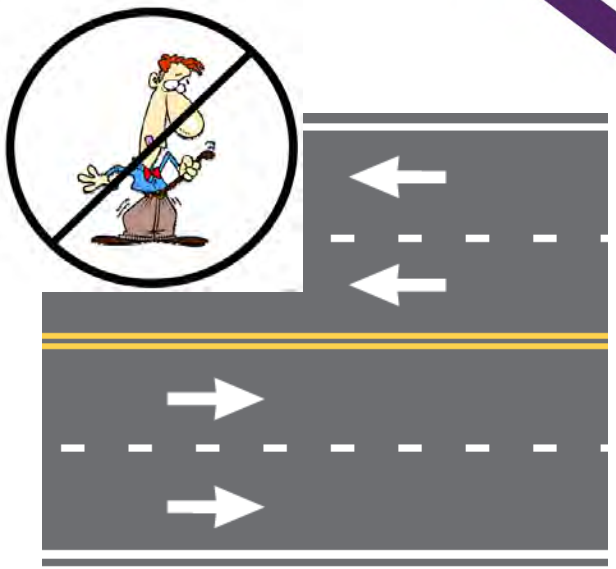


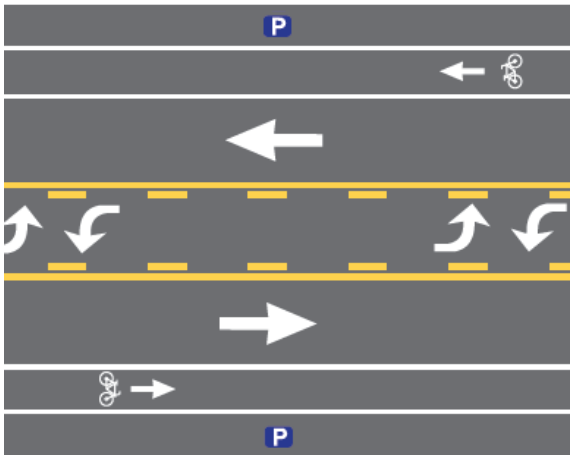
5-Lane to 3-Lane



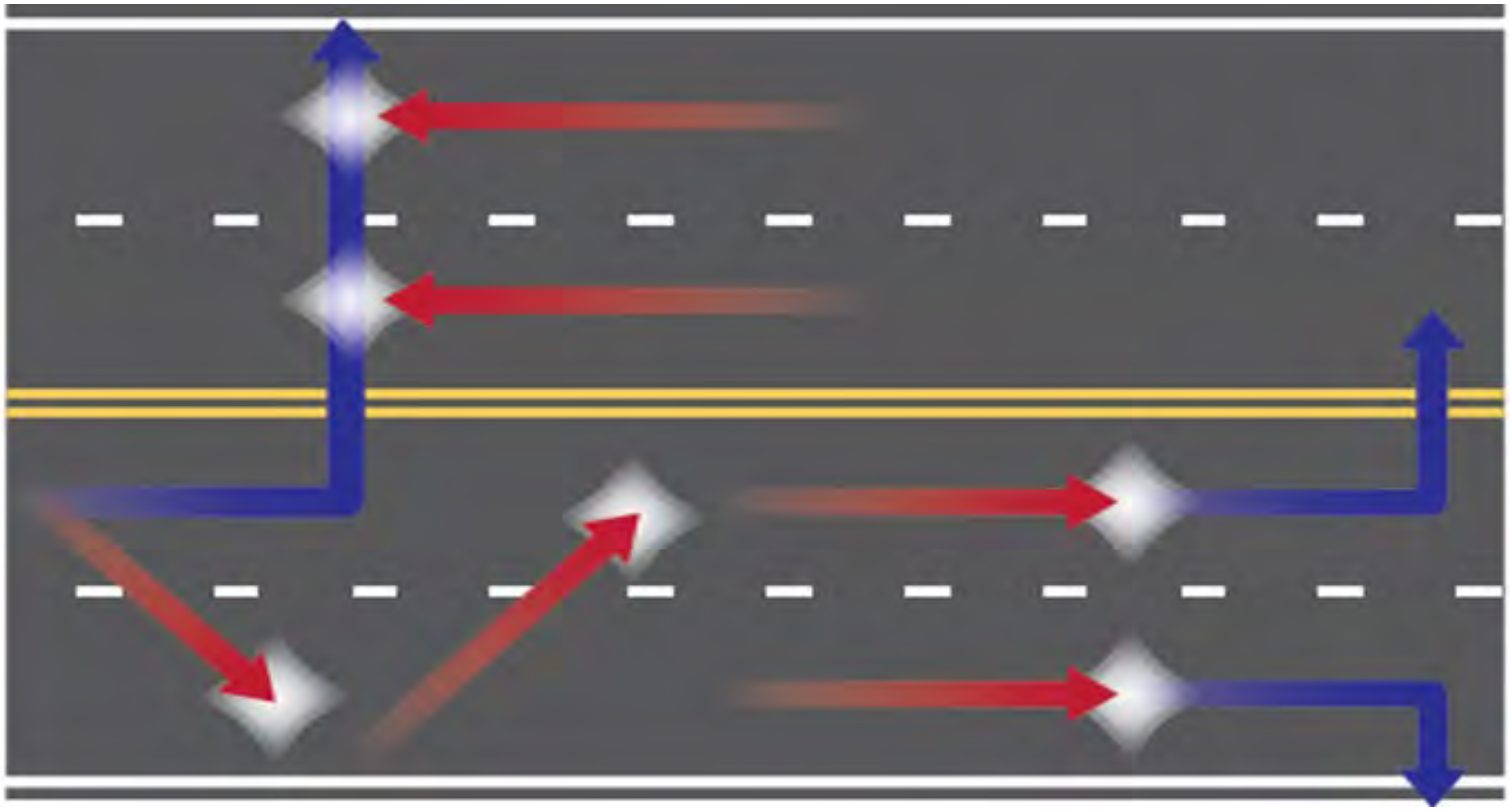
Common Characteristics

- Utilize existing footprint
- Rebalance / reallocate street space to add features such as:
  - Two-way left-turn lane (TWLTL)
  - Bike Lanes
  - On-street Parking
  - Buffer Zones
  - Landscaping
  - Etc.…





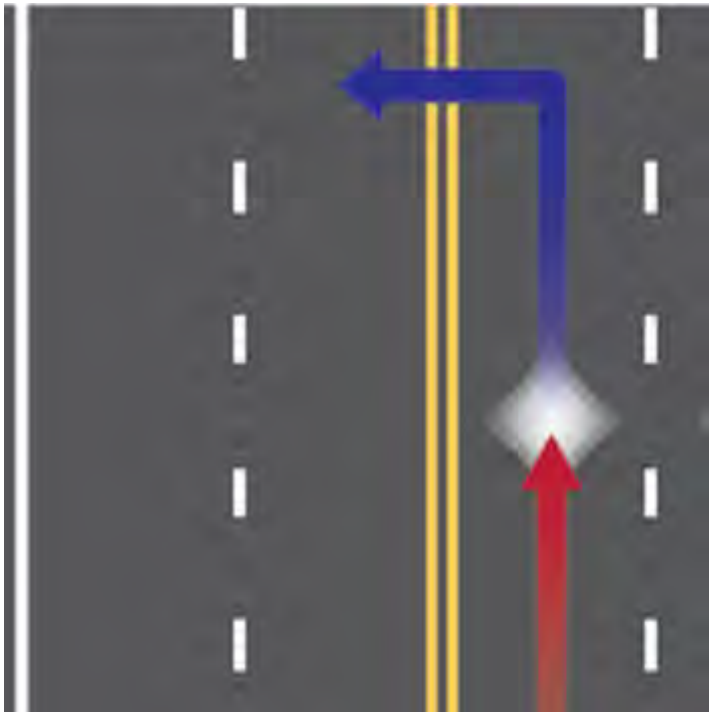
Why? – To Improve Safety !!!



- *Four-lane undivided highways have relatively high crash rates*
- *Inside lanes are shared by higher speed through traffic and left-turning vehicles*

ROAD DIET

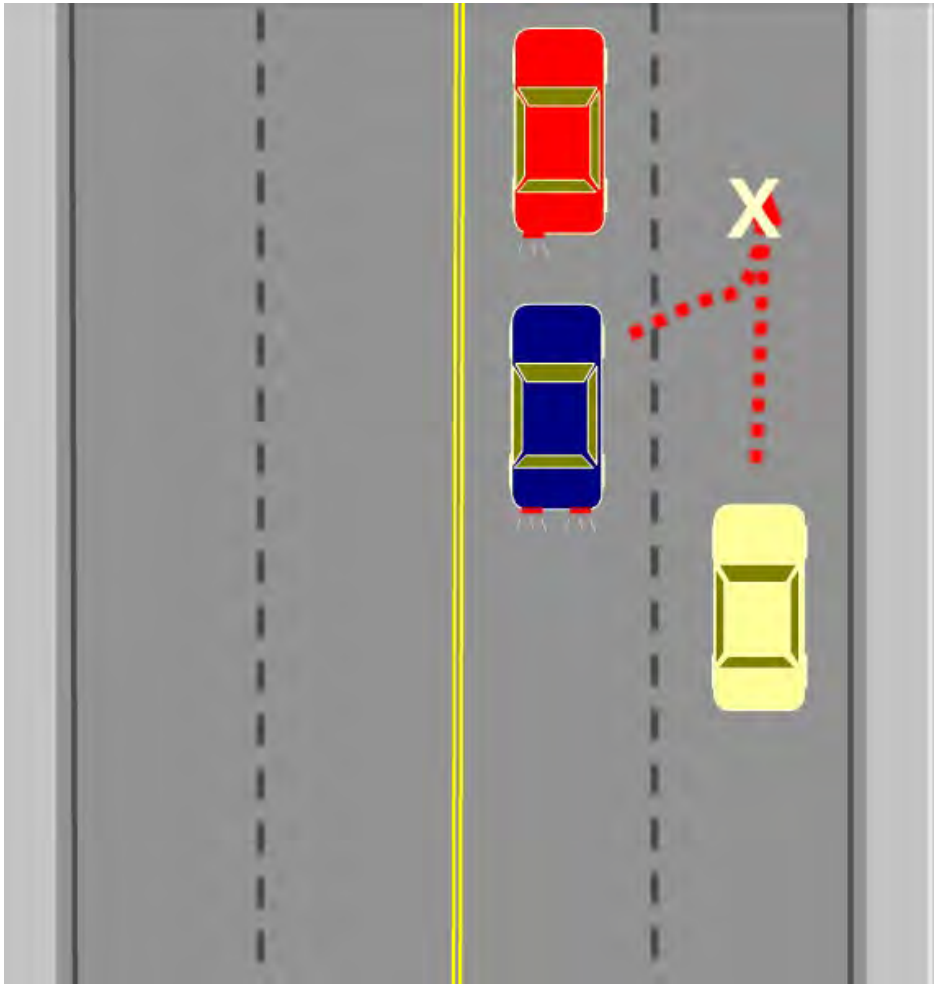
4-Lane Undivided Highways



Left-turning vehicles stopped in the inside travel lane are at risk for rear-end collisions

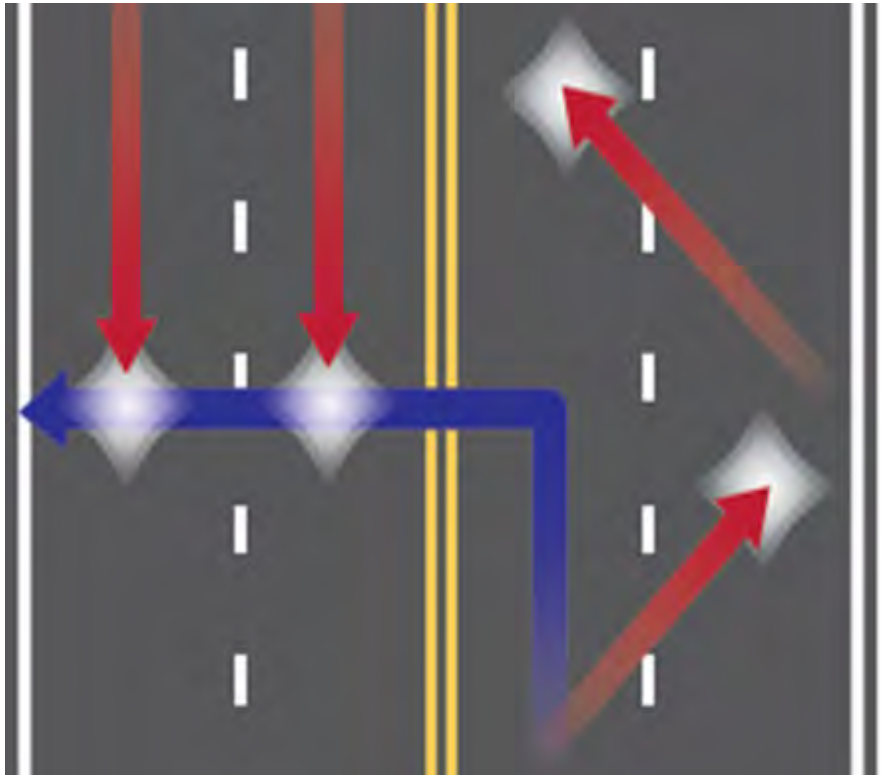
4-lane Undivided Highways

Frequent and sudden lane changing between the two through lanes contributes to sideswipe and rear-end collisions



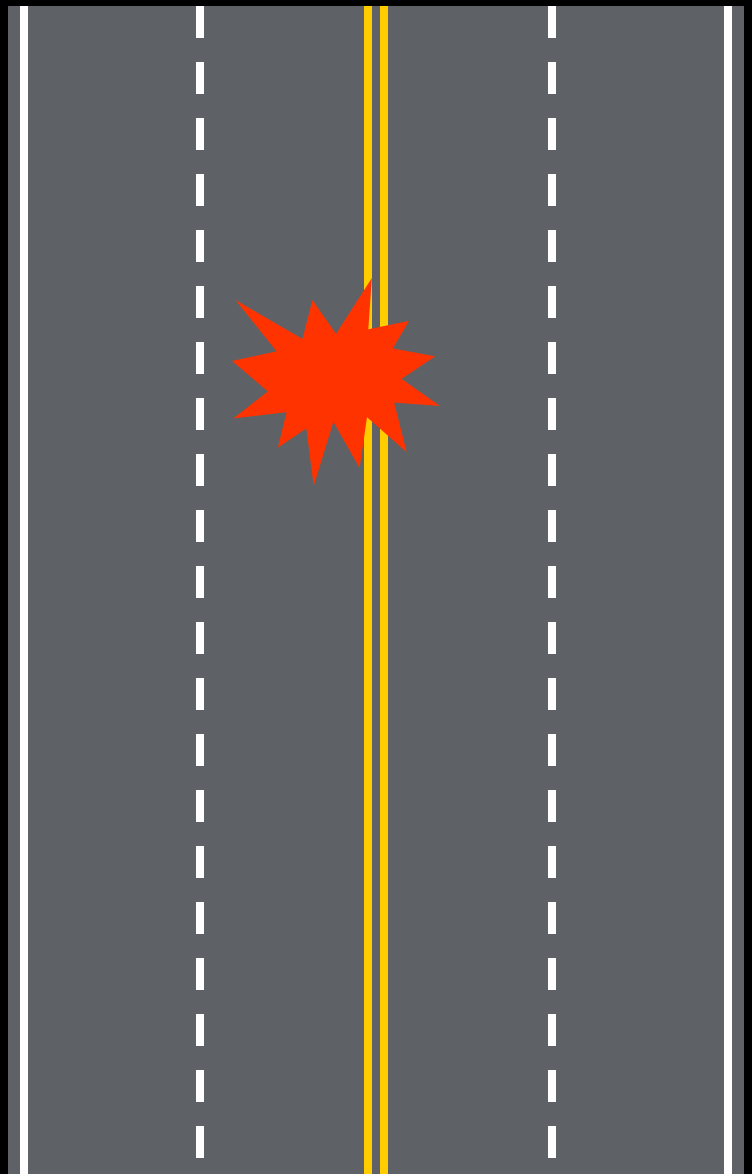
4-lane Undivided Highways

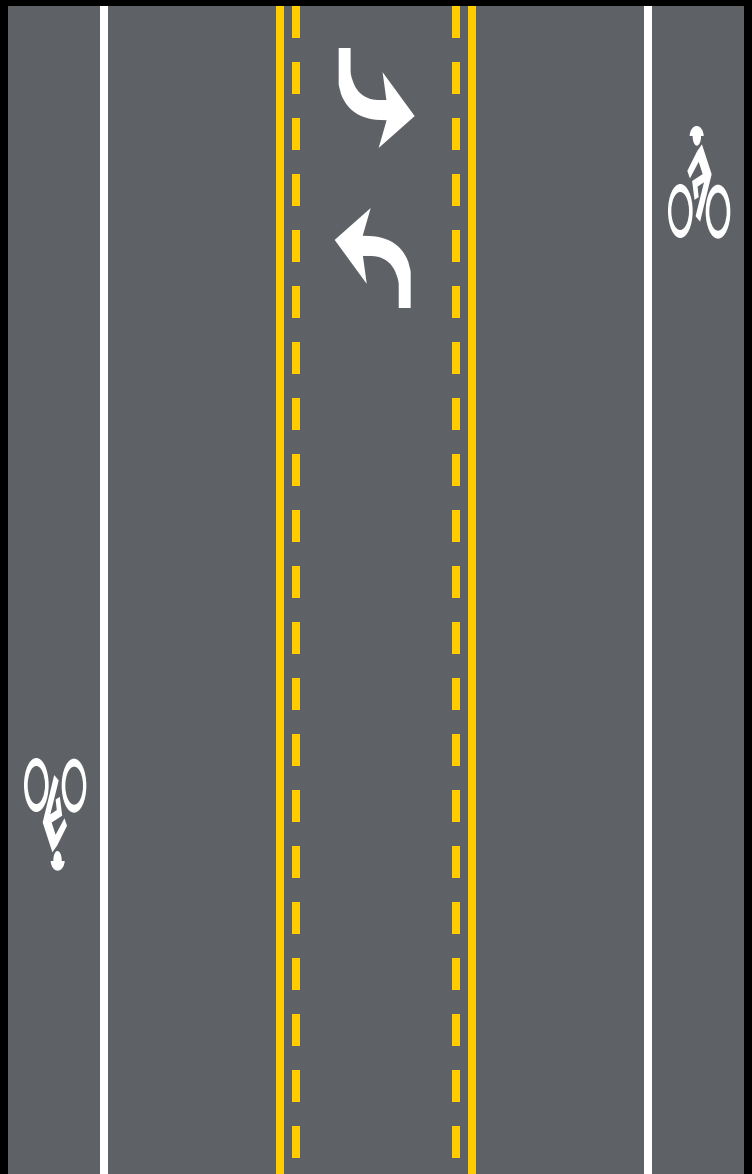
Left-turning drivers may make poor judgements in gaps or feel pressure to vacate the lane contributing to angle collisions



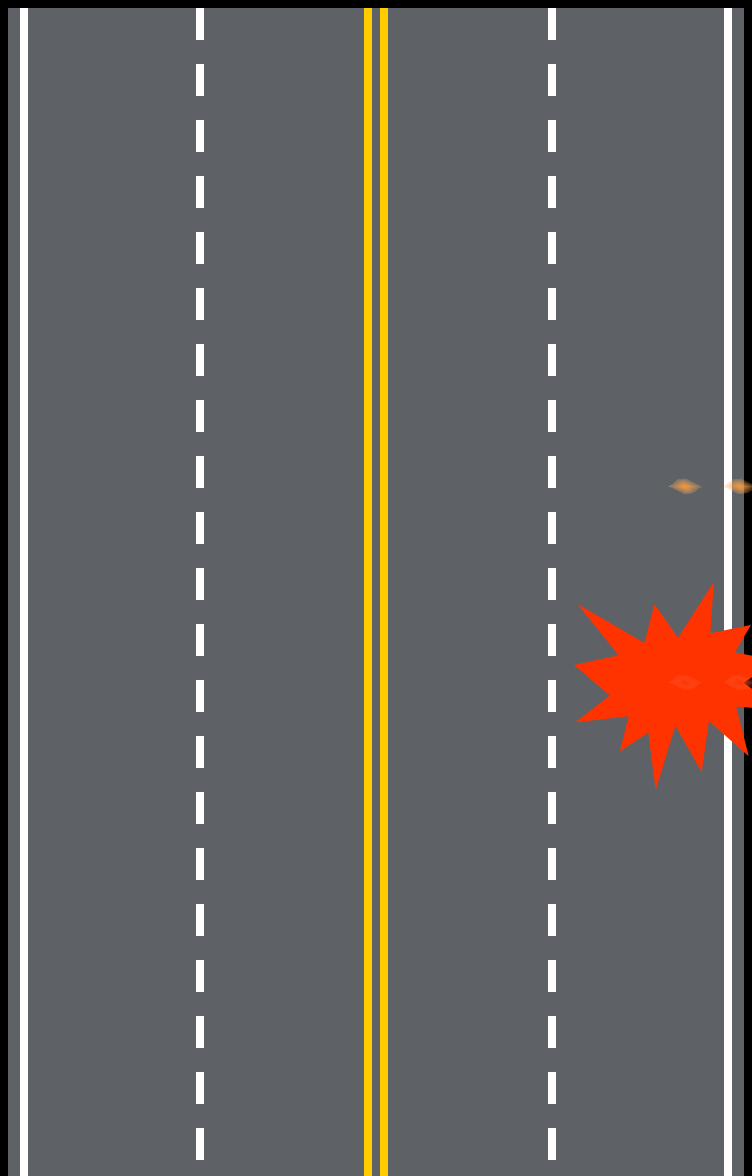
These safety problems become more evident as traffic volumes and turning movements increase

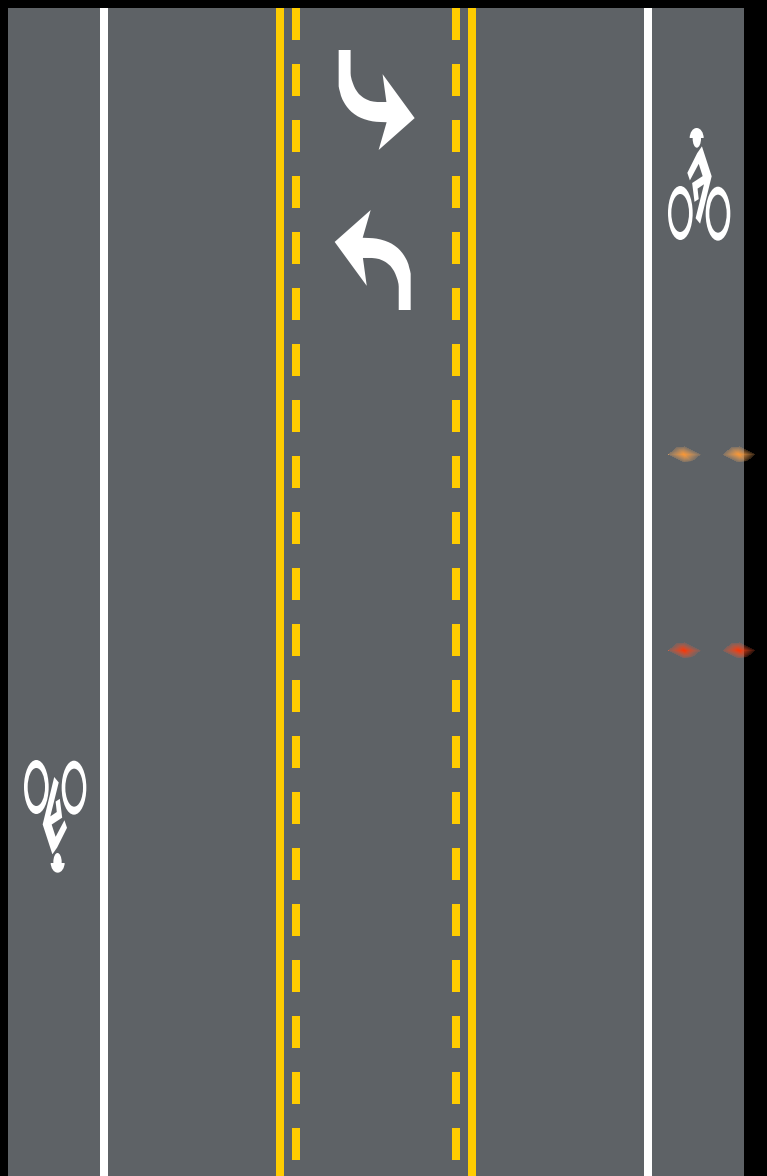
Increased Separation



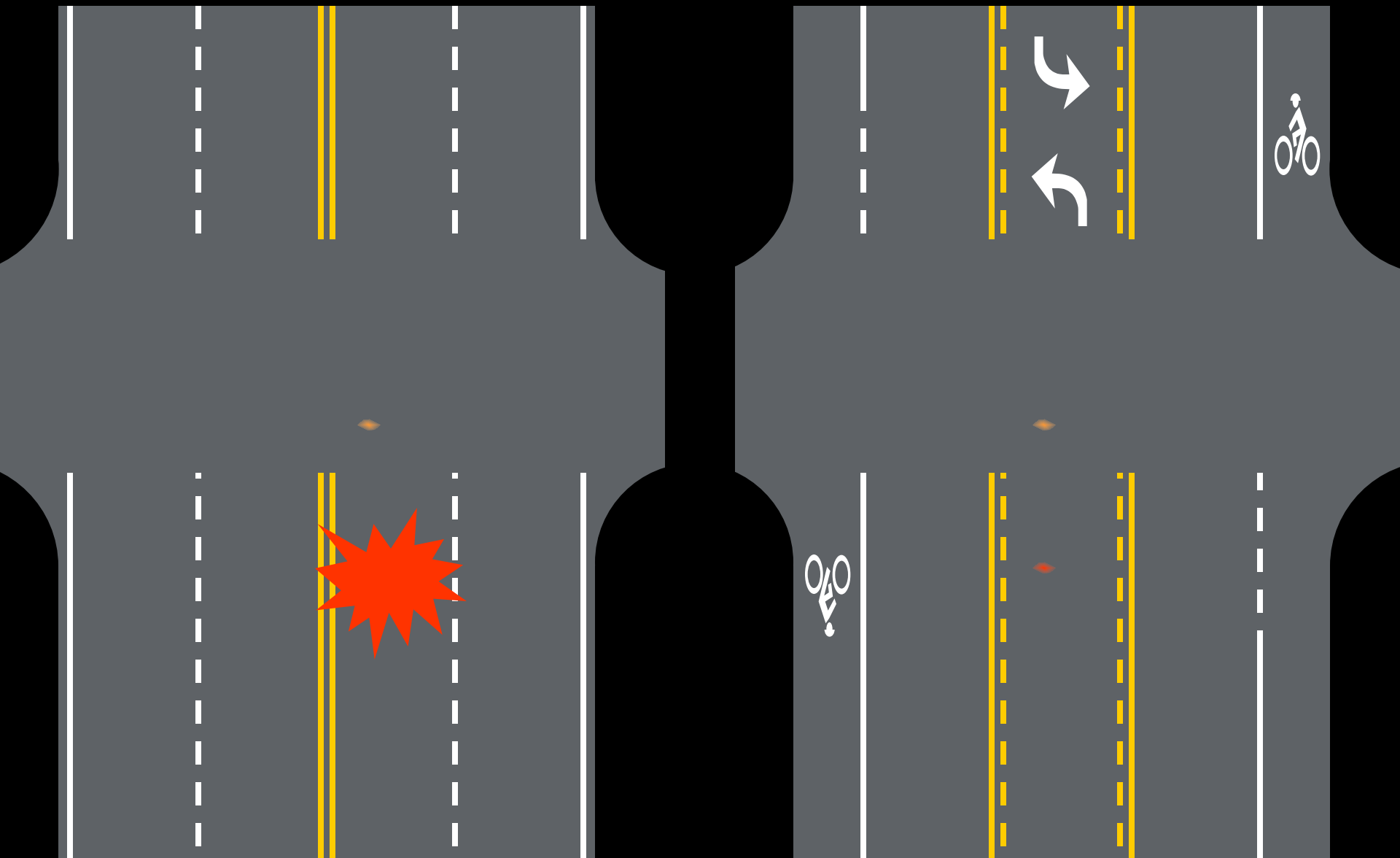


Stopped or Stalled Vehicle

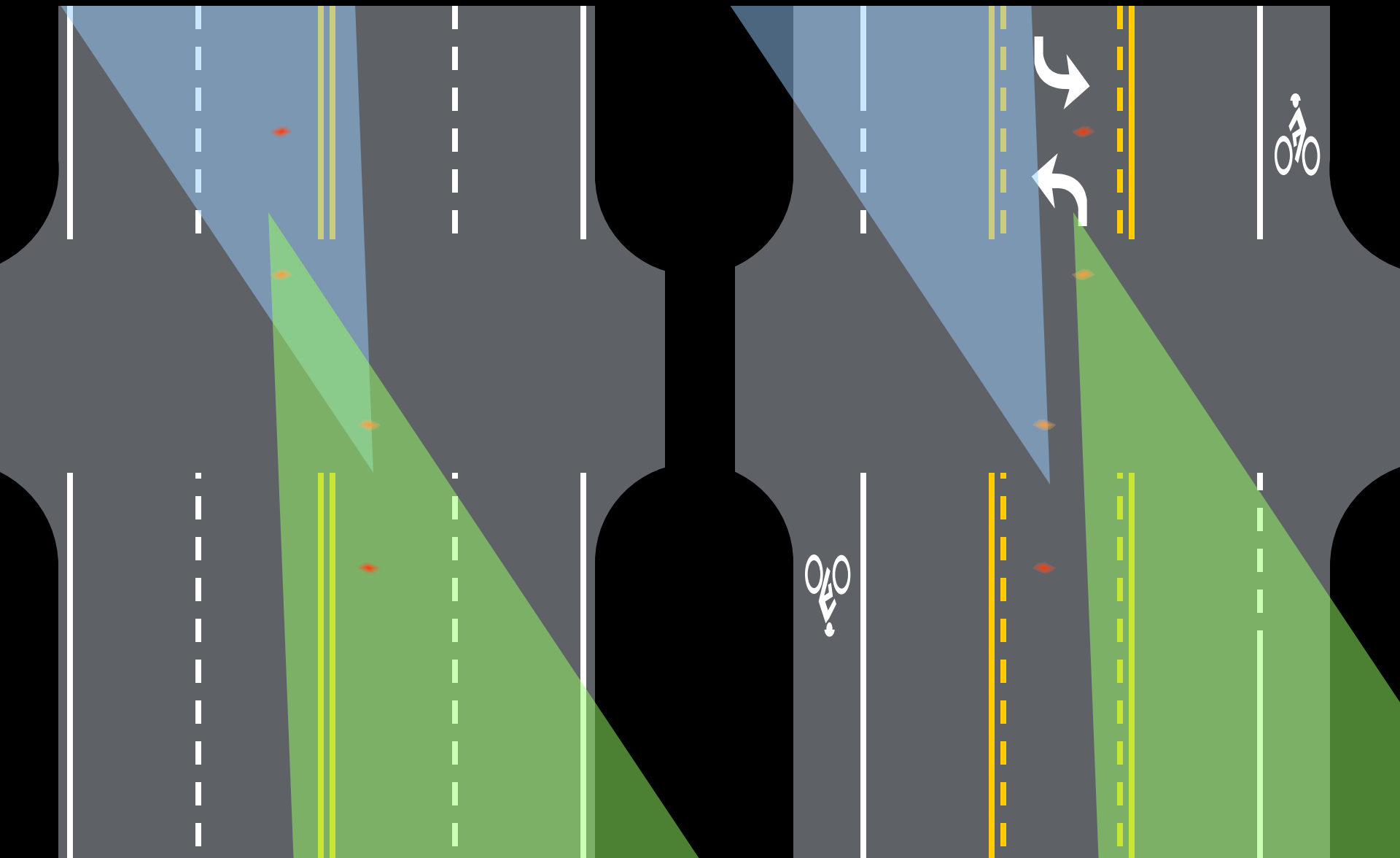




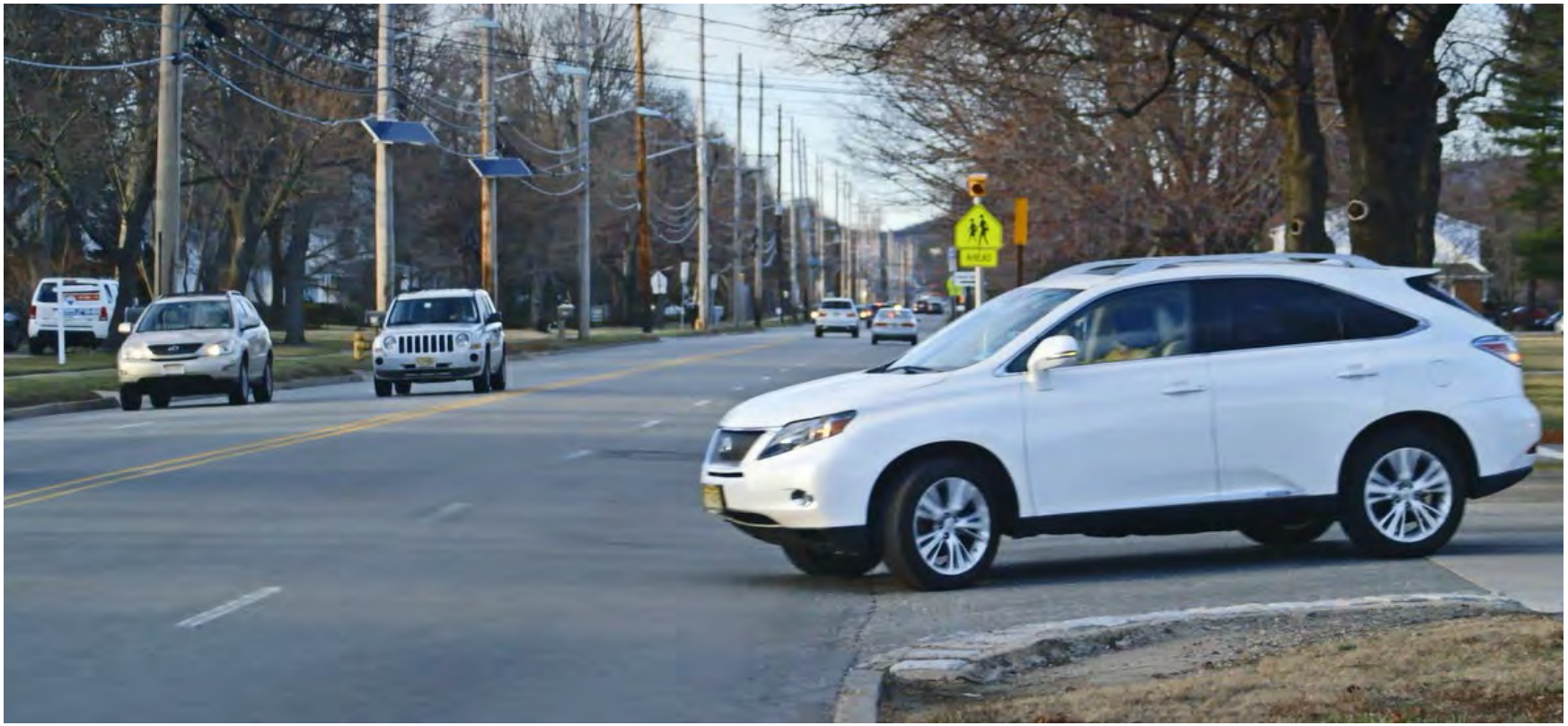
Dedicated Left Turn Lane



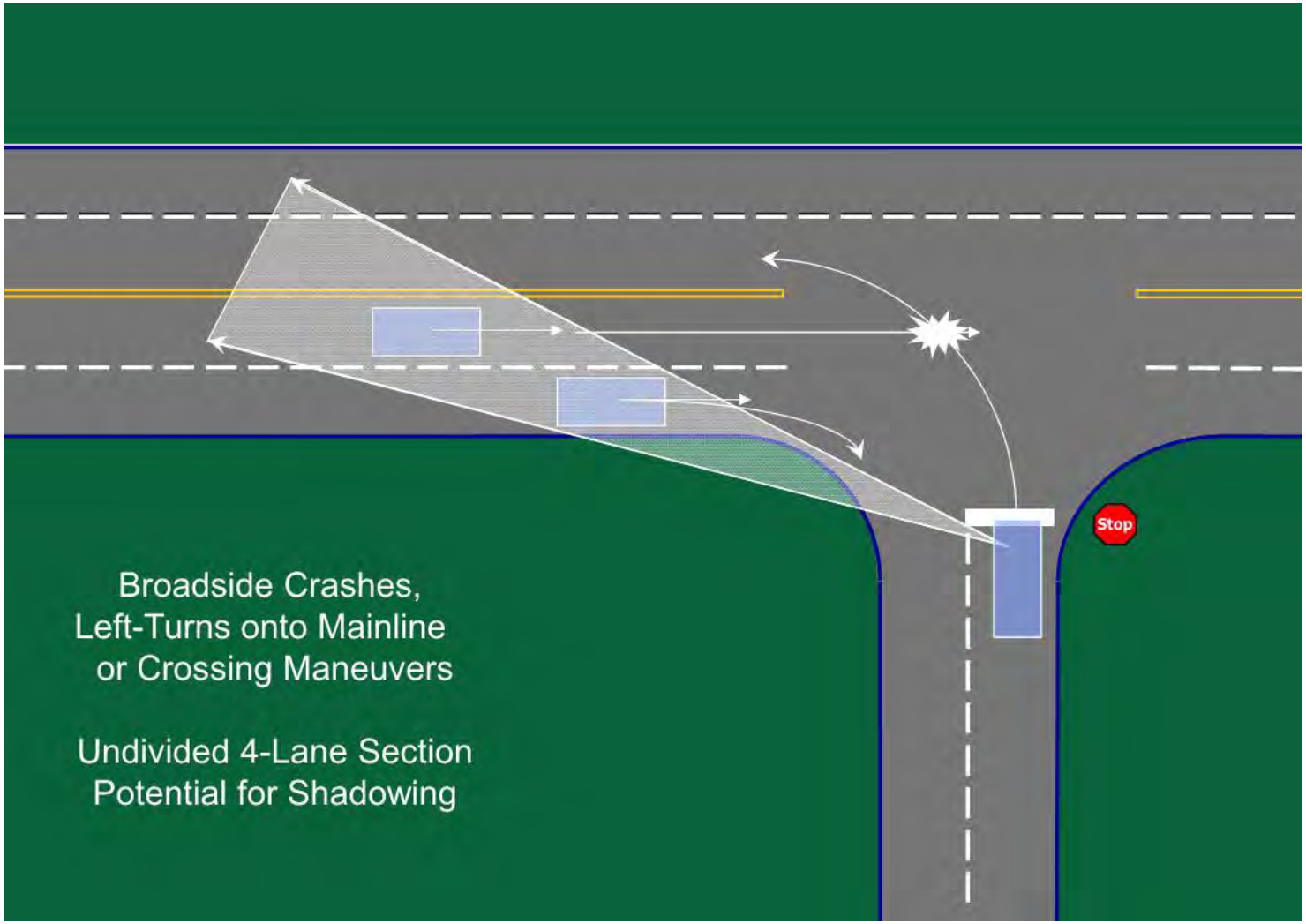
Sight Lines – Major Road



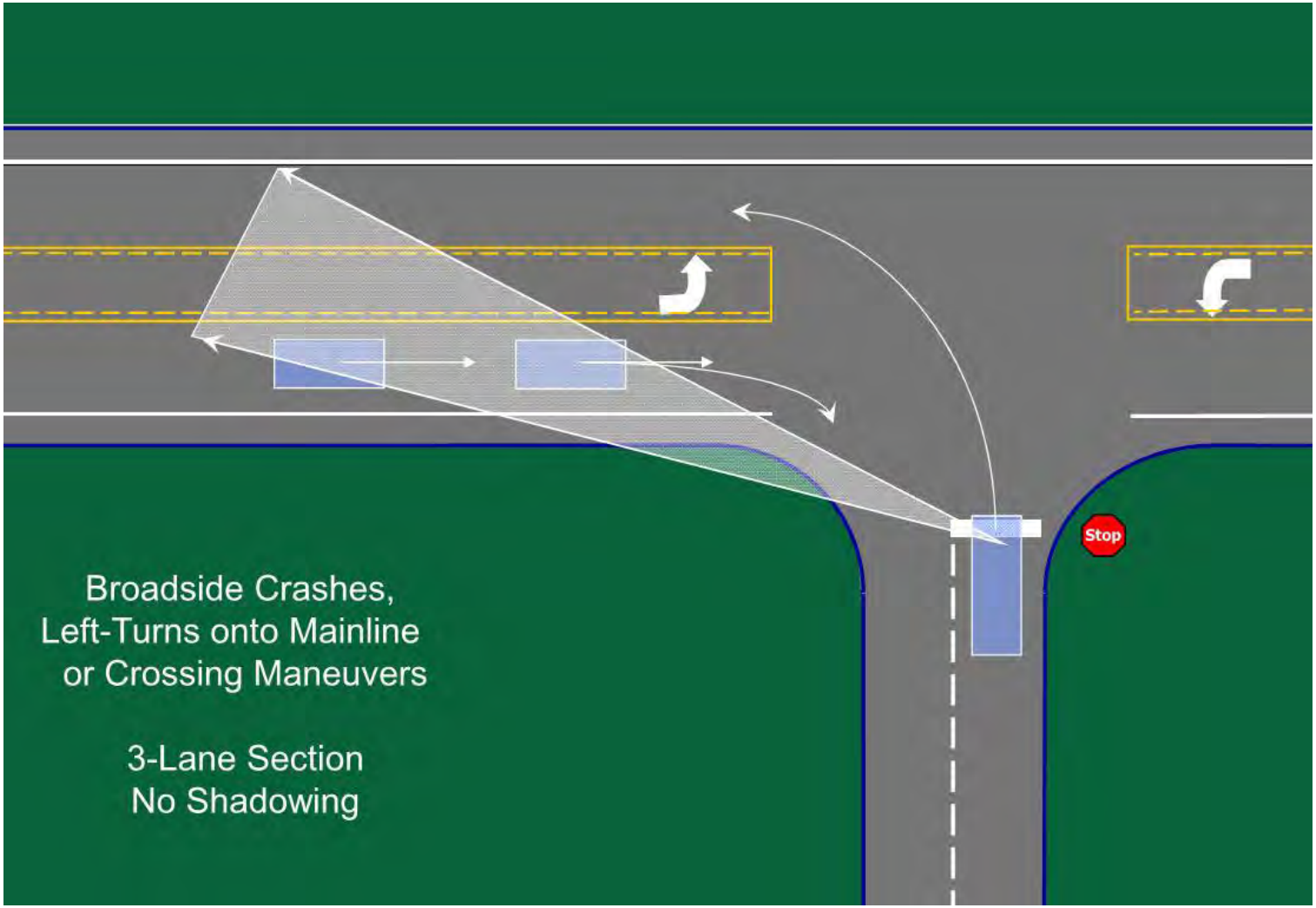
Side Street Left-Turn Challenges



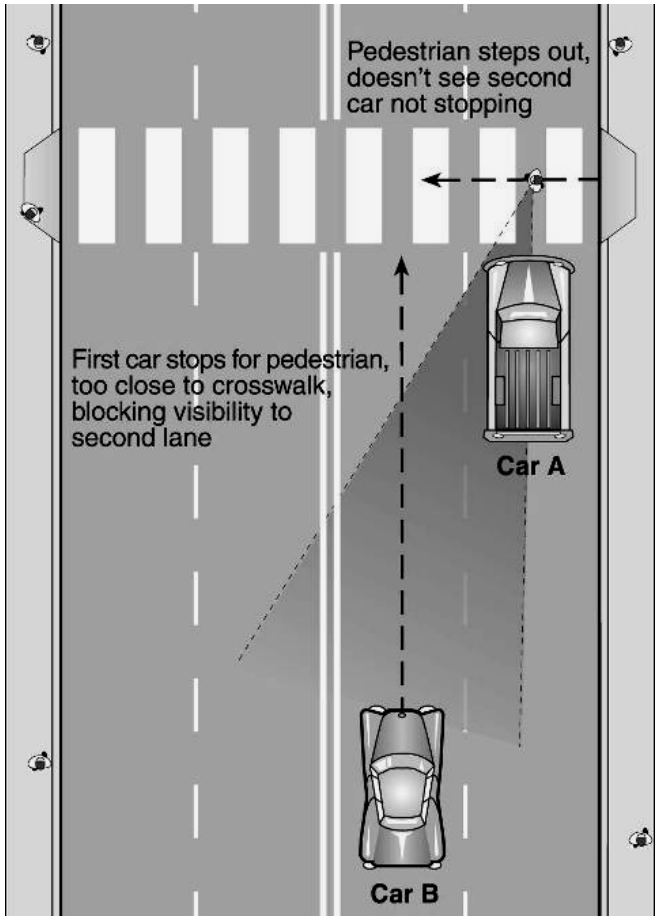
Sight Line – Left Turn from Minor Street



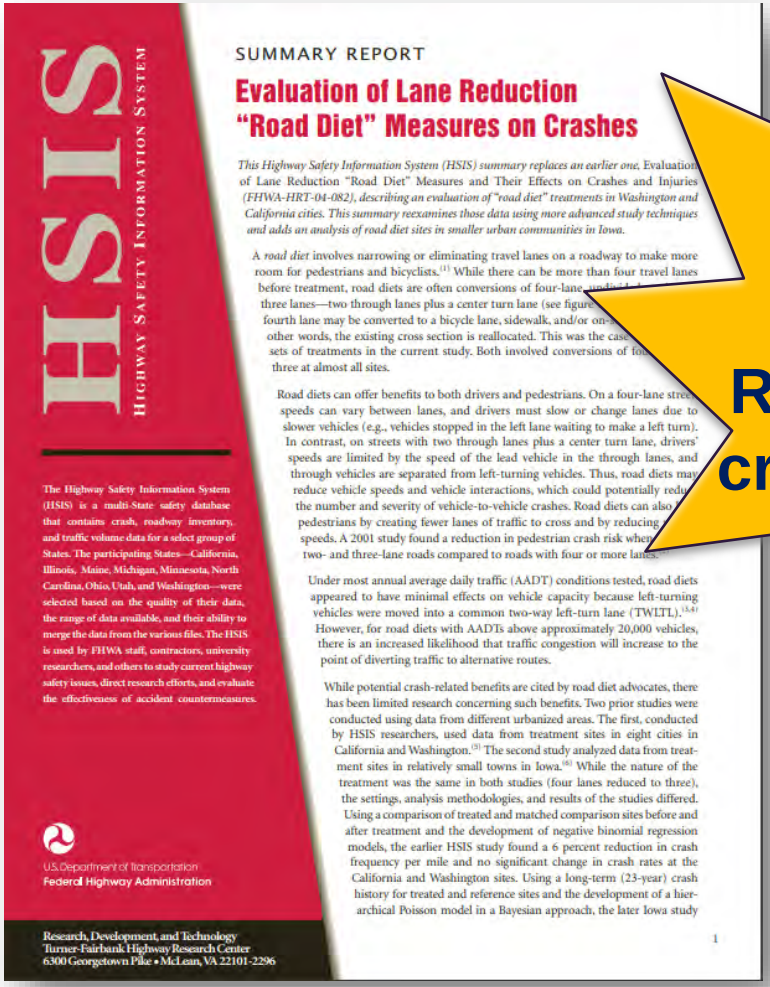
Sight Line – Left Turn from Minor Street



Improved Sight Lines at Unsignalized Crosswalks



Safety Benefits



HSIS
HIGHWAY SAFETY INFORMATION SYSTEM

The Highway Safety Information System (HSIS) is a multi-State safety database that contains crash, roadway inventory, and traffic volume data for a select group of States. The participating States—California, Illinois, Maine, Michigan, Minnesota, North Carolina, Ohio, Utah, and Washington—were selected based on the quality of their data, the range of data available, and their ability to merge the data from the various files. The HSIS is used by FHWA staff, contractors, university researchers, and others to study current highway safety issues, direct research efforts, and evaluate the effectiveness of accident countermeasures.

U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike • McLean, VA 22101-2296

SUMMARY REPORT

Evaluation of Lane Reduction "Road Diet" Measures on Crashes

This Highway Safety Information System (HSIS) summary replaces an earlier one, Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries *(FHWA-HRT-04-082), describing an evaluation of "road diet" treatments in Washington and California cities. This summary reexamines those data using more advanced study techniques and adds an analysis of road diet sites in smaller urban communities in Iowa.*

A *road diet* involves narrowing or eliminating travel lanes on a roadway to make more room for pedestrians and bicyclists.[1] While there can be more than four travel lanes before treatment, road diets are often conversions of four-lane undivided to three lanes—two through lanes plus a center turn lane (see figure). The fourth lane may be converted to a bicycle lane, sidewalk, and/or on-street parking. In other words, the existing cross section is reallocated. This was the case for both sets of treatments in the current study. Both involved conversions of four lanes to three at almost all sites.

Road diets can offer benefits to both drivers and pedestrians. On a four-lane street, speeds can vary between lanes, and drivers must slow or change lanes due to slower vehicles (e.g., vehicles stopped in the left lane waiting to make a left turn). In contrast, on streets with two through lanes plus a center turn lane, drivers' speeds are limited by the speed of the lead vehicle in the through lanes, and through vehicles are separated from left-turning vehicles. Thus, road diets may reduce vehicle speeds and vehicle interactions, which could potentially reduce the number and severity of vehicle-to-vehicle crashes. Road diets can also help pedestrians by creating fewer lanes of traffic to cross and by reducing vehicle speeds. A 2001 study found a reduction in pedestrian crash risk when comparing two- and three-lane roads compared to roads with four or more lanes.[2]

Under most annual average daily traffic (AADT) conditions tested, road diets appeared to have minimal effects on vehicle capacity because left-turning vehicles were moved into a common two-way left-turn lane (TWLTL).[3,4] However, for road diets with AADTs above approximately 20,000 vehicles, there is an increased likelihood that traffic congestion will increase to the point of diverting traffic to alternative routes.

While potential crash-related benefits are cited by road diet advocates, there has been limited research concerning such benefits. Two prior studies were conducted using data from different urbanized areas. The first, conducted by HSIS researchers, used data from treatment sites in eight cities in California and Washington.[5] The second study analyzed data from treatment sites in relatively small towns in Iowa.[6] While the nature of the treatment was the same in both studies (four lanes reduced to three), the settings, analysis methodologies, and results of the studies differed. Using a comparison of treated and matched comparison sites before and after treatment and the development of negative binomial regression models, the earlier HSIS study found a 6 percent reduction in crash frequency per mile and no significant change in crash rates at the California and Washington sites. Using a long-term (23-year) crash history for treated and reference sites and the development of a hierarchical Poisson model in a Bayesian approach, the later Iowa study

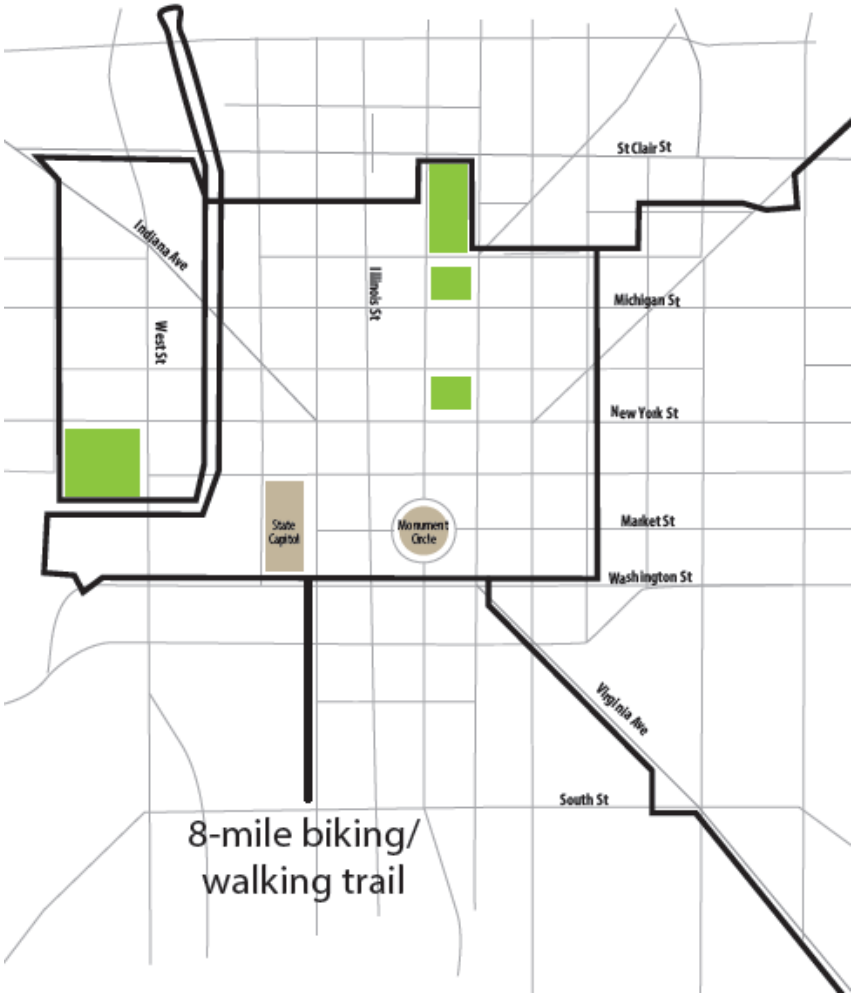
1

Based on safety studies, installing a Road Diet has an expected crash reduction of 19-47% *

*These differences may be a function of traffic volumes and characteristics of the urban environments where the road diets were implemented.
*CMF ID: 5554, 2841:

ROAD DIET

Why Road Diets? – To Improve Economic Development!!!



Indianapolis Cultural Trail
Indianapolis, IN

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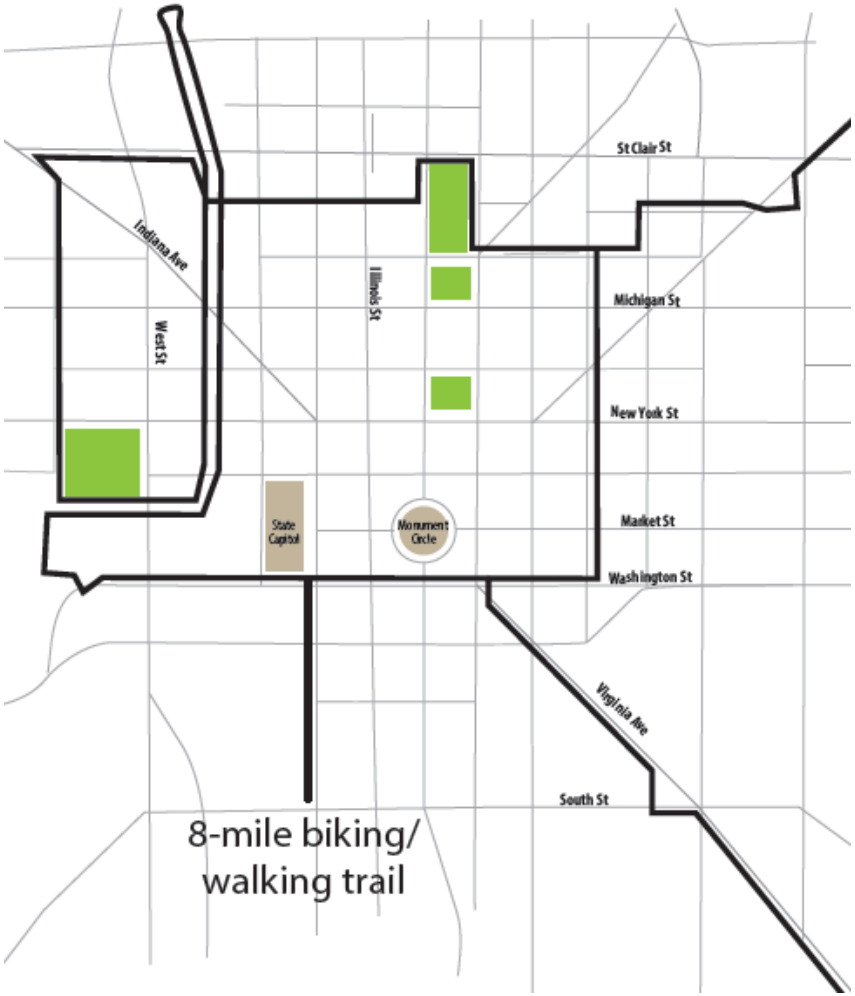
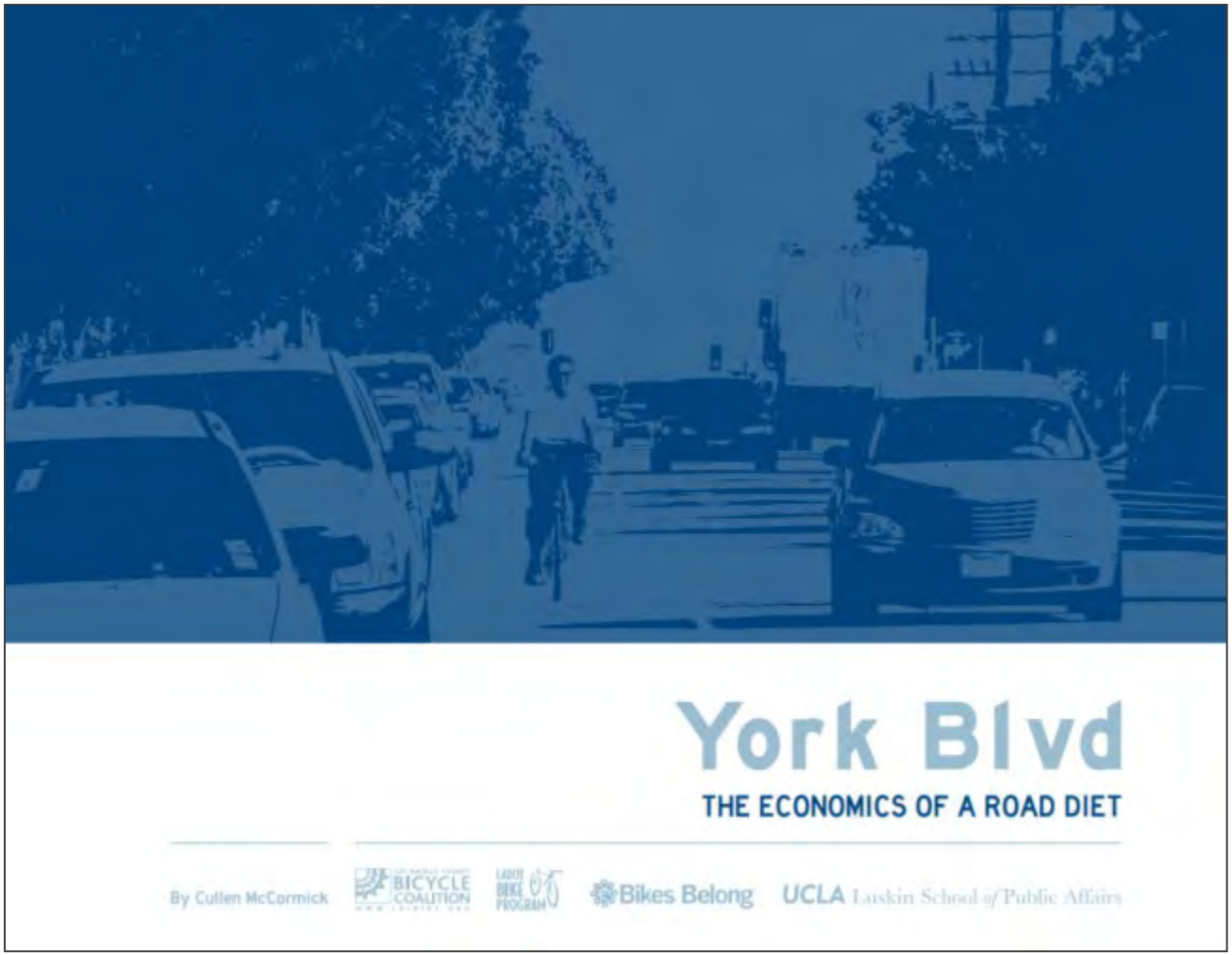


“Road diets work. West Palm Beach owes much of its downtown revitalization to successful road diets on Clematis Street and Dixie through downtown, and a successful rightsizing of Olive Avenue…”

Jesse Bailey
Walkable West Palm Beach

(https://walkablewpb.com/2015/10/06/fdot-statewide-lane-elimination-guidance/#comments)

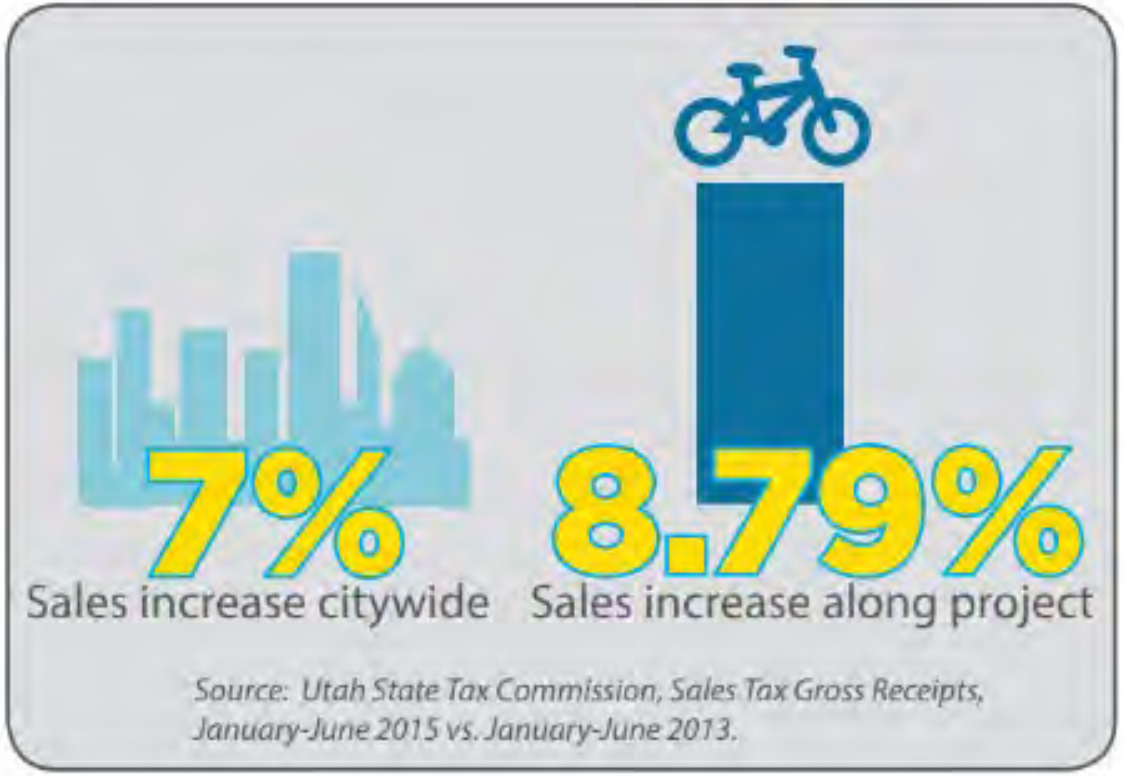
York Blvd, Los Angeles, CA
The Economics of a Road Diet



300 South (aka, Broadway) Salt Lake City, UT

"The bike lanes and lower speed limits help to calm car traffic and increase pedestrian traffic — all positives for my business"

Business owner along Broadway

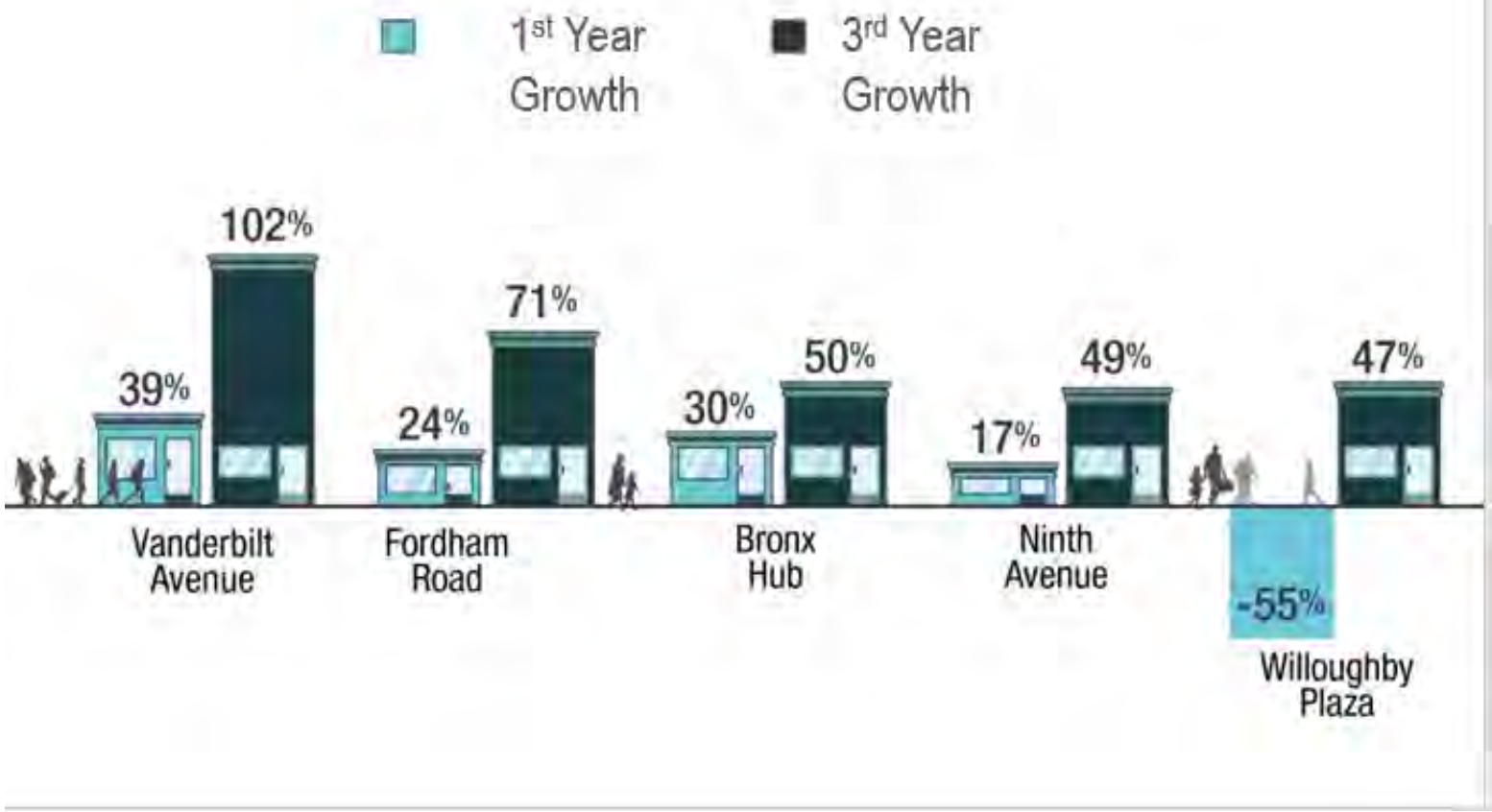


New York City DOT Study

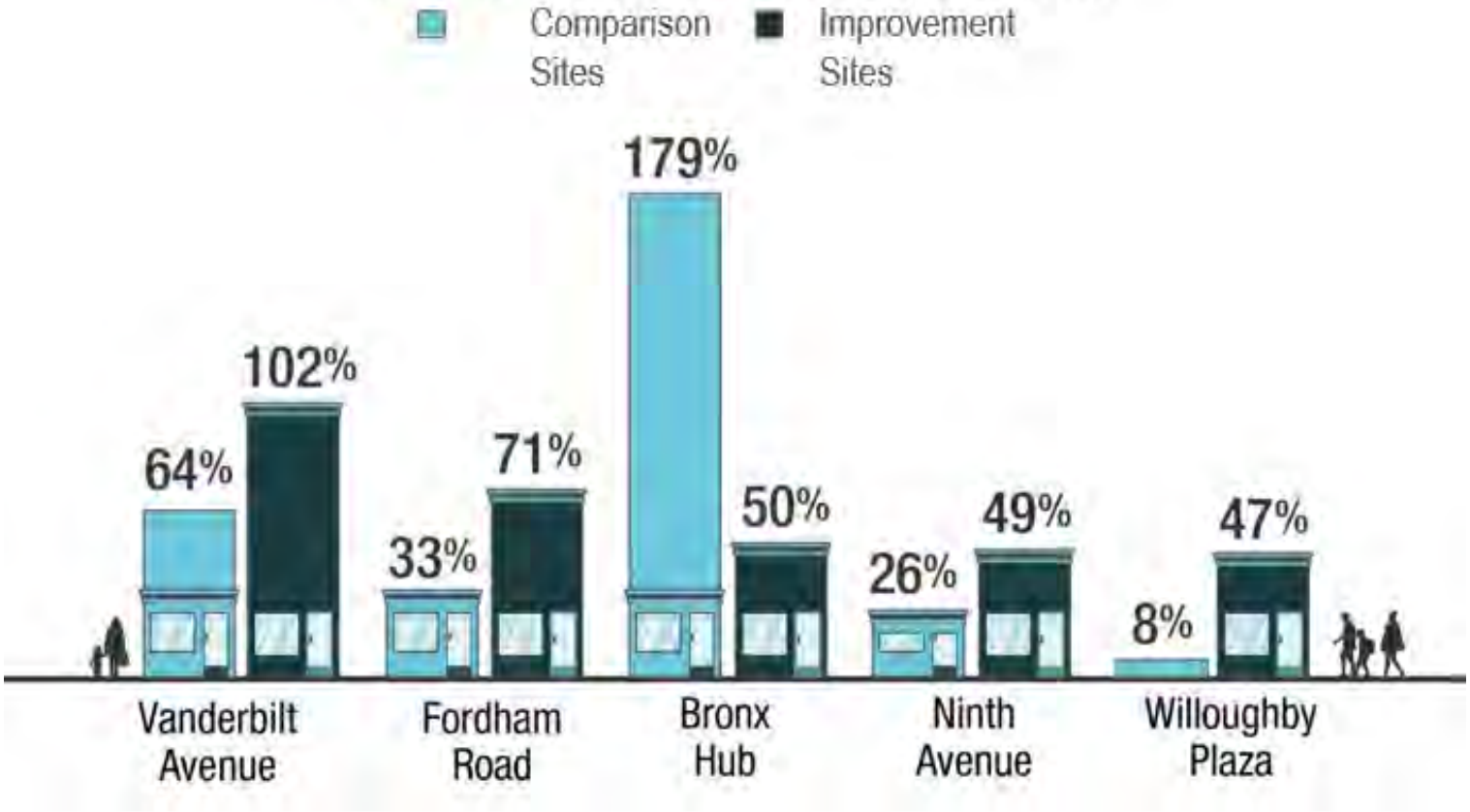

New York City
Project Case Studies
THE BRONX
Ninth Avenue
MANHATTAN
Fordham Road
Bronx Hub
Willoughby Plaza
Vanderbilt Avenue
BROOKLYN

Retail Sales Growth At Improvement Sites

First and Third Years after Improvements

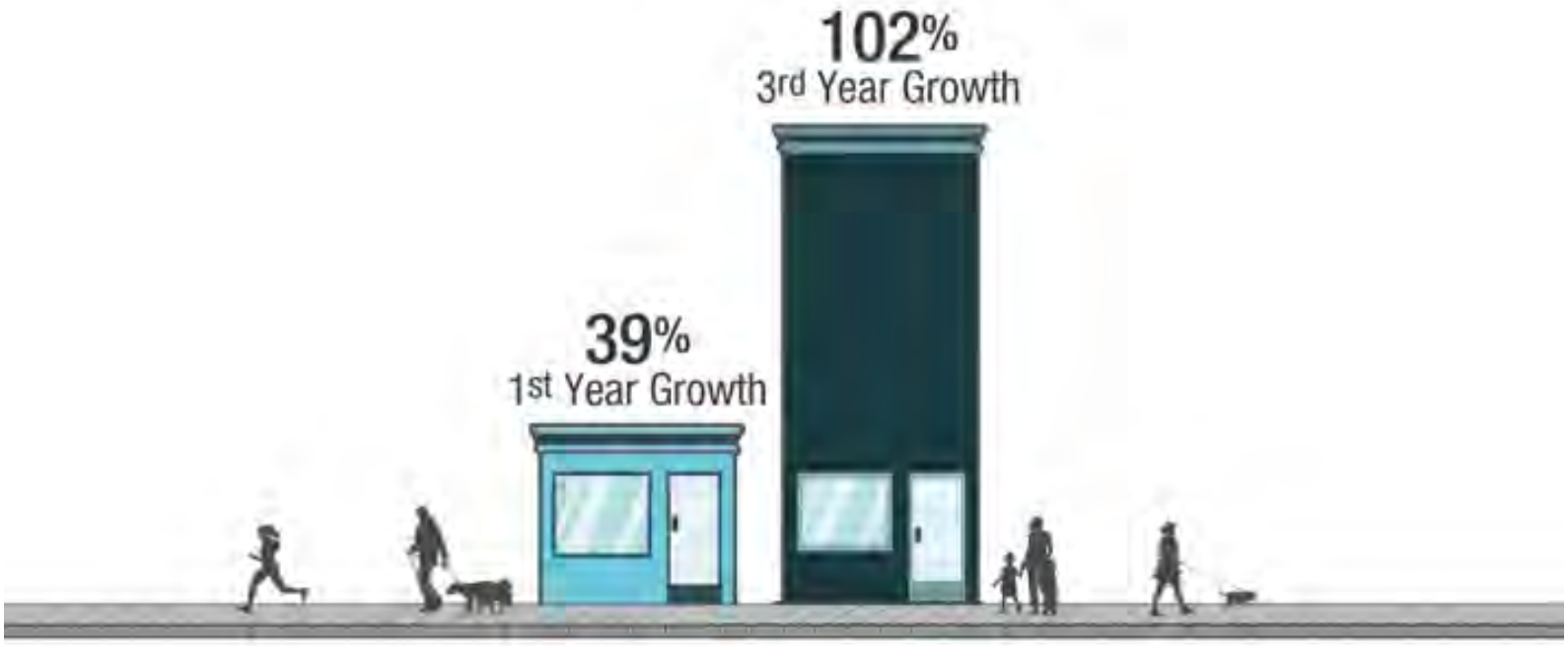


Retail Sales Growth vs. Comparison Sites
Average Growth
First and Third Years after Improvements



Vanderbilt Avenue

Baseline Quarterly Sales $894,673



Site Improvements at Vanderbilt Ave

Before

After

Site Improvements at Vanderbilt Ave

Before

After

ROAD DIET

ROAD DIET

Safety | Livability | Low Cost

M·Y·T·H·B·U·S·T·E·R·S

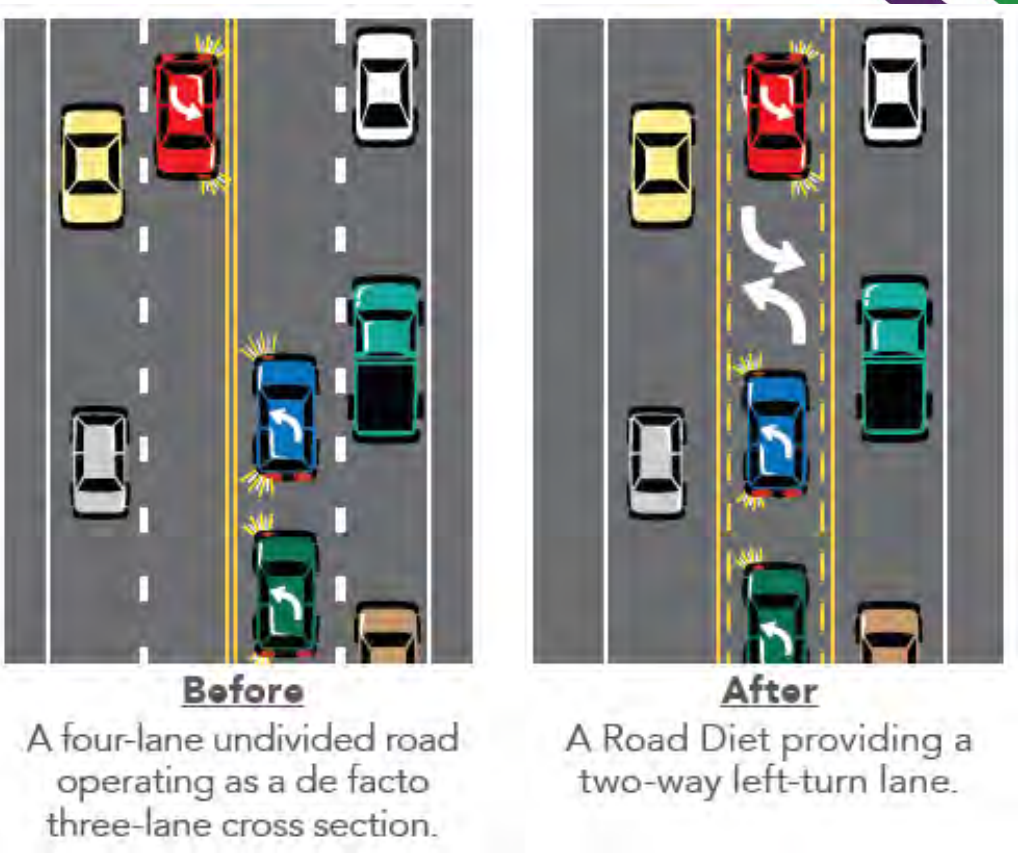
Myth: Road Diets Make Traffic Worse

A common misperception is that reducing the number of through lanes by implementing a Road Diet will cause traffic to become more congested.

FACT: Under certain conditions, Road Diets may maintain a roadway's "effective capacity" and may even reduce travel times within the corridor.

A four-lane roadway may already operate like a three-lane road.

Some four-lane roads operate essentially like a three-lane road (defacto one lane in each direction) and do not experience a reduction in capacity.



Before

A four-lane undivided road operating as a de facto three-lane cross section.

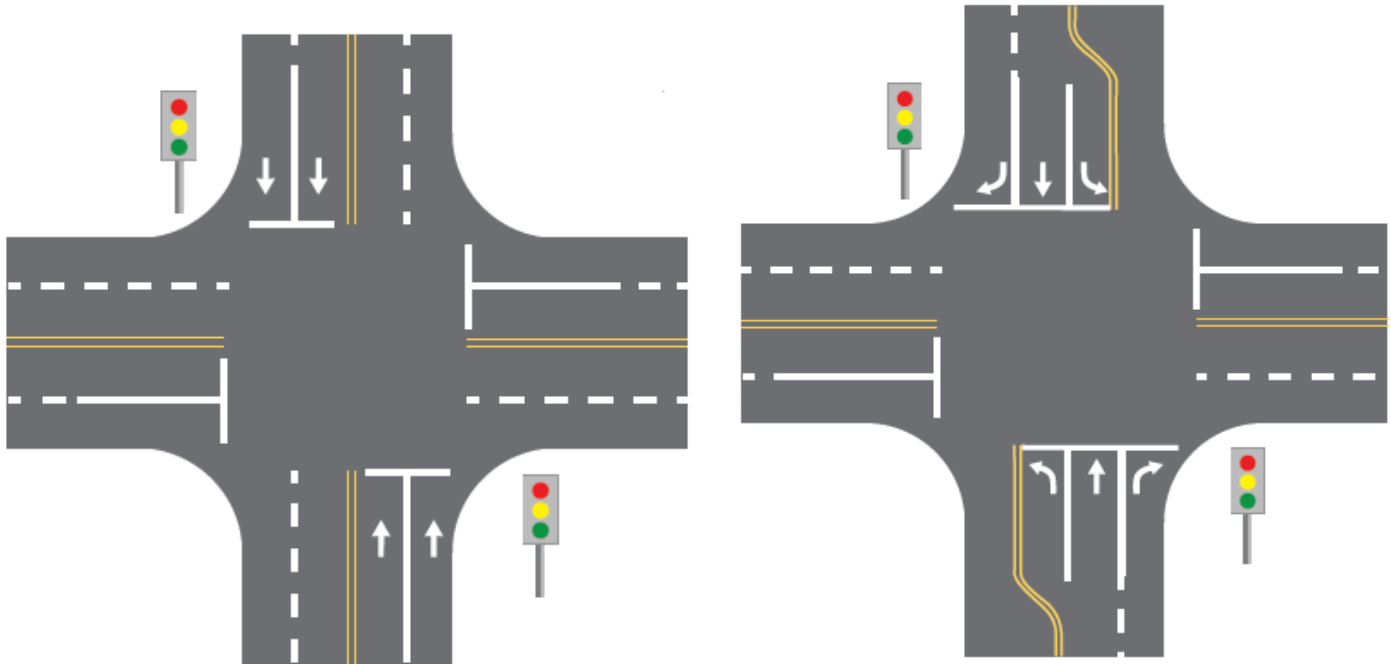
After

A Road Diet providing a two-way left-turn lane.

When a corridor contains a large number of access points (driveways) the majority of through traffic will tend to utilize the outside lanes to avoid being delayed by left-turning vehicles slowing and stopping in the inside lanes.

Intersections May Determine True Capacity

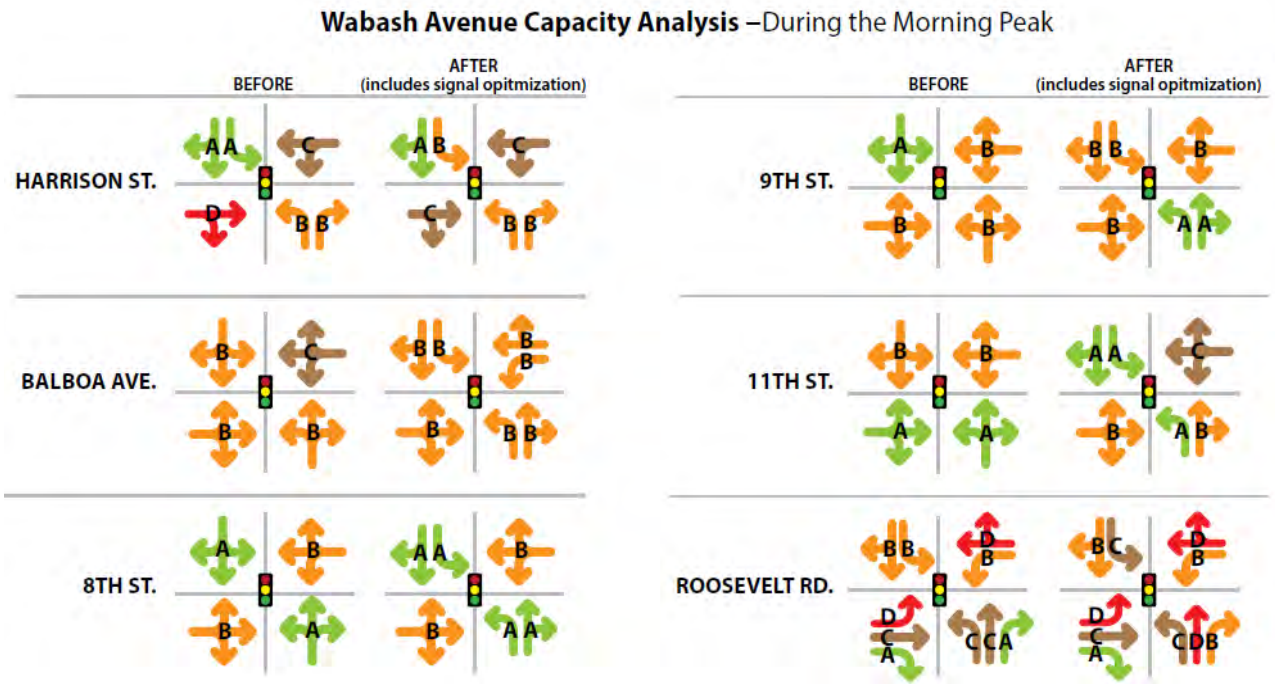
Converting four through lanes to two through lanes may make it possible to install dedicated turn lanes at the intersection



Example of intersection with added turning movements.

Turn Lane Reconfigurations and Signal Timing Changes

- By carefully analyzing and improving operations at intersections it may be possible to reduce the number of lanes mid-block on a street without increasing delay for motor vehicle traffic.



ROAD DIET

Safety | Livability | Low Cost

M·Y·T·H·B·U·S·T·E·R·S

Myth: Road Diets are only applicable to “low” volume roads.

FACT: Road Diets can be successful for a broad range of traffic volumes.

General Guidelines for Traffic Volumes

LESS THAN 10,000 ADT	10,000 – 15,000 ADT	15,000 – 20,000 ADT	GREATER THAN 20,000 ADT
Great candidate for Road Diet	Very good candidate for Road Diet	Good candidate for Road Diet	Potential candidate for Road Diet
In most instances traffic will likely not be negatively affected.	Agencies should conduct intersection analysis to study potential traffic operational effects and consider signal retiming as needed.	Agencies should conduct a corridor analysis since traffic operations may be affected at this volume depending on the "before" condition.	Agencies should complete a feasibility study to determine whether this is a good location for a Road Diet. Operations may be affected at this volume.

There are examples across the country where Road Diets have been successful with ADTs as high as 26,000.

ROAD DIET

Safety | Livability | Low Cost

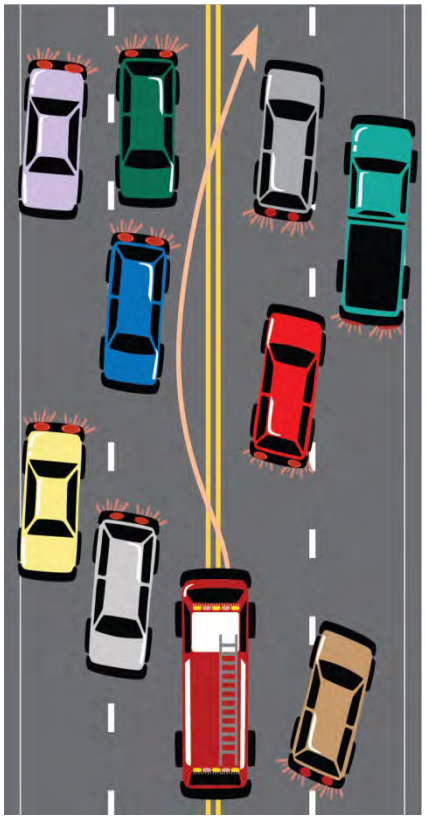
M·Y·T·H·B·U·S·T·E·R·S

Myth: Road Diets increase emergency response times.

FACT: Road Diets can <u>improve</u> emergency response times.

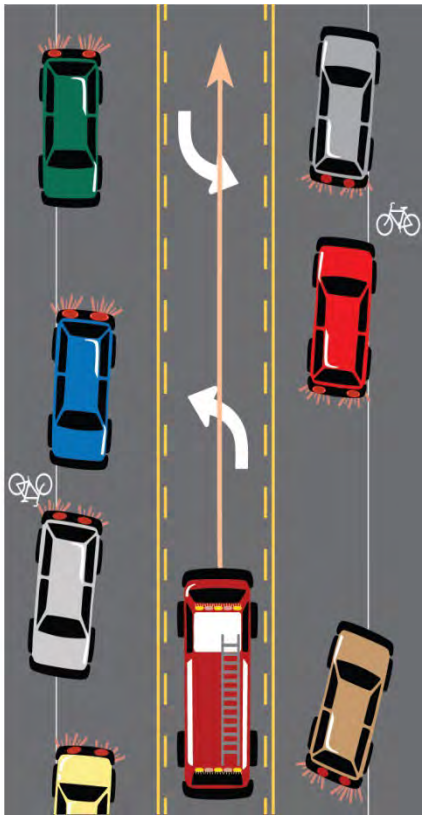
Emergency Response Vehicles

Before



A fire truck struggling to find a path.

After



An easily navigable two-way left-turn lane.

Four-lane undivided roads can be awkward for emergency responders and can slow response times.

Drivers in inside lanes are often uncertain about where to go to allow emergency responders to pass.

ROAD DIET

Safety | Livability | Low Cost

M·Y·T·H·B·U·S·T·E·R·S

Myth: Road Diets don't accommodate large vehicles.

FACT: Road Diets can often be designed to provide for the needs of larger vehicles including trucks.

Larger Vehicles

Road Diets have been successfully implemented along corridors that accommodate large vehicles like freight trucks and transit buses.

Road Diets may present opportunities to re-plan the roadway space for large vehicles by including delivery parking areas, improved intersection turning radii, and protected bus pull outs for pickup or drop-off.

A Road Diet configured to better accommodate buses.

Mini-Roundabouts

ROAD DIET

Safety | Livability | Low Cost

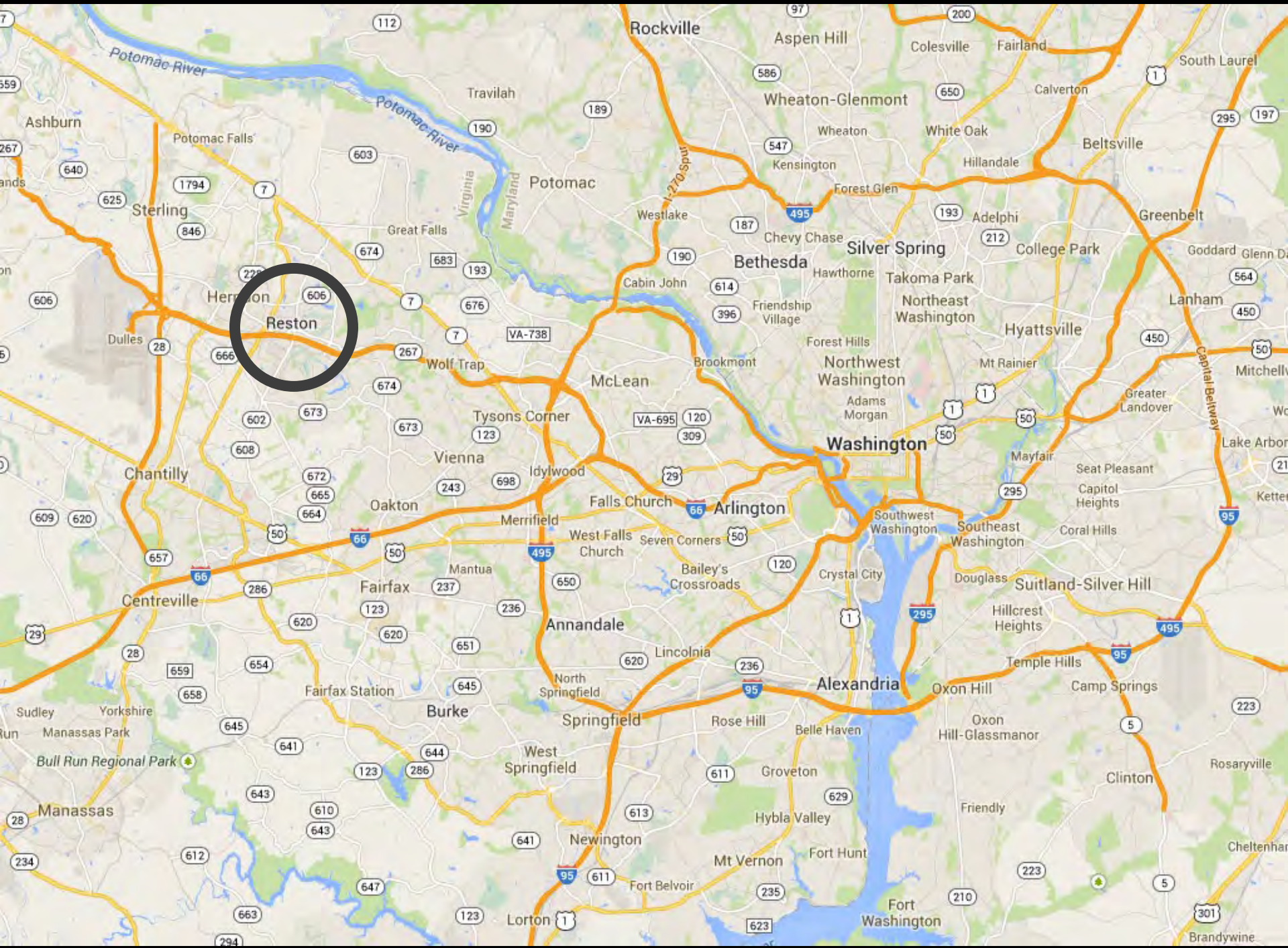
M·Y·T·H·B·U·S·T·E·R·S

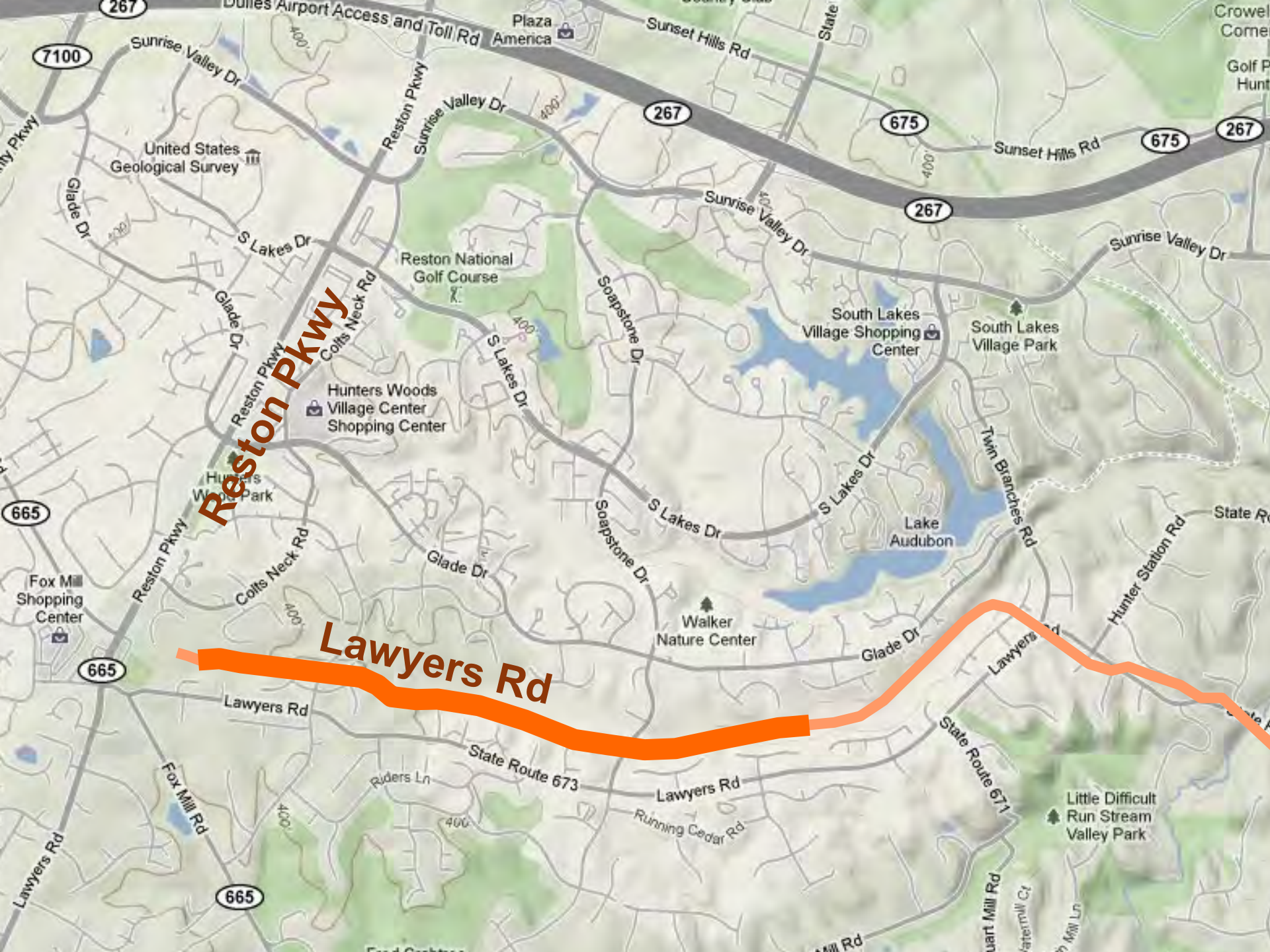
Myth: Road Diets will divert traffic onto other routes.

FACT: The average daily traffic (ADT) volumes remained the same for most Road Diet implementations.

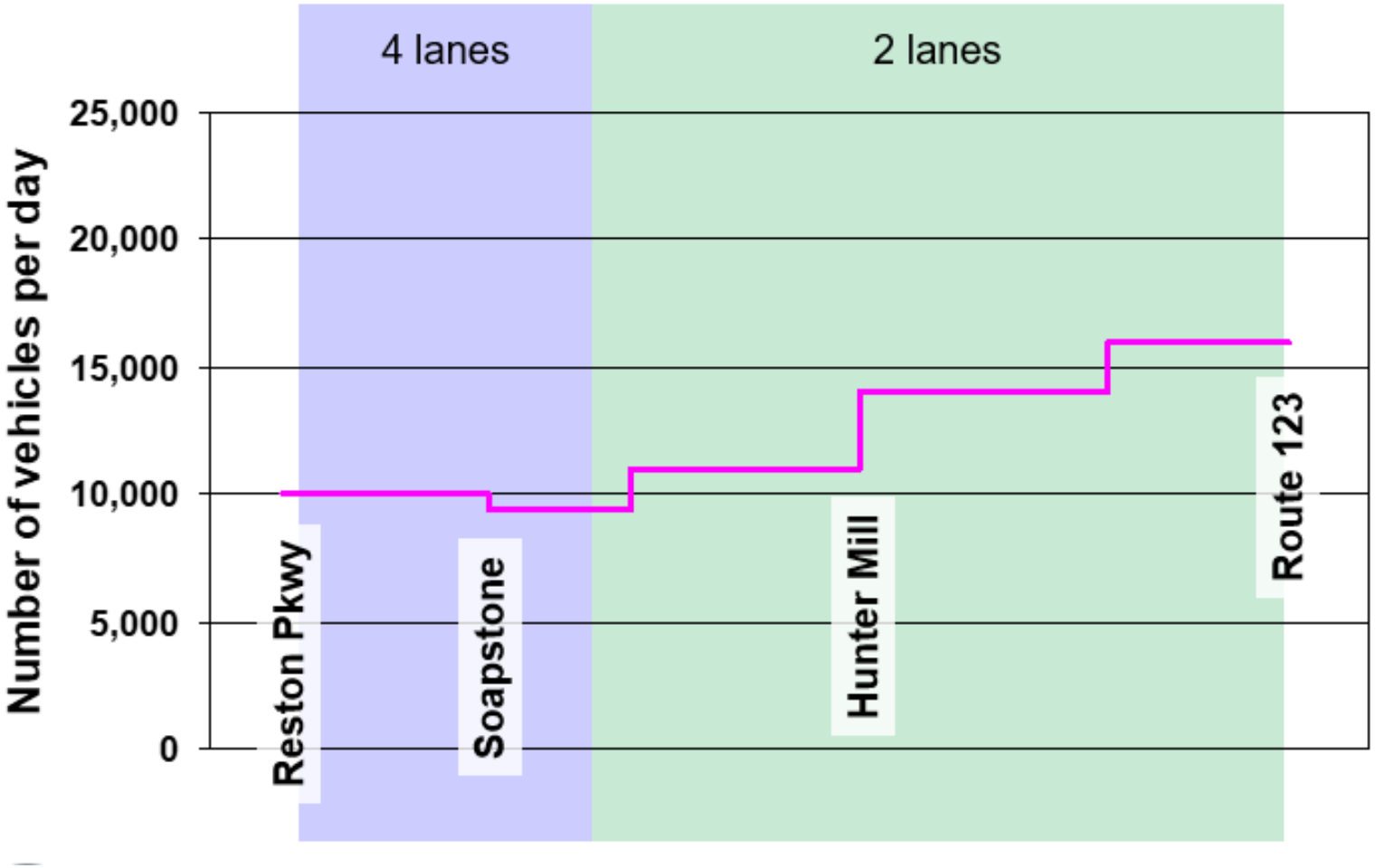
Northern Virginia Lawyers Road Road Diet

Reduced Crashes by 70%


Reston
Rockville
Aspen Hill
Colesville
Fairland
South Laurel
Potomac River
Travilah
Wheaton-Glenmont
Calverton
Ashburn
Potomac Falls
Wheaton
White Oak
Beltsville
Kensington
Hillandale
Sterling
Potomac
Forest Glen
Westlake
Adelphi
Greenbelt
Great Falls
Chevy Chase
Silver Spring
College Park
Bethesda
Hawthorne
Takoma Park
Cabin John
Friendship Village
Northeast Washington
Lanham
Hyattsville
Dulles
Forest Hills
Wolf Trap
Brookmont
Northwest Washington
Mt Rainier
McLean
Adams Morgan
Greater Landover
Tysons Corner
Washington
Vienna
Mayfair
Seat Pleasant
Chantilly
Idylwood
Capitol Heights
Oakton
Falls Church
Arlington
Merrifield
Southwest Washington
Southeast Washington
West Falls Church
Seven Corners
Coral Hills
Mantua
Bailey's Crossroads
Crystal City
Douglass
Suitland-Silver Hill
Fairfax
Centreville
Annandale
Hillcrest Heights
Lincolnia
Temple Hills
Alexandria
Oxon Hill
Camp Springs
Fairfax Station
North Springfield
Burke
Springfield
Rose Hill
Belle Haven
Oxon Hill-Glassmanor
Sudley
Yorkshire
Manassas Park
Bull Run Regional Park
West Springfield
Groveton
Clinton
Rosaryville
Manassas
Hybla Valley
Friendly
Newington
Mt Vernon
Fort Hunt
Fort Belvoir
Lorton
Fort Washington
Brandywine


Reston Pkwy
Lawyers Rd
Dulles Airport Access and Toll Rd
Plaza America
Sunset Hills Rd
Sunrise Valley Dr
Reston Pkwy
United States Geological Survey
Glade Dr
S Lakes Dr
Reston National Golf Course
Colts Neck Rd
Soapstone Dr
South Lakes Village Shopping Center
South Lakes Village Park
Hunters Woods Village Center Shopping Center
Twin Branches Rd
Lake Audubon
Hunter Station Rd
Fox Mill Shopping Center
Walker Nature Center
State Route 673
State Route 671
Fox Mill Rd
Riders Ln
Running Cedar Rd
Little Difficult Run Stream Valley Park
267
675
7100
665
400

Amount of Traffic on Lawyers

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4744


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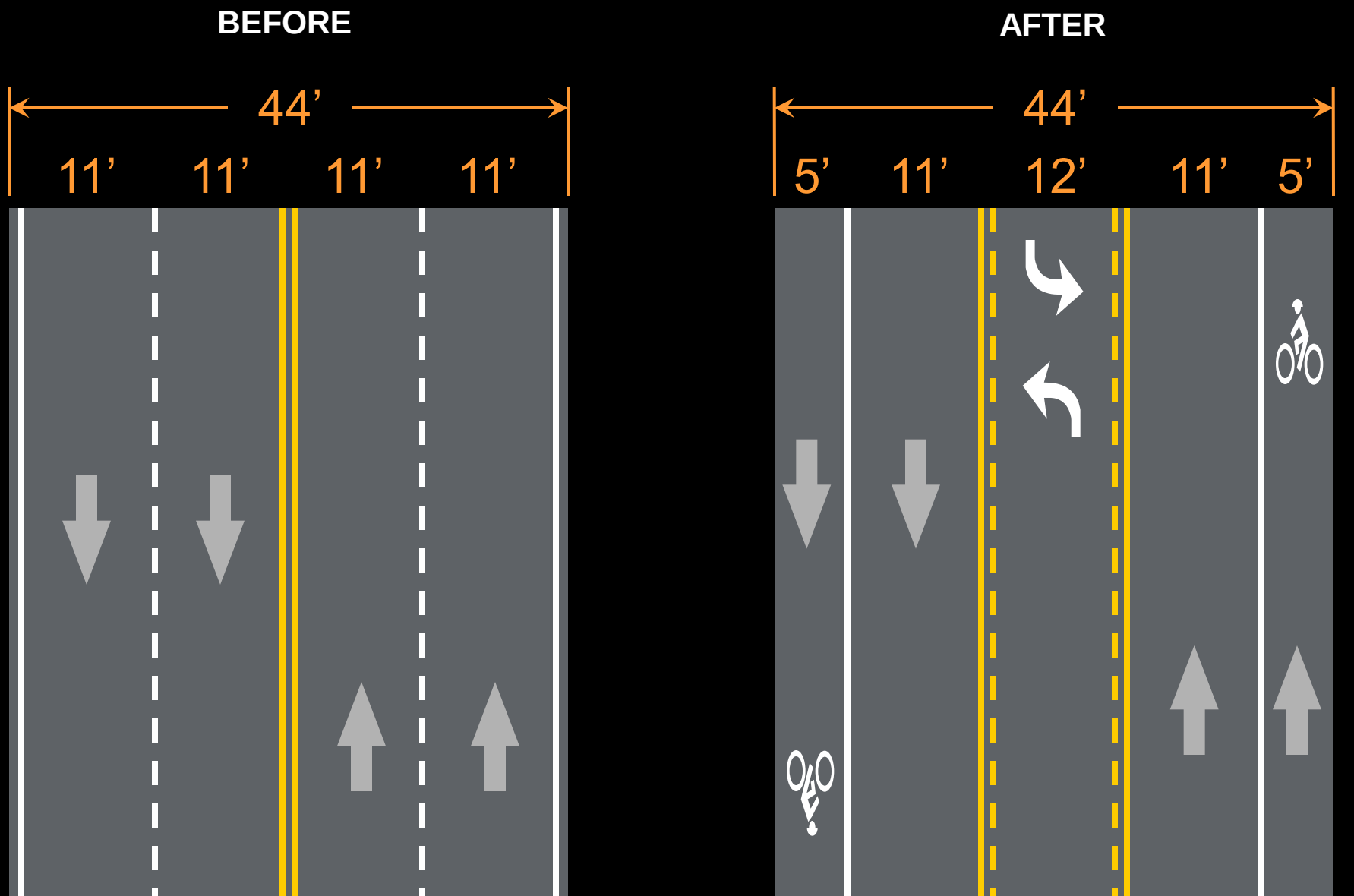
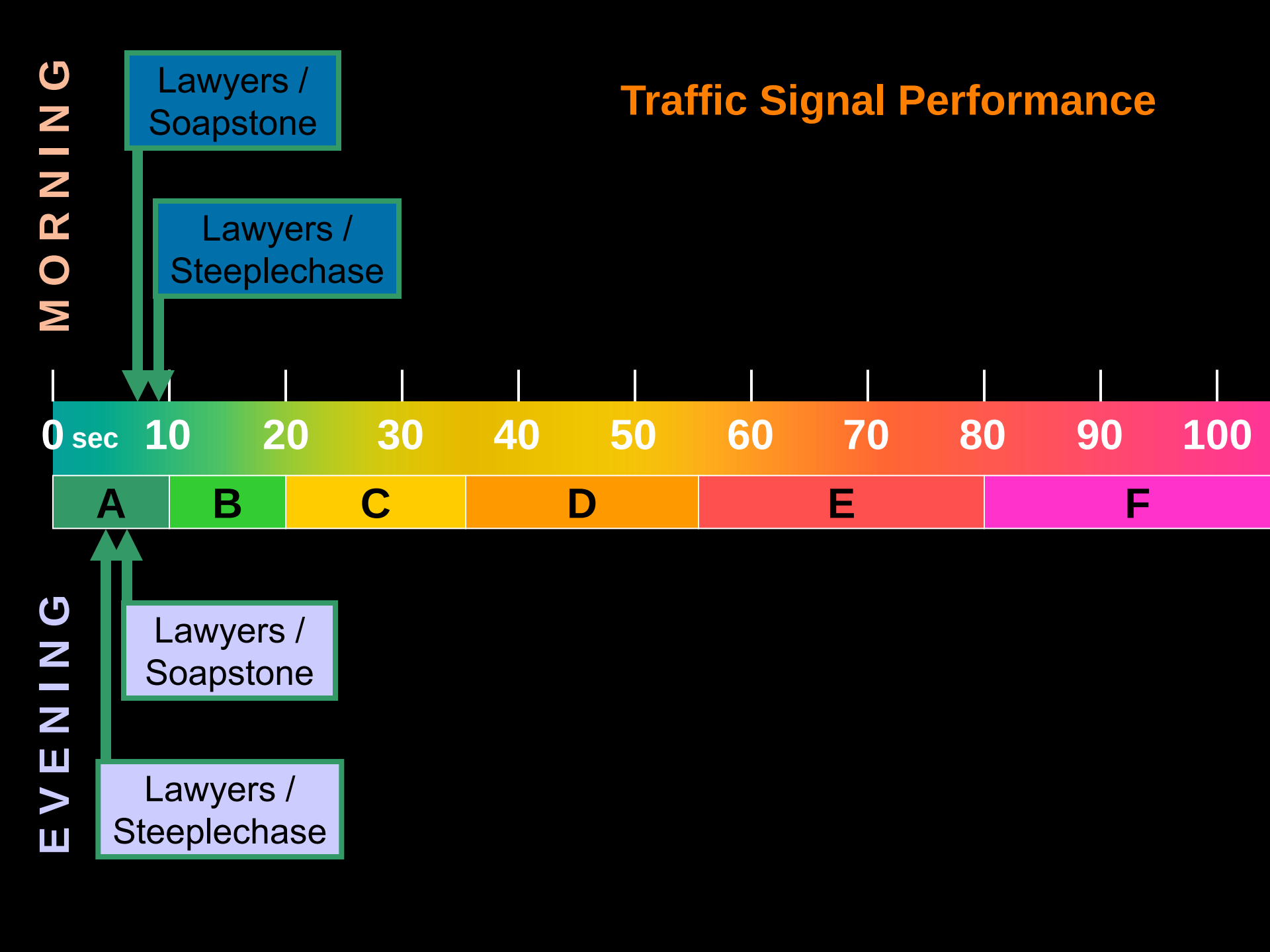
Lawyers Rd. Marking Layout




MORNING
Lawyers / Soapstone
Lawyers / Steeplechase
Traffic Signal Performance
0 sec
10
20
30
40
50
60
70
80
90
100
A
B
C
D
E
F
EVENING
Lawyers / Soapstone
Lawyers / Steeplechase

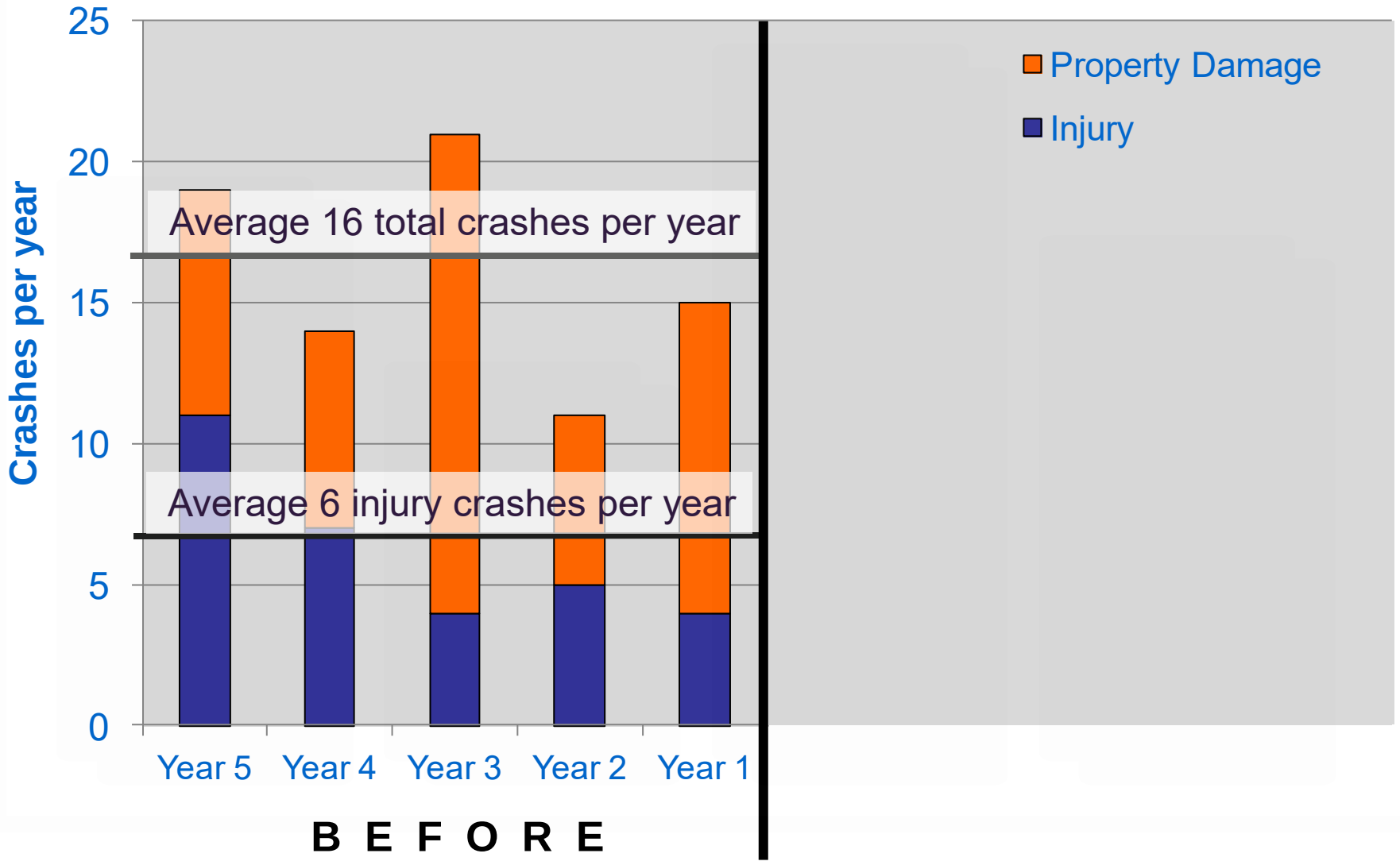
Average Delay at Traffic Signals (seconds)

	Morning		Evening	
	Existing	Proposed	Existing	Proposed
Lawyers / Steeplechase	9	12	5	6
Lawyers / Soapstone	7	8	6	7

Average Delay on Side Street (seconds)

	Morning		Evening	
	Existing	Proposed	Existing	Proposed
Typical side street	12	15	11	13

Crashes in the Road Diet Section of Lawyers



Lawyers Road Diet Results

- **Average Speeds Dropped by 1 mph**
- **Vehicles Over 50 mph Declined from 13% to 1% of Traffic**
- **No Change in Traffic Volumes**

Lawyers Road Survey

851 responses, non-scientific, one year after implementation

• Does the road feel safer?	Yes:	69%
• Do you cycle more often on Lawyers?	Yes:	47%
• Do your auto trips take more time?	No:	69%
• Have auto speeds dropped?	Yes:	59%
• Did the project improve Lawyers?	Yes:	74%

ROAD DIET

Safety | Livability | Low Cost

M·Y·T·H·B·U·S·T·E·R·S

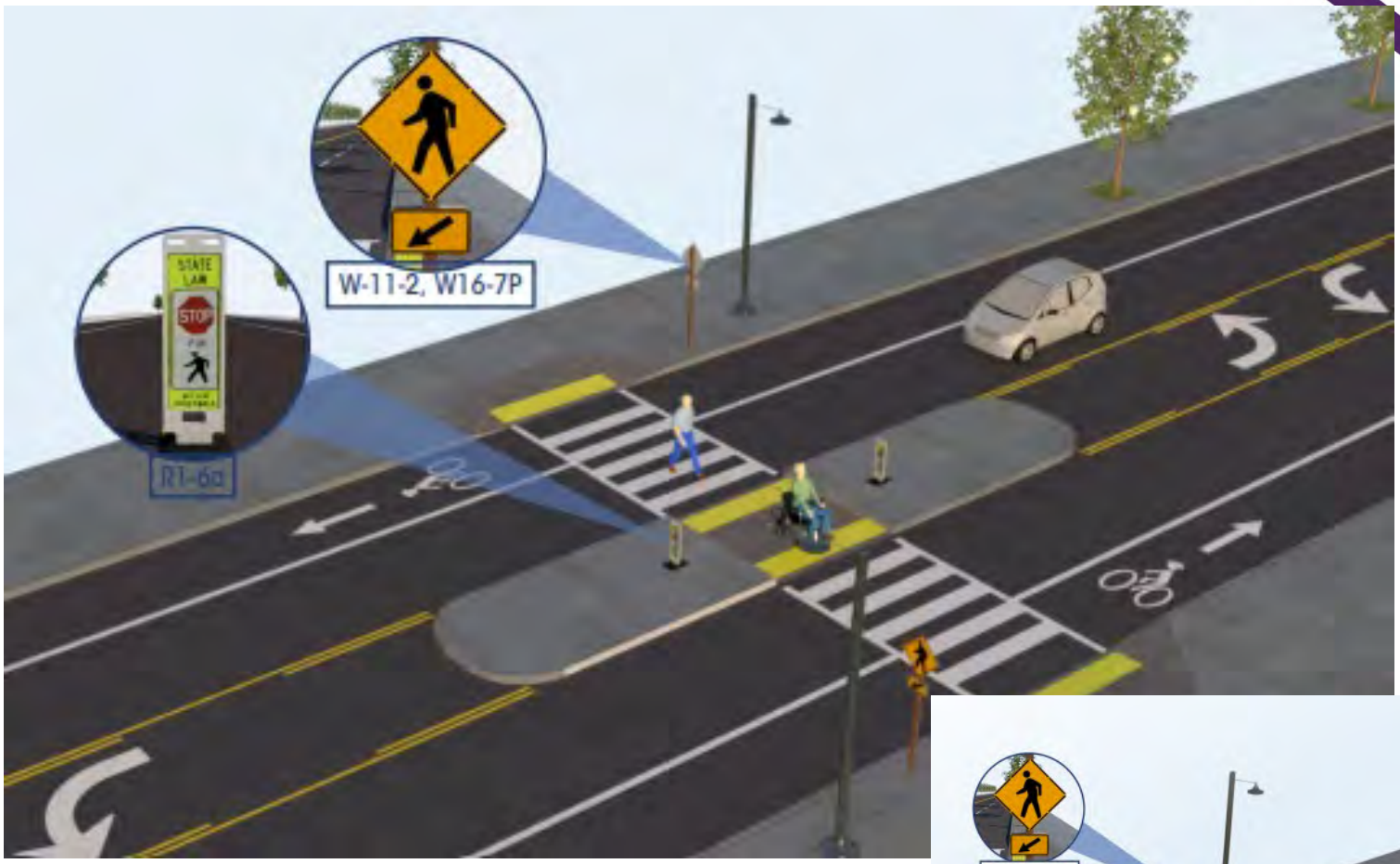
Myth: Road Diets don't benefit pedestrians or transit users.

FACT: Road Diet implementations may greatly benefit these user groups.

Pedestrian Benefits

- Opportunities to provide facilities that may not currently exist
- Speed reductions lead to fewer and less severe crashes
- Three-lane cross-section makes crossing the roadway easier for pedestrians (fewer travel lanes to cross and they are exposed to moving traffic for a shorter period of time)

By adding pedestrian refuge islands - the crossing becomes shorter and less complicated (pedestrians only have to be concerned with one direction of travel at a time)


W-11-2, W16-7P
STATE LAW
STOP
R1-6a


W-11-2, W16-7P
STATE LAW
STOP
R1-6a

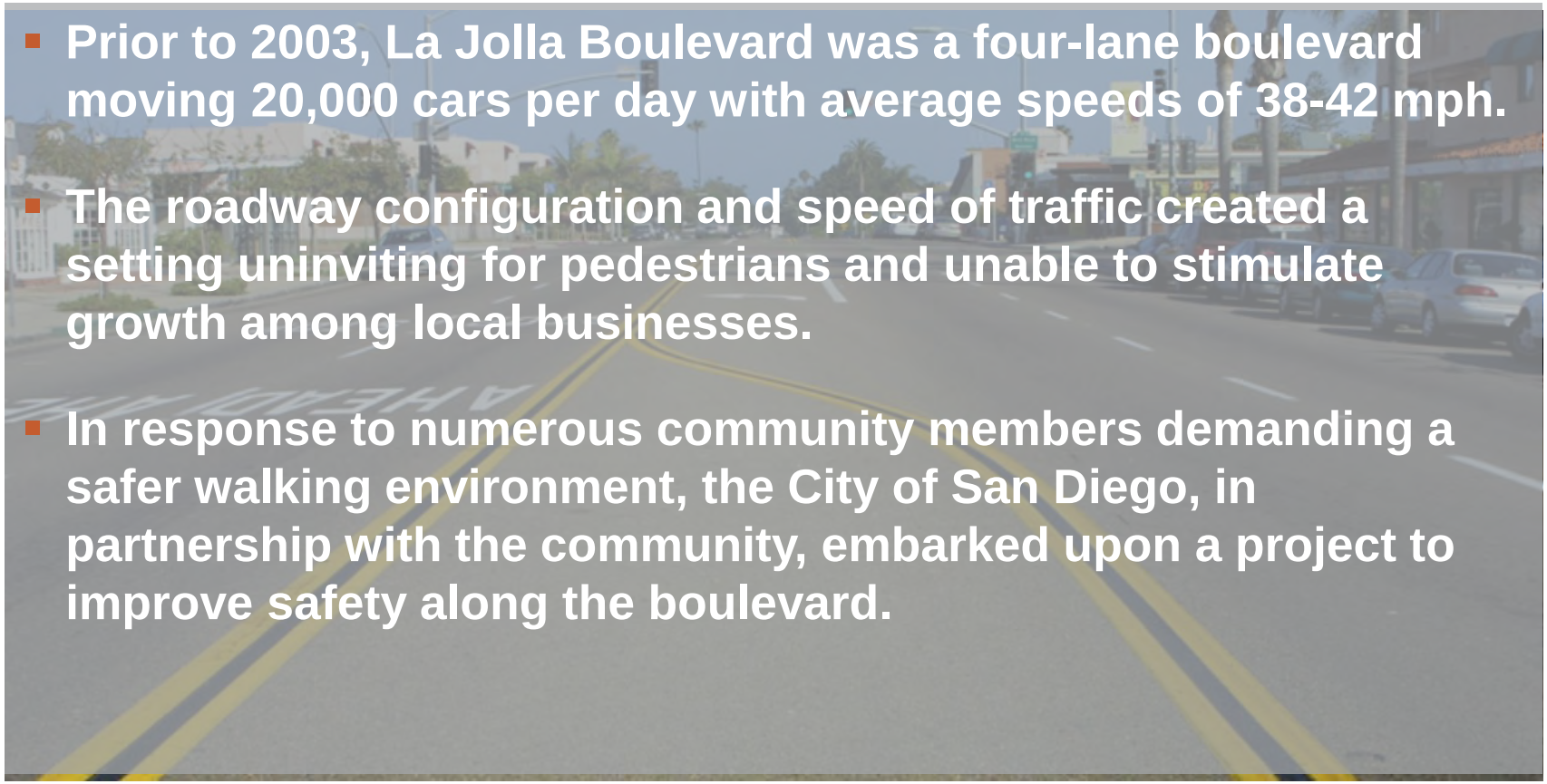
Complete Streets

- Some Complete Streets efforts may require redesign and Right-of-Way
- Road Diets can be a tool that helps implement complete streets under some conditions

Source: New York State Complete Streets Report
www.dot.ny.gov/programs/completestreets/repository/Complete%20Streets%20Final%20Report_NYSDOT.pdf

ROAD DIET

LaJolla Blvd – Bird Rock Community (San Diego, CA)



- **Prior to 2003, La Jolla Boulevard was a four-lane boulevard moving 20,000 cars per day with average speeds of 38-42 mph.**
- **The roadway configuration and speed of traffic created a setting uninviting for pedestrians and unable to stimulate growth among local businesses.**
- **In response to numerous community members demanding a safer walking environment, the City of San Diego, in partnership with the community, embarked upon a project to improve safety along the boulevard.**

Source: Arnold, M., Chui, G., and Lupo, D., P.E. “Roundabout Product Demonstration Showcase” Presentation on December 10, 2008, City of San Diego Engineering & Capital Projects Department

LaJolla Blvd – San Diego, CA

LaJolla Blvd – Bird Rock Community (San Diego, CA)

- Narrower travel lanes, five roundabouts, landscaped medians and angled parking have slowed traffic speeds, improved pedestrian safety, and also revitalized the businesses!!!

ROAD DIET

LaJolla Blvd – Photo Credit: Mark Doctor FHWA

Transit Considerations

- Potential for bus pullouts
- Reassess bus stop location and spacing
- Add physical barriers to prevent passing

ROAD DIET

Safety | Livability | Low Cost

M·Y·T·H·B·U·S·T·E·R·S

Myth: Road Diets should be used everywhere!!!

FACT: There are many items to consider before implementing a Road Diet.

Evaluative Factors

Appendix B of the FHWA ***Road Diets Informational Guide*** contains sample evaluative questions and factors for considering Road Diet feasibility.

Appendix B – Feasibility Determination Factors, Characteristics, and Sample Evaluative Questions

Factor	Characteristics	Sample Evaluative Questions
Roadway Function and Environment	• Actual, Expected, and Desired Primary Function (Access, Mobility, or a Combination of the Two) • Community Objectives or Goals for the Roadway • Available Right-of-Way • Current and Expected Adjacent Land Use • Jurisdictional Plan or Policy for Conversions • Jurisdictional Context Sensitive or Complete Street Policy	• What is the primary current, expected, and desired function of the roadway? • Is the roadway primarily a collector or minor arterial roadway? • Does the current roadway primarily operate as a "de facto" three-lane cross section? • Is the goal for the roadway improvement increased safety with somewhat lower mobility? • Is the right-of-way limited? • Will the adjacent land use remain relatively stable throughout the design period? • Will the proposed cross section match the desired function of the roadway? • Will the answers to the above questions remain the same throughout the design period of the project? • Does the jurisdiction have a plan or policy related to these types of conversions? • Does the jurisdiction have a context sensitive or Complete Streets policy that may apply?

Evaluative Factors

Washington State
Road Diet
Peer Exchange
September 5, 2018

WORKSHEET for Assessing a ROAD DIET Candidate Project

This list of evaluative questions and issues for consideration may be helpful when assessing the feasibility a road diet project. It provides a beginning point for assessing topics often relevant to road diet reviews. More issues or information about specific proposals may be needed and adapting this worksheet to meet your own needs may be appropriate. In considering these issues, exercising professional judgement is critical. Many items are interrelated and there are trade-offs in addressing these issues in relation to the desired goals and objectives of the project.

Basic Information

Project Name/Location: _____

Project Limits/Length: _____

Project Goals and Objectives

Intent: *By first identifying the objective(s), this will help determine whether a road diet is an appropriate alternative for the corridor being evaluated.*

Are there established safety improvement goals for this project? _____

Is there a desire to achieve reduced travel speeds and/or traffic calming? _____

Are there established mobility goals for this roadway improvement project? _____

Have any multimodal level of service goals been established? _____

Does the local jurisdiction have a Complete Streets policy that may apply? _____

Are there any economic enhancement or livability goals for this project? _____

Does achieving the project goals involve making changes to the current cross section (e.g., bike lane, on-street parking, etc.)? _____

Notes: _____

_____

_____

_____

_____

Road Function and Context

What is the road's current Functional Classification? _____

Is a future change in Functional Classification expected or desired? _____

Opportunities for 2025: Develop a Road Diet Policy

1. Improve Safety
2. Save Time
3. Save Money
4. Increase Multimodal Use
5. Facilitate Public Acceptance

Standalone Policies

Florida DOT

Statewide Lane Elimination Guidance

- ❑ Stage 1
  - Initial Meeting
  - Initial Central Office Notice
- ❑ Stage 2
  - Interim Meeting and Draft Concept Report
  - Interim Central Office Notice
- ❑ Stage 3
  - Formal Application
  - Final Central Office Notice
  - Approval Letter or Denial Letter

Standalone Policies
Maine DOT

Guidelines to Implement a Road Diet or Other Features Involving Traffic Calming

- ❑ Purpose and Need and Alternative Analysis
- ❑ Maine DOT Design Guidance
- ❑ Limitations
- ❑ Other Considerations
- ❑ Minimum Study Requirements
- ❑ Approval

Standalone Policies
Michigan DOT

Road Diet Checklist

- ❑ Road Diet Location
- ❑ General Items
- ❑ Complete Streets Items
- ❑ Geometric, Operations and Safety Items
- ❑ Comments

ROAD DIET

Standalone Policies
St. Louis County, Missouri

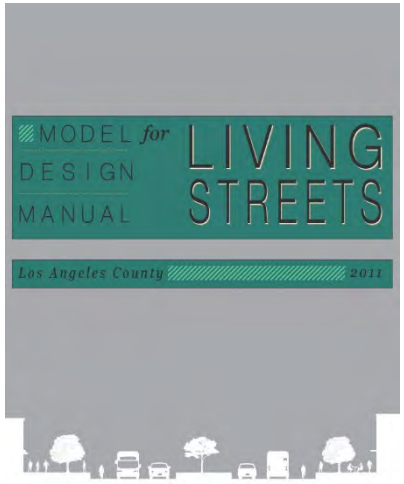
Road Diet Policy

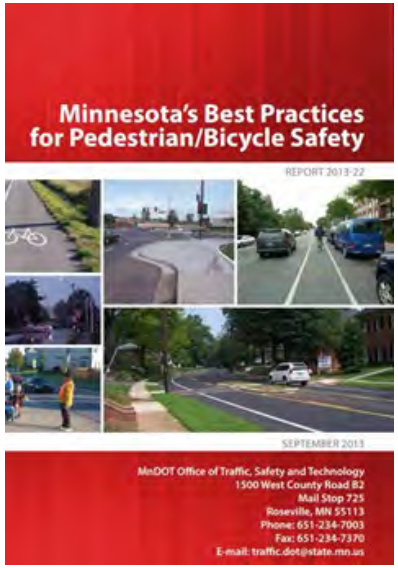
- ❑ Traffic Volumes: Average Weekday Traffic (AWT)
- ❑ Intersections: Signal progression; intersection throughput; and queuing during peak hours.
- ❑ Alternate Bypass Routes
- ❑ Bus Transit: Presence of bus stops must be considered.

Incorporating Road Diets into Planning and Design Guidance:

L.A. County, Minnesota, New York City, Ohio

- ❑ Strategic Highway Safety Plans (SHSPs)
- ❑ Design manuals
- ❑ Complete Street plans
- ❑ Bicycle and pedestrian plans
- ❑ Speed management and traffic calming plans





ROAD DIET

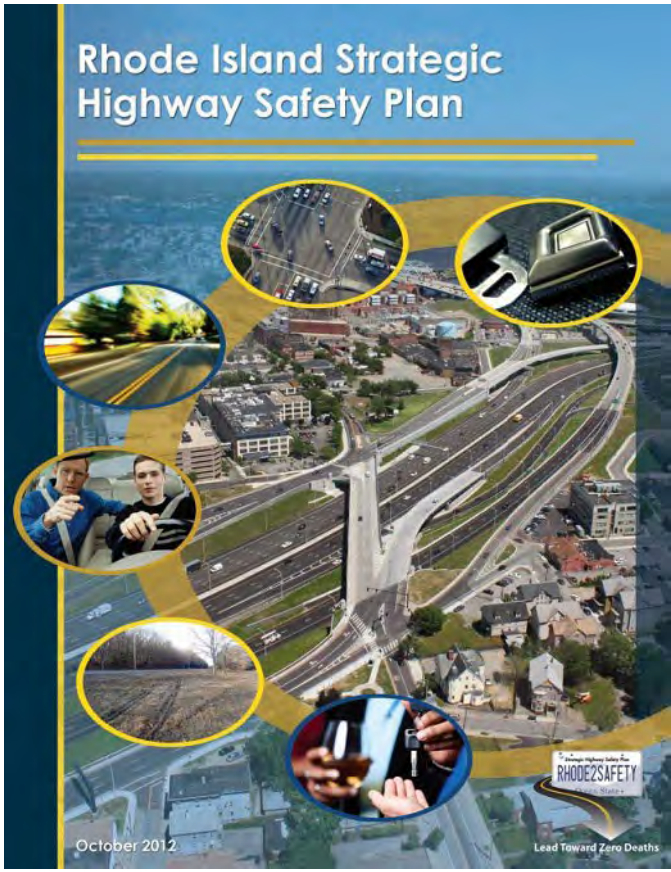
Road Diet Systemic Selection Methods

1. **Citing Road Diets as a Strategy or Approved Countermeasure in Safety Plans**
2. **Evaluating All Four-Lane Undivided Roads**
3. **Identifying Multimodal Needs**
4. **Screening All Upcoming Resurfacing Projects**

1. Road Diets as a Strategy in Safety Plans: *Rhode Island DOT*

- ❑ Strategic Highway Safety Plan (SHSP)
- ❑ Highway Safety Improvement Program (HSIP) countermeasures
- ❑ Bicycle and Pedestrian Plan

Rhode Island's 2012 SHSP mentioned Road Diets as one of the DOT's safety accomplishments and promoted the countermeasure's crash reduction benefits.

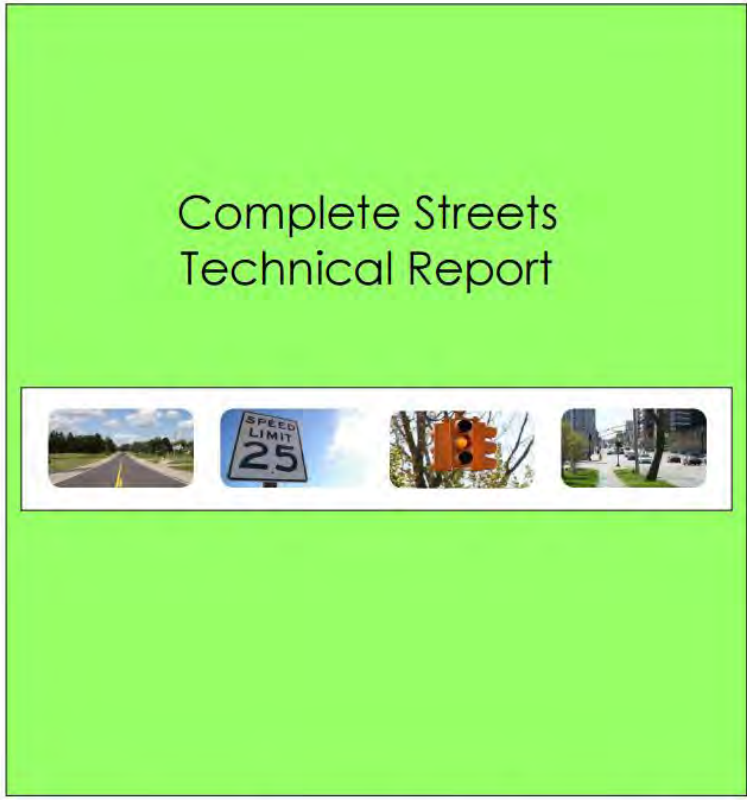


2. Evaluating All Four-Lane Undivided Roads: *Gennessee County (MI) MPC*

Michigan's Genesee County Metropolitan Planning Commission (GCMPC): Assess all 4-lane roads with ADTs less than 20,000

Filter out:

- ❑ Currently congested roads
- ❑ Areas expected to see increased traffic volumes



GCMPC
GENESEE COUNTY METROPOLITAN PLANNING COMMISSION

Genesee County
2040 Long Range Transportation Plan
GeneSEE the Future: Mobility 2040

GENESEE COUNTY METROPOLITAN ALLIANCE

ROAD DIET


Mt Morris
475
75
23
Carpenter
Flint
Flint Twp
Pasadena
Davison
Genesee
Bristol
Pushville
Lippincott
54
Swartz Creek
Hemphill
121
Flint Twp
RECOMMENDATION/RATING
★ Not recommended
★★ Not recommended without adjustments
★★★ A good candidate
★★★★ A very good candidate

3. Identifying Multimodal Needs
Chicago, IL

Chicago DOT's *Streets for Cycling Plan 2020*: 100 miles of separated bike lanes using Road Diets as a primary tool to meet this goal.

4. Screening All Upcoming Resurfacing Projects: *Charlotte, NC*

Agencies have included a Road Diet feasibility assessment into their routine review of all roads scheduled for repaving.

BEFORE

AFTER

East Boulevard Road Diet - Charlotte, NC

ROAD DIET

4. Screening All Upcoming Resurfacing Projects: *Oakland, CA*

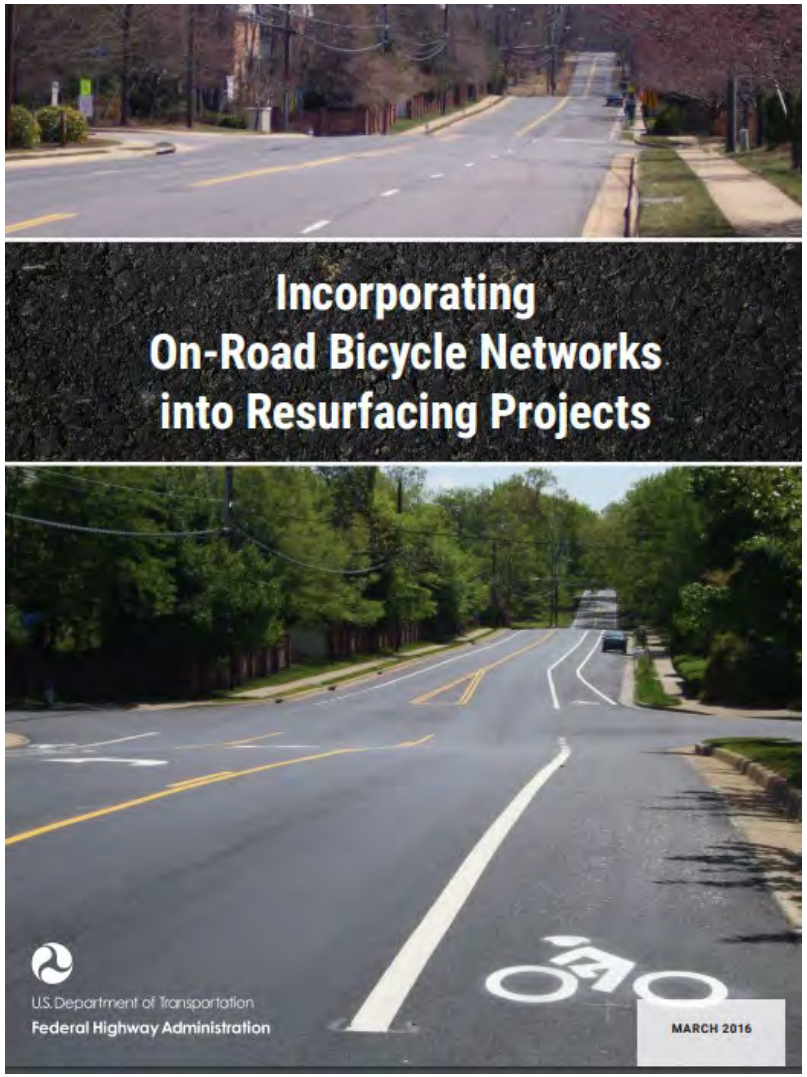
City of Oakland, CA: Checklist for each roadway segment proposed for resurfacing:

- ❑ Project Description
- ❑ Coordination with Overlapping Projects
- ❑ Safety
- ❑ Road Diets
- ❑ Complete Streets Design Elements
- ❑ Notes on Scope & Schedule
- ❑ Project Management
- ❑ Approval of Complete Streets Scope

BEFORE

AFTER

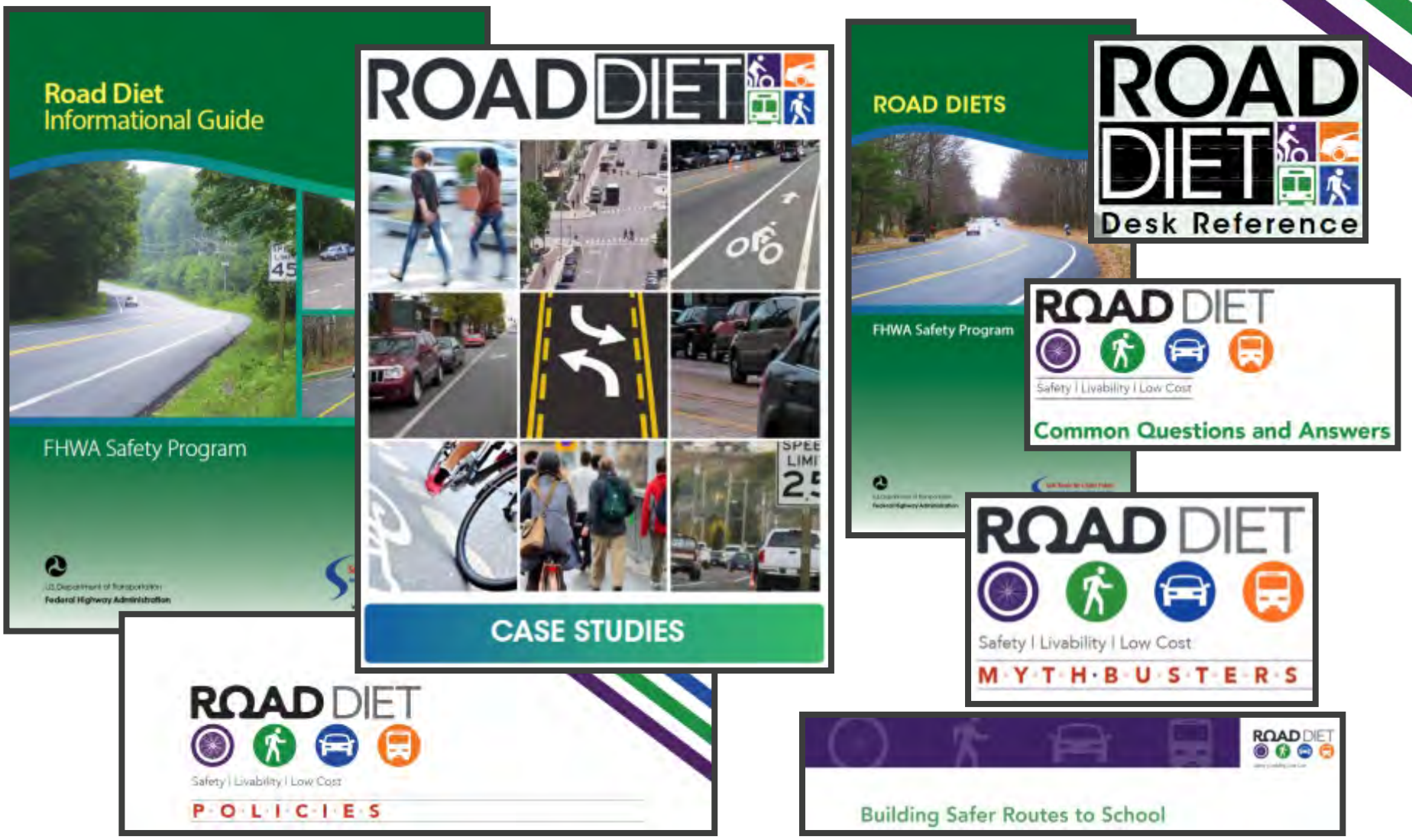
ROAD DIET



Understand how to integrate bicycle facilities into routine resurfacing programs through the use of Road Diets

Search “FHWA-HEP-16-025”

FHWA Road Diet Resources




“If it doesn’t work, we can go back.”
“Trial-basis Road Diets”
“It’s just paint.”

ROAD DIET

U.S.Department of Transportation

Federal Highway Administration

Becky Crowe

FHWA, Office of Safety

(804) 775-3381

Rebecca.Crowe@dot.gov

http://safety.fhwa.dot.gov/road_diets

Road Diets - Guidelines for Assessing Candidate Locations

Mark A. Doctor, PE
Office of Technical Services/Resource Center
Federal Highway Administration
Atlanta, GA
Email: mark.doctor@dot.gov

Submitted for Presentation and Publication at the 5th Urban Street Symposium
May 2017 - Raleigh, NC

Abstract:

A Road Diet is an innovative and low-cost strategy to improve safety and develop multi-modal corridors while generally staying within existing right-of-way. A classic Road Diet converts an existing four-lane undivided roadway segment to a three-lane segment consisting of two through lanes and a center two-way left turn lane (TWLTL). A Road Diet improves safety by including a protected left-turn lane for mid-block left-turning motorists, reducing the crossing distance for pedestrians, and reducing travel speeds to effectively decrease crash severity. The Road Diet strategy provides an opportunity to allocate roadway width to other purposes, including bicycle lanes, on-street parking, or transit stops. This paper presents guidelines for assessing the key safety, operational, and other considerations for transportation practitioners to work through the decision-making process to determine if Road Diets are a good fit for a particular location. The guidelines are compiled in a work sheet format that summarizes the potential issues and evaluative questions for use in assessing the feasibility of a candidate Road Diet project.

Introduction

A Road Diet is an innovative and low-cost strategy for improving safety and for developing multi-modal corridors within existing right-of-way. Road Diets do not typically narrow the physical width of the roadway footprint, but instead re-arrange how the curb-to-curb space is used. There are many options for reconfiguring a roadway, but most Road Diet projects are applied to four-lane undivided roads that are converted into a single lane in each direction with a center two-way left-turn lane (TWLTL). Many reconfigurations also make room for features such as bicycle lanes, on-street parking, or transit stop pull-outs[1].

Road Diets are a proven safety measure[2] and are very effective in corridors with frequent crashes, high incidents of speeding, or for streets that pass through sensitive areas like school zones or recreation areas. Road Diets generally have a traffic calming effect that reduces travel speeds to effectively decrease crash severity. Road Diets that provide for a TWLTL can greatly reduce the risk of rear-end and angle collisions for mid-block left-turning motorists[3]. Decreasing the number of road lanes reduces pedestrian exposure to traffic when crossing the street and the extra space can be used to add pedestrian refuge islands. For bicyclists, Road Diets can provide an opportunity to add bicycle lanes to the street. A Road Diet may also provide the opportunity to install bus pullouts so transit users can enjoy safer stops that do not hinder the flow of traffic.

Road Diets can be relatively inexpensive to implement, especially when done through a resurfacing project where the Road Diet itself would consist primarily of restriping (or repainting) into the new configuration. Additional features such as building pedestrian refuge islands or modifying the intersections (perhaps into roundabouts), would influence the actual cost of a Road Diet.

Although Road Diets are a proven safety strategy and offer significant multi-modal benefits, they may not be appropriate or feasible in all locations[4]. There are numerous factors that transportation agencies should consider in terms of feasibility and the overall objectives of the corridor when deciding whether a Road Diet is an appropriate solution at a particular location.

This paper presents guidance on the key considerations and evaluative questions that transportation professions should assess when screening and evaluating Road Diet candidate projects. The guidance is primarily for evaluating reconfigurations of existing four-lane undivided roads, but may also be useful for considering other types of reconfigurations.

The suggested assessment questions are presented in a worksheet type format. This worksheet was developed for use in a training class exercise utilized during a one-day Road Diet workshop offered by the Federal Highway Administration as part of the Every Day Counts initiative that featured Road Diets as a proven safety innovation. This worksheet may be of assistance to practitioners to guide and document a Road Diet feasibility assessment.

Road Diet Feasibility Assessment Worksheet

This worksheet provides a list of evaluative questions for assessing a potential road diet project. It is intended as a tool for examining the issues often relevant to road diet feasibility. Additional issues or more information about specific proposals may be needed and adapting this worksheet to meet your agency or project development needs is encouraged. Exercising professional judgement is critical to any assessment and it is critical to consider the trade-offs associated with these interrelated factors and to the desired goals and objectives of the project.

Project Name/Location: _____

Project Limits/Length: _____

Project Goals and Objectives

Intent: *By first identifying the objective(s), this will help determine whether a road diet is an appropriate alternative for the corridor being evaluated.*

Since Road Diets are essentially about reallocating precious roadway space to improve safety and better meet the needs of the various users, it sometimes requires making "trade-offs" in terms of the expected gains and detriments of the roadway change. There may be some negative effects associated with a reconfiguration. When assessing the levels of benefit (and possible detriment), it is critical to first consider the results or outcomes that are trying to be achieved with the project.

Clearly identifying and understanding the project goals and objectives (or "purpose and need") should be the first step to help determine if a Road Diet is the appropriate solution. Crash data, observational studies, and community feedback are all helpful methods to understand user needs. Good safety data can help identify the types of crashes that are occurring. Observational field studies can offer valuable insights on driver behavior, traffic patterns, presence of speeding vehicles, and clues for needs with regard to better pedestrian, bicyclist, and transit facilities.

Safety: *If safety improvement is a major objective, determine if the identified crash patterns are those that could be addressed with a Road Diet.*

Is safety improvement specifically a goal of this project? _____

If yes, then what are the current safety issues/problems including any concerns related to pedestrians, bicyclists and transit users? _____

Will the types of crashes that are occurring likely be reduced with a Road Diet conversion? _____

Will a reduction in speed and/or speed variability likely improve safety on the road? ___

Multi-modal: *If enhancements in service to other user groups are the major objective, determine if a Road Diet is appropriate to help address those needs.*

Is multimodal service enhancement specifically a goal of this project? _____

Have any multimodal quality of service goals been established? _____

Is this proposal in support of a Complete Streets policy or objective? _____

Is there a desire to achieve reduced vehicular travel speeds and/or traffic calming? ___

Other Goals & Objectives

Are there any economic enhancement or livability goals for this project? _____

Is the proposal consistent with the applicable Long-Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), Transit Development Plan (TDP), comprehensive plan, and/or any applicable bicycle plans, pedestrian safety plans, and Complete Streets initiatives? _____

What other goals and objectives are associated with this project? _____

_____

What Road Diet Configuration(s) Best Meets the Goals and Objectives?

Intent: *Based on the user needs for satisfying the goals and objectives, what reallocations of road space are appropriate? The types of changes proposed to the current cross section are important to know before proceeding with the feasibility analysis. Although many Road Diets involve reducing the number of travel lanes, it may be possible to achieve some goals by simply narrowing the width of lanes.*

What is the existing cross-sectional width (typically measured curb-to-curb)? _____

Sketch the existing cross-section below showing approximate widths:

What features are desired for a reconfigured cross section in order to achieve the project goals and objectives?

____ Two-way left-turn lane (TWLTL)
____ Painted or raised median
____ Pedestrian refuge islands
____ Bicycle Lanes
____ On-street parking
____ Delivery zones
____ Wider sidewalks
____ Bus pull-outs
____ Delivery zones
____ Other _____

Can the desired cross-sectional elements be implemented within the available width?

If not, is it possible to acquire additional right-of-way? _____

Sketch out one or more options for achieving the desired cross-section below showing approximate widths:

Road Function and Context

Intent: *The location context and major functions of the road should be understood with regard to assessing the possible tradeoffs among mobility and safety for all users. The functional classification of the roadway influences the design standards and criteria specific to the proposed project. The functional classification of the road may indicate the historical intended purpose of the corridor, but may not be indicative of the present context or the various purposes the roadway serves. The existing and intended function of the roadway and the surrounding land uses are important considerations for the feasibility of a Road Diet.*

What is the road's current Functional Classification? _____

Is a future change in Functional Classification expected or desired? _____

Is this a designated Truck Route? _____

What is the level of freight/large vehicle operation along the road? _____

What are the current and expected future levels of transit operation along the road? ___

_____

Is the adjacent land use expected to remain relatively stable? _____

Is this a designated Emergency Evacuation route? _____

Along the route, are there any:

- Hospitals?

- Fire stations?

- Schools?

- Major trip generators?

If YES to any of the above, consider involving these entities early in your project discussions.

Notes:

_____

_____

_____

Traffic Operational Considerations

A common misconception is that reducing the number of through lanes will automatically increase traffic delays. Although Road Diet reconfigurations that involve reducing the number of travel lanes have the potential to negatively impact traffic operations, this is not always the case. There are several factors besides the number of lanes and the volume of traffic that can greatly influence the actual traffic operations.

In the case of assessing a proposed Road Diet, perhaps the most critical factor is the pattern and volume of mid-block left-turning traffic. Many four-lane undivided roadways begin to operate in a manner similar to a three-lane roadway as the number of access points and mid-block left-turning movements increase. In this condition, the four-lane undivided roadway may be operating as a de facto three-lane roadway and the operational impacts of reconfiguring to a three-lane section may have no detrimental impact on traffic flow and actually improve conditions.

Other factors that greatly influence traffic operations is the number and spacing of signalized intersections and major driveways, the frequency of stopping and slow-moving vehicles through the corridor, the presence of on-street parking, and the existence of any at-grade railroad crossings.

Traffic Volumes

The overall volume of traffic on the roadway is just one consideration for assessing traffic operations - but an important one. Although some Road Diets going from four-lanes to two-lanes have been successfully implemented on corridors with volumes in excess of 26,000 vehicles per day (vpd), many agencies will limit their consideration of Road Diets to roads with 20,000 vpd or less.

Traffic volume provides a good initial screening factor for assessing Road Diet feasibility. Many agencies have established maximum thresholds based on either an average daily traffic (ADT) or a peak hour volume.

What are the current ADT volumes? _____

What are the current peak hourly volumes? _____

What is the projected future ADT (based on historical growth and/or the regional travel demand model)?

_____

Are these volumes within agency guidelines for a Road Diet? _____

Does the corridor periodically function as a “relief” route to a freeway or principal arterial and experience high volumes when those other facilities are congested? _____

Pedestrian and Bicycle Volumes

Pedestrian Counts: _____
If counts are unknown, provide a general classification such as high, moderate, or low

Bicycle Counts: _____
If counts are unknown, provide a general classification such as high, moderate, or low

Transit Operational Considerations

Intent: *Depending on the bus frequency and headways, with just one travel lane per direction, frequently stopping busses may have a significant impact on traffic flow. Constructing bus bulbs or pull-outs can mitigate these effects, although use of bus pull-outs may result in delays for busses when trying to merge back into the through lane.*

What are the bus volumes and headways in the corridor? _____

If a Road Diet is implemented, will stopping transit buses in the one through lane significantly impact traffic? _____

Are locations for bus pull-outs possible? _____

Do transit routes make turns within the corridor? (May need to assess turn radii and lane widths)

Mid-block Traffic Patterns

What is the approximate driveway density along the route? _____

What are the characteristics (commercial, residential) and approximate volumes of traffic entering and exiting from the mid-block driveways? _____

What are the patterns and turning volumes for vehicles to/from the minor streets?
_____

Is the existing roadway operating as a de facto three-lane roadway? _____

Speed Considerations

What is the current posted speed limit? _____

What are the current travel speeds along the road? (e.g., mean, 85th percentile, percent of vehicles traveling at high speeds) _____

Is a change in the posted speed limit proposed? _____

How frequent is the presence of slow-moving or frequently stopping vehicles, such as school busses, trash pick-up, curb-side mail delivery, etc.? _____

_____

On-Street Parking Considerations

Intent: *On-street parking can create a "tunnel effect" that naturally slows motorists' speeds. Providing on-street parking may also allow for construction of curb extensions at crosswalks, which reduce crossing distance for pedestrians.*

Does on-street parking currently exist? _____

Is on-street parking proposed (parallel, angle, back-in, mix)? _____

Note: *Angled parking uses less linear curb length per parking space than parallel parking (so more spaces may be provided on the same block). However, angled parking takes up more distance perpendicular to the curb. Back-in angled parking (as opposed to head-in angled parking) is beneficial to bicyclists as it is easier to make eye contact with drivers as they pull out of their parking spots.*

Will on-street parking reduce the ability of vehicles to turn in and out of minor streets and access points?

Intent: *On-street parking should not impede visibility for pedestrians, bicyclists, and other vehicles. This means that on-street parking spaces should be located carefully relative to intersections and crosswalks.*

Trucks and Freight Delivery Considerations

Intent: *Consider the potential impacts on trucks (including appropriateness of turn radii and lane widths and the possible relocation of designated truck routes).*

Consideration of the operating requirements of trucks and other large vehicles should be given when considering a Road Diet. Curb extensions or other non-traversable areas that may be added as part of a Road Diet project should be designed to accommodate the turning needs of large vehicles, but typically at slow speeds. Curb radii design should facilitate slow turning movements, but also not cause trailer off-tracking. If lane widths are decreased during a road diet, large trucks may have increased risk of involvement in sideswipe and mirror crashes, depending on the resulting width of the lane and the curvature of the road. Additionally, narrower lanes may create less space between trucks and other road users, which can create a sense of discomfort.

What is the character of the road with respect to trucks and freight delivery? Are truck volumes known? _____

Are there significant turning movements of trucks and large vehicles at the intersecting roads? _____

Consider the current and future needs for delivery zones and loading areas. Removal or relocation of delivery zones may impact truck access to businesses. Where there will be only one through lane per direction, trucks that stop for deliveries are likely to block auto traffic.

_____

_____

If applicable, how are truck deliveries currently made to businesses along the route?

_____

_____

Intersection Operational Considerations

Intent: *The major intersections within the corridor are likely to be of greatest concern with regard to capacity and operational performance risk for implementing a Road Diet. Performing a traffic analysis of the major intersections is a critical element of a Road Diet assessment to determine their expected operation under the proposed lane reconfigurations. Traffic analysis tools such as the Highway Capacity Manual (HCM) may be appropriate to evaluate intersection operations under most conditions, but for situations such as closely spaced intersections or coordinated signal systems, the use of micro-simulation models may produce better methods for adequately evaluating arrival patterns and queue formation and dissipation.*

Has a traffic analysis been performed for all the major intersections (signalized, roundabout or All-Way STOP) within the project study road segment? List the major intersections and summarize their projected operational performance (LOS, delay, max queue length, etc.).

_____

_____

_____

_____

_____

_____

Are any of the existing intersections experiencing operational problems such as excessive delays? If known, list the volume/capacity ratios of the intersection approaches:

_____

_____

_____

Are there any problematic geometric issues related to the existing intersections (e.g., intersection sight distance deficiencies, skew, approach grades, approach alignment and profile, proximity to adjacent intersections, etc.)?

_____

_____

Are there any plans to add, remove, or modify traffic signals within the corridor? _____

Note: *Road Diet projects may offer great opportunities to implement roundabouts at certain intersections. Roundabouts and Road Diets implemented concurrently offer exceptional safety co-benefits. On certain roadways, roundabouts may increase intersection capacity and reduce delay. The reduction of a four-lane road to a three-lane road could facilitate the use of single-lane roundabouts. One-lane roundabouts, and particularly mini-roundabouts, are frequently able to fit within existing right-of-way.*

At existing signalized intersections, are there opportunities to improve the signal timing, signal phasing, and/or presence of turn lanes?

_____

_____

_____

_____

When was the last time the signal timing or phasing was changed or optimized? _____

Are there any mid-block pedestrian crossings existing or proposed? _____

CAUTION: A greater risk for operational impacts (such as significantly more queuing and delay) may occur with lane eliminations in a downtown setting due to heavy side street volumes and closely spaced signals caused by short block lengths. Corridors with closely spaced signalized intersections may have greater risk for queuing affecting adjacent signalized intersections.

Special Conditions

Is the Road Diet conversion expected to divert significant traffic to parallel roadways?

Intent: *Traffic diversion to parallel streets may not be problematic for arterials or collectors with adequate reserve capacity, but could be very problematic for diversion to neighborhood residential streets.*

Are there any at-grade railroad crossings along the roadway? _____

If so, do trains regularly cross during peak travel periods and what is the typical delay time and queue length caused by a train crossing? _____

_____

Are there any other special conditions along this road that may jeopardize the feasibility of a Road Diet?

_____

Early Stakeholder Engagement

Intent: *Comprehensive public involvement and stakeholder engagement is critical to the successful implementation of Road Diet projects. Early outreach to stakeholders at a minimum should include neighborhood residents and businesses. Any anticipated increase in vehicular travel time delays on the candidate roadway, or potential overflow facilities, should be clearly communicated to the stakeholders, as well as the anticipated safety and livability benefits for all users. Visualizations can help explain proposed solutions, and in some instances, design charrettes and "demonstration days" activities could be held to address concerns.*

Initial public concern about Road Diets may be with a perceived reduction in roadway capacity and belief it will result in worse traffic congestion. Businesses may also object if they believe they'll have fewer customers due to congestion or a diversion of traffic onto other streets. Experience from case studies around the country indicates these concerns rarely come true.

Is there any known controversy associated with the project? _____

Have any concerns or supportive comments been voiced at public meetings from local businesses, residents and other stakeholders? _____

Have endorsements or documented project support been made by appropriate city, county, and/or regional bodies (e.g., a commission or board resolution)? _____

Do area drivers have familiarity with proper use of TWLTLs? _____

Systemic Implementation

The feasibility assessment worksheet is intended to assist practitioners in examining the feasibility of a Road Diet for a given location. Although some agencies may decide Road Diet feasibility on a case-by-case basis, another strategy is to implement Road Diets systemically by taking a proactive approach to assess every four-lane road within the agency's jurisdiction to determine and rate the feasibility for converting it to a three-lane road.

Whether Road Diets are assessed systemically or on an individual basis, an efficient way to implement a Road Diet is by incorporating the conversions into a resurfacing project. Including Road Diets as part of resurfacing projects can significantly reduce costs, but takes planning. A clear process is needed to determine if a reallocation of the roadway width should be made when it is resurfaced and the project timeline must allow for the appropriate public outreach. Consequently, some State and local agencies have incorporated the consideration of Road Diets into their process for reviewing roads for resurfacing.

Conclusion

Road Diets are a proven safety strategy and low-cost opportunity for developing multi-modal corridors within existing right-of-way. Implementation through a resurfacing project can be a cost-efficient way to reallocate the road space to improve conditions for multiple user groups of the facility. Although Road Diets most commonly involve restriping a four-lane undivided road to a three-lane road with two through lanes and a two-way left-tum lane (TWLTL), the concept may also be applied to other types of reconfigurations[5]. By reducing the number of lanes and/or lane widths, the created space can be used to implement bicycle lanes, on-street parking, pedestrian refuge medians, or widen sidewalks.

Operational considerations for vehicular traffic are important when assessing the feasibility of a Road Diet, but also of tremendous importance is consideration for the quality of service for other users within the facility. Methodologies for assessing quality of service for other users have evolved into the Highway Capacity Manual (HCM) to allow analysts to assess service measures for pedestrians, bicyclists, and transit users. Road Diets can be effective for improving the factors that affect travelers' perceptions of safety and comfort including:

- Reduced motor-vehicle speeds
- Increased space between motor-vehicle lanes and pedestrians and bicyclists
- Shorter crossing length for pedestrians
- Pedestrian refuge islands and dedicated bicycle lanes
- Safer and more comfortable access to transit stops

This paper provides an evaluative worksheet to guide practitioners through the many considerations for assessing the feasibility of a Road Diet at a particular location. The worksheet is intended to be a guide and practitioners are encouraged to modify the worksheet to fit local practices and policies of your agency. Decisions to implement a Road Diet may involve judgments more complex than a simple "yes/no" assessment of the factors contained in this worksheet.

Although the worksheet lists these considerations individually, the practitioner should consider these elements collectively within the larger context. Many of the feasibility factors involve making trade-offs. For example, if a roadway currently has a significant safety issue at four-lanes and has high traffic volumes, an agency may choose to implement a three-lane Road Diet in order to reduce crashes even thought it might increase travel delay. Such a trade-off may be acceptable and desirable if the safety benefit outweighs the operational detriment. Some implementation decisions may need to consider achieving a "balance" of the needs of all users of the facility and may require a shifting of the quality of service among the different user types. For example, implementing a Road Diet on a lower volume road may only marginally reduce service to vehicular traffic, but may greatly improve service to other user groups if features like bicycle lanes and pedestrian refuge islands are installed. So in such an instance, there is a minor detriment to one user group, but that is more than offset by the significant improvement for another user group.

The assessment worksheet has undergone several iterations and the paper author would welcome any feedback, comments and suggested revisions.

References

1. FHWA, *Road Diet Informational Guide,* FHWA-SA-14-028. (Washington, DC: 2014)

2. FHWA, "Proven Safety Countermeasures" web page. Available at: https://safety.fhwa.dot.gov/provencountermeasures/

3. FHWA, *Evaluation of Lane Reduction Road Diet Measures on Crashes,* FHWA-HRT-10-053. (Washington, DC: 2010)

4. New Mexico Department of Transportation, *Road Diet Guide*, 2016. Available at: http://dot.state.nm.us/content/dam/nmdot/Plans_Specs_Estimates/Design_Directives/2017/IDD-2017-16%20(Road%20Diet%20Guide).pdf

5. Florida Department of Transportation. Statewide Lane Elimination Guidance, 2014. Available at: http://www.fdot.gov/roadway/csi/Files/Lane-Elimination-Guide-Part1.pdf

CASE STUDY:
CITY OF PASCO
SYLVESTER STREET SAFETY IMPROVEMENTS

For the Washington Transportation Professional Forum

For Road Diets (Roadway Reconfiguration)

January 8th, 2025 9am to 12pm.

SYLVESTER STREET SAFETY IMPROVEMENTS

Lane re-configuration (road diet) along the corridor with bike and pedestrian facilities on both sides of the roadway. Rectangular rapid flashing beacons (RRFB), marked crosswalk, ADA curb ramp retrofit, audible pedestrian signal.

Funding Sources (Total $4.9M):

- Federal – 2020 City Safety Selections (HSIP) = $1.5M
- State – 2020 Ped/Bike Program = $2.7M
- Local = $0.7M

Existing:

- ADT (2021) = 7,000 – 20,000 < 25,000 ADT current and future (FHWA)
- Federal Functional Classification = Urban Minor Arterial
- Pavement Width = 44-ft to 56-ft
- Posted Speed = 25mph to 35mph
- Land-use = Varies between Residential and Business

City of Pasco 2020 Local Safety Plan proposed road diet for this corridor planning to decrease crashes per year by 29%.

Construction started 3/25/24. Have not reached substantial completion.

Reference Images: City of Pasco's Sylvester Street Safety Improvements webpage: Sylvester Street Safety Improvements | Pasco, WA - Official Website

LESSON LEARNED

Design Alternatives

Mailbox Coordination

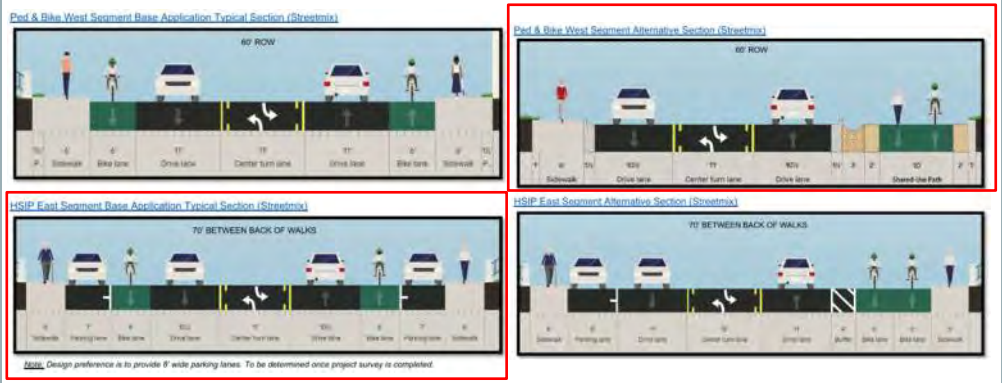
Property Tie Ins

Construction

Striping

1) DESIGN ALTERNATIVE ANALYSIS

- Conceptual Typical Section Evaluation memo
  - Developed on 3/11/22
  - Identified project goals
  - Evaluated two different cross-sections
  - Determined the design.



	East Segment		West Segment		
Project Goals	Base Application	Alternative	Base Application	Alternative	Notes
Safety	•	•	•	•	Both meet goals
Multi-Modal Improvements	•	•	•	•	Both meet goals
Signal Operations	•		N/A	N/A	Alternative requires added signal phases
Stormwater	N/A	N/A		•	Alternative creates buffer space
Cost Effective	•		•		Base application uses existing features
Forward Compatibility		•		•	Alternative positions bicyclists on southside
Total Score	4	3	3	4	

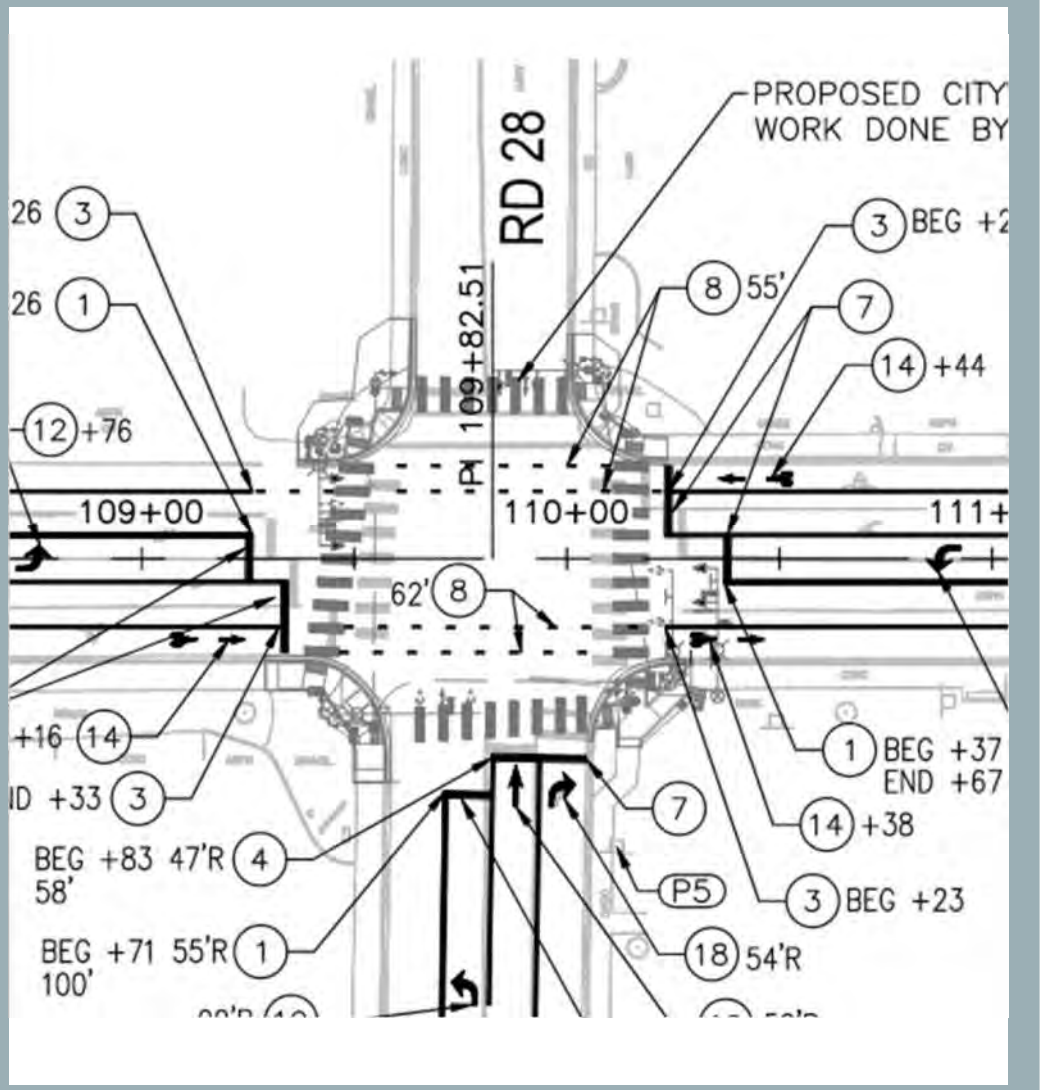
Reference Image: City of Pasco's 2020 Local Road Safety Plan

1) DESIGN ALTERNATIVE ANALYSIS

Challenges	Resolutions
No bike connectivity for the different cross-sections.	Future bridge project will add connectivity.

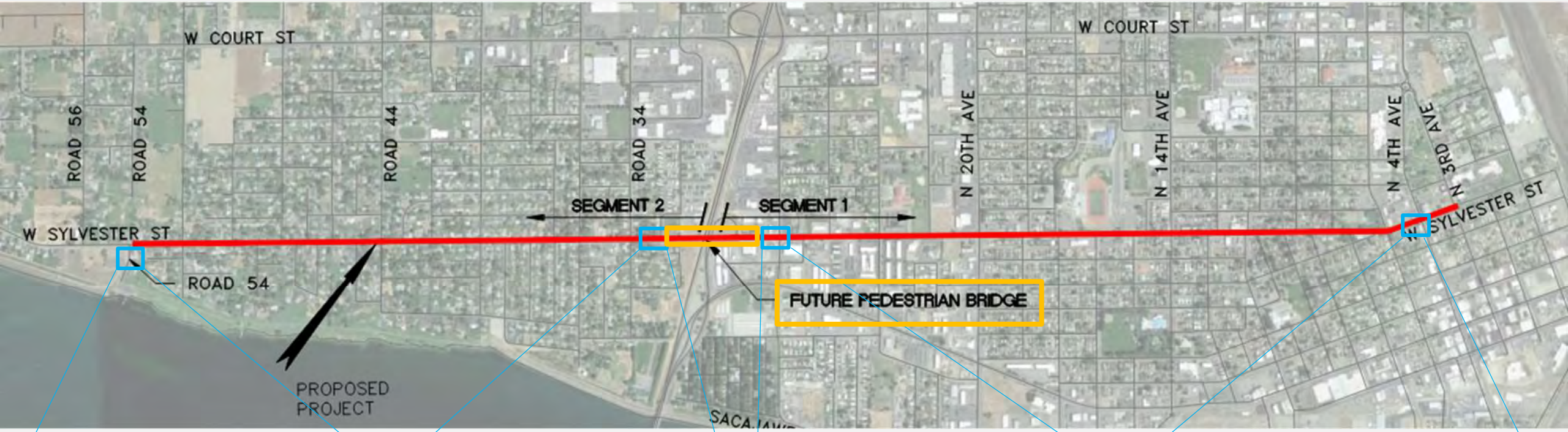
<u>Lesson Learned:</u>

Reach out to residents early and provide more information in design. Follow up during construction.



Reference Image (Top): Photo facing East at 28th and Sylvester
Reference Image (Bottom): Sylvester Street Safety Improvements contract plans Sheet PM3

CONNECTIVITY



Reference Image: Google Map Rd 54 facing South

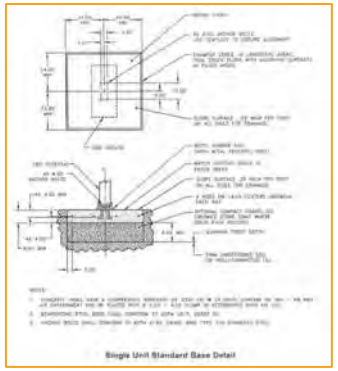
Reference Image: Photo facing East near Rd 34

Reference Image: Photo facing East near 28th Ave

Reference Image: Photo facing East near 3rd Ave

2) MAILBOX COORDINATION

- Feb 2023 – City provides plans to USPS.
- Apr 2024 – Mail not being delivered.
- June/July 2024 – City meets with USPS.
- Dec 2024 – USPS ask City to help install foundations for cluster box units (CBUs)



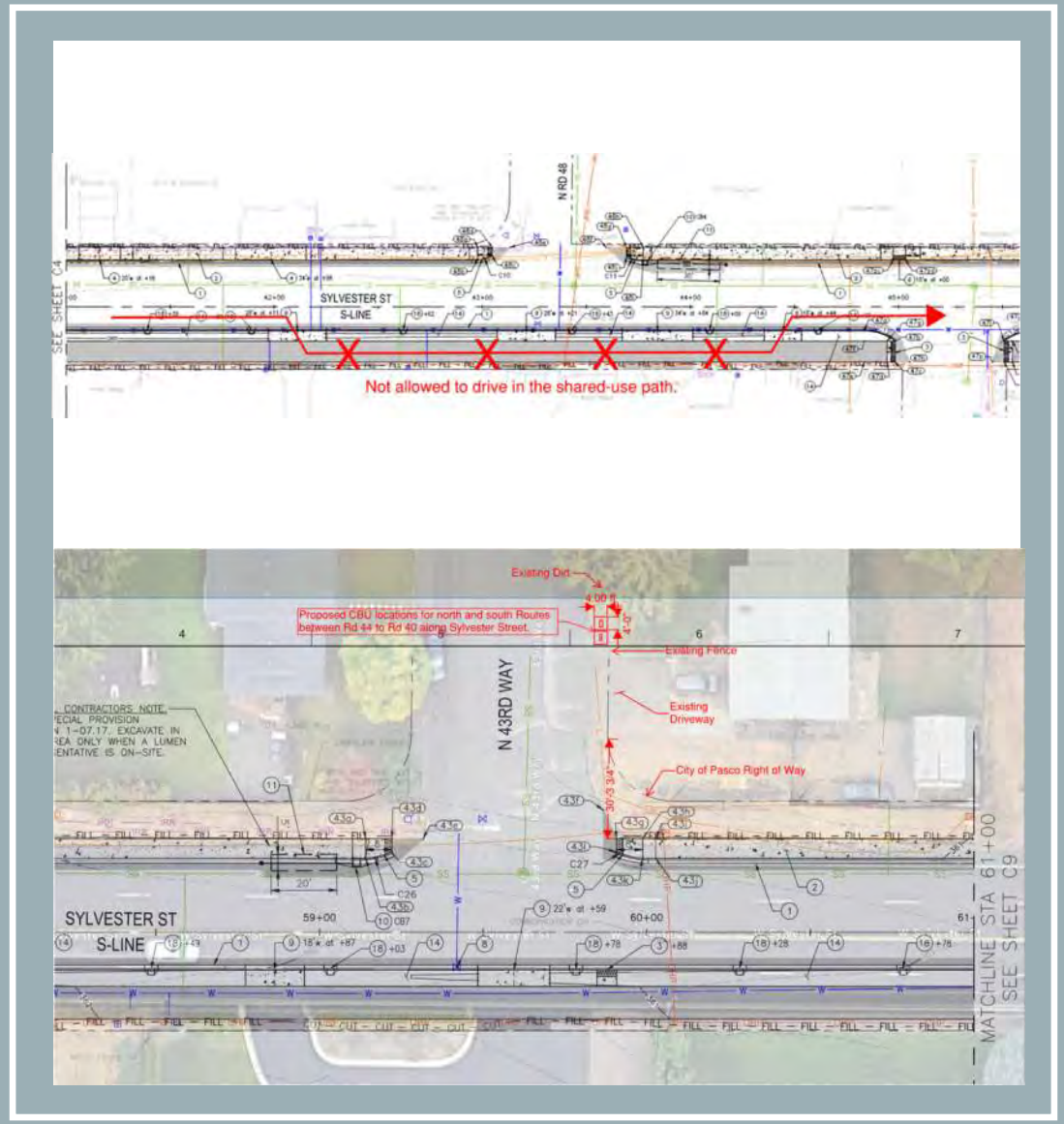
Reference Image (top): 12/2024 delivery facing West at Sylvester and Road 40.
Reference Image (bottom left): USPS Pasco WA, Growth Management's CBU Specifications
Reference Image (bottom right): Google Maps (6603 Chinook Ln - Google Maps)

2) MAILBOX COORDINATION

Challenges	Resolutions
USPS was driving in the shared-use path to deliver mail.	RCW 47.04.010 (38) "Shared-use path" the facility is designed to physically separate from motorized vehicular traffic, meant for the use of pedestrians and bicycles.
Residents not receiving mail. Carrier do not deliver in work zones.	CBUs to be installed. USPS to coordinate with residents.

<u>Lesson Learned:</u>

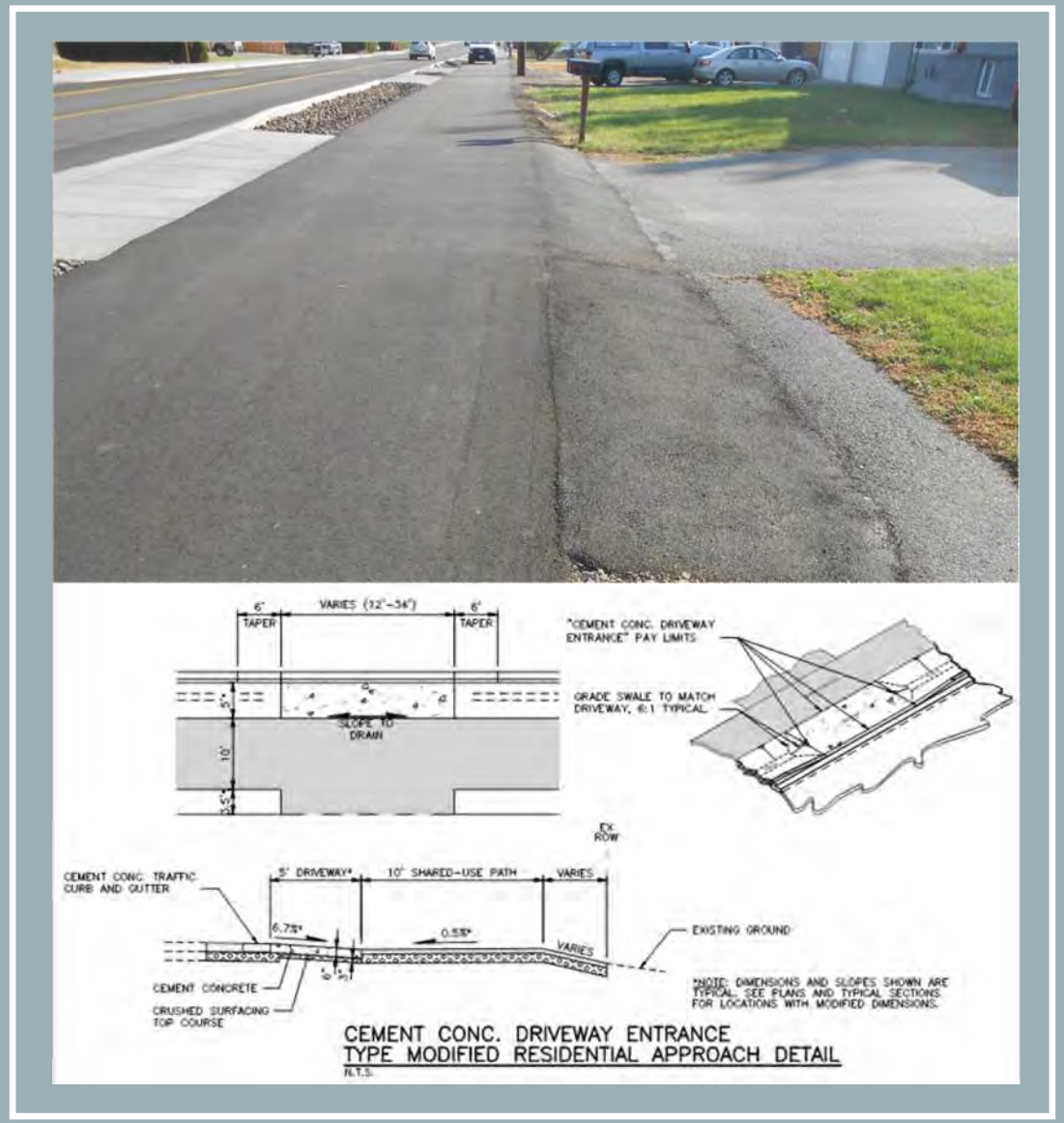
Engage Mail Service early to incorporate any of there foundation work during design.



Reference Image (top): Sylvester Street Safety Improvements contract plans Sheet C5 markup exhibit
Reference Image (bottom): Sylvester Street Safety Improvements contract plans Sheet C8 markup exhibit

3) PROPERTY TIE-INS

- No ROW phase since work stayed in city ROW.
- Standard drawing for driveways along the shared-use path.



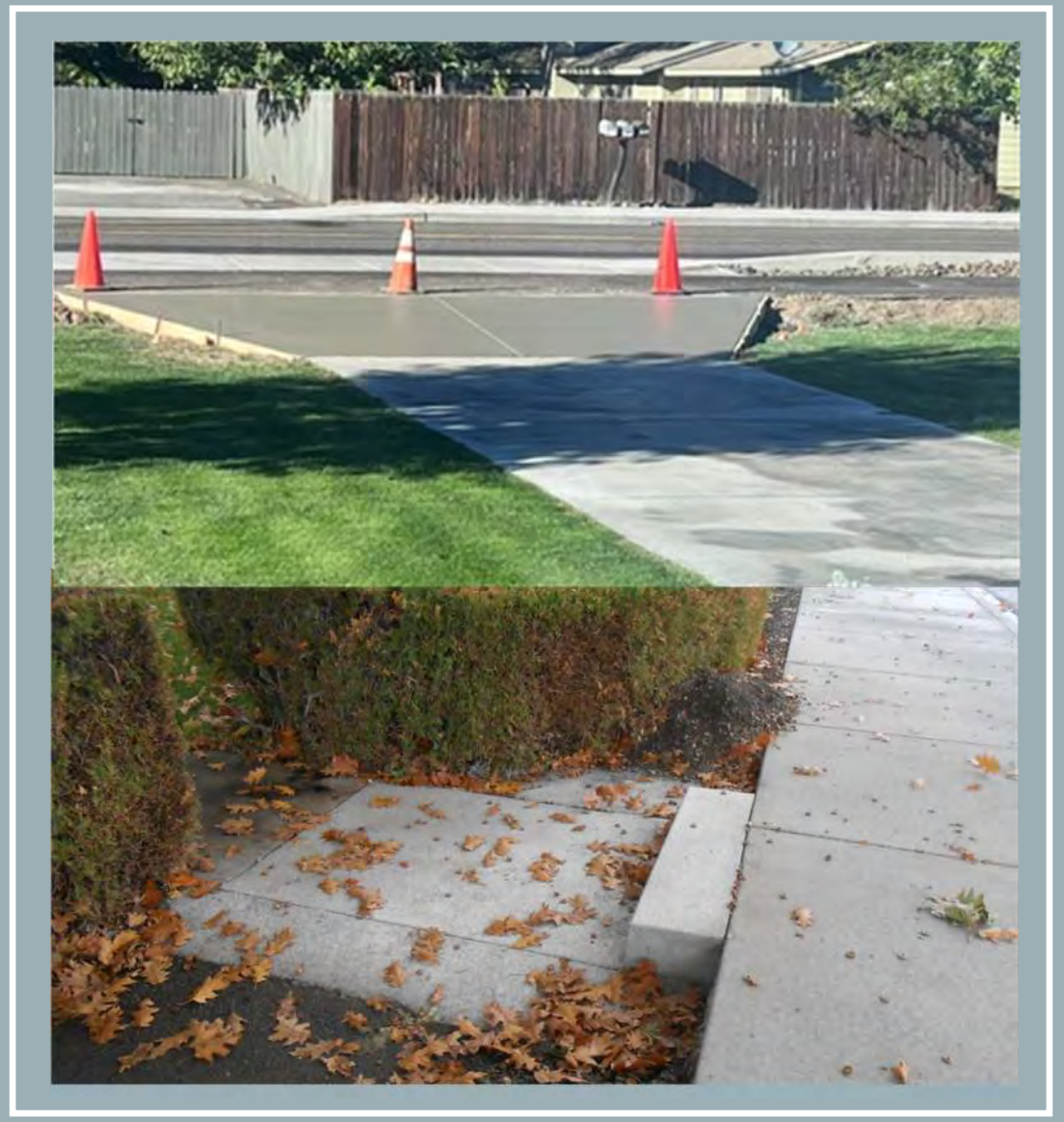
Reference Image (top): Facing East near 5120 Sylvester St
Reference Image (bottom): Sylvester Street Safety Improvements contract plans Sheet PVD1

3) PROPERTY TIE-INS

Challenges	Resolutions
"Field-fitting." No location specific profiles, resulted in steep driveways.	Property use agreement between homeowner and contractor to work on flattening the driveway conform.
No connectivity to existing walkways.	Property use agreement between homeowner and contractor to work on walkway conform.

<u>Lesson Learned:</u>

In design consider location specific profiles and connectivity to residents' walkways.



Reference Image (top): Resident photo facing North at 4812 Sylvester St
Reference Image (middle): Facing East near 3621 Sylvester St

4) CONSTRUCTION

Construction was broken up into roughly 4 phases.

- Phase 1 – North Sidewalk West of 395. (4/2024 - 6/2024)
- Phase 2 – South Shared-use path West of 395. (6/2024-9/2024)
- Phase 3 – Striping (2 week starting 8/2024)
- Phase 4 – Intersection work at 14th and Sylvester. (currently in progress)

Reference Image (Top): Traffic Control for North sidewalk work
Reference Image (Top Right): Traffic Control for South – Drone video

4) CONSTRUCTION

Construction

- 3/15/22 - Open House #1 – Early concepts of typical sections with aerial map for comments. Non-city employee attendance = 6.
- 11/10/22 – Open House #2 – 60% design on aerial map of the whole work area for comments. Non-city employee attendance = 19.
- 03/25/24 - Postcards delivered to residents.
- 03/27/24 - Door to Door outreach – 48 out of 110 parcels were talked to. Door hangers were placed doors for unresponsive homes.
- Throughout - Responded to calls and in-person meetings with residents. A radio and a news interview. Updating project website with construction updates.

Reference Image (Top): City of Pasco's Sylvester Street Safety Project Postcard
Reference Image (Bottom): City of Pasco's Sylvester Street Safety Improvements webpage: *Sylvester Street Safety Improvements | Pasco, WA - Official Website*

4) CONSTRUCTION

Challenges	Resolutions
Phase 2 forced residents on the south side to drive along a dirt path.	Additional traffic devices and door hangers help resident understand how to drive in this condition.

Lesson Learned:

Reach out to residents early and provide more information in design. Follow up during construction.

Reference Image (Left): Phase 2 near Rd 39 and Sylvester St
Reference Image (Right): Door Hanger

5) STRIPING

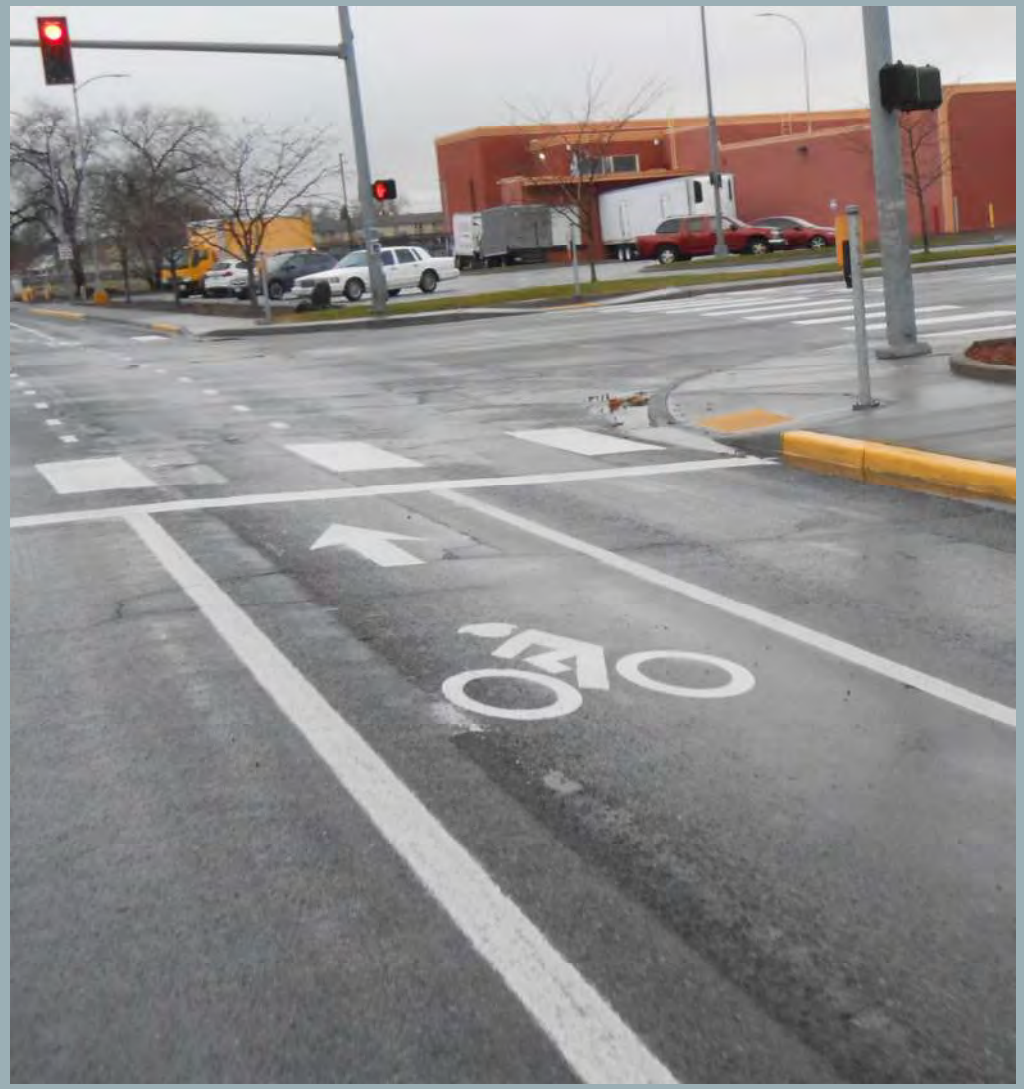
- Converts existing four-lane undivided roadway to three-lane roadway consisting of two-way left-turn lane (TWLTL)
- Add bike lanes adjacent to existing parallel parking.

Reference Images: City of Pasco's Sylvester Street Safety Improvements webpage: Sylvester Street Safety Improvements | Pasco, WA - Official Website

5) STRIPING

Challenges	Resolutions
Cars crossing bike lane to make right turn adjacent to solid stipe.	City provided a video guide encouraging vehicles to stay in the lane when planning to make a right turn.

<u>Lesson Learned:</u>
Ask the audience

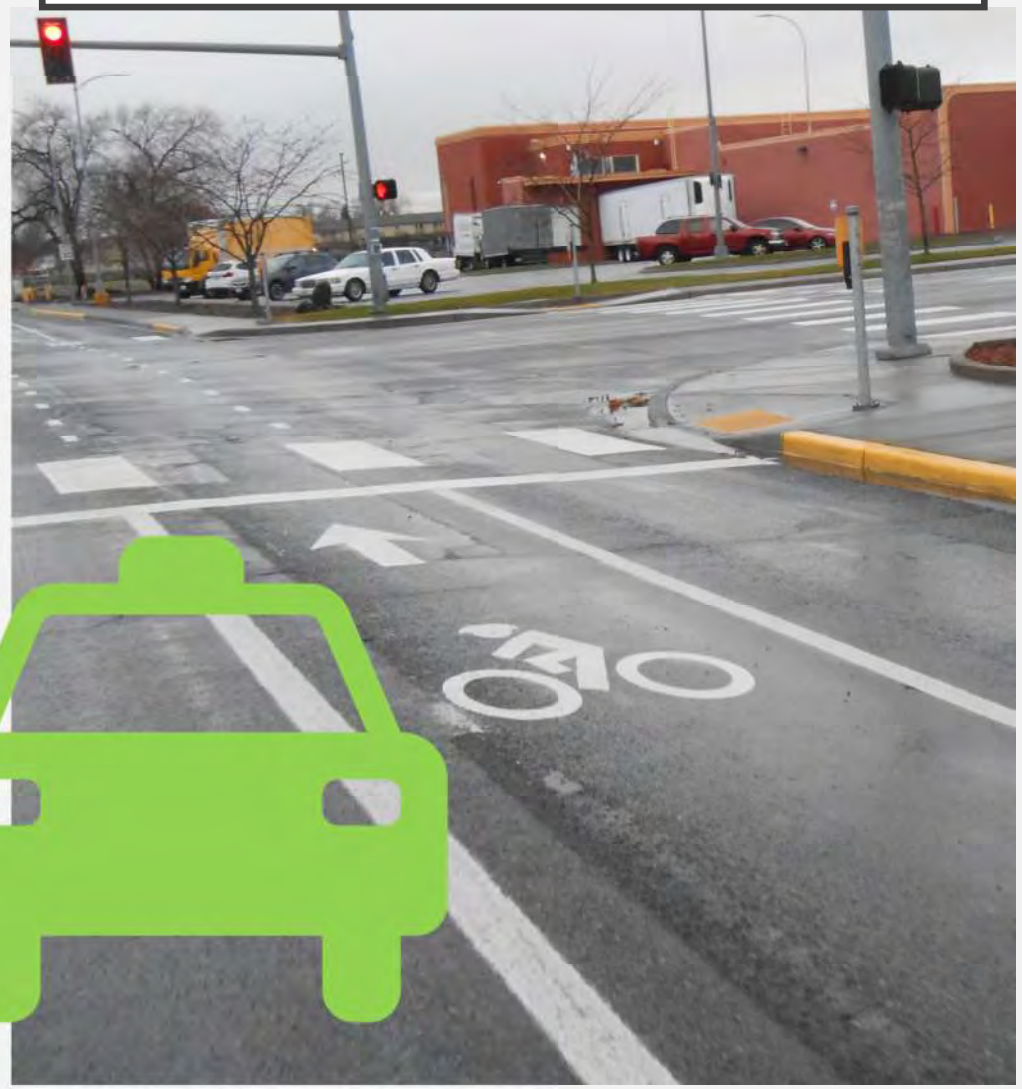


Reference Image: Facing West at 20th and Sylvester Streeet.

TURNING IN BIKE LANE

RCW – Right turn close as practicable to the right hand curb or edge of roadway.

STAY IN LANE



WSDOT Design Manual / NACTO / AASHTO Guide for development of Bicycle facilities – Solid white line separate lanes of traffic in the same direction.

Q&A

Presenter:
Vincent Malong, EIT,
Engineer II, City of Pasco (malongv@pasco-wa.gov)

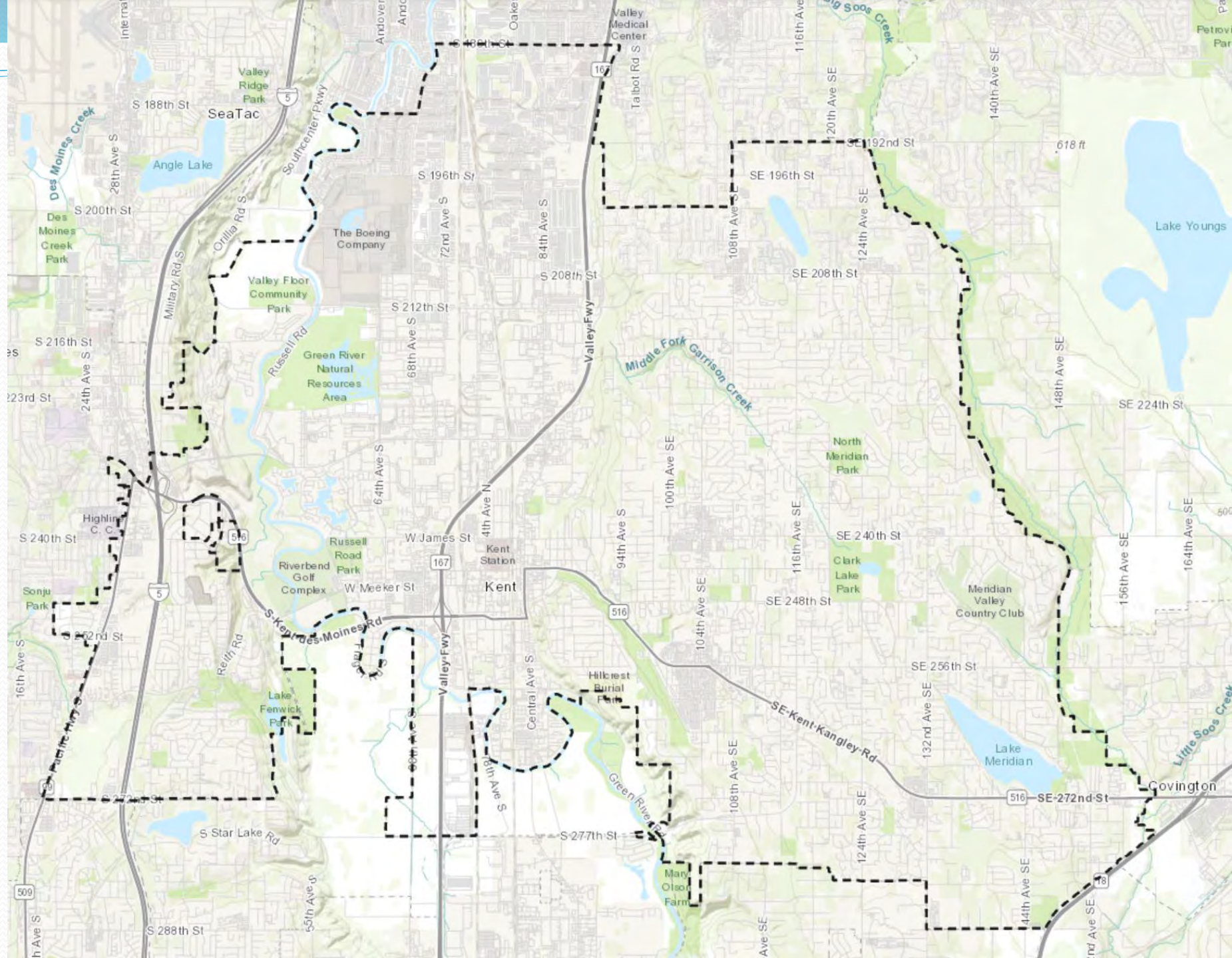
City of Kent
City Safety Road Diets

Erik Preston

January 8, 2025

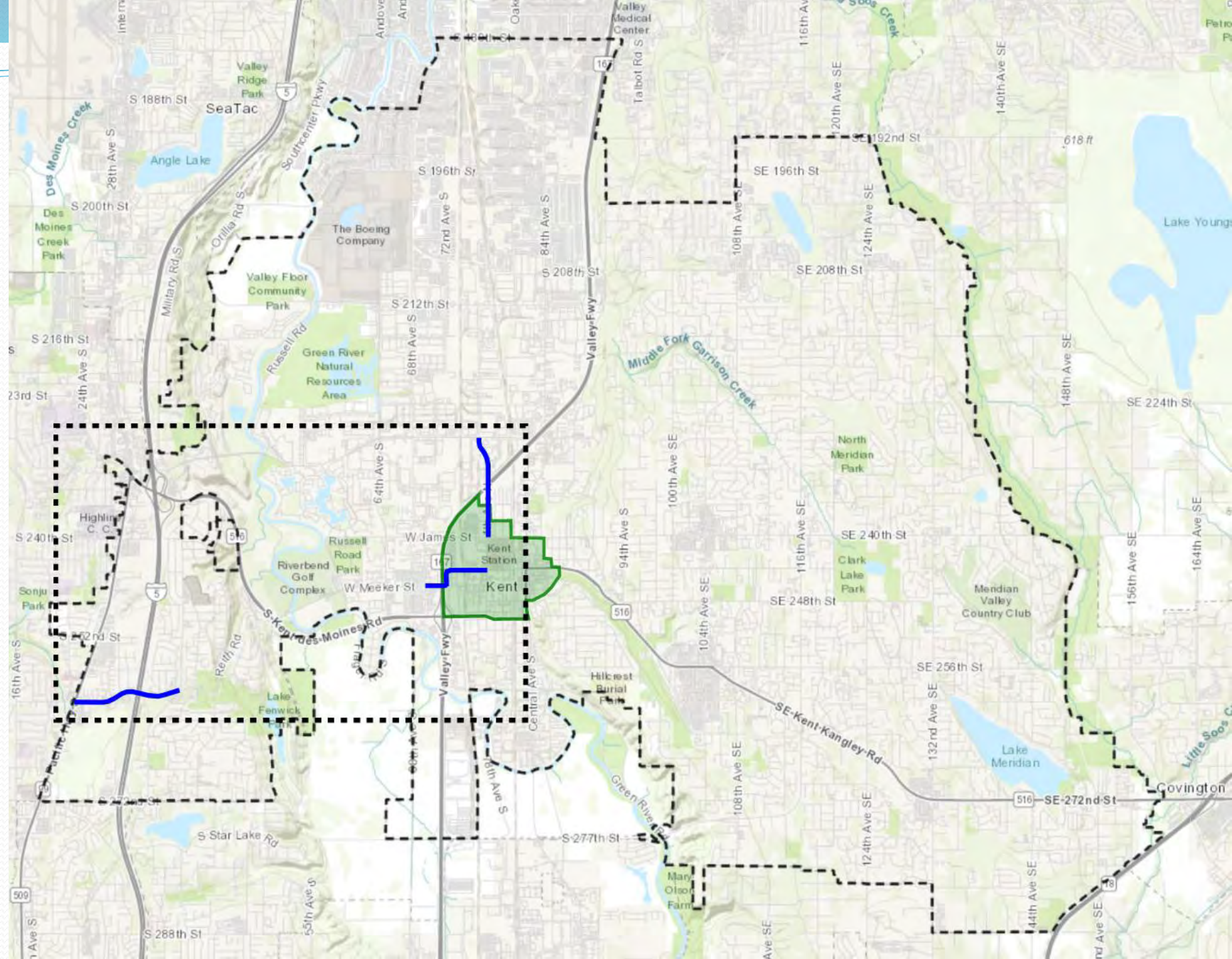
Kent

- 140k
- 60% Minority
- Industrial Valley



Kent

- 140k
- 60% Minority
- Industrial Valley
- Kent Station



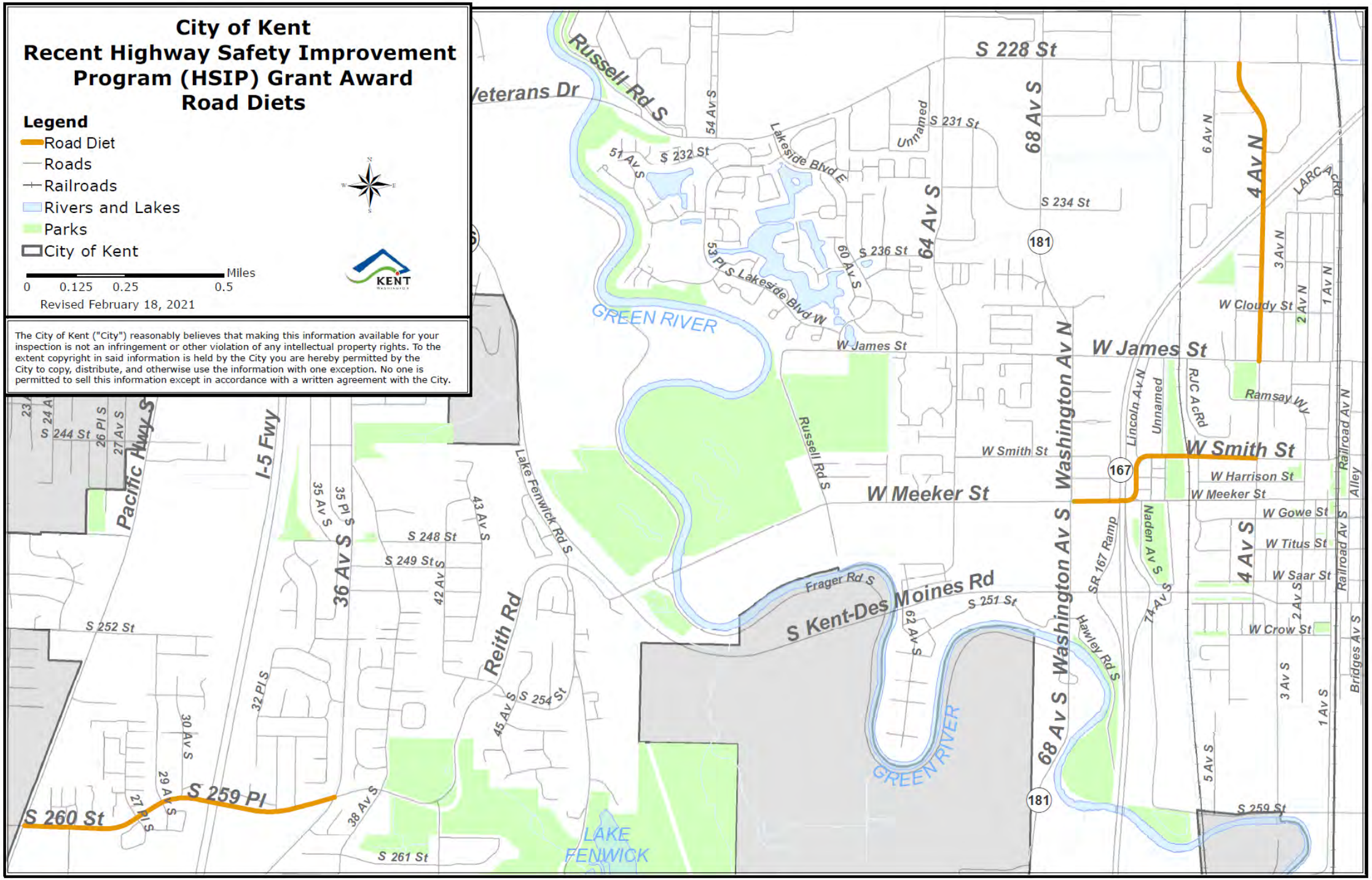
City of Kent
Recent Highway Safety Improvement Program (HSIP) Grant Award
Road Diets

Legend

- Road Diet
- Roads
- Railroads
- Rivers and Lakes
- Parks
- City of Kent

0 0.125 0.25 0.5 Miles

Revised February 18, 2021



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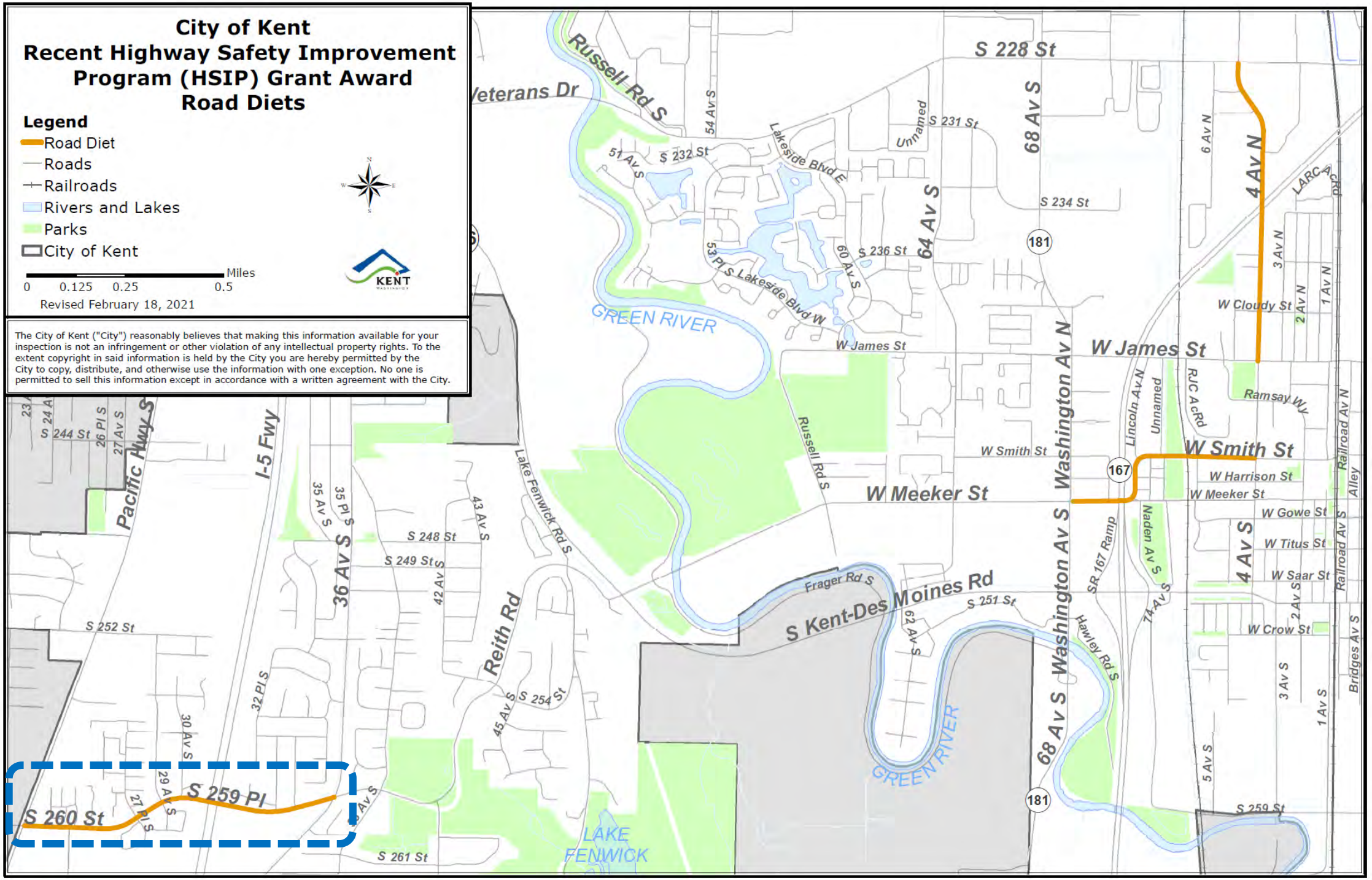

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Road Diets

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- Roads
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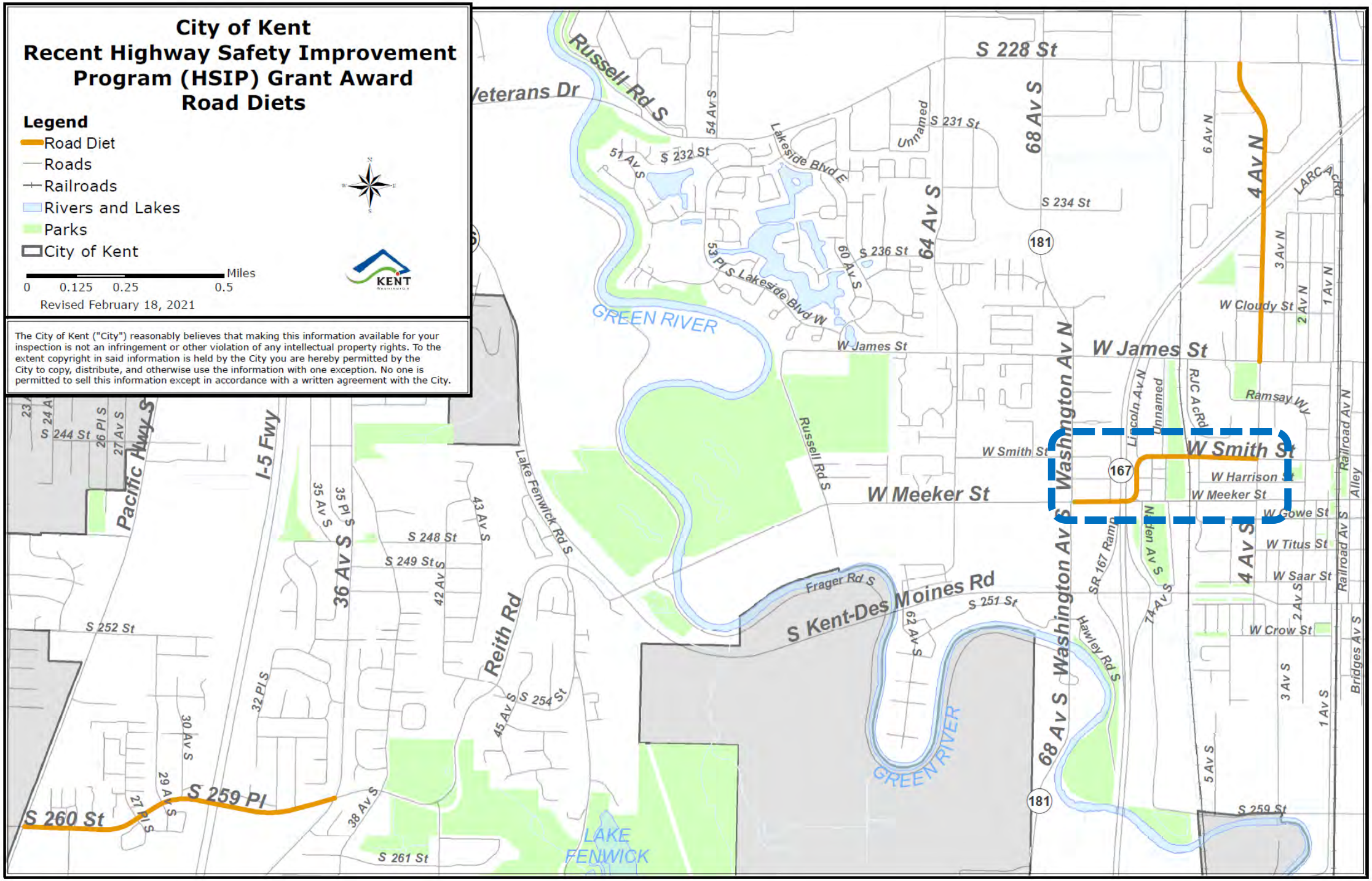
0 0.125 0.25 0.5 Miles

Revised February 18, 2021



City of Kent
Recent Highway Safety Improvement Program (HSIP) Grant Award
Road Diets

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- Road Diet
- Roads
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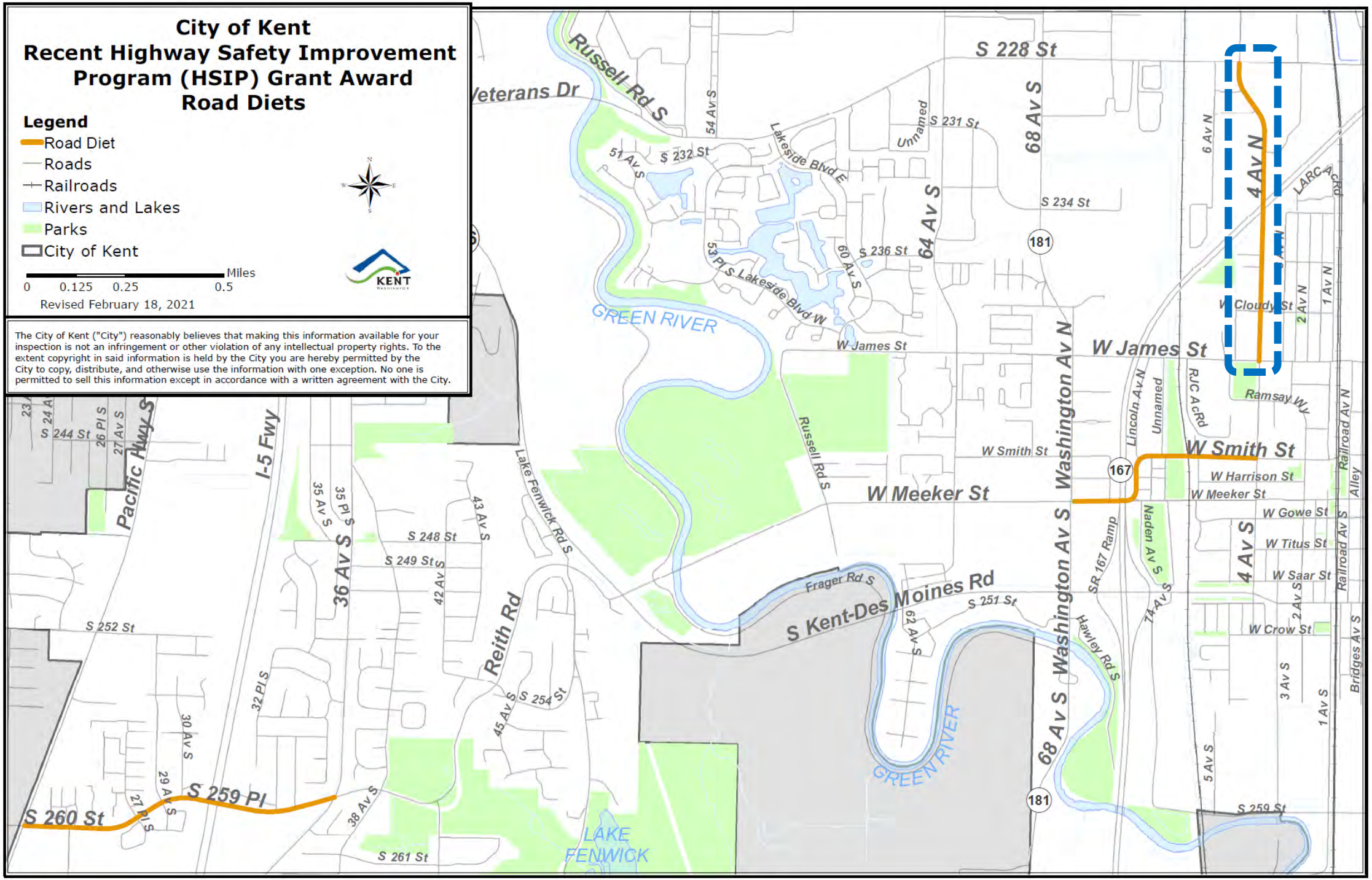
0 0.125 0.25 0.5 Miles

Revised February 18, 2021

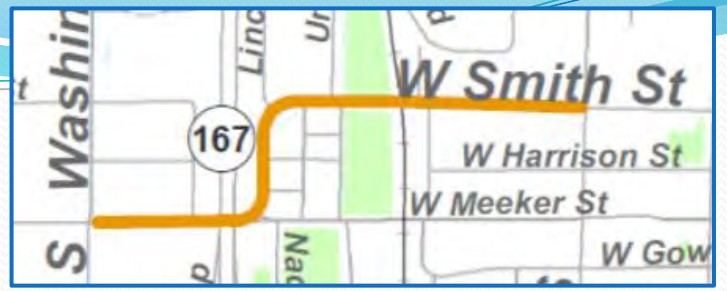


S 260 St – S 259 Pl

- @44’ width
- 2-lane + shoulder

- 12,600 ADT, 2018
- Minor Arterial, 35 mph

Meeker-Lincoln-Smith

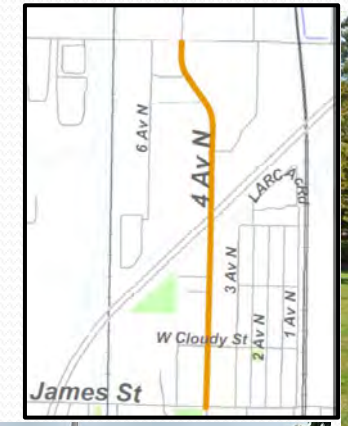


- 4 to 5 lanes
- 40’-58’-70’ width

- 12k-18k ADT, 2018-19
- Minor Arterial, 30 mph

4th Ave N – 76 Ave S

- 50’ – 66’ width
- 4-5 lanes



- 11k-12k ADT, 2018-23
- Minor Arterial, 30-35

2020 Local Road Safety Plan

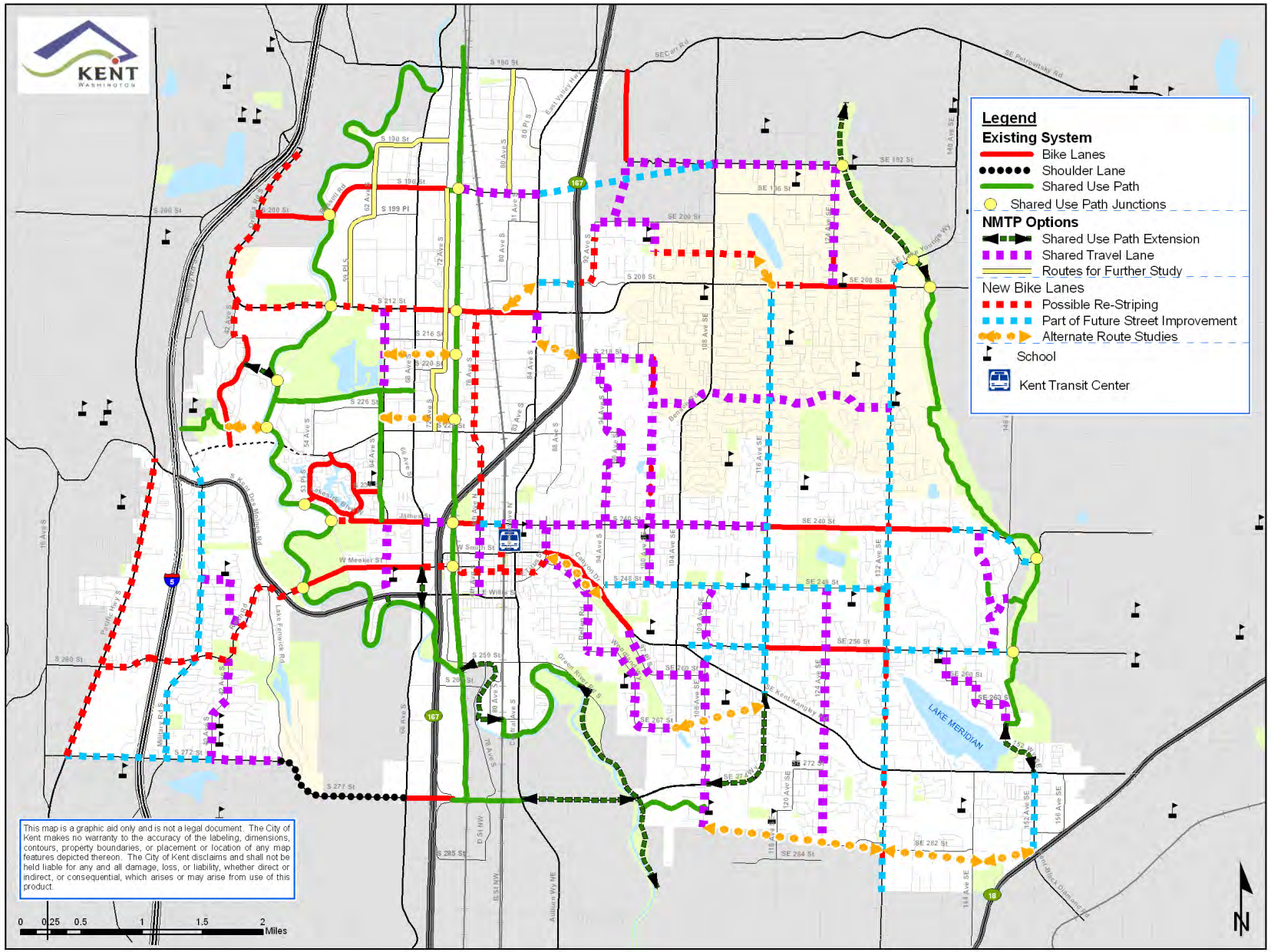
- Kent's first LRSP (2014-2018)
- Road Diets ranked well - benefit/cost ratio

Table 13 - Spot Location Project Rankings by Benefit-Cost Ratio (BCR)

BCR Rank	Map #	Int. or Seg. Rank	Spot Location	North-South / On	East-West / From	To	Cost Estimate	5-year Societal Benefit	Benefit /Cost Ratio
1	2	s32	Road Diet (Wide 2 to 3+ Bike)	S 260 St - S 259 Pl	SR 99	Military Rd S	$150,000	$5,771,662	38.5
2		s20	4th Ave Road Diet Phase 3 (4 to 3+ Bike)	4 Ave S	W Harrison St	W Willis St	$150,000	$2,924,126	19.5
3	4	s50	4th Ave Road Diet Phase 1 (4/5 to 3+ Buff/Sep. Bike)	4 Ave N	S 228 St	W James St	$250,000	$3,735,795	14.9
4		s23	Road Diet (5 to 3+ Separated bike)	E Valley Hwy	S 180 St	S 196 St	$350,000	$4,376,535	12.5
5	3	s29	Meeker-Lincoln-Smith Road Diet (4/5 to 3+ Buff. Bike)	W Meeker-Lincoln-Smith St	Washington Ave N	4 Ave N	$350,000	$4,227,716	12.1
6	6	41	Convert TWSC to Compact Roundabout	Reith Rd S	S 253 St		$850,000	$8,391,274	9.9
7		50	T-intersection Channelization, Raised Median	84 Ave S	S 200 St		$200,000	$1,847,739	9.2
8		s13	4th Ave Road Diet Phase 2 (5 to 3+ Separated Bike)	4 Ave N	W James St	W Harrison St	$200,000	$1,807,375	9.0
9		3	Curb Ext., multi-use path, sidewalk, parking, lane red.	W Meeker St	64 Ave S	Washington Ave	$4,600,000	$26,360,746	5.7
10	5	23	Dutch "Protected" Intersection.	4 Ave N	W James St		$150,000	$772,977	5.2
11	1	31	NB-SB LT Pockets and FYA phasing	94 Ave S	E James St-S 240 St		$1,500,000	$7,179,955	4.8
12	7	s26	Road Diet (4 to 2+ Buff/Separated Bike)	S Reith Rd	S 253 St	KDM Rd (SR 516)	$300,000	$941,976	3.1
13		14	Convert Signal to Roundabout	Central Ave N	NB SR 167		$4,000,000	$11,741,190	2.9
14		20	Convert Signal to Roundabout	116 Ave SE	SE 208 St		$4,000,000	$10,192,614	2.5
15	10	60	Convert minor stop-control to Roundabout	108 Ave SE	SE 264 St		$850,000	$2,058,334	2.4

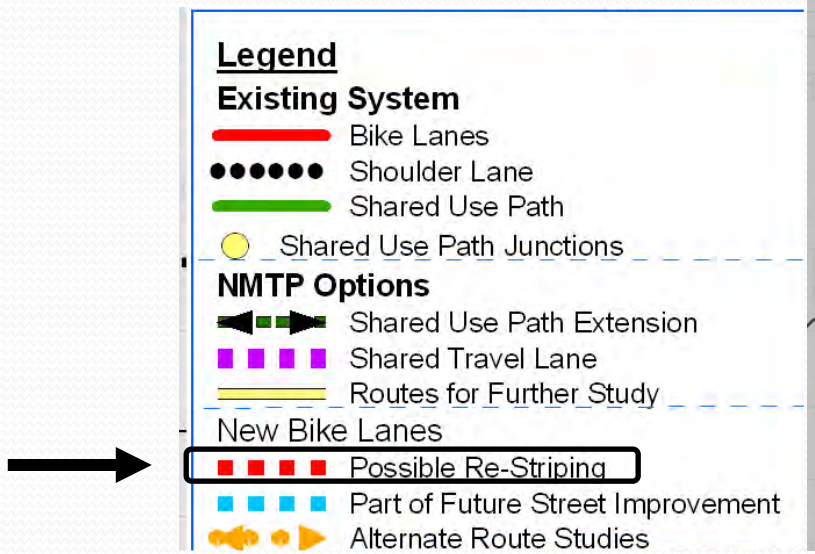
Planning Alignment

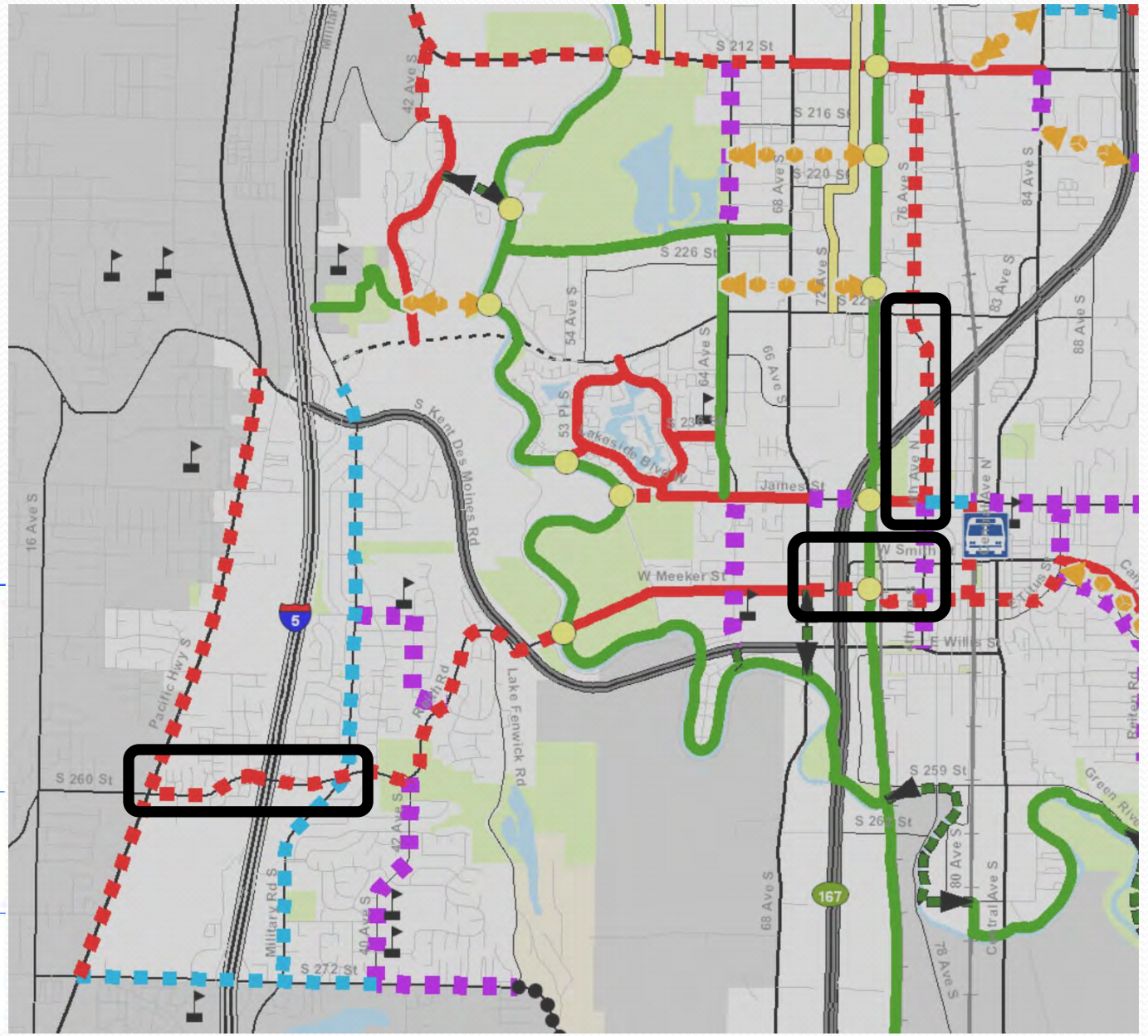
- 2008 Bicycle System



Planning Alignment

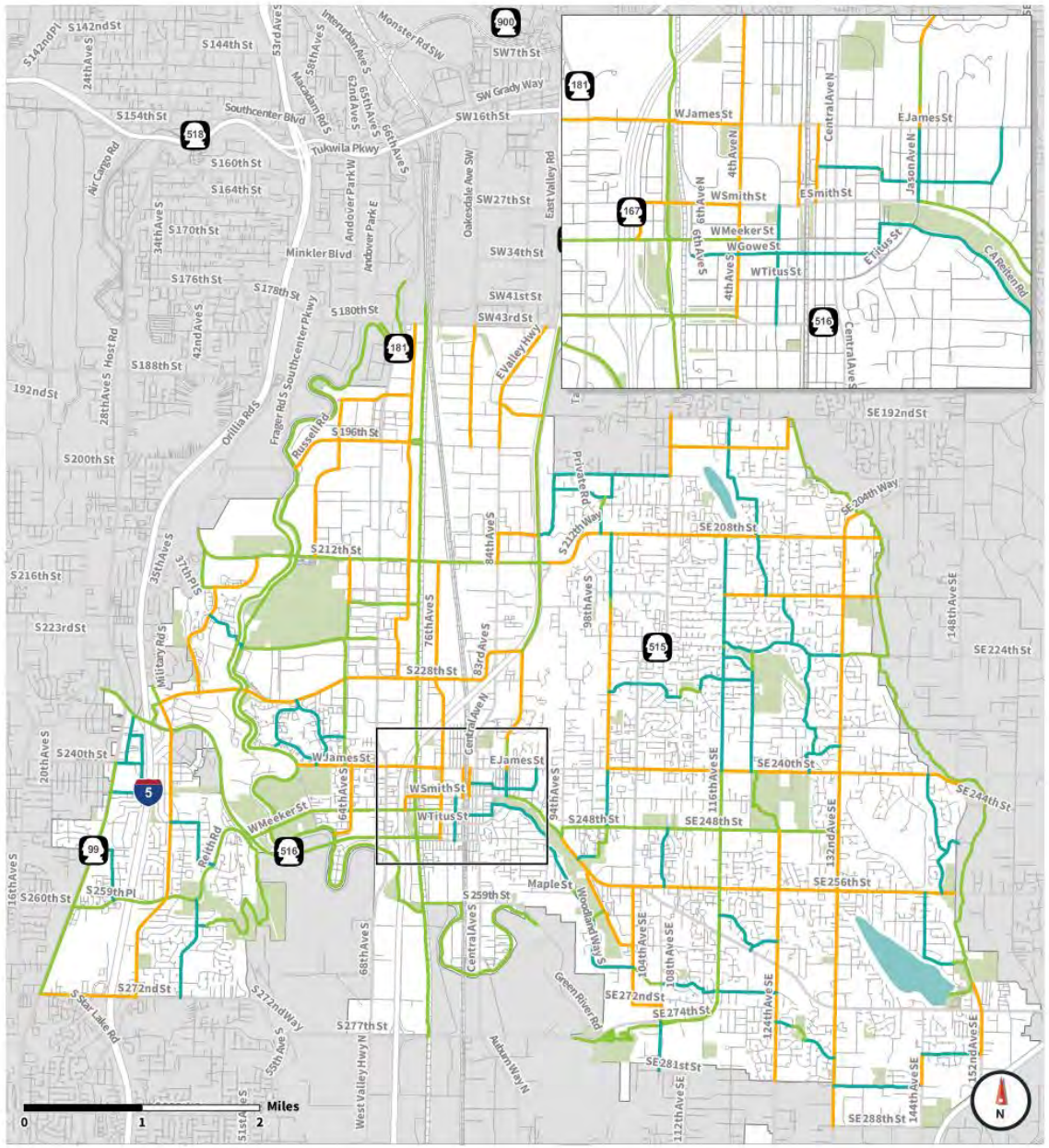
- Most Corridors are included





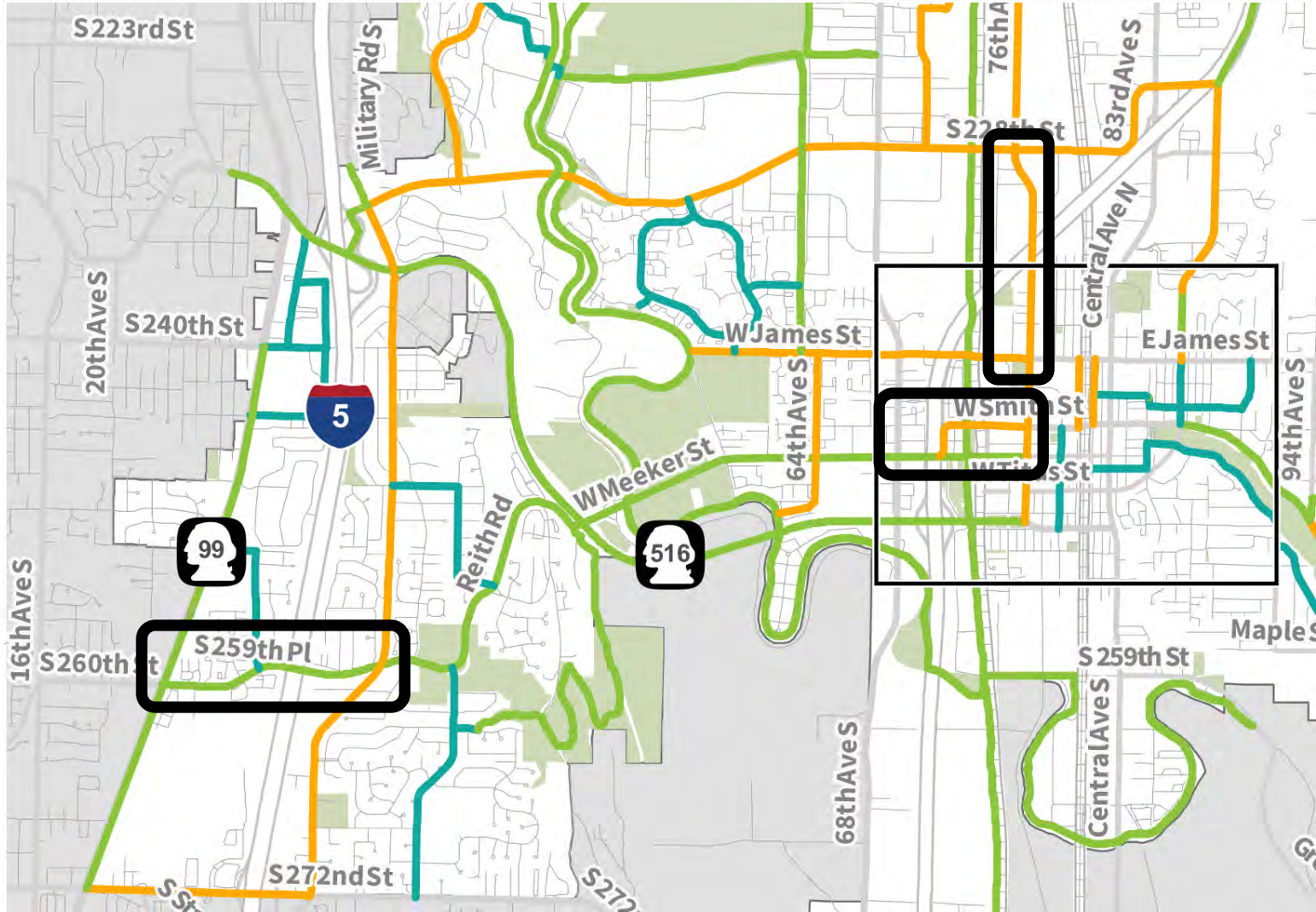
Planning Alignment

- 2021 Transportation Master Plan (TMP)
- Transitioning from vehicle-only to multimodal



Planning Alignment

- Similar Corridors



HSIP Grant Award

- Highway Safety Improvement Program
- WSDOT chooses from the LRSP project list
- 3 road diets selected, later combined.
- $750k est., $735,000 Grant Award

DESIGN – New for Kent

- Buffered Bike Lanes
  - 5’-7’ lanes, 3-5’ buffers

DESIGN – New for Kent

- Green Markings (sort of)

DESIGN – New for Kent

- Flex Posts and Parking Stops

CONSTRUCTION – S 260 St-259 Pl

- 10.5’ Auto lanes
- 11’-12’ TWLTL
- 5’-6’ Bike lanes

CONSTRUCTION – S 260 St-259 Pl

- 10.5’ Auto lanes
- 11’-12’ TWLTL
- 6’ Bike lanes

CONSTRUCTION – Meeker-Lin-Smith

- 2-3 auto lanes, 11’-12’
- Separated Bike lanes

CONSTRUCTION – Meeker-Lin-Smith

- 2-3 auto lanes, 11’-12’
- Separated Bike lanes

CONSTRUCTION – 4th Ave N

- 3-4 auto lanes
- Separated bike lanes

CONSTRUCTION – 4th Ave

- 3-4 auto lanes
- Separated bike lanes

Public Response - Successes

- Positive comments from bikers
- Kent Bicycle Advisory Board
- Beginnings of a network
- Slowed cars down/normalized speeds
- No comments from FIRE, few from PD

Public Response - Challenges

- Negative comments on social media
- Signal Timing
- Congestion looks different
  - Who moved my cheese?
  - Takes me forever / longer queues
- “I don’t see any bikes”
- Slowed cars down

Lessons Learned

- Signal Timing – early and often, confirm
- Street Sweeping – Field Test
- Public Outreach/Notification before/after construction
- Similar to Roundabouts 15-20 years ago
  - Guide on how to "sell" these projects?
- If you think you're doing enough, do more
  - Caught a lot of people by surprise

Lessons Learned

- Make it CLEAR what the public will experience
- Brief the Mayor and Council before, during, and after construction
- Social Media
  - Outsized impact of negative comments
  - Get out in front of them – Queuing/delay
  - Signal timing is an iterative process

Moving Forward

- Be more strategic
  - Signal Timing
  - Mayor, Council, Leadership
  - Public Outreach & Social Media
- "What you don't do WITH me, you do TO me"
- Post-installation study in 2025

Roadway Reallocation – NCHRP 1036 and Complete Streets

Celeste Gilman, Strategic Policy Administrator, Active Transportation Division
January 08, 2025

NCHRP 1036 (15-78)

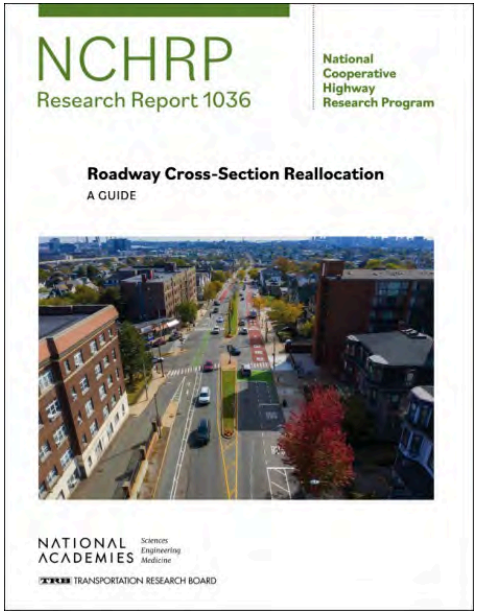
- **Problem:** How to weigh the tradeoffs of roadway reallocation in urban and suburban contexts?
  - Safety and Operations
  - Societal Goals
    - Social Equity
    - Economic Vitality
    - Public Health
    - Environmental Stewardship

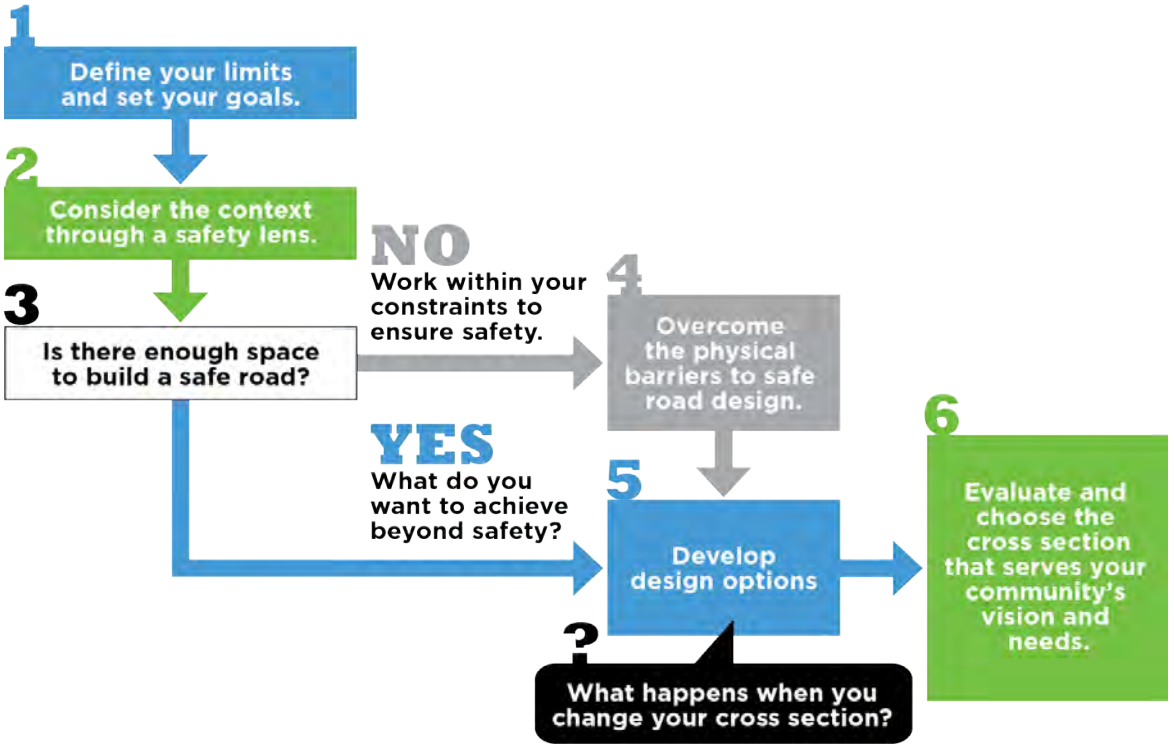
- **Objective:** Develop a transparent decision-making framework

- **Users:** Designers, Planners, Practitioners

- **Research Period:** March 2020 – September 2022

New Decision-Making Framework





NCHRP 1036


1 Define your limits and set your goals.
Access
Distributor
How much space do you have to work with?
What purpose does the road serve?
What are your community's priorities?

NCHRP 1036

2 Consider the context through a safety lens.

Determine the **minimum safe travel space** for people walking, bicycling, riding transit, and driving.

NCHRP 1036

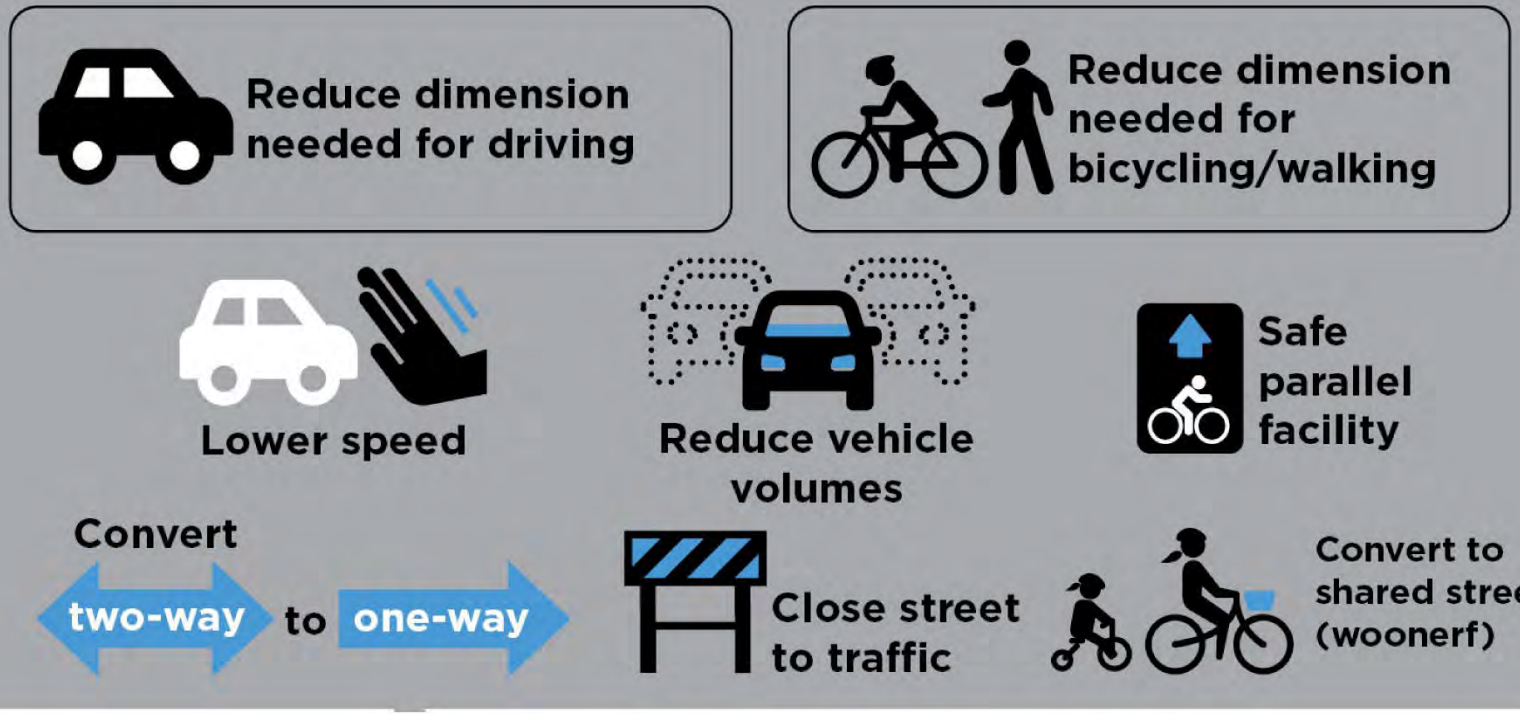
3 Is there enough space to build a safe road?

NO

Work within your constraints to ensure safety.

NCHRP 1036

4 Overcome the physical barriers to safe road design.



NCHRP 1036

3 Is there enough space to build a safe road?

YES

What do you want to achieve beyond safety?

NCHRP 1036

5 Develop design options: what happens when you change your cross section?

Choose a few suitable alternatives to evaluate. The community priorities from Step 1 may make some options more desirable.

Wider Sidewalk

Bus-Only Lanes

On-street parking

Add Traffic Lanes

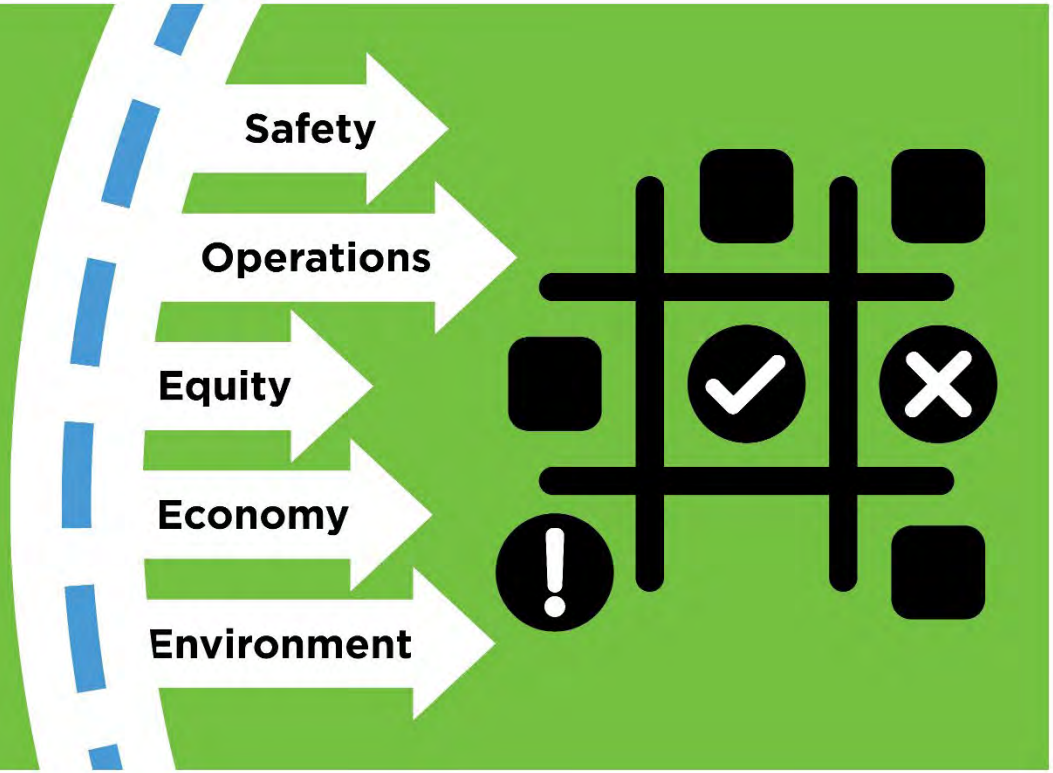
Wider Bike Lanes

Medians

NCHRP 1036

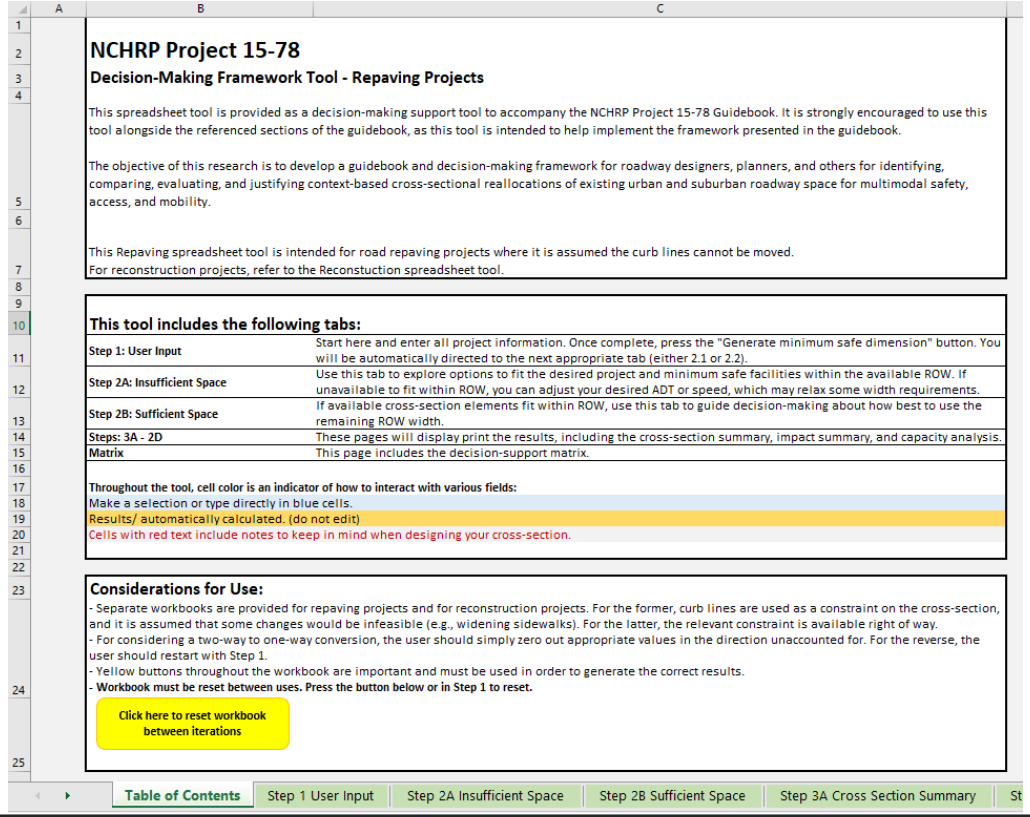
6 Evaluate and choose the cross section to serve your vision and needs.

Compare the likely outcomes of the alternatives you developed in Step 5.



NCHRP 1036

Decision-making Tool



NCHRP Project 15-78

Decision-Making Framework Tool - Repaving Projects

This spreadsheet tool is provided as a decision-making support tool to accompany the NCHRP Project 15-78 Guidebook. It is strongly encouraged to use this tool alongside the referenced sections of the guidebook, as this tool is intended to help implement the framework presented in the guidebook.

The objective of this research is to develop a guidebook and decision-making framework for roadway designers, planners, and others for identifying, comparing, evaluating, and justifying context-based cross-sectional reallocations of existing urban and suburban roadway space for multimodal safety, access, and mobility.

This Repaving spreadsheet tool is intended for road repaving projects where it is assumed the curb lines cannot be moved.
For reconstruction projects, refer to the Reconstuction spreadsheet tool.

This tool includes the following tabs:

Step 1: User Input	Start here and enter all project information. Once complete, press the "Generate minimum safe dimension" button. You will be automatically directed to the next appropriate tab (either 2.1 or 2.2).
Step 2A: Insufficient Space	Use this tab to explore options to fit the desired project and minimum safe facilities within the available ROW. If unavailable to fit within ROW, you can adjust your desired ADT or speed, which may relax some width requirements.
Step 2B: Sufficient Space	If available cross-section elements fit within ROW, use this tab to guide decision-making about how best to use the remaining ROW width.
Steps: 3A - 2D	These pages will display print the results, including the cross-section summary, impact summary, and capacity analysis.
Matrix	This page includes the decision-support matrix.

Throughout the tool, cell color is an indicator of how to interact with various fields:

Make a selection or type directly in blue cells.
Results/ automatically calculated. (do not edit)
Cells with red text include notes to keep in mind when designing your cross-section.

Considerations for Use:

- Separate workbooks are provided for repaving projects and for reconstruction projects. For the former, curb lines are used as a constraint on the cross-section, and it is assumed that some changes would be infeasible (e.g., widening sidewalks). For the latter, the relevant constraint is available right of way.
- For considering a two-way to one-way conversion, the user should simply zero out appropriate values in the direction unaccounted for. For the reverse, the user should restart with Step 1.
- Yellow buttons throughout the workbook are important and must be used in order to generate the correct results.
- **Workbook must be reset between uses. Press the button below or in Step 1 to reset.**

Click here to reset workbook between iterations

Table of Contents | Step 1 User Input | Step 2A Insufficient Space | Step 2B Sufficient Space | Step 3A Cross Section Summary

NCHRP 1036

Raising the Floor

Recommended sidewalk and buffer widths

Recommended bike lane and buffer widths

≤20 MPH

Vehicle Volume (ADT)	# of Travel Lanes	Facility Type (Width)	Street Buffer Type (Width)	On-Street Parking Location (Additional Buffer Width)	Supported By
<2000	No centerline	Mixed traffic (15-19 feet)	Not applicable (Not Applicable)	Curbside (Not Applicable)	MassDOT* CROW
2000-4000		Bike lane (5.5 feet)	Paint (Not Applicable)		FHWA, MassDOT, CROW
>4000					

*FHWA – Separated bike lane; 2019, NACTO – NACTO 2014; MassDOT – MassDOT 2015; CROW – Kester 2016

25 MPH

Vehicle Volume (ADT)	# of Travel Lanes	Facility Type (Width)	Street Buffer Type (Width)	On-Street Parking Location (Additional Buffer Width)	Supported By
<1500	No centerline	Mixed traffic (15-19 feet)	Not applicable (Not Applicable)	Curbside (Not Applicable)	NACTO, MassDOT
1500-3000	1 lane per direction	Bike Lane (5.5 feet)	Paint (Not Applicable)	Curbside (1 foot)	NACTO, MassDOT, CROW
3000-6000		Buffered bike lane (5.5 feet)	Paint (1 foot)	Curbside (1 foot)	FHWA, NACTO, MassDOT, CROW
>6000	2 lanes per direction	Separated bike lane (6 feet) Raised bike lane (6 feet) Two-way bike lane (10 feet)	Light separation* (1 foot) Light separation (2 feet) Light separation (2 feet)	Floating (2 feet) Floating (1 foot)	NACTO, MassDOT, CROW

*Light separation includes flexible delineator posts, plastic planter boxes, rubber curbs, or precast concrete curb/parking stops

30 MPH

Vehicle Volume (ADT)	# of Travel Lanes	Facility Type (Width)	Street Buffer Type (Width)	On-Street Parking Location (Additional Buffer Width)	Supported By
<6000	Any	Separated bike lane or raised bike lane (6 feet) Two-way bike lane (10 feet)	Light separation (1 foot) Light separation (2 feet)	Floating (2 feet)	NACTO, MassDOT, CROW
>6000					

35 MPH

Vehicle Volume (ADT)	# of Travel Lanes	Facility Type (Width)	Street Buffer Type (Width)	On-Street Parking Location (Additional Buffer Width)	Supported By
Any	Any	Separated bike lane or raised bike lane (6 feet) Two-way bike lane (10 feet)	Heavy separation* (5 feet)	Floating (2 feet)	FHWA, NACTO, MassDOT, CROW

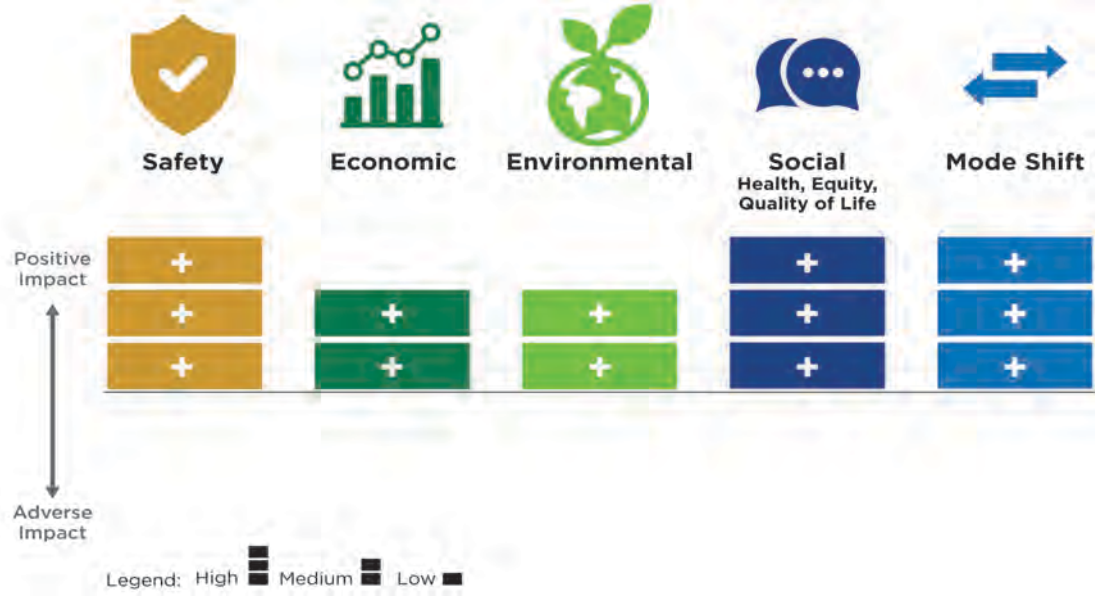
*Heavy separation includes vehicle parking, concrete planter boxes, reinforced rigid bollards, cast-in-place concrete curbs, concrete barriers, or guide rails. Should have lat. meter clearance between bike and object.

>35 MPH

Vehicle Volume (ADT)	# of Travel Lanes	Facility Type (Width)	Street Buffer Type (Width)	On-Street Parking Location (Additional Buffer Width)	Supported By
Any	Any	Raised bike lane (6 feet) Raised two-way bike lane (10 feet) Multiuse path (12 feet)	Heavy separation (6 feet)	Not applicable (Not applicable)	FHWA, NACTO, MassDOT, CROW

NCHRP 1036

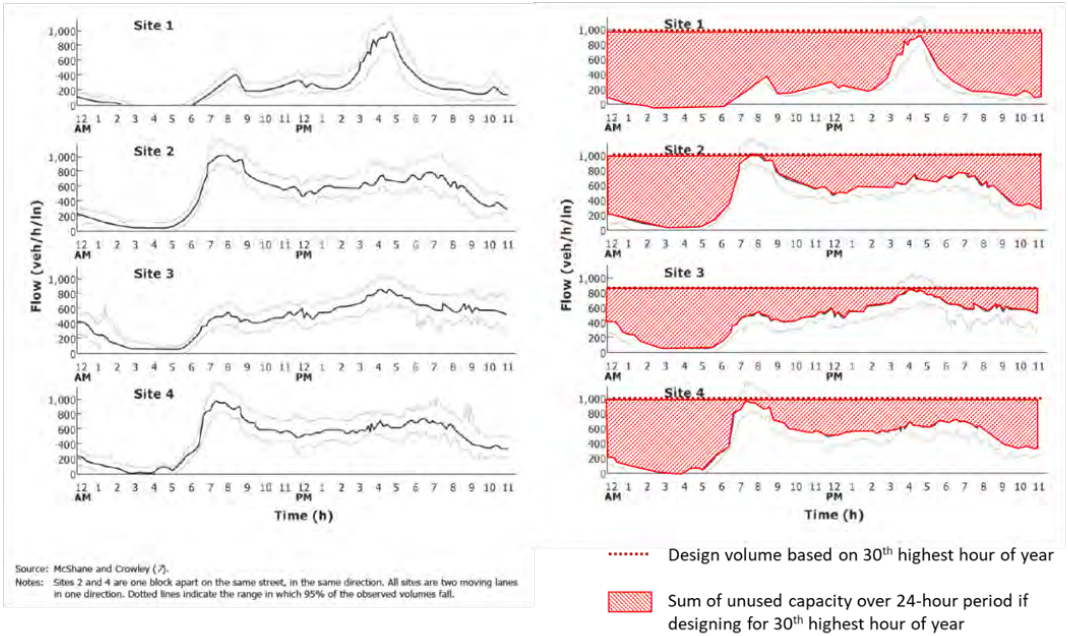
Connecting Decisions to Outcomes



Outcomes of adding bicycle lanes

NCHRP 1036

Designing for Peak-Hour Yields Unused Capacity



Source: Adapted from HCM 7th Edition Chapter 3

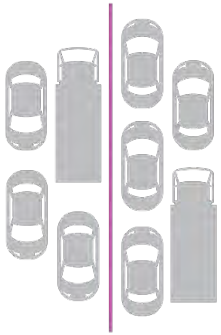
WHAT'S WRONG WITH UNUSED CAPACITY?

UNDER CAPACITY = HIGHER SPEEDS

WHICH ARE ASSOCIATED WITH INCREASED AND MORE SEVERE CRASHES

OVERDESIGNING FACILITIES

FOR CARS MAKES THEM LESS SAFE FOR PEOPLE WALKING AND BIKING

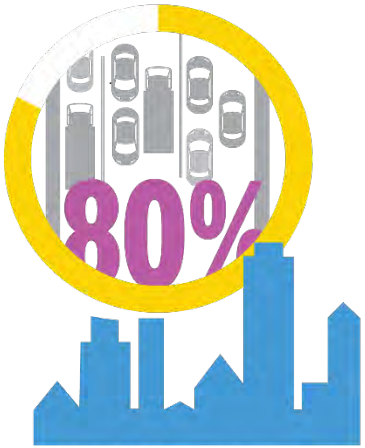


THE MORE TRAVEL LANES, THE

LONGER WAIT TIMES

FOR ALL MODES

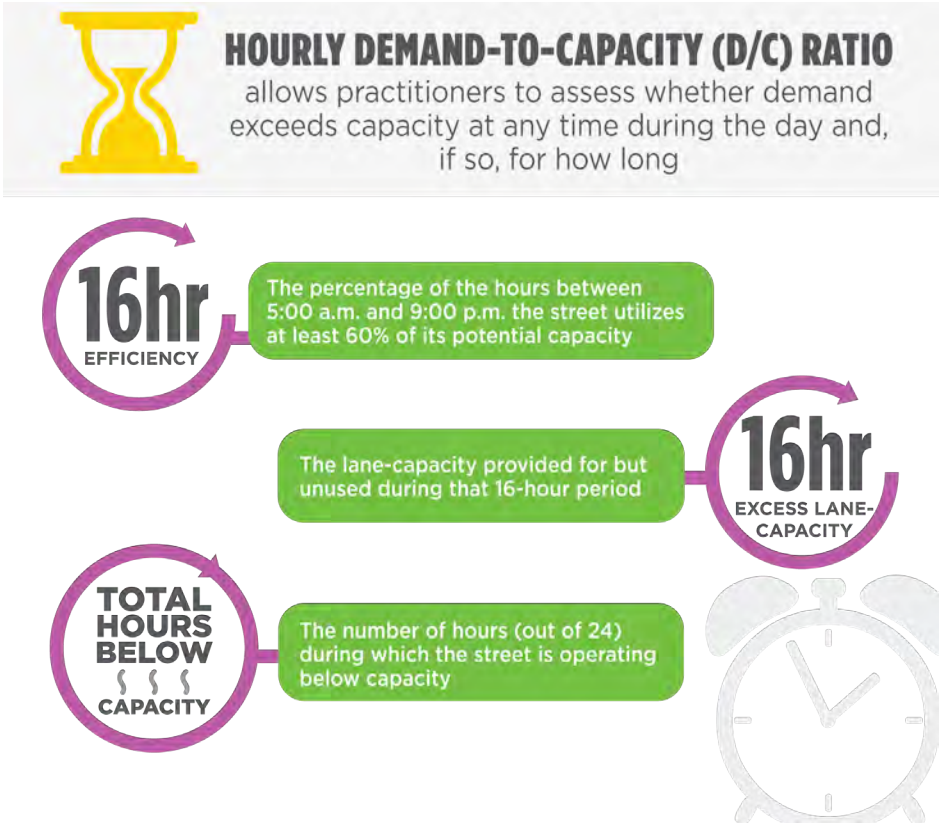
STREETS MAKE UP MORE THAN



OF PUBLIC SPACES IN CITIES AND TOWNS

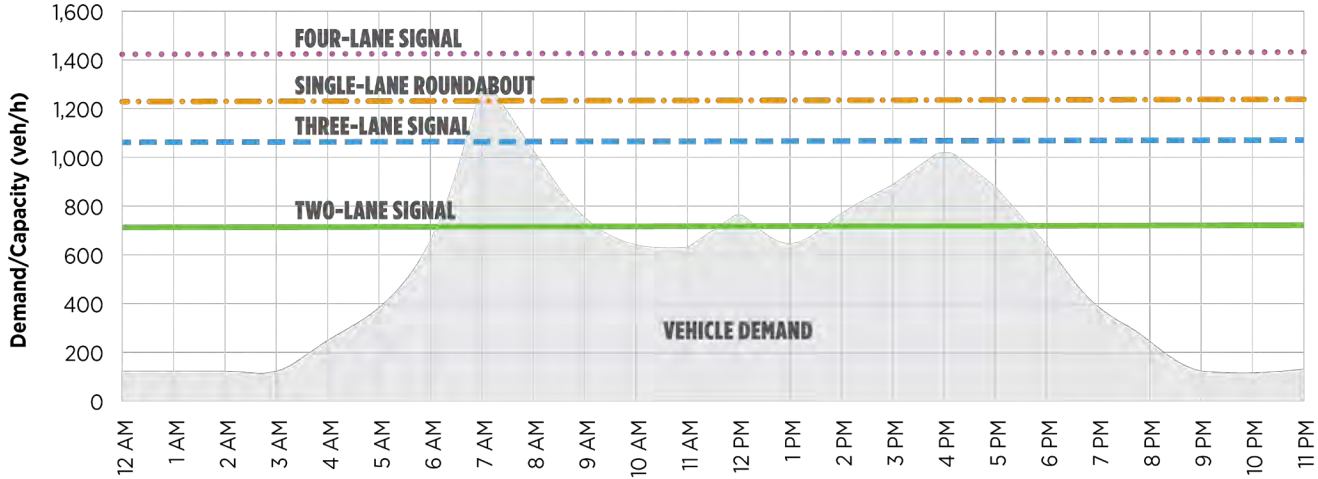
Kittelson & Associates

24-Hour Capacity Framework



NCHRP 1036

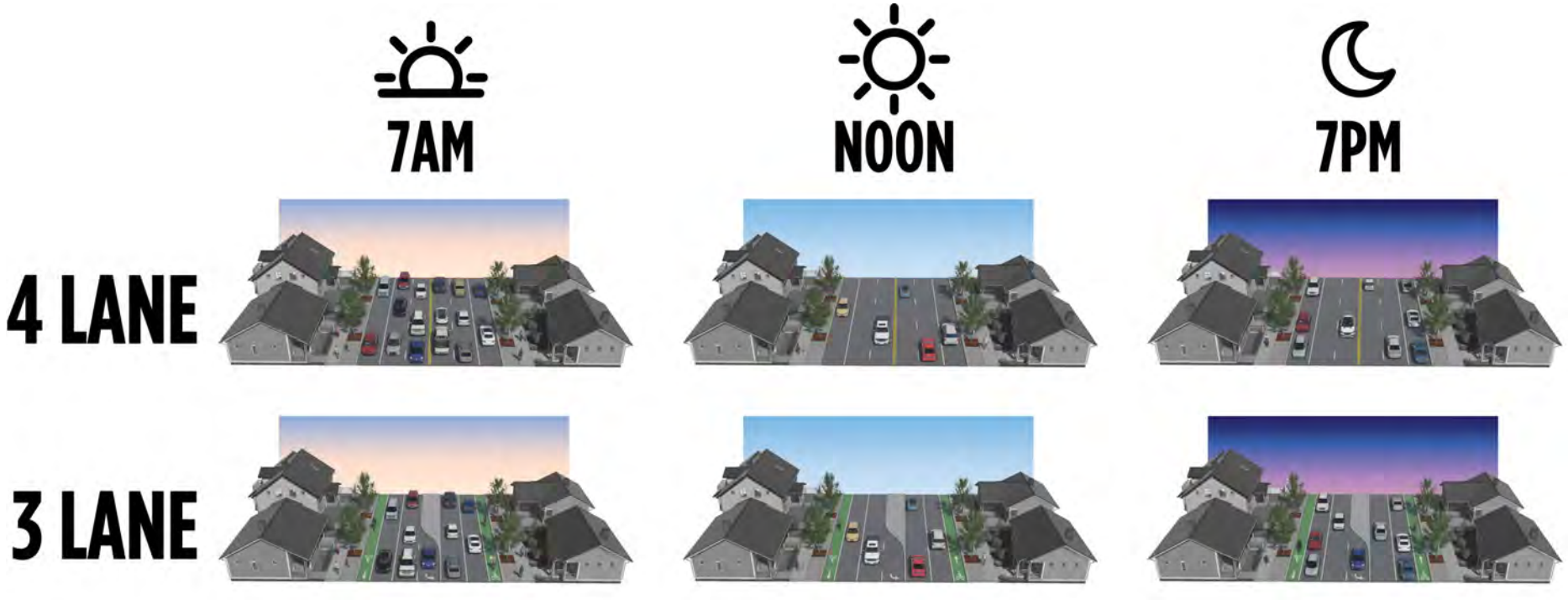
Illustrative Example



Intersection Control	Max Demand-to-Capacity Ratio (d/c)	16-Hour Efficiency	16-Hour Excess Capacity (Lane Hours)	Total Hours Below Capacity
FOUR-LANE SIGNAL	0.89	31.3%	15.9	24
THREE-LANE SIGNAL	1.18	50.0%	8.2	23
TWO-LANE SIGNAL	1.77	81.3%	2.2	16
SINGLE-LANE ROUNDABOUT	1.02	50.0%	6.7	23

NCHRP 1036

Illustrative Example



NCHRP 1036

Lane Reallocation Example

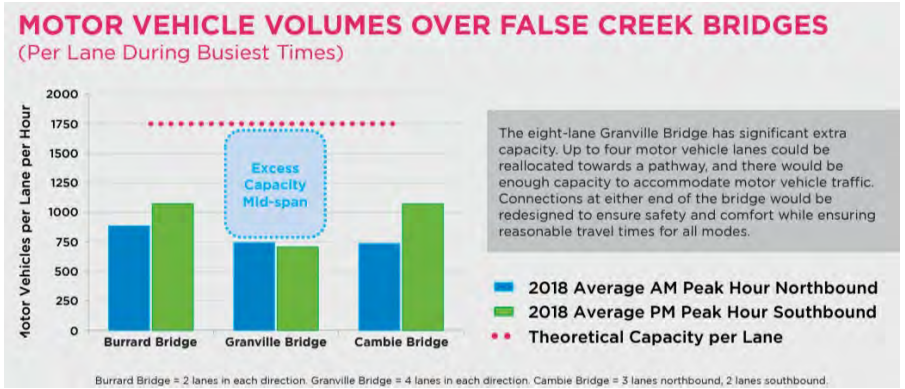
Project
City of Vancouver, BC, reallocated 2 lanes on the Granville Bridge to provide walking and bicycling facilities

Factors that contributed to the project's success

- Sharing success from nearby projects to build public support
- Use travel time as the metric for engagement instead of "LOS"
- Repurposing excess capacity for public realm improvements that excite the public

Existing

Proposed



Alex Liaw, WSDOT Active Transportation Division

CS Implementation at WSDOT

RCW 47.04.035, Complete Streets:

- The department must incorporate the principles of complete streets with facilities that provide street access with all users in mind, including pedestrians, bicyclists, and public transportation users.
- For state transportation projects starting design on or after July 1, 2022, and that are $500,000 or more

Questions/Discussion



Celeste Gilman, Strategic Policy Administrator, celeste.gilman@wsdot.wa.gov
Alex Liaw, Principal Active Transportation Engineer, alex.liaw@wsdot.wa.gov

Complete Streets: https://wsdot.wa.gov/construction-planning/complete-streets

Snow Removal and Multimodal Considerations

James Morin, Maintenance Operations Branch Manager, WSDOT

Ursula Sandstrom, Transportation Planner, WSDOT

Andi Zontek-Backstrum, Public Works Director, City of Leavenworth

Tom Wachholde, Public Works Director, City of Wenatchee

Aaron Kelly, Public Works Operations Manager, City of Wenatchee

Andy Greer, Street Maintenance Supervisor, City of Wenatchee

Multimodal Considerations for Snow Plowing

Washington State Department of Transportation
January 8, 2025

Setup

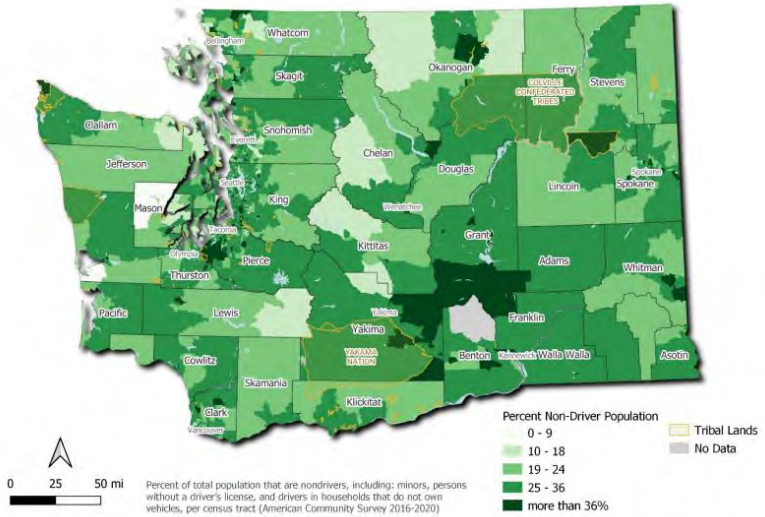
- 25 – 30% of Washingtonians are non-drivers
- From 2020 to 2022, 24% of all WA fatalities and 33% of serious injuries were intersection related.

Target Zero Emphasis Areas

Risk factors most commonly associated with fatal crashes fall into four categories. These are not mutually exclusive. Most crashes involve more than one of these (within and/or across categories):

1. **High-Risk Road User Behavior:** Impairment, Speeding, Distraction, and Lack of Seat Belt Use
2. **Road User Age Groups:** Young Drivers (age 15-24) and Older Drivers (age 70+)
3. **Locations:** Intersections and Lane Departures (including roadway departures)
4. **Road Users by Mode of Travel:** Motorcyle Riders, Heavy Vehicles, and Active Transportation Users (walkers and rollers)

Figure 2. Percentage of Nondriver Population in Washington State per Census Tract.



Sources:
Washington State JTC Nondriver Study
Washington State Strategic Highway Safety Plan 2024

Basics of WSDOT Plow Protocol

- Long routes
- Fleet is primarily large highway-scale 60,000lb trucks
- All snow must be stored on plow route
- Prioritized
- City Streets as State Highways
- Blades down in larger towns also as a courtesy
- Current policy is that roadway conditions take precedence, and all other facilities are “as resources allow"
  - Maintenance level of service standards

Current Work

- Member of Clear Roads Consortium
  - Presented on our research at the fall symposium
- December 2024 – national practice review by UW of "Maintenance of the Active Transportation Elements of Complete Streets.“ A few highlights:
  - Costs are lower when designed for wider equipment
  - Kitchener Ontario does sidewalk + bike lane so they can plow a 3m wide path with a light duty truck

Corridors

- Interconnected system – what is done on the road impacts the sidewalk and vice versa

Corridors

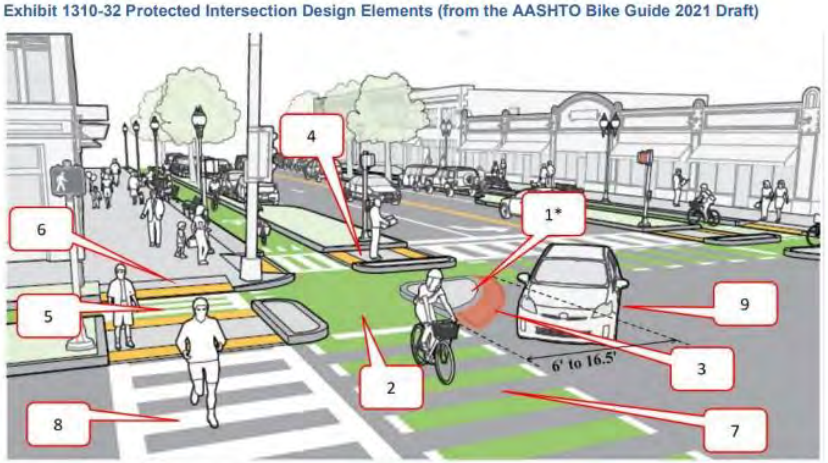
- Sufficient distance from roadway to not have roadway spray or snow storage concerns?
  - Ex: Along Seward Highway in AK
- What can we do on the design and operations sides to make corridors work better?
- What are the tradeoffs in play?

Intersections and Roundabouts

- Time consuming
- Sneckdowns – snow left on the roads shows what road surface isn't used
- How do we reduce/limit long-term snow accumulation at intersections or transit stops?
- Long term snow vs short term snow/melt cycles

Intersections and Roundabouts

- What is working well?
- What is a re-occurring challenge?
- How do mountable truck aprons work with plow blades?
- What works from a maintenance operations perspective at intersections?



WSDOT Design Manual - Exhibit 1310-32

Bridges

- Ices accumulates differently
- More freeze/thaw events
- Snow and equipment weight constraints
  - Especially retrofitted sidewalks
- Needs narrower equipment

Operations Wishlist

- Engagement two-way of maintenance and design
- Necessary equipment included in project budgets
  - 520 Trail sweeper funded this way
- Coordinated work on state routes
- Building designated long term snow storage vertically and horizontally designated places as appropriate
- Roadway access for light duty trucks to shared use paths
- Smooth transitions; avoid plow blade catchers

Questions?

Ursula Sandstrom
Complete Streets Statewide Planner
Ursula.sandstrom@wsdot.wa.gov

James Morin
Maintenance Operations Branch Manager
James.Morin@wsdot.wa.gov

Leavenworth Snow Management

January 8, 2025

Leavenworth Statistics

Approx. City Population

2,500

Approx. Annual Visitors

3,500,000

Peak Tourism

Thanksgiving - New Years

Annual Average Snow Fall

96 inches

Average Annual Snow Events

15

Vehicular Facility Snow Management Operations

Streets and Utilities Crew

Equipment Operators

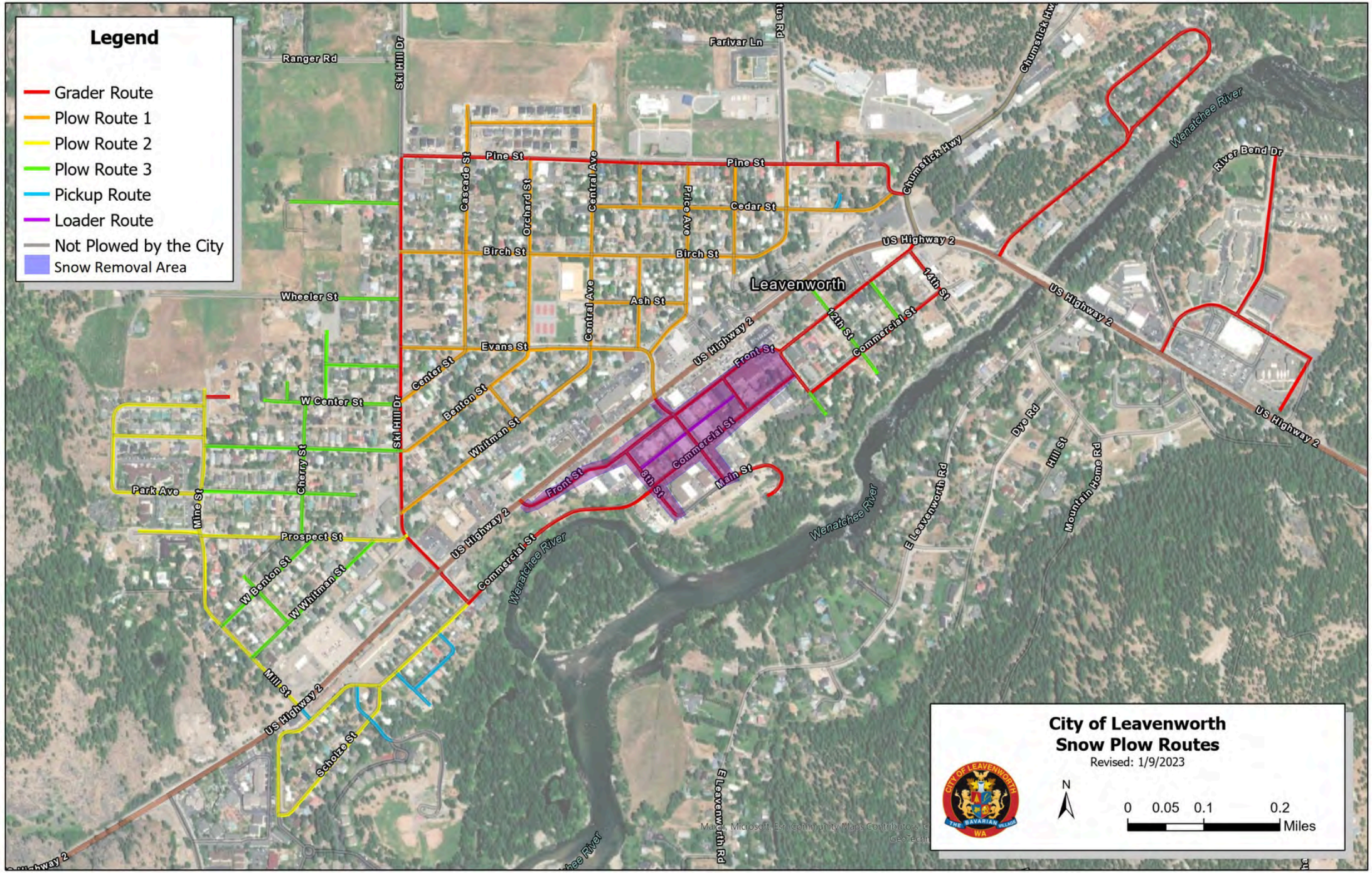
8

Lane Miles

16.2

Parking Lots

8


Legend
Grader Route
Plow Route 1
Plow Route 2
Plow Route 3
Pickup Route
Loader Route
Not Plowed by the City
Snow Removal Area
Leavenworth
Ranger Rd
Ski Hill Dr
Farivar Ln
Chumstick Hwy
Wenatchee River
River Bend Dr
Pine St
Cedar St
Birch St
Ash St
Wheeler St
Evans St
Cascade St
Orchard St
Central Ave
Price Ave
US Highway 2
14th St
12th St
Commercial St
Front St
Center St
W Center St
Benton St
Whitman St
Cherry St
Park Ave
Mine St
Prospect St
W Benton St
W Whitman St
Mill St
Schoize St
8th St
Main St
Dye Rd
Hill St
Mountain Home Rd
E Leavenworth Rd
City of Leavenworth
Snow Plow Routes
Revised: 1/9/2023
N
0 0.05 0.1 0.2
Miles

Pedestrian Facility Snow Management Operations

Parks Crew

Equipment Operators

4

Total Ped. Facility Length (Miles)

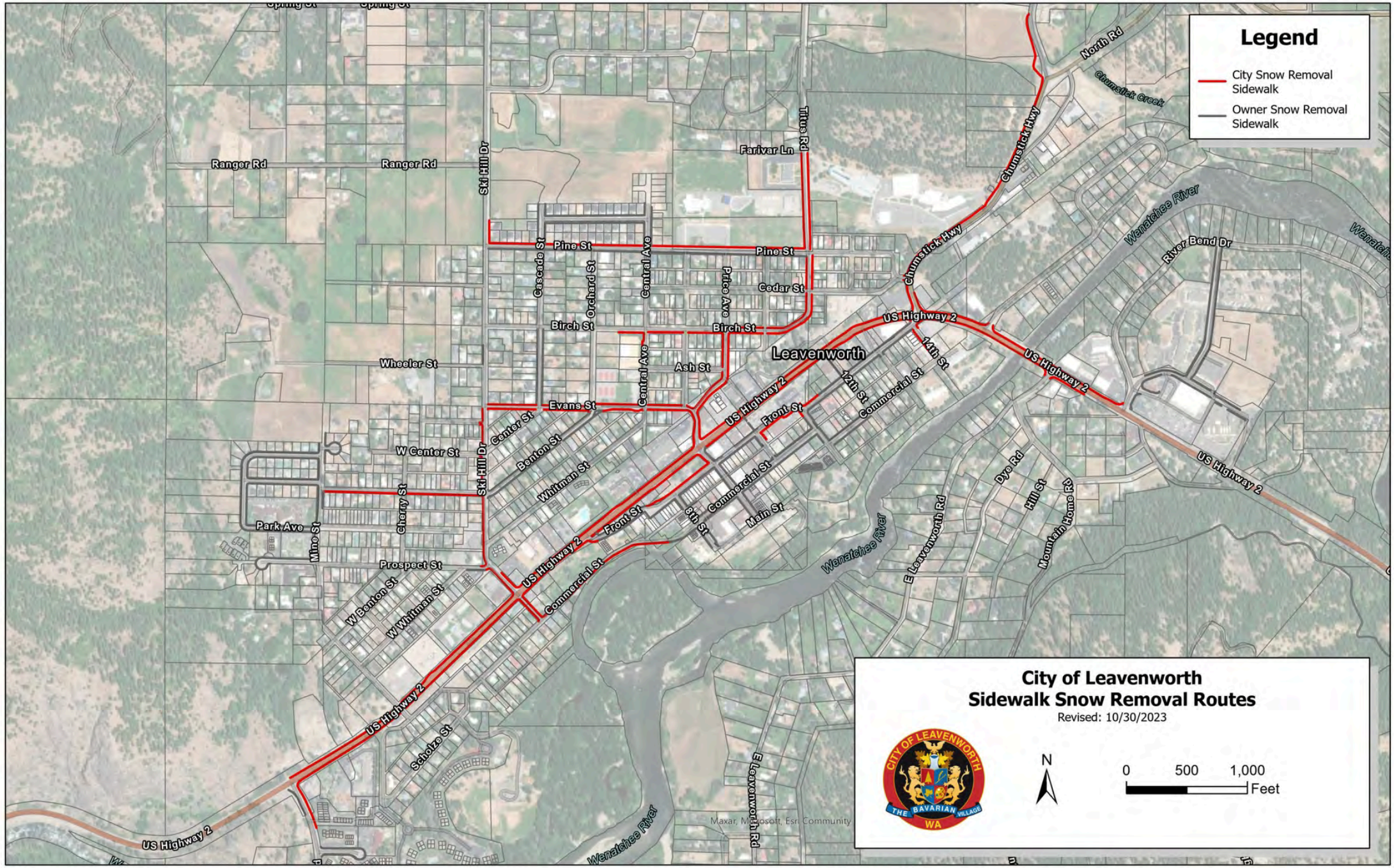
13.7

City-Maintained Ped. Facility Length (Miles)

7.4

City-Maintained Percentage

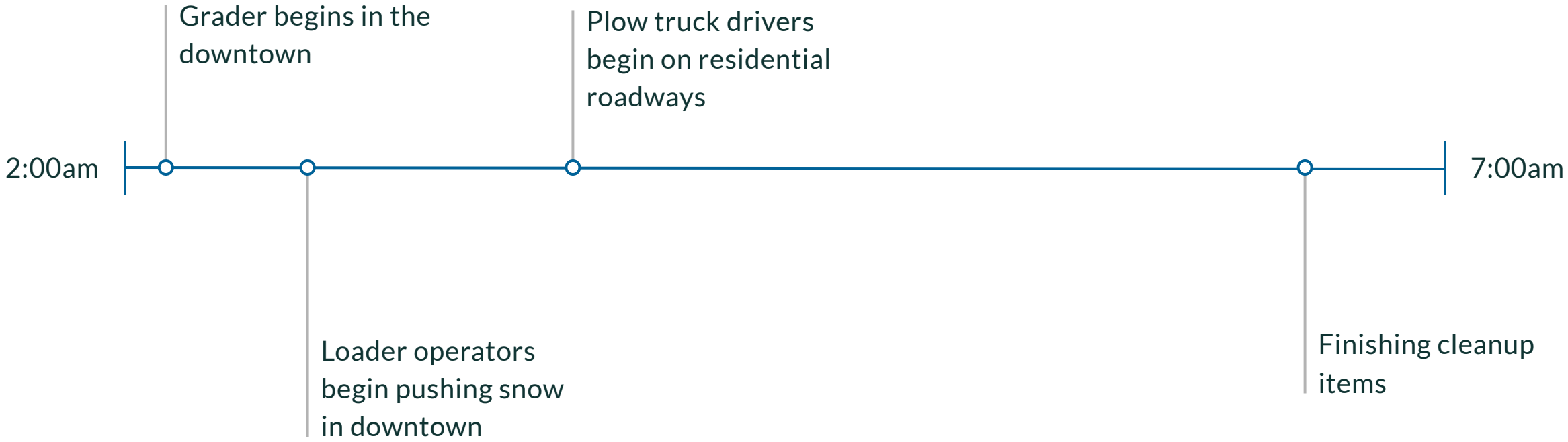
54%


Legend
City Snow Removal Sidewalk
Owner Snow Removal Sidewalk
City of Leavenworth
Sidewalk Snow Removal Routes
Revised: 10/30/2023
N
0
500
1,000
Feet
Leavenworth
Ranger Rd
Ski Hill Dr
Farivar Ln
Titus Rd
North Rd
Chumstick Creek
Chumstick Hwy
Wenatchee River
River Bend Dr
Pine St
Cascade St
Orchard St
Central Ave
Price Ave
Cedar St
Birch St
US Highway 2
14th St
12th St
Commercial St
Wheeler St
Ash St
Evans St
Front St
Center St
W Center St
Benton St
Whitman St
Cherry St
Park Ave
Mine St
Prospect St
W Benton St
W Whitman St
8th St
Main St
Dye Rd
Hill St
Mountain Home Rd
E Leavenworth Rd
Seholze St
Maxar, Microsoft, Esri Community


Starbucks

Snow Management Timeline

Triggering Snow Event: 3 inches of snow



Snow Storage Challenges

- Commercial Area: Full Removal
  - City snow storage location: private property
  - Business owner storage area
- Residential Area
  - Maintaining road width/parking area
  - Burying sidewalk: burden to adjacent property owners
- New Development
  - Roadway sections with snow storage area between curb and sidewalk

City of Wenatchee

Winter Operations – Snow and Ice Mgmt

Andy Greer, ***Street Maintenance Supervisor***
Aaron Kelly, ***Deputy Public Works Director – Operations***
Tom Wachholder, ***Public Works Director***

January 8, 2025

Discussion Objectives

1. Provide an overview of Wenatchee's snow and ice program

2. Provide an overview of staffing and equipment

3. Discuss mechanisms the City has to ensure sidewalks are maintained.

City of Wenatchee

Winter Operations in Wenatchee

- Winter weather in Wenatchee can be highly unpredictable, with snow accumulation ranging from 0 to over 4 feet.

- The Street Division is proactive and responsive to extreme weather, maintaining over **275 lane miles** of streets for **35,000+ residents**.

City of Wenatchee

Snow and Ice Control Overview

- **24/7 operation** during winter storms, ensuring priority streets remain passable.
- 2 crews (day and night) of 10 break into teams of 2 consisting of a plow truck with a sander and road grader
- Fleet of 19 pieces of equipment
- Pretreat roads with deicer
- We start the season with 2000 tons of sand and 300 tons of salt for brine

City of Wenatchee

Fleet and Equipment

- **8 Dump Trucks**: 5 with sanders & snowplows, 3 with deicer tanks.
- **6 Road Graders** & trained operators
- **3 -1.5 ton Trucks** with plows and sanders
- **2 Snowblowers** that mount to Frontend Loaders

City of Wenatchee

Snow Removal Process

- **Deicer**: Pre-storm treatment on top-priority streets

- **Plows**: Clear travel lanes based on snow depth and weather conditions

- **Berms**: City streets are plowed leaving a berm to the side of the street with the downtown core areas plowed to the center
  - Center berms are removed as soon as possible

City of Wenatchee

Center Lane Snow Berms

- Removal

Snow Storage

City of Wenatchee

Prioritization of Streets

1. **First Priority**: Major arterial & collector streets (emergency routes)

2. **Second Priority**: Residential & local streets

3. **Third Priority**: Berm removal, alleys, and center of cul-de-sacs

City of Wenatchee

Sidewalk Snow Removal

- The City's Parks Department clears City maintained sidewalks, other sidewalks are maintained by adjacent property owners
- Property owners have 24 hours following a snow storm to address sidewalks
- Enforcement action is taken to address non-compliance

City of Wenatchee

Conclusion and Key Points

- Snow routes are designed to keep streets connected even if some priorities are dropped
- Community members are urged to drive cautiously, avoid tailgating, and not pass snowplows
- Sidewalk snow removal is required by adjacent property owners
- Community cooperation is key to a successful winter season

City of Wenatchee

Questions?

City of Wenatchee

Pedestrian Scale Street Lighting Best Practices

Briana Weisgerber

WSDOT Active Transportation Division

Patrick Armstrong

Pacific Lighting Solutions

Street Lighting and Safety Study

Washington Transportation Professionals Forum
January 15, 2024

Parametrix TOOLE DESIGN PRR

WSDOT

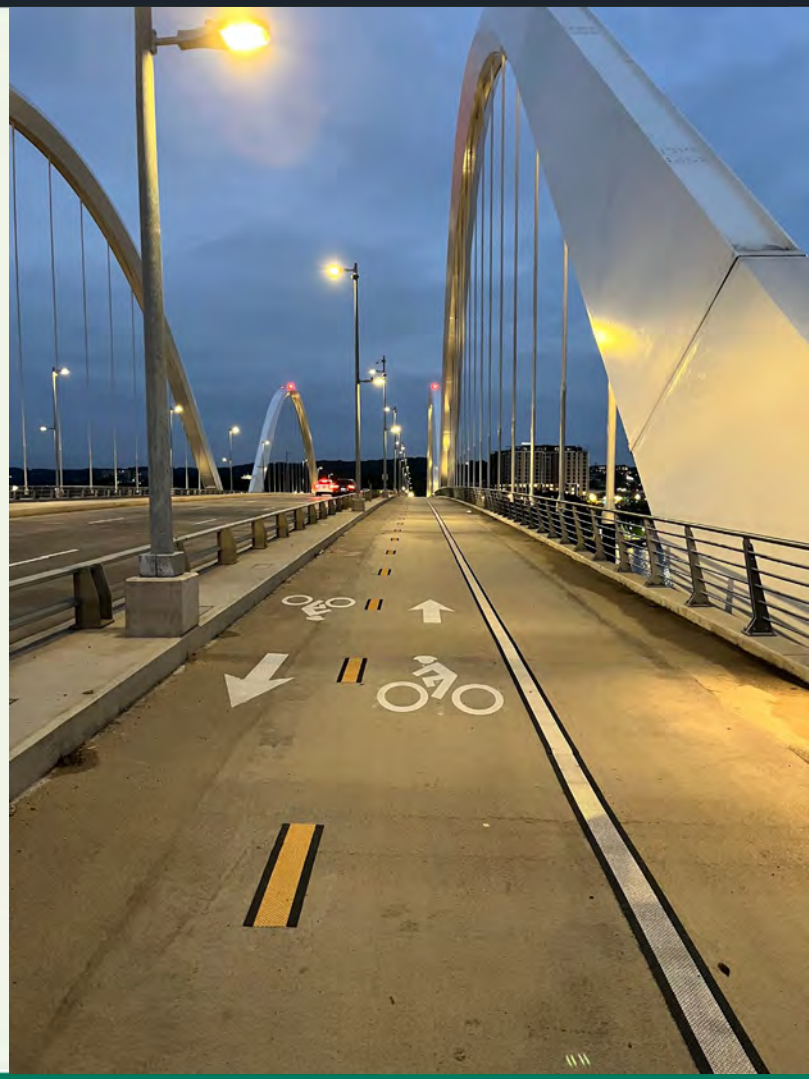
Overview

- 2022 Cooper Jones Active Transportation Safety Council recommendation
- 2024 Legislative proviso

…to conduct research pertaining to the issue of street lighting and safety, including a public input component and learning from counties, cities, the state, and other impacted entities.

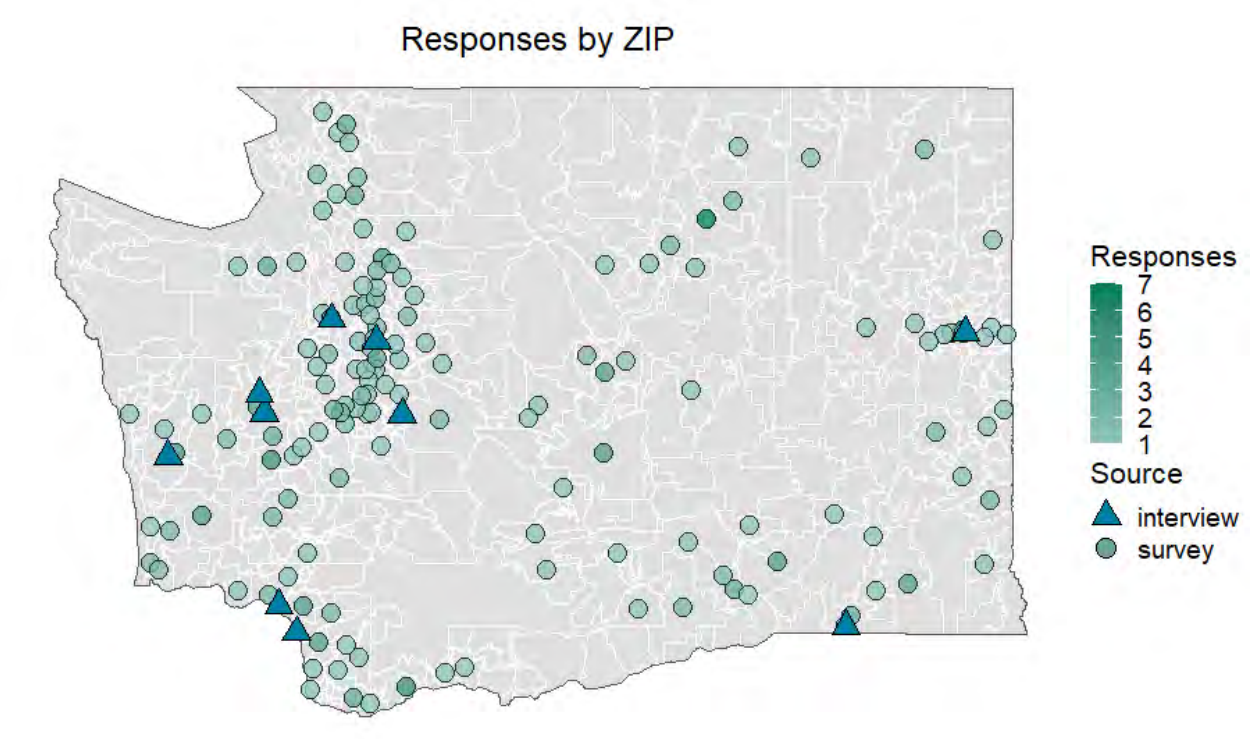
Scope

- Survey of local and regional roads departments, water-sewer districts, and other utility services, and emergency responders
- Follow up interviews
- 4 technical memos
- Information session held 11/4
- Final report to legislature and WTSC



Who we heard from

- 276 survey responses, representing 215 unique agencies
- 10 follow up interviews
  - City of College Place
  - City of Enumclaw
  - City of Hoquiam
  - City of Kalama
  - Longview Fire Dept.
  - Mason County PUD 3
  - Puget Sound Energy
  - Skokomish Tribe
  - Spokane Regional Transportation Council
  - Suquamish Tribe



Technical literature reviews

- Lighting technology
- Environmental impacts of lighting
- Lighting criteria, guidance, and plans
- Funding strategies

Washington Ave
Bremerton, WA

Emergency service providers

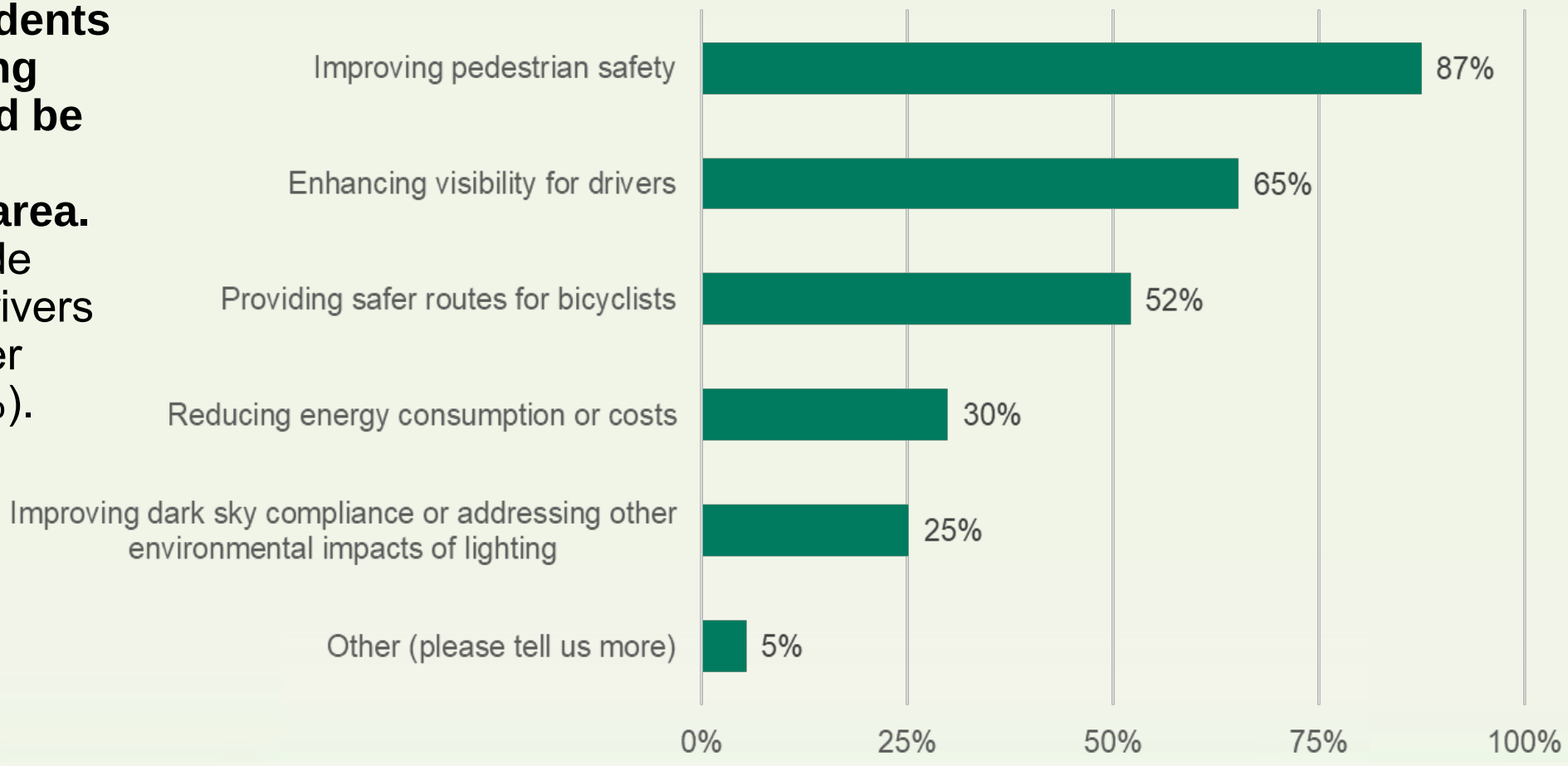
- EMS responses
- Safety implication for people responding to crashes

A majority of our roadway incidents are on multi-lane roads and at intersections - proper lighting is important not just for the incidents, but for getting to the scene safely, finding needed resources, identifying hazards around the scene, etc. Having good overhead street lighting, there's really nothing that compares to it.

– Emergency Service Provider

Survey results

If more funding were available, most respondents (87%) say that improving pedestrian safety would be a top priority for their jurisdiction or service area. Other top priorities include enhancing visibility for drivers (65%) and providing safer routes for bicyclists (52%).

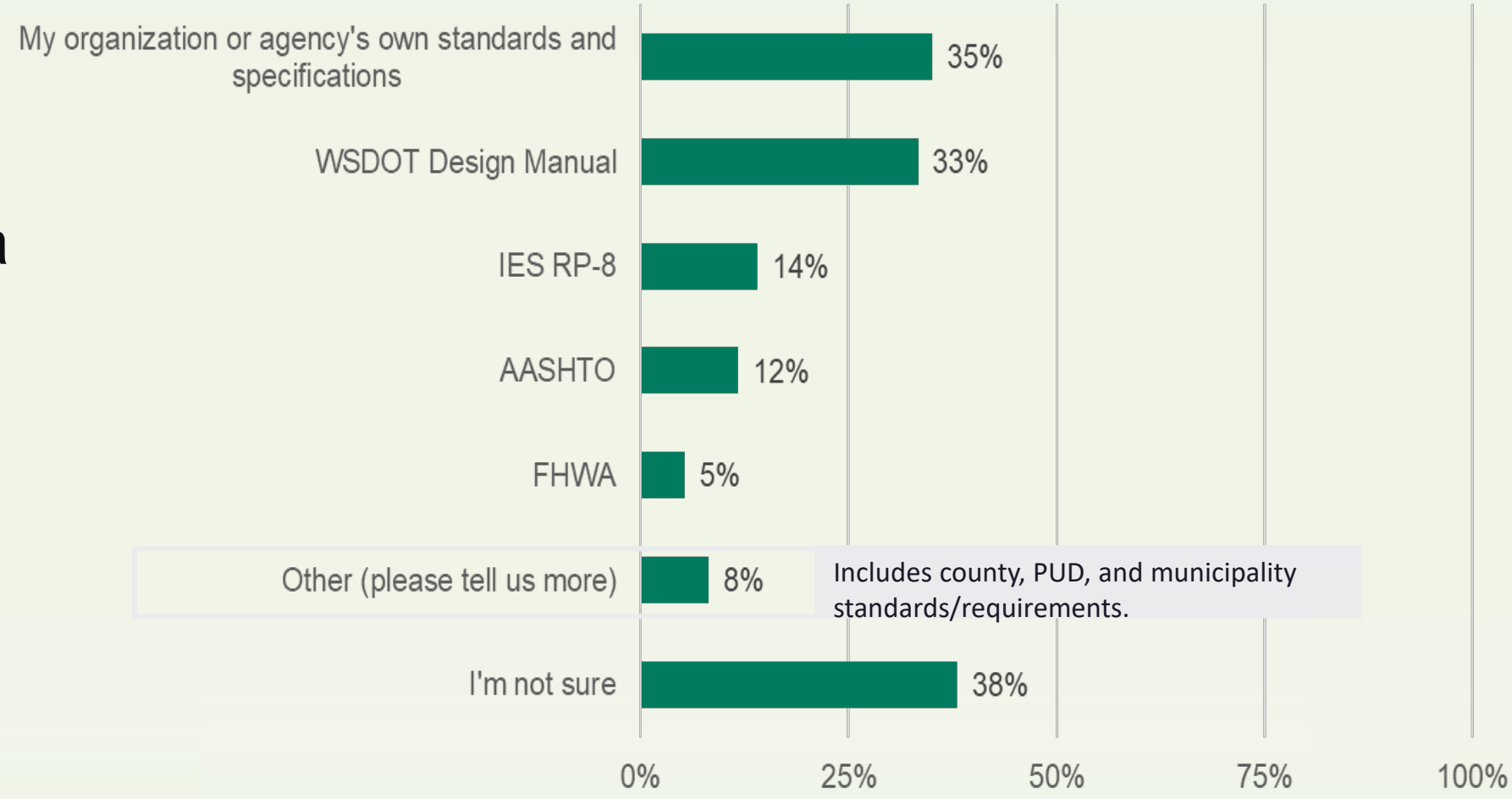


Emerging themes from the work

1. Local jurisdictions feel like the technology required to adopt new approaches to pedestrian lighting is untested for their local context (i.e. land use, weather conditions).
2. Many local jurisdictions have not identified their local street lighting needs or lack a plan for long-term implementation.
3. Local jurisdictions lack sufficient funding to complete and maintain their desired street lighting networks.
4. Coordination with utility service providers can be complicated.

Standards for lighting

- Street lighting standards vary
- Agencies and organizations use a variety sources



Recommendations

Who	Topic	Recommendation
For the state legislature	Lighting funding	• Increase funding for lighting design, installation, maintenance, and operations.
For state agencies led by WSDOT Headquarters	Technical support	• Support local partners through trainings on how to build and maintain their systems. • Aggregate lighting resources, including technical guides, in a readily accessible location for local jurisdictions to understand their applicability to local contexts. • Incorporate new lighting technology resources into guidance and standards.
	Identify local needs	• Provide guidance on how communities can determine their own needs based on local context through planning work (e.g. comprehensive and safety planning). • Support a phased approach to implementation or the retrofit of recent projects to include pedestrian lighting in high priority areas
	Lighting funding	• Identify and promote opportunities to fund lighting design and installation as part of grant-funded projects and/or WSDOT capital projects.

Recommendations Continued

Who	Topic	Recommendation
For a WSDOT-led Working Group	Lighting funding	• Convene a working group to explore the feasibility of new funding sources such as levies, private development frontage improvements, and impact fees. • Identify and publicize non-transportation funding sources that can support lighting improvements, as provided in the two examples detailed below
	Coordination	• Provide support for coordination between local jurisdictions and public utilities. • Develop model memorandum of understanding (MOU) for collaborative approaches to maintenance and operations.

Thank you

Briana Weisgerber

WSDOT Active Transportation Programs Engineer

Link to the study

Contact Information

For report questions:

briana.weisgerber@wsdot.wa.gov

For general questions or comments about WSDOT street lighting or the report:

HwyLighting@wsdot.wa.gov

PLS

LIGHTING FOR PEDESTRIAN SAFETY

Patrick Armstrong

01 / 2025

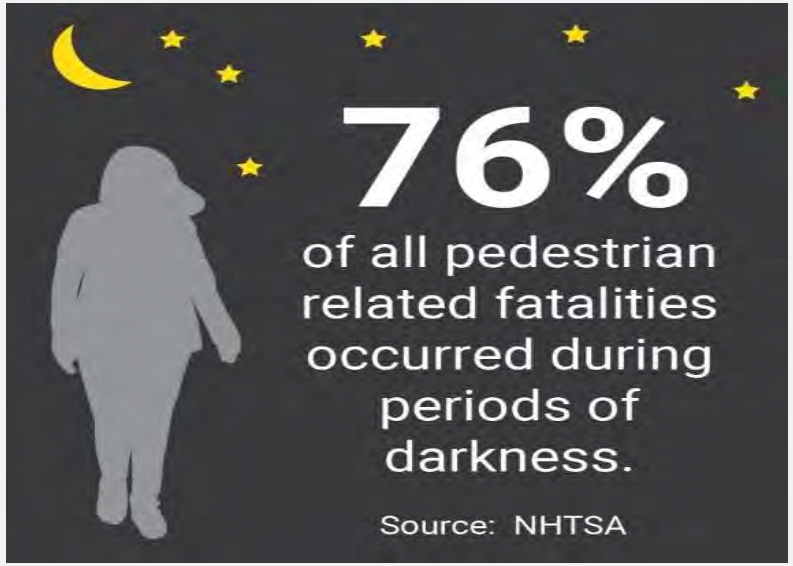
Pacific Lighting Systems

CONTENTS

SECTIONS

01 SECTION

PEDESTRIAN SAFETY STATS



- 76% OF PEDESTRIAN FATALITIES OCCUR DUING PERIODS OF DARKNESS (2022)
- PEDESTRIAN FATALITIES ARE ON THE RISE:
  - 54% increase in fatalities from 2010-2020
  - An additional 19% increase during the pandemic
    - (Small improvement reported last year – down 5% since 2022)
- 60% of Deaths happen on “non-freeway arterial roads”
  - Governors Highway Safety Association (GHSA) Data

01 SECTION

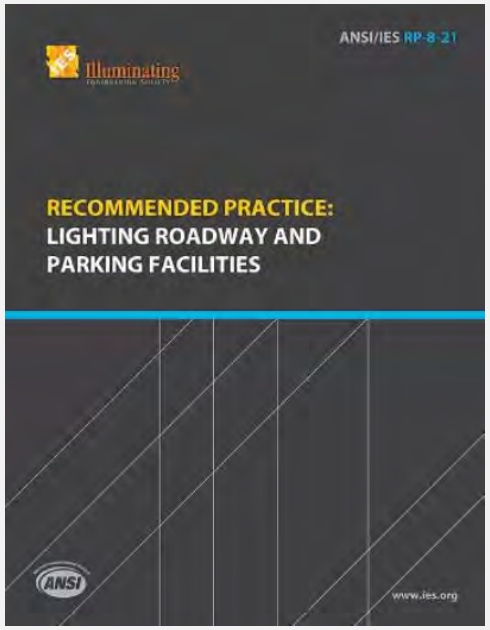
PEDESTRIAN SAFETY

- Pedestrians are the most vulnerable road user population at night and are between three and almost seven times more vulnerable in the dark than during daylight hours
- Dark conditions can also have negative effects on pedestrian security:
  - Crime
  - Fear
- Distracted driving due to technology/cell phones

- Governors Highway Safety Association (GHSA) Data

02 SECTION

LIGHTING DESIGN GUIDANCE



- Illuminating Dark areas and Improving illumination where it currently exists will greatly reduce the dangerous conditions darkness presents.

- Designers of transportation lighting have several source of design goals and standards:

  - **Design guidance sources:**
    - **American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide, 7th Edition (AASHTO, 2018).**
    - **Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting (TAC, 2006).**
    - **National Cooperative Highway Research Program (NCHRP) Report 152 Warrants for Highway Lighting (also known as the FHWA Method) (Walton & Rowan, 1974).**
    - **Illuminating Engineering Society (IES) RP-8-18 Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting (IES, 2018).**
    - **FHWA Informational Report on Lighting Design for Midblock Crosswalks (Gibbons et al., 2008).**

03 SECTION

LIGHTING DESIGN PROCESS

Assessment of Lighting Needs

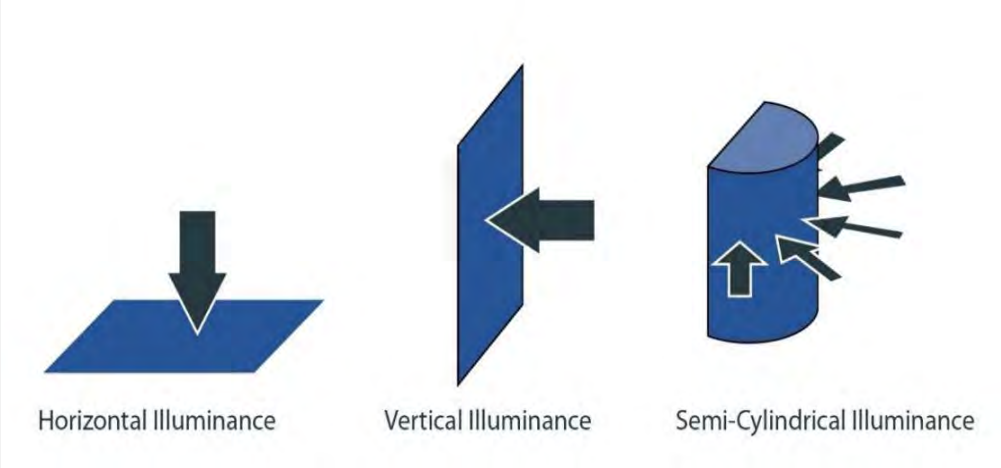
- The practice of evaluating the need for pedestrian lighting varies widely among different regions, State Departments of Transportation (DOTs), and local agencies, and decisions are often made on a case by-case basis

- In locations without pedestrian lighting, other measures to enhance user visibility of roadway edges, pedestrian crossings, and the roadside can guide drivers and pedestrians navigating darker sections of roadway and increase driver awareness of pedestrian presence. Examples include high visibility markings, parking restrictions, and signing

03 SECTION

PRIMARY DESIGN CRITERIA (FHWA)

- **Illuminance** - Illuminance is a measure of how much light is falling on a surface per unit area

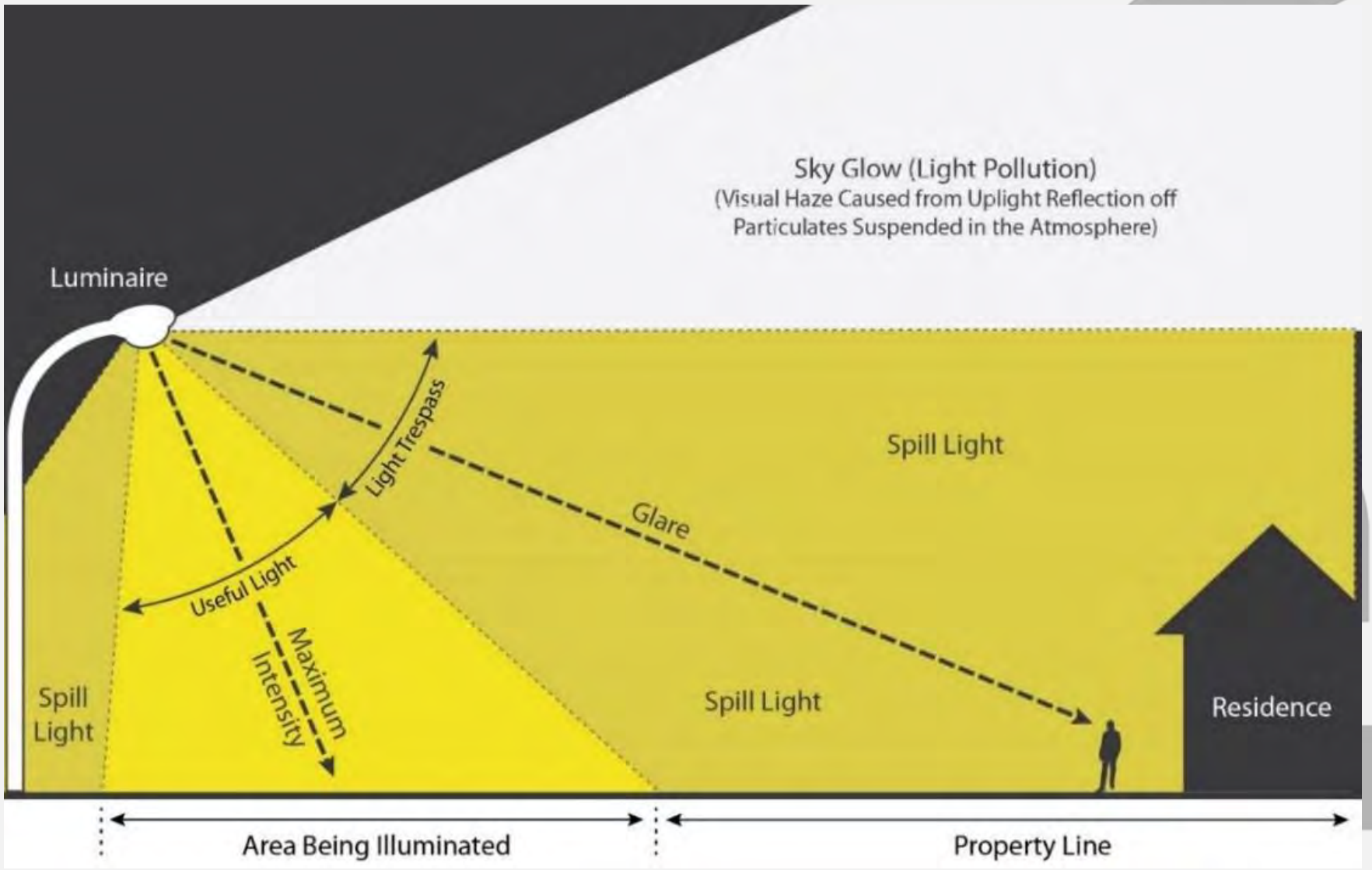


03 SECTION

SECONDARY DESIGN CRITERIA (FHWA)

- **Secondary design criteria** are selected to guide characteristics, selection, and placement of the light sources. This is where a lighting manufacturer can really help
    - **CCT** – Correlated Color Temperature - CCT represents the relative warmth of the emitted light. Lower values (e.g., 2700K) indicate a warm, yellow tone of light; higher values (e.g., 5000K or more) indicate a cool, blue tone of light; a neutral white is around 4000K
    - **Surround ratio** – A ratio of the illuminance spilling over the edge of a path or roadway relative to the illuminance on the path or roadway
    - **Glare** – Difficulty or discomfort associated with a light source in direct view of the observer
        - There are two types of glare that may occur due to the presence of a light source. •
            - Disability glare is intensity from a light source that limits a road user's ability to see. •
            - Discomfort glare occurs when light from a light source causes discomfort to a road user.
    - **Light trespass** – Excess light that falls on areas or surfaces that are not intended to be illuminated, such as private properties, residential areas, or the night sky

SECONDARY DESIGN CRITERIA (FHWA)



PEDESTRIAN AREAS FOR LIGHTING CONSIDERATION

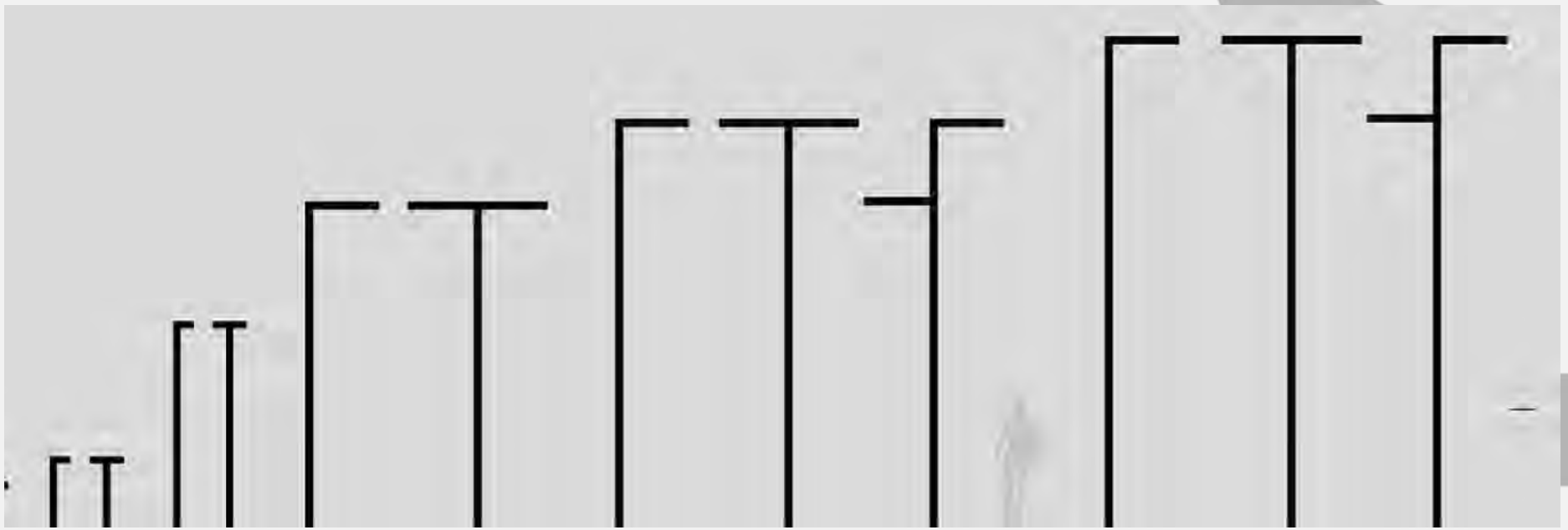
- Marked crosswalks – intersections and designated midblock crossings
- Roadway adjacent
  - The FHWA suggests maintaining a minimum average luminance on adjacent pedestrian facilities for visibility of pedestrians to drivers and for pedestrians' visibility of their walking path. Determined by:
    - high pedestrian volume facilities and school zones
    - low to medium pedestrian volume zones

IES recommendations for Roadway Luminance

Street Classification	Pedestrian Activity Classification	Average Luminance L_{avg} (cd/m^2)	Average Uniformity Ratio L_{avg}/L_{min}	Maximum Uniformity Ratio L_{max}/L_{min}	Maximum Veiling Luminance Ratio $L_{v,max}/L_{avg}$
Major	High	1.2	3.0	5.0	0.3
	Medium	0.9	3.0	5.0	0.3
	Low	0.6	3.5	6.0	0.3
Collector	High	0.8	3.0	5.0	0.4
	Medium	0.6	3.5	6.0	0.4
	Low	0.4	4.0	8.0	0.4
Local	High	0.6	6.0	10.0	0.4
	Medium	0.5	6.0	10.0	0.4
	Low	0.3	6.0	10.0	0.4

LUMINAIRE SELECTION

- **Mounting Height** – Important factor, and limitation depending on local rules
  - Roadway Scale – 20’ and greater
  - Pedestrian scale – mounting height less than 20’
    - The implementation of pedestrian scale lighting has shown to improve the visibility of pedestrians to drivers at distance, but the drawback is potential glare for drivers at lower mounting heights



03 SECTION

LIGHTING CONTROL STRATEGY

- **Dusk to Dawn** – photosensors or astronomical timers

- **Adaptive Controls** – Can adjust output, CCT and more when set scenarios are detected

    - Common application of an adaptive lighting system includes dimming of the lighting system based on pedestrian count data. In areas where pedestrian volumes are high (more than 100 pph) during the evening hours and low (0 to 10 pph) in late night hours, an adaptive lighting control system can dim the light output when pedestrian volumes decrease.
        - Adaptive lighting systems may also be programmed for special events and time of day schedules, which is particularly beneficial in school zones and public parks

- **Smart / IOT Options** – People counters, WIFI, cameras, wayfinding, emergency call stations, etc

03 SECTION

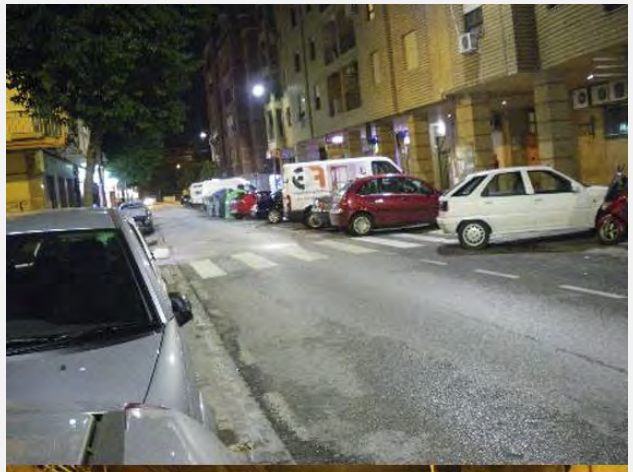
PEDESTRIAN SPECIFIC DESIGN CONSIDERATIONS

- **Pole & Bollard Placement** – For example, midblock crossings and intersections may require a particular pole location to provide the optimal vertical illuminance and positive contrast of pedestrians in a marked crosswalk

- **Requiring more than horizontal illuminance metrics** – Requiring vertical and/or Semi-cylindrical illuminance calculations for areas with expected high ped volume

04 SECTION

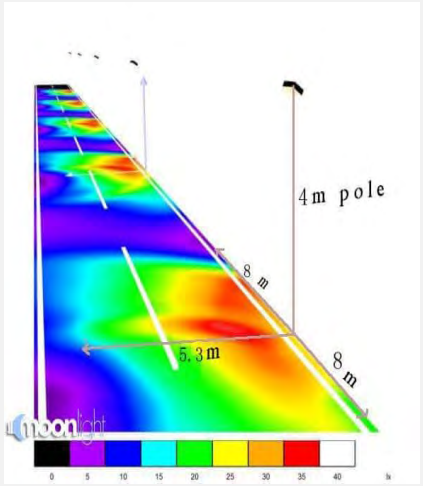
NEW LIGHTING TECHNOLOGY



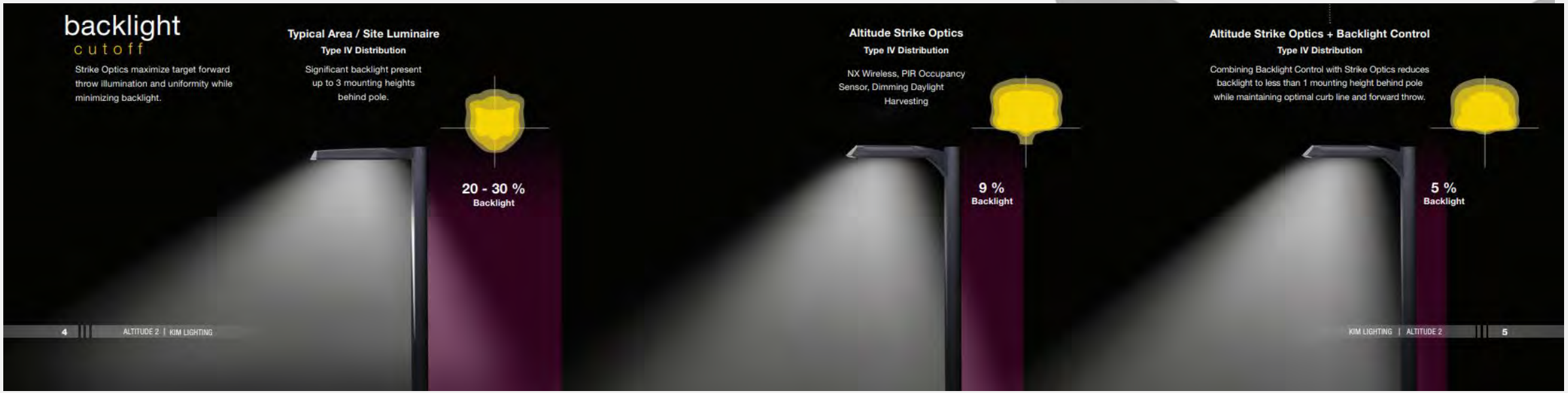
High color rendering - The high color rendering of LED street lights is close to natural light and presents colors more realistically. This helps drivers and pedestrians better identify objects at night, improving traffic safety and road

04 SECTION

NEW LIGHTING TECHNOLOGY



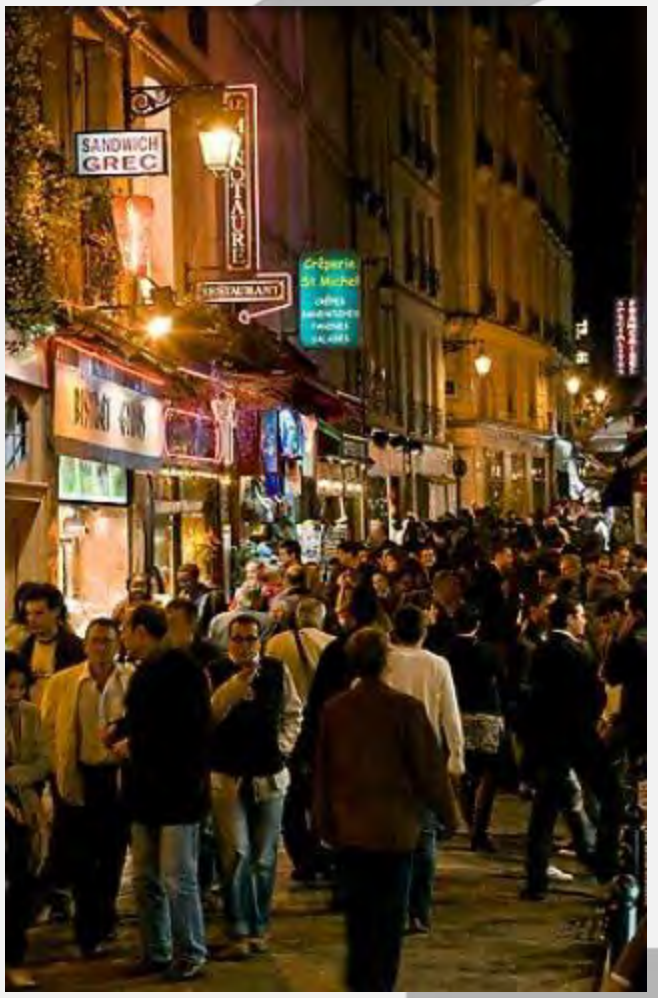
Light distribution – LED is directional and infinitely more controllable. Beyond the standard IES distribution patterns. Spacing and lighting pollution reduction



04 SECTION

NEW LIGHTING TECHNOLOGY

Greater Control – LED technology is easier to adapt to changing light conditions or events.



05 SECTION

ANY QUESTIONS?

Please contact:

Patrick Armstrong

patricka@plswa.com

305-878-7259

WEST
6004 S. 190th St. Suite 203
Kent, WA 98032
206.323.2200

SEATTLE
WeWork | Hawk Tower

EAST
12830 E. Mirabeau Pkwy, Suite A
Spokane Valley, WA 99216
509.362.9730

THANK YOU

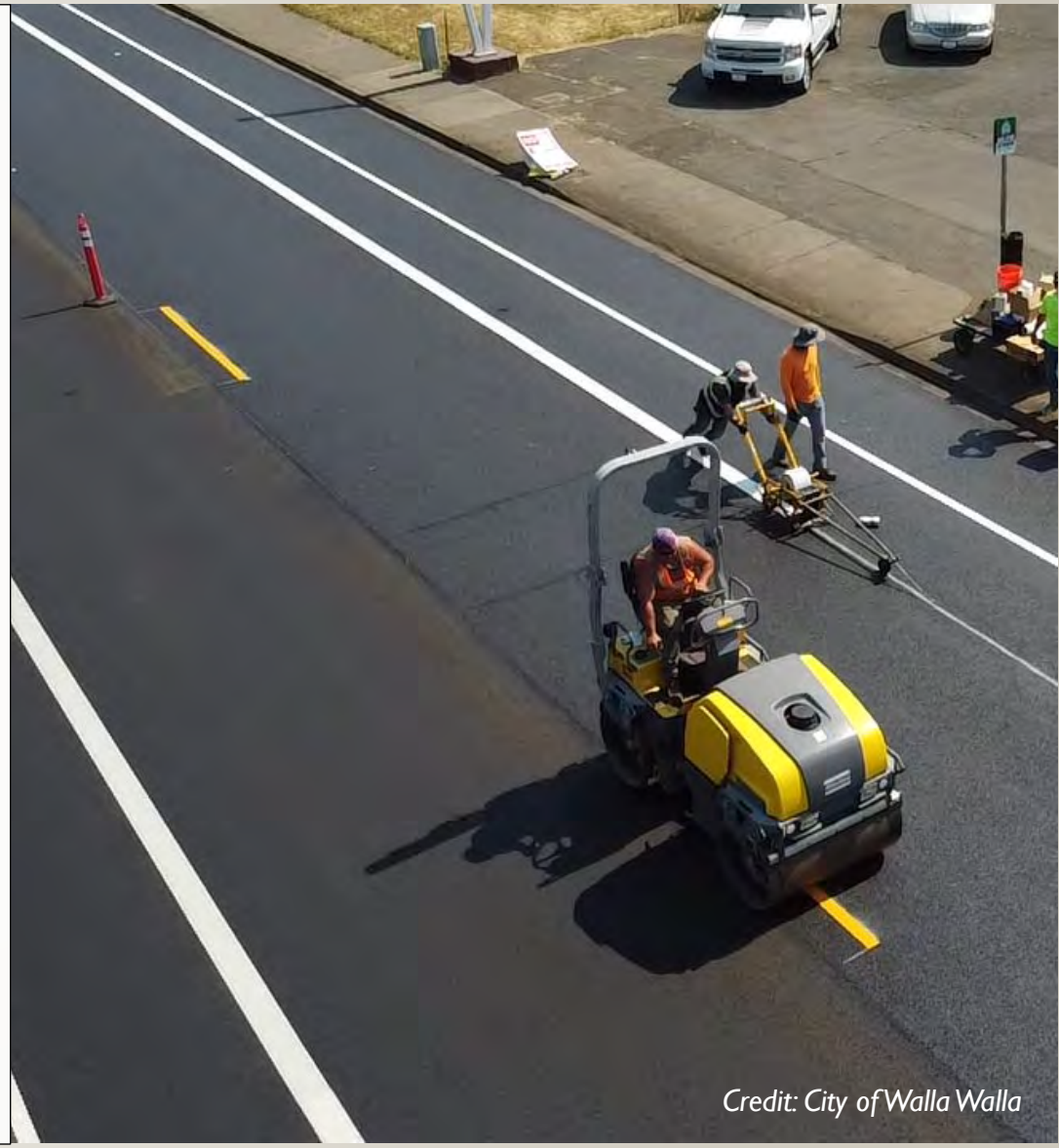
Patrick Armstrong

01 / 2025
Pacific Lighting Systems

Thank you!

Next Forum and Peer Exchange:

- ✓ April 2025
- ✓ Do you have a topic of interest?
- ✓ Contacts:
  - Ed Spilker– Ed.Spilker@wsdot.wa.gov
  - Charlotte Claybrooke– ClaybrC@wsdot.wa.gov



Credit: City of Walla Walla

Washington Transportation Professional Forum and Peer Exchange, 01-08-2025

Time Question Asked	Question/Comment	Answer
09:24:03 AM PST	I hope to hear about how to manage LOS at signalized intersections	The FHWA states that roads with closely spaced signalized intersections may have a larger impact on the LOS of the road diet conversion due to queueing affecting nearby intersections. This impact to LOS can be reduced though modifications to signal timing and coordination between adjacent signals to ensure the signals have matching green phases. Additionally, modifications to turn lanes to accomodate potential queuing impacts can also help improve LOS at the signalized intersections. https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/rdig.pdf. The case study for Lawyers Road in Virginia showed more in delay at signalized intersections, but the 70% crash reduction was worth the 3-5 second increase.
09:30:53 AM PST	Have you run into a situation where the implemented road diet created LOS concerns?	FHWA documented a road diet case study on the City of Grand Rapids on Division Street, from I-196 to Wealthy Street, that involved converting the corridor from a four and five lane road to three lanes with shared bike lanes. While the project did produce many positive outcomes such as decreased vehicle speeds and improved bicycle facilities, there were some operational impacts that included increased delays and longer travel times. https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-08/roaddiet_cs.pdf. Many localities are OK with the added delay because the Road Diet meets their objectives of the reconfiguration.
09:31:29 AM PST	What is the current ADT threshold for Road diets.	The FHWA Road Diet Informational Guide suggests that roadways with an ADT of 20,000 vpd or less may be good candidates and should be considered for a feasibility study. However, some DOTs have conducted road diets on corridors with traffic volumes as high as 25,000 vpd ADT. Road diet feasibility on higher volume roadways is highly dependent on the distribution of traffic volume throughout the day - a 25,000 vpd corridor with more evenly distributed volume over the course of the day will likely be easier to implement a road diet on than a corridor with time-specific generators such as a school. However, a road diet should still be considered even if the LOS during the peak hour is reduced. https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/rdig.pdf
09:34:45 AM PST	Hurdles to road diets include our historical overfocus on LOS: when you compare a three-lane to a five-lane facility you get better LOS for stop-controlled intersections, so agencies that are roundabout averse will say the five-lane corridor is the solution and don't necessarily look at a three-lane roundabout corridor (which will perform better at less cost). What progress is being made in requiring states and local agencies to update policies, laws, and TIPs to deemphasize LOS in favor of safety performance?	It's my understanding that California is among one of the first states to move away from LOS and towards VMT reduction. There are no requirements underway that I'm aware of to move away from LOS. FHWA constantly provides information from studies and research on considering safety performance, but updating laws and policies would ultimately be a state decision.
09:35:41 AM PST	Has there been any studies for the percentage of vehicles that utilize the TWLTL for passing other vehicles after a 4 lane to 3 lane (with TWLTL) road diet? Does this trend dwindle as time goes on and people become use to driving the new traffic pattern?	There are no known studies of the effects of a road diet and drivers using TWLTL as passing lane, though it has been noted anecdotally. However, some agencies have noted changes in driver behavior since COVID-19 - in particular, speeding and potentially risk tolerance.

09:41:43 AM PST	Great statistics and info for 4-3 road diets. We've been implementing some road diets that are really due to excess roadway capacity (not lack of turn lanes) and have struggled to find supporting data on crash reduction from slower speeds, fewer conflict points for peds/ turning vehicles. Is there good data, or can this apply to other road diets that are not 4-3 (but is 5-3 or 4 to 2)	Yes, the safety benefits of a road diet can apply to other conversions such as a 5 to 3 or 4 to 2 lane conversion! However, there is no CMF for these conversions and safety benefits most likely need to be estinated using the HSM and IHSDM. Though, there have been corridors that have undergone 5 to 3 lane and 4 to 2 lane transformations. One example is Wilton Drive in Broward, FL, which found a 66% reduction in bicycle and pedestrian crashes, a 75% reduction in severe-injury and fatal crashes: https://www.roadwaysafety.org/broward-metropolitan-planning-organization-complete-streets-master-plan-wilton-drive-implementation
09:43:27 AM PST	Where in Hawaii did you see the raised crosswalks? Which island?	Hello Inga, (I can follow up via email with more info) HDOT has installed raised crosswalks, speed humps, and speed tables across the islands. Resoure here for more information: https://histategis.maps.arcgis.com/apps/dashboards/763d38147a3a4e45a1f56f3845a600b7
09:44:27 AM PST	We get pushback on raised crosswalks from our fire/police and even traffic engineers (they are more concerned with drainage). Do you have good stats about impacts to emergency response times and maybe even reduction in needed responses due to raised crossings?	The FHWA Traffic Calming E-Primer Module 5: *Effects of Traffic Calming Measures on Non-Personal Passenger Vehicles* states that raised crosswalks could have the potential to impact EMS vehicles, though it depends heavily on the design. One of the challenges with raised crosswalks and speed tables has to do with the profile of the elevation change, as well as the width of the table or crossing. The width of the table or crossing should be wide enough or short enough so that an EMS vehicle or firetruck does not bottom out when traversing the vertical element. Other vertical defelction measures that have little to no affect to fire vehicles include speed cusions and offset speed tables. More on the impacts of vertical defelction on emergency response can be found here: https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer/module-5-effects-traffic-calming-measures-non. The City of Richmond, VA, has installed numerous vertical elements and their emergency staff support the design.
09:45:25 AM PST	Any research out there about how raised crossings impact emergency response times? If at all?	The FHWA Traffic Calming E-Primer Module 5: *Effects of Traffic Calming Measures on Non-Personal Passenger Vehicles* states that raised crosswalks could have the potential to impact EMS vehicles, though it depends heavily on the design. One of the challenges with raised crosswalks and speed tables has to do with the profile of the elevation change, as well as the width of the table or crossing. The width of the table or crossing should be wide enough or short enough so that an EMS vehicle or firetruck does not bottom out when traversing the vertical element. Other vertical defelction measures that have little to no affect to fire vehicles include speed cusions and offset speed tables. More on the impacts of vertical defelction on emergency response can be found here: https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer/module-5-effects-traffic-calming-measures-non. The City of Richmond, VA, has installed numerous vertical elements and their emergency staff support the design.
09:57:39 AM PST	Have you had issues with the cycling community with what type of facility is being installed with the road diet, i.e., painted bike lane versus seperated.	Unfortunately we have not been contacted by the cycling community. I cannot provide an answer at this time.
10:11:54 AM PST	You might also consider a green bike box at the intersections.	Thank you for the suggestion for green bike box! We will look into this treatment.
10:12:41 AM PST	Or some type of vertical element to seperate the bike lane from the travel lane at the intersections.	One of the alternatives we considered temporarily was to place candle stick delineators to operate as a bulb-out to discourage the use of the non-parking area for turning.
10:13:37 AM PST	I have a question is there any type of lane delineation material that could be used to help prevent vehicles from going into the bike lane?	Yes we are looking into possibly using diagonal stripe along the no parking zone similar to areas in downtown Olympia.

10:13:42 AM PST	For the City of Pasco, have you considered utilizing the no parking area to move the bike lane over at the intersection and create a turn pocket? The bulbout would be better but since you have the space...	Moving the bike lane is a good suggestion. Mary Heather had touched on the bulbout at the image that we being shown. Since there was a recent project that had just did the ADA improvements at this intersection we did not want to install bulbouts at this time. Bulbouts is one of the treatment options we are currently looking at. Thanks!
10:13:49 AM PST	For the Pasco project, why didn't you include bike boxes?	Bike boxes is a good suggestion. I was not apart of the design process, only construction so i cannot answer as to why bike boxes were not used.
10:14:12 AM PST	Bulbout to support vehicle turn navigation- is that something that maitence can navigate with plows.	Bulbout is an alternative we are looking into. Maintenance has been snow plowing around some of our existing bulbouts around town.
10:17:01 AM PST	For the Pasco team. NACTO has some good suggestions on how to deal with right turns and through bike lanes at intersections. https://nacto.org/publication/urban-bikeway-design-guide/intersection-treatments/through-bike-lanes/	Thank you for the NACTO guideline link! We'll be sure to take a look.
10:32:17 AM PST	How do jurisdictions handle refuse pickup when completing road diets that include protected bike lanes? Where are the refuse cans placed for pickup?	The new maintenance guide does not cover this topic. I'd imagine the trash cans would stay on the curb and workers just grab them from the curb similar to what would happen before a Road Diet if you are considering the 4 to 3 reconfiguration.
10:36:35 AM PST	Can you please cite studies on capacity issues?	FHWA documented a road diet case study on the City of Grand Rapids on Division Street, from I-196 to Wealthy Street, that involved converting the corridor from a four and five lane road to three lanes with shared bike lanes. While the project did produce many positive outcomes such as decreased vehicle speeds and improved bicycle facilities, there were some operational impacts that included increased delays and longer travel times. https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-08/roaddiet_cs.pdf
10:43:09 AM PST	What design year are you looking at for "excess capacity"? 20 years out?	I am considering the existing ADT and capacity because the Road Diet's feasibility is tied to the existing roadway cross section. I would consider traffic volumes over time and then focus on the why for the Road Diet--is it to include bicycle accommodations, deter speeding, include transit pull-outs? This comes directly from our Guidance: The ADT provides a good first approximation on whether or not to consider a Road Diet conversion. If the ADT is near the upper limits of the study volumes, practitioners should conduct further analysis to determine its operational feasibility. This would include looking at peak hour volumes by direction and considering other factors such as signal spacing, turning volumes at intersections, and other access points. Each practitioner should use engineering judgment to decide how much analysis is necessary and take examples from this report as a guide. • A 2011 Kentucky study showed Road Diets could work up to an ADT of 23,000 vehicles per day (vpd).35 • In 2006, Gates, et al. suggested a maximum ADT of between 15,000 and 17,500 vpd.36 Knapp, Giese, and Lee have documented Road Diets with ADTs ranging from 8,500 to 24,000 vpd.37 The FHWA advises that roadways with ADT of 20,000 vpd or less may be good candidates for a Road Diet and should be evaluated for feasibility. Figure 12 shows the maximum ADTs used by several agencies to determine whether to install a Road Diet. Road Diet projects have been completed on roadways with relatively high traffic volumes in urban areas or near larger cities with satisfactory results.
11:04:21 AM PST	AK DOT here: DOT doesn't maintain those rural pathways during the wintertime so the trail itself is full of snow 6 months of the year...	Hi Anna! Using your comment to share your comment and broadly that while we work on hosting the WSDOT research link, the top bibliography citation in the research for winter maintenance was the Toole Winter Maintenance Guide: https://tooledesign.com/wp-content/uploads/2024/02/2024_Winter_Maintenance_Resource_Guide.pdf

11:12:59 AM PST	Has the benefit / cost been performed to compare the cost to heat the roadway at a roundabout (and adjacent sidewalk/path) compared to the additional time to plow the roadway and keep the sidewalks clear?	Not to my knowledge and not something we heard about it the national research with peer agencies,Heated roadways have been and are being used in some locations. In most that I'm aware of they are very short sections of the roadway and/or in areas with active geo/thermal assets, typically private efforts. I don't know of a spcific cost study for intersections or roundabouts but I like the idea. There may be a benifit in some climates, in general the cost to generate the heat is very expensive to install and maintain but there may be a time/place where this could cost out.
11:15:15 AM PST	is purchasing trail sweepers federally eligible for capital projects? or were those 520 sweepers purchased with state funds?	I am not sure of the exact color of money that was used for the sweeper. In general our capitol projects have a fed component and don't allow for purchase of maintenance equipment. Further it doesn't allow for long term maintenance costs. Those costs are born by state dollars almost exclusively.
11:27:30 AM PST	Just a not for sharing comment: I have always supported the plight of the M Program, but WSDOT is culpable in that it historically has not seriously looked at reducing the scope several of the projects in the I program (Belfair and Yelm bypass projects, and the ultimately not approved attempt to reduce the NSC viaduct section from six lanes to four lanes with snow storage are current and recent examples). This has been a long long long discussion that I'm not sure why doesn't gain any traction.	
11:27:43 AM PST	For Mr. Morin, how does the WSDOT priorities affect plowing in cities?	We follow our priority routes as stated in our statewide plan. High priority roads get serviced first then down the priority list. This list is on our website if you are interested in what that looks like for your area.
11:43:32 AM PST	How are we dealing with the fact that vehicle headlights are getting brighter to the point that our illumination design standards are becoming ineffective?	Hello Larry, this is a great point. We're aware of this emerging topic and tracking the research.
11:45:01 AM PST	Has a recommendation been made to restrict the use of internally lit signage and LED signs? Both affect the abilty of the driver to identify pedestrians at night.	Hello Larry, I have passed along this question and will aim to follow up or have one of my colleagues follow up
11:53:46 AM PST	Not question but statement based upon engineering studies: Regardless of lighting (which does help), pedestrians wearing dark clothing are invisible until it is too late for drivers to react in all but the lowest speed circumstances. Only if all pets wore bright or reflective clothing would peds truly be seen by the majority of drivers.	
11:59:56 AM PST	What was Patrick's info again please	Patrick Armstrong, Pacific Lighting Solutions, patricka@plswa.com, 1-305-878-7259
12:02:03 PM PST	one idea for the spring one would be Quick Builds? also Speed Limit Reductions? but I am in AK, not Washington so I don't have a dog in the fight	Thank you for the topic suggestions, these are helpful as we plan for future events. We had a great session on setting safe speeds at the April 2024 Forum, a recording of that Forum is available at https://attendee.gotowebinar.com/recording/2264483119221338965