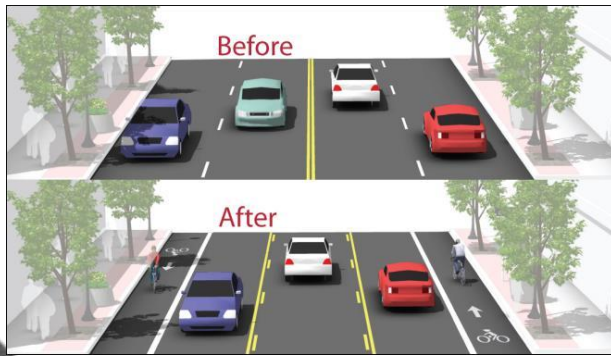


Introduction to Road Diets Roadway Reconfiguration



Dr. Benjamin Colucci
Puerto Rico LTAP Director and Every Day Counts Technical Oversight

Terrats Room, CIAPR Hato Rey (3 Contact Hours)
Thursday, April 9, 2015



Good Afternoon



INTRODUCTION: EDC 3 Road Diets

- ▶ Part of the **safety focus area** of the Every Day Counts (EDC) initiative.
- ▶ This EDC Exchange will highlight how local agencies are using this low cost safety countermeasure to improve safety, operations, and livability in their communities.
- ▶ The Puerto Rico T2 Center (LTAP) at UPRM actively participated in nine (9) EDC initiatives in the 1st phase, and is currently participating in four (4) EDC2 initiatives to be implemented in PR and USVI.



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EDC 3 Road Diets Exchange Agenda: Part 1

Time	Topic	Presenters
1:00 - 1:10p	Welcome / Introduction to EDC 3	Dr. Benjamín Colucci PRLTAP Director & EDC Technical Oversight
1:10 - 1:20p	An Overview of EDC 3 Road Diets and its Relationship with Highway Safety	Eng. Andrés Álvarez Area Engineer, FHWA Puerto Rico
1:20 - 1:30p	Introduction to Road Diets: PRHTA Perspective within the Strategic Highway Safety Plan (SHSP)	Eng. Juan Carlos Rivera PRHTA Champion
1:30 - 1:40p	Relationship of Road Diets to Complete Streets Environment and Legislation in Puerto Rico	Plan. Martha Bravo PRHTA, Planning Area
1:40 - 2:00p	Local Discussion	All



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EDC 3 Road Diets Exchange Agenda: Part 2

2:00 - 2:05p	Welcome	Becky Crowe Road Diet Program Manager FHWA Office of Safety
2:05 - 2:15p	Overview of Road Diets	Keith Harrison Safety and Design Engineer FHWA Resource Center
2:15 - 2:35p	Summary of Road Diet Safety Benefits	Keith Knapp Director Iowa LTAP Center
2:35 - 2:55p	Local Discussion: Getting Started	All
2:55 - 3:15p	The Road Diet Experience in Memphis	John Paul Shaffer Livable Memphis Program Director Community Development Council of Greater Memphis
3:15 - 3:35p	The Road Diet Experience in Charlotte	Norm Steinman Manager, Planning and Design Charlotte DOT
3:35 - 3:50p	Local Discussion: Next Steps	All
3:50 - 4:00p	Question & Answer Forum Closing Remarks	Becky Crowe Road Diet Program Manager FHWA Office of Safety



TECHNICAL BACKGROUND

- ▶ Four-lane undivided highways experience relatively high crash frequencies--especially between high-speed through traffic, left-turning vehicles and other road users.



How Road Diet is achieved?

- ▶ By converting 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.
- ▶ Impact: more convenient use to road users of the lane that was removed.

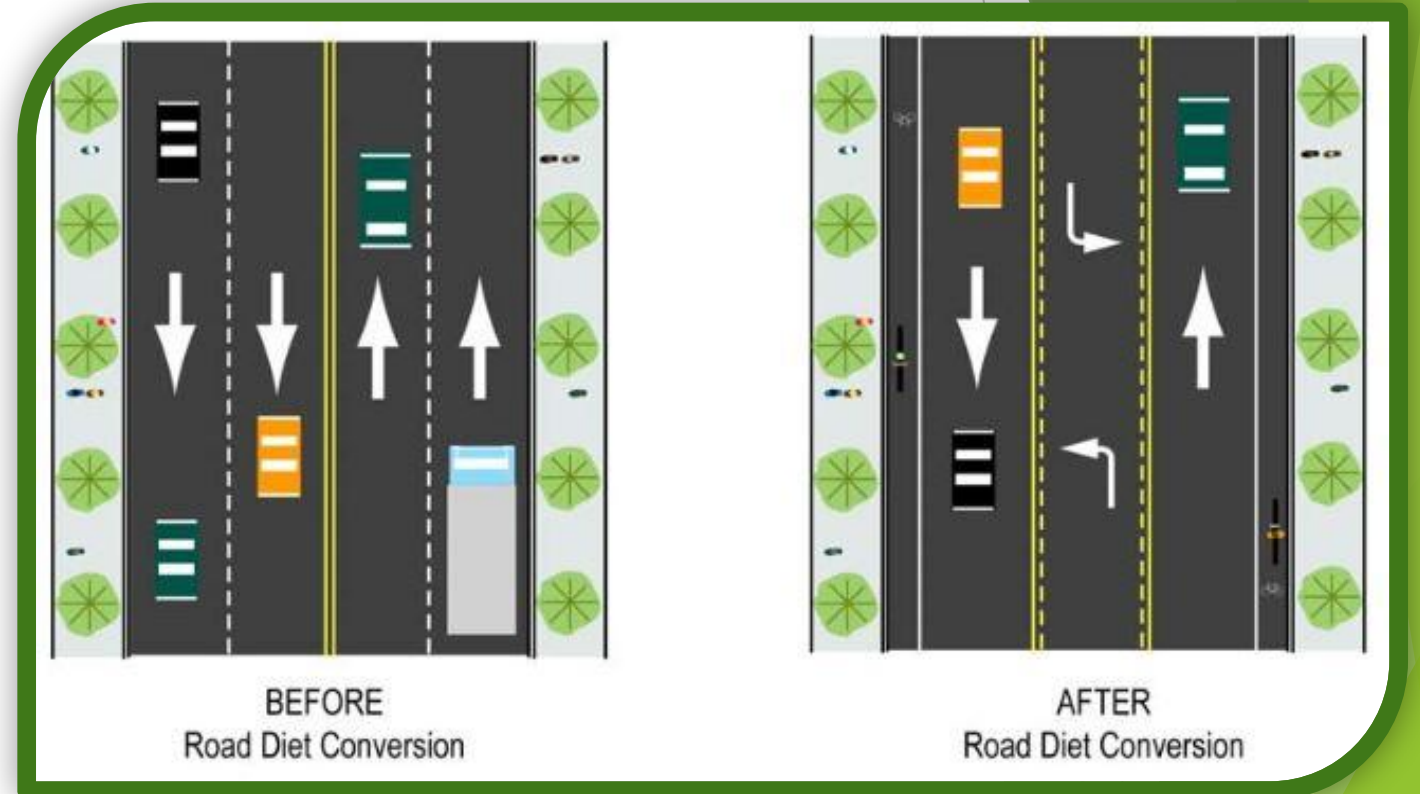
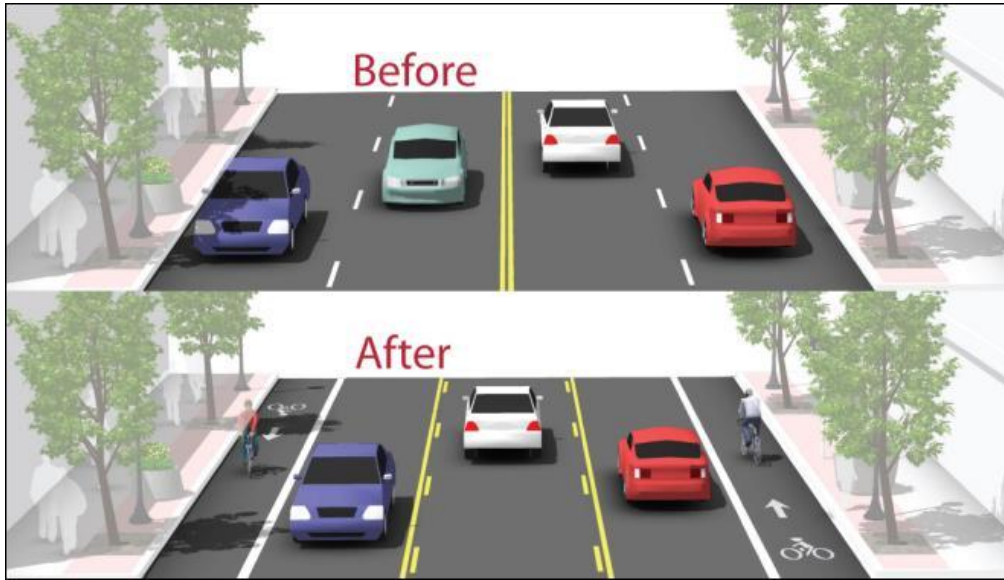


Photo Source: seattle.gov/transportation



Before and After Road Diet Improvement



Road Diets/Reconfiguration Benefits

Low Cost Alternative

- ▶ Makes efficient use of limited roadway area.
- ▶ When planned in conjunction with reconstruction or simple overlay projects, the safety and operational benefits of Road Diets are achieved essentially for the cost of restriping pavement lanes.

Quality of Life

- ▶ Can make shared spaces more livable and contribute to a community-focused, “Complete Streets” environment.
- ▶ On-street parking and bike lanes can also bring increased foot traffic to business districts.



Potential uses for the remaining space

- ▶ Turn lanes
- ▶ Bus lanes
- ▶ Pedestrian refuge islands
- ▶ Bike lanes
- ▶ Sidewalks
- ▶ Bus shelters
- ▶ Parking
 - ▶ Reverse Angle
 - ▶ Lateral
- ▶ Landscaping

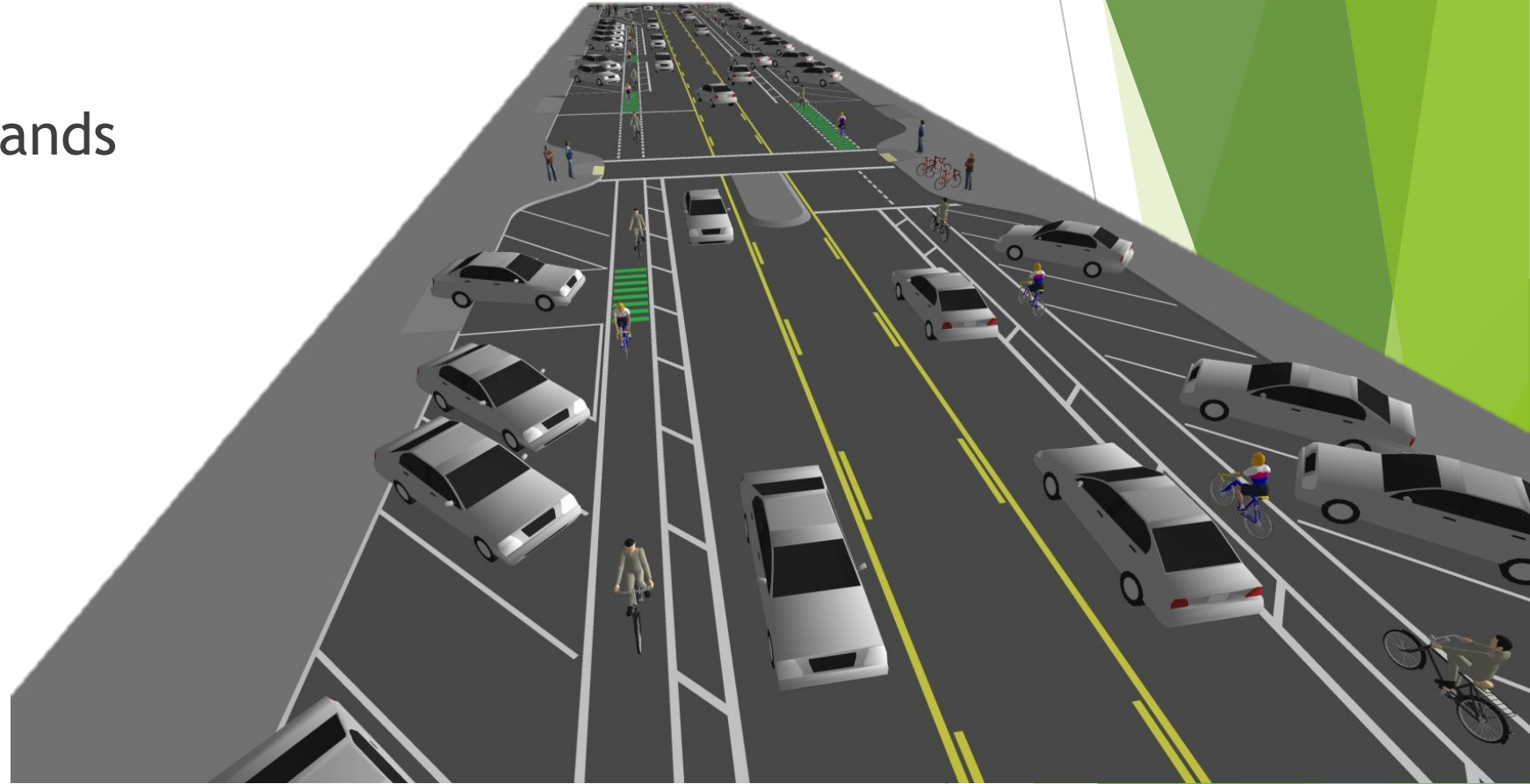


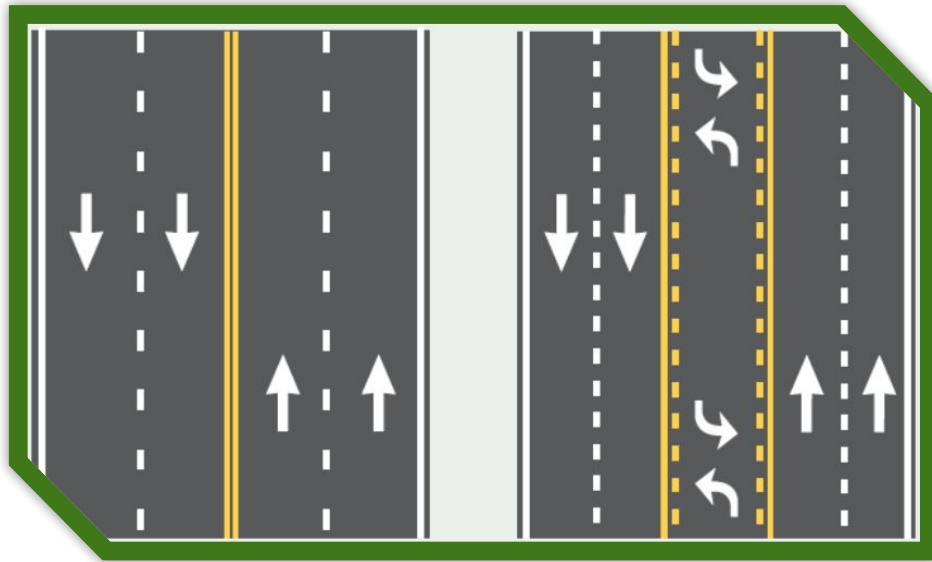
Photo Source: nacto.org



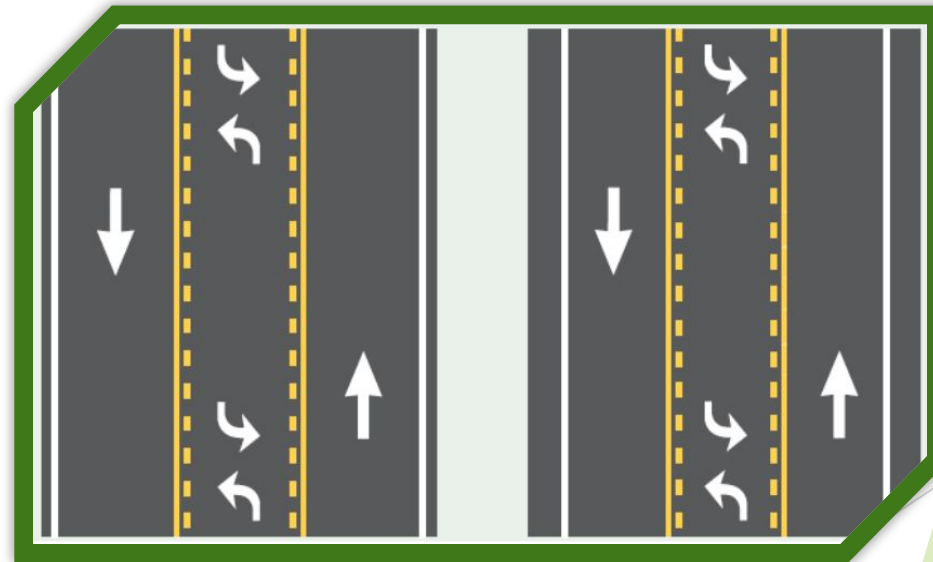
Characteristics of other Roadway Reconfigurations

- ▶ Don't require cross section reduction nor lane width reduction.

4-Lane to 5-Lane

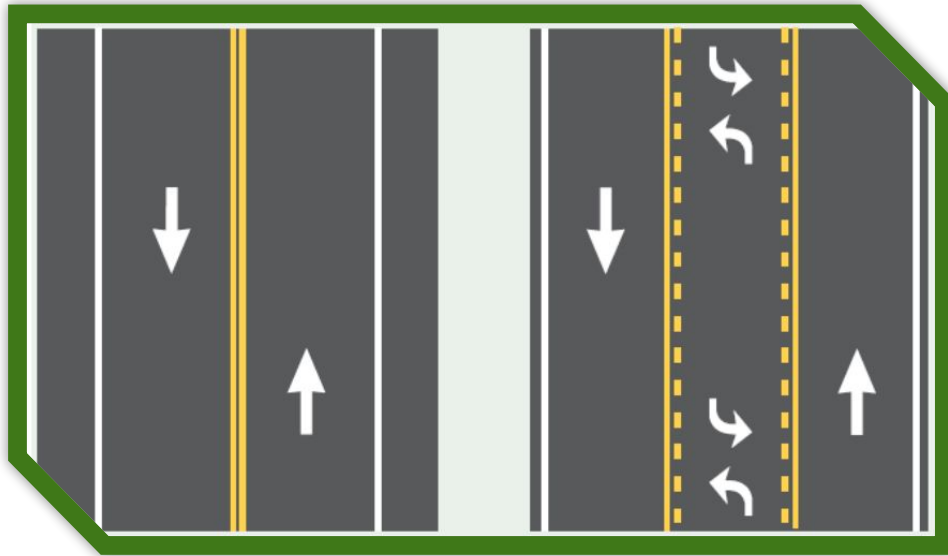


3-Lane to 3-Lane

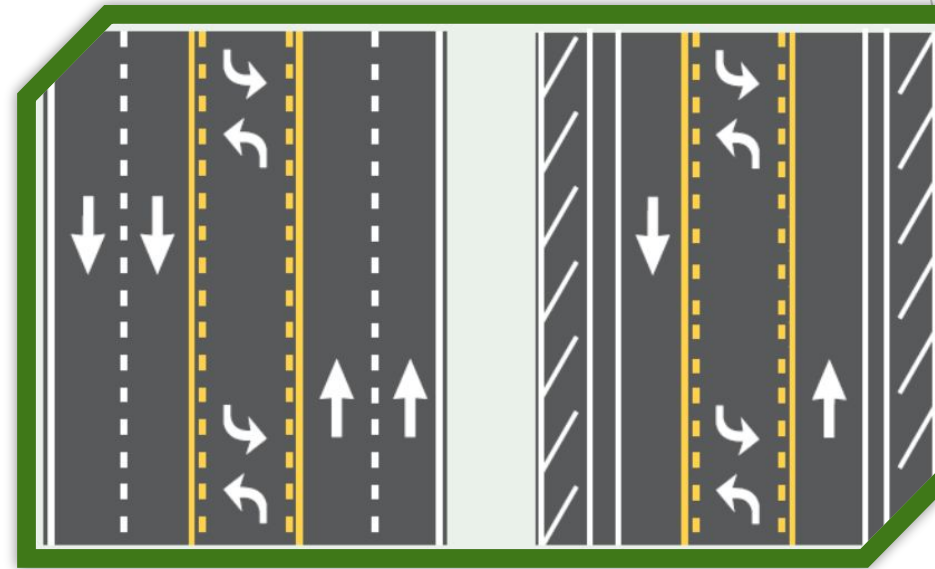


Other Roadway Reconfigurations

2-Lane to 3-Lane



5-Lane to 3-Lane

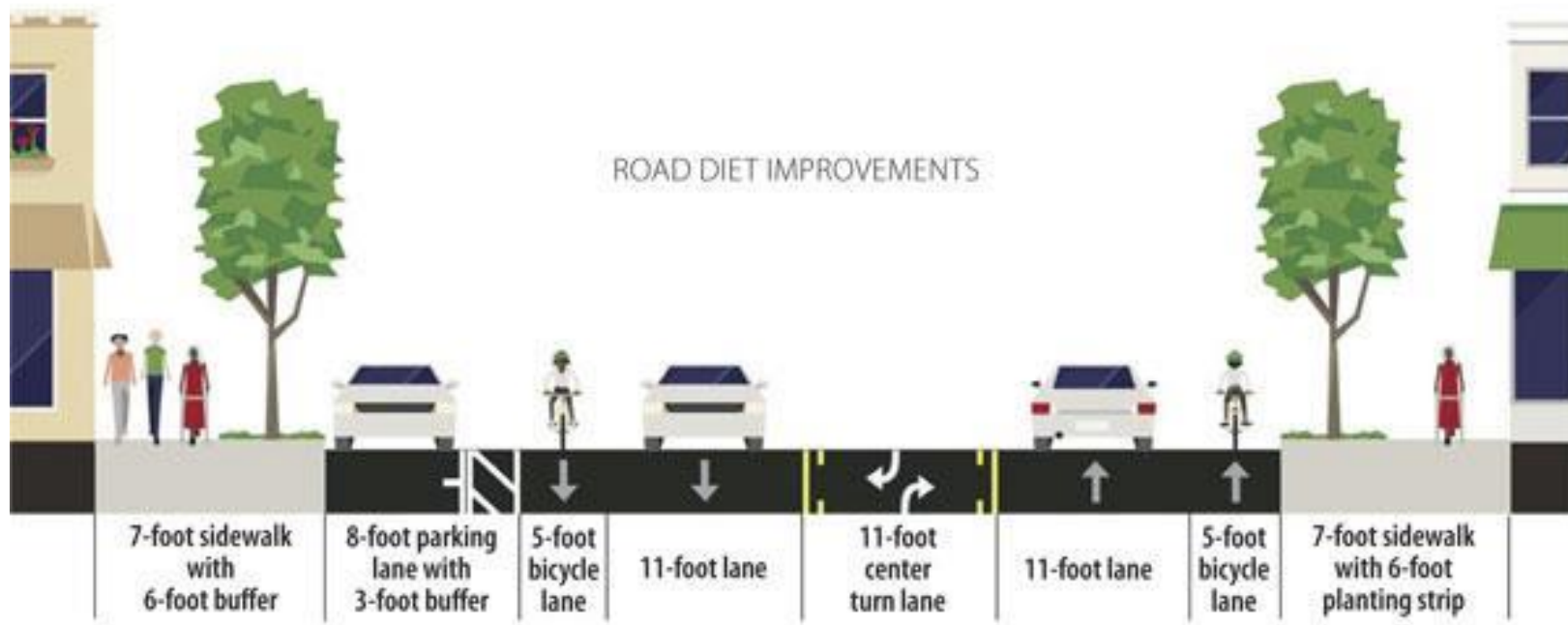


▶ **GOAL:**

- ▶ To relocate lanes and rebalance the lanes in order to reduce fatalities and traffic congestions
- ▶ To provide the community with a complete and livable street.



Success Stories of Road Diets in the U.S.



Road Diets Success Story: Pottstown, Pennsylvania



Photo Source: Michael Ronklin



Road Diets Success Story: Virginia



Photo Source: Virginia Department of Transportation



Road Diets Success Story: San Diego, California



Photo Source: Streetfilms.org



Road Diets Success Story: San Francisco, California

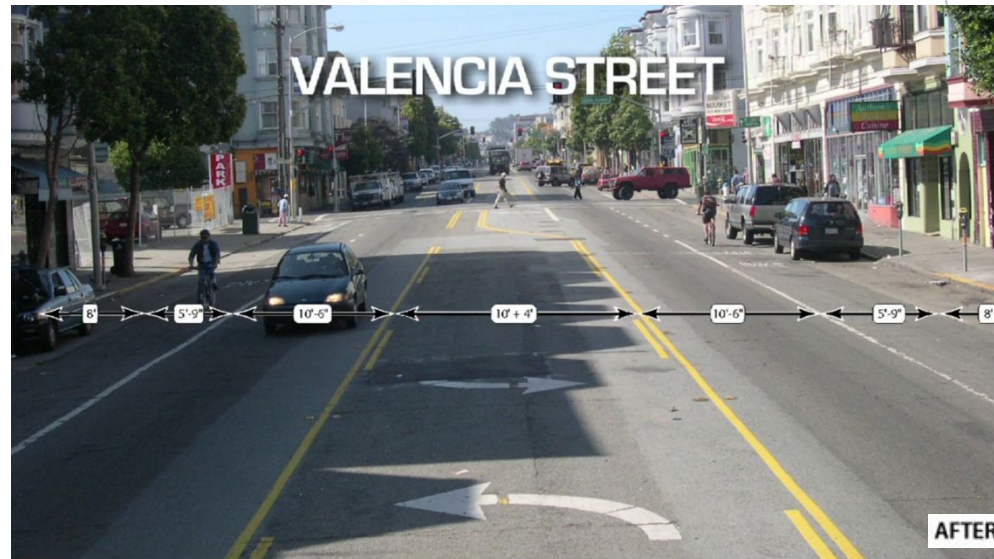


Photo Source: Streetfilms.org



Road Diets Success Story: Seattle, Washington



Photo Source: Streetfilms.org



Road Diets Success Story: Cumberland County, PA

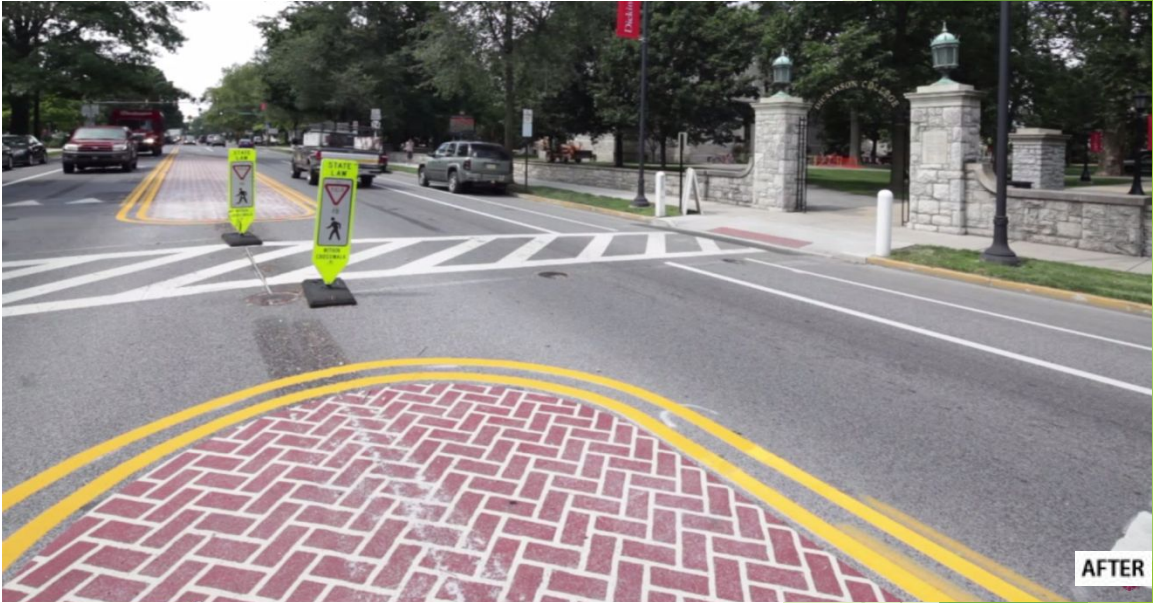


Photo Source: Dewberry



Why Consider a Road Diet?

Benefits: Complete Streets

- ▶ Many communities have adopted Complete Streets policies, establishing the expectation that all future roadway projects will adhere to the principle that streets should be designed with all users in mind rather than simply providing enough capacity for vehicle through-put.
- ▶ Embarking on a Road Diet presents an opportunity to dedicate more space to other roadway users and create a more balanced transportation system. A "complete streets" environment to accommodate a variety of transportation modes.
- ▶ Many communities have adopted Complete Streets policies, establishing the expectation that all future roadway projects will adhere to the principle that streets should be designed with all users in mind rather than simply providing enough capacity for vehicle through-put.



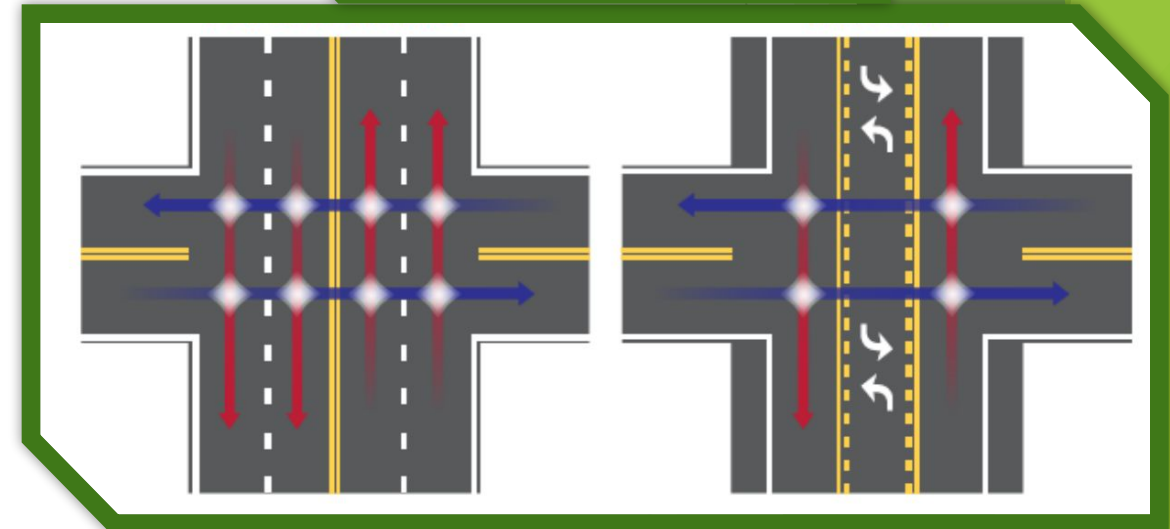
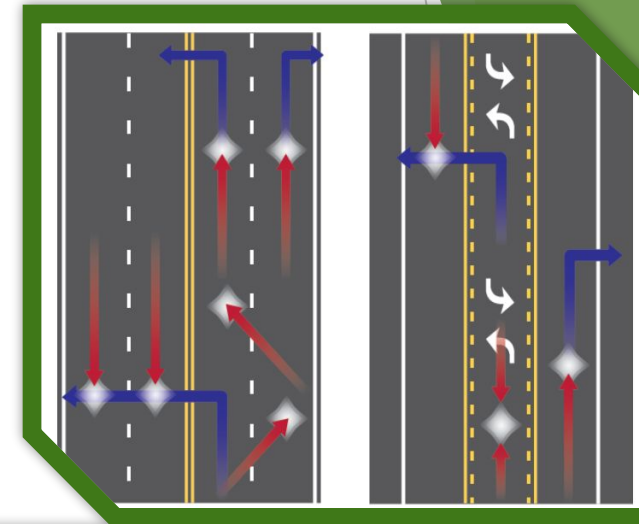
Photo Source: Completestreetsprince.org



Why Consider a Road Diet?

Speed

- ▶ Match vehicle speed, if possible, to the context of surrounding land uses, such as through central business districts and neighborhoods, and to all road users. Sometimes this means that lower vehicle speeds are more desirable. These areas often have higher pedestrian and bicycle volumes in addition to younger pedestrians and bicyclists. The need to "calm" or reduce vehicle speeds is often cited as a reason for Road Diet conversions.
- ▶ Studies indicate a 19 to 47 percent reduction in overall crashes when a Road Diet is installed on a previously four-lane undivided facility as well as a decrease in crashes involving drivers less than 35 years of age and over 65 years of age.
- ▶ Simulation results of operational analyses from Converting Four- Lane Undivided Roadways to a Three-Lane Cross Section - Factors to Consider show that 85th percentile and average speed along conversions are likely to decrease by 3 to 5 mph.



Why Consider a Road Diet?

Pedestrian and Bicyclist Benefits

- ▶ Improve pedestrian and bicyclist environment and accessibility.
- ▶ In cases where there are already bicycle facilities, a Road Diet may be an opportunity to further enhance the comfort of bicyclists by adding buffer space or converting a standard bicycle lane to a protected bicycle lane. Adding buffers may have additional benefits to other users as well. This attracts more pedestrian and bicyclist to use the facility.
- ▶ In some cases, buffered bicycle lanes are added by providing a visual or even physical barrier between modes of travel. This further enhances the comfort of the route and may encourage increased usage.
- ▶ Pedestrian refuge islands can reduce pedestrian-related crashes by up to 46 percent. The three-lane cross-section also makes crossing the roadway easier and safer for pedestrians, as they have one fewer travel lanes to cross and are exposed to moving traffic for a shorter period of time. Road diets can definitely help save pedestrian lives, since 70 percent of pedestrian fatalities occur at midblock crossings.



Photo Source: Driftlessbicycle.org



Photo Source: nacto.org



Why Consider a Road Diet?

Costs

- ▶ In many cases a Road Diet conversion may only consist of changes in pavement markings. If it is determined that a Road Diet is not the best option for the corridor, the roadway can be changed back to its original lane configuration.

Level of Service (LOS)

- ▶ Pedestrian LOS scores are likely to improve due to the lane reduction, speed reduction, and the reallocation of traveled way width to bicycle lanes and on-street parking.
- ▶ Bicycle LOS scores will improve as a result of some of the same factors, as well as the addition of a bicycle lane.



Photo Source: la.streetsblog.org



Photo Source: Dewberry



Road Diets in Puerto Rico

University of Puerto Rico, Mayaguez Campus

- ▶ The proposed 0.32-kilometer path would extend from Coliseo Mangual where it connects with the Terrace Bike Path to the Natatorium & Tennis Courts Complex where it connects with the Natatorium Sports Center and to Business Administration Building through a terminal road.

Avenida Principal Alternatives

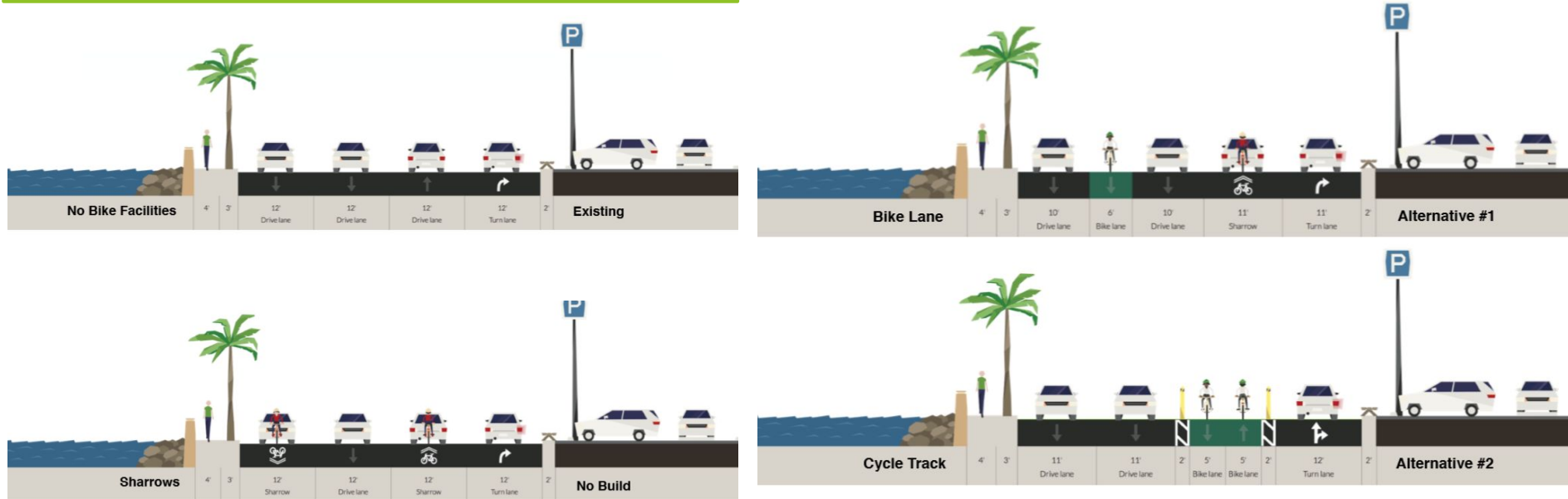


Photo Source: David Soto



Should a Road Diet be Used Here?

- ▶ There are many factors to consider before implementing a Road Diet.
- ▶ Identifying the objective will help determine whether the Road Diet is an appropriate alternative for the corridor that is being evaluated.
- ▶ Considerations:
 - ▶ Driveway density
 - ▶ Transit routes
 - ▶ The number and design of intersections along the corridor
 - ▶ Operational characteristics
 - ▶ Roadway function and access control
 - ▶ Turning volumes and 85th percentile speed
 - ▶ Crash type and patterns
 - ▶ Pedestrian and bicycle activity
 - ▶ Right-of-way availability
 - ▶ Cost



Photo Source: David Soto

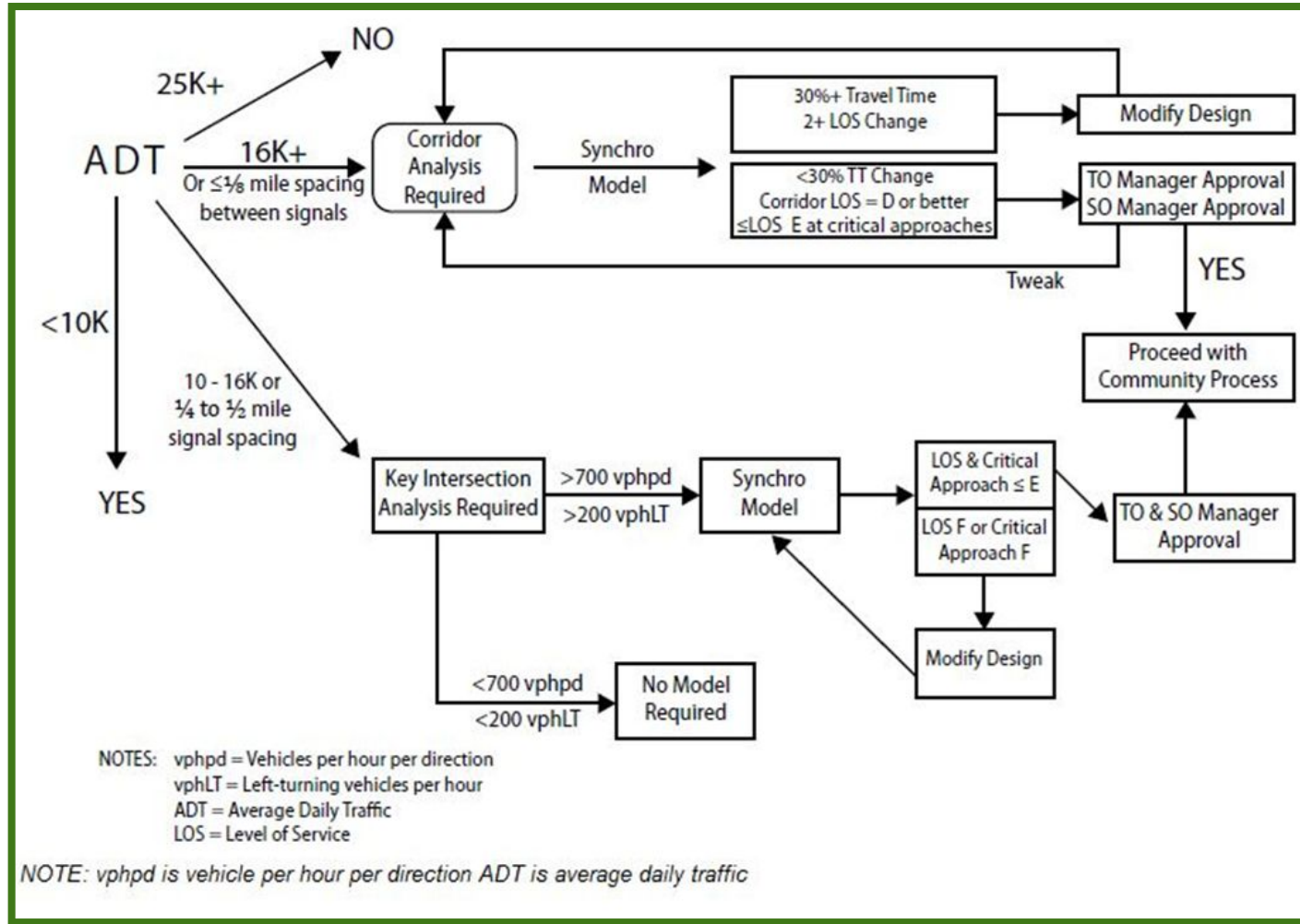


Photo Source: David Soto

“Ciclo Vias” consists of the planning, and design and implementation of bicycle routes in the Municipality of Ponce, especially in the Hostos Avenue and Las Américas Avenue, as part of David Soto’s proposal for the Eisenhower Scholarship.

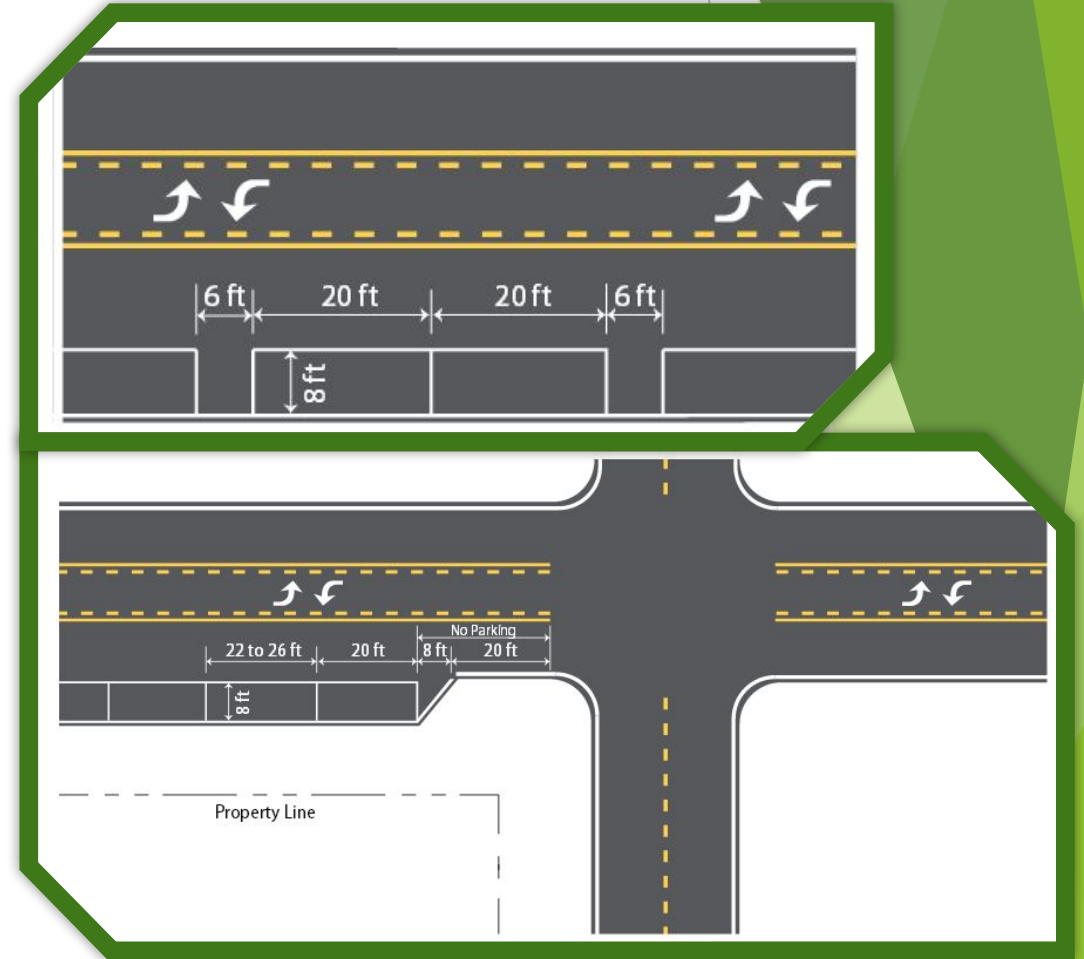


Road Diet Feasibility Seattle, Washington for 4/5 lanes to 3 lanes



Designing a Road Diet: Geometric and Operational Design Considerations

- ▶ Identifying details of the project in plan, profile, and cross-section.
 - ▶ Overarching principles of design
 - ▶ Design controls
 - ▶ Design elements
 - ▶ Cross-section design
 - ▶ Intersection design
 - ▶ Consideration for all road users



Designing a Road Diet: Geometric Design Considerations

- ▶ Road functional classification
- ▶ Design vehicles, driver characteristics, and presence of non-motorized users
- ▶ Corridor sight distance, grade, horizontal curvature, and superelevation
- ▶ Cross-sectional elements, such as lane widths, cross slope, presence of curbs or shoulders, access management, and presence of on-street parking or bus turnouts
- ▶ Intersection design elements, such as alignment and profile of intersection approaches and intersection sight distance.



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Determining if the Road Diet is Effective

Data Needs

- ▶ Before-and-After Studies
- ▶ Cross-Sectional Studies

Safety

- ▶ Crash Reduction
- ▶ Speed Reduction

Operational Analysis

- ▶ Traffic Volumes
- ▶ Level of Service (LOS)
- ▶ Speed
- ▶ Two-way Left Turn Lane Operation
- ▶ Queue Length
- ▶ Trucks, Slow-Moving Vehicles, and Buses
- ▶ Turning Traffic
- ▶ Pedestrian Wait Time
- ▶ Vehicle Yield/Stop Compliance Rate for Pedestrians Crossing the Street
- ▶ Increased Bicyclist and Pedestrian Volumes



Typical Problems Addressed by Road Diets Improvements

Category	Problem	Rationale
Safety	Rear-end crashes with left-turning traffic due to speed discrepancies	Removing stopped vehicles attempting to turn left from the through lane could reduce rear-end crashes
	Sideswipe crashes due to lane changes	Eliminating the need to change lanes reduces sideswipe crashes
	Left-turn crashes due to negative offset left turns from the inside lanes	Eliminating the negative offset between opposing left-turn vehicles and increasing available sight distance can reduce left-turn crashes
	Bicycle and pedestrian crashes	Bicycle lanes separate bicycles from traffic; pedestrians have fewer lanes to cross and can use a refuge area, if provided
Operational	Delays associated with left-turning traffic	Separating left-turning traffic has been shown to reduce delays at signalized intersections
	Side street delays at unsignalized intersections	Side-street traffic requires shorter gaps to complete movements due to the consolidation of left turns into one lane
	Bicycle operational delay due to shared lane with vehicles or sidewalk use	Potential for including a bike lane eliminates such delays
Other	Bicycle and pedestrian accommodation due to lack of facilities	Opportunity to provide appropriate or required facilities, increasing accessibility to non-motorized users
	Unattractive aesthetic	Provisions can be made for traversable medians and other treatments
	Vehicles speeds discourage pedestrian activity	Potential for more uniform speeds; opportunity to encourage pedestrian activity

Photo Source: Kentucky Transportation Center’s Guidelines for Road Diets Conversions



PARTICIPANTS THAT CAN BENEFIT FROM THIS INITIATIVE

- ▶ Safety Engineers
- ▶ Transportation Planners
- ▶ Pedestrian and Bicycle Coordinators
- ▶ Safe Routes to School Coordinators
- ▶ Local Public Agency Coordinators
- ▶ Transportation Alternatives Program Managers



Road Diets Related References

- ▶ http://safety.fhwa.dot.gov/road_diets/info_guide/
- ▶ http://safety.fhwa.dot.gov/road_diets/pdf/roaddiets_presentation.pdf
- ▶ <http://www.fhwa.dot.gov/publications/research/safety/humanfac/04082/>
- ▶ <http://www.fhwa.dot.gov/publications/publicroads/11septoct/05.cfm>
- ▶ <https://www.youtube.com/watch?v=SHLkl4NgLAc&feature=youtu.be>
- ▶ <http://www.fhwa.dot.gov/everydaycounts/edc-3/reconfiguration.cfm>

