ROAD DIETS AND TRAFFIC ANALYSIS

Road Diets are the reconfiguration of one or more travel lanes to calm traffic and provide space for bicycle lanes, turn lanes, streetscapes, wider sidewalks, and other purposes. Four- to three-lane conversions are the most common Road Diet, but there are numerous types (e.g., three to two lanes, or five to three lanes). FHWA has identified Road Diets as a Proven Safety Countermeasure and an Every Day Counts initiative.

Street are typically designed based on a forecast of future traffic volumes. In many cases, these estimates were either incorrect or circumstances have changed, resulting in fewer vehicles than anticipated. The outcome is excess capacity and streets that encourage fast speeds, and create poor conditions for pedestrians, bicyclists, and transit users.

Road Diets offer a way to rebalance the street to meet the needs of all users. A conventional approach to evaluate the feasibility of a Road Diet is to evaluate the impact on vehicles, not people. Guidance at the national level provides the flexibility to apply engineering judgment to assess the project holistically, incorporating performance measures for all modes and community goals.

KEY DESIGN FLEXIBILITY

The **2010 TRB Highway Capacity Manual** emphasizes the importance of applying engineering judgment to consider a range of performance measures in the analyses:

"Analysts and decision-makers should always be mindful that neither LOS [Level of Service] or any other single performance measure tells the full story of roadway performance."

TRB Highway Capacity Manual 2010, p. 8-11

"As always, engineering judgment should be applied to any recommendations resulting from HCM (or alternative tool) analyses."

TRB Highway Capacity Manual 2010, p. 8-20

OTHER RESOURCES

"Added to the direct safety benefits, a Road Diet can improve the quality of life in the corridor through a combination of bicycle lanes, pedestrian improvements, and reduced speed differential, which can improve the comfort level for all users."

FHWA Road Diet Guide 2014, p. 10

"Road Diets have many benefits, often reducing crashes; improving operations; and improving livability for pedestrians, bicyclists, adjacent residents, businesses, and motorists."

AASHTO Bike Guide 2012, p. 4-30

"Three-lane roadways…create opportunities for pedestrian refuges at midblock and intersection crossings and eliminate the common 'multiple threat' hazards pedestrians experience crossing four-lane roads."

ITE Designing Walkable Urban Thoroughfares 2010, p. 148

"Vibrant cities are active 24 hours a day. Streets designed for peak intervals of traffic flow relieve rush hour congestion, but may fail to provide a safe and attractive environment during other portions of the day."

NACTO Urban Street Design Guide 2013, p. 148

APPLYING DESIGN FLEXIBILITY

VOLUME THRESHOLDS

Volume thresholds, often average daily traffic (ADT), can initially approximate whether a road diet is appropriate given the proposed number of lanes; however, if volumes are at the upper limits of the threshold, designers should consider further analysis. Communities have varying ADT or peak-hour thresholds and some have had success with Road Diets on roads that exceed initial thresholds. "Road Diet projects have been completed on roadways with relatively high traffic volumes in urban areas or near larger cities with satisfactory results" **(FHWA Road Diet Guide 2014, p. 17)**.

MOTOR VEHICLE LEVEL OF SERVICE THRESHOLDS

The **2010 TRB Highway Capacity Manual** provides methods for evaluating the multimodal performance of highways in terms of operations and quality of service. It defines Level of Service (LOS) as a quantitative measure, but does not set LOS standards. Local jurisdictions have flexibility in the use of motor vehicle LOS standards. The **AASHTO Green Book** provides guidance for desirable LOS for different contexts and states that the designer has the latitude to choose an appropriate LOS **(2010, pp. 2-66–2-77)**. FHWA does not have regulations or policies that require specific minimum LOS values for projects on the NHS. The recommended values in the Green Book are regarded as guidance only. **(USDOT Memorandum, Level of Service on the National Highway System, 2016)**. This memo goes on to say that designers should take several factors into account in addition to traffic projections such as land use, context, and agency transportation goals, when planning and designing projects. In jurisdictions where LOS criteria are established, the **FHWA Flexibility in Highway Design** says, "the selection of a level of service that is lower than what is usually recommended may be appropriate" to achieve safety goals or to support adjacent land uses **(1997, p. 61)**. In fact, some States and jurisdictions are prioritizing other factors above motor vehicle LOS and relying on it less often as a measure of roadway effectiveness.

TRAFFIC PROJECTIONS

A conventional roadway design approach is to build and operate a facility to accommodate for vehicle traffic forecasts that could occur during the design life of a facility. However, in many cases "the streets were built to accommodate a projected volume that never materialized," resulting in streets that have underutilized vehicle travel lanes and may not support community goals (e.g., safety, economic activity, livability) **(AASHTO Bike Guide 2012, p. 4-30)**.

It is important for designers to recognize that transportation patterns and habits across the country are changing: fewer Americans are driving alone to work, the number of miles driven per capita is stabilizing, and rates of walking, bicycling, and transit use are up. These trends should be factored into decisions about future vehicle volume estimates.

Additionally, designers historically developed trip generation estimates based on data collected from suburban car-oriented developments. The **2012 ITE Trip Generation Manual** has new techniques for estimating trip generation for all modes and for mixed-used developments. Research is ongoing regarding the best practices for trip generation estimates for a larger variety of land uses and modes of travel.

DESIGN HOUR OR PEAK HOUR

On conventional roadway projects, vehicle volumes during the busiest hour of the day are used to evaluate motor vehicle LOS. Street utilization varies throughout the day and some communities are implementing Road Diets because off-peak needs and potential safety benefits outweigh the potential increases in delay or travel time during the peak hour. The **TRB Highway Capacity Manual 2010** provides for flexibility when considering analysis results. Specifically, it states that "the existence of a LOS F condition does not, by itself, indicate that action must be taken to correct the condition" and goes on to say that other issues should be considered, such as safety and pedestrian and bicyclist needs **(TRB Highway Capacity Manual 2010, p. 8-5)**.

THE POWER OF SMALLER STREETS AND A STREET NETWORK

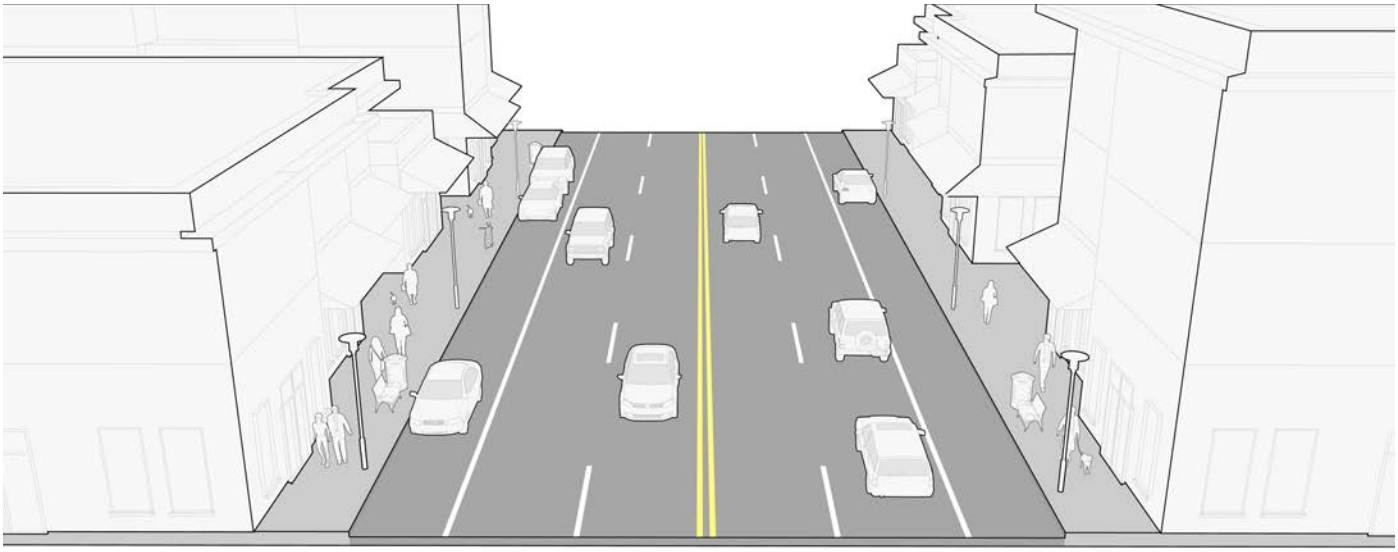
Wide streets with multiple travel lanes and turn lanes at intersections are less efficient in terms of motor vehicle capacity than a denser network of streets with fewer travel lanes. Research has shown that "the marginal capacity increase of additional lanes decreases as the size of the intersection increases" **(ITE Effectiveness of Additional Lanes at Signalized Intersections 2003, p. 26)**. This is due to additional signal phases needed to control turning movements, the width of intersection crossings, and other factors.

An interconnected street network with narrower streets (fewer travel lanes) and smaller intersections operates more efficiently because it processes more turning traffic, shortens pedestrian crossings, and provides more route choices for all modes.

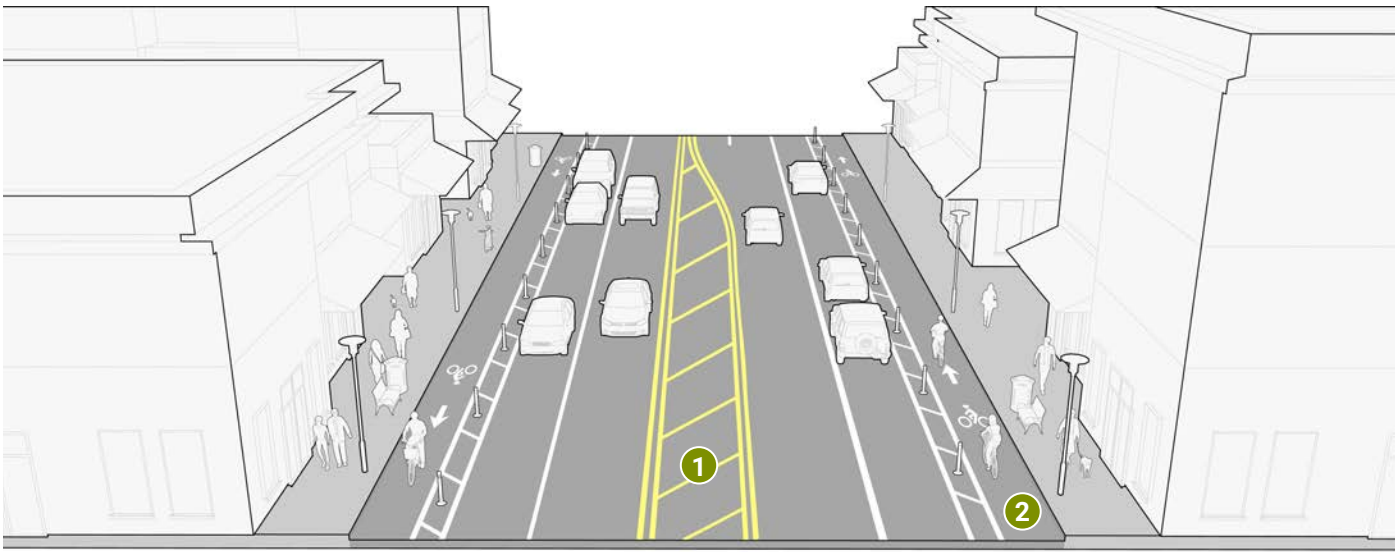
Road Diets can therefore be used as one part of an overall strategy to reduce the width of existing streets and provide a denser street network.

SAFETY BENEFITS OF A ROAD DIET

The common four- to three-lane Road Diet has proven safety benefits with "a 19 to 47 percent reduction in overall crashes" **(FHWA Road Diet Guide 2014, p. 7)**. Added two-way left-turn lanes (1) reduce the number of potential conflict points, while slower operating speeds typical of this type of Road Diet reduce the severity of crashes that do occur. In addition to the reduction of speed, pedestrian safety benefits include potentially reduced crossing distances, space for refuge



BEFORE ROAD DIET



AFTER ROAD DIET

islands, and elimination of multiple threat crashes **(FHWA Road Diet Guide 2014, p. 7)**. Road Diets often result in a dedicated space for standard or separated bike lanes. 2 For more information, refer to the design topics on **Separated Bike Lanes** and **Separated Bike Lanes at Intersections**. Additionally, refer to the design topic on **Transit Conflicts** for information on managing bus and bike conflicts.

TRANSIT BENEFITS OF A ROAD DIET

Road Diets present an opportunity for transit agencies and local jurisdictions to coordinate improvements for transit passengers and evaluate the effects on all roadway users. As part of the Road Diet, bus stops may be moved, consolidated, or upgraded to reduce delay, enhance the passenger experience, or better align with pedestrian crossings and desire lines. Where on-street parking is retained, consider bus bulbs for added amenity space and to eliminate inefficient in-and-out operations associated with pull-out spaces. At signalized intersections, consider implementing signal priority for buses and restricting parking on intersection approaches to provide queue-jump lanes. In some instances it may be feasible to implement dedicated bus lanes through a Road Diet. **(FHWA Road Diet Guide 2014, pp. 20–21)**

LANE WIDTH

Local jurisdictions have flexibility in determining appropriate lane width. The **TRB Highway Capacity Manual** recognizes that there is minimal difference in motor vehicle capacity for travel lanes between 10 and 12.9 feet at signalized intersections **(2010, p. 18-36)** and does not provide any capacity factors for lane widths in this range. For more information, refer to the design topic on **Design Criteria and Lane Width**.

CASE STUDIES

W LAWRENCE AVENUE
CHICAGO, IL

In 2014, the City of Chicago completed a Road Diet on three-quarters of a mile of W Lawrence Avenue, transforming the four-lane street to two travel lanes and a center turn lane. The remaining right-of-way was reallocated to wider sidewalks for outdoor dining, public art, improved pedestrian access, and standard bike lanes. Additional improvements included pedestrian safety measures (e.g., curb extensions/bulb-outs, refuge islands, and prominent crosswalks made from red asphalt), street trees, and rain gardens. Despite having daily traffic of approximately 30,000 vehicles/day, much higher than the typical threshold for a four-to-three lane road diet, the road diet is largely considered a success by community members.

Source: John Greenfield, Streetsblog Chicago

LAWYERS ROAD
RESTON, VA

In 2009, the Virginia Department of Transportation completed a Road Diet for two miles of Lawyers Road as part of a routine repaving project. The project reduced the four-lane roadway to one travel lane and one 5-foot bike lane in each direction separated by a continuous two-way left-turn lane. Since completion, crashes fell by 68 percent after 5 years, average speeds fell by 1 mi/h, and drivers traveling over 50 mi/h fell from 13 percent of daily traffic to 1 percent. The **VDOT Newsroom Website** noted that a 2010 follow-up survey of drivers, bicyclists, and residents found that "69 percent said the road felt safer, 47 percent said they cycled more on Lawyers, 69 percent said their car trips did not take any longer with the new configuration, and 74 percent said the project improved Lawyers Road" **(http://www.virginiadot.org/newsroom/northern_virginia/2011/second_road_diet_on54423.asp)**.

Source: Virginia Department of Transportation

STONE WAY NORTH
SEATTLE, WA

In 2007, the City of Seattle implemented a road diet on 1.2 miles of Stone Way North, converting four travel lanes to two travel lanes with a center turn lane and bicycle climbing lane. The Road Diet reduced travel speeds and collision rates while increasing bicycle volumes. The 85th percentile speed decreased and traffic volumes remained consistent with citywide trends without diversion onto adjacent streets. Based on crash data for two years before and two years after Road Diet implementation, total crashes declined by 14 percent and injury collisions declined by 33 percent. Bicycle volumes increased by 35 percent along the corridor.