ROAD DIET / LANE REDUCTION
Components of road diet projects associated with increased pedestrian safety:

- Decreases number of vehicle lanes to cross
  - Reduces the multiple-threat situation
- Provides room for a pedestrian crossing island
- Improves speed limit compliance and decrease crash severity
- Creates a buffer between pedestrians and vehicular traffic through addition of on-street bike lanes or on-street parking.
Why a Road Diet?

- Community recognized need to accommodate other road users
- Large number of pedestrian attractors led to conflicts
- Bicycle community wanted dedicated bicycle lanes

Figure 1 – Drawings of Valencia Street Before and After the Bike Lanes

Before

After

Source: Sallaberry, 2000, p. 20
CASE STUDY: ROAD DIET
(SAN FRANCISCO, CA)

Problem/Background

- Valencia Street part of San Francisco’s Mission District
- 1.8 miles long
- 4-lane road with 22,000 ADT
- High pedestrian, bicycle, bus activity but lacked supporting infrastructure

Before
CASE STUDY: ROAD DIET
(SAN FRANCISCO, CA)

Details

- In 1999, 4 lanes restriped to 2 lanes + bicycle lanes and center turn-lane
  - Trial basis
- Speed limit lowered from 30 to 25 mph
- Signal timing altered to minimize loss of capacity
- Made permanent after year trial
- Initial cost: $130,000
  - Paint and sign work, & labor spent writing an impact report
Results

- **Success**
  - No real change in ADT
  - Large increase in cycling & pedestrian activity
  - Reduction in collisions
  - Aided revitalization of area

- **Four years after, a survey of business owners along Valencia Street found general support***
  - 65% felt bicycle lanes had positive impact on their business, only 4% said it had negative impact
  - 65% would support more traffic calming

*Source: Emily Drennen, “Economic Effects of Traffic Calming on Urban Small Business”*
Results

- City implemented more changes in 2010:
  - sidewalks and bike-lanes widened
  - bulb outs, streets trees, lighting, and public art added

- Became place to try new treatments such as bicycle “green wave” and bicycle bays

Sign indicating the street is set for “green wave” speeds

Sign illustrating a bicycle bay

Sign illustrating a bicycle bay
Narrowing the roadway cross section from four lanes to three lanes (two through lanes with center turn lane) has been associated with a 29% decrease in all crashes.

Research

Converting roadway cross-section from four lanes to three lanes (two through lanes with center turn lane) has been associated with a 37% decrease in all crashes.

- Urban areas

**Countermeasure:** Narrow cross section (4 to 3 lanes with two way left-turn lane)

<table>
<thead>
<tr>
<th>CMF</th>
<th>CRF(%)</th>
<th>Quality</th>
<th>Crash Type</th>
<th>Crash Severity</th>
<th>Roadway Type</th>
<th>Area Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.63</td>
<td>37</td>
<td>3 2 1</td>
<td>All</td>
<td>All</td>
<td>Not specified</td>
<td>Urban</td>
</tr>
</tbody>
</table>

**Research**

Converting roadway cross-section from four lanes to three lanes (two through lanes with center turn lane) has been associated with a 53% decrease in all crashes.

- Suburban roadways

<table>
<thead>
<tr>
<th>CMF</th>
<th>CRF(%)</th>
<th>Quality</th>
<th>Crash Type</th>
<th>Crash Severity</th>
<th>Area Type</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.47</td>
<td>53</td>
<td>🌟🌟🌟🌟</td>
<td>All</td>
<td>All</td>
<td>Suburban</td>
<td>Persaud et. al, 2010</td>
</tr>
</tbody>
</table>

**Research**

### COLLISION REDUCTIONS FROM SEATTLE ROAD DIETS

#### Data on Street Conversions - Seattle, Washington

<table>
<thead>
<tr>
<th>ROADWAY SECTION</th>
<th>DATE CHANGE</th>
<th>ADT (BEFORE)</th>
<th>ADT (AFTER)</th>
<th>CHANGE</th>
<th>COLLISION REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenwood Ave. N, from N 80th St. to N 50th St.</td>
<td>April 1995</td>
<td>11872</td>
<td>12427</td>
<td>4 lanes to 2 lanes plus TWLTL plus bike lanes</td>
<td>24 to 10 58%</td>
</tr>
<tr>
<td>N 45th Street in Wallingford Area</td>
<td>December 1972</td>
<td>19421</td>
<td>20274</td>
<td>4 lanes to 2 lanes plus TWLTL</td>
<td>45 to 23 49%</td>
</tr>
<tr>
<td>8th Ave. NW in Ballard Area</td>
<td>January 1994</td>
<td>10549</td>
<td>11858</td>
<td>4 lanes to 2 lanes plus planted median with turn pockets as needed</td>
<td>18 to 7 61%</td>
</tr>
<tr>
<td>Martin Luther King Jr. Way, north of I-90</td>
<td>January 1994</td>
<td>12336</td>
<td>13161</td>
<td>4 lanes to 2 lanes plus TWLTL plus bike lanes</td>
<td>15 to 6 60%</td>
</tr>
<tr>
<td>Dexter Ave. N, East side of Queen Anne Area</td>
<td>June 1991</td>
<td>13606</td>
<td>14949</td>
<td>4 lanes to 2 lanes plus TWLTL plus bike lanes</td>
<td>19 to 16 59%</td>
</tr>
<tr>
<td>24th Ave. NW, from NW 85th St. to NW 65th St.</td>
<td>October 1995</td>
<td>9727</td>
<td>9754</td>
<td>4 lanes to 2 lanes plus TWLTL</td>
<td>14 to 10 28%</td>
</tr>
<tr>
<td>Madison St., from 7th Ave. to Broadway</td>
<td>July 1994</td>
<td>16969</td>
<td>18075</td>
<td>4 lanes to 2 lanes plus TWLTL</td>
<td>28 to 28 0%</td>
</tr>
<tr>
<td>W Government Way/Gilman Ave. W, from W Ruffner St. to 31st Ave. W</td>
<td>June 1991</td>
<td>12916</td>
<td>14286</td>
<td>4 lanes to 2 lanes plus TWLTL plus bike lanes</td>
<td>6 to 6 0%</td>
</tr>
<tr>
<td>12th Ave., from Yesler Way to John St.</td>
<td>March 1995</td>
<td>11751</td>
<td>12557</td>
<td>4 lanes to 2 lanes plus TWLTL plus bike lanes</td>
<td>16 to 16 0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>185 to 122</strong></td>
<td></td>
<td></td>
<td><strong>34%</strong></td>
</tr>
</tbody>
</table>
BEFORE AND AFTER CRASH DATA

Table 1. Study sites and crashes used in the analysis.

<table>
<thead>
<tr>
<th>CITY</th>
<th>NUMBER OF SITES</th>
<th>NUMBER OF CRASHES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Road Diet</td>
<td>Comparison*</td>
</tr>
<tr>
<td>Bellevue, WA</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mountain View, CA</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Oakland, CA</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Sunnyvale, CA</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

* Each road diet had one or more comparison sites.

Source: Summary Report: Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries FHWA-HRT-04-082
**BEFORE AND AFTER CRASH DATA**

Table 2. Summary of findings.

<table>
<thead>
<tr>
<th>ANALYSIS CATEGORY</th>
<th>COMPARISON</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Period Road Diets vs. Comparison Sites</td>
</tr>
<tr>
<td>Crash frequency</td>
<td>Reduction in after period</td>
</tr>
<tr>
<td>Crash rates</td>
<td>No change</td>
</tr>
<tr>
<td>Crash severity</td>
<td>No change</td>
</tr>
<tr>
<td>Crash type</td>
<td>No change</td>
</tr>
</tbody>
</table>

Source: Summary Report: Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries FHWA-HRT-04-082
The roadway has a moderately high density of driveways and other uncontrolled access

Crash severities are high

Speeding contributes to safety problems

Pedestrians and others crossing/accessing the main corridor are affected by the higher exposure of crossing

Multiple lanes exist on each approach

No center turn lane exists

Frequent crash types exist that are most amenable to reduction through a road diet (opposing left-turn, sideswipe, pedestrian, rear-end)
# Road Diet Implementation Considerations

<table>
<thead>
<tr>
<th>Chicago DOT</th>
<th>Seattle DOT</th>
<th>City of Lansing, MI</th>
<th>Michigan DOT</th>
<th>Delaware Valley Regional Planning Commission</th>
<th>City of Las Vegas, NV</th>
<th>Genesee County (MI) Metropolitan Planning Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Maximum Volume, ADT</td>
<td>Maximum Peak Volumes, DHV</td>
<td>Through</td>
<td>Left/Right</td>
<td>Bicycle</td>
<td>Crash History</td>
<td>Vehicle Speed</td>
</tr>
<tr>
<td>Minimum Lane Width, ft</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
CITY OF SEATTLE

Modeling Flow Chart for Road Diets
[from 4/5 lanes to 3 lanes]

ADT

25K+

NO

30%+ Travel Time
2+ LOS Change

Modify Design

<30% TT Change
Corridor LOS = D or better
≤LOS E at critical approaches

TO Manager Approval
SO Manager Approval

Tweak

Yes

Proceed with Community Process

<10K

10 - 16K or
1/4 to 3/4 mile
signal spacing

YES

16K+

Corridor Analysis Required

Synchro Model

<700 vphpd

>700 vphpd

>200 vphLT

Key Intersection
Analysis Required

Synchro Model

LOS & Critical Approach ≤E

TO & SO Manager Approval

<700 vphpd

No Model Required

<200 vphLT

Modify Design

vphpd is vehicle per hour per direction
ADT is average daily traffic
Road Diet Conversions: A Synthesis of Safety Research

- May 2013 Libby Thomas, Senior Associate, UNC HSRC
- FHWA DTFH61-11-H-00024

Each potential road diet should be vetted on a case by case basis.

Case study and modeling results suggest

- Caution warranted when volumes approach 1,700 vehicles in the peak hour or range of 20,000 to 24,000 ADT
- (HSIS, 2010; Knapp and Giese, 2001; Welch, 1999).
GUIDELINES
Chapters

1. Introduction
2. Why Consider a Road Diet
3. Road Diet Feasibility Determination
4. Designing a Road Diet
5. Determining if the Road Diet is Effective
ROAD DIET HANDBOOK: SETTING TRENDS FOR LIVABLE STREETS

- Jennifer A. Rosales, P.E.
- A comprehensive guide for planners, engineers, & designers to help make decisions on applicability of road diets.
- Contains information on:
  - Planning
  - Analysis
  - Design
  - Implementation
  - Results of previous research
  - Significant gaps in the field
- Analyses of safety and traffic operations
- Livability considerations
- Case study evaluations
- Lessons learned from experience
- Guidelines for identifying & evaluating potential road diet sites & typical cross-sections
- Overall guidelines for implementation.
Looks at operational and safety aspects to assist in preliminary determination whether a road diet is appropriate

Cross-section designs

Transition to and from the road diet section

Flow chart for determining appropriate action

Identified gap in Rosales Road Diet guidelines

- Did not provide specific guidance regarding volumes or left-turn percentages indicating when such a project could result in improved operational and safety conditions
ROAD DIET CANDIDATE GUIDELINES

- ADT (Road Diet Candidate)
  - 20,000 or less
  - 23,000 or less

- Peak hourly volume (Road Diet Candidate)
  - 1,700 or less
  - 1,500 – 1,750 or less depending on:
    - Percentage of left turns at intersection
    - VPH on side street

- Case with higher ADT
  - Lake Washington Blvd. Kirkland, WA
    - Initial volume of 23,000 vehicles per day
    - Increased nearly 26,000 after conversion
    - During one period about 30,000 vehicles per day

PEAK HOURLY VOLUME

- Probably feasible at or below 750 vehicles per hour per direction (vphpd) during the peak hour.
- Consider cautiously between 750 – 875 vphpd during the peak hour.
- Feasibility less likely above 875 vphpd during the peak hour and expect reduced arterial LOS.

Guidelines for the conversion of urban four-lane undivided roadways to three-lane two-way left-turn facilities. Sponsored by the Office of Traffic and Safety of the Iowa Department of Transportation, CTRE Management Project 99-54.
CONSIDERATIONS

- What are the non-intersection turning volumes and patterns
  - Driveway density
  - Left turns in and out
- Are there frequent-stop and slow-moving vehicles?
  - Buses
  - Mail
  - Double parked vehicles
  - Buggies
  - Delivery trucks
  - Agriculture
- Is there a lot of weaving?
- What are the speeds?
CONSIDERATIONS

- Safety
  - Crash rate along corridor
  - What types of crashes are occurring?
- What’s the level of pedestrian & bicycle activity?
- Commercial reinvestment areas
- Economic enterprise zones
- Historic streets
- Scenic roads
- Entertainment districts
- Main streets
NON-INTERSECTION TURNING VOLUMES AND PATTERNS

- Driveway density
- Left turns in and out
FREQUENT-STOP AND SLOW-MOVING VEHICLES

- Buses
- Mail
- Double parked vehicles
- Buggies
- Delivery trucks
- Agriculture

- Consider number & duration of vehicle stops
- Is there potential for Pullouts
DESIGN CONSIDERATIONS
INTERSECTIONS

- Signal timing or phasing changes at intersections to optimize operations and safety benefits
- Roundabouts
Typically, road diet conversions will operate at acceptable levels as long as the signalized intersections do not present any operational problems (Welch 1999)

Table 1 Level of service and maximum sum of critical lane volumes at signalized intersections

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Traffic Flow Condition</th>
<th>Volume to Capacity Ratio</th>
<th>Critical Lane Volumes (vph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Two-Phase</td>
</tr>
<tr>
<td>A</td>
<td>Stable</td>
<td>&lt;.6</td>
<td>900</td>
</tr>
<tr>
<td>B</td>
<td>Stable</td>
<td>&lt;.7</td>
<td>1050</td>
</tr>
<tr>
<td>C</td>
<td>Stable</td>
<td>&lt;.8</td>
<td>1200</td>
</tr>
<tr>
<td>D</td>
<td>Unstable</td>
<td>&lt;.85</td>
<td>1275</td>
</tr>
<tr>
<td>E</td>
<td>Capacity</td>
<td>&lt;1.0</td>
<td>1500</td>
</tr>
</tbody>
</table>

Source: Messer and Fambro, 1977
Table 2 Range of delay differences by side street volume

<table>
<thead>
<tr>
<th>Side Street (vph)</th>
<th>Min (sec)</th>
<th>Max (sec)</th>
<th>Avg (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>-2.4</td>
<td>3.4</td>
<td>0.98</td>
</tr>
<tr>
<td>700</td>
<td>-4.5</td>
<td>3.6</td>
<td>0.50</td>
</tr>
<tr>
<td>1300</td>
<td>-9.5</td>
<td>15.5</td>
<td>0.94</td>
</tr>
</tbody>
</table>
Figure 9 Guideline for operational performance at signalized intersections
## Table 3 Range of average queue differences by side street volume

<table>
<thead>
<tr>
<th>Side Street (vph)</th>
<th>Min (veh)</th>
<th>Max (veh)</th>
<th>Avg (veh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>-1</td>
<td>1</td>
<td>0.07</td>
</tr>
<tr>
<td>700</td>
<td>-2</td>
<td>2</td>
<td>0.03</td>
</tr>
<tr>
<td>1300</td>
<td>-3</td>
<td>3</td>
<td>0.30</td>
</tr>
</tbody>
</table>
UNSIGNALIZED INTERSECTIONS (KENTUCKY)

- Delay along major road very small
  - Less than 4.5 sec/veh
- 3-lane option slightly higher delays than 4-lane
  - Difference very small
    - Most < 2.5 sec/veh
    - 56% delay difference being < 1 sec/veh
- Significant differences in delays on side-street approaches
- Delays on side-street for 3-lane road diet conversion were smaller than 4-lane road
Single lane roundabout ADT similar to Road Diet ADT

- Less than 20,000
SIMULATION SOFTWARE

- CORridor SIMulation (CORSIM)
- VISSIM
- Safety Surrogate Assessment Model (SSAM)
ROAD PROFILES
WIDER LANES = HIGHER SPEEDS

- 48 feet curb-to-curb with no parking
- Sidewalks buffered in the Road Diet
- Space for pedestrian island
CROSS SECTIONS 60 FEET

Before

(6ft)   (12ft)   (12ft)   (12ft)   (12ft)   (6ft)

After

(5.5ft)   (8ft)   (11ft)   (11ft)   (11ft)   (8ft)   (5.5ft)
CROSS SECTIONS 70 FEET

Before

(5ft) (12ft) (12ft) (12ft) (12ft) (12ft) (5ft)

After

(5ft)(3ft) (9ft) (12ft) (12ft) (12ft) (9ft) (3ft)(5ft)

Diagonal Parking

(14ft) (8ft) (11ft) (11ft) (11ft) (6ft) (9ft)
Although higher cost sidewalks can be widened

Lower cost option NYC Low Cost sidewalk widening with delineator posts
BIKE FEATURES

http://nacto.org/cities-for-cycling/design-guide/

Warning: Check traffic control against the MUTCD
INTERSECTION CROSSING MARKINGS
TWO-STAGE TURN QUEUE BOXES

Parking Lane Configuration

Experimental
BACK IN ANGLED PARKING
## BACK-IN ANGLE PARKING

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better visibility getting back into traffic</td>
<td>Some people will need practice</td>
</tr>
<tr>
<td>See cars and bicyclists</td>
<td>Furniture zone items might get hit</td>
</tr>
<tr>
<td>More vehicle parking spaces than parallel</td>
<td>Exhaust from running cars at sidewalk</td>
</tr>
<tr>
<td>Open car door(s) lead kids to sidewalk</td>
<td>Consider outdoor café’s</td>
</tr>
<tr>
<td>Loading items into trunk is safer</td>
<td></td>
</tr>
</tbody>
</table>
Road diets can be low cost if planned in conjunction with reconstruction or simple overlay projects, since a road diet mostly consists of restriping.

- May involve other costs such as signal head relocation.
- Know well in advance of when road reconstruction and overlay projects will be initiated to evaluate for Road Diet.
- Obtain input from the community stakeholders, and ensure the appropriate elements are included in the project.
- Classic four-to-three-lane Road Diet is very compatible with single-lane roundabouts
CASE STUDIES
PROJECT GOALS

- Improve pedestrian safety
- Add marked crosswalks
- Reduce exposure to multiple threat collisions
- Increase driver compliance with the posted speed limit
- Reduce speed
# Speed

## 85th Percentile Speed between 3rd Avenue W and 6th Avenue W

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westbound</td>
<td>40.6</td>
<td>33.1</td>
<td>-18%</td>
</tr>
<tr>
<td>Eastbound</td>
<td>44.0</td>
<td>33.3</td>
<td>-24%</td>
</tr>
</tbody>
</table>

## Speeders

Percent driving over the speed limit

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westbound</td>
<td>88%</td>
<td>32%</td>
<td>-64%</td>
</tr>
<tr>
<td>Eastbound</td>
<td>91%</td>
<td>34%</td>
<td>-63%</td>
</tr>
</tbody>
</table>

## Top End Speeders

Percent 10+ mph over the speed limit

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westbound</td>
<td>17%</td>
<td>1.4%</td>
<td>-92%</td>
</tr>
<tr>
<td>Eastbound</td>
<td>38%</td>
<td>1.5%</td>
<td>-96%</td>
</tr>
</tbody>
</table>
Two new marked crosswalks at Dravus St & 11th Ave W

Preliminary collision statistics show a substantial reduction in collisions after the project was completed

<table>
<thead>
<tr>
<th>Change in Number of Collisions on Nickerson from 13th Ave W to N Florentia St after Rechannelization</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Year Average</td>
</tr>
<tr>
<td>33.6</td>
</tr>
</tbody>
</table>

-23%
2009 (Before)
- Approximately 18,500 vehicles per weekday between 3rd Ave W and 6th Ave W.

August 2011 (After)
- Approximately 18,300 vehicles recorded in at the same location

### Nickerson Traffic Volume

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AM Peak</strong></td>
<td>816</td>
<td>733</td>
<td>-10%</td>
</tr>
<tr>
<td><strong>PM Peak</strong></td>
<td>915</td>
<td>927</td>
<td>+1%</td>
</tr>
<tr>
<td><strong>Average Weekday</strong></td>
<td>18,563</td>
<td>18,364</td>
<td>-1%</td>
</tr>
</tbody>
</table>
FREIGHT USE

- Freight vehicles of all types on Nickerson St rose slightly after the Road Diet
  - Trucks still account for about 5% of vehicles
- Large trucks account for about 2% of total traffic
  - Some large trucks continue to use Nickerson St both as a through route and to access the Queen Anne neighborhood via 3rd Ave W
PROJECT OUTCOMES

- Add two marked crosswalks
  - Improved all marked and unmarked crosswalks on the corridor

- Collision reduction in the first year
  - 2009-2011: 23% reduction

- Significant speed reduction
  - Dramatically reduced percent of drivers traveling > 10 mph over speed limit
  - Percent drivers traveling over the speed limit reduced more than 60%
  - Top-end speeders reduced by 90%
Problem/Background

- 1.2 mile road
- High motorist speeds
- Connects regional trail to park
- 13,000 ADT
- Numerous bus routes
- 8 schools, 2 libraries and 2 parks within 5 blocks
Why a Road Diet?

- Uncontrolled, marked crosswalks needed to be changed due to new guidelines
- Aggressive speeders, high crash rates
- Seattle Bicycle Master Plan recommended climbing lanes and shared lane markings
- Repaving provided leveraging opportunity
CASE STUDY: ROAD DIET (SEATTLE, WA)

Details

- Road restriped to provide 2 thru lanes, a two-way left turn lane & bike lanes
- Crosswalks were restored if they met guidelines

Before

After
Results

- Speeding reduced
- Total collisions declined 14%, injury collisions 33%
- Pedestrian collisions declined 80%
- Bicycle volume increased 35%
- Traffic did not divert to neighborhood streets
- Peak hour capacity maintained

After
**QUESTIONS / RESOURCES**

- **Road Diet Information Guide**

- **Road Diet Handbook: Setting Trends for Livable Streets**
  - *(Rosales)*

- **Guidelines for Road Diet Conversions**
  - Kentucky Transportation Center

- **PEDSAFE Case Studies**


- **NACTO Urban Bikeway Design Guide**