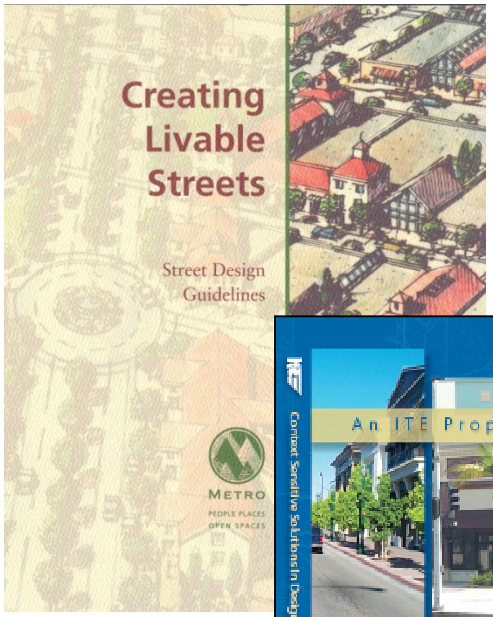
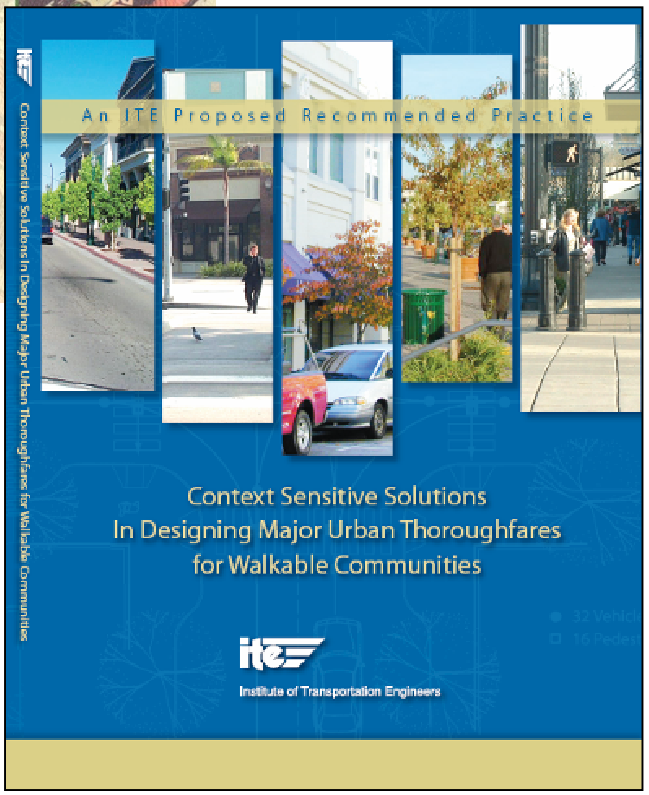

Road
Diets Seminar
Kimley-Horn
and Associates, Inc.

Instructor

- James M. Daisa, P.E.
  - "Creating Livable Streets: Street Design Guidelines for 2040", Portland Metro
  - "Bus Stop Safety and Design Guidelines", Orange County Transportation Authority
  - "Community Design & Transportation – A Manual of Best Practices for Integrating Transportation and Land Use", Santa Clara VTA
  - Recommended Practice: "Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities", ITE





Overview

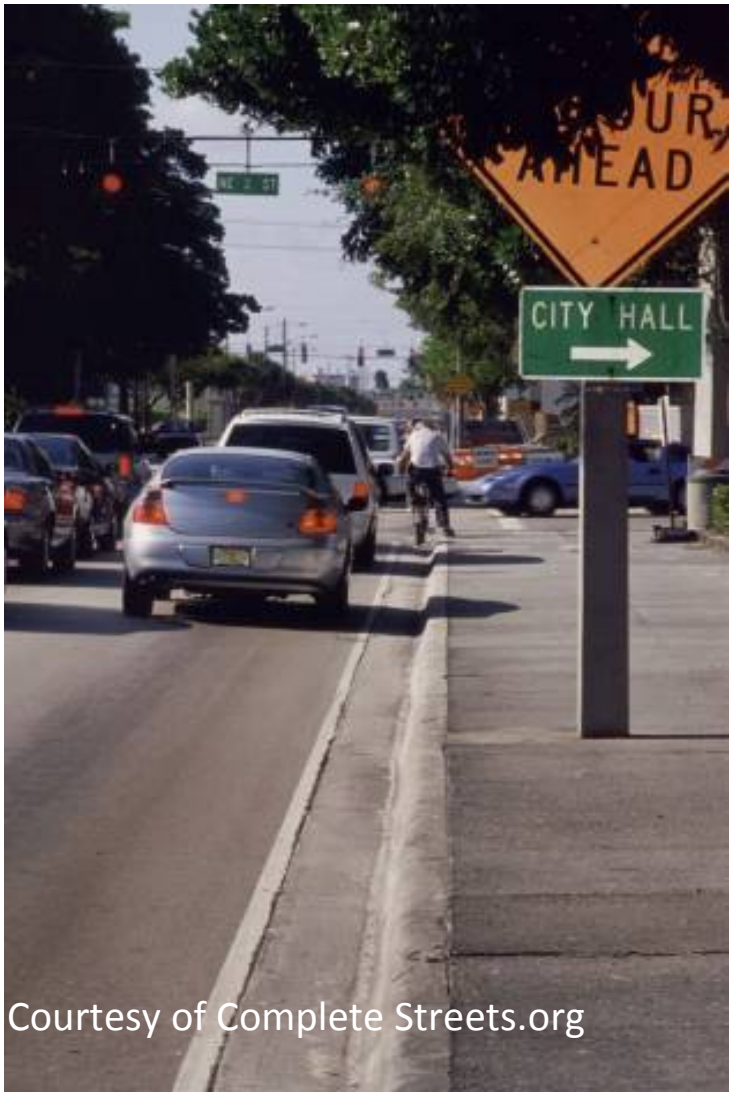
- Defining “Road Diets”, “Super Road Diets”, and “Lane Diets”
- Benefits
- Effects on Traffic Capacity
- Road Diet Configurations
- Resources
- Local Agency Case Studies

Why Road Diets?

Courtesy of Complete Streets.org

Why Road Diets?

- 25% of walking trips take place on roads without sidewalks or shoulders
- Bike lanes are available for only about 5% of bike trips

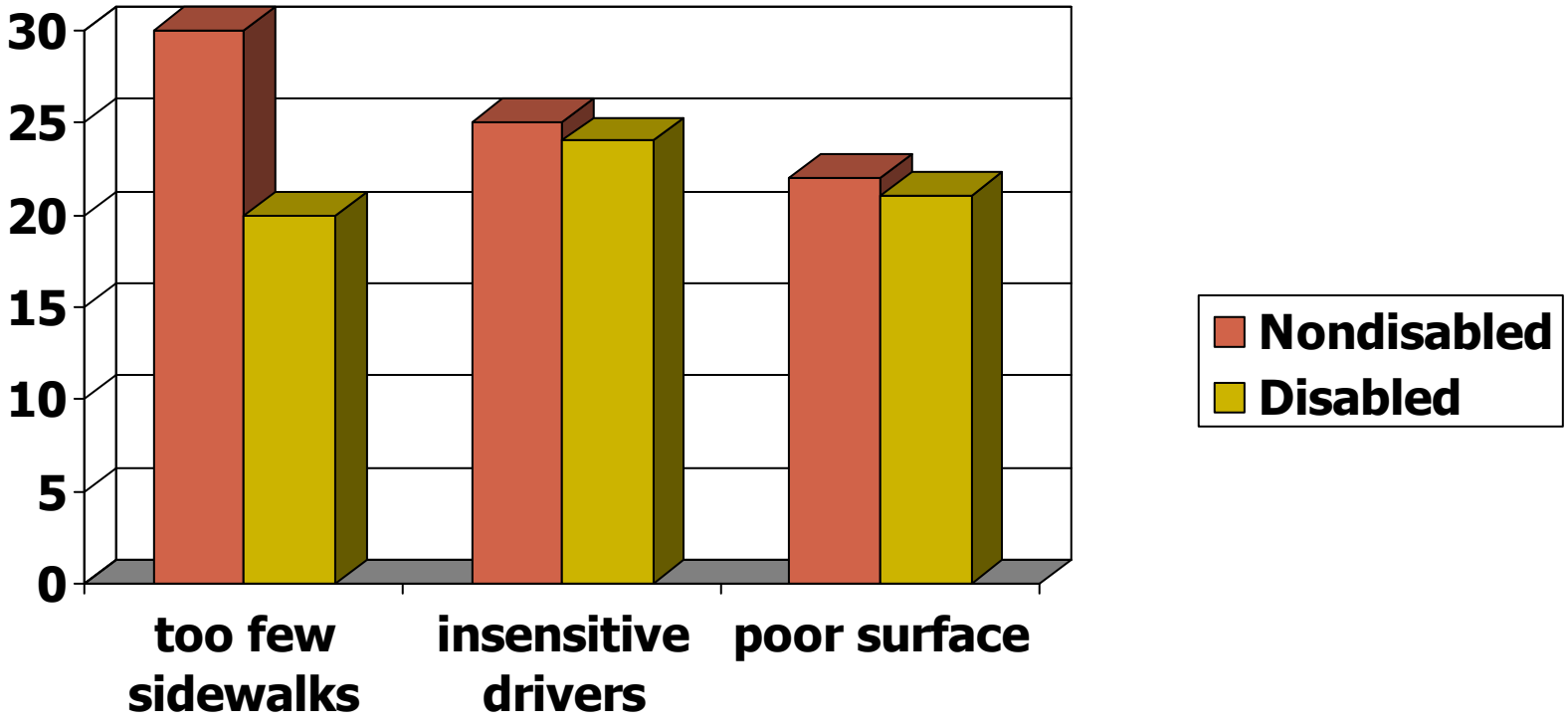


Courtesy of Complete Streets.org

Source: Natl. Survey of Ped & Bicyclist Attitudes & Behaviors, 2003 BTS

Top Pedestrian Complaints

Percent of peds experiencing problem

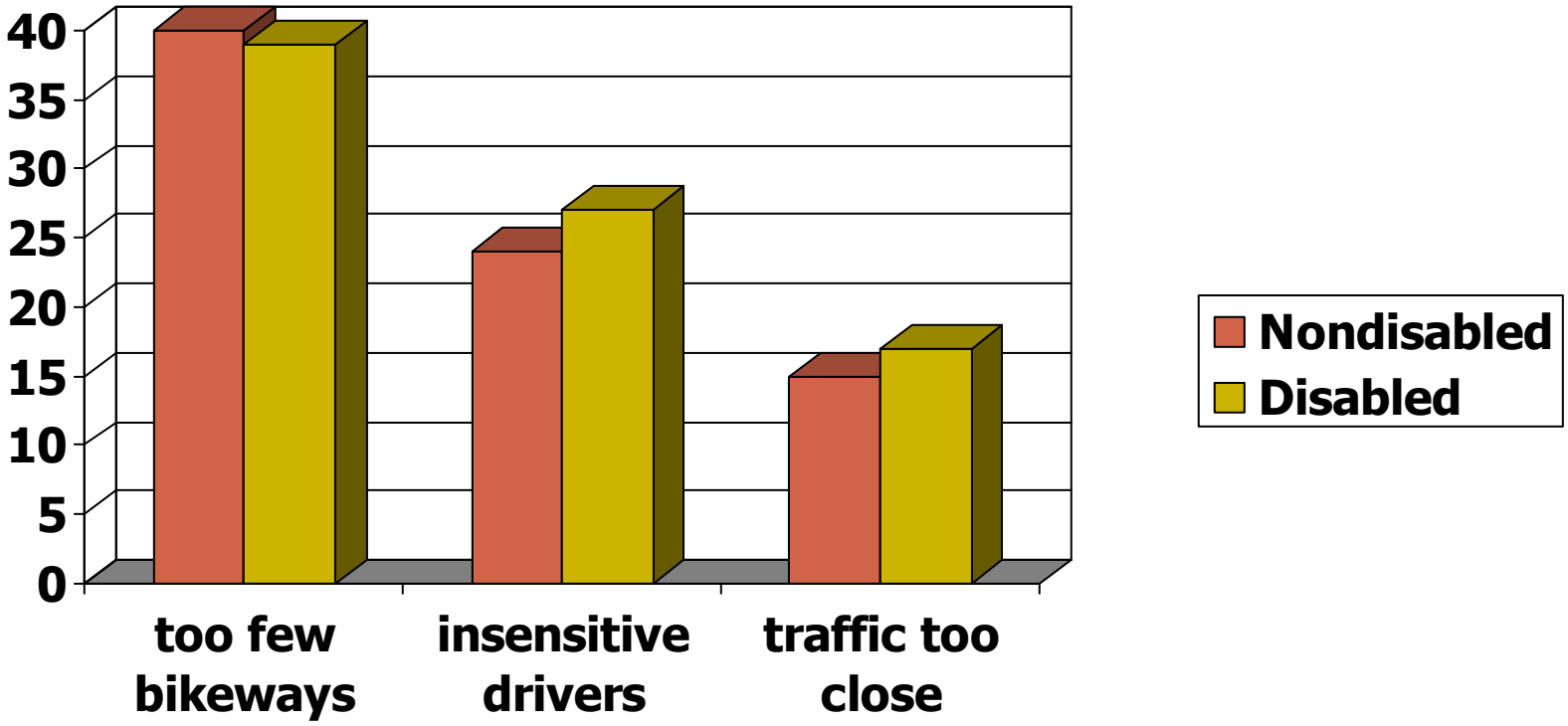


Courtesy of Complete Streets.org

2002 Natl. Transportation Availability & Use Survey

Top Bicyclist Complaints

Percent of cyclists experiencing problem

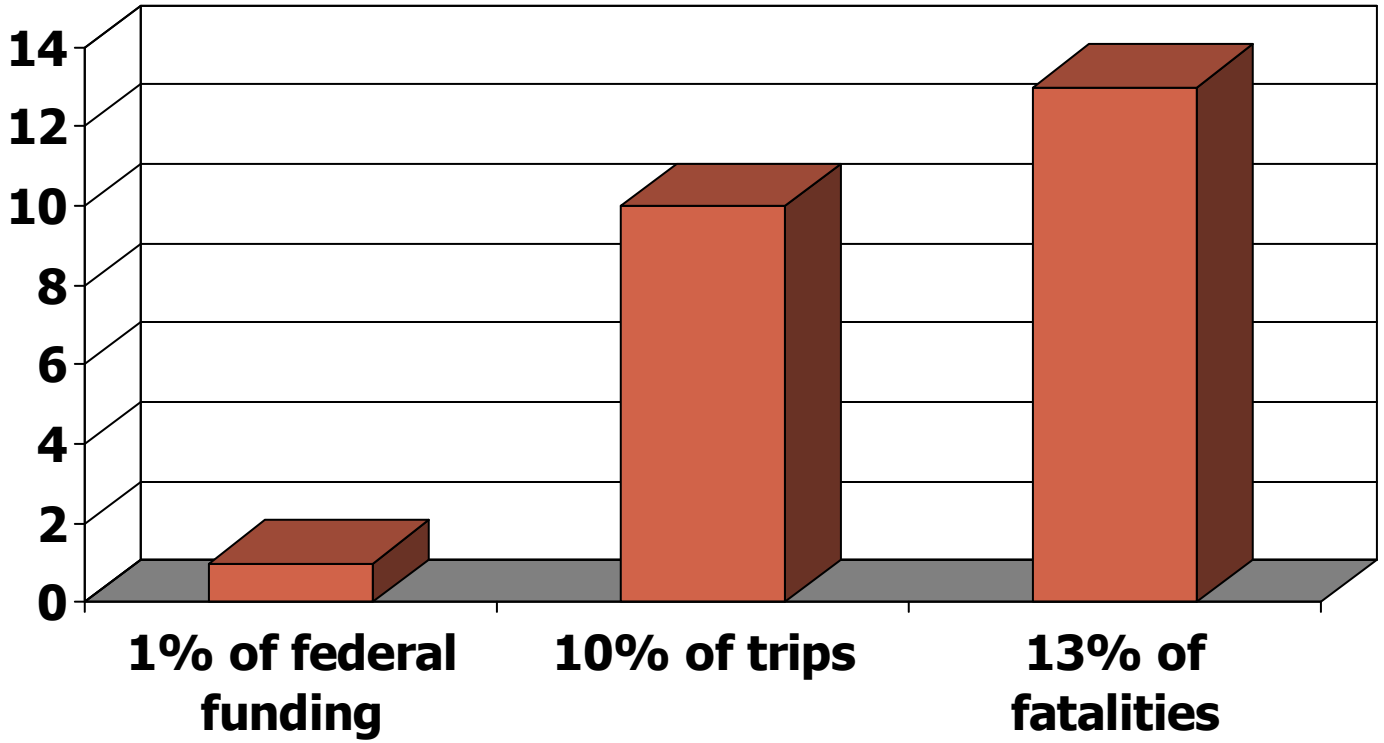


Courtesy of Complete Streets.org

2002 Natl. Transportation Availability & Use Survey

Safety Facts

Pedestrians and bicyclists…



Courtesy of Complete Streets.org

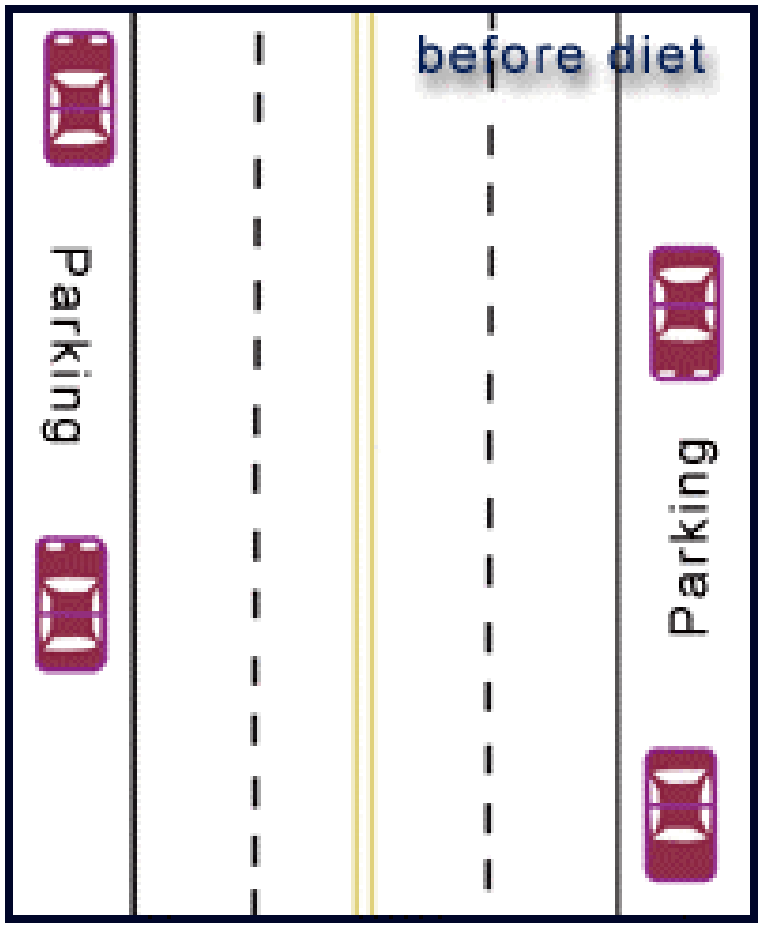
FMIS, NHTS, FARS federal databases

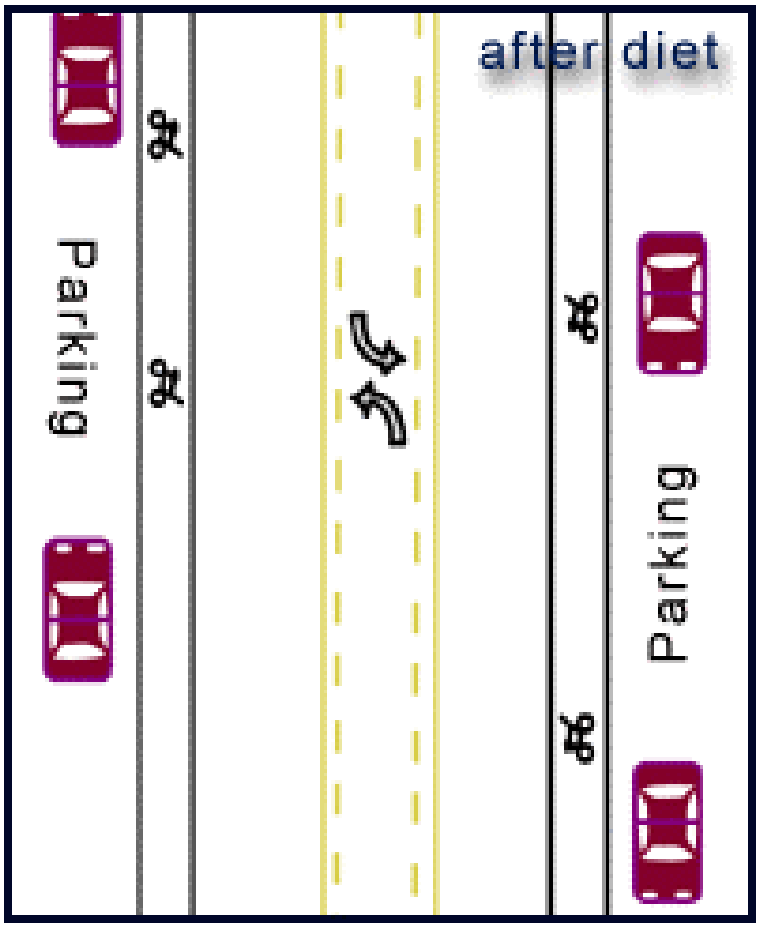
Why Road Diets?

Changes After Highway Widened from Two to Four Lanes (US-61 at Ft. Madison, Iowa)	
Corridor Element	Change
Traffic Volume	+ 4%
Corridor Travel Delay	+ 4%
Mid-Block 85th Percentile Speed	+ 2.5 mph
Traffic Exceeding Speed Limit More than 5 mph	From 0.5% to 4.2%
Accident Rate	+ 14%
Injury Rate	+ 88%
Total Value Loss	+ 280%

Courtesy of Thomas Welch, Director, Office of Transportation Safety, IDOT.

The Basic Road Diet Concept





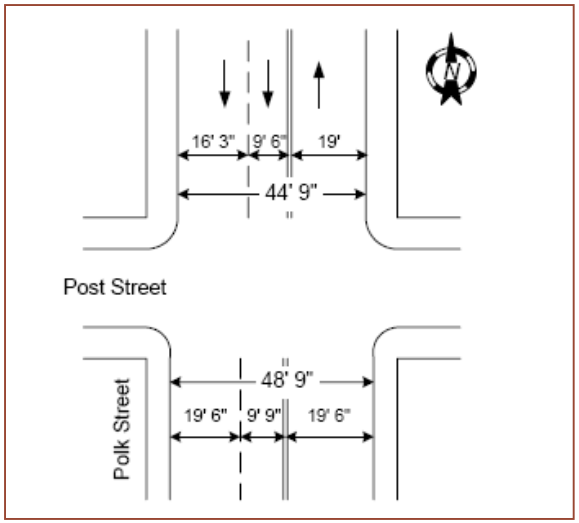
Road Diet Guidelines

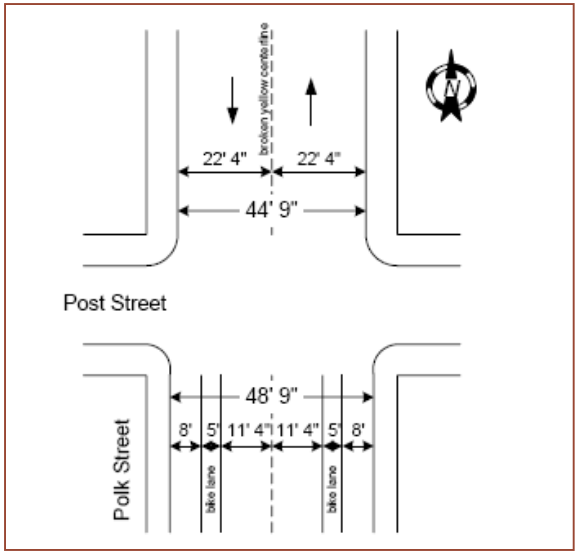
- Ideal candidate:
  - Four lane undivided roadway
  - 12,000 to 18,000 vehicles per day
- Other considerations:
  - Roads with safety issues
  - Transit corridors
  - Essential bicycle routes/links
  - Commercial reinvestment areas
  - Economic enterprise zones
  - Historic streets
  - Scenic roads
  - Entertainment districts
  - Main streets

Courtesy of Dan Burden

Reclaiming the Space

- Bike lanes
- Center turn lanes (medians)
- Pedestrian refuge
- Wider sidewalks
- Landscaping
- On-street parking





Before and After Examples

Fourth Plain Boulevard, Vancouver, WA.

17,000 ADT, Completed in 2002

Courtesy of Jennifer Rosales and Todd Boulanger.

Before and After Examples
Fourth Plain Boulevard, Vancouver, WA.

- 52% reduction in crashes
- 18% reduction in speed
- No traffic diversion

Courtesy of Jennifer Rosales and Todd Boulanger.

Before and After Examples
Baxter Street, Athens, GA.

- 20,000 ADT
- 53-60% reduction in crashes
- Reduction in speed
- 4% traffic diversion

Courtesy of Jennifer Rosales and David Clark.


Courtesy of Dan Burden

Courtesy of Dan Burden


Prospect, NJ
Courtesy of Dan Burden

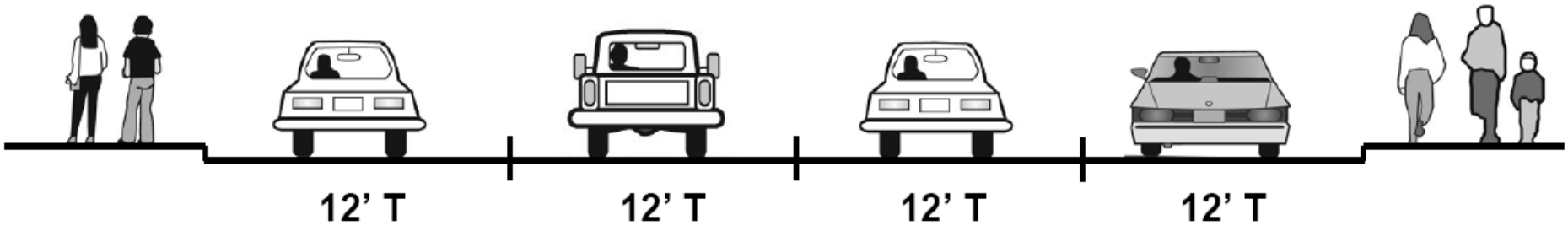
Euclid Avenue, Lexington, KY

(20,000 ADT)

Other Configurations

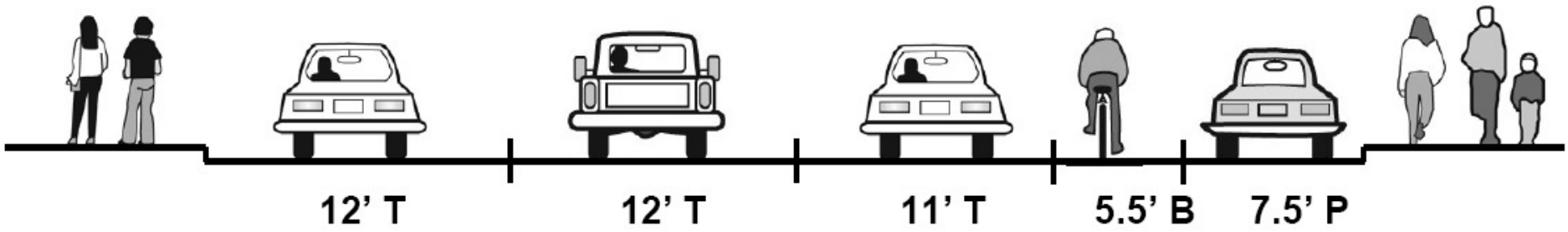
- Four lane to two lane + parking
- Five lane to four lane + raised median
- Five lane to four lane + bike lanes
- Lane reductions on one-way streets

Typical 4-Lane Section



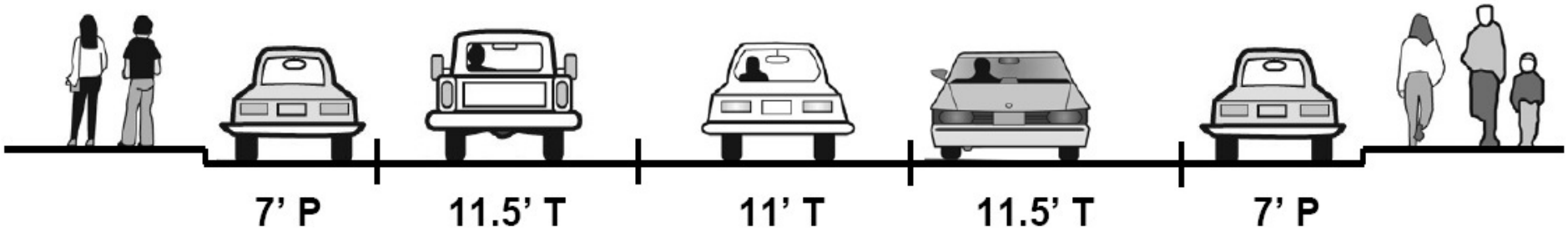
Courtesy of Michael Ronkin, Oregon DOT.

3-Lanes with Parking and Bike Lane on One Side



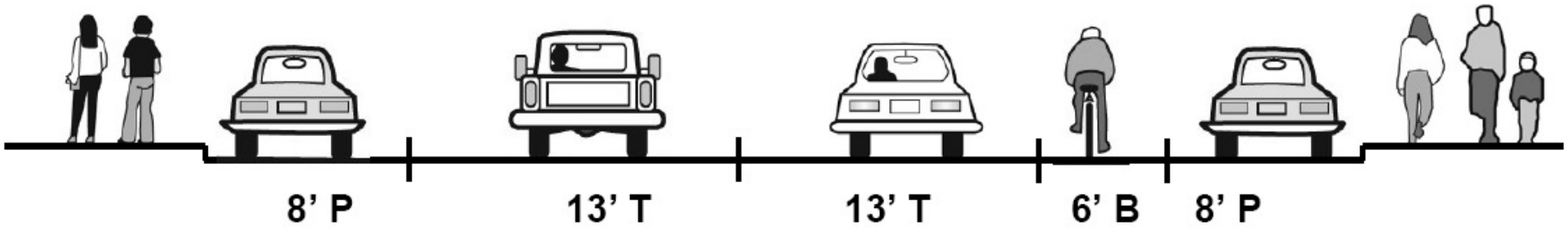
Courtesy of Michael Ronkin, Oregon DOT.

3-Lanes with Parking on Both Sides



Courtesy of Michael Ronkin, Oregon DOT.

2 Lanes with Parking on Both Sides and Bike Lane in One Direction



Courtesy of Michael Ronkin, Oregon DOT.

Lots of Potential Here

Courtesy of Michael Ronkin, Oregon DOT.

One-Way to Two-Way Conversion

Bicycle and Local Access Street

Bicycle and Local Access Streets emphasize bicycle mobility with dedicated bicycle lanes. These bicycle lanes form the primary bicycle commuter system, connecting with other bicycle facilities for comprehensive bicycle access downtown. Additionally these three lane streets are intended to provide automobile mobility within downtown, rather than automobile through-traffic. As the primary bicycle routes, the center turn lane and reduced parking create an excellent environment for bicycle travel while also providing ample eighteen-foot sidewalks. The center lane in this street type may allow dedicated left turns, occasional landscaped medians and/or mid-block turns into alleys and driveways. Alternatively, they can accommodate a biased street with three travel lanes (two lanes one way, one lane the other). Parking would be restricted along Third Street (recognizing it as the alignment for the Lance Armstrong Bikeway) but could be allowed along other streets as "duck in" parking within the eight-foot curbside zone of the sidewalk.

Proposed Bicycle and Local Access Streets include:

Third Street
Sixth Street (illustrated, with optional parking)
Eleventh Street (west of Guadalupe Street and east of San Jacinto Boulevard)
Eighteenth Street
Riverside Street
Henderson Street
Bowie Street
West Avenue (south from Sixth Street)
Nueces Street (with parking)
Trinity Street (with parking)

Transit service and accommodation on this street type to be coordinated with Capital Metropolitan Transportation Authority.

For dimensional geometrics of all other streetscape appurtenances, refer to streetscape elements and standards.

TRANSVERSE STREET SECTION
BICYCLE AND LOCAL ACCESS STREET

STREET PLAN
BICYCLE AND LOCAL ACCESS STREET

GREAT STREE
BICYCLE AND LOC

SINCLAIR BLACK & ASSOCIATES, INC.
ANDREW VERHOOFF, AIA

"Super Road Diets"

- Reducing lanes on streets with average daily volumes exceeding 20,000 vehicles per day
- Introduction of roundabouts

"Lane Diets"

- Reducing width of travel lanes to accommodate all users
- Not necessarily associated with lane elimination
- Typical dimensions:
  - Travel lanes: 10-11'
  - Turn lanes: 9-10'

"Lane Diets" – Effect on Speed

- 1994 Highway Capacity Manual:
  - 1.9 mph reduction from a 12-foot lane to an 11-foot lane
  - 6.6 mph reduction from a 12-foot lane to a 10-foot lane

*These values are not reported in the 2000 HCM because of a change in analytical methodology

"Lane Diets" – Effect on Speed

- Design Factors That Affect Driver Speed on Suburban Arterials (Fitzpatrick et al. 2000)
  - Reduction of 2.9 mph per foot of lane width reduced
  - Affected by the presence or absence of a median treatment
  - Secondary to posted speed limits:

    "When all variables are considered (including lane width), the only significant variable for straight sections was posted speed limit."
  - Decreases in speed associated with increases in access point density

Benefits

- Safety
- Improved Mobility
- Improved Emergency Access
- Accommodating the Elderly and Disabled
- Improved Health
- Air Quality

Effects on Safety

- NCHRP Report 395 " Capacity and Operational Effects of Mid-Block Left Turn Lanes"
  - Undivided section has significantly higher crash frequency than two-way left turn lane or raised curb median when parallel parking exists
  - Without parallel parking difference is negligible under 25,000 ADT
  - Parallel parking tends to increase crash frequency by 80 to 90 percent

Before and After Crash Data

City	Number of Crashes (Road Diets)	Number of Crashes (Comparison Sites)
Bellevue, WA	134	307
Mountain View, CA	20	134
Oakland, CA	443	2,067
San Francisco, CA	450	1,339
Seattle, WA	969	4,485
Sunnyvale, CA	52	224
Total	2,068	8,556
Based on study of 12 road diet study segments and 25 comparison segments.		

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

	Road Diets Before and After	Comparison Sites Before and After	Before Period (Road Diets vs. Comp. Sites)	After Period (Road Diets vs. Comp. Sites)
Crash Frequency	Reduction in After Period	No Change	No Difference	Rod Diets Lower
Crash Rates	No Change	No Change	Road Diets Lower	Road Diets Lower
Crash Severity	No Change	No Change	No Difference	No Difference
Crash Type	No Change	No Change	-Road diets higher % of angle crashes - Road diets lower % of rear-end crashes	-Road diets higher % of angle crashes - Road diets lower % of rear-end crashes

Source: Summary Report: Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries
FHWA-HRT-04-082

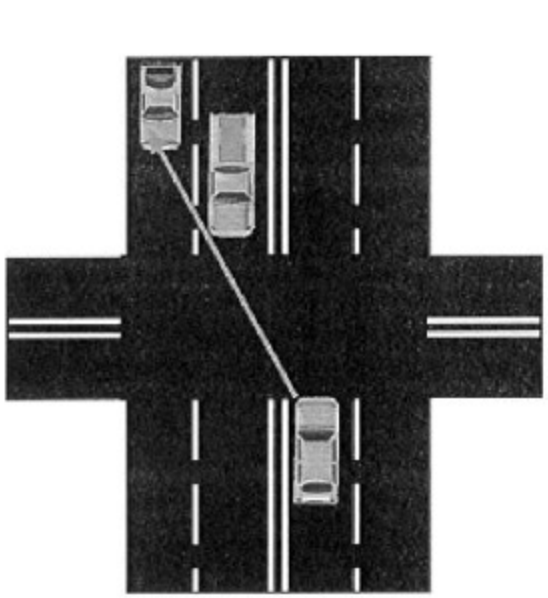
Seattle Conversions (4 to 3 Lane)

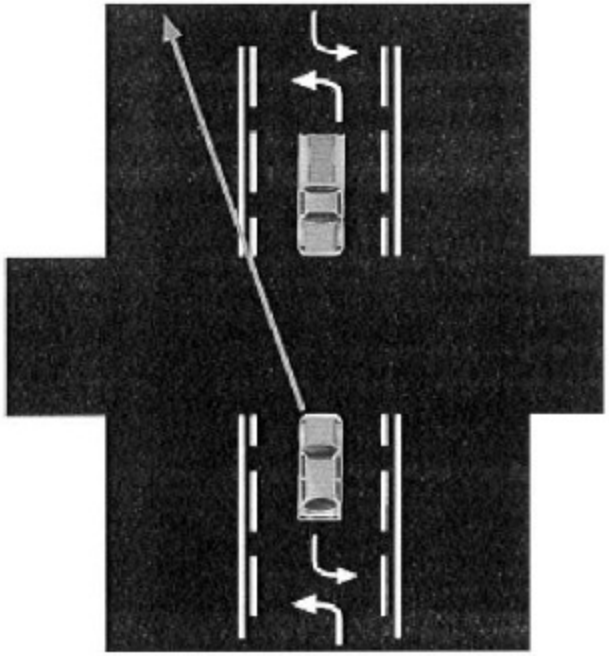
Roadway Location	Date Change	ADT Before	ADT After	Collision Reduction
Greenwood Ave N N 80th St to N 50th	Apr-95	11872	12427	24 to 10 58%
N 45th Street Wallingford Area	Dec-72	19421	20274	45 to 23 49%
8th Ave NW Ballard Area	Jan-94	10549	11858	18 to 7 61%
Martin Luther King Jr W North of I 90	Jan-94	12336	13161	15 to 6 60%
Dexter Ave N Queen Ann Area	Jun-91	13606	14949	19 to 16 59%
24th Ave NW NW 85th to NW 65th	Oct-95	9727	9754	14 to 10 28%

Courtesy of Dan Burden

Improved Sight Distance for Left Turns

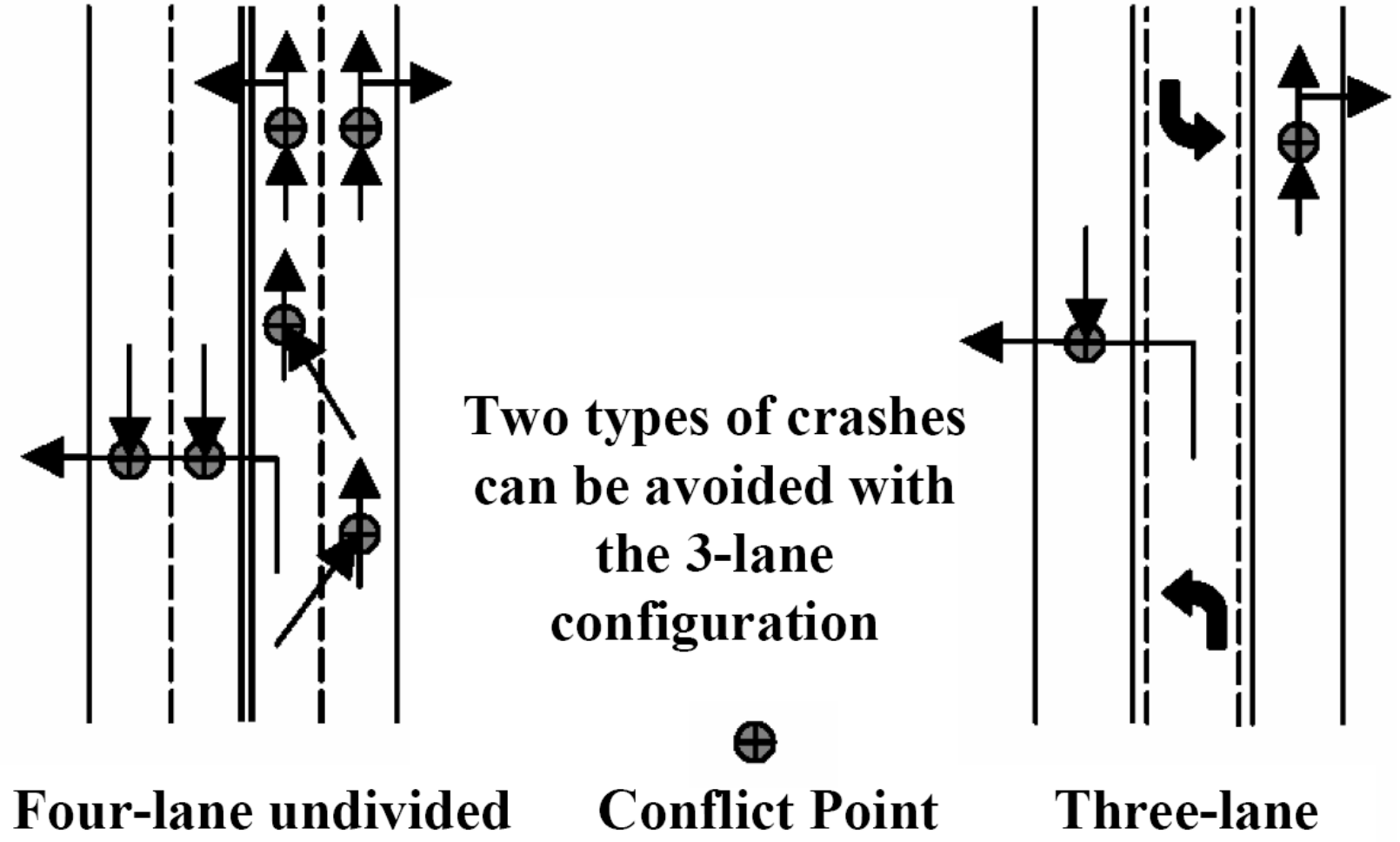
- Four lane – outside lane hidden by traffic
- Three lane – improved left turn sight lines





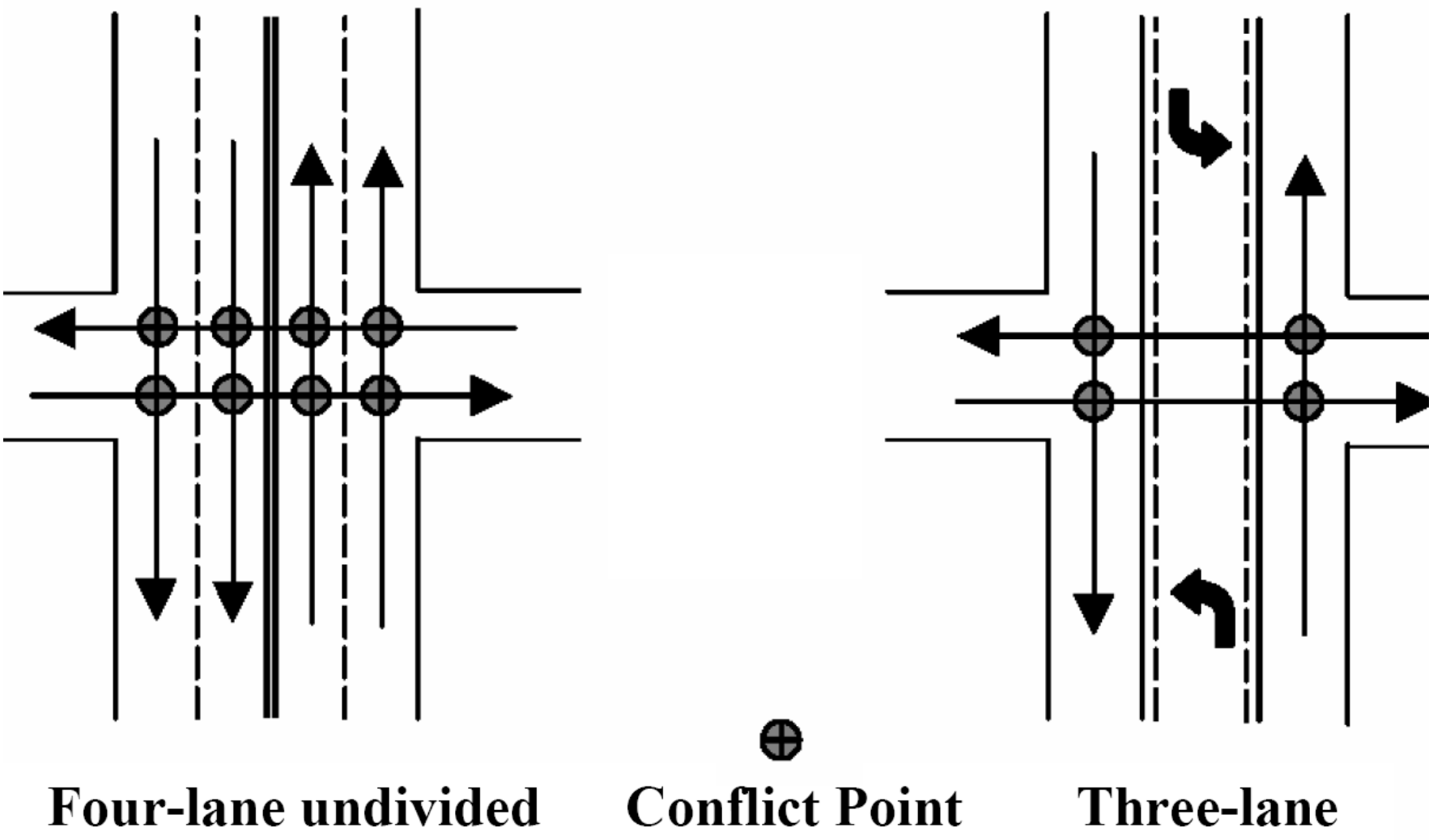
Courtesy of Thomas Welch, Director, Office of Transportation Safety, IDOT.

Fewer Mid-Block Conflicts



Courtesy of Michael Ronkin, Oregon DOT.

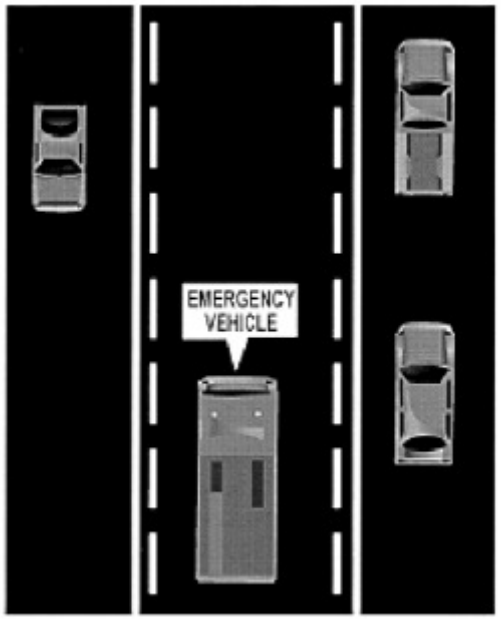
Fewer Intersection Conflicts

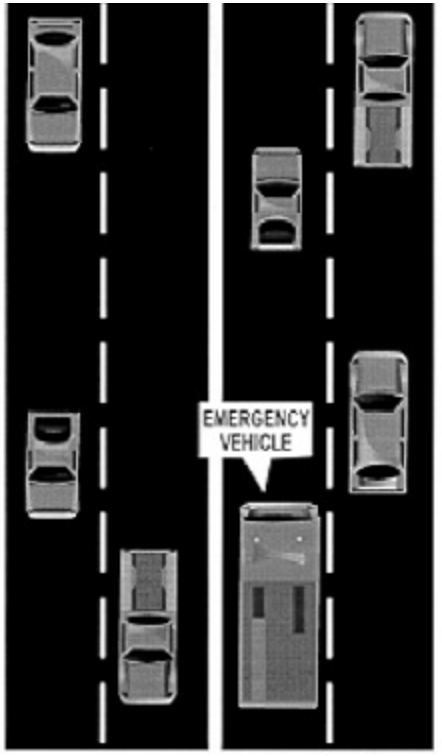


Courtesy of Michael Ronkin, Oregon DOT.

Emergency Vehicle Access

- Bypass congestion
- Space for vehicles to pull to side of the road





Courtesy of Thomas Welch, Director, Office of Transportation Safety, IDOT.

Pedestrian Benefits

- Reduces crossing distance
- Eliminate or reduce “multiple threat” crash types
- Allows refuge medians or crossing island to break a crossing into 2 simpler crossings
- Reduce travel speeds
- Increase sidewalk buffer from travel lanes (parking or bike lane)


Courtesy of
Michael Ronkin,
Oregon DOT
Old centerline
Reclaiming road space creates room for islands

Pedestrian Benefits

- FHWA Report *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations:*
  - Pedestrian crash risk reduced when pedestrians crossed two- and three-lane roads, compared to roads with four or more lanes

Other Benefits

- Easier to exit driveways (improved sight distance)
- Smaller curb return radius ("effective radius")
- Prolong pavement life
- Benefits transit (allows curbside stops outside of travel lane)
- Buffers street trees

Courtesy of Michael Ronkin, Oregon DOT.

Effects on Traffic Capacity

- Most studies show little or no change in traffic volumes after road diets
- Change in capacity depends on:
  - Percentage of left turns at mid-block locations
  - Lane configuration and signal phasing at intersections
  - Driveway density
- Roundabouts as part of road diet can increase intersection capacity

Effects on Traffic Capacity

Cross Section	Total Corridor Travel Delay	Average Travel Speed	Level of Service
Four lane undivided	20.5 secs	16.0 mph	C
Three lane alternative	29.4 secs	14.3 mph	C
Five lane alternative	15.8 secs.	17.1 mph	C

Example from US Highway 75, 1st Street to North 4th Street, Sioux Center, Iowa.

Courtesy of Thomas Welch, Director, Office of Transportation Safety, IDOT.

The Complete Streets Concept

- National movement intended to create policy
  - Policy ensures that the entire right of way is routinely designed and operated to enable safe access for all users
- Federal guidance:
  - 2000 FHWA Guidance: “Bicycling and walking facilities will be incorporated into all transportation projects unless exceptional circumstances exist.”

Contents of a Complete Streets Policy

- Apply to all phases of all projects
- Direct use of the latest and best design standards
- Allow flexibility in balancing user needs
- Specify any exceptions & require high-level approval of them

Example Complete Streets Policies

	State	County	MPO	City
Public: legislation, ordinance, resolution	OR, FL, RI, NC, SC, MA	DuPage, Il. Sacramento, CA San Diego CA Jackson, MI	Columbus, OH Bay Area, CA	Columbia, MO Sacramento, CA Spartanburg, SC
Internal: Policy, plans, manuals	TN, CA, KY, VA, PA, MA		Cleveland, OH Bay Area, CA Knoxville, TN Gulf Coast, FL Austin, TX	Chicago, Charlotte, NC Boulder, CO Santa Barbara San Diego Ft. Collins, CO W. Palm Beach, FL

Resources

- The Road Diet Handbook: Setting Trends for Livable Streets, Parsons Brinkerhoff
- http://www.fhwa.dot.gov/environment/bikeped/design.htm
- www.completestreets.org
- Effects of Urban Street Environment on Operating Speeds, FHWA, November 2007
- Road Diets - Fixing the Big Roads, Dan Burden and Peter Lagerwey
- Victoria Transport Policy Institute, www.vtpi.org
- Capacity and Operational Effects of Midblock Left Turn Lanes, NCHRP Report 365, TRB
- Recent Geometric Design Research for Improved Safety and Operations, NCHRP Synthesis 299, TRB
- Highway Safety Information System: Evaluation of Lane Reduction “Road Diet” Measures and Their Effects on Crashes and Injuries, FHWA