Practical Implementation Strategies

Real World Planning and Design for Active Transportation

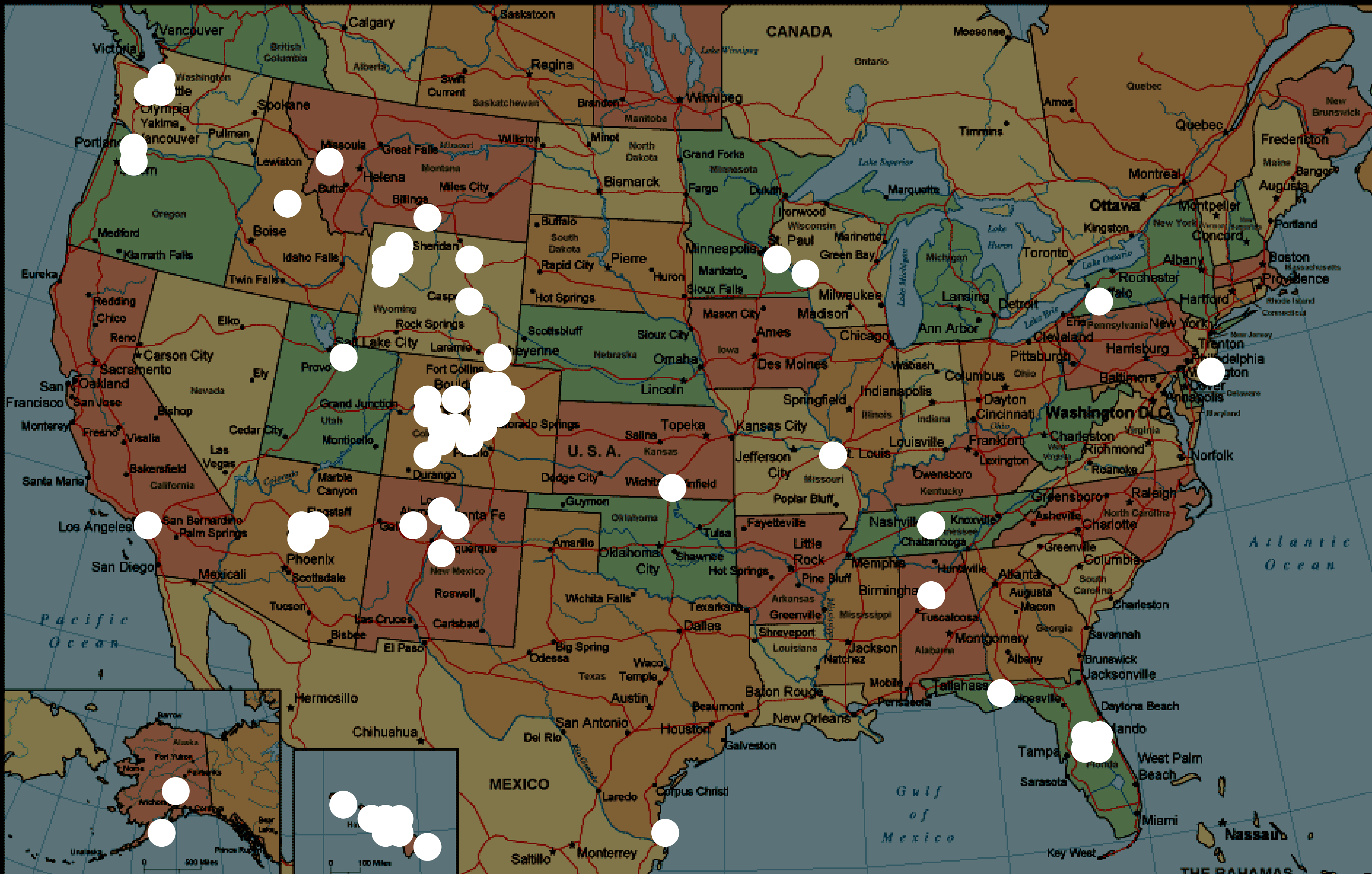
Oultine

- Introduction
- Real World Tactics
  - ✓ Pedestrian Environments
  - ✓ Bicycling & Non-Motorized Systems
- An “Intermodal” Example

Introduction

Practical Implementation Strategies

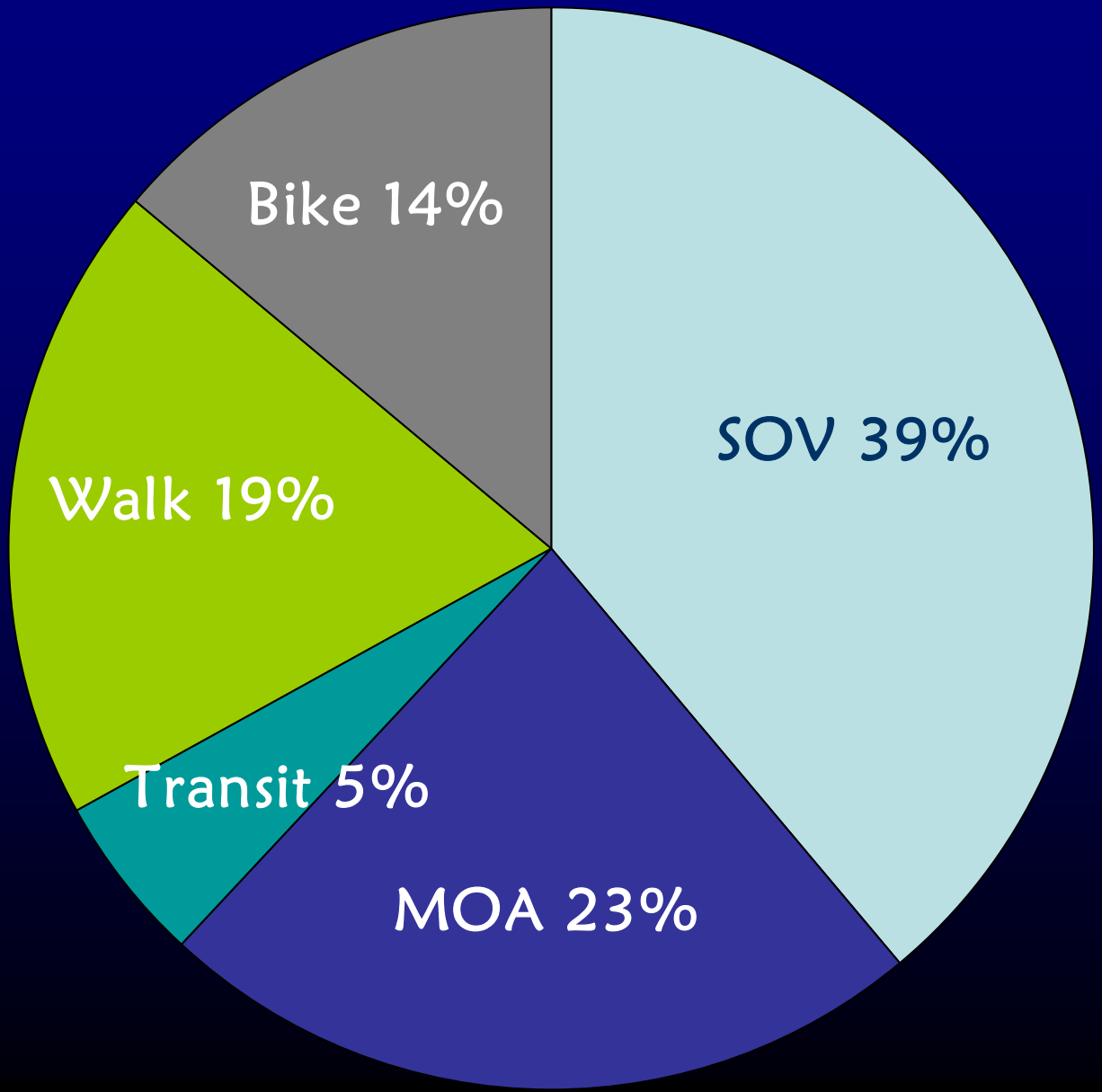
Our Work



CANADA
Calgary
Saskatoon
Regina
Winnipeg
Moosonee
Ontario
Quebec
Vancouver
Victoria
British Columbia
Alberta
Swift Current
Saskatchewan
Brandon
Manitoba
Lake Winnipeg
Amos
Timmins
Montreal
Ottawa
Fredericton
New Brunswick
Spokane
Olympia
Yakima
Pullman
Portland
Lewiston
Missoula
Great Falls
Montana
Helena
Butte
Miles City
Billings
Williston
Minot
North Dakota
Bismarck
Grand Forks
Minnesota
Fargo
Duluth
Lake Superior
Marquette
Oregon
Medford
Klamath Falls
Boise
Idaho Falls
Twin Falls
Eureka
Sheridan
Buffalo
South Dakota
Rapid City
Pierre
Huron
Minneapolis
St. Paul
Mankato
Sioux Falls
Ironwood
Wisconsin
Marinette
Green Bay
Michigan
Lake Huron
Toronto
Kingston
Montpelier
Concord
Maine
Bangor
Augusta
Portland
Boston
Albany
Rochester
Providence
Hartford
Lake Ontario
Redding
Chico
Reno
Elko
Wyoming
Rock Springs
Hot Springs
Milwaukee
Madison
Lansing
Detroit
Ann Arbor
Lake Michigan
Lake Erie
Erie
Cleveland
Pennsylvania
New York
Trenton
Carson City
Sacramento
Oakland
San Francisco
San Jose
Nevada
Salt Lake City
Provo
Laramie
Fort Collins
Scottsbluff
Nebraska
Sioux City
Omaha
Lincoln
Mason City
Ames
Iowa
Des Moines
Chicago
Wabash
Columbus
Ohio
Pittsburgh
Harrisburg
Baltimore
Dover
Annapolis
Delaware
Maryland
Washington D.C.
Monterey
Fresno
Visalia
Bishop
Ely
Cedar City
Utah
Grand Junction
Monticello
Colorado Springs
Pueblo
Durango
U. S. A.
Topeka
Salina
Kansas
Kansas City
Springfield
Indianapolis
Illinois
Indiana
Dayton
Cincinnati
Charleston
Virginia
Richmond
Norfolk
Las Vegas
Bakersfield
California
Santa Maria
Marble Canyon
Flagstaff
Dodge City
Wichita
Jefferson City
Missouri
Louisville
Frankfort
Lexington
Owensboro
Kentucky
Roanoke
Greensboro
Raleigh
Guymon
Oklahoma
Tulsa
Poplar Bluff
Fayetteville
Nashville
Knoxville
Asheville
North Carolina
Charlotte
Los Angeles
San Bernardino
Palm Springs
Phoenix
Scottsdale
San Diego
Mexicali
Santa Fe
New Mexico
Roswell
Amarillo
Oklahoma City
Shawnee
Hot Springs
Little Rock
Memphis
Chattanooga
Greenville
Columbia
South Carolina
Huntsville
Atlanta
Birmingham
Augusta
Macon
Georgia
Tucson
Bisbee
Las Cruces
Carlsbad
El Paso
Wichita Falls
Texarkana
Pine Bluff
Arkansas
Greenville
Mississippi
Tuscaloosa
Alabama
Montgomery
Savannah
Charleston
Dallas
Shreveport
Louisiana
Jackson
Natchez
Albany
Brunswick
Jacksonville
Pacific Ocean
Atlantic Ocean
Big Spring
Odessa
Waco
Texas
Temple
Austin
Baton Rouge
Mobile
Pensacola
Tallahassee
Gainesville
Daytona Beach
Orlando
Hermosillo
Chihuahua
San Antonio
Beaumont
Houston
New Orleans
Galveston
Tampa
West Palm Beach
Sarasota
Florida
Del Rio
MEXICO
Laredo
Corpus Christi
Gulf of Mexico
Miami
Nassau
Key West
THE BAHAMAS
Saltillo
Monterrey
Alaska
Barrow
Fort Yukon
Fairbanks
Nome
Anchorage
Cordova
Bear Lake
Prince Rupert
Unalaska
500 Miles
500 Km
100 Miles
100 Km


Boulder

Boulder Resident Mode Shares



2003


West Maui


Redmond

Flagstaff

Grand Teton


Aspen

Denver LoDo

Orlando

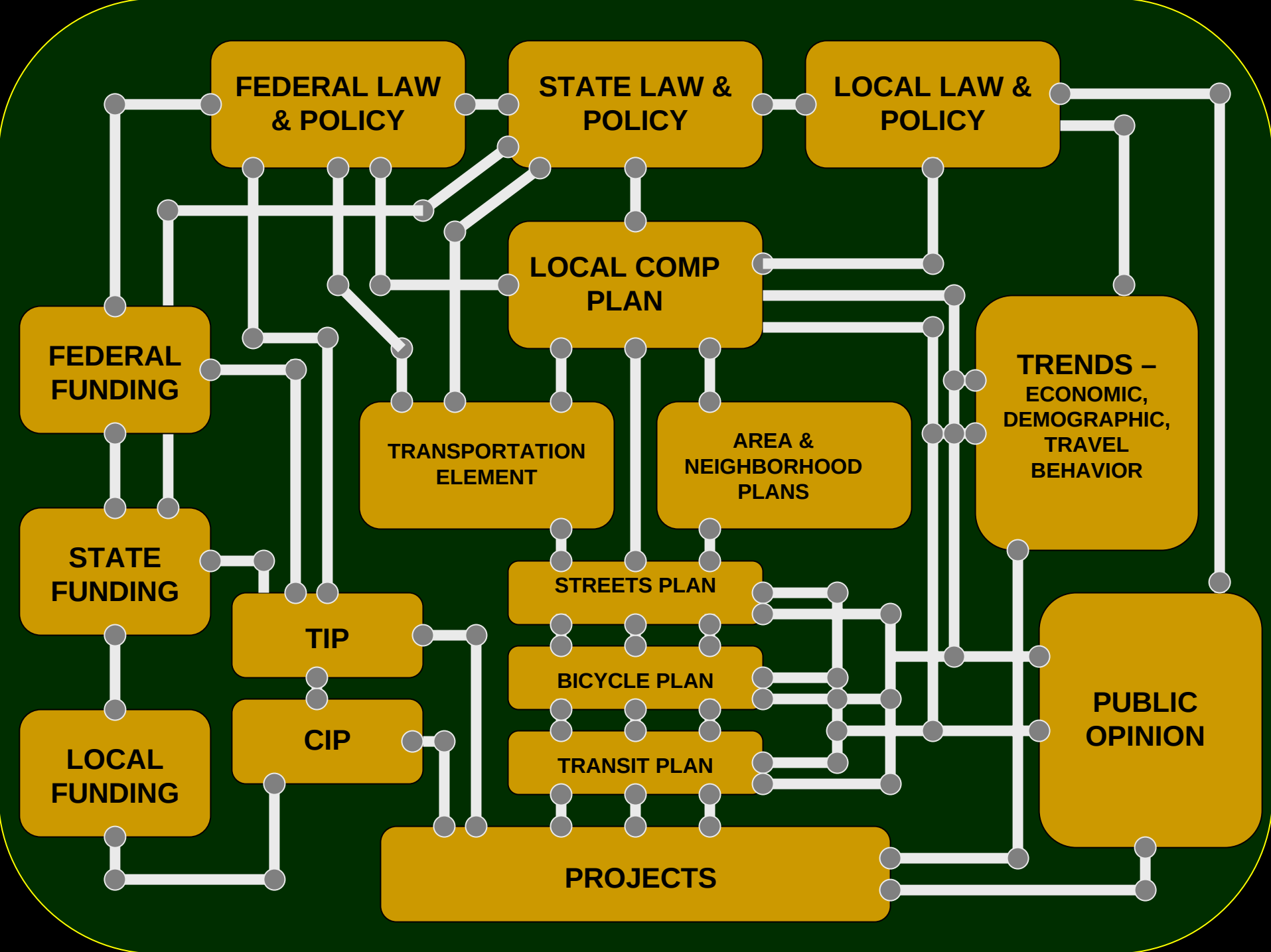
Denver

Houston

Portland

Boulder

Institutional Setting


FEDERAL LAW & POLICY
STATE LAW & POLICY
LOCAL LAW & POLICY
LOCAL COMP PLAN
FEDERAL FUNDING
STATE FUNDING
LOCAL FUNDING
TRANSPORTATION ELEMENT
AREA & NEIGHBORHOOD PLANS
TRENDS – ECONOMIC, DEMOGRAPHIC, TRAVEL BEHAVIOR
STREETS PLAN
BICYCLE PLAN
TRANSIT PLAN
TIP
CIP
PUBLIC OPINION
PROJECTS

3 Popular Planning Myths

...and how to dispel them

We don't have time to do it right.

(But we will have time to do it over.)

We need to finish this plan once and for all.

Planning Myths

Planning is iterative…

…it is never finished or complete.

Never start planning or design until you know for sure you have the money to build the project.

Planning Myths

Money comes to plans…

…much faster than plans come to money.

next...

Real World Tactics

Practical Implementation Strategies

Pedestrians:

- 2-4 mph speeds
- 0.25-mile avg. trip distance
- ADA and local guidelines

Bicyclists:

- 5-30 mph speeds
- 2.5-mile avg. trip distance
- AASHTO facility guidelines

Real World Tactics

- Pedestrian Environments
- Bicycle & Non-Motorized Networks


Skechers

Pedestrian Environments

Practical Implementation Strategies

Pedestrian Environments

- What are pedestrians?
- Types of pedestrians
- Types of pedestrian environments
- Setting clear priorities
- Distinguishing urban from suburban design
- Understanding the crossings challenge
- Safe routes to school

Types of Walking

Types of Walking

- Rambling
- Utilitarian Walking
- Strolling, Lingering
- Promenading
- Special Events

Rambling


Rambling
Redmond


Rambling
Prospect

Upcountry Maui

Rambling


Prospect
Rambling

Prospect

Rambling

Utilitarian Walking

Utilitarian Walking

Utilitarian Walking


Upcountry Maui
Utilitarian Walking

Utilitarian Walking

Redmond

Strolling & Lingering


Boulder
Strolling, Lingering


Winter Park, FL
keybowl
MODA
Park Avenue
Ladies' Fine
Fashion
Apparel
Strolling, Lingering


Pukalani
R GALLON
ATER VENDING
REVERSE OSMOSIS
ES AVAILABLE IN HARDWARE STORE
E 878-VEND
PURIFIED WATER
35¢
Per Gallon
Reverse Osmosis
MONEY REMOVED NIGHTLY
Strolling, Lingering


Boulder
TIMBUKTU
STATION
FLEET FEET
Juanita's
MEXICAN FOOD
Jägermeister
VOTED BEST MEX FOOD in Boulder!
Strolling, Lingering

Promenade


Promenade
BOOKSTORE
Boulder

Special Events


Boulder
Special Events


Boulder
Special Events

Types of Pedestrian Environments

Pedestrian Environments

“Pedestrian Friendly”

Pedestrian Environment Continuum

Pedestrian Place/District

- Mixed use with retail
- Gathering place – identifiable as a PLACE
- Significant pedestrian presence
- Motor vehicles present, do not dominate
- Supportive transportation required (parking, transit, bike)

Honolulu/Waikiki

Pedestrian Place


Boulder
Pedestrian Place

La Spezia, Italy

Pedestrian Place


Winter Park, FL
SOLSTICE
Pedestrian Place


Miami Beach, FL
Pedestrian Place


Winter Park, FL
Pedestrian Place

Pedestrian Supportive

- Mixed use including residential
- May include gathering PLACES
- Pedestrians present at busy times
- Motor vehicles present, do not dominate


Redmond
Pedestrian Supportive


Mt. Vernon, IA
Pedestrian Supportive


Longmont
2:00 AM
TO 5:00 AM
2 HR
PARKING
8:00 AM
TO 6:00 PM
WEEKDAYS
Pedestrian Supportive


Berkeley
MIKI'S PAPER
Pedestrian Supportive

Kirkland, WA

Pedestrian Supportive


Boulder
1094
Pedestrian Supportive


Boulder
Pedestrian Supportive


Lanai
Goodies
Pedestrian Supportive

Pedestrian Supportive

Gold Hill

Pedestrian Tolerant

- All land uses except freeway & certain special uses (airport runway, garbage dump, etc.)
- Utilitarian walking & rambling only
- Motor vehicles present, may tend to dominate


Redmond
Pedestrian Tolerant


Longmont
Pedestrian Tolerant

Pedestrian Tolerant

Maui


Maui
Pedestrian Tolerant

Pedestrian Intolerant

- Any land use
- Little or no walking
- Motor vehicles dominate
- Unsafe, unpleasant


Longmont
MARTIN ST
ICE
Pedestrian Intolerant


Longmont
Pedestrian Intolerant


Maui
DEAD END
SLOW
Pedestrian Intolerant


Anywhere, USA
STOP
Pedestrian Intolerant

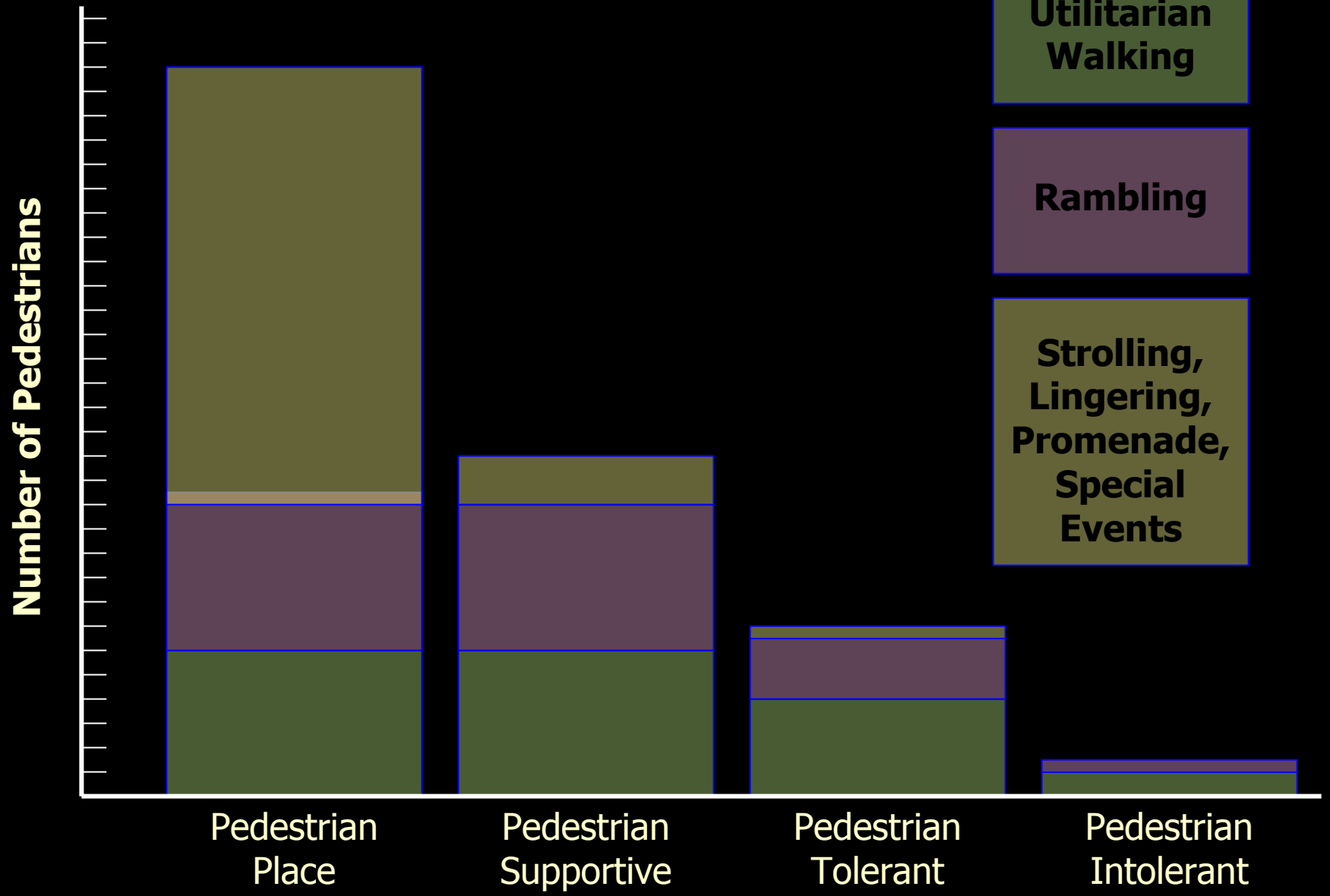

Maui
Pedestrian Intolerant


Hawaii Island
MILE
1
4
AHEAD
Pedestrian Intolerant

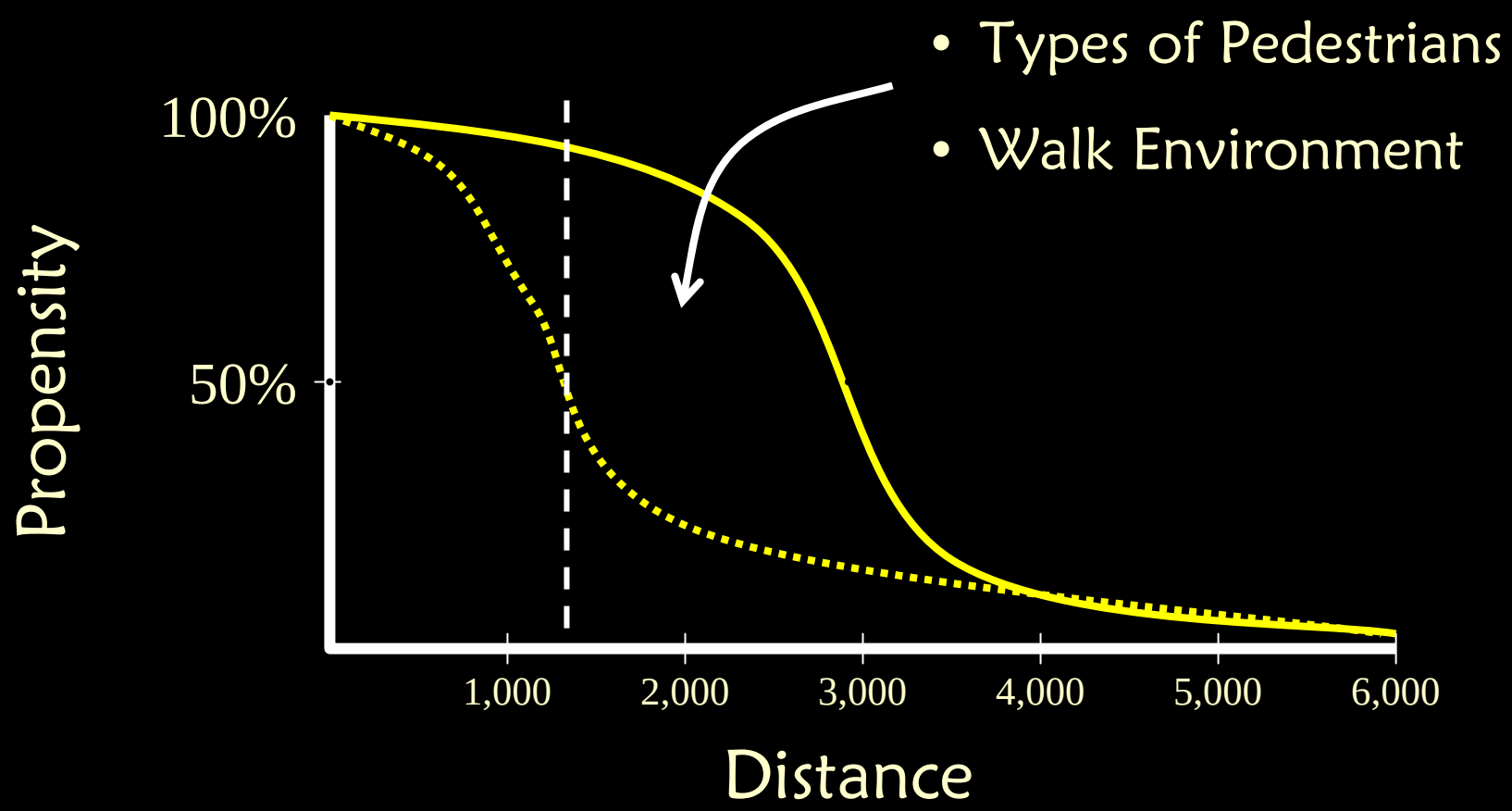

Flagstaff, AZ
KING
DRIVE
UNIVERSITY
ONLY
ONLY
Pedestrian Tolerant

Pedestrian Intolerant

Walk Environments and Types of Walking



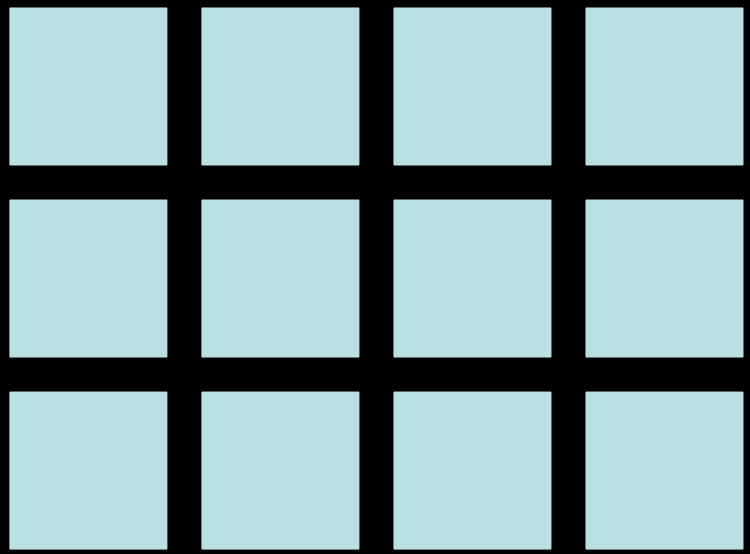
Pedestrian Walk Distance



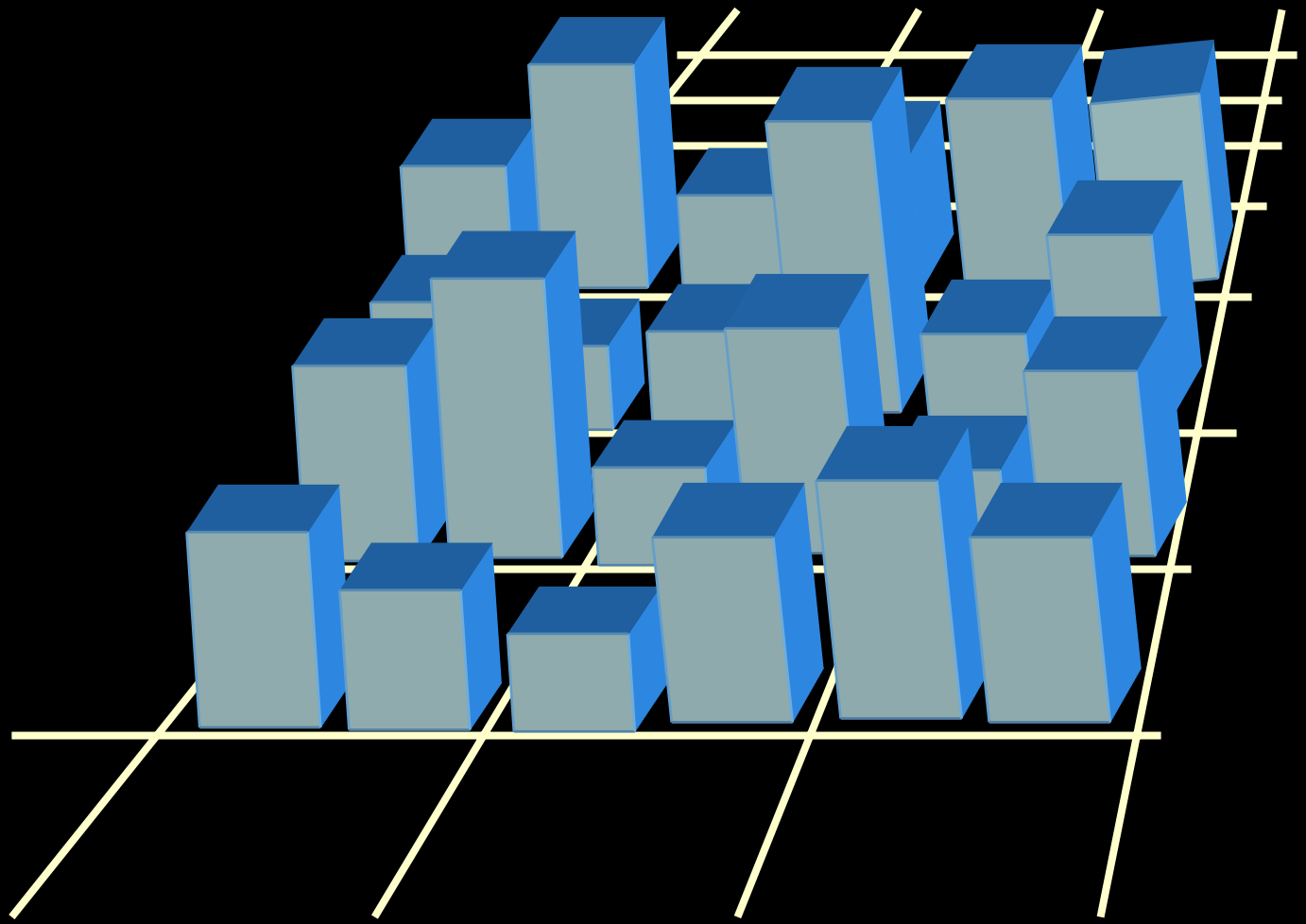
Additional Factors: "Pedestrian Oriented"

- Street design & space allocation
- Proportion of street room
- Character of street wall
- Traffic buffering
- Connectivity
- Weather protection: sun, rain
- Land use mix

Pedestrian Networks



The ideal pedestrian “grain” is 250’ to 350’




Boulder

Practical Pedestrian Strategies

- Adopt "complete streets" design standards
  - Private development
  - Public works projects (context sensitive)
- Apply concurrency/adequate public facility requirements to development projects
- Designate "safe routes to school"
- Focus public investment in high priority pedestrian districts and school routes
- Get serious about maintenance

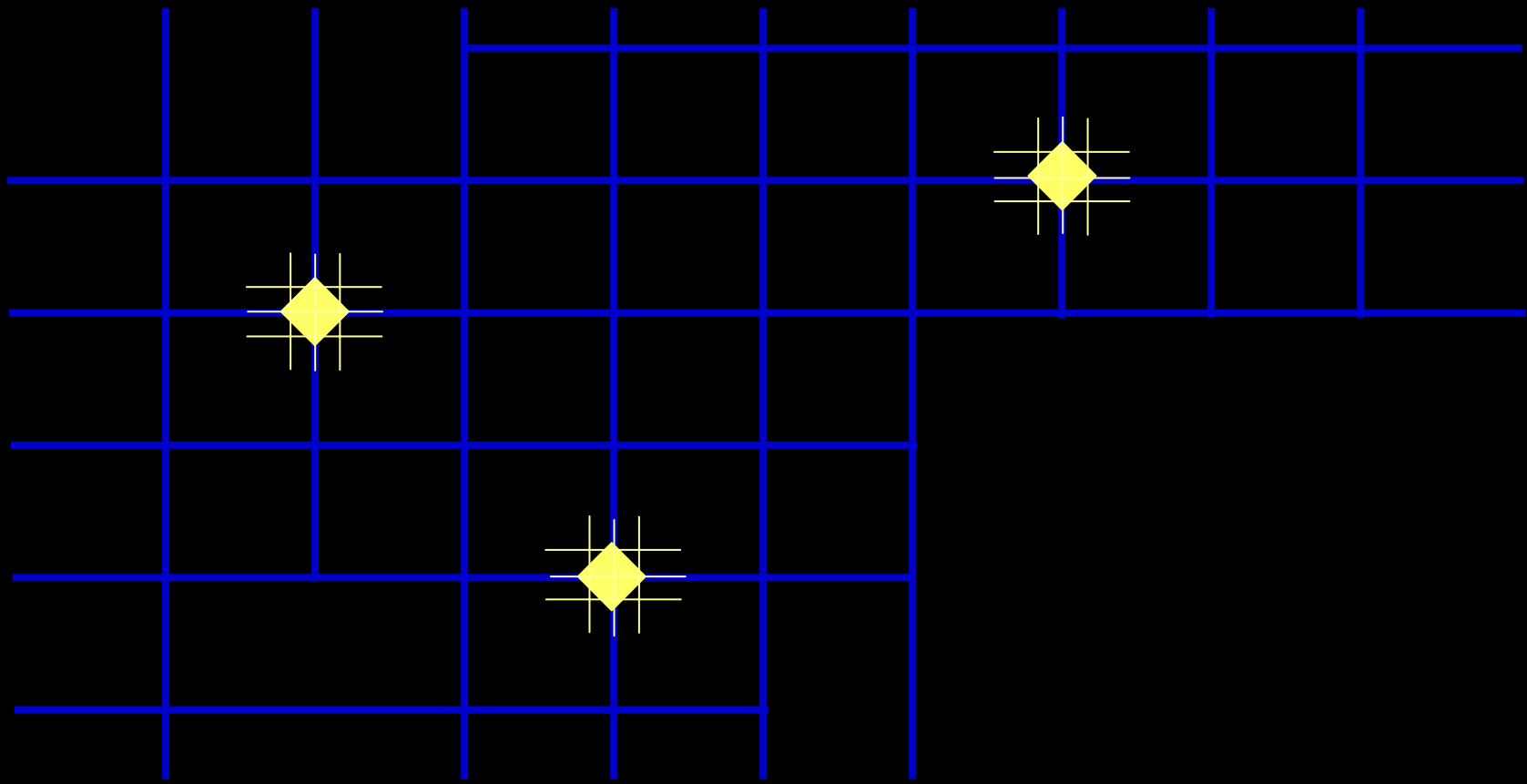
Setting Priorities

Practical Implementation Strategies

Boulder


Boulder

Real-World Pedestrian Structure
(Nodes and Corridors)



Boulder


TIMBUKTU
STATION
Juanita's
MEXICAN
FOOD
Jägermeister
VOTED
BEST MEX
Food in
Boulder!

Winter Park

Getting Serious About Maintenance

Practical Implementation Strategies

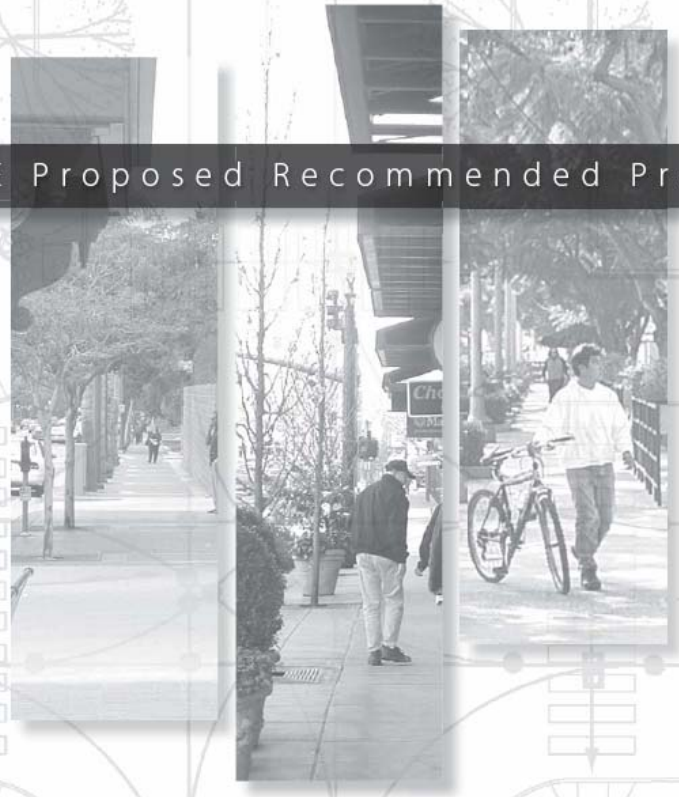
Pedestrian Maintenance

- Routine repair and rehabilitation
- Tree root toe trips
- Winter snow removal

Complete Streets – Design Standards

Practical Implementation Strategies

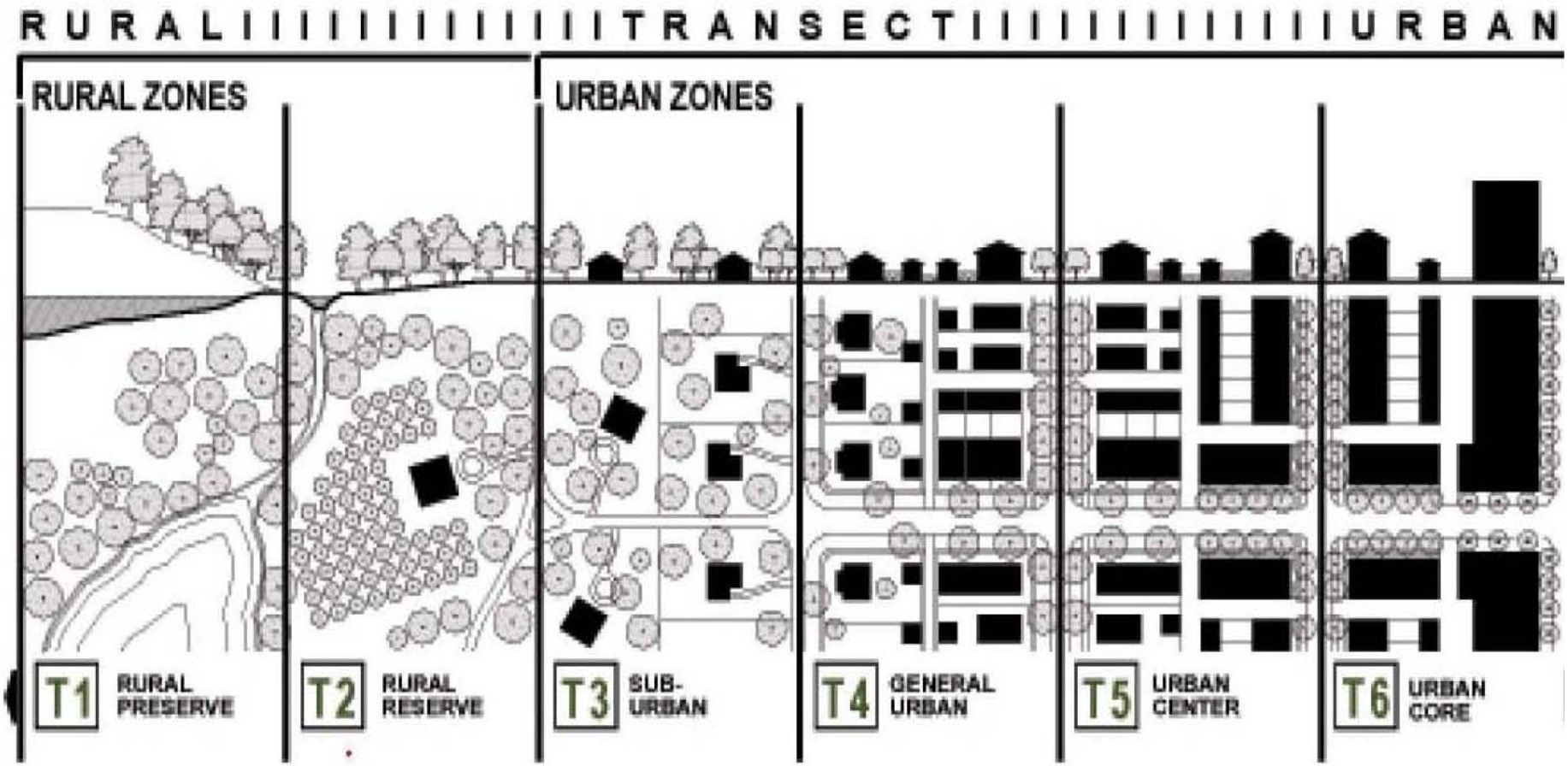
An ITE Proposed Recommended Practice

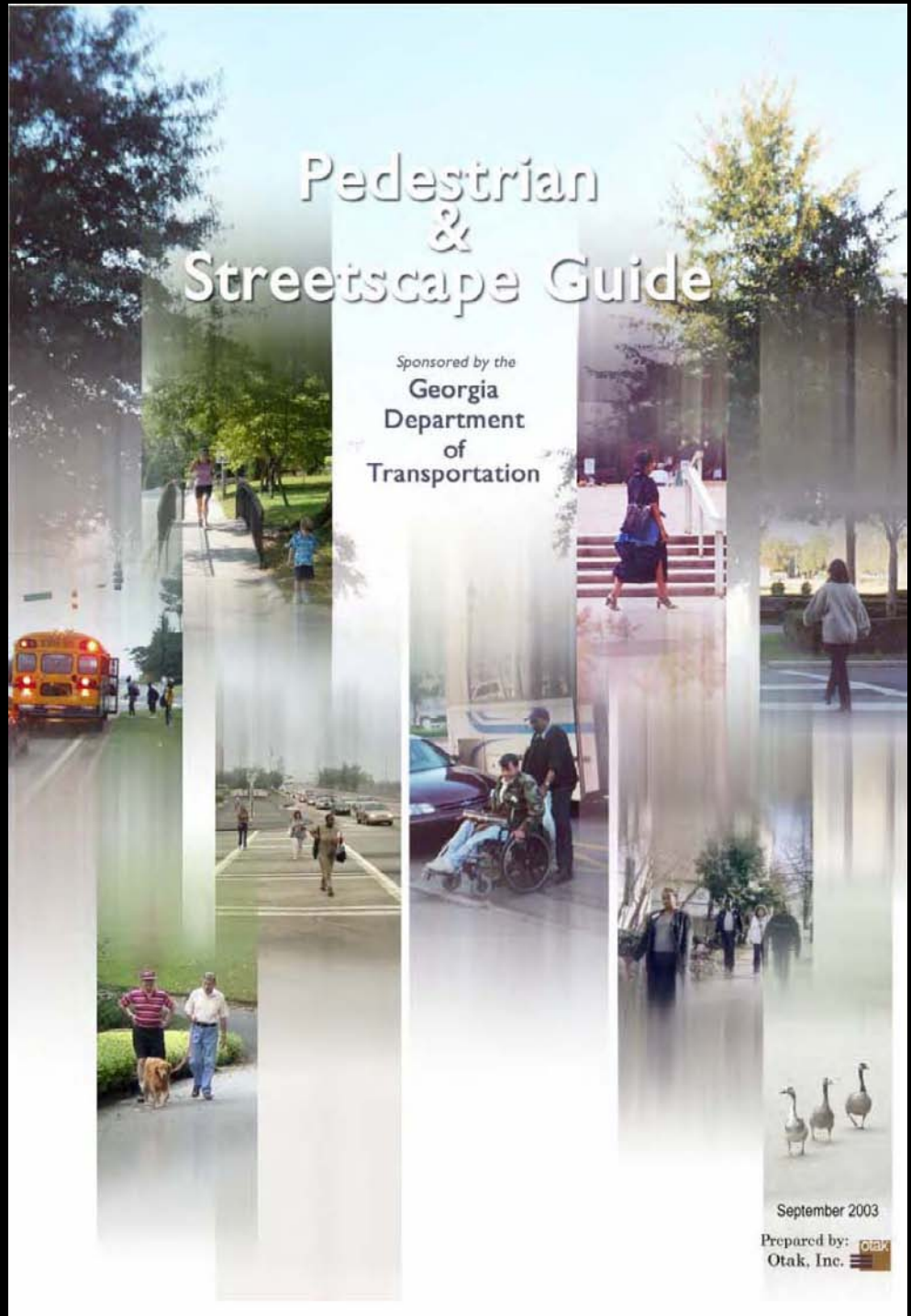


Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities

Institute of Transportation Engineers

Design Reflecting Context




Pedestrian
&
Streetscape Guide
Sponsored by the
Georgia
Department
of
Transportation
September 2003
Prepared by:
Otak, Inc.

Top 4 Pedestrian Design Issues

1. Continuous sidewalks – both sides of street
2. Street crossings
    - Shorten crossings
    - Slow traffic
3. Need for urban sidewalk standards
4. Angled curb ramps

1. Continuous Sidewalks

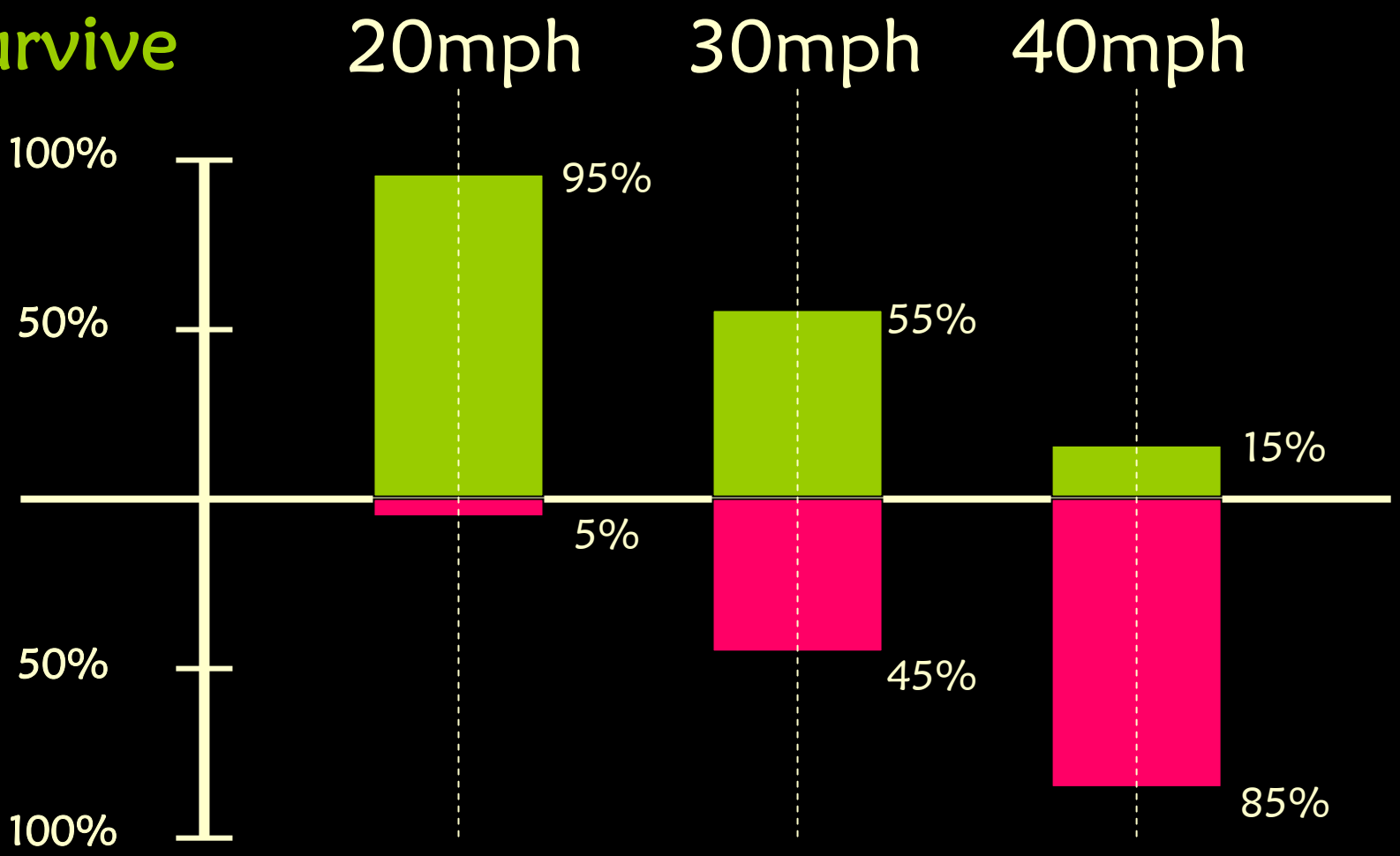
Sidewalks should be on both sides of the street and continuous

2. Street Crossings

Aurora


Aurora

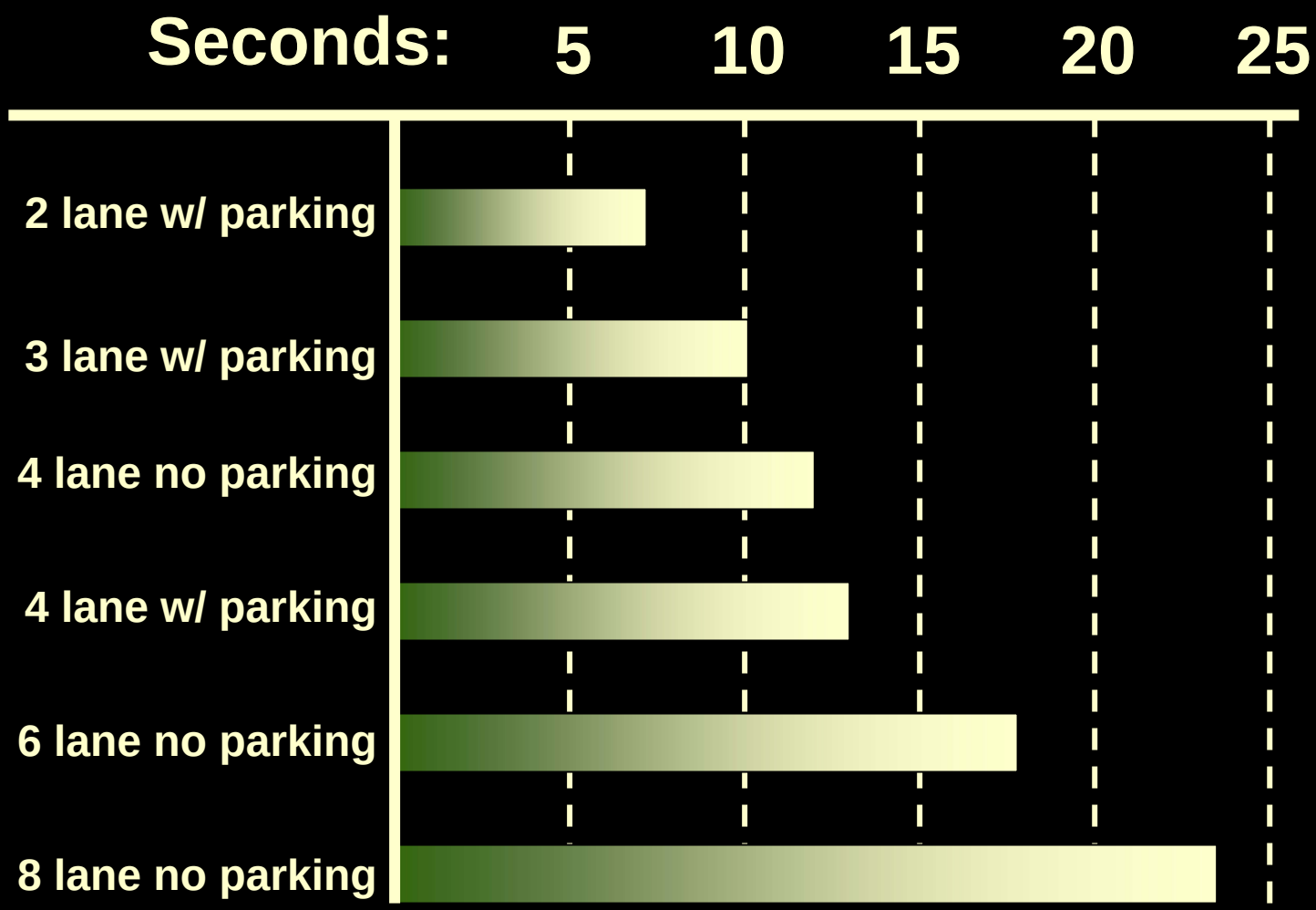
Pedestrian Survival Rates – Vehicle Speeds



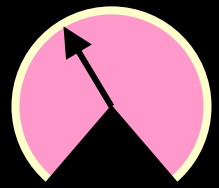
Driggs

Pedestrian Crossing Time

Curb Extensions: YES | **Lane Width: 12 ft** | **Walk Speed: 250 fpm**



Vehicle Approach Time



25 mph

Feet: 200 400 600 800 1000 1200 1400

2 lane w/ parking

3 lane w/ parking

4 lane no parking

4 lane w/ parking

6 lane no parking

8 lane no parking

Vehicle Approach Time

45 mph

Feet: 200 400 600 800 1000 1200 1400

2 lane w/ parking

3 lane w/ parking

4 lane no parking

4 lane w/ parking

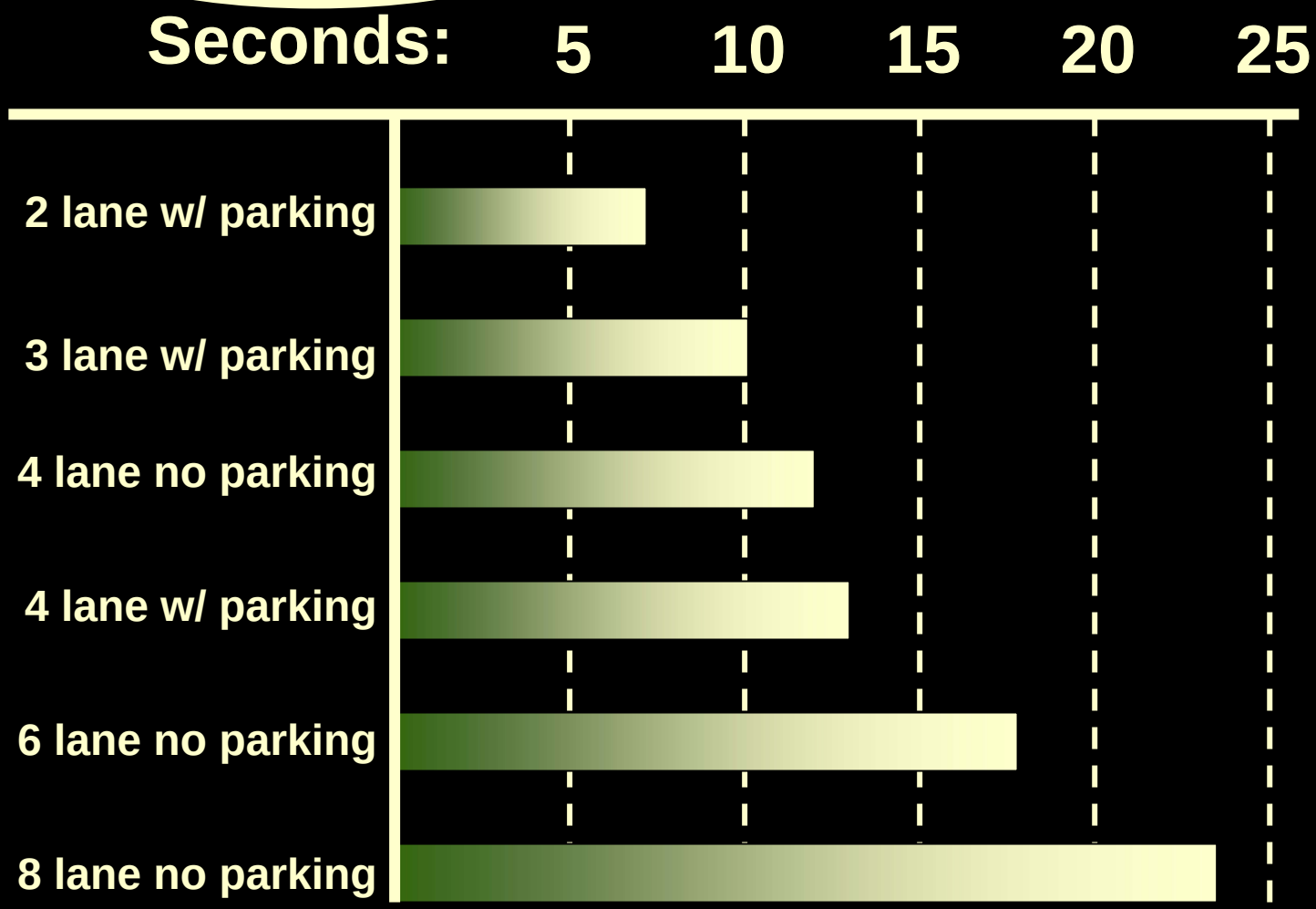
6 lane no parking

8 lane no parking


STATE LAW
YIELD
TO PEDESTRIANS
IN CROSSWALK
STATE LAW
YIELD
TO PEDESTRIANS
IN CROSSWALK

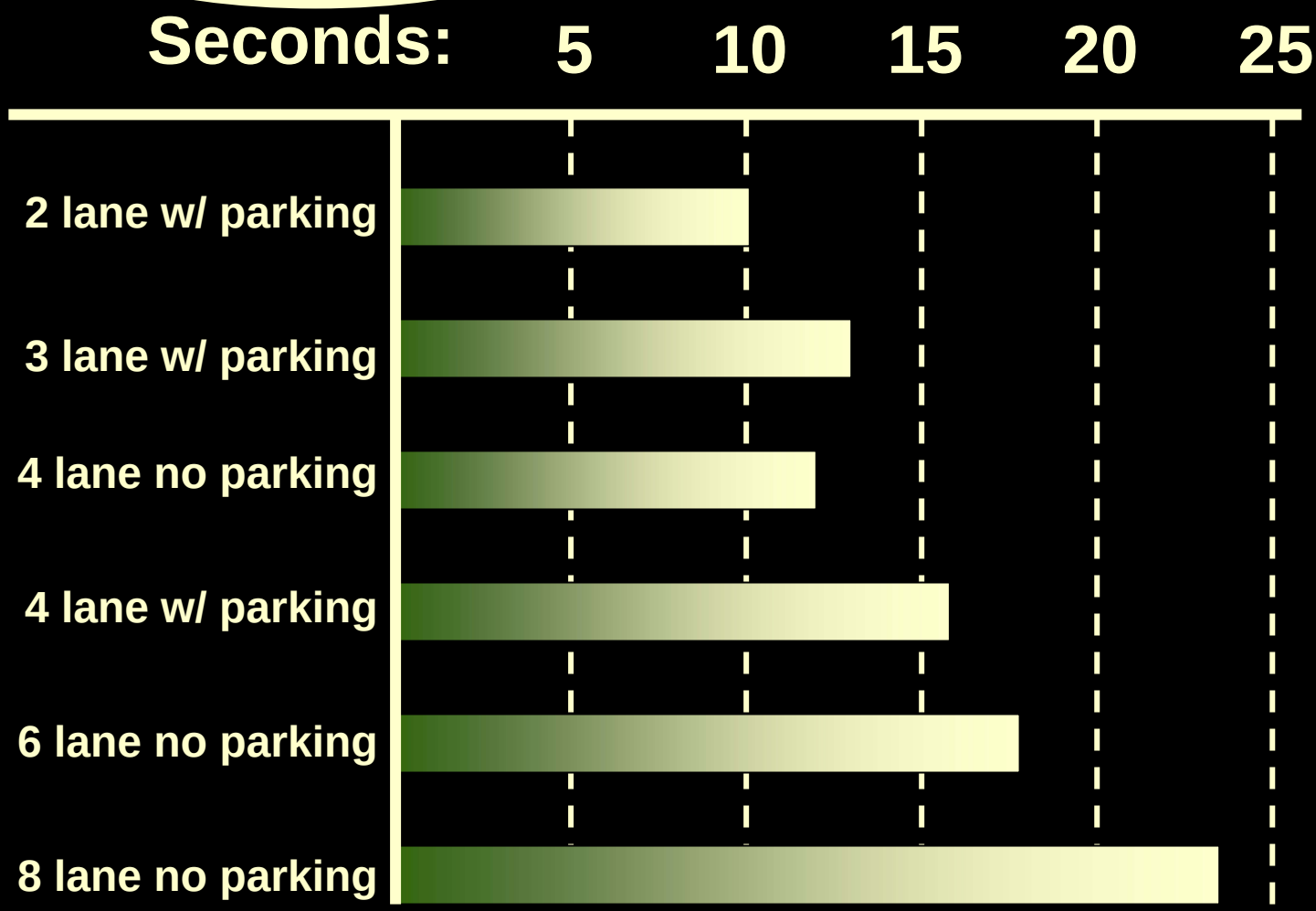
Pedestrian Crossing Time

Curb Extensions: YES | Lane Width: 12 ft | Walk Speed: 250 fpm



Pedestrian Crossing Time

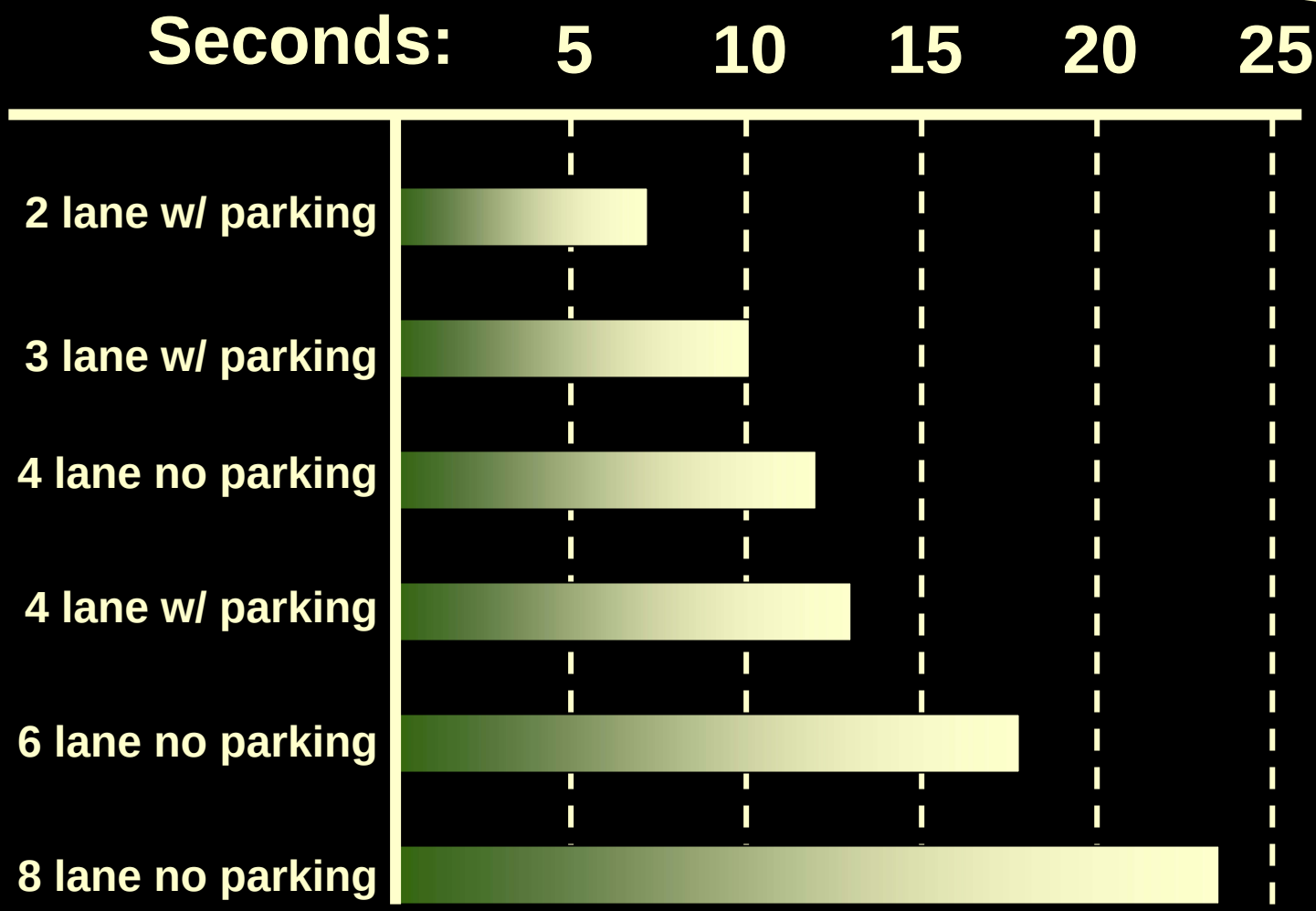
Curb Extensions: NO | Lane Width: 12 ft | Walk Speed: 250 fpm




ALOHA

Pedestrian Crossing Time

Curb Extensions: YES | **Lane Width: 12 ft** | **Walk Speed: 250 fpm**

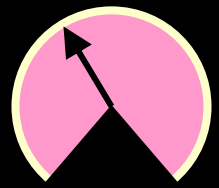


Pedestrian Crossing Time

Curb Extensions: YES | Lane Width: 12 ft | Walk Speed: 180 fpm

Vehicle Approach Time

Walk Speed: 250 fpm



25 mph

Feet: 200 400 600 800 1000 1200 1400

2 lane w/ parking

3 lane w/ parking

4 lane no parking

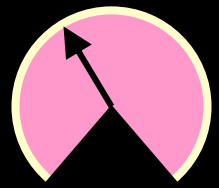
4 lane w/ parking

6 lane no parking

8 lane no parking

Vehicle Approach Time

Walk Speed: 180 fpm



25 mph

Feet: 200 400 600 800 1000 1200 1400

2 lane w/ parking

3 lane w/ parking

4 lane no parking

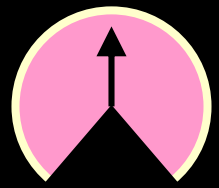
4 lane w/ parking

6 lane no parking

8 lane no parking

Vehicle Approach Time

Walk Speed: 180 fpm



35 mph

Feet: 200 400 600 800 1000 1200 1400

2 lane w/ parking

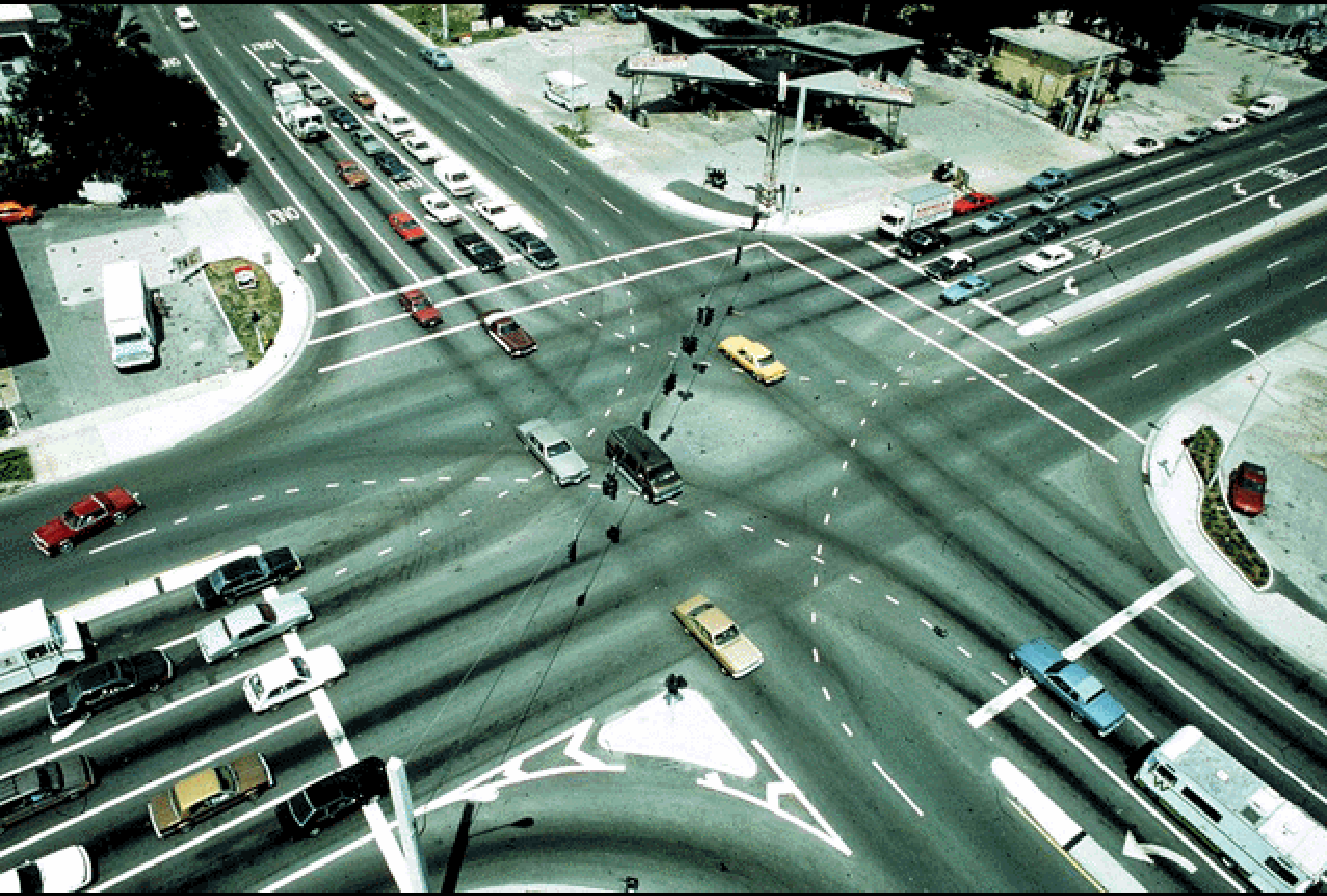
3 lane w/ parking

4 lane no parking

4 lane w/ parking

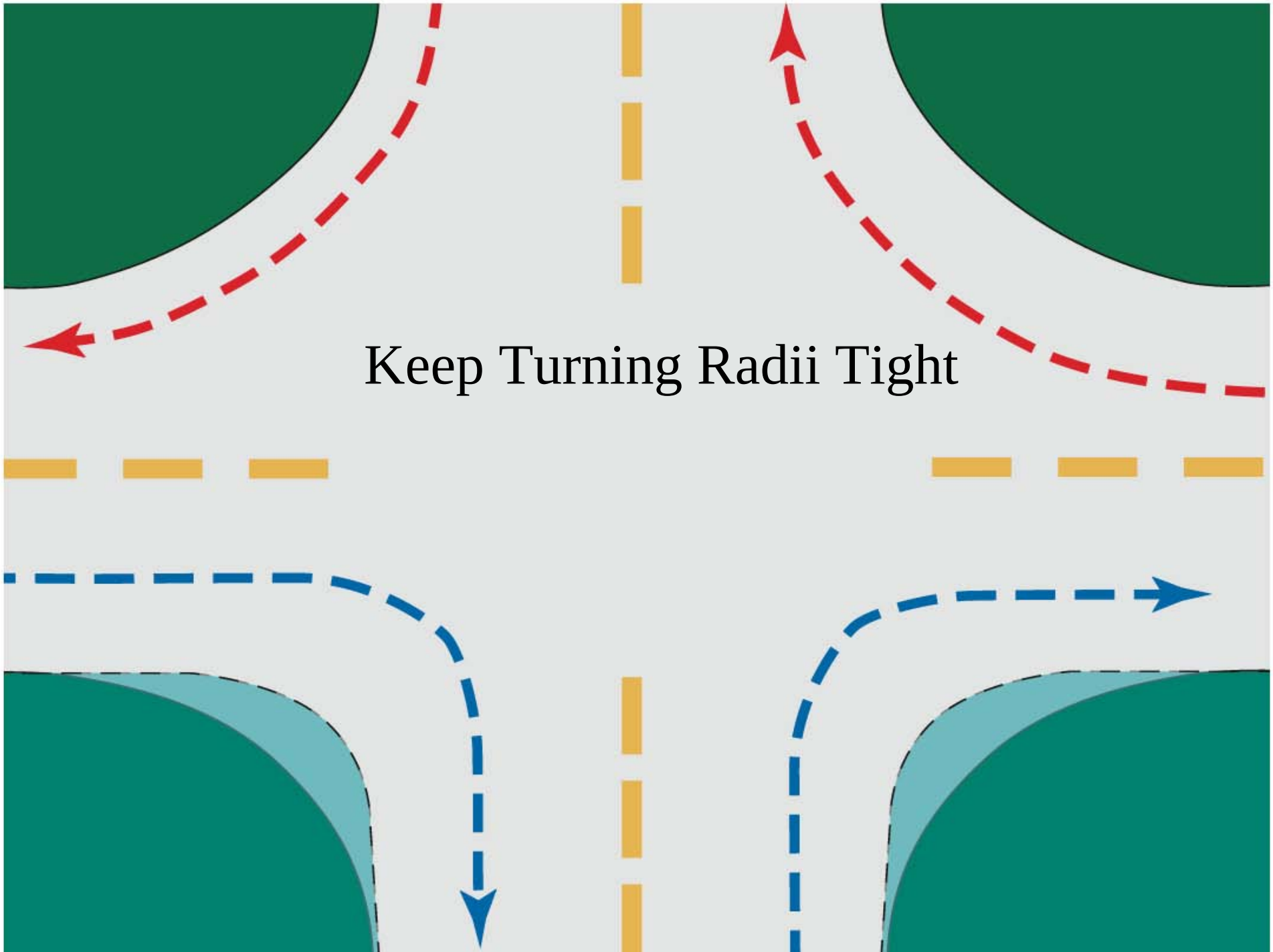
6 lane no parking

8 lane no parking

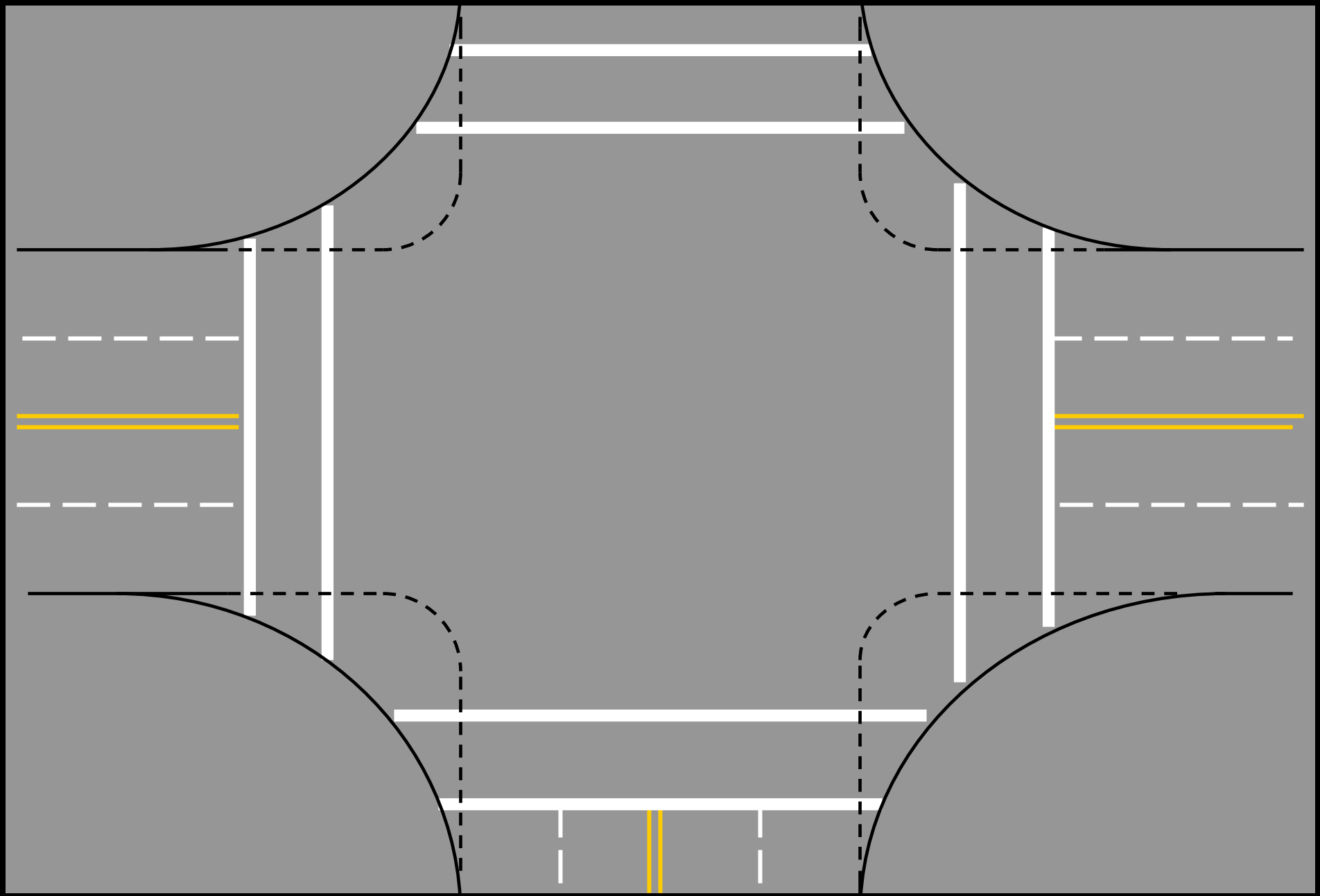



LAFAYETTE
MOTEL
TACO
BELL

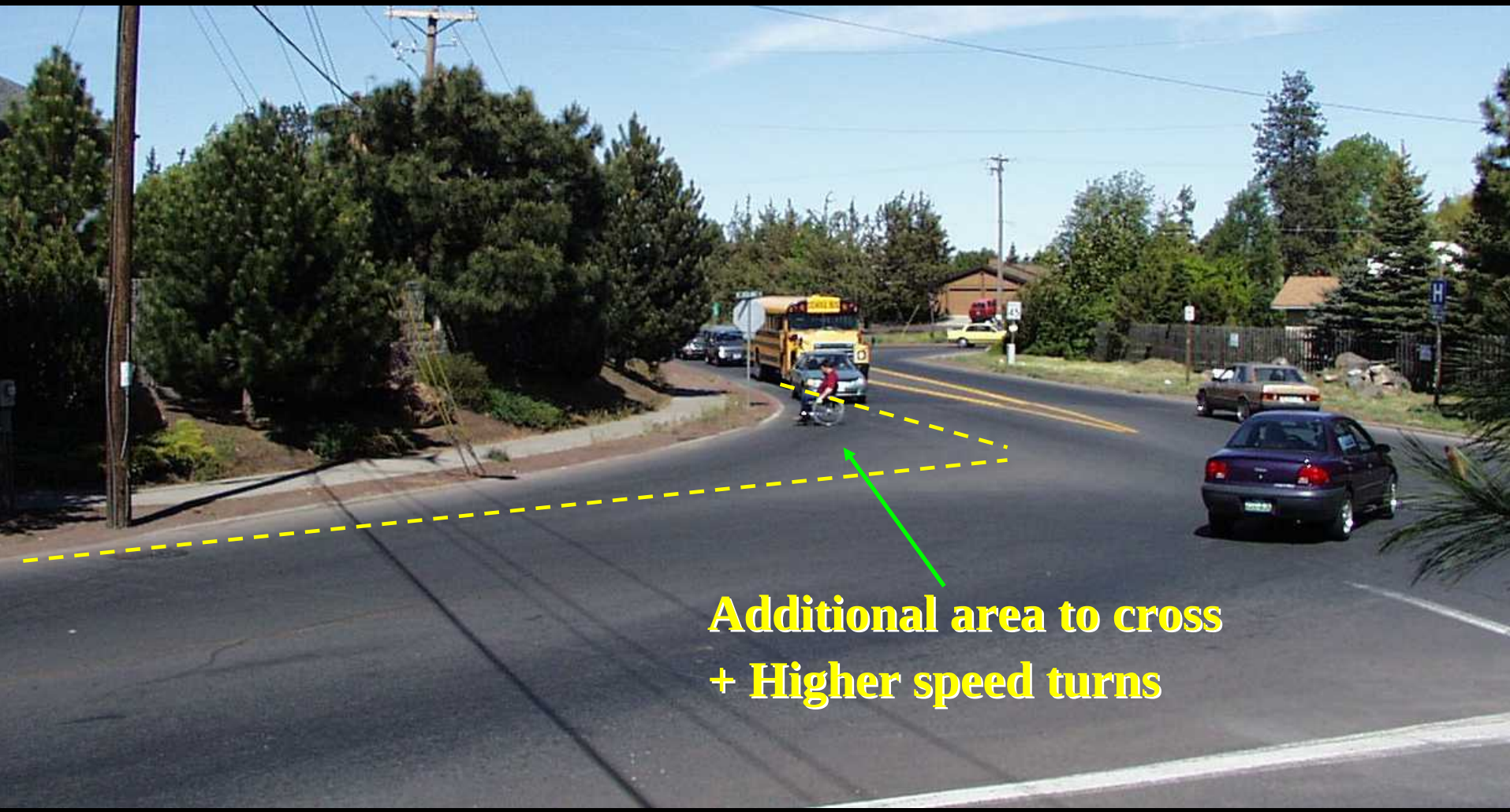

STOP
STOP
STOP


Keep Turning Radii Tight

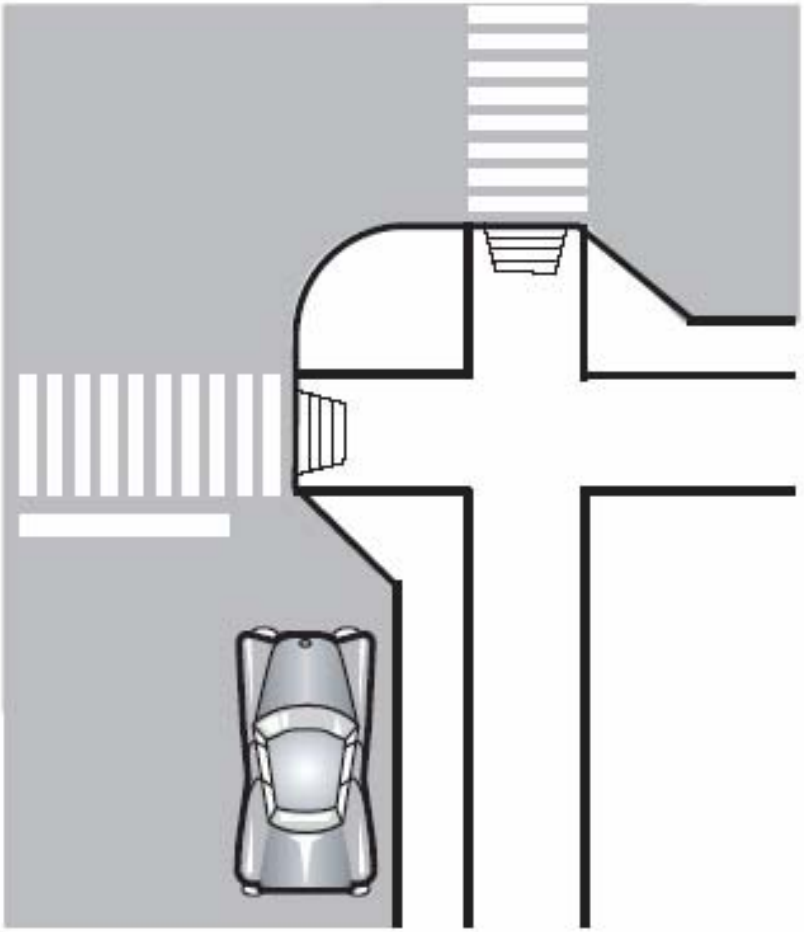
Crosswalks are pushed back



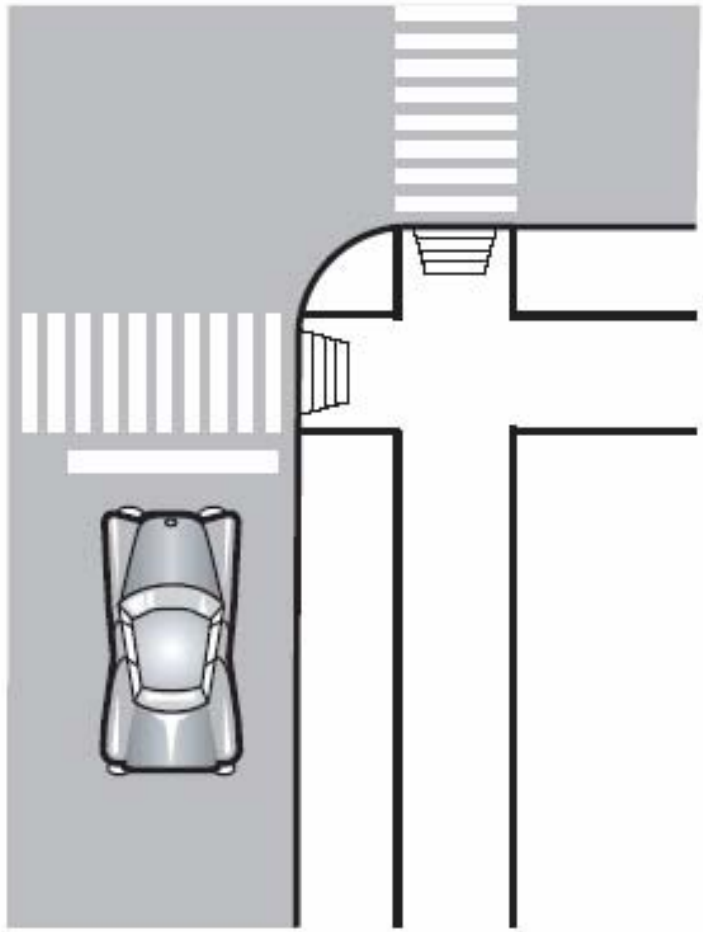
Effect of large radius on crosswalk:



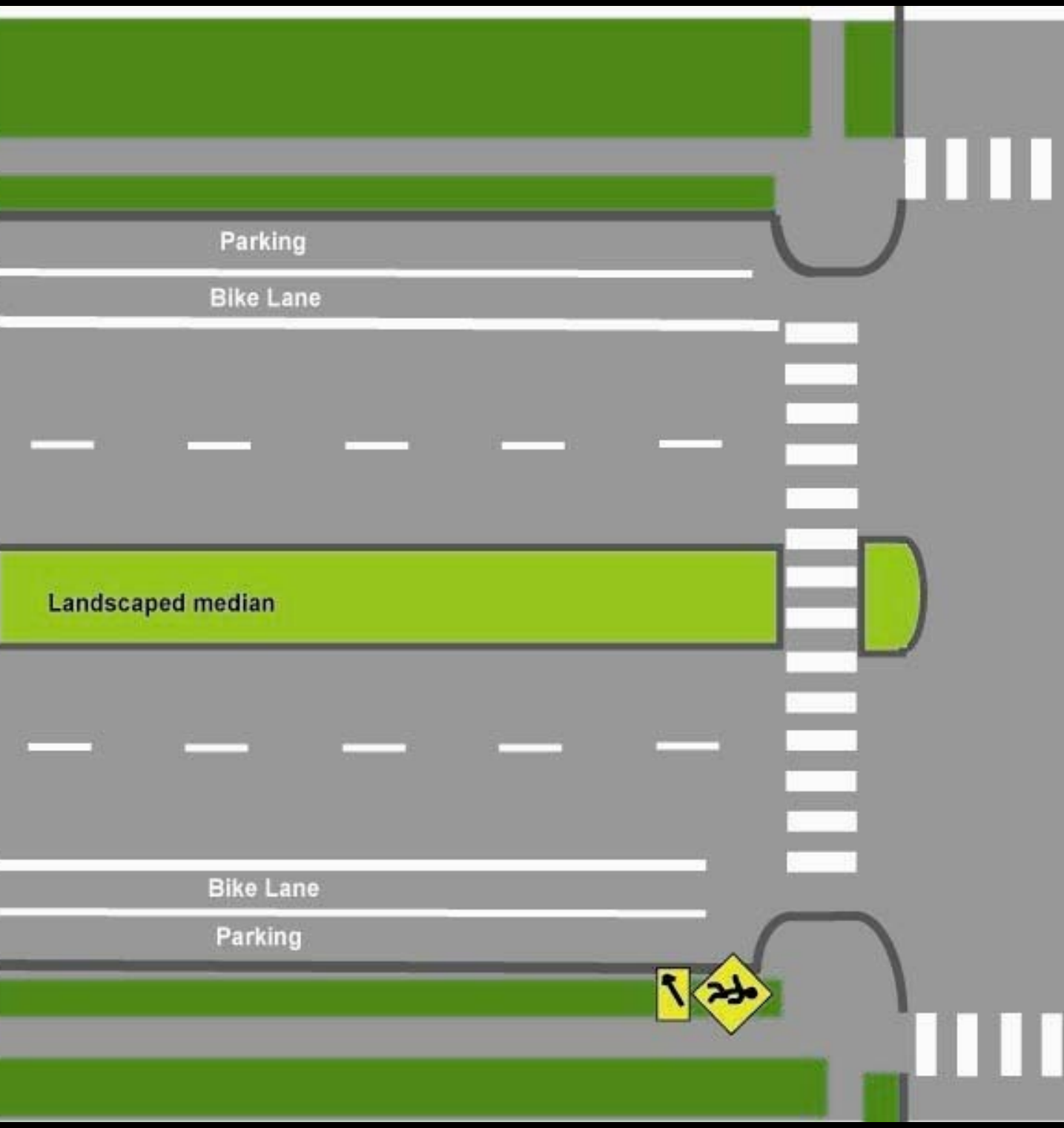
Bend OR



Pair of perpendicular curb ramps with curb extensions and on-street parking



Pair of perpendicular curb ramps aligning with crosswalks


Parking
Bike Lane
Landscaped median
Bike Lane
Parking


2050
OPEN
HAIR CUT
$12
2040 UNIVERSITY AVENUE

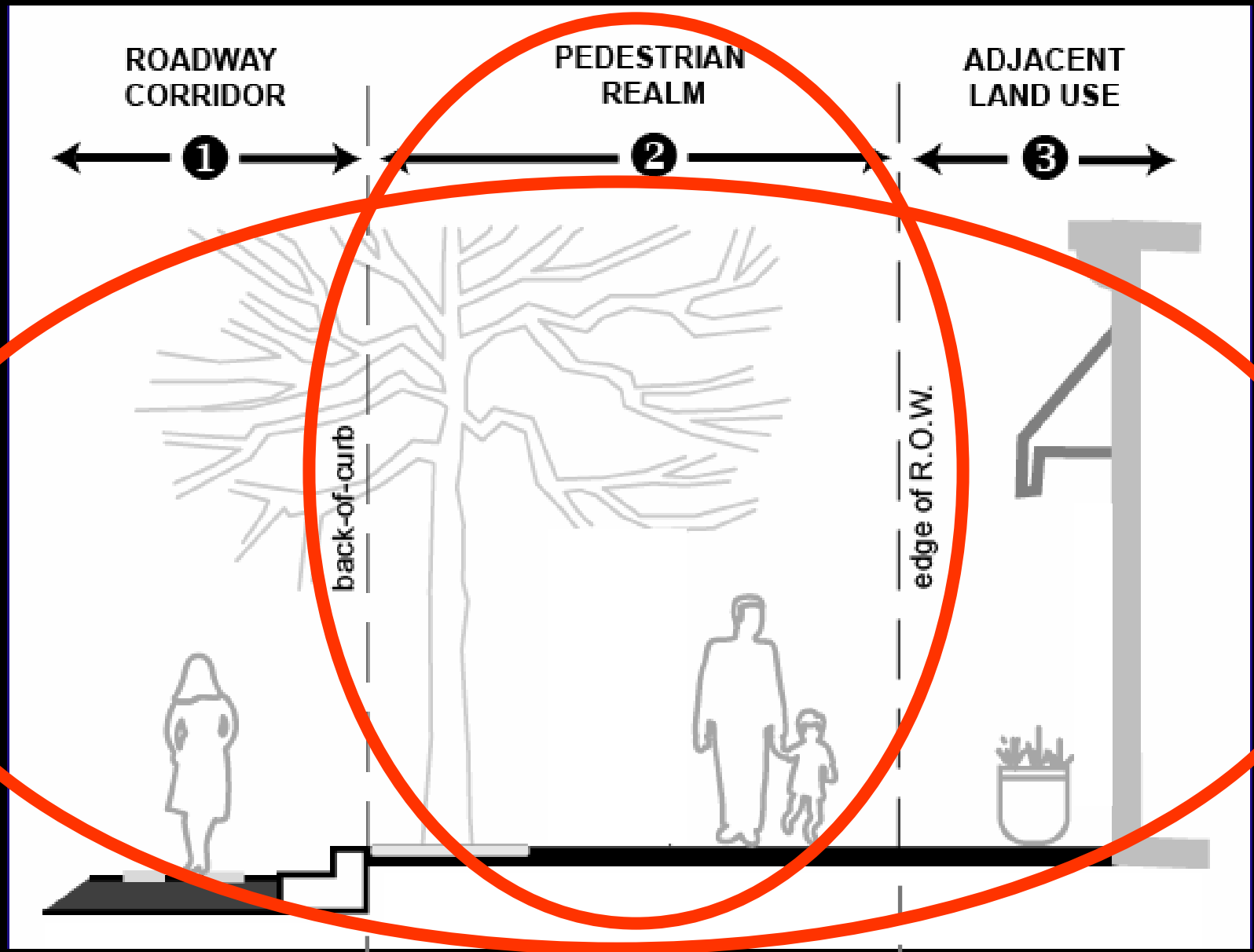
Atlanta GA

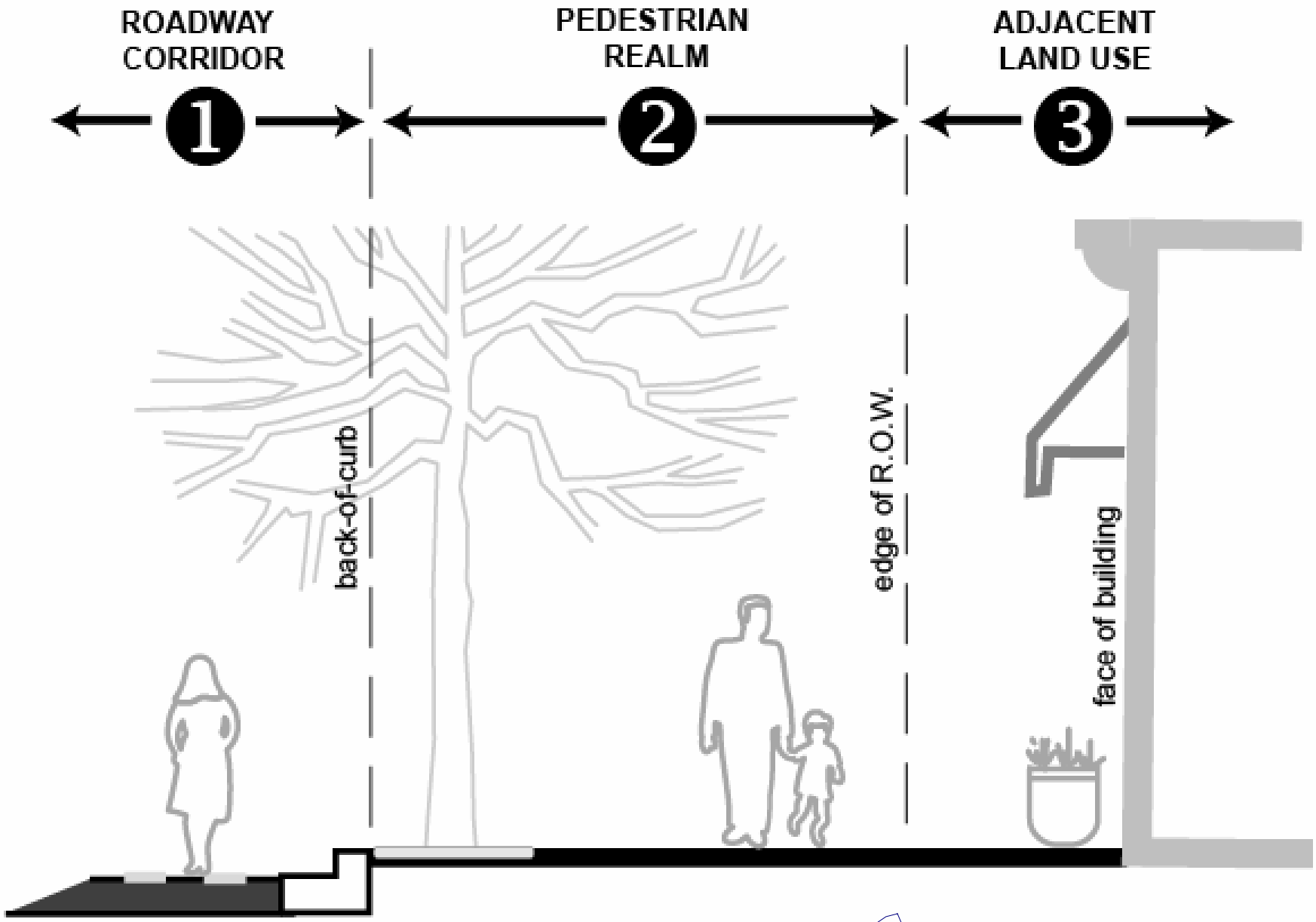

7
93

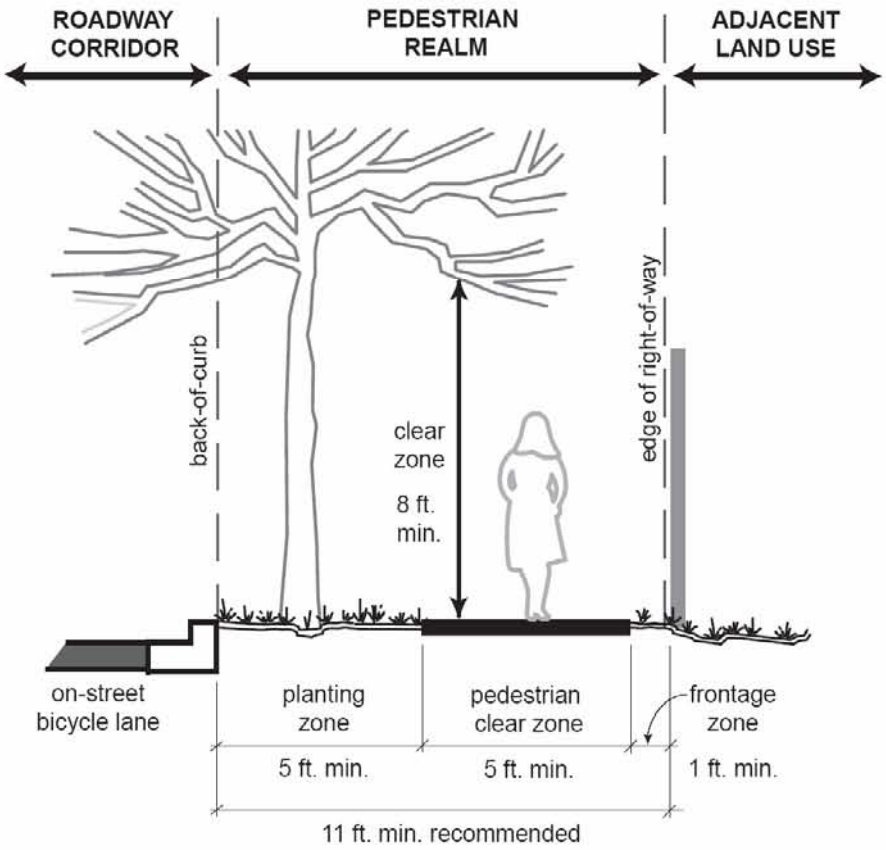

STATE LAW
YIELD
TO PEDESTRIANS
IN CROSSWALK
COLORADO

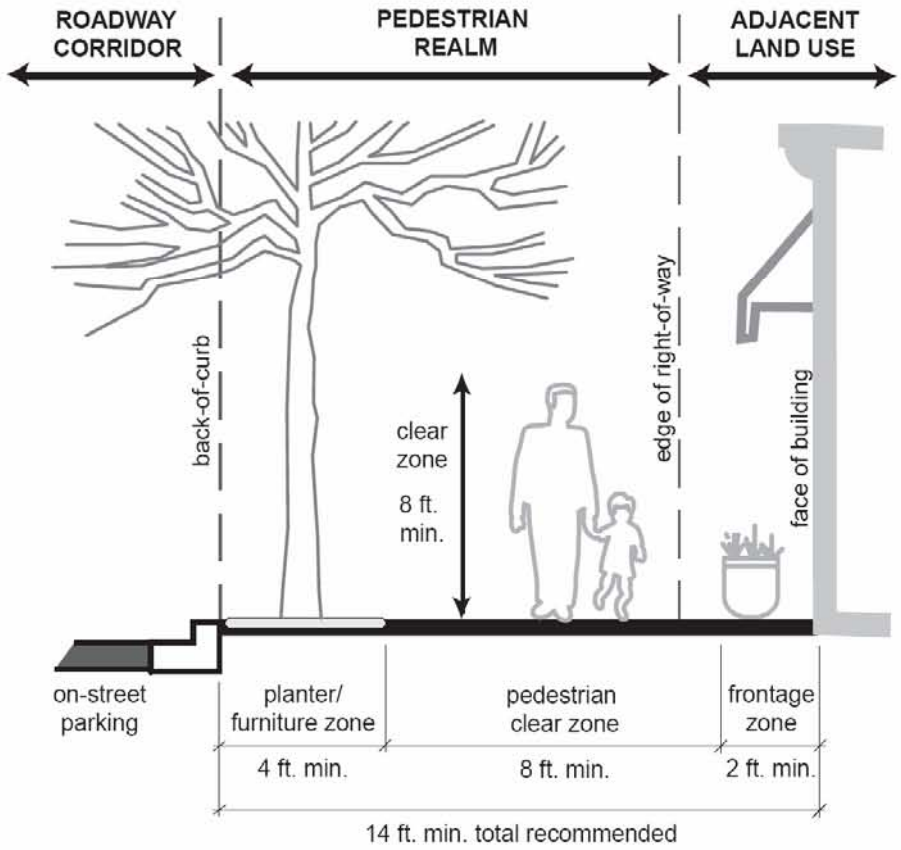

YIELD
HERE
TO
PEDESTRIANS
STATE LAW
YIELD

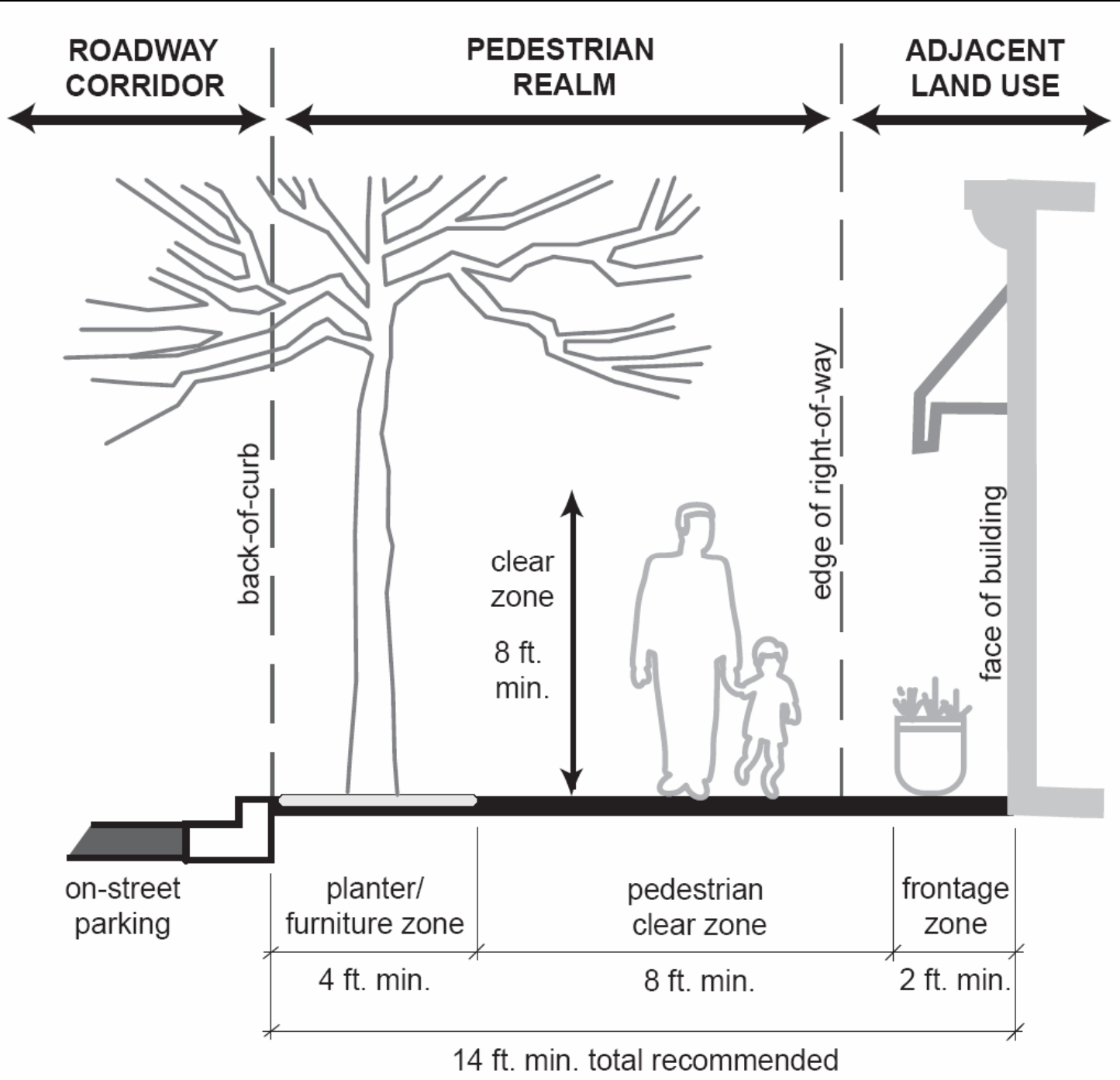
3. Urban Design Standards

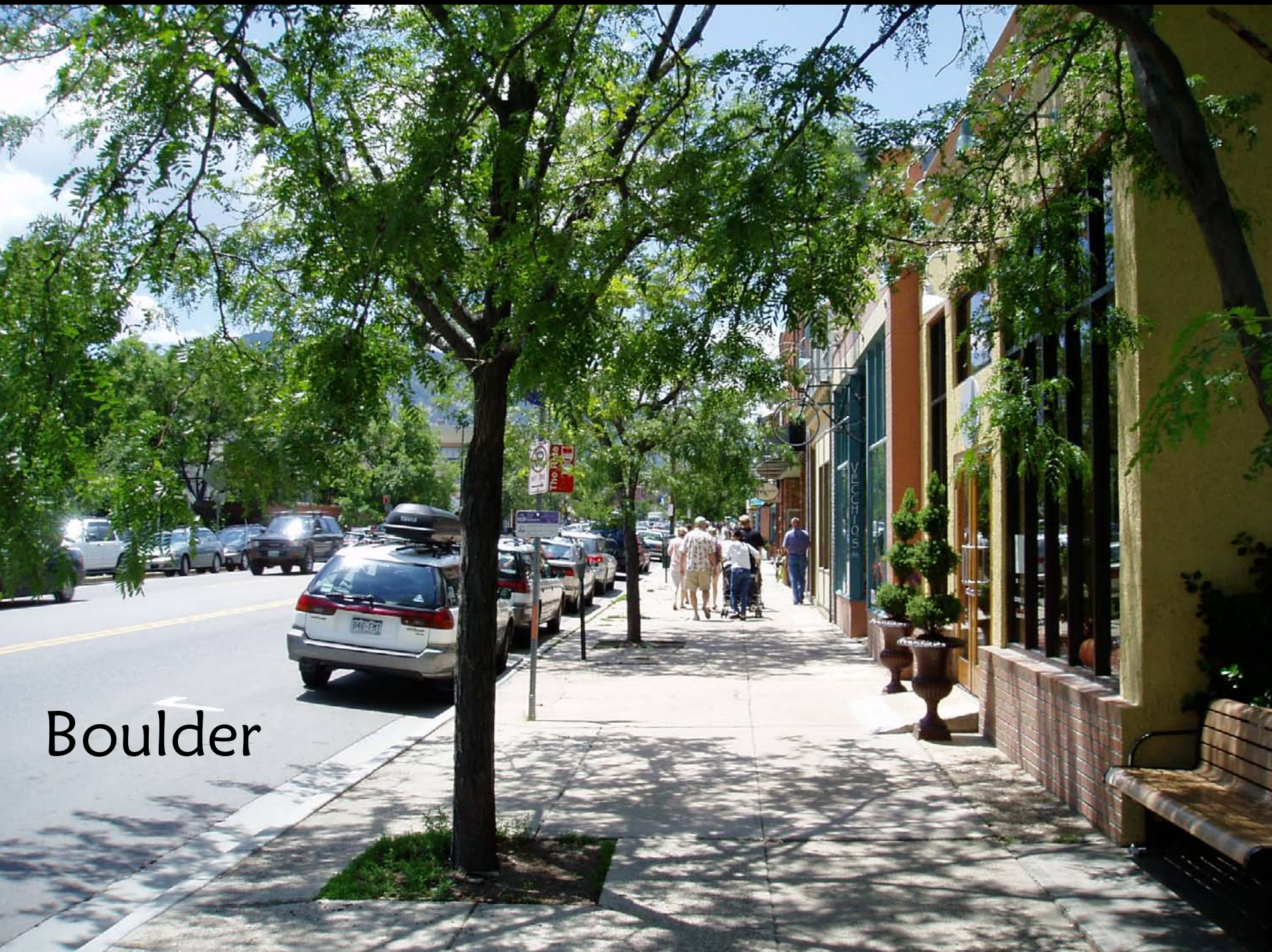

ROADWAY CORRIDOR
PEDESTRIAN REALM
ADJACENT LAND USE
1
2
3
back-of-curb
edge of R.O.W.
Traveled Way
Roadside
Context Zones


ROADWAY CORRIDOR
1
PEDESTRIAN REALM
2
ADJACENT LAND USE
3
back-of-curb
edge of R.O.W.
face of building


ROADWAY CORRIDOR
PEDESTRIAN REALM
ADJACENT LAND USE
back-of-curb
clear zone
8 ft. min.
edge of right-of-way
on-street bicycle lane
planting zone
pedestrian clear zone
frontage zone
5 ft. min.
5 ft. min.
1 ft. min.
11 ft. min. recommended


ROADWAY CORRIDOR
PEDESTRIAN REALM
ADJACENT LAND USE
back-of-curb
clear zone
8 ft. min.
edge of right-of-way
face of building
on-street parking
planter/ furniture zone
pedestrian clear zone
frontage zone
4 ft. min.
8 ft. min.
2 ft. min.
14 ft. min. total recommended


ROADWAY CORRIDOR
PEDESTRIAN REALM
ADJACENT LAND USE
back-of-curb
clear zone
8 ft. min.
edge of right-of-way
face of building
on-street parking
planter/ furniture zone
pedestrian clear zone
frontage zone
4 ft. min.
8 ft. min.
2 ft. min.
14 ft. min. total recommended


Boulder

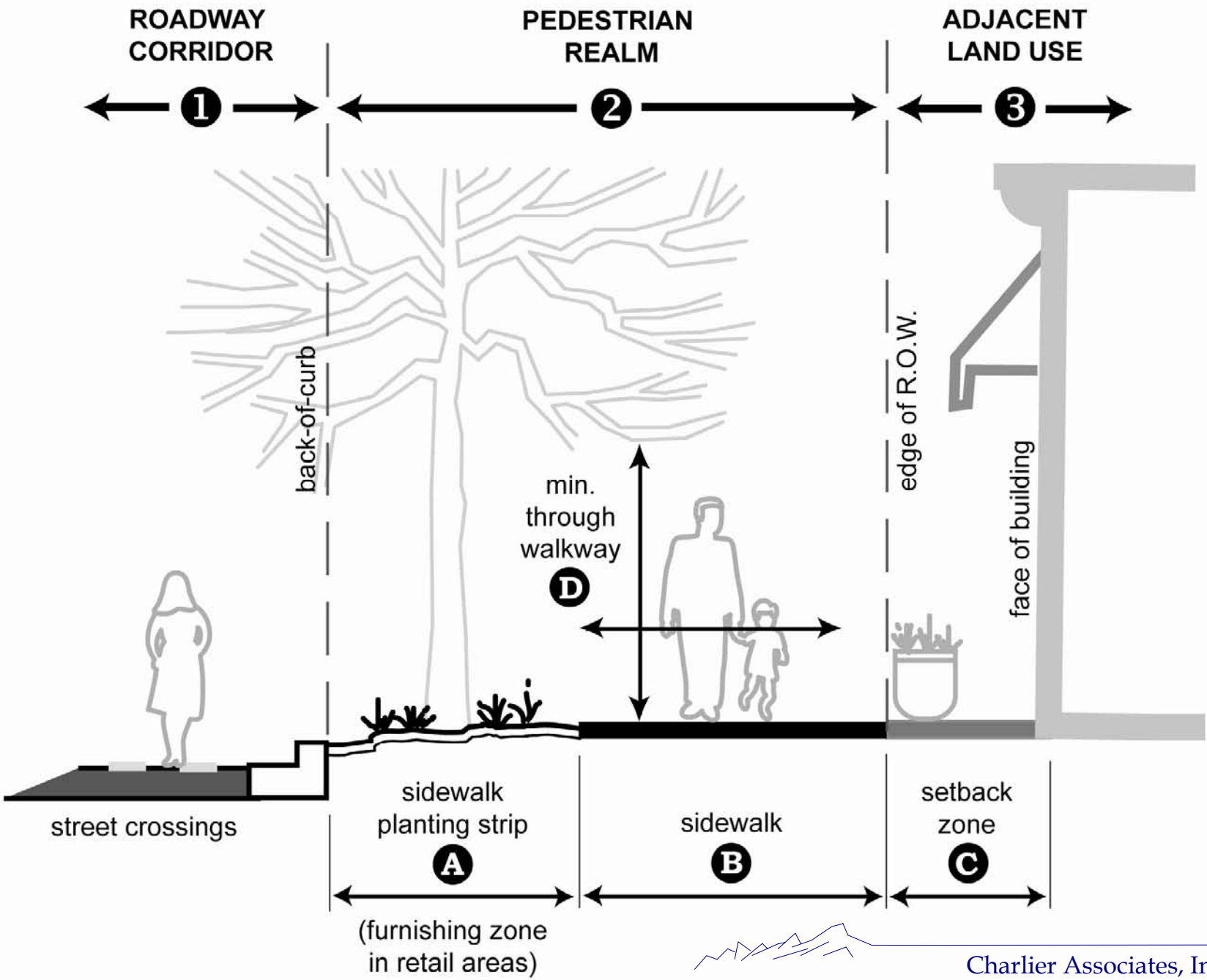

1911
The Envelope Please
The Envelope Please

Boulder


10AM - 6PM
EXCEPT SUNDAY

Bainbridge Island

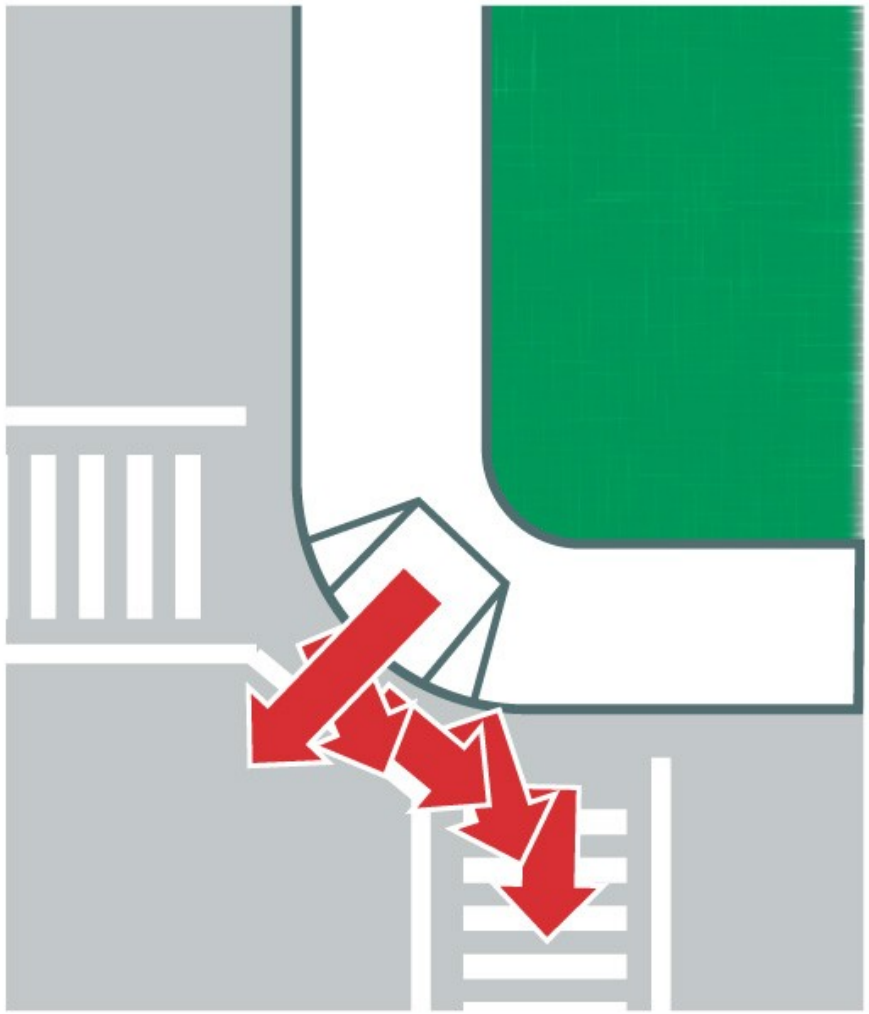

SPEED
LIMIT
45


ROADWAY CORRIDOR
1
PEDESTRIAN REALM
2
ADJACENT LAND USE
3
back-of-curb
edge of R.O.W.
face of building
min. through walkway
D
street crossings
sidewalk planting strip
A
(furnishing zone in retail areas)
sidewalk
B
setback zone
C

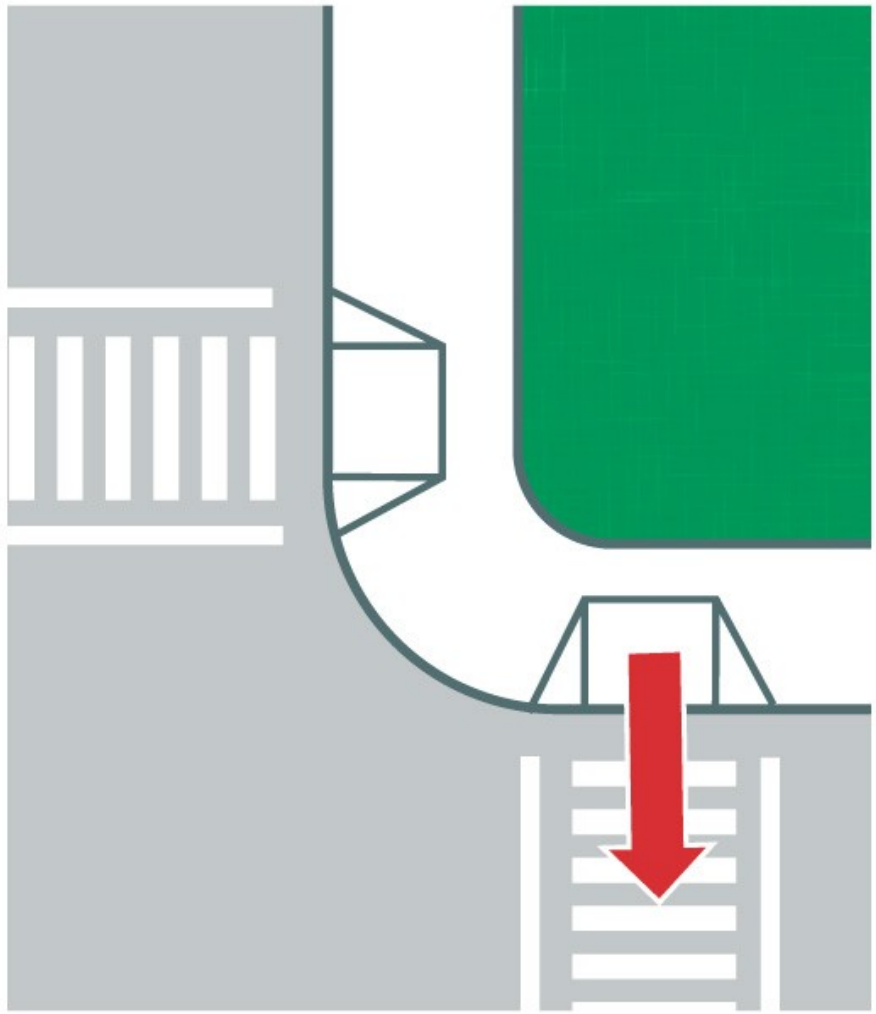
4. Modern Curb Ramps


Fair Oaks AVE
SPEED LIMIT 25

Diagnoal Curb Ramp



Perpendicular Curb Ramp




LUCCA LUCCA
1601 PEARL
Enjoy
Dine
Explore
Celebrate
Shop

next...

Bicycle & Non-Motorized Systems

Practical Implementation Strategies


B R O A D W A Y

Practical Non-Motorized Strategies

- Build a spine route – an iconic corridor
- Formally approve parallel redundancy
- Designate primary & secondary bike corridors and prioritize public spending
- Map missing links
- Create route IDs for primary corridors
- Take advantage of modern design
- Consider road diets
- Get serious about maintenance
- Use the Web to map/promote bicycling

Build a Spine Route (Iconic Corridor)

Practical Implementation Strategies

Formally Approve Parallel Redundancy

Practical Implementation Strategies

“Type A” Cyclist:

- comfortable in traffic
- prefers direct but safe routes
- rides with or without bicycle facilities present

“Type B/C” Cyclist:

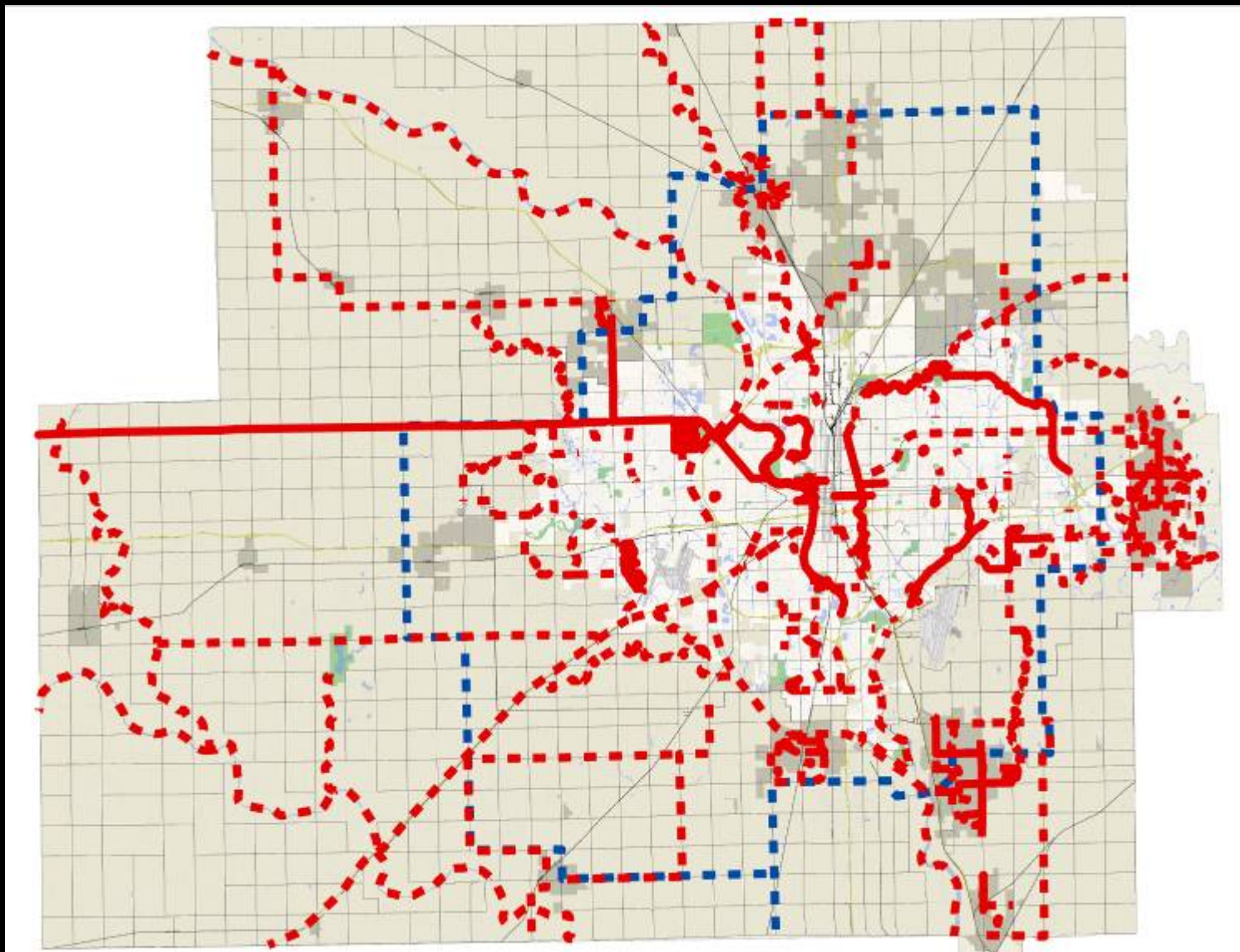
- less skilled adults and children
- intimidated by traffic
- prefer designated facilities (bike lanes and multi-use paths)

Designate Primary & Secondary Corridors & Prioritize Funding

Practical Implementation Strategies

Previously Proposed Facilities

- 421 miles off-road paths
- 0 miles on-street bicycle lanes
- 0 miles paved shoulders

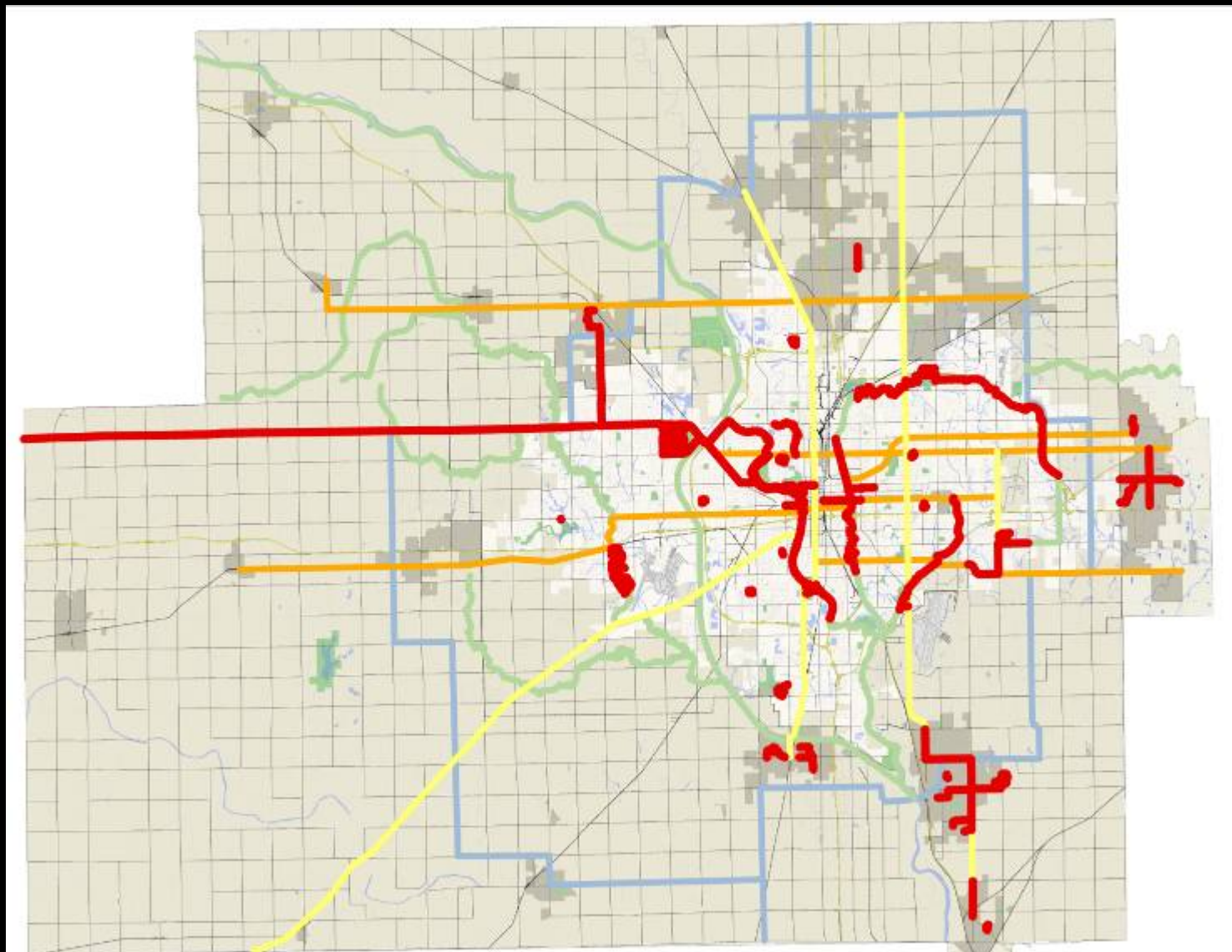


Importance of Network Connectivity:

- distance and safety impediments are the major obstacles to overcome
- facility type may change based upon context
- transitions need to be seamless

Primary Corridor System

- 164 miles off-road paths
- 67 miles on-street bicycle lanes
- 18 miles paved shoulders



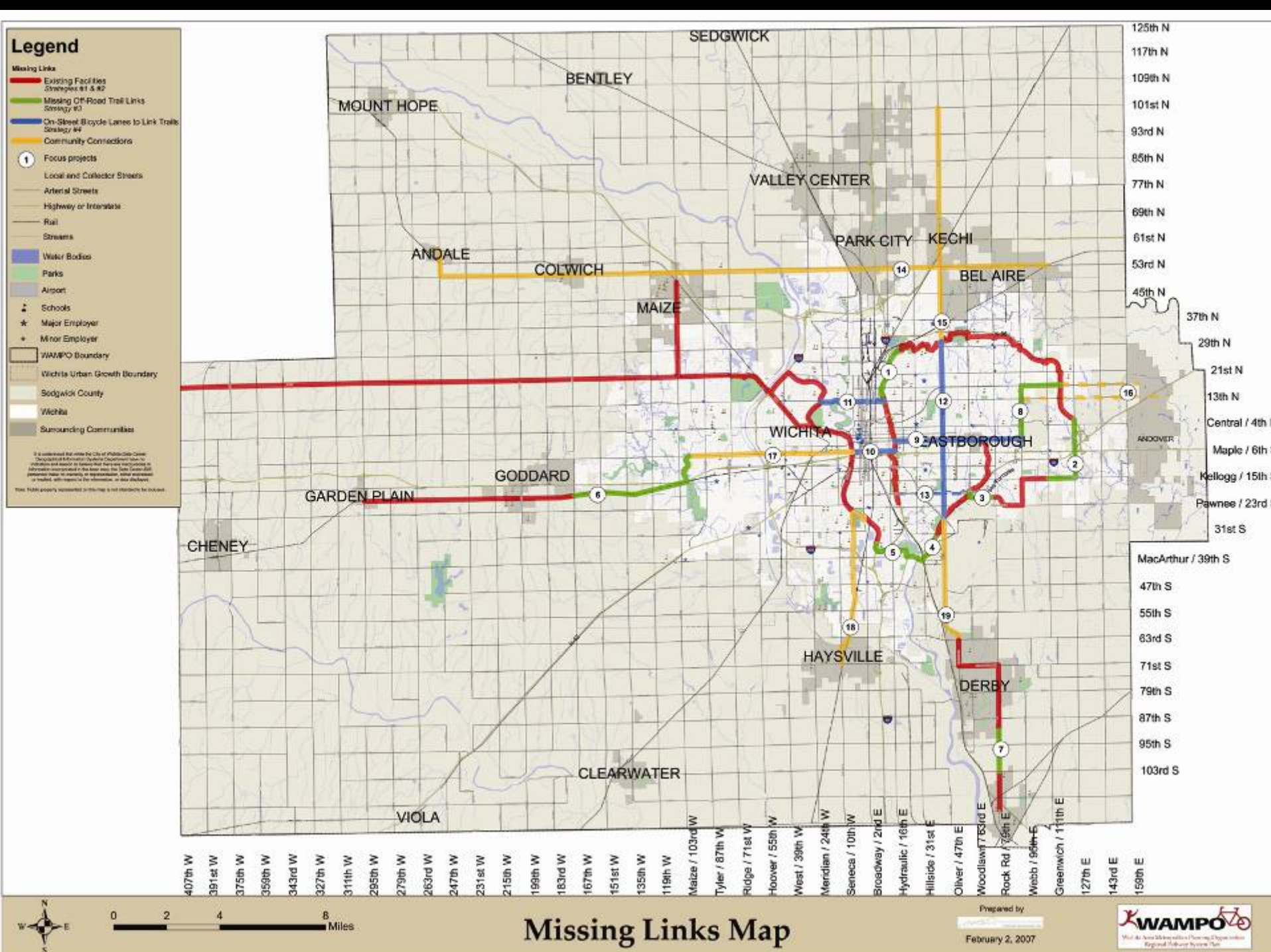
Map Missing Links

Practical Implementation Strategies

pathway users focus group

pathway users corridor workshop

pathway users corridor workshop


Legend
Missing Links
Existing Facilities
Strategies #1 & #2
Missing Off-Road Trail Links
Strategy #3
On-Street Bicycle Lanes to Link Trails
Strategy #4
Community Connections
Focus projects
Local and Collector Streets
Arterial Streets
Highway or Interstate
Rail
Streams
Water Bodies
Parks
Airport
Schools
Major Employer
Minor Employer
WAMPO Boundary
Wichita Urban Growth Boundary
Sedgwick County
Wichita
Surrounding Communities
SEDGWICK
BENTLEY
MOUNT HOPE
VALLEY CENTER
PARK CITY
KECHI
ANDALE
COLWICH
BEL AIRE
MAIZE
WICHITA
EASTBOROUGH
ANDOVER
GODDARD
GARDEN PLAIN
CHENEY
HAYSVILLE
DERBY
CLEARWATER
VIOLA
125th N
117th N
109th N
101st N
93rd N
85th N
77th N
69th N
61st N
53rd N
45th N
37th N
29th N
21st N
13th N
Central / 4th
Maple / 6th
Kellogg / 15th
Pawnee / 23rd
31st S
MacArthur / 39th S
47th S
55th S
63rd S
71st S
79th S
87th S
95th S
103rd S
407th W
391st W
375th W
359th W
343rd W
327th W
311th W
295th W
279th W
263rd W
247th W
231st W
215th W
199th W
183rd W
167th W
151st W
135th W
119th W
Maize / 103rd W
Tyler / 87th W
Ridge / 71st W
Hoover / 55th W
West / 39th W
Meridian / 24th W
Seneca / 10th W
Broadway / 2nd E
Hydraulic / 16th E
Hillside / 31st E
Oliver / 47th E
Woodlawn / 63rd E
Rock Rd / 79th E
Webb / 95th E
Greenwich / 111th E
127th E
143rd E
159th E
0 2 4 8 Miles
Missing Links Map
Prepared by
February 2, 2007
WAMPO

Create IDs for Primary Corridors

Practical Implementation Strategies


BROADWAY
BOOGIE
BEAR CREEK
TRAIL

Apply Modern Design

Practical Implementation Strategies

Paved Shoulders, Pathways or Bike Lanes?

- AASHTO & MUTCD guidelines
- Drop or dash bike lane striping in advance of intersections
- Position bike lanes to left of right-turning vehicular lanes


Boulder, CO


PAINTS

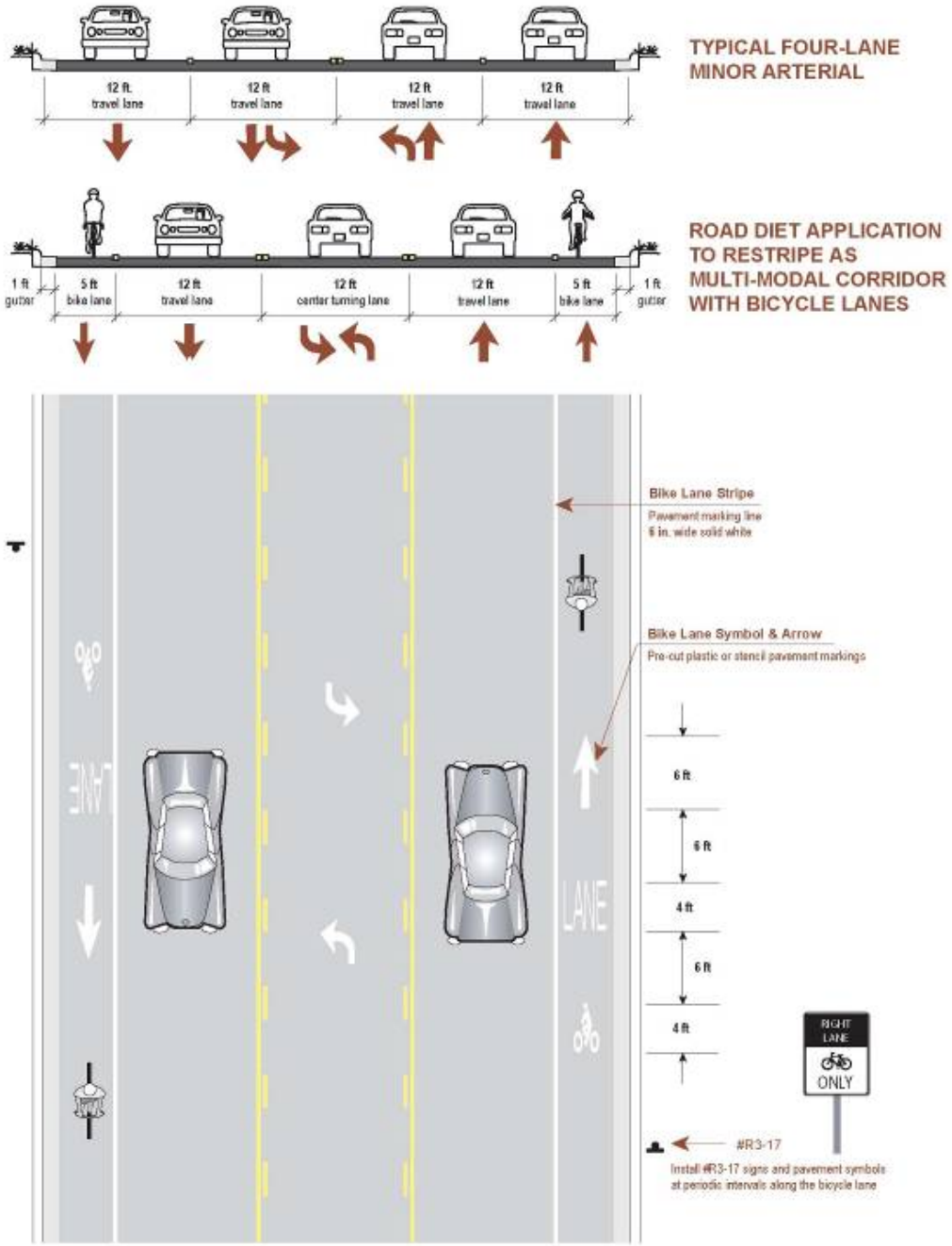

SPEED LIMIT
35

Consider Road Diets

Practical Implementation Strategies

“Road Diet”

Crash Studies: Vehicle-Vehicle



U.S.DOT FHWA

Highway Safety Information System -- Before and After Testing

Crash frequency	Road diets: 6% lower
Crash severity	No difference
Crash type	➢ Road diets had a higher percentage of angle crashes ➢ Road diets had a lower percentage of rear-end crashes

Source: HSIS, FHWA

University Place, WA

Bridgeport Way: 5-lane to 4-lane

before

after

Results

The City has analyzed speed, accident, and economic development data collected before and after the construction of the Bridgeport Way improvements between 35th and 40th Streets. The project's traffic calming features reduced speeds and crashes while increasing business activity. Average speed decreased by 13 percent and traffic accidents were reduced by 60 percent (see table below).

Safety Measures	Before	After	Change
Posted Speed Limit	6 km/h (35 mi/h)	56 km/h (35 mi/h)	Same
Average Actual Speed	1 km/h (37.6 mi/h)	52 km/h (32.6 mi/h)	–13 %
Average Annual Crashes	19	8 (first year)	–60 %

Table 1. Data from before and after the Bridgeport Way redesign.

Source: PEDSAFE

"Road Diets" Capacity Comparisons

Lane Reductions of Select Street Conversions-- Volume Changes

Roadway Section	Change	ADT (Before)	(After)	Notes
1. Lake Washington Blvd., Kirkland, Washington South of 83	4 lanes to 2 + TWLTL + bike lanes	23,000	25,913	
2. Lake Washington Blvd, Kirkland, Washington Near downtown	4 lanes to 2+ TWLTL + bike lanes	11,000	12,610	
3. Electric Avenue, Lewistown, Pennsylvania	4 lanes to 2 + TWLTL + bike lanes	13,000	14,500	
4. Burcham Road, East Lansing, Michigan	4 lanes to 2 + TWLTL + bike lanes	11-14,000	11-14,000	
5. Grand River Boulevard, East Lansing, Michigan	4 lanes to 2 + TWLTL + bike lanes	23,000	23,000	
6. St. George Street, Toronto, Ontario, Canada	4 lanes to 2 + bike lanes + wide sidewalks	15,000	15,000	
7. 120th Avenue, NE Bellevue, Washington	4 lanes to 2 + TWLTL	16,900	16,900	
8. Montana (commecial street) Bellevue, Washington	4 lanes to 2 lanes + TWLTL 4 lanes to 2 + median + bike lanes	18,500	18,500	
9. Main Street Santa Monica, California	4 lanes to 2 lanes + TWLTL 4 lanes to 2 + median + bike lanes	20,000	18,000	

Source: Walkable Communities Inc.

Iowa DOT

4-lane to 3-lane Conversions

Roads with less than 20,000 vehicles per day:

- 20%-30% reduction in crashes (due to reduced conflict points and improved sight distance)
- More user friendly to elderly drivers
- LOS remained the same (intersection delay increased from 6.2 sec/veh to 6.7 sec/veh)
- Improved emergency response time
- Improved pedestrian safety

Source: Transportation Research Board

Get Serious About Maintenance

Practical Implementation Strategies

Maintenance

- Spot improvement program
  - Standard reporting and responsibility assignment
- On-street facility maintenance
  - Sweep right hand edges
  - Maintain drainage grates
- Off-street facility maintenance
  - Remove loose material from pathway surface
  - Fix rough surfaces and post warning signs
- Prioritize snow removal


ALASKA
SNOW SAFARIS
Snowmobile tours
Dogsledding, Heli-skiing, Flightseeing
783-SNOW (7669)


SPEED
LIMIT
30

Use the Web to Map & Promote Bike Network

Practical Implementation Strategies

www.wampopathways.org

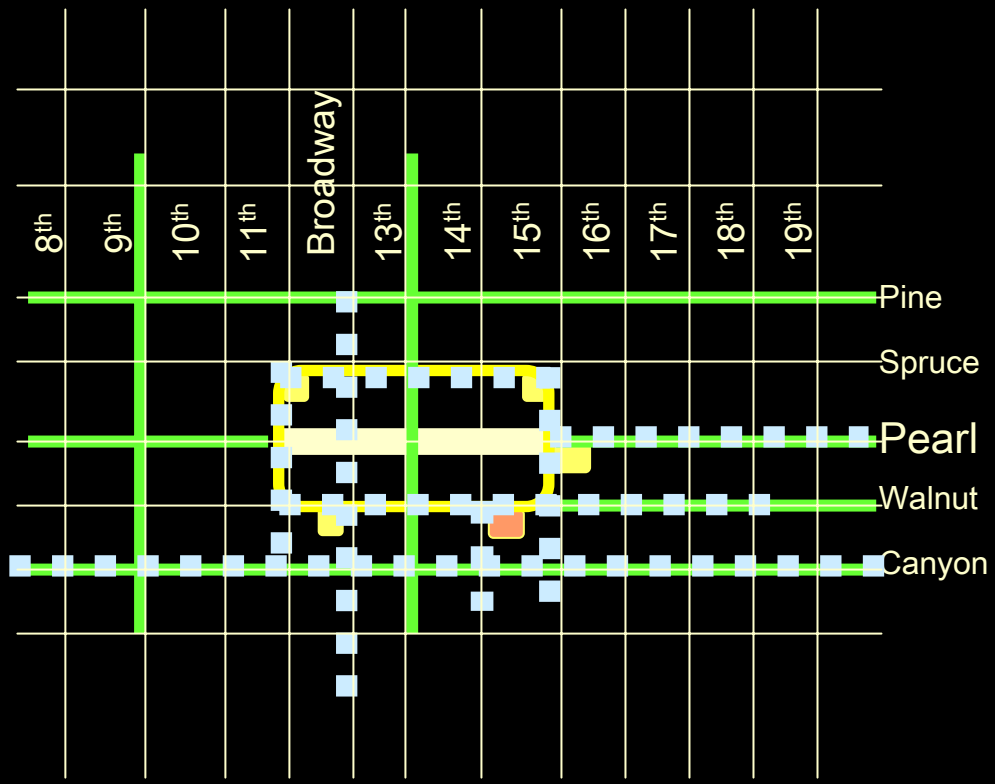
next...

An "Intermodal" Example

Practical Implementation Strategies

Boulder

Pearl Street "Pedestrian Mall"



Pedestrian Mall

Parking Structures

Parking Structure with Transit

Downtown Loop

Transit Routes

Bike Facilities

Boulder


PUBLIC PARKING
FREE PARKING SAT. & SUN.
P
BOLT
up & down
the Diagonal
6

Boulder

Boulder

Boulder


Boulder

Boulder


Boulder

Boulder's
"pedestrian mall"
works because …

... it is an integral part of an intermodal system

the end...


Thank You!