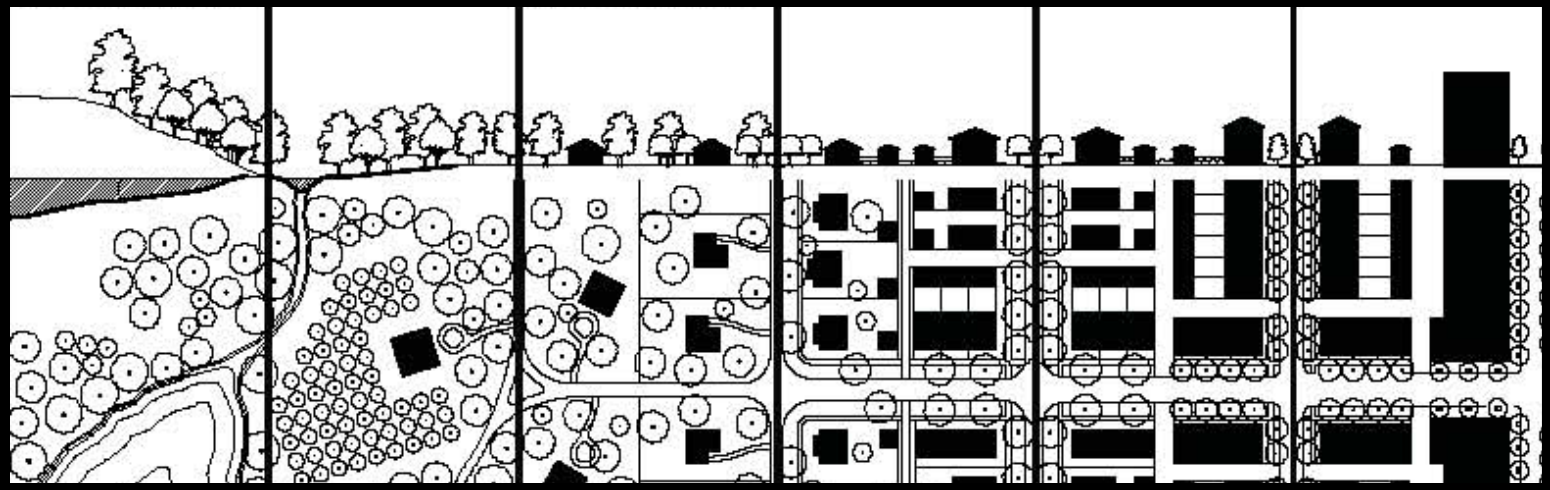
Context Sensitive Solutions for Retrofitting Urban Thoroughfares and Designing Active Communities

Colorado APA Conference

October 2007

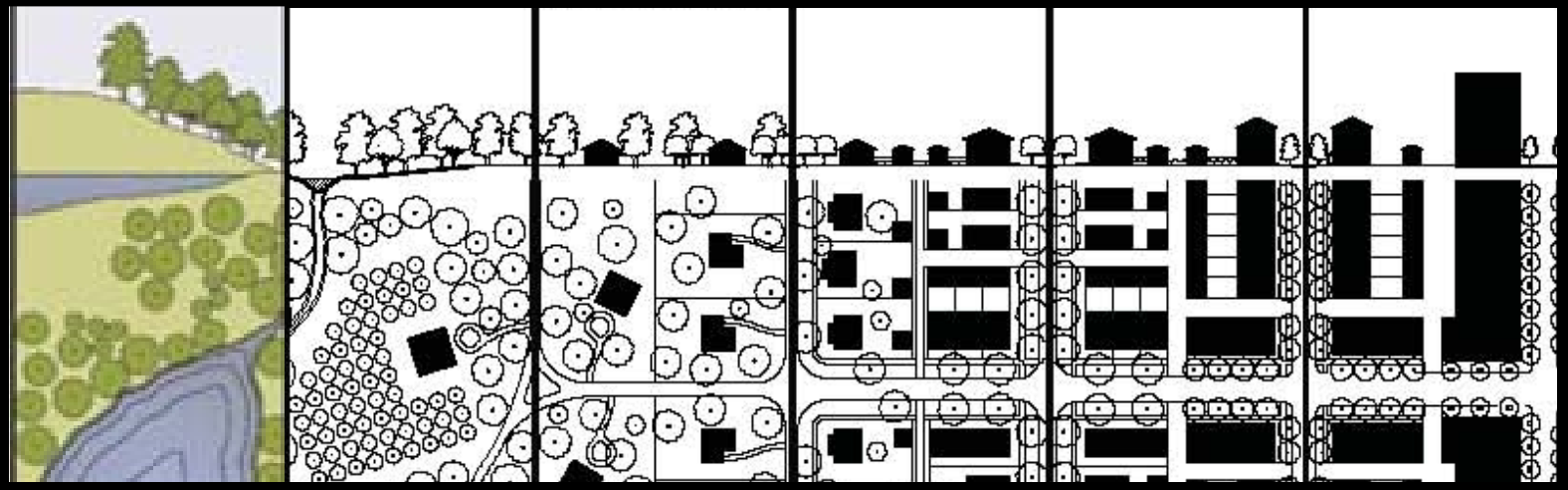
DENVER
THE MILE HIGH CITY

Charlier Associates, Inc.



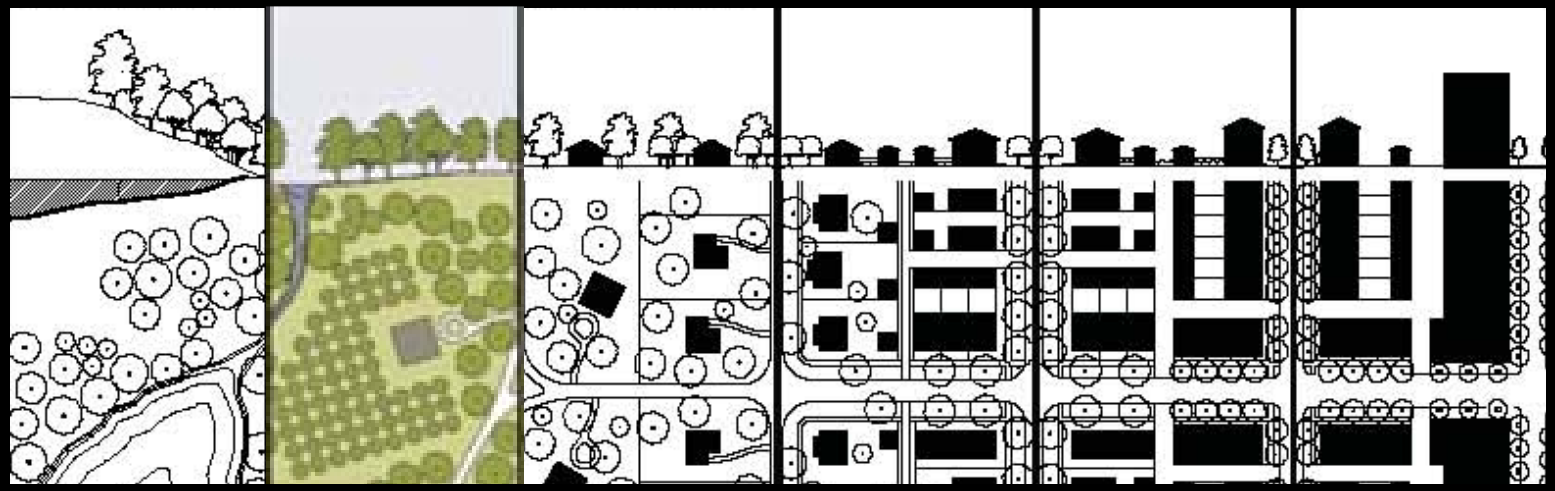
T1 T2 T3 T4 T5 T6

The Transect Zones of Colorado



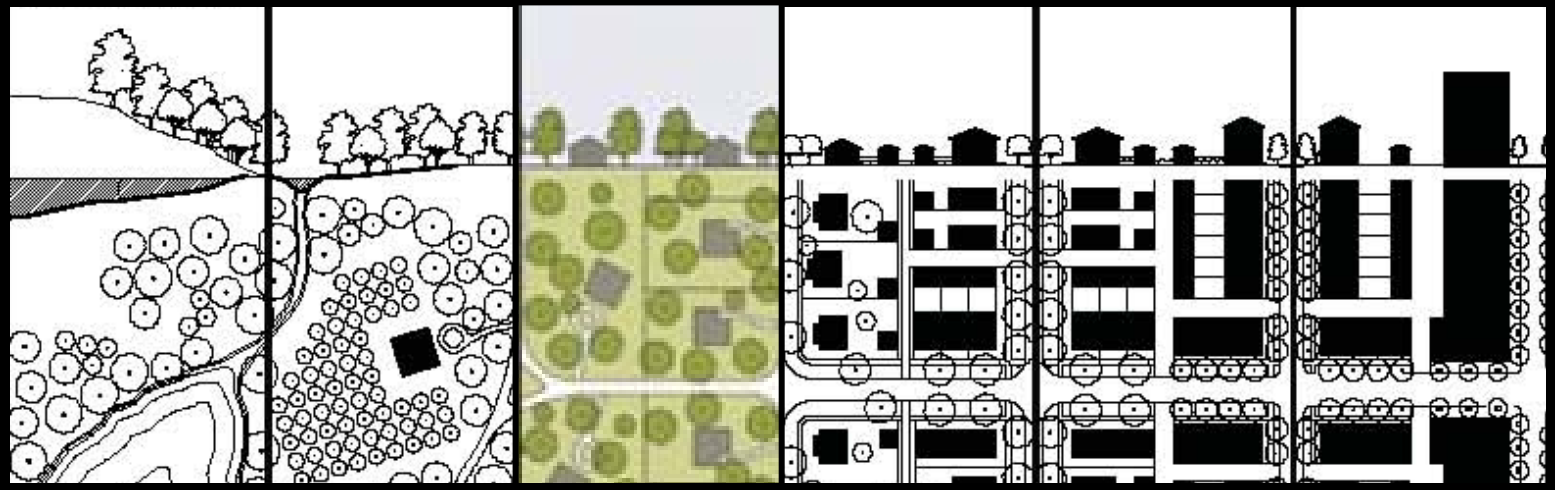
T1 T2 T3 T4 T5 T6

Natural Zone



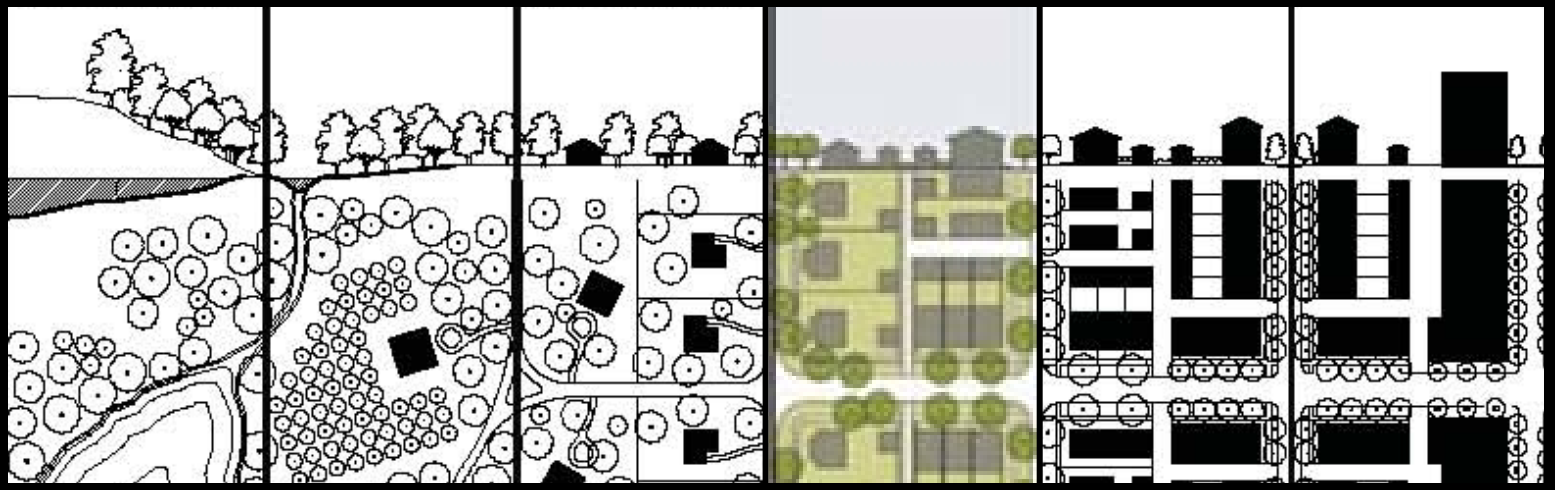
T1 **T2** T3 T4 T5 T6

Rural Zone



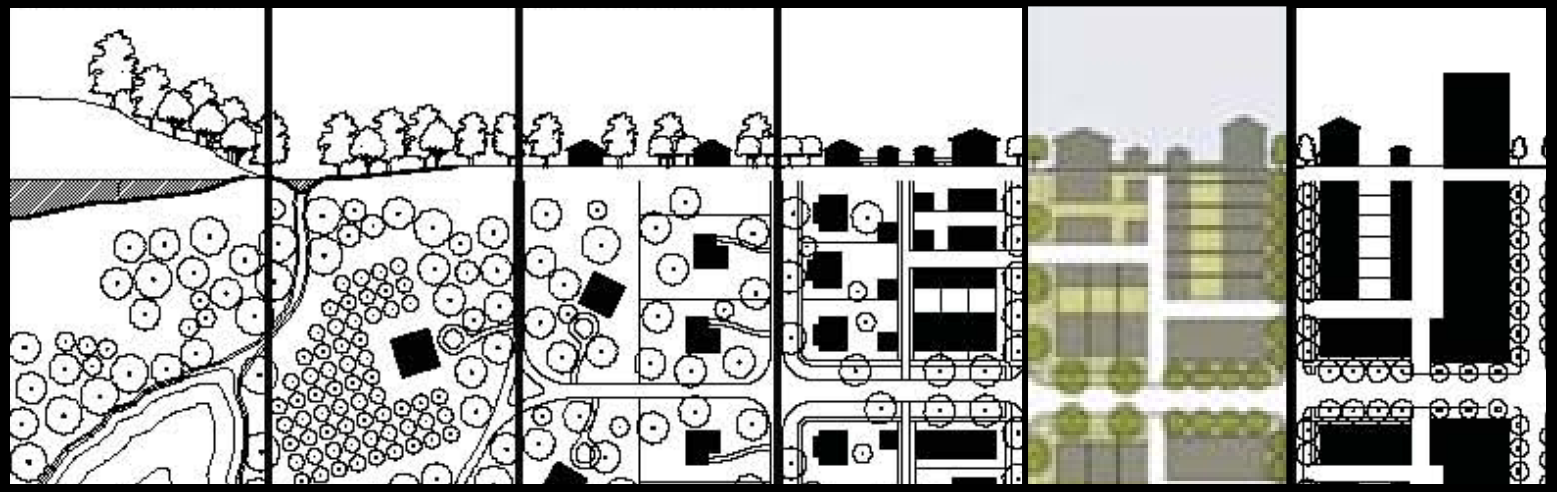
T1 T2 **T3** T4 T5 T6

Suburban or Edge



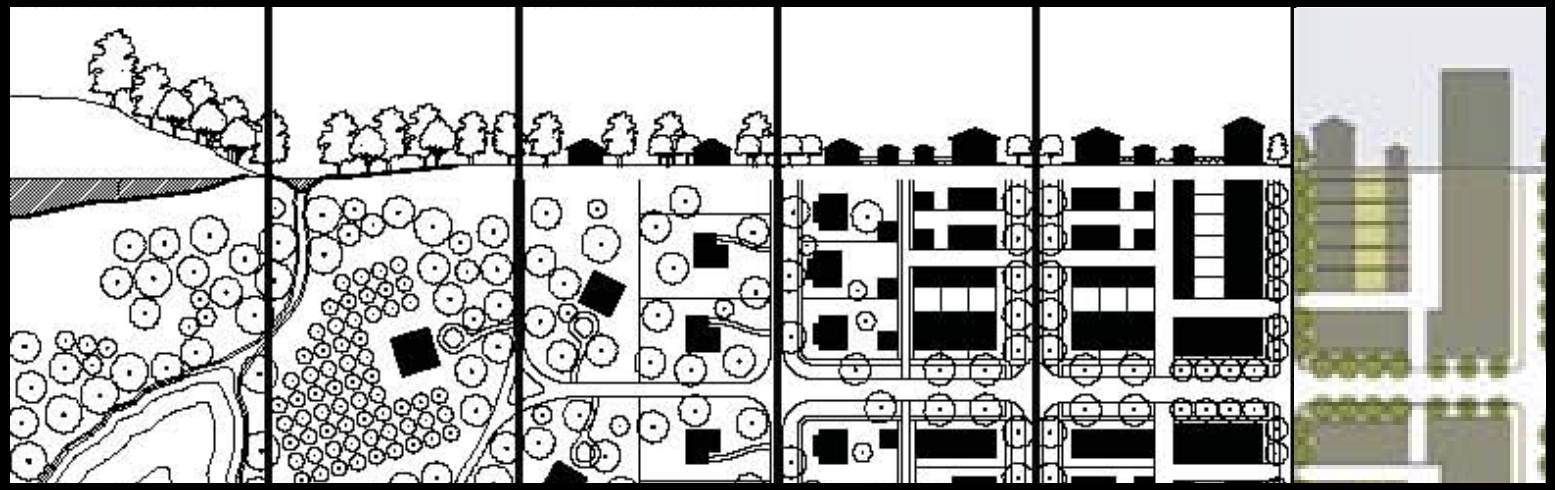
T1 T2 T3 **T4** T5 T6

General Urban



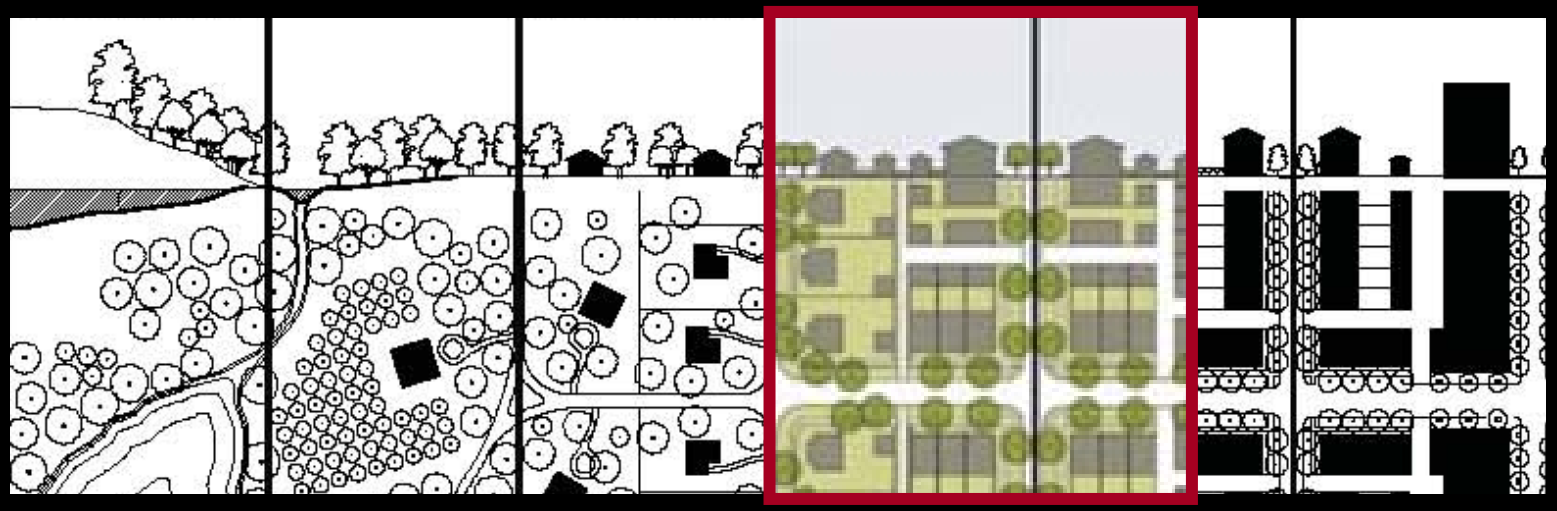
T1 T2 T3 T4 **T5** T6

Urban Center



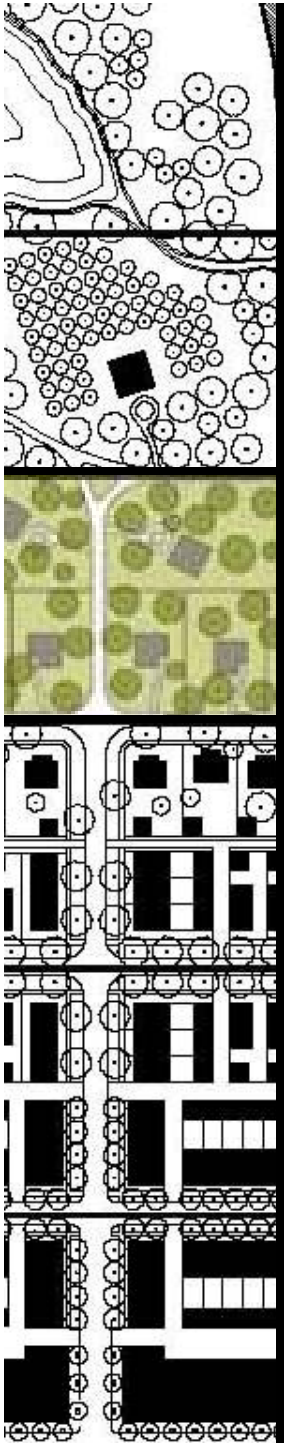
T1 T2 T3 T4 T5 **T6**

Urban Core



T1 T2 T3 **T4** **T5** T6

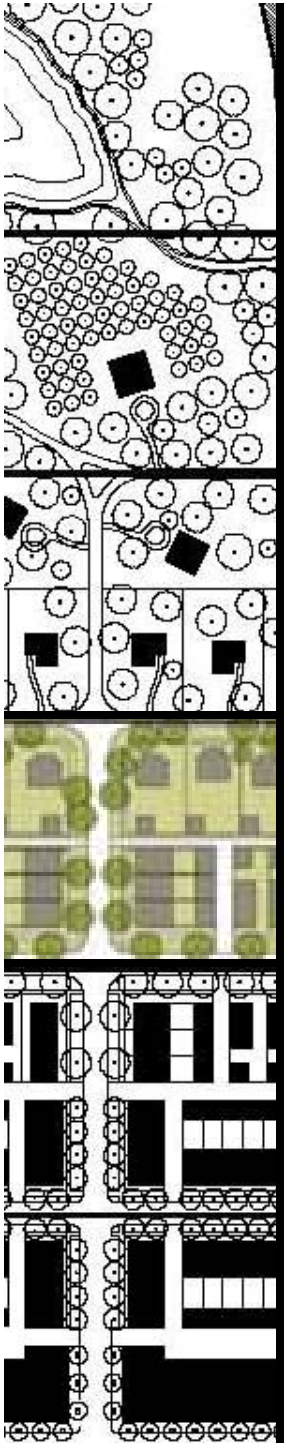
Case Study:
Federal Boulevard
Denver, CO



T3: Suburban Edge

- Low density residential
- Large blocks
- Curvilinear streets
- Deep setbacks with naturalistic plantings

T3 Characteristics

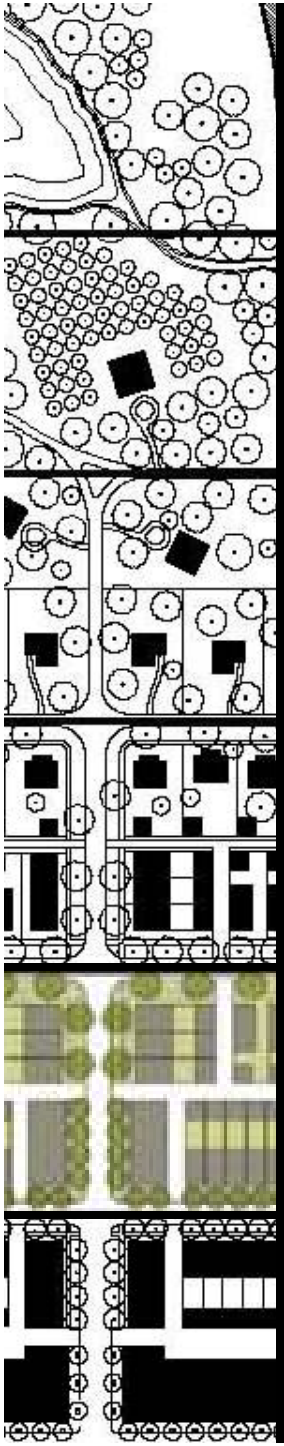


T4: General Urban

- Mixed-use, but primarily residential
- Wide range of building types – single family, sideyard, rowhouses
- Setbacks and landscaping vary
- Medium-sized blocks

T4 Characteristics

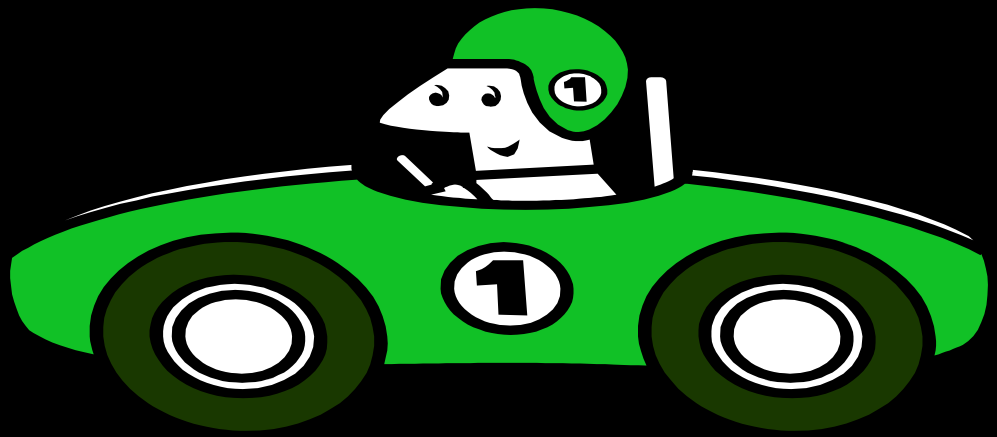
T4 Characteristics



T5: Urban Center

- Includes higher density mixed-use – retail, offices, rowhouses, apartments
- Tight network of streets
- Wide sidewalks
- Street tree plantings
- Buildings set close to frontages

T5 Characteristics



Links between Transportation and Land Use

Mobility Elements

Travel – Moving over distances

Circulation – Moving within areas

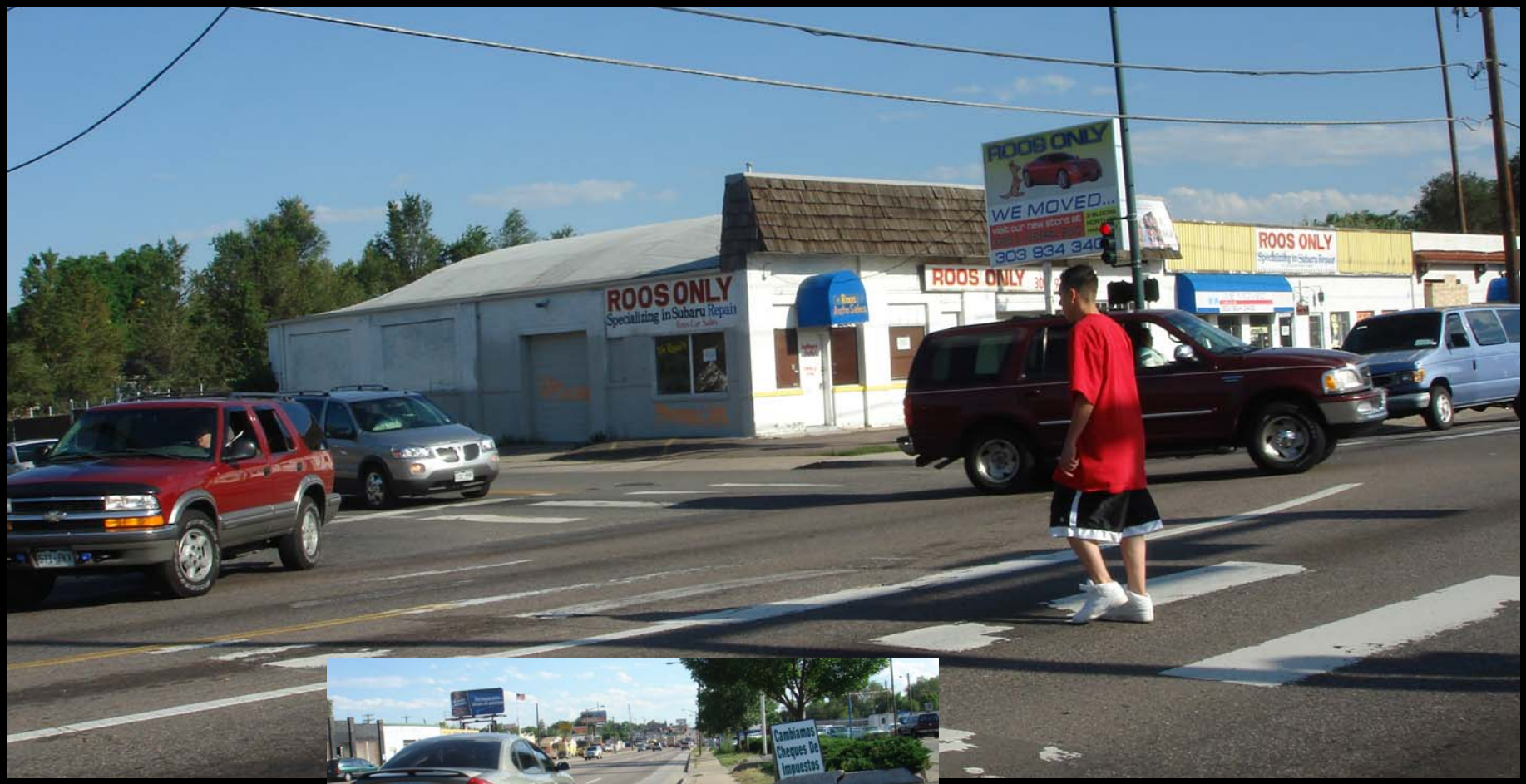
Access – Getting in the door

Facilities

Travel –	Freeways, arterials, rail transit, express bus lanes
Circulation –	Collectors, connectors, transit routes, bike trails and lanes
Access –	Local streets, parking, sidewalks and crosswalks

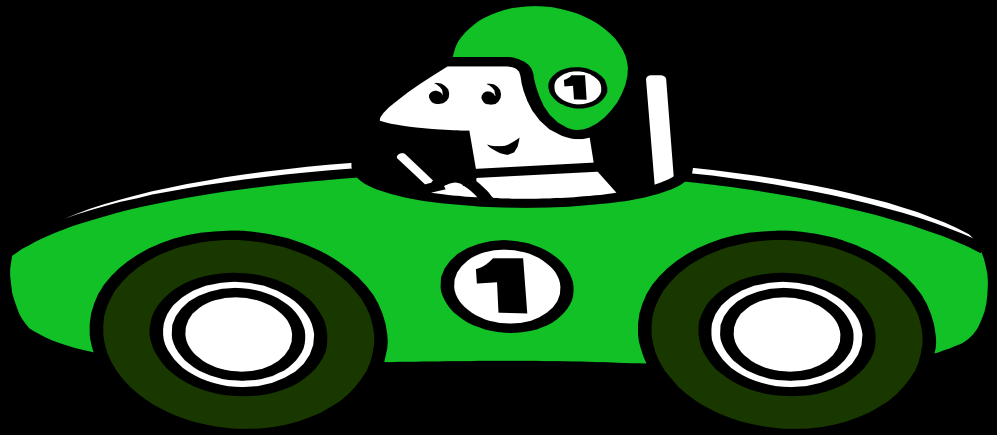
Federal Boulevard - Travel

Federal Boulevard - Circulation



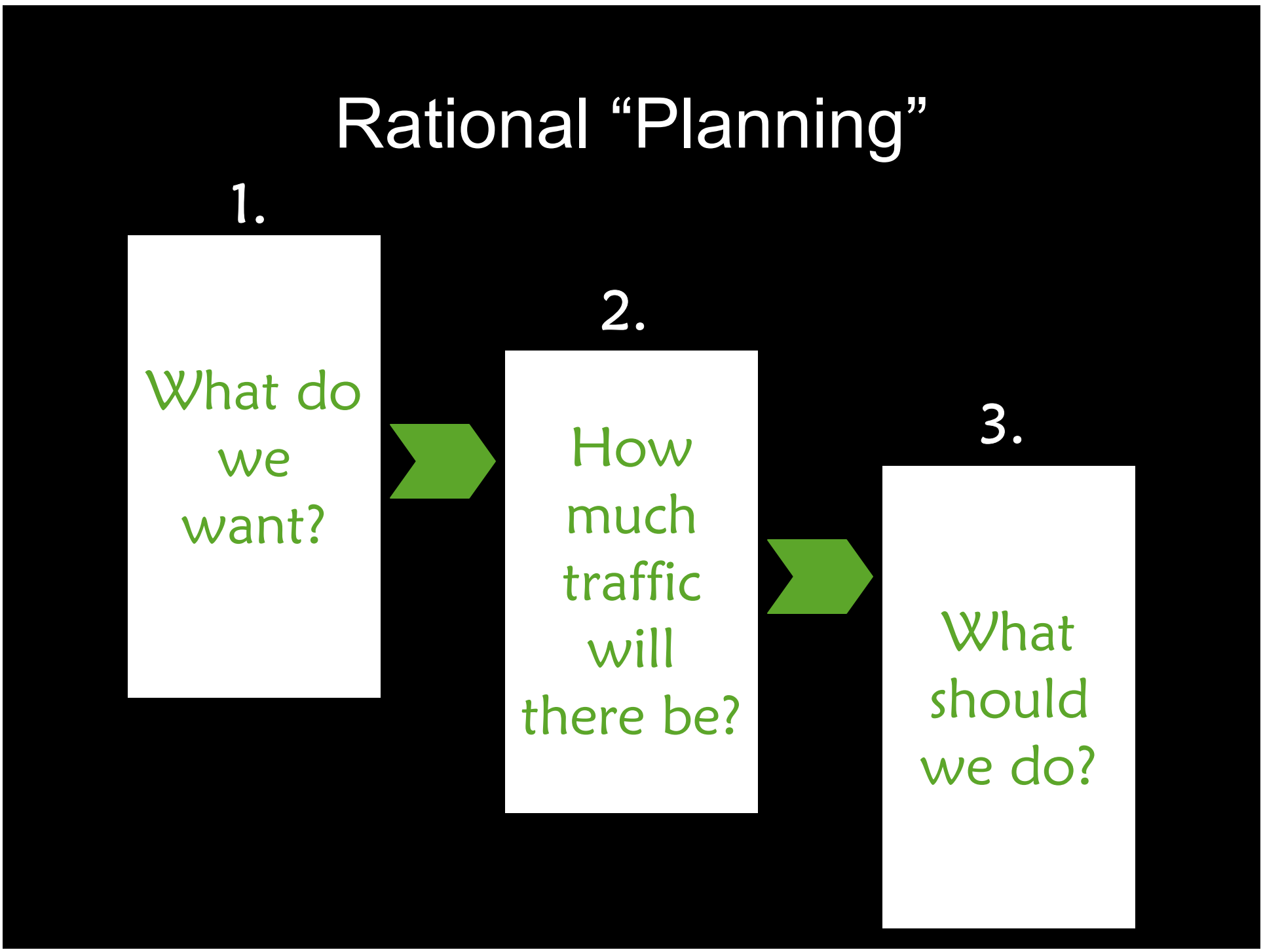
Federal Boulevard - Access

We build
too much for travel
and
too little for circulation
and access

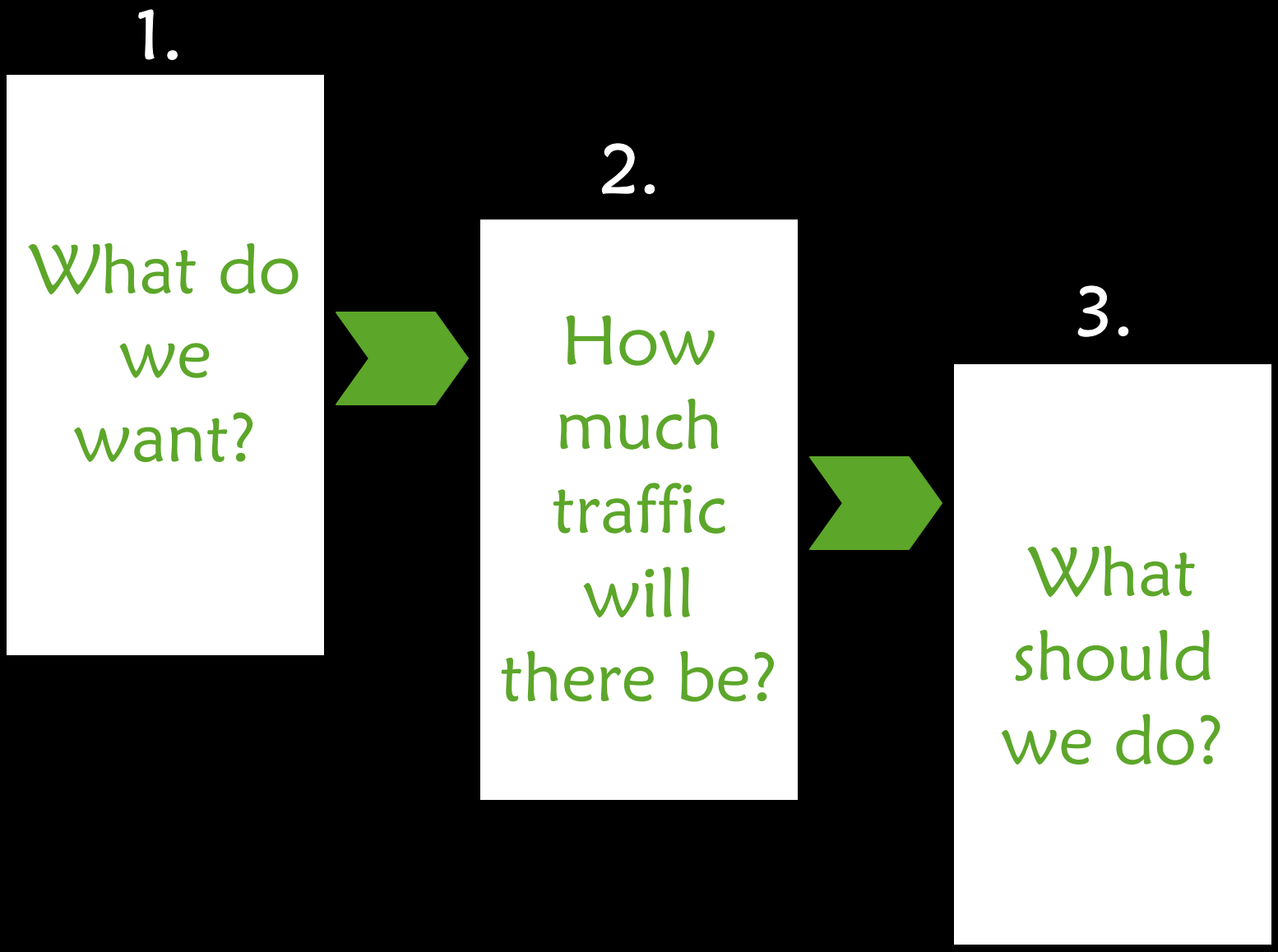


Traffic Forecasting ≠ Planning

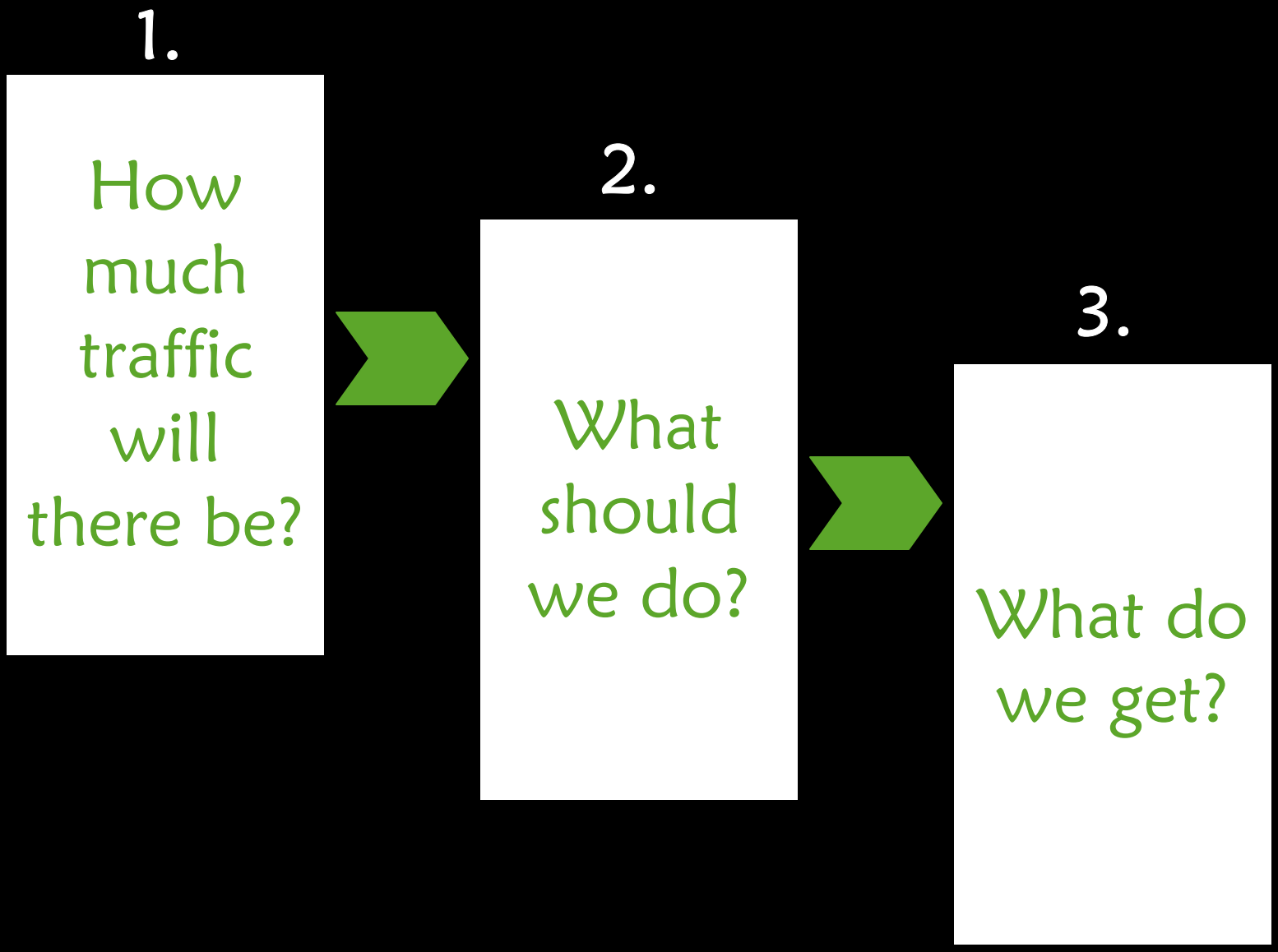
Rational “Planning”



Actual “Planning”



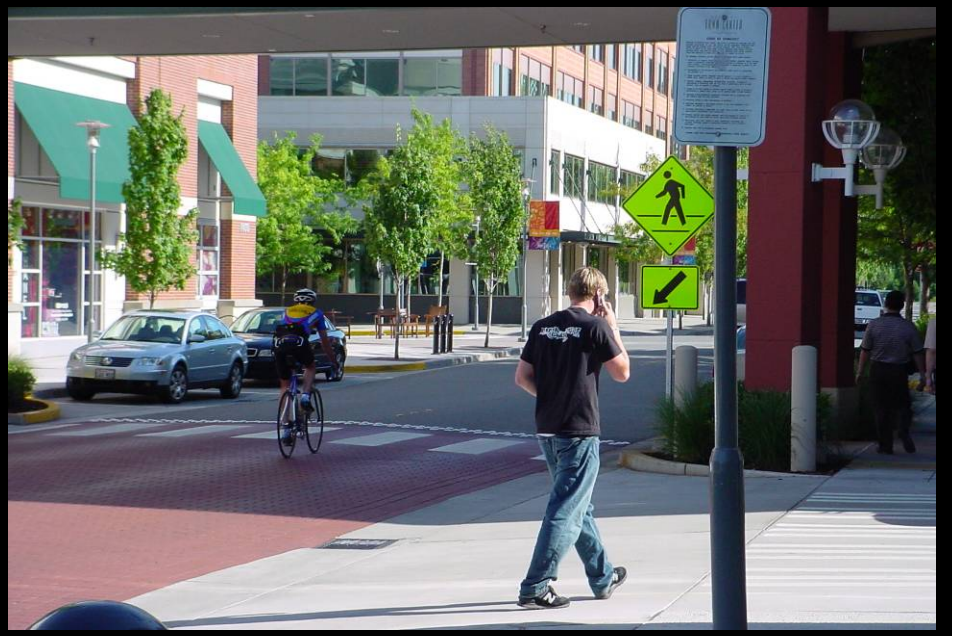
Actual “Planning”



What Do We Want?

Safe, Inviting Places to Walk and Bicycle

Design For All Users



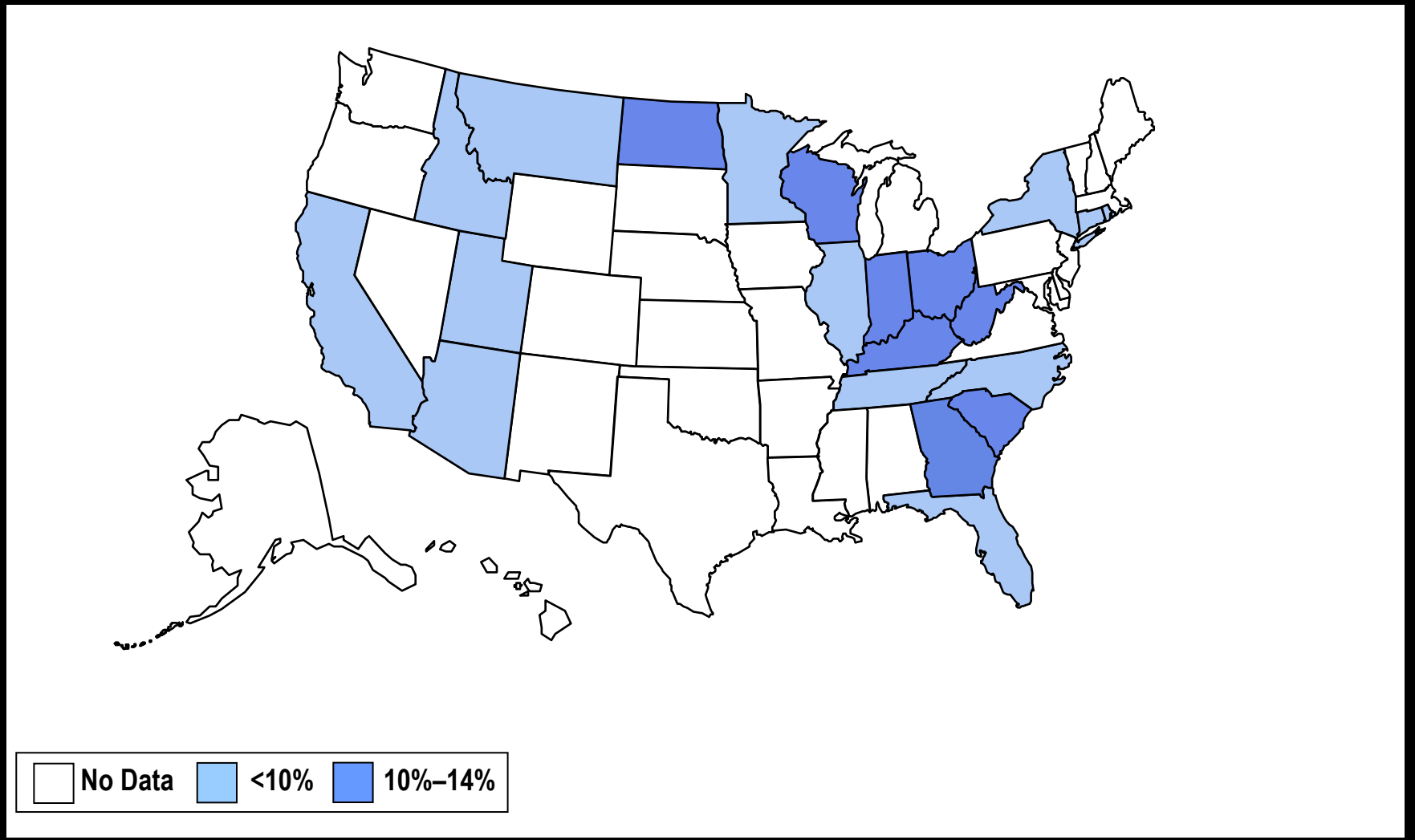
Active Lifestyles

Why?

“A growing obesity epidemic is threatening the health of millions of Americans…obesity is an epidemic and should be taken as seriously as any infectious disease epidemic ” (CDC).

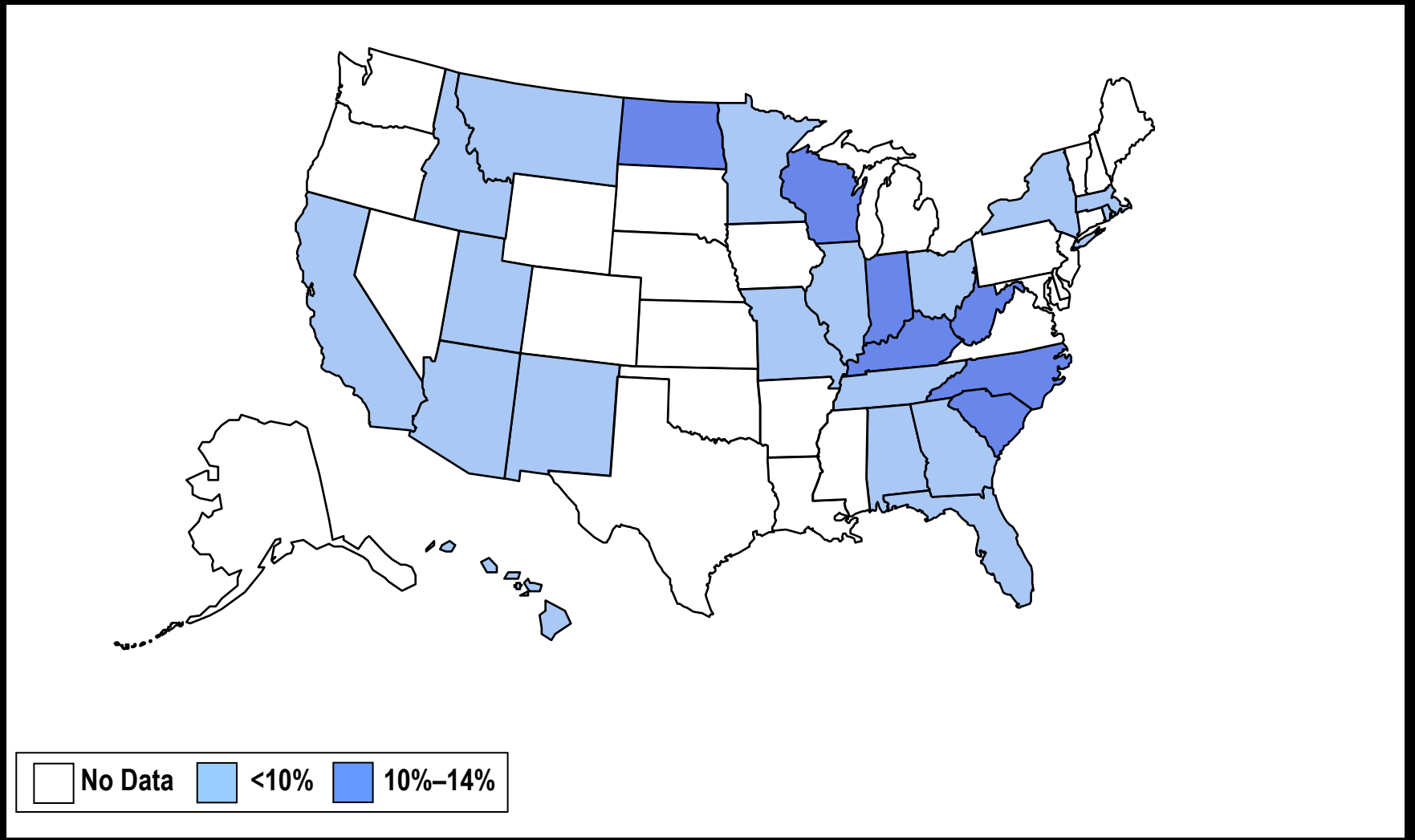
Overweight and Obesity in the Media

Obesity Trends Among U.S. Adults BRFSS, 1985



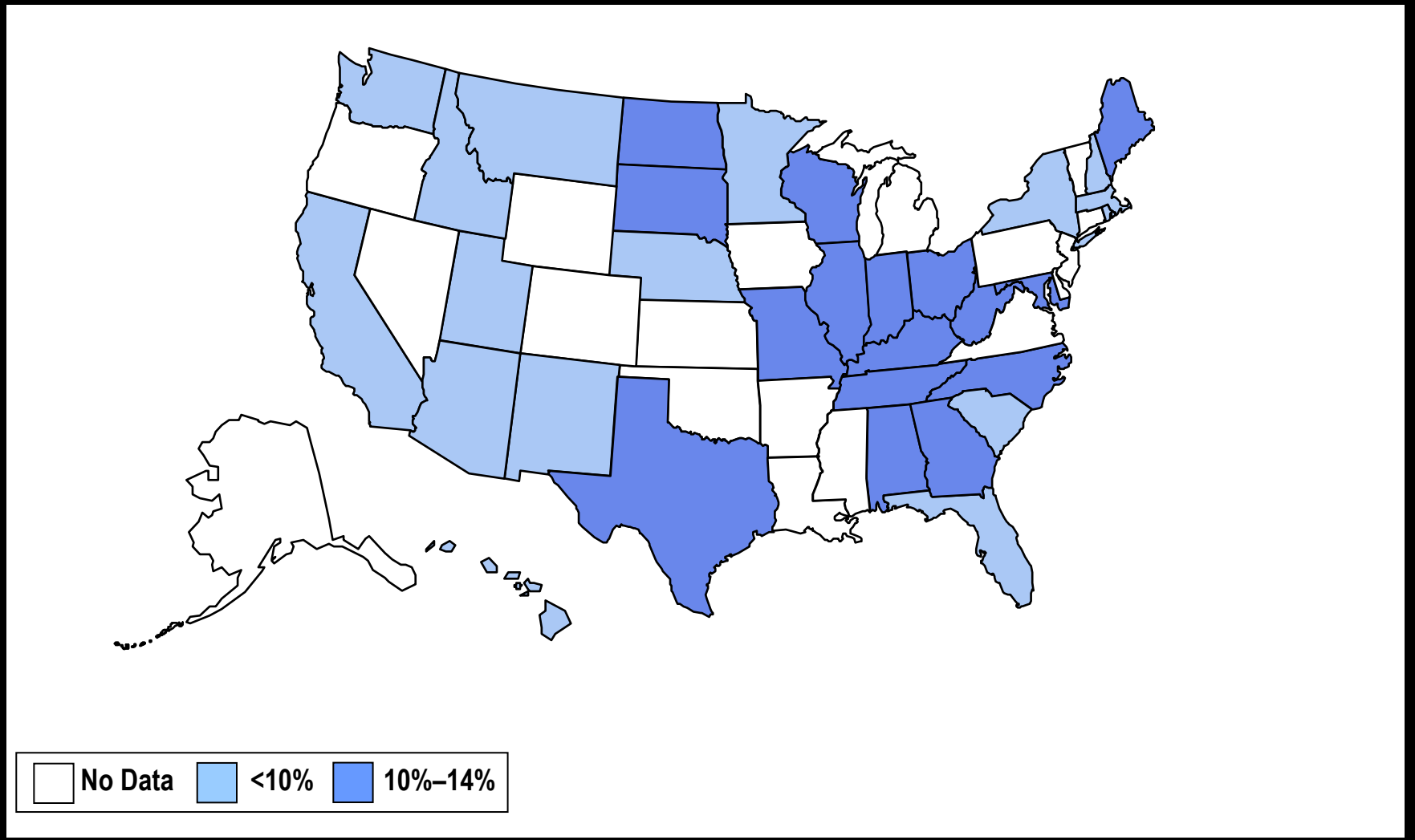
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 1986



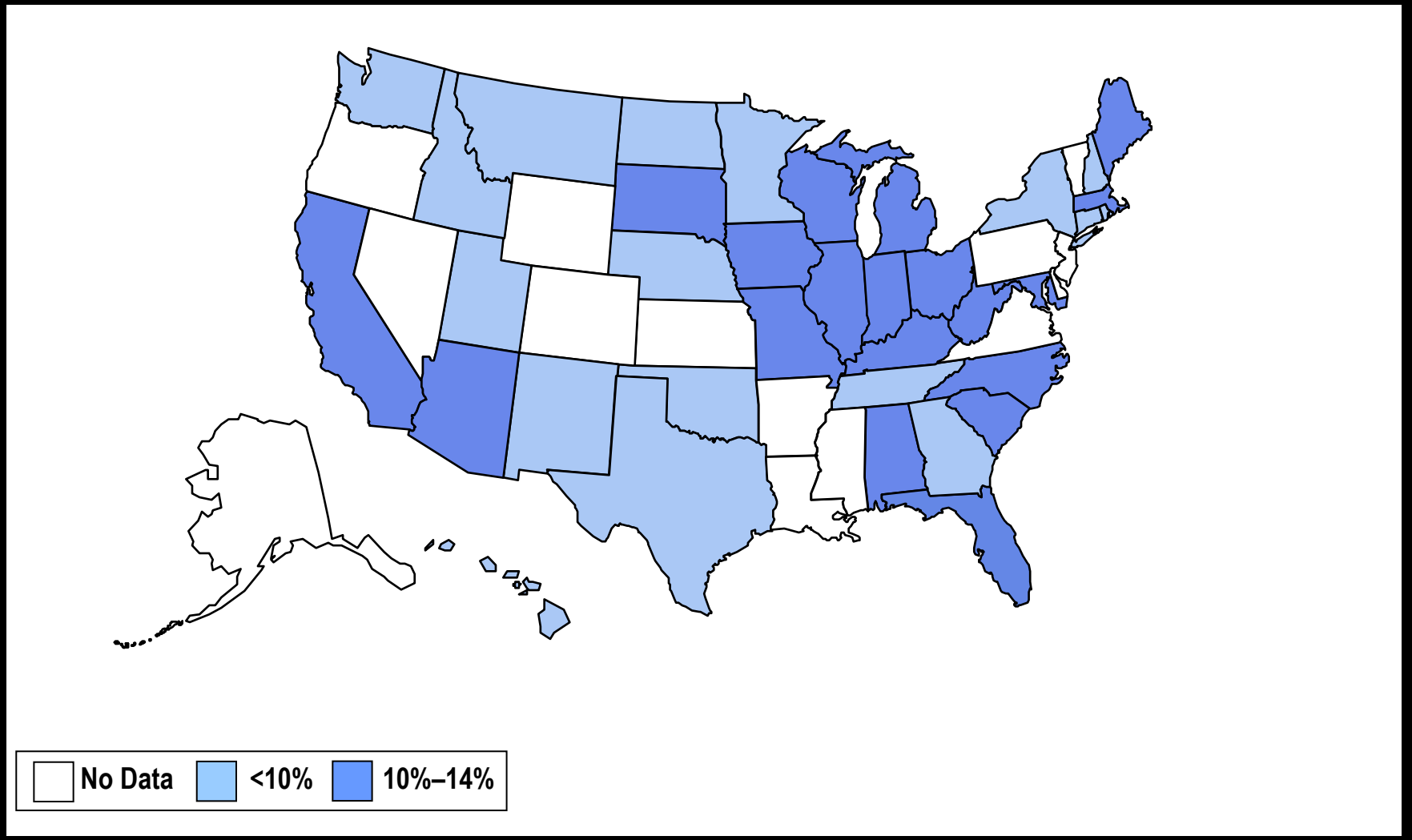
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1987



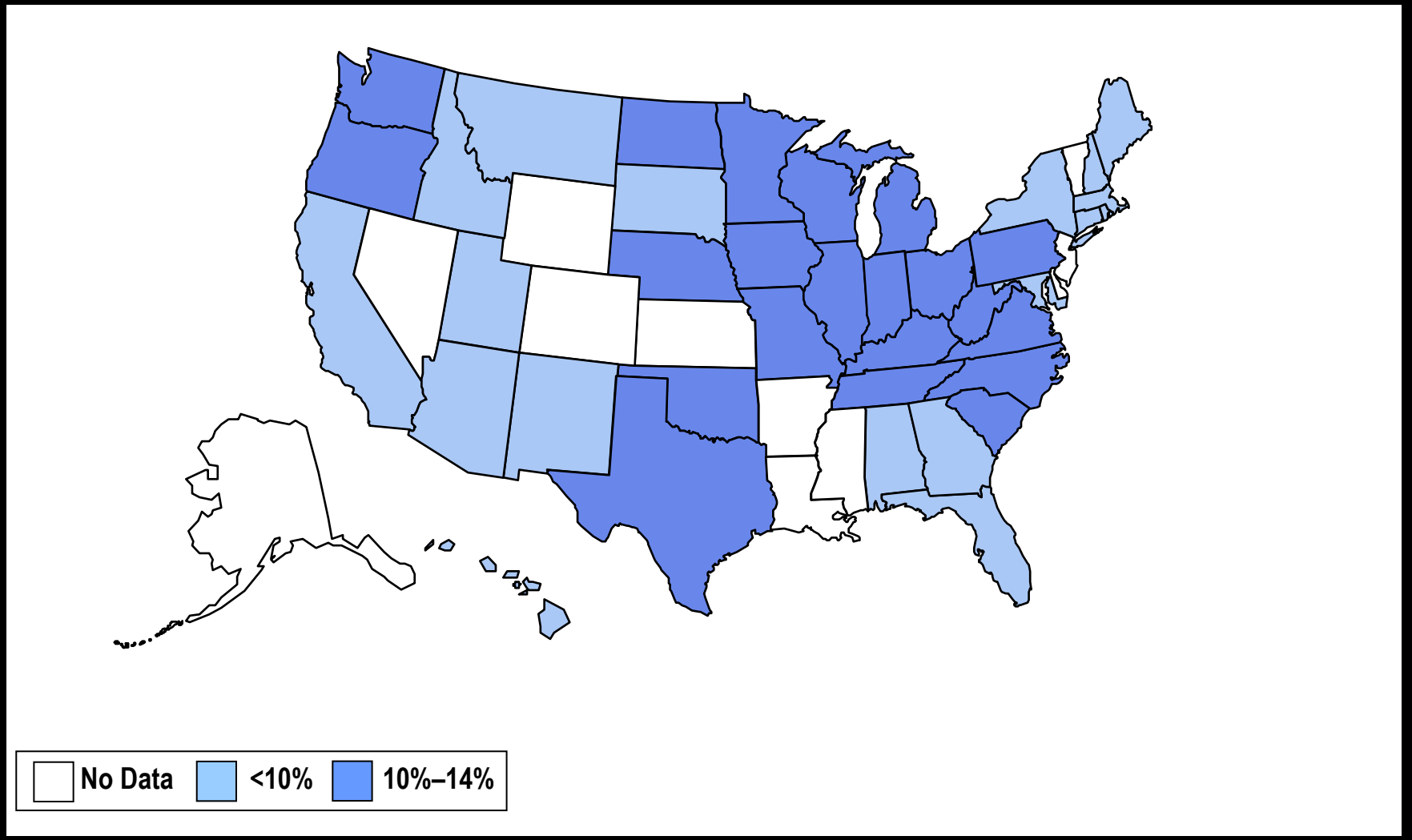
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1988



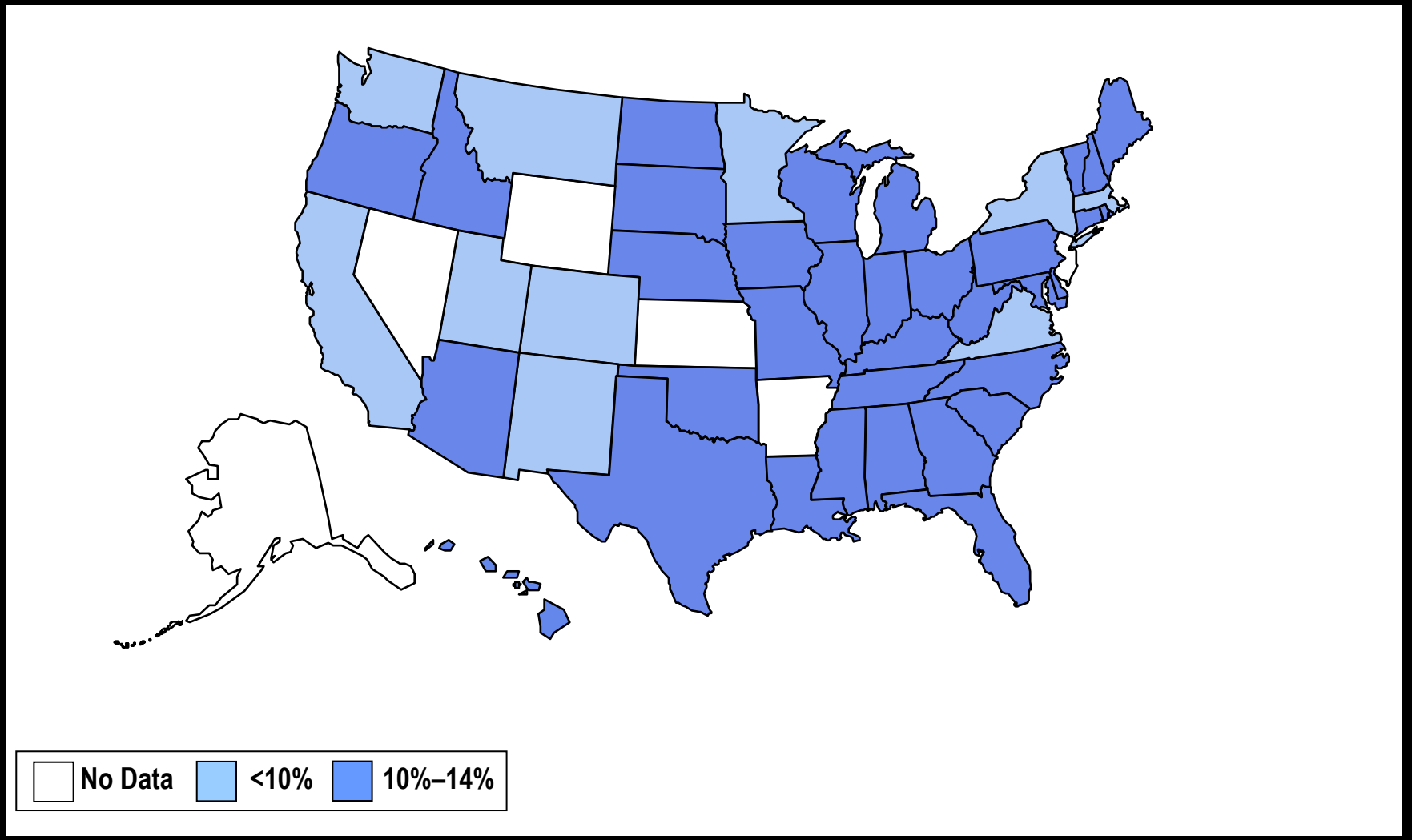
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1989



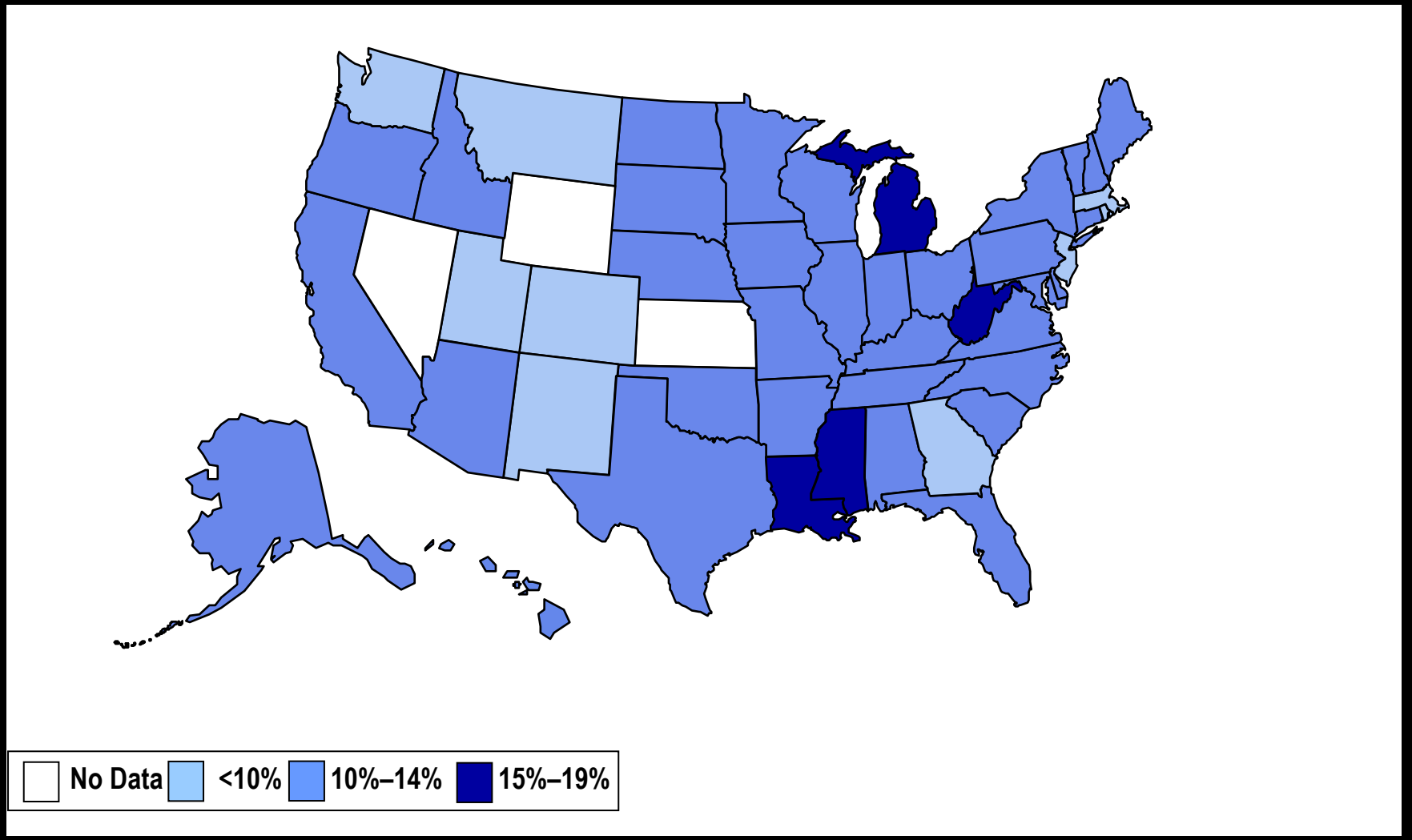
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 1990



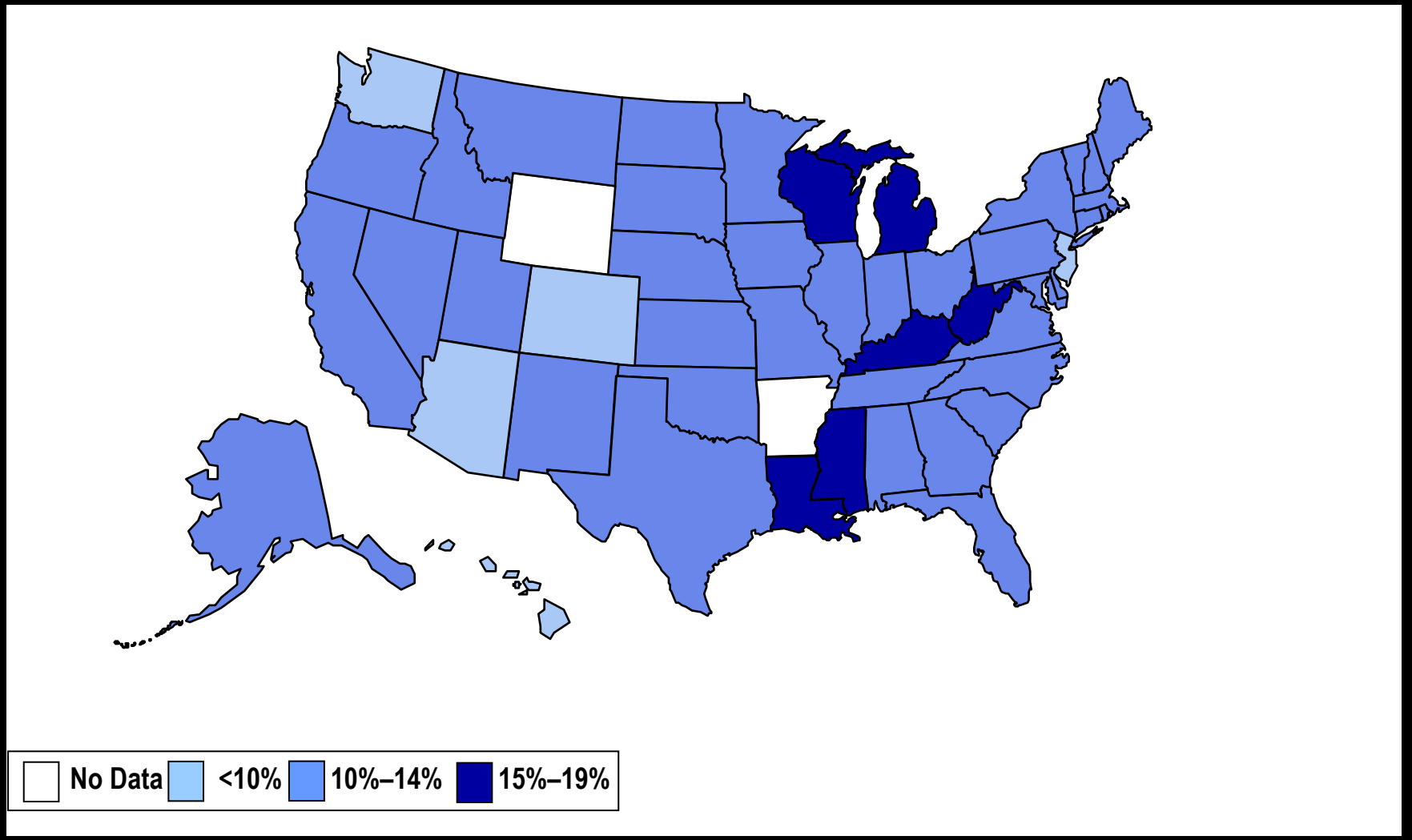
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 1991



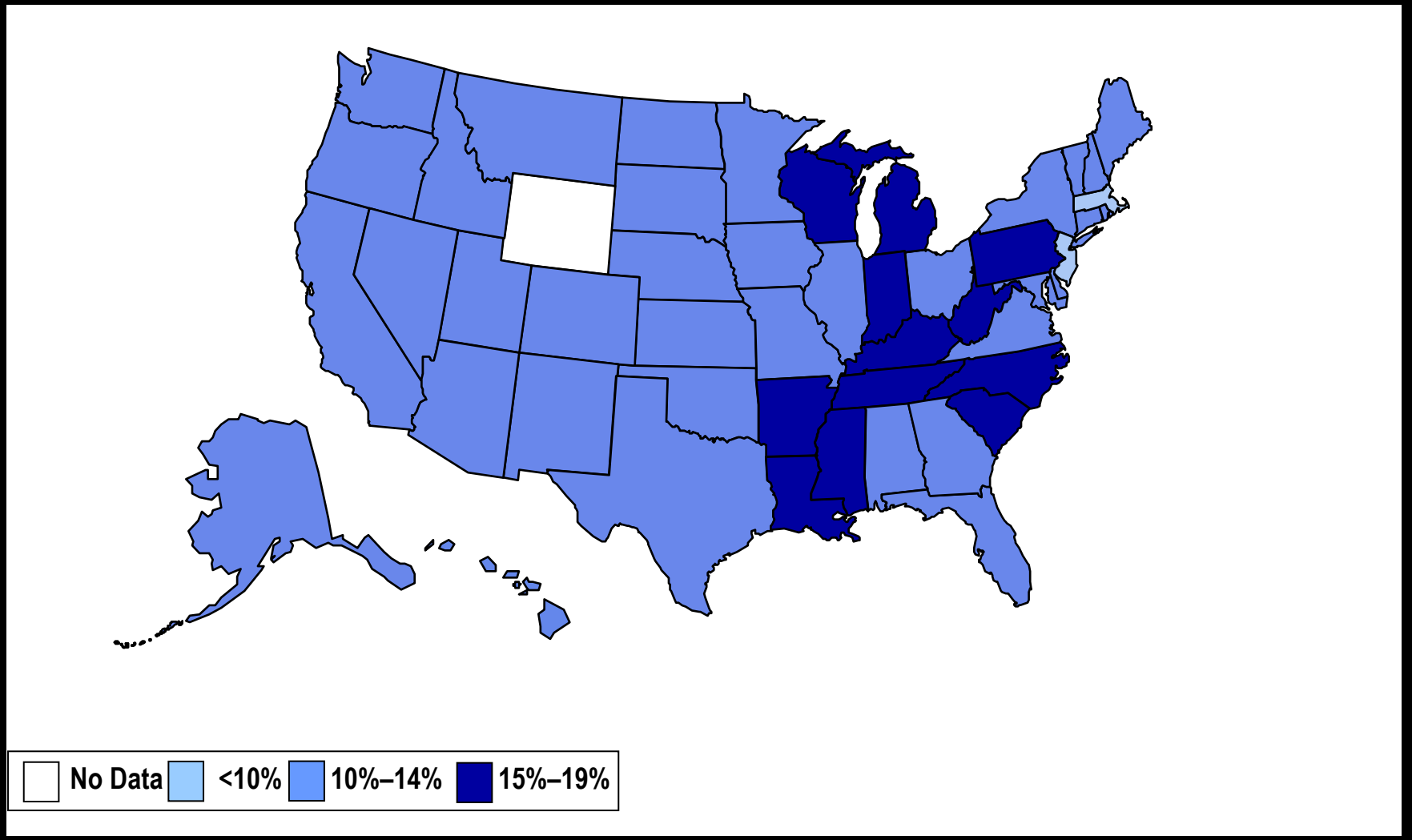
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1992



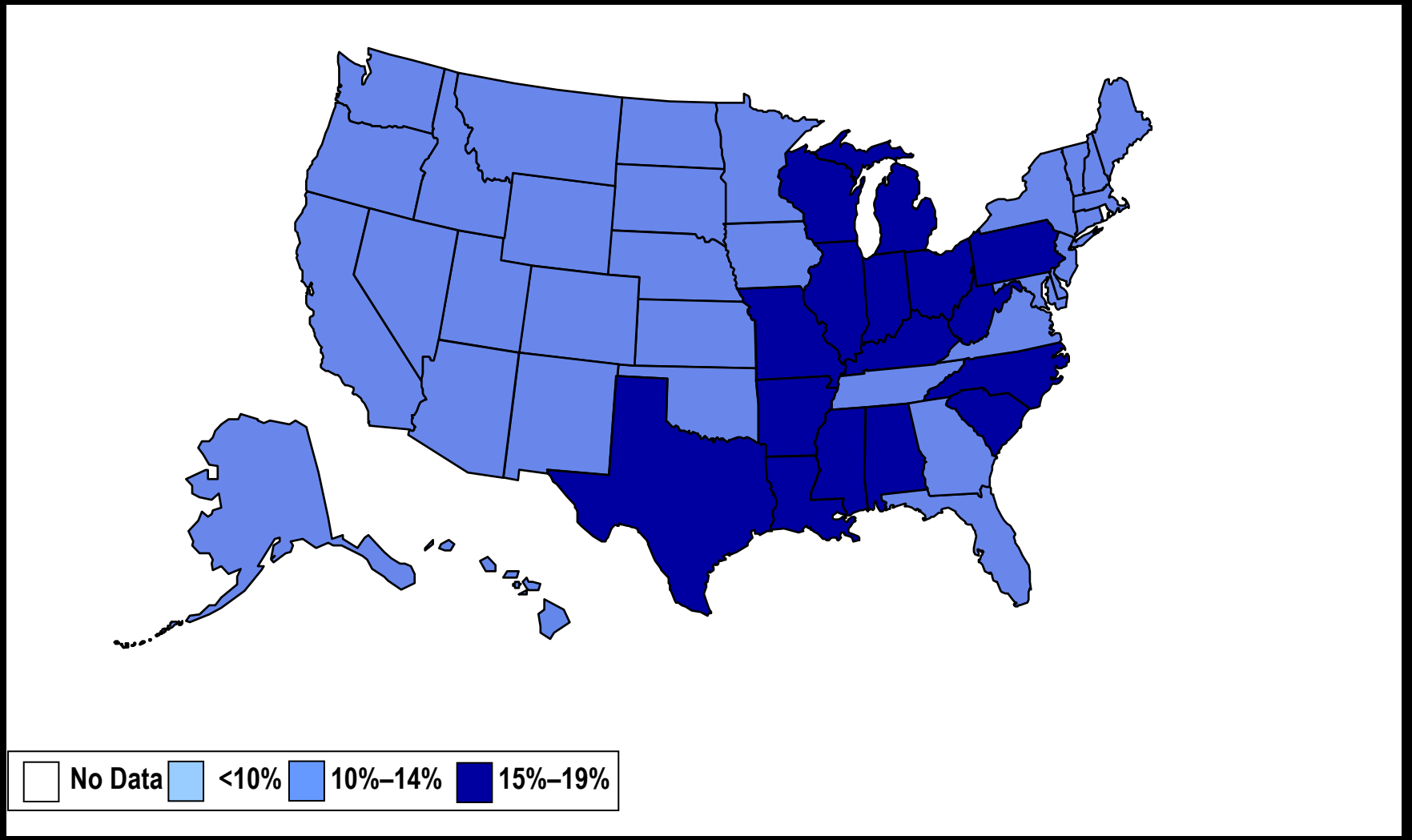
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1993



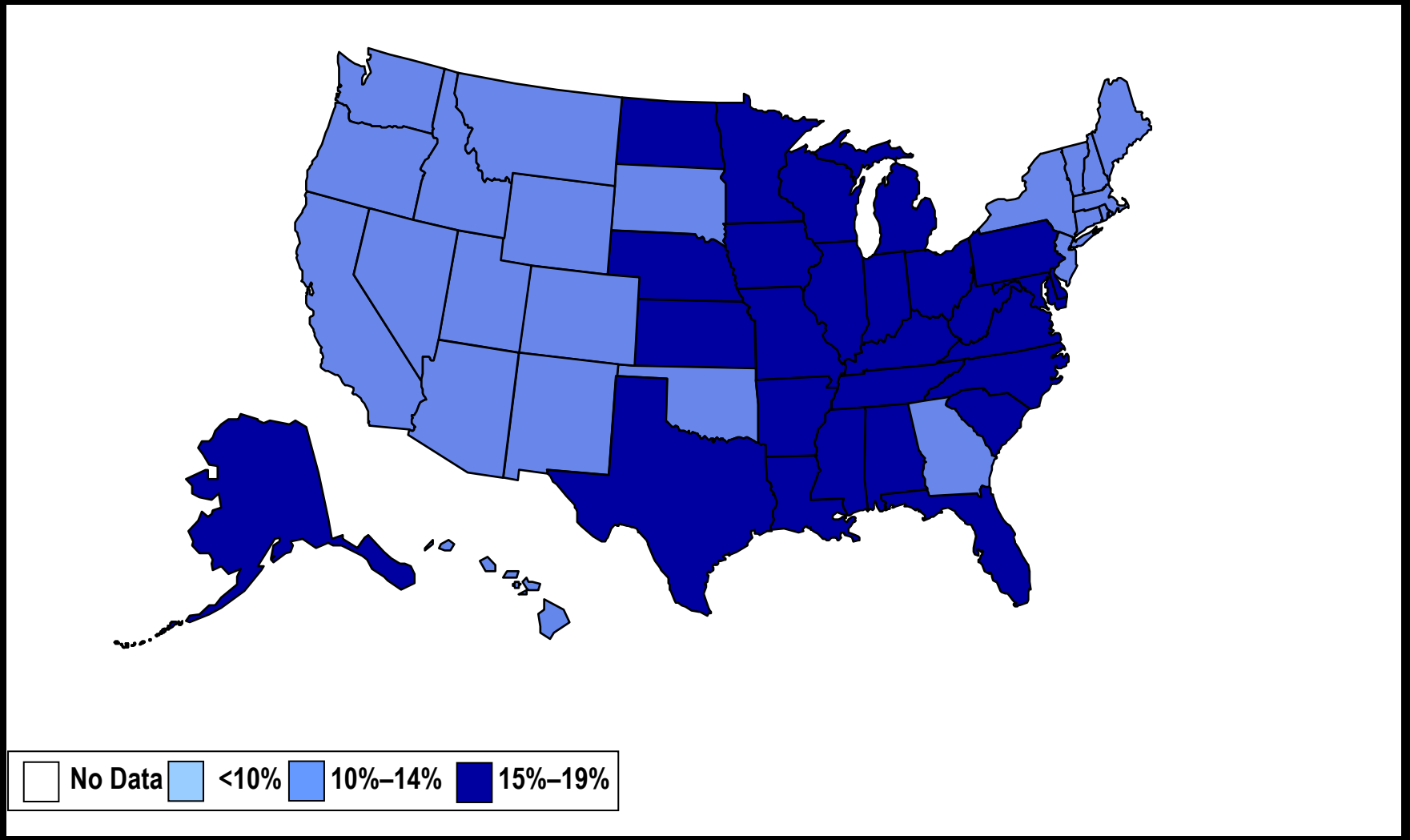
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1994



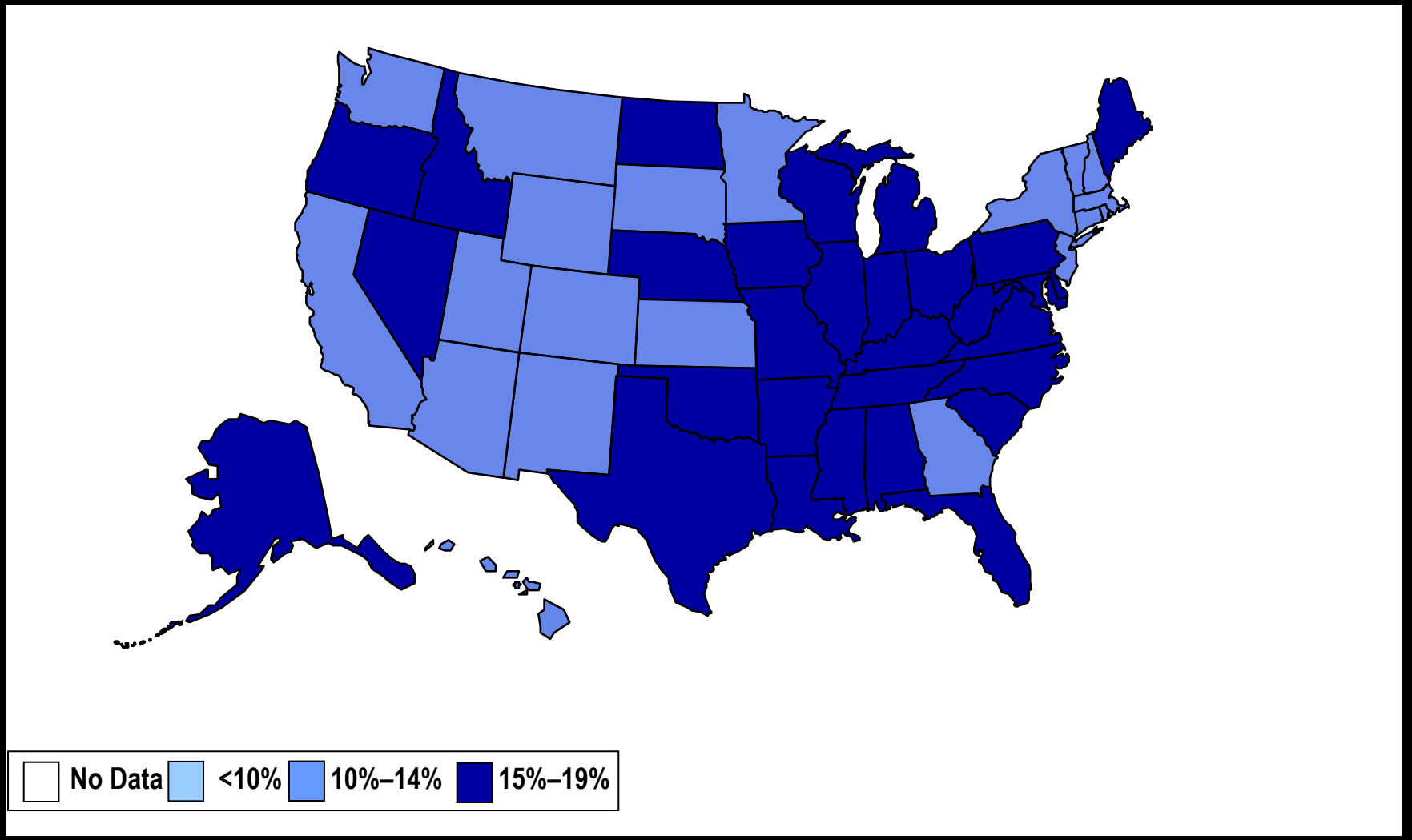
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1995



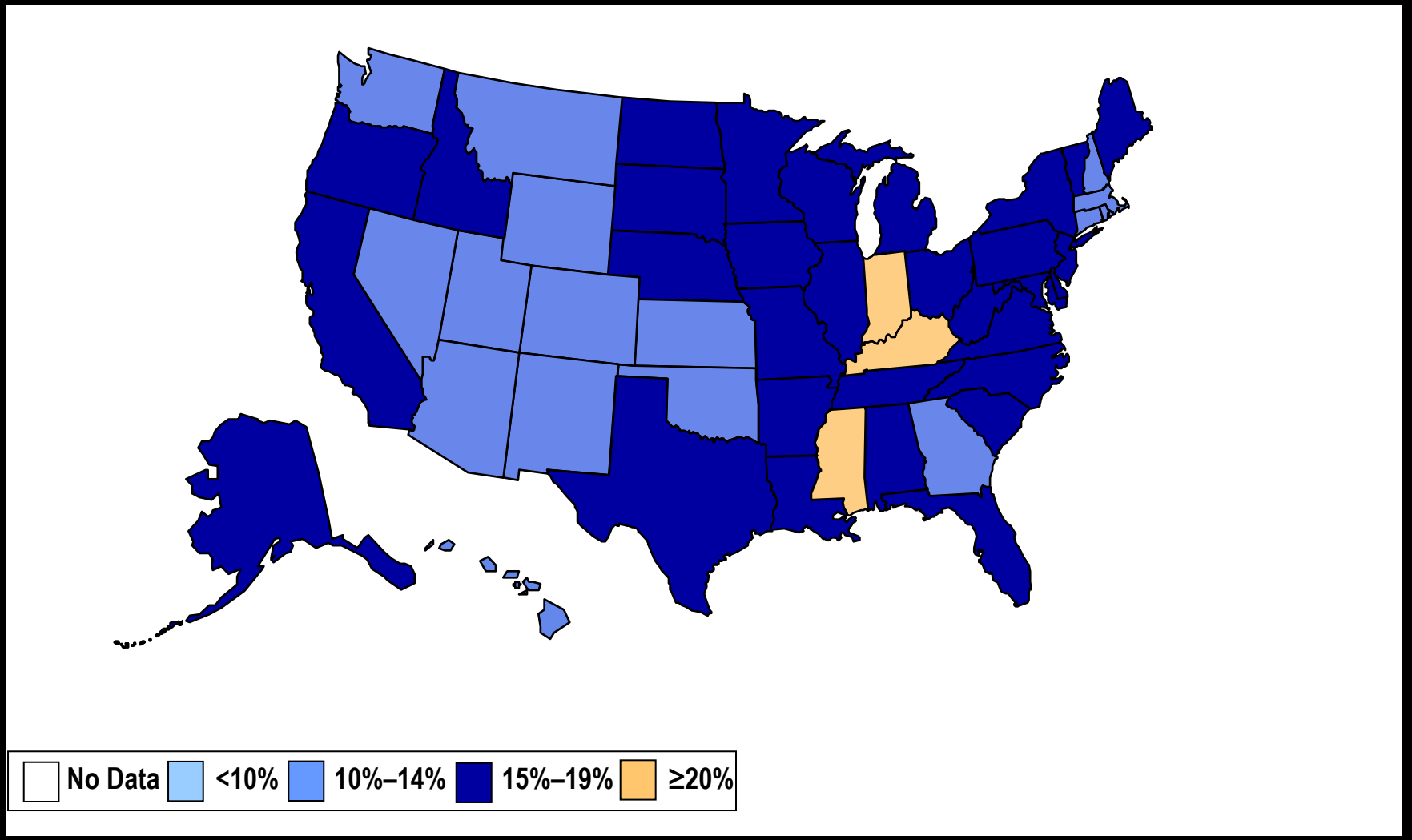
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 1996



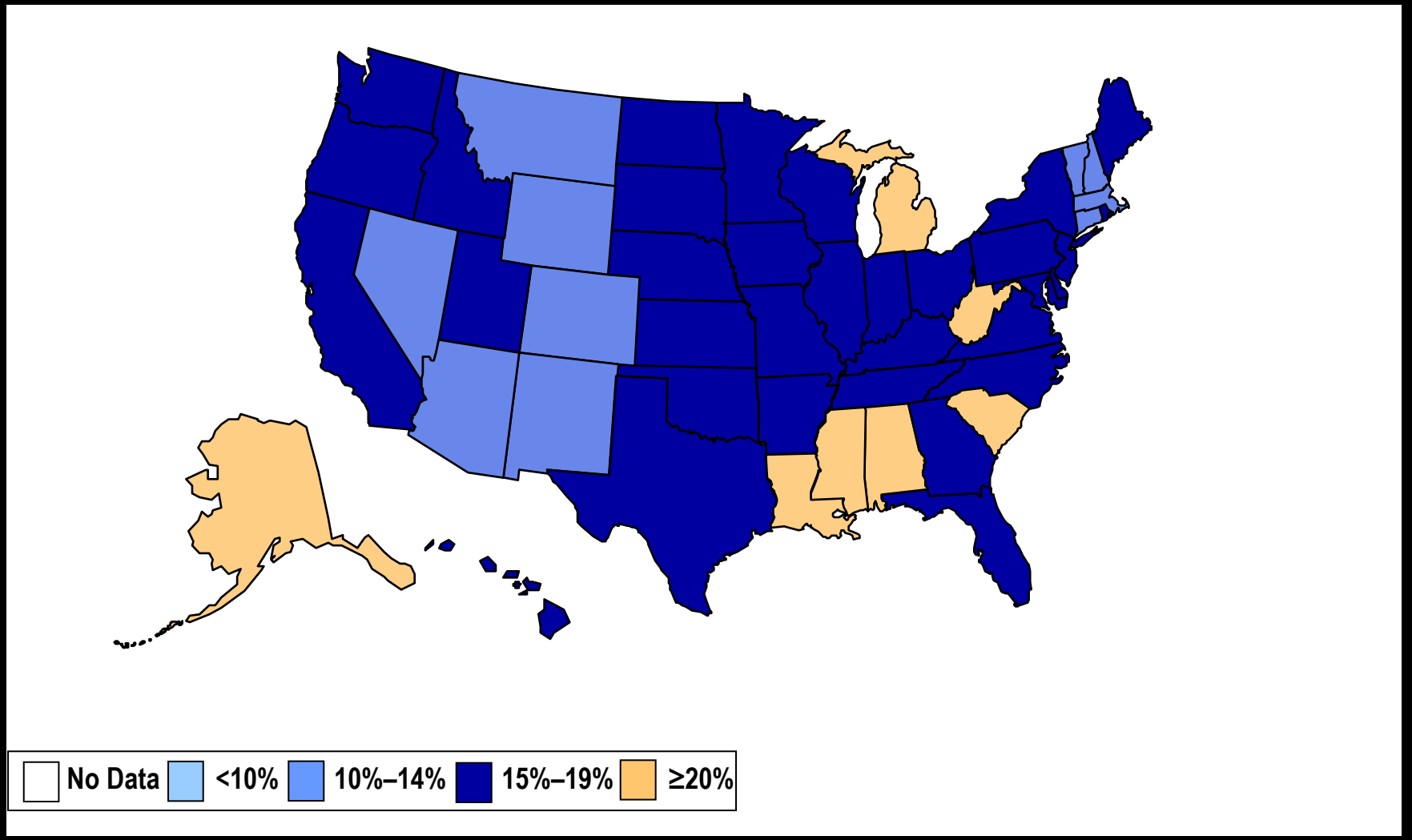
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1997



Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 1998



Source: Behavioral Risk Factor Surveillance System, CDC

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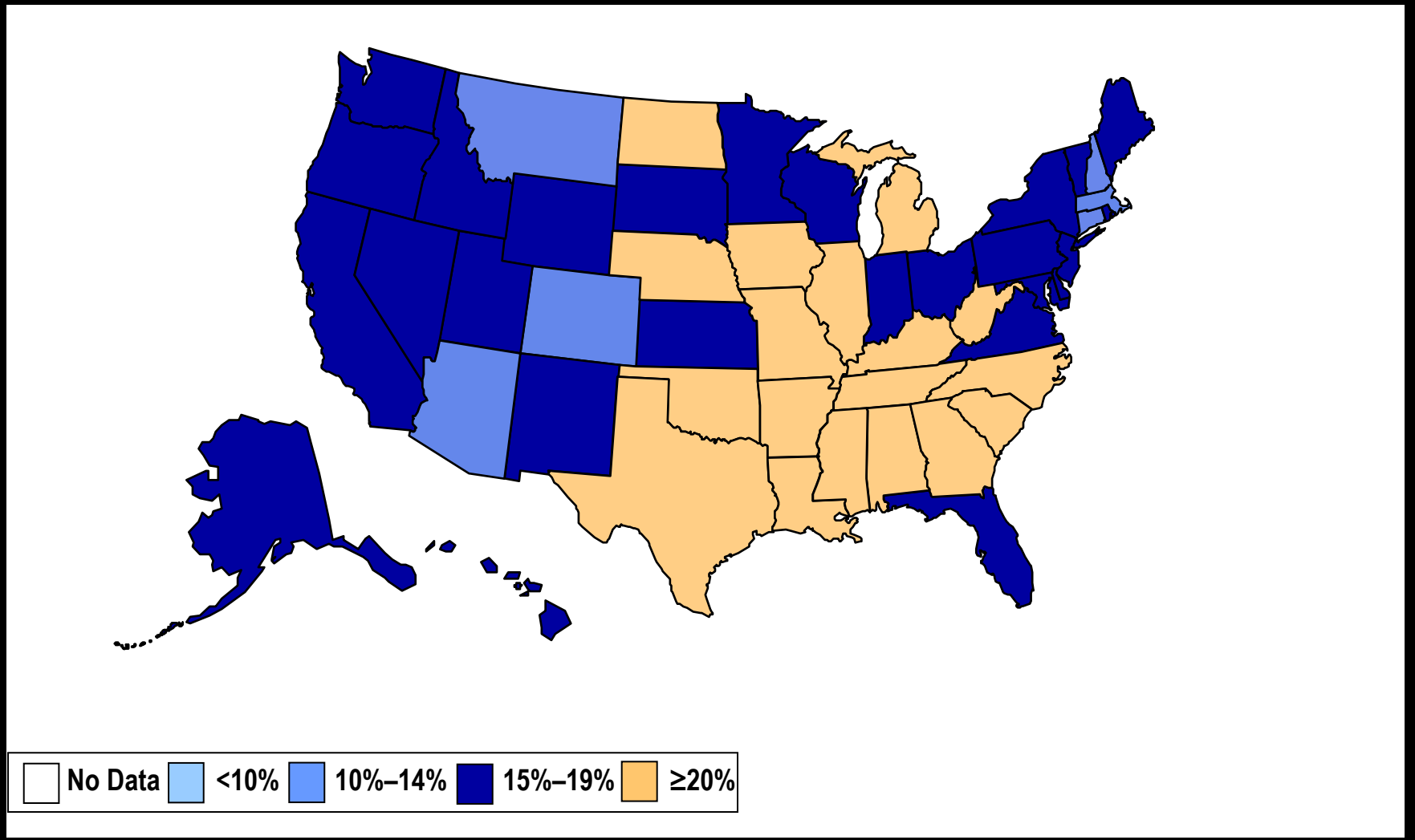
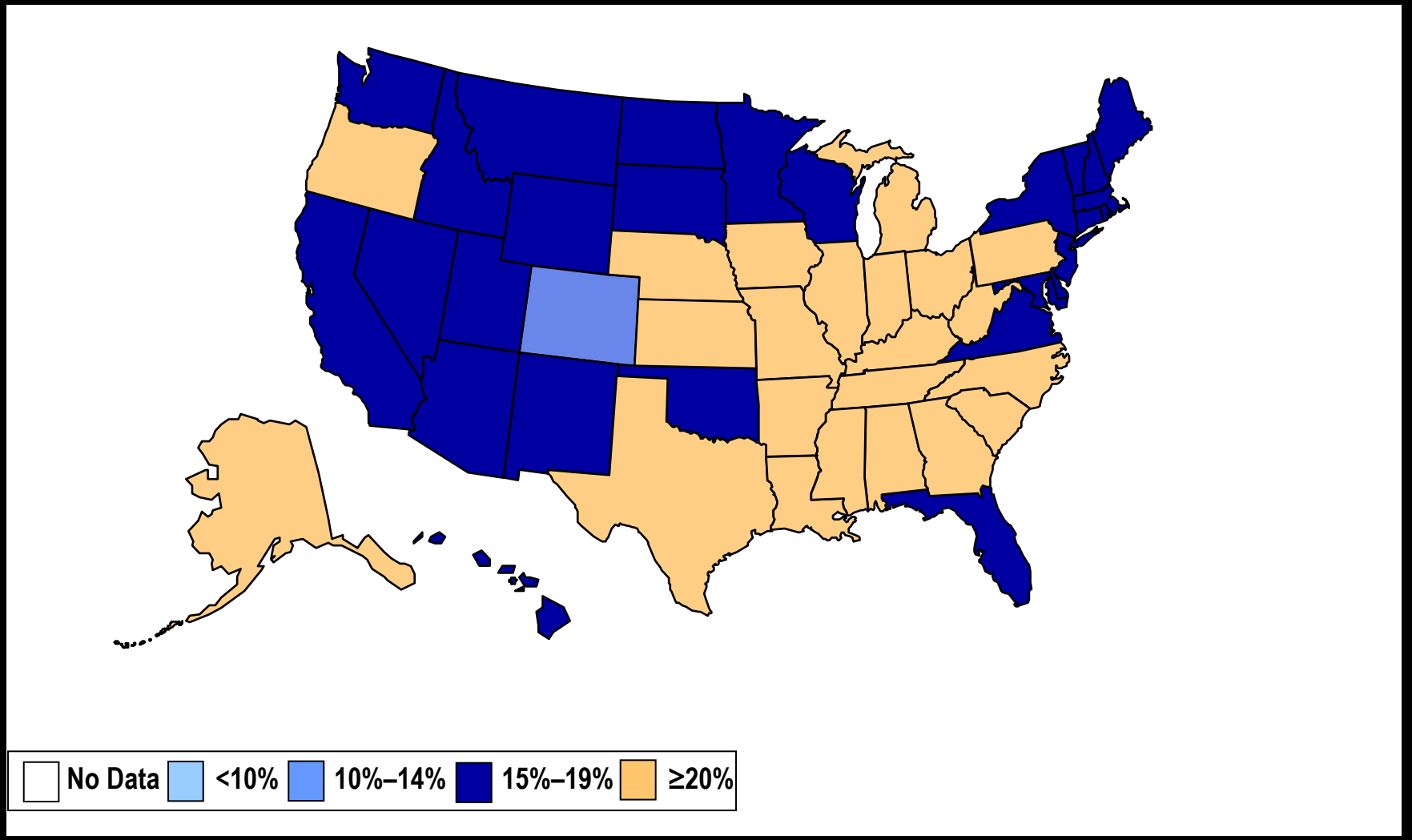


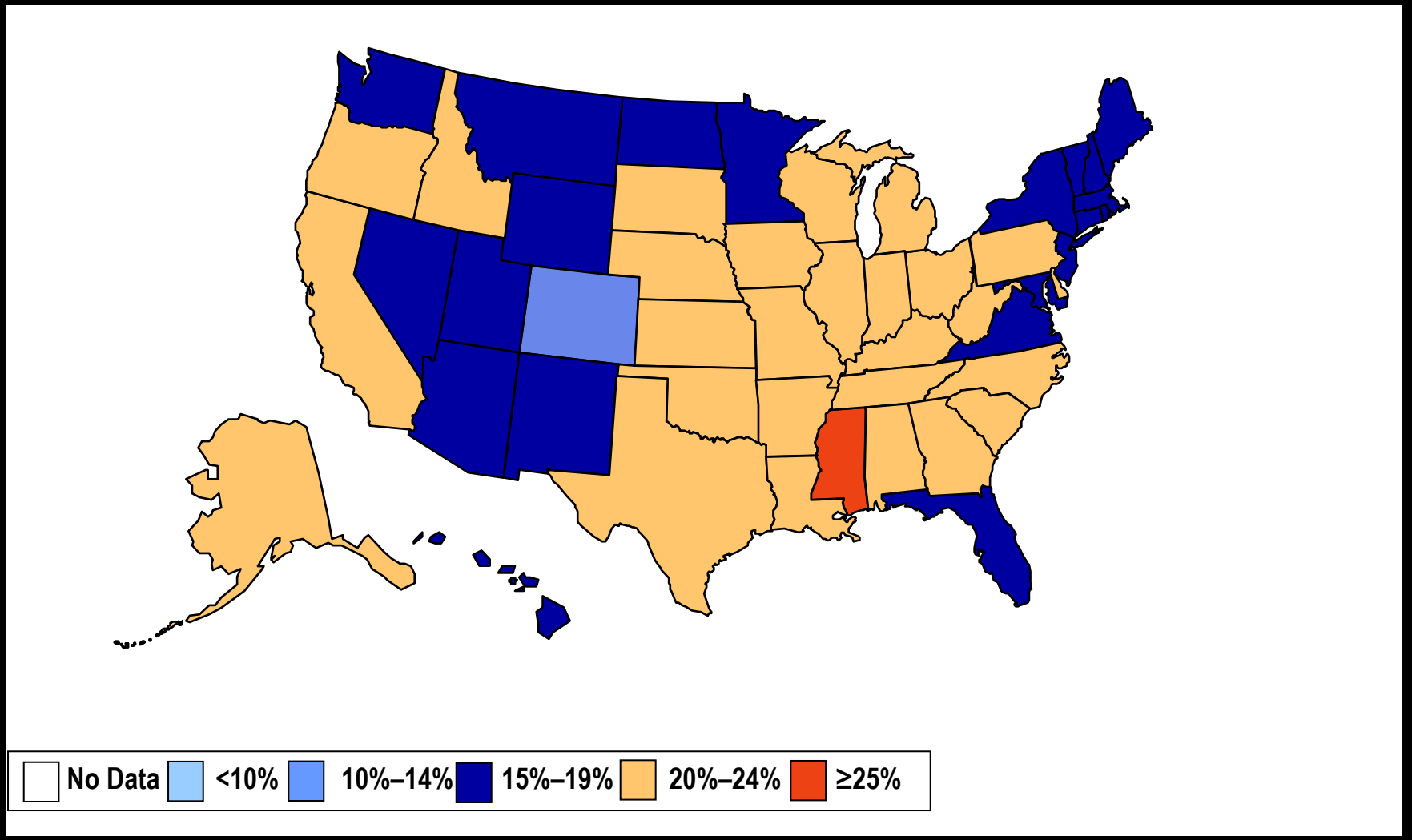
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 2000



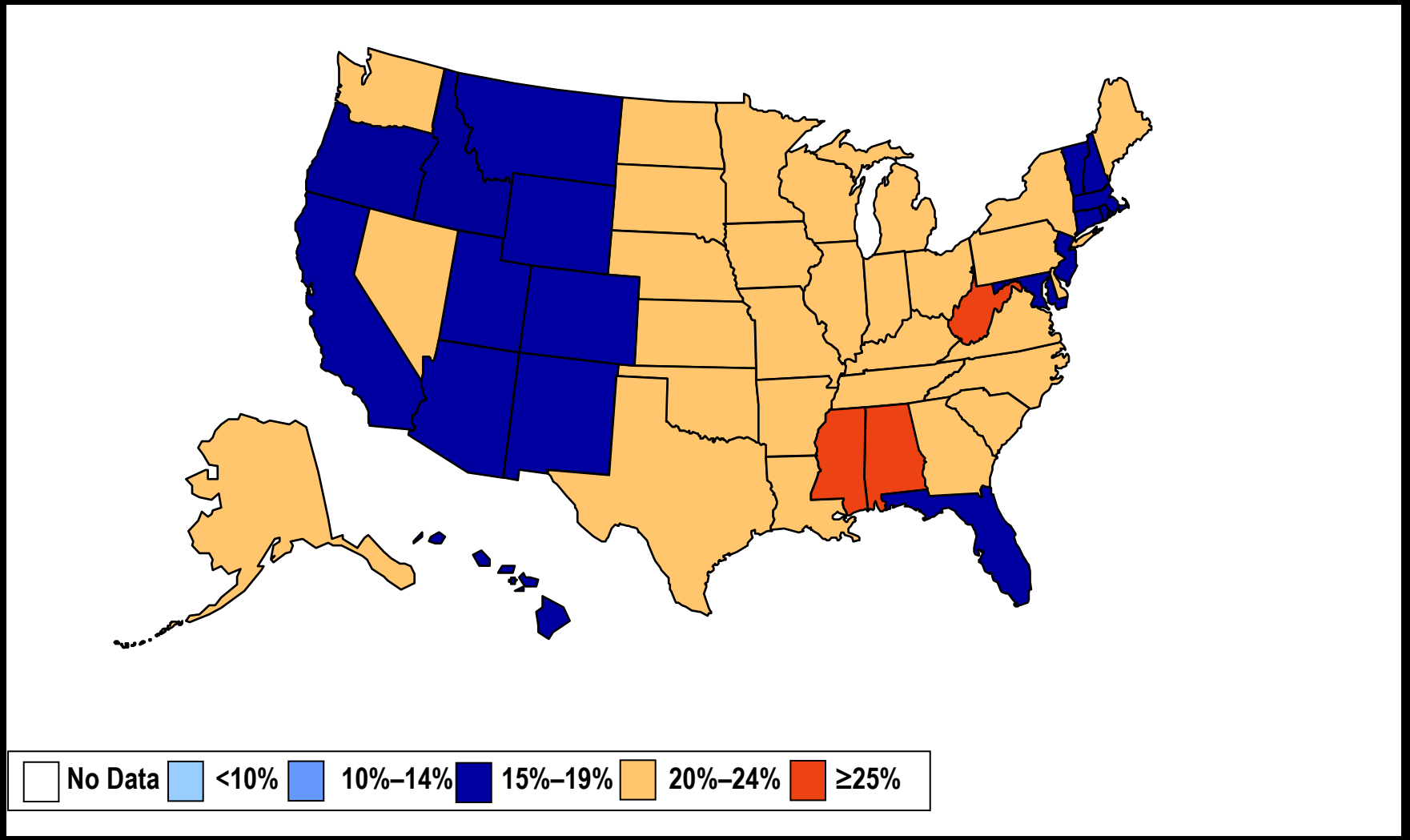
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 2001



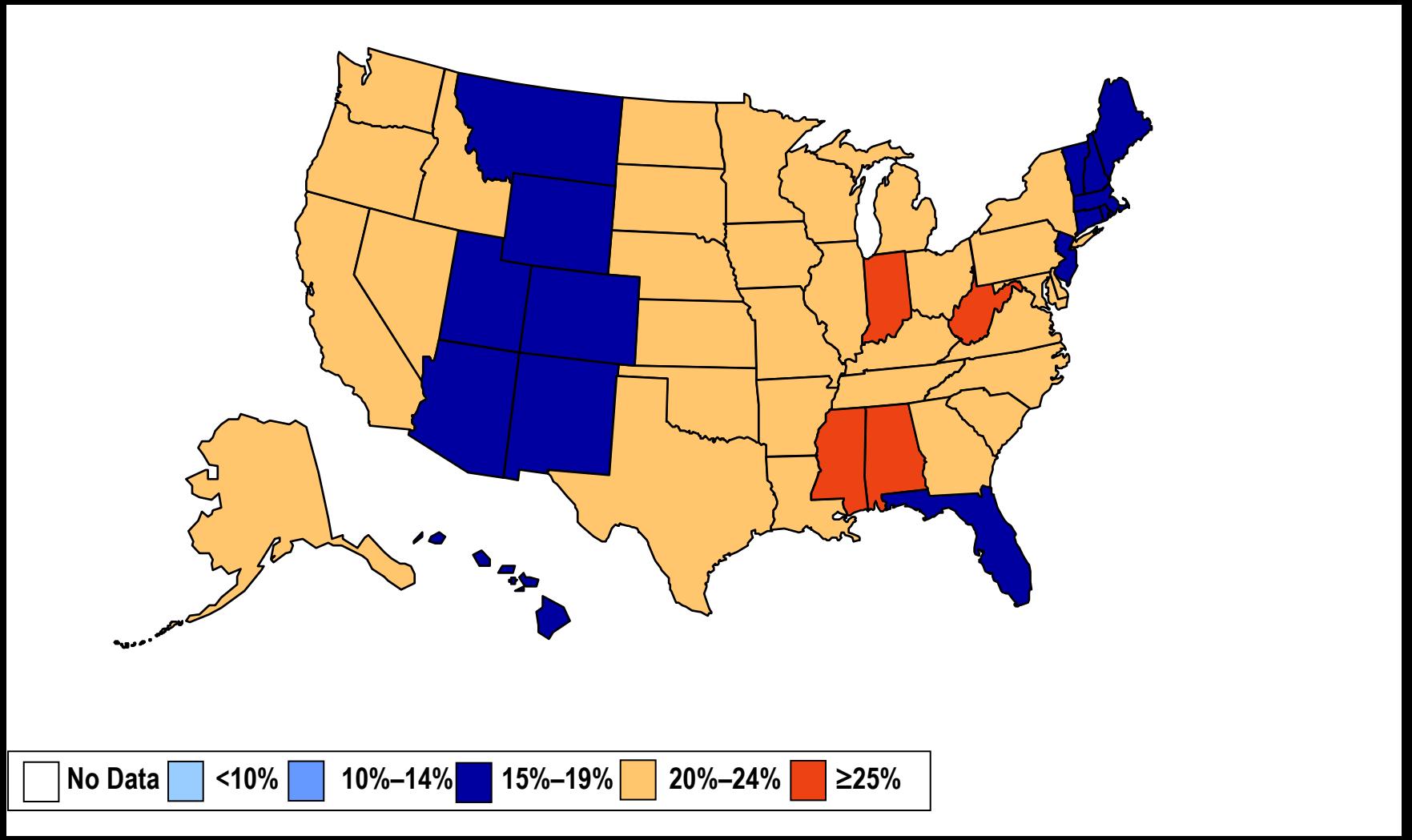
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 2002



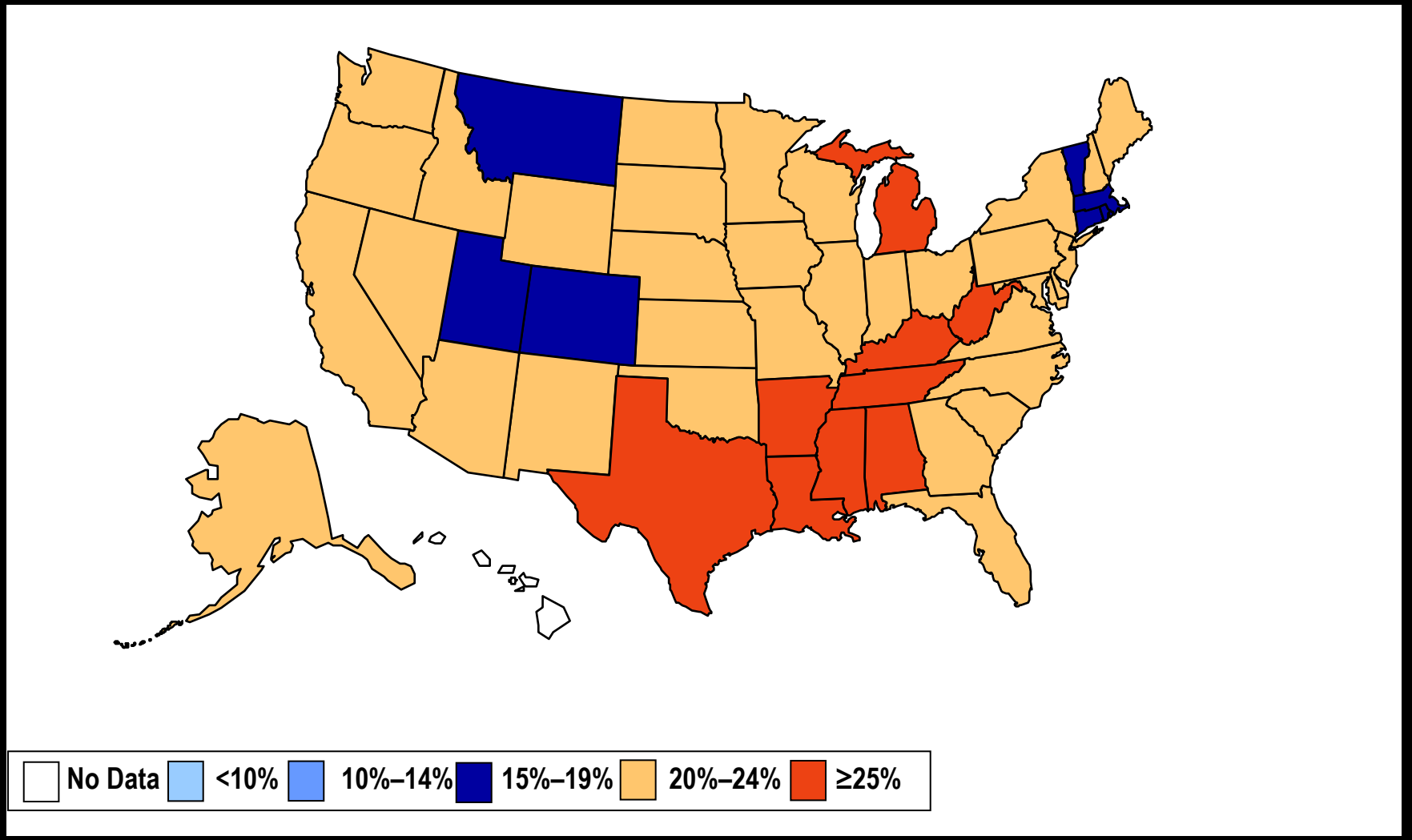
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 2003



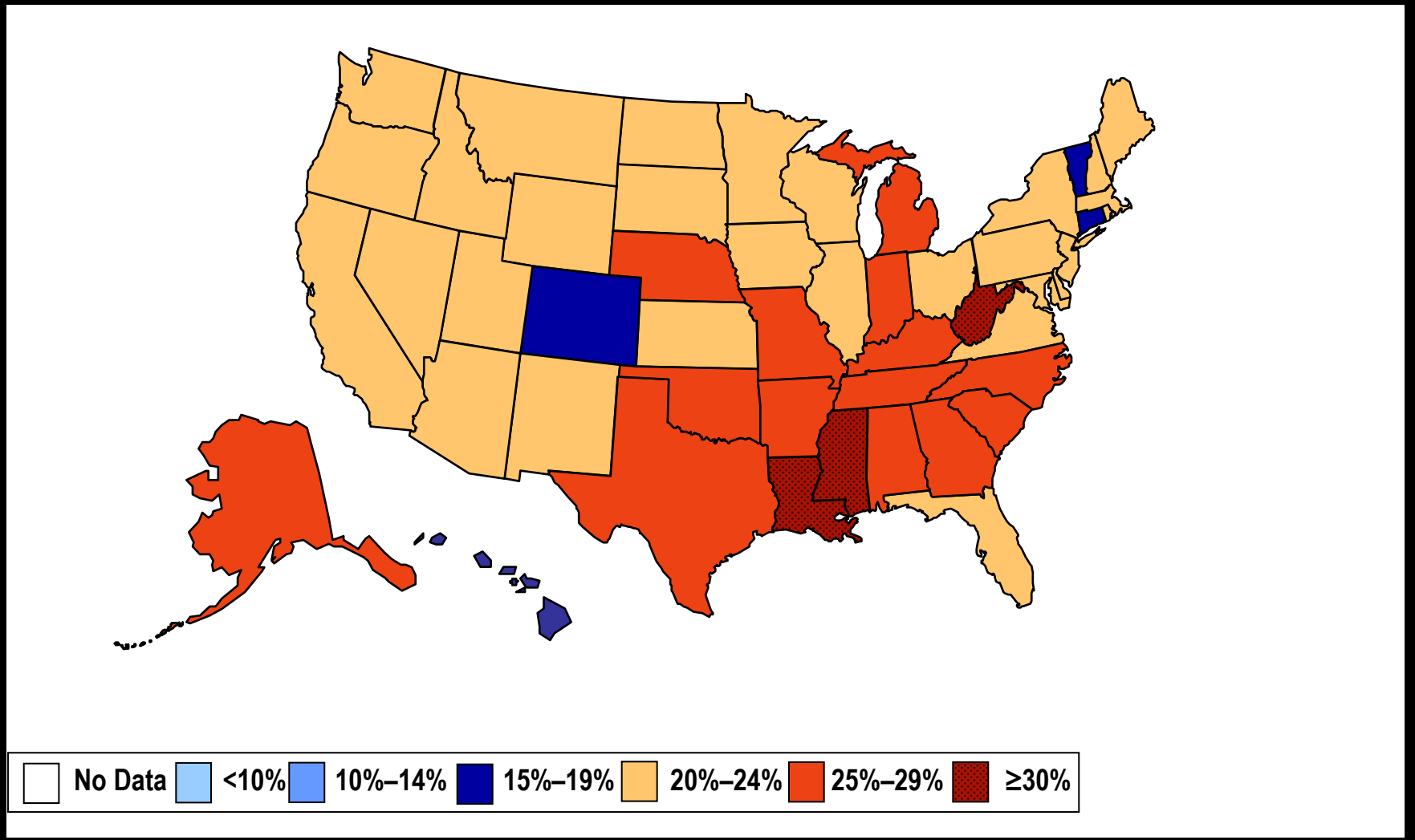
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 2004



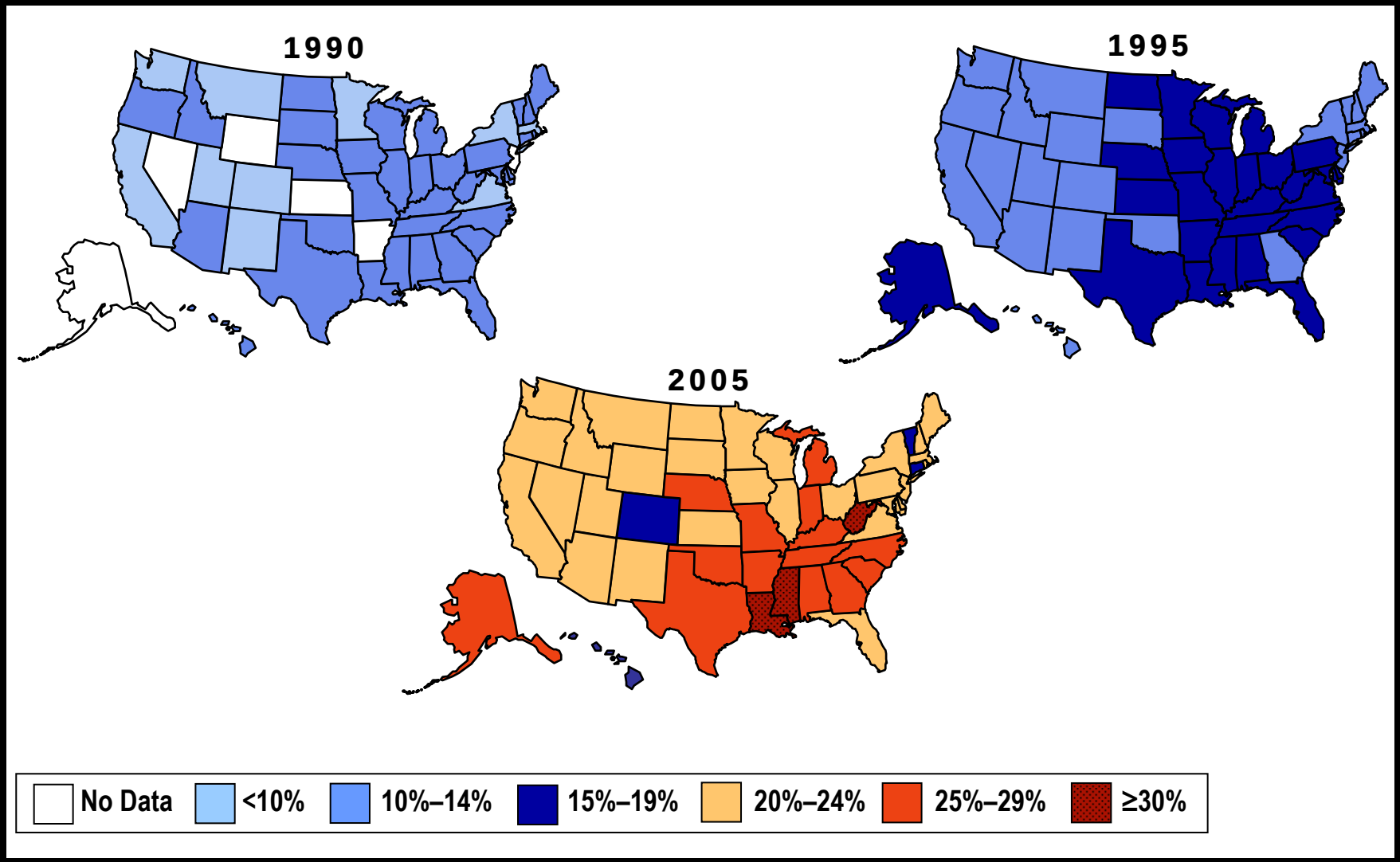
Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults BRFSS, 2005



Source: Behavioral Risk Factor Surveillance System, CDC

Obesity Trends Among U.S. Adults
BRFSS, 1990, 1995, 2005



Source: Behavioral Risk Factor Surveillance System, CDC

Determinants of Obesity

1) Genetics

"Despite obesity having strong genetic determinants, the genetic composition of the population does not change rapidly. Therefore, the large increase in . . . [obesity] must reflect major changes in non-genetic factors."

- James Hill (Director, Center for Human Nutrition)

2) Individual Behaviors

Physical activity and food consumption choices

3) Environmental Factors

Community Design – land use, connectivity, facility design

"Genetics loads the gun, but environment pulls the trigger." -- NIEHS

Health and the Built Environment

Health Disparities within Barnum/Valverde Neighborhoods

The purpose of public health is to fulfill society's interest in assuring the conditions in which people can be healthy.

~ Institute of Medicine

"Environmental factors influence 85 out of the 102 categories of diseases and injuries listed in the World Health Report."

~World Health Organization

Healthy People 2010 – National Health Goals

GOALS:

- ✓Eliminate Health Disparities
- ✓Increase Quality and Years of Life

TEN LEADING HEALTH INDICATORS:

- ✓ Obesity
- ✓ Physical Activity
- ✓ Environmental Health
- ✓ Injury and Violence Prevention
- ✓ Mental Health
- ✓ Immunizations
- ✓ Responsible Sexual Behavior
- ✓ Substance Abuse
- ✓ Tobacco Use
- ✓ Access to Health Care

10 Leading Causes of Death in Denver, 2006

- **Cancer**
- **Heart Disease**
- **Unintentional Injuries**
- **Chronic Lower Respiratory Disease**
- **Cerebrovascular Disease/Stroke**
- Alzheimers' Disease
- Influenza and Pneumonia
- Chronic Liver Disease
- **Diabetes**
- Kidney Disease

Health Disparities

Health Behavior Data: Race/Ethnicity Disparities

Source: Behavioral Risk Factor Surveillance Survey, CDPHE, 2005-2006

	Denver	African American	Hispanic	White
General Health Fair or Poor	17.2%	15.4%	33.2%	9.4%
Uninsured	20.4%	26.1%	44.3%	7.4%
No Leisure Time Physical Activity	30.0%	25.5%	37.9%	11.7%
Overweight/Obese	55.3%	64.3%	64.9%	50.3%
Diabetes/Pre-Diabetes (excludes Pregnancy-related)	5.9%	12.5%	5.4%	5.3%
Binge Drinking	22.4%	23.4%	26.4%	21.4%
Smoking	19.7%	27.7%	20.7%	16.5%

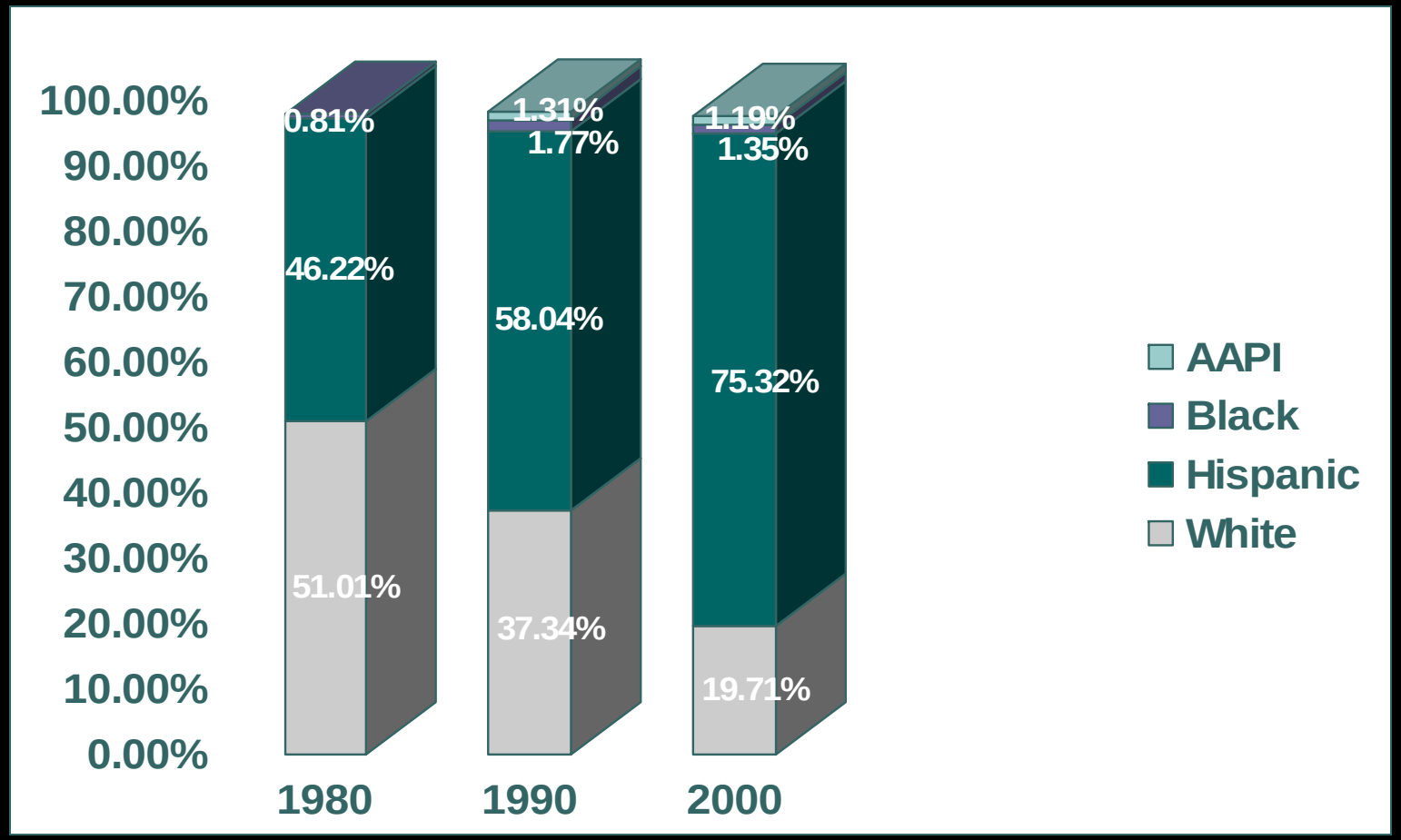
Health Behavior Data: Income Disparities

Source: Behavioral Risk Factor Surveillance Survey, CDPHE, 2006

	Denver	< $15,000	$15,000 - $24,999	$25,000 - $34,999	$35,000 - $49,999	>=$50,000
General Health Fair or Poor	14.9%	31.6%	29.1%	22.7%	9.2%	5.8%
Uninsured	18.5%	34.3%	46.0%	25.2%	10.6%	4.3%
No Leisure Time Physical Activity	19.2%	41.5%	35.4%	22.4%	18.6%	4.7%
Overweight/ Obese	54.7%	60.7%	60.7%	51.8%	60.3%	51.9%
Diabetes/ Pre-Diabetes	5.7%	8.4%	8.45%	6.5%	7.2%	2.3%
Binge Drinking	20.3%	20.7%	20.7%	17.0%	20.1%	27.0%
Smoking	20.0%	19.1%	19.1%	32.7%	16.2%	18.6%

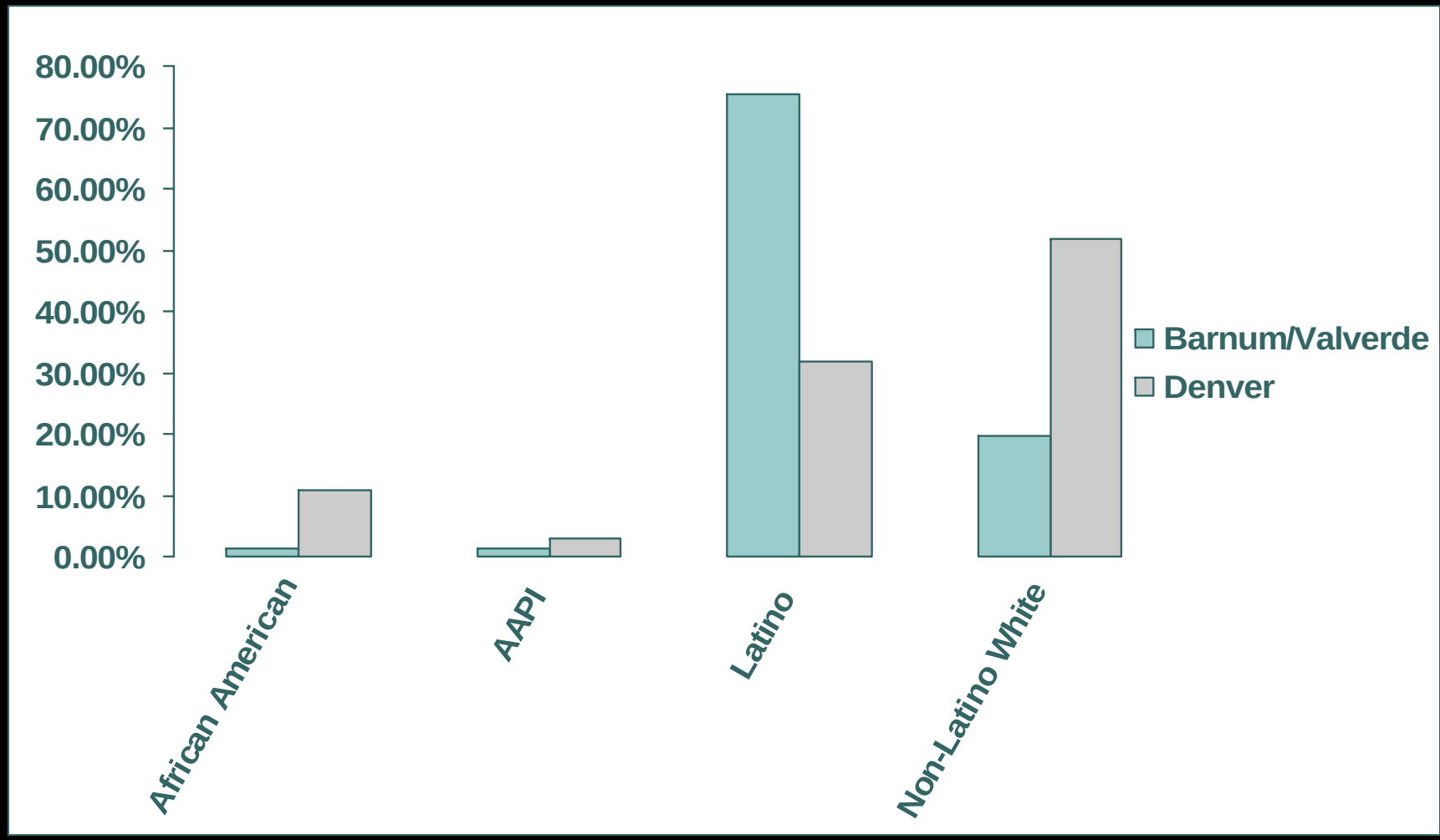
Barnum and Valverde Population Overview: Race/Ethnicity

Source: U.S. Census, 2000



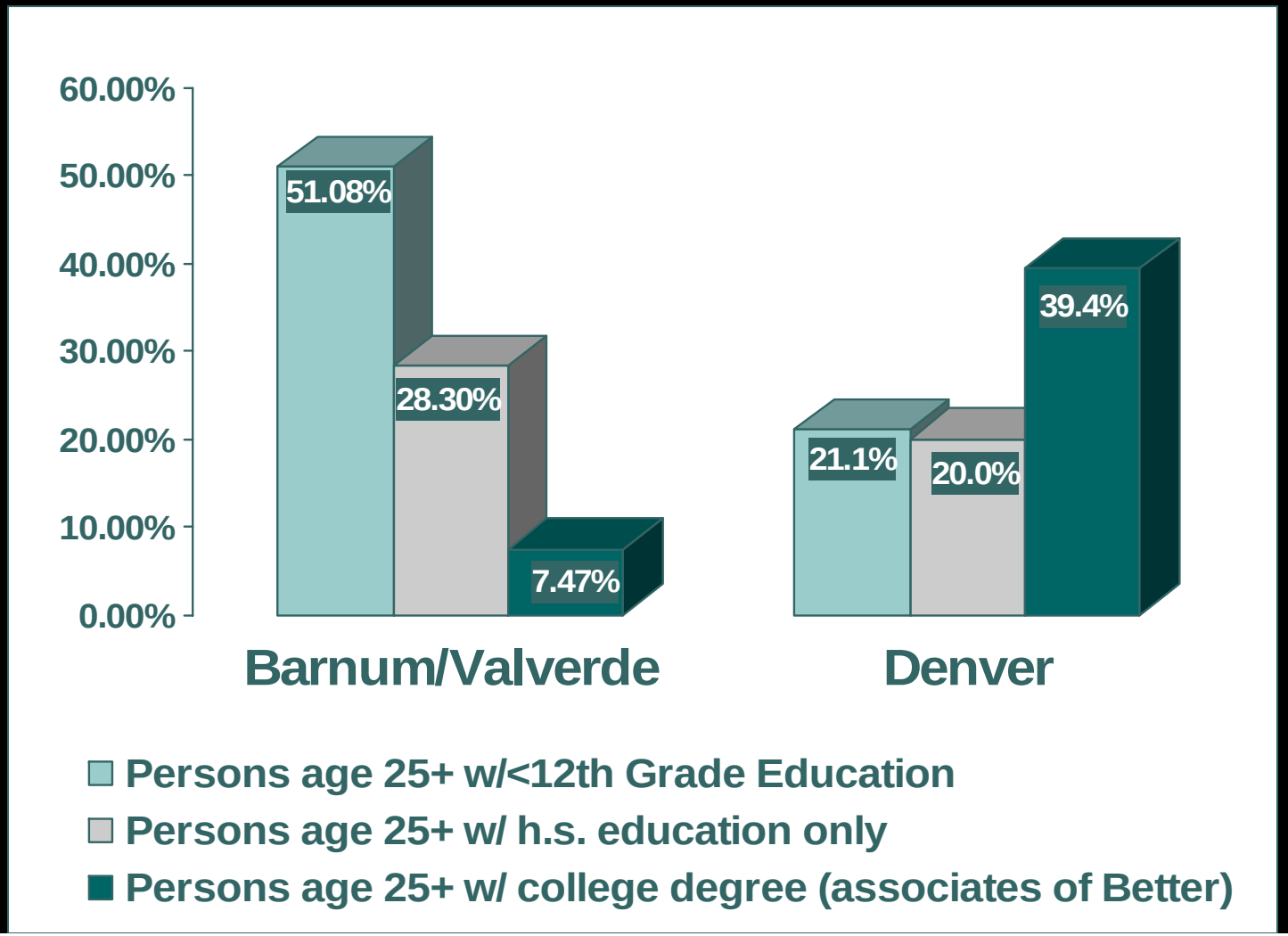
Population Overview: Race/Ethnicity, 2000

Source: U.S. Census, 2000



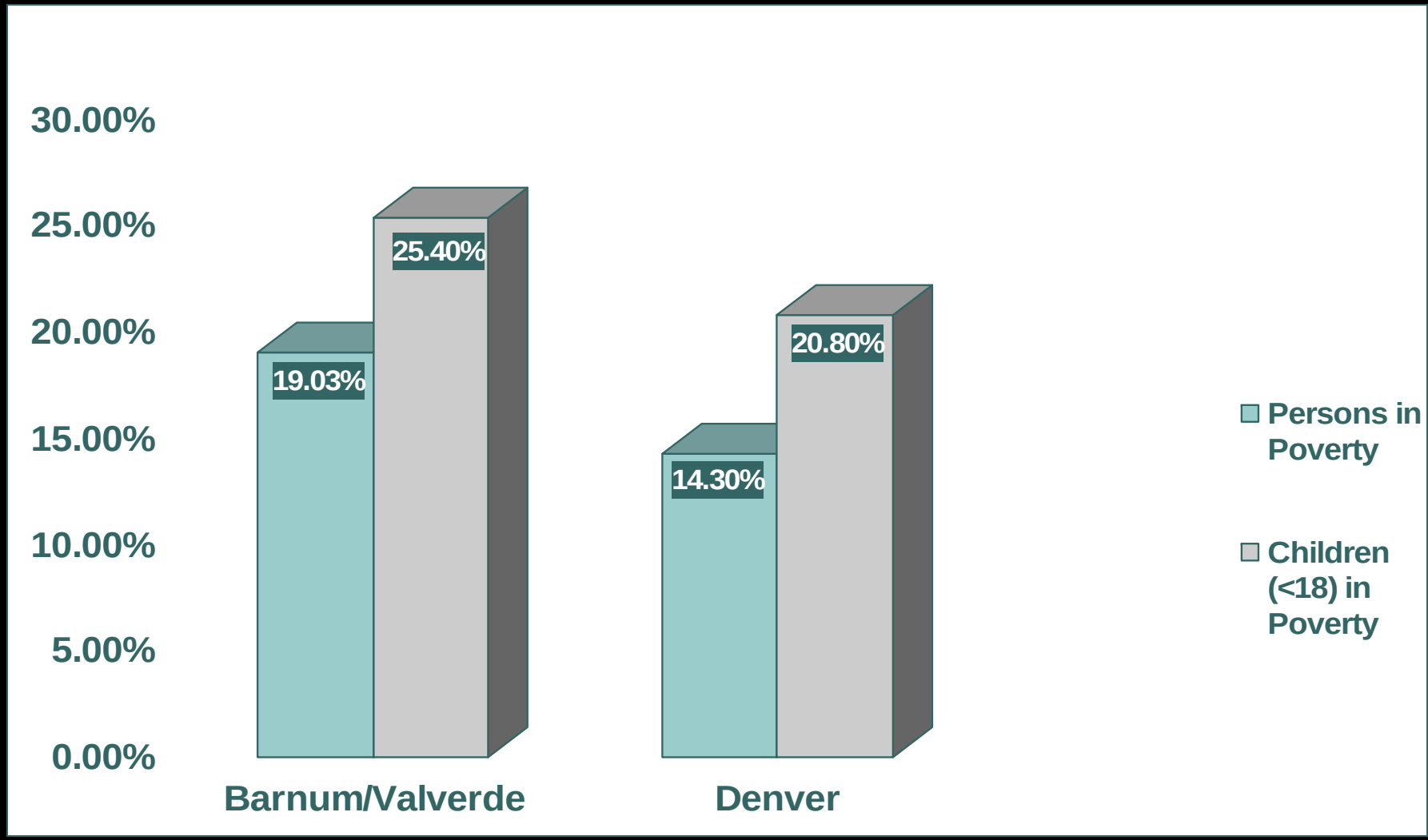
Population Overview: Education, 2000

Source: U.S. Census, 2000



Population Overview: Poverty

Source: U.S. Census, 2000



A Systems Approach

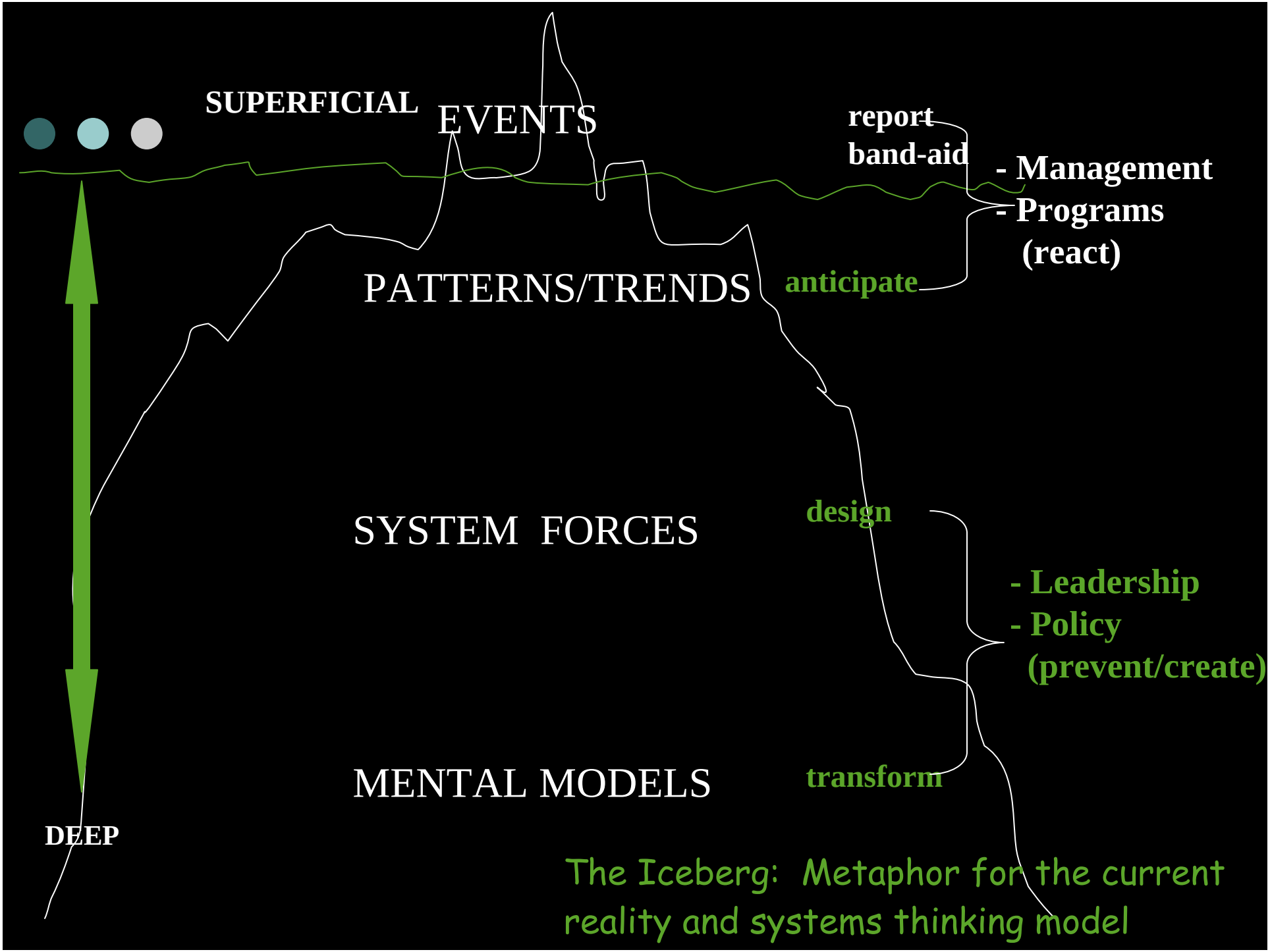
Systems thinking is the ability to:

- Understand and deal with complexity
- See the whole and the parts and how those parts are interacting to create the current level of performance
- Everything is connected to everything else
- There are unintended consequences of our actions throughout the system

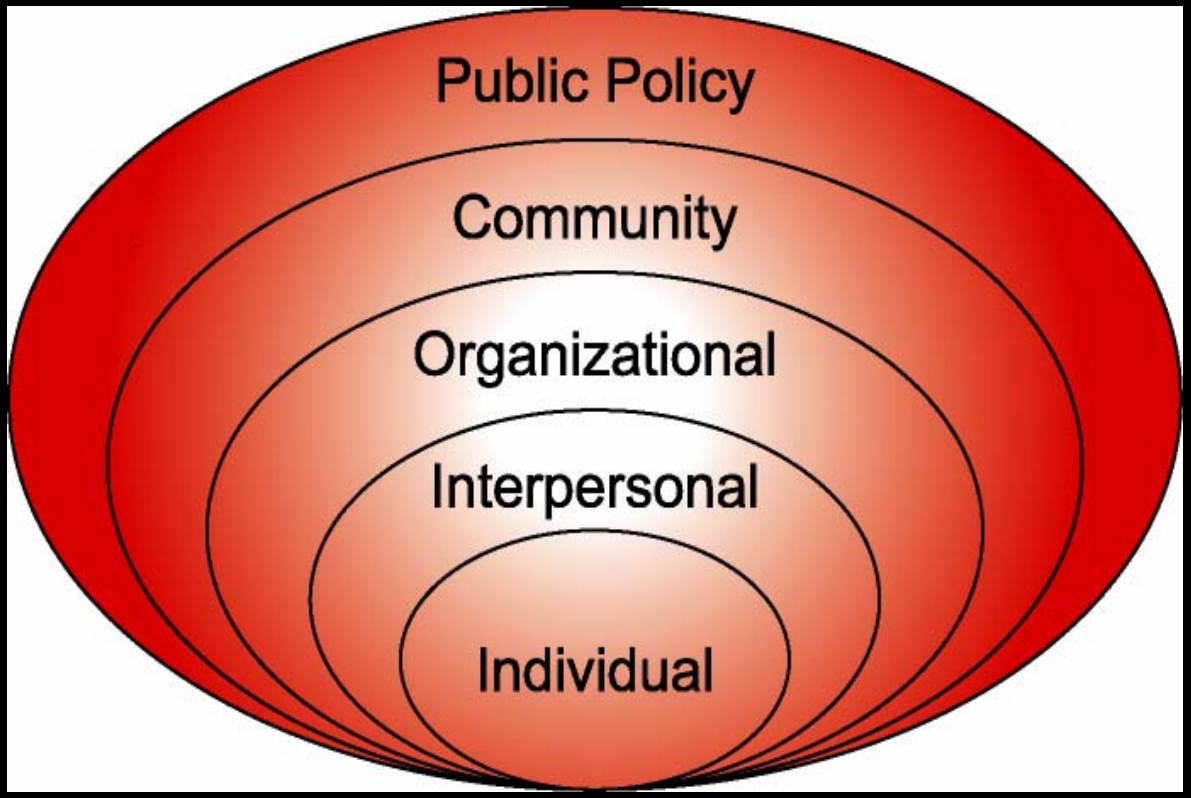
~Charlotte Roberts

A Systems Approach

- **Events -** "What just happened?"
- **Patterns/Trends -** "What's been happening? Have we been here or someplace like this before?"
- **System Forces -** "What are the forces at play contributing to these patterns/ trends? How are these forces interacting?"
- **Mental Models -** "What is it about our thinking that allows this situation to persist?"


SUPERFICIAL
EVENTS
report
band-aid
- Management
- Programs
(react)
PATTERNS/TRENDS
anticipate
SYSTEM FORCES
design
- Leadership
- Policy
(prevent/create)
MENTAL MODELS
transform
DEEP
The Iceberg: Metaphor for the current reality and systems thinking model

Socioecological Model for Health Promotion

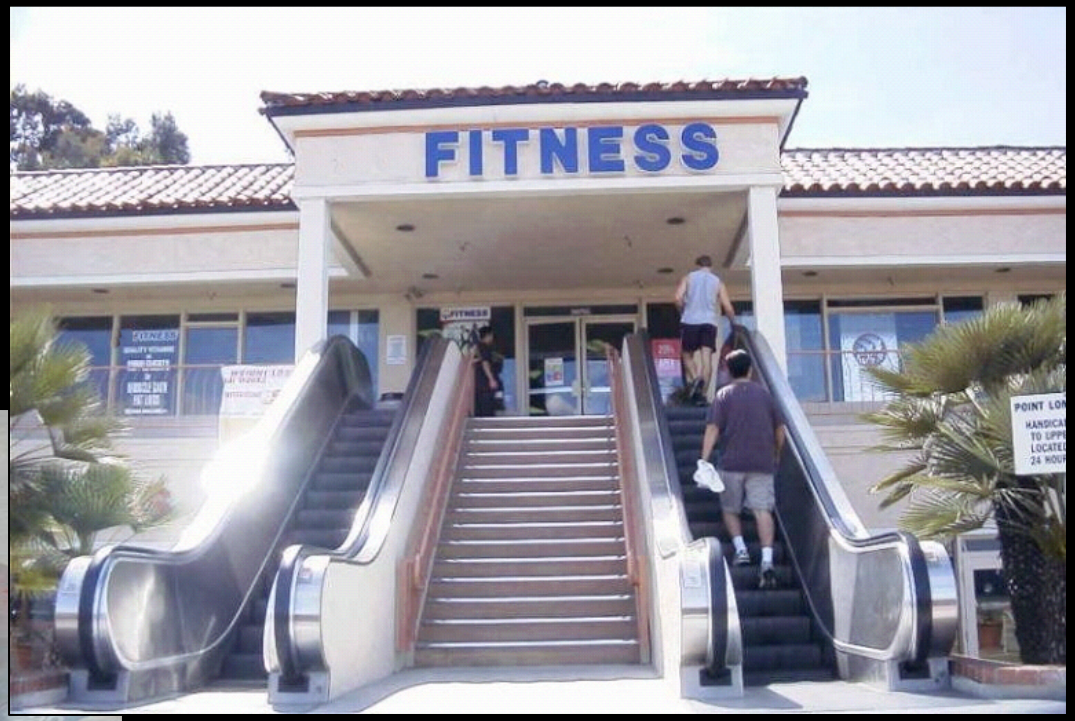


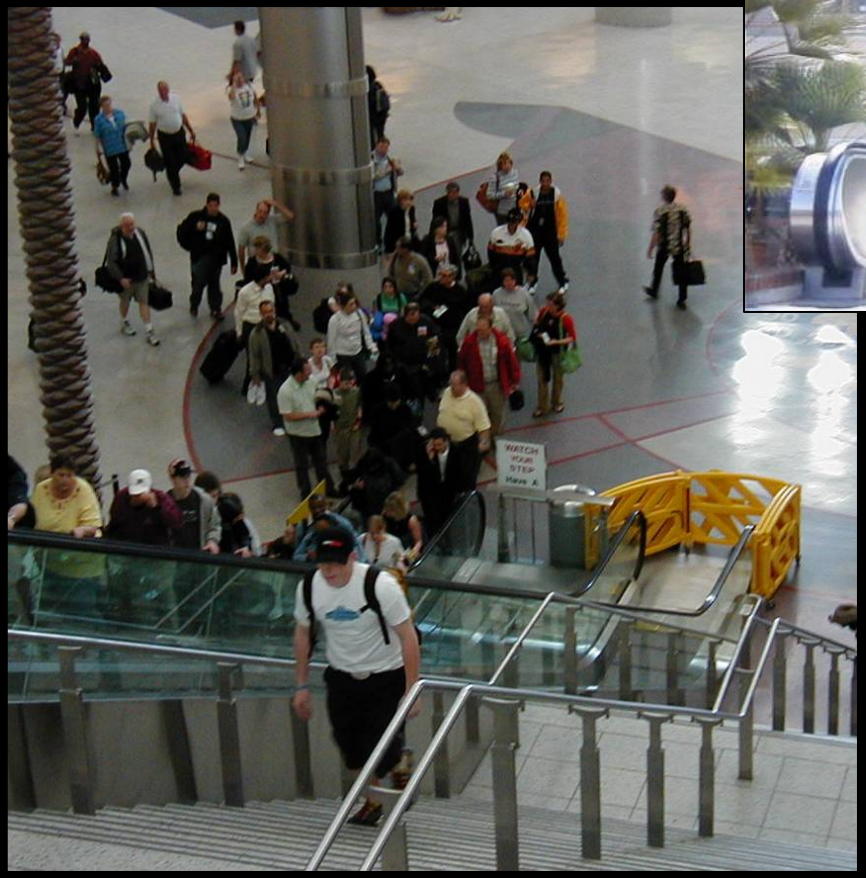
So What Should We Do?

Active Living is a way of life that integrates physical activity into daily routines.

"It's *not* just an obesity epidemic. It's an epidemic of physical inactivity and poor nutrition." -- Mark Fenton

Physical Inactivity





In 2001, 54.6 percent of U.S. adults did not achieve the recommended levels of physical activity…

Old Recommendation:

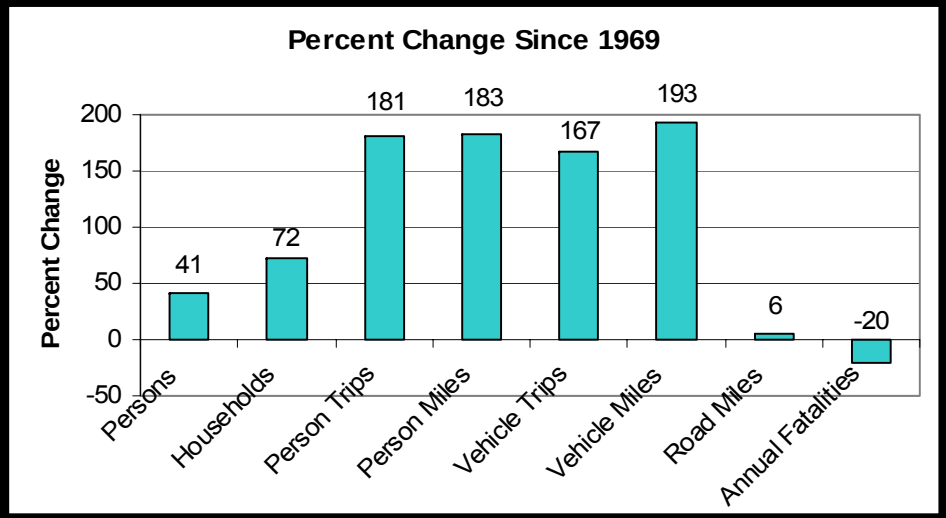
30 minutes, 5 days/week of moderate or 20 minutes, 3 days/week of vigorous intensity activity

New Recommendation:

- 30+ minutes of moderate intensity activity most days of the week to reduce chronic disease risk
- 60 minutes of moderate to vigorous intensity activity most days of the week to prevent weight gain
- 60 – 90 minutes of moderate intensity activity most days of the week to sustain weight loss

Why are we so sedentary?

- Appliances/labor saving devices
- Fast/convenience foods and products
- Television, computers, video games
- Increase in low-activity occupations
- Motorized transportation
  - Walking trips have decreased by 42 percent in the last 20 years;
  - Children's walking and bicycling trips have decreased by 37 percent



Relative Change in Travel Characteristics, 1969 - 2001

Physical Activity vs. Exercise

- **Physical Activity**: any bodily movement produced by skeletal muscles resulting in energy expenditure (CDC).

- **Exercise**: bodily exertion for the sake of developing and maintaining physical fitness

Integrating physical activity into daily routines may be a more effective public health strategy than structured exercise programs.

Active Transportation Potential

- Between 1977 and 1995, trips made by walking decreased by 40 percent.
- Children's walking trips to school declined by 60 percent during this period.
- ¼ of all trips are a mile or less; ¾ of these short trips are made by car.
- 60 percent of trips are 5 miles are less (a convenient distance to bicycle) yet less than 0.9% of these trips are made by bicycle.

Barriers to Physical Activity

Environmental – crime, traffic, weather, land use, lack of facilities

Personal – lack of time, motivation, encouragement, confidence

Active Living and Active Transportation

Addressing personal barriers…

- Incorporated into daily routine
- No special skills or gear needed

Designing for Active Transportation and Recreation

(Addressing environmental barriers)

Types of Walking Environments

- Pedestrian Intolerant
- Pedestrian Tolerant
- Pedestrian Supportive
- Pedestrian Place



Different standards are appropriate for different place types…

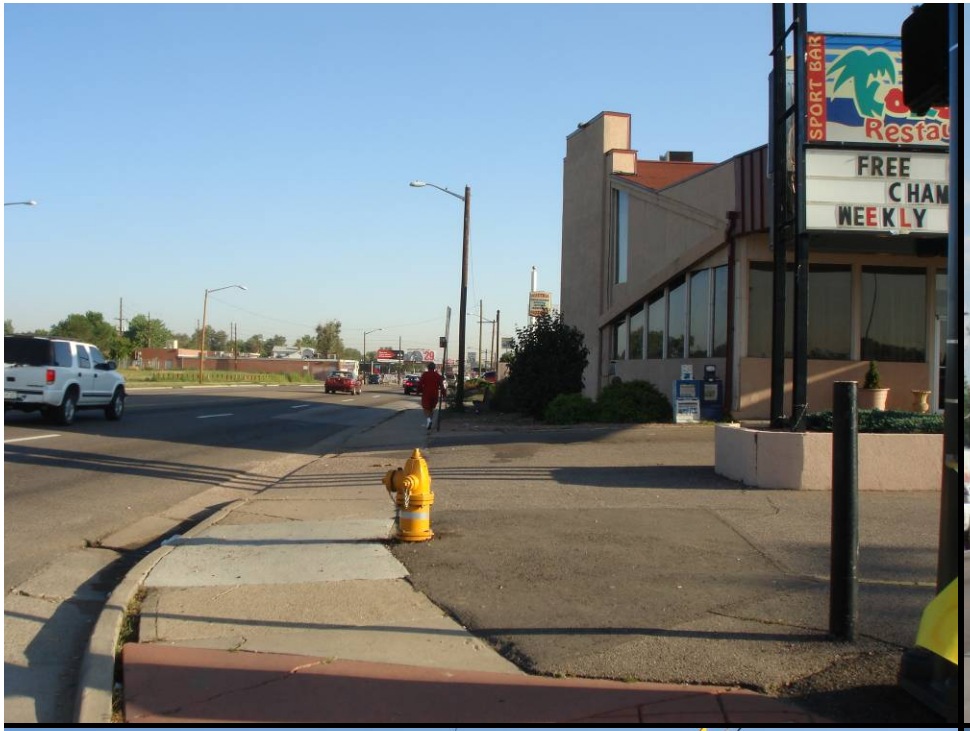
Pedestrian Intolerant

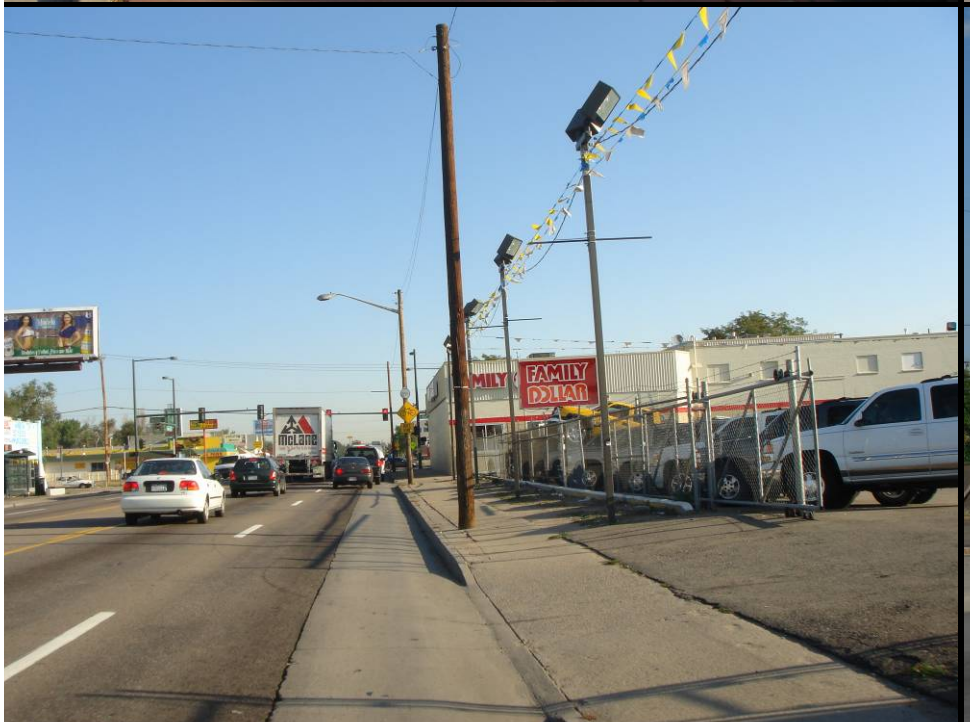
Pedestrian Tolerant

Pedestrian Supportive


Pedestrian Supportive

Pedestrian Place



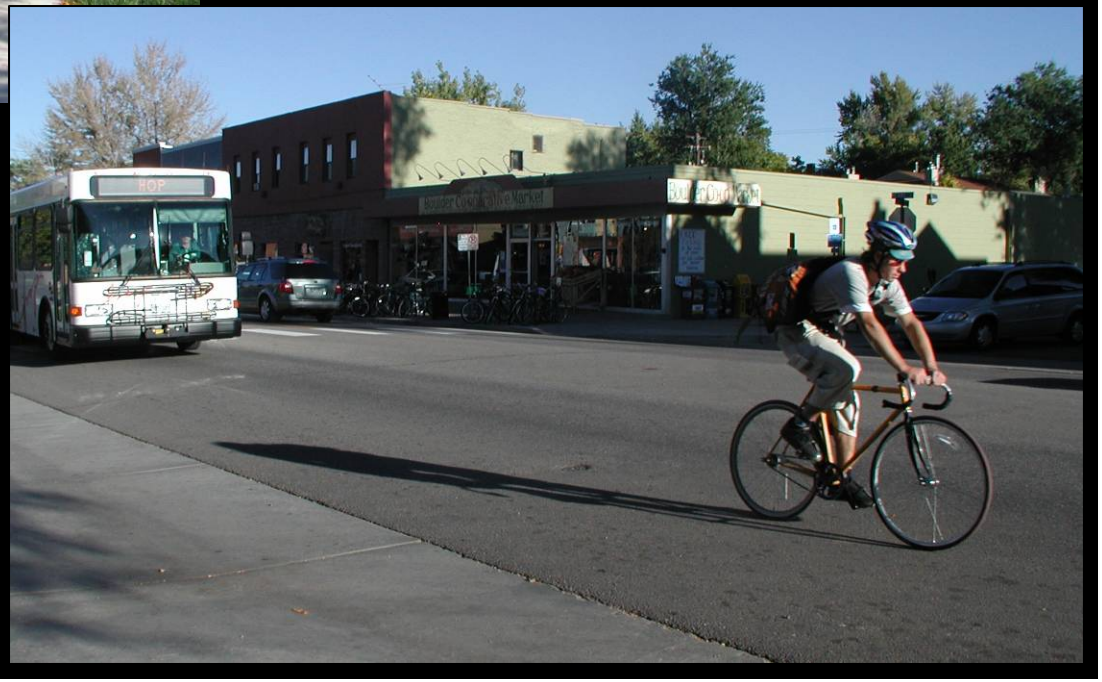


Federal Boulevard

Bicycling

“Type B/C” Cyclist

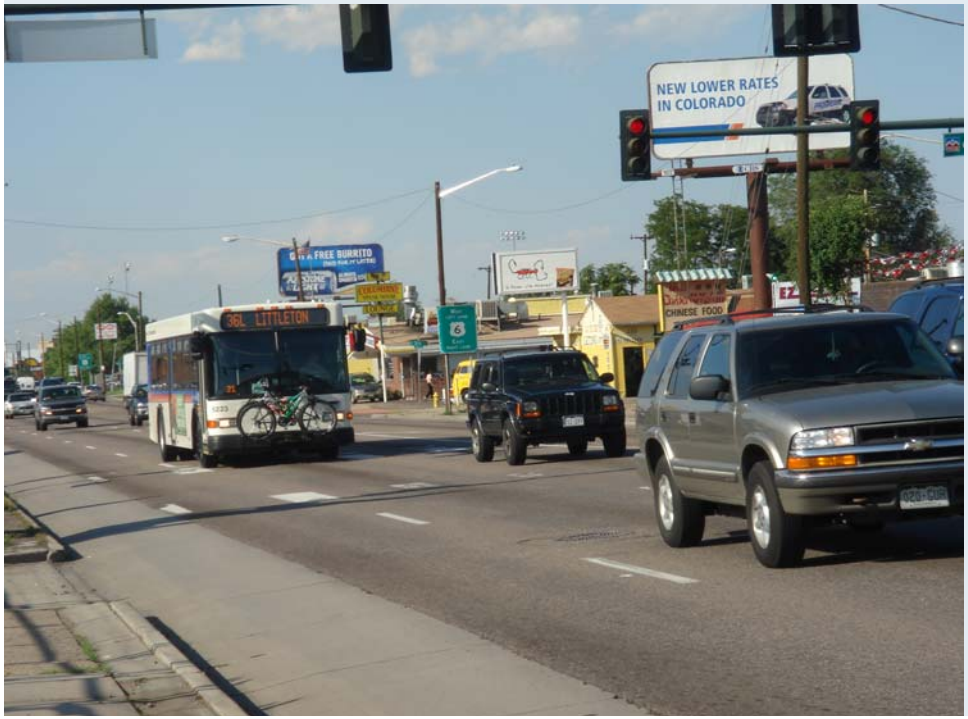
- less skilled adults and children
- intimidated by traffic
- prefer designated facilities (bike lanes and multi-use paths)



“Type A” Cyclist

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

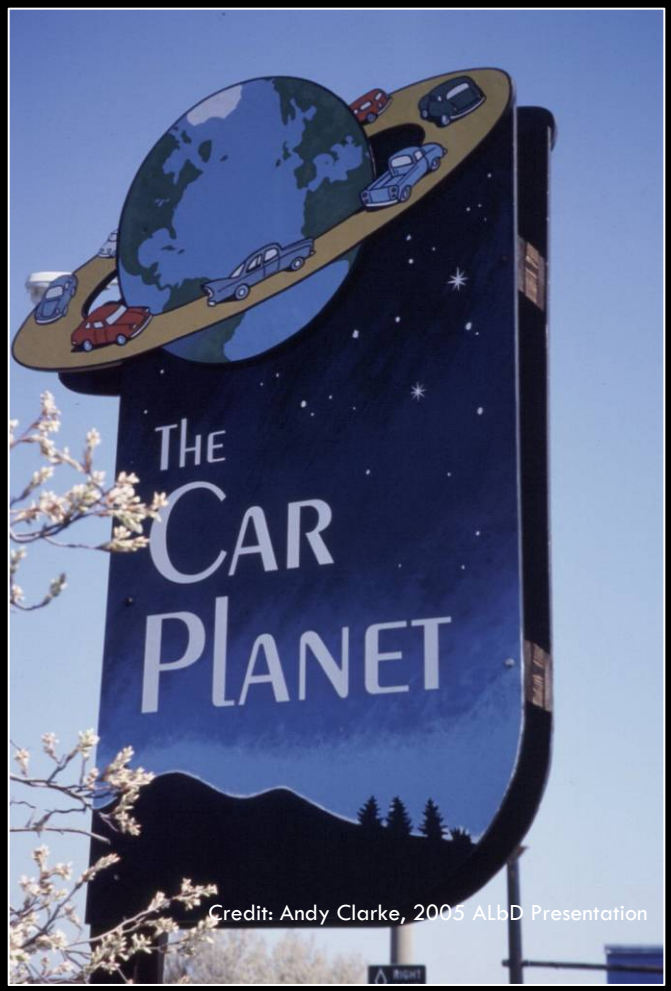
Facility Types



Federal Boulevard

A balanced transportation system provides choice and removes barriers to activity, allowing people to integrate physical activity into their daily routines.

- People with access to sidewalks are 28% more likely to be physically active.
- People with access to trails are 55% more likely to be physically active.
- Walking trips increase in areas with well connected, narrow, calm, attractive streets.

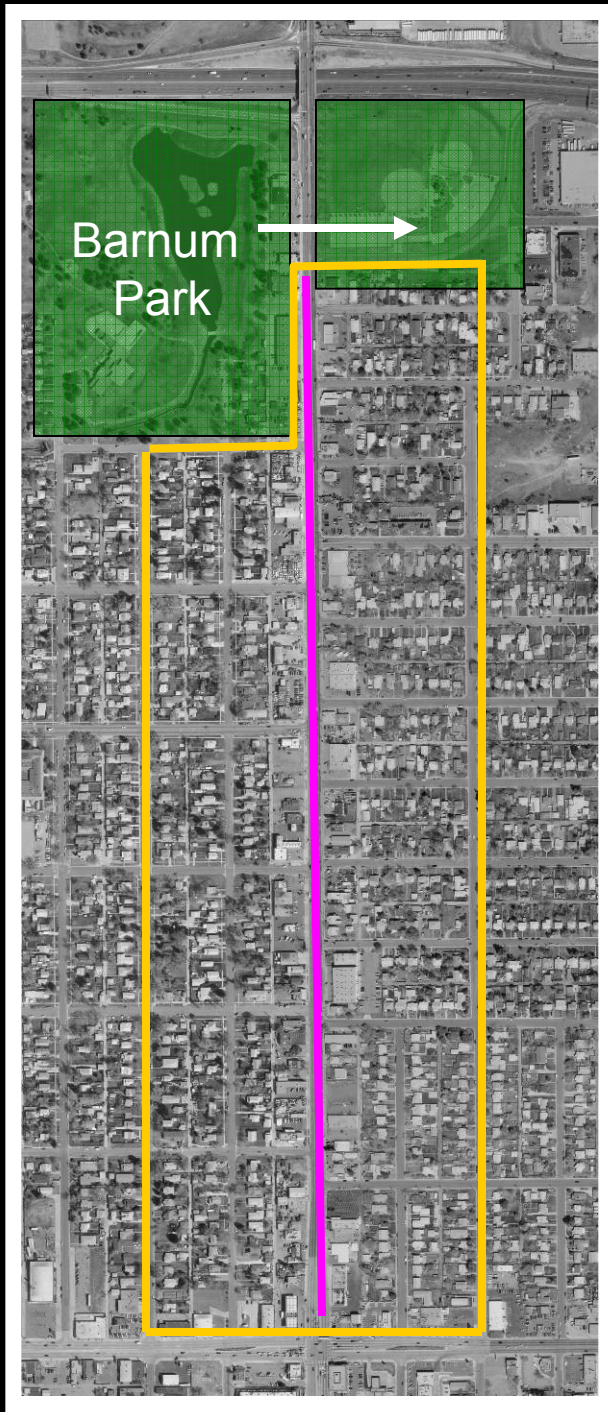


Credit: Andy Clarke, 2005 ALbD Presentation

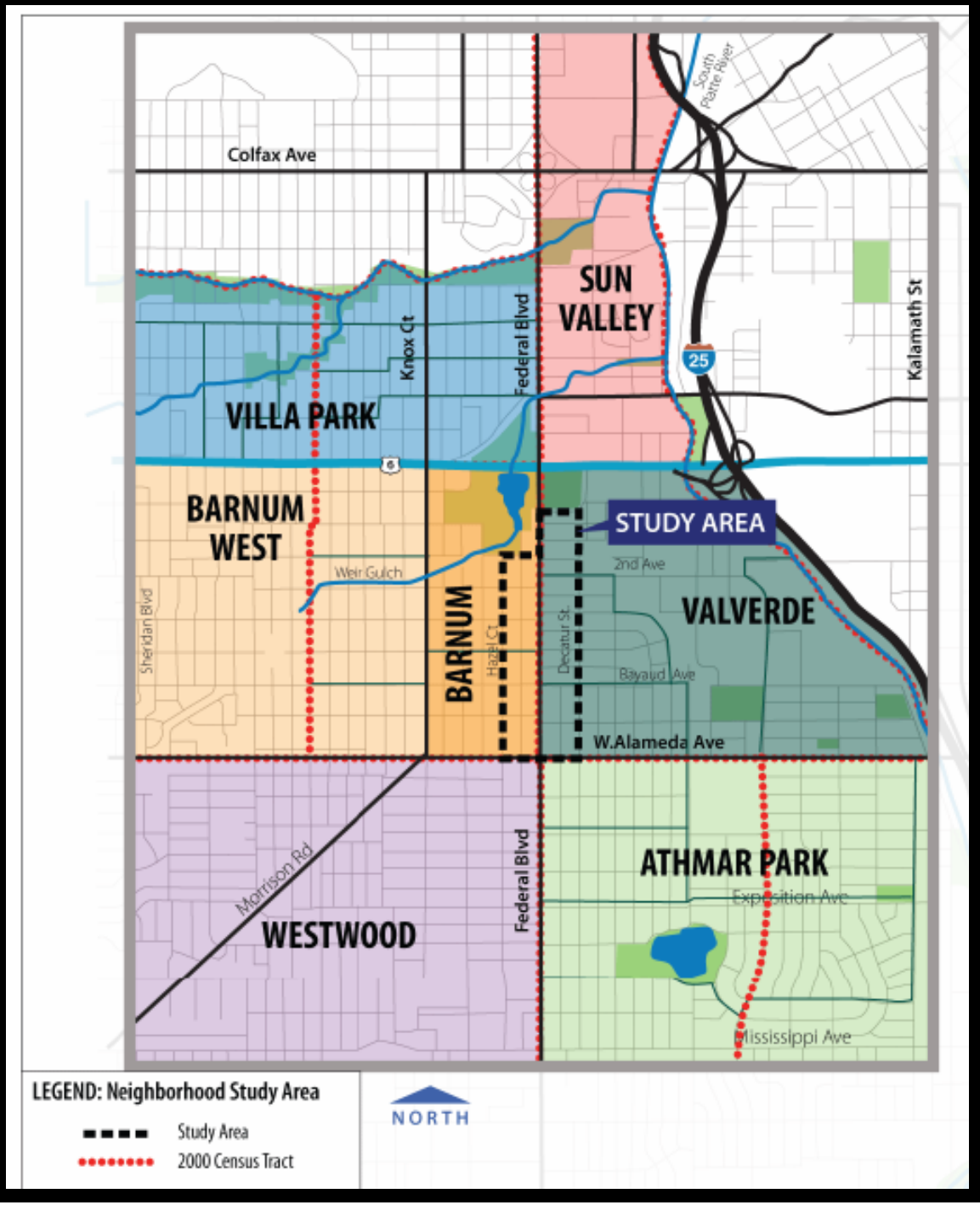
Federal Boulevard Background and Context

EA – Study Area

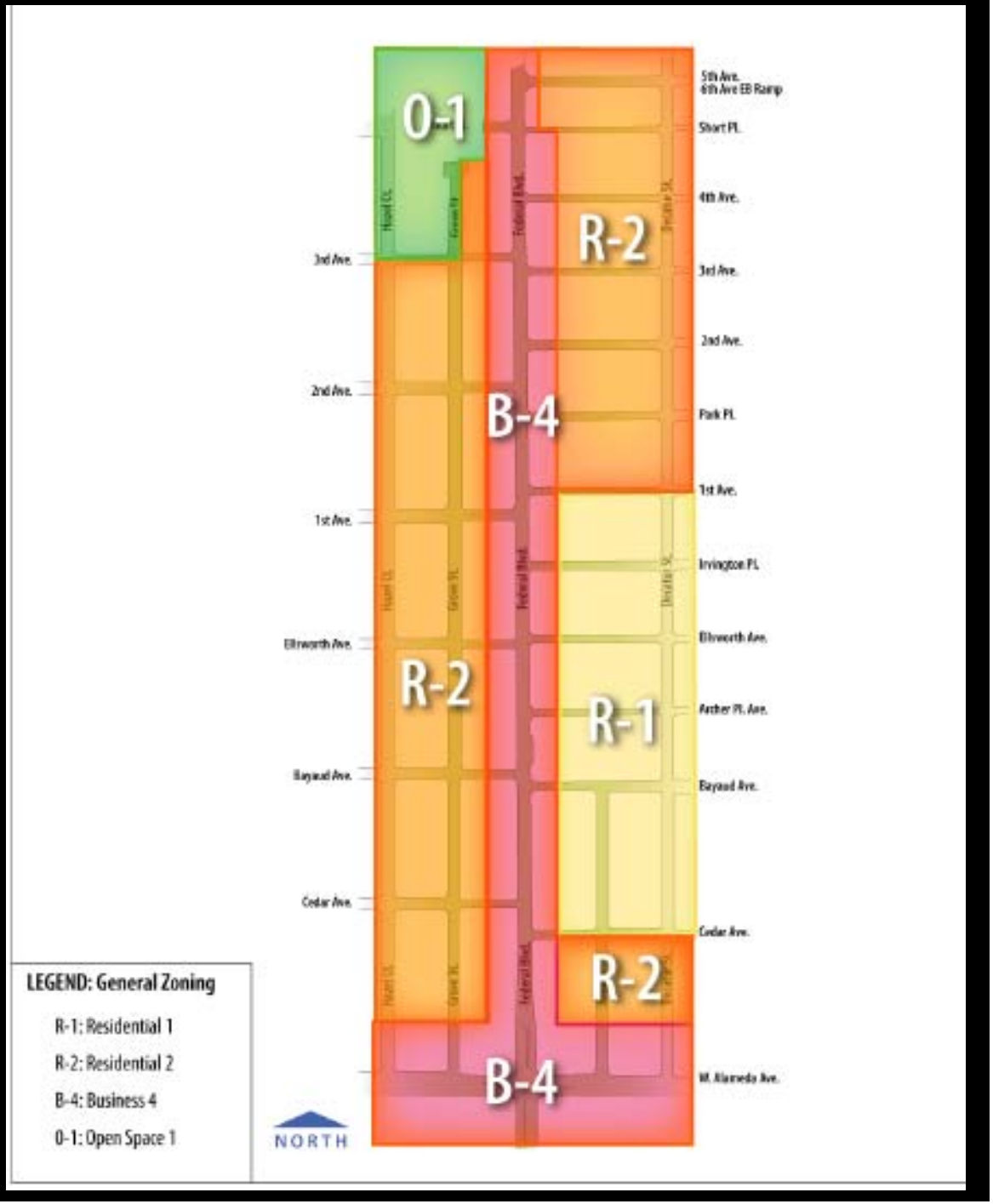
- Posted Speed Limit 35MPH
- Enhanced Transit Corridor
- 2nd Highest RTD Route
- Designated Parkway
- Pedestrian Route



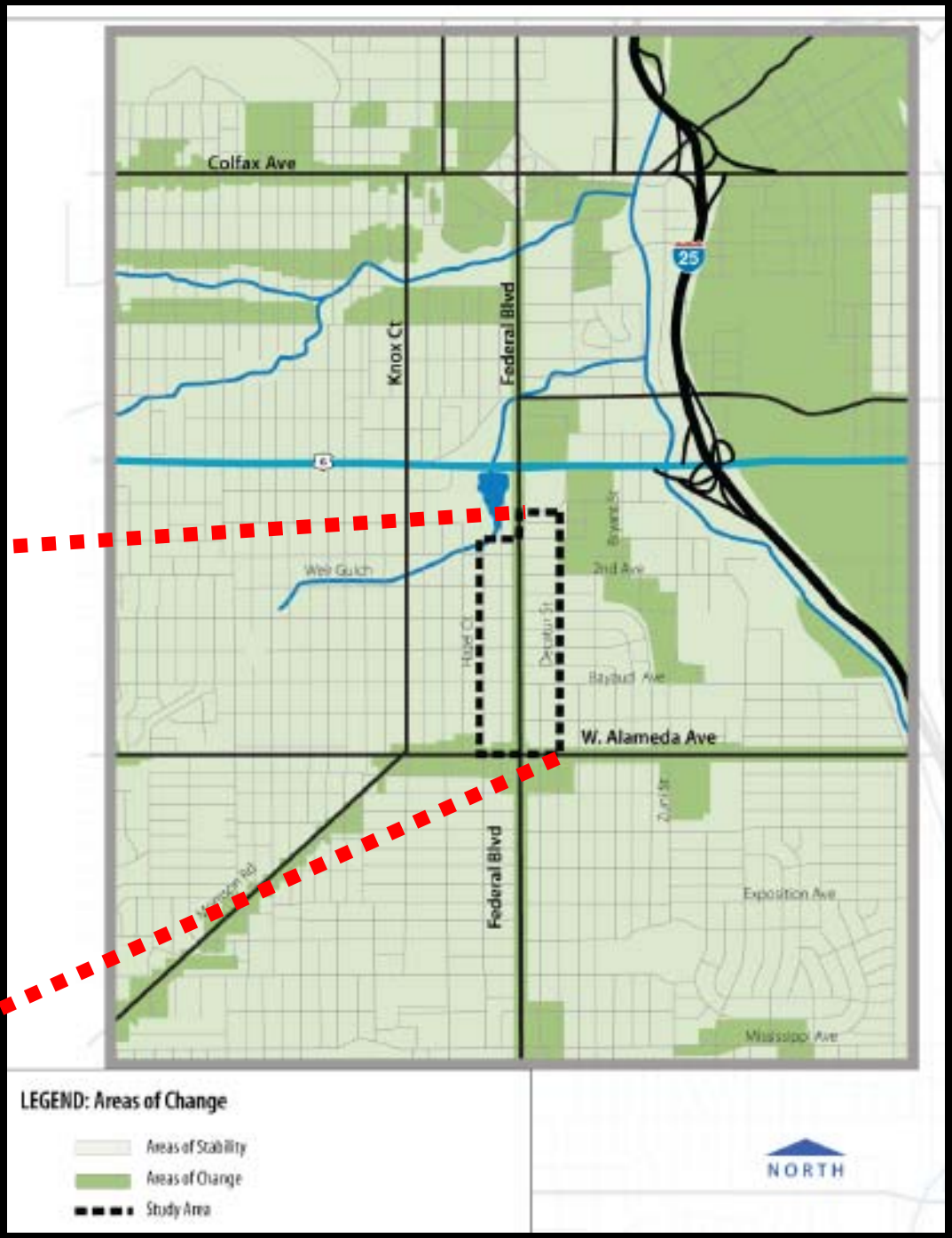
Neighborhood Study Area



Zoning


O-1
R-2
B-4
R-2
R-1
R-2
B-4
5th Ave.
6th Ave EB Ramp
Short Pl.
4th Ave.
3rd Ave.
2nd Ave.
Park Pl.
1st Ave.
Irvington Pl.
Ellsworth Ave.
Aather Pl. Ave.
Bayaud Ave.
Cedar Ave.
W. Alameda Ave.
3rd Ave.
2nd Ave.
1st Ave.
Ellsworth Ave.
Bayaud Ave.
Cedar Ave.
LEGEND: General Zoning
R-1: Residential 1
R-2: Residential 2
B-4: Business 4
O-1: Open Space 1
NORTH

Areas of Change/Stability



Challenges

1. **Safety** - Federal Boulevard, through your community, has more accidents than most roadways in Denver. Also, accidents happen 3 times more often along Federal Boulevard than similar roadways in Colorado. Between 2001 and 2003, 14 adults and 1 school age child were hit by cars – 2 people were killed, 12 were injured and 1 was not hurt.

2. **Capacity -** By 2030, there will be about 55,000 cars per day, which is more than the roadway can carry. There will be long delays at red lights, causing some travelers to use another roadway.

3. **Roadway Deficiencies -** The roadway lane widths and other roadway features do not meet CDOT's current standards. The high number of driveways along Federal Boulevard do not meet CDOT's access code requirements.

4. **Modal Connectivity** – This refers to connections to buses and sidewalks. Every day, 1,200 people board buses that arrive every 10 minutes on Federal Boulevard between Alameda and 6th Avenues. Bus stops and sidewalks are in poor condition and in some places there are no sidewalks at all.

Alternatives Considered

No Action ≈ 68’ ROW

1. Traffic Management – 90’ ROW
2. Minimum Width Raised Median – 100’ ROW
3. “Ideal” Pedestrian Zone – 103’ ROW
4. Minimum Width Painted Median – 98’ROW
5. West Side Alley Conversion – 96’+ ROW
6. Current Design Standards – 125’ ROW
7. 4-Lane Section – 94’ ROW

Alternatives Eliminated - Fatal Flaw

5. West Side Alley Conversion
6. Current Design Standards
7. 4-Lane Section

PA 5 and 6 were eliminated due to high direct building impacts.

PA 7 had poor capacity due to 222 seconds of total delay.

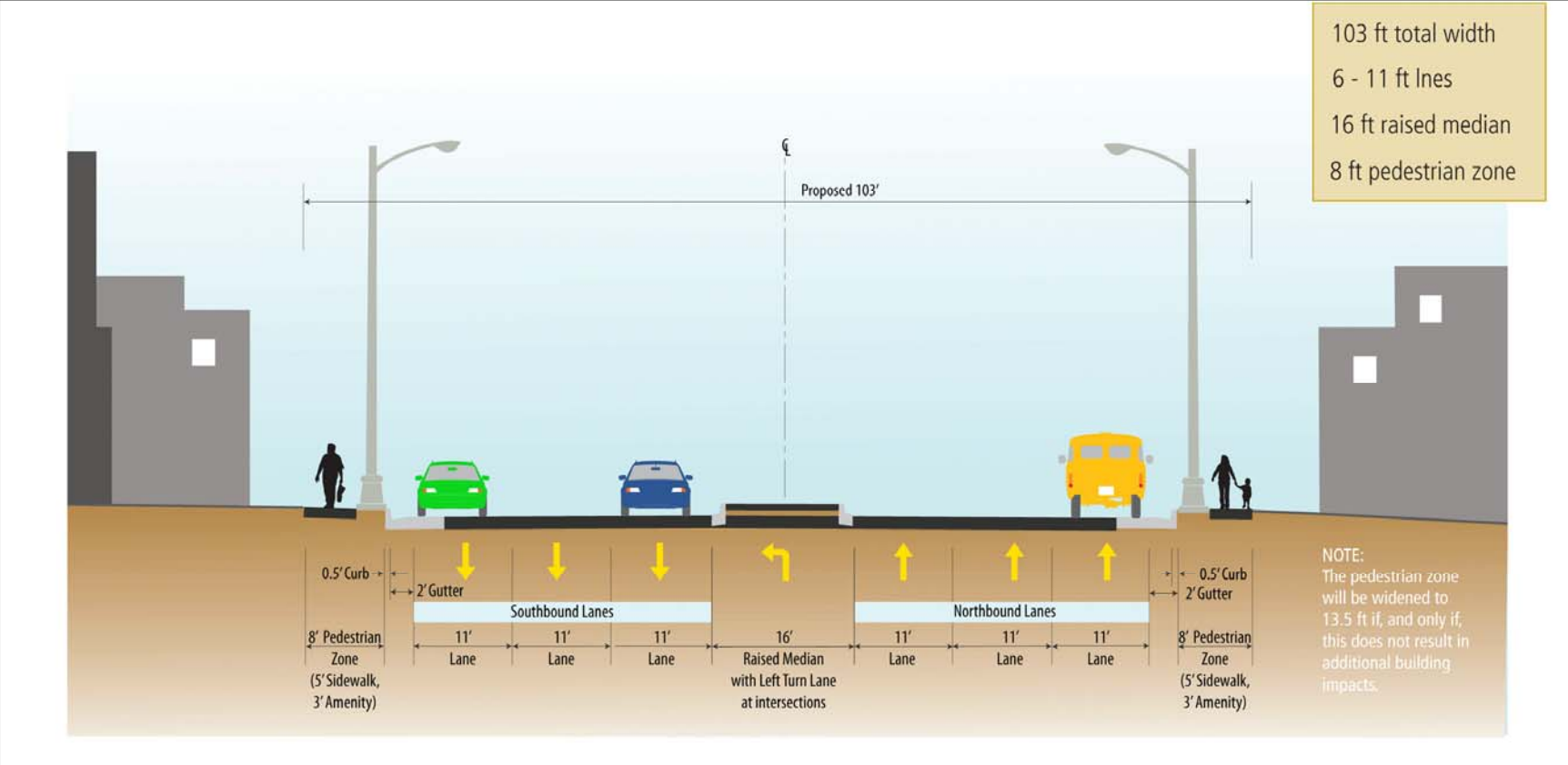
PA 1 was eliminated during the Level 2 screening due to poor capacity and minimal improvement in geometric deficiencies.

Alternatives Remaining

No Action ≈ 68’ ROW

2. Minimum Width Raised Median – 100’ ROW
   - 6 – 11’ Lanes
   - 13’ Raised Median
   - 8’ Attached Sidewalk
3. “Ideal” Pedestrian Zone – 103’ ROW
   - 6 – 11’ Lanes
   - 16’ Raised Median
   - 8’ Attached Sidewalk
4. Minimum Width Painted Median – 98’ROW
   - 6 – 11’ Lanes
   - 11’ Painted Median
   - 8’ Attached Sidewalk

Proposed Build Alternative



Who Benefits?

- Travel
  - Increased capacity
    - Added lane
    - Reduction in conflict points
- Circulation
  - Sidewalk
    - 8-foot consistent
    - Curb ramps
- Access
  - Reduction in the existing 129 Private Accesses

- Through Traffic
- Pedestrian Tolerant
  - Community and Transit Access
- Pedestrian Tolerant
  - Community and Transit Access

NEPA Challenges

- Direct Property Impacts
  - # of Property & Business Owners
- Environmental Justice

NEPA Solutions

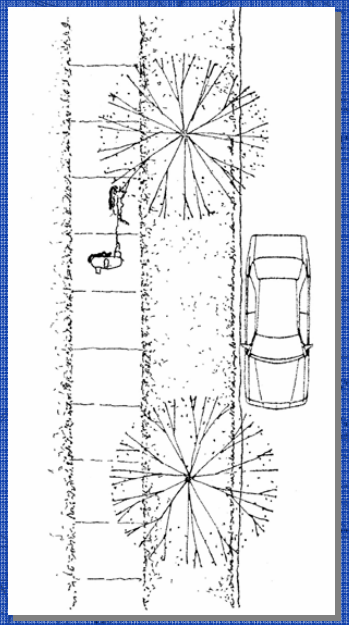
- Avoid, Minimize, Mitigate

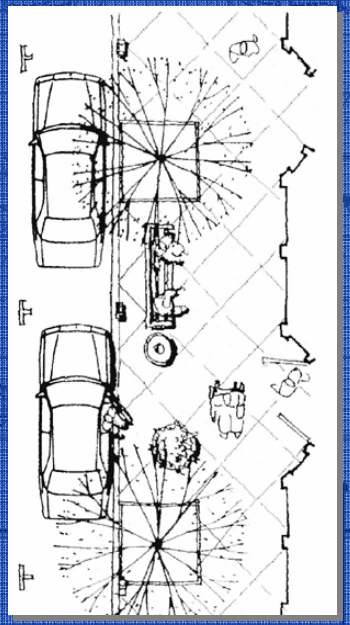
City Challenges

- Definition of community/environmental justice impacts/benefits
- Reduction in depth of adjacent properties and the opportunity for re-development
- Existing/Potential Zoning
- Existing/Increased Non-conformance

Opportunities for Improvement?

Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities

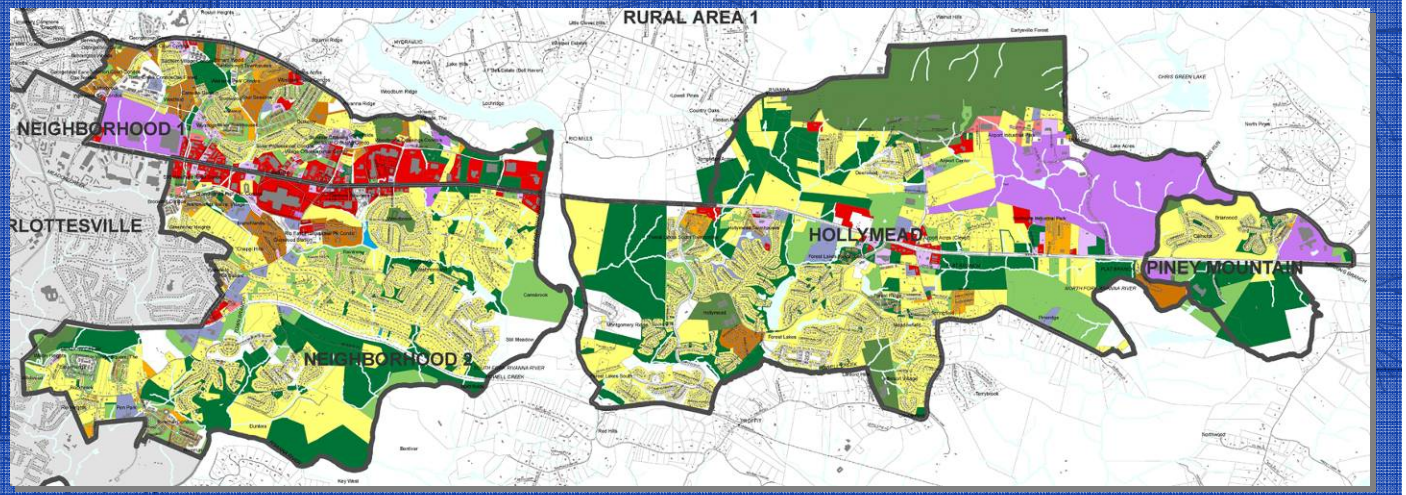




Defining Context & Thoroughfares Together

- City & Corridor
- Neighborhood
- Building & Site

- **Land Use Patterns**
- Transportation Network

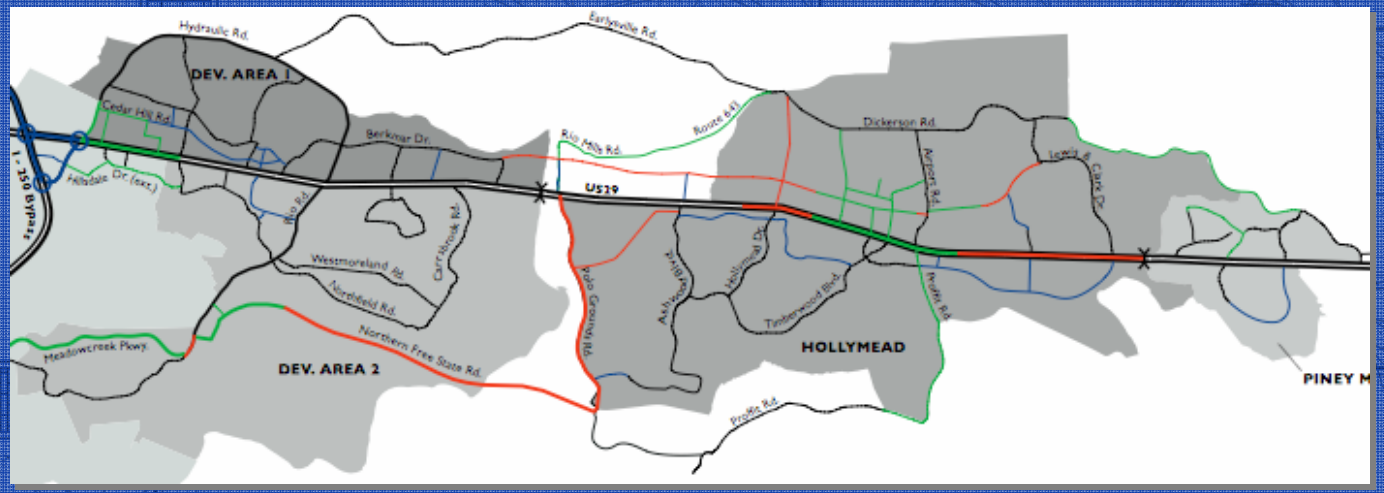


Places29 – Albemarle County, Virginia

Defining Context & Thoroughfares Together

- City & Corridor
- Neighborhood
- Building & Site

- Land Use Patterns
- Transportation **Network**



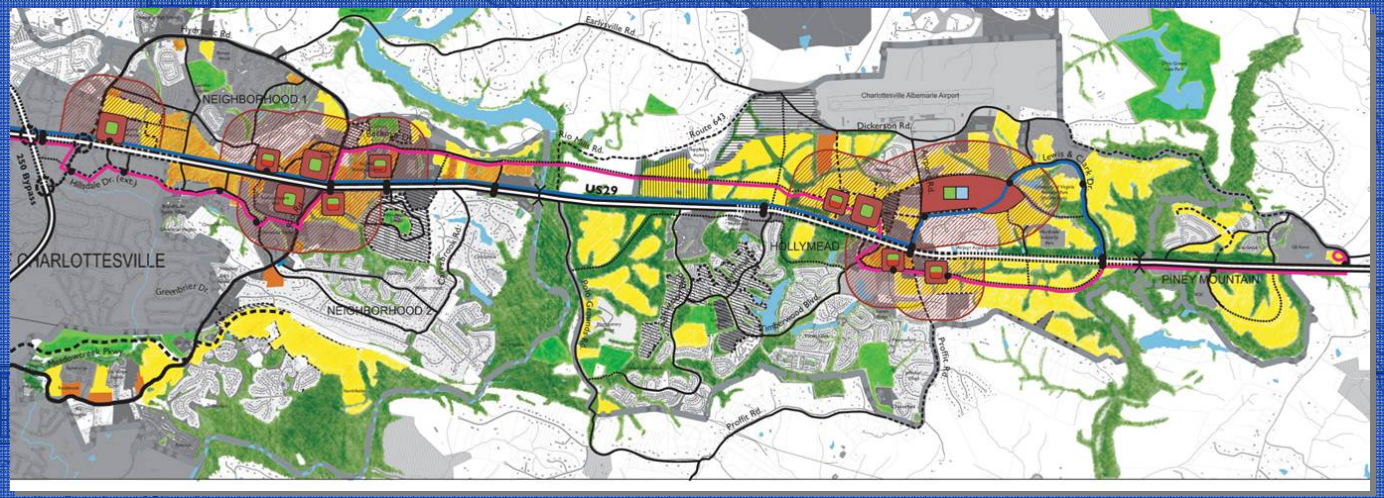
Places29 – Albemarle County, Virginia

Defining Context & Thoroughfares Together

- City & Corridor
- Neighborhood
- Building & Site

- **Land Use Patterns**
- **Transportation Network**



Places29 – Albemarle County, Virginia

Changing Thoroughfare & Context

- Arterial Street
- C-3: Suburban

***US29H250 Project** – Charlottesville & Albemarle County, VA*

Design by CD+A and MMA – Visualization by Urban Advantage

Changing Thoroughfare & Context

- Boulevard Thoroughfare
- C-4: General Urban

US29H250 Project *– Charlottesville & Albemarle County, VA*

Design by CD+A and MMA – Visualization by Urban Advantage

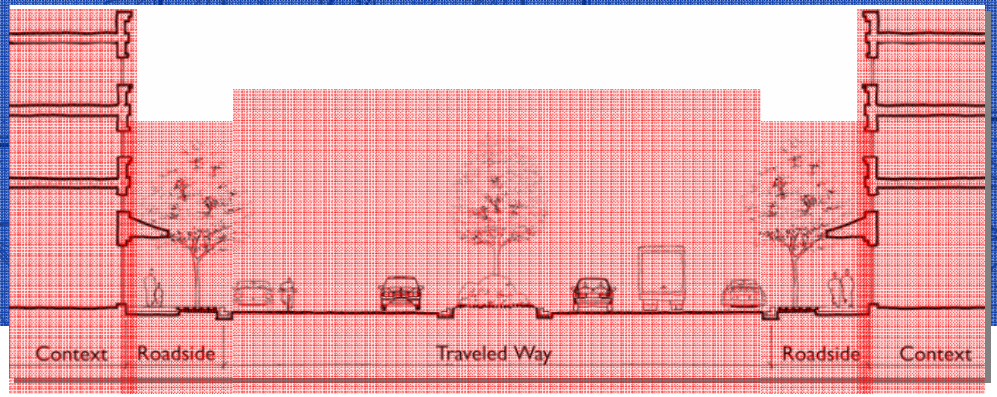
Changing Thoroughfare & Context

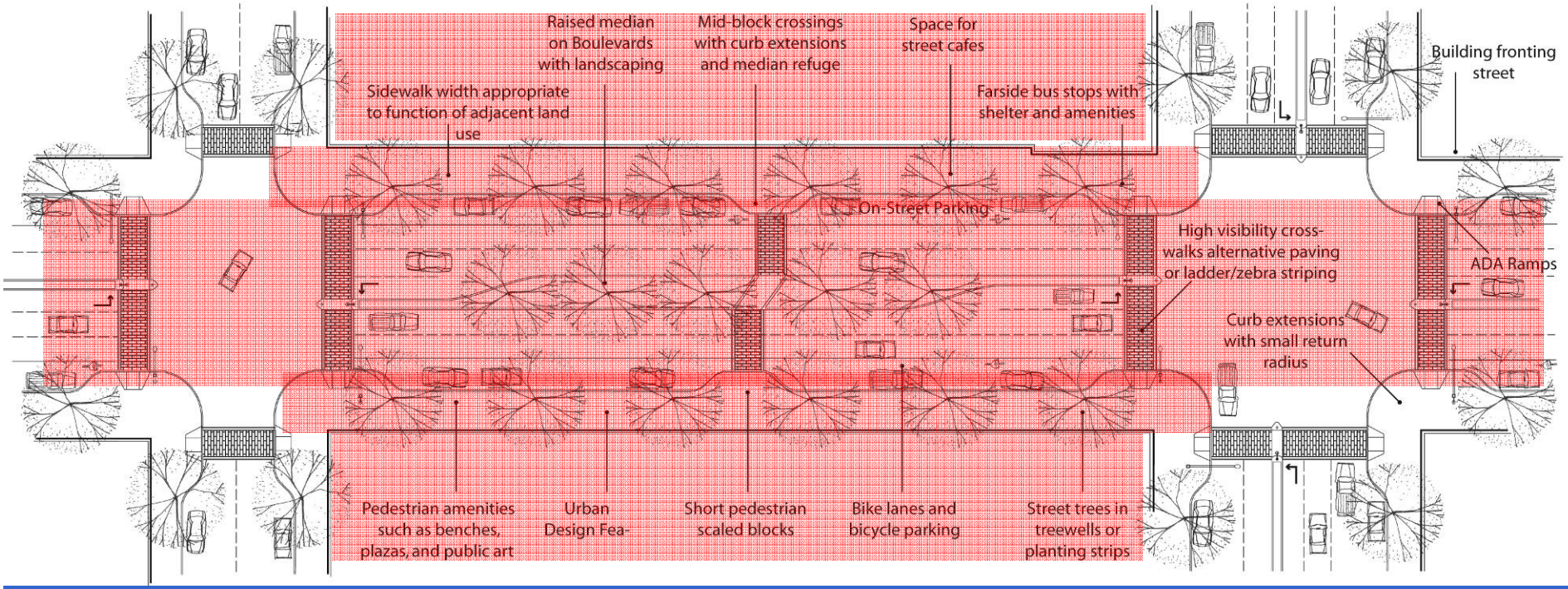
- Avenue Thoroughfare
- C-5: Urban Center

***US29H250 Project** – Charlottesville & Albemarle County, VA*

Design by CD+A and MMA – Visualization by Urban Advantage

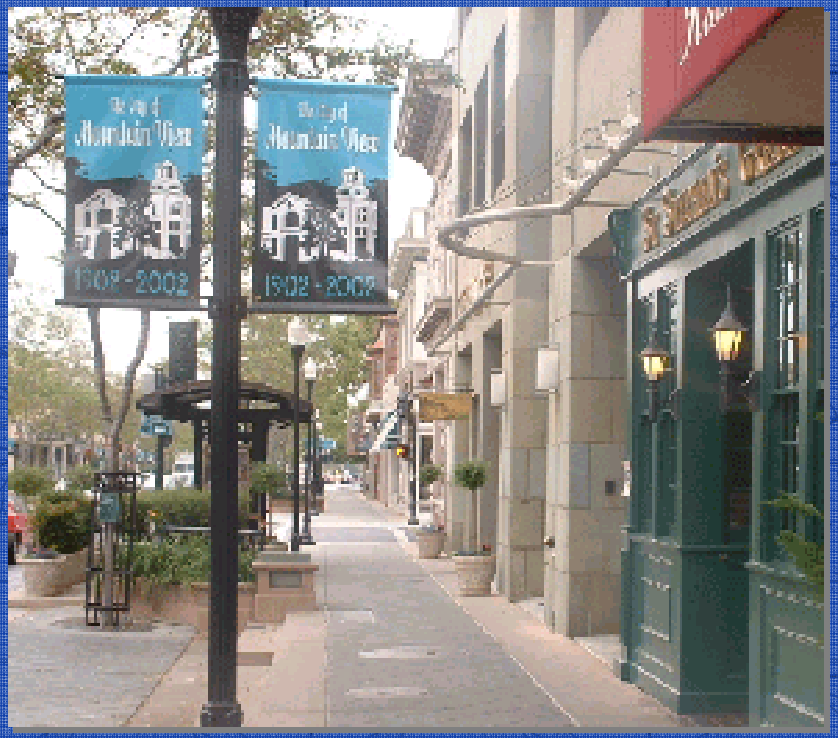
CSS Elements in Urban Contexts





Design Guidance: Roadside

- Roadside zones
- Public places
- Placement of roadside facilities
- Public art
- Sidewalk width & function
- Pedestrian buffers
- Sidewalk/driveway/alley crossings
- Street furniture
- Utilities
- Landscaping/street trees



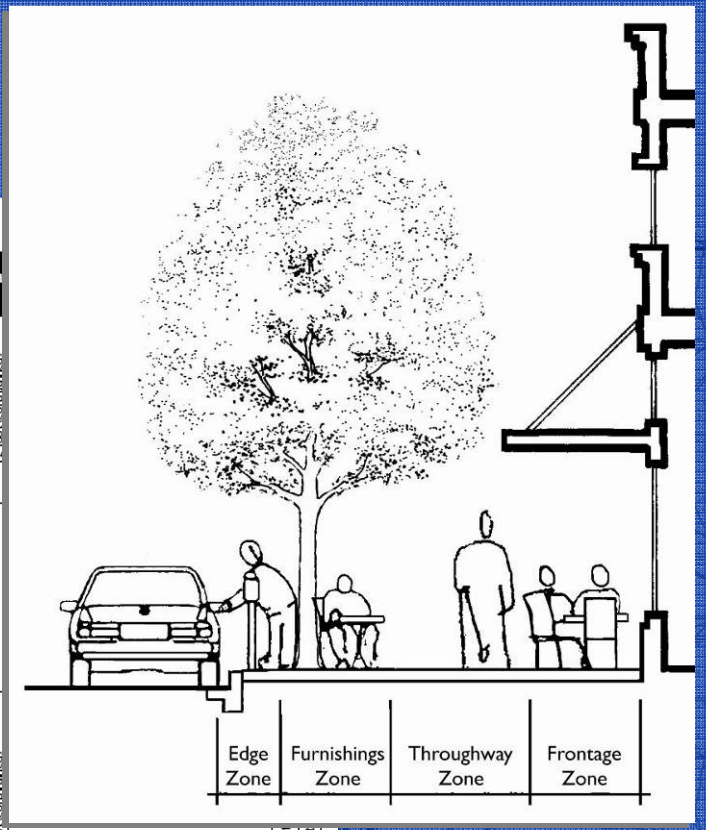
Roadside Design

Table 8.1 Recommended Roadside Zone Dimensions

			CONTEXT ZONE AND PREDOMINANT GROUND FLOOR LAND USE OR FRONTAGE											
	Sidewalk Zone [1]		C-6 and C-5			C-4 w/ Predominantly Commercial Ground Floor Use			C-4 w/ Predominantly Residential Frontage			C-3 w/ Predominantly Commercial Ground Floor Use		
Boulevard	Edge		1.5 ft. 2.5 ft. at diagonal parking	21.5 foot (recommended) 12 foot (constrained)		1.5 ft. 2.5 ft. at diagonal parking	19 foot (recommended) 12 foot (constrained)		0.5 ft.	16.5 foot (recommended) 9 foot (constrained)		1.5 ft. 2.5 ft. at diagonal parking	16 foot (recommended) 12 foot (constrained)	
	Furnishings		7 ft. (trees in tree wells)			7 ft. (trees in tree wells)			8 ft. (landscape strip w/ trees and grasses, or groundcovers)			7 ft. (trees in tree wells)		
	Throughway		10 ft.			8 ft.			8 ft.			6 ft.		
	Frontage		3 ft.			2.5 ft.			0 ft. along lawn and groundcover 1 foot along low walls, fences and hedges 1.5 ft. along facades, tall walls and fences			1.5 ft.		
Boulevard Without Parking	Edge		THIS THOROUGHFARE TYPE NOT APPLICABLE TO THE PREDOMINANTLY COMMERCIAL GROUND FLOOR LAND USES FOUND IN C-4 THROUGH C-6 CONTEXT ZONES						0.5 ft.	18.5 foot (Recommended) 9 foot (constrained)		THIS THOROUGHFARE TYPE NOT APPLICABLE TO THE PREDOMINANTLY COMMERCIAL GROUND FLOOR LAND USES		
	Furnishings								10 ft. (landscape strip w/ trees and groundcovers. or low shrubs)					
	Throughway								8 ft.					
	Frontage								0 ft. along lawn and groundcover 1 foot along low walls, fences and hedges 1.5 ft. along facades, tall walls and fences					
Avenue	Edge		1.5 ft. 2.5 ft. at diagonal parking	19.5 foot (recommended) 12.0 foot (constrained)		1.5 ft. 2.5 ft. at diagonal parking	16 foot (recommended) 12 foot (constrained)		0.5 ft.	14.5 foot (recommended) 9 foot (constrained)		1.5 ft. 2.5 ft. at diagonal parking	16 foot (recommended) 12 foot (constrained)	
	Furnishings	With Parking	6 ft. trees in tree wells			6 ft. (trees in tree wells)			8 ft. (landscape strip w/ trees and grasses, or groundcovers)			6 ft. (trees in tree wells)		
		Without Parking	8 ft. with buffer landscaping			8 ft. with buffer landscaping			8 ft. with buffer landscaping			8 ft. with buffer landscaping		
	Throughway		9 ft.			6 ft.			6 ft.			6 ft.		6 ft.
	Frontage		3 ft.			2.5 ft.			0 ft. along lawn and groundcover 1 foot along low walls, fences and hedges 1.5 ft. along facades, tall walls and fences			2.5 ft.		0 ft. along lawn and groundcover 1 foot along low walls, fences and hedges 1.5 ft. along facades, tall walls and fences
Street	Edge		1.5 ft. 2.5 ft. at diagonal parking	16 foot (recommended) 12.0 foot (constrained)		1.5 ft. 2.5 ft. at diagonal parking	16 foot (recommended) 12 foot (constrained)		0.5 ft.	11.5 foot (recommended) 9 foot (constrained)		1.5 ft. 2.5 ft. at diagonal parking	15 foot (recommended) 12 foot (constrained)	0.5 ft.
	Furnishings		6 ft. (trees in tree wells)			6 ft. (trees in tree wells)			5 ft. (landscape strip w/ trees and grasses, or groundcovers)			6 ft. (trees in tree wells)		5 ft. (landscape strip w/ trees and grasses, or groundcovers)
	Throughway		6 ft.			6 ft.			6 ft.			6 ft.		6 ft.
	Frontage		2.5 ft.			2.5 ft.			0 ft. along lawn and groundcover 1 foot along low walls, fences and hedges 1.5 ft. along facades, tall walls and fences			1.5 ft.		0 ft. along lawn and groundcover 1 foot along low walls, fences and hedges 1.5 ft. along facades, tall walls and fences

NOTES: Recommended dimensions for the throughway zone may be wider in active commercial areas.
See Table 5.2 in Chapter 5 for discussion of minimum roadside zone widths in constrained conditions.

[1] In AASHTO's *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, the furnishing zone is termed the "buffer" zone, and the frontage zone is termed the "shy distance."



CNU

2006 Proposed Recommended Practice

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