COMPLETE STREETS

Design & Implementation

Santa Clara, CA

July 13, 2017

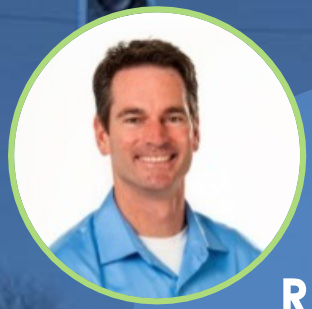
Smart Growth America
Improving lives by improving communities

National Complete Streets Coalition

Complete Streets

Trainers

Emiko Atherton
National Complete Streets Coalition



Mike Rutkowski P.E., AICP
Stantec

Agenda

- ✓ Creating a Plan – Implementing CS
- ✓ Complete Streets, the Process
- ✓ Funding 101/Outreach
- ✓ Project Development/Review Process
- ✓ Next Steps

Implementing Complete Streets

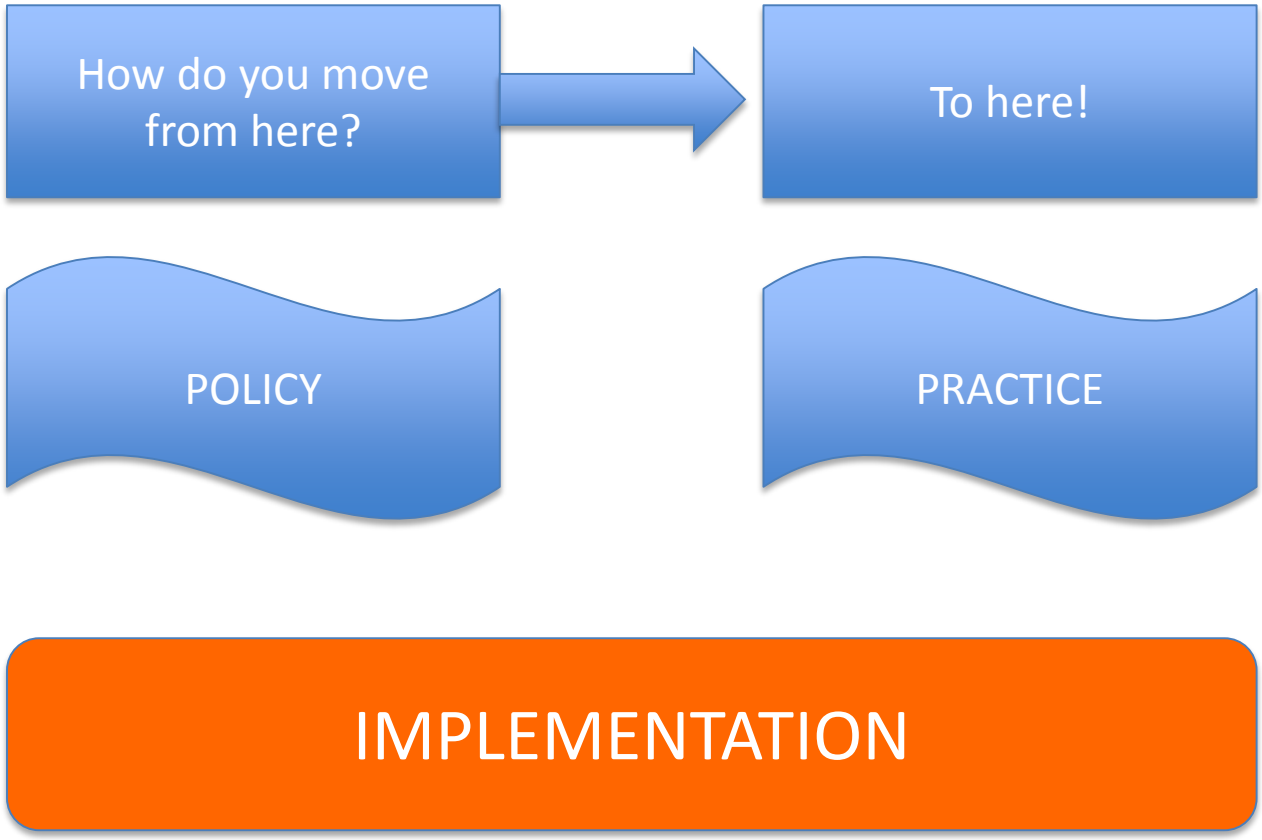
Emiko Atherton

Planning for Implementation

"Complete Streets policies are intended to end (this) project-by-project approach to change, and they do so by focusing not on projects but on changing the internal guidelines, policies, processes and systems that have been set up to provide for a single mode."

-Barbara McCann, founder of the Complete Streets movement

Policy to Practice



Implementation Activities

1. Organize implementation activities
2. Restructure processes, procedures, policies, plans, and programs
3. Rewrite or update design guidance
4. Offer educational opportunities to transportation staff, community leaders, and the general public
5. Create new performance measures

1. Organize Implementation

- Create an Implementation Committee
- Assess what you have
- Develop an implementation plan

Implementation Committee

- Internal: Easier to manage expectations, achieve goals
  - An internal committee charged with implementing a policy becomes a driver of change because it provides a forum for different departments to work out problems.

Implementation Committee

- External: Builds stronger community and political will
  - Places with successful Complete Streets policies include more people in the decision-making process.

Assess what you have…

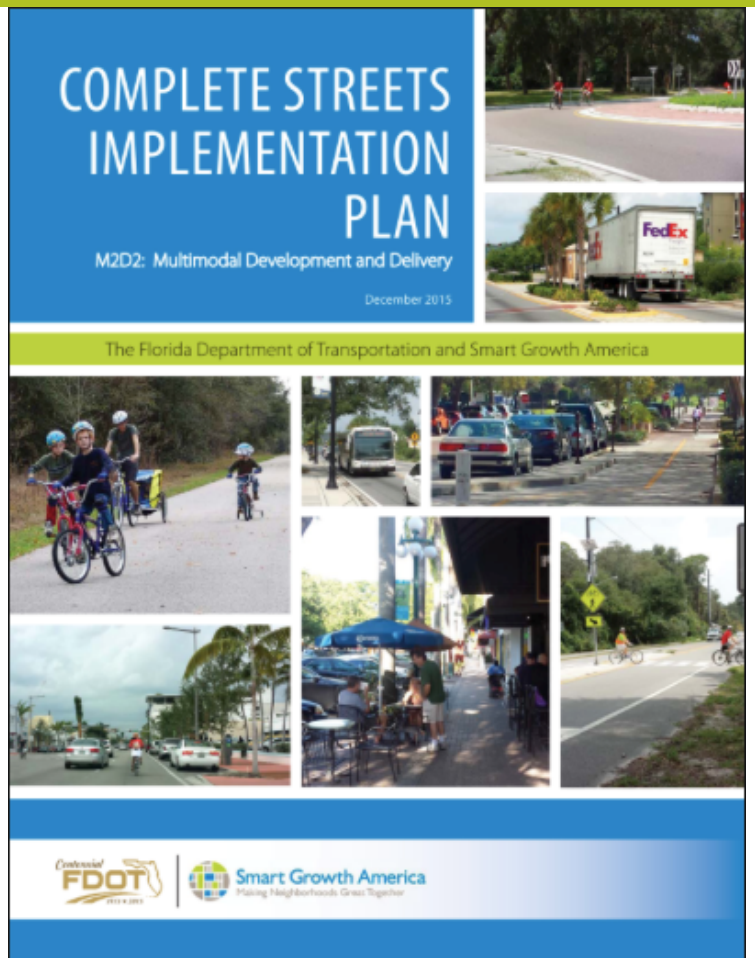
Get a clear picture of all the steps involved in choosing, planning, and building your transportation projects.

Assess what you have…

- Understanding the current process is essential because the project development system dictates how decisions are made.
  - Checklists, design trees, procedures, plans, processes, code/ordinances, design guidance, performance measures currently used
  - Also consider looking at land use, zoning, and subdivision regulations.

Create an implementation plan

- “Best practices”
- Clear path forward
- Measures internal and external change
- Communications tool



2. Process & procedure

Opportunities for change

- Update documents to comply with Complete streets (RFPs, plans, regulations, codes, project scope)
- Modify process, procedures, and documents
- Prioritize projects that achieve CS goals
- Clarify exceptions process, accountability
- Adopt or update supporting plans and policies
- Take advantage of maintenance and operations opportunities

Change project procedures

- Planning
- Programming
- Scoping
- Design
- Construction
- Maintenance*
- Operations*

- Capital projects
  - New, retrofit, reconstruction
- Repair, resurfacing, restoration, rehabilitation
- Bridges

**More opportunities than with CIP/TIP projects!*

Modify procedural documents

- Checklists
  - Roadway design, signals, streetscaping, ADA, development reviews, etc.
- Decision trees
- Design vehicle
- Standard operating procedures
- Project development forms

3. Update design guidance

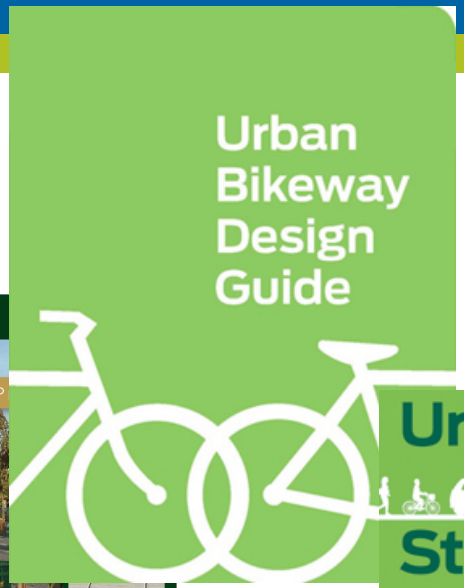
- Create new document or revise existing
- Reference latest and best national/state guides
- Public and private development
- Set new standard templates
- Pilot new designs
- Integrate new techniques into practice

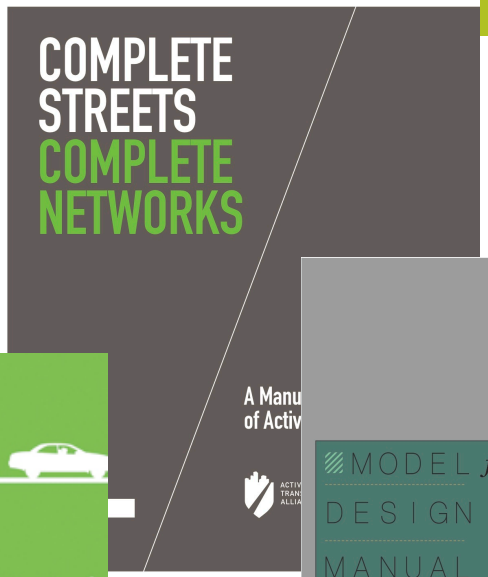
Design Guidelines

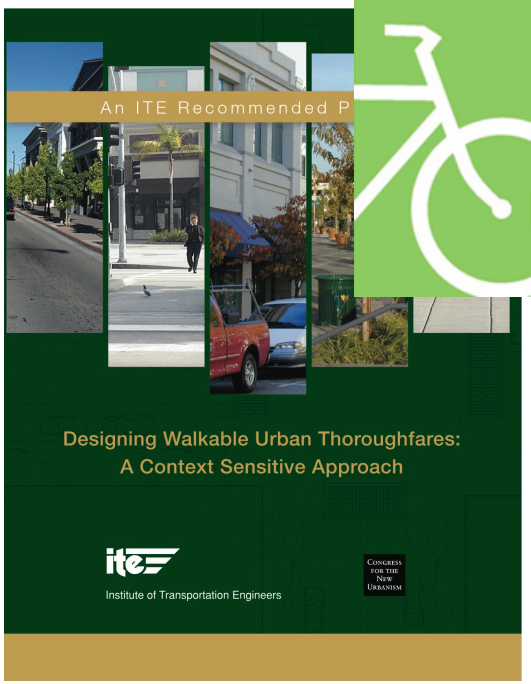
- Design guidelines are a set of rules and standards to guide a community's design.
- Revising design manuals to support multimodal efforts is one of the major actions taken to implement Complete Streets.
- Gives engineers and planners better decision-making tools

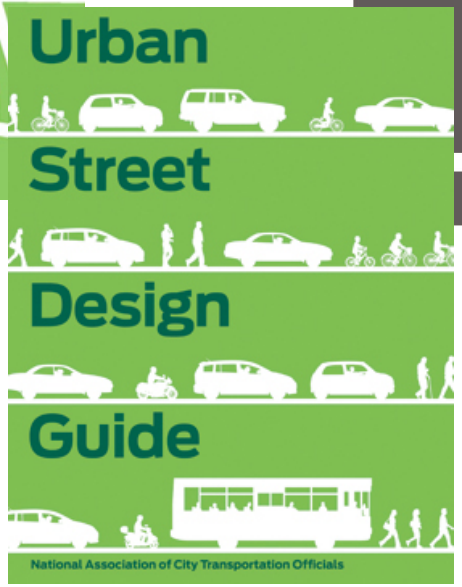
Agency-specific examples

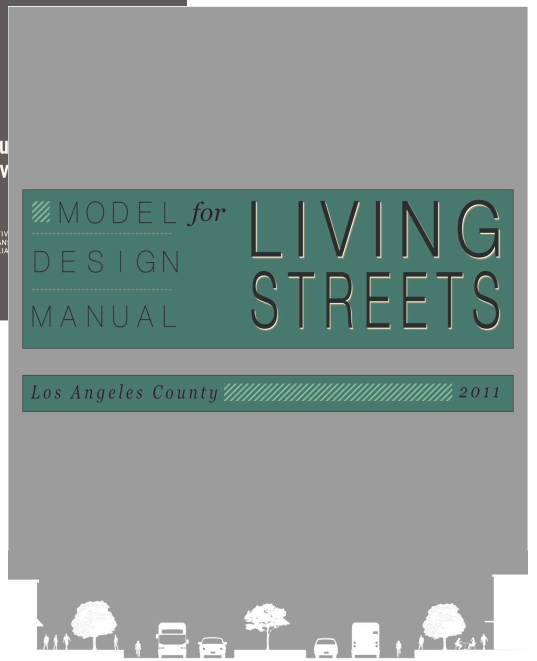
Adoptable/adaptable models



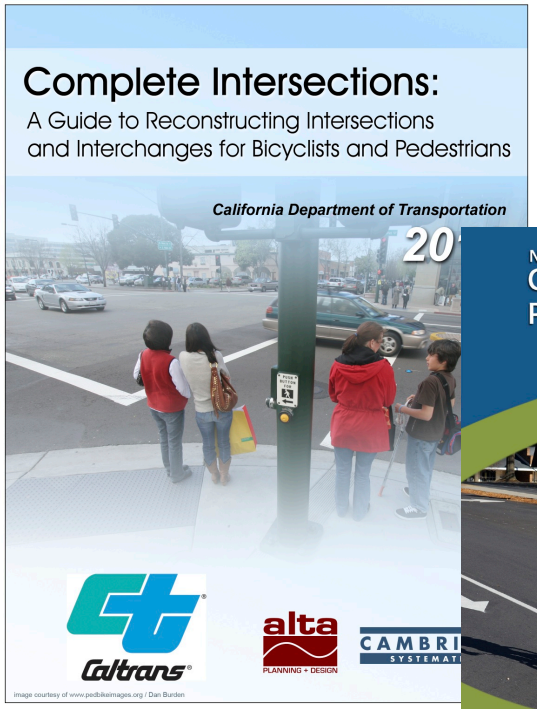


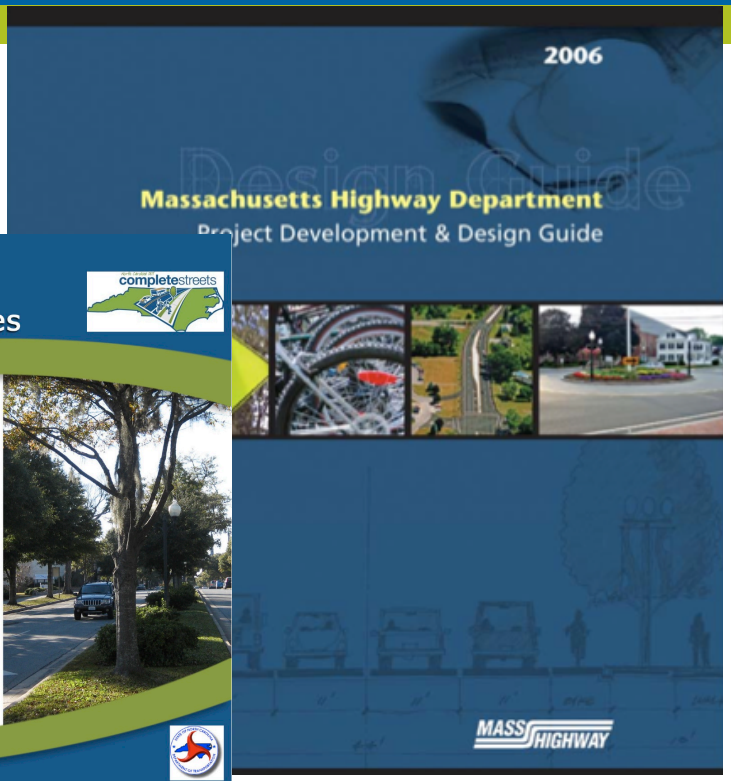






Refer to state standards





4. Educate and Train

public	• Determine what people want of out their streets • Explain new treatments • Educate on the transportation process
public officials	• Understand how the policy are being translate to projects on the ground • Educate on the transportation process
practitioners	• Professional transportation training • Community engagement

Identify different training needs

- Department heads, managers, program staff
- Planning/design staff
- Construction/field operations staff
- Cooperating agencies)

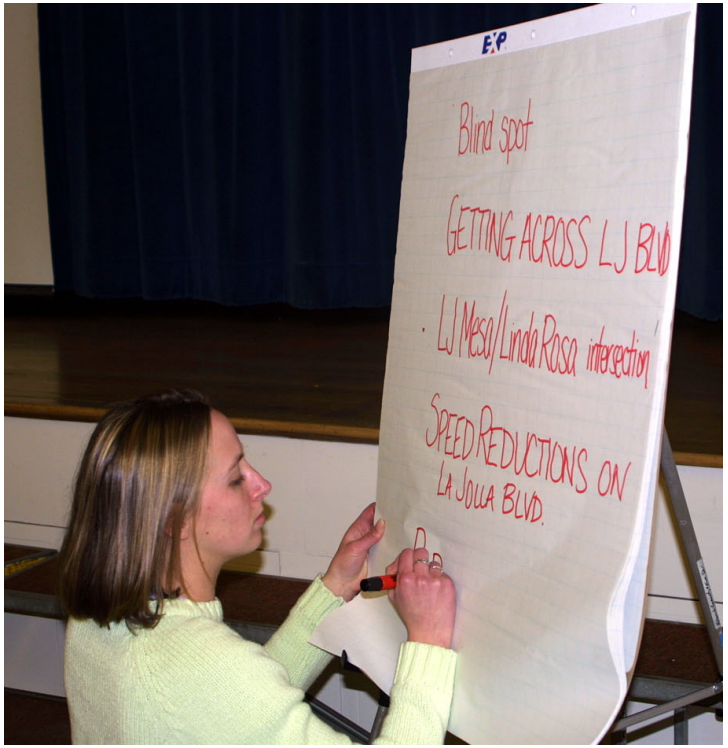
Offer training

Formal & informal training for all staff levels

- Series of technical training sessions
- Walk/bike tours and audits
- Conferences, webinars
- Walk to lunch with coworker

Offer training

- Technical and non-technical issues
  - Not always needed for design, but for procedures
- Multi-departmental
- Public outreach and education is key



PERFORMANCE MEASURES

Performance Measures

- MAP-21 requirements
- Accountability to goals and policies
- Transparency of decisions
  - Guidance making trade-offs
- Biggest bang for the buck
  - Incl. impact on other sectors
- Making the case for transportation projects

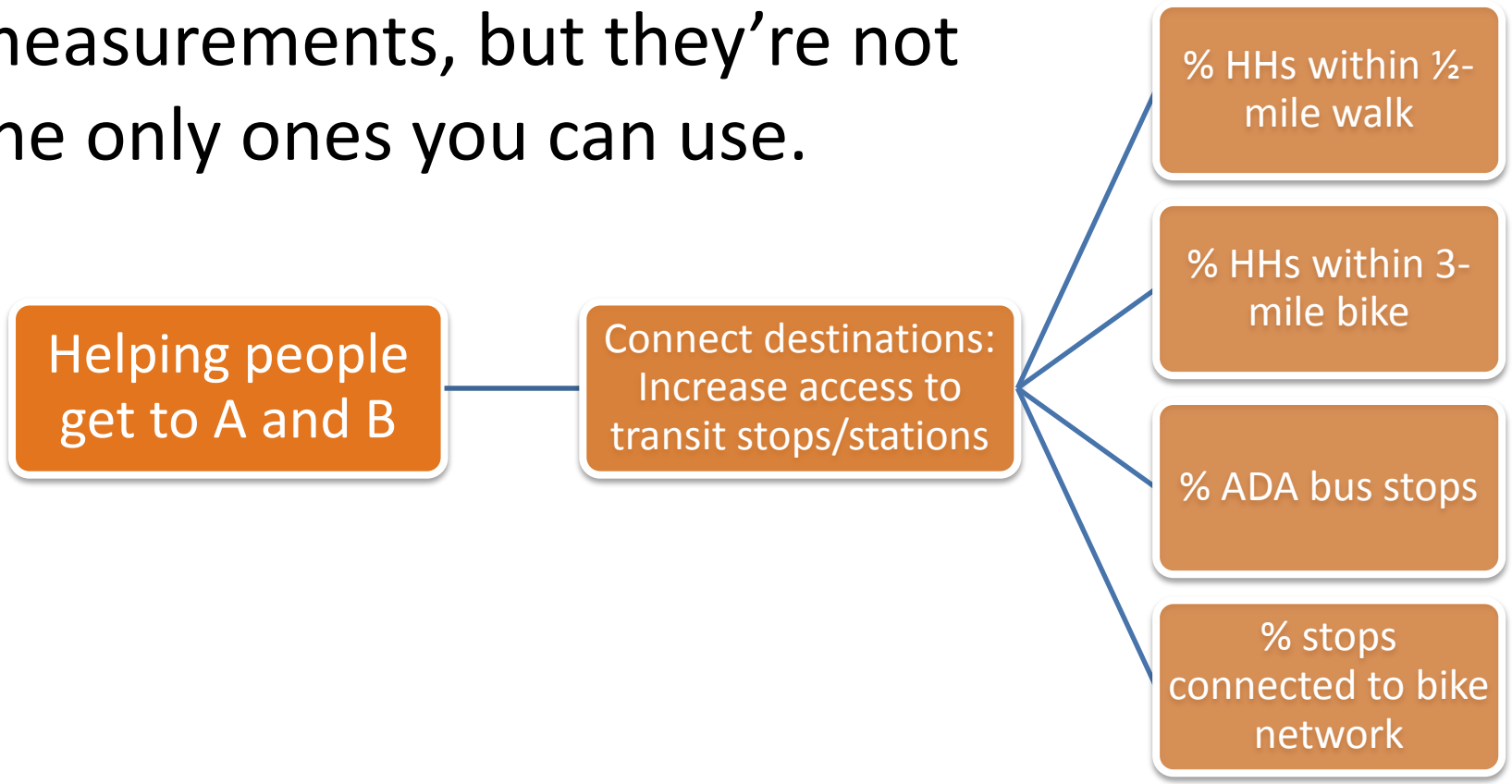
Measures flow from goals.

For example:

Goal	Measures	Metrics
	• Objectives	• Data
Helping people get to A and B	Person trips • Increase walk, bike, transit	Active transport trips as portion of all trips • ACS, Household Travel Survey, Automated counters…

Simple measures can be good measures

Some goals need complex measurements, but they're not the only ones you can use.



Outcome-oriented performance measures

- Beyond mobility-based or system condition measures
  - V/C, LOS, pavement quality
- Use data to support:
  - Long term decisions
    - E.g., Program funding, LRTP, STIP
  - Short term decisions
    - E.g., Alternatives analysis, design choices
- Set goals, objectives, then measures of success

Types of results

You control outputs

Examples:

- Blocks of sidewalks, new and repaired
- Percentage of accessible bus stops
- Percentage of bike plan completed
- Miles of repaved travel lanes
- Average distance between crosswalks

You influence outcomes

Examples:

- Number of people walking
- Parking utilization
- Rate of fatalities per mode
- Retail sales
- Property values
- Amount of physical activity
- Rate of chronic diseases

Tell your story!

Making bus routes work better:
Fordham Road (Bronx)

Neighborhood traffic calming:
East 180th Street (Bronx)

Case Study: Edgewater Drive, FL

Background

- Repaving project scheduled by FDOT
- FDOT was open to reconfiguration if City takes over jurisdiction
- Changes needed to be accepted by neighborhood and a before/after study must be conducted
  - Public determined 9 “measures of effectiveness”

Before

After

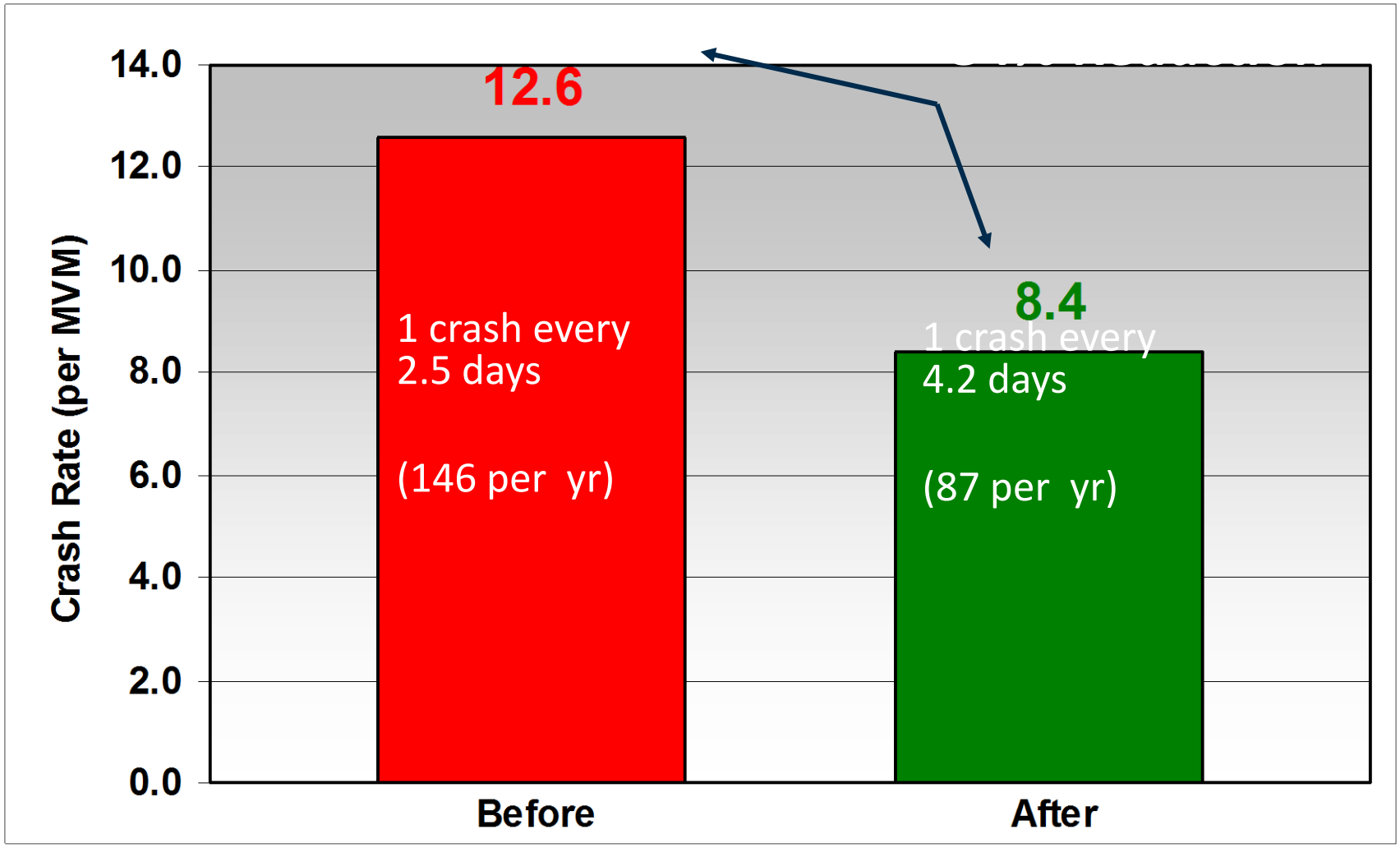
Performance measures

	Measures
1	Avoid increased traffic on neighborhood streets
2	Reduce speeding on Edgewater Drive
3	Increase number of people bicycling
4	Increased number of people walking
5	Reduce crashes
6	Increase use of on-street parking
7	Increase pedestrian satisfaction among residents
8	Increase pedestrian satisfaction among merchants
9	Increase parking satisfaction among residents

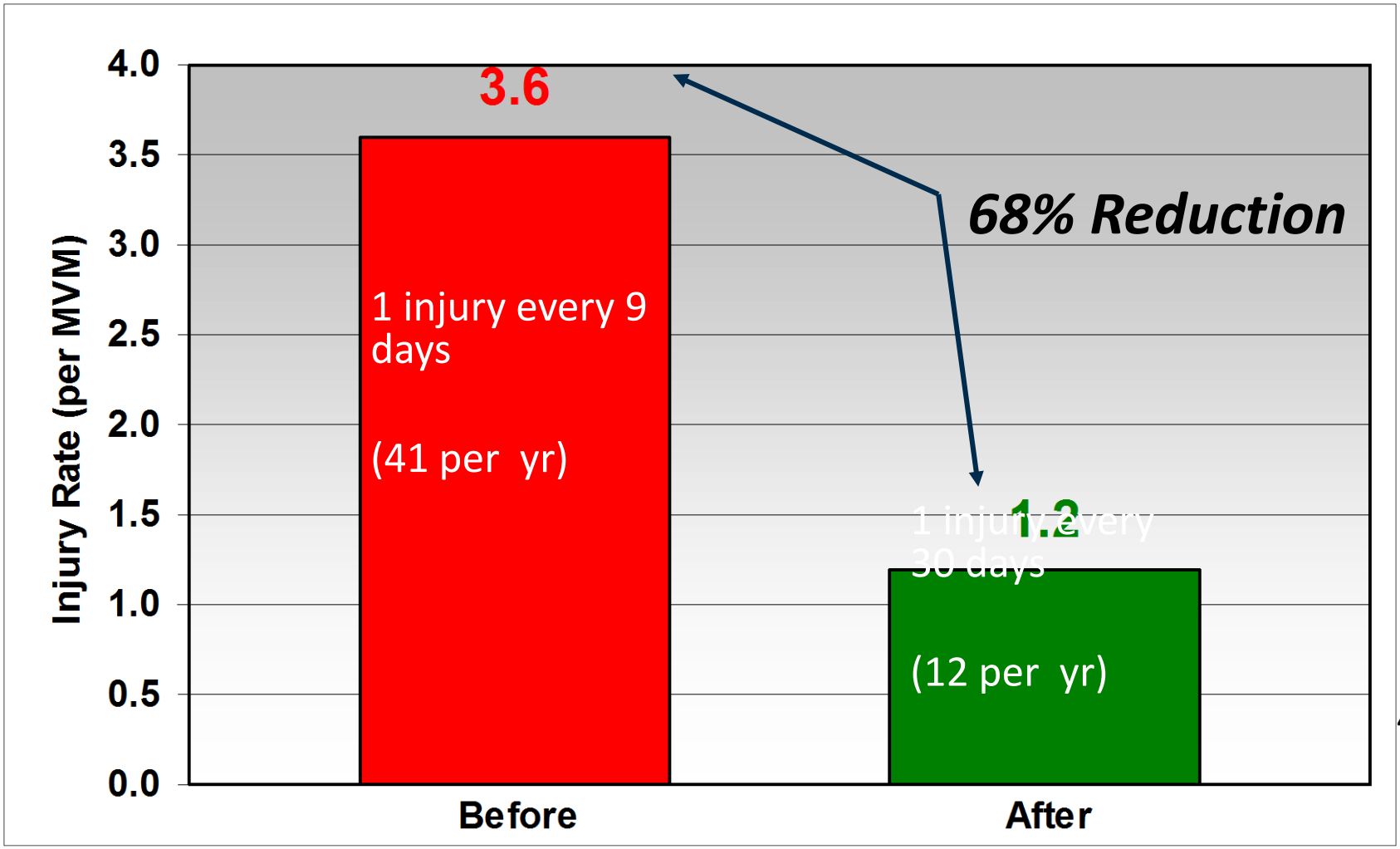
Performance measures

	Measure	Accomplished?
1	Avoid increased traffic on neighborhood streets	YES
2	Reduce speeding on Edgewater Drive	YES
3	Increase number of people bicycling	YES
4	Increased number of people walking	YES
5	Reduce crashes	YES
6	Increase use of on-street parking	YES
7	Increase pedestrian satisfaction among residents	YES
8	Increase pedestrian satisfaction among merchants	NO
9	Increase parking satisfaction among residents	YES

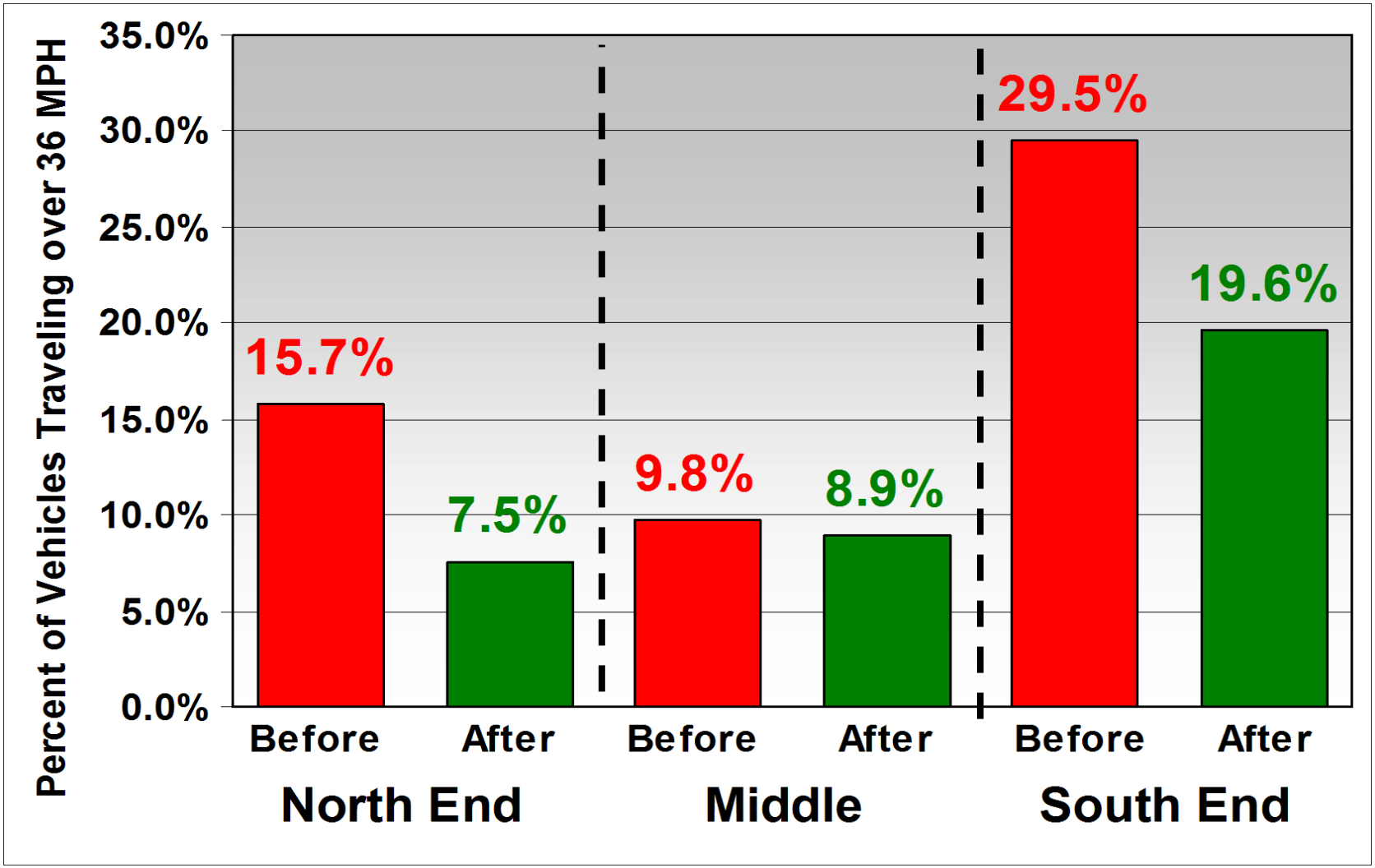
Crash rate


Crash Rate (per MVM)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12.6
1 crash every
2.5 days
(146 per yr)
8.4
1 crash every
4.2 days
(87 per yr)
Before
After

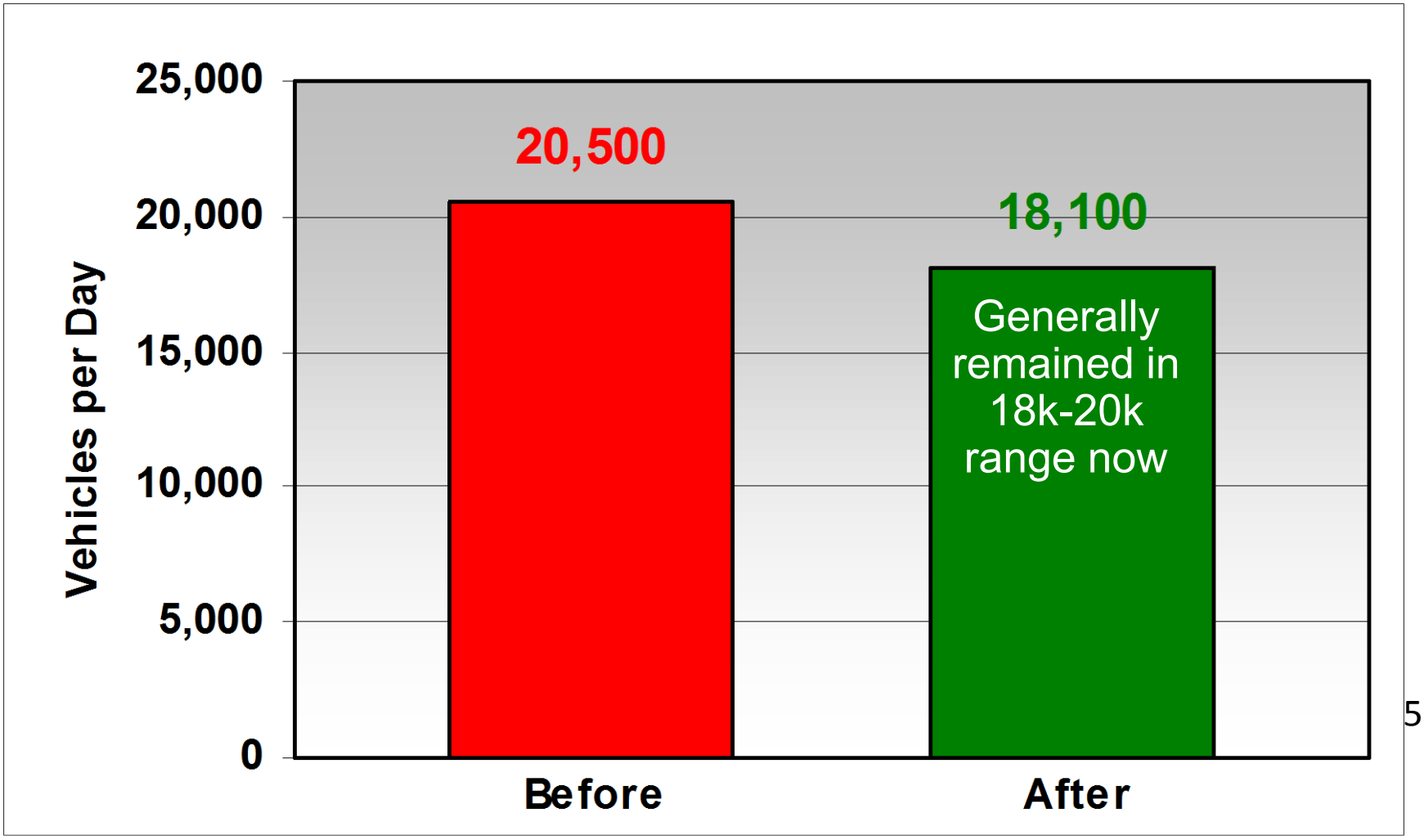
Injury rate


Injury Rate (per MVM)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3.6
1 injury every 9 days
(41 per yr)
68% Reduction
1.2
1 injury every 30 days
(12 per yr)
Before
After

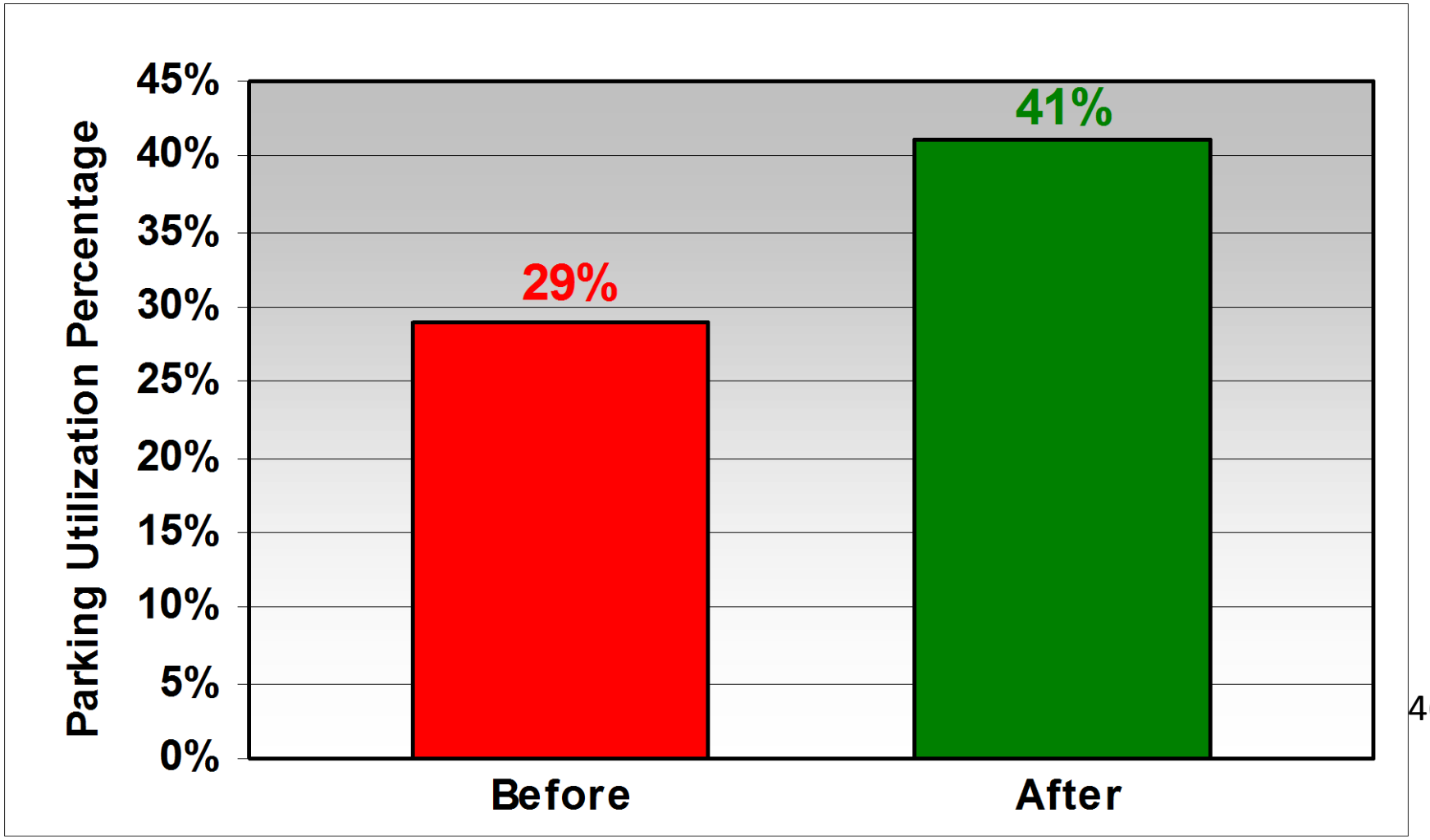
Speeding


Percent of Vehicles Traveling over 36 MPH
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
15.7%
7.5%
9.8%
8.9%
29.5%
19.6%
Before
After
Before
After
Before
After
North End
Middle
South End

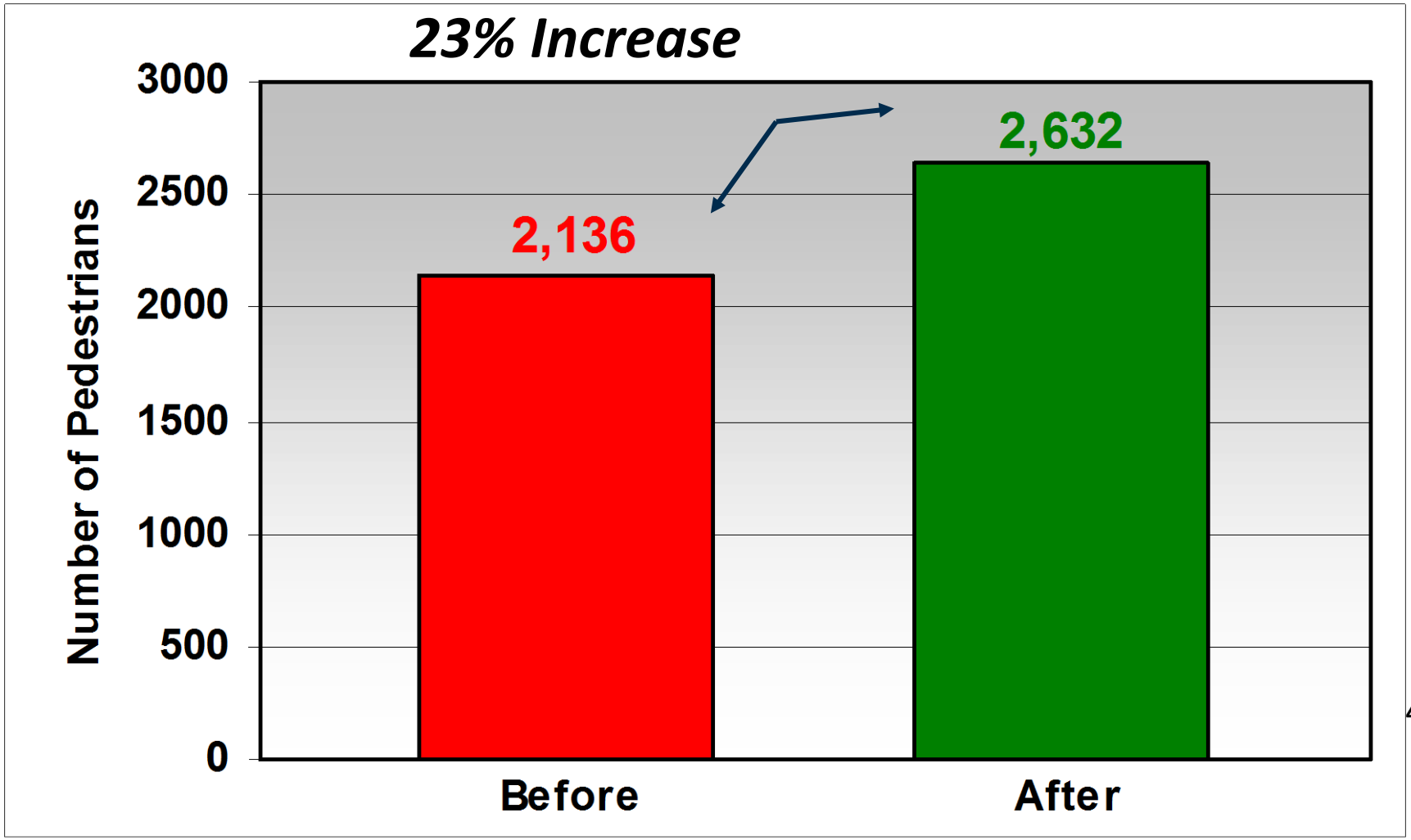
Automobile traffic volumes



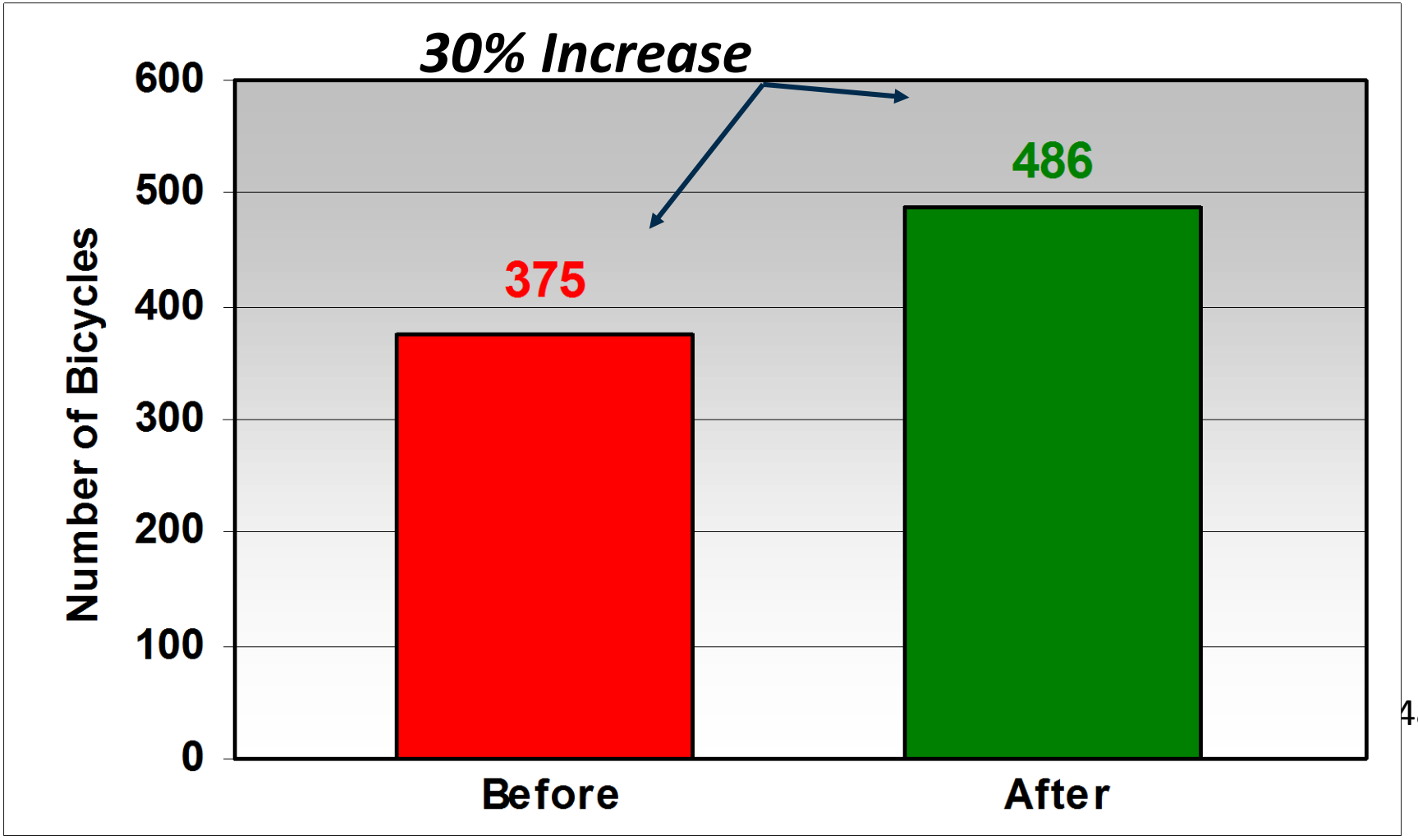
On-street parking use



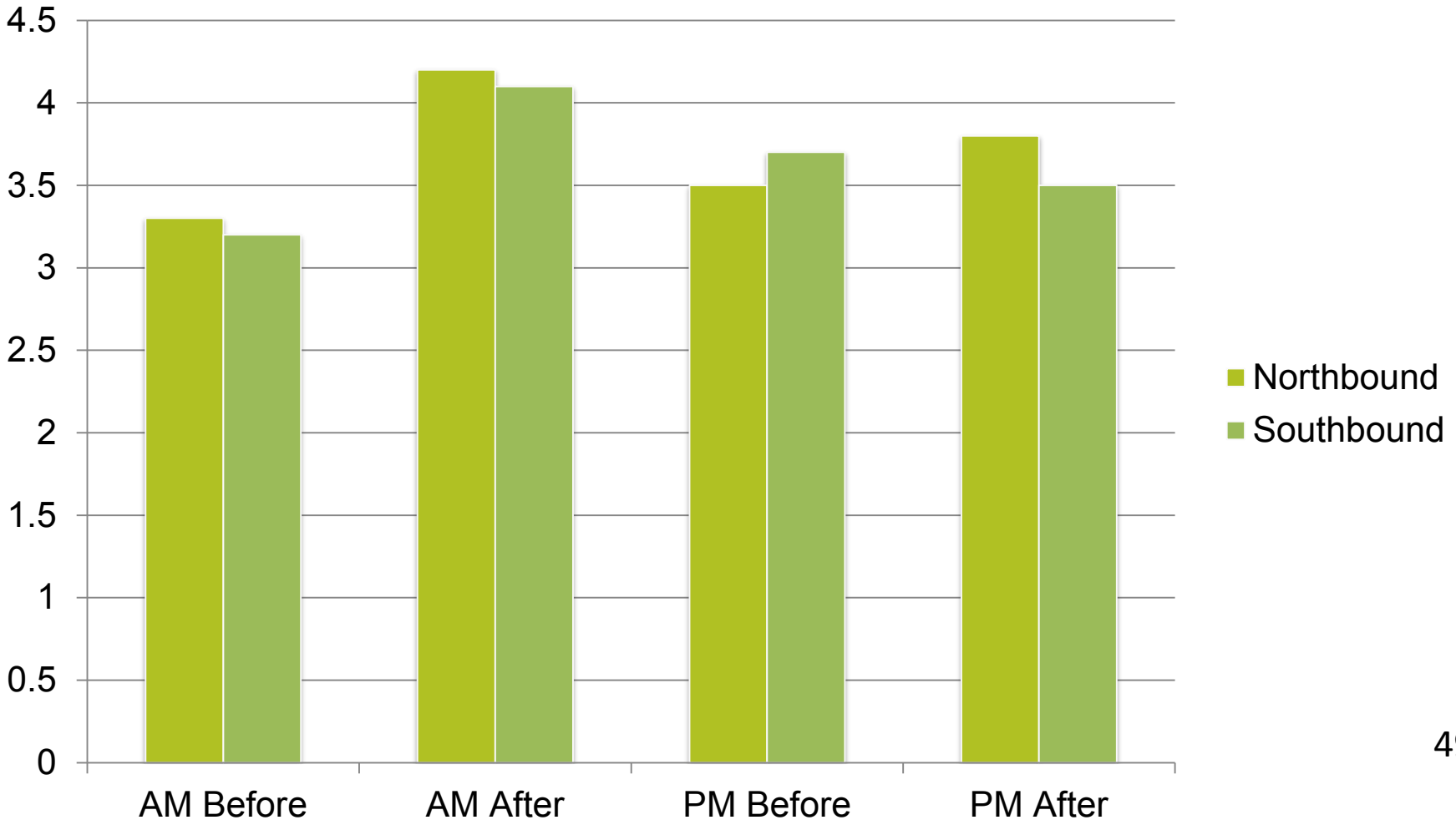
People walking



People bicycling



Average peak period travel time



Property values

- 77 net new businesses open and 560 new jobs created since 2008.
- Average daily automobile traffic, which saw a slight dip following project completion, has returned to its original pre- project level and on-street parking use has gone up 41 percent.
- The value of property adjacent to Edgewater Drive has risen 80 percent, and the value of property within half a mile of the road has risen 70 percent.

30 Minute Lunch Break

Complete Streets – the Process

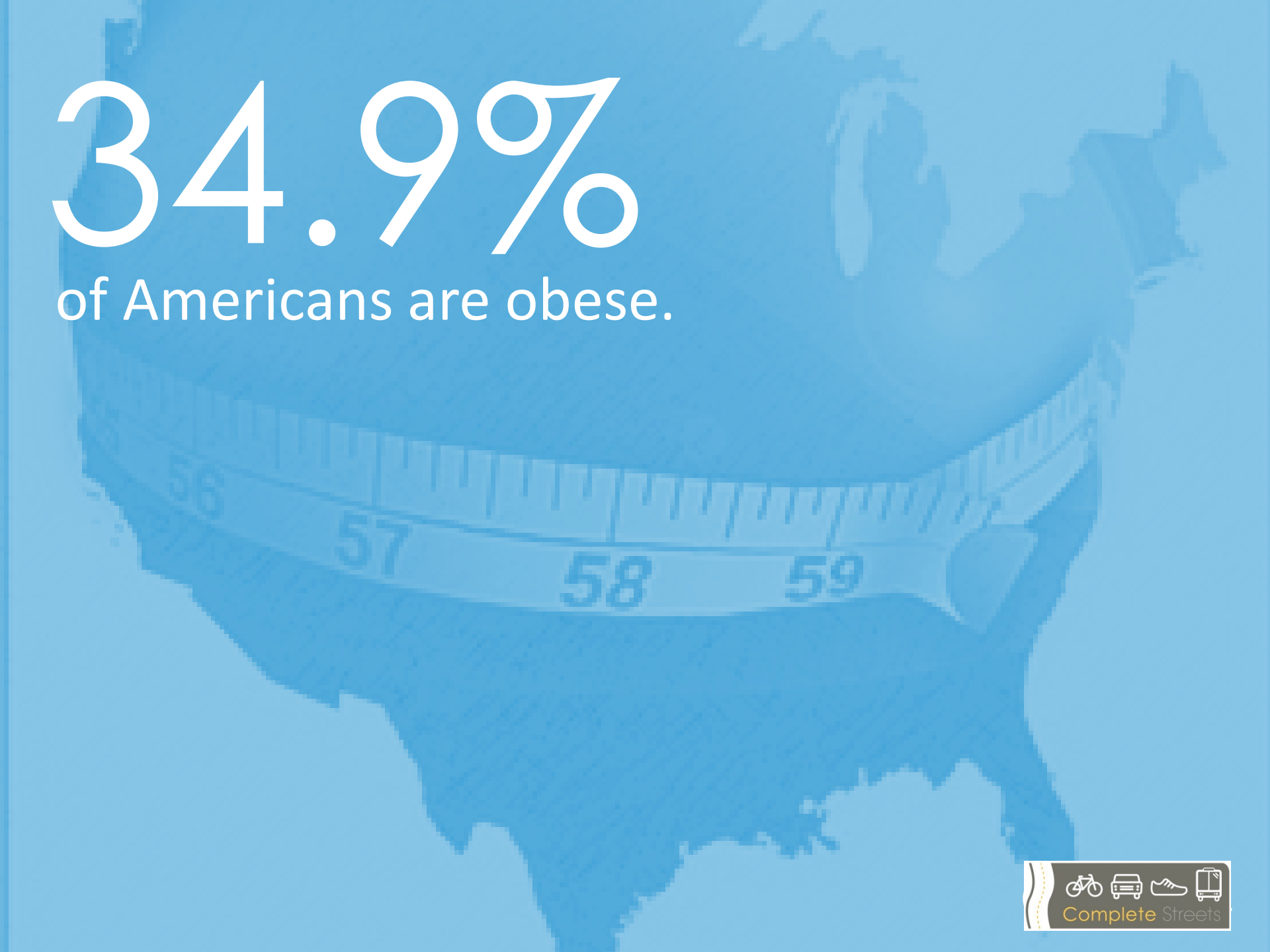
Mike Rutkowski, P.E., AICP

What are Complete Streets?

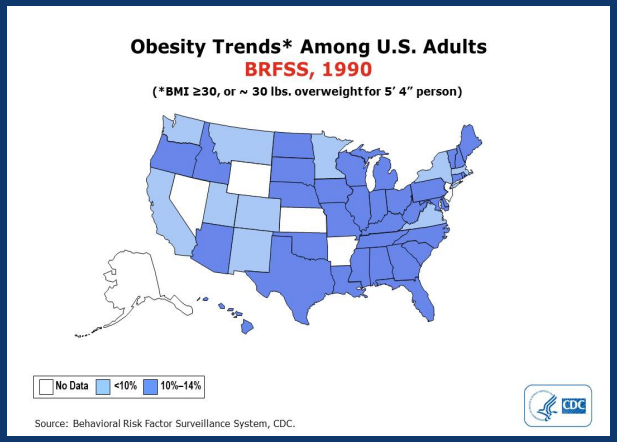
Safe. Comfortable. Convenient.

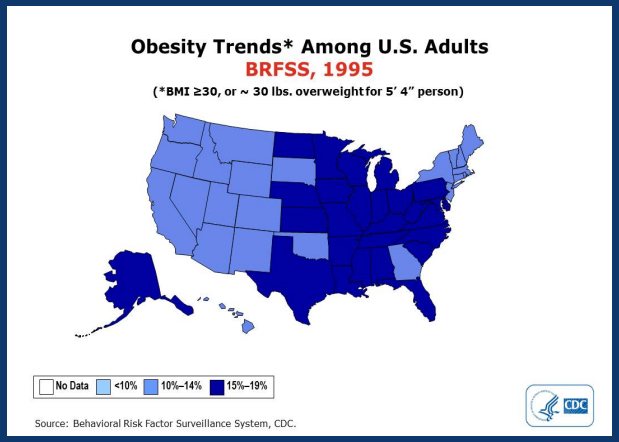
Benefits of Complete Streets

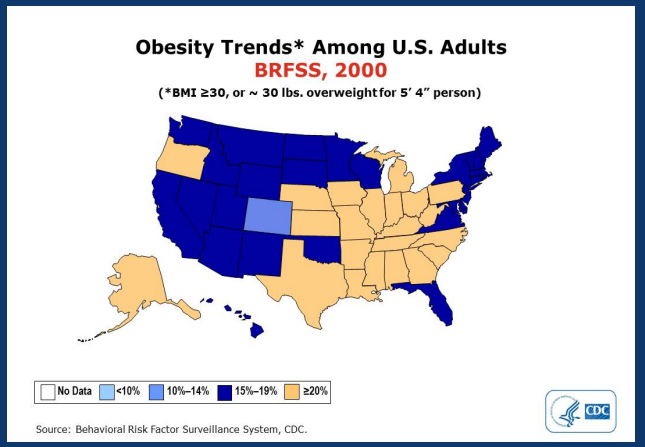
- **Safety**
- **Equity**
- **Health benefits**
- **Increase demand for different modes**
- **People with disabilities**
- **Children and aging population**
- **Relieve congestion**

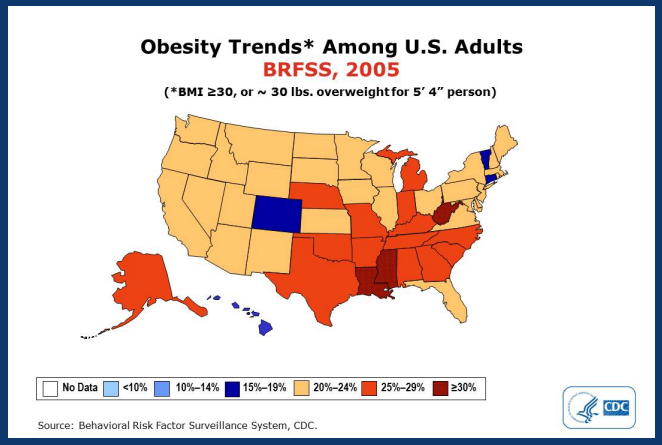

34.9%
of Americans are obese.
56
57
58
59
Complete Streets

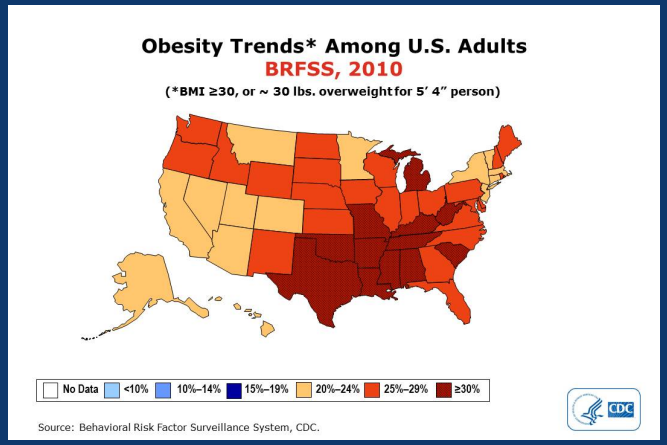
Benefits: Health







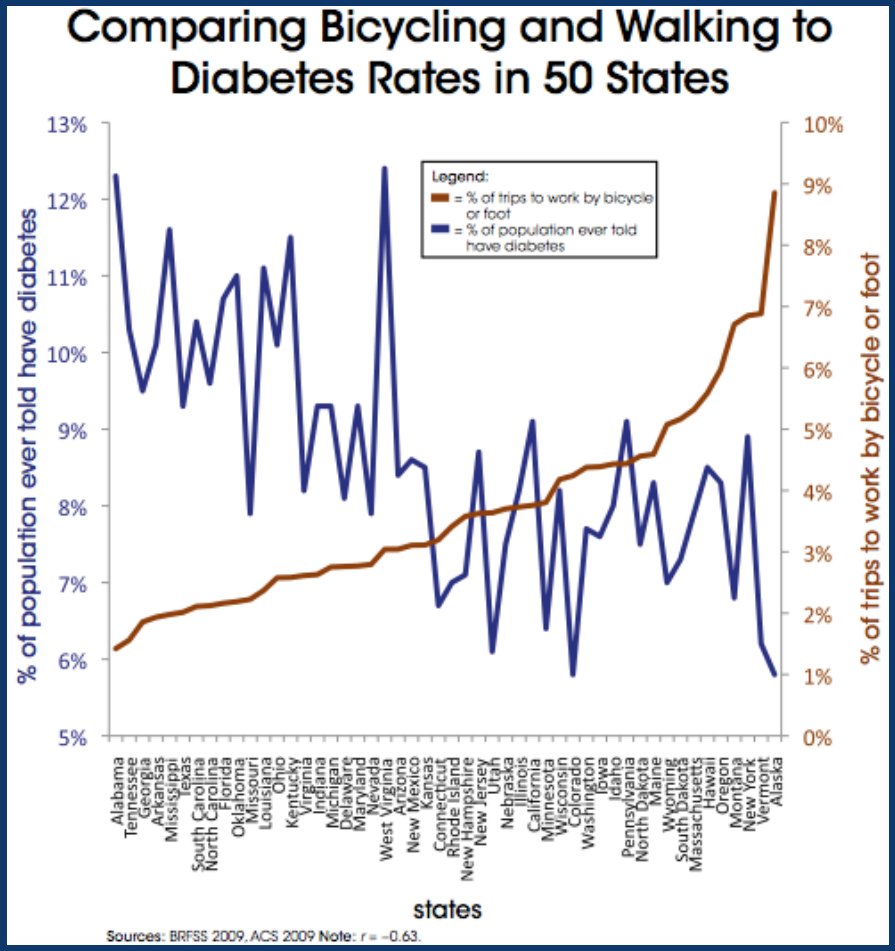




Smart Growth America and National Complete Streets Coalition

Benefits: Health

States with the lowest levels of biking and walking have, on average, the highest rates of obesity, diabetes, and high blood pressure.



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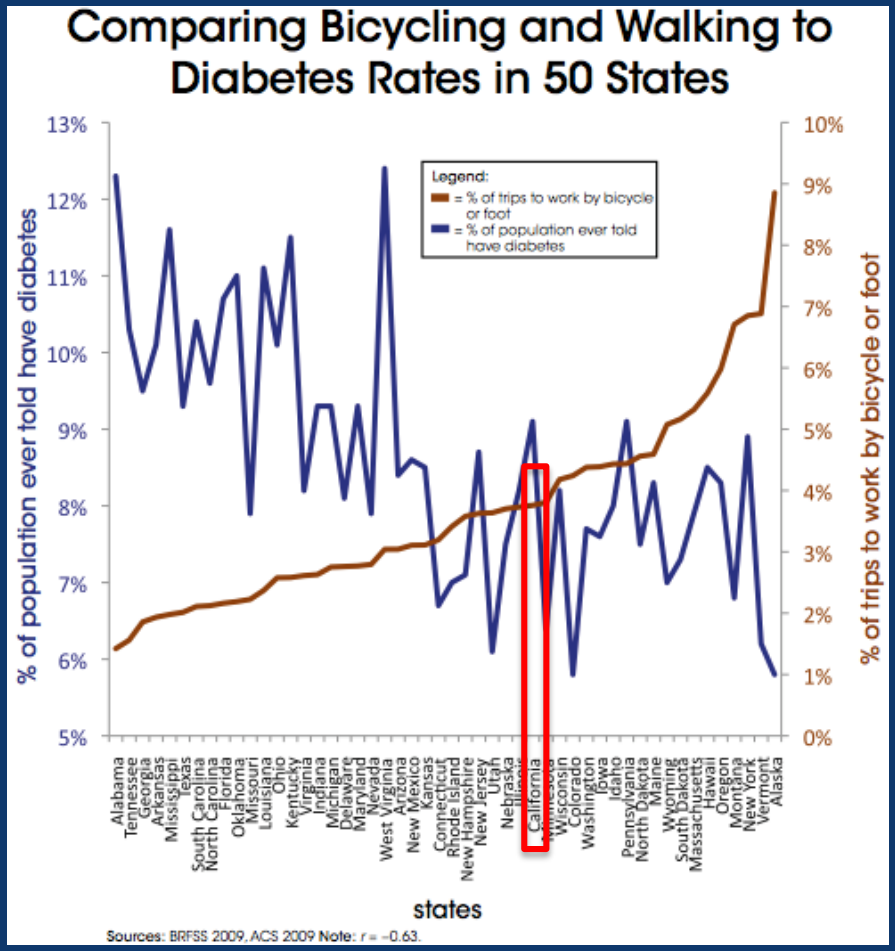


Benefits: Safety

There were 32,719 traffic fatalities in the U.S. in 2015. Of these fatalities:

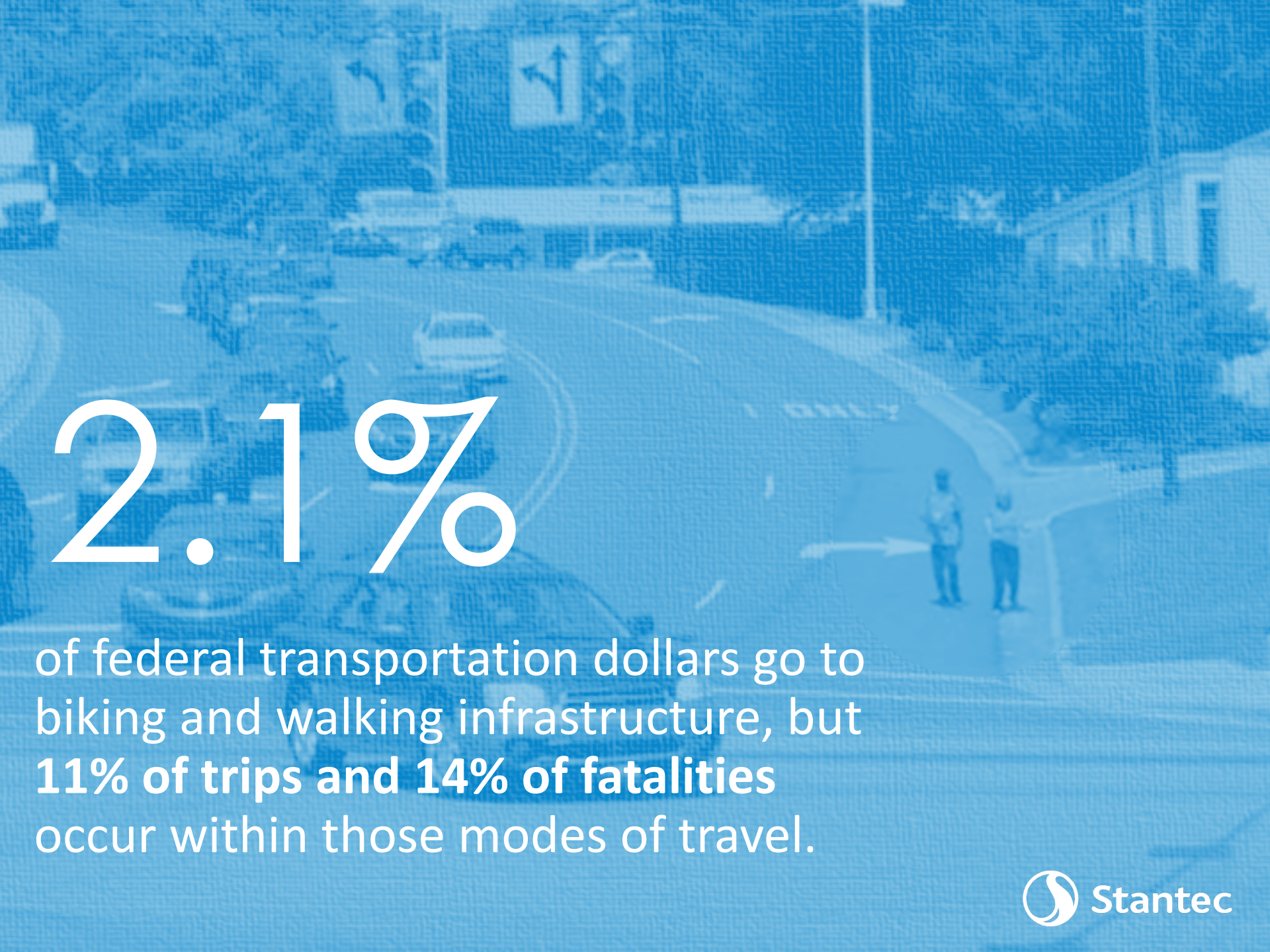
- **23,303 were people in cars**
- **4,735 were people walking**
- **743 were people on bicycles**

National Highway Traffic Safety Administration: Fatality Analysis Reporting System 2015

Safety Benefits

- Sidewalks reduce pedestrian crashes 88% (FHWA)
- Shoulders reduce pedestrian crashes 71% (FDOT)
- Medians reduce crashes 40% (NCHRP)
- Road diets reduce crashes 18 – 49% (ITE)
- Countdown signals reduce crashes 25% (FHWA)

60



2.1%

of federal transportation dollars go to biking and walking infrastructure, but **11% of trips and 14% of fatalities** occur within those modes of travel.

Stantec

Complete Streets

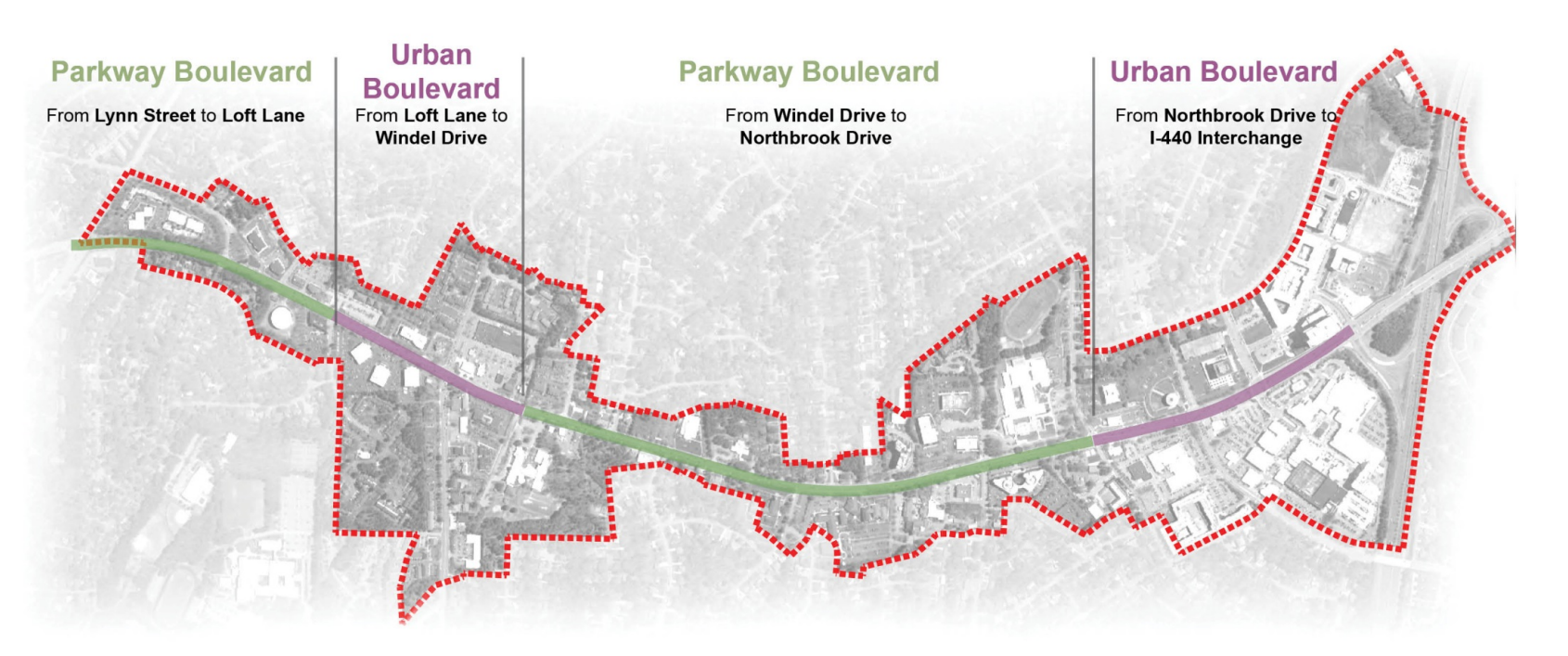
Design Elements

Complete Streets:

"It's a process, not a product" - MMR

- ✓ Define Success
- ✓ Prioritize Modes
- ✓ Define Design Features/Limitations
- ✓ Make Tradeoffs
- ✓ Design in detail
- ✓ Measure Success

Area Context

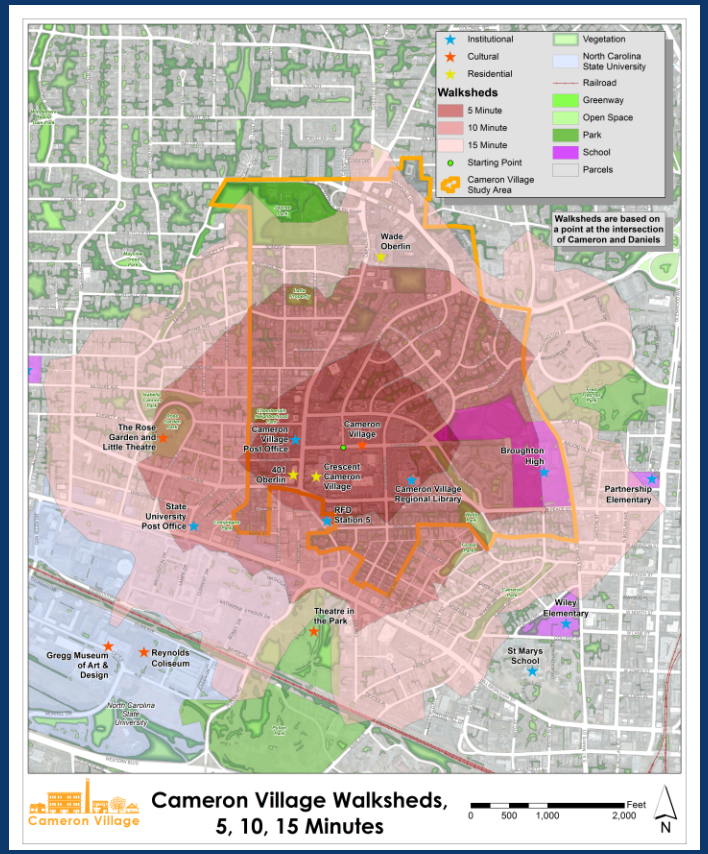


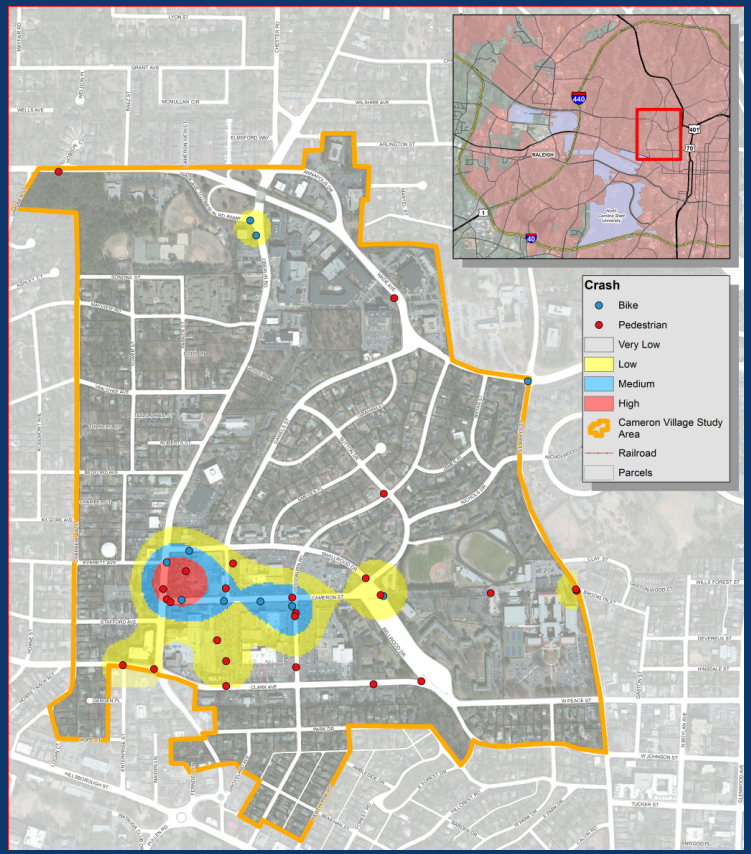
Area Context






Walksheds and Bike/Ped Crashes





Lighting

WHY

SECURITY MATTERS TO US

When we talk to people, they tell us all about their places. We tend to tune out the parts we don't want to hear, or that we can't address, or that aren't part of the scope. Big Mistake.

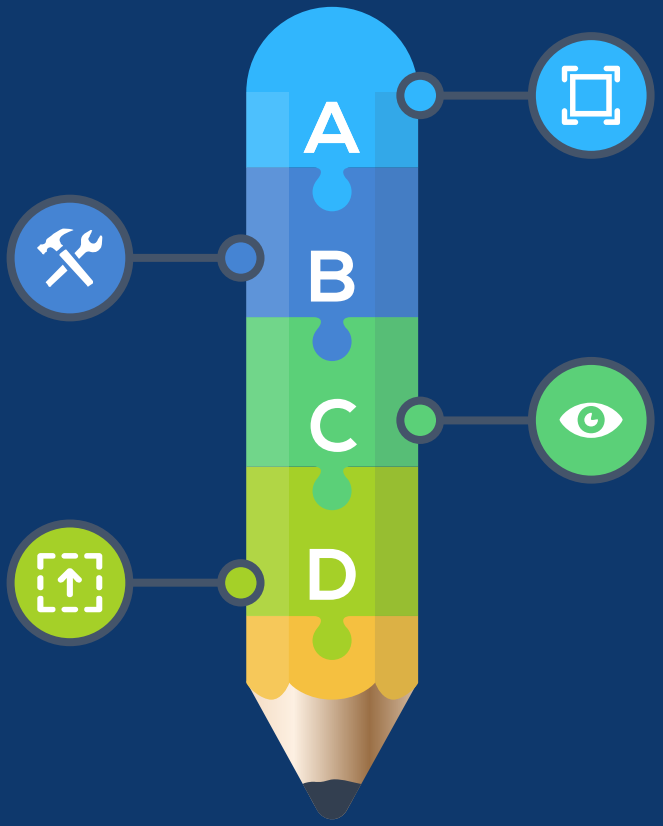
Start Listening.

"Complete Streets don't deserve the name if they aren't safe for people to use."

WHY

Principles of CPTED

Crime Prevention through Environmental Design



Territorial Reinforcement

Space should be easily defined as public, semi-public, and private.

Maintenance

If a window is broken, then a door follows, then it gets worse from there.

Natural Surveillance

Jane Jacobs' "Eyes on the Street" is still just as important as it was 50 years ago.

Natural Access Control

Traffic calming, street access, gateway treatments, and parking design influence access.

Not just lighting

There's more to lighting than you think.

Pattern, illumination source, and placement make a big difference in the result.

SECURITY

Not Just lighting

But there's more to lighting than you think.

Pattern, illumination source, and placement make a big difference in the result.

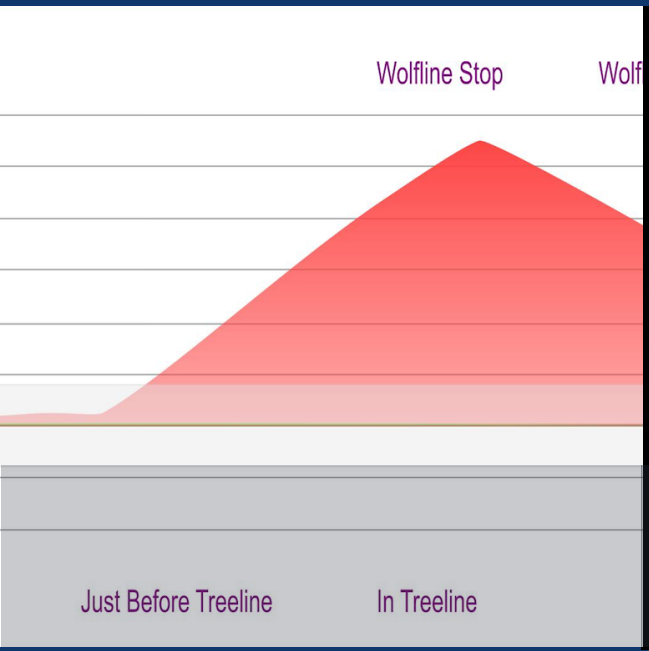
Not just lighting

There's more to lighting than you think.

Pattern, illumination source, and placement make a big difference in the result.

Making a Difference

North Carolina State University
Western Boulevard Complete Street Study



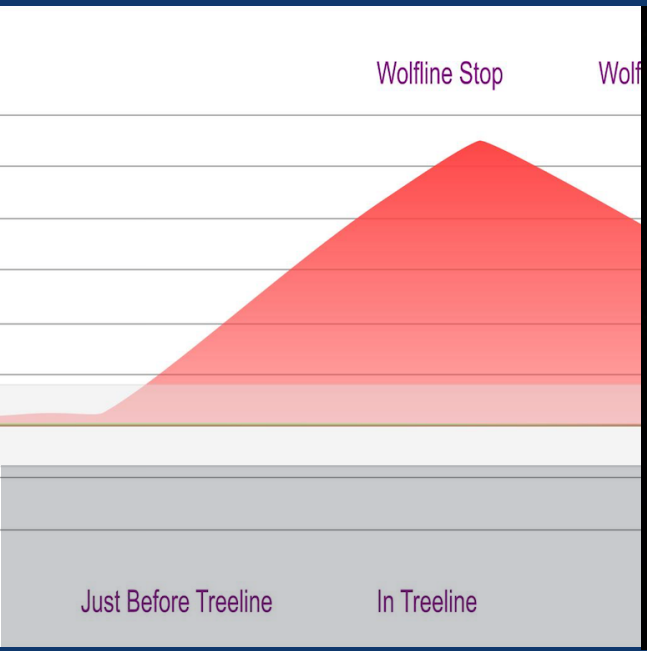
Lighting Inventory

Intercept Survey

Influence on the Ultimate Design

Making a Difference

North Carolina State University

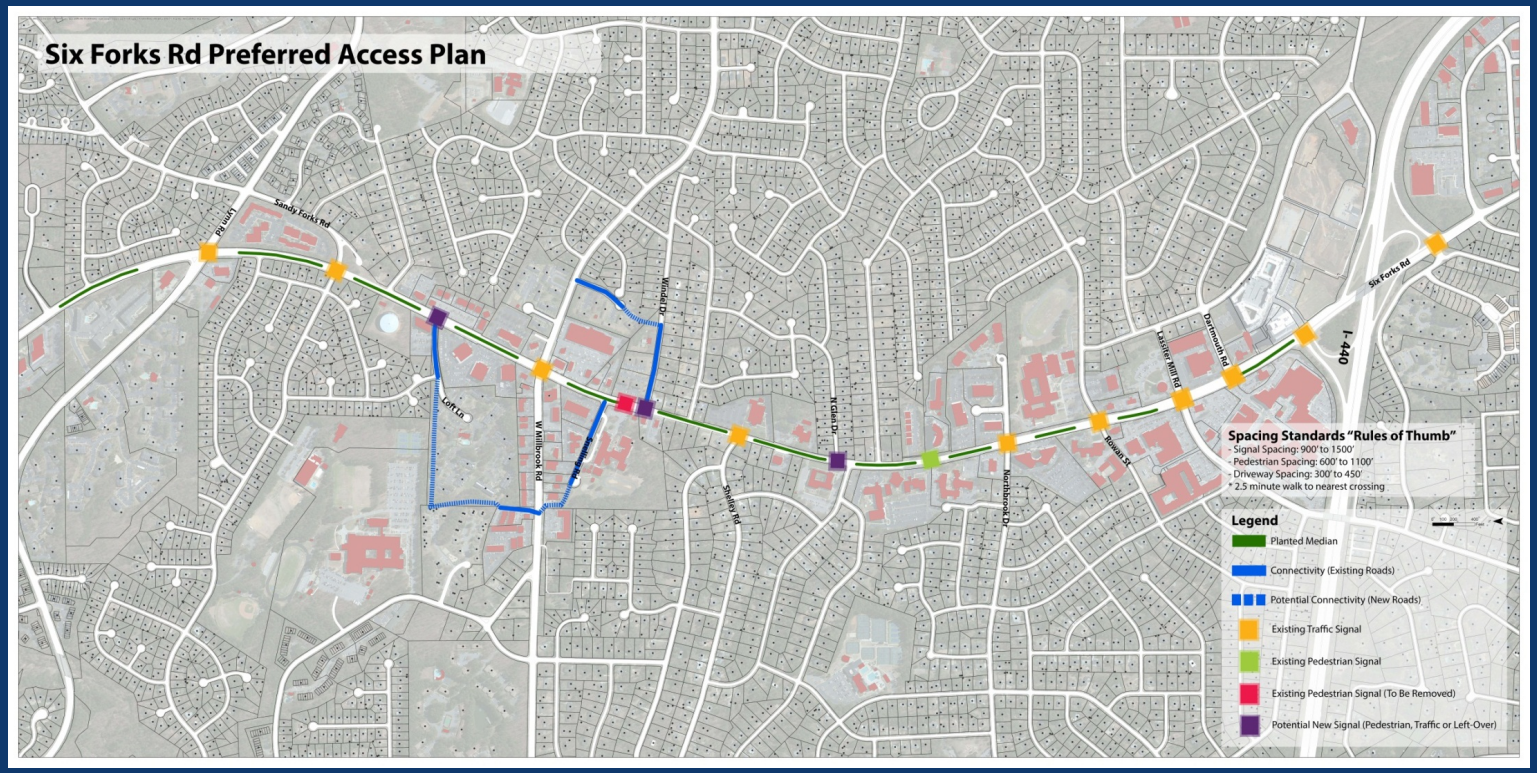


Lighting Inventory

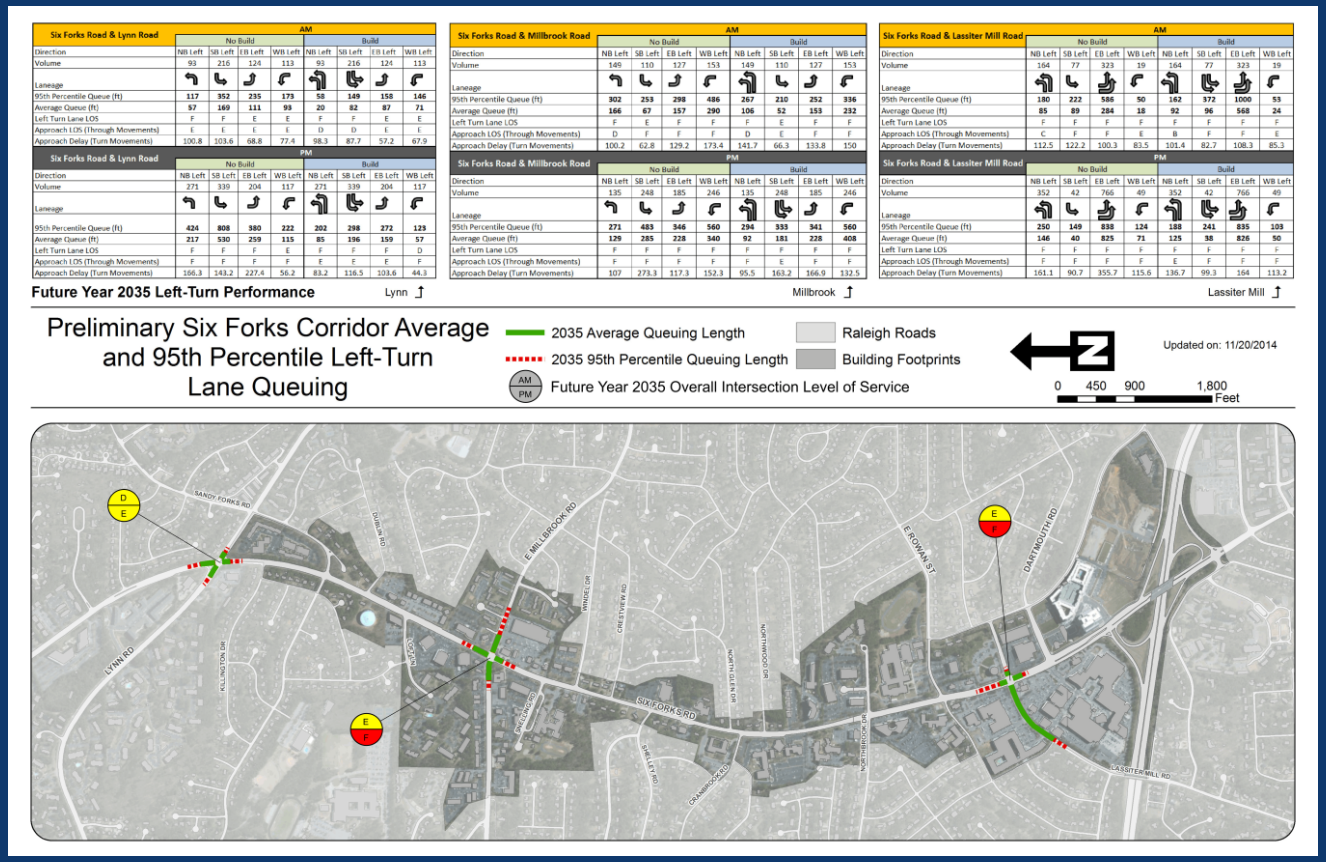
Intercept Survey

Influence on the Ultimate Design

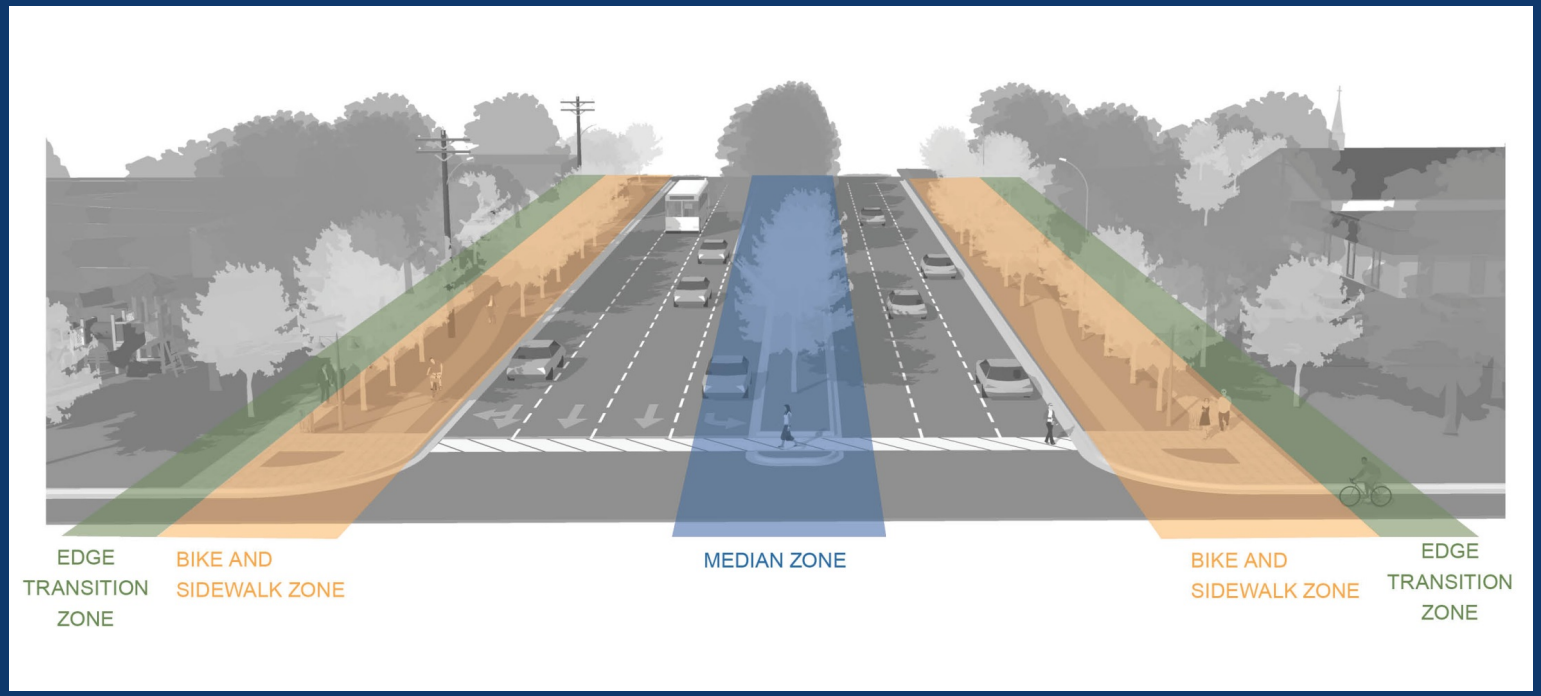
How does it all work together?



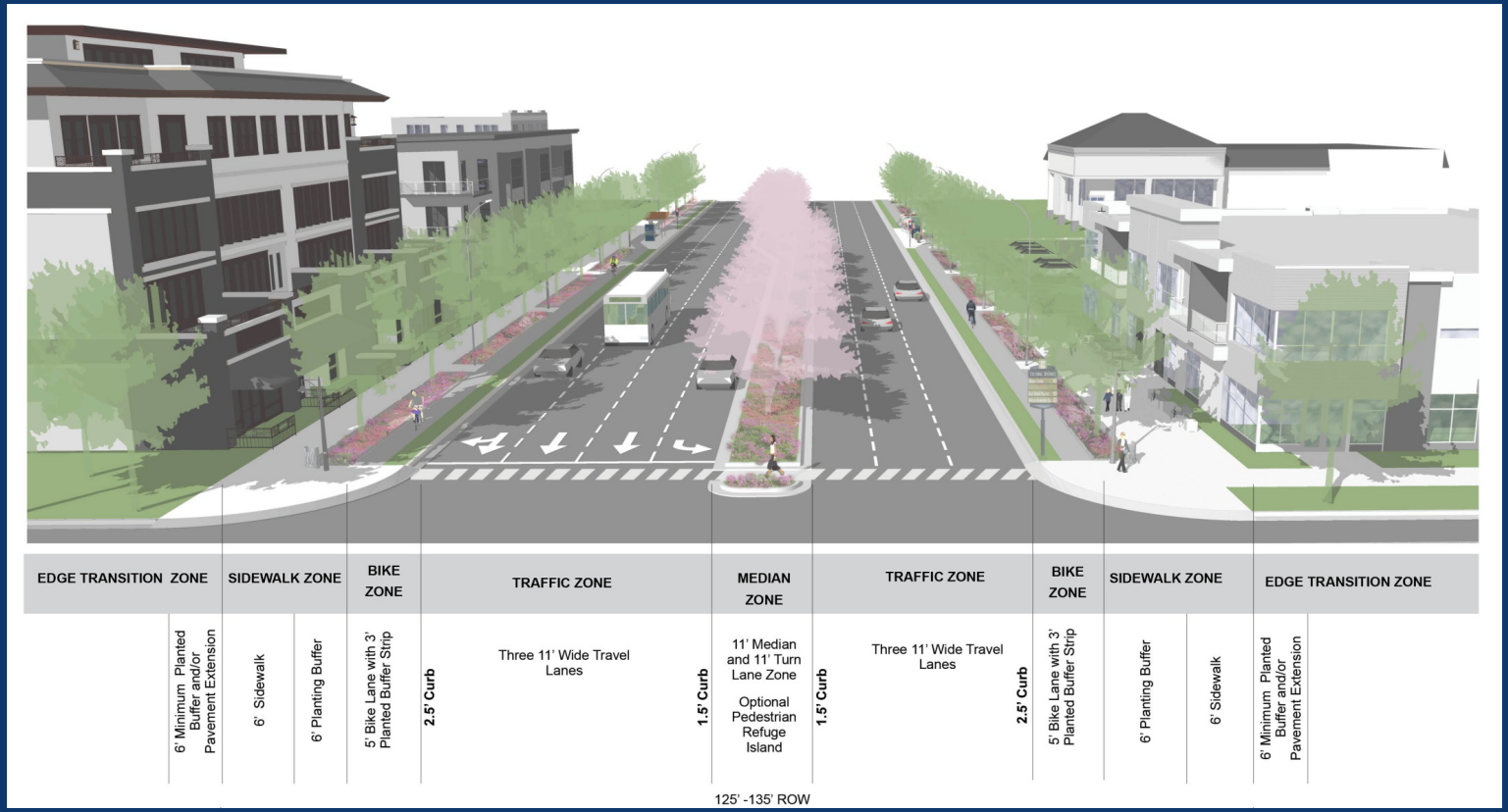
Traffic, Traffic, Traffic!



Corridor Transition

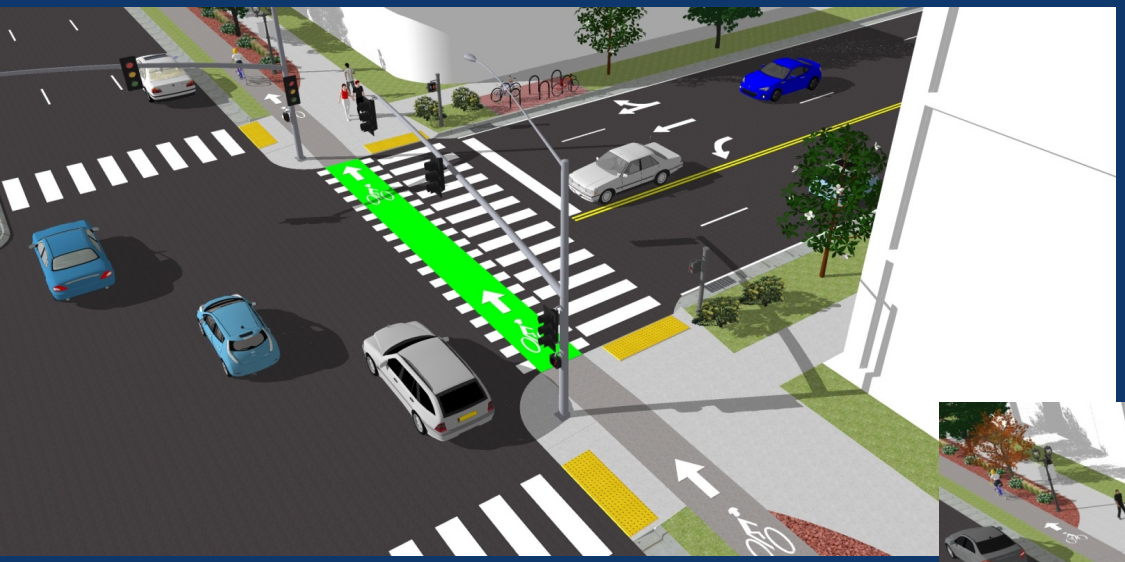


Corridor Cross-Section



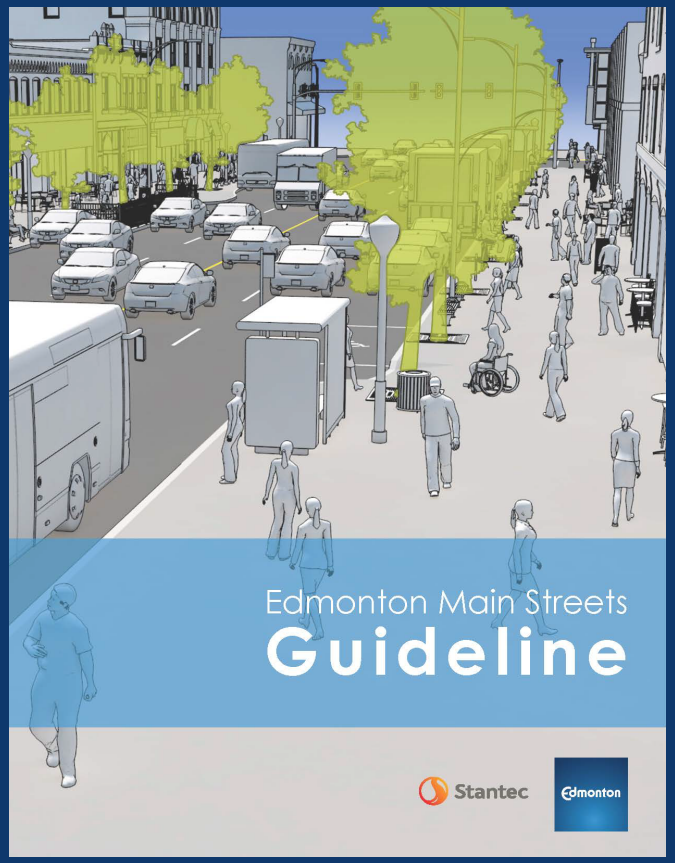
Bicycle/Pedestrian

Intersection Treatments



Major intersections

Minor Cross Streets



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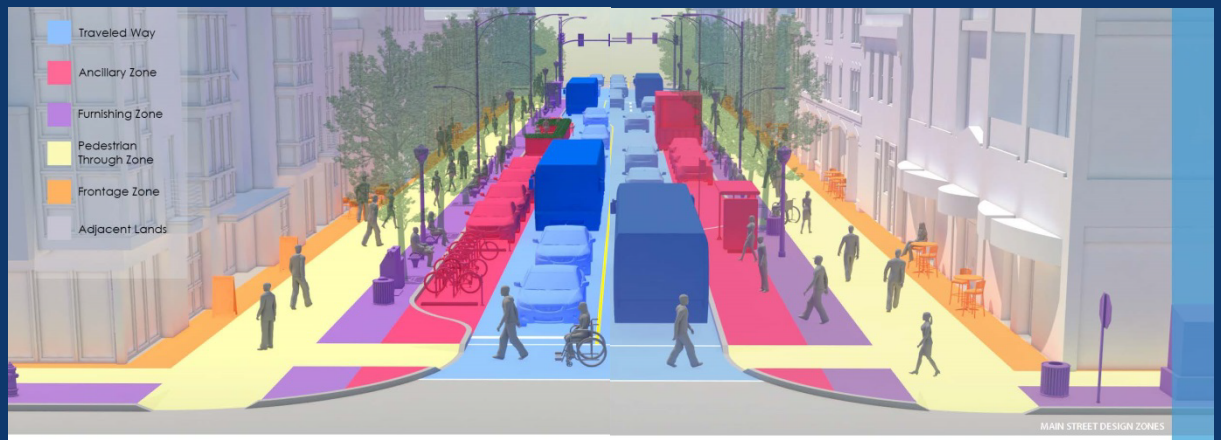

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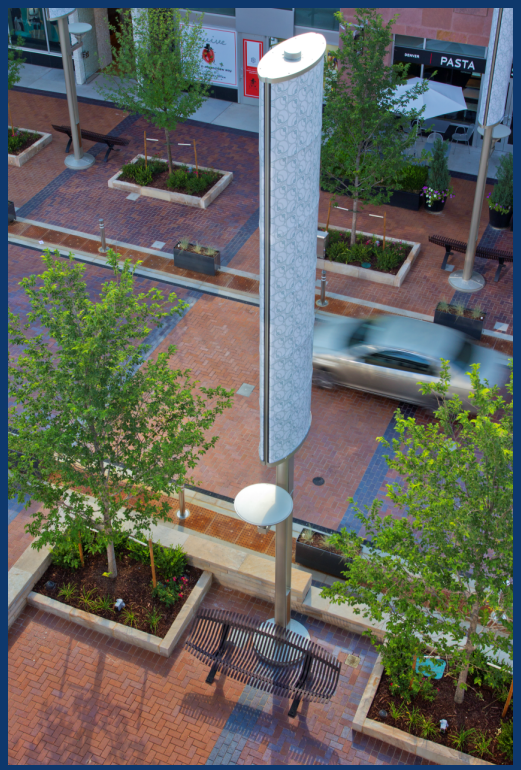
High Priority Transit Corridor

Furnishings, Public Art, Streetscape



LID & Stormwater BMPs

Example: Honore Avenue, Sarasota, FL (2013)

Two-Lane vs. Four-Lane

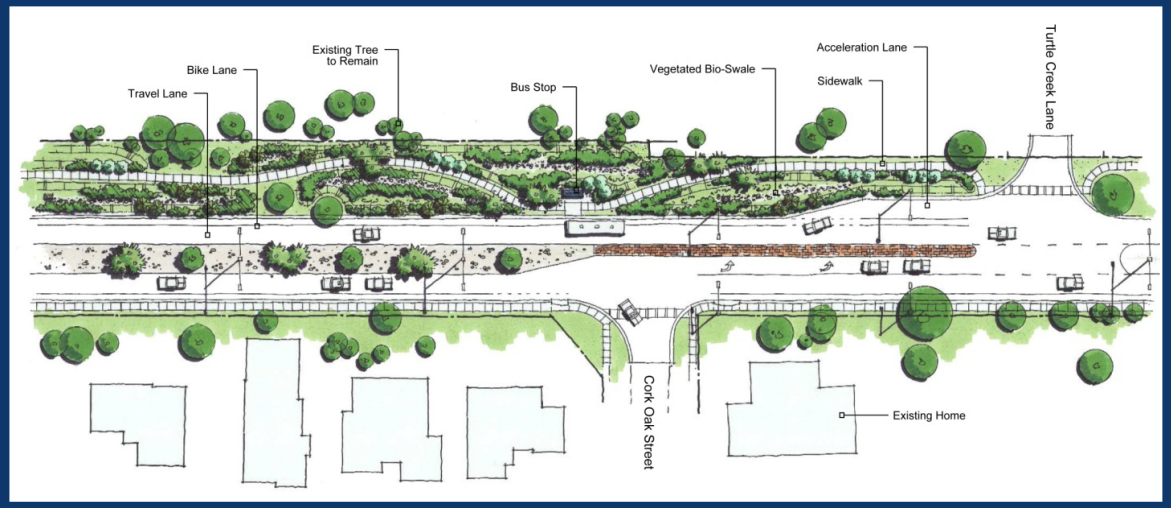
Limited ROW

Needed better connections to school and parks

What to do with the water?

Save the Trees!

The Idea Behind Stormwater



Tradeoff Benefits

- **Context-sensitive design and low impact development (LID) strategies reduced floodplain impacts by 23.2 acre-feet**
- **Saved 1000 mature trees**
- **Buffered ped/bike facilities with connections to school/parks**

Reduced Floodplain Compensation Area

Design in Detail

Measuring Success

- 3X the area for bikes, pedestrians and streetscape
- Consistent lanes, with only a 26% increase in asphalt roadway paving
- 10 new high quality bus shelters
- 52 high visibility crosswalks
- Over 4 miles of grade separated bike lanes
- Over 4 miles of new wider sidewalks
- Almost 8 million gallons of water quality treatment
- Locations for over 700 canopy and flowering trees
- Over 3 acres of planted medians
- Plans for 10 neighborhood gateway
- Measurable increase in LOS for cars, bikes, pedestrian and transit

Final Thoughts…

- **It's a process, not a product**
- **Context Defined**
- **Prioritize modes**
- **There's always tradeoffs**
- **Intersection Design Exceptions**
- **Available Design Guidelines**
- **Measure your success!**

Funding 101/ Outreach

Emiko Atherton

Complete Streets Costs

- Many Complete Streets improvements are modest in size and low cost.
- A Complete Streets approach means thinking ahead and thinking smart— and that can lead to decisions that save money and avoid costly mistakes.
- The incremental cost of features such as bicycle lanes and sidewalks are dwarfed
  by much bigger cost concerns, such as variable labor and materials costs

Simple, low-cost, high-impact

Simple Changes, Small Budgets

- restriping to narrow travel lanes and provide more room for bicycles and/or pedestrians;
- changing signal timing;
- installing refuge islands, medians, and curb extensions;
- restriping crosswalks to be more visible;
- installing temporary curbside plazas;
- adding pedestrian countdown signals;
- using on-street head-out angled parking, instead of parallel parking, to narrow wide, dangerous roadways.

Complete Streets = Funding Opportunities

- Complete Streets policies are necessary to safely accommodate existing users
- Complete Streets can be achieved within existing budgets.
- Complete Streets can lead to new transportation funding opportunities.
- Complete Streets add lasting value.

Funding Opportunities

- Multimodal planning and design can be an opportunity rather than a constraint.
- Complete Streets projects can make transportation projects more popular and garner more support for transportation funding.
- A multimodal design can make projects more competitive for some federal, state, and regional funding opportunities.

Federal Funding

Pedestrian and Bicycle Funding Opportunities
U.S. Department of Transportation Transit, Highway, and Safety Funds
Revised August 12, 2016

This table indicates potential eligibility for pedestrian and bicycle projects under U.S. Department of Transportation surface transportation funding programs. Additional restrictions may apply. See notes and basic program requirements below, and see program guidance for detailed requirements. Project sponsors should fully integrate nonmotorized accommodation into surface transportation projects. Section 1404 of the Fixing America's Surface Transportation (FAST) Act modified 23 U.S.C. 109 to require federally-funded projects on the National Highway System to consider access for other modes of transportation, and provides greater design flexibility to do so.

Key: $ = Funds may be used for this activity (restrictions may apply). $* = See program-specific notes for restrictions. ~$ = Eligible, but not competitive unless part of a larger project.

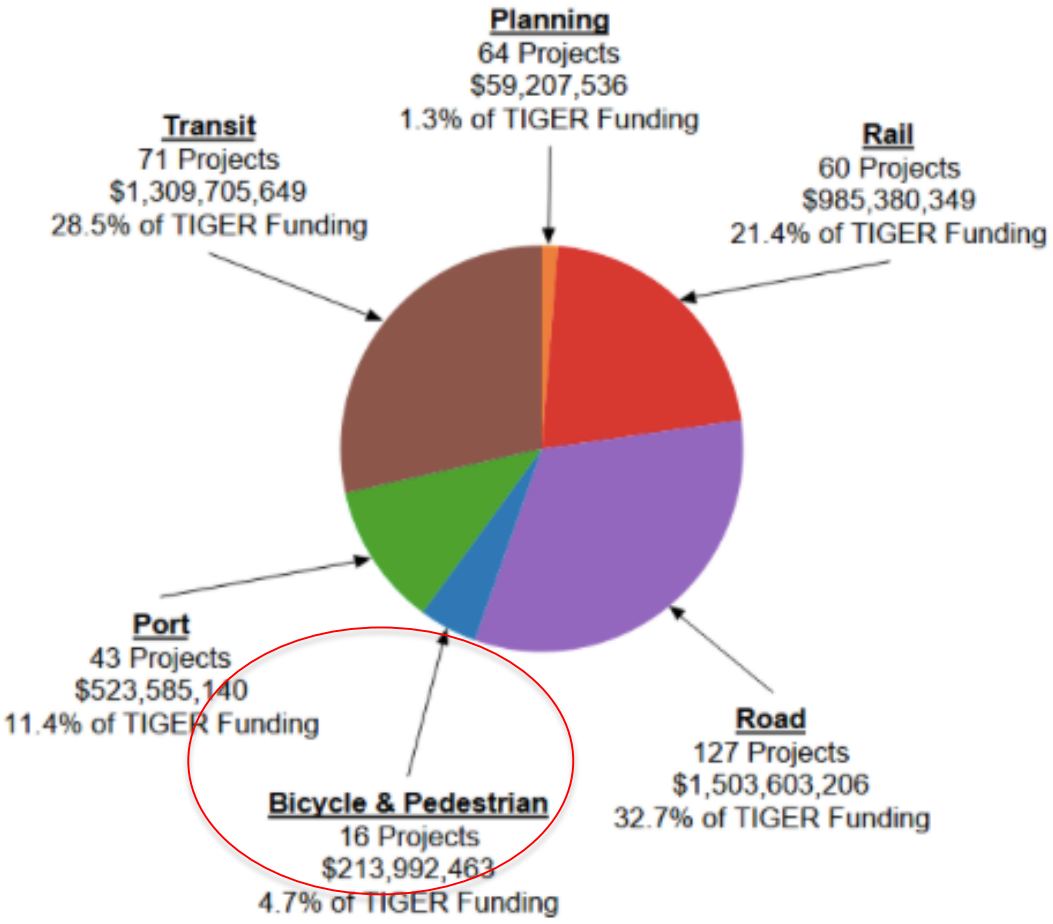
Activity or Project Type	TIGER	TIFIA	FTA	ATI	CMAQ	HSIP	NHPP	STBG	TA	RTP	SRTS	PLAN	NHTSA 402	NHTSA 405	FLTTP
Access enhancements to public transportation (includes benches, bus pads)	$	$	$	$	$		$	$	$						$
ADA/504 Self Evaluation / Transition Plan								$	$	$		$			$
Bicycle plans			$					$	$		$	$			$
Bicycle helmets (project or training related)								$	$SRTS		$		$*		
Bicycle helmets (safety promotion)								$	$SRTS		$				
Bicycle lanes on road	$	$	$	$	$	$	$	$	$		$				$
Bicycle parking	~$	~$	$	$	$		$	$	$	$	$				$
Bike racks on transit	$	$	$	$	$			$	$						$
Bicycle share (capital and equipment; not operations)	$	$	$	$	$		$	$	$						$
Bicycle storage or service centers at transit hubs	~$	~$	$	$	$			$	$						$
Bridges / overcrossings for pedestrians and/or bicyclists	$	$	$	$	$*	$	$	$	$	$	$				$
Bus shelters and benches	$	$	$	$	$		$	$	$						$

TIGER Funding

- The Transportation Investment Generating Economic Recovery, or TIGER Discretionary Grant program, provides a unique opportunity for the DOT to invest in road, rail, transit and port projects that promise to achieve national objectives.
- Since 2009, Congress has dedicated nearly $4.6 billion for seven rounds of TIGER to fund projects that have a significant impact on the Nation, a region or a metropolitan area.

Source (USDOT)

TIGER Funding

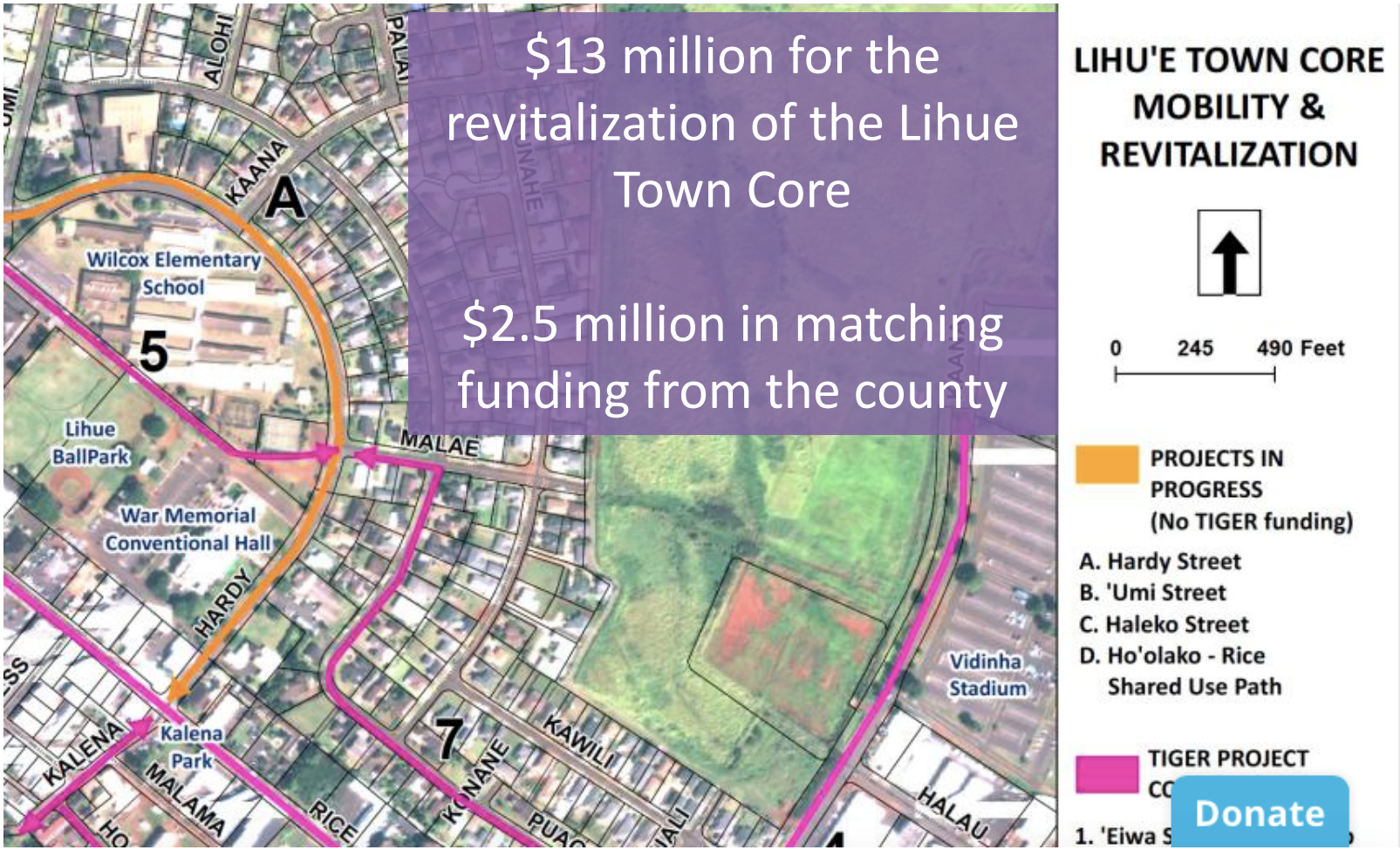


TIGER: Dahlonega, GA

- Gaps in sidewalk network
- Adds better crossing
- Introduces bicycle facilities

5.1 million awarded in 2014 for Downtown Dahlonega Complete Streets Corridor Improvements

TIGER: Kauai, HI



TIGER: Mobile, AL

Reconnecting **Mobile**

One Mobile: Reconnecting People, Work and Play Through Complete Streets

City of Mobile awarded $14.5 Million Federal Grant to Connect Citizens to Jobs

Safe Routes to Schools

Surface Transportation Block Grants

- Formally TAP (Transportation Alternatives Program) grant.

- Federal funding for programs and projects defined as ***transportation alternatives.***

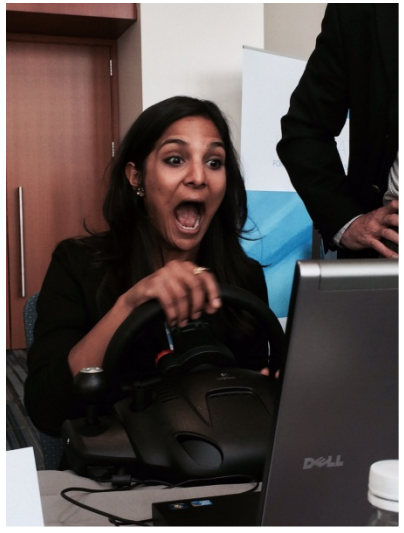
Year	2016	2017	2018	2019	2020
Authorization	$835 M	$835 M	$850 M	$850 M	$850 M

Other Sources of Funding

- Metropolitan Planning Organizations
- CMAQ
- Federal Transit Administration (FTA)
- Community Development Block Grants
- Main Street Programs
- Local funding strategies (bond measures, sales and property tax, business improvement districts, tax increment financing)

OUTREACH 101


Community Design
Economy
Environment
Transportation
Land Use
US 441
SMALL AREA PLAN
JACKSON COUNTY, NC



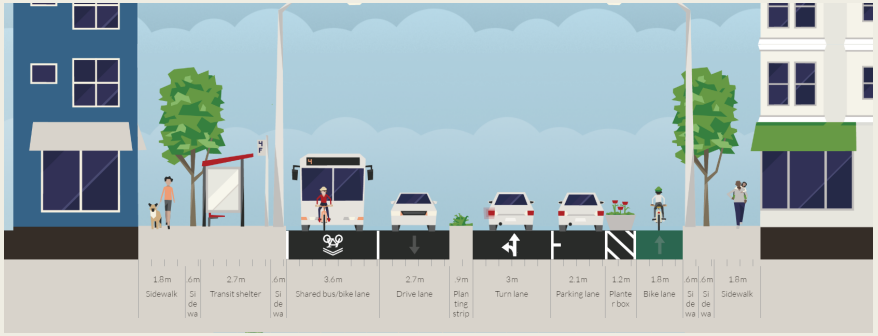

FEEDBACK

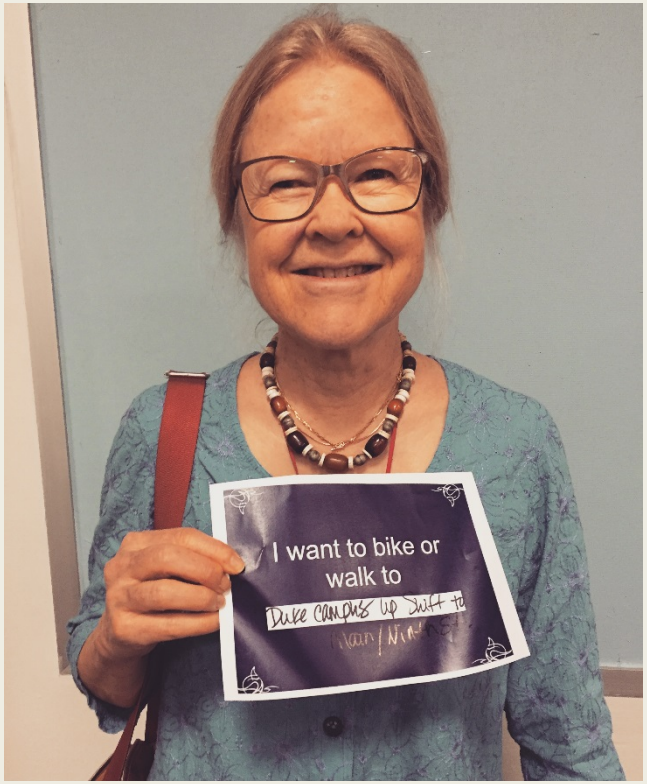

Northeast Area Study
www.NEAreaStudy.com
Please! Check us out...
Facebook
Website

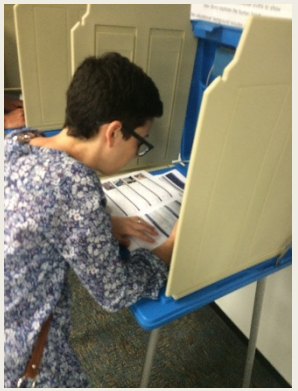

Heading Westbound on Main Street

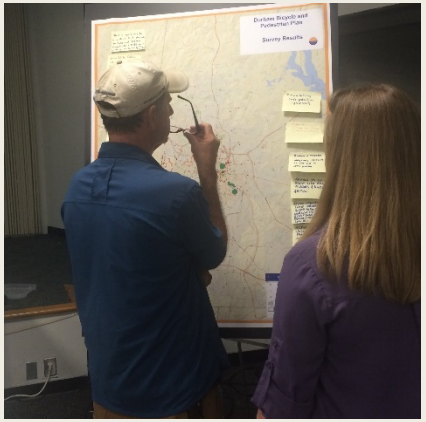
Project Symposiums/Workshops

- Interactive Polling
- StreetMix
- Tablet Surveys









Traveling Roadshows

- Host interactive booths at festivals/events

Small Group Interviews

- Reach out to interest groups to solicit input
- In person or phone call

One on One Interviews

- Engaging discussions
- Specific topics and questions

Project Advisory Committees

- Mix of staff, elected officials, retail owners, emergency services, school administration, parks & recreation, citizens.
- Interactive
  - *Discussions, mapping activities, tours/walks*
- Never boring!

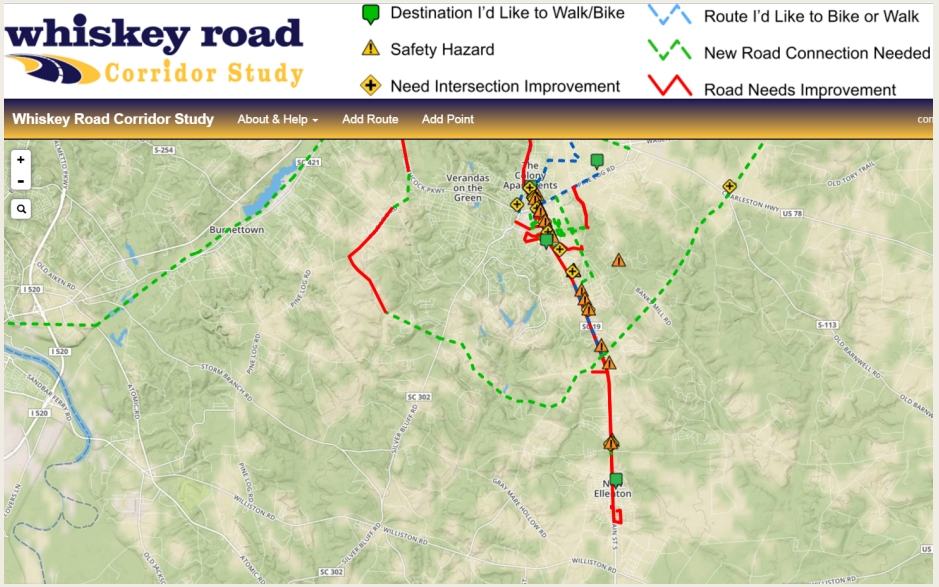
Charrette

- Work Collaboratively
- Work in Detail
- Use design to create a shared vision & create holistic solutions
- Deliverable produced at the end of the session

	Monday	Tuesday		Wednesday		Thursday	Monday
8:00		Breakfast		Breakfast		Breakfast	
9:00		9:00 Interest group meetings and interviews		9:00 Interest group meetings and interviews		DESIGN	
	11:00 Set Up Design Studio and Overview by Local Staff						
12:00	Lunch	Lunch		Lunch		Lunch	
1:00	1:00 Tour of the Study Area	1:00 Interest group meetings and interviews	DESIGN	DESIGN	DESIGN	DESIGN	
	3:00 Market Study Overview						
5:00	Dinner with Stakeholder Committee	5:30 Pin-Up Session and Project Update		5:30 Pin-Up Session and Project Update		5:30 Pin-Up Session and Project Update	
6:00		Dinner		Dinner			
7:00	**Opening Presentation & Facilitated Design Session**	7:00 Interest group meetings and interviews		7:00 Interest group meetings and interviews			**Reception and Closing Presentation**

WikiMapping

- Interactive Mapping Platform
- Spatial results (Arc)



Project Websites

- Platform for providing up-to-date information and links to surveys/mapping activities

Social Media

- Facebook, Twitter, Instagram, Local Aps
- Live discussions, collaboration, cost efficient

Surveys

- SurveyMonkey, QuestionPro,
- Gather information from direct and open ended questions.
- Gather demographics

Online Engagement (MindMixer/mySidewalk)

- Interactive
- Change topics often to keep interests alive

Story Map

- Dynamic visualization tool that combines a web map and other presentation quality graphics and multimedia content

Telephone Survey (Robocall)

- Inexpensive
- Fast responses

Newsletters

- Up-to-date information
- Work with schools, churches, civic organizations to distribute

5 Minute Break

Project Development/ Review Process

Mike Rutkowski, P.E., AICP

Topics Covered:

- **Embracing Complete Streets in the planning process**
- **Project scoping, checklists; burden of proof; assuming all needs must be accommodated**
- **Reviewing Santa Clara's project review process**

Holistic Project-Development Process

Existing and future conditions

1. Define land use context
2. Define transportation context

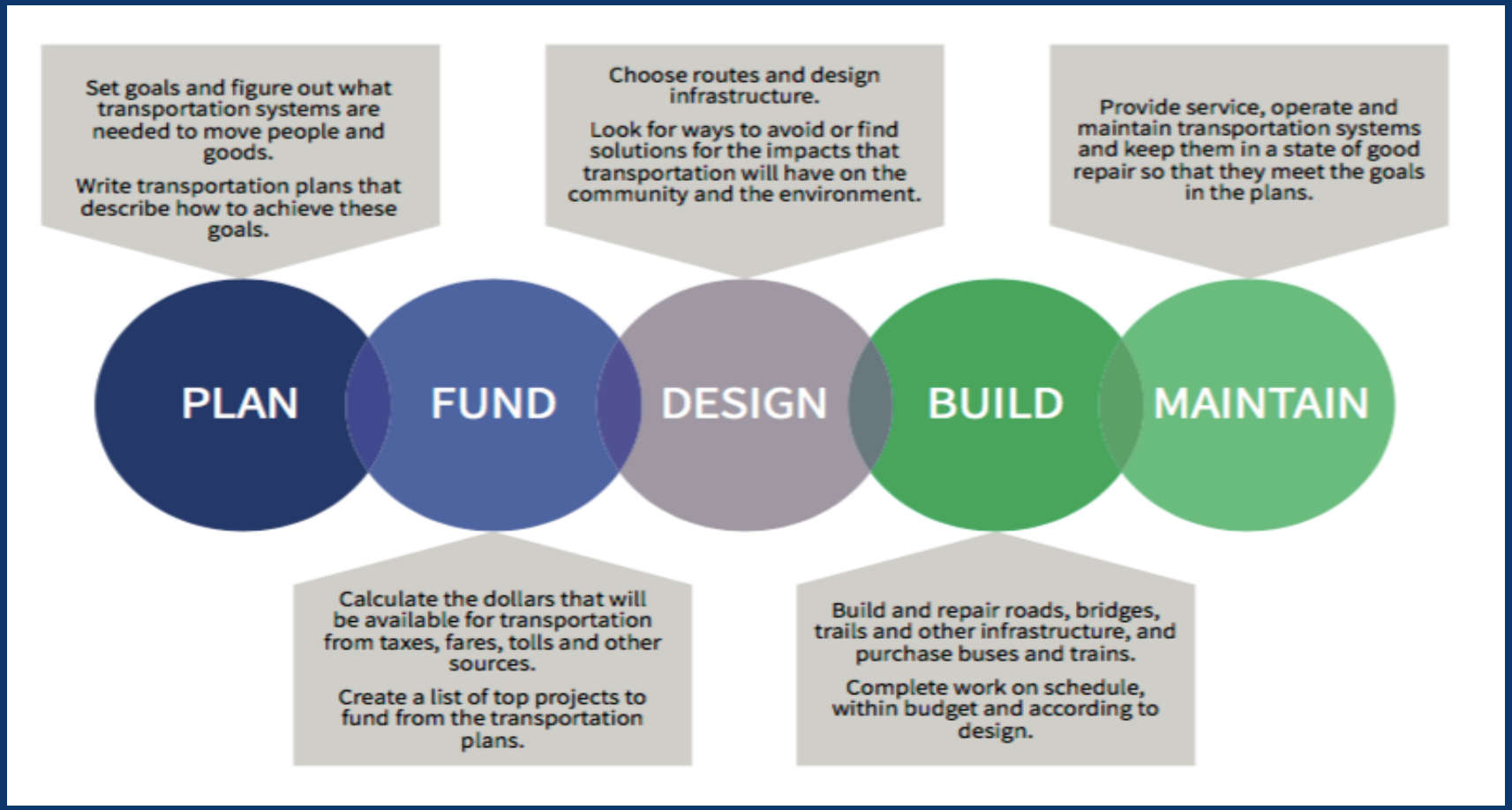
Goals and objectives

3. Identify deficiencies
4. Describe who you are trying to serve

Decision-making

5. Define street type and Modal Priorities
6. Describe trade-offs and select cross-section

Choices are made in each stage…



Scope – Establish Purpose and Need

- Clearly answer "Why do we need the project?" without making design choices
- Describe how each alternative will:
  - Affect all users – Who wins? Who loses?
  - Reflect land use/community context
  - Meet broader plans, visions, goals
- Assume presence of walking, bicycling, & transit patrons, of all ages and abilities
- Choose measures of success

Scope – Reversed 'Burden of Proof'

Assume facilities for all users with limited exceptions:

- **No expected users = no need now or in the future,**
- **Costs disproportionately high relative to need/goals, or**
- **Avoid "Build it and they will come" mentality**

Rural, homogeneous land use; no sidewalk needs *now or in the future*

Slow speed, no need for bike lanes

Fund

- Use all available sources
  - Federal/State: STP, HSIP, CMAQ, TAP, 402, TIGER
  - Local: property & sales taxes, bonds, user fees, development fees, grants, PPPs, discretionary budgets, etc.
- Have a capital plan
  - Coordinate with ADA transition, pavement management, master plans, etc.
- Robust ROI analysis that includes impacts all users, on other sectors

Plan

- **Begin discussion of specific design elements**
- **Use your design resources (NACTO)**
- **Understand who you are trying to serve!**
- **Additional opportunities for community engagement – "Build Advocacy"**
- **Include design staff in plan process**
- **Go to site and observe how people use it**

Design

- Final decisions for specific design elements
- Include planning staff in design process
- Go to site and observe how people use it
  - Prioritize Modes
  - Identify Tradeoffs
  - Design in Detail
  - Minimize C/G displacement

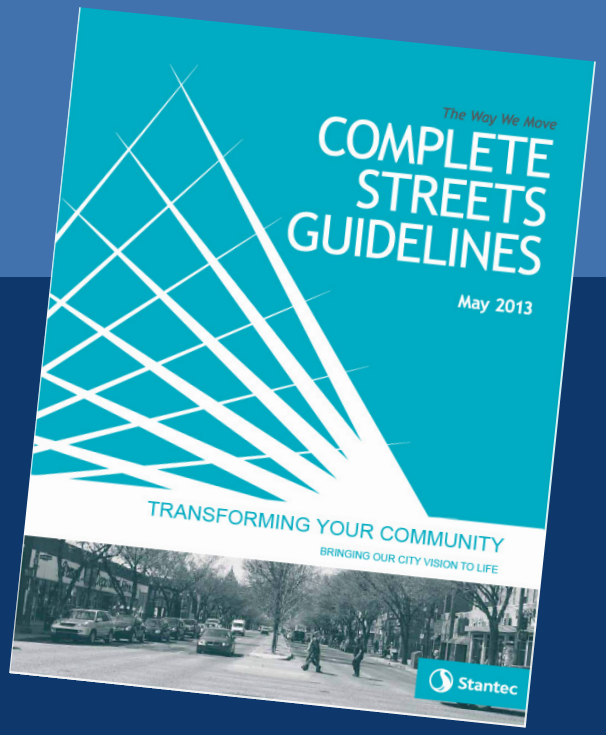
Design Guidance

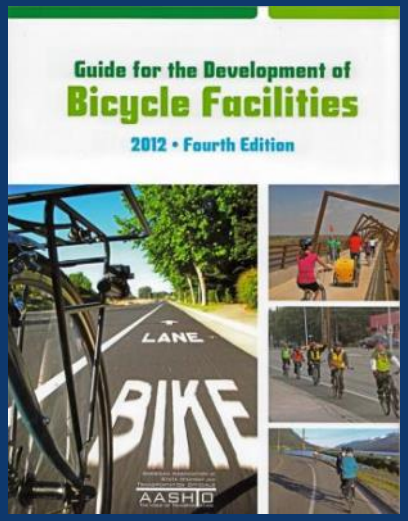
Smart Growth America
Improving lives by improving communities

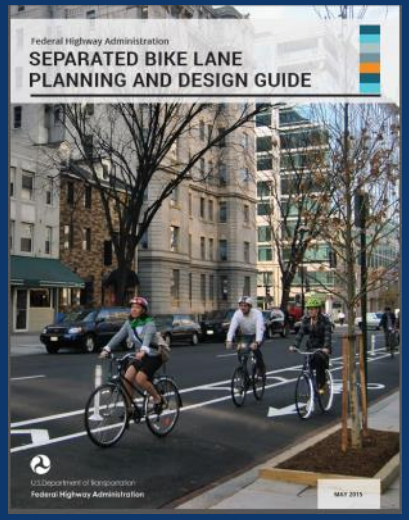
National Complete Streets Coalition

Complete Streets

Design Guidance







Smart Growth America
Improving lives by improving communities

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Complete Streets

Complete Street Guidelines

Evidence-based design tailored to local conditions

Element Description

Application Context

Cross-sections

4.3.6 Cycle Tracks

Description

A cycle track is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a bike lane. A cycle track is physically protected from motor vehicle traffic and distinct from the sidewalk. Protection methods include on-street parking, raised median curbs, or a raised [illegible] surface.

By separating bicyclists from motor vehicle traffic and pedestrians, cycle tracks can offer a higher level of comfort than ***Bike Lanes*** or ***Shared Use Paths*** and are attractive to a wide range of the public.

Application Context: Land Use, Street Type and Orientation

- City wide bike routes on the **Bike Network**
- This facility type is most likely to be installed on **Arterial** streets with high motor vehicle volumes and speeds.
- On **Transit Network** streets consider integration with bus stops. See **Transit Integration with Cycle Tracks**

Bikeway facility selection should be based on an analysis of roadway volumes and speed and other local characteristics.

Best on Roadways with:

- > 10,000 vehicles/day[1]
- >50km/h speed limit
- Frequently congested roadways
- High Truck Volume streets
- High Transit volumes
- Extra available roadway width
- Best on the left side of a one-way road

Driveway and Intersection Crossings

Crossings of driveways and intersections are a challenge for cycle track design. Strategies to mitigate potential crossing conflicts include:

- Reduce the density of driveways and simplify movements through access management.
- Prohibit parking 10-15 m in advance of the crossing.
- Sidewalk furnishings should accommodate a sight triangle of 3.0 - 6.0 m from a crossing.
- Colored pavement and yield signs should be used to identify the conflict areas.

Design Details and Dimensions

Cycle tracks generally require wider dimensions than ***Bike Lanes***, to provide a higher level of comfort and separation, to permit bicyclists to pass one another. Consider the placement of utilities when designing bike facilities with physical separation and the access to fire hydrants.

One-Way Cycle track through zone:

- Standard width: 2.1[2] m

Cycle track buffer zone:

- Standard adjacent to parking: 1.0 m
- Standard adjacent to travel lane: 0.5 m (1.0 m preferred for snow storage).

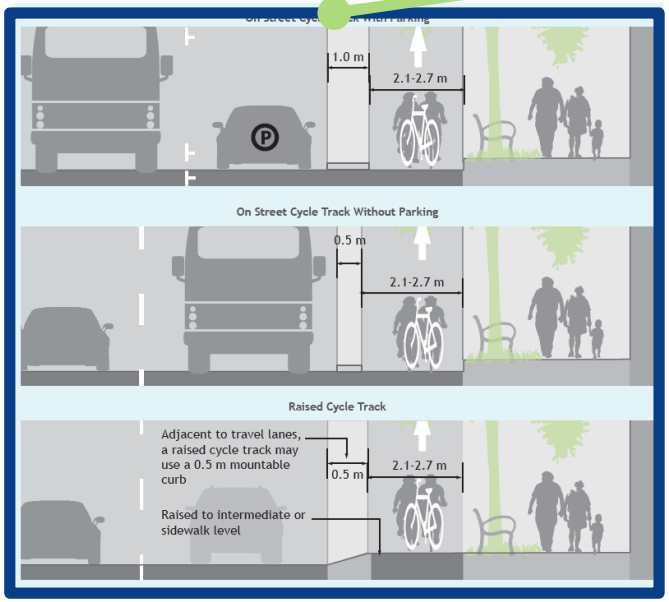
Two-Way Cycle Track:

Application best on one way streets. This is similar to a ***Shared-Use Path Adjacent to Roadways***. See the NACTO Urban Bikeway Design Guide for details.

Two-way cycle tracks function best on the left side of one-way streets.

Raised Median Curb Protection

- Consider bicycle compatible curb profiles to minimize conflict with pedals and maximize ridable surface.



Snow Removal and Maintenance Considerations

City of Edmonton practices for snow removal on bike facilities are currently [illegible] reviewed. On cycle tracks the expectation [illegible] snow windrows will be cleared away and [illegible] remain on the cycle track.[1]

References

Bikeway Traffic Control Guidelines for Canada, 2nd Ed. Transportation Association of Canada. February 2012.

Urban Bikeway Design [illegible] National Association of City Transportation Officials. Septe[illegible]2012. Bicycle Boulevard Planning and Design Handbook.

Design Considerations/Details

Operational Considerations

References

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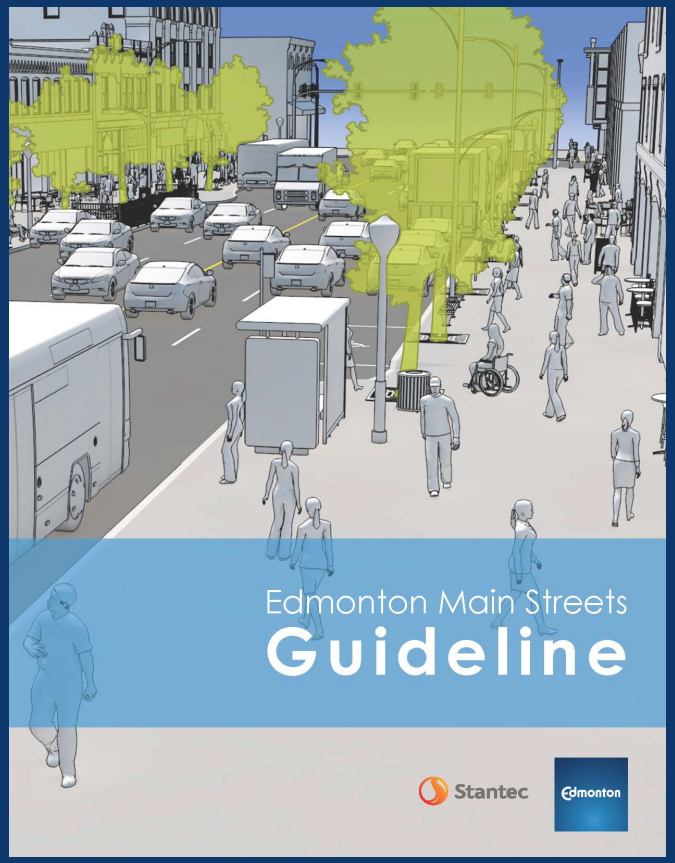
Improving lives by improving communities

National Complete Streets Coalition

Complete Streets



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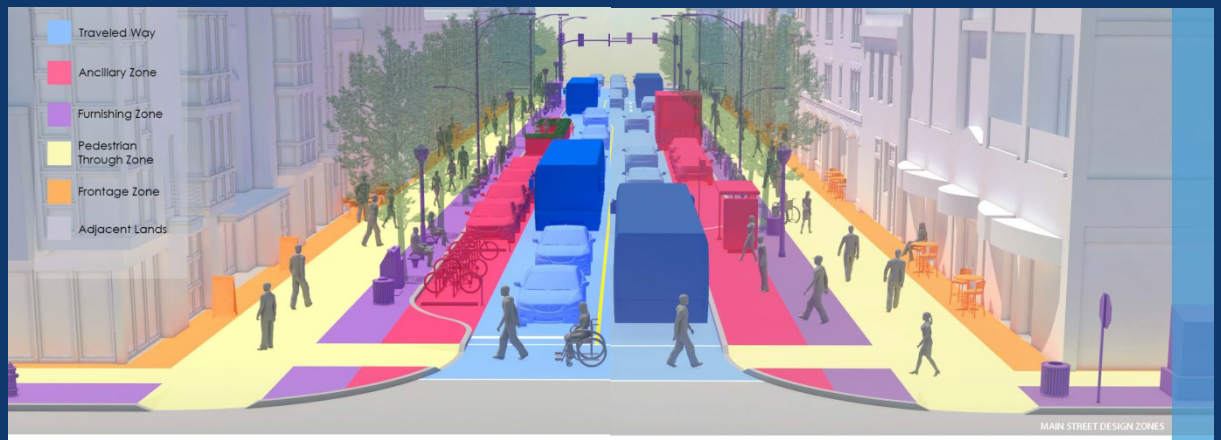

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This space provides an area for travelling through a Main Street area or to access Main Street destinations for people travelling by automobile and transit, and for the delivery of goods. In non-peak hours, some of this space may be used as an area for parking and loading and can also be closed at times to motor vehicles to host events and festivals.

Build

- Do you need a Demonstration Project?
- Provide temporary accommodations for all users: walking, bicycling, transit
  - Clear signage
  - Advance communication about closures and changed patterns
- Hold contractors to high standards
- Communicate project timeline

Operate

- Celebrate project completion!
- Measure success in achieving project goals
- Observe changed conditions and patterns
- Don’t be afraid to “tweak”

Reviewing Your Project Development Process

“What is your Development Review Process?”

Let's Test Your Expertise

Case studies 101

Santa Clara's Complete Streets – Your Turn

- ✓ Put yourself as a pedestrian or bicyclists
- ✓ Define the problem
- ✓ Discuss Priorities & Tradeoffs
- ✓ Monitor project performance

Incomplete Streets

88%

Reduction in pedestrian crashes by adding sidewalks

(FHWA crash reduction factors)

Santa Clara's Requirements

- 5' wide sidewalk
- Anything less may require design exception

Obstacles in Pedestrian Zone

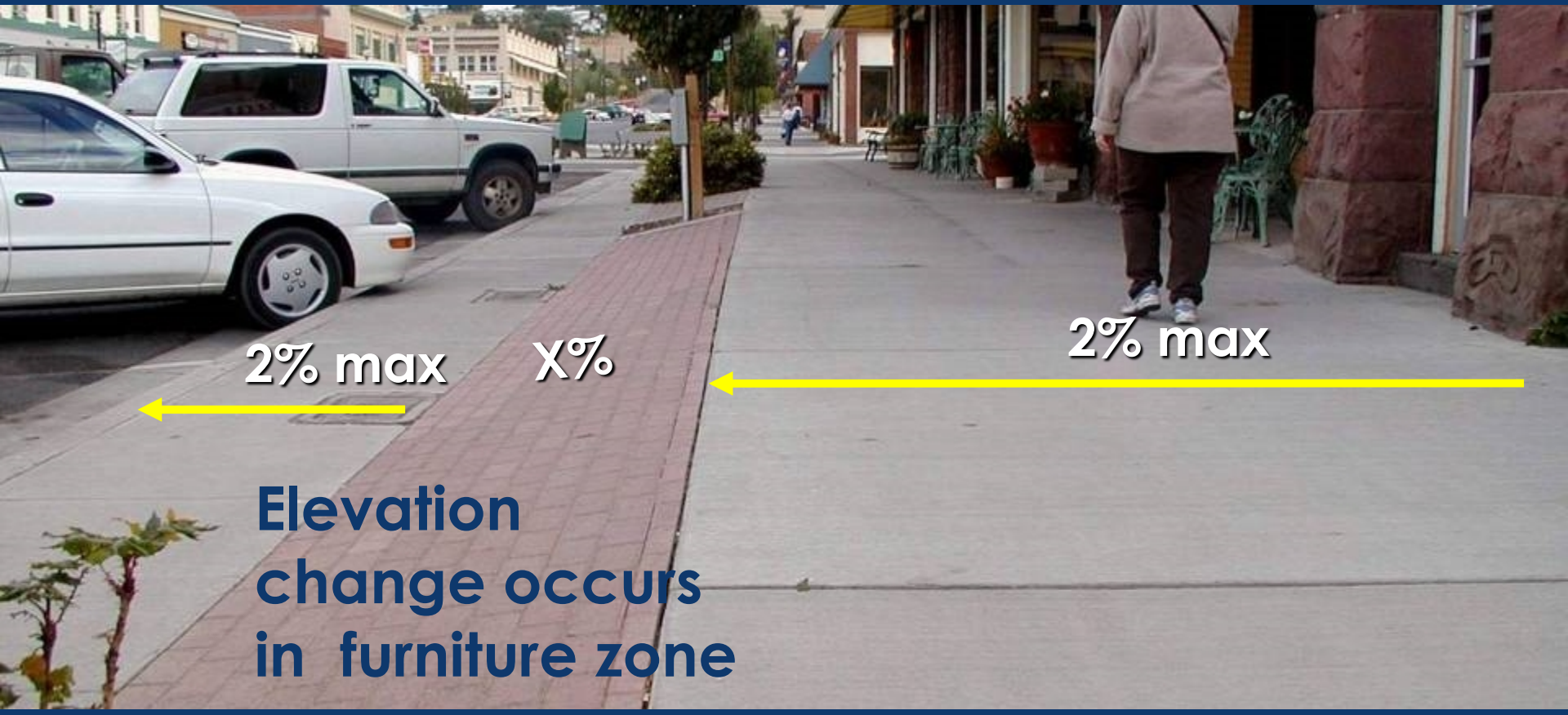
50%

More energy to push a wheelchair at a 3% cross slope than at 2% (US Access Board)

Cross Slope Guidelines

- **2% max cross slope "*Level*" (design to 1.5%)**
- **"Level Landing" – 2% max slope in all directions (design to 1.5%)**

Cross Slope Solutions

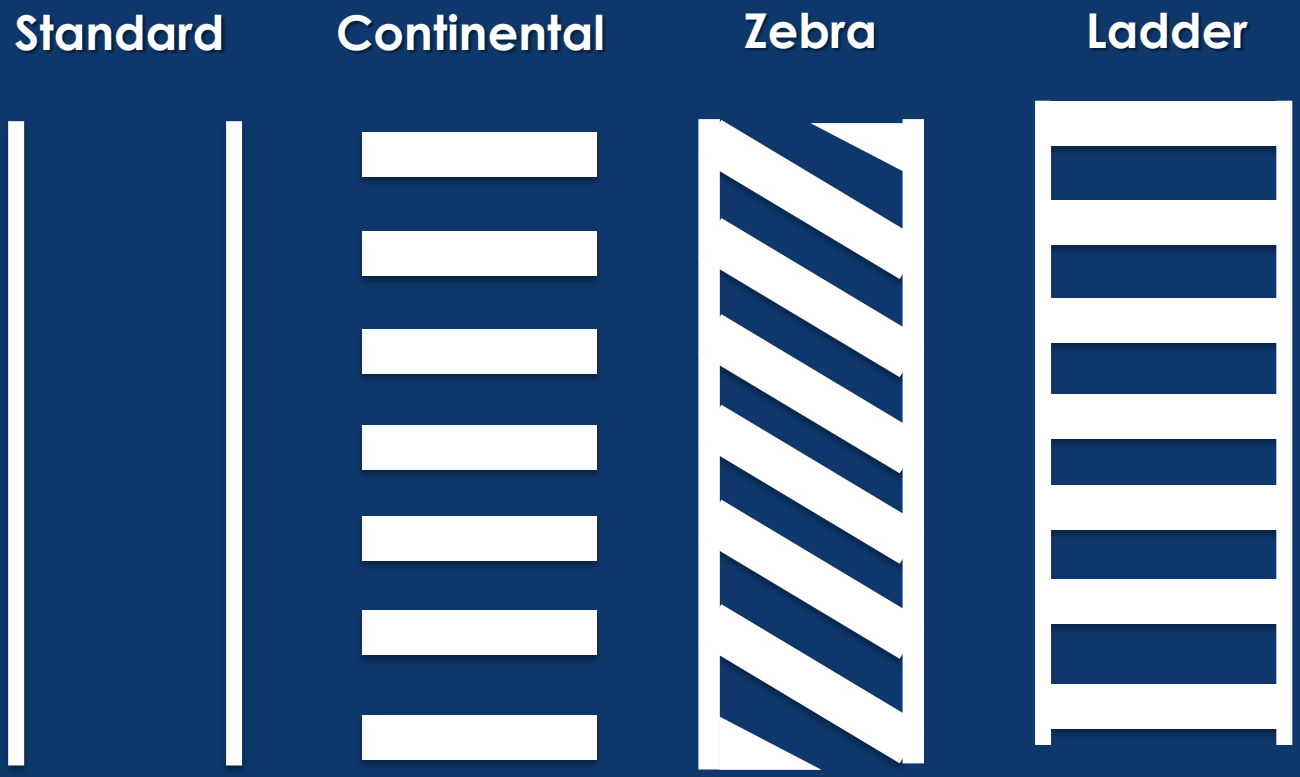


Pedestrian Crossings

Crosswalk

- Connects sidewalks on opposite sides of roadway
- Any portion of a roadway marked for crossing

Crosswalk Design



- Continental and ladder designs are the most visible to drivers
- Caltrans Standard is “Standard” lines
- Be consistent!

Crosswalk Design

What is wrong with this crosswalk?

Group Discussion

Which crosswalks are Caltrans & FHWA approved?




Group Discussion

Which crosswalks are Caltrans & FHWA approved?

YES

YES

NO - GREEN

NO - YELLOW

Pedestrian Signals

Many pedestrians do not understand "Flashing Don't Walk" means it's OK to continue walking

- How much crossing time is left
- Reduces all crashes by 25%
- Included in 2009 MUTCD

Rectangular Rapid Flashing Beacon

- **For midblock locations**
- **Motorist yielding rates increased**
  18.2% to 81.2% for 2 beacons and
  to 87.8% for 4 beacons (TRB)
- Pedestrian activated (pushbutton or passive)
- Warning device
- Interim approval from FHWA, July 2008
- Can be solar powered or hard wired
- Costs approximately $20k-$40k

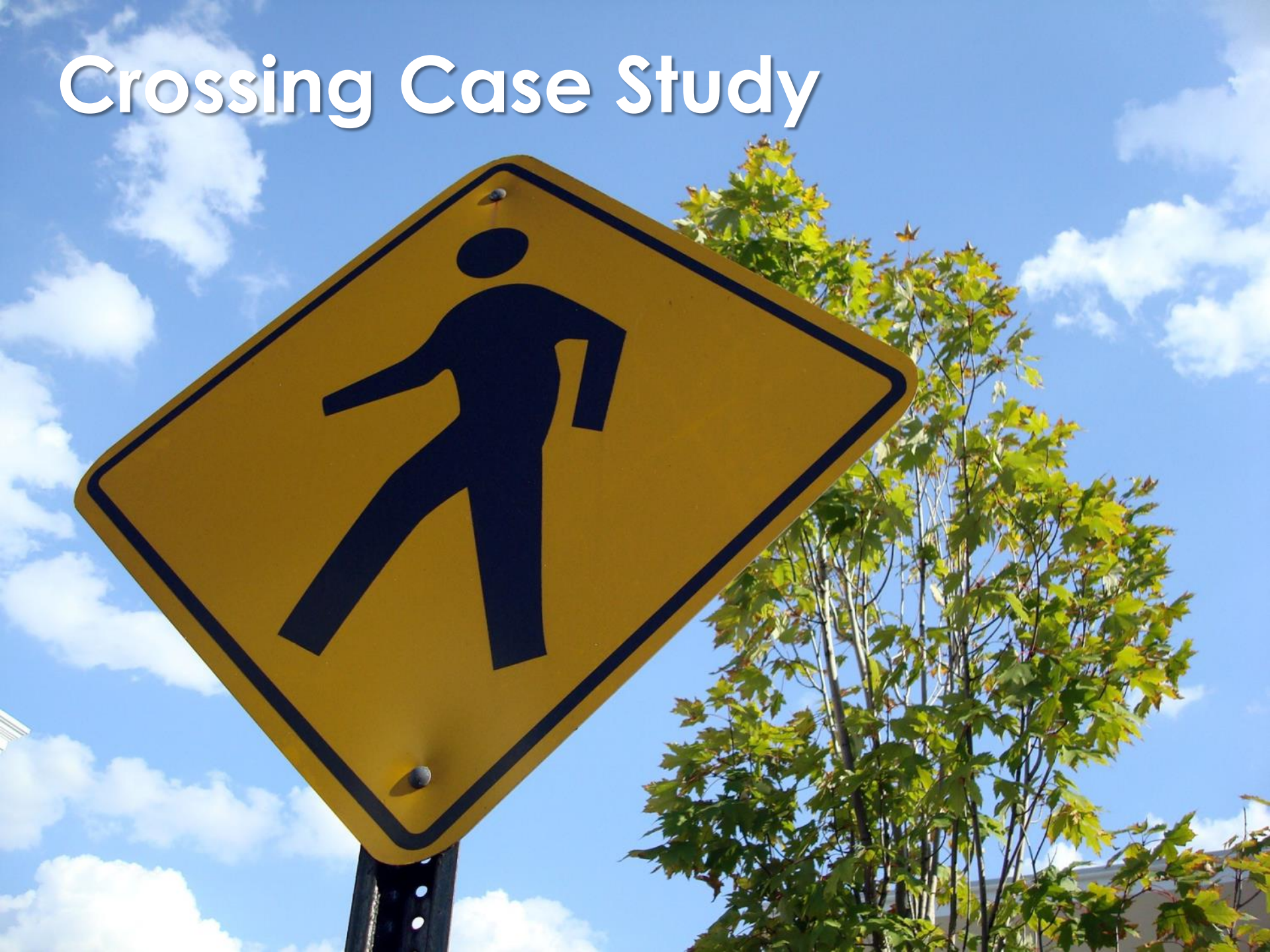
Pedestrian Hybrid Beacon (PHB)

- For midblock locations
- Motorist yielding rate greater than 95%
- Traffic control device
- Up to a 69% reduction in pedestrian crashes (FHWA)
- Up to a 29% reduction in total roadway crashes (FHWA)
- Requires mast arms and foundations
- Costs around $75 - $150K

Pedestrian Crossing Island

- Reduces pedestrian crashes by 46% (FHWA)
- Allows pedestrians a safe place to stop
- Enhances visibility of the crossings
- Reduces the speed of vehicles
- Can be used for access management
- Can be utilized for stormwater management
- Minimum 4’ (8’ preferable)

Crossing Case Study



What Crossing Treatment Would you Choose?

Shared Use Path Crossing

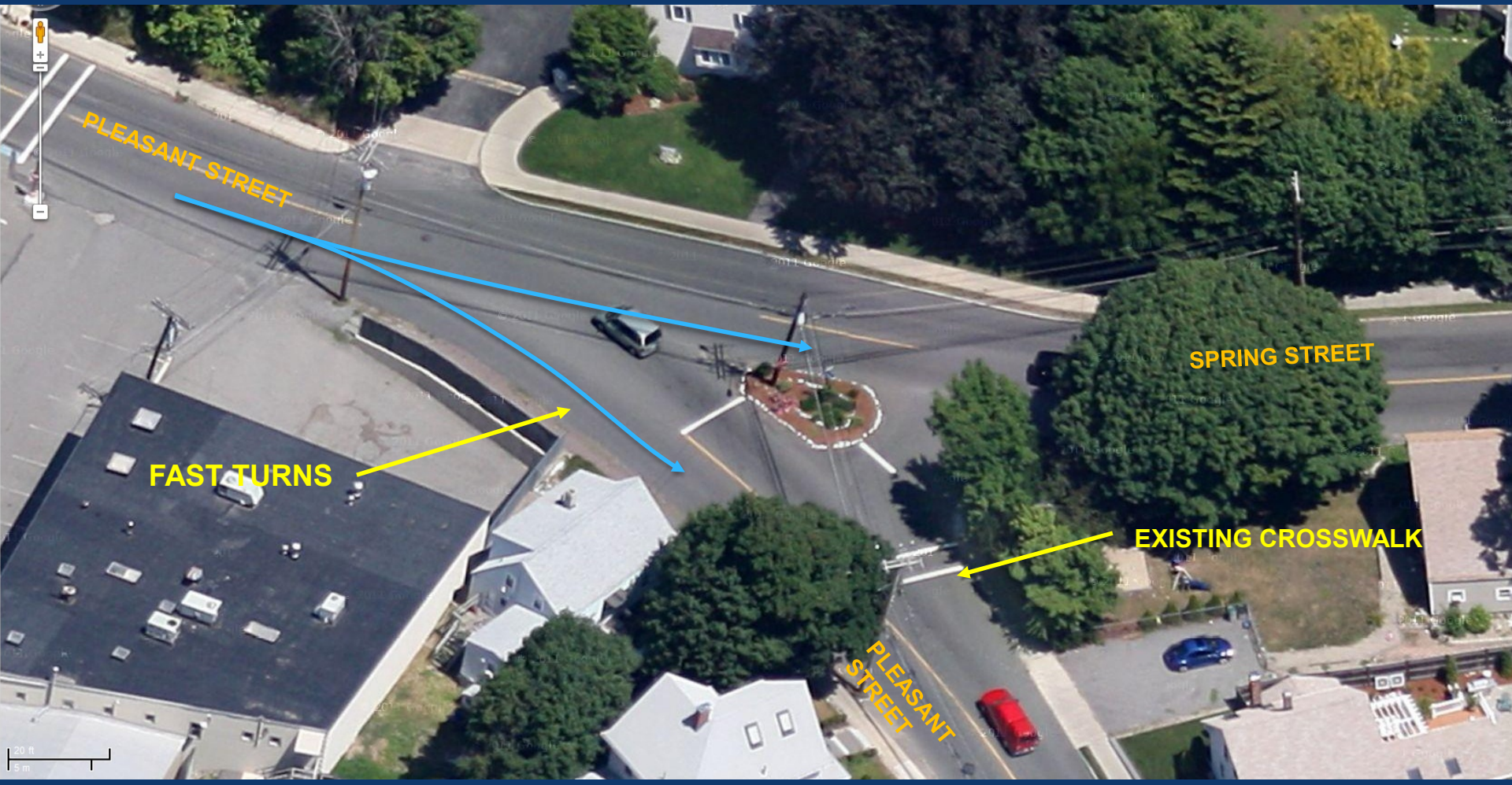
- **ADT: 12,600**
- **Speed: 25 mph**
- **Two lane roadway**

Which Crossing Treatment Would you Choose?

RRFB was chosen based on speed, volume and roadway width

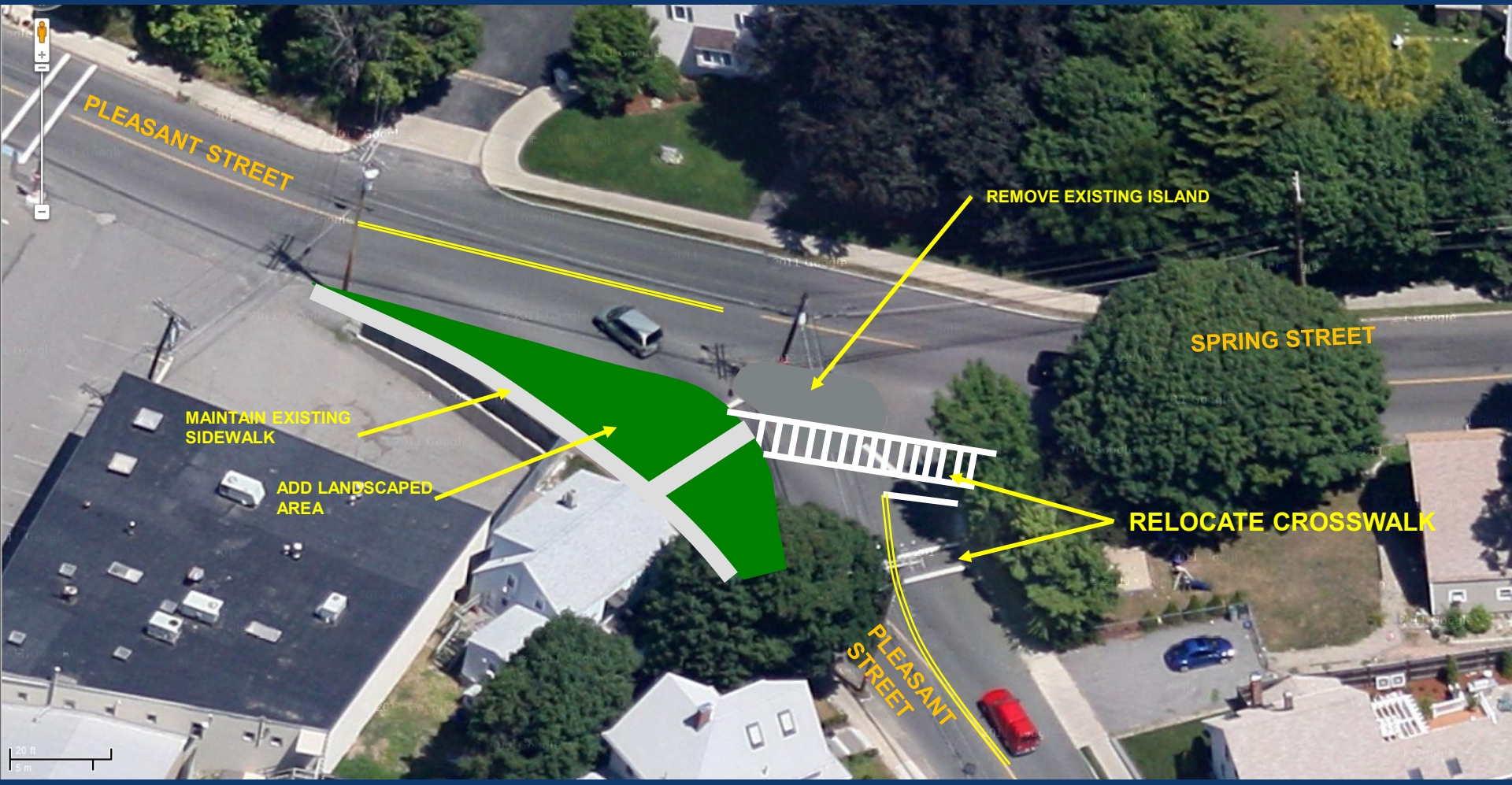
Effect of Large Radius on Drivers

How would you change it?



Source: Google Maps

Tighten Corner Curb Radii



Source: Google Maps

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Complete Streets