



Metro



Transportation Design for Community Outcomes:  
**Performance-Based Design**

April 22, 2019

# Welcome & Overview



**Margi Bradway**

Deputy Director, Metro  
Planning and Development

# Forum Agenda



**Welcome &  
Overview**



**Why Design  
Matters**



**National Trends &  
Perspectives**



**Performance-  
Based Design**



**Regional Guidance**



**Local Examples**



**Closing Remarks**

# Welcome



**Shirley Craddick**  
Metro Councilor  
JPACT Chair

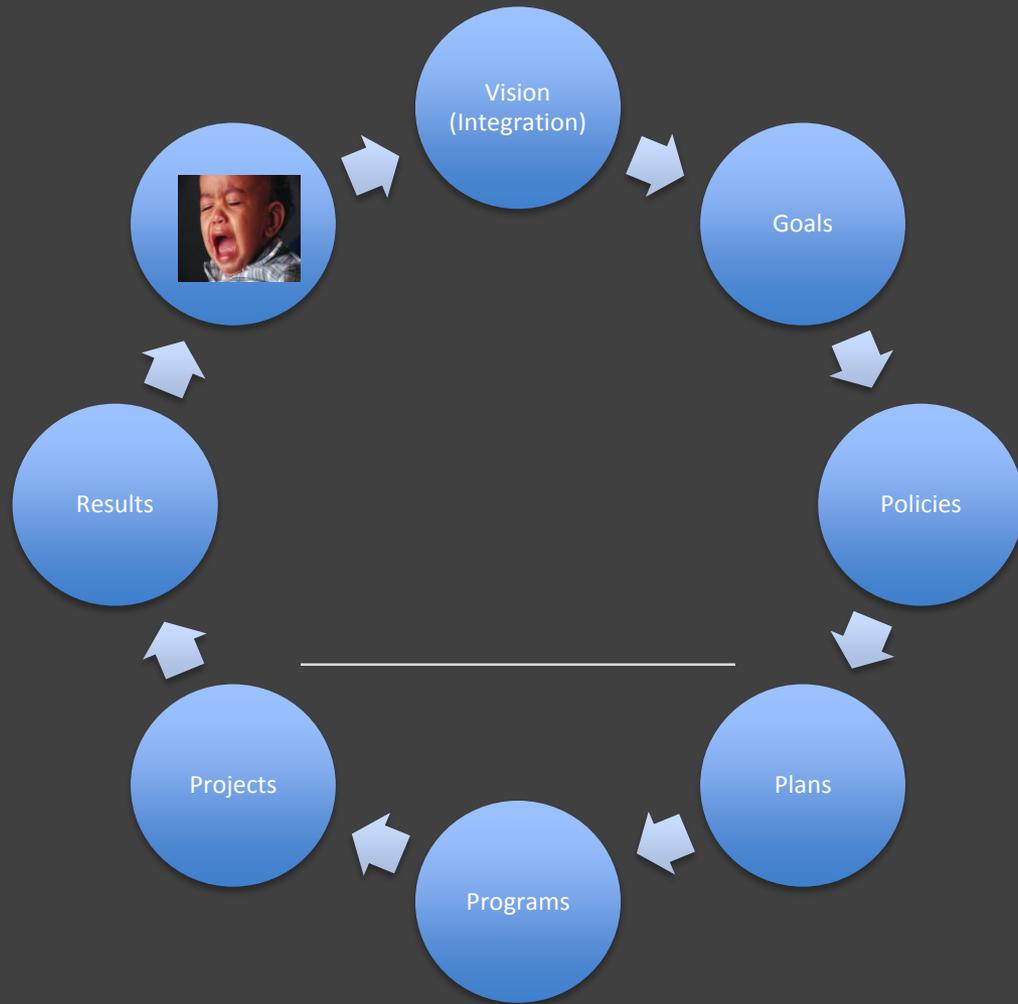
# Why Design Matters



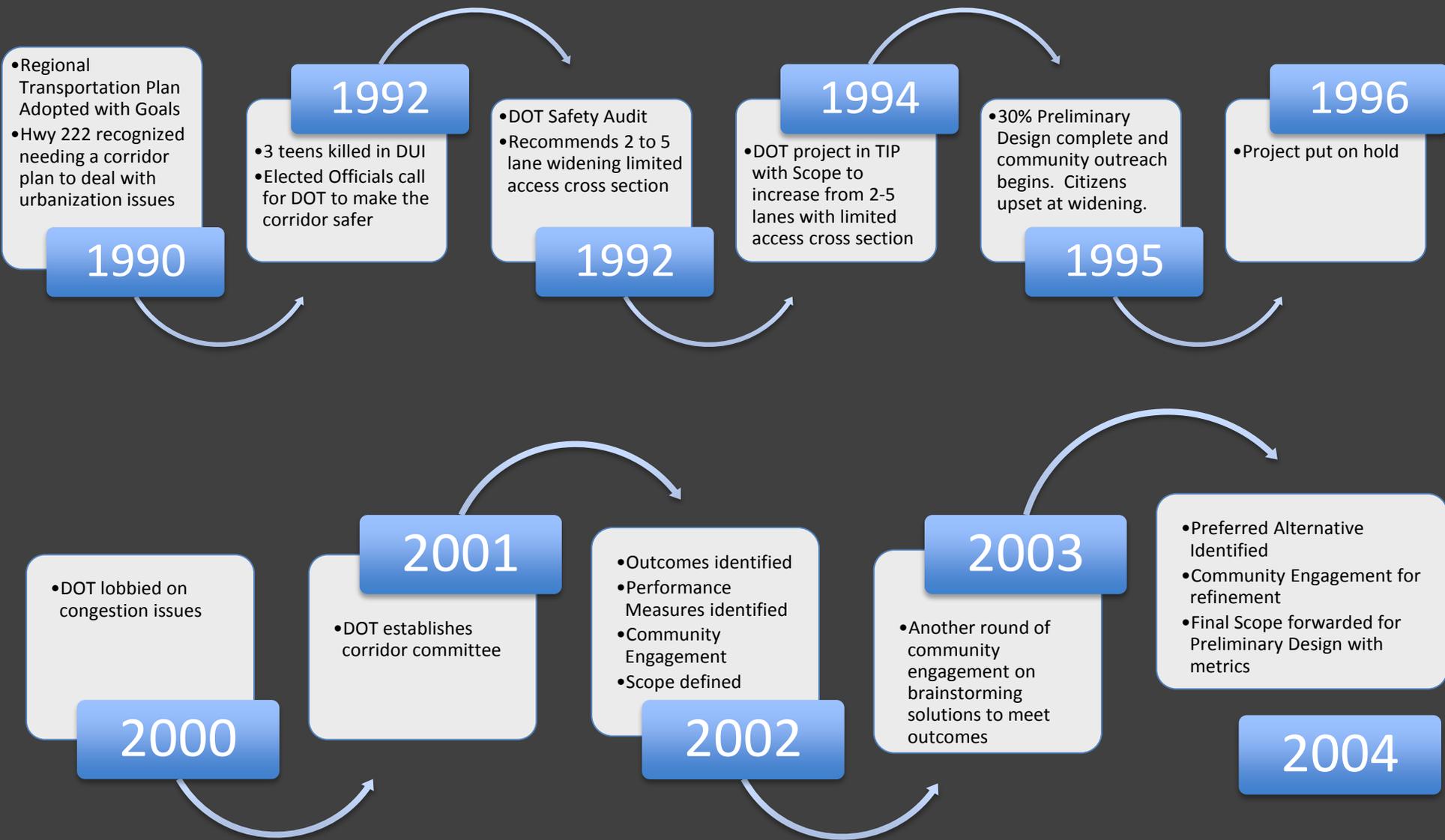
**Lynn Peterson**  
Metro Council President

# **What is Performance Based Practical Design/Solutions?**

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# **Hypothetical Hwy 222 Project Development**

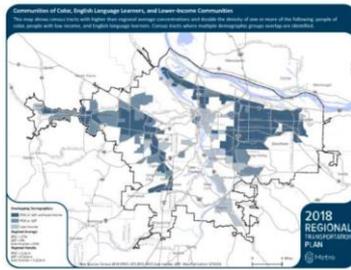


# Final Hypothetical Project Alternative Analysis

Measure	Scenario A – high capacity transit lane	Scenario B – additional transit and HOV lane
Safety by mode and demographics		
Public Health – improved accessibility and connectivity by mode		
Reliability by mode		
Land Use – supports the development pattern		

# Your observations?

- Has this happened on projects here?
- Can you identify assumptions that were made at each step?
- Can you name federal or state guidance that has changed since the 1990s that would help clarify how to approach these issues.
- What are some issues we should/would consider now?



People



Planet



Prosperity

The plan has a responsibility to the people of the region, to our planet and to the region's economic prosperity now and for future generations.



Strategic plan to advance racial equity, diversity and inclusion

oregonmetro.gov

# Why Performance Based Practical Design?



Six desired outcomes for the greater Portland region

- Equity**  
The benefits and burdens of growth and change are distributed equitably.
- Vibrant communities**  
People live, work and play in vibrant communities where their everyday needs are easily accessible.
- Economic prosperity**  
Current and future residents benefit from the region's sustained economic competitiveness and prosperity.
- Safe and reliable transportation**  
People have safe and reliable transportation choices that enhance their quality of life.
- Clean air and water**  
Current and future generations enjoy clean air, clean water and healthy ecosystems.
- Climate leadership**  
The region is a leader in minimizing contributions to global warming.

— Adopted by Metro Policy Advisory Committee and the Metro Council in 2008.



Climate Smart Strategy for the Portland metropolitan region

oregonmetro.gov/climatestrategy 2014

# Practical Design v. Value Engineering? (UDOT)



**Value Engineering** - Method to determine the most cost effective way to achieve proposed improvements. Typically focuses on maximizing project improvements. It is a tool for practical design.



**Practical Design** - Method to determine the most cost effective way to achieve the objective statement. Focuses on maximizing roadway system improvements and strategic goals.

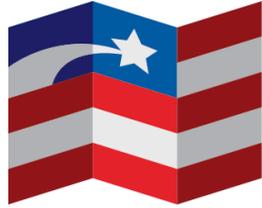
# Group Discussion



# National Trends & Perspectives



**Beth Osborne**  
Transportation for America



**Transportation**  
for America

# Metro Performance-Based Design Workshop

Beth Osborne, T4America

[www.T4america.org](http://www.T4america.org)

@t4america

# About Transportation for America

T4A supports moving people, safely and affordably, to jobs and services by multiple means of travel with minimal impact to communities and the environment. We do this through advocacy, technical assistance, research and analysis.



MEMOS ON  
Practical Solutions

## 8 Ways to Improve State DOTs, According to Smart Growth Advocates

State transportation departments are often criticized for being too highway-centric. Here are some suggestions for changing that.

BY DANIEL C. VOCK | MARCH 26, 2019 AT 4:00 AM

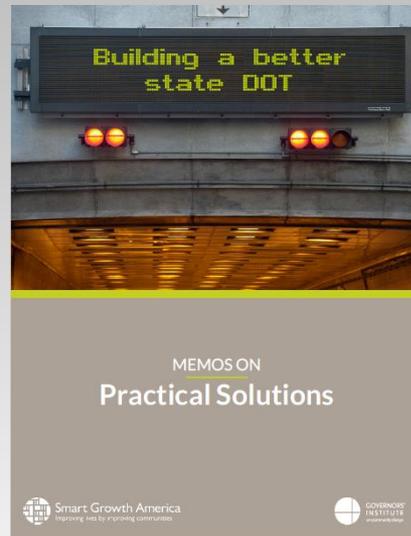


# Focusing on speed leads to overbuilding

**Make sure the vehicles can always go fast**

**AND**

- Prioritize repair first
- Keep everyone safe, including people walking & biking
- Create vibrant places worth visiting
- Keep your costs low
- Don't negatively impact nearby communities
- Help connect everyone to jobs and opportunity, whether they drive or not
- Promote sustainable and lasting economic development
- Reduce transportation-related emissions



# Work starts long before breaking ground

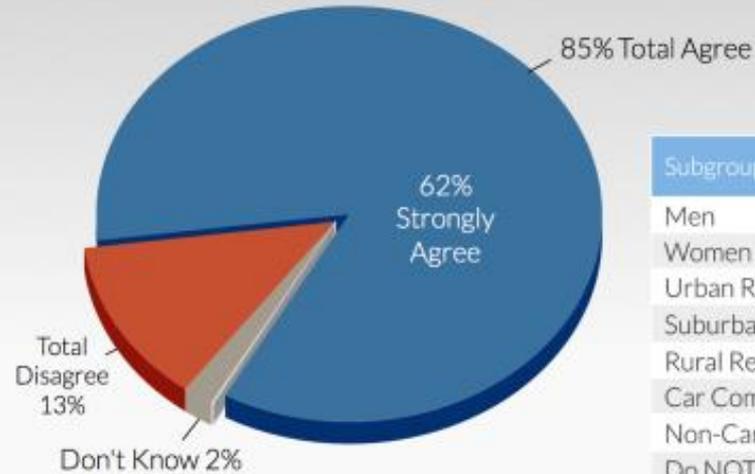
- Changing the culture: more than encouragement – direction and standards
- Getting project scopes right – start with the problem statement, not the solution
- Improving public engagement

# If that road feels out of place,...

...that's probably because it is!

- Coordinate land use and transportation decisions.
- Articulate benefits and reasons for funding one project over another.
- Measure the right things.

*"Transportation infrastructure funding decisions are based more on politics than on need."*



@t4america

Subgroups	Strongly Agree
Men	62%
Women	62%
Urban Residents	58%
Suburbanites	67%
Rural Residents	54%
Car Commuters	60%
Non-Car Commuters	55%
Do NOT Commute	65%

 Transportation for America

 Transportation for America

www.transportationforamerica.org

# How does transportation impact the economy?

1. Connecting people to jobs
2. Connecting employers to workers
3. Attracting development
4. Increasing property values
5. Creating jobs
6. Saving time/increasing travel speeds
7. Improving freight access and reliability
8. Reducing energy use
9. Reducing transportation costs

# How does transportation impact the economy?

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8. Reducing energy use
9. Reducing transportation costs

# Congestion as an Economic Measure



Image source: World Bank Photo Collection on Flickr

# Congestion as an Economic Measure

## Atlanta Travel Time

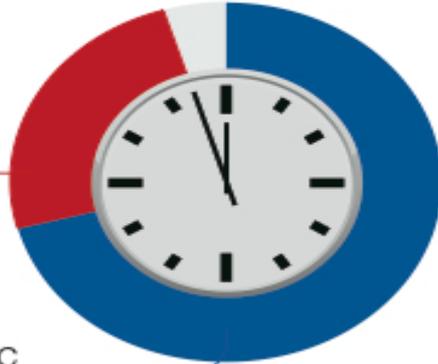
57.4 minutes

Extra rush hour delay

**14.8 mins**

Travel time without traffic

**42.5 mins**



## Chicago Travel Time

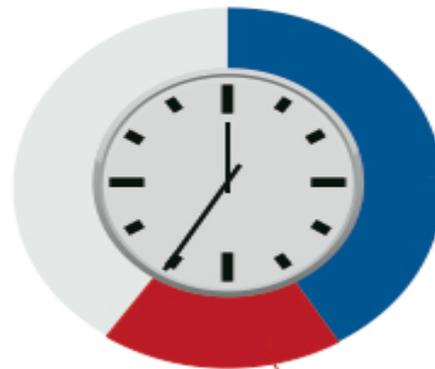
35.6 minutes

Travel time without traffic

**24.9 minutes**

Extra rush hour delay

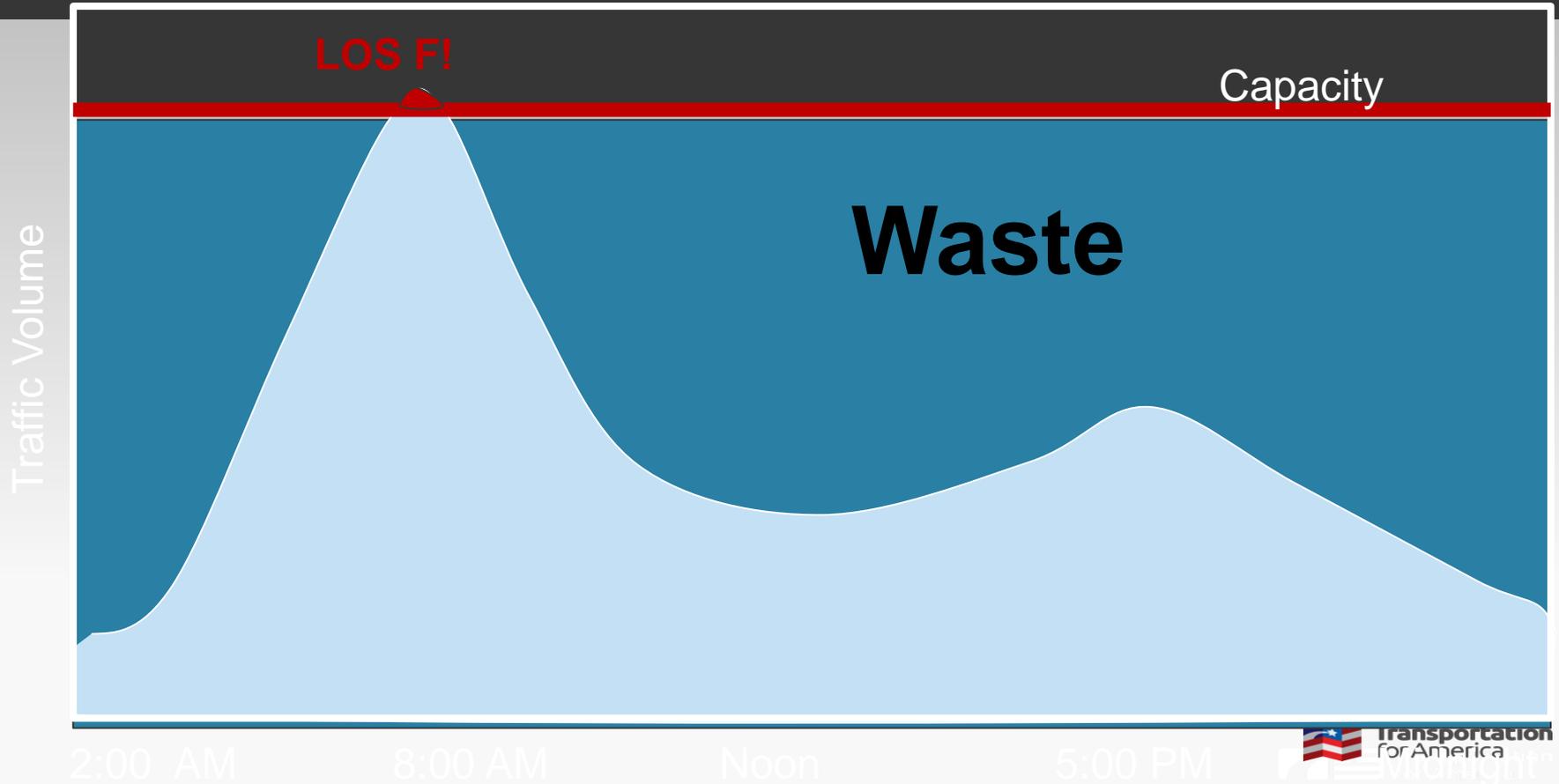
**10.7 minutes**



# Old Speed Paradigm → Roadway LOS

<b>LOS</b>	<b>Average delay in seconds per vehicle</b>	<b>Description of motorist perception</b>
A	< 10	Free-flow traffic: “Good” LOS
B	10.1 – 20	Reasonable free-flow
C	20.1 – 35	Stable but unreasonable delay begins to occur
D	35.1 – 55	Borderline “bad” LOS
E	55.1 – 80	“Bad” LOS: long queues
F	> 80	Unacceptable: very high delay, congestion

# Traffic Economics





# Level of Service A



**Level of Service F**

# What's important depends upon perspective



Traffic engineer:

**F**

**A**

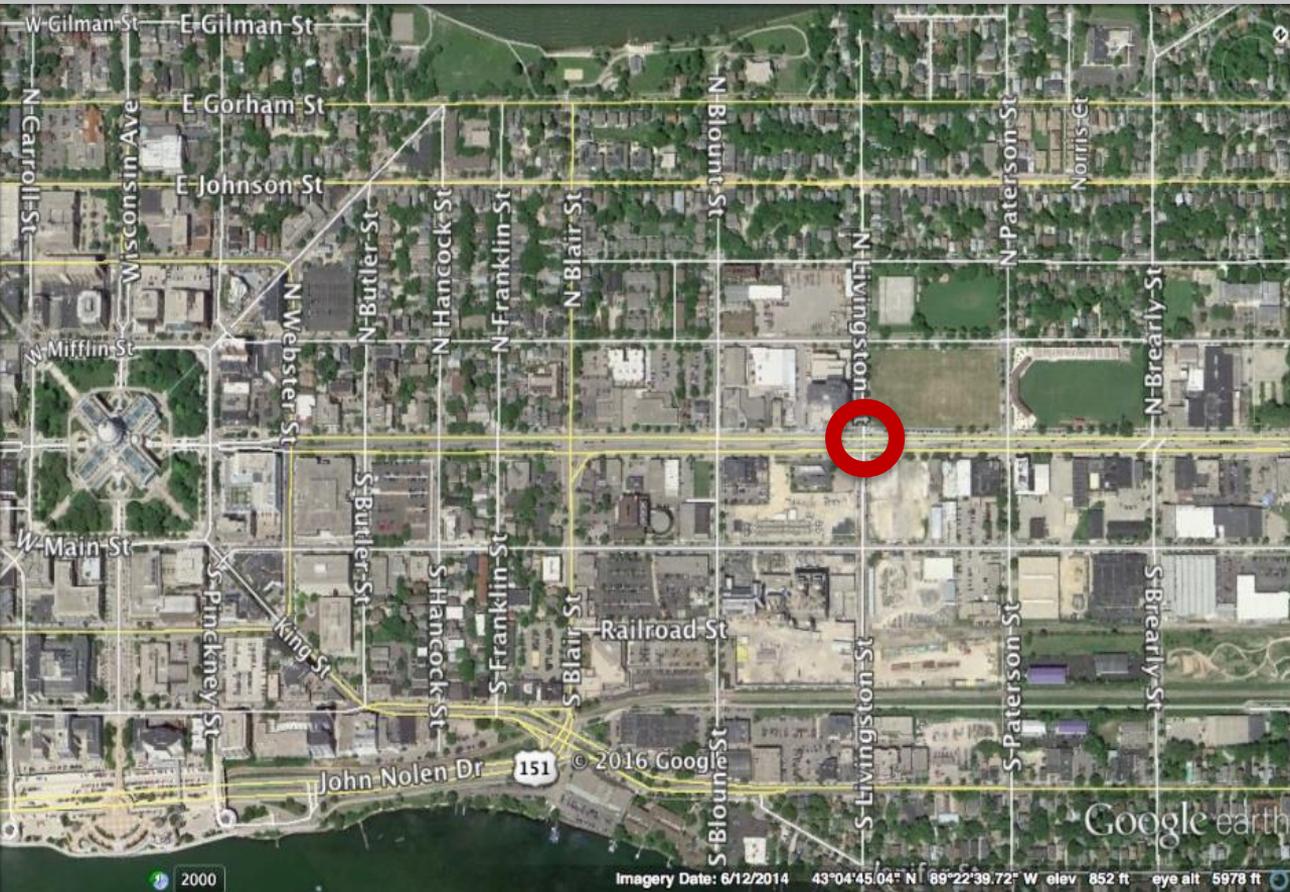
Economist:

**A**

**F**

# Access to Jobs and Services

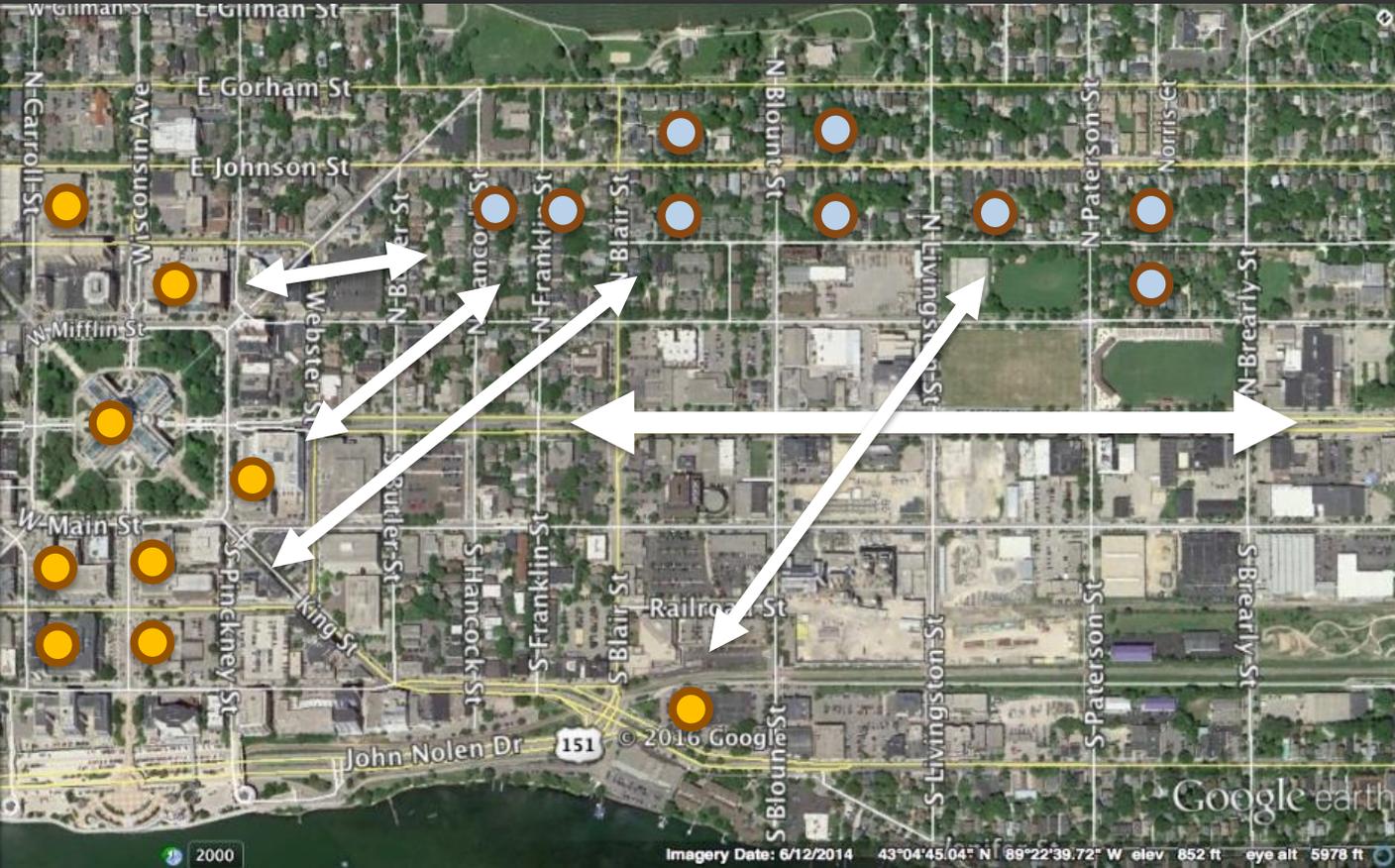
# Conventional practice



## Mobility measures

- Travel speed
- Level of service
- Vehicle throughput
- Person throughput

# Modern practice

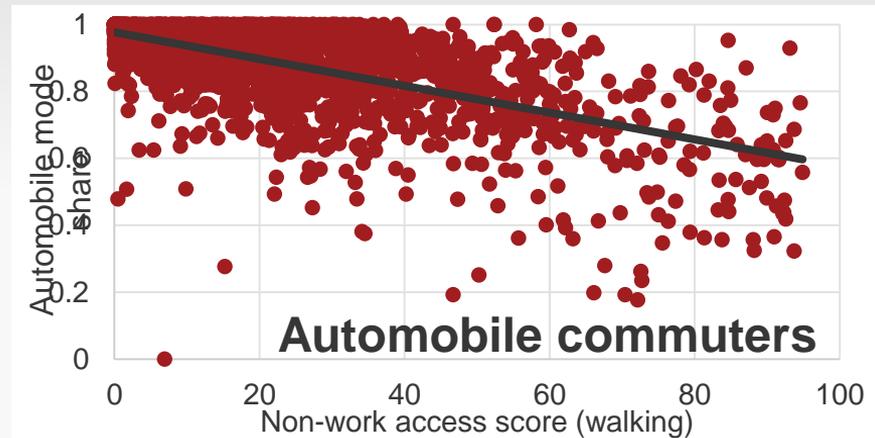
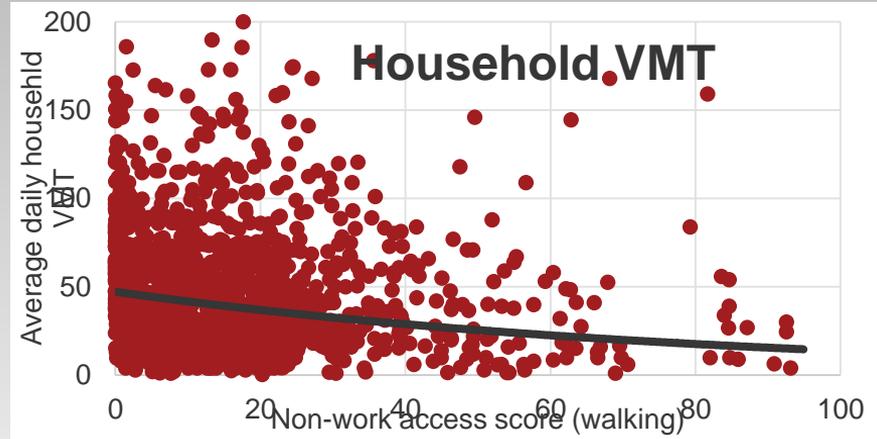
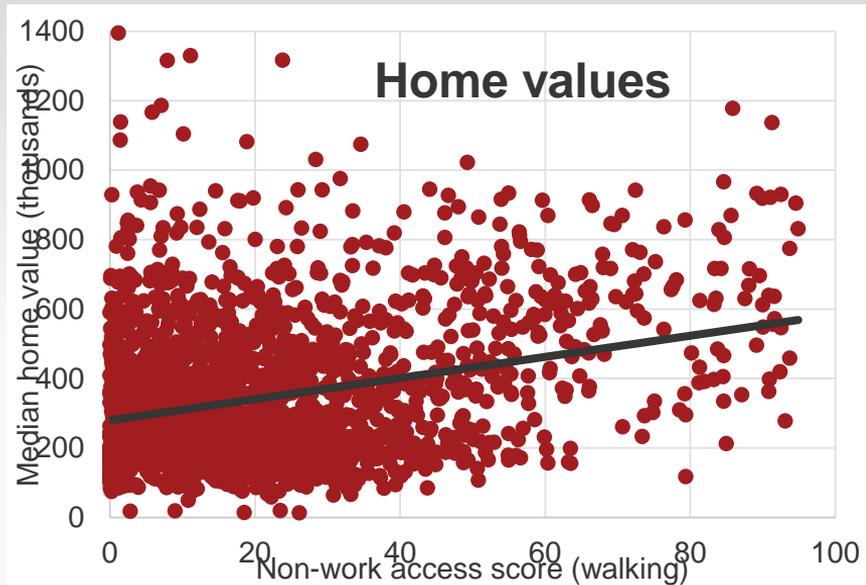


## Accessibility measures

- Origins
- Destinations
- Ability to travel between them
- Time measured; compare modes
- Can analyze transportation or land use change

# Related outcomes

Higher accessibility = lower travel demand and greater economic value



# Applying access scores

Scan  
conditions

Diagnose  
problems

Assess  
solutions

Engage  
stakeholders

Track  
performance

Predict  
outcomes

# Accessibility measures

## Two measures

### Access to jobs

- 20% of trips; 30% of VMT
- Reported as “number of jobs”

### Non-work access

- Groceries, parks, schools, restaurants, and other non-work destinations
- 80% of trips; 70% of VMT
- Reported as a score (0-100)

## What’s needed?

### Transportation networks

- Roads, bike paths, sidewalks, vehicle speeds, and transit routes and schedules

### Land uses

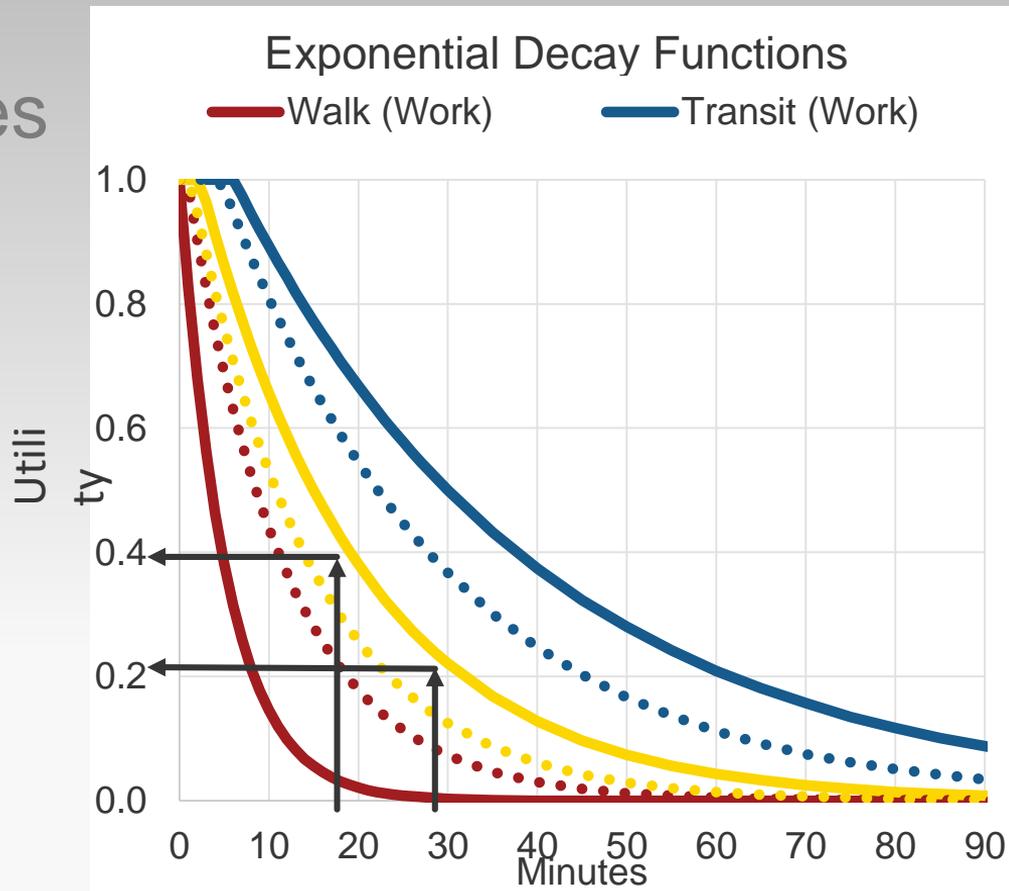
- Jobs and non-work destinations

### Calculation methods

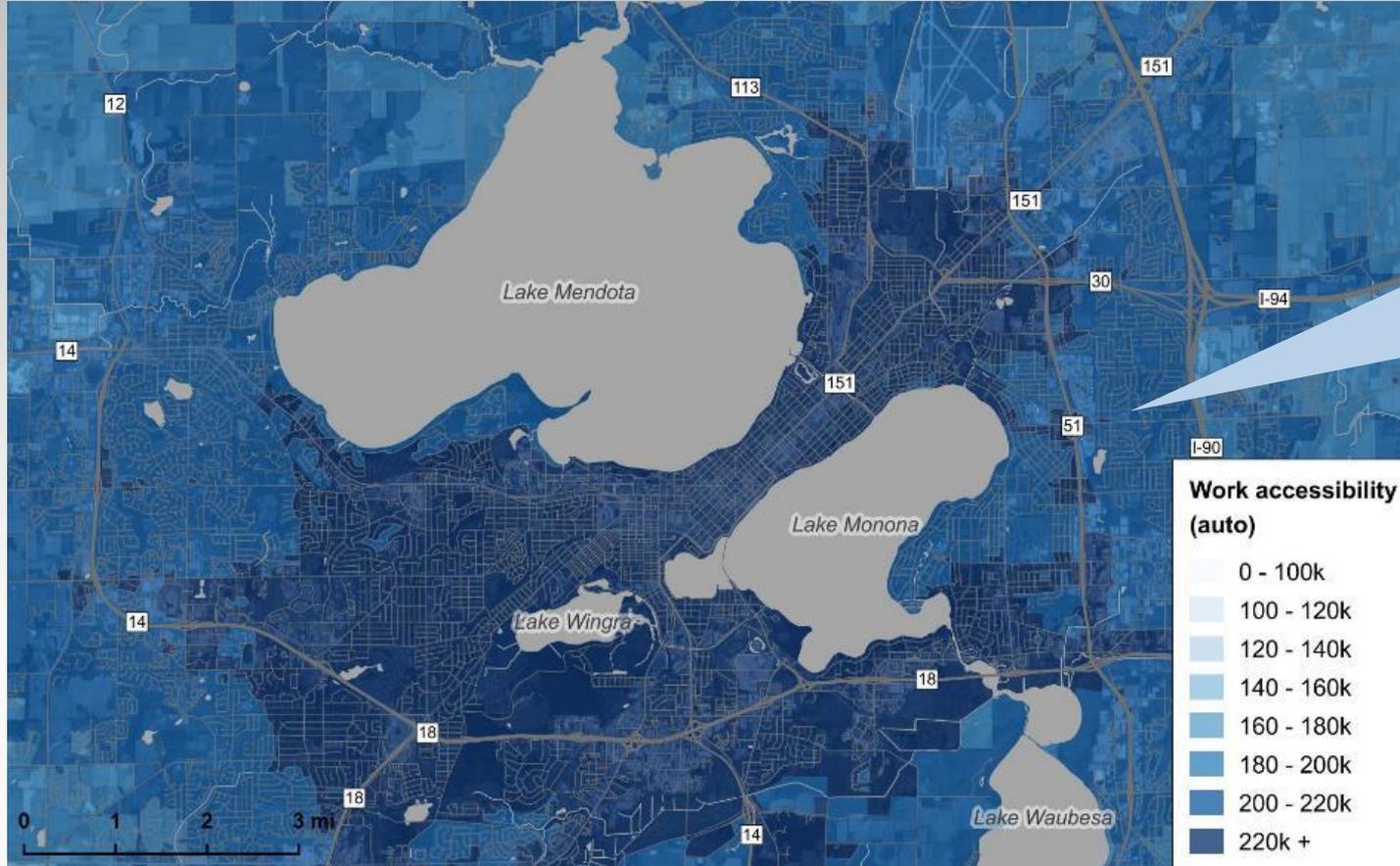
# How long am I willing to travel?

## Decay-weighted measures

- Opportunities that take less time to reach are more valuable
- Used in Sugar Access calculations



# Access to jobs by automobile (morning)



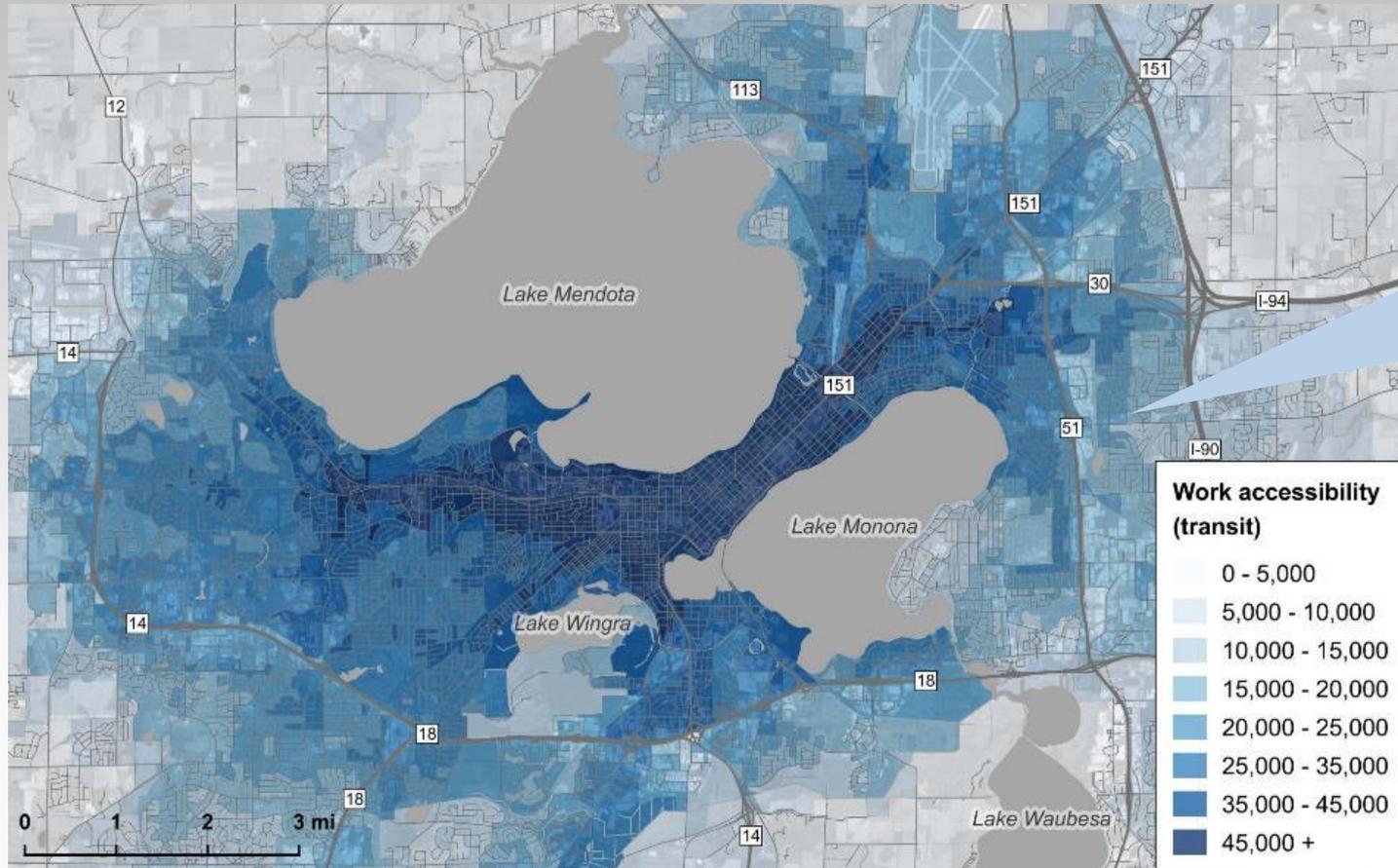
## Jobs accessible

< 15 min	29,000
< 30 min	293,000
< 45 min	308,000
< 60 min	308,000
<b>Final score</b>	<b>212,000</b>

## Work accessibility (auto)

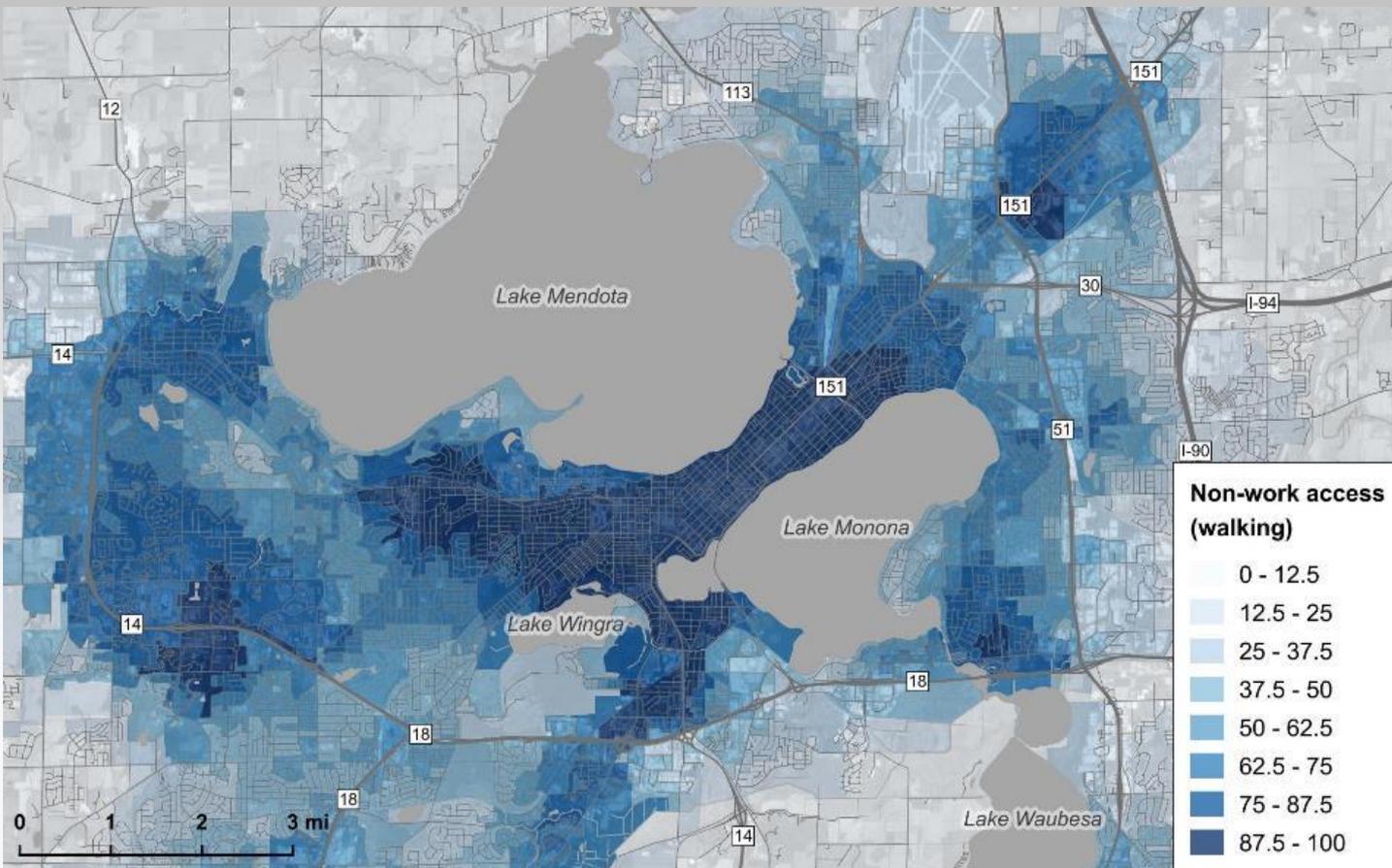
0 - 100k
100 - 120k
120 - 140k
140 - 160k
160 - 180k
180 - 200k
200 - 220k
220k +

# Access to jobs by transit (morning)



Jobs accessible	
< 15 min	250
< 30 min	24,000
< 45 min	33,000
< 60 min	122,000
<b>Final score</b>	<b>18,000</b>

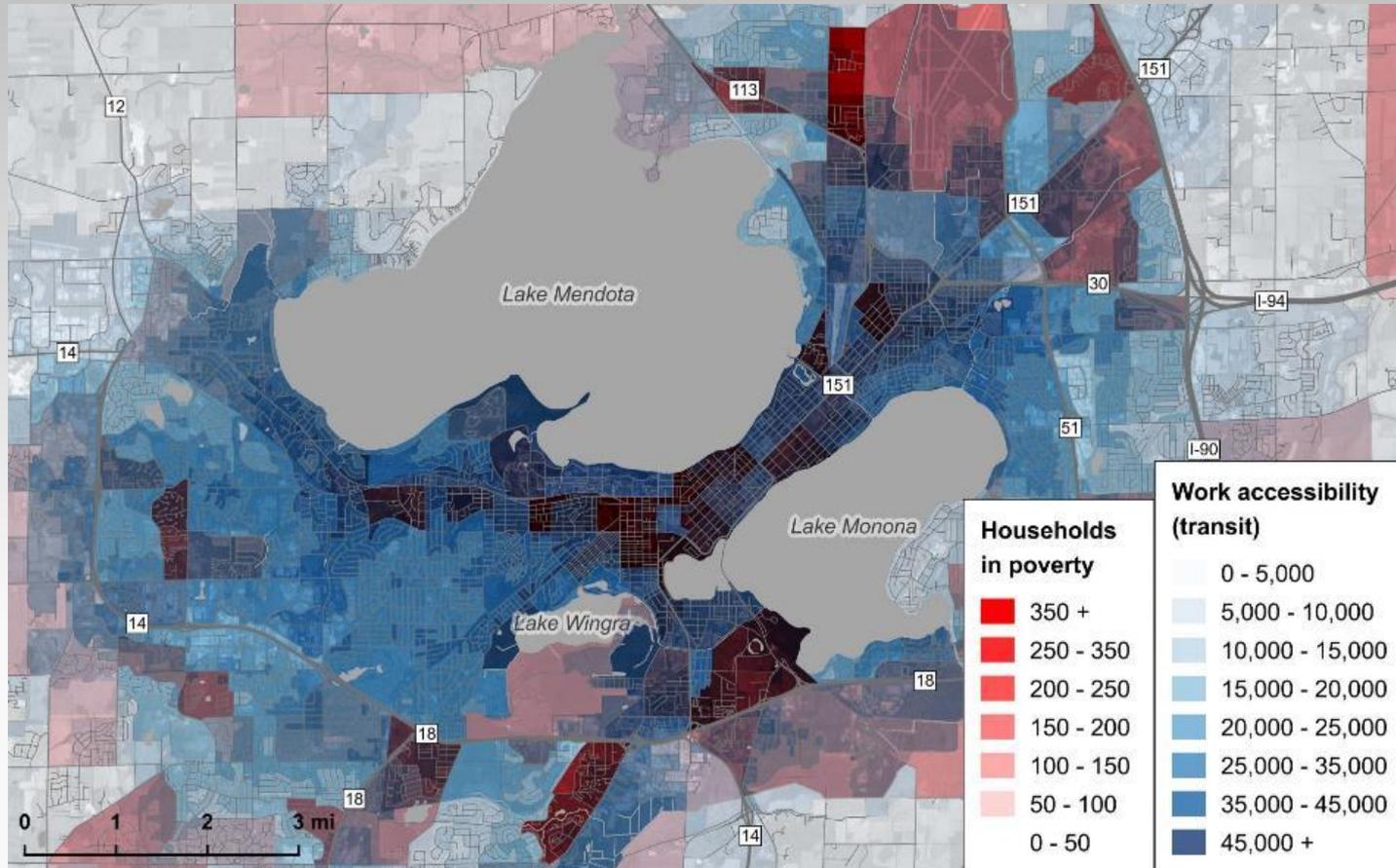
# Non-work access



Map shows access to bins of destinations, like Walk Score.

Tool allows analysis of access to particular destinations, such as grocery stores

# Access to jobs by transit & poverty



Scan for equity issues

Set policy goals

- Percent of households with minimum level of access

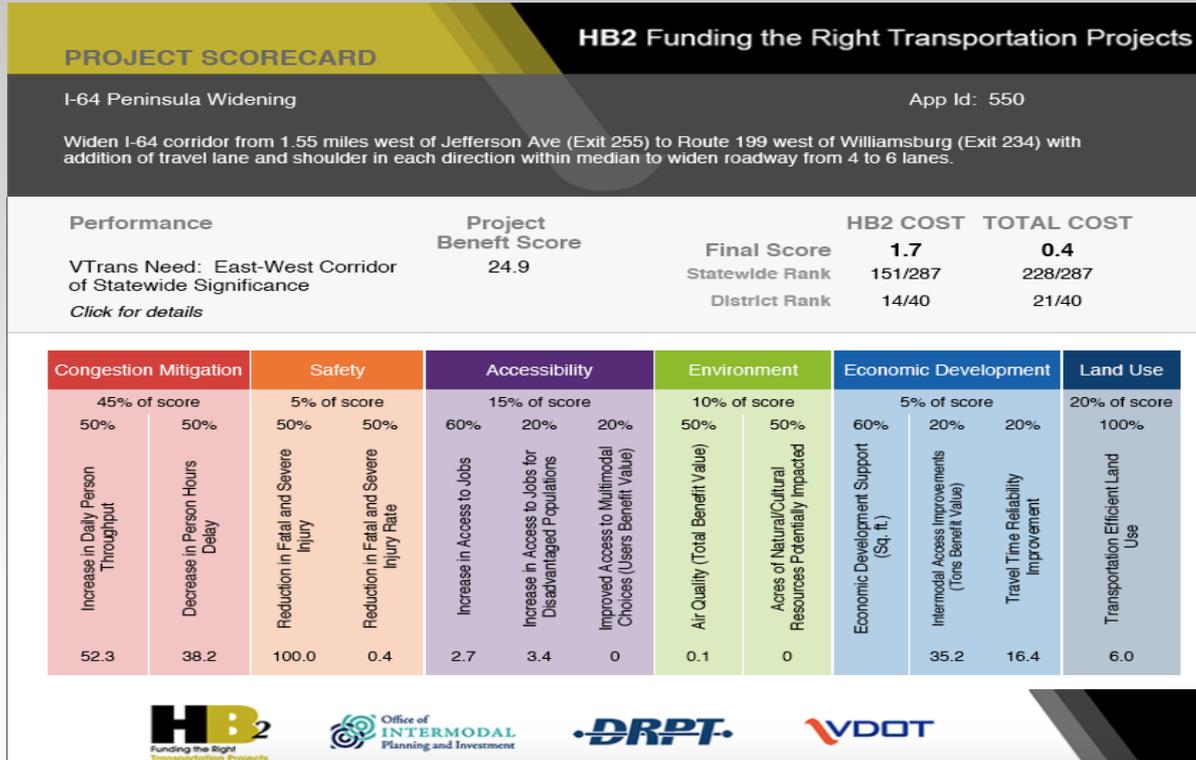
Evaluate proposals

- Transit improvements
- Affordable housing sites

Track progress



# Maximizing return on investment



# Keeping the Economy Running



**Table 3.5 Accessibility Measures**

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
A.1	Access to Jobs	Change in average jobs accessibility	Measure assesses the average change in access to employment opportunities as a result of project implementation based on the GIS accessibility tool.	60%
A.2	Access to Jobs for Disadvantaged Populations	Change in average jobs accessibility for disadvantaged populations	Measure assesses the average change in access to employment opportunities as a result of project implementation based on the GIS accessibility tool.	20%
A.3	Access to Multimodal Choices	Assessment of the project support for connections between modes, and promotion of multiple transportation choices	Measure assigns more points for projects that enhance interconnections among modes, provide accessible and reliable transportation for all users, encourage travel demand management, and potential to support emergency mobility.	20%

# Adding economic value



**Table 3.8 Transportation Efficient Land Use Measure**

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
L.1	Transportation Efficient Land Use	Amount of population and employment located in areas with high non-work accessibility	This measure determines the degree to which the project supports population and employment that on averages has a reduced impact on the transportation network	70%
L2	Increase in Transportation Efficient Land Use	Increase in amount of population and employment located in areas with high non-work accessibility between present day and the horizon year of 2025	This measure determines the degree to which the project supports population and employment that on averages has a reduced impact on the transportation network	30%

# Adding economic value



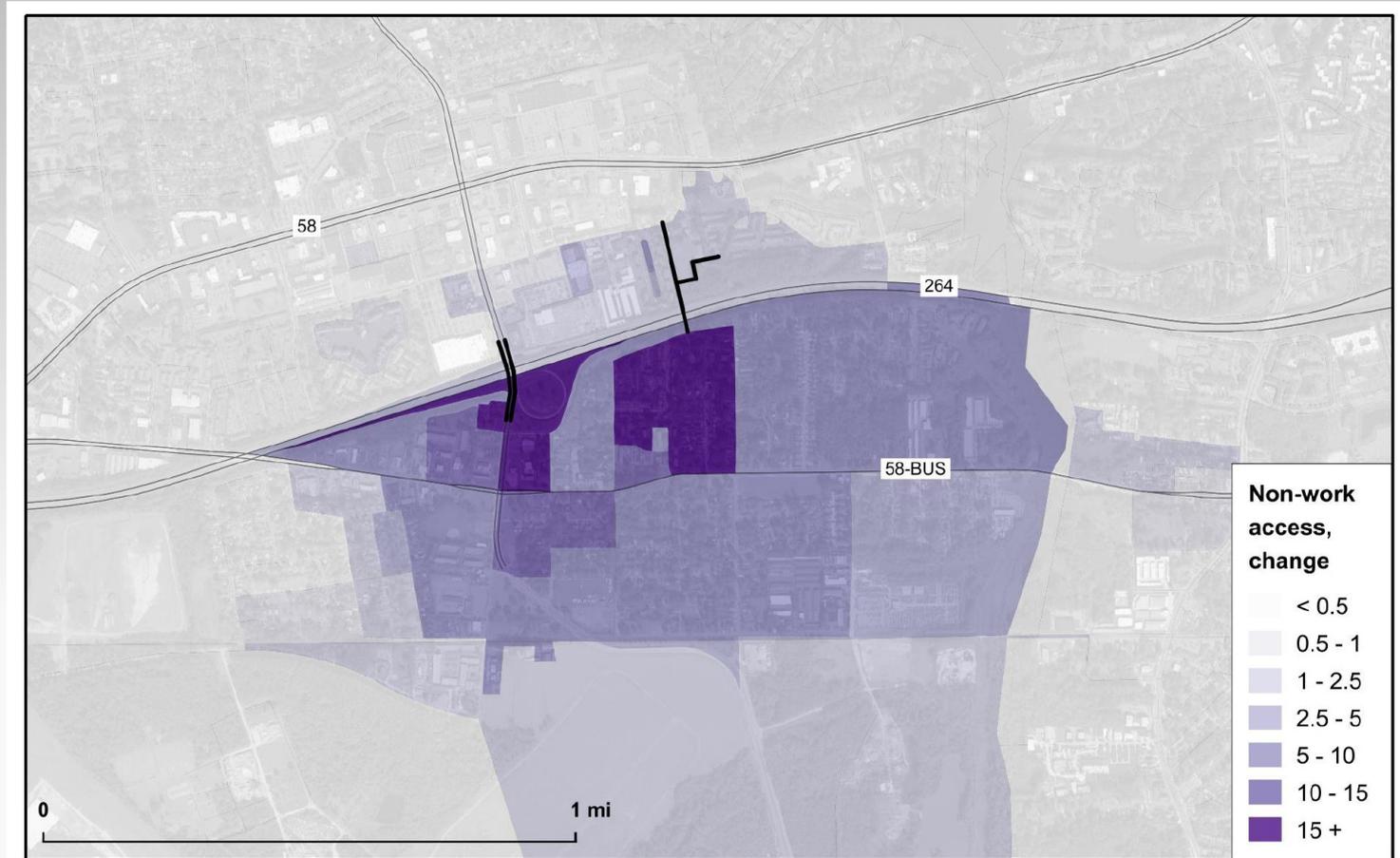
**Table 3.6 Transportation Efficient Land Use Measure**

ID	Measure Name	Measure Description	Measure Objective	Measure Weight
L.1	Transportation Efficient Land Use	Project support for mixed-use development with multimodal choices, in-fill development, and corridor access management policies	This measure determines the degree to which the project and adjacent future land use will help achieve goals for transportation efficient land use.	100%

# Non-work access score

Category	Points	Definition
Bank	0.74 each (up to 15 occurrences)	Bank, ATM
Education	5.6 each (up to 2 occurrences)	School
Entertainment	5.6 each (up to 2 occurrences)	Cinema, Performing Arts, Museum, Nightlife*, Sports Complex, Convention/Exhibition Center, Sports Center, Animal Park
Food & Drink	0.25 each (up to 45 occurrences)	Restaurants, Coffee Shop, Winery, Bar or Pub*
Grocery	3.7 each (up to 3 occurrences)	Grocery
Healthcare	3.7 each (up to 3 occurrences)	Hospital, Medical Service*, Pharmacy
Public Services	3.7 each (up to 3 occurrences)	Library, Post Office, Community Center, City Hall, Court House, Police Station
Recreation	3.7 each (up to 3 occurrences)	Golf Course, Ice Skating Rink, Campground, Park/Recreation Area
Shopping	0.34 each (up to 33 occurrences)	Shopping, Convenience Store, Clothing Store, Department Store, Specialty Store, Home Improvement & Hardware Store, Office Supply & Service Store, Bookstore, Home Specialty Store, Sporting Goods Store, Consumer Electronic Store
<b>Total points</b>	<b>100</b>	<i>* Incomplete data</i>

# Virginia Beach walkable crossings added

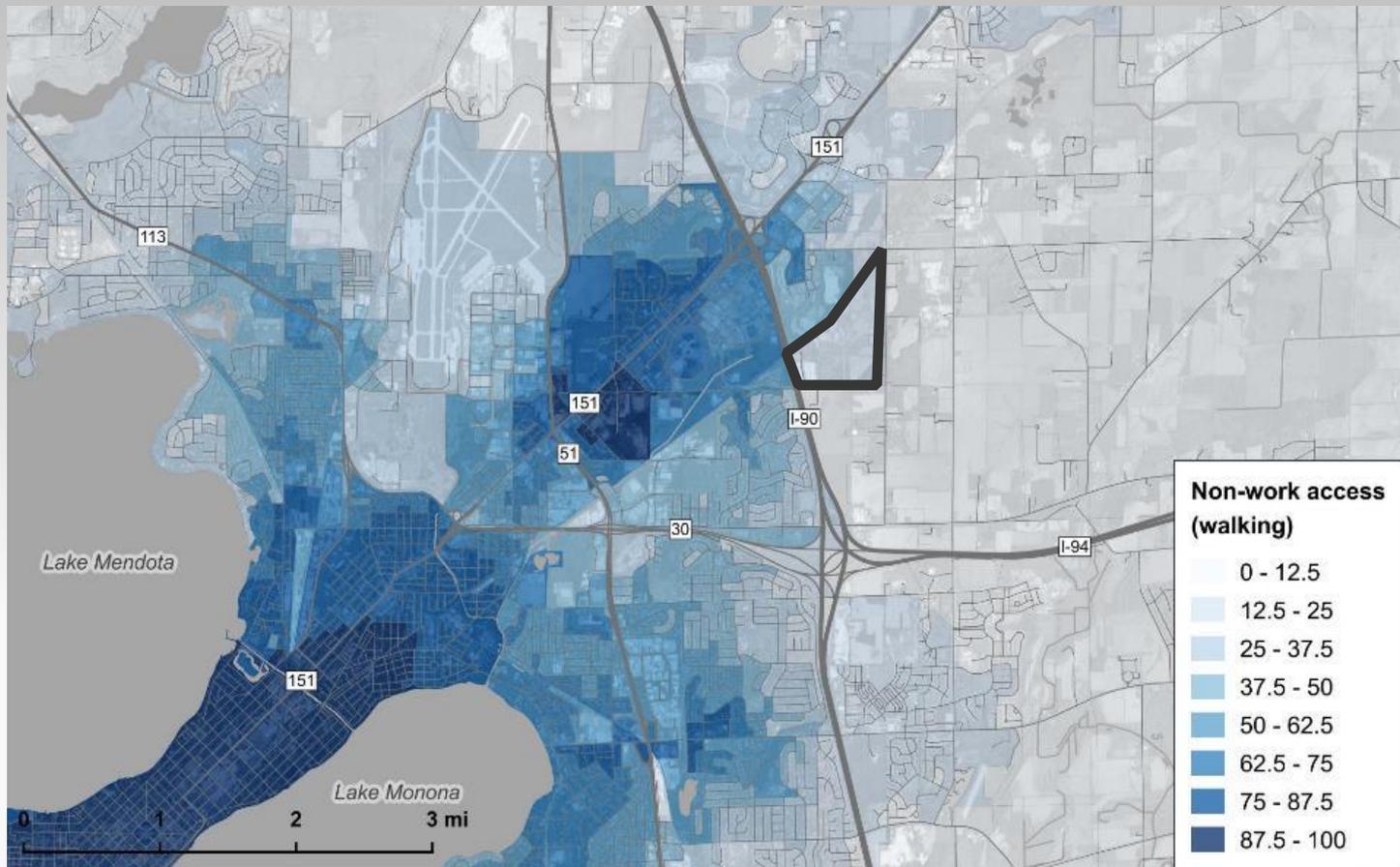


# Virginia Beach accessibility change

	Pedestrian non-work access			Weight (population)	Weighted change
	Before	After	Change		
Census blocks with greatest change	6	32	26	0	0
	6	31	25	0	0
	7	31	24	0	0
	7	29	22	0	0
	8	29	22	0	0
	9	25	16	0	0
	9	25	16	12	192
	5	20	16	203	3,191
	6	21	15	487	7,378
	10	24	14	4	55
	<b>Total</b>				706
<b>Total for entire project*</b>				67,438	33,498
<b>Average impact of entire project*</b>				0.497	

*\*within three miles of the project area*

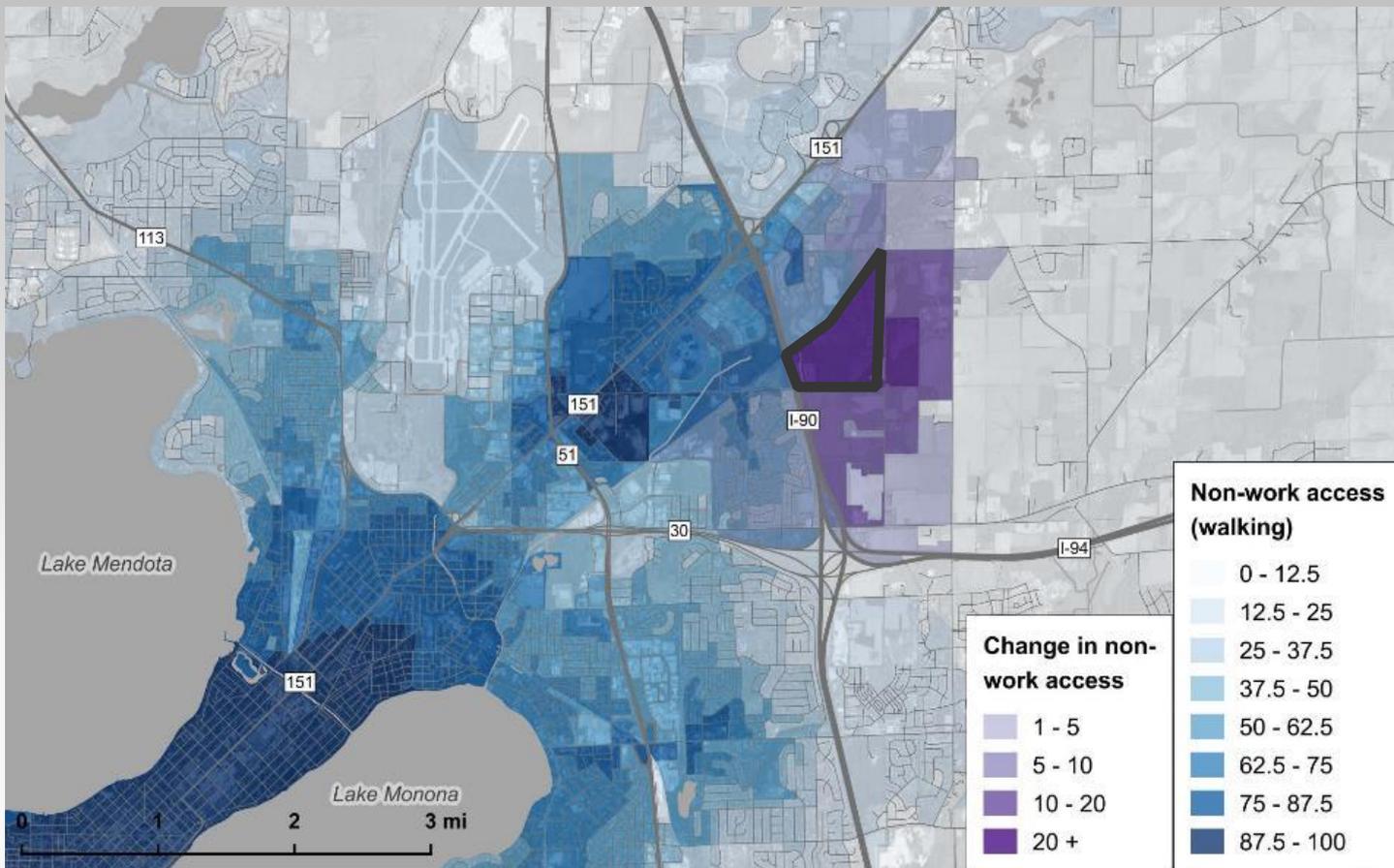
# Land use project evaluation



Greenfield development as proposed (second iteration)

# Land use project evaluation

Improved accessibility with mixed-use development



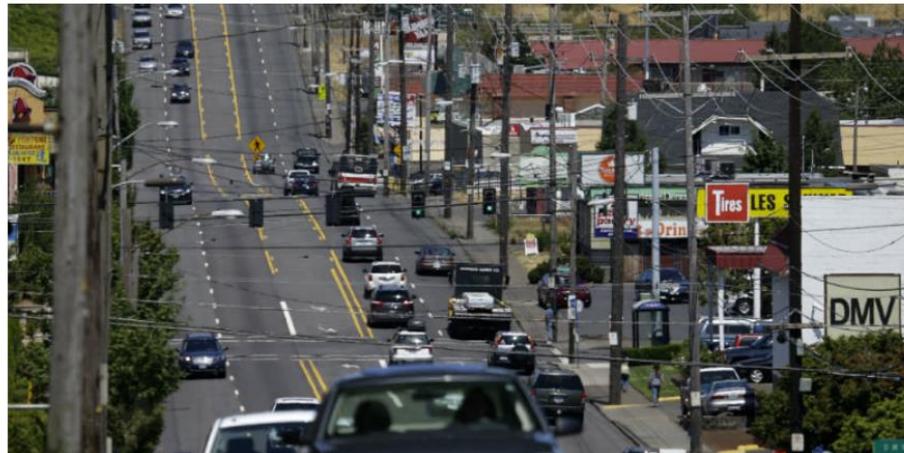


MEMOS ON  
Practical Solutions

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# Transportation for America

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[beth.osborne@t4america.org](mailto:beth.osborne@t4america.org)



[@t4america](https://twitter.com/t4america)

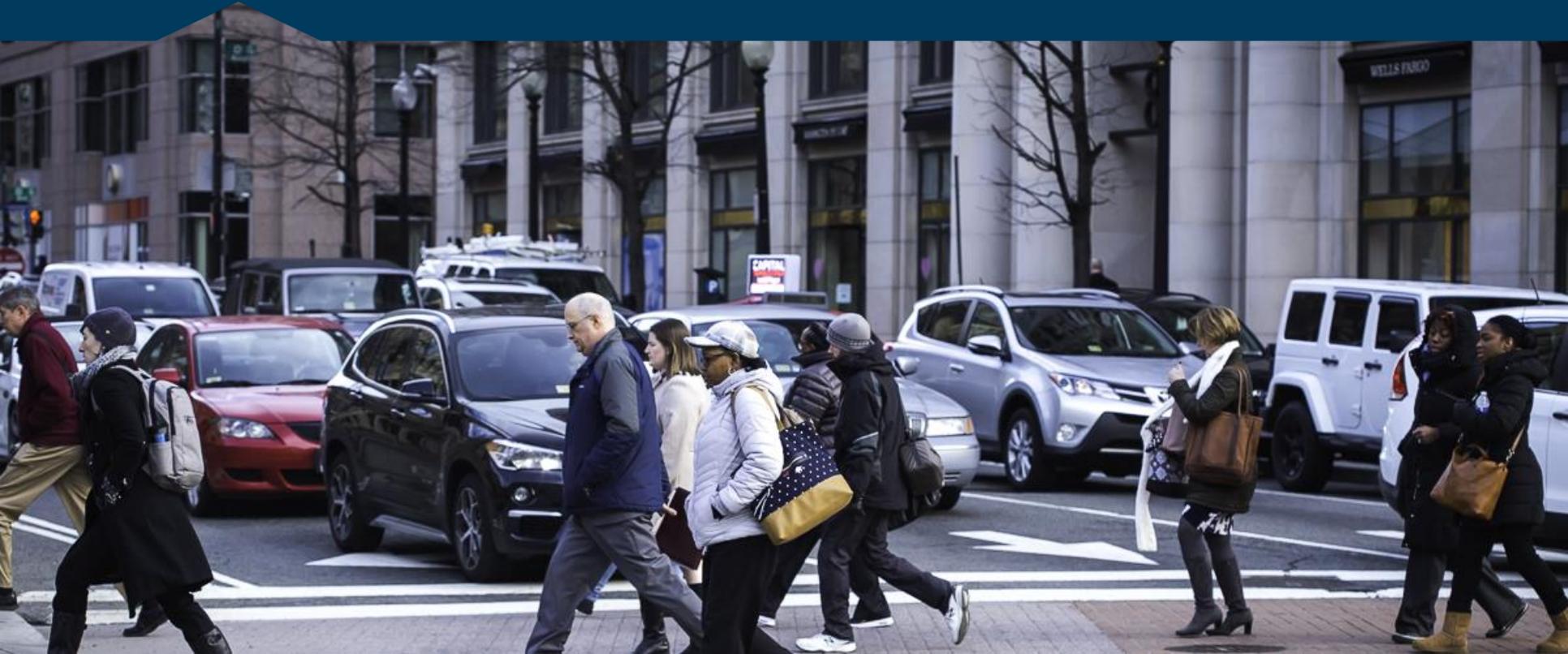


[www.t4america.org](http://www.t4america.org)

# Group Discussion



# Break

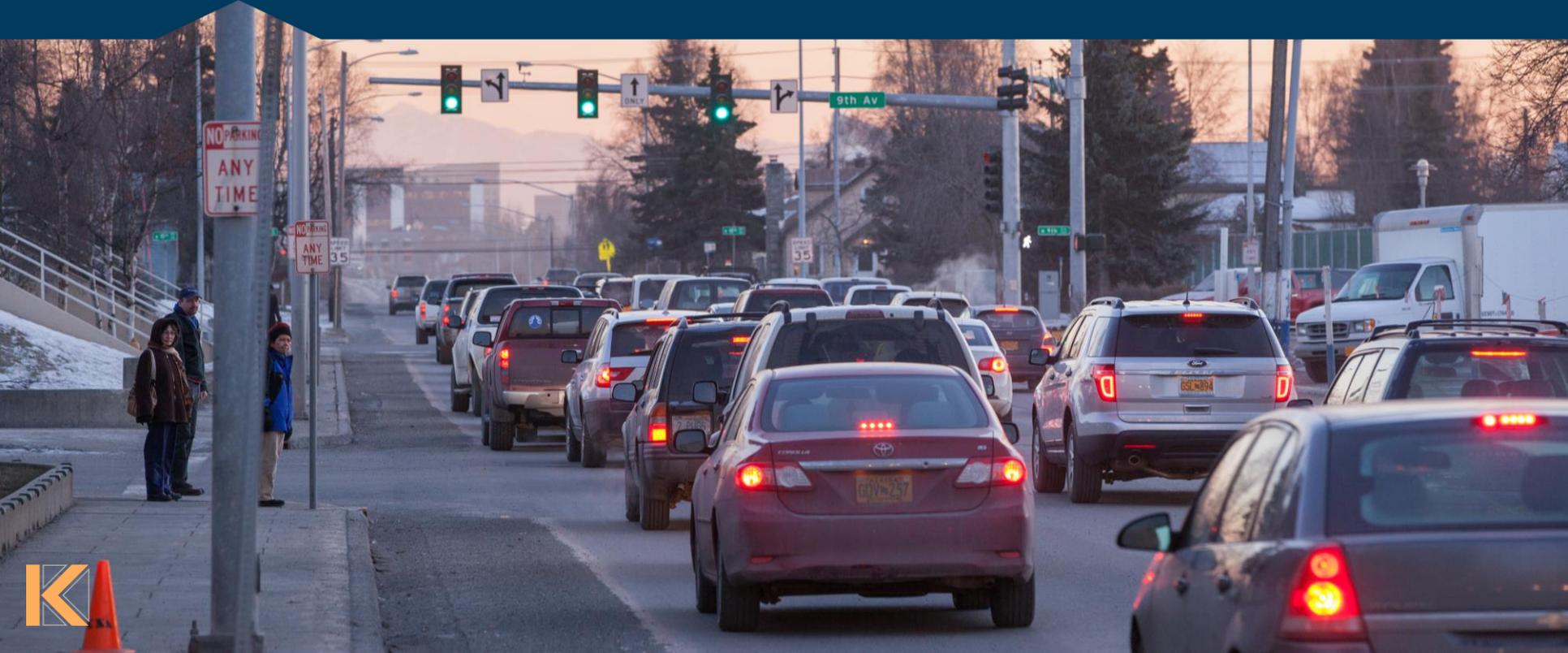


# Performance-Based Design

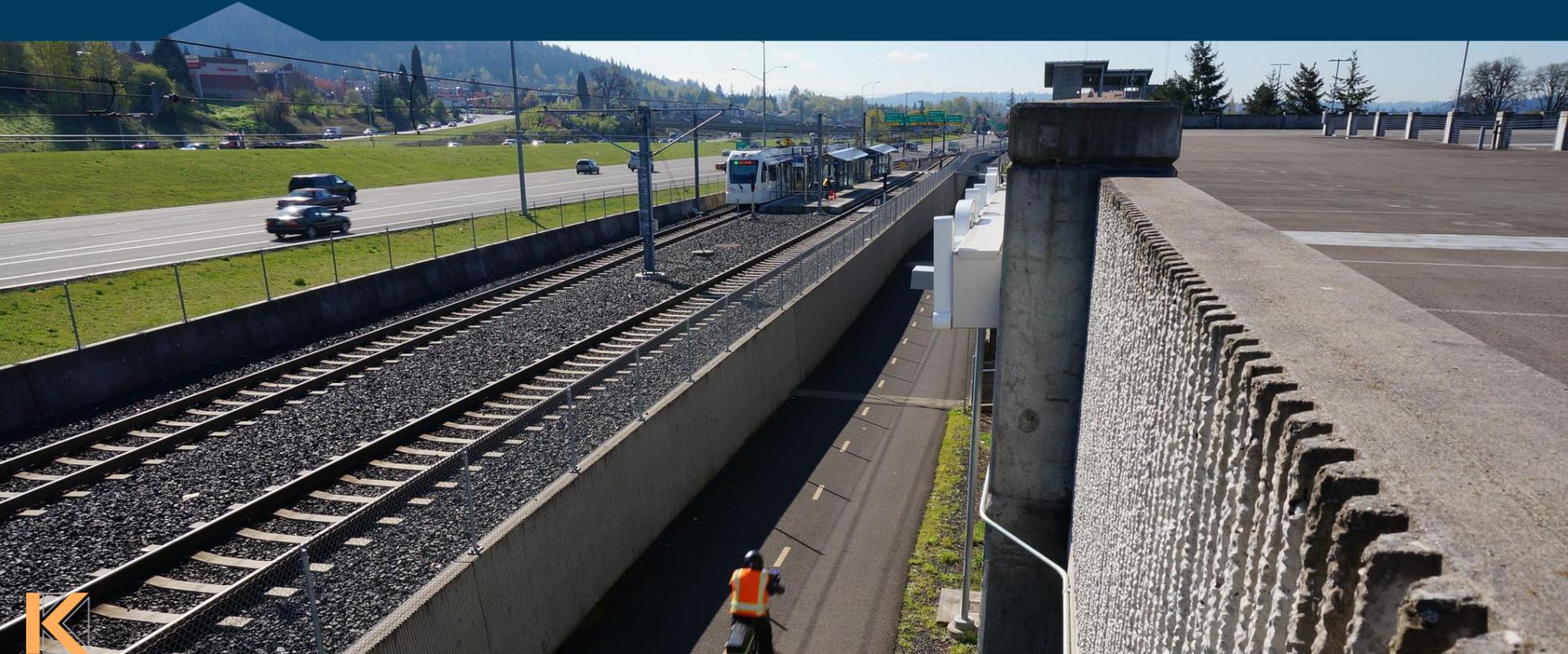
- What is performance-based design?
- How can you put it to work for your community?



# When standards stop working...



# Design with your goals in mind





05101

MIAMI-DADE  
COUNTY

We'll take you there!

**OUT the CLOSET**  
Now Open at 1910 Alton Road in South Beach!

COLLEGE





26 28  
26 28  
18465  
METRO

NB SR 99  
USE  
THOMAS





49 St  
900

SHERIFF RD  
4800

U4  
SHERIFF RD  
RIVER TERRACE

3017

metrobus

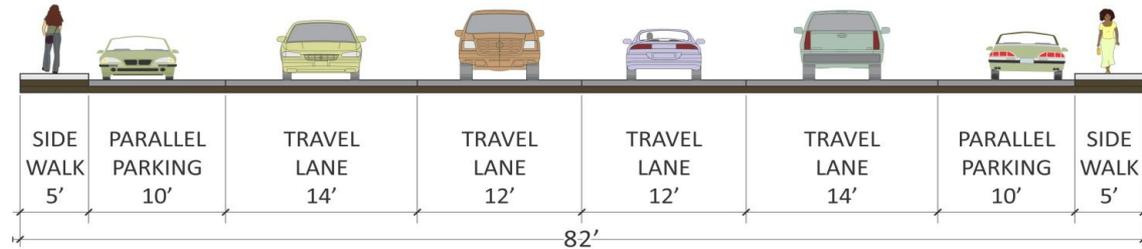
metrobus

AirAlerts

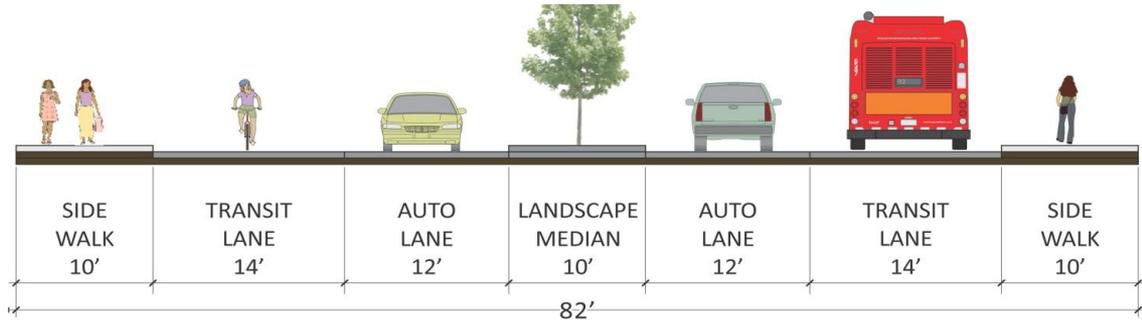


# Performance-Based Design gives you choices

Existing Conditions

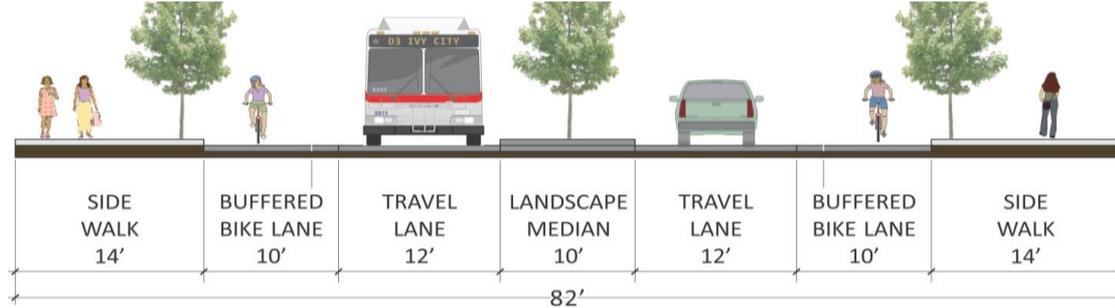


Alternative 1:  
Transit Oriented

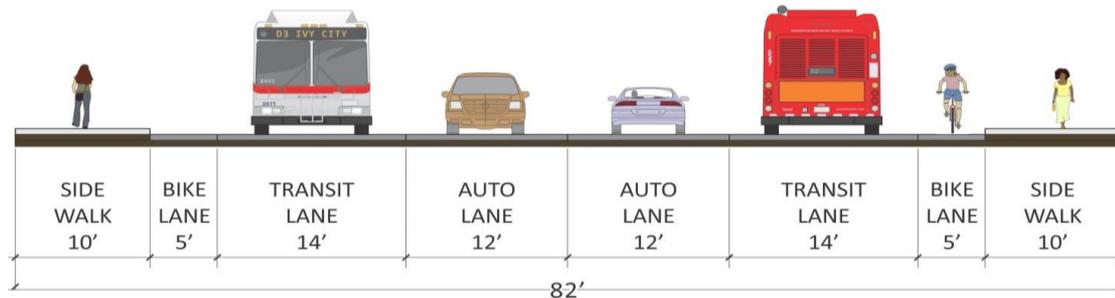


# Performance-Based Design gives you choices

**Alternative 2:**  
Bicycle and  
Pedestrian  
Oriented



**Alternative 3:**  
Hybrid of Transit,  
Pedestrian &  
Bicycle



# Why performance-based design?

- Why didn't we do it before?
- Why can we do it now?



# National Trends

## MORE FLEXIBLE, MULTIMODAL DESIGN PRACTICES

First nationwide best practices guide introduced



Official adoption by industry leaders



**2014**  
NCHRP Report 785:  
*Performance-based Analysis of Geometric Design of Highways & Streets*

**2016**  
AASHTO Standing Committee on Highways Resolution

Refinement of best practices  
Land use considerations



**2018**  
NCHRP Report 855

**2018**  
AASHTO Green Book, 7<sup>th</sup> Edition

**2019**  
Green Book, 8<sup>th</sup> Edition visioning complete

Metro adopts Performance-Based Design



**2019**  
Metro *Designing Livable Streets & Trails Guide*





“...Performance-based analysis is a principles-focused approach that looks at the outcomes of design decisions as the primary measure of design effectiveness...”



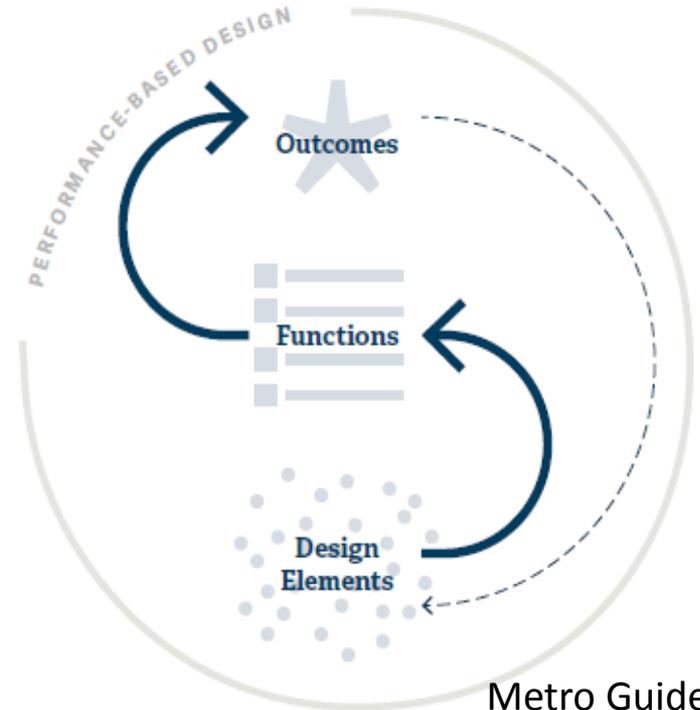
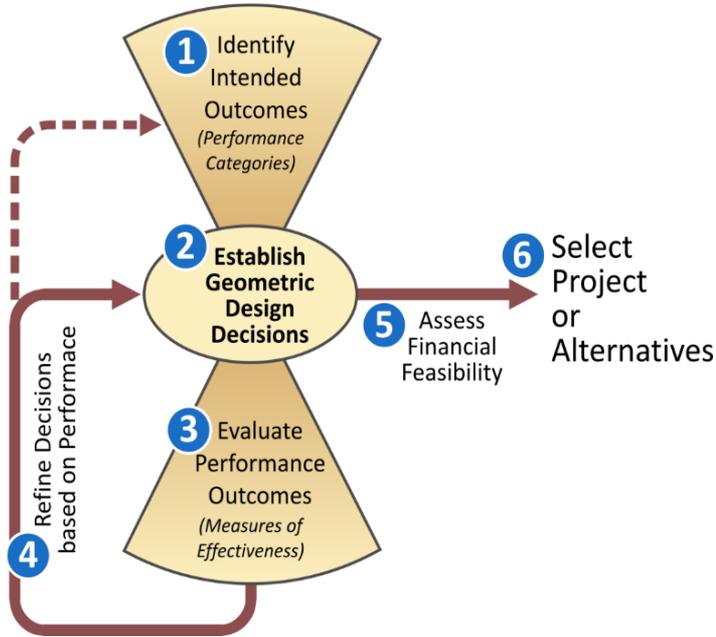
# What are your goals?

- **Design standards** make meeting standards the goal.
- With **performance-based design**, your desired outcomes are the goal.



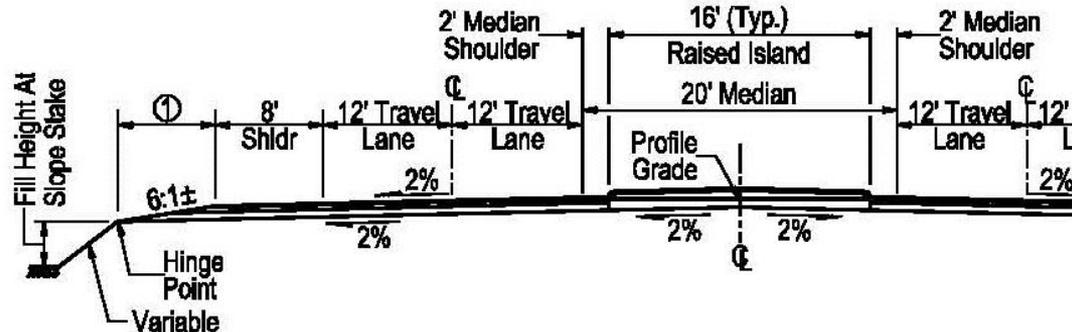
# What are your goals?

## Identify Issues to Solve



# What are standards anyway?

- Uniform approaches to ensure consistent design
- Tools to match criteria to similar design environments
- Approaches that represent the standards of care of our profession
- Anything else?



# True or false?



Design standards are by definition science-based.

**FALSE.**



# True or false?



Designing to standards  
minimizes risk and tort  
liability.



**FALSE.**

# True or false?



Performance-Based Design  
allows us to adapt to a  
unique project need.



TRUE.

# True or false?



Performance-Based Design  
supports risk management.

TRUE.

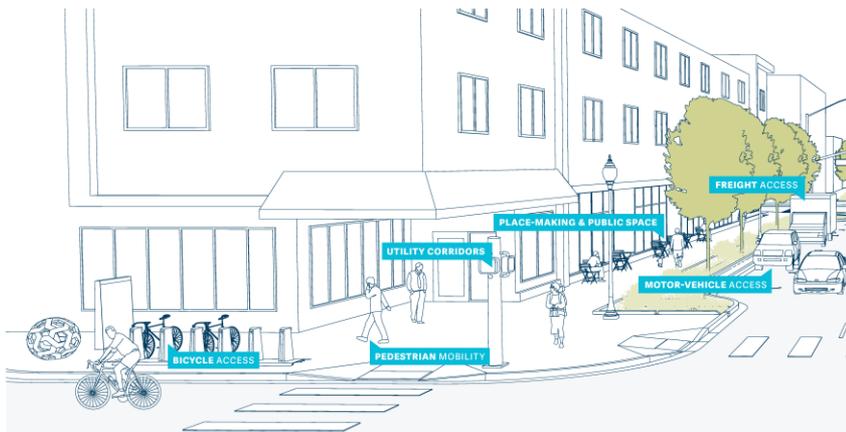


# Takeaways



# Metro's *Designing Livable Streets & Trails Guide*

## Livable Street Functions



### Pedestrian ACCESS & MOBILITY

Every street and trail has safe, comfortable space for people walking, rolling, and enjoying the place they're in.

### Bicycle ACCESS & MOBILITY

Connected bicycle networks, separated from heavy vehicle traffic, ensure that bicycling is a great way to get around in our communities.

### Transit ACCESS & MOBILITY

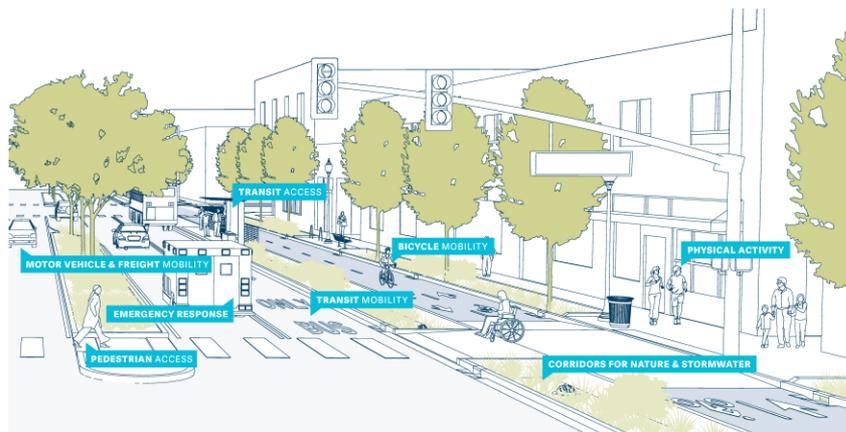
Our streets enable transit to serve the region with an efficient, reliable way to travel between and within our communities.

### Freight ACCESS & MOBILITY

Key freight corridors provide reliable freight movement, and streets allow delivery access to serve both businesses and residents.

### Motor-vehicle ACCESS & MOBILITY

Our transportation system provides for safe, reliable travel in motor vehicles, providing space to facilitate pooled or shared trips.



### Place-making & Public Space

Our streets and trails are a canvas for our community life and daily commerce, helping to form our regional identity.

### Corridors for Nature & Stormwater

Weaving nature and sustainable stormwater management into our streets and trails protects and enhances our region's natural assets.

### Utility Corridors

Our transportation corridors move more than just people and goods; they also move water, power, gas, communications, and information.

### Physical Activity

Our streets and trails are places where people enjoy spending time outdoors as part of an active lifestyle.

### Emergency Response

In case of a local or widespread emergency, our streets must provide access and evacuation routes to keep people safe.

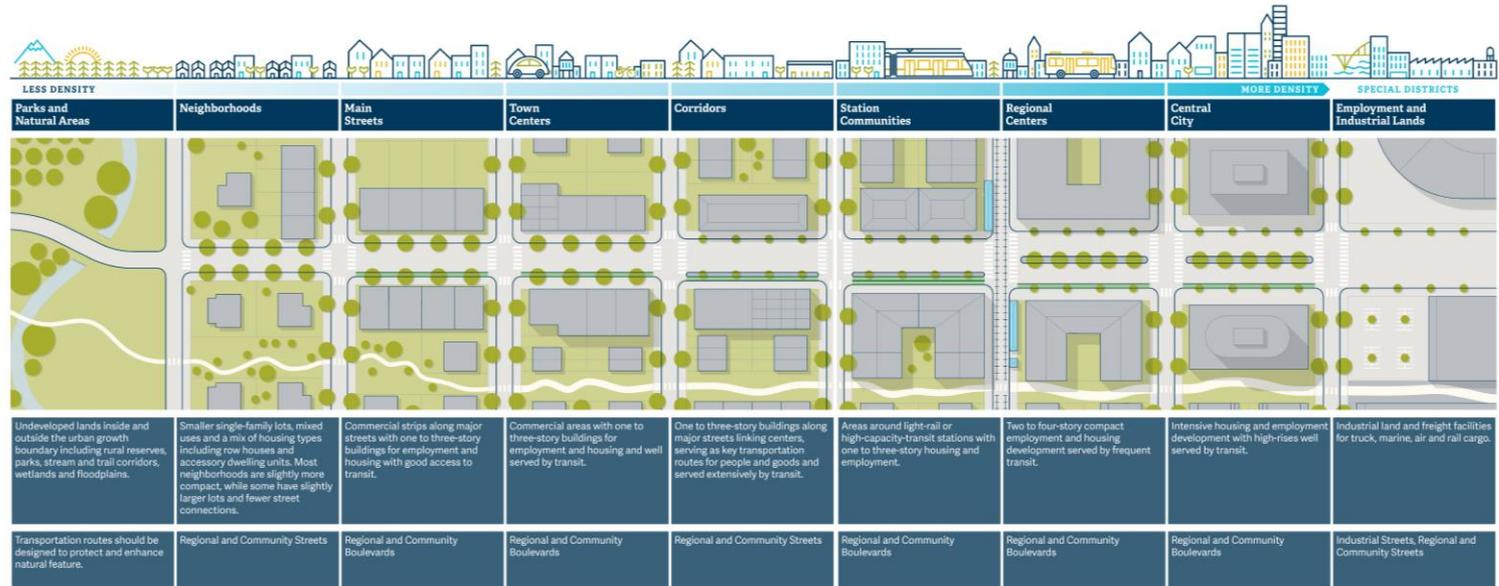
# What is in the design guidelines?

- [1] Purpose and how to use the guidelines
- [2] Policy framework and desired outcomes
- [3] Design functions and classifications
- [4] Design elements, recommendations, considerations
- [5] Visualizations, street illustrations
- [6] Performance-based decision making framework



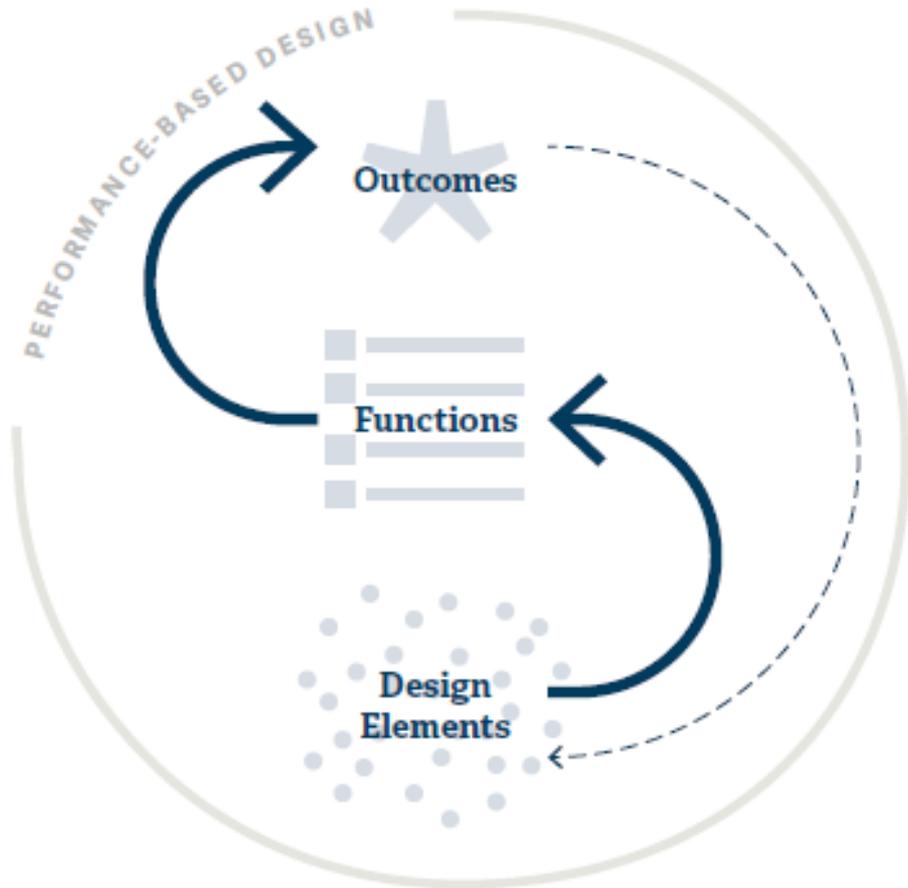
# Connecting to the land use

## Metro Land-Use and Transportation Transect



# Desired outcomes guide decisions



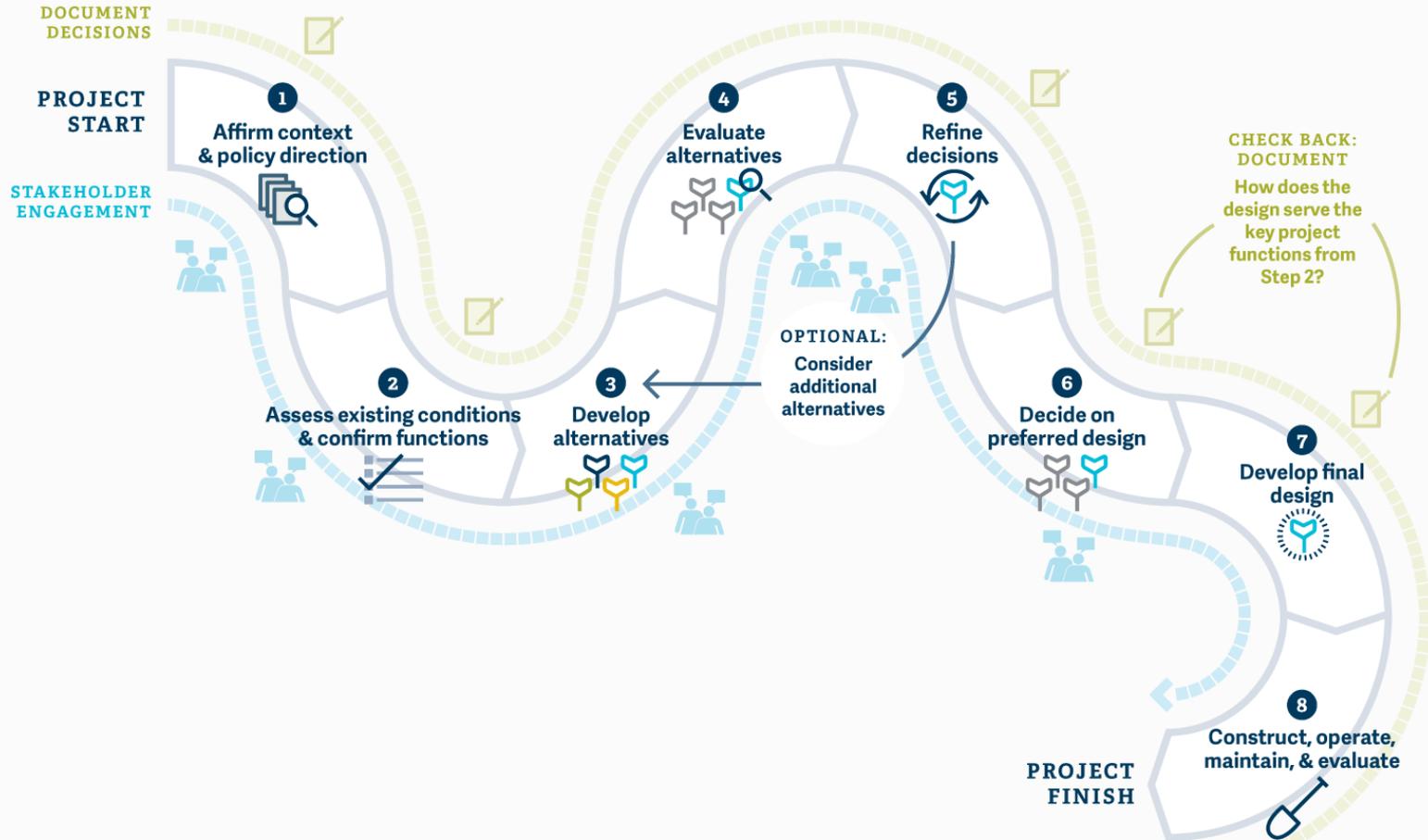


With performance-based design, design elements support street functions to achieve desired outcomes



**A performance-based design decision-making framework contributes to systemwide networks and regional outcomes.**

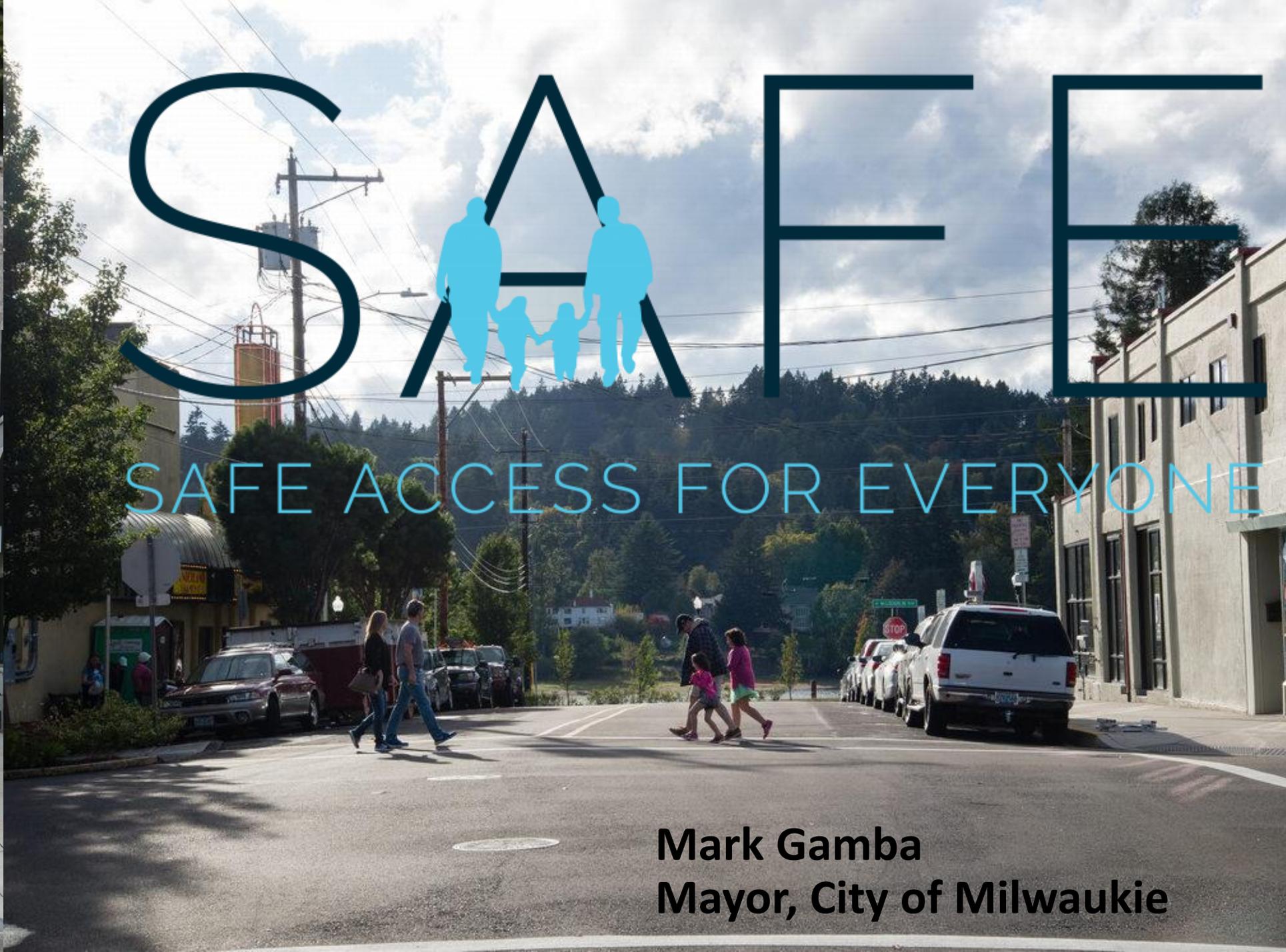
**It starts with a well-defined project need and clear objectives.**



# Group Discussion







# SAFE

SAFE ACCESS FOR EVERYONE

**Mark Gamba**  
**Mayor, City of Milwaukie**

# Policymakers Forum: Transportation Design for Community Outcomes



**Dr. Linda  
Simmons**

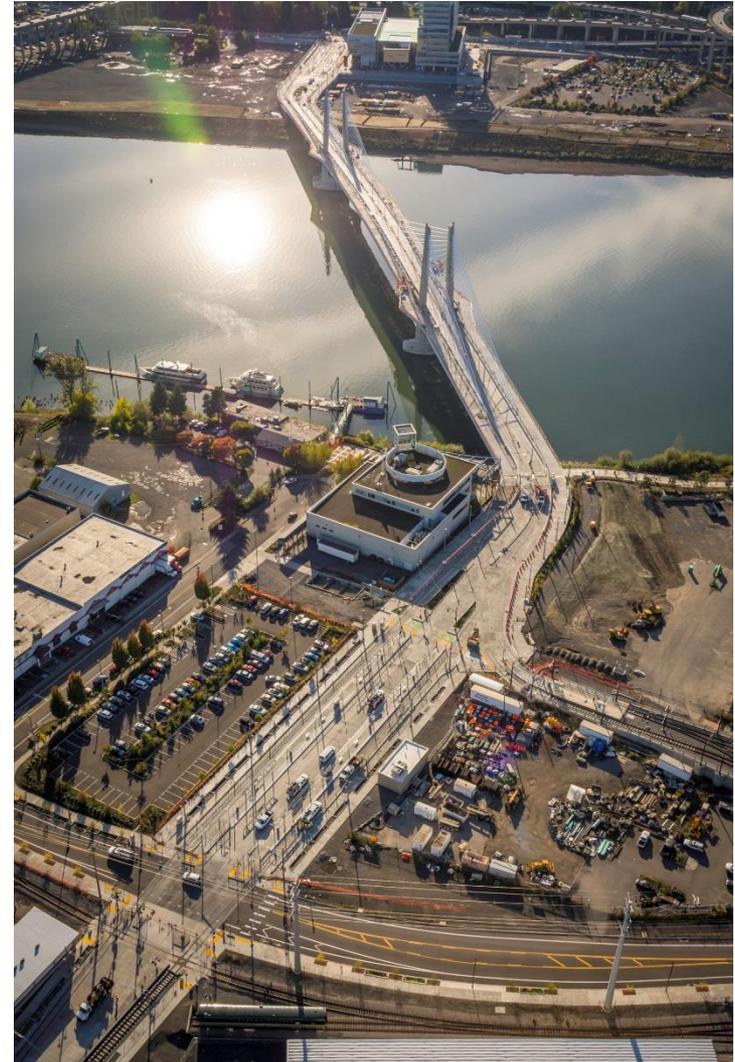
**TriMet Board  
Member**

**April 22, 2019**

# Light rail projects are more than mobility...



... they transform  
communities, foster  
partnerships, and  
make this region a  
better place to live



## MAX Orange Line

- Opened in 2015
- Partnerships and innovations focused on sustainability

# Community engagement in design



# Capacity building in construction

- 134 firms owned by women and people of color worked on the project
- Small businesses contributed the project's success



# Sustainable design features



- Eco-roofs divert stormwater
- Eco-track on SW Lincoln Street
- 286 bioswales capture and filter 1.8 million square feet of stormwater



# Reuse of materials

- Along the Trolley Trail, art is created from removed trees



# Enhancements to natural environment

- Major habitat restoration of Crystal Springs Creek, including new salmon-friendly culvert
- \$4 million in environmental mitigation funds



# Keeping freight moving



- \$40 million in roadway improvements
- Harold Street overcrossing separates light rail from trucks at Union Pacific's Brooklyn Yard freight hub

# A new bridge exclusively for people biking, walking, riding transit

- Tilikum Crossing connects neighborhoods, and links educational and research facilities
- Partnerships fostered environmental mitigation and redevelopment on both sides of the river



# More than \$65 million in bicycle and pedestrian improvements

- More than 10 miles of new/replaced sidewalks
- More than seven miles of new/replaced bicycle facilities
- Two 14-foot bike/ped paths on Tilikum Crossing
- 446 bike parking spaces plus two Bike & Rides with 146 secured spaces



# Thank you!

Thank you for a  
great discussion  
– Lunch is  
available in the  
foyer



[oregonmetro.gov](http://oregonmetro.gov)

