

# Madison Beltline Flex Lane



**HNTB**



Existing Beltline



# Madison Beltline Flex Lane

## Presenters:



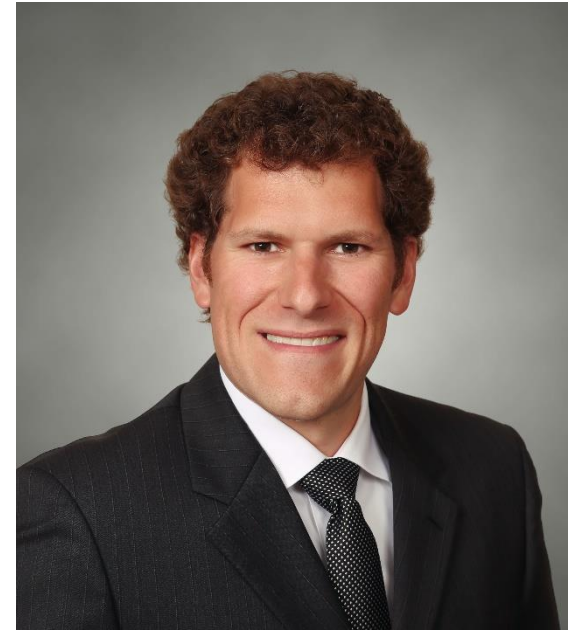
Brenda Schoenfeld, P.E.



Luke Holman, P.E.



Jerry Shadewald, P.E.



Nick Bennett, P.E.



# Presentation Agenda

1. Beltline Background
2. Flex Lane Project Introduction
3. Project Feasibility
4. Project Concept and Operations



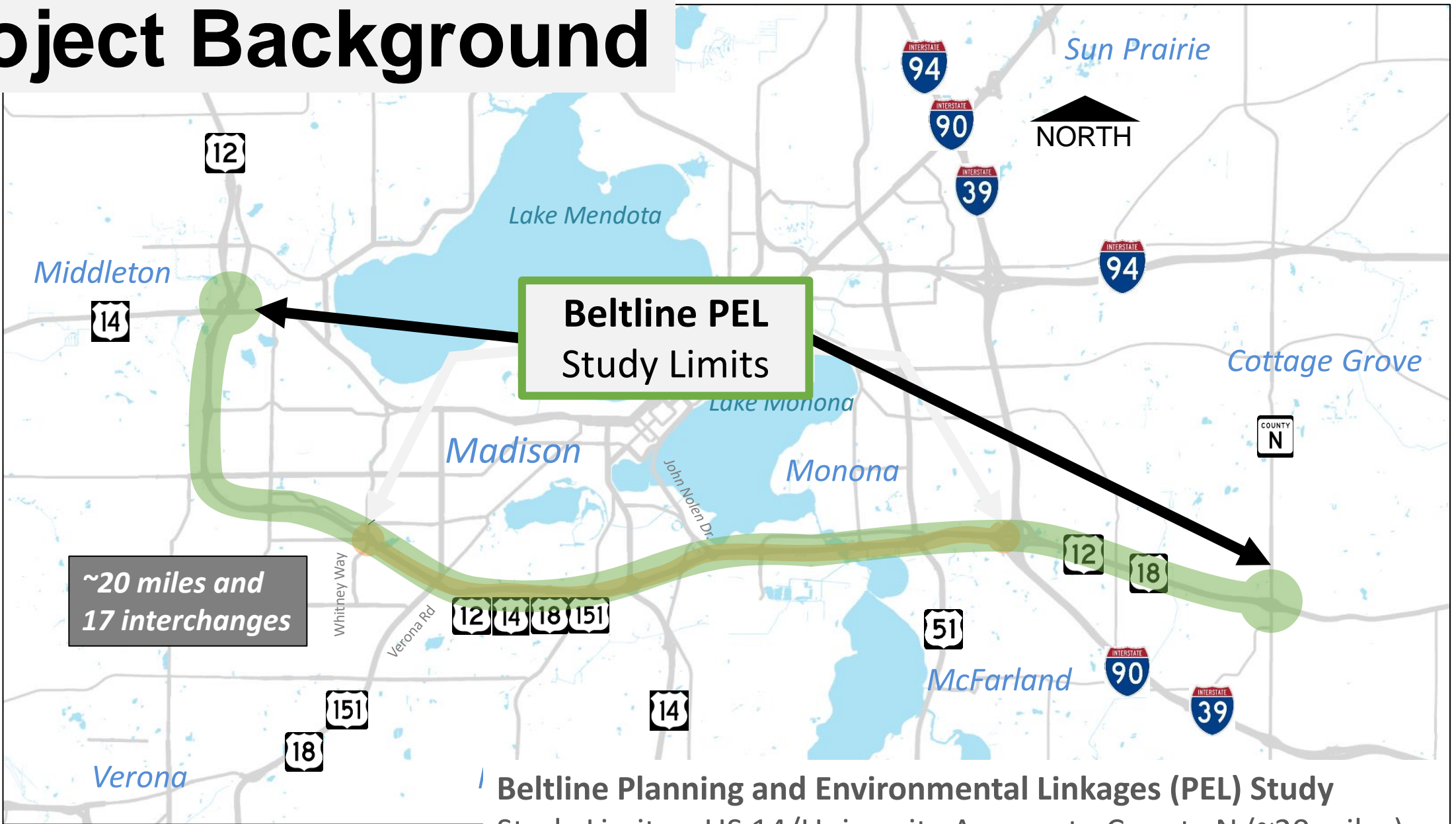


# Beltline is vital for Dane County



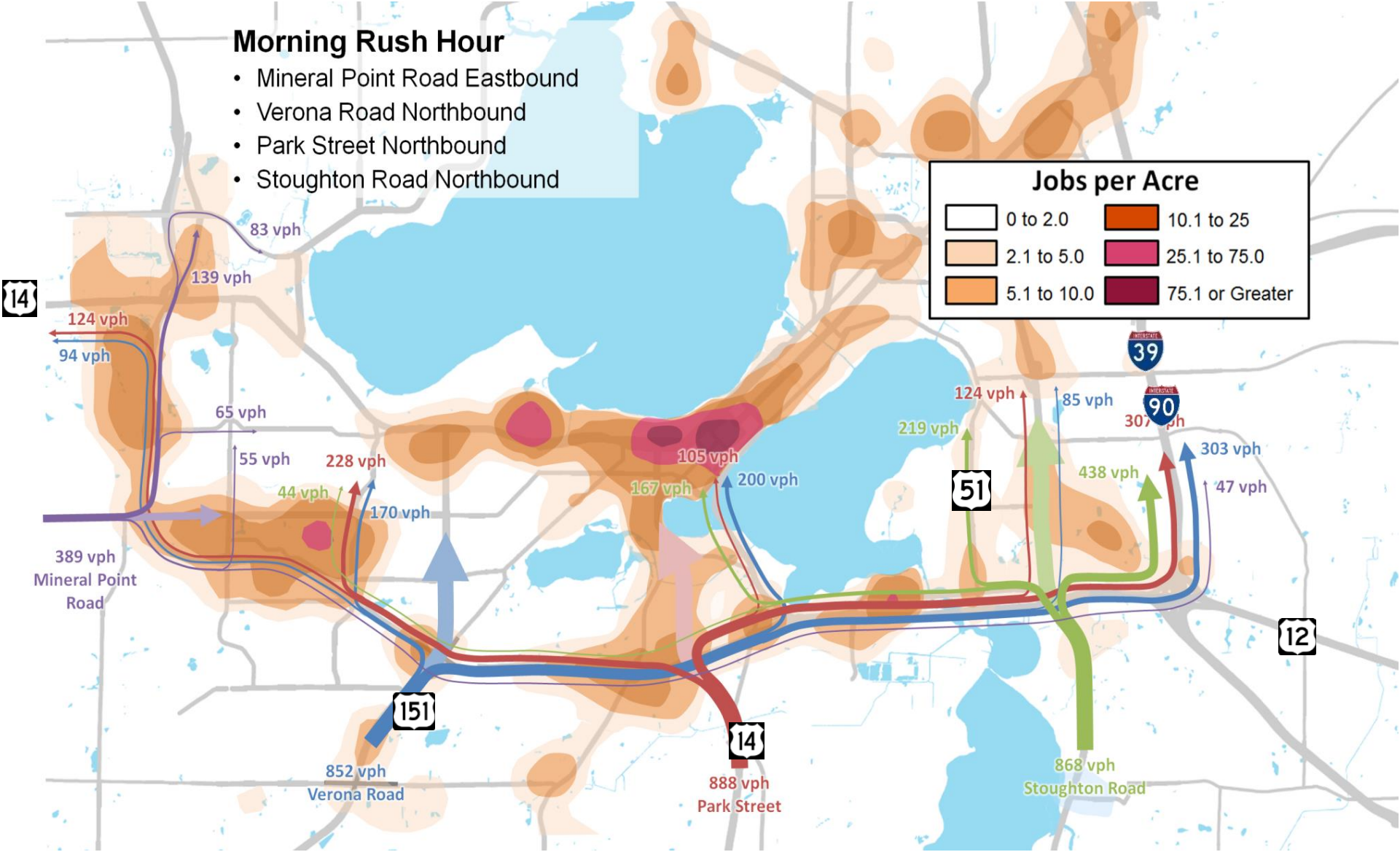
1. Beltline provides access to homes, schools, jobs, businesses.
2. Beltline supports the local economy.
3. Beltline has been affected by area growth.

# Project Background



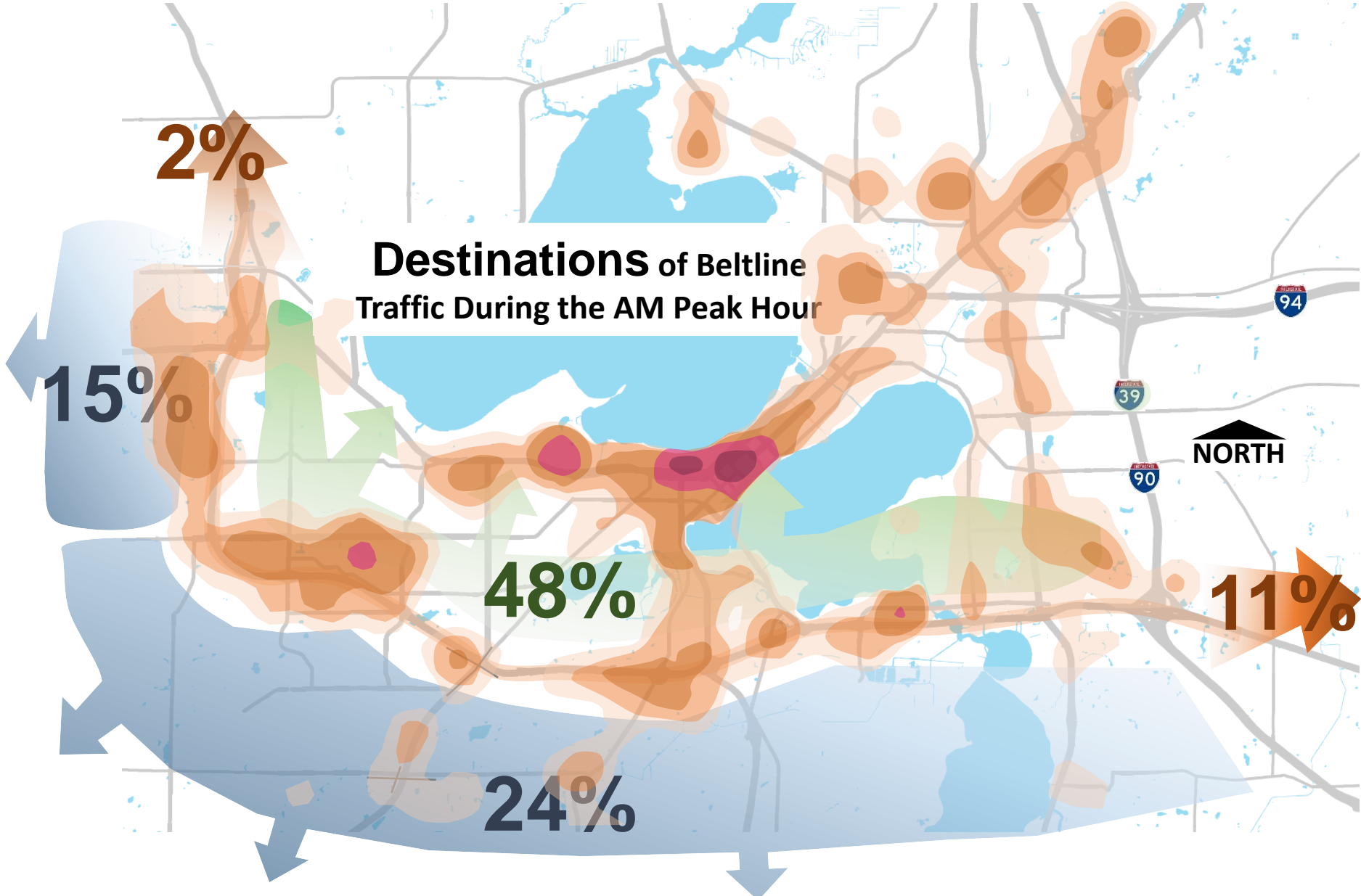
**Beltline Planning and Environmental Linkages (PEL) Study**  
Study Limits = US 14/University Avenue to County N (~20 miles)

# Beltline supports employment centers

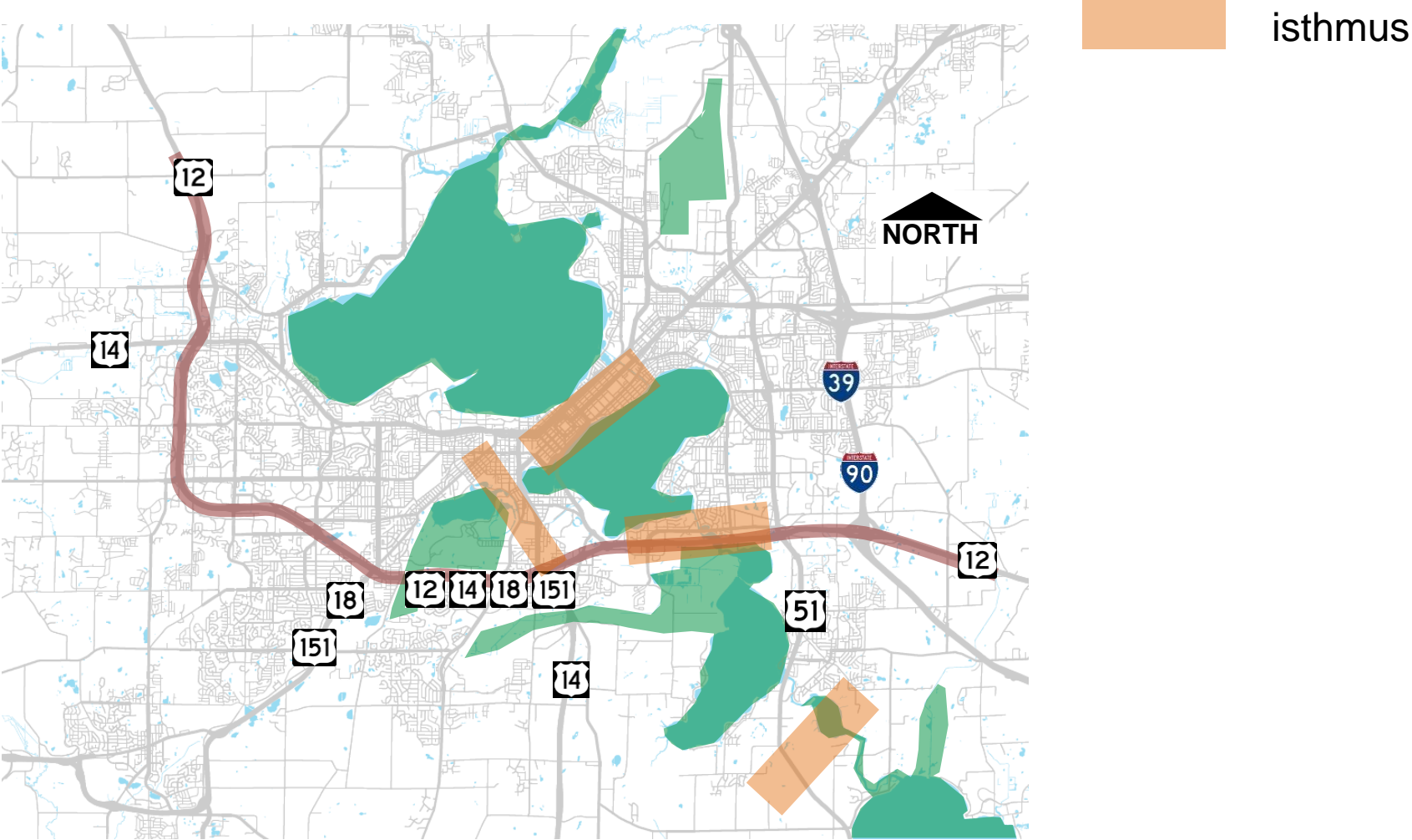




# Beltline supports employment centers



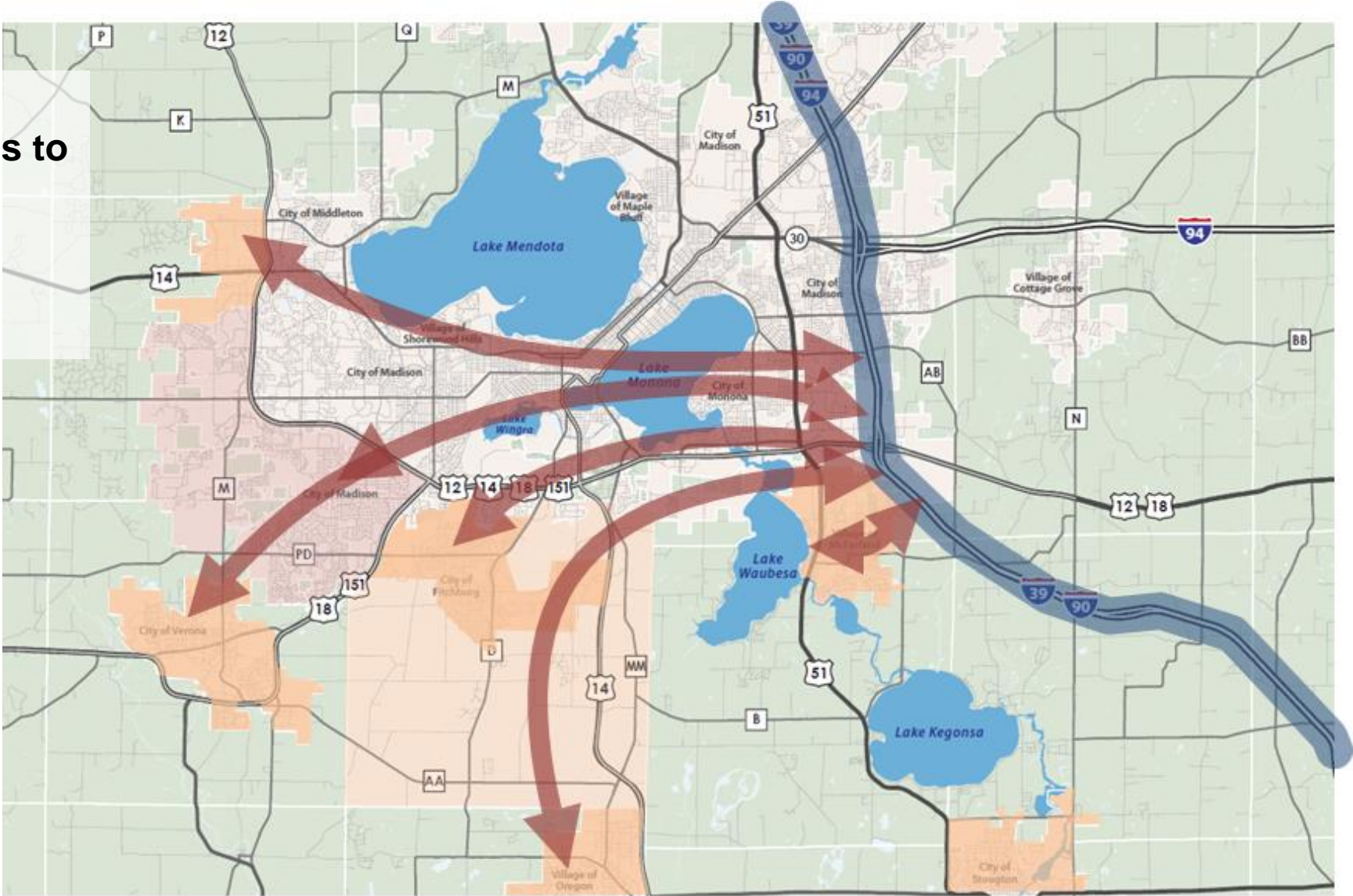
# People use the Beltline to get around resources and facilities



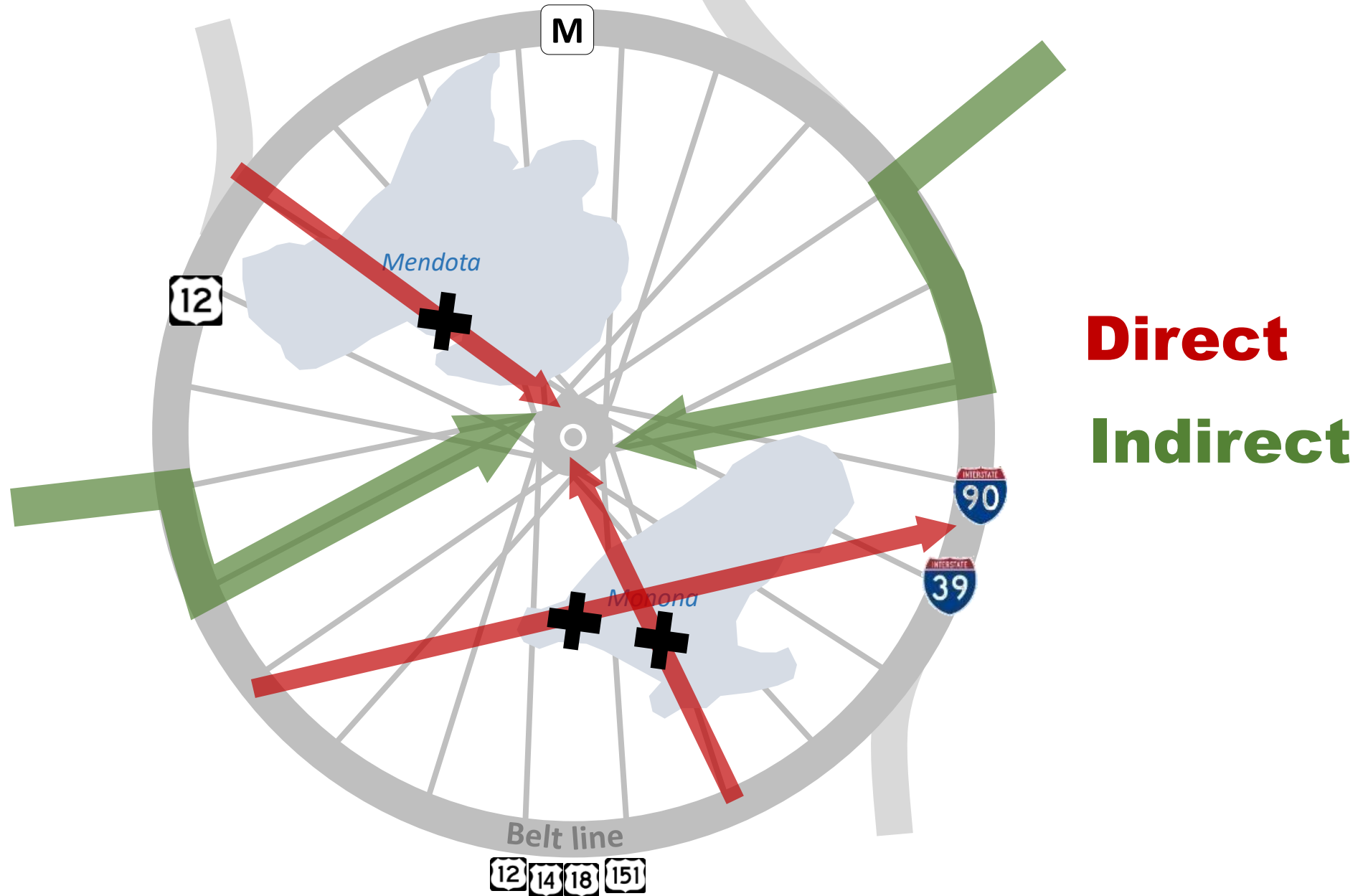


# I39/90/94 traffic destined for Beltline

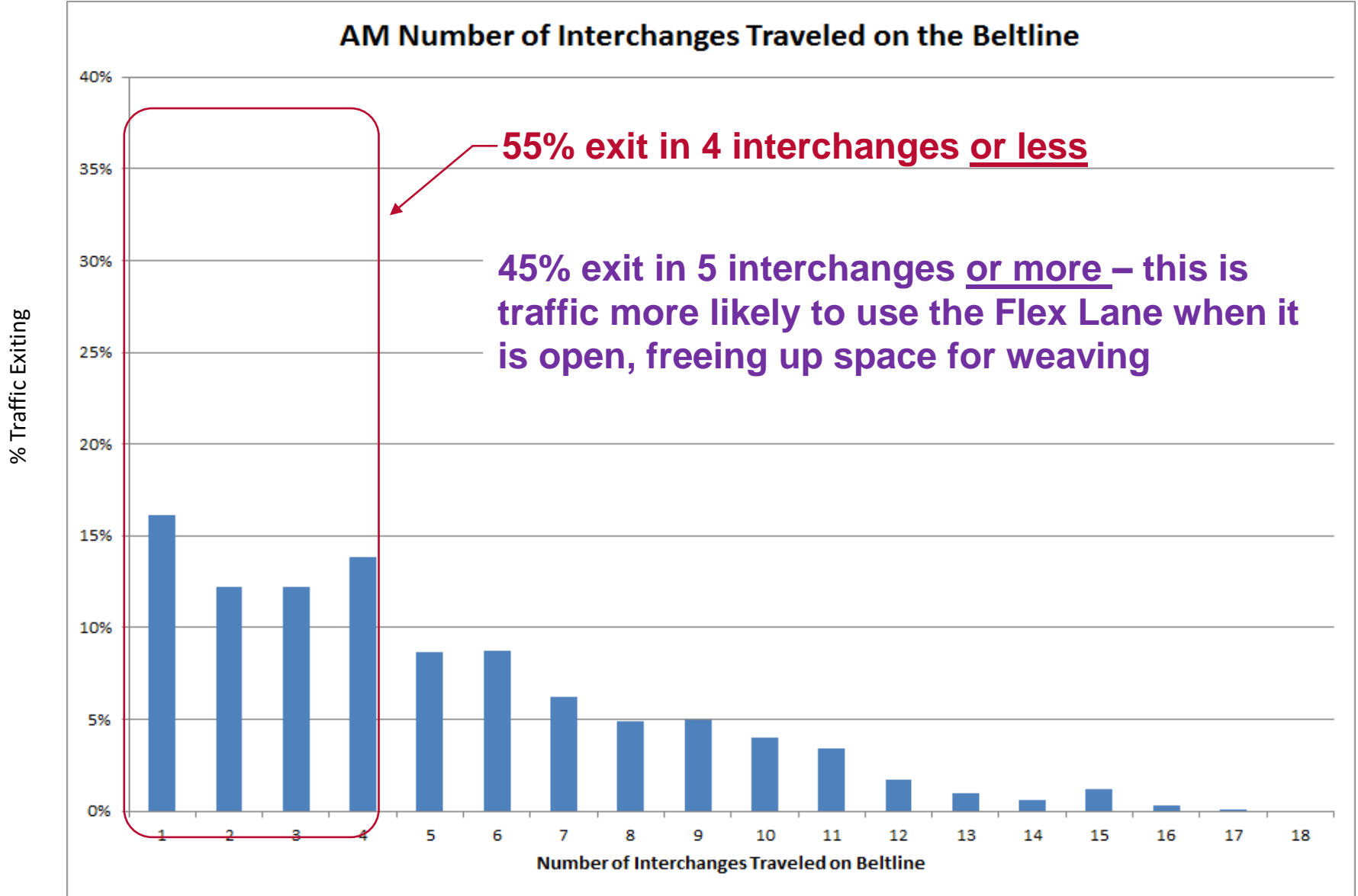
Beltline is the primary access to the Interstate System for surrounding communities



# Madison transportation is different



# Beltline Traffic is Mix of Shorter and Longer Trips



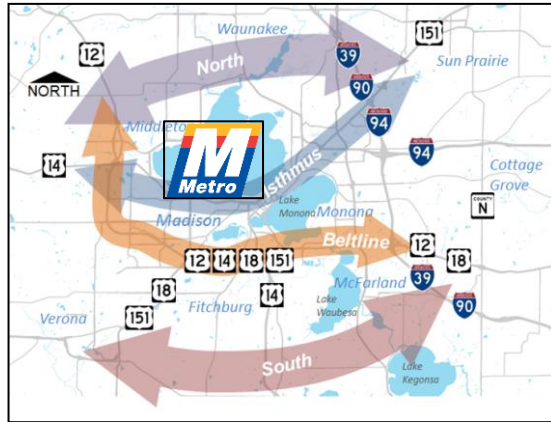


# Beltline Maintenance Projects 2012 - Present

*WisDOT Study / Engineering*

2012 - Present

*Beltline PEL  
Focus =  
Long-Term  
Solutions*

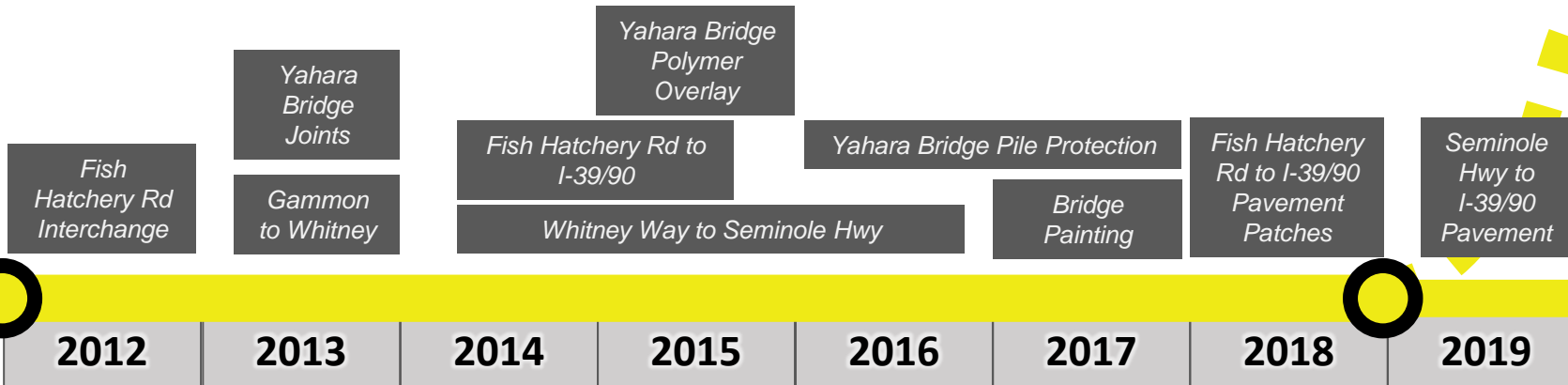


*2020+ Beltline PEL Study*

**2019 & 2021**

**Overlay Projects**

2020: South Towne Bridge  
2021: **Whitney Way to I-39/90 Flex Lane**



**Ongoing Pavement & Bridge Preventative Maintenance Projects**

# Project Background

What is Hard Shoulder Running (aka Part-Time Shoulder Use aka Flex Lane)?

- Use of shoulders for part-time travel during busiest hours
- Cost-effective interim solution to address recurring congestion
- Can be classified as:
  - A Transportation System Management and Operations (TSM&O) Strategy
  - A Performance-Based Practical Design (PBPD) approach, used by FHWA & WisDOT

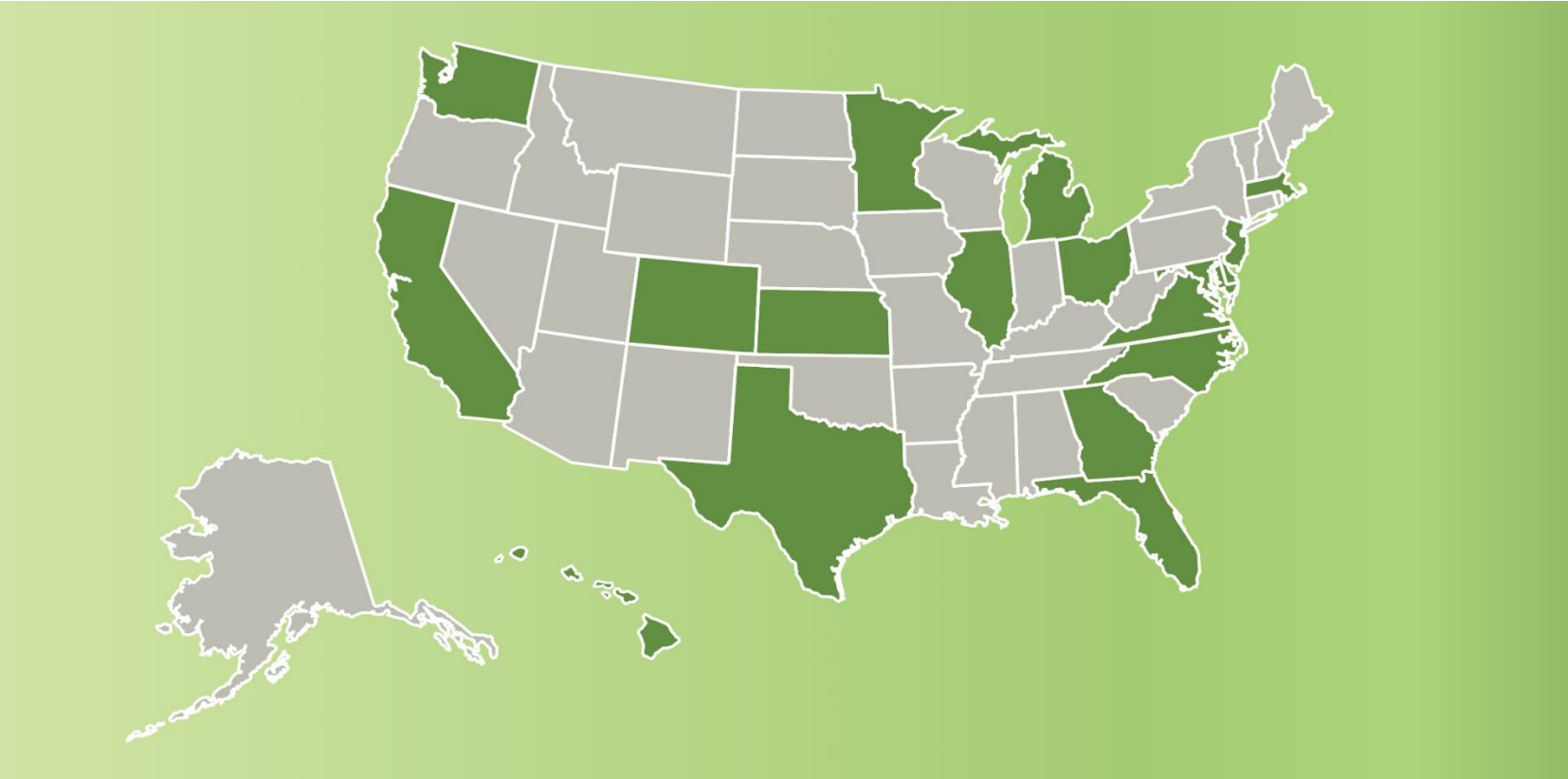


*Reference:*

<https://ops.fhwa.dot.gov/publications/fhwahop15023/ch1.htm>

# Part-time Shoulder Use in the United States

States with Part Time-Shoulder Use in 2019





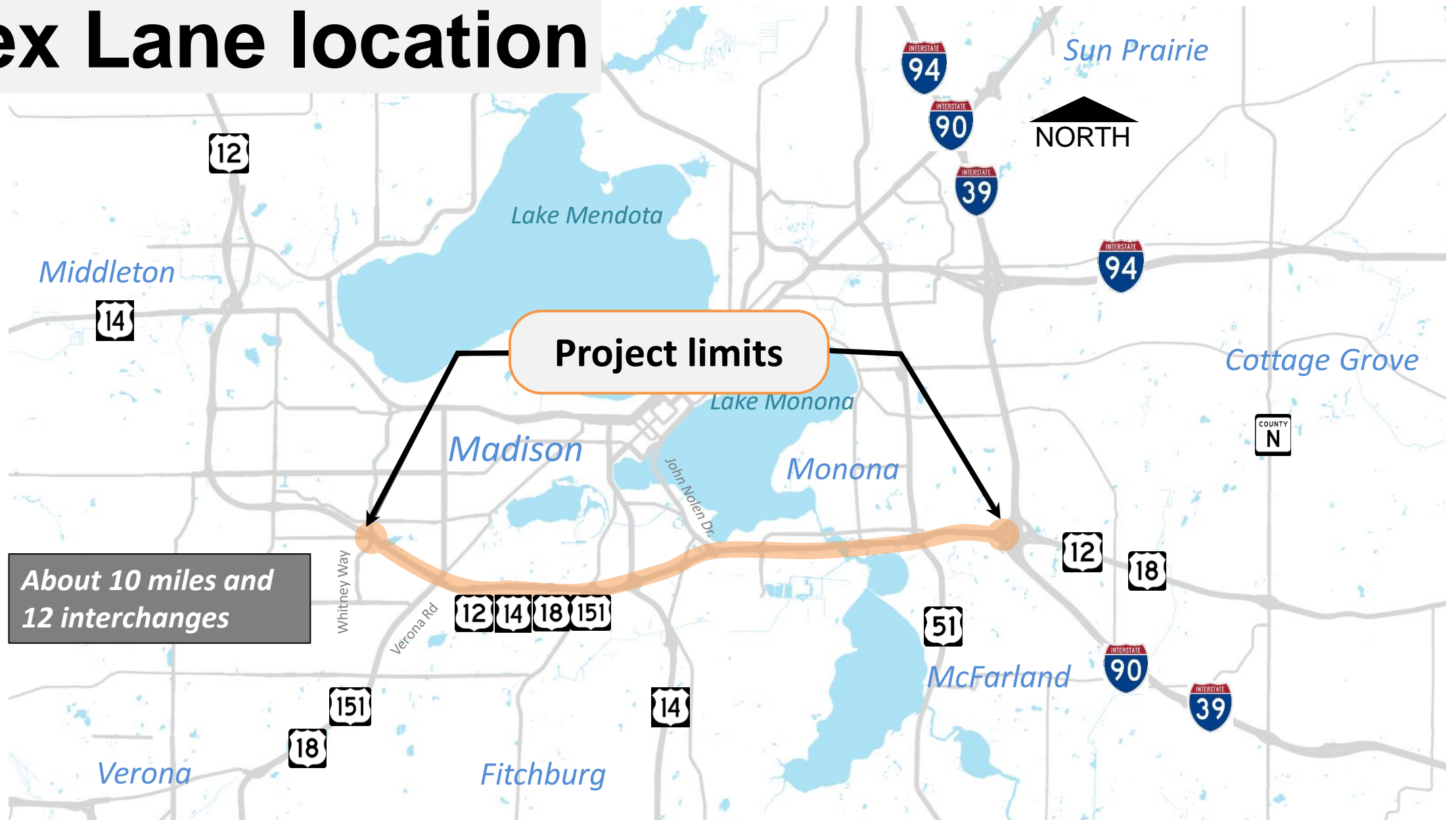
# Dynamic Part-Time Shoulder Use Nationally

Part-time shoulder use is being used effectively around the country, including the Midwest, to address recurring congestion.



Image: I-35W in Minnesota

# Flex Lane location



# Project Purpose and Need

## Project Purpose:

- Address deteriorating infrastructure needs in the pavement structure and median areas
- Address operational issues during weekday peak periods and unexpected congestion



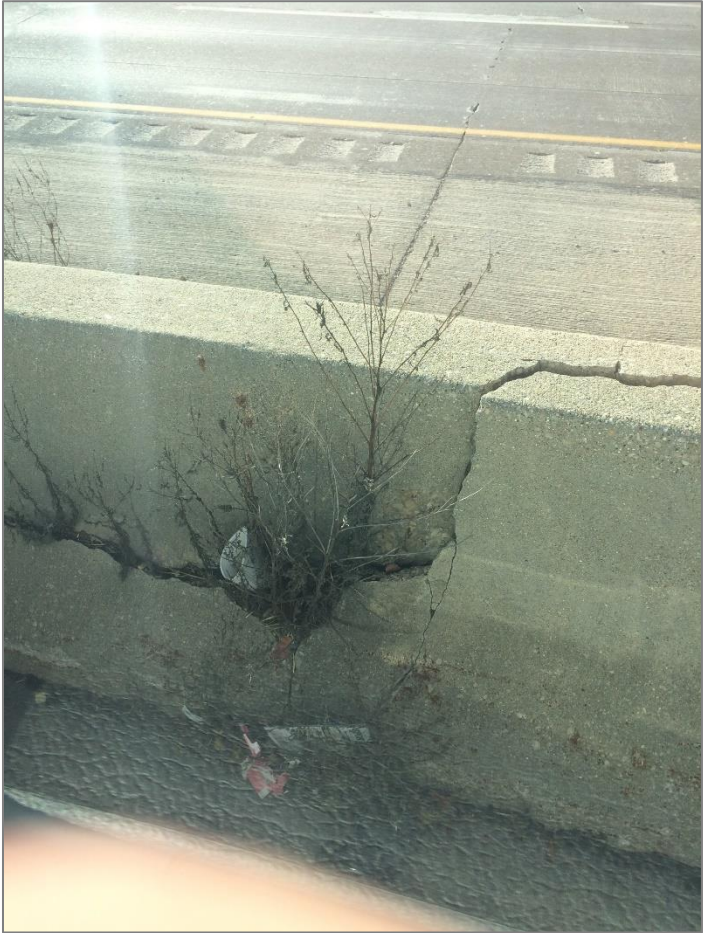
# Short-Term Project Needs

## Project Needs:

- Existing Pavement Condition
- Median Barrier Condition
- Roadway Drainage System
- Operational Issues
  - Crashes
  - Travel Time and Level of Service
  - Travel Time Reliability

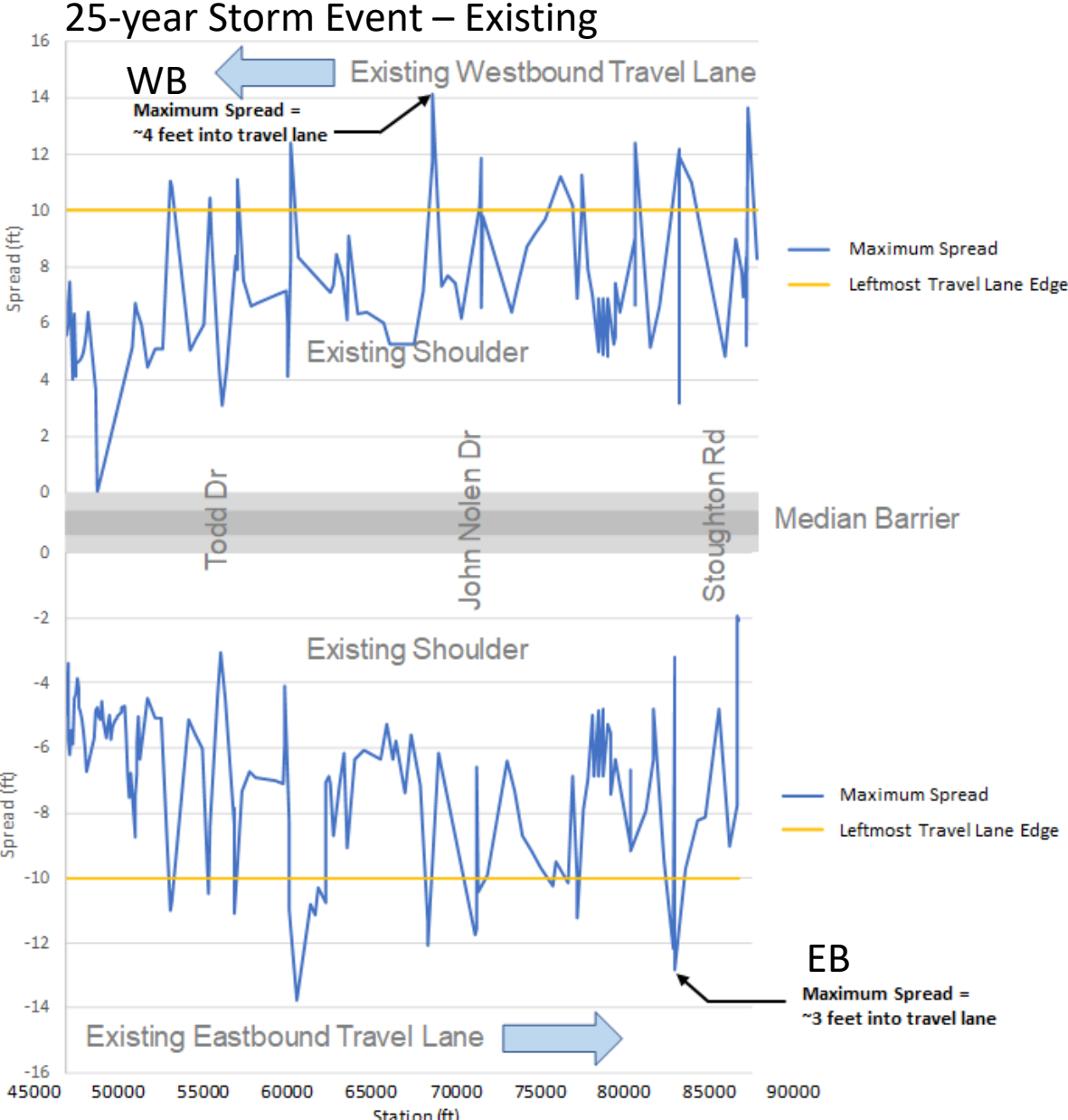


# Project improvements: pavement, median barrier, drainage, and operations





# Project Needs: Roadway Drainage

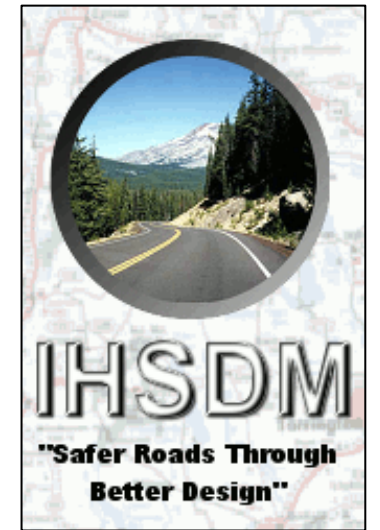


Near Todd Drive



# Project Feasibility: Safety

- Experience in the U.S. to date has not identified major safety issues with part-time bus, static, or dynamic shoulder use that led to discontinuation.
- The best available predictive crash analysis tool (IHSDM) was used for this project's safety analysis.
- The relative analysis showed that with the activation of the Flex Lane, the number of predicted crashes is not anticipated to increase compared to a No-Build condition.



**IHSDM = Interactive  
Highway Safety  
Design Model**

# Project Feasibility: Safety

- Experience in the U.S. to date has not identified major safety issues with part-time bus, static, or dynamic shoulder use

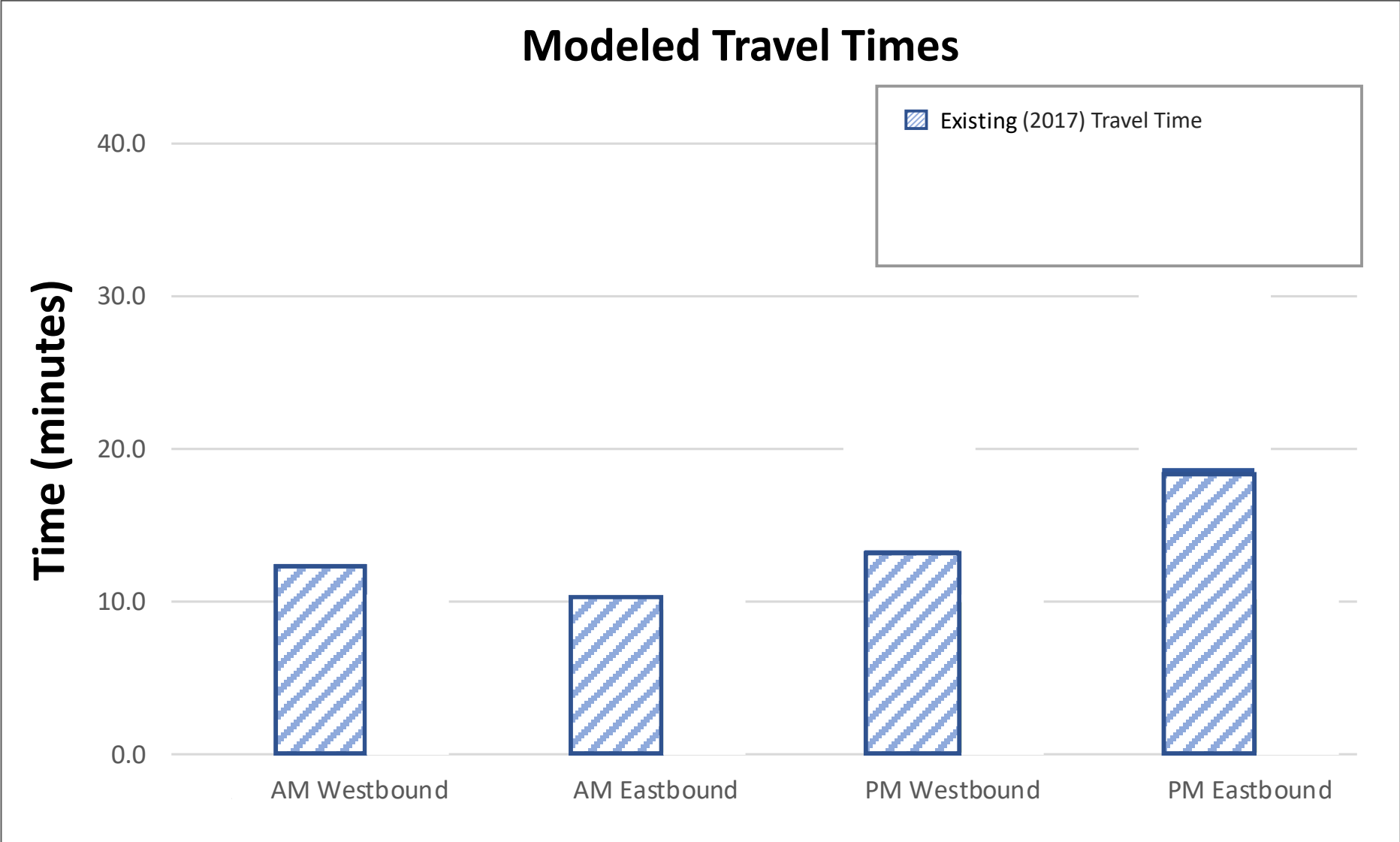


- Showed Traffic Operations / Safety Benefits
- Quantitative Predictive Safety Analyses not Performed

***\* Performance Assessment (Operations, Safety, Compliance, etc.) for US 23 system in progress.***

# Project Feasibility: Traffic Operations

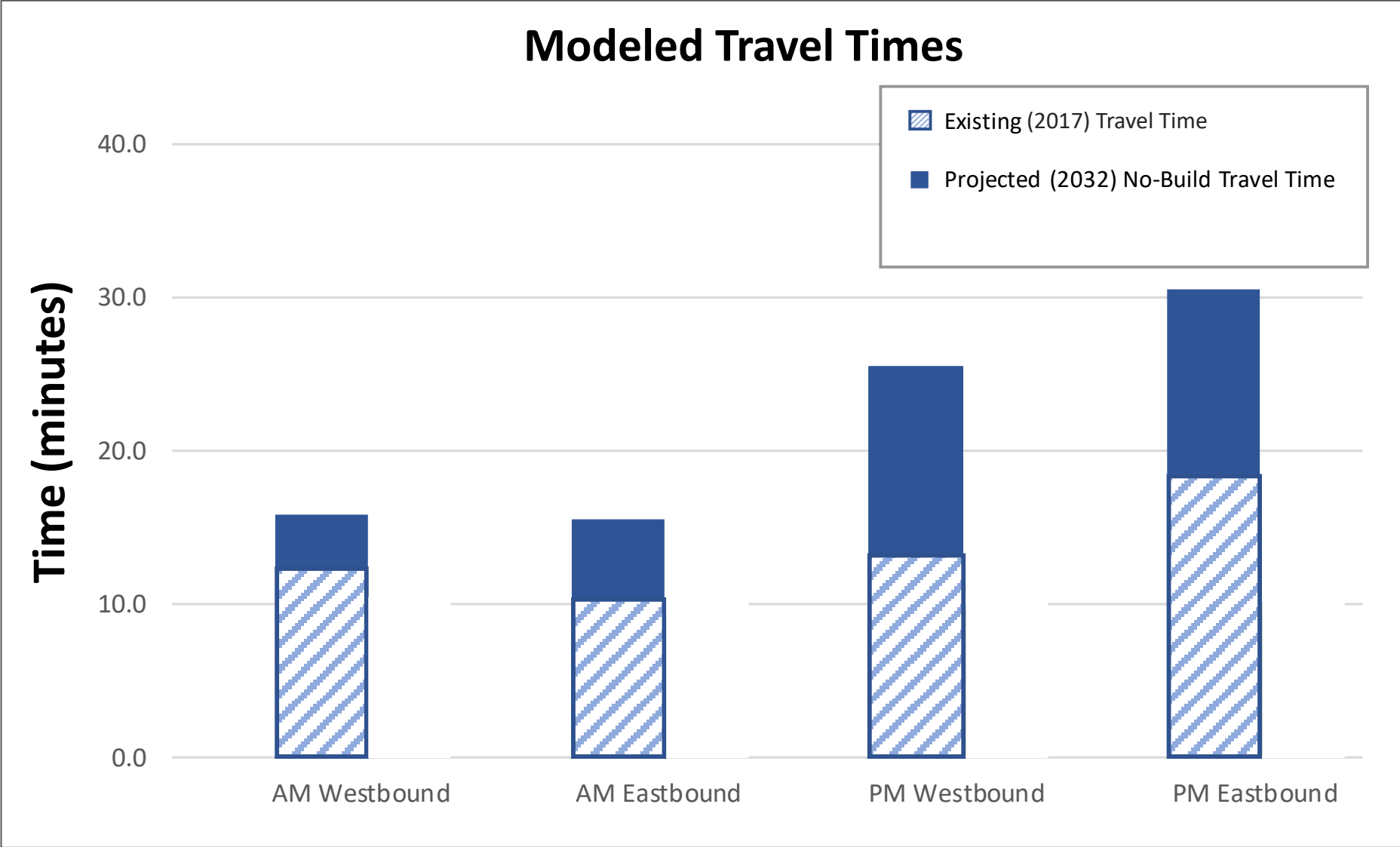
Travel Time During Peak Periods: Whitney Way to I-39/90



Note: Field-measured travel times may be longer for a variety of reasons (incidents, disabled vehicles, weather, etc.).

# Project Feasibility: Traffic Operations

## Travel Time During Peak Periods: Whitney Way to I-39/90

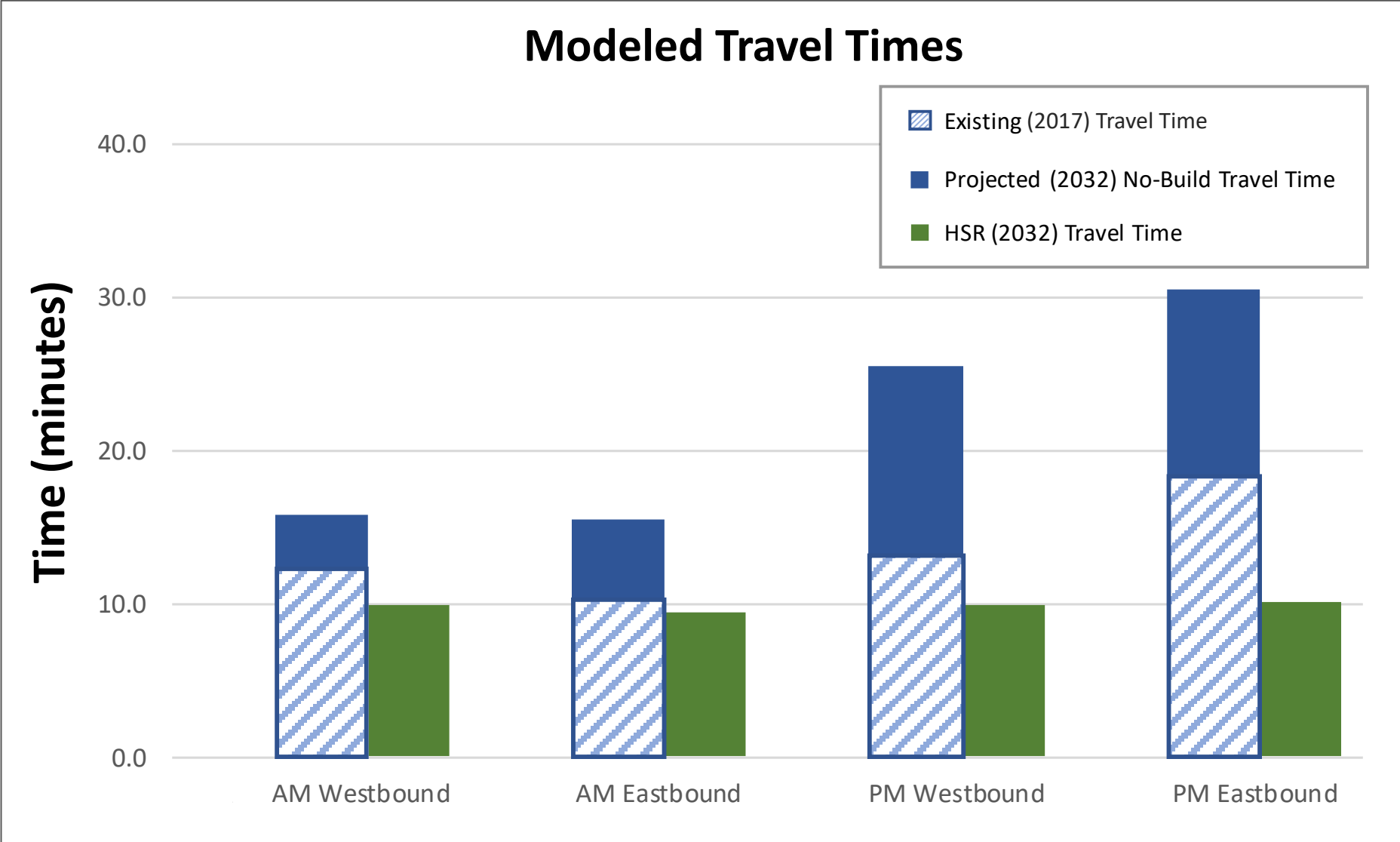


Note: Field-measured travel times may be longer for a variety of reasons (incidents, disabled vehicles, weather, etc.).



# Project Feasibility: Traffic Operations

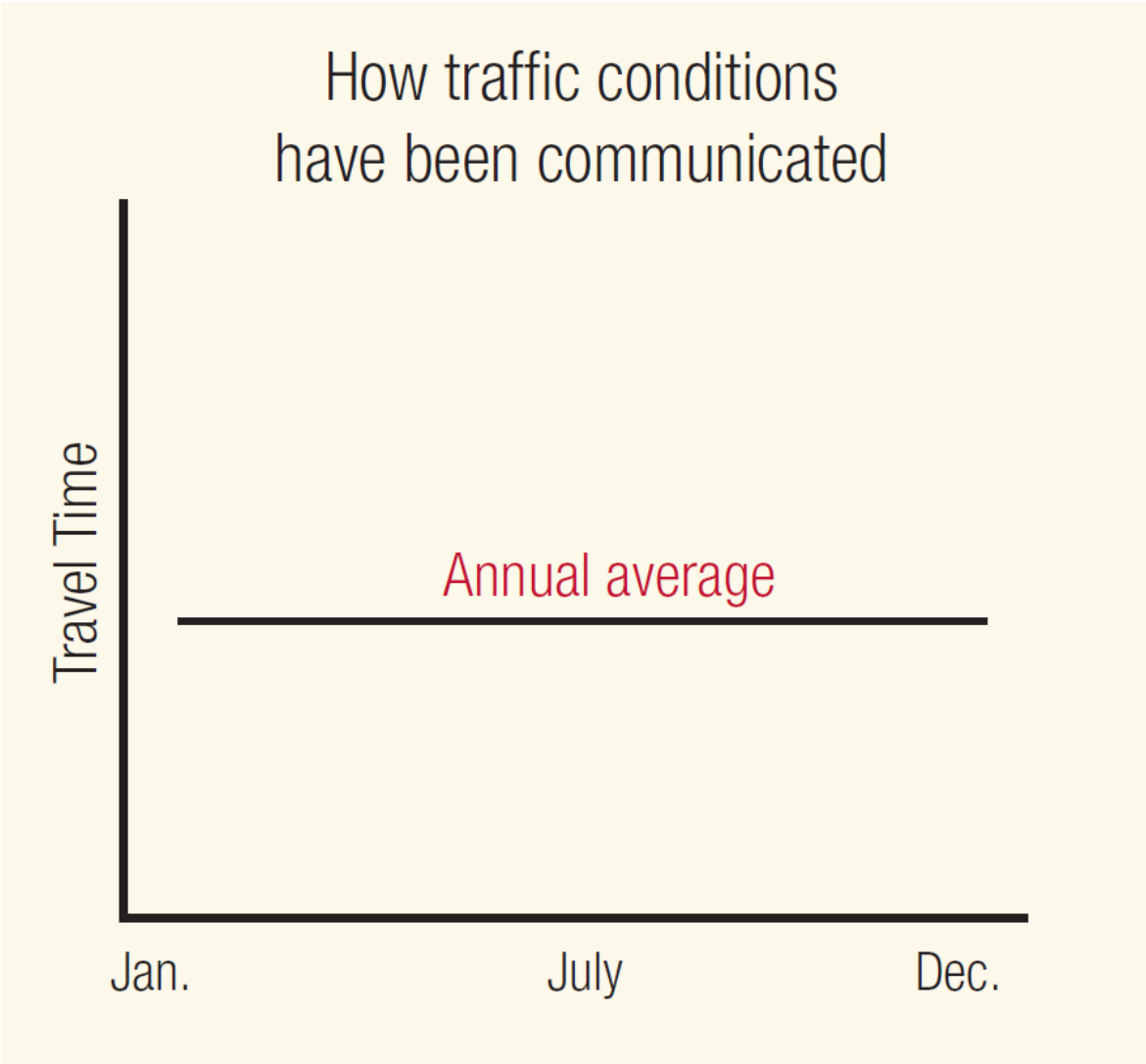
## Travel Time During Peak Periods: Whitney Way to I-39/90



*Existing peak period travel times improved up to 30% with Flex Lane*

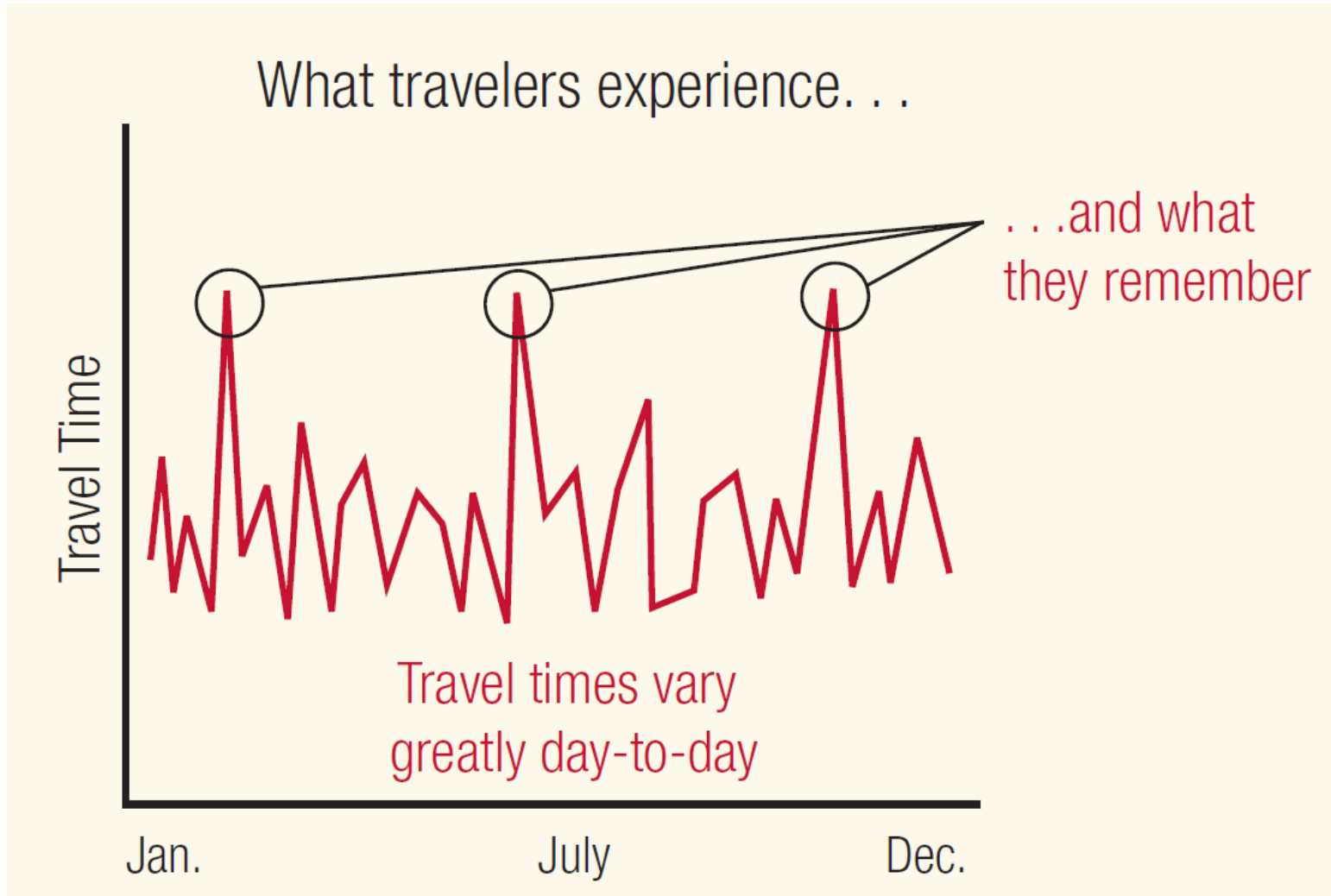
Note: Field-measured travel times may be longer for a variety of reasons (incidents, disabled vehicles, weather, etc.).

# Travel Time Reliability



Graphic Source: [https://ops.fhwa.dot.gov/publications/tt\\_reliability/brochure/ttr\\_brochure.pdf](https://ops.fhwa.dot.gov/publications/tt_reliability/brochure/ttr_brochure.pdf)

# Travel Time Reliability



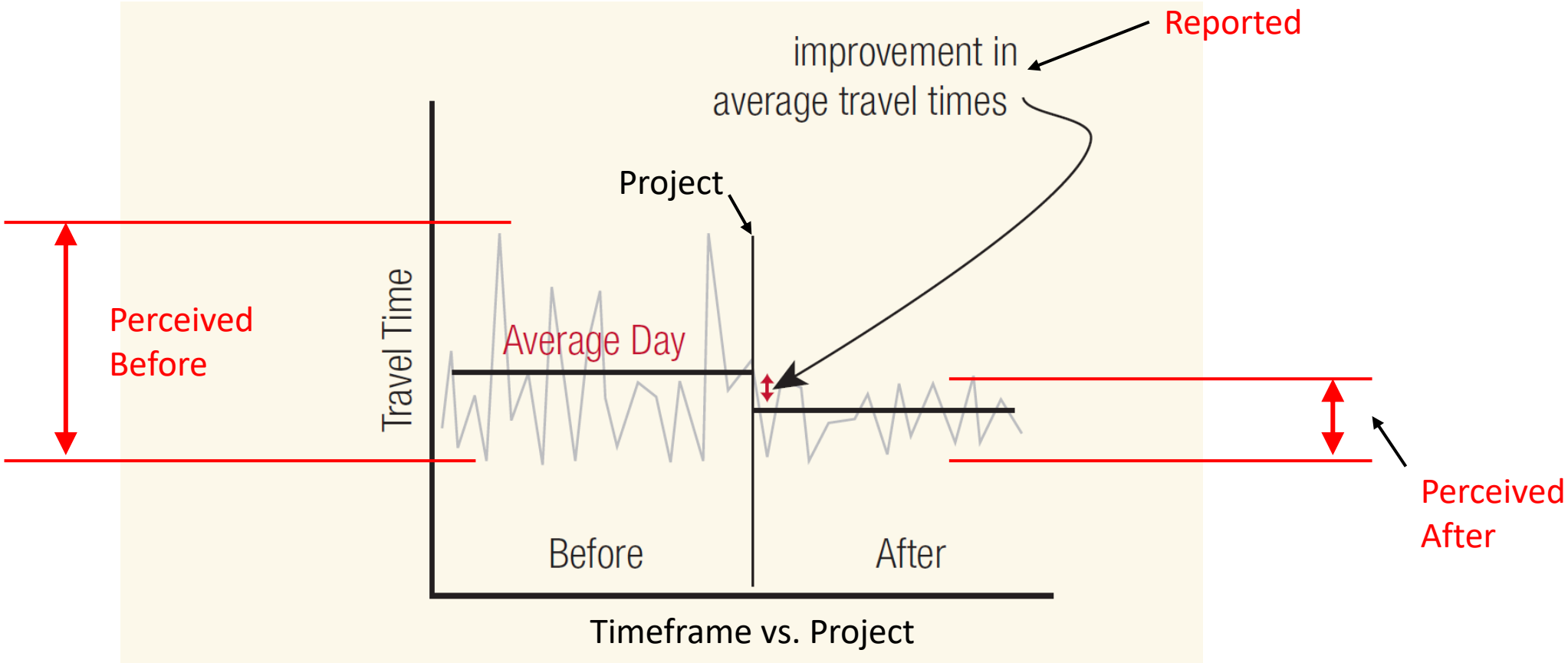
**Travel time reliability measures the extent of this unexpected delay**

Example: Getting to Work

Graphic Source: [https://ops.fhwa.dot.gov/publications/tt\\_reliability/brochure/ttr\\_brochure.pdf](https://ops.fhwa.dot.gov/publications/tt_reliability/brochure/ttr_brochure.pdf)

# Project Feasibility: Travel Time Reliability

*Reliability measures capture the benefits of traffic management*

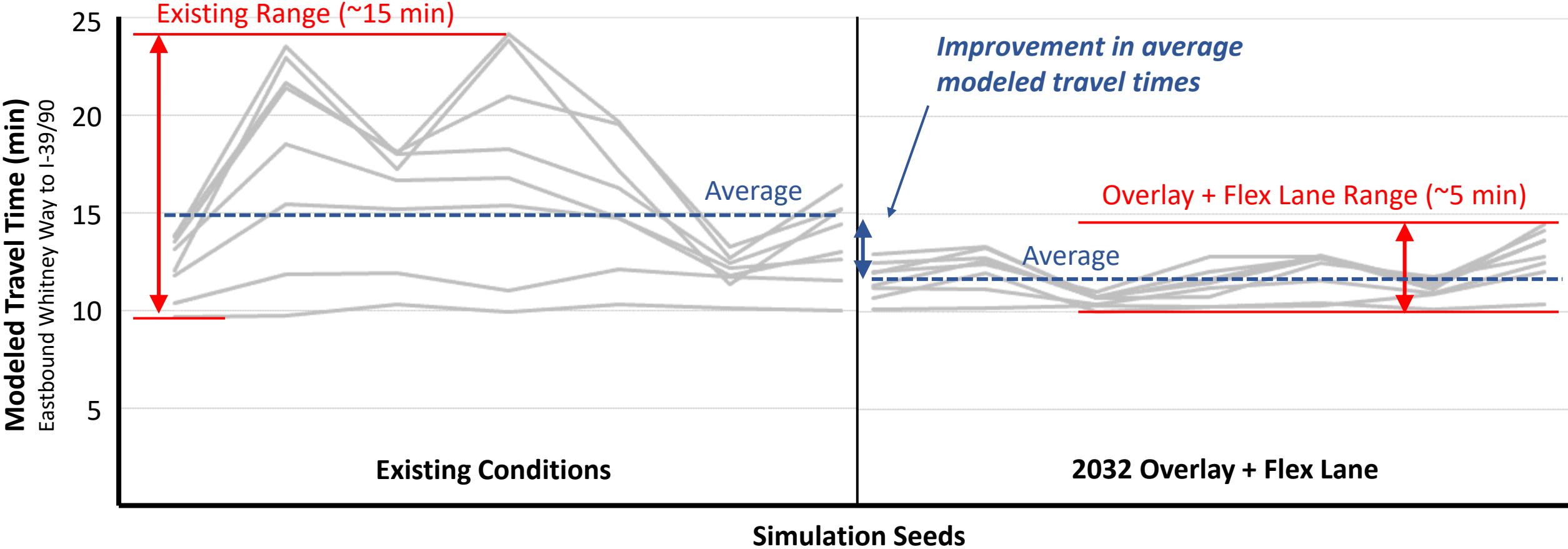


*Note: This diagram shows a general display of the travel time reliability concept and is not intended to reflect traffic data for the Beltline corridor.*



# Project Feasibility: Travel Time Dependability

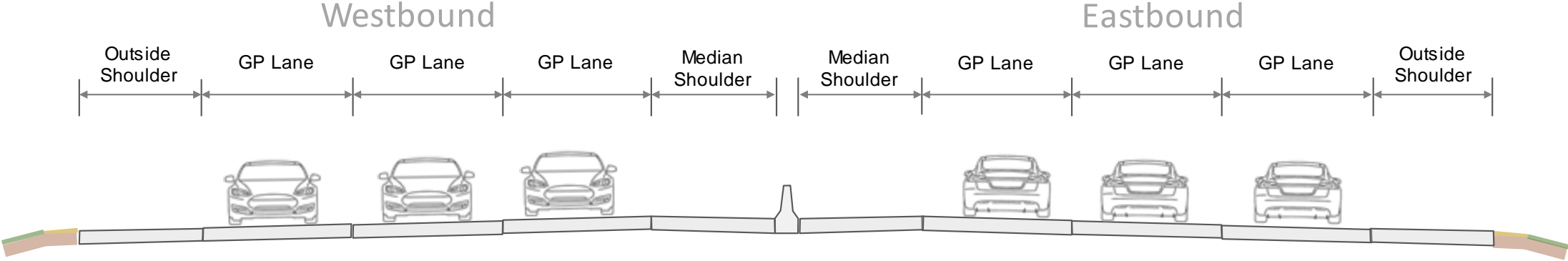
*“Dependability” represents the range of modeled travel times for different conditions*



# Project Concept

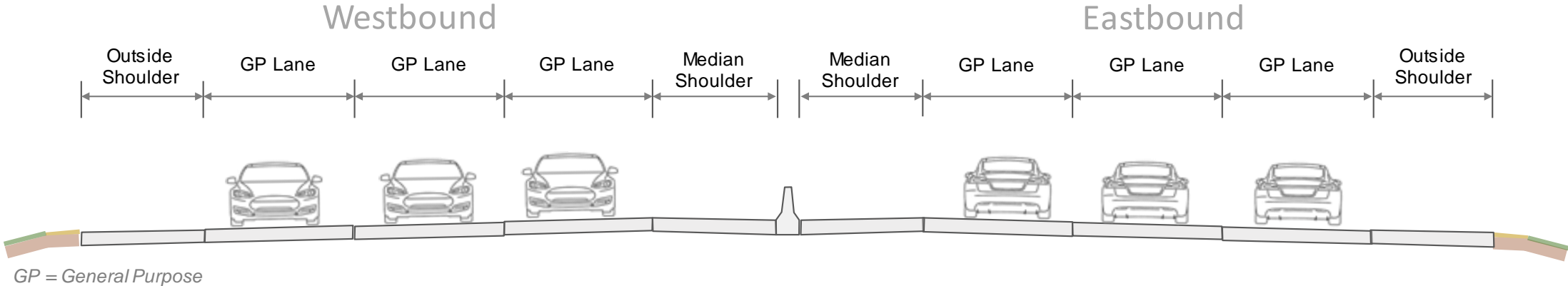
# Cross Section

## Typical Existing (No-Build) Beltline Cross Section



# Cross Section

## Typical Existing (No-Build) Beltline Cross Section



## Typical Resurfacing with Flex Lane Beltline Cross Section (2021)

