Madison Beltline Flex Lane

Existing Beltline

Flex Lane

General Purpose
Lanes Open 24 Hours
Madison Beltline Flex Lane

Presenters:

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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

Study Limits = US 14/University Avenue to County N (~20 miles)
Beltline supports employment centers

Morning Rush Hour
- Mineral Point Road Eastbound
- Verona Road Northbound
- Park Street Northbound
- Stoughton Road Northbound

Jobs per Acre
- 0 to 2.0
- 2.1 to 5.0
- 5.1 to 10.0
- 7.5 to 25.0
- 25.1 to 75.0
- 75.1 or Greater
Beltline supports employment centers

Destinations of Beltline Traffic During the AM Peak Hour

- 48%
- 24%
- 2%
- 15%
- 11%
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

- 55% exit in 4 interchanges or less
- 45% exit in 5 interchanges or more – this is traffic more likely to use the Flex Lane when it is open, freeing up space for weaving
**Beltline Maintenance Projects 2012 - Present**

**WisDOT Study / Engineering**

**Beltline PEL**
Focus = Long-Term Solutions

**2012 - Present**

- **Overlay Projects**
  - **2019 & 2021**
    - Yahara Bridge Joints
    - Fish Hatchery Rd to I-39/90
    - Whitney Way to Seminole Hwy
    - Yahara Bridge Pile Protection
    - Fish Hatchery Rd to I-39/90 Pavement Patches
    - Seminole Hwy to I-39/90 Pavement

- **2020+ Beltline PEL Study**
  - Beltline Maintenance Projects 2012 - Present
  - Ongoing Pavement & Bridge Preventative Maintenance Projects

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

**Timeline**

- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
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.
Flex Lane location

About 10 miles and 12 interchanges

Project limits

Lake Mendota
Lake Monona
Waunakee
Madison
Monona
Fitchburg
Verona
Middleton
Sun Prairie
Cottage Grove
McFarland
NORTH
Whitney Way
Study Limits
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

25-year Storm Event – Existing

- Maximum Spread = ~4 feet into travel lane
- Maximum Spread = ~3 feet into travel lane

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.
- 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

Modeled Travel Times

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

Modeled Travel Times

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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.).

Existing peak period travel times improved up to 30% with Flex Lane.
Travel Time Reliability

How traffic conditions have been communicated

Travel Time


Annual average

Travel Time Reliability

Travel time reliability measures the extent of this unexpected delay Example: Getting to Work

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.

Existing Range (~15 min)

Modeled Travel Time (min)

Eastbound Whitney Way to I-39/90

Improvement in average modeled travel times

Overlay + Flex Lane Range (~5 min)

Simulation Seeds
Project Concept
Cross Section

Typical Existing (No-Build) Beltline Cross Section

Westbound

Outside Shoulder | GP Lane | GP Lane | GP Lane | Median Shoulder | Median Shoulder | GP Lane | GP Lane | GP Lane | Outside Shoulder

Eastbound

Overlay
Existing Pavement / Joints
Proposed Pavement Marking

GP = General Purpose
Cross Section

Typical Existing (No-Build) Beltline Cross Section

Westbound
Outside Shoulder | GP Lane | GP Lane | GP Lane | Median Shoulder |
|----------------|---------|---------|---------|----------------|

Eastbound
Outside Shoulder | GP Lane | GP Lane | GP Lane | Median Shoulder |
|----------------|---------|---------|---------|----------------|

Typical Resurfacing with Flex Lane Beltline Cross Section (2021)

Westbound
Outside Shoulder | GP Lane | GP Lane | GP Lane | Flex Lane |
|----------------|---------|---------|---------|----------|

Eastbound
Outside Shoulder | GP Lane | GP Lane | GP Lane | Flex Lane |
|----------------|---------|---------|---------|----------|

GP = General Purpose

Cross section fits within the existing width (each direction)