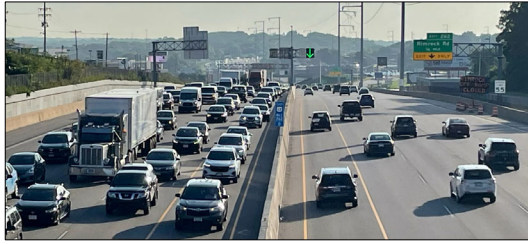


Madison Beltline Flex Lane

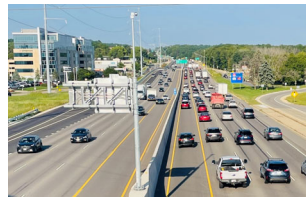


1



Outline

- Background / Location
- Purpose / Need
- Feasibility / Concept
- Design, Construction, Integration, & Testing
- Operations / Response



2



Madison Beltline Flex Lane

Presenter:



Luke Holman, P.E.




3



Strand Associates, Inc.

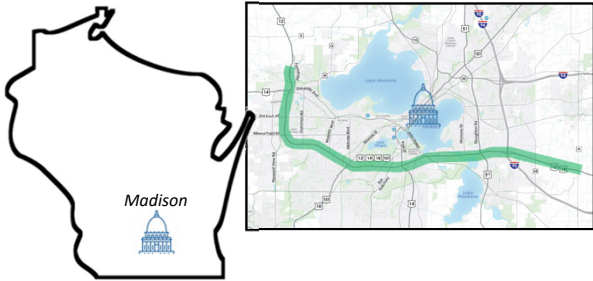
- More than 75 years of service
- 495 total staff
- 12 Office Locations
- Full Range of Services



Transportation Municipal Buildings/Facilities Wastewater Management Water Supply Aviation

STRAND ASSOCIATES, INC.


Project Background



Madison

STRAND ASSOCIATES, INC.

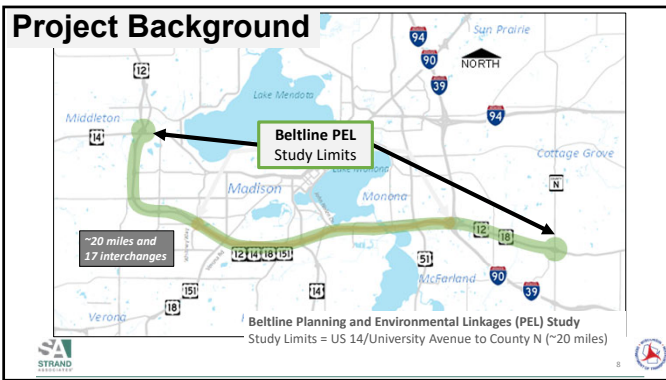
Beltline is vital for Dane County

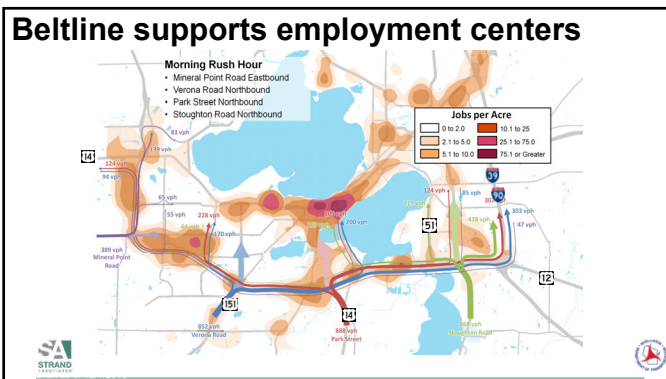


1. Beltline provides access to homes, schools, jobs, businesses.
2. Beltline supports the local economy.
3. Beltline has been affected by area growth.

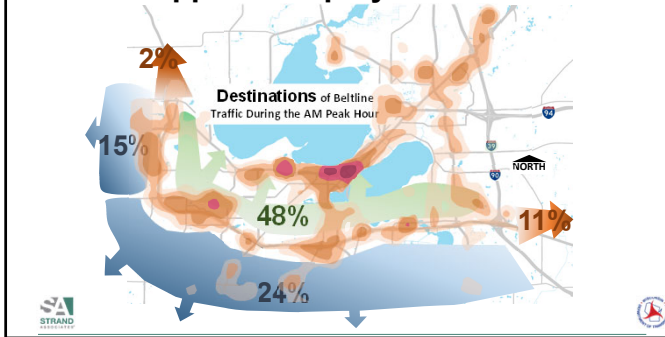
STRAND ASSOCIATES, INC.



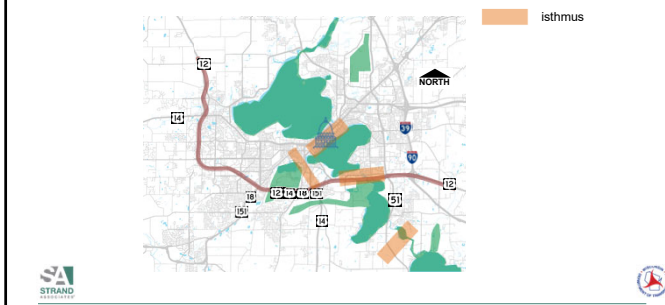




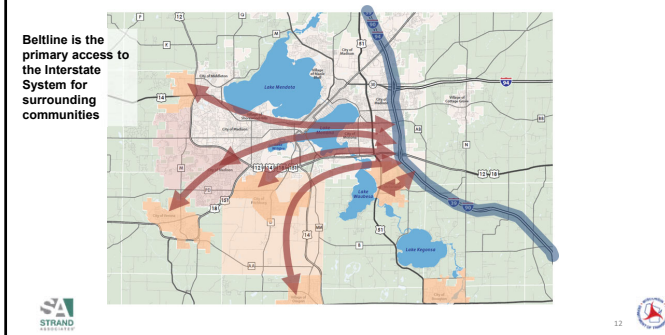
Beltline supports employment centers



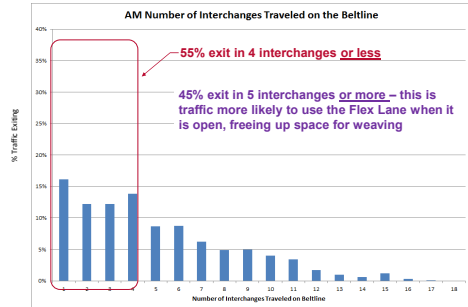
People use the Beltline to get around resources and facilities



I39/90/94 traffic destined for Beltline

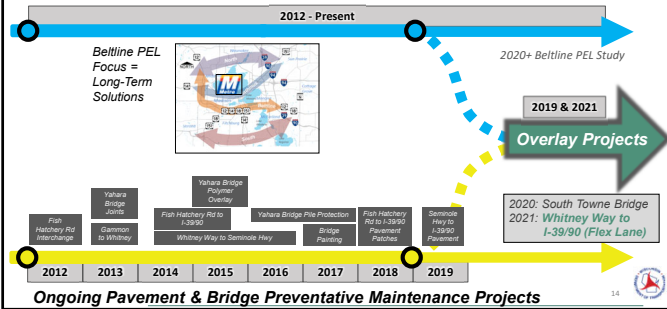


Beltline Traffic is Mix of Shorter and Longer Trips

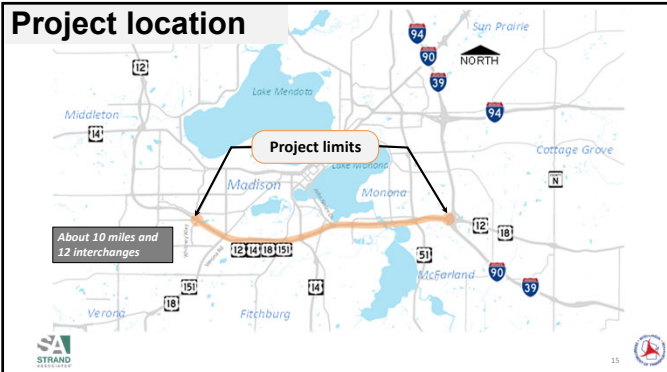


Beltline Maintenance Projects 2012 - Present

WisDOT Study / Engineering



Project 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



16

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



Madison Beltline - Prior to 2019 overlay

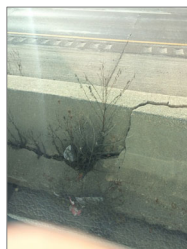


17

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



Madison Beltline



Barrier Wall

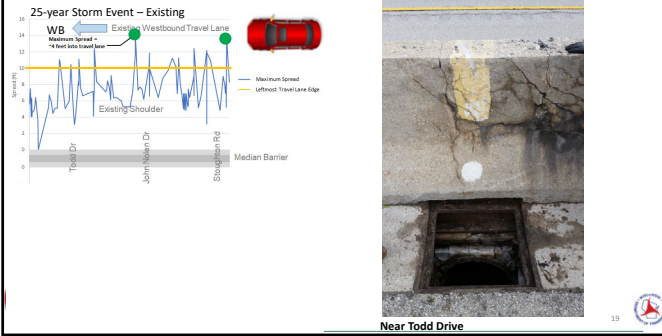


Median Drainage



18

Project Needs: Roadway Drainage



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



20

Existing Footprint Presented Operational Opportunities



21

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:

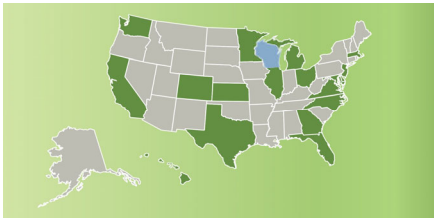
<https://ops.fhwa.dot.gov/publications/fhwahop15023/ch1.htm>

22



Part-time Shoulder Use in the United States

States (17) with Part Time-Shoulder Use in 2019

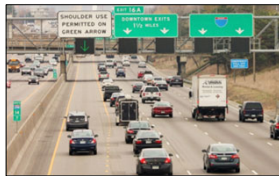


23



Dynamic Part-Time Shoulder Use Nationally

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



I-35W in Minnesota



M-23 in Michigan

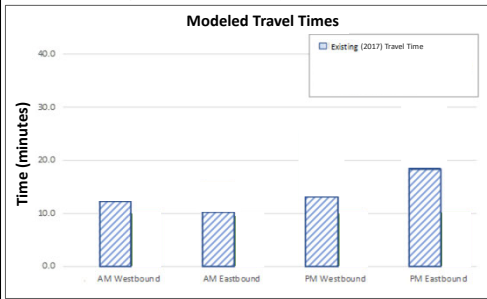


24



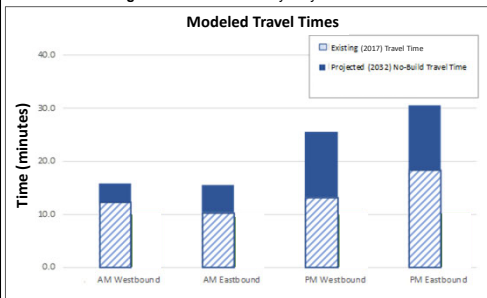
Project Feasibility: Traffic Operations

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



Project Feasibility: Traffic Operations

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

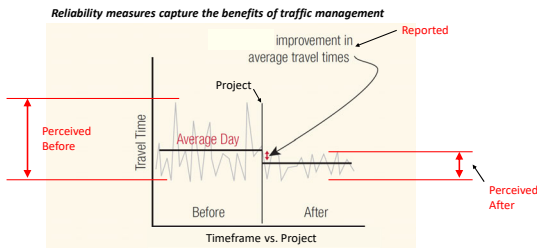


Project Feasibility: Traffic Operations

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



Project Feasibility: Travel Time Reliability



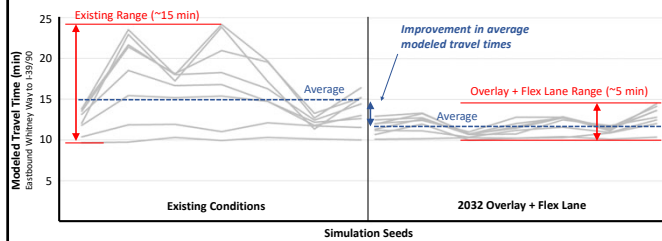
Note: This diagram shows a general display of the travel time reliability concept and is not intended to reflect traffic data for the Beltline corridor.



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Project Feasibility: Travel Time Dependability

"Dependability" represents the range of modeled travel times for different conditions



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



30

Project Concept



31



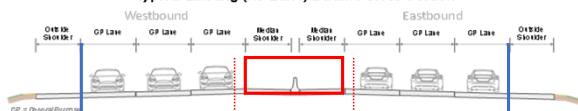
Cross Section

Typical Existing (No-Build) Beltline Cross Section

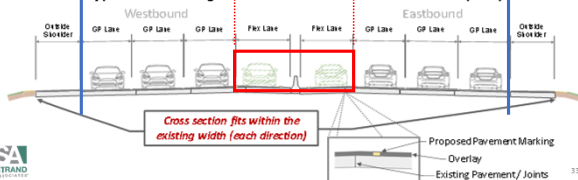


Cross Section

Typical Existing (No-Build) Beltline Cross Section

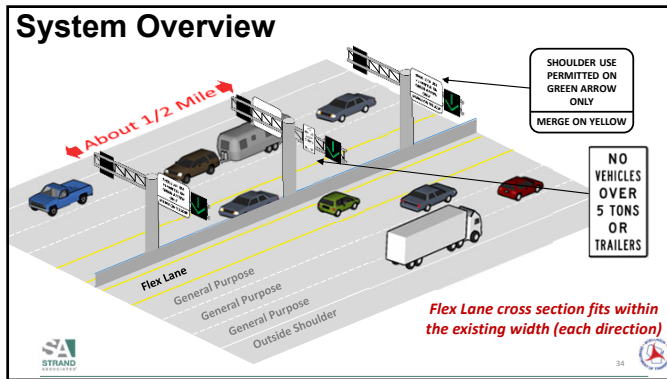


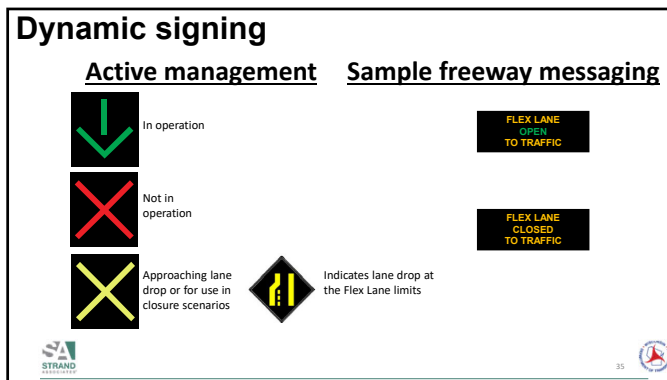
Typical Resurfacing with Flex Lane Beltline Cross Section (2021)

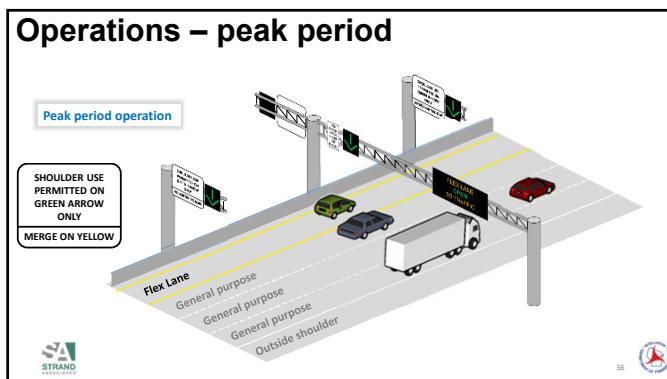


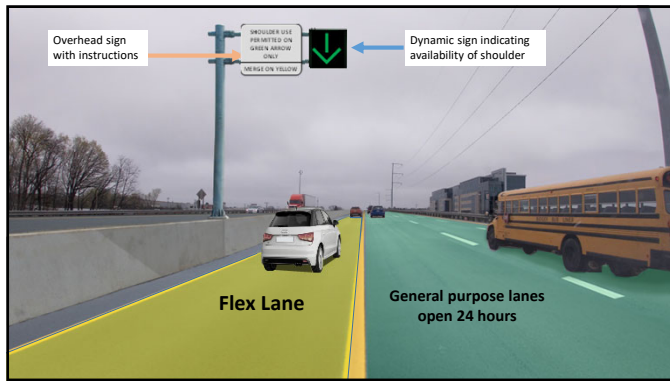
32

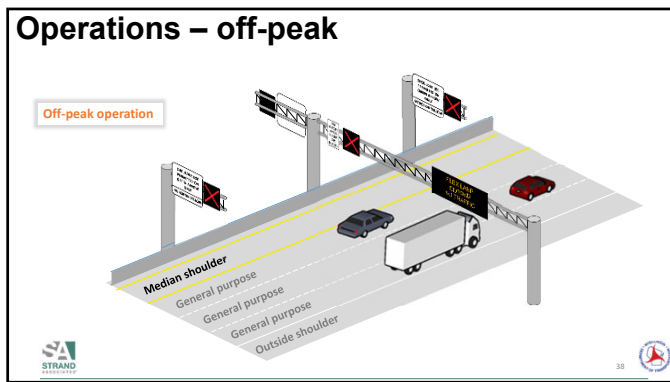


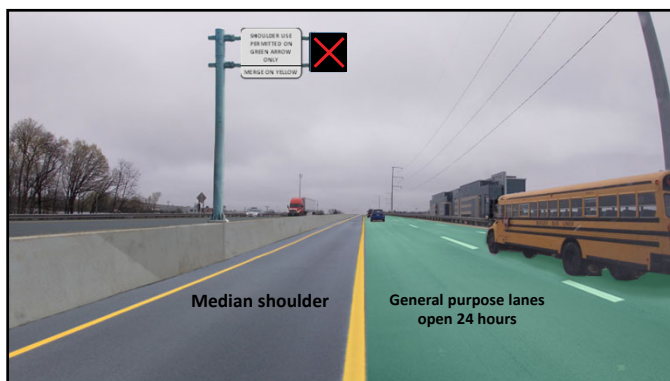


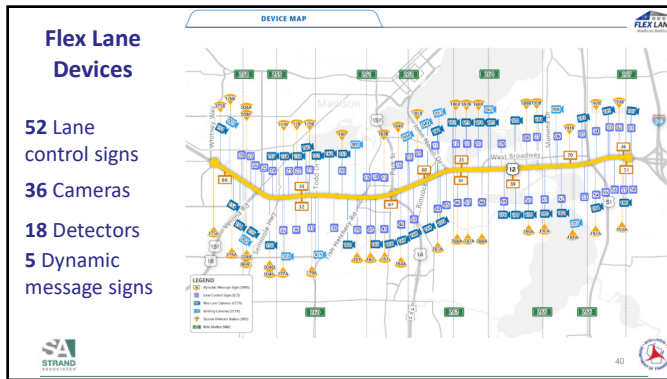


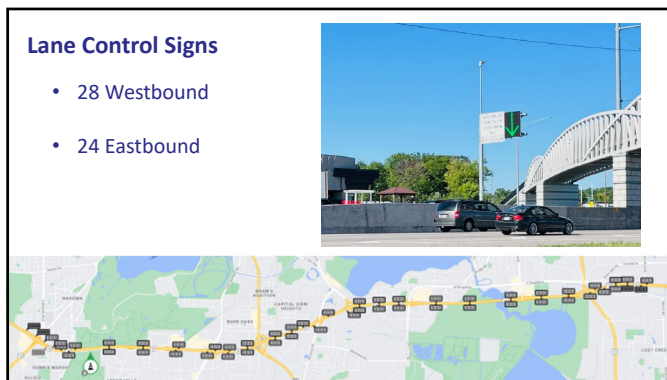


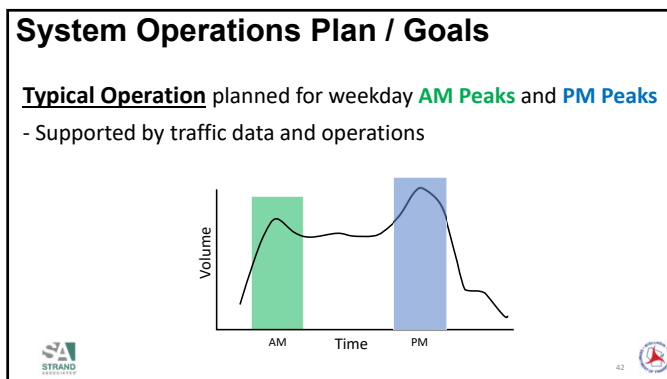












System Operations Plan / Goals

Scenarios

Nonrecurring congestion / Scenario planning

- Incidents
- Special Events
- Weather
- Power Outages/Failure
- others



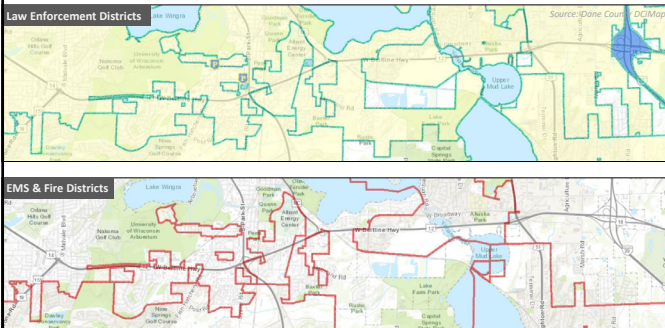
43

Design, Construction, Integration, Testing



44

Jurisdictional Challenges



Flex Lane Stakeholder Outreach



First Responder Coordination



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Flex Lane Stakeholder Outreach



Flex Lane Draft Layouts



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Flex Lane Stakeholder Outreach



First Responder Incident Table Top Exercise



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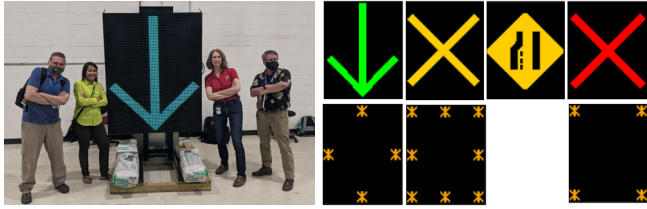








Lane Control Signs



Construction/Deployment

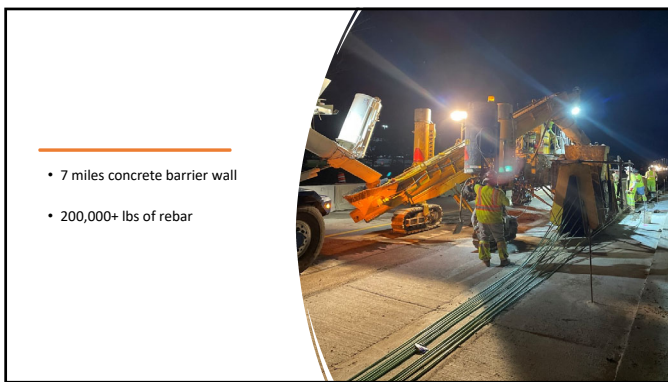
- Work Began March 1, 2021
- Work occurred nearly 24 hours a day – 6 days a week
- 3-4 crews during day
- 9-10 crews at night.
- Engineer oversight – 3-4 staff during day; 7-8 staff at night

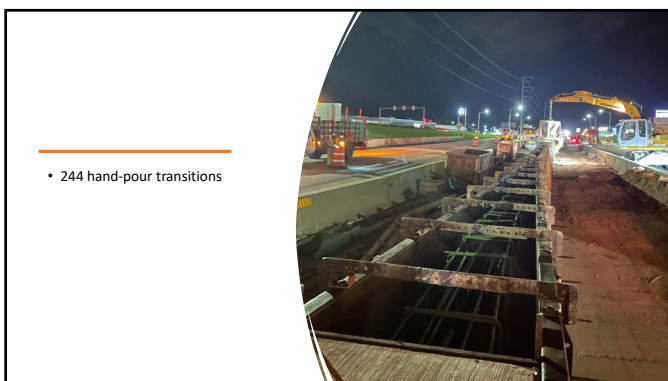


- 18 miles temporary barrier wall
- 760 semi loads

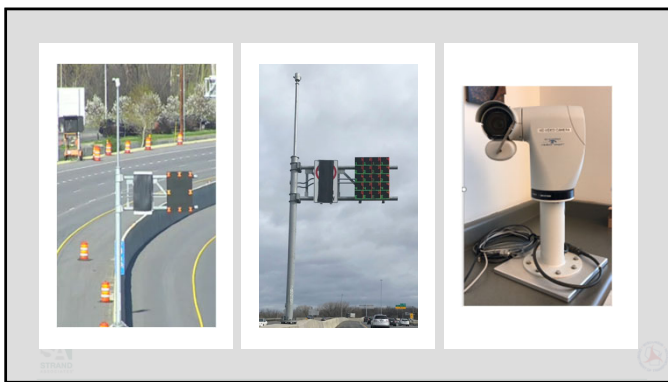


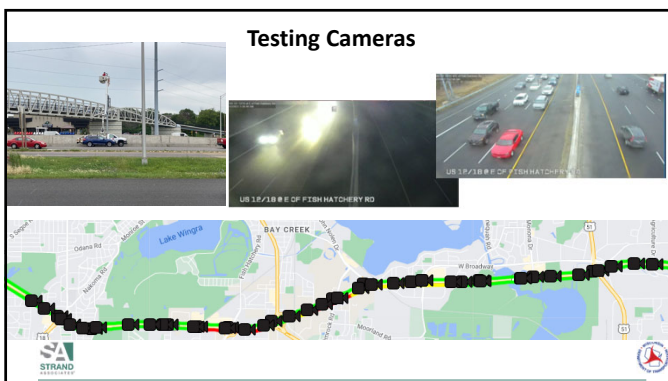




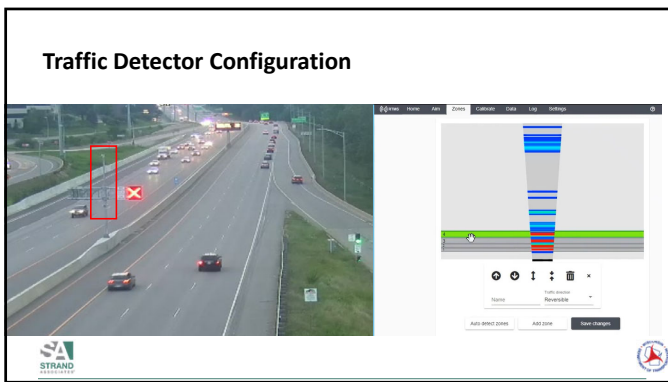


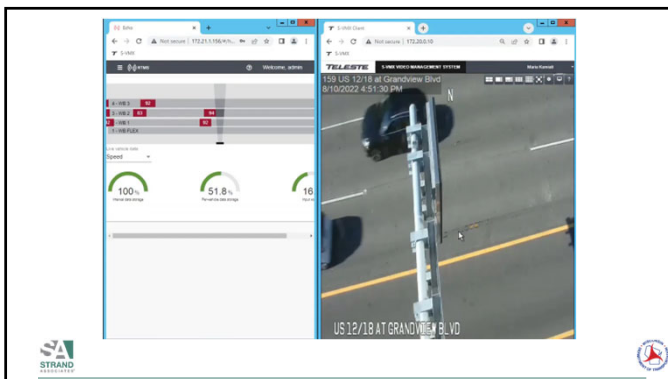












Testing Software

The screenshot displays a software interface for testing. On the left, there's a map view with a green highlighted area. In the center, a smaller map shows a specific location. On the right, a vertical list contains various vehicle types and their corresponding counts or statuses. The interface includes several tabs and buttons at the top, suggesting a complex data management system.

Control Room Flex Lane Prep - Training

- Flex Lane Certification process
- Training of backups
- Ops Manual & Quick Reference Guide
- Scenario based training
- First responder meetings & training session
- Driving Flex Lane

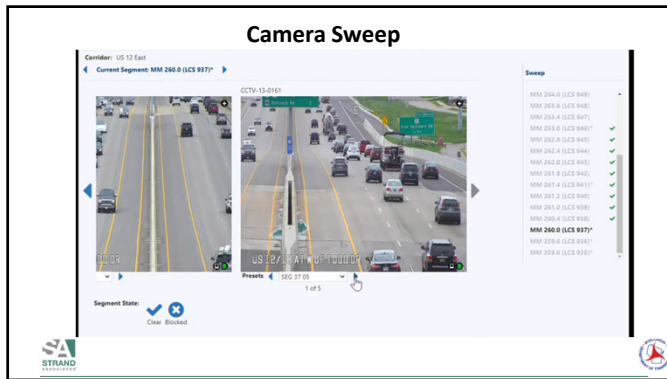
The image shows a person in a control room environment, seated at a desk with multiple computer monitors. The screens display various traffic-related data and maps. Overlaid on the bottom of the image are two documents: a 'QUICK REFERENCE GUIDE' and an 'OPERATIONS MANUAL', both featuring a road diagram. The STRAND logo is visible in the bottom left corner.

Daily Opening Sequence

The diagram illustrates the 'Daily Opening Sequence' as a horizontal timeline with a large green arrow pointing right. The sequence includes the following steps:

- Overnight Maintenance (3am-6am)**: Represented by a green circle.
- FST Sweep (6:30 am)**: Represented by a green circle, with a note 'FST – Freeway Service Team' below it.
- Camera Sweep (Concurrent with FST Sweep)**: Represented by a green circle, accompanied by an image of a yellow maintenance vehicle.
- Is Flex Lane Clear and Ready?**: Represented by a green circle, accompanied by a traffic camera view.
- TMC Opens Flex Lanes**: Represented by a green circle, accompanied by a traffic camera view.
- Monitor Conditions**: Represented by a green circle, accompanied by a control room view.
- TMC Closes Flex Lane (prep for PM)**: Represented by a green circle, accompanied by a traffic camera view.

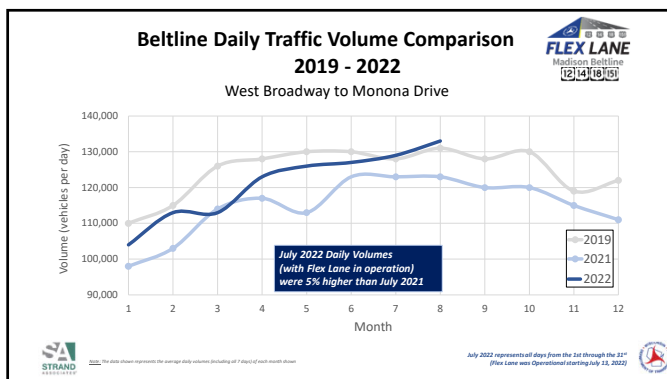
 The STRAND logo is in the bottom left corner.

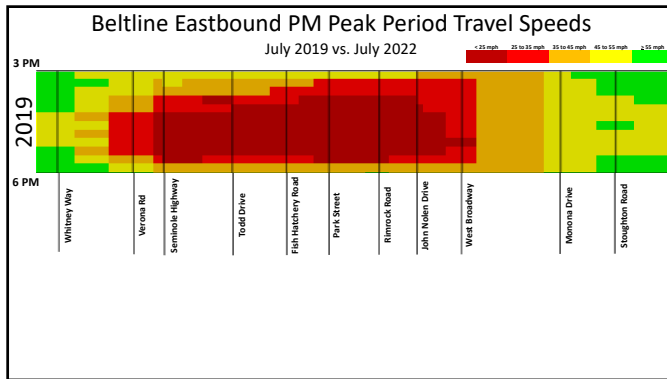
[illegible]

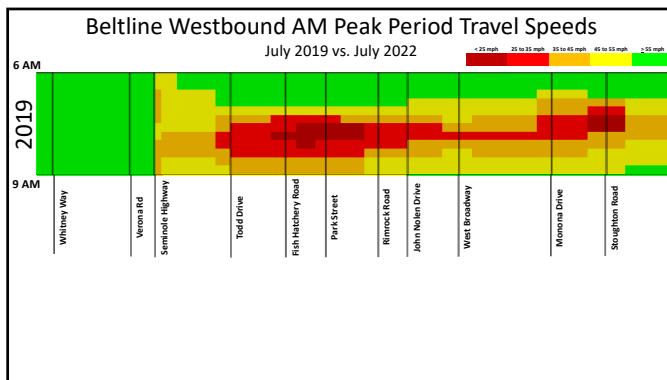
Operations

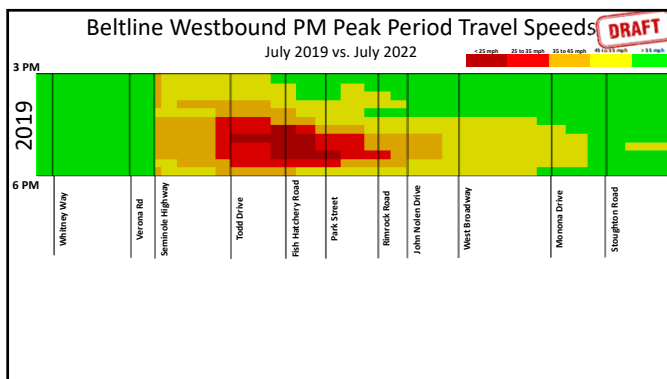
Initial Data Indicates:

- Increase in traffic volumes ~5%-20% in first month
- Travel-time Reliability improved ~40% in first month
- Average Travel Time reduced by ~45% in first month

[illegible]







Feedback

Saul Sevcik
That can't be real. It has to be a dream.
There's no way that worked that smooth...

Like Reply 6w 8

Chernobog2 · 16 days ago
Last time I commuted regularly on the beltline was over 2 years ago and it was absolute hell during rush hour; constant stop and go for a majority of the drive.
Have recently tried it out twice after the flexlane addition and its surreal how different the commute is. I never imagined going a consistent speed with no stops on the beltline during rush hour was possible.

2 2 2 Reply Share Report Save Follow

Brian Wilson
Worked well this morning!

Like Reply 6w

Skyler Cage
Just do us all a favor and open it 24/7 so the Karen's can quit complaining. Also stay out of the fast AND flex lane if your not a speeder.

Like Reply 4w 8

Kathy Nehmer
Why not just call it an extra lane and use it all the time????

Like Reply 4w 8



Questions?

Team Acknowledgments:

- Wisconsin Department of Transportation – SW Region and Bureau of Traffic Operations
- HNTB (Prime Roadway Design)
- Strand (Planning, Systems Engineering, ITS, Drainage, Public Involvement, Env. Doc., and Construction Oversight)
- IBI (Software Vendor)
- Payne+Dolan (Prime Roadway Contractor)
- TAPCO (Integrator)
- Westphal (Electrical Contractor)

wisconsin.gov/FlexLane

YouTube videos are posted on the website

Luke Holman, Strand Associates
(608) 251-2129 – LukeHolman@strand.com

Liz Schneider, WisDOT Traffic Management Center
(414) 750-2918 – Elizabeth1.Schneider@doh.wi.gov

Extra



76



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

77



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



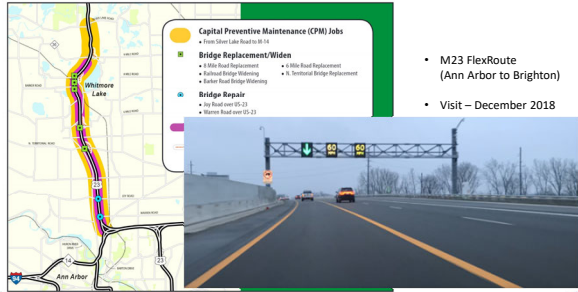
- Showed Traffic Operations / Safety Benefits
- Quantitative Predictive Safety Analyses not Performed



78

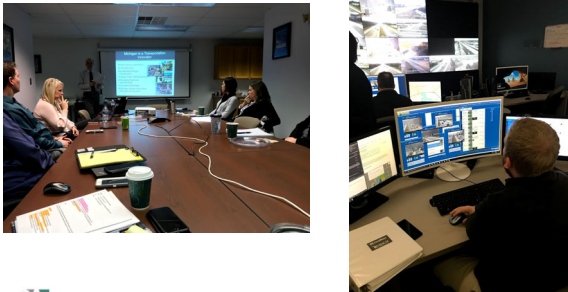


Other Agency Visits Provided Useful Background and Perspective



79

Other Agency Visits Provided Useful Background and Perspective



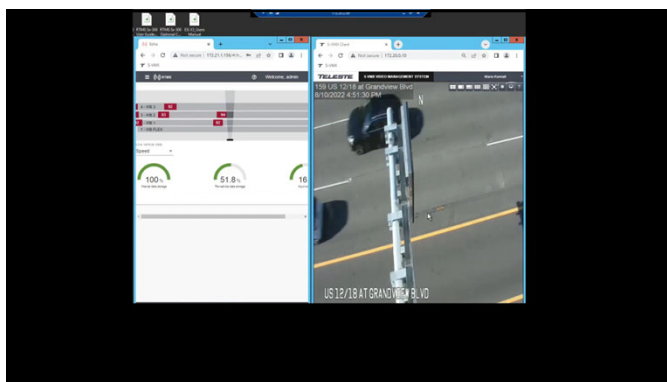
80

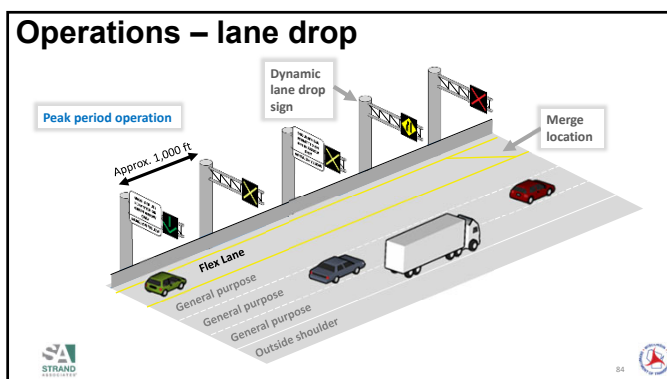
Other Agency Visits Provided Useful Background and Perspective



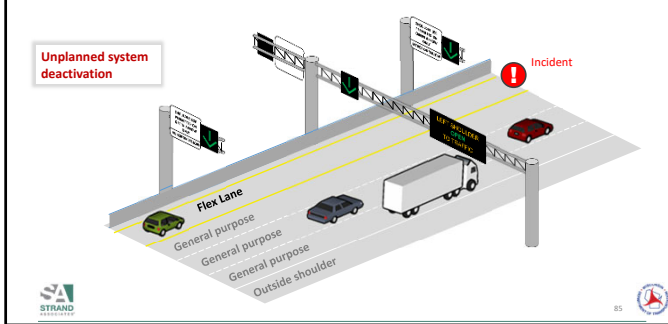
81



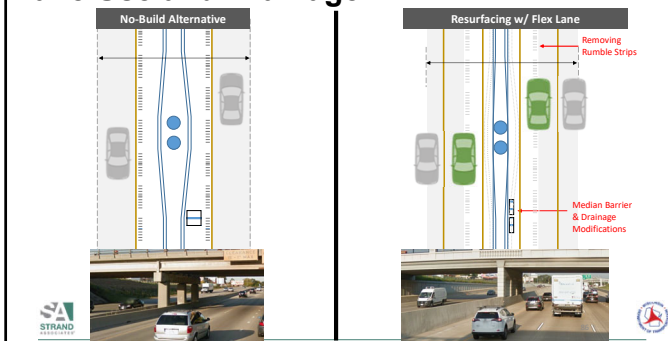




Operations – system deactivated



Lane Use and Drainage



Special Events are Common

