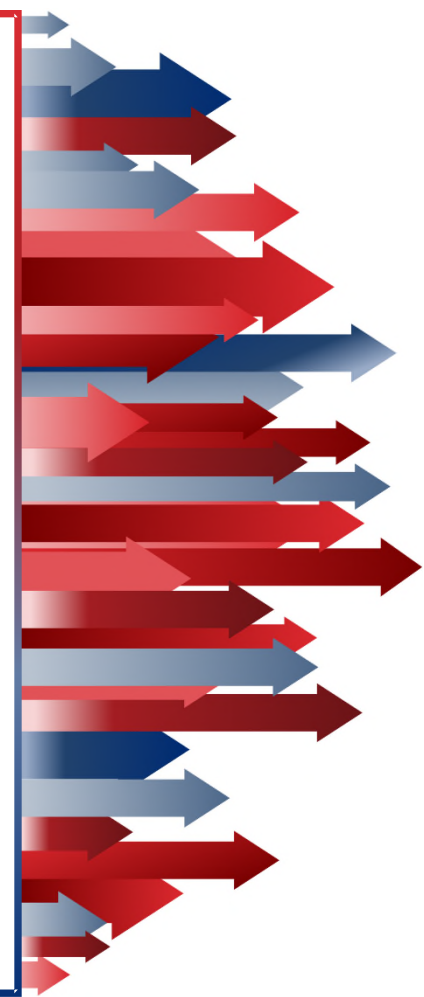# Statewide TSMO Integration Efforts & Mississippi River Bridge Closure

October 27, 2021

TSITE Fall Meeting
Jon Storey
Traffic Operations Division

Transportation Systems Management and Operations (TSMO)

Safety | Efficiency | Reliability | Workforce

Key Objectives

- Key Objectives:
  - Traffic Operations Division Overview
  - Provide an overview of TSMO
  - What, why, and how of TSMO for TDOT
  - Provide update on TDOT's draft TSMO Program Plan
  - TSMO in Action!- Mississippi River Bridge Closure

Introduction & Traffic Operations Division Overview
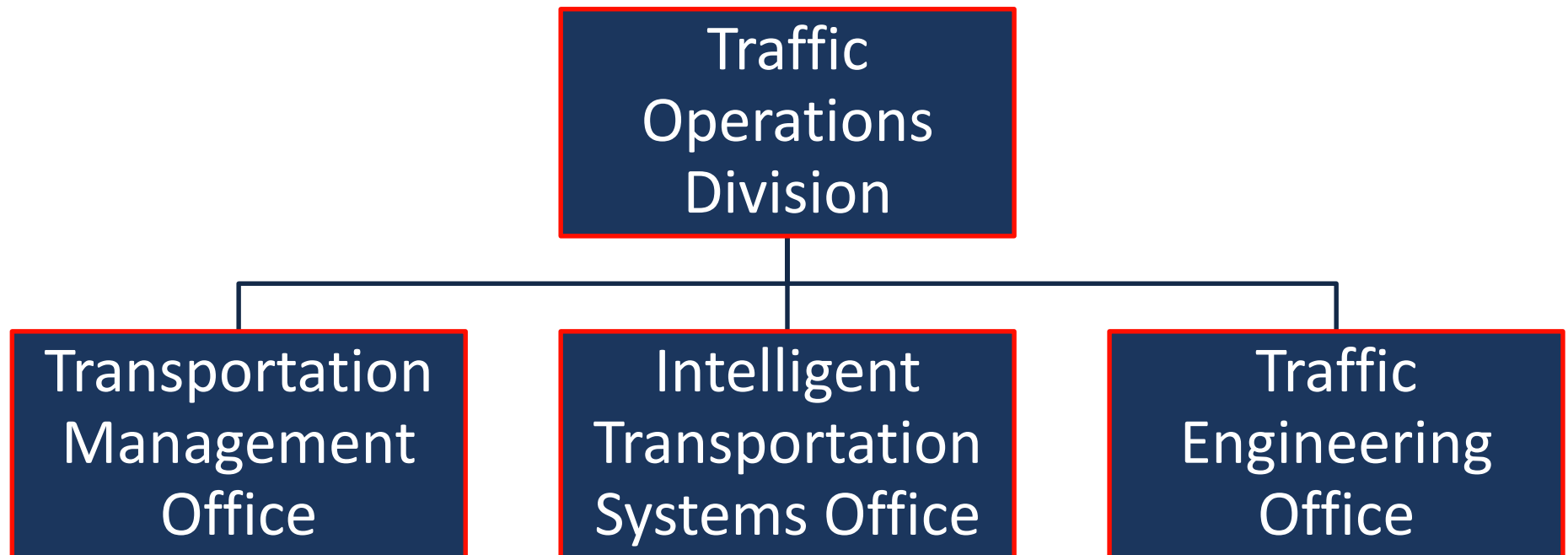
Introduction

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Traffic Operations Division Overview

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                    ┌─────────────────┐
                    │     Traffic     │
                    │   Operations    │
                    │    Division     │
                    └────────┬────────┘
          ┌──────────────────┼──────────────────┐
┌─────────────────┐ ┌─────────────────┐ ┌─────────────────┐
│ Transportation  │ │   Intelligent   │ │     Traffic     │
│   Management    │ │ Transportation  │ │   Engineering   │
│     Office      │ │ Systems Office  │ │     Office      │
└─────────────────┘ └─────────────────┘ └─────────────────┘
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Traffic Operations Division Overview

TMC & TIM Activities and Guidance

- Management of Traffic Management Center (TMC) & Traffic Incident Management (TIM) programs
- Establishing TMC, TIM, & Traffic Engineering guidelines and procedures

ITS Architectures and System Engineering Analysis

- ITS Project Design
- ITS Project Letting Support
- ITS Construction and Maintenance Technical Support
- ITS Statewide Architecture Management
- Systems Engineering Review

Traffic Operations Division Overview (cont.)

Traditional Traffic Engineering

- Provide Traffic Engineering legal support for TDOT/State Government (State Traffic Engineer)
- Perform traffic engineering studies (including traffic simulation and analysis and)
- Prepare traffic signal, roadway lighting, and roadway signage designs

Measures of Effectiveness

- Transportation system performance monitoring and reporting

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Traffic Operations Division Overview (cont.)

Communications Equipment

- Manage TDOT wireless radio network
- Motorist Information Systems management & support (Tennessee SmartWay, 511, Twitter)

Miscellaneous

- Support the communication, coordination, and collaboration between Headquarters and Regional offices Research, management, and deployment of ITS projects
- Manage state Logo and Tourist Oriented Directional Signs (TODS) programs

TSMO Overview

TSMO Overview

What is TSMO?

TSMO is an emerging term used to describe a cross-discipline, collaborative, and integrated program of strategies and applications to improve existing and planned transportation infrastructure and multimodal systems through better integration, coordination and implementation of key operational strategies, innovation, and technology. TSMO improves the safety, reliability, and operation of the transportation system with lower-cost, high-impact actions that can be implemented relatively quickly as well as enhance traditional capacity projects.

TSMO Overview

Safety — Reduce the frequency and severity of crashes on the transportation system through TSMO focused planning, design and management.

Efficiency — Operate and maintain a coordinated multi-modal transportation system that provides seamless mobility to users.
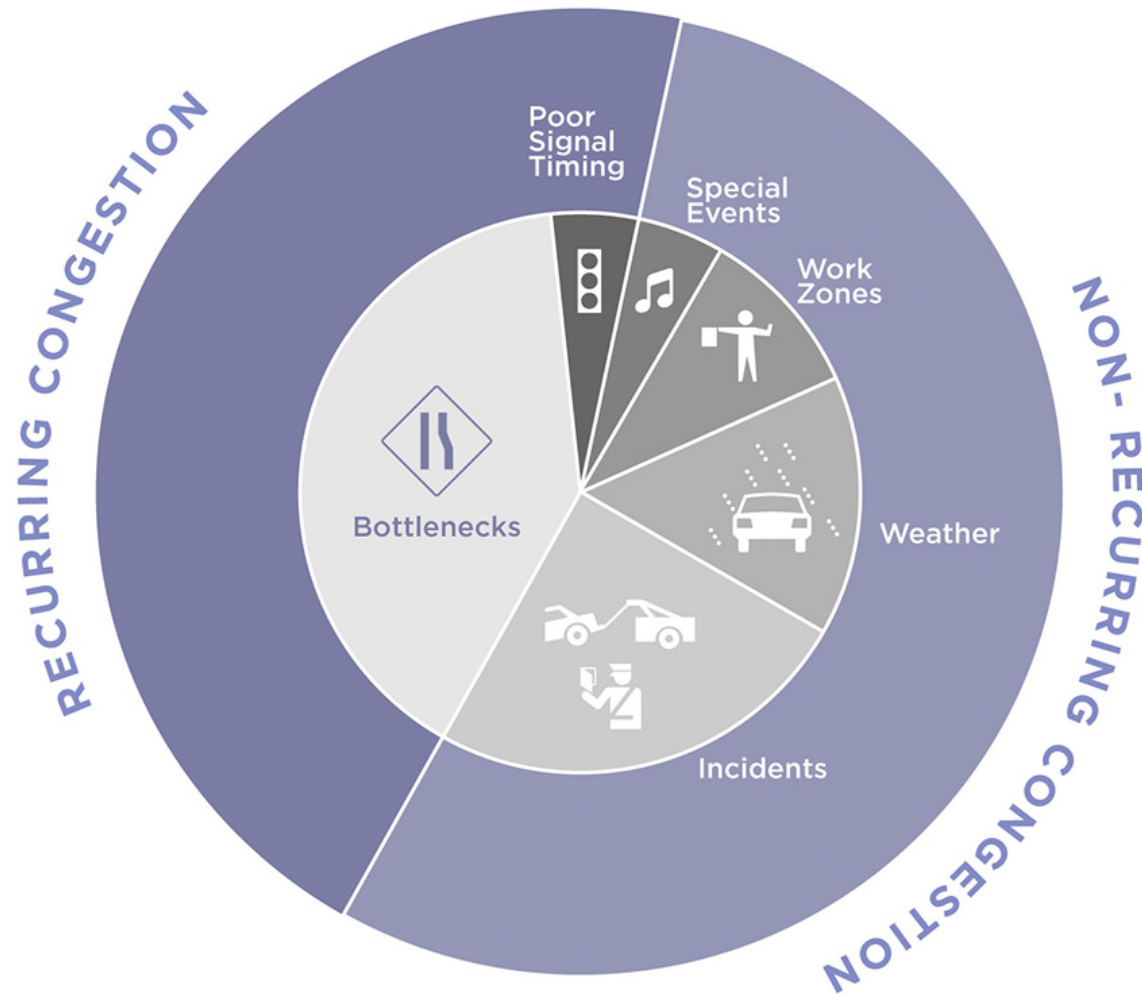
Reliability — Improve travel-time reliability by managing transportation network delays and enhancing real-time traveler information.
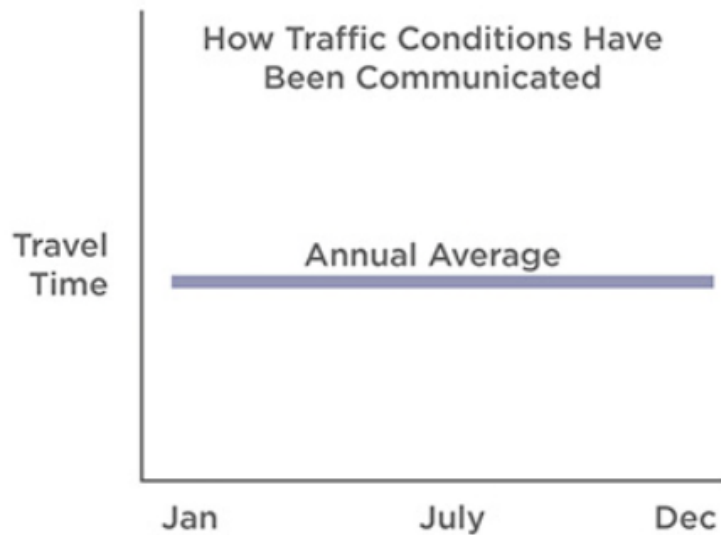
Workforce — Support and advance TSMO education, training needs, and resource depositories for TDOT and local partners.

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TSMO Overview

TSMO Overview

How Traffic Conditions Have Been Communicated

Travel Time

Annual Average

Jan   July   Dec

What Travelers Experience . . .

. . . and what they remember

Travel Time

Travel Times Vary Greatly Day-to-Day

Jan   July   Dec

TSMO Strategies

- Work zone management
- Road weather management
- Traffic signal coordination
- Ramp metering
- Traveler information
- Active transportation and demand management
- Access management
- Intersection Control Evaluation
- Improved bicycle and pedestrian crossings
- Connected and automated vehicle deployment
- Mobility on demand
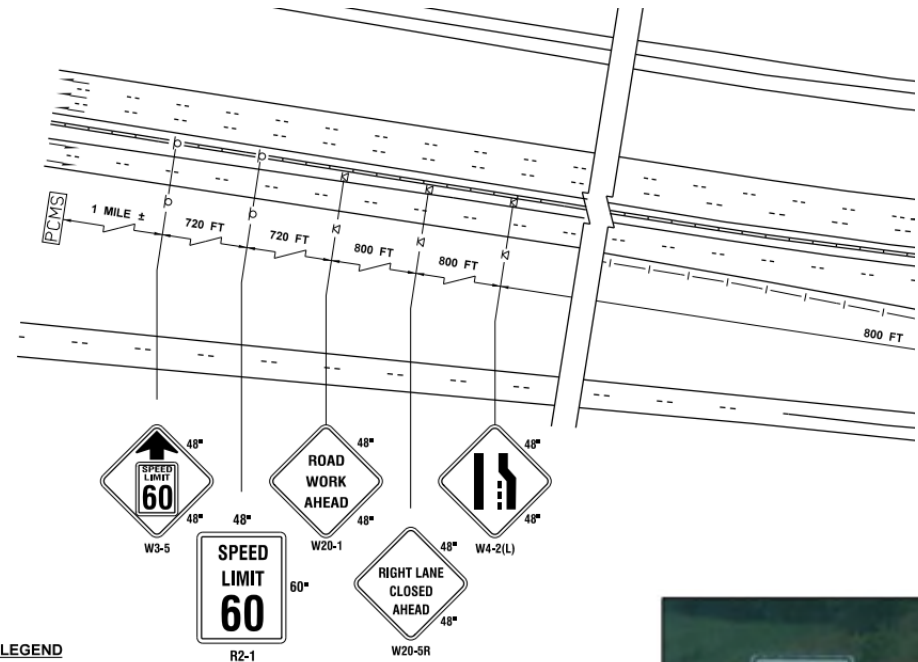
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TSMO Strategies

TSMO Strategies

TDOT's Strategic Approach to TSMO

SAFETY

REDUCE THE **FREQUENCY AND SEVERITY OF CRASHES** ON THE TRANSPORTATION SYSTEM THROUGH TSMO **FOCUSED PLANNING, DESIGN, AND MANAGEMENT.**

TDOT has deployed variable speed limit programs during heavy fog events to improve the safety on interstate corridors where fog caused crashes.

EFFICIENCY

OPERATE AND **MAINTAIN** A **COORDINATED MULTI-MODAL TRANSPORTATION SYSTEM** THAT PROVIDES **SEAMLESS MOBILITY TO USERS.**

TDOT's Traffic Operations Division assists local agencies with signal programs to improve reliability on key corridors and feeders to the interstate system.

RELIABILITY

IMPROVE TRAVEL-TIME RELIABILITY BY **MANAGING** TRANSPORTATION NETWORK DELAYS AND **ENHANCING REAL-TIME TRAVELER INFORMATION.**

Smart Corridor deployments take a comprehensive approach to managing the existing infrastructure along an interstate and its parallel arterial and improving travel time reliability.

WORKFORCE

SUPPORT AND **ADVANCE TSMO EDUCATION, TRAINING NEEDS**, AND **RESOURCE DEPOSITORIES** FOR TDOT AND LOCAL PARTNERS.

TDOT's Traffic Operations Division conducts outreach and training opportunities to advance a TSMO mindset.

What, Why, and How of TSMO for TDOT

Why TSMO Is Critical to TDOT's Success

TSMO solutions generally:

- Are quicker to implement
- Have high benefit-to-cost ratios
- Take a holistic, multimodal view of the system and issue
- Can enhance the benefits of traditional infrastructure projects
- Help the DOT meet priority goals in areas such as:
  - Safety
  - Efficiency
  - Reliability
  - Emissions
  - Partnerships

Connecting Legacy Activities to TSMO

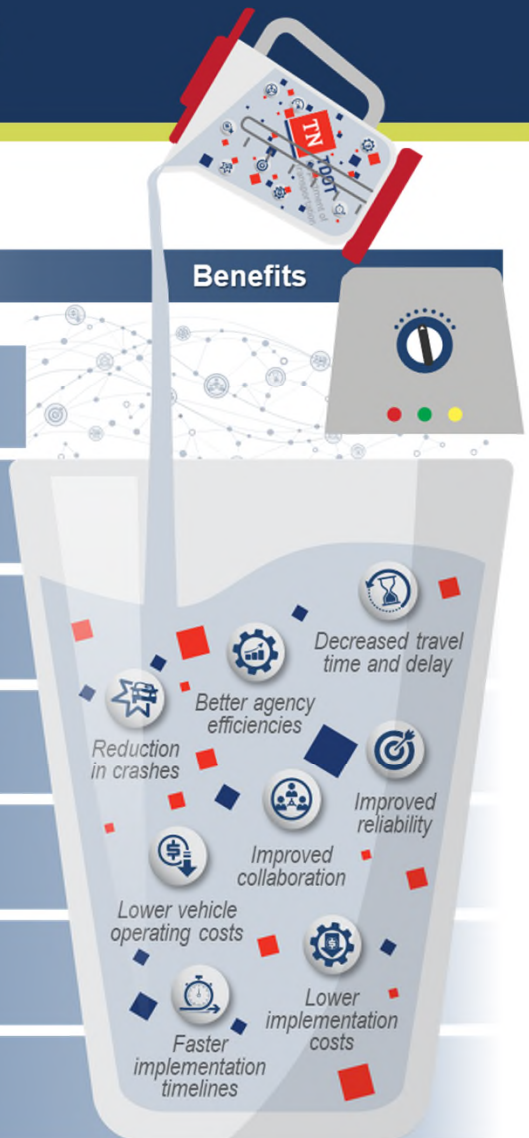| Traditional Method	Transportation Systems Management and Operations (TSMO)	Benefits
Individual Strategies	No single division "owns" TSMO; TDOT Divisions and Regions integrate TSMO strategies throughout.	
Operating Completed Projects	TDOT develops projects through integrated delivery approaches that emphasize life cycle costs and resource allocation.	
Static and Reactive	The TDOT's SmartWay provides real-time traffic information on road conditions to influence proactive and dynamic responses.	
Average Travel Time, Level of Service	TDOT plans to expand and mature the Performance Measurement Program to assess system performance and achieve established performance objectives related to trip reliability, mobility, and safety.	
Adding Capacity	TDOT includes TSMO strategies and solutions in the concept and planning stages to complement capacity projects, such as the Congestion Action Plan for Nashville.	
Focus on Individual Routes and Jurisdictions	TDOT is deploying tools and guidelines for Integrated Corridor Management operations to proactively manage traffic and respond to incidents through Active Transportation and Demand Management.	
Deploying ITS Devices	TDOT uses a holistic approach to implement TSMO strategies and solutions beyond ITS devices to enhance infrastructure programs, fleet vehicle management, and maintenance and operations.	

Benefits:
- Decreased travel time and delay
- Better agency efficiencies
- Reduction in crashes
- Improved reliability
- Improved collaboration
- Lower vehicle operating costs
- Faster implementation timelines
- Lower implementation costs

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TSMO Program Plan

Draft TSMO Program Plan

- High-level structure:
  - Executive Summary
  - Introduction (to TSMO and the plan)
  - Why TSMO?
  - TDOT TSMO Program Vision, Mission, and Goals
  - Strengths, Challenges, and Needs

  Part I
  Background and direction for focus areas and actions

  - Institutional, Organizational, and Procedural (IOP) Strategies
  - Performance Measurement
  - Services and Projects
  - Plan Maintenance

  Part II
  Focus areas and actions

Draft TSMO Program Plan

- Regional Operation Forums – 2021 Revisits
  - Region 1; August 23
  - Region 2; September 7
  - Region 3; August 24
  - Region 4; August 26
- Multi-Division, Multi-Agency Teams of approximately 10
- Top 3 goals per Region to work concurrent with the Statewide Plan

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Draft TSMO Program Plan

- Focused Topic Discussions – 2021
  - Corridor Management; September 30
  - Future Projects; September 30
  - ITS; October 5
  - Connected and Automated Vehicles; October 5
  - Traveler Information; October 12
  - Signal Management; October 12
  - Traffic Incident Management; October 13
  - Communications Equipment; October 22

- Typically, TDOT Headquarters Staff

Draft TSMO Program Plan

Plan scheduled to be "complete" this calendar year

Plan Maintenance
- Living document
- Regular updates

I-40 Mississippi River Bridge Case Study

I-40 Bridge Closure

- On May 11, 2021, a routine inspection revealed a large crack on one of the I-40 Hernando de Soto Bridge's critical beams

- The bridge was immediately closed, and traffic was diverted towards the **I-55 Big River Crossing**

TDOT Response

- TSMO played an important role in TDOT's immediate response to the bridge closure.
- TDOT leveraged its existing ITS systems and technology.
  - **Video streams** allowed TDOT to monitor flows and queues.
  - Portable **dynamic message signs** (DMS) and TDOT's **Smart Way** system provided traveler information to drivers.
  - Collaboration with City of Memphis for **signal timing plans**.

I-55 Improvements

- TDOT utilized a data-driven approach to implement traffic improvements on the I-55 detour route
  - Phase 1 – Identifying bottlenecks and making modifications, such as **closing conflicting ramps**, changing **pavement markings**, and using **Waze closures**.
  - Phase 2 - **Ramp widening** and other modifications to improve I-55 operations. For instance, dual lane SB ramp completed on 6/13/21.

I-40 Hernando DeSoto Bridge Closure

- Phase 2 : Widen southbound I-55 ramp
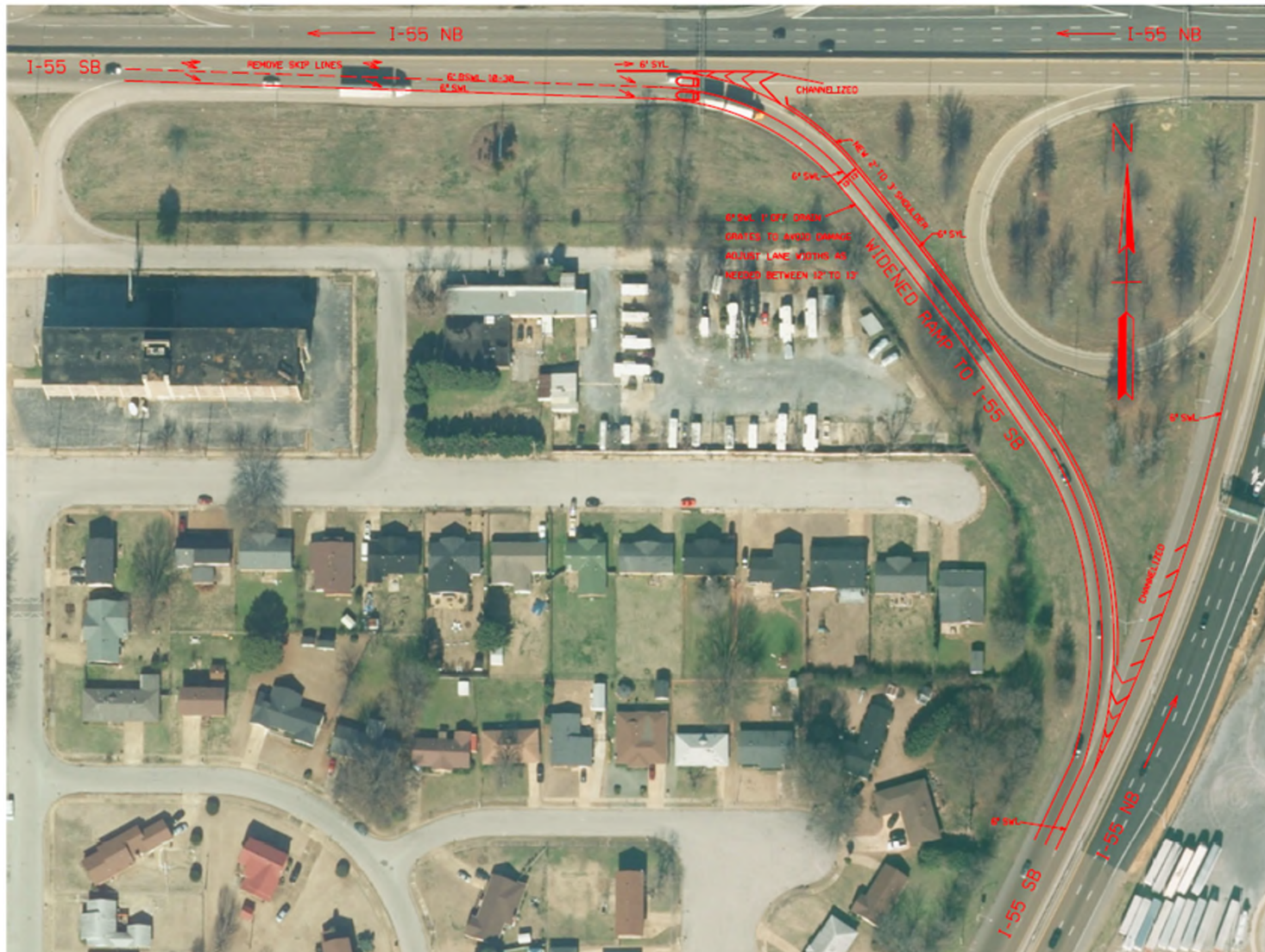
I-55 Improvements

I-55 Improvements

I-40 Hernando DeSoto Bridge Closure

- Phase 1 : Closed some access to I-55
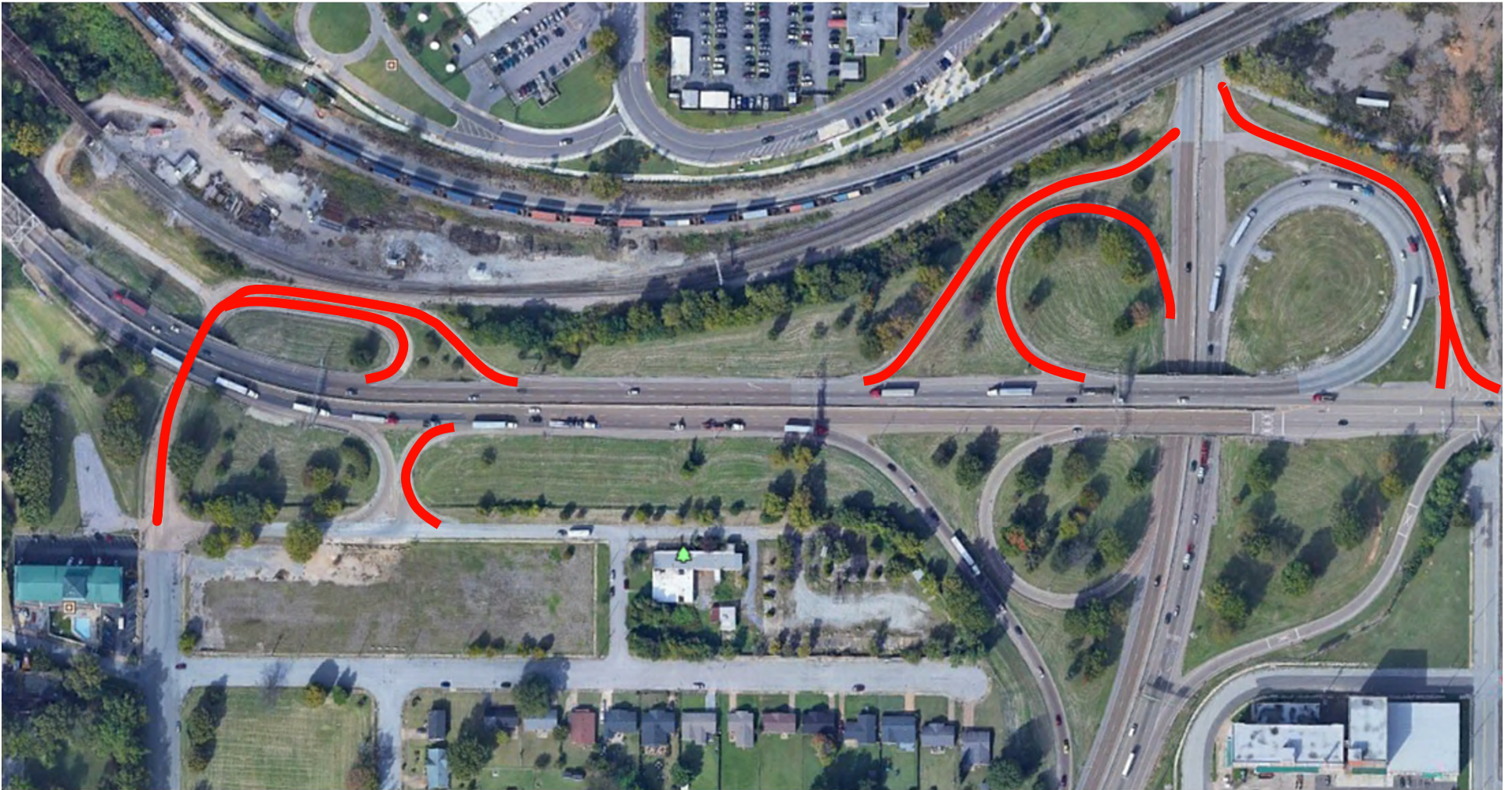
I-55 Improvements

- As vehicle throughout increased on the I-55 crossing, collaboration with ARDOT played an important role
  - Data sharing and real-time video feeds allowed both DOTs to implement adaptive **response plans** on a day-by-day basis and adjust **lane configurations.**
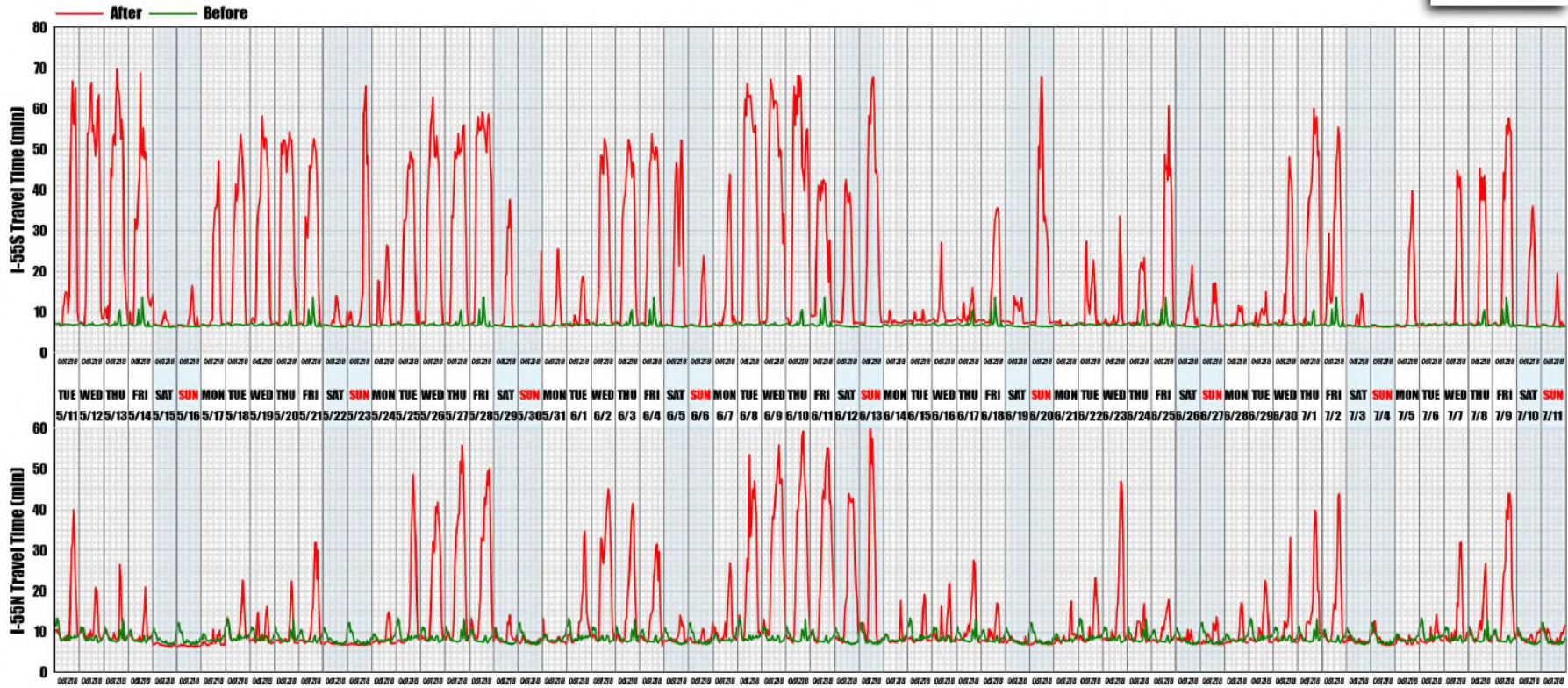- A week after these solutions were put in place, TDOT noted a **40% reduction in peak traffic delay**

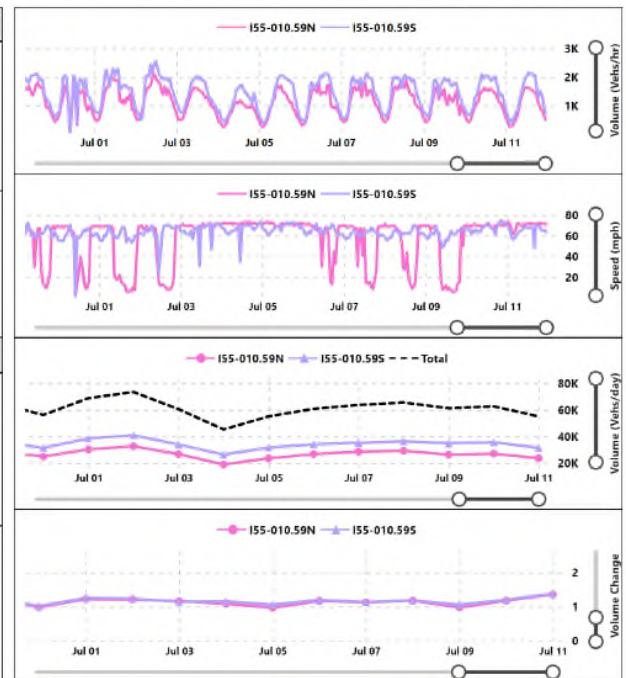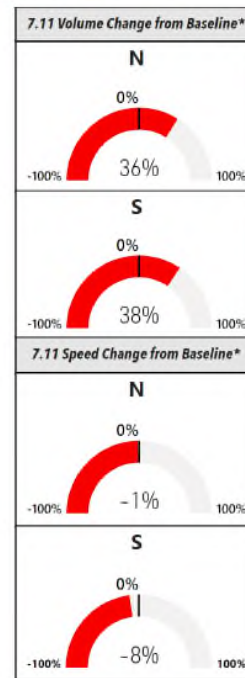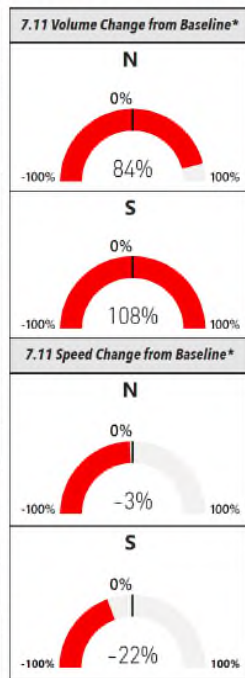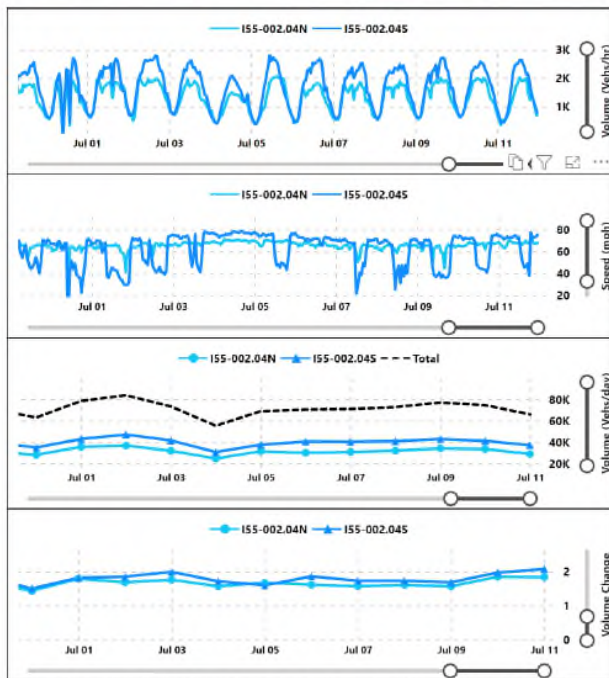Vehicle Throughput Data For the I-55 Mississippi River Bridge Crossing
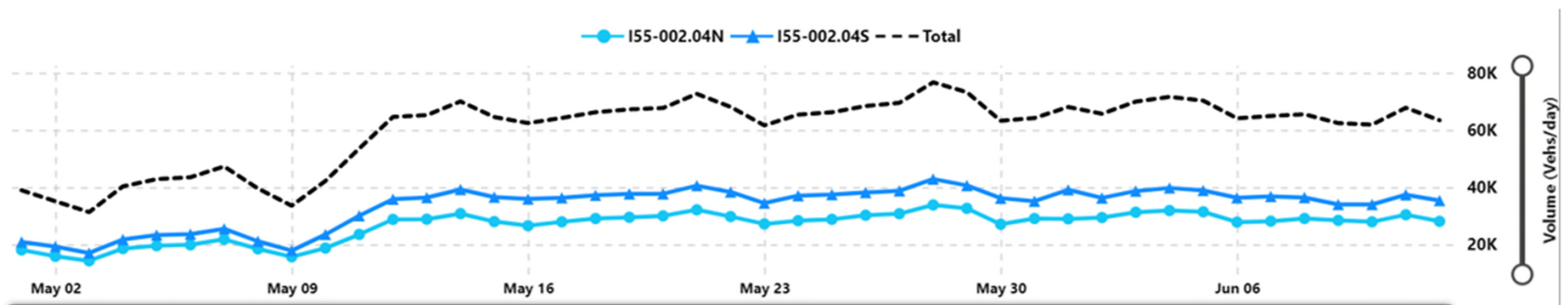
I-40 Hernando DeSoto Bridge Closure

I-55 Daily Travel Time Summary

I-40 Hernando DeSoto Bridge Closure

I-55 Daily Traffic & Speed Summary — Sunday 7/11

I-55 MM002.04

I-55 MM010.59

7.11 Volume Change from Baseline*

N 0% — 84%

S 0% — 108%

7.11 Speed Change from Baseline*

N 0% — -3%

S 0% — -22%

7.11 Volume Change from Baseline*

N 0% — 36%

S 0% — 38%

7.11 Speed Change from Baseline*

N 0% — -1%

S 0% — -8%

*Baseline day used for volume and speed comparisons is the same day of the week before May 11, 2021

I-40 Hernando DeSoto Bridge Closure

- Prior to opening the bridge, all traffic control devices had to be removed

Steel Barrier Rails	65
Drums	1000+/-
Type 3 Barricades	11
Arrow Boards	4
Cones	140+/-
Message Boards	6
Construction Signs	11
Sign Stacks	40+
Portable ITS Camera Unit	1

I-40 Bridge Reopening

- I-40 Bridge Reopening
  - Full reopening 84 days later
  - Eastbound lanes opened July 31. Westbound lanes on August 2nd
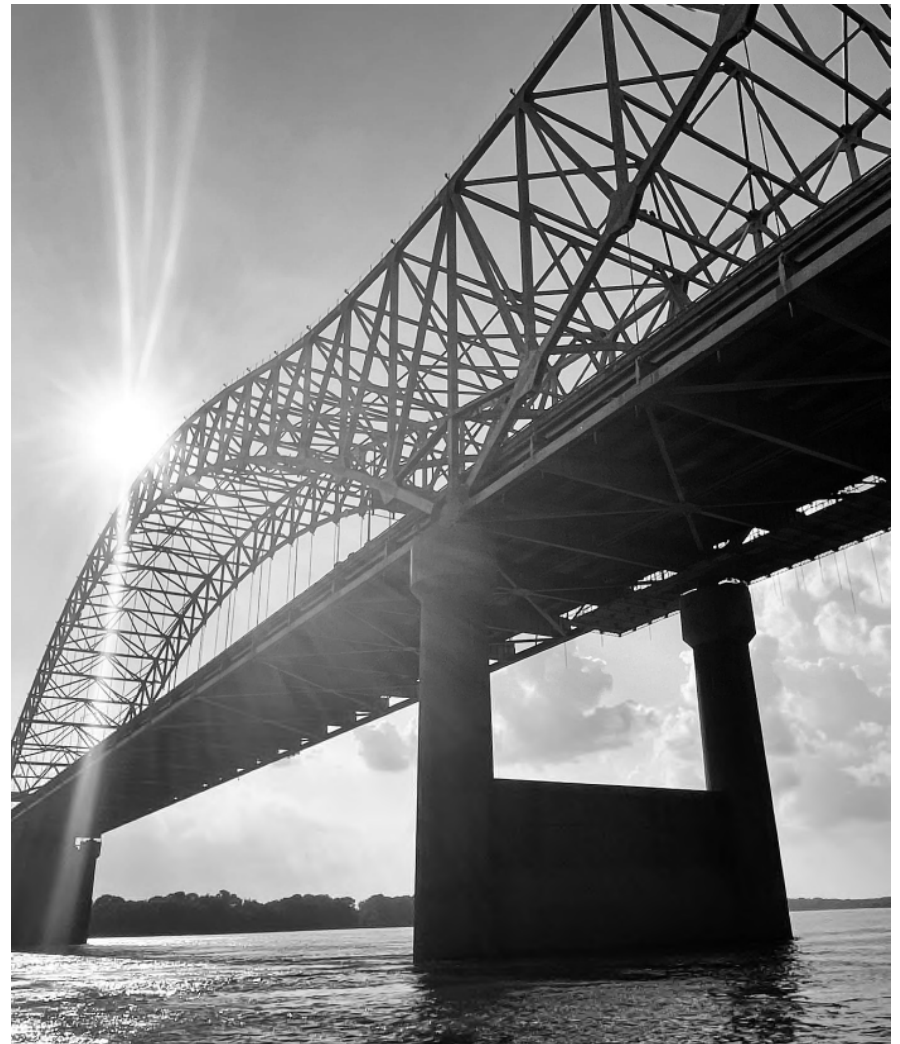
Thank You!

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