

I-96 Flex Route



By Michigan DOT

10/30/2026

Overview

The I-96 Flex Route moves the needle on transportation systems management and operations (TSMO) in Michigan by delivering measurable reliability gains, meaningful travel time reductions, and safer incident and work zone operations. This was achieved through a cohesive active traffic management (ATM) strategy. The project's outcomes are quantified, its challenges transparent, and its lessons learned from device health monitoring to enforcement and public education are already shaping next-generation TSMO deployments statewide. The I-96 Flex Route is more than a project; it's a platform for the future of freeway operations.

In this case study you will learn:

1. Why converting an existing freeway inside shoulder into a dynamically managed flex lane can improve travel time reliability and safety without widening the roadway
2. How MDOT integrated lane control signs, dynamic message signs, ramp metering, and variable speed advisories into a single actively managed corridor operated from one traffic operations center
3. How MDOT measured outcomes — including a 41 percent eastbound travel time reliability improvement and a 37 percent reduction in overall corridor crashes — and applied the lessons learned to future TSMO deployments statewide

BACKGROUND

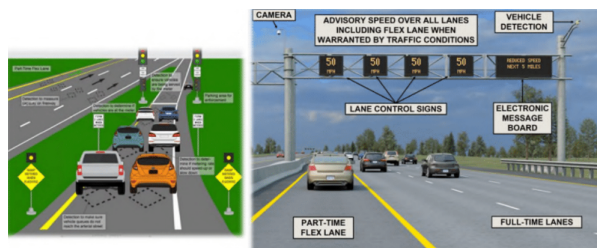
The I-96 Flex Route is Michigan's most comprehensive deployment of ATM to date, converting the inside shoulder of the freeway to dynamic, actively managed flex lane on both bounds, while integrating 166 lane control signs (LCS), 24 dynamic message signs, expanding coverage with 36 closed-circuit televisions, as well as integrating 8 ramp metering and variable speed advisories through coordinated response plans. Interstate 96 in Oakland County is a critical regional corridor in the Metro Detroit area, supporting commuter travel, freight movement, and emergency response across Southeast Michigan. Prior to implementation of this project, the corridor experienced recurring peak-period congestion, unreliable travel times, and congestion-related crashes.

Recognizing that roadway widening was not feasible with current bridges. The Michigan Department of Transportation (MDOT) pursued TSMO solutions that could improve safety, congestion, and travel time reliability within the existing roadway footprint. These strategies increase capacity when needed, improve incident response, promote speed harmonization, and provide drivers with advance notice of roadway conditions. The I-96 Flex Route went live in March of 2025.

TSMO PLANNING, STRATEGIES, AND DEPLOYMENT

The project was planned and deployed as a single, actively managed corridor rather than a collection of standalone improvements to address all stakeholders and motorists' needs. The project originally started as only median work, then was selected as part of the Rebuilding Michigan bonding program to be a full reconstruct. The project had to be redesigned to meet the reconstruction guidelines and requirements. At its core, an MDOT branded "Flex Route" is an ATM system that allows for dynamically adjusting capacity and operations in response to real-

time conditions. Overhead gantries equipped with lane control signs provide clear, real-time direction to motorists, enabling operators to open or close lanes based on traffic conditions, incidents, or weather.



Ramp metering was deployed at entrance ramps along the corridor to manage traffic by regulating the rate at which vehicles enter the freeway during congested conditions. Ramp metering reduces merge-related turbulence, breaks up vehicle platoons, and stabilizes mainline flow through vehicle detection on the freeway mainline lanes and the entrance ramp monitoring capacity. This strategy complements the flex lanes by maintaining smoother speeds through known bottlenecks and improving overall system performance.

All field devices were fully integrated into MDOT's advanced traffic management system and operated by the Southeast Michigan Transportation Operations Center (SEMTOC). Centralized control allows the SEMTOC operations team to monitor conditions in real time, coordinate responses across the corridor, and make data-driven operational decisions.



COMMUNICATIONS PLANNING AND EXECUTION

Given the complexity and visibility of the project, communications planning and execution were integral to successful deployment. Internally, MDOT prioritized continuous coordination among SEMTOC, the Department of Technology, Management and Budget, designers, contractors, system integrators, and operations staff. Comprehensive device-level, subsystem-level, and system-level testing supported a smooth transition from construction to full operational use. SEMTOC also refined internal processes related to staff training, operational readiness, device monitoring, and work-order management, strengthening MDOT's institutional capacity to deliver future TSMO projects.

Externally, MDOT implemented clear and consistent public-facing communications to support driver understanding and compliance. MDOT developed a public information campaign through the use of videos, brochures, post cards and coordination with all local media highlighting the new system and what drivers should expect.

A robust operational testing period allowed MDOT to validate performance, make operational adjustments, and manage change in a controlled manner prior to live operations. Coordination and outreach with emergency responders further enhanced situational awareness and response capabilities along the corridor and enforcement. In the days leading up to activating and utilizing the Flex Route, media was brought to a safe location to view the system and inform the public on expectations and use.



OUTCOMES, BENEFITS, AND LEARNINGS

The I-96 Flex Route and Ramp Metering Project has produced measurable and documented mobility outcomes that align directly with NOCoE priorities. Post-deployment analysis presented at the 2026 Transportation Research Board Annual Meeting demonstrates significant operational improvements. Travel time reductions were most pronounced in the eastbound direction during the morning peak, historically the corridor's most congested condition. Westbound travel times also improved, with remaining congestion largely attributable to downstream lane drops outside the limits of the flex route.

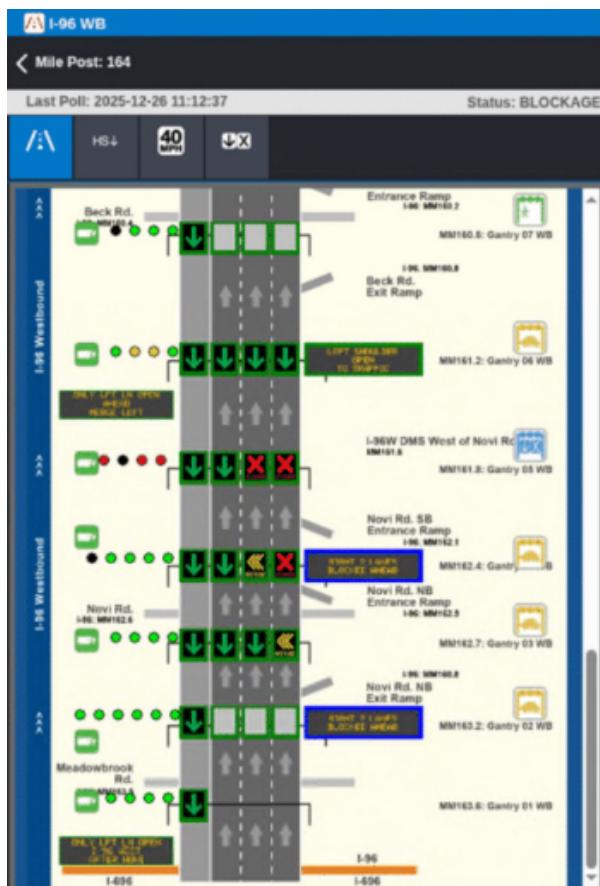
Travel time reliability improved substantially in both directions, with a 41 percent improvement eastbound and a 28 percent improvement westbound during peak hours.



These improvements reflect reduced day-to-day variability and more predictable travel conditions for commuters, freight operators, and emergency services. Time-of-day speed analysis further shows smoother peak-period speed profiles, indicating fewer stop-and-go conditions and reduced traffic shock waves.

Safety performance also improved following implementation as a result in part of the traffic smoothing and congestion. A comparison of pre-deployment conditions in 2019 to post-deployment conditions in 2025 indicates

reductions in congestion-related conflicts and improved incident management, with overall crashes in the corridor reducing by 37 percent, westbound peak hour crashes reducing by 18 percent and eastbound peak hour crashes reducing by 68 percent. The integrated ATM solution provides faster incident confirmation (through 100 percent closed-circuit television coverage), improved advance warning for incident scene protection, and more effective diversion when needed minimizing secondary crashes and exposure for responders and work crews. The ability to open the flex lane for incident or planned events restores capacity quickly and provides advance warning in real-time.



Beyond corridor-specific benefits, the project delivered lasting institutional value for MDOT. Enhancements to the advanced transportation management systems improved SEMTOC operations systemwide, and lessons learned

related to system integration, testing, stakeholder coordination, and operational readiness have been documented to be applied to additional ATM and ramp metering deployments across the state. These outcomes demonstrate the project's scalability and transferability.

CONCLUSION

The main goals of the I-96 Flex Route project were improved travel time reliability and safety. Dynamic shoulder lanes were implemented to reduce congestion, improve travel time reliability by providing consistent conditions and reduce crashes by providing speed advisories and advance notice of conditions ahead. The variable speed advisory reduced stop-and-go conditions. Dynamic ramp metering helped reduce platooning and improved on-ramp merging. The project delivered safer, more reliable travel for regional mobility and economic competitiveness.

The I-96 Flex Route and Ramp Metering Project demonstrates how implemented, integrated, and actively operated TSMO strategies can deliver meaningful improvements in congestion, travel time reliability, and safety. By prioritizing operations over expansion within limited right-of-way, MDOT delivered a scalable, cost-effective solution with lasting public benefit. The project advances NOCoE's mission by showcasing a performance-driven, repeatable approach to managing complex freeway corridors.