



## Traffic Management Systems (TMSs) Supporting the Use of Part-Time Shoulders

Part-time shoulder use (PTSU) involves converting roadway space primarily used as a shoulder to a lane for travel during specific hours of the day or for different types of vehicles. PTSU has been implemented on freeways and other related types of roadways to improve travel safety and reliability when conditions warrant. The use of PTSU as an operational strategy requires TMS to actively manage and operate traffic in response to recurring or nonrecurring conditions. Implementing and using PTSU can have a significant impact on various aspects of managing and operating a roadway and integrating with TMSs. Those impacts require adjustments to agency systems, policies, staffing plans, operational procedures, support resources, and control plans.

### DESIRED OUTCOMES

- Manage TMSs actively based on changing conditions and circumstances.
- Improve safety by reducing the number and severity of crashes.
- Alleviate congestion and increase system reliability by adding capacity at the times when capacity is most needed.
- Understand the information operators need to actively manage and operate PTSU.

### KEY ISSUES TO CONSIDER

- Policies, procedures, and staff resources to support the active management and operations of PTSU.
- Operations staffing and scheduling to enable and operate PTSU.
- Staff knowledge, skill, and ability to manage PTSU operations.

### BENEFITS

- Add roadway capacity only when necessary, allowing the shoulder to remain as a refuge for most hours of the day.
- Improve safety, reduce travel time, and improve travel-time reliability during PTSU times of operation.
- Reduce severity and number of crashes and improve reliability of travel.
- Help agencies address political, physical, and financial constraints.

### LESSONS LEARNED

- Agencies that implemented dynamic PTSU required more operator staff than static PTSU.
- Agencies that initially used dedicated operators to perform only PTSU operations were able to transition away from dedicated operators.
- Agencies found a benefit to training operators responsible for PTSU management in traffic operations and traffic flow theory.
- Agencies found a benefit in updating their SOPs before PTSU implementation.

## CURRENT PRACTICES

### New Jersey Department of Transportation (NJDOT) U.S. 1 Arterial Implementation<sup>(1)</sup>

<https://www.nj.gov/transportation/about/press/2017/061617.shtm>

- PTSU operates on a time of day and day of the week schedule.
- PTSU shoulder lane hours of operation are based on State statute, requiring an NJDOT Traffic Regulatory Order.
- NJDOT developed and executed policies, procedures, and communication protocols for effectively managing and operating PTSU during incidents or special events.
- NJDOT originally operated using staff dedicated to PTSU-only operations and later transitioned to a standard function performed by all operators.
- New employees undergo a week-long observation period to grasp the intricacies of managing this part-time shoulder lane before being allowed to manage the PTSU subsystem.

### Michigan Department of Transportation (MDOT) U.S. 23 in Ann Arbor<sup>(2,3)</sup>

<https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Projects-Studies/US-Route/US-23-Flex/US23-Flex-Final-Report.pdf?rev=ec5248017b0a46bb8afa33e6970381b0&hash=E729FFAA1B83E3BBFC47E7205F6167EF>

- MDOT implemented PTSU on U.S. 23 in the Ann Arbor area to address peak hour commute-related and special events-related congestion (figure 1).
- Deicer application timing in a PTSU lane during snow events presents a challenge. The application of deicer along a highway section may not coincide with the PTSU lane being open. Lack of traffic in PTSU can result in the deicer not activating and not being effective.
- No policy or staffing changes were implemented in the TMC except reallocating onroad maintenance personnel to sweep the lanes.
- Travel time was substantially improved.

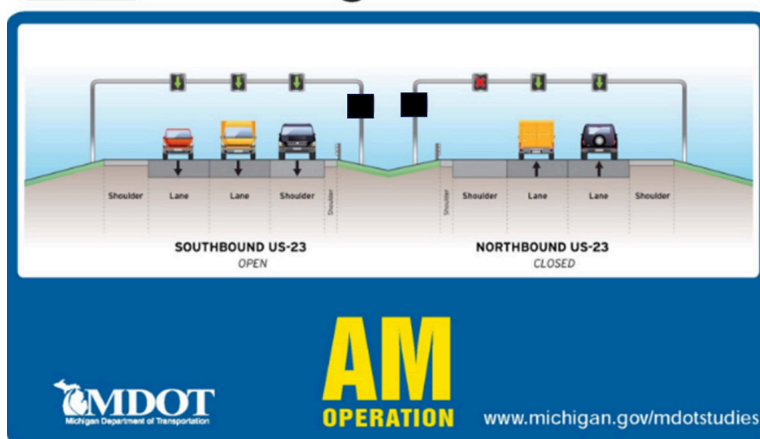
### Virginia Department of Transportation (VDOT)<sup>(5)</sup>

<https://vtrc.virginia.gov/media/vtrc-pdf/vtrc-pdf/17-R5.pdf>

- VDOT has operated PTSU for several years. In the Hampton Roads area, the I-264 shoulder is opened for the same 2 hr each direction on weekdays, although the I-264 shoulder can be opened dynamically when necessary. Commercial vehicles are restricted from using PTSU.
- The system added responsibilities for existing TMS staff when deployed, but no additional staff were necessary. Operators must be advanced in experience before they are assigned PTSU.



## Active Traffic Management



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AM = active management.

**FIGURE 1. Illustration. Active Traffic Management Configuration for U.S. 23 in Michigan.<sup>(2,4)</sup>**

## Georgia Department of Transportation (GDOT)<sup>(6)</sup>

[http://mydocs.dot.ga.gov/PublicOutreach/110600-/PDF/110600\\_PIOH\\_Welcome%20Packet.pdf](http://mydocs.dot.ga.gov/PublicOutreach/110600-/PDF/110600_PIOH_Welcome%20Packet.pdf)

- GDOT's PTSU lane operates on I-85 northbound in a peak period schedule. However, the PTSU lane can also be activated or remain open as needed outside these scheduled times to alleviate congestion or respond to incidents. Trucks and buses are restricted from using the shoulder when PTSU is allowed.
- Senior operators (TMC specialists) are responsible for activating the PTSU system, and other operators on staff perform sweeps and make recommendations for activation to the TMC Specialists. Standard operating procedures (SOPs) for activating and managing PTSU are reviewed annually.

## Washington State Department of Transportation (WSDOT)<sup>(7)</sup>

<https://wsdot.wa.gov/travel/roads-bridges/part-time-shoulders>

- WSDOT successfully implemented PTSU on various corridors, including I-405 (figure 2), Highway 2, and Highway 14.
- WSDOT designated transportation engineer positions for the operation of PTSU because WSDOT recognized that operating the PTSU system required more advanced capabilities than less experienced operators had.



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**FIGURE 2. Photo. Part-Time Shoulder on I-405.**

## CONSIDERATIONS WHEN PLANNING FOR TMS SUPPORT OF PTSU

- Evaluate staffing resources and capabilities to manage and operate PTSU.
- Identify training needs to effectively operate PTSU.
- Integrate PTSU operational strategy into TMSs.
- Assess TMSs' capabilities to allow operators to monitor, evaluate, and report on travel conditions.
- Consider PTSU to mitigate adverse impacts of changing traffic and roadway conditions.
- Explore operational considerations when implementing or extending the use of PTSU along a roadway section or corridor or an entire region.
- Review policies and processes to actively manage and operate PTSU.
- Review legislation, policies, and procedures to operate PTSU.

## ISSUES TO CONSIDER WHEN INCORPORATING PTSU INTO TMSs

- Agencies may implement PTSU based on times of day and days of week or traffic conditions.
- Agencies may implement PTSU with other TMS strategies (e.g., variable speed limits, dynamic lane management, display of queue warning messages).
- Agencies may need to integrate intelligent transportation system devices to support TMSs in managing and operating PTSU.
- Agencies may need to change legislation, policies, or operating procedures for PTSU.
- Agencies may need to automate TMS operation of PTSU to achieve desired safety and operational results.
- Agencies may need to increase TMC operator staffing and training.
- Agencies may need to communicate PTSU status to vehicles upstream of the shoulder.
- Agencies have indicated the need for TMSs to have the capability to communicate with emergency responders and other agencies.

## REFERENCES

1. NJDOT. 2017. "Route 1 Congestion Relief Project Will Use Shoulder as Travel Lane During Peak Commuting Times in South Brunswick." June 16, 2017 news release. <https://www.nj.gov/transportation/about/press/2017/061617.shtm>, last accessed July 22, 2024.
2. Jenior, P., R. Dowling, B. Nevers, and L. Neudorff. 2016. "Implementation Process." Chapter 8 in *Use of Freeway Shoulders for Travel—Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy*. Report No. FHWA-HOP-15-023. Washington, DC: Federal Highway Administration. <https://ops.fhwa.dot.gov/publications/fhwahop15023/ch8.htm>, last accessed August 20, 2024.
3. MDOT and Michigan State University. 2021. *Evaluation of an Active Traffic Management System with Part-Time Use of the Inside Shoulder*. Report No. SPR-1706. East Lansing, MI: MDOT. <https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Projects-Studies/US-Route/US-23-Flex/US23-Flex-Final-Report.pdf?rev=ec5248017b0a46bb8afa33e6970381b0&hash=E729FFAA1B83E3BBCF47E7205F6167EF>, last accessed July 21, 2024.
4. MDOT. 2024. "Studies" (web page). <https://www.michigan.gov/mdot/projects-studies/studies>, last accessed September 18, 2024.
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6. GDOT. 2014. *Welcome packet for the Public Information Open House for the proposed I-85 Express Lanes Extension Project*. Atlanta, GA: GDOT. [110600-PIOH-Welcome Packet.pdf \(ga.gov\)](https://www.gdot.ga.gov/110600-PIOH-Welcome-Packet.pdf), last accessed July 25, 2024.
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### FOR MORE INFORMATION on other TMC practices or the TMC Pooled-Fund Study:

- Traffic Management System portal (NOCoE): <https://transportationops.org/traffic-management-systems-and-centers>.
- TMC PFS website: <https://tmc pfs.ops.fhwa.dot.gov/>.
- Part-Time Shoulder Use web page: <http://ops.fhwa.dot.gov/atdm/approaches/ptshoulderuse.htm>.
- Hard Shoulder Running Fact Sheet v2.0: <https://www.cedr.eu/docs/view/629f3cd6e8920-en>.

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