pennsylvania
DEPARTMENT OF TRANSPORTATION

Transportation Systems Management & Operations

Introduction

90% of all congestion is **non-recurring** such as weather, traffic incidents, and roadwork.

The Pennsylvania Department of Transportation (PennDOT) leverages **emerging and innovative operational strategies to address reliability, mobility, and congestion challenges.** Collectively, these strategies comprise PennDOT's **Transportation Systems Management & Operations (TSMO)** Program, which is administered by the Bureau of Operations (BOO). Congestion occurs when traffic demand exceeds the available capacity and can occur if there is a surge in demand, a reduction in physical capacity, or a combination of both. The strategies we deploy help us proactively manage congestion and the constantly changing situations on the roads. This annual report monitors the progress of PennDOT's TSMO Program in achieving our goals and objectives during 2022.

Our Program Goals

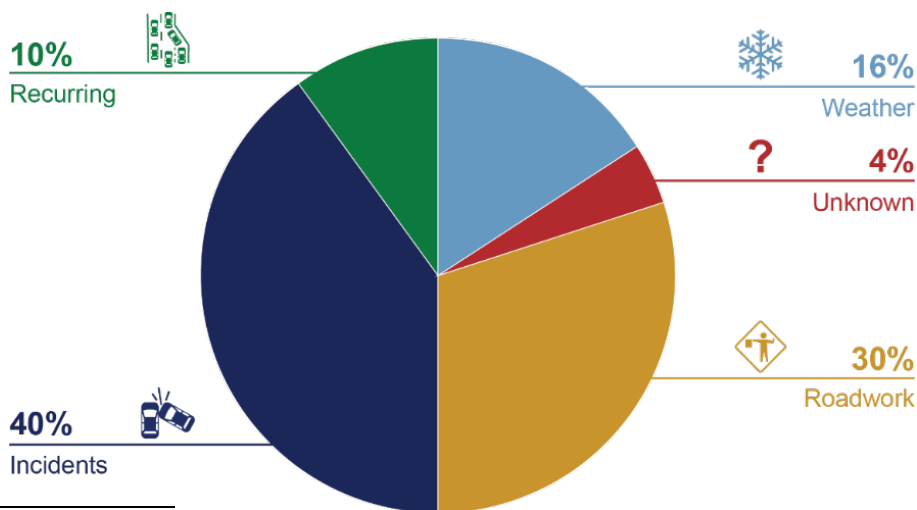| TSMO Goals	Causes of Congestion	Objectives
Minimize Traffic Impacts During Unplanned Events	Traffic Incidents	Minimize the incident influence time
		Improve mobility on identified detour routes
	Inclement Weather	Manage mobility during weather events
		Minimize the weather event clearance time
Maintain Mobility During Planned Events	Work Zones	Optimize work zone mobility
	Special Events/Other	Improve mobility during special events
Mitigate Recurring Congestion	Bottlenecks	Reduce vehicular demand during peak hours
		Improve capacity during peak hours
	Poor Signal Timing	Optimize the timing of traffic signals

Identifying and Classifying Congestion

Understanding congestion is central to achieving the goals of PennDOT's TSMO Program. The three main activities included in this process are:

1. Identifying congestion
2. Classifying congestion
3. Mitigating congestion

BOO is using performance data for the PennDOT Core Roadway Network[1] to drive business decisions for TSMO-related improvement strategies and projects. Project and operational-specific investments are being made to directly address the core causes of congestion. PennDOT's Traffic Systems and Performance Unit created a Pennsylvania-specific congestion pie chart to classify congestion at statewide, regionwide, districtwide, and corridor levels. The **congestion pie chart was named "Best Overall Winner"** at the National TSMO Awards by the National Operations Center of Excellence (NOCoE) in 2021 for the insights revealed by applying and analyzing the congestion pie chart with real-world data, such as the impact of crowd-sourced data on detecting incidents early, rubbernecking as a form of congestion, and the severity of work zone congestion and its ties to safety.

DATA SOURCES		
PennDOT: Road Condition Reporting System (RCRS)		
PennDOT: Crash Reporting System (CRS)		
PennDOT: Road Weather Information System (RWIS)		
PennDOT: ECMS Maintenance Database		

PENNSYLVANIA-SPECIFIC CONGESTION PIE CHART[2]

10% Recurring
16% Weather
4% Unknown
30% Roadwork
40% Incidents

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[1] PennDOT's "Core Roadway Network" was established in 2011 for 511PA, and includes 3,885 miles of PennDOT-owned interstates, limited access roads, and other major routes throughout the Commonwealth of Pennsylvania.
[2] Congestion pie chart data represents average causation from CY 2018 – CY 2021.

Mitigating Congestion

Incidents

Objectives

- ▲ Minimize the incident influence time
- ◆ Improve mobility on identified detour routes

40% Incidents

Traffic incidents cause approximately 40% of all congestion in Pennsylvania, including crashes, vehicle breakdowns, roadway debris, and rubbernecking. Rubbernecking occurs when incidents on the shoulder or opposite side of the road distract drivers even though all travel lanes are open and unrestricted. Since we do not know where and when incidents will occur, the first objective is to minimize the duration of time the incident influences travel on the roadway where it occurred and parallel diversion routes.

> To improve incident response along I-81, District 8-0 expanded its Safety Service Patrol to reduce minor crash and other incident congestion. Vehicle incidents account for 56% of all congestion on I-81.

Recent Milestones

Traffic Operations Analytics (TOA) Tool Incident Timeline ▲
The incident timeline module within the TOA tool shows when incidents occurred, how they were detected, how long it took them to be cleared, and their overall impact on traffic. **TOA establishes a baseline and a means to measure our improvement in incident management.**
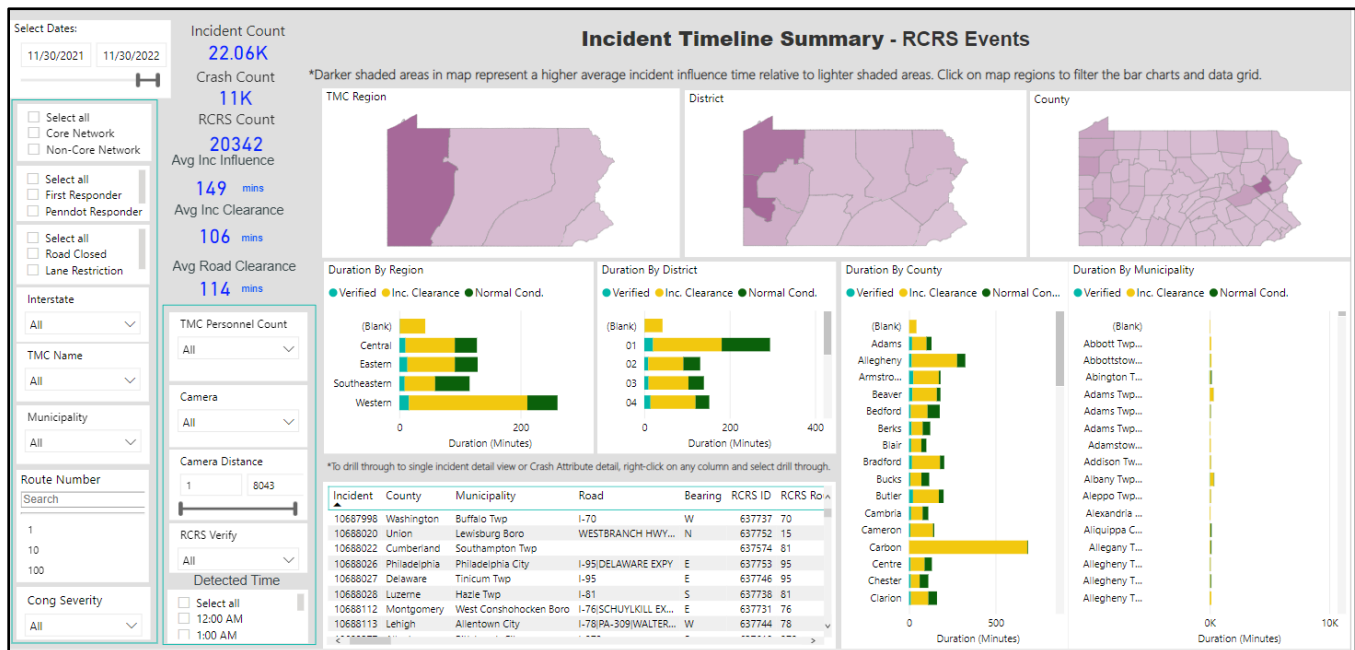
Modernized Video Sharing ▲ ◆

Video feeds from PennDOT-owned cameras have been available to public-agency third party incident management partners using a web-based video sharing solution, MView, since the fall of 2021. **Allowing first responders access to PennDOT-owned cameras helps improve their situational awareness** by viewing aerial footage of an incident. Camera access also allows responders to view incidents before arriving at the scene, gaining a better understanding of what equipment needs to be deployed. Better coordinated responses with Traffic Management Centers (TMC) help reduce the time to clear incidents.

Traffic Management Center (TMC) Bootcamp Training ▲ ◆

PennDOT's four Regional TMCs are the front line for traffic management and **key to their efforts of effectively moving people and goods during changing roadway conditions**. The Bootcamp provides a week-long training for TMC operators and supervisors covering all aspects of TMC operations, including policies, procedures, and best practices. Not only do all new hires receive training; but refresher courses are also available.

DISTRICTS AND REGIONS
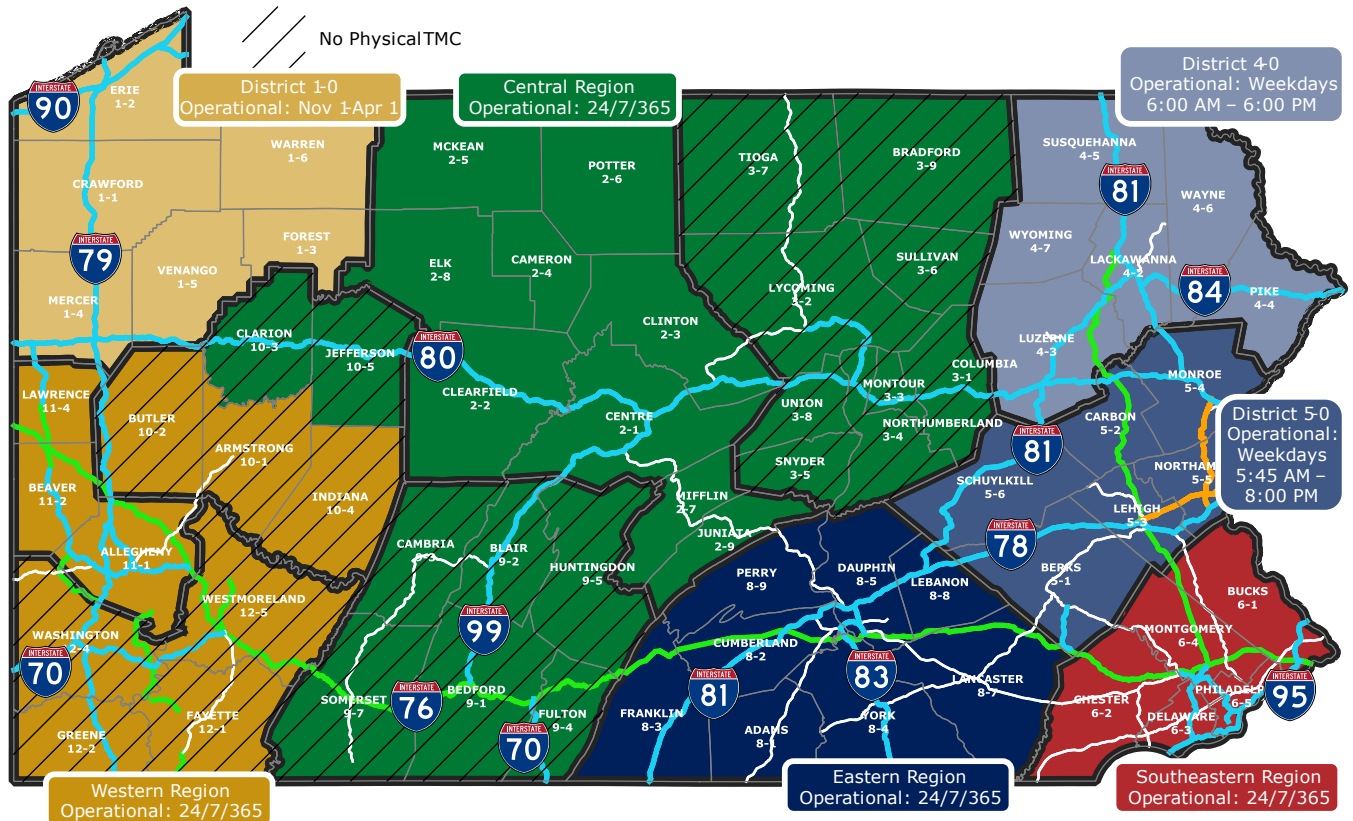
Future Innovations

Traffic Signal Incident Timing Plans ▲ ◆

Using capabilities in PennDOT's Unified Command and Control (UCC) software to remotely manage traffic signals, action sets can be created for Regional TMC operators to easily activate and deactivate special traffic signal timings to handle diverted traffic due to incidents on nearby freeways and expressways.

Expanding Video Sharing Partnerships ▲ ◆

The next step in leveraging video sharing and the MView platform is to expand partnerships with other entities. Integrating other sources, such as video from city cameras and other public venues, into MView and allowing it to be accessible to first responders will dramatically **improve situational awareness and help manage nonrecurring congestion.**

Establish Traffic Incident Management (TIM) Liaisons ▲ ◆

TIM is a coordinated, multi-disciplinary process to **detect, respond to, and clear incidents as safely and efficiently as possible.** PennDOT is working to establish TIM liaisons for each TMC and identify a Statewide TMC TIM liaison. The liaisons will work with local first responders to ensure consistency, share best practices and performance data, and improve TIM moving forward.

Computer-Aided Dispatch (CAD) Integration ▲

Today, Regional TMCs must communicate with County 911 Centers for information about traffic incidents or log into separate county incident websites. This manual information sharing is time consuming and inefficient. Integrating CAD data from County 911 Centers directly into PennDOT's Advanced Transportation Management System (ATMS) would greatly improve PennDOT's ability to detect, respond to, and clear incidents. Real-time data sharing would help minimize the incident influence time and the time responders are exposed to traffic. As part of a proof-of-concept project, **the Central Region's TMC integrated CAD data into standard operating procedures, which improved incident detection and reduced incident duration.**
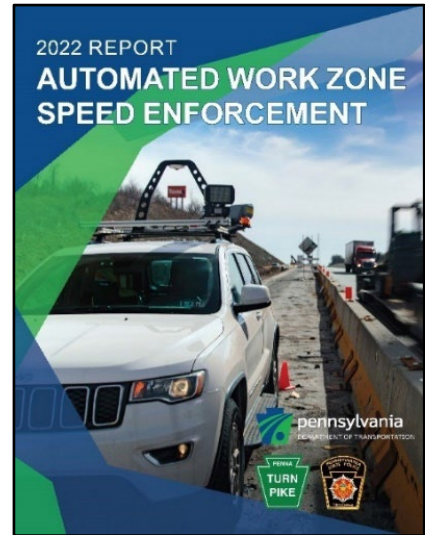
Roadwork

Objective

⬡ Optimize work zone mobility

Roadwork, or work zones, are activities that occur to maintain or improve the transportation infrastructure. Temporary traffic control measures may reduce the number of travel lanes, shift lanes, close shoulders, or reduce roadway capacity increasing travel times and the potential for back-of-queue crashes. The constrained environment makes incident clearance more challenging, so reducing crashes is essential to maintain mobility in work zones.

30% Roadwork

2022 REPORT
AUTOMATED WORK ZONE SPEED ENFORCEMENT

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PENNA TURNPIKE

Recent Milestones

Automated Work Zone Speed Enforcement (AWZSE) ⬡

AWZSE is a joint safety program between PennDOT, PA Turnpike Commission, and the PA State Police. Authorized by Act 86 of 2018 as a 5-year pilot program, AWZSE has led to a **25% reduction in fatal crashes and helped us achieve a reduction of 100 overall crashes annually in work zones**. Excessive speeding, greater than 11 MPH over the speed limit, has been reduced to 3% in work zones since its introduction.

> For a project in Berks County, PennDOT used FREEVAL-PA to run different work zone time scenarios and identify the best time to allow a contractor to extend their working hours to complete the project.

FREEVAL-PA ⬡

In 2021, PennDOT established the FREEVAL-PA road user delay and queuing assessment tool. This tool replaces outdated methodologies to better evaluate work zone impacts on limited access highways using simulation and modeling capabilities. Deployment included seven self-paced training modules, a website, and recurring quarterly user group meetings to discuss use cases and enhancements.
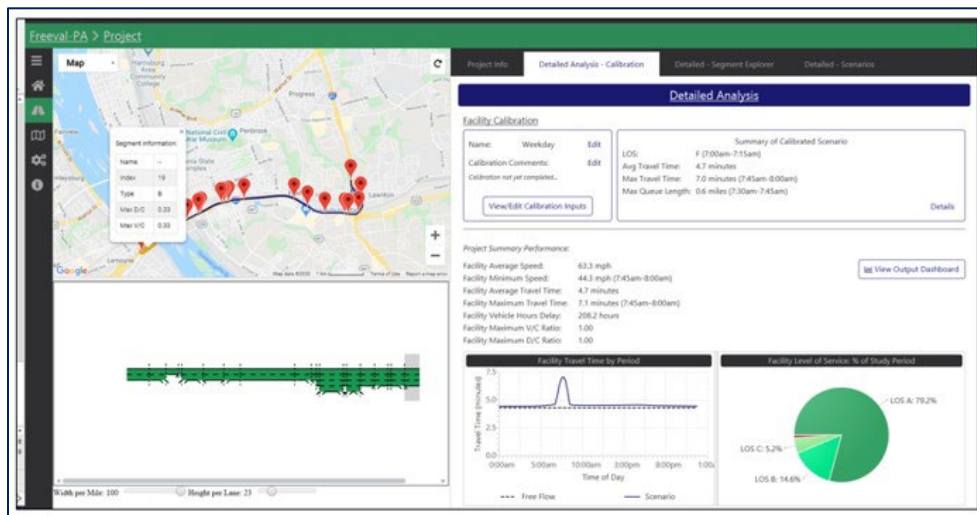
Speed Harmonization and Work Zone Speed Limit Policy ⬡

Speed harmonization is a method to **reduce congestion and improve traffic performance**. This method is applied at points where lanes merge and form bottlenecks, like in work zones. Research shows that speed variation is generally higher when there is a work zone present and therefore, so are crash risks. The **Department has developed a policy to ensure a consistent, data-driven process for determining appropriate work zone speed limits**. This policy indicates that all work zones should be **designed to accommodate the existing posted speed limit** whenever possible. Innovations for harmonizing speeds are referenced throughout this document and could include AWZSE, Variable Speed Limits (VSL), and Wok Zone Data Exchange (WZDx).

Virtual Queue Protection ⬡

The Department's ATMS command and control software can now pre-define "virtual queue protection corridors" for work zones and known backup locations. Using INRIX speed data, this feature can automatically change upstream message signs when speeds drop below a defined threshold. Without the need for additional field detection equipment, this tool helps reduce rear-end crashes by alerting motorists ahead of stopped/slowed vehicles. **Queue warning systems have been shown to reduce crashes by 18% to 45%[3].**


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[3] Source: *https://www.itskrs.its.dot.gov/node/209197*
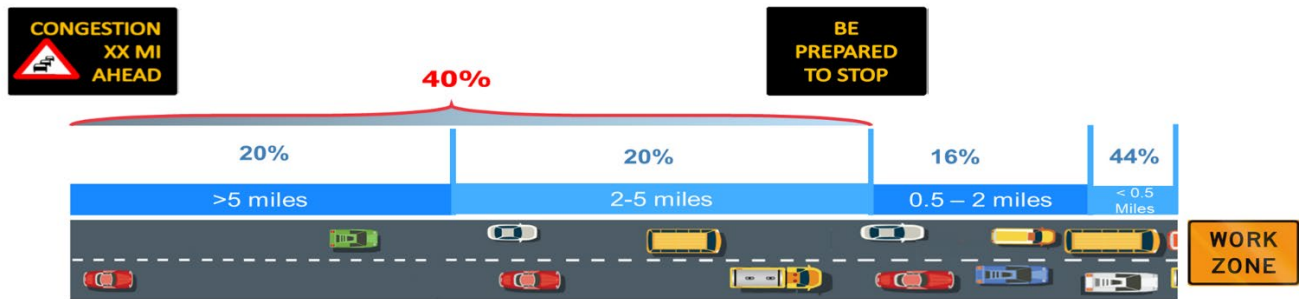
Future Innovations

Lane Reservation System (LRS)

LRS will provide PennDOT with a tool to better manage the reservation, review, and approval of lane restrictions for roadwork, utility work, and other roadway uses. In doing so, it will help with **worker/motorist safety, limit work zone conflicts, lead to more effective work zone operations, and improve mobility**. The information entered into LRS will generate the first comprehensive work zone centric database that can then be shared with internal and third-party applications to provide the most accurate work zone information.
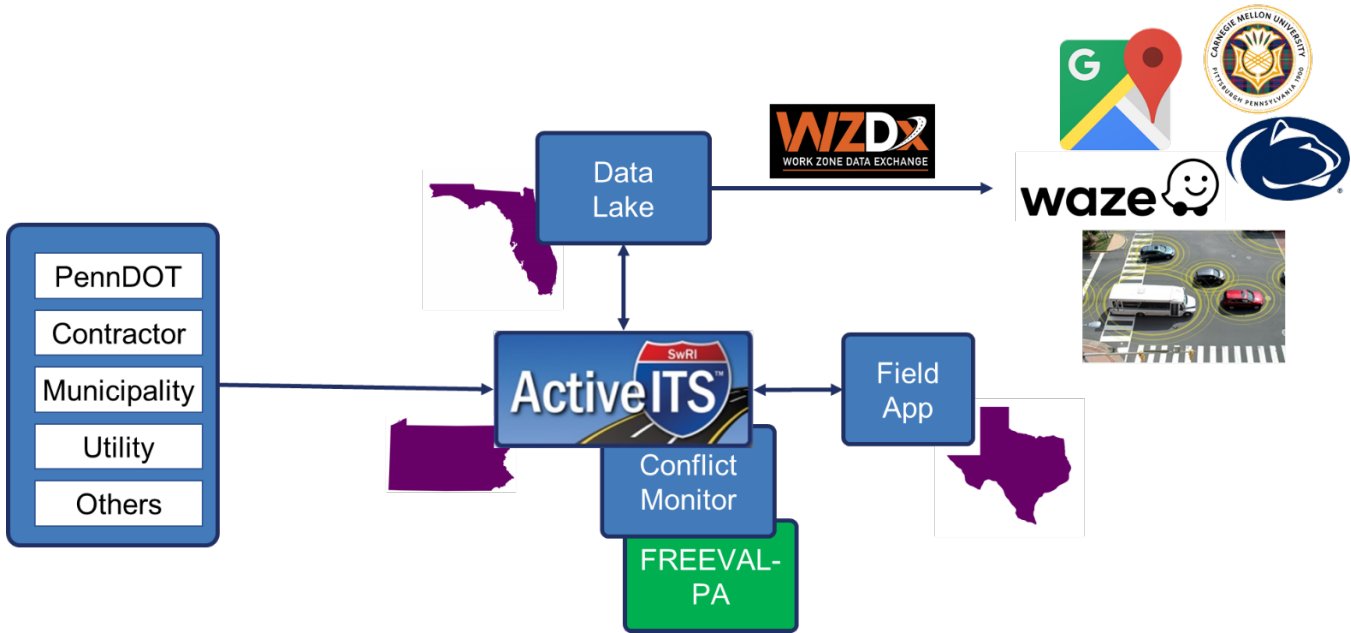
Work Zone Data Exchange (WZDx)

The U.S. Department of Transportation is leading an initiative for state transportation agencies and other infrastructure owners and operators to standardize work zone data. This initiative, called the Work Zone Data Exchange (WZDx), created a standard work zone data feed specification to facilitate the use of work zone data by third parties. **Third parties having easy access to work zone data will allow for more widespread use of the data, enhancing traveler information, compounding research knowledge, reducing congestion from work zones, and making roadways and workers safer.**

Automated Work Zone Speed Enforcement (AWZSE) Reauthorization

The current AWZSE program described above has a legislative sunset date of February 16, 2024. The program is **proving to be effective in decreasing speeds and increasing safety across the state**. The data from the current program should be shared to encourage the state legislature to take action to extend the program or make it permanent.

47%
of fatalities in work zones result from drivers speeding or driving too fast for conditions

A Customer Focus

Congestion not only burdens the traveling public with additional delay and unnecessary costs, but it also impacts the safety of travelers. PennDOT uses a variety of communication methods to **provide customers with the information they need to make informed decisions about their travel plans and to help ensure their safety**. Traditional traveler information methods include the 511PA website, 5-1-1 phone number, and ITS devices like Changeable Message Signs (CMS). Innovative technologies and partnerships with third parties have created new opportunities for BOO to share traffic information with the traveling public.

> *i* Drivers, our customers, rely on information to make millions of decisions about their trips daily. PennDOT is collecting and converting data into consumable information and pushing it to our customers.

What are we doing?

511PA Enhancements

The 511 Pennsylvania website is part of a statewide travel information service that **provides reliable traffic, weather, and transit information to travelers**. Using real-time traffic data from various sources throughout the state, we provide current information to commuters, travelers, and commercial carriers so they can make informed decisions regarding their next drive to work, trip, or delivery. By providing this information to travelers, *511 Pennsylvania helps to keep traffic moving*.

511PA has added new features for the traveling public. Many of the additions have focused on commercial vehicles including weather-related vehicle restrictions, a commercial vehicle profile for mobile devices, and low clearance bridge data.

Third-Party Data Sharing

PennDOT recently established a data sharing agreement with Waze to provide real-time incident, road closure, speed limit restriction, and roadwork information. As part of the agreement, PennDOT can access Waze user-reported travel information to **enhance operational awareness and disseminate critical traveler information** more quickly to customers.

Where are we going?

Virtual ITS
Highway Advisory Radios (HAR) technology has become a less effective tool in recent years, largely due to its limited bandwidth and reliance on AM radio. **Geo-targeted "virtual" HAR will open opportunities to share information about major traffic events**, unrestricted by the location of an ITS device along the road. This information will be available through 511 via the website, mobile app, and by calling the regional 5-1-1 traffic report.

Fiber Backbone Plan
A Fiber optic communication backbone network is:

- More **secure** and **reliable**
- Expands **bandwidth** and improves **scalability** of the Department's ITS network
- **Reduces reoccurring costs**
- **Reduces the risk of downtime**

Additionally, an adopted Fiber Backbone Plan allows for conduit installation to be **included in roadway and bridge projects** across the state which **reduces future infrastructure costs** during fiber installation in those conduits.

Next Generation Data Sharing
PennDOT plans to create a **data lake** which will be a central repository to store, manage, and integrate data from **hundreds of sources**. This will enable:
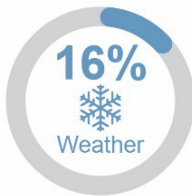
- Advanced **analytics**
- Real-time **decision-making**
- Facilitating insights to **internal stakeholders** and **external partners**.

This information will ultimately be **provided to drivers** via onboard units, apps, news broadcasts, or ITS devices.

Weather

Objectives

- ● Manage mobility during weather events
- ■ Minimize the weather event clearance time

16% Weather

Inclement weather conditions reduce the effective roadway capacity as vehicle spacing increases and speed decreases by drivers adjusting to reduced visibility and/or road surface traction. Warning motorists of changing conditions and minimizing crashes are critical to maintaining mobility during inclement weather events.

Recent Milestones

Variable Speed Limit (VSL) Deployments ●

Throughout February and March 2022, PennDOT deployed 14 Variable Speed Limit, or VSL, signs along I-80 in Clearfield County (District 2-0) in collaboration with the Pennsylvania State Police, and lowered speed limits six times. Preliminary results show this low-cost innovative solution **effectively slowed traffic when conditions warranted and reduced or eliminated crashes**. This pilot program was expanded to 63 locations, to include high-crash areas in District 4-0, 5-0, 8-0, and 10-0, for winter 2022-23 to quickly reduce speed limits when visibility or roadway conditions call for slower speeds. Permanent speed limit signs were covered while the program was active. The normal posted speed limit was displayed on the VSL unless visibility or winter weather conditions called for slower speeds. When speed limits were reduced, a yellow light at the top and bottom of the VSL flashed to ensure motorists were aware of the change.

Speed Limit and Vehicle Restrictions ●

In conjunction with the Pennsylvania Emergency Management Agency, State Police, and Turnpike Commission, PennDOT created a travel restriction and ban framework that includes considerations, timelines, and decision points for travel restrictions and bans during inclement winter weather conditions. The framework also contains communications procedures for disseminating information regarding travel restrictions and bans.

The framework has helped the Department move from being reactive to being proactive **to prevent winter weather incidents from occurring**. This has resulted in the implementation of a strategy to restrict or ban certain types of commercial and motor vehicle use on limited-access highways during times of inclement winter weather to prevent extended duration closures and the resultant life threats to the motoring public.

Future Innovations

Automate Hazardous Winter Driving Messages ⬤

Specific weather conditions have been determined to increase the likelihood of crashes. An update to the TMC's command and control software will support automated messages to alert motorists as they approach a confirmed hazardous winter condition. **Better-informed, alerted motorists will drive more carefully,** reducing crashes due to inclement weather.

Road Weather Information Systems (RWIS) ⬤

RWIS uses roadway field sensors to monitor past, present, and forecasted road weather data and **provide better situational awareness by understanding changing weather conditions**.

PennDOT has a robust network of RWIS deployments, with only a few gaps in coverage. These gaps have been identified and future RWIS are planned. After future RWIS are deployed, 92% of state roads will be within 15 miles of an RWIS.
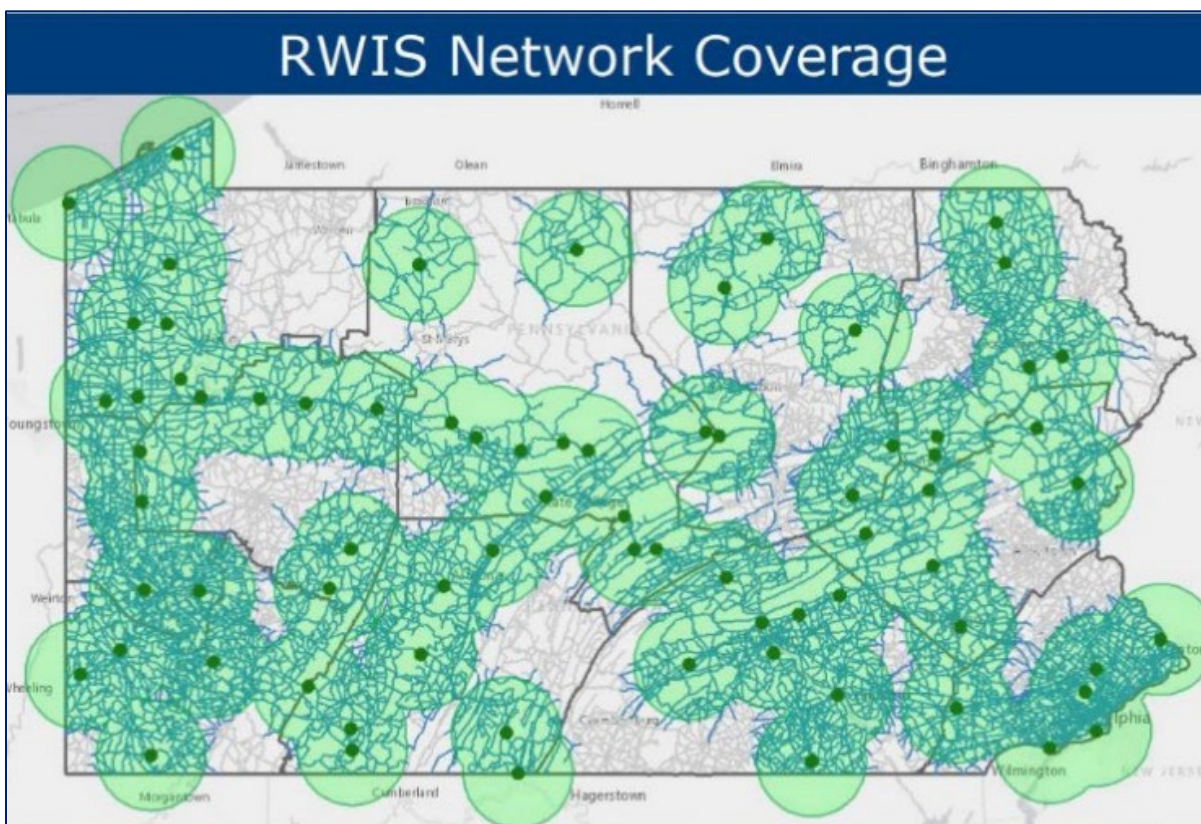
Weather Dashboard ⬤ ◼

BOO is creating a weather dashboard that consolidates and disseminates key weather and reference data to **support operational decision-making** at the statewide, district, and regional level. The dashboard will allow a user to view statewide weather conditions and trends or weather data at specific locations.

Recurring

Objectives

- ◣ Reduce vehicular demand during peak hours
- ▬ Improve capacity during peak hours
- ▶ Optimize the timing of traffic signals

10% Recurring

Recurring congestion occurs when there are more vehicles on the roadway than the roadway capacity can accommodate. Traditionally, transportation agencies addressed this type of congestion through capacity-adding highway projects, which required a significant amount of time and money to construct. Over the past few years, new technologies and approaches have been developed that leverage TSMO solutions. **These solutions address recurring congestion more quickly and at a fraction of the cost of capacity-adding highway projects.**

Recent Milestones

Integrated Corridor Management (ICM)   ▬ ▶

The I-76 ICM project consists of a variety of strategies to improve mobility along the Schuylkill Expressway and the nearby region. The first strategy, completed in the summer of 2021, deployed 72 VSL devices which determine the speed limit using an intricate algorithm of real-time vehicle speeds. The system is designed to reduce speed limits one mile upstream of a slowdown and can also post appropriate queue protection messages on integrated CMS.
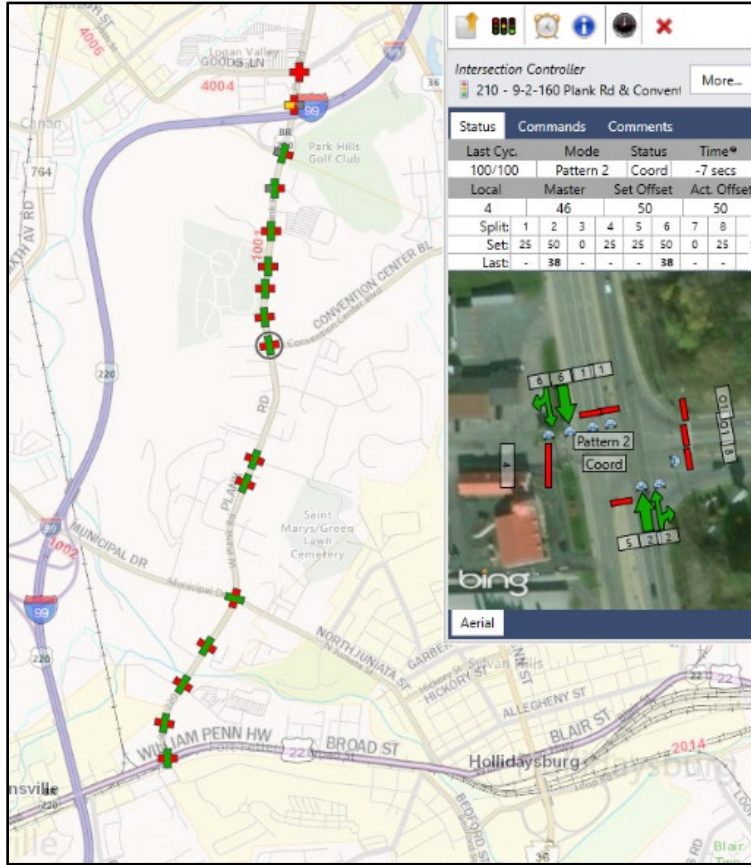
As part of another ICM strategy, PennDOT took ownership of 57 traffic signals along routes adjacent to I-76. Historically, the traffic signals have been managed by three individual municipalities and have not been coordinated. By taking over ownership, PennDOT modernized the signal equipment and communications to actively control signal operations from a central location. The modernization also coordinated signals to provide better progression along the routes during normal conditions and allows PennDOT to implement incident response timing plans if traffic needs to be detoured from I-76.

Additional ICM strategies[4] (e.g., dynamic junction control, ramp metering, flexible lane use, and queue detection) are planned along I-76 to decrease congestion, reduce crashes, and provide real-time roadway information to drivers. **Across the nation, ICM projects have been shown to reduce delay by 40% and have a benefit to cost ratio of 25:1**[5].

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[4] Source: *Smart Corridor Initiatives | (transform76.com)*
[5] Sources: *https://ops.fhwa.dot.gov/publications/fhwahop21054/index.htm*
        https://ops.fhwa.dot.gov/fastact/atcmtd/2017/applications/penndot/project.htm

Traffic Signal Unified Command and Control (UCC) ▶

UCC is PennDOT's web-based software approach for streamlining statewide traffic signal operations remotely from TMCs. Currently, the software is connected to more than 700 traffic signals. **This connection allows traffic management staff to adjust signal timings based on traffic conditions and implement incident timing plans.**

Future Innovations

Proactive Management of Signals ▶

As PennDOT takes ownership of select signals, we will quickly identify and correct issues that hinder operations. We will also be moving towards a proactive approach of conducting preventative maintenance to ensure equipment is in good working order and identifying and correcting potential issues before they occur. **A proactive operations approach will lead to better traffic flow** as signal timings can be adjusted to fit changing conditions in the field.

Leveraging Performance Measures ▶

Poorly timed traffic signals contribute to traffic congestion on arterial roadways. Automated Traffic Signal Performance Measures (ATSPM) use what's known as "high resolution" data from signal controllers to pinpoint maintenance and operational issues at signalized intersections so that necessary improvements can be made. **Adjusting signal timings in real-time will improve throughput and safety for all users.**

Flex Lanes on I-476 ▬

To alleviate traffic congestion on I-476 between the PA 3 and I-95 interchanges, the existing roadway shoulders will be upgraded and overhead gantries with signs and ITS devices will be installed. These improvements will **provide the ability to dynamically manage recurrent congestion based on prevailing and predicted traffic conditions by opening and closing the roadway shoulder to travel.**
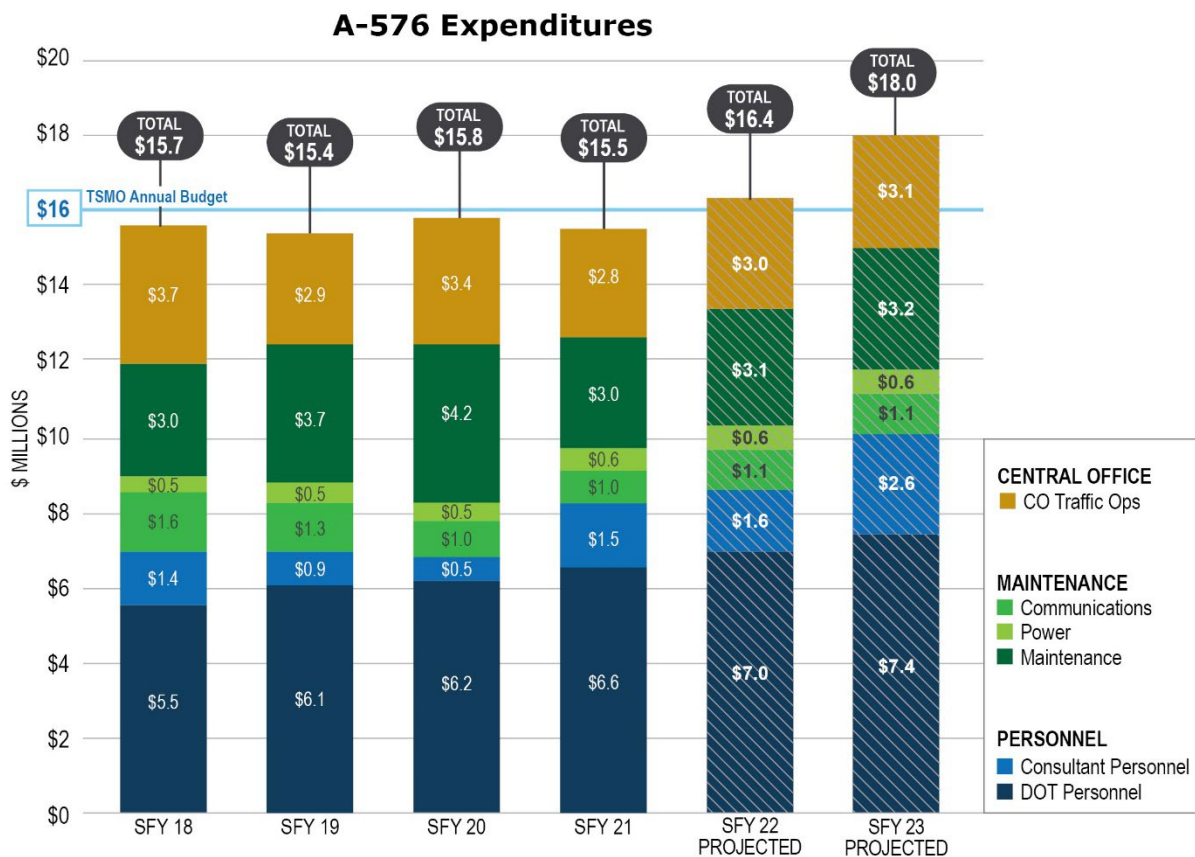
TSMO Investments

Highway Technology Funds have remained stagnant since 2018 creating an anticipated $2M shortfall in funding to maintain existing operations and maintenance

TSMO Funding

Highway Technology Funds

BOO manages several funding sources to deploy, maintain, and operate TSMO solutions that improve travel time reliability and help mitigate congestion:

- **PennDOT Central Office** funds are used to build and maintain statewide systems, such as TSMO OneMap, ATMS, and planning studies that identify TSMO projects to implement.
- **Maintenance** funds are spent on the upkeep of TSMO strategies through routine and emergency maintenance. This includes field device hardware, power, communications, and software systems.
- **Personnel** funds are used for PennDOT and consultant staff to manage the TSMO program, complete TSMO initiatives, and operate the TMCs.

These funding sources have been spent to identify, classify, and mitigate congestion, most of which is nonrecurring – the 90% piece of the statewide congestion pie chart. **The combination of a fixed Highway Technology appropriation (A-576) at $16 million (since state fiscal year 2018) and additional costs due to a growing number of devices and systems has diminished the ability of a fixed appropriation to cover basic operations.** For fiscal year 2023, BOO predicts over $18 million is needed to maintain the current level of operations.

A-576 Expenditures

	SFY 18	SFY 19	SFY 20	SFY 21	SFY 22 PROJECTED	SFY 23 PROJECTED
TOTAL	$15.7	$15.4	$15.8	$15.5	$16.4	$18.0
CO Traffic Ops	$3.7	$2.9	$3.4	$2.8	$3.0	$3.1
Maintenance	$3.0	$3.7	$4.2	$3.0	$3.1	$3.2
Power	$0.5	$0.5	$0.5	$0.6	$0.6	$0.6
Communications	$1.6	$1.3	$1.0	$1.0	$1.1	$1.1
Consultant Personnel	$1.4	$0.9	$0.5	$1.5	$1.6	$2.6
DOT Personnel	$5.5	$6.1	$6.2	$6.6	$7.0	$7.4

TSMO Annual Budget $16

CENTRAL OFFICE
- CO Traffic Ops

MAINTENANCE
- Communications
- Power
- Maintenance

PERSONNEL
- Consultant Personnel
- DOT Personnel

Grant Programs

BOO is responsible for obligating funds of the TSMO Funding Initiative (TFI), Green Light-Go (GLG), Automated Red Light Enforcement (ARLE) Transportation Enhancements, and Traffic Signal Technologies Grant (TSTG) programs. The GLG, ARLE, and TSTG programs were established to aid municipal and planning partners in addressing congestion and safety on state and local road networks.

Green Light-Go (GLG) Program

GLG is a competitive state grant program designed to improve the efficiency and operation of existing traffic signals. GLG has funded 548 projects in the first seven rounds since inception in 2014, representing an investment in traffic signals of more than $136 million.

Automated Red Light Enforcement Program

ARLE is a competitive state grant program designed to fund mobility and safety projects to address capacity issues, signal operations/efficiency, road user safety, and fund vulnerable road user improvements. ARLE has funded 537 projects since inception in 2010, representing an investment of more than $127.79 million to improve mobility and operations for all modes of transportation.

Traffic Signal Technologies Grant

TSTG is a new competitive state program designed to assist municipalities with installation and maintenance of traffic signal technologies. TSTG was established in 2022 as part of Act 54 which provides an additional $5 million annually for signal technology deployments.

TSMO Funding Initiative (TFI)

This program provides set-aside capital federal funding to incentivize regional TSMO projects and has helped to advance statewide initiatives by providing up to $5M annually that requires a 50/50 match by the District or MPO. Projects are selected in conjunction with the biennial TIP update cycle.

National System Performance Measurement

The Federal Highway Administration requires State departments of transportation and metropolitan planning organizations to report standard performance measures for the National Highway System (NHS). The purpose of this requirement is to increase accountability and transparency of the Federal-aid highway program and improve project decision-making through performance-based planning and programming.

Per federal rulemaking, PennDOT is responsible for measuring travel time reliability (TTR), which refers to the consistency of travel times on a particular route or mode of transportation. It's a measure of how accurately a person can predict how long it will take to travel from one place to another. Factors that affect travel time reliability include the different elements of the congestion pie chart: recurring congestion, weather, roadwork, and incidents.
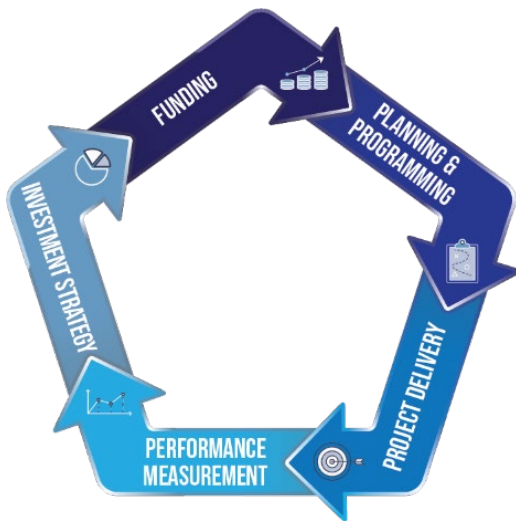

Implementing TSMO strategies that target the nonrecurring elements of the congestion pie chart can reduce unexpected congestion and improve travel time reliability by helping people plan their trips more effectively, reducing the risk of being late or missing appointments. Since 2017, PennDOT has been measuring TTR on interstate and non-interstate NHS roadways statewide. **Each federally monitored TTR measure has improved or remained steady, consistently beating yearly targets, due to strategic investments in TSMO solutions.**
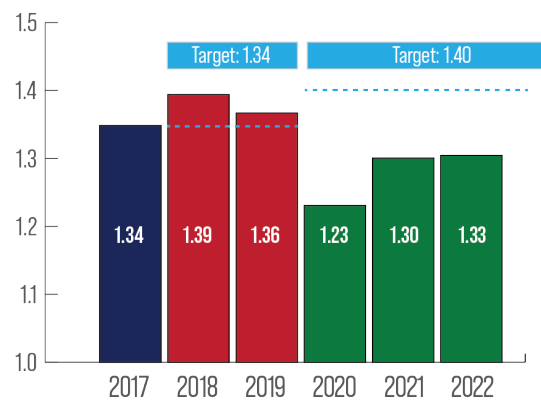
1% ANNUAL IMPROVEMENT
Percent of Reliable Person-Miles Traveled on Interstates

Year	Value	Target
2017	89.7%	
2018	89.6%	89.9%
2019	89.9%	
2020	96.2%	
2021	92.8%	89.5%
2022	93.3%	
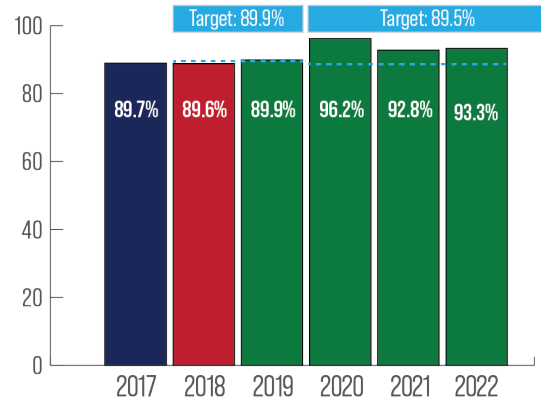
1% ANNUAL IMPROVEMENT
Percent of Reliable Person-Miles Traveled on Non-interstates in NHS Network

Year	Value	Target
2017	87.2%	
2018	88.2%	87.4%
2019	88.5%	
2020	94.1%	
2021	92.6%	88.0%
2022	93.3%	
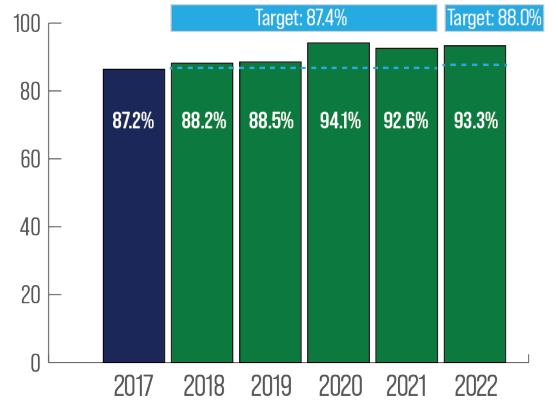
CONSISTENTLY MEETS
Truck TTR Index on Interstates

Year	Value	Target
2017	1.34	
2018	1.39	1.34
2019	1.36	
2020	1.23	
2021	1.30	1.40
2022	1.33	

Note: 2020 was an anomaly year due to the reduction of traffic volumes from the COVID-19 pandemic

Legend: No Target | Met Target | Did Not Meet Target

Summary

Open and safe movement of people and goods on Pennsylvania's core roadway network is essential to our economy. It enables trade and commerce on the east coast and supports job creation and tourism. All vital to the health of the Keystone state. Congestion can have a crippling impact on our economy and environment due to lost hours of productivity, delayed deliveries, and additional carbon emissions. In 2022 alone, congestion cost Pennsylvania approximately $650 million.

With a $16 million annual budget, the TSMO program has made great strides in reducing congestion throughout the state. PennDOT has been outperforming federal travel time reliability targets due to investment in TSMO strategies, resulting in a $120 million reduction in congestion costs. PennDOT's investment in TSMO strategies have proven to be successful in reducing nonrecurring congestion in ways that capacity-adding projects cannot, helping to support Pennsylvania's economic vitality.

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Pennsylvania Department of Transportation is the 2021 TSMO Award Overall Winner

PennDOTs real-time incident and congestion information allows for actionable decisions to keep their highways safer for the traveling public.

N⊘CoE

National Operations Center of Excellence | October 21, 2021

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Transportation Systems Management & Operations

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