TEAM KENTUCKY®

TRANSPORTATION CABINET

EXPLAINED

STRATEGIC PLAN ▸ 2023

TSMO EXPLAINED

Transportation Systems Management and Operations (TSMO) is not a new concept in Kentucky. Kentucky has implemented numerous management and operations projects and elements in many different contexts across the state. The objective of the TSMO Strategic Plan is therefore to establish a framework for integrating system management and operations tools and strategies into KYTC's processes and decision making. The ultimate goal is to maximize the performance of Kentucky's transportation network and infrastructure.

TSMO is a transportation management approach for optimizing the performance of the transportation system. It uses various operational and management strategies to improve safety and mobility. The strategies can be implemented on their own or in concert with other upgrades. They enhance system performance to maximize the benefit of and optimize existing facilities and new projects, and where possible, delay the need for larger capital investments. The strategies can address traffic safety (eliminating crashes and reducing crash severity) and traffic congestion (reducing delay).

TSMO strategies often can be implemented quickly at relatively low cost, enabling transportation agencies to "stretch" their funding to benefit more areas and customers. The strategies can also help balance supply (capacity) and traffic demand, providing flexible solutions to match changing conditions.

To be successful, this approach to operations and management requires a systems perspective. Strategies must be coordinated with each other and across jurisdictions, agencies, divisions, and modes. This includes collaboration with internal and external partners.

EXAMPLE TSMO STRATEGIES

Traveler information systems update drivers on current and future roadway conditions—including delays, incidents, weather-related messages, travel times, emergency alerts, and alternate routes. Providing this information to drivers before and during trips allows them to make more effective travel decisions about changing routes, modes, departure times, or even destinations. Traveler information is conveyed through dynamic message signs, the GoKY website, apps like Waze, and other platforms.

Intersection control ranging from simple physical geometric improvements, like adding a turn lane on an arterial, to advanced traffic signal control. Advanced traffic signal control strategies use actual (measured) or predicted travel conditions along with technology to make signal timing adjustments that improve traffic flow and safety.

Connected vehicles use wireless communication to enable two-way information exchange between the vehicle and other vehicles or roadway infrastructure. Various apps use the information exchange to provide traveler information, warnings, and alerts.

Responding to Kentucky's Transportation Challenges with TSMO

CHALLENGE		EXAMPLE RESPONSE WITH TSMO
PRESERVING AND IMPROVING SAFETY	Fatal and injury crashes continue to be a primary concern in Kentucky.	TSMO strategies such as queue warning systems and road right-sizing (e.g., four-lane to three lane reconfigurations) have proven to be effective tools for reducing crashes in Kentucky.
POPULATION AND EMPLOYMENT GROWTH	Kentucky has continued to grow with some communities seeing rapid changes in population, employment, and development, resulting in roadways that cannot meet the traffic demand causing increased delay and reduced safety.	TSMO strategies such as constructing center turn lanes and optimizing signal timing can help reduce delays and improve safety despite the growth in population and employment.
CONNECTING COMMUNITIES	Connectivity is essential for economic vitality and the efficient movement of goods. New development and traffic congestion can lead to situations where connectivity is inadequate.	TSMO strategies, such as dynamic shoulder use and ramp metering, can preserve or enhance connectivity by reducing congestion. TSMO can also improve system performance for all modes, not just driving, increasing connectivity opportunities for all users.
LACK OF RIGHT-OF-WAY	Right-of-way (ROW) acquisition is often one of the most challenging and costly aspects of project development, especially in areas with dense development.	Restriping roadways to reallocate the available pavement width can optimize the use of existing ROW and infrastructure.
FREIGHT MOBILITY	The free-flowing movement of goods is essential for the economic vibrancy of the state. Freight volumes by truck (and other modes) continue to increase.	Truck Parking Information Management Systems (TPIMS) provide truck drivers with real-time data on available parking spaces, allowing them to better plan their trips and where they need to park for mandated breaks.
LEVERAGING TECHNOLOGY	Technology continues to change at a rapid pace. Technology provides KYTC the opportunity to use new operational strategies to better serve the residents and businesses in the Commonwealth.	KYTC has upgraded some signal cabinets with new technology controllers to improve signal operations and reduce delay where they are installed. KYTC also has embraced Big Data by ingesting data and building tools to help understand real-time driving conditions, enabling quicker operational decisions.

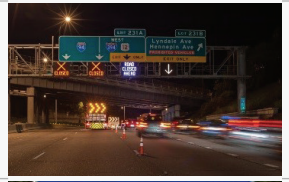
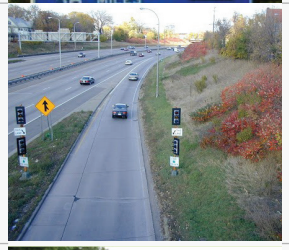
Benefits of TSMO Strategies

TSMO can yield local, regional, and even systemwide benefits. TSMO strategies can be implemented to enhance capacity, reduce travel times, improve system reliability, prevent crashes and reduce their severity, reduce fuel consumption, and improve air quality. The strategies may vary from simple striping changes to new technology applications.

As with other states, Kentucky faces challenges in maintaining and improving its transportation system while system demand continues to increase. However, by leveraging improved Transportation Systems Management & Operations techniques, the state can efficiently utilize its available funds and get the most out of the existing infrastructure. By focusing on maximizing the potential of current resources, Kentucky can effectively address the growing demands on its transportation system, making travel safer and more convenient for everyone.

TSMO strategies provide benefits in a number of ways.

EXAMPLE TSMO STRATEGIES AND REALIZED BENEFITS

STRATEGIES		DESCRIPTION	OUTCOME/BENEFIT
INNOVATIVE STRIPING AND SIGNING		Example: Arizona DOT restriped and revised signing on a high volume ramp with a high number of serious and fatal crashes to add an additional lane.	▪ 66% reduction in crashes
TRAFFIC SIGNAL OPTIMIZATION		Provides traffic-responsive or traffic adaptive signal operations at intersections for corridor and network optimization and event responsiveness.	▪ 29% reduction in traffic delay for traffic signal optimization ▪ 20 to 51% reduction in travel time for adaptive signal control in Phoenix
TRAFFIC INCIDENT MANAGEMENT		Applies incident detection, verification, response, clearance, accident investigation, medical response, and traffic control. Organizes the management and clearance of disruptions and responses to emergencies and ensures incident site safety and restoration of traffic flow.	▪ Average 12-minute reduction in incident response time ▪ 39-51% reduction in duration of traffic incidents resulting in reduced congestion and improved reliability
WORK ZONE MANAGEMENT SYSTEMS		Provides dynamic, traffic-responsive traffic control (lane use, speeds, warnings) in construction work zones.	▪ Improves safety to drivers and workers ▪ 41% to 75% reduction in delay (based on simulation estimate)
TRUCK PARKING INFORMATION MANAGEMENT SYSTEM		System that uses dynamic message signs to display available parking spots for trucks based on real-time parking sensor data.	▪ 15-minute-per-truck reduction in time drivers search for parking spaces, resulting in improved safety, reduced congestion, reduced emissions ▪ 3.35 to 4.27 Benefit-cost ratio
RAMP METERING / ADAPTIVE RAMP METERING		Use of traffic signals, installed on a set of consecutive freeway entrance ramps, that control the rate that vehicles enter the freeway based on real-time conditions. Adaptive ramp metering anticipates conditions on the freeway and sets metering rates accordingly.	▪ Ramp Metering Compared to No Ramp Metering ▪ 20% reduction in travel time ▪ 90% Improvement in travel time reliability ▪ Adaptive Compared to Regular Ramp Metering ▪ 17% reduction in travel time (*peak period)* ▪ 20% improvement in travel time reliability (*peak period)*
DYNAMIC SHOULDER USE		System to dynamically open or close a freeway shoulder to traffic in response to increasing congestion, incidents, or work zones.	▪ 15% to 45% reduction in travel time ▪ 27% to 56% improvement in travel time reliability