



MODOT STRATEGIC TRAFFIC INCIDENT MANAGEMENT PLAN



March 2021

TABLE OF CONTENTS

- 1. Introduction 1
 - 1.1. Importance of Traffic Incident Management..... 1
 - 1.2. Vision, Goals, and Objectives 5
 - 1.3. Performance Measures and Targets..... 6
- 2. Existing TIM Practices in Missouri 9
 - 2.1. History of TIM in Missouri 9
 - 2.2. Status of Missouri TIM Practices 10
- 3. TIM Program Assessment 14
- 4. Recommendations 16

LIST OF FIGURES

- Figure 1. Fatal Crashes on Rural Interstates due to Rear-End Collisions, Not in Work Zone, in Missouri 2015-2019 2
- Figure 2. Responder Pedestrians Injured or Killed by Motor Vehicles in Missouri, 2015-2019.... 2
- Figure 3. Freeway Travel Time Reliability – St. Louis Metro Area 3
- Figure 4. Freeway Travel Time Reliability – Kansas City Metro Area 3
- Figure 5. Cost of Congestion on Select State Roads in Missouri..... 4
- Figure 6. Average Time to Clear Traffic Incidents – St. Louis..... 6
- Figure 7. Average Time to Clear Traffic Incidents – Kansas City..... 7
- Figure 8. Average Time to Clear Traffic Incidents – Springfield..... 7
- Figure 9. Average Time to Clear Traffic Incidents – I-70 Rural 8
- Figure 10. Average Time to Clear Traffic Incidents – I-44 Rural 8
- Figure 11. Timeline of Missouri TIM Efforts 9
- Figure 12. Capability Maturity Model Levels6..... 11
- Figure 13. Timeline of Traffic Incident Elements..... 12
- Figure 14. TIM Training by Percent of Responders – Missouri, Adjacent States, and National.. 13

LIST OF TABLES

- Table 1. Regional Emergency Response Programs..... 10
- Table 2. TIM Capability Maturity Self-Assessment 2020 11
- Table 3. Missouri TIM Program Assessment..... 15

1. INTRODUCTION

Traffic incident management (TIM) is a planned and coordinated multi-disciplinary process to detect, respond to, and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible. TIM partners include law enforcement, fire and rescue, emergency management services (EMS), public safety, and towing and recovery. Effective TIM improves the safety of emergency responders, crash victims, and motorists, as well as reduces the duration and impacts of traffic incidents. As part of transportation systems management and operations (TSMO), traffic incident management is consistent with MoDOT's mission and strategic initiatives by providing a safe and reliable transportation system.

MoDOT and its partners have successfully implemented a number of TIM strategies and practices on Interstates and highways in Missouri over the years. In order to further advance TIM in Missouri, this plan identifies goals, objectives, strategies, and action items that can be practically implemented and prioritized by MoDOT. Best practices including the National Unified Goal (NUG) established by the National Traffic Incident Management Coalition (NTIMC) are used to guide the content of this document.

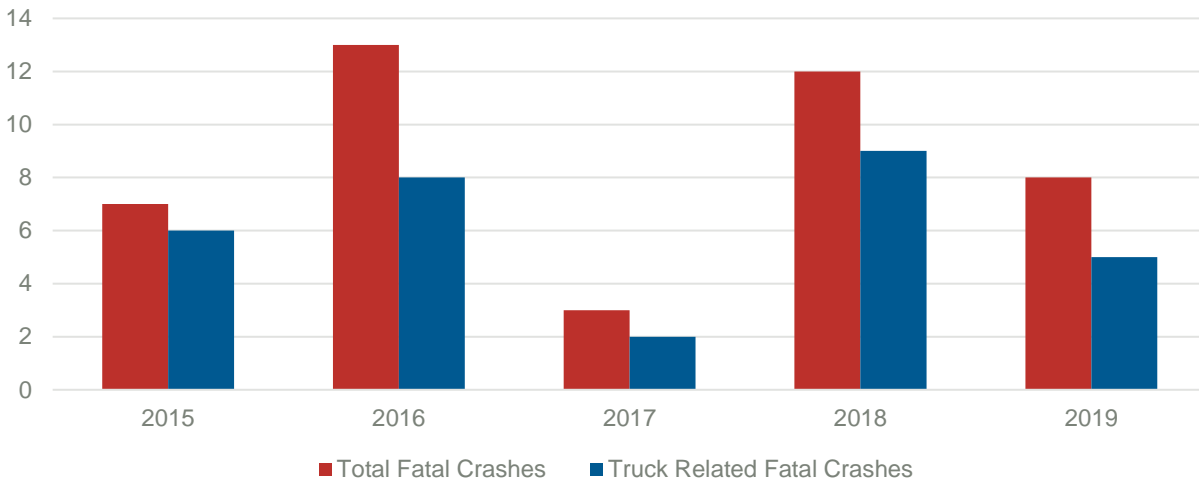
1.1. Importance of Traffic Incident Management

Traffic incidents may block travel lanes, but even when on the shoulder these incidents can cause driver distractions and congestion. Traffic incidents have a significant impact on Missouri's transportation system, leading to secondary crashes, safety risks for first responders, costly travel delays, and economic impacts.

Traveler Safety

According to the Federal Highway Administration (FHWA), approximately 20 percent of all traffic incidents are secondary crashes¹. Traffic incidents may include crashes, stalled vehicles, overheating, or running out of fuel. Secondary crashes are collisions resulting from the initial incident, either occurring at the incident scene or within the traffic queue. Secondary crashes can be particularly severe on high-speed highways, particularly rural interstates, often times as a result of a rear-end collision. Although secondary crashes are not directly tracked in Missouri, there are surrogate measures that can approximate this statistic. For instance, rear-end collisions on rural Missouri interstates not attributed to work zones have resulted in 43 fatal crashes between 2015-2019², based on data from the National Highway Traffic Safety Administration (NHTSA). Most of these fatal crashes—30 of the 43—involved at least one large truck in the collision. See **Figure 1**.

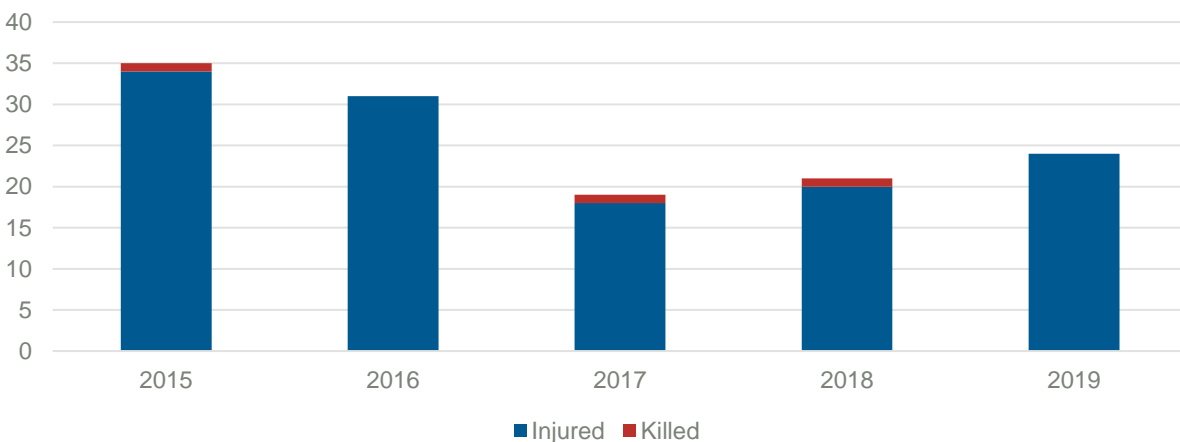
Figure 1. Fatal Crashes on Rural Interstates due to Rear-End Collisions, Not in Work Zone, in Missouri 2015-2019



Responder Safety

Responders at a traffic incident scene such as law enforcement, fire and rescue, tow operators, or MoDOT personnel are vulnerable when traffic is moving. Incident responders risk their lives when tending to injured victims, assisting stranded motorists, or clearing debris from the roadway, particularly on high-speed facilities such as interstates. Although crashes involving responders at traffic incidents are not directly tracked in Missouri, there are proxy measures that can approximate this statistic. For instance, the number of responder pedestrians (i.e., outside of their vehicle) injured by a motor vehicle between 2015 and 2019 in Missouri was 130³. Of these collisions, three resulted in a responder fatality. See **Figure 2**.

Figure 2. Responder Pedestrians Injured or Killed by Motor Vehicles in Missouri, 2015-2019



Travel Delays

According to FHWA, approximately 25 percent of all traffic congestion in the US is due to traffic incidents⁴. Traffic incidents can cause drivers to be delayed, resulting in lost time and being late to work, school, or appointments. Although travel delays due to traffic incidents are not directly tracked in Missouri, there are other measures that serve as substitutes. MoDOT tracks reliability of travel times on freeways in the St. Louis and Kansas City metro areas for instance. As shown in **Figure 3** and **Figure 4**, the 95th percentile planning time in 2019 for PM rush hour in the St. Louis and Kansas City metro areas are 56 percent and 42 percent greater than the average travel time, respectively⁵. This means that for travelers to plan to reach their destination 95 percent of the time during the PM rush hour, they should add that much more time to account for unexpected travel delays. The below measures are updated through 4th quarter 2020.

Figure 3. Freeway Travel Time Reliability – St. Louis Metro Area



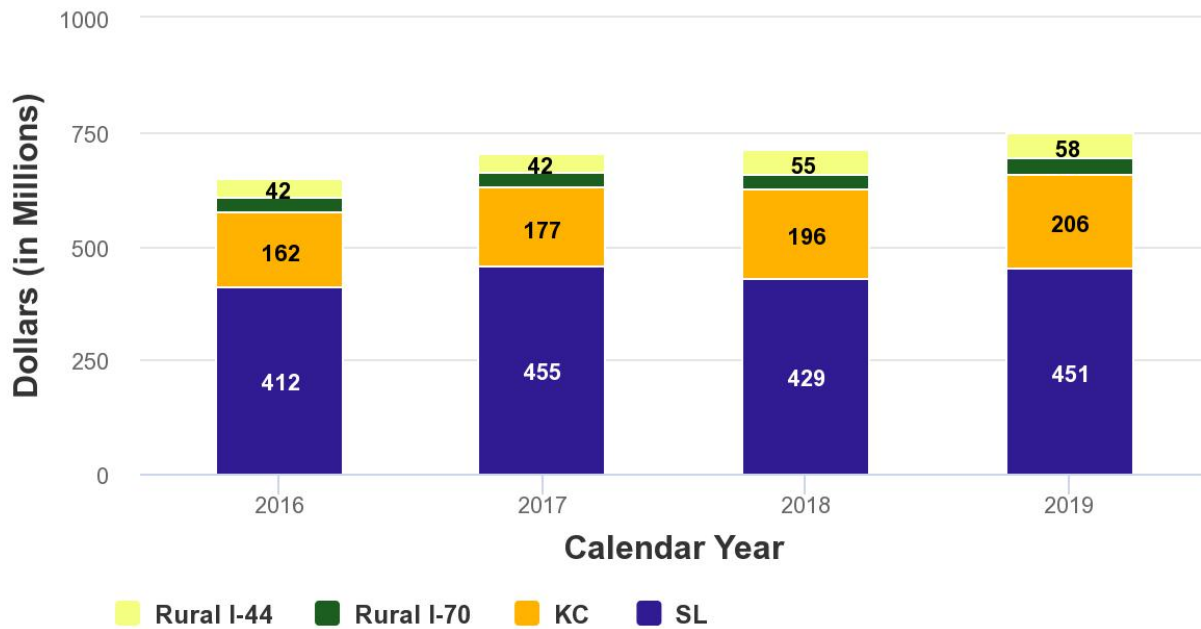
Figure 4. Freeway Travel Time Reliability – Kansas City Metro Area



Economic Impacts

Travel delays, particularly due to traffic incidents, result in a broad impact to the economy, affecting travelers, employers, businesses, and industries. Travelers stuck in unexpected traffic waste fuel and may, for instance, be late for work, impacting employers. Businesses and industries that rely on timely deliveries can lose business. And in the modern world of increased reliance on connected supply chains and on-time delivery to consumers, unexpected travel delays can have a deep and hidden economic impact. Although economic impacts due to traffic incidents are not directly measured in Missouri, as shown in **Figure 5** the cost of congestion on select state roads is significant, resulting in an economic impact of \$750 million in 2019⁵.

Figure 5. Cost of Congestion on Select State Roads in Missouri



1.2. Vision, Goals, and Objectives

TSMO and TIM are integral to support MoDOT's overall mission and strategic initiatives.

MoDOT's TIM vision *is to enhance the safety and efficiency of Missouri's transportation system for travelers and incident responders*. Broken down further, there are five goals to achieve this vision in Missouri, each with specific objectives:

Goal #1	<p>Enhance safety of traveling public</p> <ul style="list-style-type: none"> • Objective 1.1: Reduce number and severity of secondary crashes • Objective 1.2: Record and track secondary crashes
Goal #2	<p>Enhance safety of incident responders</p> <ul style="list-style-type: none"> • Objective 2.1: Reduce number and severity of responders struck • Objective 2.2: Record and track crashes involving incident responders
Goal #3	<p>Enhance reliability and efficiency of Missouri's transportation system</p> <ul style="list-style-type: none"> • Objective 3.1: Respond to incidents quickly • Objective 3.2: Clear incidents quickly
Goal #4	<p>Strengthen coordination, communication, and collaboration between MoDOT and TIM partners</p> <ul style="list-style-type: none"> • Objective 4.1: Formalize and implement coordination agreements with TIM partners • Objective 4.2: Regularly meet with TIM partners at state, regional, and local levels
Goal #5	<p>Establish TIM as a core TSMO program at MoDOT</p> <ul style="list-style-type: none"> • Objective 5.1: Establish TIM policies, procedures, and protocols within MoDOT • Objective 5.2: Fill MoDOT TIM coordinator positions

1.3. Performance Measures and Targets

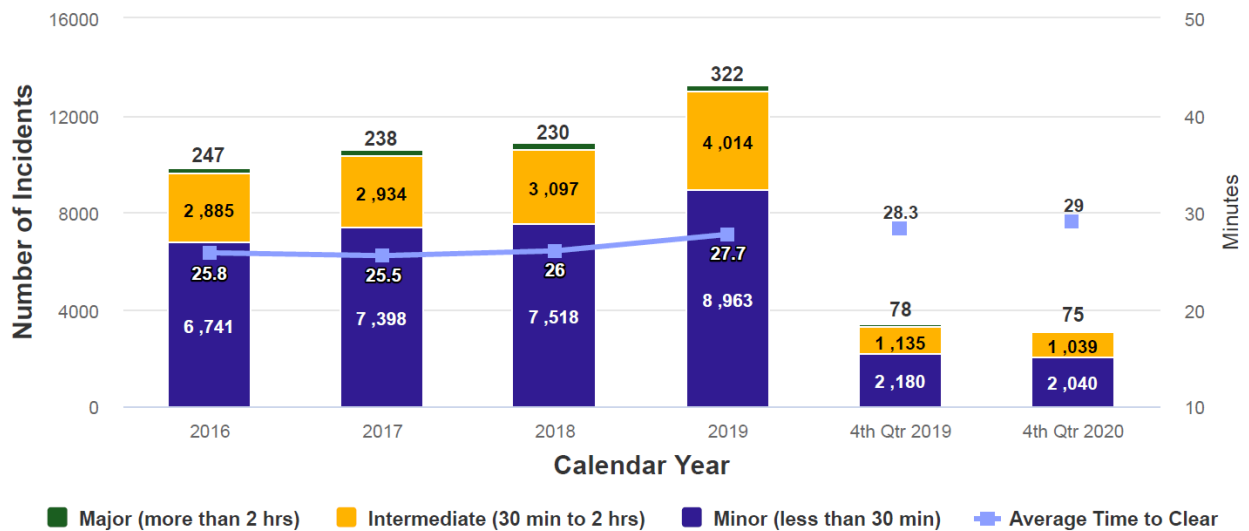
As noted in **Section 1.1**, there are a number of existing performance measures in Missouri related to TIM. Performance measures are essential to ensure successful implementation of TIM. Quantifying and documenting relevant performance measures are an objective of the MoDOT TSMO Program Plan.

There are three performance measures currently tracked by MoDOT related to TIM:

- 1. Reliability on Major Routes**
- 2. Cost & Impact of Traffic Congestion**
- 3. Average Time to Clear Traffic Incidents**

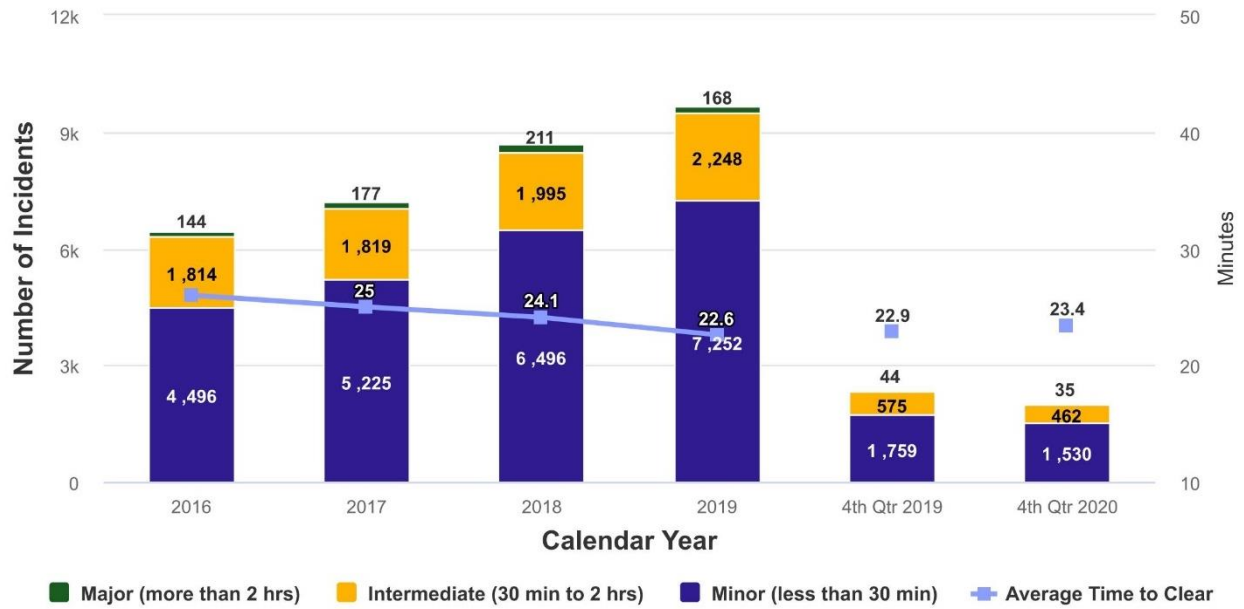
Each of these measures have multiple sub-measures, as well as associated targets. Some of the first two measures are shown in **Section 1.1**. The third measure, Average Time to Clear Traffic Incidents, is shown in **Figures 6-10**. All measures are updated through 4th quarter 2020.

Figure 6. Average Time to Clear Traffic Incidents – St. Louis



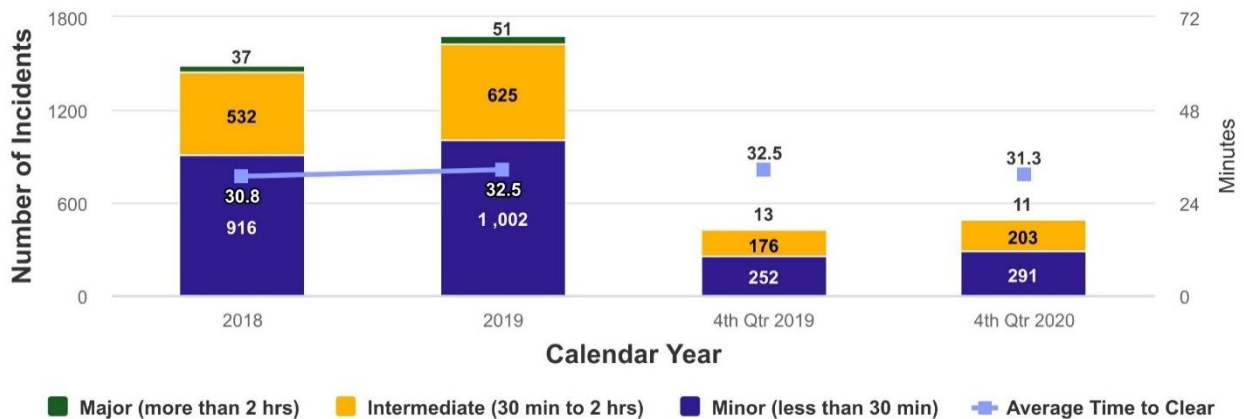
2020 Target: Below 23.9 Minutes to clear

Figure 7. Average Time to Clear Traffic Incidents – Kansas City



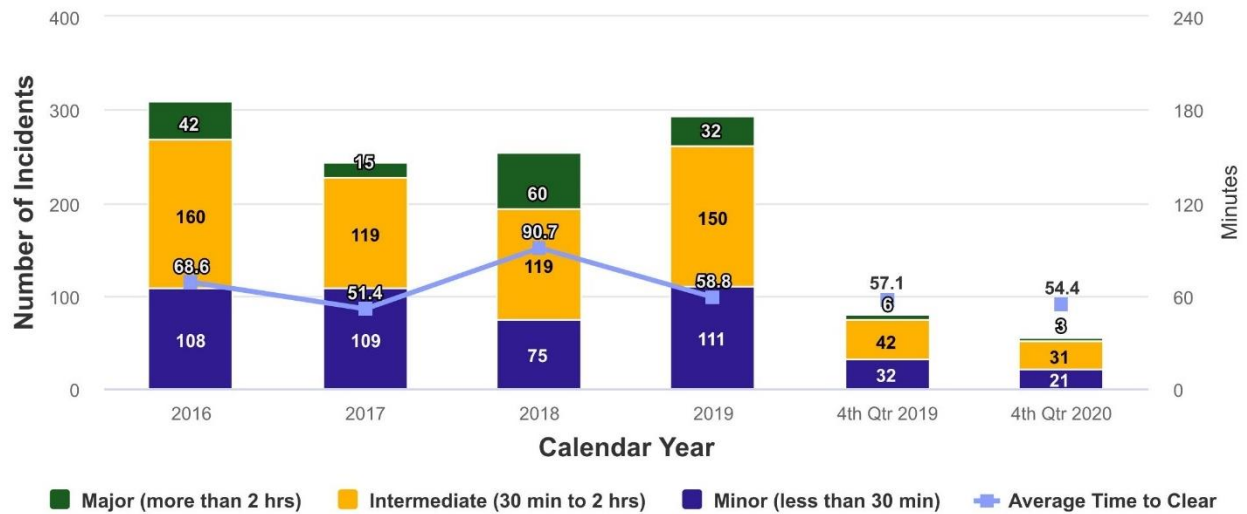
2020 Target: Below 22.1 Minutes to clear

Figure 8. Average Time to Clear Traffic Incidents – Springfield



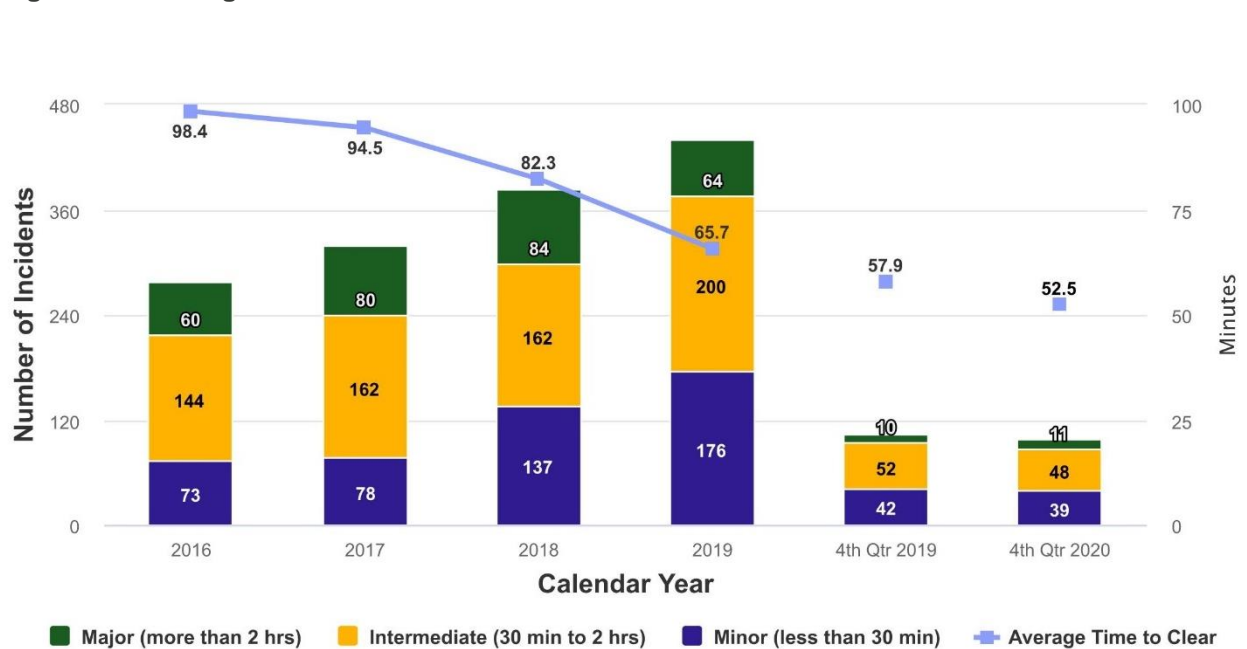
2020 Target: Below 28.5 Minutes to clear

Figure 9. Average Time to Clear Traffic Incidents – I-70 Rural



2020 Target: Below 60.6 Minutes to clear

Figure 10. Average Time to Clear Traffic Incidents – I-44 Rural



2020 Target: Below 76.7 Minutes to clear

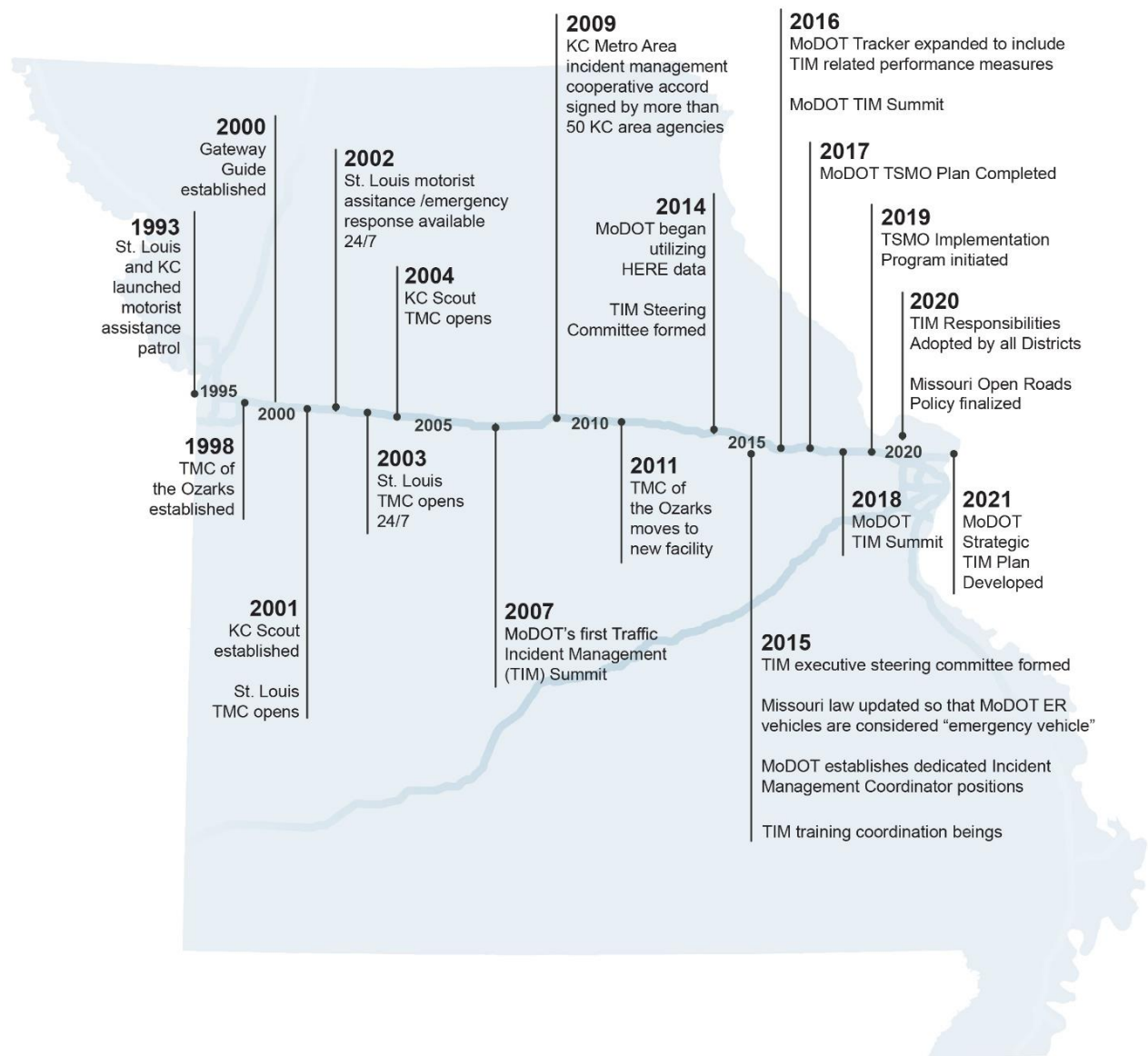
These performance measures can be directly accessed through the Tracker website <https://www.modot.org/tracker-measures-departmental-performance>.

2. EXISTING TIM PRACTICES IN MISSOURI

2.1. History of TIM in Missouri

MoDOT has made significant progress in recent years implementing TIM strategies in Missouri with its partners. While TIM strategies were first implemented in major metro areas in Missouri in the 1990s with the establishment of motor assistance patrols and traffic management centers, additional accomplishments to advance TIM have been made within the last 10 to 15 years. A timeline of the major TIM accomplishments to date in Missouri is provided in **Figure 11**.

Figure 11. Timeline of Missouri TIM Efforts



2.2. Status of Missouri TIM Practices

The status of TIM in Missouri may be best conveyed through the most recent TIM Capability Maturity Self-Assessment (SA). Based on FHWA's capability maturity model, this approach allows stakeholders to assess how advanced their capabilities are within various TIM components. A component may be performed inconsistently based on individual champions outside mainstream activities (least advanced) or performed as part of a core program integrated with leadership and other stakeholders on a continual basis (most advanced).

The FHWA works with TIM partners in regions covering each urban area to conduct a self-assessment annually. The assessments consist of questions that generally fall into three categories:

- **Strategic** – Questions covering formal policies and understandings among agencies and TIM partners including performance measure and program evaluation.
- **Tactical** – Questions covering on-scene response and clearance practices, traffic control, and responder and motorist safety.
- **Support** – Questions on interagency communications, data sharing, ITS for TIM and traveler information.

In Missouri, TIM self-assessments are conducted for the St. Louis, Kansas City, and Southwest Missouri regions. Each of these regions is covered with an emergency response program. A summary of the emergency response programs in each region is provided in **Table 1**.

Table 1. Regional Emergency Response Programs

Region	Safety Service Patrol Availability	Emergency Response Availability	Traffic Management Center
St. Louis Gateway Guide	24/7/365 (limited holiday coverage)	24/7/365	St. Louis Region
Kansas City KC Scout	24/7/365 (limited holiday coverage)	24/7/365	Kansas City Region
Southwest	7 days per week: 7am – 6pm	24/7/365	Springfield

Self-assessment scores are given for each question on a scale from 1 to 4, with 4 being the highest capability level. See **Figure 12** for descriptions of each maturity level. These scores are in turn converted into a percentage. The national average scores, as well as the Missouri regional scores, are provided in **Table 2**.

Figure 12. Capability Maturity Model Levels⁶

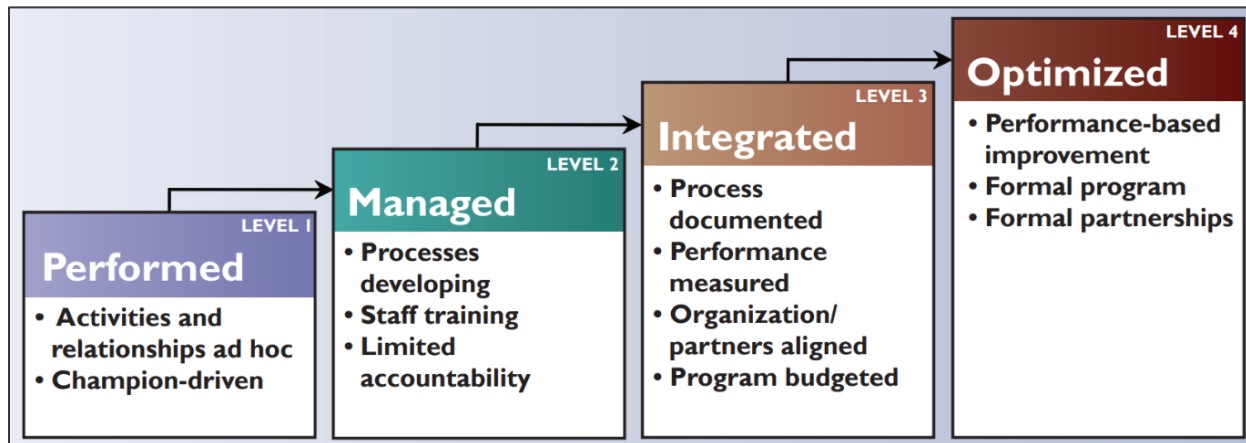


Table 2. TIM Capability Maturity Self-Assessment 2020

Category	2019 National Average*	2020 Missouri Average**	St. Louis	Kansas City	Southwest
Strategic	68.5%	68%	50%	71%	81%
Tactical	77.5%	71%	69%	69%	75%
Support	74.0%	67%	58%	58%	83%
Overall	73.3%	69%	59%	70%	79%

*Most recent national scores available: https://ops.fhwa.dot.gov/eto_tim_pse/preparedness/tim/self.htm.

**There have been major changes to the FHWA self-assessment since 2019.

Examples of TIM components that were rated as highly mature in the 2020 TIM Capability Maturity SA include:



STRATEGIC

Performance measures such as roadway clearance time (RCT) and incident clearance time (ICT) are measured and used. See **Figure 13** for illustration of RCT and ICT.



TACTICAL

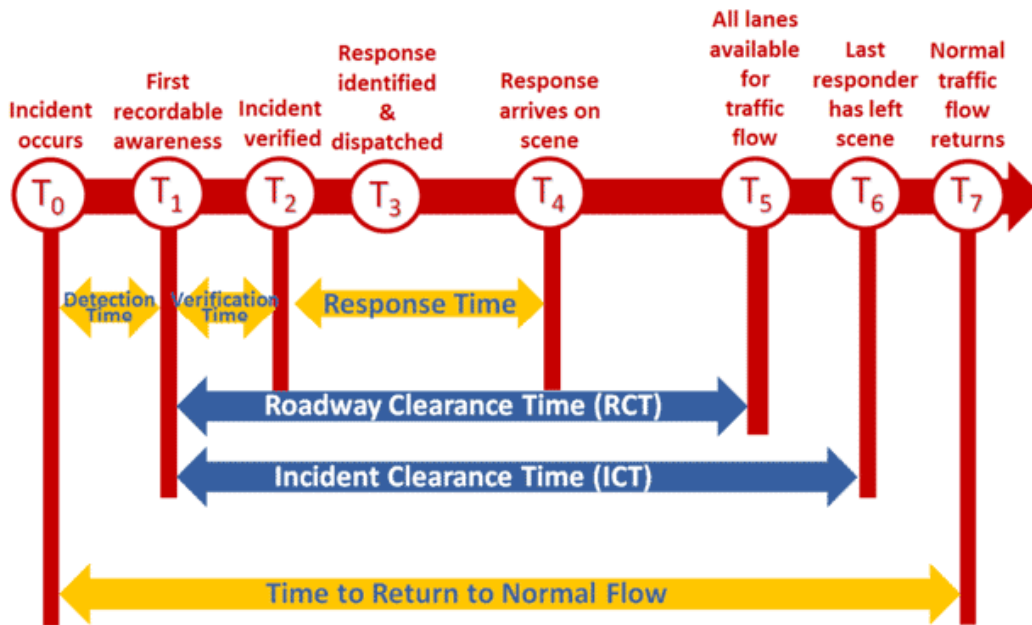
Safety service patrol programs are in place for all three regions with substantial coverage.



SUPPORT

Policies and procedures are in place for signal timing changes to support traffic management during incident response.

Figure 13. Timeline of Traffic Incident Elements



Examples of TIM components that were rated as having opportunities for maturity in the 2020 TIM Capability Maturity SA include:

STRATEGIC

- Having all disciplines and agencies participate in TIM enhancement activities.
- Establishing and using performance targets for secondary crashes.
- Conducting TIM training in a multidiscipline setting.
- Conducting multidiscipline, multi-agency after action reviews.

TACTICAL

- Having tow operator/rotation list policies include penalties for non-compliance of response criteria.
- Procedures for incidents involving a fatality prior to medical examiner arrival.

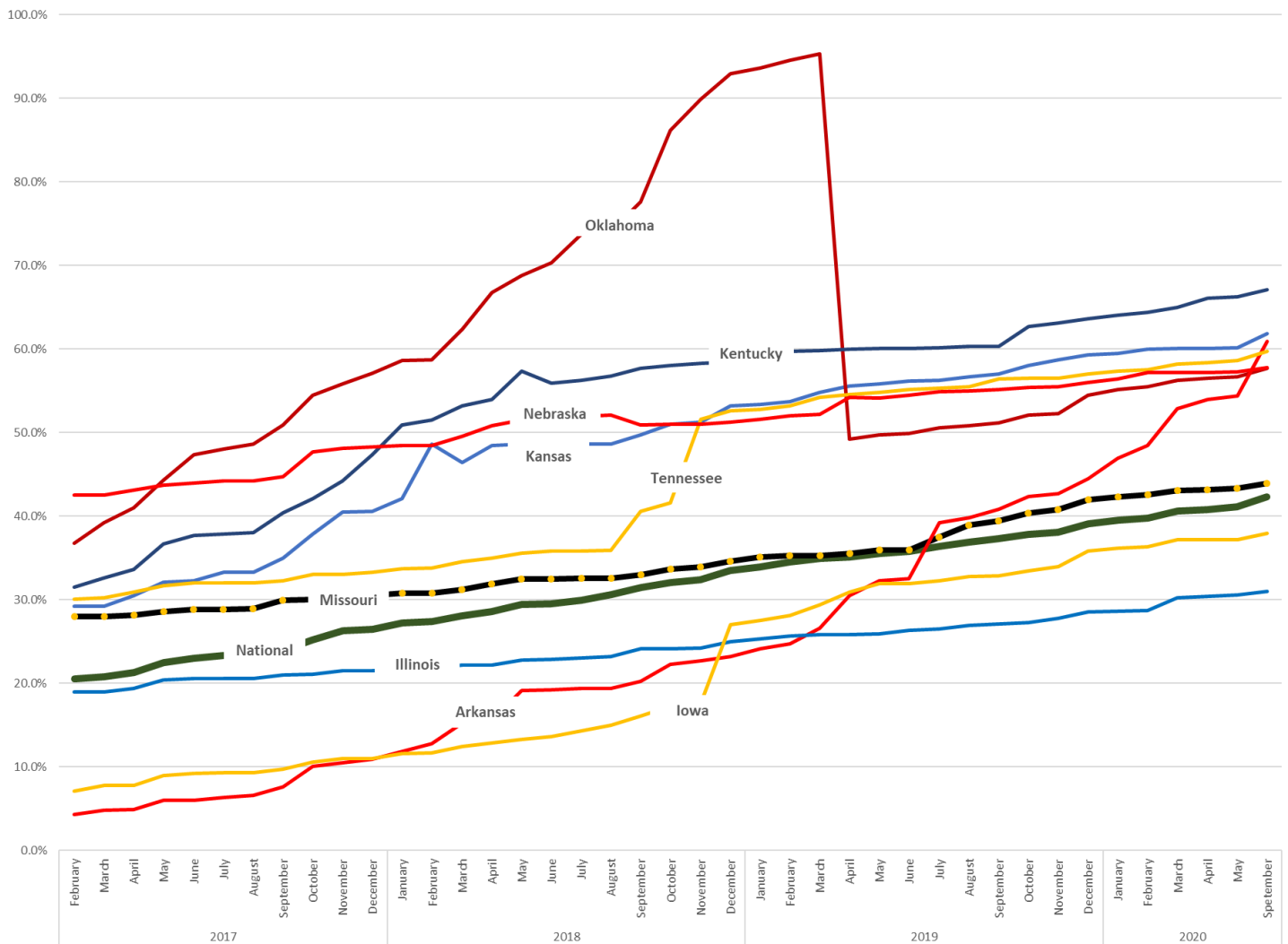
SUPPORT

- Sharing of TIM video for real-time operational purposes.
- Pre-planned detour routes identified and shared with TIM stakeholders.

Detailed self-assessment scores for each region in Missouri is found in **Appendix B**.

Since TIM training is not only a major focus at the national level but in Missouri as well, the common TIM training performance measure—percent of responders trained—was reviewed. As shown in **Figure 14**, the percent of Missouri responders trained in TIM is approximately 44 percent, slightly above the national average of 42 percent. Many of Missouri’s adjacent states have percentages exceeding the national average.

Figure 14. TIM Training by Percent of Responders – Missouri, Adjacent States, and National



3. TIM PROGRAM ASSESSMENT

Although Missouri has made significant progress advancing TIM in recent years, as noted in **Section 2.2** there are still opportunities for growing capabilities in certain areas. In order to determine next steps for implementation, an assessment was conducted to identify targeted opportunity areas that align with the vision/goals/objectives identified in **Section 1.2**.

The assessment utilized the following resources:

- **TIM Gap Analysis** – Previous MoDOT TIM Gap Analysis and the FHWA TIM Gap Analysis Primer⁷.
- **Self-Assessment** – 2020 Missouri TIM Capability Maturity Self-Assessments (SA) and the 2019 FHWA Capability Maturity Self-Assessment National Analysis Report.
- **National Unified Goal (NUG)** – The National Traffic Incident Management Coalition NUG for TIM⁸.

As noted in the FHWA TIM Gap Analysis Primer, the criteria found in the FHWA TIM SA and the NUG are the two recognized authorities on TIM program assessments. However, as noted in this Primer, the two approaches are similar but have some differences. For instance, the SA asks if a state has an “authority removal” and “driver removal” laws, while the NUG only refers to “move over/slow down” laws. The Primer includes an assessment checklist that is similar to the SA to the NUG, but with some differences. To account for these differences, a comprehensive approach shown in **Table** was developed and used in the assessment.

Each TIM program component was evaluated to determine if it could be a focus area for improvement. The evaluation included previous MoDOT TIM Gap Analysis results, feedback from MoDOT, the 2020 Missouri TIM Capability Maturity SA, and input from the TIM Coordinating Team. As noted in **Table**, the strategic components have the most area for high priority improvement. This is consistent with the FHWA national TIM Capability Maturity SA scores, since historically this area typically has the lowest scores across all regions and states.

The detailed assessment matrix can be found in **Appendix C**.

Table 3. Missouri TIM Program Assessment

No.	TIM Program Component	Criteria Included In:			Focus Area for Improvement
		Gap Analysis Primer	2020 SA	NUG	
STRATEGIC					
1	Have a TIM multiagency team or task force that meets regularly to discuss and plan for TIM activities	Yes	Yes	Yes	HIGH PRIORITY
2	Conduct multiagency TIM training	Yes	Yes	Yes	HIGH PRIORITY
3	Conduct multiagency post-incident debriefings (after action reviews)	Yes	Yes	No	HIGH PRIORITY
4	Conduct special event planning	Yes	No	No	LOW PRIORITY
5	Conduct workzone planning	Yes	No	No	LOW PRIORITY
6	Have multiagency agreements for quick clearance with clearly defined roles and responsibilities	Yes	No	Yes	HIGH PRIORITY
7	Conduct planning to support TIM activities across participating agencies, including MPO	Yes	Yes	No	NO
8	Have a position that has TIM as primary job function	Yes	Yes	No	NO*
9	Have multiagency agreements for RCT and ICT	Yes	Yes	No	NO
10	Have methods to collect and analyze RCT and ICT	Yes	Yes	No	NO
11	Have RCT and ICT targets	Yes	Yes	Yes	NO
12	Routinely review progress in achieving RCT and ICT targets	Yes	Yes	Yes	NO
13	Track performance in reducing secondary incidents	Yes	Yes	No	HIGH PRIORITY
14	Have secondary incident targets	Yes	Yes	No	HIGH PRIORITY
15	Deploy technology to support TIM activities (e.g. incident detection & responder notification)	Yes	No	Yes	NO
16	24/7 availability of responders and equipment	Yes	No	Yes	NO
17	Multiagency resource management	Yes	No	No	NO
18	Funding for TIM	Yes	Yes	No	NO
19	Education and awareness partnerships for TIM	Yes	Yes	Yes	NO
TACTICAL					
20	Have "authority removal" law	Yes	Yes	No	NO
21	Have "driver removal"/STEER IT CLEAR IT law	Yes	Yes	No	NO
22	Have MOVE OVER law	Yes	No	Yes	NO
23	Driver training and awareness related to TIM laws	No	No	Yes	NO
24	Have Safety Service Patrol (SSP) Program	Yes	Yes	No	NO
25	Utilize Incident Command System (ICS) on scene	Yes	Yes	No	LOW PRIORITY
26	Have pre-staged response equipment for timely response	Yes	Yes	No	NO
27	Tow operator/rotation list policies deploy resources based on type/severity of incident	No	Yes	No	HIGH PRIORITY
28	Tow operator/rotation list policies include penalties for non-compliance of response criteria	No	Yes	No	LOW PRIORITY
29	Identify and document tow operator capabilities	Yes	Yes	No	HIGH PRIORITY
30	Identify and document hazmat operator capabilities	Yes	No	No	NO
31	Authority to override hazmat contractor to call in other resources	Yes	No	No	NO
32	Medical examiner response clearly defined for incidents involving fatalities	Yes	Yes	No	NO
33	Have procedure for removing deceased prior to medical examiner arrival	No	Yes	No	LOW PRIORITY
34	Electric utility companies' role clearly defined for incidents involving downed electrical wires	Yes	No	No	LOW PRIORITY
35	Have procedures for expedited accident reconstruction/investigation	Yes	Yes	No	NO
36	Have policy for removal of abandoned vehicles	Yes	No	No	LOW PRIORITY
37	Train responders in MUTCD traffic control	Yes	Yes	No	NO
38	Utilize resources to conduct traffic control procedures for various levels of incidents	Yes	Yes	No	NO
39	Utilize traffic control procedures for back of queue	Yes	Yes	No	NO
40	Have procedures/guidelines for safe vehicle positioning	No	Yes	No	NO
41	Have procedures for equipment staging and emergency lighting	Yes	Yes	No	NO
42	Have multidisciplinary communication practices and procedures	No	No	Yes	LOW PRIORITY
43	Have procedures for prompt responder notification	Yes	No	Yes	LOW PRIORITY
SUPPORT					
44	Use TMC for incident detection, notification, response	Yes	No	No	NO
45	Share data/video between agencies	Yes	Yes	No	HIGH PRIORITY
46	Have policies/procedures for traffic management during incident response, such as signal timing changes and pre-planned detours	Yes	Yes	No	HIGH PRIORITY
47	Provide interoperable, interagency communications onsite between incident responders	Yes	No	Yes	LOW PRIORITY
48	Have real-time motorist information system	Yes	No	Yes	LOW PRIORITY
49	Provide motorists with travel time estimates	Yes	No	Yes	NO
50	Develop and implement cost recovery and management systems	Yes	No	No	LOW PRIORITY
51	Have partnerships with news media and information providers	No	No	Yes	LOW PRIORITY

*Recently accomplished

4. RECOMMENDATIONS

Missouri has optimized and integrated many mature TIM practices. The region(s) need to continue and expand upon these best TIM practices. However, based on the 2020 multi-agency TIM program assessment, with concurrence from district Incident Management and TIM Coordinators, a focus on these categories: **Strategic**, **Tactical** and **Support** should be prioritized in these TIM components:

STRATEGIC:

1. Within each district form a district or regional TIM multiagency team(s), task force(s), or committee(s) and conduct consistent and regular meetings involving the TIM stakeholders and meet regularly to discuss TIM plan activities and training.
2. Continue and expand multiagency and multidisciplinary TIM training.
 - Classroom
 - Virtual
 - Web-based
3. Establish a process to conduct post-incident after action reviews.
 - Regional TIM committees establish guidelines that identify under what conditions such reviews will be taken in their region, as well as which agency and position will be responsible to lead such efforts.
4. Have a multiagency agreement for quick clearance within the regional TIM committees.
 - Use the Statewide Open Roads Agreement as a framework for the regional agreement
5. Expand tracking of secondary crashes as a performance measure within the regions, as well as establishing targets.

TACTICAL

1. Towing and Recovery within regional TIM collations work with and inform responders and dispatch agencies of their recovery capabilities.
 - Agencies with authority to request and dispatch tow consider type and severity of incidents in addition to recovery procedures to expedite quick clearance and recovery.
 - Agencies with authority to request and dispatch tow to incident scenes ensure they are dispatching/requesting tow and recovery responders that have the capabilities and special equipment to perform the work for the type and severity of the incident they are being requested for.

2. Regional TIM collations discuss and plan for fatal incident procedures including but not limited to discussion and plans for:
 - Expedited accident reconstruction/investigation
 - a. New 'available' technologies or processes for reconstruction/investigation
 - b. Optional concurrent activities for expedited restoration of traffic flow
 - Delayed response by medical examiner or designee procedures
 - a. To prevent secondary incidents and restore traffic flow in incidents involving fatalities. Possible available options for relocating or removing deceased prior to medical examiners arrival to incident scene.

SUPPORT

1. Expand and improve video sharing technologies as camera systems become obsolete and are updated.
2. Have pre-planned detour routes identified and shared between TIM stakeholders for critical corridors.
3. Expand TMCs use of new technologies and remote connectivity for corridor signal timing coordination during incidents and for incident bypass routes
4. As technology and accessibility becomes available to do so.
 - Access and expand CAD feed information at MoDOT TMCs
 - Expand interoperable, interagency communications onsite between responders/agencies

REFERENCES

- ¹ FHWA TIM “one pager”: https://ops.fhwa.dot.gov/aboutus/one_pagers/tim.htm
- ² NHTSA Fatality Analysis Reporting System (FARS): <https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars>
- ³ MSHP Statistical Analysis Center:
<https://www.machs.mshp.dps.mo.gov/MSHPWeb/SAC/Compendium/TrafficCompendium.html>
- ⁴ FHWA Traffic Congestion and Reliability Report:
https://ops.fhwa.dot.gov/congestion_report/executive_summary.htm
- ⁵ MoDOT Tracker: <https://www.modot.org/tracker-measures-departmental-performance>
- ⁶ FHWA Creating an Effective Program to Advance TSMO:
<https://ops.fhwa.dot.gov/publications/fhwahop12003/fhwahop12003.pdf>
- ⁷ FHWA TIM Gap Analysis Primer:
<https://ops.fhwa.dot.gov/publications/fhwahop15007/fhwahop15007.pdf>
- ⁸ National Traffic Incident Management Coalition National Unified Goal for TIM:
<http://ntimc.transportation.org/Documents/NUGUnifiedGoal-Nov07.pdf>

MODOT STRATEGIC TRAFFIC INCIDENT MANAGEMENT PLAN

Missouri Department of Transportation

March 2021