

## Traffic Incident Management

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The intent of System Layers is to define in further detail recommendations that would serve toward the goals of how ADOT should be operating and managing their network. This System Layer Plan is focused on:

- **Traffic Incident Management** – Traffic incident management includes any unplanned activity occurring on the transportation network that causes safety risk, capacity restriction, rerouting, and coordination between transportation and public safety agencies.

## Context of Existing Capabilities

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ADOT puts a high priority on functions and operations to support incident management on the state's road network. The ADOT TOC, and the first phases of the Phoenix Freeway Management System, were designed to help ADOT better detect, monitor and support response processes to safely and quickly clear incidents from the travel lanes and notify other travelers of potential restrictions or closures due to an incident. ADOT has built response teams to provide emergency responders with valuable traffic control support to help with incident clearance and support traffic management near incident scenes. ADOT TOC staff roles have been re-aligned to reflect their role as 'dispatchers' to track incident details and dispatch/coordinate with ADOT Incident Response Units.

In the Phoenix urban area, ADOT is active with the TIM Coalition, which brings together responders and transportation representatives from state, county and city agencies. ADOT's urban area Incident Response Units routinely support freeway incident needs in partnership with AZDPS. On a statewide level, many of the traffic management response support comes from ADOT maintenance staff in the Districts.

While ADOT has continued to develop processes and team to better support incident response needs throughout the state, there are some key gaps pertaining to incident data sharing with AZDPS that could help to streamline current processes and provide a higher level of accuracy and TIM performance tracking for ADOT. Understanding TIM needs throughout the state is a key focus of this System Layer Plan.

## Challenges and Gaps

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Through a variety of meetings, workshops, and review of existing conditions and applications utilized by the state, current issues were uncovered that provide insight into the direction that ADOT should focus on addressing. The following are some of the current issues identified as related to Traffic Incident Management:

- Real-time incident data is not currently shared between AZDPS and ADOT TOC (on-site officer, when present, will alert TOC of an incident).
- ADOT's TIM response program in the urban areas is well established; there are limited formal TIM response programs and resources in the rural districts.
- Need to add CCTV coverage to improve TIM response when there is an incident or inclement weather in the rural area/blind spots in the urban area.
- The level of expertise of each staff member is not equivalent such as: experience, self-confidence and time in operational deployment.

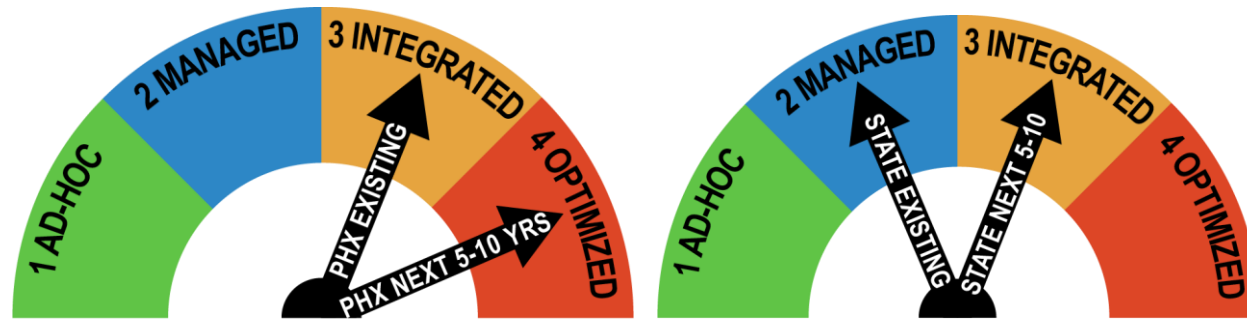
## Future Direction

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The project team conducted a series of individual workshops with ADOT for each System Layer Plan to identify the perceived existing readiness and future direction within the functional areas. The workshop included an interactive, online (JamBoard) activity in which ADOT staff provided specific feedback following a similar structure to the TSMO Capability Maturity Model (CMM) Framework. For Traffic Incident Management, the workshop was held on April 4, 2022.

CMM levels for consideration of ADOT staff for their current capabilities, where they see progress in the next 5 years, and where there is desire to move toward in the next 10 years.

- **Level 1 – Ad-Hoc** – Activities are ad-hoc, informal, champion-driven
- **Level 2 – Managed** – Basic strategy application is understood with limited internal accountability or coordination
- **Level 3 – Integrated** – Standardized strategy applications that are managed for performance and aligned
- **Level 4 – Optimized** – Full and sustainable program based on prioritized data-driven process of continuous improvement



A summary of the feedback for the Phoenix metropolitan area and the rest of the state is shown in the graphics to the left. The Phoenix metropolitan area has been evaluated separately from the rest of the state because of the differences in capabilities surrounding the Central District. At the current state in the Phoenix area, existing capabilities are well integrated and well supported, but have the opportunity of moving to the optimized state in the future. The current Level 2 managed capabilities for the rest of the state can move to the Level 3 integrated state in the future.

*Traffic incident management strategies are focused activities to provide real-time coordination between public safety and transportation departments, as well as providing accurate information to the traveling public as to the impacts an unexpected event will have on their route to aid in their decision-making. There is a basic level of public safety coordination throughout the state that provides real-time support and is linked to traveler*

*information messaging statewide. This foundational level of coordination can be challenged by communication dead zones, not specifically to be handled by this System Layer Plan. However, there are additional TIM strategies deployed specifically in the Central District because of the proximity to resources, accessibility to multiple state-owned facilities, and high traffic usage on the facilities. ADOT and AZDPS are pursuing opportunities to share real-time data between public safety and transportation management as an essential component of TIM, and work through any technical or institutional issues to facilitate real-time data sharing. ADOT should also invest in TIM strategies already implemented in the Central District in other urbanized areas of the state. The goal is to cohesively coordinate strategies so that all urban areas have similar TIM operations and outcomes while providing an elevated level of support throughout the remainder of the state.*

## Recommendations

This section provides a summary of important steps that can be used as building blocks for achieving the ultimate vision that extends to the five- to 10-year horizon. Because ADOT is looking at the three- to five-year horizon for implementation, these recommendations will focus on investments that are foundational technologies needed to support ADOT's future. The remaining gaps between what ADOT has today and where ADOT needs to be in the future becomes the recommended changes/additions that are needed.

ADOT desires to look at potential recommendations in the following areas:

- Incident Response Unit (IRU)
- Alternate Routing Management – this particular category is captured in the Traffic Management System Layer Plan to account for variety of needs for alternate routing spanning multiple System Layer Plan topics
- Emergency Management
- Unmanned Aircraft System (UAS) – recommendations for UAS were not included because of the desired focus on CCTV and incident situational awareness using traditional TMC-CAD interface for better coordination. Utilizing video on responding vehicles as a faster deployment of eyes on the incidents could be a better option than drones in the future.
- Response Agency Coordination

**Table 1** provides a summary of recommendations that ADOT should undertake to move toward Level 3 capabilities for Traffic Incident Management in the Phoenix metropolitan area and Level 3 capabilities for the rest of the state. While many of the recommendations are independent and can be accomplished in a short timeframe, ADOT should focus on a few key recommended activities (denoted in bold) to ensure adequate resources are available and generate the greatest benefits in progressing their readiness level.

Table 1 – Traffic Incident Management System Layer Plan Recommendation Summary (STIP level information)

PROCESS Recommendation Title	Description	Steps and Outcomes	Context for Recommendation	Recommended Champion	Recommended Stakeholder Involvement in Implementation	Total Funding Required	Annual Funding Required	Contracting Mechanism
<b>DATA MANAGEMENT</b>								
<b>Enhance Data Sharing Between AZDPS and ADOT TOC</b>	Establish connection between AZDPS Spillman FlexCAD system and ADOT TOC Spillman FlexCAD system. This will streamline dispatcher processes for ADOT to acquire, enter and update information in TOC systems when incidents occur, as response progresses and as status changes.	<p><b>Steps:</b> Work with AZDPS to implement a data feed from the AZDPS CAD to ADOT’s FlexCAD system. There is currently a FlexCAD connection to ERS that pushes ADOT CAD entries directly into AZ511 that this AZDPS CAD link to FlexCAD can utilize. This can be a filtered data feed with only key pieces of information such as: incident type, location (including direction), injuries (yes/no), fatality (yes/no). Information that could compromise Criminal Justice Information System (CJIS) or Health Insurance Portability and Accountability Act (HIPAA) is not needed and does not need to be send to ADOT TOC. ADOT should conduct a feasibility assessment (in partnership with AZDPS) to address institutional and technical requirements to facilitate this data feed. Identify, allocate, and train a staff person to serve as administrator of this connection.</p> <p><b>Outcomes:</b> Software connection for ADOT TOC viewing and entering CAD to support response. Dedicated staff to maintain connection.</p>	The ADOT TOC currently does not get incident data directly from AZDPS. The partnership with AZDPS for an on-site sworn officer at the TOC has been beneficial and improved ADOT’s ability to respond to incident notifications; however, there are challenges when AZDPS officers are not on-site. ADOT TOC operators are receiving few notifications of incidents if the scheduled officer is absent, or if AZDPS resources limit the time/ability of officers to be present at the TOC. A CAD data feed will provide more accurate and timelier incident information to ADOT TOC operators, will limit duplicate data entry by operators (FlexCAD and ERS), and ultimately provide more accurate incident warnings and alerts to travelers. There are examples around the country of joint operating procedures with a TMC-CAD interface to allow for sharing resources. More timely information about incident timeframes will support better response and better performance measures for TIM. This is an excellent example of a technology implementation that can help to mitigate staffing challenges for both the ADOT TOC and AZDPS. From a staffing perspective, the ADOT TOC is running at a 50% deficit of being able to support these TIM purposes – particularly when there are multiple high-profile events occurring at the same time. Supporting staffing will also mitigate impacts due to changes and shortfalls in staffing for DPS.	Traffic Management Group Manager	ADOT TOC personnel, AZDPS personnel	\$50K for Spillman CAD connection 50% of one FTE staff position	50% of one FTE staff position	Out-source – either RFP or TSMO On-Call assignment for software connection and staff augmentation for 50% of one FTE staff position to serve as administrator of this connection

PROCESS Recommendation Title	Description	Steps and Outcomes	Context for Recommendation	Recommended Champion	Recommended Stakeholder Involvement in Implementation	Total Funding Required	Annual Funding Required	Contracting Mechanism
<b>PERFORMANCE MEASURES</b>								
<b>Develop TIM Data Dashboard</b>	Develop a data dashboard to support ADOT monitoring and prioritizing response to incidents and events. Leverage existing ADOT work on RITIS procurement and deployment plan with relation to TIM activities and share with ADOT TSMO for use.	<i>Steps and Outcomes have been incorporated in the <b>Develop and Utilize TSMO Performance Measure Platform</b> action item in the <b>Data and Performance Management System Layer Plan</b></i>	A single platform would offer the ability to incorporate other types of data such as pump stations, tunnels, etc.	ADOT TSMO Director and Operational Traffic & Safety Manager	ADOT ITG to assist in database/software development, all TSMO Group managers to contribute	-	-	In-house
<b>Improve and Automate TOC TIM Performance Tracking</b>	Recommend specific measures and TIM parameters for the TOC to track and report on a statewide basis.	<b>Steps:</b> Recommend specific measures and TIM parameters for the TOC to track and report on a statewide monthly or quarterly basis. Coordinate and reference AZDPS performance metrics within the TOC TIM performance tracking. L101 Mobility may have some metrics that will require the TOC to provide for TIM response. Track ADOT maintenance resource time allocation spent on TIM-related activities versus regular duties to identify where additional resources may be needed. This is similar to the public safety Personnel Allocation Model (PAM). <b>Outcomes:</b> TIM Performance Report collected and provided quarterly.	The ADOT TOC is already conducting some performance tracking and would need to be updated with connections to additional systems such as DPS CAD. ADOT currently is not reporting on TIM specific metrics on a statewide basis. There is some reporting being done within the Maricopa County region as part of the AZTech TIM Coalition, and this effort could build upon that tracking and reporting to track successes and opportunities for improvement.	ADOT TOC	AZDPS, ADOT TOC	-	-	In-house – this can be out-sourced as well, although in-house staff should initiate the process
<b>STAFFING STRUCTURE</b>								
<b>Develop and Conduct ITS Training Program for TIM Staff (Table Top Exercise)</b>	Develop standard software system trainings for all ADOT groups, subgroups, and districts as related to TIM software and processes.	<i>Steps and Outcomes outlined in the <b>Develop and Conduct ITS Technologies and Software Training Program</b> action item in the <b>Traffic Management System Layer Plan</b></i>	A comprehensive training program needs to be developed and implemented to ensure those utilizing these resources can use them to their full potential. This would also help ensure redundancy in staff's knowledge to combat potential for information loss from staff turnover.	Traffic Management Group Manager	District Maintenance Personnel	-	No funding required – although this information should be updated and verified annually for accuracy	In-house – this can be out-sourced as well, although in-house staff should initiate the process

PROCESS Recommendation Title	Description	Steps and Outcomes	Context for Recommendation	Recommended Champion	Recommended Stakeholder Involvement in Implementation	Total Funding Required	Annual Funding Required	Contracting Mechanism
<b>STAFFING STRUCTURE</b>								
<b>Complete IRU Expansion Feasibility Study and Implement Recommendation</b>	Implement additional IRU resources outside of the metro area to support statewide traffic incident response. Evaluate the potential for small on call incident response units or service agreements with local providers in areas with historically prolonged response times.	<p><b>Steps:</b> Conduct feasibility study/pilot for expanded TIM Response Teams beyond the Phoenix metropolitan area. Pima County/Tucson region may be a strong candidate. Evaluate use and resources of existing IRU staff and activities IRU performs in the Phoenix area – leverage existing data to support evaluation. Assess high crash frequency locations (such as Pima County or south on I-10 into Casa Grande area), develop costs for pilot (2-3 years) for staff, equipment, vehicles, and training. Utilize performance data on IRU platform to identify where additional staffing support is needed to support TIM responses. If ADOT determines this would be beneficial, implement a pilot and evaluate performance with quantitative SMART measurable results. Collect and report demonstrable benefits of such programs prior to pilot deployment.</p> <p><b>Outcomes:</b> TIM Response Team Expansion Feasibility Study and resulting program recommendation and benefits of such a program for inclusion in funding programming for upcoming years.</p>	ADOT's IRU program has been successful in the Phoenix area in supporting incident response, safely diverting traffic/closing ramps to travel and providing a safe environment for responders on scene. Drivers have peace of mind in the Phoenix metro area that they are available to support. ADOT needs to study other regions/key corridors to identify where IRU and expanded ADOT incident response capabilities can support improved safety (for responders and travelers) and mitigate impacts of incidents and closures.	Traffic Management Group Manager, TSMO RTEs	ADOT IRU existing staff, District Maintenance Personnel, DPS Districts	\$100K	Depending on outcomes of study, ongoing costs would be for expansion program with pilot and potentially long-term ongoing permanent program	Out-source – either RFP or TSMO On-Call assignment
<b>PROCESS STRUCTURE</b>								
None								

INFRASTRUCTURE DEPLOYMENT Recommendation Title	Description	Steps and Outcomes	Context for Recommendation	Recommended Champion	Recommended Stakeholder Involvement in Implementation	Quantity	Cost Per Unit	Total Capital Cost	Total O&M Cost	Contracting Mechanism
<b>LIFECYCLE REPLACEMENT</b>										
None										

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<b>EXPANSION OF ADOT TECHNOLOGY DEPLOYMENT</b>																																																						
<b>Expand Availability of Additional Portable ITS Equipment (Rural Areas)</b>	Equip Districts with portable equipment to mobilize for longer-term closures or evacuations (cameras, portable DMS, UAS, supporting communications). Evaluate implementation and equip Districts for interim/temporary CCTV where CCTV is temporarily unavailable due to construction, upgrades, replacements, or downtime due to weather or incidents.	<p><b>Steps:</b> Obtain feedback from ADOT Districts on current inventory of portable DMS and identify additional needs. Develop SOQ or RFP to solicit procurement of additional portable equipment with trailers as shown in the table below to support mobilization by District during weather, incidents, or events. Acquire equipment and disseminate to District or allow use by contractors during work zones. Work with Districts to develop a standard process for implementing portable equipment to support notifications or detours for planned closures and restrictions. Districts to identify appropriate location to store portable equipment for likely most use. Procurement should include vendors providing ADOT staff with appropriate training and licensing.</p> <table border="1"> <thead> <tr> <th></th> <th>Portable CCTV</th> <th>Portable DMS</th> <th>Portable Comm (radio)</th> </tr> </thead> <tbody> <tr> <td colspan="4"><b>Northern Region</b></td> </tr> <tr> <td>NE</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>NC</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>NW</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td colspan="4"><b>Central Region</b></td> </tr> <tr> <td>CN</td> <td>5</td> <td>5</td> <td>2</td> </tr> <tr> <td>SW</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td colspan="4"><b>Southern Region</b></td> </tr> <tr> <td>SC</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>SE</td> <td>2</td> <td>2</td> <td>2</td> </tr> </tbody> </table> <p><b>Outcomes:</b> Procurement of portable equipment to support weather, incidents or events needs by each District.</p>		Portable CCTV	Portable DMS	Portable Comm (radio)	<b>Northern Region</b>				NE	2	2	2	NC	2	2	2	NW	2	2	2	<b>Central Region</b>				CN	5	5	2	SW	2	2	2	<b>Southern Region</b>				SC	2	2	2	SE	2	2	2	The permanently installed ITS infrastructure may not be always located in the exact area of a weather, incident, or event need for monitoring real-time conditions. Portable equipment deployment allows the District flexibility to address an immediate need for real-time condition collection without the long-term requirements.	TSMO RTEs	District Maintenance Managers	As shown in Steps and Outcomes	\$15K for portable CCTV with trailer \$20K for portable DMS with trailer \$10K for portable comm. (radio)	Northern Region: \$270K Central Region: \$285K Southern Region: \$180K Total: \$735K	No O&M cost anticipated – although replacement may occur in advance of traditional lifecycle due to wear and tear	Out-source through RFP to vendor for procurement
	Portable CCTV	Portable DMS	Portable Comm (radio)																																																			
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<b>Enhance CCTV Coverage for Monitoring</b>	Add communication, detection and CCTV at key locations to be able to monitor and inform travelers of conditions and monitor the extent of congestion issues where needed.	<i>Steps and Outcomes have been incorporated in the <b>Real-Time Roadway Condition Enhancements – DMS and CCTV</b> action item in the <b>Traffic Management System Layer Plan</b></i>	Monitoring and responding to congestion can be aided through visual confirmation. Increasing CCTV coverage in locations that routinely have congestion issues will benefit ATDM.	TSMO RTEs	District Maintenance Managers, one representative from each TSMO group	Refer to Tool – quantity will depend on specific location where deployed	\$150K for mini DMS \$400K for full DMS \$35K for each CCTV and pole	Refer to Tool – cost will depend on quantities included at specific locations where deployed	\$15K per DMS \$1.5K per CCTV	Out-source – either RFP or TSMO On-Call assignment																																												

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<b>DEMONSTRATED TECHNOLOGIES FOR ADOT DEPLOYMENT</b>										
None										
<b>EMERGING TECHNOLOGY FOR ADOT PILOTING</b>										
None										

## Performance Measures

The ADOT TSMO Plan defines performance measures using three categories, safety, mobility, and infrastructure/system health. AZDPS tracks several metrics through the TIM Coalition, but not likely any metrics on the road network. ADOT does not need to duplicate AZDPS metrics such as response times, secondary crashes, etc. but could leverage what AZDPS is doing. Performance measures as described in the table below would help to support ADOT’s goal of expanding IRU in meaningful ways and building a case around time ADOT maintenance staff spending time responding to incidents which takes them away from their core maintenance responsibilities. There needs to be some better coordination with ADOT and DPS on TIM/response performance measures that could be tracked on more of an output basis rather than an activity basis as suggested below:

Performance Measurement Topic	Performance Measure	Measure Applicability
Improve safety on key corridors during incident response	Reduce secondary crashes	Measure reduction in secondary crashes on corridors with active incidents
Improve safety and reliability	Improve incident response and clearance times for IRU areas	Continue measuring incident clearance time for IRU response areas
Improve ADOT response time to incidents statewide	Notify ADOT staff of incidents and impacts faster through CAD data feed from AZDPS	Reduce incident notification and mobilization time through AZDPS CAD data alerts