MID REGION COUNCIL OF GOVERNMENTS

TRAFFIC INCIDENT MANAGEMENT CONCEPT OF OPERATIONS

FINAL

JUNE 13, 2022

TABLE OF CONTENTS

FIGURES

1 INTRODUCTION

This document serves as the Concept of Operations (ConOps) for the Traffic Incident Management Plan (TIMP) for the Albuquerque Region. The TIMP is a cross-jurisdictional effort to address congestion, safety, and operational issues related to traffic incidents in the Albuquerque Metropolitan Planning Area (AMPA). While the standalone *Incident Management Plan for the Albuquerque Metropolitan Planning Area* document outlines the traffic analysis and identifies the recommended TIM strategies, this document provides greater detail related to the planning and operation of those strategies relative to the infrastructure and stakeholder environment.

1.1 PROJECT OVERVIEW

The MRCOG and partner agencies have developed the TIMP project to create a framework for better coordination on traffic incident management (TIM) in the AMPA. The project focuses on the evaluation of existing conditions relative to crash patterns and roadway infrastructure, research of traffic incident management practices, development of alternate routes for traffic detours, and creation of a TIM response template.

As part of the overall project effort, the following activities have been completed and provide input to this document:

- Research of national effective TIM practices
- One-on-one interviews with transportation and law enforcement stakeholders
- TIM Strategy Workshop (July 2020)
- Concept of Operations Workshop (November 16, 2020)

In addition to this document, the project has developed several additional documents, including:

- Technical memo on historical crash/event data, existing ITS infrastructure, and alternative routes
- Technical memo on national effective TIM practices and local stakeholder practices
- *Incident Management Plan for the Albuquerque Metropolitan Planning Area*
- TIM response templates
- TIM diversion routes

1.2 DOCUMENT PURPOSE AND USE

The primary purpose of this ConOps document is to define how the regional TIM strategies will operate from the viewpoint of multiple stakeholders. In addition, it will outline the governing vision, goals, and objectives that the regional partners established and describe the strategy characteristics, anticipated constraints and limitations, institutional issues, and external interfaces.

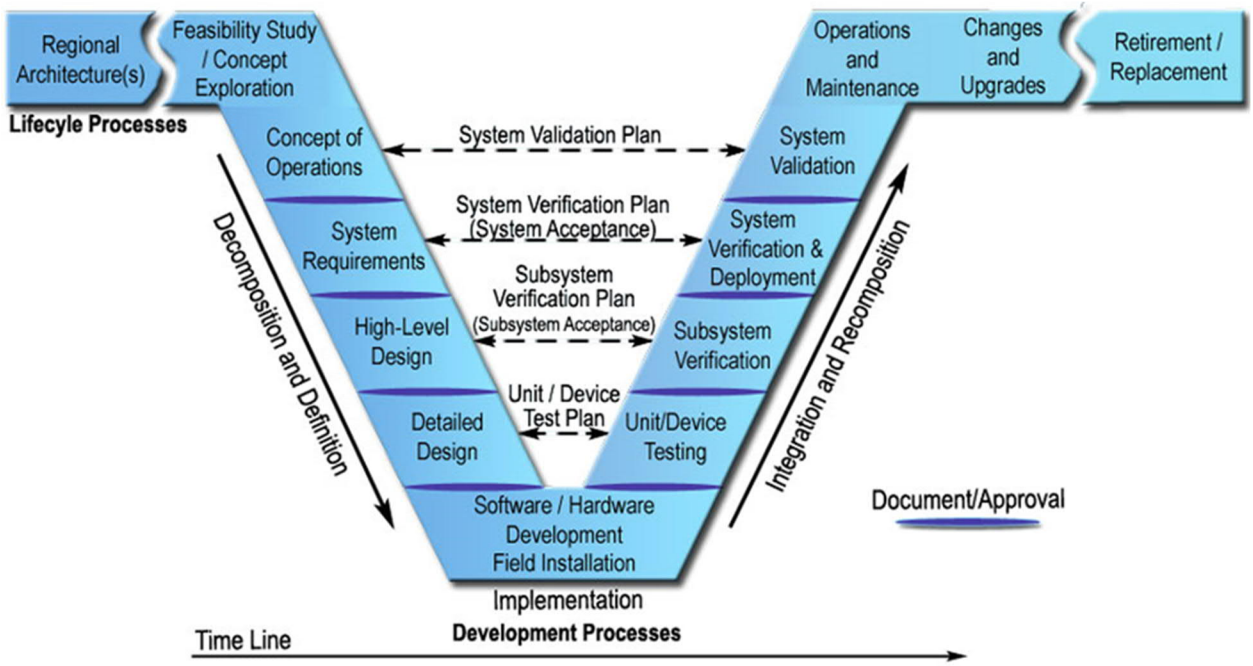
The ConOps will answer the who, what, when, where, why, and how questions about the proposed traffic incident management strategies:

- Who? — Identifies the various people who engage in TIM strategies.
- What? — Identifies the known components/elements – human or technology (hardware/software) – required for TIM.
- When? — Identifies the activities, including any required time sequence (precedence, concurrence), and operations under various events or conditions.
- Where? — Describes the physical and geographic location and environment.
- Why? — Explains the reasoning behind specific sequences or partitioning of activities (e.g., policies, skill sets).
- How? — Combines the above information to explain how the TIM Plan is to be deployed, operated, and maintained. (Not to be confused with prescribing how to implement individual strategies).

A Traffic Incident Management Plan has been developed for the AMPA Region which outlines specific TIM strategies and includes response templates that help identify when various TIM strategies are deployed. This ConOps helps support the implementation of the TIM Plan.

The ConOps is integral to the systems engineering approach required by FHWA for use of federal funding on ITS projects. As shown in the Figure 1, the ConOps effort serves as a transition between feasibility or concept exploration and the first stages of design. This “vee model” or “V-model” places the relevant procedures in a step-wise, temporally relevant shape with time moving left to right. The systems engineering flowchart provides continuity and checkpoints between planning, development, and implementation with each step referencing back to an earlier effort to verify or confirm that prior requirements and concepts are still being satisfied and carried forward.

Figure 1: Systems Engineering Lifecycle V-model



Source: FHWA "Systems Engineering for ITS," Publication No. FHWA-HOP-07-069, EDL-14340, January 2000

1.3 PROJECT GOALS AND OBJECTIVES

The AMPA Traffic Incident Management Plan was initiated to create a framework for better coordination on TIM efforts in the region. The project focuses on expanding existing traffic incident management practices, identifying new practices, developing alternate routes for traffic detours, and creating TIM response templates.

Goal: To develop a planned and coordinated multi-disciplinary process to detect, respond to, and clear traffic incidents.

Objectives:

To reduce the duration and impact of traffic incidents.

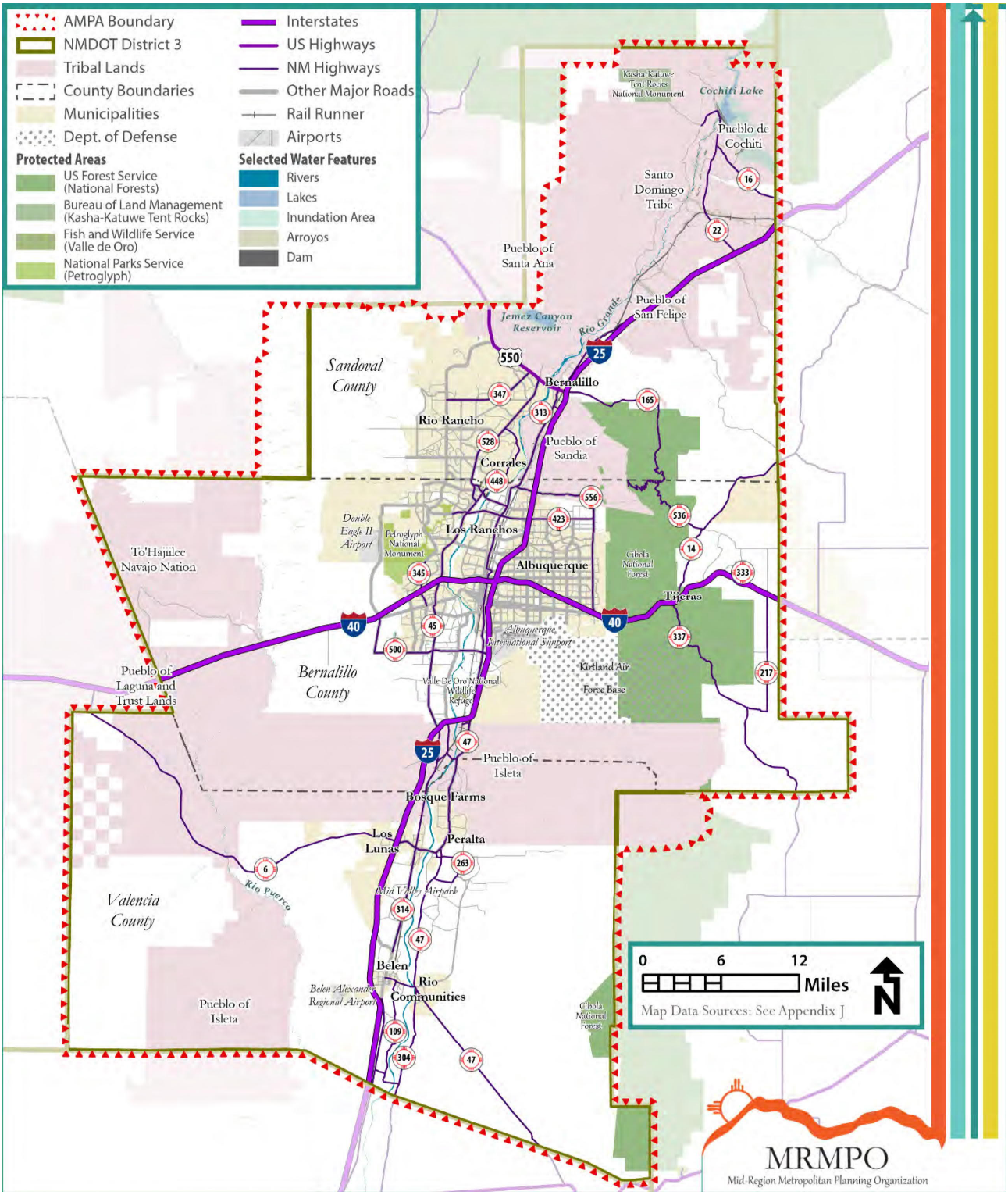
To improve the safety of motorists, crash victims, and emergency responders.

1.4 PROJECT LIMITS

The AMPA is geographically situated in central New Mexico and encompasses the central Rio Grande valley including all of Valencia County, Bernalillo County, and the most developed part of southern Sandoval County. The AMPA also includes all, or portions of, several tribal reservations and land grants. The project area is shown in Figure 2.

The roadway network within the AMPA limits includes two interstates – I-25 (running north-south) and I-40 (running east-west) – and one US Highway – US 550 (located on the northern boundary of Rio Rancho). Numerous state highways are located throughout the AMPA network and serve as principal arterials.

Figure 2: Albuquerque Metropolitan Planning Area (AMPA) Boundaries



Source: Connections 2040 Metropolitan Transportation Plan

1.5 DOCUMENT CONTENTS

The AMPA ConOps document generally follows the high-level outline structure that has been developed for systems engineering efforts. A brief description of each section is provided below.

Section 2: Reference Documents lists the resources used in the development of this document and serves as a source that readers may use to obtain additional details on aspects of the project. A brief description of each is provided for those readers unfamiliar with the reference.

Section 3: Existing Operations provides an overview of the current traffic incident management efforts within the project limits. It describes each stakeholder and their respective role, existing ITS infrastructure, and operational processes and procedures.

Section 4: Operational Needs identifies and describes the operational needs that were identified based on interviews with the AMPA stakeholders. Identified needs are categorized by stakeholder type.

Section 5: Practice Enhancement Overview provides a description of the new and enhanced TIM practices that have been recommended as part of the TIM Plan. Each practice is described at a high level to facilitate broad understanding by all stakeholders. General roles and responsibilities will be identified.

Section 6: Operational Support Environment discusses the non-physical elements that are necessary to support the practices listed in Section 5. This section will include topics such as laws, training, performance measures and evaluation, media, and after-action reviews.

Section 7: Operational Scenarios discusses the events or incidents that would initiate a regional TIM response and activation of the concepts within the TIM Plan. Within the section, example scenarios are provided illustrating the types and ranges of responses. The full range of response scenarios is provided in the TIM Plan.

Section 8: Next Steps highlights the additional steps that are required beyond this ConOps for those TIM practices that are technology-based. This section focuses on the formal processes in the systems engineering approach.

2 REFERENCED DOCUMENTS

The AMPA TIMP ConOps effort utilized available information from existing documents, rules/laws, procedures, and analysis. These resources range from national rules/guidelines to regional and local projects/procedures. Each of the referenced sources are identified below with a summary of the applicability and utility to the ConOps.

2.1 AMPA REGIONAL ITS ARCHITECTURE

The AMPA Regional ITS Architecture was most recently updated in 2016 to conform with federal requirements, statewide ITS architecture, and local projects/efforts. The Regional ITS Architecture document provides a "roadmap for transportation systems integration…over the next 20 years" and serves as a planning-level framework for more detailed systems engineering during future ITS project development. The 2016 update brings the architecture up to Turbo Architecture Version 7.1 and updates the applicable institutional and technical components. Customized service packages map the specific elements and information flows associated with the various functions.

An update to the Regional ITS Architecture was underway during the development of this ConOps and changes to the ITS Architecture have not been included in this document. However, based on discussions with stakeholders, there are not planned to be substantive changes to the ITS Architecture that would impact traffic incident management strategies.

2.2 USDOT/FHWA RULE 23 CFR 940

This regulation outlines the requirements for ITS projects to conform to the National ITS Architecture and Standards in compliance with the Transportation Equity Act for the 21st Century (TEA-21). The rule requires all regions implementing ITS projects to establish a regional ITS architecture that conforms to the National ITS Architecture. Subsequent ITS projects that utilize federal funding (highway trust fund) shall utilize a systems engineering process, follow the regional ITS architecture plan, and use applicable ITS standards that have been adopted/approved to ensure interoperability.

2.3 USDOT/FHWA RULE 23 CFR 511

This regulation outlines the requirements for states to implement real-time information programs in compliance with the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The rule requires all states to provide traffic and travel conditions information to the traveling public, other public agencies, and other parties who "may deliver value-added information products". For metropolitan areas such as AMPA, traffic and travel condition information related to construction activities and/or lane (or road) blocking incidents should be available within 10 minutes of occurrence (closure or reopening) being verified. For weather-related closures, information should be available within 20 minutes of observation. The traffic and travel condition program shall include coverage on all Interstate roadways and metropolitan area routes of significance. The information accuracy should be 85% accurate or higher with a 90% availability.

2.4 RTMC IMPLEMENTATION (CONOPS)

A Regional Traffic Management Center (RTMC) has recently been constructed in the Albuquerque region. The NMDOT led the development of a Concept of Operations report for the RTMC during the pre-design effort in 2012, at the time entitled "Albuquerque Area Joint Transportation Management Center Concept of Operations". The document focuses on the various considerations that need to be included in the TMC development including operation, staffing, information exchanges, and management. Additional information was included related to contracting methods, facility needs, and site selection.

2.5 LOCAL FIRST RESPONDER PROCEDURES

First responders in each agency or municipality have specific procedures that are unique to their local group. These may vary based on local laws/rules, resources (staffing, equipment), or other considerations. As part of this project, one-on-one interviews were held with transportation and law enforcement stakeholders to determine current TIM practices which are summarized in the *Incident Management Plan for the Albuquerque Metropolitan Planning Area* (2021).

2.6 EXISTING LAWS AND RULES

The State of New Mexico has several laws related to traffic incident management – move over, authorized removal, and accident investigation unit. The “Move Over Law” (66-7-332) requires all vehicles approaching a stationary authorized emergency vehicle to move over, slow down, or be prepared to stop. The “Authorized Removal Law” (66-7-350) allows police officers to move, or direct the driver to move, any vehicle that is obstructing traffic. Statute 66-7-202 requires the driver of any vehicle involved in a damage-only crash to move the vehicle to a position that does not obstruct traffic “more than is necessary”. Statute 66-7-507 provides the NMDOT Traffic Safety Bureau with authority to establish an “accident-investigation program” which would investigate crashes and crash causes.

3 EXISTING OPERATIONS

Traffic incident management is the coordinated response to traffic incidents and the use of tactics to safely and quickly restore traffic operations to pre-incident conditions. The process relies on the various stakeholders, strategies, policies, and frameworks that ultimately define the operational TIM capabilities.

3.1 TIM STAKEHOLDERS

Stakeholders involved in traffic incident management are varied and include a wide range of public agencies and private companies in addition to the general public. Each TIM stakeholder has a specific role and responsibility, and include the following:

- Elected officials
- Metropolitan planning organizations
- Transportation professionals
- Law enforcement
- Emergency responders (fire, medical)
- Transit providers
- Towing and recovery firms
- Commercial vehicle operators and organizations
- Media
- Road users/general public

Within each of the above groups, there are multiple types of stakeholders such as policy makers, managers, engineers or designers, application developers, operators, maintenance workers, construction workers, manufacturers or suppliers, and others. While this list is extensive, it is important to consider all potential stakeholders as the ConOps is being developed.

Specific to AMPA, each primary stakeholder organization and their associated role(s) is described below.

New Mexico Department of Transportation (NMDOT)

- District: Oversees traffic operations on I-25 and I-40, maintains freeway ITS elements (vehicle detection, cameras, dynamic message boards, roadside weather systems, advanced traveler information system), provides traffic control during major incidents, and operates a Courtesy Patrol service.
- Statewide: Manages the Statewide Traffic Management Center (TMC), and custodian of traffic crash records.
- Statewide: Develops traffic signal timing plans, exclusive to US 550 within the AMPA.

New Mexico Department of Public Safety (DPS)

- Enforces traffic laws, responds to incidents on I-25 and I-40, responds to major incidents on state highways as requested, and provides hazmat resources for the region.

Mid-Region Council of Governments (MRCOG)

- Supports the federal transportation planning process as the designated metropolitan planning organization for the AMPA. Stakeholder agencies with roadway operations responsibilities are members of the MRCOG. MRCOG coordinates regional ITS planning and supportive TSMO project planning and coordination efforts and, hosts the ITS Subcommittee in monthly/on call stakeholder coordination meetings. MRCOG also tracks performance measures (PMs) as part of the Traffic Monitoring and Counts program, and is responsible for other federal PM monitoring within the AMPA.

City of Albuquerque

- Department of Municipal Development: Oversees traffic operations on local roadways, maintains arterial ITS elements (traffic signals, vehicle detection, cameras), and manages a part-time TMC. Maintains dynamic message boards installed on arterials adjacent to the interstates.
- Develops and maintains signal timing plans for all City owned and NMDOT owned signals within the City limits.
- Police Department: Enforces traffic laws and responds to incidents on local roadways within jurisdiction.
- Fire Rescue Department: Provides fire protection and medical aid at incidents within jurisdiction.
- Public Safety Answering Point (PSAP): Answers 9-1-1 system calls for public reporting of emergencies. Coordinates with appropriate law enforcement on response.

Bernalillo County

- Public Works Division: Oversees traffic operations on local roadways, and maintains arterial ITS elements (traffic signals, vehicle detection, cameras).
- Develops and maintains signal timing plans for all County owned and NMDOT owned signals within the unincorporated portions of Bernalillo County.
- Sheriff's Office: Enforces traffic laws and responds to incidents on local roadways within jurisdiction.
- Fire Department: Provides fire protection and medical aid at incidents within jurisdiction.
- Public Safety Answering Point (PSAP): Answers 9-1-1 system calls for public reporting of emergencies. Coordinates with appropriate law enforcement on response.

Sandoval County

- Public Works Department: Oversees traffic operations on local roadways, and maintains arterial ITS elements (traffic signals, vehicle detection, cameras).
- Sheriff's Office: Enforces traffic laws and responds to incidents on local roadways within jurisdiction.
- Fire and Rescue Department: Provides fire protection and medical aid at incidents within jurisdiction.
- Public Safety Answering Point (PSAP): Answers 9-1-1 system calls for public reporting of emergencies. Coordinates with appropriate law enforcement on response.

City of Rio Rancho

- Public Works Department: Oversees traffic operations on local roadways, and maintains arterial ITS elements (traffic signals, vehicle detection, cameras).
- Police Department: Enforces traffic laws and responds to incidents on local roadways within jurisdiction including several State Routes (SR 347, SR 528, and US 550).
- Fire and Rescue Department: Provides fire protection and medical aid at incidents within jurisdiction.

Towing and recovery companies

- Remove disabled vehicles, and clear roadway of debris.

Office of Medical Investigators (OMI)

- Removes and transports deceased persons, establishes cause and time of death, and conducts toxicology analysis.

FHWA

- Coordinates stakeholder participation in the annual TIM Report Card that documents regional performance on incident responses and operations. In support of this, the FHWA also coordinates the region's self-evaluation of respective institutional structures and policies considered necessary for effective incident management and coordination. This is done through their administering the Capability Maturity Model (CMM) assessment.

3.2 DEFINITION OF SIGNIFICANT EVENT

Traffic incidents can be caused by several factors, such as crashes, weather, or construction, and can occur with regular frequency. Responding to minor traffic incidents may require few resources and may be managed by a single agency. These minor events typically rely on internal agency operating procedures without substantial planning. In contrast, major traffic incidents can impact traffic operations on a larger scale both in area and duration and require increased planning and coordination across multiple stakeholder groups. Due to the larger impact, these significant events also have a greater potential to cause secondary crashes upstream from the initial event.

The definition of a "significant event" is not a national standard but should be defined based on local considerations. For AMPA, the following definition of a significant event was adopted based on input from stakeholders:

> A significant event is generally one that is anticipated to last at least 90 minutes. Significant events typically affect one or more of the travel lanes, result in area-wide or corridor-wide traffic impacts, require response from multiple agencies or companies, require a more formal response plan, may involve fatalities or hazardous materials, and may require investigation. The impacts of a significant event will vary depending on the time of occurrence.

3.3 TIM PRACTICES

Current agency practices relative to TIM have been documented in the *Incident Management Plan for the Albuquerque Metropolitan Planning Area* (2021). While the use and implementation of each TIM practice differs between agencies and depends on internal policies, resources, and staffing, a summary of major regional practices categorized by functional area is provided below.

Regional Planning and Training

Agencies operating within the Albuquerque metropolitan area have recurring regional planning efforts and TIM training goals. Regional planning is largely conducted through recurring quarterly meetings between agencies to discuss traffic issues ranging from operations, safety, and projects. These recurring meetings include NMDOT, DPS, and local agencies and are split into three metro areas – northern, central, and southern. The purpose of the meetings is to coordinate efforts between engineering and enforcement across all agencies. In addition, participants identify operational issues, including construction and maintenance activities, that may impact traffic safety.

Standalone planning efforts are often untaken for scheduled events (construction or maintenance) which may require prolonged closures or have impacts on an adjacent agency. Similarly, special event planning, such as the annual Balloon Fiesta and a recent Presidential visit, are more aligned to managing event traffic and not necessarily incidents but there may be common aspects that could be shared. In addition, winter operations planning typically involves coordination between traffic maintenance crews and first responders to review freeway closure procedures and impacts. These planning activities include the identification of possible diversion routes for impacted traffic and staging areas for resource deployment.

In terms of TIM training, the Albuquerque area has held two individual training sessions for regional responders. These resources help with progress toward the Statewide TIM training goal of 15%, currently standing at 12%. For law enforcement, TIM training typically starts at the Academy with basic TIM training. This SHRP2 National Traffic Incident Management Responder Training, which highlights safe and quick clearance of incidents to minimize impact to traffic and limit exposure to responders, is also offered to professionals involved in towing/recovery. Outside the initial TIM training, officers also take Safer New Mexico Now training on traffic safety including traffic enforcement, DWI checkpoints, speed enforcement, and crash reconstruction.

TIM training for support personnel within the transportation and public works sections are mostly required of TMC operators and Courtesy Patrol. These staff are typically required to complete the introductory FEMA National Incident Management System (NIMS) courses that highlight the goals, scope, and methods of incident management and the role of the Incident Command System (ICS).

Incident Detection and Reporting

Incident detection in the AMPA region is typically done through public calls to 9-1-1 or information from law enforcement officers in the field. This information is then relayed to the regional dispatch center who can notify the corresponding agency responsible for incident response.

If the incident occurs on routes owned and maintained by NMDOT, additional incident detection may occur through field equipment such as CCTV or vehicle detectors. The NMDOT, which currently operates a Statewide Traffic Management Center (TMC) in Albuquerque, has a total of 6 to 8 dedicated operators who staff the center throughout the operating hours of 6:00 AM to 8:00 PM. Outside those hours, the operators rotate on-call status and can access the TMC remotely if called or requested. In addition to manual surveillance, 3rd party traffic data and video analytics have been utilized to assist in incident detection. Once detected, incidents can be verified and monitored through the same NMDOT camera feeds.

If the incident occurs on routes owned and maintained by local agencies, there is less likelihood of incident detection. Local agencies may have a traffic management center – either through physical or virtual TMC workstations – that allow access to cameras and traffic signals once incidents are identified. In many cases, law enforcement agencies also have access to the CCTV camera feed for observation.

For weather-related events, separate road weather information systems (RWIS) are installed on the peripheries of the metropolitan area where adverse weather is more of a concern. The NMDOT is in the process of installing two additional RWIS sites also on the periphery of the urbanized areas.

Interagency Communication and Coordination

Communication and coordination between agencies within the AMPA region is accomplished using a variety of methodologies and approaches.

Organizational communication is handled through the distribution of a formal contact list managed and maintained by NMDOT. Due to the relative size of the region, there is a manageable number of stakeholders and most know who to contact and how to contact them. Stakeholder feedback indicates that most rely on personal relationships and prefer direct phone calls.

Field communication is managed through face-to-face, radio, and cellphone methods. Law enforcement agencies (State, County, local, Tribal) currently operate on different radio frequencies and all fire departments are on a separate radio system from law enforcement. However, all agencies can be reached through the regional dispatch center. Officers try to keep radio traffic to a minimum during incidents and typically use cell phones for most tactical coordination on scene. Personal/verbal communication is adequate on small scenes.

Inter-agency coordination occurs on many of the shared roadways through shared patrol/response. For example, Sandoval County Sheriff patrols both incorporated and unincorporated areas and responds to incidents on I-25 for the State. If there is a need for a joint investigation, they will notify the partner agency. Similarly, the City of Rio Rancho patrols several major State routes – SR 347, SR 528, and US 550. Conversely, NMDPS typically takes the lead on large, unusual events – and anything involving animals or hazmat.

Data sharing between agencies consists of sharing camera video feeds through the NMRoads website environment. Direct connection between networks has been attempted but proven more difficult.

Traveler Information

Within Albuquerque, there are approximately 80 permanent dynamic message signs (DMS) installed to provide traveler information with more being planned. Most of these are either along the major freeways (I-25 and I-40) or on major arterials adjacent to the freeways. In addition, portable message boards are used if incidents are longer duration and either in an area without DMS or require additional messaging. These systems allow information to be displayed to the public about traffic incidents, road closures, travel times, and other conditions.

Traveler information is also available through the NMRoads website and the 511 phone system. For notable events, communication can also be handled through media releases and social media platforms managed by the Public Information Officers (PIO).

Clearance Procedures

The State of New Mexico has several laws related to traffic incident management. The “Move Over Law” (66-7-332) requires all vehicles approaching a stationary authorized emergency vehicle to move over, slow down, or be prepared to stop. The same law requires vehicles to yield right-of-way, move to the right, and/or stop if approached by a

moving authorized emergency vehicle. The “Authorized Removal Law” (66-7-350) allows police officers to move, or direct the driver to move, any vehicle that is obstructing traffic. Under 66-7-202, the driver of any vehicle involved in a damage-only crash shall move the vehicle to a position that does not obstruct traffic “more than is necessary”. If a vehicle is obstructing traffic, the Authorized Removal Law allows law enforcement to move it off the paved roadway using the push bumpers installed on patrol cars.

Clearance procedures performed on-scene are typically performed by law enforcement. However, the State also operates a Courtesy Patrol to assist with incidents on the Interstates within the metro boundaries. There are currently 8 patrol vehicles that operate on a rotating schedule between 6:00 AM and 6:00 PM, Monday through Friday. The overlapping schedules allow the following coverage: 3 vehicles in the AM, 5-6 vehicles midday, and 3 vehicles in the PM.

Motorcycle patrols are common within most of the law enforcement groups. These can allow quicker access to incidents though the units are limited in function due to size and equipment capacity.

Towing and recovery, typically the final step in incident clearance, is largely coordinated through law enforcement agencies using contracted services. These on-call towing companies remove disabled vehicles and clean-up the scene. In instances where there are heavy vehicles involved, specialty equipment may be needed and may limit the number of companies that are adequately equipped to respond.

Crash Investigation

Crash investigation is performed on all severe incidents (those involving major injuries or fatalities). At a minimum, photos and measurements are collected as well as the vehicle black box information. While most agencies use distance wheels and total stations, some agencies have advanced equipment such as a 3D scanner which takes photos, measurements, and scans a point cloud. Several agencies have started using drones to gather data during incidents but it has only been used in large scenes and is limited to collecting photos and video.

Medical treatment varies based on the severity of any injuries. Fire and/or private ambulance typically treats patients on-scene or transports them to the hospital. Fatalities require the notification of the Office of Medical Investigators (OMI) to investigate and transport the body. When fatalities do occur, law enforcement doesn’t move the vehicle until OMI is on-scene and removes the body.

Performance Management

Performance measures in the Albuquerque area are limited and focus on the NMDOT metrics related to the DOT response time only. The primary source of data for incident details remains the crash reports collected by law enforcement.

After-action debriefings of incident responses occur in most agencies with internal discussions between law enforcement and traffic staff. These are typically informal, limited to the largest and most significant events, and usually occur ad-hoc during other coordination meetings. This is especially true in scenarios where the responses did not meet mutual expectations. NMDPS/NMDOT formally document lessons learned from these discussions and electronically store them with required action items.

Aside from specific traffic incident debriefings, there are some annual events that have after-action discussions such as winter operations and the Balloon Fiesta but these focus more on the planning aspects rather than response.

3.4 ITS INFRASTRUCTURE

Intelligent transportation systems (ITS) serve an important part of TIM by providing means to collect data, disseminate information, and control traffic devices. ITS features can include any technology-based field devices, communication networks, and software/data platforms that support agency operations. The following types of ITS are included in the study area inventory:

- Traffic signals: Signalized traffic control installed at at-grade intersections.
- Dynamic message signs (DMS): Electronic message boards that can display changeable messages to the roadway user. Typically installed overhead for vehicular drivers.
- Closed circuit television (CCTV) cameras: Video cameras that capture and transmit live video of roadway segments or at-grade intersections. Typically have pan, tilt, and zoom control features.
- Roadway weather information systems (RWIS): Weather-focused instrumentation that is installed along the roadside in areas where weather is a concern. Can transmit data on temperature, precipitation, wind, visibility, and other weather features.
- Vehicle detection: Equipment that is installed (overhead, in pavement, side of road, or other) for the purpose of detecting vehicle passage or presence, as well as

vehicle speeds. Can be based on a number of technologies and installed along a roadway segment or at an intersection. Vehicle detection data can be used for a variety of purposes either in real-time or from an archive or data warehouse.

- Advanced communications network: Installations of fiber-optics, radar, or other technologies that connect ITS infrastructure devices to common communication points. The network allows remote access and control of features including data collection and real-time operations. Per MRCOG data comprised of stakeholder agency GIS files, the AMPA region has 295 miles of advanced communications network as of 2018/2019.

Figure 3 shows the existing ITS infrastructure within the AMPA region organized by major feature and owning jurisdiction.

Figure 3: Existing AMPA ITS Infrastructure

	Traffic Signals	DMS	CCTV	RWIS	Vehicle Detection
NMDOT (total)	15	68	107	2	70
(interstate)	0	31	86	2	67
(other)	15	37	21	0	3
City of Albuquerque	708	11	224	-	32
City of Rio Rancho	60	-	11	-	10
Bernalillo County	56	-	19	-	

In addition to the existing features above, the AMPA stakeholder agencies operate traffic management centers that serve as the central hub for monitoring and operating the above ITS devices. Data is transferred between the field devices and the respective individual TMCs through a network of communication links including copper wire and fiber optic cable. There are currently 4 separate traffic management centers within AMPA, though each center differs in terms of capability, number of dedicated staffing, and hours of operation. The existing centers include:

- New Mexico Department of Transportation: Statewide TMC with a total of 6 to 8 operators that rotate throughout the operating hours of 6:00 Am to 8:00 PM.
- Bernalillo County: Local TMC, no dedicated staff.
- City of Albuquerque: Local TMC, no dedicated staff.
- City of Rio Rancho: Local TMC, no dedicated staff.

A regional TMC has been constructed and is now occupied by NMDOT TMC operators with other agencies continuing to operate under existing configurations. Several local agencies have been approved for new staff to reside at the regional TMC and it is envisioned that multiple agencies will ultimately operate from within the regional TMC. While multiple agencies will occupy the regional TMC, there are no current plans for integration of individual agency systems or networks; each agency will operate and maintain separate systems within a shared facility.

3.5 SHARING AGREEMENTS

Sharing resources can be beneficial to agencies as it allows for an increase in capability, efficiency, and/or consistency. Within the AMPA project area, stakeholders have a number of sharing agreements related to incident response though most are informal and lack documentation.

Law enforcement response to incidents along State Routes is typically shared between DPS and the local jurisdictions. Examples include:

- Sandoval County Sheriff patrols both incorporated and unincorporated areas and responds to I-25 for the State.
- City of Rio Rancho manages traffic operations and incident response for NMDOT on SR 347, SR 528, and US 550.
- New Mexico DPS typically takes the lead on large, unusual events – and anything involving animals or hazmat – regardless of jurisdiction.

Memorandum of Agreements (MOAs) are in place for the sharing of infrastructure (fiber, DMS) in support of stakeholder cooperation relative to incident response. Data sharing currently exists between stakeholders but is largely one-directional from NMDOT to other agencies. The major data sharing platform is the NMRoads website which provides local agencies and the general public access to the NMDOT camera feeds from CCTVs as well as RSS feeds (.xml) that can be consumed by anyone. NMDOT also has camera sharing agreements with the media though there are limits to the use of the images.

4 OPERATIONAL NEEDS

Stakeholders in the AMPA region currently deploy and utilize a number of strong traffic incident management practices as described in the previous chapter. However, a number of additional needs have been identified by TIM stakeholders through an AMPA TIM Plan workshop and various interviews. Identified needs are described below and organized by stakeholder group. These operational needs form the basis for proposed TIM practices, the TIM Plan, and this ConOps document.

4.1 METROPOLITAN PLANNING ORGANIZATION

AMPA stakeholders identified a number of needs related to initial planning and performance management through one-on-one interviews and project workshops. These needs are generally listed under the MPO as it serves as a facilitator for regional planning efforts. These needs are summarized below.

- The state currently participates in an annual FHWA TIM Self-Assessment. This provides a high-level, statewide perspective primarily led by NMDOT. The creation of a **regional MRCOG TIM self-assessment** would provide more local insight to the AMPA TIM stakeholders.
- Many of the AMPA TIM stakeholders currently coordinate on planned and/or special events, typically meeting on a quarterly basis. However, there is a **need for strategic planning** focused on day-to-day coordination on traffic incidents. Joint procedures between stakeholders, including a shared response matrix and alternate route plans, could improve TIM response coordination.
- TIM training is largely handled by agencies individually based on staff requirements. AMPA could **increase regional training resources** available to member agencies, such as those located on the New Mexico ITS website. These include access and administration of national TIM training resources and the maintenance of train-the-trainer resources.
- Data collection related to TIM within the region is limited mostly to NMDOT. However, data is important for real-time operations as well as historical reference. MRCOG has identified a **need for increased data sharing** among member agencies including planned construction/maintenance data, incident data, TIM response efforts, and traffic data (counts, speed).
- Planning, including TIM planning, requires knowledge of the system performance and the establishment of quantitative goals. There is a **need for establishing a performance management system for TIM** that allows the region to track TIM response performance over time and establish goals.

4.2 INCIDENT RESPONSE AGENCIES (LAW ENFORCEMENT, FIRE)

Incident responders within the AMPA study area identified a number of needs through one-on-one interviews and project workshops. These needs are summarized below.

- Many of the AMPA TIM stakeholders currently coordinate on planned and/or special events, typically meeting on a quarterly basis. However, the same stakeholders identified a **need for regional planning for unplanned events** and more common traffic incidents. Increasing upfront planning could improve the ICS coordination and improve on-scene management.
- The AMPA area currently **lacks a common radio frequency** to allow responding agencies to communicate directly. While a common workaround includes the use of the regional dispatch and cell phone communication, a common radio frequency could be useful in larger incidents that span multiple agencies or in cases of delegated response.
- There is a **limited amount of video sharing** within the AMPA area. NMDOT roadside cameras are available to other agencies through a website (NMROADS) but local agency cameras are not widely available. NMDOT video does not stream on the public NMROADS site but agencies can request enhanced access from NMDOT to allow "live" video feed.
- The State currently has a quick clearance law that allows removal of disabled vehicles but many agencies have limited the use due to **liability concerns over vehicle damage**. Law enforcement agencies have developed internal policies restricting the situations where push bumpers can be used and some have an approval process that must be followed. Limiting the potential liability to agencies may increase usage of the tactic.
- TIM training is available but **participation in TIM training is not required**. Police/sheriff training after the Academy is typically focused on law enforcement and not TIM. Statewide TIM training stands at 12% and increased training could improve coordinated response.

4.3 TRANSPORTATION AGENCIES

Transportation professionals within the AMPA study area identified a number of needs through one-on-one interviews and project workshops. These needs are summarized below.

- Detection of incidents is largely through law enforcement and 9-1-1. While the NMDOT has good detection coverage on the interstate system, there are large gaps in field detection devices on the state highways and local arterials. In addition, there are **limited automated detection methods** and most rely on staff

observation. Increased coverage of automation methods may improve detection and alleviate staff workload.

- Most **local agencies do not have dedicated TMC staff** and therefore have limited capabilities for traffic observation and management. During incidents, transportation professionals at local agencies are not always notified of incidents and therefore do not manage operations. Increasing the ability to support real-time operations could improve incident management. The freeway system has a robust platform allowing real-time monitoring. Adding **real-time monitoring to the arterial roadways** of regional significance would increase situational awareness particularly when significant incidents create diversion traffic
- TIM training is available but **participation in TIM training is not required**. Training for transportation staff is typically focused on traditional design, construction, and maintenance. Statewide TIM training stands at 12% and increased training could improve coordinated response.
- **Performance measurement evaluation is limited** and tracked mostly at the State level. Detailed breakdown of the TIM timeline is available through the uniform crash report which includes the following time inputs: time notified, time arrived, time roadway cleared, and time incident cleared. Routine evaluation of the data could help assess the TIM response for improvements.
- **After-action reviews are limited and informal** in the AMPA area. Some agencies do conduct after-action reviews on a limited basis depending on the magnitude of the incident but many agencies do not. Providing increased opportunities to debrief TIM responses could help future efforts.

4.4 ROAD USERS

AMPA stakeholders identified the following road user needs through one-on-one interviews and project workshops.

- The web-based NMRoads platform is a good tool for distributing traffic and incident information to the public but is limited to the state system. Travelers on local arterials have **limited means of obtaining real-time information** regarding incidents and therefore must rely on so called “third party” mobile app traveler information. Though many new vehicles come equipped with these apps and data services, the travelers within the AMPA will benefit from expanded and integrated stakeholder-supplied and managed data services. Increased traveler information could assist in routing decisions and reduce the impact of incident on traveler delays.
- Incidents on higher speed roadways create speed differentials at the end of the queue that can surprise approaching drivers. While NMDOT has a network of permanent DMS signs, there are areas that may benefit from **increased end-of-queue notification**. Increased detection and warning in key areas (such as curves in alignment) may increase awareness.

- There is a **need for public education regarding safe practices** during incidents – such as Move Over and Quick Clearance. Individual agencies do not currently develop or distribute education through media platforms. Additional public education could improve responder safety and driver safety.

5 PROGRAM ENHANCEMENT OVERVIEW

The AMPA TIM Plan includes recommendations for new and enhanced TIM practices that will increase the ability of individual agencies to respond to and clear incidents as well as improve interagency coordination. Some of these practices build upon existing efforts while others are new functions within the region. While each practice described below may not be applicable to all jurisdictions, they are presented as a "toolbox" of options of which the application and combination of practices will address identified TIM needs.

Each recommended TIM practice enhancement is described below at a high-level to facilitate broad understanding by all stakeholders.

5.1 DATA AND VIDEO SHARING

Data and video sharing among AMPA agencies can improve TIM planning, response, and evaluation. Primary types of data to be shared include traffic data, video data, and incident response data. These data sources will be shared in real-time and, with the exception of video data, archived for future reference.

Traffic Data

Traffic data consists of vehicle volume, vehicle speed, and vehicle classification by lane. Data sources are a combination of agency-owned detection equipment (inductive loops and non-intrusive detectors such as infrared, radar, and video analytics) and 3rd party data. Each of these sources have their respective benefits and may be applied in different approaches according to each transportation agency preference. Generally, agency-owned equipment is more accurate and reliable but requires upfront capital costs and recurring maintenance. While these features are typically required at intersections for traffic control devices (traffic signals), there are no common standards or guidance for use along roadway segments. In contrast, 3rd party data requires no capital costs or maintenance but does require a recurring subscription cost. This type of data is available for most major roadways and has increased coverage but provides less granularity due to collection methodology.

For operational use, traffic data generated and collected by NMDOT will be uploaded to the existing NMRoads platform. Partner agencies will be provided administrative access to the platform which allows increased detail and reporting abilities. Traffic data

generated and collected by local transportation agencies will be uploaded to a new shared platform similar to the NMRoads site. This effort is in the early planning stages and being led by City of Albuquerque. All traffic data will be made accessible to MRCOG for planning and archival purposes.

Video Data

Video data sources consists of agency-owned cameras installed along the roadside. These video feeds are to be used for real-time operations and not archived or recorded by transportation agencies. Local law enforcement will remain an exception to video recording as Albuquerque Police Department has the ability to save video within 24 hours of initial recording if investigating criminal activity.

For operational use, video feeds collected by NMDOT will be uploaded to the existing NMRoads platform. Partner agencies will be provided administrative access to the platform which allows increased streaming rates and displays with multiple camera feeds. Video feeds collected by local transportation agencies will be uploaded to a new shared platform similar to the NMRoads site. This effort is in the early planning stages and being led by City of Albuquerque.

Access to agency-owned cameras will be limited to video feed and not shared control. Camera control, in terms of pan/tilt/zoom, will remain with the owner agency at this time.

Incident response data

Incident response data consists of documented incident location, incident details, response timeline, and clearance procedures. A common spreadsheet/format will be developed by the AMPA stakeholders to provide consistency in reporting.

For operational use, transportation agencies will collect and distribute the information to adjacent jurisdictions if there are anticipated impacts. All incident response information will be made accessible to MRCOG for planning and archival purposes.

5.2 INTEROPERABLE RADIO SYSTEM

The AMPA region is currently underway with the development of an interoperable radio system. This system will provide common radio frequencies that are available and accessible to all incident response agencies. The Department of Information Technology

(DoIT) manages the state radios and leads this effort. The radio system and network will be developed by FirstNet through grant funding.

The interoperable radio system will upgrade the communications towers and associated infrastructure to provide shared frequencies accessible to law enforcement, fire, transportation, and other incident responders. Each agency will obtain compatible radios that are programmable to access and store the shared frequency and will be responsible for maintaining such equipment.

For operational use, the State DoIT project will develop shared communication protocols and standards for use of the shared frequencies. Training material relative to the operation of the devices will be developed by the State and distributed to the individual agencies.

5.3 REGIONAL TMC

The AMPA region has developed a regional TMC for joint operations that is currently staffed by NMDOT TMC operators with other agencies planning to add staff in the future. The RTMC will provide shared building space for multiple agencies to setup workstations and conduct real-time operations. Agency operations will remain separate and there are no plans to share computer networks, systems, or other infrastructure outside the physical building. While individual agency networks will remain separate, the RTMC will allow shared use of the monitor walls as well as access to response personnel to share situational awareness and access to response resources among agencies. There will not be shared or delegated control of cameras or other features.

In the initial stage, NMDOT will be the sole agency to occupy the TMC in a similar manner as the current NMDOT TMC. Additional local agencies will occupy the TMC as staffing and resources allow.

5.4 RESPONSE TEMPLATES

Incident response in the AMPA region is currently managed by individual agencies and performed based on separate procedures. Common response templates were developed and provide the regional stakeholders with a single point of reference in terms of process. These templates are not prescriptive to individual agencies but serve as a general framework.

The response templates provide a structured approach to incident response. Details on the level of response necessary is predicated on the anticipated impact to the traveling public – larger impact events requiring more effort – and the forms are segregated by incident location, incident type, and time of day. Each response template includes specific actions that are to be considered standard to ensure that agencies do not overlook a critical step while managing multiple events. These steps include actions by law enforcement, fire, medical, and transportation agencies as well as media and towing and recovery.

In addition to the procedural steps, the response templates include a list of critical items to monitor for traffic operations with corresponding actions based on the condition. A contact list identifying the primary contacts in each agency with phone number, email, and other contact methods is managed by NMDOT District 3 Traffic.

5.5 RAMP METERING

The addition of ramp meters along the AMPA interstates would be based on typical weekday traffic volumes and congestion. Studies are underway along I-40 to evaluate ramp metering as part of a Congestion Management Plan. If installed, ramp metering would allow NMDOT to control the flow of vehicles entering the interstate system in order to improve operations on the mainline.

Ramp metering design, construction, and operation will require a coordinated approach with all stakeholders involved and will benefit from a Systems Engineering process including a standalone Concept of Operations to define the configuration and operation of the system. This process will also determine how the ramp meters will be controlled, monitored, and maintained along with any TMC upgrades.

Ramp meters consist of a traffic signal on the interstate on-ramps with associated ramp signal controller, traffic detection (on-ramp and interstate mainline), and appropriate regulatory/warning signs. When activated, the ramp meter temporarily stops vehicles on the on-ramps and releases them one at a time at a “metering rate” that allows for a more controlled merge onto the interstate. The design efforts will determine if the existing ramps provide adequate acceleration distance for vehicles to safely merge with interstate traffic and adequate storage length to store the ramp meter queuing or whether infrastructure improvements are needed.

From an operational perspective, and related to incident response, the ramp meters will be connected to the TMC through existing fiber and operators will be able to turn the meters on/off and adjust the metering rate.

5.6 END-OF-QUEUE NOTIFICATION

End-of-queue notification will be deployed when incidents have resulted in standing queues or slowed traffic on high speed divided highways such as state highways and interstates, particularly in areas or under conditions where/when the end-of-queue is not anticipated or easily detected by approaching vehicles. The notification will be placed upstream providing adequate distance to slow prior to the queue. As queuing lengths change, the location of the end-of-queue notification will be modified to match the condition.

End-of-queue notification to drivers approaching an incident can be given through a variety of methods – fixed overhead DMS, portable DMS, and response vehicles with emergency lights. For incident queues in areas with fixed overhead DMS, the TMC operators or the ATMS will post warning messages on the DMS indicating the presence of a queue and the need to slow. For incidents in areas without fixed DMS, agencies will utilize portable DMS to display similar warning messages if the incident duration is long enough to warrant the deployment of equipment and equipment is readily available. If the incident duration is shorter or equipment is not available, then end-of-queue notification will be provided by response vehicles with emergency lights. These vehicles will be positioned on the roadway shoulder upstream of the queue and move according to the back of the queue.

5.7 PRE-POSITIONED EMERGENCY EQUIPMENT

Pre-positioned emergency equipment will be deployed by individual agencies in areas where historic incident data indicates unique response times or response procedures. Equipment will consist of vehicles, tools, traffic control devices, consumable supplies, or other items that an agency requires for incident response.

Pre-positioned equipment will be located in secure facilities such as a fenced yard or mobile trailer. Access will be provided to all emergency response personnel through a common key, electronic keypad, or other mechanism. To maintain inventory, each agency will develop a system to track usage and replenish supplies.

6 OPERATIONAL SUPPORT ENVIRONMENT

To support the AMPA TIM Plan, agencies need to provide various resources that are directly related to traffic incident management but not explicitly deployed during an incident. These resources, some of which augment existing efforts while others are new, are provided to authorize, enable, and/or improve TIM response by AMPA stakeholders. Many items described below can be developed/provided by each jurisdiction individually or be addressed regionally as shared resources.

6.1 AUTHORITY REMOVAL LAWS

To support quick clearance of disabled vehicles, stakeholders have indicated that existing legislation providing authority to remove vehicles does not provide sufficient liability protection to agencies. Past judgements and the potential for future liability against agencies are restricting the use of “push/pull/drag” operations which may cause additional damage to a vehicle. Some agencies report an internal blanket restriction from any push/pull/drag operations while others have instituted a requirement for obtaining approval from management prior to moving vehicles.

To increase the ability of agencies to utilize New Mexico Statute 66-7-350, there are several modifications that are needed and described below. AMPA TIM stakeholders will need to educate executive leadership and champion specific action within the State Legislature to modify the law.

Related to establishing limited liability, New Mexico Statute 66-7-350 will require specific language that states “those governmental agencies and their personnel and other designated representatives are insulated from liability resulting from such actions taken pursuant to incident clearance” so long as vehicle clearance activities are “exercised with reasonable care and at the direction of the incident commander.” (source: *Incident Responders' Safety Model Law)*

To increase the available personnel able to carry out quick clearance of vehicles during an incident, New Mexico Statute 66-7-350 will require expansion beyond “police officer”. In addition to law enforcement personnel, the Statute will need to explicitly authorize “state department of transportation (DOT)”. This will allow removal by DOT maintenance

vehicles, courtesy patrols, or other resources that may increase the ability to remove vehicles quicker and relieve law enforcement to conduct police-related tasks.

In conjunction, Statute 66-7-349 will need to be reviewed due to a statement that states 66-7-349 and 66-7-350 do not apply to vehicles that are disabled "to such extent that it is impossible to avoid stopping" on the roadway. Subsection C of the same Statute may conflict and/or overlap with 66-7-350. As such, review of both 66-7-349 and 66-7350 will be required with legal staff.

ABANDONED VEHICLE TOWING

The current New Mexico law authorizes the removal of abandoned vehicles if there is a safety concern to mainline traffic. This clause is consistent with recommended authority removal practices though the FHWA Quick Clearance Best Practices cautions that the authority may be met with public resistance. Some have argued to prohibit towing of abandoned vehicles and to only allow agencies authority to tow attended vehicles despite similar safety concerns.

6.2 NATIONAL TIM TRAINING

TIM training across all stakeholder groups will be needed to support traffic incident management within AMPA. Statewide, TIM training remains under the 15% goal. Use of national training resources will limit the burden on agency resources by eliminating the need to develop internal material and national web-based courses will make it convenient for self-paced individual learning. The following are recommended sources for training material:

- Federal Highway Administration, Office of Operations
- (https://ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm)
- Federal Highway Administration, National Highway Institute (https://www.nhi.fhwa.dot.gov/)
- Federal Emergency Management Agency (https://www.fema.gov/)
- AASHTO, National Traffic Incident Management Coalition (http://ntimc.transportation.org/Pages/default.aspx)
- Consortium for ITS Training and Education (https://www.citeconsortium.org/)
- Emergency Responder Safety Institute (https://www.respondersafety.com/)
- The Eastern Transportation Coalition (https://tetcoalition.org/)

- Towing Recovery Association of America (www.traaonline.com)
- American Traffic Safety Services Association (www.atssa.com)

Making TIM training a requirement of employment will ensure adequate training completion. This will require agencies to work with their human resource groups to establish requirements for their staff based on role and/or position. Training requirements can be linked to promotions or other personnel actions that reward completion or provide other incentives. Internal certifications, while less formal, can also help incentivize a certain level of TIM training.

State or local responding agencies can also consider requiring TIM training as a prerequisite for towing providers to be added to the pre-approved list.

6.3 TRAIN-THE-TRAINER PROGRAM

Associated with the National TIM Training support function, the Train-the-Trainer program will certify local staff to deliver national training programs. The certification process is administered by FHWA and will require agencies to identify staff interested in serving as instructors. The prospective instructors are required to have prior TIM training as well as instructor experience and must be willing to commit time to certify themselves and to instruct others through group settings. Adding new Train-the-Trainers to the AMPA region will allow more frequent training opportunities than otherwise available through national trainers.

6.4 TIM SELF-ASSESSMENT

Annual self-assessments of TIM efforts within the AMPA region will support the TIMP progress and identify progress, important trends, and priorities. The current Statewide FHWA TIM Self-Assessment provides a general framework that will be used to customize a regional assessment specific to AMPA. The assessment will need to include categories/topics relative to all stakeholder groups and relative to the AMPA TIMP in order to assess progress. Qualitative and quantitative measures will be used on individual questions as appropriate and the overall result of the Assessment should be summarized in a single quantitative number similar to the FHWA model.

As the assessment would be local, MRCOG will serve as the lead in facilitating the scoring and will utilize an existing committee structure such as the ITS Subcommittee as the basis for convening the appropriate stakeholders. Expanded participation could include first

responders, law enforcement, agency resource departments, and other entities as appropriate.

6.5 MEDIA EDUCATION TOOLS

Educating the general driver population, independent of specific incidents, is an important support element to increasing safety at active incident sites. AMPA stakeholders will identify opportunities to partner on education materials focused on TIM laws, such as Move Over and Authorized Removal, general traffic safety during incidents, and responder safety.

National public service announcements (PSAs) and other material have been developed for public distribution and will be posted to AMPA agency websites, agency social media platforms, and provided to local television and radio stations for advertisement. FHWA has developed a TIM Outreach Toolkit and websites like ResponderSafety.com, Trafficsafetymarketing.gov, or Moveoveramerica.com provide material for download. For topics that are specific to AMPA or New Mexico, regional PSAs and material will be evaluated for need. If necessary, these will be developed and distributed by MRCOG and/or NMDOT and can include other stakeholder agencies as appropriate.

During incidents, media (traditional and social) will serve as outlets for specific information relative to location, conditions, duration, and potential detours. To standardize delivery of incident information, the AMPA stakeholders will develop a standard form for media information packets.

6.6 PERFORMANCE MEASURES

The development and tracking of incident response performance measures will support the evaluation of TIM effectiveness within AMPA. Performance measurement will require granular data from each agency in order to provide insight to the various steps within the overall TIM effort and provide feedback to specific stakeholders.

The region, as part of annual TIM coordination, will establish measures that can be applied consistently across AMPA. The measures will break the TIM timeline down to smaller measures in order to isolate stakeholder groups/functions or specific issues to the extent possible. In addition, targets or goals will be established to guide improvement efforts.

As part of the incident response performance measures identified above, associated data requirements will need to be identified as well as data sources. Data collection will be automated to the extent possible and be integrated into regular TIM documentation. Archiving the data will also be important for establishing long-term trends.

Individually, agencies will utilize available TIM data to create performance measure reports and regularly report both the current values as well as any trends. Quarterly meetings will be established to allow stakeholders to collectively review the measures and discuss action items required to improve local TIM efforts.

6.7 AFTER ACTION REVIEWS

After-action reviews will be formalized to support an interdisciplinary learning environment. To increase the utility of after-action reviews, the reviews will be timely, well documented, and distributed for review. However, after-action reviews will remain limited to significant incidents in order to maximum use of agency resources.

To encourage and standardize after-action reviews, the AMPA stakeholders will develop defined criteria that agencies will use to initiate incident reviews. The criteria will be based on incident performance metrics that are easily tracked and understood by the owner agencies, such as but not limited to roadway clearance times, incident clearance times, number of vehicles involved, number of fatalities, or less numeric metrics such as significant media coverage/public complaints, large recurring planned events, or risk assessments.

To ensure completeness and consistency, the meeting objectives, formats, and agenda will be formalized to allow a standardized process. Each agency will develop a form/checklist that will be used during the review to increase involvement by stakeholders and ensure that each function is addressed. By creating a formal process, the stakeholders develop a familiarity with the reviews and expect similar results regardless of who conducts the meeting. Guidance on after-action reviews, including an example agenda, is provided in the **Appendix**.

Documentation of each after action review will be distributed to the partner agencies with actionable items assigned to specific stakeholders. These items may be minor changes to existing processes that can be implemented immediately or may require new processes to be developed requiring a long-term commitment. The moderator (or other

participant) will be responsible for conducting follow-up with stakeholders to ensure action items are advancing.

7 OPERATIONAL SCENARIOS

Operational scenarios are hypothetical events but illustrate how the various components (practices) of the traffic incident management system work together in realistic situations. The intent of each scenario is to help stakeholders understand how the system may operate and what roles each stakeholder may be responsible for during the incident.

Per the AMPA TIM Response Templates (referenced in Figure 4), incident response has been categorized into various levels based on incident location (facility type), time-of-day, and number of lanes blocked. Level 1 incidents are relatively low impact and can typically be resolved by a single agency. Level 2 and Level 3 incidents are more significant and may require additional resources and TIM practices. Level 4 incidents, the most severe in terms of impact to traffic operations, will require a multi-agency response.

While the range of possible operational scenarios is extensive, this chapter is not intended to be a comprehensive reference but will serve as a guide with descriptions of several common scenarios in which the TIM practices are intended to operate. This chapter provides operational descriptions for the following scenarios:

- Local arterial, shoulder blocked (Level 1)
- State highway, two lanes blocked (Level 2-3)
- River crossing, full closure (Level 4)

TIM activities associated with the above operational scenarios can be common. However, despite the perception of repetition, the full list of activities is provided with each scenario to preserve the context and roles of each stakeholder.

It is important to note that the current version of this document provides a snapshot of the state of practice between 2020 and 2021. As internal agency capabilities and policies change or external conditions require different approaches, it is important to hold recurring meetings with stakeholders and update the response templates and operational scenarios. Tabletop exercises are one such tool to help agency staff think through the process and practice implementation of each step, potentially highlighting possible gaps and/or improvements.

Figure 4: TIM Response Levels

Interstate 25 Interstate 40	Off-Peak Hours (8 PM – 6 AM)	Typical Midday (9 AM – 4 PM)	Peak-Periods (6 AM – 9 AM, 4 PM – 8 PM) Special Event
Shoulder Blocked	Level 1 (Low)	Level 1 (Low)	Level 2 (Medium)
1 Lane Blocked	Level 1 (Low)	Level 2 (Medium)	Level 3 (High)
2+ Lanes Blocked	Level 2 (Medium)	Level 3 (High)	Level 4 (Severe)
Full Closure	Level 3 (High)	Level 4 (Severe)	Level 4 (Severe)

Major Arterials (State Highways or Local Agency River Crossings)	Off-Peak Hours (8 PM – 6 AM)	Typical Midday (9 AM – 4 PM)	Peak-Periods (6 AM – 9 AM, 4 PM – 8 PM) Special Event
Shoulder Blocked	Level 1 (Low)	Level 1 (Low)	Level 2 (Medium)
1 Lane Blocked	Level 1 (Low)	Level 2 (Medium)	Level 3 (High)
2+ Lanes Blocked	Level 2 (Medium)	Level 3 (High)	Level 4 (Severe)
Full Closure	Level 2 (Medium)	Level 4 (Severe)	Level 4 (Severe)

Major Arterials (Local Agency)	Off-Peak Hours (8 PM – 6 AM)	Typical Midday (9 AM – 4 PM)	Peak-Periods (6 AM – 9 AM, 4 PM – 8 PM) Special Event
Shoulder Blocked	Level 1 (Low)	Level 1 (Low)	Level 2 (Medium)
1 Lane Blocked	Level 1 (Low)	Level 1 (Low)	Level 2 (Medium)
2+ Lanes Blocked	Level 1 (Low)	Level 2 (Medium)	Level 3 (High)
Full Closure	Level 2 (Medium)	Level 3 (High)	Level 4 (Severe)

7.1 LOCAL ARTERIAL SHOULDER BLOCKED OFF-PEAK

Traffic incidents along major arterials owned and operated by local agencies are fairly typical due to the number of lane-miles and high traffic volumes that utilize this facility type. This scenario represents a minor vehicular crash in which the shoulder and one lane of the arterial are temporarily blocked. The collision is a non-injury collision and the vehicles are not disabled to a level that prevents drivers from moving the vehicles off the travel way. This scenario takes place during off-peak hours and there are limited queues resulting from the incident. As shown in Figure 4, the scenario is classified as a Level 1 based on the incident characteristics. The operational strategies described below focus on traffic incident response and do not include planning, training, incident detection, or initial notification/reporting.

Traffic Management Personnel Perspective

Traffic management personnel positioned at the Regional TMC:

1. Utilize the agency field cameras to locate incident and verify conditions.
2. Inform dispatch (police) if there are changes in conditions or access restrictions from original notification.
3. Enter incident details in the ATMS and ATIS platforms in order to inform the public.
    a. The ATMS and ATIS platforms can be used to track performance measures.
4. Regularly monitor the incident for changes in conditions. Provide updates to the ATMS and ATIS platforms as needed as conditions change or as time-stamp updates.
5. Once notified that incident has cleared, remove incident details in the ATMS and ATIS platforms.

Law Enforcement Personnel Perspective

Law enforcement personnel at the scene:

1. Secure the scene through vehicle positioning and provide emergency lights, flares, and/or cones for warning approaching vehicles.
2. Assess the vehicles for towing. If needed, law enforcement will contact regional dispatch to request tow assistance.
3. Investigate the incident, if needed, and record data using the agency's standard investigation techniques.
4. Notify the TMC once the incident is cleared and vehicles are removed.

Driver Perspective

Drivers involved in the incident:

1. Move personal vehicle off the travel way.
2. Remain on scene and comply with law enforcement for investigation.

Drivers approaching the incident:

1. Perceive the warning lights and identify the incident scene.
2. Move over or slow down to improve safety.

7.2 HIGHWAY TWO LANES BLOCKED MIDDAY

Traffic incidents along state highways introduce a scenario with potentially higher travel speeds, higher traffic volume, and multi-jurisdictional coordination. This scenario represents a vehicular crash in which multiple lanes are blocked due to multiple disabled

vehicles. The collision results in personal injuries but no fatalities. This scenario takes place during typical midday hours (9:00 AM – 4:00 PM) and there are recurring queues resulting from the incident. As shown in Figure 4, the scenario is classified as a Level 3 based on the incident characteristics. The operational strategies described below focus on traffic incident response and do not include planning, training, incident detection, or initial notification/reporting.

Traffic Management Personnel Perspective

Traffic management personnel positioned at the Regional TMC:

1. Utilize the agency field cameras to locate incident and verify conditions.
2. Inform dispatch (police) if there are changes in conditions or access restrictions from original notification.
3. Enter incident details in the ATMS and ATIS platforms in order to inform the public.
    a. The ATMS and ATIS platforms can be used to track performance measures.
4. Activate upstream DMS (if available) through ATMS to warn approaching drivers.
5. Dispatch the HELP courtesy patrol for traffic control assistance.
6. Relay incident details to traffic personnel of adjacent agencies for traffic operations consideration.
    a. Local agency to modify traffic signal timing, as needed, through their ATMS/signal management platform to manage operations on the highway.
7. Regularly monitor the incident for changes in conditions. Provide updates to the ATMS and ATIS platforms as needed as conditions change or as time-stamp updates.
8. Once notified that incident has cleared, remove incident details in the ATMS and ATIS platforms and deactivate DMS.

HELP Courtesy Patrol Perspective

HELP personnel at the scene:

1. Assist in traffic control through placement of cones and/or signs.
2. Provide Regional TMC with information related to scene closures, estimated time to open, and other incident information.

Law Enforcement Personnel Perspective

Law enforcement personnel at the scene:

1. Secure the scene through vehicle positioning and provide emergency lights, flares, and/or cones for warning approaching vehicles.
2. Direct vehicle owners to move vehicles off the roadway on to the shoulder. As appropriate, utilize push/pull/drag operations to clear roadway.
3. Assess the scene for towing and medical needs. If needed, law enforcement will contact regional dispatch to request towing and medical resources.
4. Investigate the incident and record data using the agency's standard investigation techniques.
5. Remove any large debris from the roadway.
6. Notify the TMC once the incident is cleared and vehicles are removed.

Emergency Response Personnel Perspective

Upon notification of incident, determine the best route to the scene.

Medical personnel at the scene:

1. Assess patients for medical need and render treatment on-scene.
2. Transport injured patients to the local hospital as necessary.

Adjacent Agency Perspective

Traffic personnel within adjacent agency:

1. Access available traffic cameras (either within TMC or through NMRoads) to determine impact.
2. Modify traffic signal timing, as needed, to manage operations and potential queues.

Driver Perspective

Drivers involved in the incident:

1. Move personal vehicles off the travel way if operable.
2. Remain on scene and comply with law enforcement for investigation.

Drivers approaching the incident:

1. Perceive the warning lights and identify the incident scene.
2. Move over or slow down to improve safety.
3. If available, read and follow information on DMS.
4. If not driving, access NMRoads website to find details

7.3 RIVER CROSSING FULL CLOSURE PEAK HOUR

Traffic incidents at a river crossing introduce a scenario with significant impacts to the regional network requiring multi-jurisdictional coordination. This scenario represents a vehicular crash that completely closes a river crossing due to a fatality. This scenario takes place in the peak hours resulting in a Level 4 impact as shown in Figure 4. The operational strategies described below focus on traffic incident response and do not include planning, training, incident detection, or initial notification/reporting.

Traffic Management Personnel Perspective

Traffic management personnel positioned at the Regional TMC:

1. Utilize the agency field cameras to locate incident and verify conditions.
2. Inform dispatch (police) if there are changes in conditions or access restrictions from original notification.
3. Enter incident details in the ATMS and ATIS platforms in order to inform the public.
    a. The ATMS and ATIS platforms can be used to track performance measures.
4. Activate upstream DMS (if available) through ATMS to warn approaching drivers.
5. Dispatch the HELP courtesy patrol for traffic control assistance.
6. Relay incident details to traffic personnel of adjacent agencies for traffic operations consideration.
    a. Local agency to modify traffic signal timing, as needed, through their ATMS/signal management platform to manage operations.
7. Regularly monitor the incident for changes in conditions. Provide updates to the ATMS and ATIS platforms as needed as conditions change or as time-stamp updates.
8. Once notified that incident has cleared, remove incident details in the ATMS and ATIS platforms and deactivate DMS.

HELP Courtesy Patrol Perspective

HELP personnel at the scene:

1. Assist in traffic control through placement of cones and/or signs.
2. Provide Regional TMC with information related to traffic operations and queuing.

Law Enforcement Personnel Perspective

Law enforcement personnel at the scene:

1. Secure the scene through vehicle positioning and provide emergency lights, flares, and/or cones for warning approaching vehicles.
2. Assess the scene for towing, and medical needs. If needed, law enforcement will contact regional dispatch to request towing and medical resources.
3. Establish emergency traffic control at the nearest signalized intersections to prevent additional traffic accessing the river crossing.
4. Investigate the incident and record data using the agency's standard investigation techniques.
5. Contact the Office of Medical Examiner (OMI) to investigate the fatality.
6. Remove any large debris from the roadway.
7. Notify the TMC once the incident is cleared and vehicles are removed.

Emergency Response Personnel Perspective

Upon notification of incident, determine the best route to the scene.

Medical personnel at the scene:

1. Assess patients for medical need and render treatment on-scene.
2. Transport injured patients to the local hospital as necessary.

Agency DOT Personnel Perspective

Traffic personnel within owning agency:

1. Access available traffic cameras (either within TMC or through NMRoads) to determine impact.
2. Identify potential diversion route(s) and communicate with Regional TMC and adjacent agencies.
3. Modify traffic signal timing, as needed, to manage operations and potential queues.
4. Place temporary traffic control and wayfinding along the diversion route.

Adjacent Agency Perspective

Traffic personnel within adjacent agency:

1. Access available traffic cameras through NMRoads to determine impact.
2. Modify traffic signal timing, as needed, to manage operations and potential queues.
3. Place temporary traffic control and wayfinding along the diversion route.

Office of Medical Examiner Perspective

OMI personnel at the scene:

1. Coordinate with law enforcement and emergency response personnel.
2. Conduct investigation per agency standards.
3. Remove bodies from the scene and transport per agency guidelines.

Driver Perspective

Drivers involved in the incident:

1. Move personal vehicles off the travel way if operable.
2. Remain on scene and comply with law enforcement for investigation.

Drivers approaching the incident:

1. Perceive the warning lights and identify the incident scene.
2. If available, read and follow information on DMS.
3. If not driving, access NMRoads website to find details.
4. Follow temporary traffic control while using diversion route(s).

8 NEXT STEPS

This Concept of Operations document serves as the framework planning effort for the AMPA Traffic Incident Management Plan (TIMP). As described in Section 1.2, the ConOps provides the first step in a systems engineering approach that transitions from concept exploration toward implementation. Additional steps are required beyond this ConOps for those TIM practices that are technology-based to continue the systems engineering approach.

It is anticipated that the following individual practices may require standalone Concept of Operations documents to expand on the specific operations and components required of those practices:

- Data and Video Sharing
- Interoperable Radio System
- Ramp Metering
- End-of-Queue Notification
- Lane Control

Once the individual ConOps are complete, these TIM practices will continue through the systems engineering process (V-model). The following sections describe the additional steps along the systems engineering path after the ConOps.

8.1 ITS ARCHITECTURE

ITS Architectures have already been developed for New Mexico that apply to this project – the New Mexico Statewide ITS Architecture Update (2019) and the AMPA Regional ITS Architecture Update (2016). Each has been reviewed at a cursory level but may warrant further review once the individual ConOps are prepared as described above. For the AMPA Regional ITS Architecture, an update was underway during the development of this document.

In terms of technical TIM elements, all ITS-based practices are currently covered in the regional AMPA ITS Architecture as follows:

- Data and Video Sharing: Service Package ATMS06 (Traffic Information Dissemination)
- Ramp Metering: Service Package ATMS04 (Traffic Metering)

- End-of-Queue Notification: Service Package ATMS06 (Traffic Information Dissemination)
- Lane Management: Service Package ATMS06 (Traffic Information Dissemination)

Other applicable service packages that support these systems include:

- ATMS01 (Network Surveillance)
- ATMS02 (Traffic Probe Surveillance)
- ATMS03 (Traffic Signal Control)
- ATMS07 (Regional Traffic Management)
- ATMS08 (Traffic Incident Management System)
- ATMS18 (Reversible Lane Management)
- ATMS21 (Roadway Closure Management)
- ATIS01 (Broadcast Traveler Information)
- EM04 (Roadway Service Patrols)

8.2 SYSTEM REQUIREMENTS

System requirements are clear, concise statements of what the system should do and how it should do it under various circumstances. Requirements are derived from and should be traceable to the ConOps but typically formatted in a tabular form that allows direct confirmation of individual items. A key concept in developing system requirements is that each statement or requirement is a singular aspect of the system that informs what the system will do. These requirements can be function-based, performance-based, environment-based, or other as described below.

- Functional requirement: describes what the system should perform; it's function/task.
- Performance requirement: describes how well the system should perform; a quantitative measure of the quantity, quality, or other performance measure.
- Environmental requirement: describes the conditions within which the system should perform; typically a range of values for temperature, moisture, motion, etc.
- Non-functional requirement: describes other requirements related to how the system performs such as usability, interface, and maintenance.

During this step, it is important to identify a comprehensive list of system requirements that link back to stakeholder needs and the Concept of Operations and can be used to track progress and ensure requirements are met during future system development. This may include mandatory ("must" or "shall have") and/or desirable ("nice to have" or "future function") requirements.

8.3 HIGH-LEVEL DESIGN

The system design can be broken into two components – high-level design and detailed design. The high-level design is typical an engineer-led role in which the system requirements are used to develop a system architecture and design alternatives. The high-level design will require the decomposition of the system requirements to the smallest parts and functions to ensure the proposed system architecture accomplishes the requirements through components or subsystems. Alternative architectures may be developed to evaluate the range of cost, performance, maintenance, and other attributes. For replacement systems, the design should also include features that may be needed for integration and continuity of operations.

High-level design should provide sufficient detail regarding the subsystems and external/internal interfaces to allow future vendors to develop detailed designs. The high-level design and associated architecture diagrams and descriptions typically form the foundation for a vendor RFP along with the ConOps and System Requirements.

8.4 DETAILED DESIGN

Detailed design is typically led by a product vendor and may be initiated through a vendor selection process. The detailed design represents the actual "built" design including the hardware, software, and required support systems such as databases and communication systems.

For hardware, the various components will usually be satisfied through pre-fabricated, off-the-shelf units. In rare occasions, if developing totally new concepts or using new technologies, hardware may require specialized development which necessitates component-level planning, design, prototyping, and fabrication. Similarly, software may be accomplished through existing software or may require customized software development.

8.5 INTEGRATION AND VERIFICATION

Once the system components have been developed and installed, it is important to verify that the collective system functions as designed. Each component should be tested individually and as part of the system to ensure that the supplied components work and can integrate. The vendor is typically asked to demonstrate how the system meets system requirements and will perform various levels of testing or verification including factory acceptance, site acceptance, systems acceptance, and operational acceptance testing. The goal is to make sure that equipment and software is delivered and installed as intended. This step correlates with the System Requirements and High-Level Design steps.

8.6 SYSTEM VALIDATION

Once the system has been verified and accepted based on requirements, the system will be assessed against the stakeholder needs (i.e., its intended purpose). To this end, the system will be evaluated to ensure it functions as stakeholders stated that it should. While all stakeholders have a role in system validation, the operators of the system will be of particular importance since they are the day-to-day users of the system. During this step, modifications may be made to the system based on operator feedback to ensure operational success. Depending on the feedback, modifications may be made to system requirements or new system requirements may be identified. This step correlates with the Concept of Operations step.

APPENDIX

Appendix D: Implementation Checklist

1. After Incident Reviews

There are several elements that are key to having successful AIRs, which are included below.

Clear Objectives: Specific performance objectives for each incident are important so all responders know what success will look like. These objectives must be communicated and understood by all responders and then used to measure performance. An example of a specific objective is setting a goal of clearing all incidents within 90 minutes.

Safe Organizational Climate: The climate must be one in which all member agencies can openly and honestly discuss in detail what actually transpired during an incident.

Leader Commitment: In order to ensure a safe and secure environment for open discussion, there must be an absolute commitment to the process on the part of agency leaders at all levels. When members of an organization see the leaders' commitment, they will more likely give their support.

Timely Post Event Analysis: A timely post-event analysis is critical to the effectiveness of an AIR while the incident details are fresh on the minds of those involved. Unless all elements of performance are examined—including decisions made by leaders—the AIR will not be entirely effective. When the discussion is open and honest, and explores all elements of performance, real learning follows as responders explore how to improve processes or outcomes for future endeavors.

Moderator: A neutral third party should moderate the AIR, and each responding agency should be given a chance to recount incident details from their perspective. The moderator should explain that the AIR is not held to place blame or point fingers but is rather a way to review how the incident was managed, pointing out both the good parts of the response and any areas for improvement.

Ground Rules for AIRs: Rules should be established to ensure success, which may include participation from everyone. It's okay to disagree but there should be no blaming, whining, or sidebar conversations. The AIR should identify specific successes and, ultimately more importantly, things that should have gone better, and encourage creative and critical thinking.

Attendee List: Every agency that was involved in the incident should be encouraged to participate in the review. If an incident has any particular characteristics that were new to the responders, but there are other stakeholders that have experienced similar incidents, it might be useful to invite those "third parties" as well to share their views.

AIR Agenda: The agenda should include pertinent topics such as

- Incident overview (timeline with pictures and/or video).
- Incident response objectives.
- Incident/Unified Command structure.
- Outcomes (what was accomplished versus original intent).
- Lessons learned (sustain versus improve).
- Future actions needed to correct any problems.

Actions: Lessons learned should be disseminated through meeting minutes, additional outreach/presentations, etc. Ensuring an action plan is developed and completed will sustain what went well and correct deficiencies