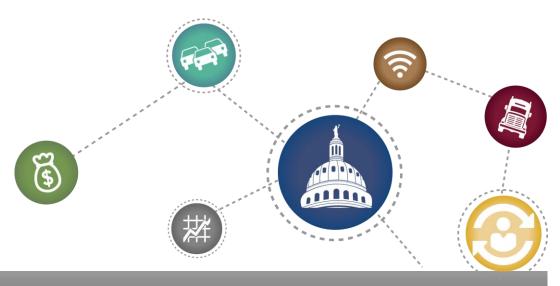Review of Literature and Practices for Incident Management Programs

Technical Report

TRANSPORTATION
Policy Research CENTER

Review of Literature and Practices for Incident Management Programs

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List of Acronyms

APD   Austin Police Department
AZTech Arizona Traffic Management and Operations
CAD   Computer-aided dispatch
CTRMA Central Texas Regional Mobility Authority
DOT   Department of transportation
DPS   Department of Public Safety
FHWA   Federal Highway Administration
HCTRA Harris County Toll Road Authority
HERO   Highway Emergency Response Operators
IMP   Incident management plan
IRT   Incident response team
MAG   Maricopa County Association of Governments
MAP   Harris County Motorist Assistance Program
MAPP   Dallas-Fort Worth Mobility Assistance Patrol Program
MOU   Memorandum of understanding
MPO   Metropolitan planning organization
MUTCD *Manual on Uniform Traffic Control Devices*
NIMS   National Incident Management System
NTIMC National Traffic Incident Management Coalition
NTTA   North Texas Tollway Authority
NUG   National Unified Goal
PTI   Planning Time Index
SHRP2   Strategic Highway Research Program 2
TIM   Traffic incident management
TIMSA   Traffic Incident Management Self-Assessment
TMC   Traffic management center
TxDOT   Texas Department of Transportation
WATIMCo Washington Traffic Incident Management Coalition
WSDOT Washington State Department of Transportation
WSP   Washington State Patrol

Review of Literature and Practices for Incident Management Programs

The project team examined project evaluations, best practice summaries, and synthesis documents, and derived a summary of key elements of programs to speed the time to find and clear stalled vehicles and crashes from freeway shoulders and main lanes. The key questions about these programs (known generically as incident management) include the following:

- Who operates the program?

- What are the key equipment and procedural elements?

- How is the program funded?

- How much of the road network is covered and for what times/days?

- What are the incident management program institutional arrangements and interjurisdictional operating practice memoranda?

- What are the benefits and costs?

This literature review summarizes key practice elements that describe a comprehensive traffic incident management (TIM) program and then compares those characteristics to the significant Texas programs. The goal is to describe the current state of the practice on a few key items as the beginning point of discussion about any additional public policy guidance or legislation needs.

The Federal Highway Administration: Incident Management Key Strategies

The Federal Highway Administration (FHWA) analyzed the important elements of TIM programs and determined several characteristics that are associated with a high-performing program. These are not all the needed elements, and not all of these elements are absolutely required. Accomplishing all of these aspects does not ensure that a program will provide all the services and performance that an area could desire, but the following list of best practice elements provides a good return on the operations investment (*1*):

- Agency relations—These elements make the point that TIM is not simply a technology program. Agency relations include:

  o Routine, periodic TIM team meetings to encourage ongoing dialogue among TIM responders, increasing awareness of priorities and roles.

  o Joint agency/jurisdictional protocols and joint traffic/emergency management centers to formalize agency relations and respective roles in TIM and to demonstrate commitment through common resource/facility investments.

- Training—In particular, this makes the point that interagency training is the way to not only improve performance but also to enhance agency relations. Training includes:

  o National TIM and information clearinghouses/communities of practice to support information exchange among various response agencies involved in TIM regarding national best practices.

  o Local multidisciplinary TIM training and associated tabletop exercises/scenarios and after-action reviews/debriefings to encourage joint and effective training among responders and improved local TIM operations.

  o Multidisciplinary TIM response plan/operating procedures to formalize recommended actions in support of future TIM training efforts, enhanced responder competency, and consistent operations.

  o TIM personnel certifications/training requirements to support enhanced TIM responder competency and consistent operations.

- Communications—Incident reviews have consistently shown great benefits from better interagency communications throughout an incident. Communications includes:

  o A common mutual-aid frequency/channel, alternative communications devices, wireless information networks, and an associated standardized communications terminology/protocol to enhance en-route and on-scene communications among responders from different agencies.

- A mobile unified communications vehicle to enhance en-route/on-scene communications among responders from different agencies for major incidents and emergencies.

- Technology—Increasing the opportunity for all agencies to have the same equipment reduces some of the most vexing technology issues; it is important that state policy be aligned with this goal to the extent possible. Technology includes:

  - An expedited standards development process and policies requiring state standard procurement to encourage the acquisition of interoperable equipment and technology, reduce purchasing time, and minimize capital and maintenance costs.

- Performance measurement—An important aspect of evaluation, improvement, and accountability is a continuous monitoring and reporting system that covers safety and congestion outcomes. A performance measurement process can be the beginning of the process of deciding how much, if any, change is needed. Performance measurement includes:

  - National performance measurement guidance to lend consistency and consensus to TIM performance metrics at the state and program levels.

  - TIM self-assessment to support the identification of strengths and weaknesses and the determination of activities that can improve performance. (See Appendix A for a copy of the self-assessment results). Policies could mandate the annual completion of the self-assessment form and improve the information within the self-assessment process.

  - A strong funding and performance link to ensure that TIM program effectiveness can be demonstrated and adequate attention is given in project funding prioritization.

  - A multi-agency data exchange protocol to enhance data sharing and accessibility in support of TIM performance measurement activities.

- Program resources and funding—Most of the resource issues are within an agency's control; state, county, city, metropolitan planning organization (MPO), and other governmental groups could fund incident management programs. In many places, the limitations relate to historic operations funding allocations and an expectation that all funding will go toward road building. Certainly there is enough information to describe the high cost-effectiveness of incident management programs that reduce congestion, improve safety, and enhance customer service. Program resources and funding include:

  - Dedicated, ongoing funding, guidelines for federal/state funding sources, MPO partnerships, and an associated TIM strategic plan to ensure ongoing access to program resources and funding.

- o Efficient/effective TIM resource management to encourage optimum use of existing resources.

- o Executive outreach materials/events to ensure that the effectiveness of TIM programs is adequately demonstrated to decision makers and that TIM programs subsequently receive adequate attention in prioritization of projects for funding.

Performance Measures and Targets

If the FHWA key strategies are examined, progress on agency change could begin with performance measurement. All regions focus on responder safety as a primary objective of enhanced incident management programs. A few regions have established targets for TIM performance that specify response and/or clearance times for all incidents within a specified time frame. A goal of clearing all incidents within 90 or 120 minutes is typical. Such goals can be highly controversial and even political if they are applied to all incidents; for example, even a well-done hazardous materials spill could take much longer than 90 minutes to clear. The goals encourage multi-agency reviews of the incident processes to see where procedural changes or coordination of activities at the incident can reduce clearance time (*2*).

The key performance measures should include agency action measures, as well as congestion and safety outcome measures. Incident management or service patrol programs should gather data about the services that each service patrol operator delivers and the congestion and safety outcomes. In this manner, statistical analysis can be used to develop trends and comparisons. When tracked properly and linked with the traffic management center and first responder computer-aided dispatch (CAD) systems, statistics should also be kept about:

- Types and number of services rendered.

- First responders struck during incident scene activity.

- Response time.

- Incident clearance time.

- Incident duration time.

- Lane blockages.

- Number and severity of incidents.

- Congestion and delay hours.

These data will help identify the program performance and its impact on quick clearance times, safety, and congestion (*3*).

Among other measurements, the Washington State Department of Transportation (WSDOT) collects the following data:

- Number of incidents by geographical area.

- Response times.

- Incident clearance times.

- Incident duration goal.

- Volume of instant tow deployments in each area.

- Number of major incident tow team activations.

- Success rate in the 90-minute clearance requirement.

Data are shared between agencies so that all groups use the same information and data costs are minimized (*4*).

Key Rapid Clearance Strategy Elements

National guidance on creating an excellent TIM program points to key elements that successful operations have in common. These are a combination of policies, operating practices, and agreements between agencies and typically focus on freeways rather than streets, due to the higher traffic volume on freeways and the potential for crashes to be moved from major streets to driveways or side streets. The programs usually require alterations in the practices of individual agencies toward more engagement and interaction. The strategies are designed to accomplish broad outcome types of goals (such as reduced crashes and travel time) with specific actions, practices, and policies that operating agencies and on-scene personnel can understand and accomplish.

In most cases, any incident management program review mentions budget concerns. However, incident management program costs are relatively small in comparison to most state agency budgets. This section describes the key elements from the National Traffic Incident Management Coalition (NTIMC) report on achieving the National Unified Goal (NUG) (*5*) and the *Traffic Incident Management Gap Analysis Primer* (*6*).

Unified Incident Command

Unified incident command and incident command systems improve command, control, and coordination of an emergency response. When complex incident scenes involve multiple agencies or political jurisdictions, it is important that personnel at all levels understand where control and scene management are directed.

Standardized Operations and Response Practices

NTIMC held stakeholder listening sessions in 2006 (*5*), producing these and other suggestions for best practice guidelines. The report promotes "proper incident investigation and data collection" during clearance of commercial vehicles "to ensure that the carrier will be able to substantiate insurance claims." Towing and recovery operations can be improved through vetting of qualified towers, combined with quick clearance incentives. WSDOT, the Georgia Department of Transportation, and the Florida Toll Road Authority's incentive clearance programs have proven successful. Additionally, the report (*5*) endorses:

- Improved traffic control at incident scenes.

- Streamlined procedures for investigating fatal incidents.

- Training more state and local officials in traffic incident investigations.

- Training responders to distinguish between hazmat incidents and nonhazardous spills.

Developing the Framework of a Successful TIM Program

The TIM gap analysis framework (*6*) describes a process to customize programs to fit the needs of each community by considering three elements. The framework uses the principle that there is no single one-size-fits-all incident management program, but there are important considerations. A plan formed around these three key elements might look like the strategic highway safety plans that are being developed; they would be a documentation of the program investments and describe a dynamic plan that adjusts to resource allocations and policy directions. The three elements are:

- Strategic—a framework for multi-agency planning, programming, and evaluation needed to support on-scene operations, including strategic plans, policies, and training.

- Tactical—the tools and technologies for traffic management and interagency communication.

- Support programs—communication systems, data and video sharing, and traveler information.

More Coordinated and Timely Use of Technology

Technology can be used more efficiently in the areas of responder communication, traveler information, and incident investigations. Responder communication can be improved with integration of CAD data into the traffic information system, the formation of "regional wireless interagency emergency information exchange networks," and next-generation 9-1-1 systems. Automating traveler information systems (for example, to control changeable message signs) can allow personnel to focus on tasks requiring human input.

Incident investigations were improved with the use of survey equipment in the 1990s; today, there is some reluctance to move away from that equipment, even though digital photos can do the same job as accurately and much faster, creating less congestion and fewer secondary incidents. The Indiana State Police, for example, estimate that digital photogrammetry saved more than 90 minutes over the use of the total station surveying technique at crash scenes (*7*).

Availability of Transportation Incident Responders

Transportation responders are frequently unavailable for traffic control during non-business hours, even though their help is especially useful at night. Budgetary constraints are typical, but having an overnight response force in large regions with a 24-hour traffic management center is important.

Joint Accredited Incident Management Training

Interdisciplinary cross-training should involve towing companies, law enforcement personnel, fire departments, emergency medical services, and transportation agencies from all levels of

government. This training should improve the safety of all responders by better informing transportation and towing professionals about incident command systems, including the National Incident Management System, and to train other responders in traffic-related operations. FHWA, the American Traffic Safety Services Association, and the Towing Recovery Association of America provide resources for TIM training and certification. These resources include workshops on TIM and temporary traffic control, and a vehicle identification guide to help responders identify the appropriate towing and recovery vehicles at an incident scene.

Clearance Performance Goals

Clearance goals should be universal in all U.S. cities and states, but they are not. If goals include both adequate measurement resources and performance metrics that all parties agree to, they can focus the efforts of many agencies and the private sector to improve TIM. There are variations in the challenges in each city or region; goals should be relevant to that jurisdiction, and the key is to develop information for field personnel.

The following are examples of states' chosen clearance times:

- California, Washington State, and Florida: 90-minute incident clearance targets.

- Utah: 20 minutes for fender-benders, 60 for injury crashes, and 90 for fatalities.

- Idaho: 30-, 60-, or 120-minute maximum clearance times, based on incident severity.

Performance Measures

FHWA is developing performance measures that address the mandates in the Moving Ahead for Progress in the 21st Century Act (MAP-21) legislation. While these measures are not yet available, Table 1 provides a few good measures of agency activity and congestion improvement performance. These measures were developed in the *Guide to Effective Freeway Performance Measurement* (published by the National Cooperative Highway Research Program) (*8*) and Strategic Highway Research Program Report L03, *Analytical Procedures for Determining the Impacts of Reliability Mitigation Strategies* (*9*).

Table 1. Incident Performance Measures.

Performance Measure	Definition	Units
Responder safety	Responders struck by vehicles during incident scene activity	Number
Response time	Time from notification of an incident to arrival on scene	Minutes
Incident duration	Time from notification of an incident to when all evidence of the scene has been removed	Minutes
Planning Time Index (PTI)	95th percentile travel time divided by low-volume travel time; a PTI of 1.80 indicates a traveler should allow 36 minutes for a 20-minute uncongested trip	None (unitless)

Source: (*3, 8, 9*)

Move-It Laws and Policies

Move-It laws encourage or require drivers that are involved in a non-injury crash to move crashed vehicles and debris out of the roadway if they can do so safely. These laws may also empower responders to move vehicles and debris off the roadway (*4*). The I-95 Corridor Coalition has issued a model Move-It law, which protects drivers and responders from liability as they move cars and cargo, while excusing failure to perform these actions if drivers or responders identify risk of further damage or injury (*10*).

Texas' Steer It, Clear It law was enacted in 2001 (Section 550.022 of the Texas Transportation Code) (*11*) to require motorists to move crashed vehicles if they can be safely driven from the freeway main lane, ramp, shoulder, median, or area adjacent to the freeway. The law states that vehicles shall be moved as soon as possible to a location on the frontage road, nearest cross street, or other suitable location to minimize interference with existing freeway traffic flow. And yet, many drivers remain under the mistaken impression that they must wait for police officers before their vehicles can be moved.

Authority Removal Laws

Authority removal laws provide authorization to a set of designated public agencies (usually including state, county, and local law enforcement or the state department of transportation [DOT]) to remove damaged or disabled vehicles and/or spilled cargo that are determined to be a hazard. Driver and authority removal responsibilities are often defined within the same statute: if the driver is unwilling or unable to remove the vehicle or cargo from the roadway, designated authorities may require or perform removal without consent of the owner (*10*). Texas Transportation Code 545.3051 provides removal authority to staff of law enforcement, metropolitan rapid transit authorities, and regional transportation authorities if the spilled cargo or personal property "blocks the roadway or endangers public safety" (*12*).

Quick Clearance/Open Roads Policy

Open roads policies are a formal statement of agency goals and the partnerships needed to remove vehicles, cargo, and debris from roadways. Goals for incident clearance time often start with the arrival of the first responding officer and are designed to restore safe and smooth traffic flow after crashes and other incidents (*13*).

Law Enforcement and Quick Clearance Performance Goals

Relationships between DOTs and state patrols can be strengthened with agreements on quick clearance performance goals that recognize the concerns about crime investigation and public safety (*10*). Some examples of agreements between state DOTs and law enforcement are:

- Florida and Washington—The state patrol has fully endorsed a 90-minute clearance goal.

- California—The state DOT's 90-minute clearance goal is not an official performance measure for the California Highway Patrol, though the agency has agreed to embrace this target.

Traffic Control by On-Site Traffic Management Teams

Effective traffic control by on-site traffic management teams can reduce congestion and the occurrence of secondary incidents. These activities can be enhanced by warning systems that alert drivers to incidents or the associated congestion (*3*).

Medical Examiner Procedures and Policies

Rather than waiting for a medical examiner to arrive at a fatal traffic incident, some states have attempted to institute legislation (or informal agreements) that allow for quicker clearance. California has seen mixed results in pursuing these policies; on the state level, the proposed legislation failed, but Los Angeles County has adopted protocols that facilitate rapid clearance of fatal injuries. One proposed compromise is to move a vehicle containing a fatally injured passenger off the road until the medical examiner can perform an investigation.

Towing Industry Issues

Rotation lists are used in many regions to provide equitable business opportunities to towing operators. Cities and regions typically have response time goals around 20 or 30 minutes and allow operators to opt out of a tow if they are unable to respond. Incentive pricing is infrequently used to solve towing delays. Florida's approach, mentioned previously, involves both incentives for quick clearance and pricing disincentives for slow performance. The result is average clearance times below 90 minutes in two studied locations in Florida. Financial supplements are also provided that tow companies can use for equipment and training (*10*).

The Houston SAFEClear towing program is an effective public-private partnership. This City of Houston–operated program holds towers accountable to a response time goal by assigning each section of freeway to a towing operator. The operator is responsible for identifying the resources needed to meet a standard of 90 percent of responses within 6 minutes. This aggressive goal has been met almost every month of operation since the program began in 2005 and continuously since 2009. In 2013, almost 98 percent of responses were within the 6-minute standard (*14*). The program's success is a combination of this specific accountability element—an operator is responsible for every incident—and the city's willingness to pay the towing companies for rapidly removing stalled and crashed vehicles, rather than investing in its own personnel and equipment fleet.

Emergency Responder Designations

Transportation agencies and private-sector responders (including towing companies) should be recognized as part of the first responder team, with rapid notification and safe scene access provided. Oregon treats transportation agencies as emergency responders; Oregon Department of Transportation traffic incident response teams (IRTs) are stationed in specific corridors, and the Oregon Department of Transportation and the state patrol are notified of incidents using a shared CAD system. Texas Transportation Code Section 547.305 (*15*) allows tow trucks to use lighting restricted to emergency vehicles. In most Texas cities, tow trucks are second responders; they are called by law enforcement after some initial scene investigation, slowing the crash or stall clearance.

Attributes and Experiences from Incident Management Programs

The literature and experience reveal that most large Texas cities know about and use many of the elements in the standard, FHWA-guidance incident management program. All of the equipment and technology may not be present, but they could be obtained if a more extensive and aggressive program was developed. While incident management programs are not ubiquitous, the limitations are typically related to lack of budget allocation for operations programs and lack of institutional support.

This section provides an overview of major program components for the Texas incident management systems and three examples of systems from outside Texas. More information on systems and practices from other states can be found on the website for NTIMC (http://ntimc.transportation.org). Kansas City Scout, Arizona Traffic Management and Operations (AZTech), and the Washington Traffic Incident Management Coalition (WATIMCo) are considered among the best management programs across a number of aspects from technical expertise to interjurisdictional relationships.

Incident Management Program Operating Agencies

Table 2 illustrates the variety of agency groups involved in incident management programs. There are many approaches to organizing a program, and the variety can be useful in studying the effect of different program types and configurations. The most frequent Texas approach is for sheriffs to operate the system. The tollway authorities also have their own staff to provide incident management services to their customers. In most cases, these are motorist assistance programs that are designed to aid stranded drivers on the roadside and improve safety. The Houston SAFEClear and the Harris County Tollroad programs stand out as those with rapid response and removal of all disabled vehicles (unless there is a law enforcement reason to not move the vehicle). Best practice, however, as evidenced in Washington State, is to have the DOT and state patrol as official, committed partners in the effort. They have signed an official joint operating statement that contains procedures, goals, and performance measures (*16*).

Funding and Contracting Partnerships

In most Texas cities, the Texas Department of Transportation (TxDOT) plays a role in funding the programs and in purchasing the vehicles to operate the services, with funding also coming from some MPOs (Table 3). Most of the field operation of the incident management programs is handled by others—sheriff, toll authority, police callout program, and, in the case of Houston SAFEClear, the tow operators. TxDOT traffic management centers provide the central control, communication, and traveler information components of the programs. In addition, the TxDOT maintenance forces and area offices are involved in larger traffic incidents, providing necessary traffic control and some clean-up services.

Table 2. Incident Management Program Operating Agencies.

Program Name and Location	Incident Management Program Operator and Key Associated Agencies	Brief Overview of Program
Austin Highway Emergency Response Operators (HERO) (*17, 18*)	TxDOT, in partnership with Central Texas Regional Mobility Authority (CTRMA); private contractor	TIM efforts provide a framework for the Austin Regional Traffic Incident Management Plan developed for Austin's most congested corridors.
Dallas-Fort Worth Mobility Assistance Patrol Program (MAPP) (*19, 20*)	Dallas County Sheriff, Tarrant County Sheriff, and North Texas Tollway Authority (NTTA)	The Dallas County Sheriff, Tarrant County Sheriff, and NTTA operate MAPP with the goal to alleviate congestion on area highways in the Dallas-Fort Worth region and to assist law enforcement.
El Paso Incident Management Plan (IMP) (*21*)	TxDOT, in conjunction with El Paso Incident Management Team	TxDOT and other agencies want to improve cross-border traffic operations within the inspection and security environment. The purpose of the incident management plan is to optimize the operational, technical, and institutional resources to detect, respond to, control, remove, and recover from incidents as safely and quickly as possible.
Harris County Incident Management Program (*22*)	Harris County Toll Road Authority (HCTRA)	The primary role of the IRT is to help clear incidents on HCTRA roads as safely and quickly as possible, preventing other incidents from occurring.
Harris County Motorist Assistance Program (MAP) (*23*)	TxDOT and Harris County Sheriff	MAP is designed to help stranded motorists and clear the freeways of minor incidents and stalls.
Houston SAFEClear (*24*)	City of Houston	The mayor and city council created the program, modeled after a similar program in New York City. The primary objective is to improve public safety (reduce collisions, injuries, and deaths on Houston freeways).
San Antonio IMP (being developed—not in operation) (*20, 25, 26*)	TxDOT and City of San Antonio	This planning project is focused on identifying methods to enhance the TIM program and intelligent transportation system technology (focused on the five most congested corridors in the San Antonio region). The City of San Antonio recently renegotiated its contract for the callout towing program.
WATIMCo (*4*)	Primarily WSDOT and Washington State Patrol (WSP); also other members of WATIMCo	Washington created WATIMCo to oversee implementation of NUG, set by NTIMC. The Washington Joint Operations Policy Statement is a key element, documenting consensus between WSDOT and WSP.
Kansas City Scout (*27*)	Kansas and Missouri DOTs	Kansas City Scout was established in 2003 to improve rush-hour speeds, increase safety, and improve emergency response to traffic situations.
AZTech (*28*)	Arizona Department of Public Safety (DPS), Maricopa County DOT, and Arizona DOT	Arizona DPS created the Freeway Service Patrol with sponsorship from Arizona DPS, AAA of Arizona, and the Maricopa County Association of Governments (MAG).

Table 3. Funding and Contracting Partnerships.

Program	Who/What Funds Service Patrol (or Other Towing Services)?	Are Services Contracted?	Who Is Responsible for Day-to-Day Oversight?	Are Service Patrols/Operators Dedicated Solely to the Program?
Austin HERO (*17*, *29*)	Capitol Area Metropolitan Planning Organization; funds being sought for new program similar to Houston SAFEClear	No, TxDOT provides trucks	CTRMA and TxDOT, though when Austin Police Department (APD) arrives on scene, it coordinates other services, such as towing	HERO patrol: Yes (private contractor). Rush Hour Rapid Response program: No.
Dallas-Fort Worth MAPP (*19*, *30*)	Dallas, funded by TxDOT; Tarrant, funded by federal Clean Air grant and operation funded by TxDOT and North Central Texas Council of Governments	No	Both Dallas and Tarrant operations are operated by the Sheriff's Department	Yes
El Paso IMP (*21*)	Towing organized by city, but TxDOT funds other components	Yes	El Paso Police Department dispatches tow and facilitates traffic to alternate routes	City of El Paso's contracted tower handles all towing
Harris County Incident Management Program (*31*)	Harris County Tollroad Authority	No, HCTRA vehicles (which have towing capabilities)	HCTRA IRT	Yes
Harris County MAP (*23*)	TxDOT	No, equipment purchased by TxDOT	Operated by Harris County Sheriff and TranStar	Yes
Houston SAFEClear (*26*, *32*)	City of Houston	Yes	Tow operators provide tow authorization; Houston Police Department monitors program operation	Yes
San Antonio IMP (proposed) (*25*)	TxDOT	No	New contract will involve callout procedure, managed by San Antonio Police Department	No
WATIMCo (*4*, *33*)	Usually WSDOT tow trucks and funding. If funding allows, they contract for tow trucks.	Mixed, WSDOT tow trucks and sometimes contractors	WSDOT region IRT for day-to-day management	Yes
Kansas City Scout (*27*, *34*)	Kansas and Missouri DOTs	No	DOT traffic management center	Yes
AZTech (*35*, *36*)	Congestion Mitigation and Air Quality funds started program. Now funded through 2026 with Maricopa County Regional Transportation Plan funds.	No	DOT traffic management center	Yes

Most incident management programs in the United States have vehicles that are purchased by a government agency or toll road authority and operated by DOT employees, a contracted employee, or an off-duty law enforcement officer. The vehicles have patrol routes, and the operators are responsible for finding or responding to disabled vehicles, performing minor auto repair types of tasks (such as gas or radiator filling, changing a flat tire, or replacing a fan belt), or calling for a tow truck if the problem cannot be resolved. If a tow truck is called, the response vehicle may remain on site with warning lights until the disabled vehicle has been loaded and removed. Programs of this type were considered innovative a few decades ago, and agencies are still complimented by motorists for these assistance services (*37, 38, 39*).

Implementation of Specific Strategies

Table 4 summarizes the task-specific strategies used by the programs under study. Most areas have a service patrol function and quick clearance and open roads policies. But only Houston SAFEClear and Washington have towing and quick clearance incentives. Other differences between programs are in the definitions of *quick* and the time period or event that is at the start of the quick period.

Houston SAFEClear, the Harris County Tollroad Authority, and Austin HERO incident management programs are unique in that every vehicle has tow capabilities, allowing the same vehicle that patrols the road (and in most cases discovers the disabled or crashed vehicle) to respond and clear the problem, consistent with Texas Transportation Code Section 545.305 governing the removal of stopped vehicles to maintain safety (*40*). The other programs do not prioritize clearing the problem; instead they have provisions enabling police or fire responders to call for towing services, and use their forces for moving traffic away from disabled vehicles, clearing roadway debris, and assisting with flat tires, fuel, water, and other minor vehicle repairs for stranded motorists.

Most programs do not offer quick clearance incentives, with Washington and Houston being the exceptions. Washington provides a $2500 incentive payment for quick (90-minute) clearance of heavy-truck incidents. Houston's 6-minute response time goal incentivizes contracted towers' speedy arrival at the scene; another tow company may be called if the goal is not met. In contrast, most other programs have a callout type of program where a service response occurs first, and a tow response begins only after that initial response. This results in longer response and clearance times when vehicles are disabled; the approach prioritizes the reduction in false or unnecessary callouts of towing services instead of pushing for short response times and accepting that there might be some equipment responses that are not needed.

Table 4. Implementation of Specific Strategies.

Program	Service Patrols	Quick Clearance/ Open Roads Policy	Towing and Recovery Quick Clearance Incentives	Major IRTs
Austin HERO(*29*)	Yes, 75% of disabled vehicles found by HERO trucks	Yes, medical examiner memoranda of understanding (MOUs)—rapid removal of deceased. APD and TxDOT MOU allows traffic to be diverted to toll road if 2+ hour incident.	No	APD preparing a heavy tow contract to rapidly deploy equipment and personnel with resources and training to clear commercial vehicle incidents
Dallas-Fort Worth MAPP (*19*)	Yes	No	No	No
El Paso IMP (*21*)	No	Yes	No, El Paso has contracted towing company, but trucks only come when called; do not patrol	Procedure is flow-charted to explain agency involvement; no mention of specific dedication to major incidents
Harris County Toll Incident Management Program (*22, 31, 41*)	Yes, 65% of disabled vehicles found by patrol trucks	HCTRA supports the "Steer It…Clear It" campaign. Average response to major crash is 5 minutes; average clearance is 27 minutes.	No, HCTRA tow trucks move vehicles off road; private tow trucks move from there	No
Harris County MAP (*41, 42*)	Yes	Yes	No	No
Houston SAFEClear (*14, 24, 32, 43*)	Yes, by tow operators; 95+% of disabled vehicles found by patrol tow trucks	Yes, 6-minute response time mandate and quick clear goals built into Houston SAFEClear	Yes, 6-minute response time and 20-minute clearance time requirements have been met for 10 years	Agreement between police and heavy-duty wreckers
San Antonio IMP (proposed) (*20, 25*)	Wants full service safety patrol; not yet operational	N/A, in process	N/A, 30-minute clearance goal for minor incident; 90-minute goal for major. New city tow contract has 20-minute response time.	No
WATIMCo (*10*)	Yes	Yes	Yes, Blok-Buster provides $2500 incentive payment for meeting quick clearance goals	No
Kansas City Scout (*27, 44*)	Yes	Yes	30-minute clearance goal	Not included in sources
AZTech (*36, 45*)	Yes	Yes	REACT team goal—respond to 99% of incident calls within 30 minutes for a distance 20 miles or less	REACT responds to both major and minor incidents

The quick clearance incentives apply to the time after the callout, and the quick clearance typically refers to average response time goals of 20 to 30 minutes. By comparison, in 2013, the Houston SAFEClear program had an average response time of less than 1 minute and incident duration time (the combination of response and clearance times) of 14.5 minutes; 83 percent of the incidents had duration times less than 20 minutes—the *response time goal* for many programs.

About half of the programs have written or endorsed an Open Roads policy that encourages quick clearance of incidents. The City of Austin has developed several MOUs to facilitate communications between Austin police and fire, medical examiners, and TxDOT Toll. Nationally, Washington State is a leader in the blending of several jurisdictions and agencies for a comprehensive program. Several programs have developed alternate routes for motorists if a road section is closed (*46*).

Most programs discussed here involve some form of major IRT or protocol. Washington State has instituted the Major Incident Tow program. Austin is preparing a heavy-wrecker contract, and Houston has already prepared such a contract. El Paso does not have a major IRT, but the city has clearly laid-out procedures for dealing with incidents of varying severity.

Service Area Coverage and Staffing

Table 5 demonstrates that the scope of TIM programs varies widely, both in terms of size of service area and the number of vehicles and personnel required. Dallas MAPP covers the largest span of road at 500 to 600 miles with 29 peak-period assistance vehicles. Austin focuses on a comparatively short 55 miles on US 183 and IH 35. Houston SAFEClear tow contractors use an especially large number of vehicles in peak hours to meet their response time targets (estimated by the towing companies at 60 to 75). Most programs have between 10 and 20 trucks that dispense minor repair and fluid replacement.

Program Operating Hours

NTIMC encourages 24-hour, 7-day-a-week availability among responders. Table 6 examines TIM programs' progress in achieving 24-hour, 7-day-a-week availability. The NTTA Courtesy Patrol, Harris County Tollroad Incident Management Program, Houston SAFEClear, and WSDOT operate 24 hours a day, 7 days a week. Other programs operate during specified hours; these include Austin HERO, Dallas County and Tarrant County Courtesy Patrol, and Harris County Mobility Assistance Program. Towing services in El Paso are managed by a callout system and do not patrol; San Antonio intends to operate in this same way.

Table 5. Service Area Coverage and Staffing.

Program	Service Area	Coverage	Number of Vehicles/ Personnel
Austin HERO (*29, 47*)	IH 35 from Georgetown to Kyle; US 183 from IH 35 to US 183A	66 miles	Six vehicles
Dallas-Fort Worth MAPP (*19, 20, 30*)	Dallas and Tarrant Counties, portions of Collin and Denton Counties. Patrols from NTTA and the Dallas County Sheriff's Department follow scheduled routes on freeways/tollways.	Approximately 500– 600 miles (3,500 lane miles)	**MAPP (as of Dec. 2014):** Dallas County: 20 vehicles in three shifts; Tarrant County: 9 vehicles in three shifts. **Courtesy Patrol (2012):** 10 trucks and 48 workers on patrol; 9–10 trucks operate on weekdays, and about 5 trucks operate on weekends.
El Paso IMP (*21*)	Four major El Paso highways	137 miles	Not found
Harris County Incident Management Program (*31*)	Harris County toll roads	120 miles	15 trucks. As of 2013, HCTRA Incident Management coordinates 126 deputies from six different agencies.
Harris County MAP (*23*)	Most Houston/Harris County freeways	Approximately 400 miles	Not found
Houston SAFEClear (*43, 44*)	Freeways inside city limits	250 miles	Approximately 60 to 75 in peak periods
San Antonio IMP (*20*)	Bexar County freeways	Not decided yet	Not decided yet
WATIMCo (*16, 33*)	Washington State transportation system	20,000 lane miles	86 million vehicle miles every day
Kansas City Scout (*27, 48*)	Emergency response units patrol five zones	More than 125 freeway miles in the Kansas City metropolitan area	Not found
AZTech (*35*)	Freeways within MAG region	334 miles	11 vehicles and 11 operators as of July 2013

Table 6. Program Operating Hours.

Program	Hours	Weekday Operating Hours	Weekend Operating Hours
Austin HERO (*29*)	HERO: weekdays. Rush-hour towing: peak periods	HERO: 6 a.m.–10 p.m. Rush hour: 6–9 a.m., 4–7 p.m.	None
Dallas-Fort Worth MAPP (*19*)	Dallas County: weekdays only. Tarrant County: daily. NTTA: three shifts 24/7.	Dallas County: 5 a.m.–9:30 p.m. Tarrant County: 6 a.m.–10 p.m. NTTA: 24/7	Dallas County: N/A. Tarrant County: 6 a.m.–10 p.m. NTTA: 24/7.
El Paso IMP (*21*)	N/A	N/A	N/A
Harris County Toll Incident Management Program (*22*)	24/7	24/7	24/7
Harris County MAP (*42*)	Weekdays	6 a.m.–10 p.m.	N/A
Houston SAFEClear (*24*)	24/7	24/7	24/7
San Antonio IMP	Not yet decided	Not yet decided	Not yet decided
WATIMCo (*4*)	Roving patrols: Peak periods. WSDOT incident response and maintenance techs: 24/7.	Roving patrols: Peak periods. WSDOT techs: 24/7.	Roving patrols: Likely none. WSDOT techs: 24/7.
Kansas City Scout (*48*)	Weekday and after hours shifts	5 a.m.–7 p.m. After-hours emergency response staffed 7 days a week.	N/A. After-hours emergency response staffed 7 days a week.
AZTech (*28, 45*)	7 days a week	18 hours	As needed

Note: Another source of information is the 24-Hour Texas Department of Public Safety Stranded Motorist Hotline (*49*).

While the congestion problem is usually only an issue during the peak periods, the incident management programs can play a significant role in reducing serious crashes during the midday and overnight periods. Promptly removing stalled vehicles and minor crashes can prevent additional crashes from happening during a time when higher speed and darkness might cause any crash to be more severe. Freight movement also benefits even though these are not large truck incident management efforts; trucks operate more often during the midday and overnight periods in order to avoid congested conditions.

Transportation Operations Performance Data and Meetings

Few of the Texas incident management programs report congestion or safety outcome performance measures (Table 7). The focus of most measurement programs is on measures that the agency can control rather than a broad focus on the effect of the activity across all responding agencies/companies. Response and clearance times are good measures that allow a determination of the adequacy of the procedures and resources, but the programs are usually designed around

historic practice and the expected budget. Improving agency actions will result in a congestion and safety benefit; Houston SAFEClear operations show that a 1-minute response time improvement results in four fewer collisions per day, about a 10 percent crash reduction. If this is examined further, it is unlikely that there was any reduction in the primary crash (that is, vehicles do not avoid crashes because there is a tow truck nearby). The reduction in secondary crashes must, therefore, be on the order of 20 to 30 percent. (There is no agreed-upon secondary crash definition at the national level.)

Table 7. Transportation Operations Performance Data and Meetings.

Program	How Is General Performance of the Program Measured?	How Are Data Collected for Performance Measures?	Are There Clear Guidelines for Follow-Up of an Incident?	Does the TIM Team Meet on a Regular Basis?	To Whom Does TIM Team Report?
Austin HERO (*17, 47, 50*)	Notification time, response time, roadway clearance time, incident duration, recovery time, secondary incidents, primary and secondary incident severity	Traffic Incident Management Self-Assessment every year through FHWA	Recommends debriefings for incident durations 2+ hours long; common practice is 4+ hours	Bi-monthly Austin-area Incident Management for Highways meetings including major transportation agencies and governments	IH 35 HERO Performance Report submitted to Capitol Area Metropolitan Planning Organization
Dallas-Fort Worth MAPP (*19*)	Number and type of assists, number of motorist assist calls	NTTA: call logs	Not included in sources	Not included in sources	Not included in sources
El Paso IMP (*21*)	Response and incident clearance time, vehicle delay, emissions, information dissemination, travel time, secondary incidents, delay cost, worker safety	TransVista records and reports weather conditions, closures, and border wait times	No official follow-up	Not included in sources	Not included in sources
Harris County Toll Incident Management Program (*31*)	Assists, calls to dispatch center	Dispatch center	Not included in sources	Monthly TranStar leadership meetings	Harris County Tollroad Authority director of operations
Harris County MAP (*23, 42*)	Assists	Dispatch logs	Workers record date and time of each assist	Monthly	TranStar
Houston SAFEClear (*43, 51, 52*)	Assists, response time, clearance time, duration time, crashes	TranStar logs, Houston Police Department records, and crash records	Workers record date and time of each assist	Monthly	Houston Police Department and TranStar

Program	How Is General Performance of the Program Measured?	How Are Data Collected for Performance Measures?	Are There Clear Guidelines for Follow-Up of an Incident?	Does the TIM Team Meet on a Regular Basis?	To Whom Does TIM Team Report?
San Antonio IMP (proposed) (*20, 25, 53*)	Dispatch acknowledgment time, response time, assists, lane closures, incident clearance times, road clearance times, crashes, time on patrol route	Roadway detectors and TransGuide data	Encouraged for 2+ hour durations but not yet enacted	Monthly TIM team meeting	San Antonio hopes to hire incident management coordinator
WATIMCo (*16, 33, 50*)	IRT: quarterly reports including number of incidents, response time, clearance time	State and region traffic management center and Washington State Patrol CAD	At annual Joint Operations Policy Statement meeting, each district commander and region administrator jointly report the number of over-90-minute incident debriefs and identify two or three key lessons learned	Monthly meetings between WSP district commander and WSDOT regional transportation incident management coordinator (includes local fire agencies)	WSP and WSDOT both responsible for reporting progress toward 90-minute clearance goal to the governor
Kansas City Scout (*27, 54*)	Collision clearance times (30-minute goal), response times, secondary incidents, average time to travel a 10-mile road segment in AM and PM peak (goal is 10 minutes)	Cameras and sensors. Information about incident severity and assist locations in monthly reports.	Not included in sources	Not included in sources	Not included in sources
AZTech (*45, 55*)	Roadway clearance time, incident clearance time, secondary crash numbers	Not included in sources	Not included in sources	TIM Coalition* and several committees: Executive Committee, Strategy Task Force, Operations Committee, ATIS Working Group, TMC Operations Working Group	TIM Coalition chair

* "Led by the Arizona Department of Public Safety (DPS), the AZTech TIM Coalition is a multi-disciplinary traffic incident management partnership including state and local police, fire agencies, state and local transportation agencies, metropolitan planning offices and towing companies in the Phoenix metropolitan region to share ideas, lessons learned, best practices and knowledge to foster regional incident management" (*55*).

The best approach to performance measurement is to have the system automatically collect the data that are used for the minute-to-minute program operation. The TIM self-assessment in Appendices A and B is an outline of best practices. One best practice is for meetings between all parties to review any incident that lasts more than 2 hours; the goal of these meetings is to identify changes that can reduce the incident duration time.

A periodic report that summarizes agency activity and outcomes can provide the right level of understanding about program accomplishments and spending. The information in the self-assessment is useful for operators as a gauge against basic practice but is not sufficient as a public report on the effects of the programs. The self-assessment questions are designed to examine procedures and policies rather than determine the congestion and safety outcomes. It seems clear from best practices in performance measurement that there must be both agency activity and procedure measures that focus the field staff on targets, as well as crash and congestion measures that inform the public (*38*).

Program Costs and Benefits

Table 8 summarizes the costs and benefits of the TIM programs. Measurements used to gauge TIM program costs and benefits vary by city and state. Dallas-Fort Worth MAPP, Harris County Mobility Assistance Program, and Houston SAFEClear have produced annual expenditure estimates, expressed as either funding received or funding spent. Austin HERO has calculated its average cost per tow, and Houston SAFEClear has publicized fees charged to motorists for roadside services, tows from the road shoulder, and tows from a freeway lane. The Austin HERO and Houston SAFEClear costs can be converted to an estimated annual program cost of approximately $25,000 per freeway mile covered. Benefit/cost ratios have been estimated for several areas for different program elements and using different methodologies; these do not use identical procedures, but they all consistently show very high benefit/cost ratios for incident programs.

Table 8. Program Costs and Benefits.

Program	Annual Expenditure	Average Cost per Tow	Benefit/Cost Ratio
Austin HERO (*17, 29, 47*)	Accomplished 10,000 assists. Approximately $25,000 per freeway mile per year. Annual cost approximately $1.5 million	$250	Ranges from 11:1 to 19:1. More benefits: Increased availability of APD officers; 11% decrease (800 fewer) in crashes on IH 35 in the area patrolled by HERO evaluated by APD (2013).
Dallas-Fort Worth MAPP (*20*)	2013 program cost: Dallas County: $3 million for 62,000 assists; Tarrant County: $2.2 million for 20,000 assists	N/A	N/A
El Paso IMP	N/A	N/A	N/A
Harris County Incident Management Program (*31*)	54,000 assists in 2012	N/A	N/A
Harris County MAP (*23*)	15,200 incidents; 28,000 assists (2013)	N/A	10:1 to 13:1 (various years)
Houston SAFEClear (*43, 44*)	Tows and program administration cost approximately $6 million for 74,000 tows in 2010 (approximately $24,000 per mile per year)	Houston SAFEClear tows funded by the city and free to the public (2005 to 2011); motorist now has option to pay $50 for a tow from shoulder and $30 for roadside services. Tow cost from freeway lane is set annually by city council.	8:1 for crash benefits only (estimated at $49 million in crash reduction benefits in 2008)
San Antonio IMP	N/A	N/A	N/A
WATIMCo (*33*)	Approximately $50 per hour of service	N/A	N/A
Kansas City Scout (*56*)	Annual cost is $6,404,000	$6.4 million/28,100 incidents managed by Scout in 2014 (about $230 per incident)	8:1
AZTech (*45*)	$22,750,000 to cover costs until 2026	Not included in sources	Not included in sources

Conclusions

Most Texas incident management programs are good basic efforts. Motorist assistance programs are low cost relative to roadway construction efforts, get great reviews from the public, can be done as a single agency effort within the current policy structure, and can be coordinated with the activities in the large traffic management centers. They provide good benefits for the modest resources of people, equipment, and funds used.

The best practice as identified in the FHWA Self-Assessment process concentrates on having appropriate procedures, practices, and policies in place. Focusing on process is not inappropriate; it is relatively easy to know which processes and practices are being used, and in general, there is a connection with good outcomes such as safety or congestion improvements. The problem is that in an operations context the level of creativity, attention, and aggressiveness is usually more determinative of the outcomes. The right procedures, processes, and partnerships are a good start. Agencies that are monitoring and responding to events must also be able to clear crashes or stalled vehicles, adjust signal or ramp meter timing schemes, alter pricing policies, activate hazmat cleanup equipment, and call out towing or medical responses. The irony is that the more comprehensive approach does not cost much more than the traditional single-entity, motorist assistance approach.

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Appendix A: Summary of 2013 Traffic Incident Management Self-Assessment Results

Federal Highway Administration, Office of Operations. Traffic Incident Management Self-Assessment. October 2015. http://ops.fhwa.dot.gov/eto_tim_pse/preparedness/tim/self.htm

2013 Traffic Incident Management Self-Assessment (TIMSA) Results for Strategic Section.

No.	Question	Avg. Score (0 to 4)		% Score of 3+		% Change from Base to 2013
		Base	2013	Base	2013	
4.1.1.1	Have a TIM multi-agency team or task force that meets regularly to discuss and plan for TIM activities?	1.90	2.96	28	67	55.6
4.1.1.2	Is multi-agency training held at least once a year on TIM-specific topics? (NIMS/ICS 100? Training of mid-level managers from primary agencies on the National Unified Goal? Traffic control? Work zone safety? Safe parking?)	1.26	2.70	9	70	114.0
4.1.1.3	Conduct multi-agency post-incident debriefings?	1.62	2.57	18	56	58.6
4.1.1.4	Conduct planning for special events? Construction and maintenance? Sporting events, concerts, conventions, etc.? Weather-related events? Catastrophic events?	2.47	3.47	35	91	40.6
4.1.2.1	Is the TIM program supported by multi-agency agreements/memoranda of understanding? Is the agreement/MOU signed by top officials from participating agencies? Are incident scene roles and responsibilities clearly defined in the agreement and communicated to all participating agencies? Are agency roles and responsibilities for planning and funding for the TIM program clearly defined in the agreement/MOU? Are safe, quick clearance goals stated as time goals for incident clearance (e.g., 90 minutes) in the agreement/MOU?	1.71	1.92	18	45	12.6
4.1.2.2	Is planning to support the TIM activities done across and among participating agencies?	1.35	2.43	12	53	80.0
4.1.2.3	Is there someone from the participating agencies responsible for coordinating the TIM program as his or her primary job function?	2.28	2.53	54	54	10.8

No.	Question					
4.1.3.1	Have a multi-agency agreement on the two performance measures being tracked? Roadway clearance time? Incident clearance time?	0.64	2.31	3	48	260.4
4.1.3.2	Has the TIM program established methods to collect and analyze the data necessary to measure performance in reduced roadway clearance time and reduced incident clearance time?	0.64	2.40	3	54	274.7
4.1.3.3	Have targets (e.g., time goals) for performance of the two measures?	1.16	2.24	4	47	92.8
4.1.3.4	Routinely review whether progress is made in achieving the targets?	0.74	2.06	3	48	179.0
4.1.3.5	Track performance in reducing secondary incidents?	1.03	1.11	8	17	7.5

2013 TIMSA Results for Tactical Section.

No.	Question	Mean Score Range = 0 to 4		% Score of 3 or Higher		% Change from Base to 2013
		Base	2013	Base	2013	2013
4.2.1.1	Have "authority removal" laws allowing pre-designated responders to remove disabled or wrecked vehicles and spilled cargo? Is there an "authority removal" law in place? Is it understood and utilized by responders?	2.92	3.38	67	87	15.8
4.2.1.2	Have "driver removal" laws that require drivers involved in minor crashes (not involving injuries) to move vehicles out of the travel lanes? Is there a "driver removal" law in place? Is it communicated to motorists?	3.01	3.05	71	81	1.3
4.2.1.3	Use a safety service patrol for incident and emergency response?	2.73	2.78	67	74	2.0
4.2.1.4	Utilize the incident command system on scene?	2.55	3.57	58	90	40.0
4.2.1.5	Have response equipment pre-staged for timely response?	2.21	3.04	41	78	37.7
4.2.1.6	Identify and type resources so that a list of towing and recovery operators (including operator capabilities and special equipment) is available for incident response and clearance?	2.86	3.44	67	85	20.3
4.2.1.7	Identify and type resources so that a list of hazmat contractors (including capabilities and equipment) is available for incident response?	2.89	3.45	69	85	19.4

4.2.1.8	Does a responding agency have the authority to override the decision to utilize the responsible party's hazmat contractor and call in other resources?	3.22	.57	89	89	11.0
4.2.1.9	In fatality incidents, is the medical examiner response clearly defined and understood?	2.53	3.16	55	78	25.0
4.2.1.10	Are there procedures in place for expedited accident reconstruction/investigation?	2.59	2.98	72	72	14.9
4.2.1.11	Is there a policy for removal of abandoned vehicles?	3.47	3.59	91	91	3.4
4.2.2.1	Have "move over" laws? (Drivers required to slow down and, if possible, move to the adjacent lane when approaching workers/responders/equipment?) Is there a "move over" law in place? Is it communicated to drivers?	3.20	3.69	85	96	5.3
4.2.2.2	Train all responders in traffic control following Manual on Uniform Traffic Control Devices (MUTCD) guidelines?	1.97	3.06	28	81	55.6
4.2.2.3	Routinely utilize transportation resources to conduct traffic control procedures for various levels of incidents in compliance with the MUTCD?	1.93	3.48	27	85	80.5
4.2.2.4	Routinely utilize traffic control procedures for the end of the incident traffic queue?	1.56	2.96	17	63	89.6
4.2.2.5	Have mutually understood equipment staging and emergency lighting procedures on site to maximize traffic flow past an incident while providing responder safety? Vehicle and equipment staging procedures? Light-shedding procedures? PPE used by responders? Pre-established, signed accident investigation sites?	1.38	2.38	14	63	72.2

2013 TIMSA Results for Support Section.

No.	Question	Mean Score Range = 0 to 4		% Score of 3 or Higher		% Change from Base to 2013
		Base	2013	Base	2013	
4.3.1.1	Does the TIM program use a traffic management center/traffic operations center to coordinate incident detection, notification, and response?	1.98	3.61	41	92	82.5
4.3.1.2	Is there data/video sharing between agencies?	43	3.41	10	82	138.4
4.3.1.3	Does the TIM program have specific policies and procedures for traffic management during incident response? Signal timing changes? Pre-planned detour and alternate routes identified and shared between agencies?	1.55	2.34	18	55	50.9
4.3.1.4	Does the TIM program provide for interoperable, interagency communications on-site between incident responders?	1.61	2.91	17	69	81.0
4.3.2.1	Have a real-time motorist information system providing incident-specific information? • Traveler information delivered via 511/website? • Traveler information delivered via mobile applications? • Traveler information delivered through traffic media access to traffic management center/TOC data/ information?	1.90	3.54	27	91	86.6
4.3.2.2	Provide motorists with travel time estimates for route segments?	0.99	3.14	12	76	217.1

Appendix B: Federal Highway Administration 2009 Traffic Incident Management, Self-Assessment Template Instruction Sheet and User Guide

Introduction

Traffic incident management programs continue to play a vital role in the safe and quick clearance of traffic incidents while providing a framework for reducing congestion and maximizing use of existing transportation infrastructure. A critical component of capitalizing on the success of existing programs and aiding the development of new TIM programs is periodic evaluation of the components of successful multi-agency TIM programs. The TIMSA was designed to provide an easy-to-use tool for measuring TIM program performance.

Since its inception in 2002, a number of federal initiatives have evolved to the point where synergies between those initiatives and individual TIM program progress should be evaluated and captured in the TIMSA. Among these initiatives are:

- The National Traffic Incident Management Coalition and its National Unified Goal.

- FHWA's Traffic Incident Management Performance Measures Focus States Initiative.

- U.S. Department of Homeland Security National Incident Management System (NIMS) requirements.

- State Strategic Highway Safety Plan requirements.

Additionally, the 2009 TIMSA has been updated with a new format, scoring system, and revised content to more accurately reflect TIM state of the practice and to more easily facilitate completion of the TIMSA.

What's New for 2009?

The TIMSA is a tool for assessing various aspects of a TIM program. Since many different public- and private-sector partners are involved in TIM, it is highly recommended that assessments be conducted in meetings where the principal TIM partners are represented. Some partners may have very different understandings and views of issues covered in the self-assessment questions. Group discussions leading to consensus scores for each question will be highly beneficial in identifying specific actions that are needed to address the problems or shortcomings that are identified in the group discussions.

The TIMSA categories have been renamed to create a tighter crosswalk to the NIMS. The three categories under which the questions are organized are as follows:

- Strategic (formerly program and institutional issues).

- Tactical (formerly operational issues).

- Support (formerly communications and technology issues).

To eliminate duplication and confusion in some of the questions, and to more accurately reflect the current state of TIM practice, the questions have been edited, merged, and in some cases eliminated. The total number of questions is down to 30 from the previous 34. The 30 questions are organized into the following subcategories (see the 2009 Template tab):

- Strategic:
  - Formal TIM programs (two questions).
  - Multi-agency TIM teams (four questions).
  - Performance measurement (five questions).

- Tactical:
  - Policies and procedures for incident response and clearance (seven questions).
  - Responder and motorist safety (five questions).

- Support:
  - Data collection/integration/sharing (five questions).
  - Traveler information (two questions).

A new scoring scheme is being used that asks participants to rate TIM program performance in each question as high, medium, or low. The numeric score for the subsections and the overall assessment will be automatically calculated based on the assigned scores. The following thresholds should be used when answering each question:

- Low—little to no activity in this area; no discussions or some informal discussions with no or minimal action taken.

- Medium—some or a good level of activity in this area; has been put into practice with some multi-agency agreement and cooperation and with fair to good results.

- High—outstanding activity; well-coordinated efforts in this area with a high level of cooperation among agencies.

When a question is answered low or medium, you will be prompted to provide further clarification on the level of activity through the assignment of a supplemental score. The thresholds for the supplemental scores are as follows:

- Low:
  - No activity—no activity or discussion of this issue.
  - Some activity—issue has been acknowledged, and there has been some single-agency activity.
- Medium:
  - Fair level of activity—some good processes exist, but they may not be well integrated or coordinated.
  - Good level of activity—efforts in this area are strong, and results are promising, though there is still room for improvement.

The Traffic Incident Management Self-Assessment Questions

The following provides background on each of the seven TIMSA subcategories and is intended to assist in your evaluation of TIM program performance for each question in the subcategories.

Strategic

Formal TIM Programs

At the core of effective TIM programs is multi-agency coordination and cooperation. For emerging programs, this typically starts out as informal and ad hoc. However, as a TIM program matures, it generally requires joint responsibility among agencies for resource sharing as documented in agreements or MOUs.

Such agreements and MOUs can take many forms. Among the possibilities are the following:

- An Open Roads policy that declares shared responsibility among the signing agencies for keeping roads cleared.
- A state Strategic Highway Safety Plan that designates in its action plan(s) the leveraging of partner agency resources for TIM.
- Any state or local incident management or business plan where the concepts of incident management and unified command are interpreted by the responder agencies to include all non-recurring highway incidents.

Multi-agency TIM Teams

The NIMS emphasizes planning, training, and field-level exercises for incident responders as key to preparedness. Similarly, multi-agency TIM teams should meet on a regular basis to plan and train for TIM on-scene operations using the same protocols and resources used for anticipated and planned events.

Performance Measurement

Performance measurement is a key part of targeting limited resources and measuring TIM program performance. It is the means for documenting program value, identifying areas for improvement, and justifying program continuation and expansion. However, measuring program performance is challenging. The program is the result of the efforts of many agencies, and the data necessary to evaluate program performance usually reside with those multiple agencies.

To address these challenges, FHWA convened 11 states through its Focus States Initiative to develop, implement, and test TIM performance measures. Two program-level performance measures were identified by TIM Performance Measures Focus States Initiative participants and are the focus of the questions in this section. The two measures are defined as follows:

- Roadway clearance time—the time between the first recordable awareness of an incident (detection, notification, or verification) by a responding agency and first confirmation that all lanes are available for traffic flow.

- Incident clearance time—the time between the first recordable awareness of the incident and the time at which the last responder has left the scene.

Tactical

Policies and Procedures for Incident Response and Clearance

The questions in this subcategory focus on the basic elements of incident response and clearance including quick clearance legislation, safety service patrols for incident and emergency response, use of the incident command system (as required in the NIMS), and pre-staging of equipment for quick response. Additionally, the subcategory reflects a core NIMS principle calling for incident response programs to be scalable based on both the size and complexity of the incident.

Responder and Motorist Safety

The focus of this subcategory is the safety of responders and motorists and the processes in place to ensure both, including the presence of Move Over laws and the training and use of traffic control procedures by safety service patrols for incident and emergency response.

Support

Data Collection/Integration/Sharing

The NIMS requirement for integrated communication and information systems mandates that transportation and public safety integrate data collection and sharing. An assessment of how well TIM programs integrate these procedures reveals how effectively these two groups coordinate and share incident response resources and technologies.

Traveler Information

Providing motorists with current incident information, estimated travel times, and suggested alternate routes allows motorists to make informed decisions about their travel. The

infrastructure for doing so has greatly expanded over the years and now includes 511 and traveler information websites.

Testing and Completing the 2009 TIMSA Survey

The 2009 TIMSA survey is available only online and may be accessed at http://myata.truckline.com/TIMSA.

Survey participants are encouraged to take a trial run or test of the redesigned survey. To ensure a clear distinction between survey trial runs and actual surveys, participants should enter "Test" in the "This assessment is for (fill in location)" box or any of the "Contact Information" boxes. The TIMSA webmaster will delete all test surveys on a daily basis.

The 2009 TIMSA survey features a "finish later" functionality that allows users to start the survey, exit, and then complete the survey at a later date or time. To complete a survey that you have already begun, simply click on the same link as above, and you will be returned to the screen where you last entered a response. *This functionality is only available if the same computer is used to both start and resume the survey.*

Participants that access the survey shortly after a trial run and are ready to complete the survey may encounter their test version of the survey. If this occurs, please send an email to cshulz@trucking.org, and your test survey will be deleted promptly.

Appropriate Comparisons from the 2015 TIMSA

Even when the definitions for the performance measures are standardized, the way in which the performance measures are reported must be carefully communicated. For example, an agency may only report performance for "DOT-notified incidents," "lane-blocking incidents," or "incidents on interstate highways." In any case, this qualifying information should be communicated along with the performance measures to ensure that reporting is consistent and understood across all agencies and that appropriate comparisons are made.

Appendix C: 2015 Traffic Incident Management Self-Assessment

Section 1: Strategic

Formal TIM Programs

1. Is there a formal TIM program that is supported by a multidiscipline, multi-agency team or task force that meets regularly to discuss and plan for TIM activities?

> 1a. How frequently does the team or task force meet?

2. Are all disciplines and agencies participating in ongoing TIM enhancement activities/efforts?

3. Is the importance of TIM understood by all TIM stakeholders and supported by multidiscipline, multi-agency agreements or memoranda of understanding (MOUs)?

> 3a. How often is the document updated?

> 3b. Which agencies are signatories on the agreement/MOU?

4. Is agency leadership actively involved in program-level TIM decisions (policy establishment, training, funding, legislation, etc.)?

5. Is there a full-time position within at least one of the participating agencies with responsibility for coordinating the TIM program as his or her primary job function?

6. Are the TIM response roles and responsibilities of public- and private-sector TIM stakeholders mutually understood?

> 6a. How are the roles and responsibilities of public- and private-sector TIM stakeholders communicated to participating agencies?

7. Is planning to support TIM activities, including regular needs assessments, done across and among participating agencies?

8. Are funds available for TIM activities?

9. Is TIM considered and incorporated into planning efforts for construction and work zones?

10. Is TIM considered and incorporated into planning efforts for special events such as sporting events, concerts, conventions, etc.?

11. Is TIM considered and incorporated into planning efforts for weather-related events?

TIM Training and After-Action Reviews

12. Have stakeholders in the region participated in a Strategic Highway Research Program 2 (SHRP2) National TIM Responder Training Program, or equivalent, Train-the-Trainer session, and are they actively training others?

> 12a. Is there any other TIM-related supplemental or topic-specific training being provided?

13. What percentage (estimated) of TIM responders in the region identified as needing training have received the 4-hour SHRP2 TIM Responder Training (in person or via web-based training), or equivalent?

14. Is the SHRP2 TIM Responder Training being conducted in a multidiscipline setting?

15. Has the SHRP2 TIM Responder Training, or equivalent, been incorporated into the local academy and/or technical college curriculums?

16. Does the TIM program conduct multidiscipline, multi-agency after-action reviews?

     16a. How many multi-agency after-action reviews were held in the last 12 months?

TIM Performance Measures

17. Is roadway clearance time being measured using FHWA's standard definition "time between first recordable awareness of an incident by a responsible agency and first confirmation that all lanes are available for traffic flow"?

     17a. If available, what was the average roadway clearance time for the prior year?

     17b. If applicable, describe the difference between your definition for roadway clearance time and the standard definition.

18. Is incident clearance time being measured using FHWA's standard definition "time between the first recordable awareness of the incident and the time at which the last responder has left the scene"?

     18a. If available, what was the average incident clearance time for the prior year?

     18b. If applicable, describe the difference between your definition for incident clearance time and the standard definition.

19. How are data for roadway/incident clearance time being collected?

     19a. What type of incident data is used to calculate roadway/incident clearance time? (Choose the option that best describes your data or provide your own description.)

     __ All incidents

     __ Major incidents only

     __ DOT-involved incidents only

     __ FSP-involved incidents only

     __ Other (describe)

     19b. What percentage of incidents is being considered when calculating roadway/incident clearance time?

20. Has the TIM program established TIM performance targets for roadway/incident clearance time?

     20a. How is progress measured?

21. Is the number of secondary crashes being measured using FHWA's standard definition "number of unplanned crashes beginning with the time of detection of the primary crash where a

collision occurs either a) within the incident scene or b) within the queue, including the opposite direction, resulting from the original incident"?

21a. If available, what was the estimated number of secondary crashes relative to the total number of crashes considered (total data set) for the prior year?

21b. If applicable, describe the difference between your definition for number of secondary crashes and the standard definition.

22. How are data for the number of secondary crashes collected?

22a. What type of data is used to calculate the number of secondary crashes? (Choose the option that best describes your data or provide your own description.)

__ All crashes

__ Major crashes only

__ DOT-involved crashes only

__ FSP-involved crashes only

__ Other (describe)

22b. What percentage of crashes is being considered when calculating the number of secondary crashes?

23. Has the TIM program established TIM performance targets for a reduction in the number of secondary crashes?

24. Is TIM performance data used to influence and/or improve operations?

24a. Are data being collected on other performance measures by any of the following agencies? (Check all that apply.)

__ Law enforcement

__ Fire/rescue

__ MPO

__ DOT

__ Other (please specify)

If yes, please describe.

Section 2: Tactical

TIM Laws

25. Is an authority removal law in place and understood by TIM stakeholders?

26. Is a driver removal law in place and understood by TIM stakeholders?

27. What activities are in place to outreach to and educate the public and elected officials about TIM?

27a. Is the Move Over law enforced?

27b. In addition to internal agency-specific reporting, is information on responder injuries sustained during traffic incident response being recorded in a "responder struck-by database"?

27c. In addition to internal agency-specific reporting, is information on responder fatalities that occur during traffic incident response being recorded in a "responder struck-by database"?

27d. If yes to one/both questions above, who maintains the database?

27e. If yes to one/both questions above, how is the struck-by information being reported?

Policies and Procedures for Incident Response and Clearance

28. Is there a safety service patrol program in place for incident and emergency response?

29. What level of coverage does the safety service patrol program provide?

29a. If there is a safety service patrol program, please provide details on lane miles covered, hours of operation, days of operation, services provided, number of vehicles, equipment on vehicles, and any operator training.

30. Do TIM responders routinely utilize the incident command system, specifically unified command, while on scene?

31. Are temporary traffic control devices (e.g., cones and advanced warning signs) pre-staged in the region to facilitate timely response?

31a. Are there other types of equipment or resources pre-staged (e.g., crash investigation equipment)?

32. Do towing and recovery procedures/rotation list policies deploy resources based on type/severity of incident?

33. Do towing and recovery procedures/rotation list policies include company/operator qualifications, equipment requirements, and/or training requirements?

34. Do towing and recovery procedures/rotation list policies include penalties for non-compliance of response criteria?

35. Is there a policy in place that clearly identifies reportable types and quantities, and appropriate hazmat response?

36. Does at least one responding agency have the authority to override the decision to utilize the responsible party's hazmat contractor and call in other resources?

37. For incidents involving a fatality, is there a procedure in place for early notification and timely response of the medical examiner?

38. For incidents involving a fatality, is there a procedure for the removal of the deceased prior to medical examiner arrival?

39. Are there procedures in place for expedited crash investigations?

39a. What technology is used to support crash investigations?

40. Is there a procedure in place for removal of abandoned vehicles?

41. Do standardized, documented TIM response procedures/guidelines exist?

Responder and Motorist Safety

42. Do TIM responders routinely use temporary traffic control devices to provide traffic control for the three incident classifications (minor, intermediate, and major) in compliance with the *Manual on Uniform Traffic Control Devices* (MUTCD)?

43. Do TIM responders routinely use traffic control procedures to provide back-of-traffic-queue warning to approaching motorists?

44. Is there a mutually understood procedure/guideline in place for safe vehicle positioning?

45. Are there mutually understood procedures/guidelines in place for use of emergency-vehicle lighting?

46. Are TIM responders following high-visibility safety apparel requirements as outlined in the MUTCD?

  46a. Which responders are regularly wearing their high-visibility safety apparel?

Section 3: Support

Data Collection/Integration/Sharing

47. Are TIM stakeholders aware of and actively utilizing traffic management center (TMC)/traffic operations center resources to coordinate incident detection, notification, and response?

48. What TIM data (number of involved vehicles, number of lanes blocked, length of queue, etc.) are captured via TMCs and/or public safety CAD systems, and are they shared with other disciplines for real-time operational purposes?

49. Is TIM video captured via TMCs and/or public safety CAD systems, and is it shared with other disciplines for real-time operational purposes?

50. Are there policies or procedures in place for signal timing changes to support traffic management during incident response?

51. Are there pre-planned detour and/or alternate routes identified and shared between TIM stakeholders?