

Improving Texas Incident Management Programs

Crashed, stalled, or disabled vehicles account for approximately one-quarter of all travel delay in major cities, and a much higher amount in small cities and rural areas where congestion is not usually a problem. There is an opportunity for Texas to lead the country in addressing this problem with relatively low-cost, high-return techniques that will help Texans get where they want to be safer, faster, and with a more predictable travel time. Implementing best practices can also help reduce injuries to the first responder community.

Current Situation

As described in the companion review of practice in Texas cities and a few national examples of best practices, most cities have a program to assist freeway motorists in the event they have a vehicle breakdown, run out of gas, get a flat tire, or experience another minor vehicle emergency. These services are also deployed to assist law enforcement officers with traffic control at crash scenes. Each of these motorist assistance vehicles has 40 to 75 miles of freeway to patrol, with response time goals in the range of 20 to 30 minutes. These operating parameters and practices are fairly standard across the country. The advantages of these programs are the relatively low cost, high benefit/cost ratio, and very positive public response to the service (1).

The 20- to 30-minute response times, unfortunately, lead to additional travel delay and to secondary collisions—crashes that occur because the travel lanes are unexpectedly congested (2, 3, 4). This congestion might be the result of a collision in the main lanes, or due to the distraction or constriction caused by a disabled vehicle that has been parked on the emergency shoulder. The best U.S. incident management systems focus on minimizing response times by creating multi-agency work groups governed by official partnering agreements oriented toward performance targets (4).

Best Practices

The review of guidance and existing practice (1, 3, 5, 6) yielded the following items that achieve fast and safe clearance of crashes and stalls.

Best practices to use before an incident occurs are as follows:

- Appropriate training and discussion about how incidents are managed have a tremendous effect on the rapid response and clearance of crashes and stalled vehicles. The full range of responders should be involved in the training and development of scene management procedures. The specific techniques and deployment strategies will vary according to, among other factors, the location (for example, urban, suburban, and rural), type and
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severity of incident, and time of day. There are national traffic incident management training programs for all types of jurisdictions and situations.

- The procurement of standard equipment and communication technology allows the many agencies that work an incident to be flexible and coordinated. Consistent communication equipment allows the scene manager to have clear instruction and immediate action. Having the appropriate and sufficient equipment to take those actions means shorter time on scene and greater ability to clear problems.

Best practices to use at the incident scene are as follows:

- Much of the traffic incident management literature and practice guidance begins with standardized operations and response practices. Evaluations of incident scenes have found that a lack of standard processes and clear lines of authority prolongs the response and clean-up process. This can frustrate drivers and may contribute to interagency confusion regarding authority at incident scenes and during major events.
- Having a sufficient number of the right type of incident responders and resources is important. This might entail more resources or deploying the staff and equipment more strategically. Focusing on known incident locations is a logical strategy, but more evolved analyses might place hazardous material resources near high-truck-volume routes or production facilities, or place barricades and cones near key diversion route locations.
- The operating behavior of first responders can be affected by specific performance goals for response and clearance times. Agreed-upon standards allow those involved in the programs and decision makers to have clear understanding of whether the resources, policies, and procedures are appropriate. More strategic goals such as travel time predictability or travel delay reduction are difficult to operationalize.
- Incident responders must have the authority to remove disabled vehicles and spilled cargo that are determined to be a hazard. Crashes and stalled vehicles—whether they are in the travel lanes or on the emergency shoulders—are hazards.

Best practices for communication and coordination are as follows:

- Routine, periodic traffic incident management team meetings provide opportunities to review actions and decisions. These (typically monthly or bi-monthly) meetings usually focus on larger incidents, but they also offer the chance to review performance data and decide if the right policies and resources are in place for the 90 percent of incidents that are smaller but that cumulatively can create more travel delay and secondary crashes.
- Joint traffic and emergency management centers have been developed in most large metropolitan regions. With the operating agencies in one place, interagency and interjurisdictional communication, cooperation, and coordination are easier. Practice

makes perfect, and the everyday smaller incident scenarios provide regular opportunities for practice that is very useful when larger traffic incidents, emergency weather events, or other problems arise.

- The traffic incident management self-assessment tool (5) presents a framework for assessing the readiness and ability to address traffic incidents.

Possible Improvement Steps—A Clean Sheet Vision

A range of operating practices, funding options, and interagency cooperation agreements can improve the service provided by the typical Texas incident management operation. This section describes specific improvement steps based on programs in other states and national best practice guidelines. These steps would move most Texas programs from reactive to rapidly responding. Rather than waiting for an investigation to decide on the type of response, for example, a best practice encourages the appropriate personnel and equipment to be nearby or involved in the initial investigation. This approach has proven cost effective with significant congestion and crash reduction benefits.

What would a well-run incident management program look like? The *Traffic Incident Management Gap Analysis Primer* (3) identifies big-picture goals as a starting point for developing a set of policies, relationships, and practices. Considering goals such as improving first responder safety, reducing crashes, and relieving congestion by clearing stalled and crashed vehicles as rapidly as possible will lead to a locally tailored program. Several key elements are offered for consideration by all areas (urban, suburban, or rural) based on the review of existing Texas programs and best national practices. The deployment could take a number of forms:

- Regional or system-wide programs.
- A focus on a smaller set of roads with the biggest problems, such as those on the list of the 100 most congested sections of Texas road (7).
- A test of each element in some areas and the performance assessed for wider implementation.

Develop a Common Understanding of Mission and Objectives among All First Responders

The data show that rapidly clearing crashes and stalled vehicles reduces secondary crashes and traffic congestion. Common practice among some responders, however, is to create a safe scene using a plus-one strategy—closing the incident scene plus one additional lane. These traffic flow restrictions are put in place before any clearing activity is begun and, especially in high-traffic areas, creates lengthy sections of stop-and-go traffic. Best practice as demonstrated by the National Traffic Incident Management Coalition (4) shows responders that the stop-and-go traffic also causes serious crashes, encourages the closure of only as much space as needed, and focuses on rapidly clearing minor incident scenes (rather than deploying traffic control). Texas'

Move Over/Slow Down law (8) has been implemented in the period since many of the first responder procedures were developed; this law is designed to change motorist response to the presence of emergency vehicles.

Consideration: Ensure that all responders participate in a National Traffic Incident Management Responder Training course (9), and consider revising the courses' procedures to adopt the best practices. This would at least include law enforcement, medical services, transportation agencies, and tow operators.

Make Multi-agency and Multi-jurisdiction Arrangements

Substantial improvement is seen when agencies cooperate, as noted in the literature and best practice summary (1). But more than cooperation, the agency practice may change more rapidly if there are memoranda of understanding governing scene management procedures. Official partnering arrangements and joint training sessions that enable agencies to not only develop processes but also develop relationships are very valuable. Finding a common mission and set of operating practices to keep the first responders safe, rapidly clear incident scenes, and reduce secondary crashes begins with having all groups using and understanding common operating procedures.

Consideration: Develop and obtain agency agreements on memoranda of understanding to ensure that agencies and jurisdictions train and work together with common procedures toward common goals.

Enable Rapid Response by a Tow Truck

Most existing motorist assistance services involve a pickup or other light-duty vehicle attending to and making minor repairs for stranded vehicles on the roadside (1). Vehicles in a travel lane or on the shoulder are a safety hazard and a distraction for other motorists; their removal is a safety enhancement.

Consideration: Create an alternative program to have all the responses be conducted by tow trucks; these would remove any disabled vehicle to a safe location away from the freeway. This program might involve the following elements:

- A public agency or private tow contractor could be used to provide the service.
- The towing group would be required to meet a fast response time for some high percentage of incidents involving debris, stalled vehicles, and crashes (for example, within six minutes for 90 percent of the incidents) on a specific section(s) of road.
- Tow operators would be paid for each tow from a public agency fund (rather than by the motorists). Higher fees would be paid for vehicles disabled in a travel lane.
- Vehicles would be moved to a nearby safe, lighted parking area in accordance with Section 545.305 of the Texas Transportation Code (10) governing the removal of stopped

vehicles. If motorists desire additional towing, they would accept financial responsibility for that charge.

- Tow operators would be responsible for deciding the number of vehicles and the optimum strategy to meet the response time (for example, the vehicles could patrol or remain stationary in some key locations).
- A public entity would ensure that background checks are conducted on all tow drivers.
- A public entity would ensure that each incident record contains the license plate of the disabled vehicle, tow vehicle, driver identification, location of the incident, and reason for the disablement. This information can be gathered with the traffic-monitoring system cameras in larger cities and with smartphone apps for regions without monitoring cameras.

Houston's SAFEclear program has had many of these attributes at various times of its 10-year existence (2). A planning-level budget for a program with these attributes is between \$25,000 and \$30,000 per year per mile of freeway, depending on the incident rate and payment amounts. The assignment of a tow operator to a piece of roadway and the requirement for meeting a specific fast response time are two key factors that generate the desired performance. This combination of accountability and performance focus is not seen in most incident management programs. The ability for the government to pay for the tow is how the usual time-consuming discussion about "who pays?" and "why do I need to move my car?" is overcome. Most programs rely on a law enforcement officer to call a tow truck from a rotation list or for the motorist to call his or her own service through a roadside service. Either of these approaches has much longer response times; 20 to 30 minutes is not unusual. The much more rapid response and clearance times from the Houston SAFEclear program are the reason it showed a 10 percent reduction in crashes (1, 2).

Such a program would be effective with the extensive monitoring and signal and sign infrastructure that has been deployed; closed-circuit cameras and a variety of communications tools are present in many metropolitan regions. The SAFEclear program tows are authorized by a City of Houston police officer in the Houston TranStar control center location; one officer approves tows for the 250 miles of freeway in the program. The cameras and communication equipment are not required, but the same procedures could be enacted with cell phone cameras, smartphone apps (for example, Towbook), and vehicle location software.

Give Authority for Rapid Clearance of Vehicles

Texas Transportation Code Section 545.3051 (11) grants authority to law enforcement agencies, metropolitan rapid transit authorities, and regional transportation authorities to approve the removal of disabled vehicles, spilled cargo, and hazardous materials. The first responder in many cases is a tow company.

Consideration: Broaden the definition of authority to *trained* transportation operations center staff and/or towing and recovery providers. Training for this important decision should involve existing authorized agencies, the transportation agencies, and other important stakeholders such as insurance companies. A consensus on this effort will allow the first arriving emergency responder to direct the removal of vehicles, if necessary, without fear of liability, clearing the road faster. This re-opens roads faster, decreases possibility of additional congestion-caused crashes, and reduces responder exposure to hazardous situations.

Develop Faster Investigation Procedures

Serious and fatal crashes are thoroughly investigated. Federal Highway Administration (FHWA) guidance and field practices point to increased use of close-range photogrammetry as a tool to improve the documentation of a crash scene and reduce the time to collect information (9). The Total Station surveying equipment used in many jurisdictions is expensive and not included in every law enforcement vehicle. The equipment arrival, setup, and operation time can be long; lanes or the entire road may be closed, and first responders may be exposed to potential injury during this period. Commonly available smartphones or small handheld cameras now possess more than enough precision for a crash area to be photographed in 10 minutes or less and scene clearance to begin much faster than the time to set up the surveying equipment.

Consideration: Identify best practices and best technology for the money, and ensure older technologies are replaced and innovation encouraged. The purchase of photogrammetry equipment and computer programs will likely be repaid many times with reduced secondary crashes and lower congestion levels during incidents.

Involve the Medical Examiner

Fatal crashes represent a particularly difficult incident scene. There are usually more responders, the scene usually has more damage and debris, and greater investigative rigor is required. In addition, procedures ensure the careful and respectful handling of the deceased and preserving evidence for crime scene investigation. If the medical examiner's office is involved in the development of procedures for these scenes, the scenes can be resolved in more time-efficient ways (9). For example, some jobs can be done at the same time, rather than one after the other.

Consideration: 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. 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.

Develop a Standard Annual Report

A report describing the incident management activities would allow the agencies to describe the operations of the incident management program and document the benefits and cost of the programs (1, 4, 12). Accomplishments such as interagency cooperation agreements could be highlighted, and a review of some significant events would provide the public with more

information about how agencies are working to reduce incident timelines. Larger incidents that require longer clearance times could also be placed in context; a relatively small percentage of incidents last longer than 60 minutes. Goals for being accountable to the public suggest that both agency activity goals and congestion and safety performance standards are needed. The agency measures are logical as monthly check-in elements that can be reviewed at the staff level to ensure the right changes are occurring, but these might be included in a quarterly report for senior management or the public.

Consideration: Consider the following sample measures for an incident management program report, by freeway or freeway section:

- Response time (the time between the recorded incident and when the first responder arrives): Report quarterly.
- Roadway clearance time (the time between the recorded incident and when all lanes are available for traffic flow): Report quarterly.
- Cost of the program and cost per mile of freeway covered: Report annually.
- Cost per assist: Report annually.
- Congestion levels (the average travel time and travel delay): Report annually.
- Travel time predictability (the planning time index is the ratio of the 95th percentile travel time and the free-flow travel time—essentially the 19th worst trip of 20 commute trips each month): Report annually.
- Crashes and crash rate (the crash rate in collisions per 100 million vehicle miles of travel): Report annually; if possible, also note the number of secondary crashes, those that occur within the incident scene or within the traffic queues resulting from the original incident.
- Benefits (the value of travel time saved and crash reduction): Report annually.
- Benefit/cost estimate: Report annually.

Consideration: FHWA publishes the Traffic Incident Management Self-Assessment (5) every year; Texas cities should participate in the process. The 2013 evaluation, summarized in the review-of-the-practice report (1), was completed by 93 metropolitan regions.

The self-assessment is a formal process for the incident management partners to evaluate their programs and identify improvement opportunities. All of the factors in the self-assessment are elements of good practice. Training, equipment, policies, data collection, and interjurisdictional cooperation are all important factors in a well-executed incident management program. Unfortunately, all of the self-assessment factors can be graded highly without achieving a rapid response, quick clearance, safety improvement, or traveler information improvement. For

example, a motorist assistance program with one response vehicle for every 30 miles of freeway is graded the same way as a program with a vehicle for every 5 miles; clearly these two programs would not have the same ability to respond.

Consideration: Improve the self-assessment tool (5) to also include elements such as time goals and crash or congestion reduction targets that will tell a region if it is doing enough and doing it properly.

Provide Faster Traveler Information

Traditional transportation information technologies (such as radio and television), websites, and new social media communication options can help people avoid problem routes, slow down before they reach the stop-and-go traffic, and understand their departure time, route, and travel mode options. Some major corridor construction projects have used these techniques for longer-term events, but now that motorists are more accustomed to using a range of real-time information sources, these can be extended to applications involving crashes and stalled vehicles.

Consideration: Expand the use of real-time techniques to communicate the location, expected time length, and severity of the incident. This can be done with a combination of traditional traffic message signs, electronic media, and newer social media options. Standard messages and message formats can be developed for rapid deployment. Programs like HootSuite and TweetDeck can provide the capability to use one message to post on several social media platforms.

Develop Alternate Route Plans

Prior planning for route diversion pays significant dividends in terms of deployment time and ensuring comprehensive treatment of the issues. These typically involve state and local transportation agencies, law enforcement, traffic management operators, and a range of first responders (4). Initial focus of these efforts is typically on incidents that would close or significantly degrade capacity in particularly problematic areas—freeways or major roads that are narrow or have few diversion route options. Many Texas regions have engaged in these efforts for collision closures or weather-related problems; these can be used as model efforts.

Consideration: Develop incident diversion route plans for possible closures of major roadways. These would include consideration of physical elements such as message signs, barricade and cone placements, road direction changes, or lane designation devices. Operating strategies such as traffic signals, ramp meters, ramp closures, variable speed limits, and route navigation should be specified as well as personnel locations to make these changes happen.

Authors

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