

# Best Practices for Traffic Incident Management in Florida



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## **Introduction**

The purpose of this research effort was to consolidate pertinent information on traffic incident management programs, procedures, and techniques from throughout the country and within the state of Florida; summarize lessons learned and best practices; identify suitable performance measures for incident management programs; and recommend overall program improvements for application in Florida. This project was a successful collaborative effort of the Center for Urban Transportation Research at the University of South Florida and Transportation Solutions, Inc.

Through the course of the literature review for this project, it became apparent that there are inconsistent definitions of exactly what is an incident. To law-enforcement or other emergency responders, an incident is anything that requires response. Even among transportation agencies, it might be difficult to get a consistent definition of exactly what is and is not an incident. For the purposes of this project, an incident can be defined as a non-recurring event that results in a reduction of the roadway capacity. Some of the literature also includes special events (sporting events, concerts, parades, etc.) in the definition of “incidents.” However, there is a significant distinction that should be made here: special events typically increase the demand on a roadway facility or transportation system, whereas crashes reduce the capacity. In both cases, the volume-to-capacity ratio (a common measure of congestion) will increase, but the response to a crash is much different than the response to a special event. In the case of a crash, law-enforcement, fire/rescue, and other agencies may be dispatched. In the case of a special event, many of these responders are typically not needed (unless a crash occurs in the congested conditions). Therefore, it would be helpful to maintain a distinction between an incident (a non-recurring event that results in a reduction of the roadway capacity) and a special event (a non-recurring event that results in an increase in the roadway demand).

One of the most common impacts associated with roadway incidents is the increased delay experienced by other motorists that are inconvenienced by the capacity reduction associated with the incident. However, two more serious impacts need to be considered

also; the risk of secondary crashes and the danger associated with the responding personnel being exposed to the traffic stream. Each of these impacts will be given some discussion below.

The delay and traffic back-ups associated with major traffic incidents is, as mentioned above, one of the most commonly cited concerns related to traffic incident management because it typically impacts a large number of people. These delays and back-ups result in many negative impacts including the following:

- Increased response time by police, fire, and emergency medical services
- Lost time and a reduction in productivity
- Increased cost of goods and services
- Increased fuel consumption
- Reduced air quality and other adverse environmental impacts
- Increased vehicle maintenance costs
- Reduced quality of life
- Negative public image of public agencies involved in incident management activities.

In the major metropolitan areas across the United States, delay related to traffic incidents is estimated to be between one-half and two-thirds of the total congestion-related delay.

Another serious impact of traffic incidents is the danger of secondary collisions. Major freeway incidents produce a “shock wave” that propagates upstream of the incident site. This shock wave is caused by drivers that are traveling at highway speeds suddenly encountering traffic at a significantly reduced speed and having to slam on their brakes. Thus, many secondary collisions are high-speed rear-end type collisions that may be more severe than the initial crash.

A third impact of traffic incidents is the exposure of responding personnel to freeway traffic. “Struck-by” incidents are far too common among responding agencies. A “struck-by” incident is when a responder is struck by a passing vehicle while they are

doing their job at an incident scene. “Struck-by” incidents are one of the leading causes of death among fire/rescue and law-enforcement personnel.

Traffic incident management is defined as the planned, systematic, and coordinated use of human, mechanical, institutional, and technical resources to reduce the duration and impact of incidents, and improve the safety of crash victims, incident responders, and motorists. Incident management has traditionally included seven steps each of which are equally important toward improving the process and becoming more effective. These seven steps are: (1) detection, (2) verification, (3) response, (4) site management, (5) traffic management, (6) clearance, and (7) recovery. If the steps of the incident management process are not pre-planned and well coordinated, it can make a bad situation much worse because of the number and variety of participants typically involved. These usually include: transportation agencies, law enforcement, service patrols, fire/rescue/EMS, HAZMAT, tow/recovery operators, and the media/information service providers. Interagency cooperation is a significant issue in the process because interagency agreements have usually not been formalized to clearly define roles and responsibilities.

## Literature Review

A great wealth of information on traffic incident management is available from a variety of sources. Particularly, during the course of this project, several new publications on traffic incident management have been printed. Some of the most comprehensive and useful would include the following:

- NCHRP Synthesis 318 – Safe and Quick Clearance of Traffic Incidents
- Traffic Incident Management Tow Operators Workplan (TIMTOW) guide
- The Manual on Uniform Traffic Control Devices – Part 2I
- NCHRP 520 – Sharing Information between Public Safety and Transportation Agencies for Traffic Incident Management
- 2004 Emergency Response Guidebook
- I-95 Corridor Coalition – Quick Clearance and “Move-It” Best Practices
- Freeway Management and Operations Handbook

The vast majority of the articles and documents contain the same basic thoughts – that successful incident management requires the three C’s: cooperation, coordination, and communication.

From the available literature, no consistent standard has been identified that can be uniformly applied to evaluate the quantifiable benefits of an effective incident management program. In part, this results from the relatively diverse structure and operations of incident management programs. Each program is developed to meet the unique identified needs of the given region. Incident management programs are also generally developed to fit within the existing institutional framework. In addition, baseline data against which to measure a new program’s benefits (e.g., incident response times) are rarely available. In any case, quantifiable benefits generally associated with an effective incident management program include:

- Increased survival rates of crash victims
- Reduced delay
- Improved response time

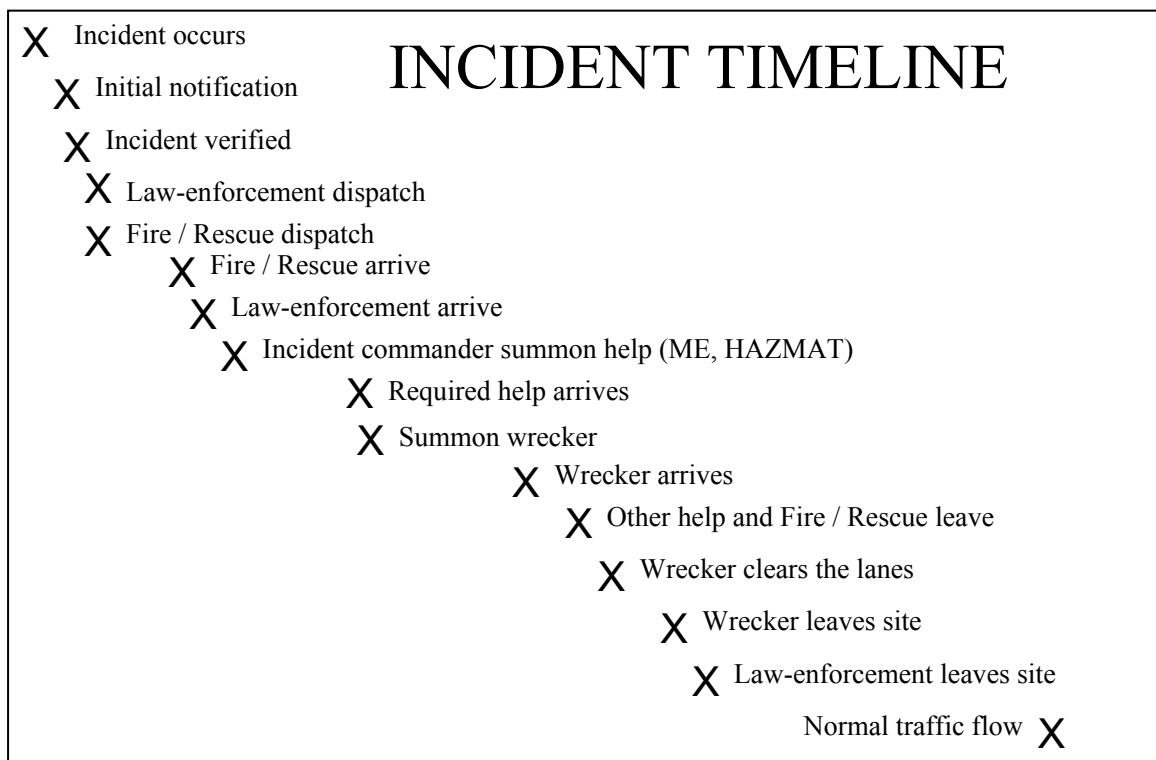


- Improved air quality
- Reduced occurrence of secondary incidents
- Improved safety of responders, crash victims and other motorists.

In order to facilitate the distribution of many of the various new and recent publications on traffic incident management, the Incident Management Resource CD was created by CUTR under this project. This CD features electronic copies of all of the documents listed above plus many others. The documents on the CD cover issues from tow operations, unified command, incident management in workzones, etc. and have documents from the perspectives of all traffic incident responders. The CDs have been distributed to all of the District Traffic Operations offices and are periodically updated.

## Incident Timeline

Early in the project, it became clear that in order to attempt to measure and monitor our performance in traffic incident management, we first had to make sure that we are all measuring the same things and using a relatively constant vocabulary. Toward this end, the incident timeline shown in Figure 1 below was developed as a tool to help establish the framework for consistent measurement and analysis of the various elements that comprise an incident. Unfortunately, although many of these times are known by one or more of the incident responding agencies, there is not a common database from which the values for all of these elements can be pulled. These various elements are described in the paragraphs that follow. Please note: this is a generic incident timeline. The actual location of the X's and the order in which they appear will vary greatly for each incident. Many incidents may not have all of these elements, and some incidents will have elements not included here. The figure is intended for informational purposes to facilitate discussion and illustrate the concept.



**Figure 1 – Traffic Incident Timeline**

Incident occurs – This is, as the name implies, the point in time in which the crash or incident occurs. This typically results in a very sharp and sudden decrease in the available roadway capacity.

Initial notification – This is the point in time in which the emergency responding agency is first notified that there is an incident. In most urban-area traffic incidents, this happens within a few seconds of the incident occurrence, due to numerous cellular phone calls that flood the emergency call center (911 Center).

Incident verified – This is the point in time when the incident is considered to be a confirmed incident, rather than an alleged incident. In many cases, after receiving several cellular calls, many agencies will consider the incident to be confirmed. If camera coverage is available, many agencies will verify the incident via the video camera system prior to dispatching assistance.

Law-enforcement dispatch – This is the time when the law enforcement officer in the street is first notified by the call-taker or dispatcher of the incident.

Fire/rescue dispatch – This is the point in time when the fire/rescue agency is notified of the incident by the dispatcher. This typically occurs almost simultaneously with the notification of the law-enforcement officers.

Fire/rescue arrive – This is the point in time when the fire/rescue team arrives on the scene. Due to wide spacing of fire stations throughout most areas, in many instances, fire/rescue will be to the scene quicker than the law-enforcement officers.

Law-enforcement arrive – This is when the first law-enforcement officer arrives on the scene.

Incident commander summon help – After the law-enforcement officer or fire/rescue team has arrived on the scene and assessed the situation, they can then call for any additional resources that were not in the first response. For example, in the case of a fatal crash, the traffic homicide investigator and the medical examiner should be called out. If there is a hazardous materials spill, a hazmat contractor needs to be called out. If there are live animals involved, perhaps animal control needs to be called to the scene.

Required help arrives – This is when the second responders arrive on the scene. Unfortunately, many times the second responders are not legally allowed to respond with lights and sirens like law-enforcement or fire/rescue, and they must slowly fight their way

to the scene through the back-up of traffic that has occurred since the incident occurred. This can sometimes greatly increase the duration of the incident.

Summon wrecker – This is the time when the officer asks the dispatcher to contact the next towing service on the towing rotation list. In many instances, the tow operator is not contacted until all of the victims are treated for their injuries and the investigation is nearing completion.

Wrecker arrives – This is when the wrecker arrives on the scene. As indicated above for the other required help, wreckers do not typically have the luxury of lights and sirens to speed their response. They may operate along roadway shoulders, however, by this time there may be a back-up of several miles on the freeway, and it typically takes the wrecker a long time to get to the scene.

Other help and Fire/Rescue leave – This is the point in time when all of the patients have been removed and the scene stabilized with no eminent fire danger. The mission of these responders has been accomplished and they are now no longer required at the scene.

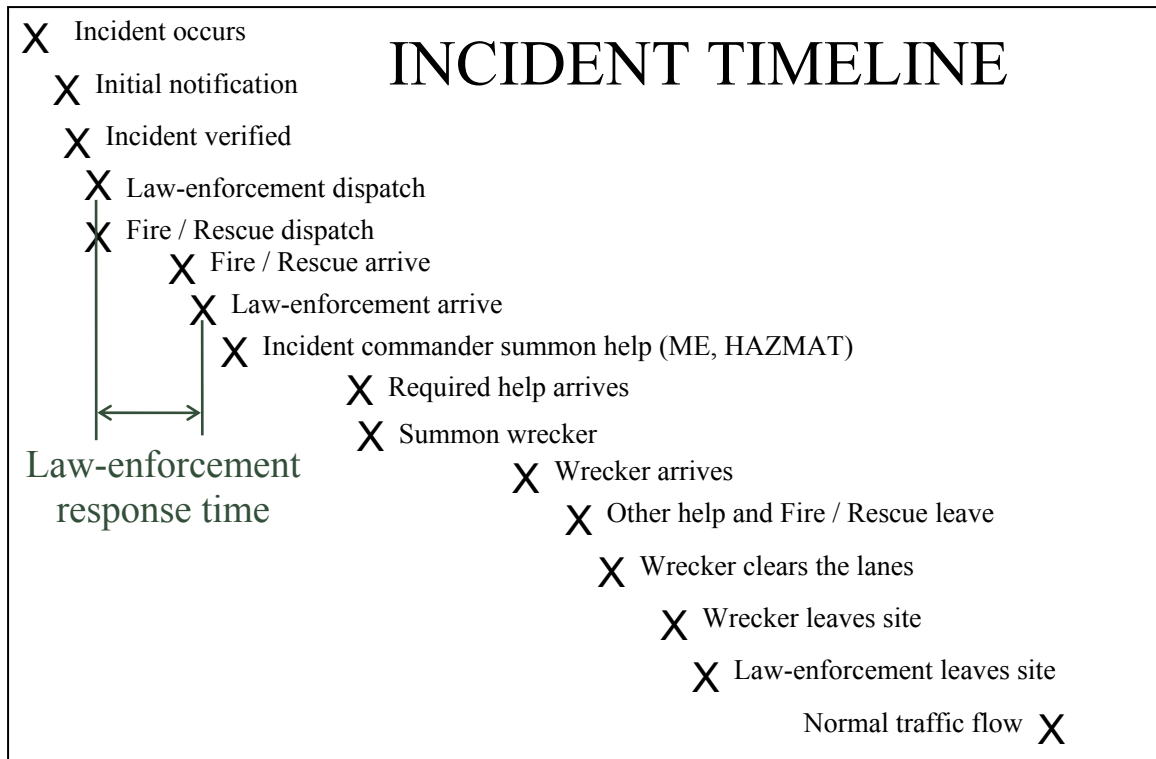
Wrecker clears the lanes – This represents the time when the wrecker is able to clear all the vehicles and debris out of all lanes. There may still be vehicles or debris on the shoulder, in the median, or off the side of the roadway, but all lanes are now clear.

Wrecker leaves the site – Once the wrecker has cleared the vehicles out of the lanes, the vehicles must be readied for transport (if applicable). This point represents the time in which the wrecker physically leaves the site with the vehicles. In the case of a multi-vehicle crash with multiple responding wreckers, this should be the time when the last of the wreckers leaves with the last of the vehicles.

Law-enforcement leaves site – This is the point in which all of the investigative and reporting tasks are complete, the lanes are clear, and the scene is somewhat back to normal, except for the large queue of traffic that is being cleared. This time point represents the time in which all of the vehicles with flashing lights have left the scene.

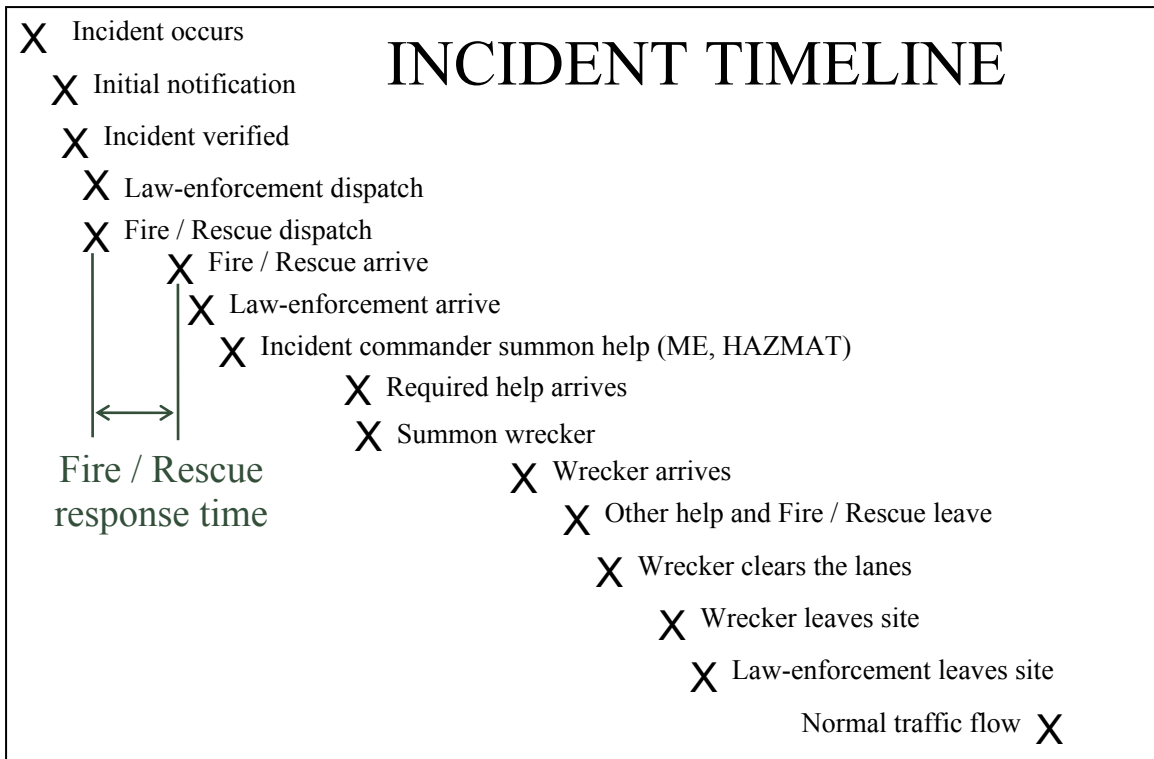
Normal traffic flow – This represents the point in time in which all traces of the occurrence of the crash have vanished. This typically may take several hours and will usually occur at some point several miles from where the incident occurred.

Now that the individual elements that might make up the generic incident have been identified and labeled, it is now possible to determine some performance statistics based on these times. For example, the time from the dispatch of the law-enforcement officer until they arrive on the scene is their response time (see Figure 2). Similarly, the time from the dispatch of fire/rescue until they arrive on the scene is the fire/rescue response time (see Figure 3).



**Figure 2 – Law-Enforcement Response Time**

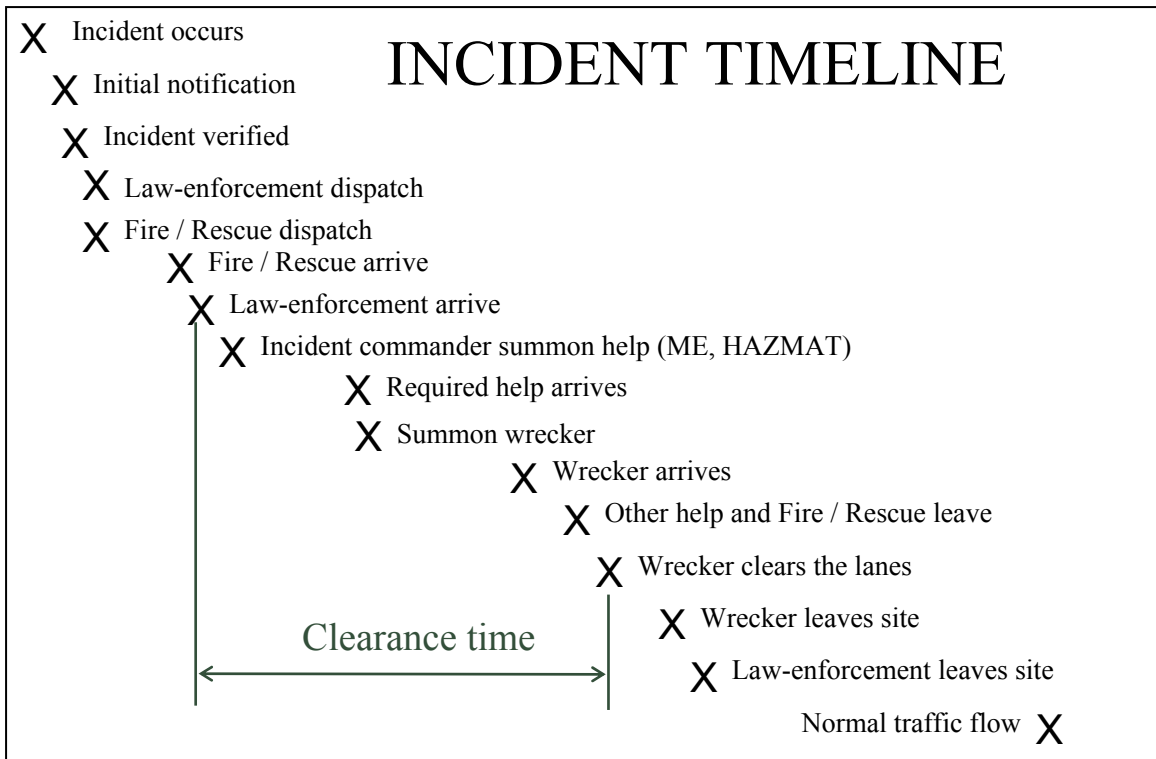
For both fire/rescue and law-enforcement, the response time is the most important and significant performance measure that is commonly tracked and reported. Very little emphasis was previously placed on tracking or reporting the on-scene time, or other durations related to the incident response. However, due to the cooperative nature and atmosphere of the traffic incident management team meetings and the emphasis on reducing the responders' exposure to traffic and reducing secondary crashes, many law-enforcement and fire/rescue/EMS agencies are now working more closely together to minimize their on-scene time.



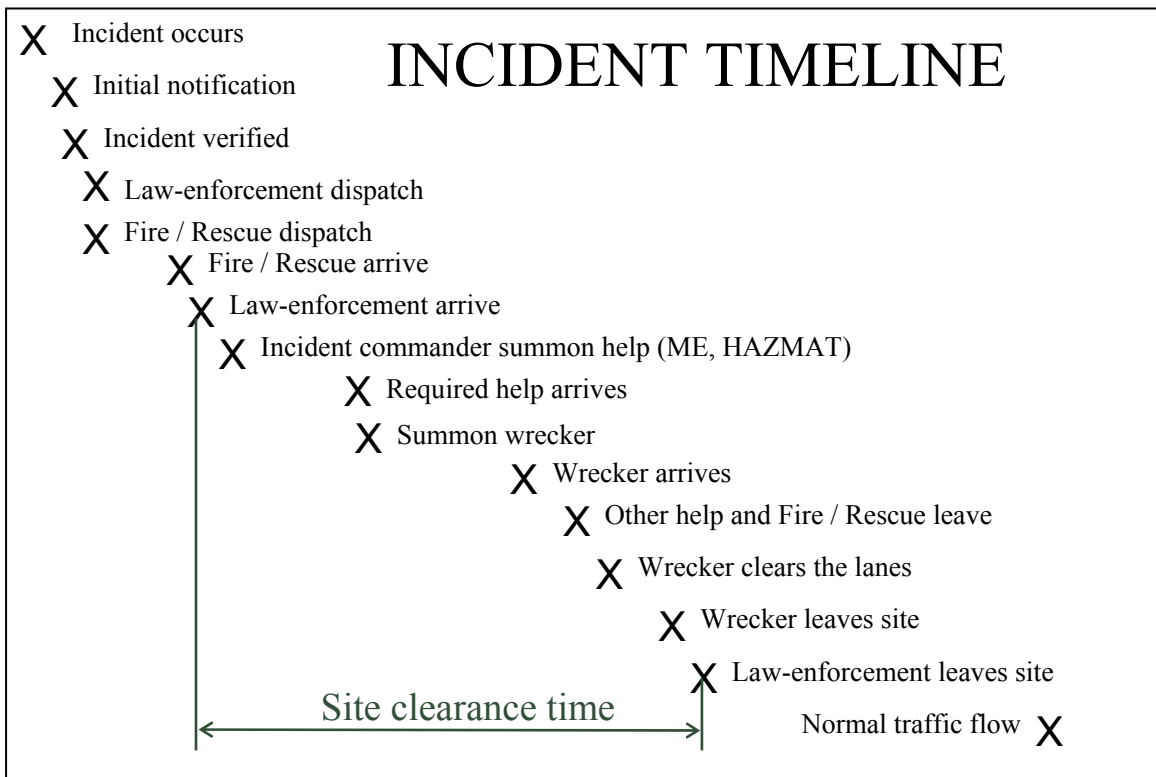
**Figure 3 – Fire / Rescue Response Time**

Now that the initial responders are on the scene, we can now start to assess how well they do once they get there. Figure 4 shows the incident clearance time as defined by Florida’s Open Roads Policy. The Open Roads Policy defines the clearance time as the time from the arrival of the first responding officer until all of the lanes have been cleared. Since the Open Roads Policy is an agreement between the Florida Highway Patrol and the Florida Department of Transportation, and most other agencies have not signed on to the Policy, we shall use this definition of clearance time for uniform statewide application. The arrival of the first responding officer, in other words – the start of the clock, will be the arrival of the first FHP trooper on the scene.

As another measure of incident management performance, the “site clearance time” is a logical extension. The site clearance time is shown in Figure 5, and is the time from the arrival of the first responding officer until all responders have left the scene. This is significant in that even after all of the lanes have been cleared, there is a significant reduction in the roadway capacity due to the flashing lights of the responders. Even if they are completely off the road, their presence is still causing traffic delays.

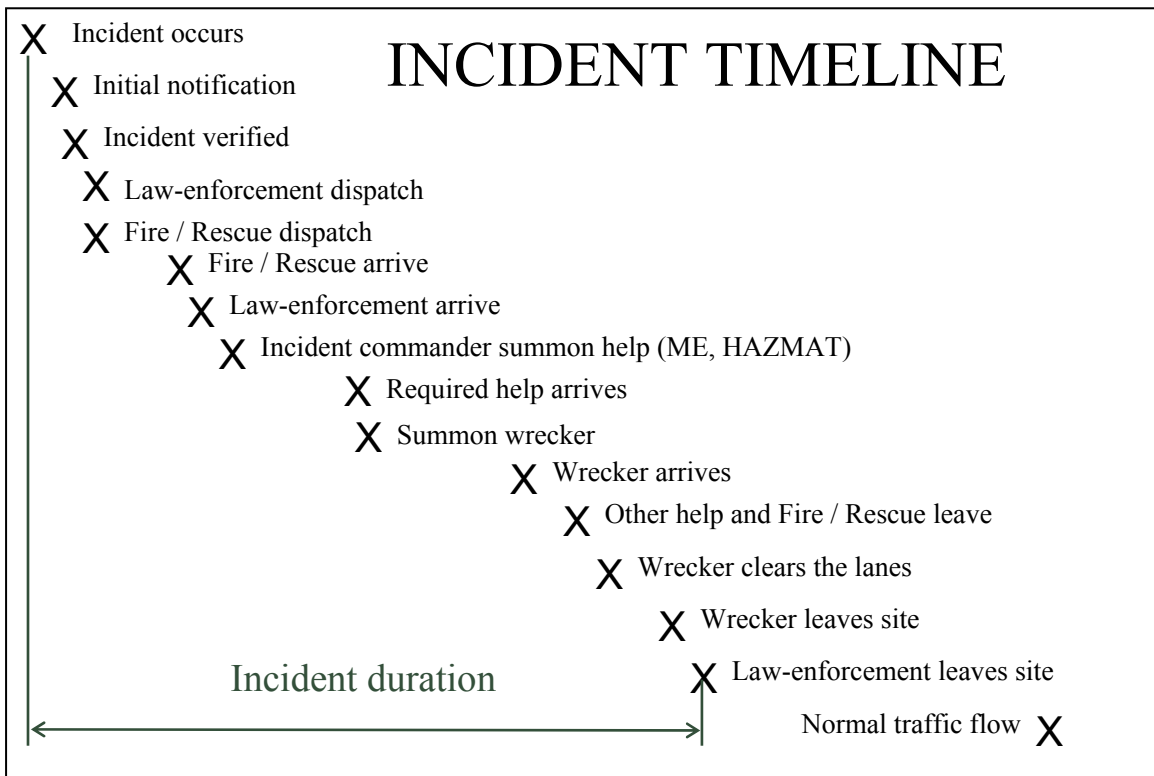


**Figure 4 – Clearance Time**



**Figure 5 – Site Clearance Time**

The next interval that we can look at would be the overall incident duration (Figure 6). This is the time from the occurrence of the incident until all of the responders have left the scene. This includes the detection time, verification time, response time, and the clearance time. With regard to the seven steps identified previously for incident management, the site management and traffic management steps are presumed to be occurring concurrently with the clearance, such that the clearance time is inclusive of these two steps.

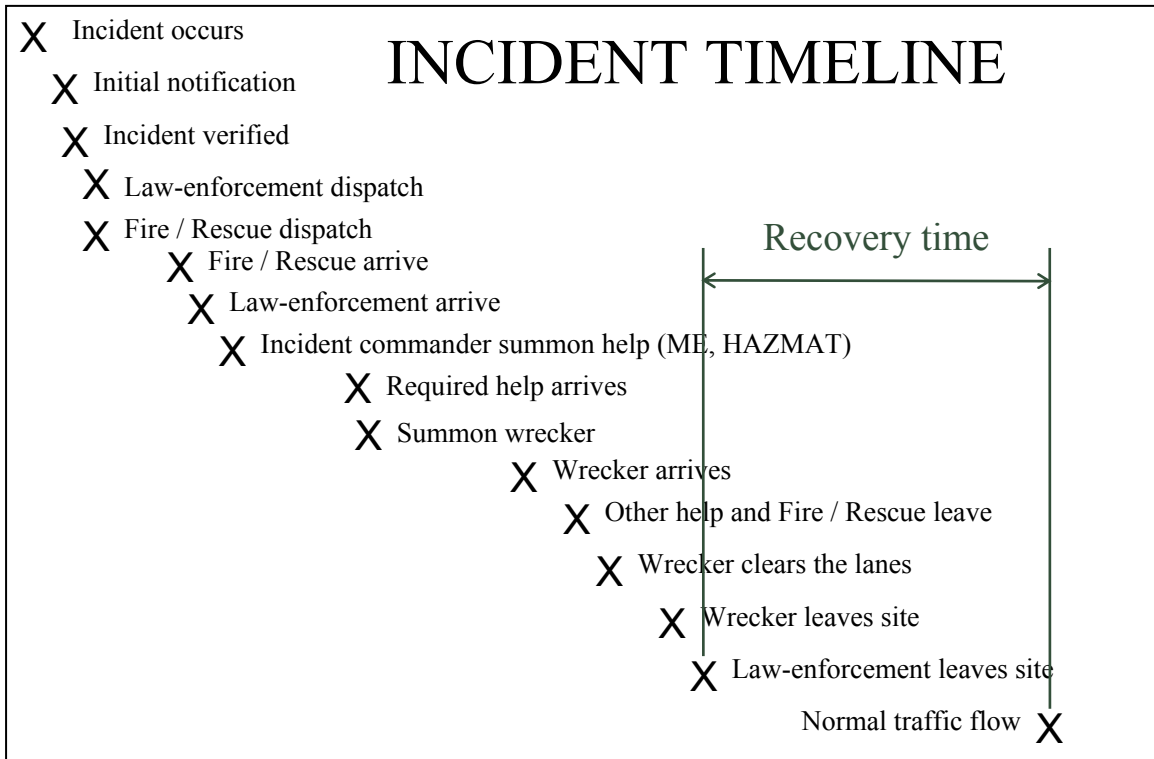


**Figure 6 – Incident Duration**

The remaining step in the overall incident management process is the recovery time (see Figure 7). It is important to note that in this context, we are not talking about recovery in the sense that it is used when we speak of towing and recovery operations. In this instance, we are talking about the time it takes for the traffic stream to recover from the incident. As soon as the incident occurred, traffic began backing up behind the incident. The amount and the extent of backup is a function of many factors including the number of lanes, the number of lanes blocked, the approaching traffic volume, etc. The amount of “rubbernecker” influence would also be variable depending on the specifics of the



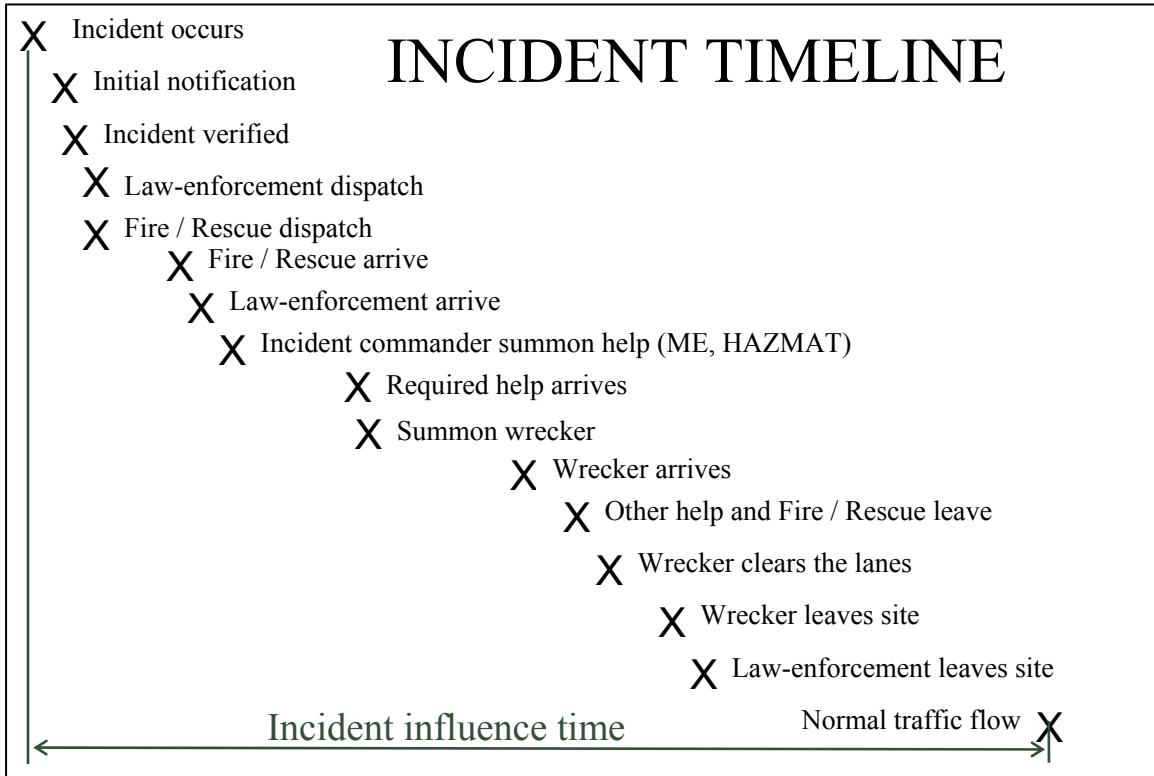
incident. For instance, a rear-end crash that occurred in the lane and blocked a lane would have a much greater capacity reduction for traffic in both directions if one of the vehicles was also on fire.



**Figure 7 – Recovery Time**

Once this traffic disturbance starts to back up traffic, it generates a backward moving shock wave that propagates upstream from the incident as approaching traffic slows or stops to avoid hitting slower traffic ahead of them. Once the incident scene is cleared, a clearance wave begins moving back through the built-up traffic. However, vehicles are still entering the back of this queue. In the event of major incidents, this queue back-up could extend for several miles. Normal traffic flow resumes when the clearance wave overtakes the shock wave, which again, could be several miles from the location of the incident. This makes the return of normal traffic flow an extremely difficult point in time to measure, and requires a fully instrumented freeway system with complete camera (or other sensor) coverage.

The total of all of these time intervals makes up the overall incident influence time (see Figure 8). This represents the total amount of time that the traffic stream is affected by the initial incident, and includes all of the seven steps previously identified.



**Figure 8 – Incident Influence Time**

Again, the intent and purpose of the incident management timeline is to facilitate discussion and to establish a common definition for these time intervals. This will then serve as the basis to facilitate meaningful performance measurement.

## **Assessment of Incident Management Programs**

During the course of this project, there were numerous parallel activities that added considerably to the end product of this effort. In the early stages of this project, it was discovered that FHP had just purchased an entirely new Computer Aided Dispatch (CAD) system, and was in the midst of its implementation. This produced a delay in getting some early data, as much of the old data was difficult to obtain through the new system, and much of the FHP resources were heavily tied up in the conversion to the new system. Additionally, as is typical with a major software conversion such as this, there were numerous implementation problems that FHP was continuing to work out as we began the data collection phase.

The CAD captures all of the data related to the incident that is entered into the database by the FHP dispatcher and/or the officer on the scene. It also includes any information regarding citations issued, background information on all of the people involved in the incident, and other highly sensitive information that is intended for law-enforcement personnel only. For transmittal to FDOT, none of the identifying information about the drivers or the sensitive law-enforcement-only information should be available. Through the deciphering of the various signal codes and the notes appended to the records in CAD, an analyst can typically get a pretty good indication of the events that transpired. Since all of these items are time-stamped when entered into the system, it creates a very good time history for the incident. This type of tracking of the incident can occur at any time after the incident.

However, in the early stages of the project, it was clear that there were some characteristics of the CAD data that made it difficult to use in assessing incident management performance. The CAD system operators typically recorded just the signal code that corresponded to the incident. The signal code indicates only the most serious part of the incident. There are signal codes for a crash (S4), a crash with roadblock (S4R), a crash with injuries (S4I), and a fatal crash (S7). Unfortunately though, there is not a signal code for a crash with injuries and roadblock or a crash with fatalities and roadblock. A car in a fatal crash that ran off the road and crashed in the woods would be

indistinguishable from a fatal crash where the car flipped in the middle of the roadway and completely shut down the freeway. In both cases, it would be a signal S7, which translates into crash with fatality.

FHP is now doing a better job in using the capabilities of their CAD system by using the remarks field to indicate when lanes are open or cleared. By accessing the complete call history related to an incident, the CAD data now will show all of the time-stamped changes to the call record. Thus for a signal S7, if the dispatcher entered “with roadblock” in the remarks field, and at some time later entered “roadblock cleared” in the field, the duration of the roadblock would be determined. It is believed that this operational change came about because of discussions in the Statewide Traffic Incident Management Team meetings.

At the onset of this project, an evaluation was performed of 238 lane-blocking incidents on I-95 that were monitored by District 4 and 125 lane-blocking incidents that were monitored by District 5 on I-4. At that time, approximately 46% of the incidents on I-95 and 9% of the incidents on I-4 had estimated clearance times greater than 90 minutes. In the concept evaluation phase of this project, a total of 104 incidents were monitored in the same areas. By late 2004, only 7% of the lane-blocking incidents were estimated to have exceeded the 90-minute goal of the Open Roads Policy. Much of this improvement is due to the efforts of the Districts in aggressively implementing incident management practices and active participation in regional incident management teams. A detailed report on this assessment entitled “Traffic Incident Management (TIM) Performance Evaluation for Florida” was performed by TSI as a part of this project.

## Summary of Best Practices

It is difficult to list all of the things that are underway in Florida that would be considered “best practices” in incident management. All of the Districts have picked up on the emphasis on the need for improved traffic incident management that has come from the FDOT leadership. Each of the Districts are aggressively implementing a variety of projects and procedures to pursue the 90-minute goal of the Open Roads Policy. Though not comprehensive, the following list describes many of the efforts underway to improve incident management in Florida:

Road Rangers – The Road Ranger service patrol is one of the best programs ever enacted by the Florida DOT in terms of providing improved travel to motorists in Florida. The Road Rangers are able to get minor incidents quickly out of the roadway and off the shoulder, and thus provide a tremendous capacity benefit to the Department and a significant delay reduction to the other motorists using the facility. The benefit-cost ratio of the Road Ranger program is the subject of another ongoing research effort, but preliminary results indicate that this number will be very significant. However, it is important to note that there is a great deal of inconsistency in the Road Ranger program.

The Road Ranger contracts are managed individually by each District Office, and thus the capabilities and operating parameters of the Road Rangers vary from District to District. In some areas, Road Ranger coverage is 24-hours a day, 7 days per week. In other Districts, the Road Rangers cover just peak commuter travel hours. Some areas feature Road Ranger coverage on all freeways; other areas feature coverage only on limited segments. In some areas, the Road Rangers have light towing capabilities, in other areas they do not. Funding for the program typically comes out of the District’s discretionary funds, and thus reduces the money available to be used on locally important projects. The Department should consider contracting and funding the statewide Road Ranger program from the Central Office.

Districts 4 and 6 are currently evaluating the use of Personal Digital Assistants (PDA) by the Road Rangers to help better log some of the information that could be useful in performance monitoring and measurement. These two programs were conceived independent of each other, and each uses a different architecture for the PDA system. The Central Office should continue to monitor these two projects for possible implementation of a statewide Road Ranger data collection system to provide uniform traffic incident data in all of the districts.

Another aspect of the Road Ranger operation that should be evaluated would be whether the Road Rangers should be contract employees or full-time FDOT employees. In the current fiscal climate, the addition of additional full-time FDOT staff would not normally be considered, but the Road Ranger program should justify an exception. The Road Ranger program is the most visible face of FDOT to the roadway patrons. By having the Road Rangers as state employees, there may be less turnover than with contract employees whose contract will have to periodically be re-bid. Additionally, since these contracts are low-bid type contracts, there is always an economic incentive for the contractor to cut corners or to give just the absolute minimum required level of service.

Another possible option would be to consider even greater privatization of the Road Ranger program. Recently, one of the major auto insurance companies entered into a contract to help fund the Road Rangers for the Turnpike Enterprise. The insurance company realized not only the good public relations that they could accrue from such a relationship, but also the potential for a reduction in claims by having the roadway operate more safely. In other states, freeway service patrols have been provided by private companies in an effort to build goodwill among their customers.

Co-location – The Department, as well as ITS Florida and the Transportation Commission, are currently evaluating the benefits of co-location in traffic management centers. In all the Districts where it has been tried, it has been successful and beneficial in improving incident management. However, one issue that needs additional focus is in the discussion of who should be co-locating. District 5 is working very well being co-located

with FHP dispatch. By using the images from the cameras on I-4, this helps the FHP to know what is going on at an incident before they get there. However, the information on major incidents does not always get transferred down to the local governments that manage the traffic signal system. Thus when there is a major incident that is dumping traffic on to the arterial system, the locals may not find out about it until it is too late.

In District 6, the intent is to have FHP and DOT in the same facility. An enclosed bridge was constructed as a part of the SunGuide Center that linked the FHP building to the TMC. However, currently the FHP is not routinely using the TMC and has not moved their operation to the center. Although they showed co-located operation in the nicely produced video on the SunGuide Center, that was just for show and does not reflect the current operating reality.

The District 4 traffic management center is co-located with Broward County Traffic Engineering. This allows the local signal system agency to know when major freeway blockages occur and then work cooperatively with the DOT to adjust signal timing patterns on those affected surface streets. In the planning and design of the TMC, console space was allocated for FHP as well as Broward County Transit and other agencies. However, to date, none of the other agencies has joined in the regional traffic management effort. The District also maintains a detailed database of major traffic incidents for performance tracking.

The Turnpike Enterprise has two traffic management centers; in Pompano (near Ft. Lauderdale) and Turkey Lake (near Orlando). They also are not physically co-located, but do work closely with FHP Troop K. In fact, the Turnpike stations one of their operators at the FHP dispatch station in West Palm Beach. Additionally, the Pompano TMC has a mini-console from which they can monitor communications with FHP in the event of major incidents. The Turkey Lake TMC is also adjacent to the FHP building, and the FHP Colonel will periodically come into the TMC to view the video to see what is going on at some of the major incidents.

Traffic Incident Management Teams – The statewide and regional traffic incident management teams have helped to improve the communication, coordination, and cooperation among the various incident responding agencies. In particular, by getting the various entities together, many misunderstandings have been cleared up. An example of this would be the “Guidelines for the Mitigation of Accidental Discharges of Motor Vehicle Fluids (Non-cargo).”

Prior to this issue being brought up in the statewide meetings, many responding agencies were under the assumption that when the saddle tanks of a tractor were ruptured, or motor oil from the engine spilled, it was then a hazmat incident. By having the Department of Environmental Protection (DEP) as an involved participant, it was discovered that existing DEP policy supported quick clearance goals. The cooperative spirit that was evident from the DEP representatives made the development of these guidelines a much easier and more productive task.

Open Roads Policy – The “Open Roads Policy” is the first output of the Statewide Traffic Incident Management Team. The policy is a guideline that sets a 90-minute goal for incident clearance. However, the policy is something that is often misunderstood by many responding agencies, and thus is not fully embraced by all of the stakeholders in incident management. As it currently stands, the “Open Roads Policy” is an agreement between the Florida DOT and the Florida Highway Patrol. The agreement states that it is the goal that incidents will be cleared from the travel lanes within 90-minutes of the arrival of the first responding officer.

District 5 of FDOT has taken the “Open Roads Policy” around to the municipalities within their district and has made it now a policy that the locals have signed onto.

Roadway Incident Scene Clearance (RISC) Program – The Turnpike Enterprise took a very innovative and aggressive step in incident management by creating the RISC program. This program provides specific performance objectives for heavy recovery operators and provides both incentives for quick clearance, and disincentives for delayed



clearance of incidents. The RISC contractors are specially qualified with very heavy duty recovery equipment and highly trained operators that know how to safely and quickly clear the roadway. The RISC program is a supplement to the normal rotation tow list that is used by the Florida Highway Patrol for typical crashes and incidents on the Turnpike system. RISC is only activated for major incidents that require greater resources than the typical rotation tow operator may be able to bring to a scene. The RISC program has proven to greatly reduce the duration of the major incidents on the Turnpike system.

Traffic Management Vehicle (TMV) – The TMV is another aggressive innovation by the Turnpike Enterprise to help them better manage the incidents that occur on their system. The TMV is a full-sized van equipped with a 45 foot telescoping boom with a dome camera mounted on it. The camera has full pan-tilt-zoom capability, and the TMV then transmits the live video images via digital satellite back to the Turnpike TMCs. The TMV typically is deployed in the heavily-traveled portion of the Turnpike system in South Florida in two shifts that cover the AM and PM peak hour periods. The TMV has a planned location on the system to monitor each shift, but if a significant incident occurs, the TMV will be re-deployed to monitor traffic conditions around the incident. The TMV was used heavily to help monitor heavy traffic flows during the hurricane evacuations and recoveries in 2004. The TMV has also been used to help manage traffic for special events including major NASCAR events at the Homestead Motor Speedway and sporting events at ProPlayer Stadium and other venues.

Severe Incident Response Vehicle (SIRV) – District 4 has outfitted a vehicle specifically designed to provide assistance during major freeway incidents. The SIRV truck has additional equipment and supplies to provide a higher level of maintenance of traffic than Road Rangers typically are able to during major incidents.

Interim Traffic Management System (ITMS) – District 4 has also initiated a temporary traffic management system in Palm Beach County to handle incident management during the reconstruction of I-95. This project involves the use of portable “Smart Zones” which feature a camera, a small DMS, and a radar detector. The smart zones are connected via a

communications network that features both hard-wired and wireless connections. The camera images and data from the radar detectors are fed into the interim TMC, where operators analyze the data and send out appropriate messages via the DMS. The data and information from the ITMS is also shared with other agencies and posted on the ITMS website.

5-1-1 – Now operational in South Florida (Dade, Broward, and Palm Beach Counties), Orlando, and Tampa, 511 motorist information systems help provide real-time traffic information to motorists. This will help reduce the backup from an incident, and hence greatly improve mobility by providing motorists with the information that they need to make intelligent and informed transportation decisions.

Photogrammetry – The FHP is now using photogrammetry in their crash investigations to reduce their investigation times. This use of technology will greatly reduce the amount of time that the officers are exposed to traffic, and will speed the clearance of the incident scene.

## Recommended Performance Measures

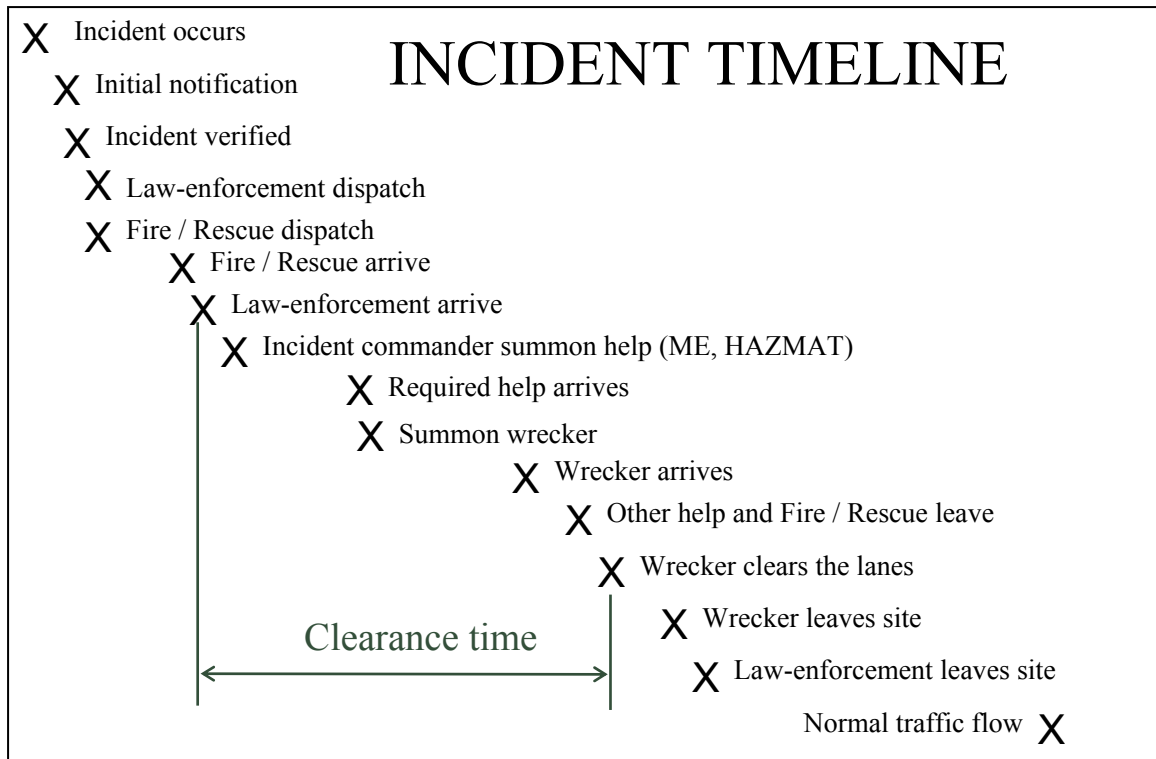
The most difficult part of assessing performance measures in traffic incident management is that an effective traffic incident management program relies on a wide variety of agencies that have different performance objectives. Through the course of this project, the most significant obstacle to true performance assessment is the availability of good incident data. The data available for measurement of incident performance is not easily available presently. Each of the responding agencies has bits and pieces of the necessary data, but no one agency has all, or even most of it.

Short-term performance measures: It is recommended that the Department adopt the following short-term performance measures as the standards for monitoring traffic incident management performance in Florida:

- Clearance time (as defined in the Open Roads Policy)
- Response times
- Site clearance time
- Incident duration

Clearance time, as defined in the Open Roads Policy (see Figure 9) is the primary performance measure recommended for immediate implementation. It is a clearly stated goal of both the FDOT and the FHP, and thus makes sense to measure, evaluate, and track performance relative to this goal.

These short-term measures were chosen largely because they can be readily be measured or estimated once the link to FHP CAD data is implemented (see Conclusions and Recommendations). The FHP data will have the dispatch times and arrival times (to compute response time), as well as data on when the officer left the scene (duration), and information on when the lanes were cleared (from the remarks field of the incident records – clearance time). This will give a good foundation for monitoring the performance of the incident management efforts. Having these data from FHP will also help facilitate detailed incident debriefings, so that the incident management teams can decide on action plans as they try to continually reduce the duration of incidents.



**Figure 9 – Clearance Time**

Long-term performance measures: It is recommended that the Department adopt the following long-term performance measures as the standards for monitoring traffic incident management performance in Florida:

- Recovery time
- Incident influence time
- Incident-related delay
- Lane-miles of backup
- Secondary crash rates

These long-term measures are certainly highly desirable measures that the Department would like to be able to estimate or determine. However, for most of these measures, additional data sources will be required. The recovery time and incident influence time, for instance, will require a fully instrumented freeway. This is because the point in time and space in which traffic returns to normal flow may be several hours after all of the responders leave the scene, and may be several miles from where the incident occurred. In order to estimate incident-related delay, the volumes and speeds approaching and

departing the incident must be known (again requiring a heavily instrumented facility). Similarly, in order to know how many lane-miles of backup, there must be some means for determining the back of the queue.

Probably the most difficult measure to try to estimate will be the secondary crash rates. A great deal of this difficulty is due to varying definitions of a secondary crash. For instance, if there is a crash on a secondary road that is congested due to an incident on the freeway, should that be considered a secondary crash? Many would argue that it is, but it is very difficult to determine this linkage between the two incidents after the fact based on crash reports or even CAD logs.

Some agencies have used a rule-of-thumb that an incident that occurs on the same facility within one or two miles of another incident, within a one-hour period can be counted as a secondary crash. This is a rough estimate at best. Probably the best way to really assess secondary crash rates is to have complete camera coverage. When an incident occurs, if there is existing traffic congestion both downstream and upstream of the incident scene, it is a likely secondary incident.

## **Conclusions and Recommendations**

The key to continuing to improve traffic incident management in Florida is to apply consistent performance measures. The intent of applying these measures is not to measure one FDOT district, FHP troop, or other responding agency against another, but to allow the districts, troops, and agencies to track their own improvements over time and to determine what areas of the overall incident response need emphasis and additional resources (people, equipment, training, etc.) in order to continue to “sharpen the saw” of incident management.

To accomplish this end, it is strongly recommended that the Department create a direct linkage into the FHP CAD system. This represents the best source of traffic incident-related time-stamped data that is available statewide. The interface would best be accomplished by creating a separate data network in the FHP headquarters in Tallahassee where all of the live data from all of the Troops is consolidated and published onto the FHP website. This would involve close coordination with FHP and their CAD contractor to create the data connections through the FHP firewall, and to block any of the sensitive information from being accessed from the FDOT side. For timely tracking of traffic incident data, it is essential that FHP not be tasked with providing data. In the data collection phase of this project, we had to interact directly with a number of people from various FHP stations. While they all were very cooperative and supportive, having to rely on the duty officers to run reports created a significant time delay, and created somewhat of a burden on the FHP officers. The officers have numerous other responsibilities, and often not enough resources to expediently handle numerous additional information requests. The CAD system data should be supplemented by other available data sources as we continue to bring other agencies into the fold of traffic incident management, and as we continue to build regional traffic management centers.

The Statewide Traffic Incident Management Team meetings have helped to bring the overall concept of good incident management more to the forefront among many of the incident responders. The various agencies are now more aware of the problem of

secondary collisions and the risks of being in the roadway longer than necessary. It is recommended that the Department continue to host and promote the Statewide Traffic Incident Management Team. It is also recommended that the Department continue efforts in promoting regional traffic incident management teams.

The Road Ranger freeway service patrol is an extremely valuable component of the Florida DOT effort to improve traffic incident management. It is recommended that the Department examine centralizing the Road Ranger contract, to provide uniform coverage and capabilities. The Central Office, with input from the Districts, should develop uniform criteria and expectations, and should centralize the Road Ranger contracts. This would promote better uniformity in the Road Ranger program statewide.

The System Management for Advanced Roadway Technologies (SMART) system that is being used in District 4 for monitoring and tracking their incident management program should be used as a prototype for the future statewide TMC software. This system features a centralized database and GIS-based interface to help support real-time traffic incident management.

Finally, the incident timeline concept developed for this project is a useful tool that the Statewide and Regional TIM Teams should use in assessing their incident performance. If they are able to identify most of the X's on the chart, they can expect to be able to perform a detailed debriefing to help identify areas that need additional emphasis in future incidents.