



U.S. Department of  
Transportation

# Massachusetts Incident Management Conference Proceedings

June 1991



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1992



# **Massachusetts Incident Management Conference Proceedings**

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**June 6, 1991**

## **Sponsored by**

Executive Office of Transportation  
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Executive Office of Public Safety  
(Massachusetts)  
American Trucking Association  
National Incident Management Coalition

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## ABSTRACT

Highway accidents, disabled vehicles and other incidents are a prime cause of congestion in Massachusetts. Highway capacities are reduced, backups form, and about \$1 billion per year is lost in terms of lost time and wasted fuel.

An incident management system to deal with congestion caused by highway incidents needs to pull together resources and talents from several public agencies and private organizations, each of which can effectively solve part of the problem.

In recognition of this need, the Executive Office of Transportation and Construction and the Executive Office of Public Safety, the American Trucking Associations, and the National Incident Management Coalition sponsored the first Incident Management Conference for the Commonwealth of Massachusetts on June 6, 1991. It was an important first step in what is now an effort to create a full incident management program for the Commonwealth.

This publication contains the proceedings for the June 6 Conference.

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## I. INTRODUCTION AND WELCOME

**Richard L. Taylor**  
Secretary of Transportation and Construction  
Commonwealth of Massachusetts

On behalf of Governor Weld and Lieutenant Governor Cellucci, I would like to welcome all of you to the first Incident Management Conference in Massachusetts where the private sector and the public sector have come together in the interest of efficient highway travel.

We are pleased and honored to have with us today an impressive line up of professionals in public transportation, public safety, the trucking industry and in private transportation operations. These individuals will share with us past experiences and new initiatives in the area of incident management.

Let me just begin by saying, when Governor Weld came to the State House in January 1991, he promised a more business-friendly environment where innovation and excellence would be rewarded. Part of that pledge involved welcoming the participation of the private sector where these qualities have always been fostered.

The Incident Management Task Force, which includes public and private sector individuals from law enforcement officers to traffic engineers, is an excellent example of this new entrepreneurial approach to government.

And it is just one of the many new initiatives which we must explore as we move towards the 21st century.

Here in the Boston region, highway incidents and the congestion they cause result in losses totalling one billion dollars per year.

Considering Boston's Central Artery carries an average of 165,000 vehicles every day and that average rush hours in Boston are increasing at an annual rate of four percent we cannot afford to let highway incidents further aggravate an already overloaded system.

Commercial trucks haul over 2 billion tons of freight each year. Over 350,000 American firms operate trucks for hire and many hundreds of thousand of private companies operate trucks as an integral part of doing business. We must not let accidents, vehicle breakdowns or cargo spillage hamper this \$214 billion industry.

The Incident Management Task Force we have convened will work to detect, respond, clear and recover highway incidents that hurt business and frustrate travelers.

We are hoping today's conference will lead to a comprehensive incident management program in Massachusetts.

Transportation is an integral part of our economic development. In Massachusetts, transportation is being used as both an economic stimulator that will infuse billions of dollars in construction into our economy and also as an agent for long-term economic growth.

Transportation determines how competitive our products are, how livable our cities and towns are, and how attractive we are to businesses, travelers and students. It certainly will affect whether or not Massachusetts becomes a viable player in the global marketplace.

The public-private connections that we are making here today and the Commonwealth's renewed commitment to the business community will bring positive results that will help us in the very important business of moving people and goods.

Thank you all for coming.



## II. WHAT IS INCIDENT MANAGEMENT? WORKING TOGETHER TO ALLEVIATE CONGESTION

**Thomas J. Donohue**  
President  
American Trucking Associations

I am pleased to have the opportunity to join in the first Massachusetts Incident Management Conference.

First, I want to applaud Massachusetts' interest in incident management, and the "public-private partnership" it will encourage. The eyes of the nation are on Boston--the incident management plan you establish here will be the basis for many such programs across the country.

In addition, I'd like to thank Secretary Richard Taylor and the Massachusetts Executive Office of Transportation and Construction for organizing the event.

As you embark on this project, you have the continued support of the American Trucking Associations and the Massachusetts Motor Transport Association. I'd also like to point out that the ATA Foundation's local office, with Robert D. Pritchard, Director, is available as a resource for the Boston area.

A simple definition of incident management is clearing highway accidents and breakdowns quickly, and minimizing the traffic jams they cause. Of course, it is much more complicated than that, involving a cooperative effort to establish a common plan for police, fire, tow-truck operators, highway maintenance teams, hazardous materials experts--all the workers who are drawn to the scene of an accident.

The goal of any incident management plan is to clear up incidents as quickly as possible and divert traffic before vehicles are caught in it. About 30 cities currently have programs to manage freeway incidents.

At ATA, incident management is a top safety priority, and it will be for some time. As the Federal Highway Administration reports:

- Incidents cause 60 percent of highway congestion.
- They result in billions of hours of lost time every year.
- They impose huge economic costs on society.

- Incidents also reduce trucking productivity and contribute to negative image of trucks.

On the other hand, effective incident management programs:

- Reduce operating costs.
- Save time for commuters.
- Improve highway safety.
- Improve trucking and shipping productivity.
- Maintain highway capacity.
- Reduce air pollution

Boston is one of a dozen major urban areas that together account for over 80 percent of total U.S. freeway congestion cost. Trucking industry studies estimate congestion costs Boston \$1 billion a year.

Traffic volume on major roadways in the city of Boston grew by 30-50 percent between 1977 and 1987.

From our perspective, incident management is a good investment. One example is the Chicago Minuteman program, which returns about \$17 in benefits for each \$1 invested in the program.

The ATA Foundation's Trucking Research Institute conducts research on a number of truck safety issues. The Institute, which is dedicated to improving highway safety, did a study on incident management last October to document effective approaches to incident management. A local firm, Cambridge Systematics, conducted the study. It advances the following recommendations:

- Mandate development of comprehensive metropolitan incident management programs.
- Establish clear lines of authority for incident management, especially those involving hazardous wastes.
- Adopt "quick-clearance" policy for incidents.
- Require uniform annual reporting of congestion and the impact of incidents on congestion.

The study also recommends legislative changes at the federal level to allow states to use federal-aid highway funds for local incident management programs and encourages states to give incident management programs priority.

The National Incident Management Coalition, sponsor of this event, is a national effort to get states and cities to adopt incident management programs. NIMC promotes incident management and builds consensus for it. The role of NIMC is to develop educational and promotional materials, help organize and fund local incident management educational events and provide follow-up technical and training support.

NIMC consists of many organizations including AASHTO, AAA, FHWA, HUFSA, Institute of Transportation Engineers, and the International Bridge, Tunnel and Turnpike Association of America.

NIMC plans to assist incident management efforts in up to a dozen areas during 1991 and 1992.

The National Coalition will be here for Massachusetts providing support you need as you develop your incident management program. In addition, you can count on the support of the American Trucking Association, our local ATA Foundation office, and other coalition members as you work to improve safety on Massachusetts highways.

### **III. BENEFITS OF INCIDENT MANAGEMENT: WHAT'S IN IT FOR YOU?**

**Francis Francois**  
Executive Director  
AASHTO

Opposition to building more highways -- on the grounds that they will lead to increases in automobiles and automobile use -- is unfounded; these increases will come anyway. As the population grows and more people enter the workforce, the number of automobiles will grow accordingly.

Nationwide, 96% of the people travelling to work use a vehicle to do so. A diverse network of highways leading into and out of urban areas, to allow for the movement of people and goods, is vital to the economy. If the present highway systems in our urban areas were doubled, or even tripled, it would still not be enough capacity. More investment in our nation's highway system is needed.

Between 1967 and 1987, estimates show that the number of drivers and mileage driven have doubled. Over that same time period, the total increase in real dollars in highway investment was only 8%.

We need more money for the highway system and we also need to better utilize the assets we already have. This is where incident management comes in.

The state role, up until recent years, has always been to design and build new highways. The problems of congestion were left for the urban areas to deal with. This is now changing as states, together with federal and local agencies, are working to ease congestion.

Highway user fees must not only be used to construct new highways, but also to operate existing highways. Operating procedures are especially important when an existing highway is under reconstruction. AASHTO has formed a special committee on traffic operating procedures that can be used by state transportation agencies.

The current problem, however, is that a portion of an urban area's highway system will belong to the state, with some arterial routes belonging to the city, and another portion belonging to the federal government.

There is no cohesive group to oversee highway operations. That is the basic problem we have when we approach an incident management program. When an incident occurs, we have separate police departments, separate fire departments,

separate medical agencies, separate tow truck operators and other people. A coordinating mechanism for the metropolitan area needs to be established.

Intelligent Vehicle Highway Systems, or IVHS, are already out there. IVHS is a communications and monitoring system that gives drivers real-time traffic information. Also, the immediate reporting of any accident or breakdown will bring a tow truck or police car five, ten and even thirty minutes sooner. It is the time delay in response to traffic incidents that is the problem.

Sixty percent of urban congestion is attributable to incidents. We need to reorganize our thinking and give highway operations the same priority, and funding, as new capacity (highway construction).

#### **IV. BENEFITS OF INCIDENT MANAGEMENT: WHAT'S IN IT FOR HIGHWAY USERS?**

**Carlton Robinson**  
Executive Vice President  
Highway Users Federation for Safety and Mobility

As one of America's 165 million licensed drivers, I own "a piece of the rock." Actually, although this figure is a little hard to compute, what I own--and what each of you and every other highway user owns--is about \$3,000 worth of America's roads and streets. We let Frank Francois and his members run these roads for us but we know that we paid for those roads and we own them--and we use them a lot: 2.1 trillion vehicle miles and 3.4 trillion passenger miles each year; something in excess of 37 travel miles per day for each of us.

We would like all of that travel to be free of congestion and safe, and comfortable; and much of it is; but too much of it isn't.

Those of us who must commute to work or ship goods or conduct business in America's large urbanized areas know that traffic congestion is a serious and growing problem.

Freeway Incident Management is one way to reduce that congestion. It is a cost-effective way, and it is an idea whose time has come. That is why we join with AASHTO, the Federal Highway Administration, American Trucking Associations, American Automobile Association and your own state and local officials in saying: "O.K.--it's a job worth doing--let's get it done!"

But I'd like to spend a few minutes on another message--on why we have congested freeways and arterials in too many of America's urban areas and what we should be doing about it--because Freeway Incident Management is just one of the things we need to be doing!

The reason that too many urban facilities are overcrowded is simple: we haven't kept up with the growth and change in highway use.

During the past five years, we have added about 9% to lane miles of urban freeways. This is a considerable feat! But in the same time period urban vehicle miles grew 26% and urban combination truck travel grew 17%.

Some people would say that we can never keep up and should quit trying--but I won't buy that. First, I won't accept that we can't solve urban growth problems, and even more importantly, I don't think that we are ready to face the alternatives--

what happens if we don't solve them. Because, finally, the engine that drives travel demand is people at work, making things, performing services and delivering those goods and services to the marketplace.

There are people who, I think, honestly believe otherwise--that congested roads are caused by people who are out there just for the fun of it all and really should stay at home--or ride a bike to wherever they are going. But it really doesn't work that way. We had 120 million people at work on Census Day, just a little over a year ago. That is double the work force of 1956--the year we began building the Interstate System. We also have twice as many households as 35 years ago and our Gross National Product is 2 1/2 times 1956--in constant dollars. More jobs, more households, more production, a rising per capita real income all combined to produce more highway travel. And I don't think we would want it any other way!

But what was our response to this growing need? We cut our annual expenditure on the roads needed to support that growth--from 4 1/2 cents per vehicle mile in 1960 to 3 cents per vehicle mile--in constant purchasing power--last year.

What happens when you double and triple the use of a facility and cut the investment in its maintenance and upgrading by 50%? Well, it doesn't make any difference whether it is a highway, or your home, or a manufacturing plant; what happens is that it quits working as well, it breaks down more often, the level of service it provides to its users goes to pot. On a highway we call that congestion.

And the solution isn't to throw up your hands and say "we can't keep up--we can't meet the need," We think we don't have the money, or we don't have the room or we don't have the will to provide the needed facilities. But that answer means also that we don't want the jobs and we don't want the growth, we don't want the goods and we don't want the services that depend on that transportation.

This focus on how we approach urban congestion problems is, of course, very current because Congress is about to choose between two approaches. The Department of Transportation has proposed a balanced highway program structured around the 4 to 5% of urban and rural roads of national importance that carry 45 to 50% of all traffic and probably 75% of all heavy truck traffic. There would be support for bridges and safety and metropolitan mobility needs and for rural roads and for scenic and recreational roads and for operational improvements like Freeway Incident Management. It is a package the nation's Highway Users can support, even though we believe that it should be even larger than the Administration has proposed.

Contrasted against the Administration's proposal is a bill developed by Senator Moynihan of New York which throws up its hands and says, in effect, "Highways don't work!" It would abandon any real national priority on upgrading our important roads--urban or rural--and even penalize a state or city that wanted to increase highway capacity or improve the level of highway service.

Senator Moynihan would take the funds each of you pay as highway users and let them be spent on magnetic levitation trains, high speed rail, new transit starts, congestion pricing, conversion of free roads you have already paid for into new toll roads, so you can pay for them again.

The country may need magnetic levitation trains. It may need high speed trains--although neither of these would do much for urban conditions. Certainly we need better public transportation designed to meet today's needs not yesterday's. But all of these new departures, to the extent that they are cost effective, should be in addition to renewing our investment in highways, not instead of that investment.

The Moynihan bill would solve our urban congestion problems by spending less on the solution, and I don't see how that makes sense to anyone.

This defeatist attitude is founded, I believe, on a basic misunderstanding of the modern American city and how it works. There are a lot of misconceptions.

The New York, New Jersey urbanized area is America's largest. It covers over 3,000 square miles--about 30 miles by 100 miles. It is the nations second most densely developed urbanized area (5,000 people per square miles). Do you wonder about the most dense? It isn't Boston, by the way, which, at 2,700 people per square mile over about 1,000 square miles, is below the national average for big urban areas. (You are a low density city--and may not even know it!)

The most densely developed of the nation's 32 large urbanized areas denser than New York in people/square mile is--Los Angeles, America's freeway capital!

But, of course, Los Angeles isn't America's freeway capital. Los Angeles is in the bottom quarter of large urban areas in freeway miles per capita. It has fewer freeway lane miles per capita than Boston, which at about 1/2 a lane mile per 1,000 population is just about at the national average.

Where is the freeway capital of the U.S.? It's Kansas City, Missouri, followed by Dallas, St. Louis and Cincinnati. So, when people say "Freeways don't work--just look at Los Angeles," they may be drawing the wrong conclusions. They may be looking at a very fast growth area that has fallen behind in its freeway construction.

Now, look at the New York urban area which relies on its largest subway, bus and commuter rail systems to minimize freeway use. Partly true. The New York area is 8th from the bottom in daily freeway use per capita. But it relies more on freeways than New Orleans, Phoenix, Buffalo and Fort Lauderdale, among others. Boston, at 8 miles of freeway vehicle miles per capita per day, is almost exactly in the middle of the 32 largest urban areas.



What does it prove? Misconceptions! High density, transit oriented New York relies a great deal on freeways to meet its daily needs. Low density Phoenix, Buffalo and Fort Lauderdale use freeways less than New York does. At the other end of the scale, citizens of the San Francisco Bay area drive more daily miles on freeways than those in Los Angeles. Citizens of spread out Los Angeles (but it isn't so spread out is it?) drive only 20% more daily miles than you do here in Boston. And the champion drivers among all 32 urban areas are not Californians at all; the top 5 cities are Atlanta, Georgia; Houston and Dallas, Texas; Seattle, Washington and Milwaukee, Wisconsin in that order. Los Angeles is 9th in per capita highway use.

What does it prove? I hope it proves that highways are important to all of us whether we drive to work, move goods or enjoy the environment. And that even massive investments in alternate travel modes won't change that. We need to maintain the \$3,000 stake each of us has already in America's highways and get the most and best service possible. We need also to invest prudently in the future and a better future America--not divert money needed to make highways better to pie-in-the-sky solutions.

In terms of today's investment opportunities to make the current system better, there is none with a surer pay-off than our subject today--an organized, pre-planned ability to act surely and quickly when emergencies strike and minutes are vital. Frank Francois has pointed out some of the practical problems in creating such an ability; but they can be beaten, and the results will be well worth the effort--as speakers later this morning will document. I wish you well in your efforts. Thank you.

## **V. BENEFITS OF INCIDENT MANAGEMENT: WHAT'S IN IT FOR BUSINESS?**

**Frank Strouse**  
Chief Financial Officer  
GTE Labs/128 Transportation Council

Some roads and highways cannot be widened or improved, so we have to make better what we already have. Highway problems affect businesses in metropolitan areas. One of the effects is cost, other effects include hiring and retaining employees, business expansion and real estate values.

The concern with business costs comes from lost employee time. For a company like GTE, having 300 employees stuck in a traffic jam on Rt. 128 can cost the company \$12,000 an hour. Another impact is the cost from lost sales because people cannot get to you. The impact of lost sales mainly affects retail places such as the Burlington Mall.

The third impact, one which truckers can appreciate, affects companies that literally keep their raw inventory in trucks. Companies that use just-in-time delivery in order to keep down inventory costs are affected when a truck carrying essential parts is stuck in traffic. There is a big impact if a vital shipment does not arrive.

Employee hiring is affected when a potential candidate from outside the area comes to Boston to interview. Airport, tunnel and highway conditions in the metropolitan Boston area have a negative impact. For current employees, efforts to avoid driving on Route 128 add time to their commute and the "frustration factor" of being stuck in traffic can affect their morale and productivity for the morning.

Business expansion is affected because expansion must be preceded by a traffic impact study. Expansion is often prevented due to the paralyzing impacts it would have on traffic. Companies such as GTE own hundreds of acres along Rt. 128 and could be prohibited from expansion on it. This land, in such cases, obviously could not be sold either. An acre of land along Rt. 128 can cost upwards of a million dollars, so it could be a lot of money sitting around.

Solutions: an incident management program is extremely promising. It cannot be done alone---by either the public or private sectors. The heart of this program for businesses is communications. Companies should try to keep their employees off the road when conditions are bad. The Route 128 Council and GTE have worked to develop a system where employees can get up-to-date information on traffic conditions---and hopefully stay at work or seek alternate routes when traffic is jammed.

A better system is being developed by a company called SmartRoute Systems in Cambridge, Massachusetts. Their system is a dial-up information network which disseminates traffic information gathered via CCTV cameras mounted atop buildings, airplanes, and a cellular network of mobile traffic observers.

Private industries and public agencies can get together and work out problems.

## **VI. EFFECTIVE INCIDENT MANAGEMENT: LESSONS LEARNED FROM EXEMPLARY PROGRAMS**

**Lance Grenzeback**  
Principal  
Cambridge Systematics

Highway congestion has doubled over the past ten years. Incidents account for about 60% of highway congestion. About 80% of these incidents are breakdowns such as a truck that is too heavy to move out of a lane, or a car with a broken axle. This type of incident will back up traffic and cause time delays---to upwards of 500 vehicle hours.

Another 10% of incidents are caused by debris on the road and by pedestrians. Small incidents, although minor, account for a lot of lost time. The last 10% of incidents, and only 10%, are those that are really vehicle accidents. Of those accidents, about 50-60% are fender benders (minor accidents). These incidents, like flat tires, wind up in the breakdown lane or on the shoulder, take an hour to clear and cause about 1,000 hours in vehicle delays.

More serious accidents involving injuries or fuel spills cause up to 5,000 vehicle hours delay. One reason for the longer delays is that many vehicles---police, ambulance and tow truck---will be present at the scene, causing delays in both traffic directions as people slow down and look. No more than 5% of accidents are really major accidents, but a really good one will last 12-14 hours and rack up to 30-40,000 hours in vehicle delay.

The metropolitan area's highways and arterials are saturated with traffic; they are congested. A number of small incidents occurring on these highways causes backups and costs cities a great deal of money. One way to ease this problem is through incident management. It is important here to have good communication, a dispatch center to call out emergency vehicles and have a coordinated response system, to clear the road quickly and to inform other motorists to stay off the highway---and go back to work.

Cambridge Systematics has looked into the reasons for what makes an incident management program successful. Case studies were done on the few successful programs in the country: the programs in Chicago and Los Angeles, which have been in place for some 15-20 years; the newer programs in Fort Worth and Minneapolis, which copy Chicago's program, but use more advanced technology; and the TRANSCOM program in the New York/New Jersey area, which operates as an informational service.

There are five steps to creating a successful incident management program:

- 1) A clear mandate for managing incidents and the traffic problem they create must be established.
- 2) You need to assign responsibility to an agency or organization--new or old--to set up and coordinate an incident management response. Put together the basic organizational building blocks: organize the agencies involved (teams are a good approach), set up a dispatch/command center that is also a traffic information center.

Put out traffic patrols, whether public or private, to patrol the highways and help clear small incidents.

Have a quick clearance policy. A written policy gives the program manager something to evaluate response performance by and also gives response expectations to motor carriers and other drivers.

- 3) Have an information system where the media are involved. The quick, and accurate, dispersal of information is important to help keep delays from worsening.

An incident management program that is set up now will be able to make use of future systems and advances in technology. New systems such as Intelligent Vehicles, and the technologies these systems use, will be ineffective if there are no programs in place to employ them.

- 4) Have designated funding for the incident management program. The initial investment for incident management are modest, but the benefits are substantial. The Illinois DOT spends about \$5.5 million per year on its Minuteman Patrols which are comprised of tow truck operators and other emergency vehicles. It is estimated that these Patrols save the City of Chicago, motor carriers and others approximately \$95 million per year. Every \$1 invested in that program returns about \$17 to the region's economy.
- 5) Keep an incident management record or report. Most cities and states do not have information on incidents occurring on their highways. It is estimated that incidents cause 50-60% of the congestion, but we do not have the solid data base that is needed to make reliable estimates. A report card will allow assessment of a traffic manager's performance and will also show if the investment in incident management is yielding a good return.

## **VII. INCIDENT MANAGEMENT IN MASSACHUSETTS: THE BUILDING BLOCKS FOR A NEW PROGRAM**

**Thomas Kennedy**  
Lieutenant Colonel  
Massachusetts State Police

The Massachusetts State Police have been building a cellular phone network for reporting incidents to the State Police. The State Police have set up "800" numbers for people to call to report incidents. We currently receive 6-8,000 calls each month.

The calls go into a central dispatch area helping to keep the costs of this system low. The costs to the department of running this system are approximately \$9,700 a year. This system gives the department real-time reporting of incidents. The State Police respond to 90% of the incidents. A record has been kept so that we know our response time. Because of this system, the response time has been shortened by 10-15 minutes, which, when dealing with incidents, is really critical.

Another system, which was begun several years ago, is aerial surveillance. The State Police own planes and helicopters. In addition, the department teamed with a Boston radio station and assigned Trooper Grant Mouliason to work with the station in aerial traffic surveillance.

Service patrols, such as the one run by the Massachusetts Turnpike and by CVS Samaritan, have been very helpful at clearing incidents. CVS Samaritan is tied into the State Police phone system, sign in and out with the department, and respond to State Police calls.

Areas for improvement include improving communications between agencies and services---having the same, or similar, equipment. Having a central transportation communication center, like the one at the State Police, would also be an improvement.

Public safety is most important when dealing with an incident. The State Police are concerned with developing a system that clears incidents safely and quickly, and not withholding motor carriers and other companies responsible for clearing their own vehicles.

**VIII. INCIDENT MANAGEMENT IN MASSACHUSETTS:  
A View From The Highway Agency**

**Michael Swanson**  
Chief Engineer  
Massachusetts Department of Public Works

Incident management is not a luxury item, it is a necessity. Incident management strategy has been used by the Massachusetts Department of Public Works for a number of years as part of construction mitigation. Incident management needs to be broadened to include all the major highways in Massachusetts. The MDPW's construction mitigation has been applied to projects in the past, such as the Southeast Expressway, and will be applied to the Central Artery and Third Harbor Tunnel projects.

For the Central Artery there will be a state-of-the-art incident management program. There will be an operations control center, a traffic surveillance system and a communications systems. There will also be on-sight emergency response vehicles (tow trucks) to help remove broken-down or damaged vehicles.

The incident management system being used by the DPW---cellular phones, surveillance cameras, radios, carbon monoxide measuring devices and emergency vehicles---will be expanded to include the Massachusetts Turnpike, Logan Airport and other MassPort facilities, and the State and Boston Police forces for special events.

## **IX. INCIDENT MANAGEMENT IN MASSACHUSETTS: WHAT'S IN PLACE IN BOSTON?**

**Joseph Beggan**  
Director of Policy and Planning  
City of Boston Transportation Department

The City of Boston is pleased to be part of the Incident Management Conference. We have a strong interest in the development of an incident management program and are pleased with the efforts and progress that have been made under the Executive Office of Transportation and Construction and the Executive Office of Public Safety.

I would like to describe the building blocks that the City of Boston can bring to an incident management program. The City will be a major player in a regional incident management program. The City has much to gain from a successful incident management program including continued access to the downtown economy, reduced diversions through city neighborhoods, public safety and air quality benefits, and improved operations on local streets. The City also has much to offer including a number of services such as police, fire, and ambulance that will be cornerstones of an incident management program within Boston. I will describe the building blocks that are under the jurisdiction of the Boston Transportation Department (BTD) and our recent experience and current efforts.

The City has made great strides over the past five years to improve traffic flow in the downtown district. One of the most significant accomplishments has been the Traffic Relief Program. The BTD began the Traffic Relief Program in August of 1986 as an effort to improve traffic flow and safety on three major corridors: Congress Street, Tremont Street and Arlington Street. The Program successfully reduced travel times on these corridors by 30 percent and improved the consistency of travel time throughout the day on each of these streets. These street were given a better chance of recovering from incidents on local streets or diversions from the Central Artery due to the improved operating conditions. As a result of these success of the Traffic Relief Program on Congress, Tremont, and Arlington Streets, the program was expanded to other parts of the downtown area.

The BTD operates its own fleet of tow trucks including two that can tow commercial trucks in addition to a full complement of parking enforcement officers. BTD tows over 56,000 vehicles per year and provides numerous assists to motorists. If BTD were a private company it would be the largest towing company in the state.

Boston faced problems four years ago as construction projects proliferated: loss of travel lanes, disruption on streets, etc.. To correct this problem, the BTD began the



**Construction Management Program.** The Construction Management Program is a review process that seeks to minimize construction impacts of individual projects. Each contractor is required to submit a Construction Management Plan to the BTD for approval before construction. This allows the BTD to review construction proposals and insure that construction projects do not use street capacity unnecessarily.

Communication and coordination will be important elements to anticipate and respond to incidents. The BTD is active in both areas operating a communications network and participating at several different levels to coordinate special events and construction activities.

The BTD operates a state of the art communication network that is on-line 24 hours a day at three base locations and almost 300 field units assigned to enforcement and other BTD personnel. These units, coupled with the field staff of other City line departments, provide a network of eyes and ears on the street that could be useful in incident detection.

The BTD has also participated in the Boston Technology Coordinating Group, chaired by MIT Center for Transportation Studies Director Thomas Humphrey, and will be part of a pilot program that will provide communications links between key line personnel in City and State departments responsible for traffic management.

Three years ago, the City and State jointly convened the TRANSCOM group. The group is made up of various City and State transportation and construction related departments as well as major utility companies. The group meets quarterly to anticipate construction in the downtown area and ensure coordination between different projects.

Each of the elements reviewed so far highlight areas where the City has current on-line programs that could be part of a regional incident management program. The BTD is also moving forward in two other very important areas that would form the cornerstone---at the City level---of an improved incident management program: a computerized traffic signal system and a traffic and emergency control center (TECC).

Over the past two years, the BTD has been installing a \$16 million state-of-art computerized traffic signal program with several thousand loop detectors. The control center for the system is housed in City Hall and will allow the City to detect traffic congestion and respond with different signal timing patterns. It will be a key element in handling incidents on Boston streets that would otherwise promulgate throughout the Downtown and potentially affect highway operations. It will also provide the flexibility to handle traffic diversions caused by highway incidents, minimizing impacts to the local street network.

The City has also constructed a TECC which houses communications links to various City line departments. The TECC is the command post for the City in times of snow emergencies. It can potentially be hooked into other similar centers run by state agencies or envisioned by the Central Artery project to form a comprehensive communications network.

The City of Boston brings a number of important building blocks in the effort to form an incident management program. What needs to be done is to establish incident management as a metropolitan transportation incident management system. The Central Artery incident management program should be joined with the Boston incident management program so that traffic is not monitored just on the Central Artery, but in all of Boston. The whole city will benefit as a result. The City comes as a participant, eager to work on this project. We recognize that much work needs to be done, however, we are encouraged by the work that has begun and the commitment of all those that are involved with this effort. We look forward to the continued, cooperative effort between the City, the Commonwealth and the private sector to develop a truly state-of-the-art, comprehensive incident management program.

## **X. NEXT STEPS IN BUILDING MASSACHUSETTS' NEW INCIDENT MANAGEMENT PROGRAM**

**James Roche**  
Secretary of Public Safety  
Executive Office of Public Safety

Sitting in a traffic jam is an inconvenience to the average driver but to a trucking firm it means missed runs and lost business. Sitting in traffic jams is also very expensive. Estimates show that from 1984 to 1987 the cost to motorists and companies nationwide rose from \$9 billion to \$16 billion. It is projected that within 14 years the costs could top \$88 billion.

Many officials have spoken on what is needed to put an incident management program in place. The road from here includes a new communications system to bring the Public Safety Department into the 21st century. The key to implementing an incident management program in the state is a commitment from both the Executive Office of Public Safety and the Executive Office of Transportation and Construction to manage and improve the Commonwealth's highway system.

In the near future, we expect to introduce a state operations control center to coordinate the state's incident management program. This control center will effectively become the first transportation control center for the Commonwealth. Imagine it as a focal point from which incidents on the highways can be better controlled, managed and mitigated.

Private industry also has a big role in this program. A joint planning committee, made up of public safety and transportation specialists, will make sure that every available public and private sector resource is made use of. Every advanced technological resource will be studied.

The implementation of an incident management program will involve the participation of local, city and state agencies. Jurisdictional boundaries will be crossed. The Office of Public Safety will be committed to the program as State Police and Boston Police Department work together, as State Police work with the Metropolitan District Commission Police, and as police forces within Massachusetts are consolidated within the State Police.

I can also assure the trucking firms, and other companies, that their concerns about highways in the 1990s will also be our priorities.

## XI. CONCLUSION

**Dean Carlson**  
Executive Director  
Federal Highway Administration

When you say incident management to people they do not know what you are talking about. It is not unlike another program we are trying to get underway: Intelligent Vehicle Highway System (IVHS). IVHS and incident management are similar in that they both involve cooperation and the crossing of jurisdictional boundaries.

Institutional and jurisdiction issues are the major problems, not technology. We have, or are developing, the technology needed; it is not new. The Federal Highway Administration has been using incident management in its area offices since 1972.

We do not have very good data on the amount and length of backups caused by incidents, or by backups caused by such things as the raising of the Woodrow Wilson Bridge. The people collecting this data will be doing a great service.

Between 40-60% of congestion is caused by incidents. Total costs of congestion has been estimated to be \$30-35 billion. This means that costs from incidents could be as much as \$20-25 billion. It will not cost nearly that much to resolve the problem. Surveillance and innovative ideas will help ease traffic congestion.

The FHWA has traditionally been concerned with highway construction but not highway management. One new focus, however, will be on incident management. The FHWA is studying this and will be publishing several reports. The FHWA would also like to have at least two years of funding to look at the issues and help set up programs.

The states are doing a great job of addressing the incident management issue. Massachusetts has the building blocks to run a successful program. We all need to work on public awareness.

**ADDENDUM**



# **INCIDENT MANAGEMENT in MASSACHUSETTS**

**Edward L. Silva**  
Transportation Planner  
Federal Highway Administration, Massachusetts

and

**William T. Steffens**  
Manager, Traffic Analysis and Design  
Central Transportation Planning Staff, Massachusetts

## **Why is Incident Management Important in Massachusetts?**

Traffic congestion is one of the greatest concerns facing some of the largest metropolitan areas in the United States, including Boston. In fact, the Boston metropolitan area ranks among the top eight most severely congested areas in the country. The cost impacts of the area's congestion, in terms of lost time and wasted fuel alone, exceed \$1 billion per year.

It is a well recognized fact that congestion is made-up of two components:

- Recurring Congestion and
- Non-Recurring Congestion

Recurring congestion is predictable in that it takes place at expected locations where the traffic volumes routinely exceed capacity. Non-recurring congestion is very unpredictable and is caused by incidents such as disabled vehicles, traffic accidents and spilled loads. The Federal Highway Administration estimates that at least 60% of congestion is non-recurring in nature and therefore caused by incidents. Because incidents contribute so heavily to congestion, it is of paramount importance that large metropolitan areas, including Boston, establish areawide programs to manage these incidents.

## **How Successful have Incident Management Programs been in Other Parts of the Country?**

Several areas in other parts of the country already have comprehensive incident management programs in place. According to information compiled by the

Federal Highway Administration, some of the most comprehensive programs are found in the following cities:

- Chicago (program covers approximately 120 miles of freeway)
- Los Angeles (program covers approximately 450 miles of freeway)
- Minneapolis/St. Paul (program covers over 100 miles of freeway and
- Seattle (program covers close to 100 miles of freeway)

Studies of existing incident management programs clearly demonstrate that these programs are proven and cost-effective ways to reduce traffic congestion. In Chicago, for example, where one of the nation's leading incident management programs has been substantially in place since the early 1960's, it is estimated that the program is returning \$17 in benefits for each dollar spent. In times of limited resources, this extraordinary investment return provides further justification for implementing a comprehensive incident management program in the Boston metropolitan area.

#### What are the Criteria for a Successful Incident Management Program?

A successful incident management program must address each of the four stages of incident management - detection, response, clearance and recovery - in a well-organized and expeditious fashion. According to the Transportation Research Board, an effective incident management program must meet the following objectives:

- Incidents must be detected accurately and rapidly.
- The nature of the incidents must be determined quickly.
- All relevant information must be collected and passed on to the appropriate agencies expeditiously.
- Roles and responsibilities of the various agencies involved must be developed, understood and agreed upon.
- An appropriate coordinated response to the incident is necessary.
- Quick removal of both major and minor incidents needs to take place.
- Traffic management needs to be applied for the duration of the incident.
- Information on traffic conditions and bypass routes needs to be provided to motorists.



- Traffic management plans for "planned" incidents (major events) need to be developed, implemented and operated.

To achieve these objectives successfully, an incident management program must include the following key organizational components: traffic management teams; traffic operations/communications centers; dedicated service patrols, incident command systems; contingency planning; quick clearance policies; and a strong service orientation.

Lastly, a comprehensive program must provide sufficient geographic coverage to serve all areas that experience daily congestion. Facility-specific approaches cannot be expected to meet the important objectives of an areawide program.

### Where Do We Stand in Massachusetts?

In the Boston metropolitan area, where congestion is not only severe, but also areawide in scope, there does not exist a program that meets the above criteria for an effective and comprehensive program. However, individual agencies have, on their own, recognized the importance of incident management, and have implemented various components specific to their particular needs. As a result of these endeavors, the Boston area now has some basic building blocks with which to develop an effective and comprehensive incident management program.

Some of the more significant endeavors of recent years will facilitate the development of a comprehensive incident management program for the Boston metropolitan area:

- The Massachusetts State Police, working in conjunction with the cellular telephone companies, has established a toll-free highway emergency number (\*SP) whereby motorists can report incidents to the Massachusetts State Police dispatch center in Boston. This service is already logging 6,000-8,000 calls per month. With a good publicity campaign and some highway signing, it could become the principal means of detecting incidents in a comprehensive incident management program.
- The Metropolitan District Commission (MDC) has a modern communications center located in downtown Boston which could be expanded to become the communications center for an areawide incident management program. This center now serves essentially MDC facilities which represent a very small fraction of the highway network in the Boston area.
- There are two CVS Samaritan vans, one located on the Southeast Expressway and one on Route 128, that are equipped with push bumpers

and can address 60-80% of mechanical problems encountered by disabled motorists. This is already a valuable element of incident management in the area which should be continued and, if possible, expanded.

- There are two Massachusetts State Police and one MDC helicopters which provide aerial surveillance. By tying them into a central communications center, their effectiveness in detecting and verifying incidents could be increased.
- The MDC has two heavy-duty tow trucks which now see limited use on MDC facilities. Under an areawide program, these could be more extensively used to deal with many of the incidents involving larger vehicles.
- The Massachusetts State Police has in place a policy for the use of private tow companies to assist in the clearance of disabled vehicles. This policy could be updated and enhanced to serve the needs of a comprehensive incident management program. Private tow trucks could remain the principal means of incident clearance.
- The Massachusetts Turnpike Authority (MTA) has developed contingency plans for traffic management during an incident that is severe enough to require traffic to be diverted from the Turnpike. The MTA's precedent could now be followed in developing the contingency plans needed for every other congested roadway in the Metropolitan area.
- The MTA has installed variable message signs on certain portions of the Turnpike intended to keep motorists informed of what is happening during an incident. These are essential components of a comprehensive incident management program.
- The City of Boston has a state-of-the-art computerized signal system covering the downtown area. This system is being used to optimize signal timing at approximately 250 intersections. The system, if connected to a central communications center, could become an important asset in incident management. Interconnected with a communications center, it could be used to regulate the traffic that is delivered to or diverted from the freeway system during incidents and thereby assist the recovery process.
- The Massachusetts Department of Public Works has implemented comprehensive incident management programs during the major highway reconstruction projects it has undertaken in recent years. During the reconstruction of the Southeast Expressway, the incident management program included: a 24-hour provision of four tow trucks, the use of paddle-type glare screens in work areas to prevent motorist distraction, 24-hour police details for enforcement and emergencies, the provision of

advance signing to warn motorists of the traffic management scheme, and the establishment of a project site communications center to coordinate activities.

- The Massachusetts Port Authority has in place at the Tobin Bridge an emergency contingency plan which can address any emergency situation which may occur on the bridge, or its approaches. Emergencies such as, vehicle accidents, hazardous material incidents, suicides, bomb threats, traffic congestion, etc., have all been incorporated into documented procedures for effective traffic management. The Authority's bridge also has a portable variable message sign which can be quickly programmed with a variety of messages to assist its traffic management program. In addition, the traffic management program can deploy tow trucks and provide alternative routing to Logan Airport via the airport identification signs placed on state and local highways.
- The MIT Center for Transportation Studies has organized and is facilitating several interagency efforts to promote advanced traffic management systems. One of these is the Boston Technology Coordinating Committee which is an ad hoc group that is establishing a quick-response interagency Communication System to deal with incidents in the metropolitan area. It includes the MDPW, MBTA, MTA, MPA (Logan and Tobin), the City of Boston, the MDC and the State Police.

#### What Comes Next For Massachusetts?

With the above as building blocks, the state is in an excellent position to develop a comprehensive incident management program for the Boston metropolitan area. What is needed is an overall policy and plan in order to realize the benefits of a such a program. At present a traffic management team is being formed to direct the establishment of a program. The Executive Office of Transportation and Construction and the Executive Office of Public Safety have agreed to lead these efforts.

**INCIDENT MANAGEMENT:  
THE NATIONAL PERSPECTIVE**

Compiled by

**Robert D. Pritchard**  
Director, Regional Economic Analysis  
ATA Foundation

The three items in this packet together present a status report on Incident Management activities nationally. The first, "Freeway Incident Management," by Judychi and Robinson, was written in 1988 and details the characteristics of five model programs servicing areas across the country. The second, "What's New in . . . Freeway Incident Detection and Response," by Robinson, was written in 1990 and describes some of the latest technology available and presents examples of successful, real-world applications. These papers have been reprinted with permission from ITE's Technical Report from ITE's 1990, 1989, and 1988 Conferences.

The third, a table titled "Incident Management Programs in the United States," was prepared by the FHWA and identifies the components of programs in cities around the country.

## **Freeway Incident Management**

Prepared by:  
Dennis C. Judycki  
Director, Office of Traffic Operations  
Federal Highway Administration

and by  
James Robinson  
Highway Engineer  
Traffic Engineering Applications Branch  
Office of Traffic Operations

An incident is an accident, breakdown, spilled load or other random event that reduces the capacity of the roadway. When traffic demand approaching the scene of an incident exceeds the reduced capacity, traffic congestion will result. Most incidents are relatively minor and don't create a particular problem. At peak travel times, however, even minor incidents can cause big problems and major incidents can affect travel patterns over a entire area. The impact of incidents is most obvious on urban freeways because of the concentration of travel on these facilities.

Nearly everyone can cite a horror story about being caught in a massive traffic jam that resulted from a fiery multicar accident, overturned truck or spilled load. Because the time and location of these incidents occur randomly, few of us have had to suffer through such experiences on a regular or recurring basis. Minor incidents, on the other hand, do occur very regularly, but are generally thought of as mostly just a nuisance. Oftentimes when we are caught in congestion caused by a minor incident, we never know what caused the backup because it's gone by the time we actually pass the point where it occurred. Both major incidents and minor incidents contribute to the overall problem, the first because of the large impact each has and the latter because they do occur so frequently.

The hit and miss nature of incidents helps mask the true impact they have on our urban freeway system. A recent FHWA study shows that in our 37 largest urban areas, incidents account for 60 percent of all freeway congestion. User costs, based on 1984 data, were calculated to exceed \$5B a year in delay and wasted fuel. Unless something is done, the situation will only grow worse. Urban freeway travel is increasing at a rate of more than 2 percent a year. As travel increases, the time periods that urban freeways operate at or near capacity also increases which in turn results in even more incidents. The FHWA study shows that incidents will account for 70 percent of urban freeway congestion that will cost users in excess of \$35B a year by the Year 2005 in the absence of significant improvements (Reference 1).

The effect of incidents is not confined to motorist delay and wasted fuel. Accidents occur more frequently under stop-and-go, congested traffic flow conditions. Abandoned vehicles on freeway shoulders and pedestrians are also a safety consideration not generally associated with freeways. In the years 1983-1985, pedestrian accidents and accidents involving striking a parked motor vehicle resulted in 19 to 20 percent of all Interstate System fatalities, almost 800 fatalities each year. Unfortunately, there are no definitive studies to show how many accidents or fatalities are directly the result of freeway incidents. The evidence, however, clearly shows that incidents and traffic congestion resulting from incidents have a significant adverse effect on freeway safety.

Enough with the bad news already; what's the good news? Can anything really be done to reduce incident related congestion? The answer is yes, of course, otherwise there would be no reason for this paper.

On urban freeways in two of our larger cities, Los Angeles and Chicago, and on some bridges, tunnels and toll facilities throughout the U.S., comprehensive incident management programs have evolved over the past 25 years that clearly and significantly reduce the impact of incidents. In many other cities and even on some rural freeways, more limited incident management activities have also clearly demonstrated the effectiveness of various incident management strategies. So why isn't freeway incident management routinely practiced, especially, in our urban areas? As with any complex problem, there is no single simple answer.

The very nature of incidents leaves one with a certain sense of helplessness. If the time and location of an incident can't be predicted, how can we deal with it? The fact is, while the exact time and location can't be predicted, the frequency of occurrence and nature of incidents is fairly predictable even when there is very little local incident data available. Using accident rates, traffic volumes by time of day, incident data from other areas and research results, a fairly good picture of the incident problem can be developed for an urban area or a specific roadway. This picture can then be used to help allocate appropriate resources and can form the basis for an evaluation of incident management activities.

Another reason incident management is not routinely practiced is the historical focus of the highway program in the U.S. Driven initially by the need to develop a basic highway system and then by the Interstate program, the funding and resource allocations for our highway program are primarily directed to construction, reconstruction and maintenance of the highway infrastructure. While it is clear that construction and reconstruction alone will not solve the urban freeway congestion problem, these needs remain great. It is difficult then to look beyond this longstanding singular focus on infrastructure and give greater attention to the operational integrity of the system. Operational improvements simply do not have the visibility with management and elected officials that construction does.

A third major reason incident management is not practiced more widely is also steeped in tradition and often comes under the nebulous heading of "institutional barriers." A large number of public and private agencies and groups all have a legitimate role or responsibility in some aspects of providing a safe, efficient transportation system. At one time or another, freeway incidents will involve State and local police, State and local traffic engineering and maintenance forces, fire and emergency services, transit, service organizations like AAA, State and Federal environmental agencies, private tow companies, and trucking organizations as well as others. Each of these groups have their own priorities and operating procedures which may, but probably don't, compliment each other. Incident management requires a service role that is beyond the traditional mission and the resources of any single agency or group. Budgets and operating procedures must be modified. There is no magic answer. It basically requires a "people solution" that includes a recognition of the problem, a commitment to improve the problem, and most of all, open communication to reduce conflicts, duplication of effort and ultimately failure.

What is freeway incident management? Our definition is a coordinated preplanned use of human and mechanical resources to restore full capacity after an incident occurs, and to provide motorists information and direction until the incident is cleared. Time is critical because the effect of an incident on traffic can last long after the incident is removed. Studies by Caltrans in Los Angeles show that for each minute a lane blocking incident continues, the time to normal flow after the incident is removed is increased 4 to 5 minutes. Freeway incident management involves a systematic process to reduce the time necessary to detect, respond to and clear incidents and a means to communicate with motorists to reduce demand or divert traffic away from the scene.

Incident management programs vary widely in cost and sophistication, but all share the common elements of detection, response, clearance, traffic management and motorist information.

Detection - The objective of the detection element is, obviously, to detect that an incident has occurred. Examples of detection or surveillance options include electronic detection, police patrols, courtesy or service vehicles, closed circuit TV (CCTV), call boxes, CB monitoring, media, and cellular telephone. Most freeway incident management programs in the U.S. that include a detection element, rely on some combination of detection measures that enhance each other and also provide information on the nature of the incident when it is detected.

Response - The response element includes identifying the nature of the incident and initiating the appropriate response. Preplanned, coordinated response plans reduce the time needed to service an incident. For major incidents, an accurate initial assessment of the situation is critical to set all subsequent response, traffic management, and motorists information activities in motion.

Clearance - This element includes actually clearing the incident to restore normal operations. As part of an incident management program, it also includes establishing operating policies and procedures that recognize the impact incidents have on traffic (i.e., fast removal policies and procedures).

Traffic Management and Motorists Information - The objective of this element is to minimize the impact of an incident on traffic and it includes traffic management at the scene plus communication with motorists to reduce traffic demand approaching the scene. In the case of closures, also included is a means to divert all traffic and direct it to and along alternate routes.

There is one other component essential to effective incident management: a focal point or operations center where bits and pieces of information can be gathered to help form an accurate picture of what's happening. The operations center also becomes the focal point for the dissemination of motorists information and a support center for the response and clearance activities. The operations center need not be elaborate, but it does need to be equipped and staffed to function as the information focal point to be effective.

While each of the elements are separated here for discussion purposes, they tend to overlap when actually applied. Perhaps the best way to illustrate this is by actual example.

### Chicago, Illinois

The Illinois Department of Transportation (IDOT) operates a comprehensive traffic management program for the Chicago area freeway system. Three major parts of the program are (1) The Traffic Systems Center (TSC) located near the center of the city's freeway network, (2) the Communications Center located in the District H.Q. in suburban Schaumburg, and (3) the Emergency Traffic Patrol which operates throughout the freeway system 24 hours a day, 7 days a week.

The TSC houses the real-time computer system and other equipment for centrally supervising the freeway surveillance and control system. This system covers 110 miles of freeway and includes 1,650 detector locations, 91 ramp controls and 1 changeable message sign. Installation of a network of 35 additional signs is now underway, and 8 of the new signs should be operational this month. A unique feature of the Chicago system is the comprehensive network of radio and TV stations using traffic reports provided by IDOT. Eight users have direct transmit/receive and/or transmit only terminal hookups with the TSC computer. One of these users, a traffic service, furnishes traffic reports to more than 35 additional media outlets. One of the radio stations has its own color-coded traffic map, driven by the TSC sensor-feed, in its showcase downtown street-level studio. IDOT



computerized reports provide congestion and travel time information as often as every 5 minutes around-the-clock. Special messages including commuter rail and bus transit information are added as warranted by keyboard. The TSC is staffed generally from 5:00 a.m. to 7:00 p.m. on week days, but the equipment operates continuously.

The Communications Center located some 23 miles from the TSC is staffed around the clock. Remote computer terminals and map displays connected to the TSC allow the center to serve as the primary incident detection site when the TSC is not staffed. The center also operates the Districts' five highway advisory radio (HAR) stations. All of the HAR stations now operate in a real-time automatic update mode made possible by having the TSC surveillance sensors produce synthesized voice broadcasts for each site.

Incidents, detected through the electronic surveillance system or any other means, are responded to by the Emergency Traffic Patrol (ETP) trucks. The radio-equipped ETP vehicles carry fuel, water, air, numerous traffic control devices and other aids and are equipped with towing capabilities. All ETP services are free, except motorists are invoiced \$5.00 payable by mail when the maximum 2 gallons of emergency gas are provided. In addition to the 35 ETPs that patrol 100 miles of freeway around the clock on fixed routes, the IDOT maintains several heavy duty recovery vehicles, a crash-crane and other special units for incident servicing and clearance. Some of this equipment was obtained as government/military surplus at a fraction of its replacement cost. In 1986 the ETP fleet handled 108,000 incidents or assists (References 2 and 3).

The Institute of Transportation Engineers named the IDOT "Chicago Area Freeway Traffic Management Program" as its 1987 Transportation Achievement Award recipient. A most deserved recognition we wish to add.

### Los Angeles

The California Department of Transportation operates an extensive surveillance and control system on about 475 miles of freeway in the Los Angeles area. The system which has evolved from 42 miles in 1971, now includes 750 ramp meters, 718 detector locations, 43 changeable message signs, a 12-camera CCTV system on a 12-mile section of the Santa Monica Freeway, and three additional cameras at other locations in the downtown area. Among the unique features of the Los Angeles system are the close working relationship enjoyed by Caltrans and the California Highway Patrol (CHP) and Caltrans' Major Incident Response Team.

The Traffic Operations Center (TOC), located in downtown L.A. in the Caltrans District 7 headquarters, is jointly staffed by Caltrans and CHP personnel. The TOC is equipped with a CHP Computer Assisted Dispatch terminal and the CHP officers at the Center have direct two-way communication with the CHP central computer. These tools supplement

Caltrans' surveillance system to enhance the TOC operators' ability to detect and verify incidents. When an incident is identified, the joint CHP/Caltrans staffing arrangement reduces the time required to assess and then coordinate the appropriate response. When a major incident (defined generally as 2 or more lanes closed for 2 or more hours) occurs, the Caltrans' Major Incident Traffic Management Team may be called.

This team is composed of about 2 dozen volunteers all with traffic engineering backgrounds and all of whom have regularly assigned full-time duties in the Traffic Operations functions. The team operates similar to a volunteer fire department. Team members take agency owned and equipped vehicles (sedans, sign trucks, portable signs, etc.) home with them and are on call 24 hours a day. When the team is called, team personnel meet at the incident scene with police and other responding agencies and actively manage the situation. The primary responsibility of the Caltrans' traffic engineering team member is to expedite the safe, orderly movement of traffic through and/or around the incident. He takes the lead role in determining alternate routes, and then carries much of the responsibility for implementing the detour plan. In recent years the team has responded to about 220 incidents a year or an average of 4 plus a week. The average duration of these major incidents is around 3.5 hours.

Over time, alternate route plans have been developed for potential closures at over 3,000 locations on the L.A. freeway system. These are recorded on maps that can be referred to when a major incident does occur. The team members and other responding agencies also meet after major incidents, to critique the operation, and determine what and how response activities can be improved in the future. Throughout any incident, the CHP/Caltrans staffed TOC becomes a key support tool by monitoring traffic conditions, activating changeable message signs, issuing media advisories, etc. (Reference 4).

#### Orlando, FL

The Florida Department of Transportation has initiated a program to implement Freeway Corridor Management Teams throughout the State. In 1986 FDOT, through the the State Traffic Engineer's office contracted with JHK and Associates to organize and train traffic management teams in Jacksonville and Orlando and to expand the activities of an existing team in the Tampa Bay Area. Teams have also now been initiated in Ft. Lauderdale, Miami, and others are anticipated. It is not possible here to describe all of the activities of these teams which are concentrated currently on low-cost incident management programs. We would like to describe a unique arrangement with private wrecker companies in Orlando. This arrangement actually predates the Freeway Corridor Management Team, but provides an example of an effective, low-cost incident management technique.

An important aspect of incident management is the relationship between the responsible public agency and private wrecker companies. Formal arrangements usually take the form of registered or regulated companies called from a rotation list or contractual agreements. Either way helps ensure that freeway incidents will be cleared quickly and efficiently at little cost to the taxpayer and that wrecker operators are qualified in terms of personnel and equipment.

The Orlando Police Department, which is responsible for enforcement on all freeways in the city, utilizes a contracting arrangement with two components: (1) a contract with a single company that responds to all peak period (7-10 a.m. and 4-6 p.m.) freeway incidents as well as abandoned vehicles and tow-away zone violations throughout the city; and (2) a "citizen preference" arrangement for non-peak incidents. The single peak period contract is awarded to the bidder with the lowest tow rates, the city receives no money from the contractor. A unique feature of this service is that a wrecker is dispatched at the same time a patrol officer is dispatched when an incident is first reported. The possibility of "dry-runs" is something the contractor accepts in his bid price. No fee is paid unless a tow is actually made.

Under the off-peak citizen preference arrangement, the city is divided into four sectors. For each sector, the Orlando Police have contracts with a number of wrecker companies that meet city's requirements. The contracts include tow rates which are established by bid. At the scene of an incident, the motorist is shown the list of wrecker companies available for that sector and is given the opportunity to choose. The rates charged by each company are shown on the list the motorists sees. This particular service has resulted in contracts with 23 different services, a number the Police Department considers too high to effectively manage, and some modification of this arrangement is being considered (Reference 5).

#### Michigan - I-75 (Non-Urban Application)

While this paper primarily addresses urban areas because the problem is greatest there, incident management strategies have application on all highway systems. An example of a non-urban application is found in Michigan. The emphasis of this program is coordinated response and preplanned alternate routes for major incidents.

This Michigan program covers 100 miles of I-75 from south of Flint, north through Arenas County, in Michigan DOT's District 6. This section of I-75 serves a predominately rural area but does pass through the Flint, Saginaw and Bay City urbanized areas. The average daily traffic ranges from 55,000 at the southern end of the District to 13,000 in the north. Peak volumes in excess of 70,000 vehicles/day occur during holidays and special seasons.

The Incident Management Program for I-75 was developed in 1978-80 by Michigan's Region 6 Steering Committee which is one of nine steering committees of the State Safety Commission. The Region 6 Committee chairperson is the Commanding Officer of the Michigan State Police - Third District, and members include personnel from the Michigan State Police, DOT, and Department of State. The primary task of the Committee was to develop an assessment of traffic safety needs in the Region. An incident management program for I-75 was chosen as an activity by the Committee because most of the Region would benefit from such a plan.

Beginning at the location of an actual recent accident that closed I-75, the Steering Committee met with representatives of the counties affected by alternate routes, and a comprehensive closure plan was developed. The plan included locating and identifying detour routes, defining closure responsibilities and procedures, signing requirements, and identifying contacts for the nearest emergency services, local police, etc. The same was then done for the entire 100 miles of I-75 and a freeway closure manual compiled. The Michigan DOT furnished detour "sign kits" which are placed at the 3 State Police barracks along I-75.

The initial "detour" using the plan was implemented for an incident in May 1980. In the next 4 years, the plan was employed 51 times or slightly more than once a month. About 40 of the incidents were major accidents; the rest included flooding, a downed utility line, ice, and a bascule bridge stuck in its open position. Incident clearance time has been reduced and traffic management enhanced by this incident management program (Reference 6).

### TRANSCOM

TRANSCOM (Transportation Operations Coordinating Committee) is a consortium of 16 agencies that provide highway, rail, bus, transit, and enforcement service in the New York/New Jersey metropolitan area. In what is surely the ultimate in multiagency cooperation, the member agencies include both State DOT's and Police, New York City DOT, NJ Transit, Metropolitan Transportation Authority, six autonomous and independent toll bridge, tunnel and roadway authorities, AMTRAK and FHWA. TRANSCOM functions much like corridor management teams in Texas and Florida and other States, but its membership and scope is obviously much greater because of the number of transportation providers and the density and complexity of the NY/NJ metro area. TRANSCOM's mission statement is a natural extension of the mission statements for all its members, that is to provide efficient transportation within and between New Jersey and New York for both people and goods by optimizing the regions transportation network.

TRANSCOM's programs and strategies can be grouped into three categories: (1) establish and maintain an effective information sharing and coordination system; (2) establish a formal, permanent and mutually supportive environment among the regions public transportation agencies; (3)

establish coordinated and expanded operational information services in response to users needs. Projects and major activities to date include:

- Establishing an Operations Center to function as a real-time interface with all member agencies. The Center can monitor all major incidents/emergency in the region and communicate conditions simultaneously to all member agencies and others through an alpha-numeric pager system also implemented by TRANSCOM. Each agency can then assess the information and make operating decisions it may deem appropriate.
- A Special Coordinated Operations Plan to pre-establish diversionary, alternate service routes for major regional road segments or transportation facilities to expedite incident response. Currently work is underway on 3 critical highway segments.
- A Construction and Scheduled Maintenance computerized data bank, that will permit agencies to schedule these activities to avoid conflicts on parallel or interfacing facilities.

TRANSCOM staff, project funding, and other resources come from the member agencies. The current staff includes personnel "on loan" from New York State DOT, New York City DOT, New Jersey State Police, New Jersey Transit, New Jersey DOT and the Port Authority of New York/New Jersey. The "Special Operations Plan" and "C&M Scheduling" projects are being funded in part with Federal-Aid Highway Planning funds (Reference 7).

These examples show the wide variety of strategies and options that have been employed to mitigate the impact of freeway incidents. There is no best or ideal system, and there is something for everyone regardless of the size of the problem and available resources. The bottom line is that the urban freeway incident problem is simply not now receiving the attention it warrants from agencies responsible for the safe efficient operation of the freeway system. The magnitude of the problem, over 50% of all urban freeway congestion, warrants funding, staffing and other resource allocations directed specifically at the incident problem. Incident management need not be expensive, especially initially, to be effective, but it does require modifying our traditional focus on building and maintaining the infrastructure. The bad news is the problem is not going to go away by itself and in fact will only get worse as travel on our Nation's urban freeway system increases. The good news is we have the tools to effectively mitigate the problem.

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May 24, 1989

## **What's New in ... Freeway Incident Detection and Response**

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An incident is an accident, vehicle breakdown, spilled load or other random, extraordinary event that reduces the capacity of the roadway. The hit-and-miss nature of incidents masks the true impact they have on our highway systems. Studies by FHWA and several state DOT's, for instance, show that 40% to 60% of the total vehicle delay on urban freeways is caused by incidents. The cost of this congestion is enormous, not only in terms of the costs we can measure, over \$5B annually in wasted fuel and motorist delay, but in added indirect costs on everything we buy due to lost productivity. By all accounts the problem seems to be growing worse on an almost daily basis.

Consider the results of a FHWA staff study comparing 1984 and 1987 Highway Performance Monitoring System (HPMS) data for freeways in the 37 U.S. cities with more than 1M population.<sup>1</sup>

- o 4.1% increase in licensed drivers
- o 7.5% increase in licensed motor vehicles
- o 5.0% increase in urban freeway mileage (due primarily to reclassification rather than new construction)
- o 22% increase in vehicle miles traveled
- o 61% increase in vehicle hours of delay
- o 68% increase in veh-hrs of delay due to incidents

These statistics clearly show a cycle. As the use of our freeways increases at rates far exceeding new capacity, the time periods that urban freeways operate under congested conditions increase. More congestion leads to more incidents, more incidents lead to more congestion, more .... ; a cycle that will continue unabated unless and until effective countermeasures reduce the number and the impact of incidents on traffic.

### **Incident Frequency**

Incident rates on urban freeways range from 40 to 200 incidents per MVM. Studies made in California, Minneapolis, Virginia, Texas and other areas consistently show that about 80% of urban freeway incidents are minor. Less than 2% have a duration of 2 hours or more, but of course these are the ones that draw the greatest attention. On a national basis, an FHWA analysis indicates that 80% of the total delay caused by incidents on urban freeways occurs during peak traffic periods. About one-third of the total delay is due to lane blocking accidents and two-thirds is due to minor incidents, those lasting less than 30 minutes that are confined mostly to the shoulder.<sup>1</sup> The point is that both major and minor incidents contribute significantly to the problem and countermeasures should address both. Countermeasures on urban freeways should also be concentrated in, but not limited to, the peak traffic periods.

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## **Secondary Accidents**

Every police officer who works accidents talks about secondary accidents, those that occur at the end of a queue as high speed traffic approaches an unexpected stopped or slow moving backup. Quantifying secondary incidents is extremely difficult, but certainly more vehicle breakdowns and accidents occur in congested stop-and-go traffic. A Minnesota DOT study found that 13% of all peak period accidents on one Minneapolis freeway that is covered by a surveillance and control system were caused by a previous incident.<sup>2</sup>

## **Freeway Pedestrian Fatalities**

The danger to disabled motorists, police officers and other responders is also great. Fifteen percent of Interstate fatalities and 24% of non-Interstate freeway fatalities are pedestrians. Two-thirds, 460 in 1987, of the Interstate pedestrian fatalities occur in urban areas.<sup>3</sup> Studies of this problem made in the 1960's and 1970's indicate 20% to 30% of freeway pedestrian fatalities were related to the disabled vehicle situation.<sup>4</sup> The percentage may well be higher now because of much higher traffic volumes and levels of congestion.

## **What is Incident Management?**

Freeway incident management is the coordinated, preplanned use of human, institutional and mechanical resources to reduce the duration and thus the impact of incidents. Incident management involves a systematic approach to reduce the time it takes to detect and verify an incident has occurred, mount the appropriate response, clear the incident and manage traffic until full capacity is restored. Incident management programs vary widely in cost and sophistication but all share one or more of these common elements - detection, response, clearance and traffic management. An essential component is an operations center, or information focal point, where bits and pieces of information can be gathered by trained personnel to form a picture of events as they occur. The operations center also becomes the focal point for the dissemination of motorist information and a support center for the response and clearance activities.

The remainder of this paper is devoted to illustrating examples of the implementation of these components of incident management, with an emphasis on some of the more recent programs.

## **Detection and Verification**

### **Electronic Detection**

There are many benefits of electronic surveillance systems, but loop detectors are blind relative to incident detection. Systems based on loops must have some kind of verification technique to confirm that an incident has occurred and to determine the nature of the incident. Even the most sophisticated freeway surveillance projects employ a variety incident detection and verification techniques to supplement the electronic detection. The systems in Chicago and on Long Island

have CB antennae installed in several field locations. When the system indicates an incident may have occurred, the operator calls up the antenna closest to the incident and monitors the CB traffic. Many times they are able to get a complete description of the incident this way. In Minneapolis/St. Paul, system operators monitor CB Channel 9. As well as gaining information about the nature of incidents detected by the system, between 15% and 20% of incidents are initially detected from the CB reports.

#### **Closed Circuit T.V. (CCTV)**

CCTV is a good incident verification tool that is used not only on freeway systems, but on surface street CBD and arterial systems as well. The cities of Ft. Worth, Texas, Columbus, Ohio, and Charleston, S. Carolina use CCTV to monitor signal and traffic operations and confirm incidents. The city of Los Angeles requires an easement for the installation and maintenance of a camera and communications equipment as a condition for building permit approval for the construction and rehabilitation of tall buildings in that city.

CCTV is now in use and is being expanded on freeway systems in N. Virginia, Seattle, Norfolk, Minneapolis, Detroit and Los Angeles. In Detroit a feature of the freeway surveillance and control system operated by the Michigan DOT, is a T.V. monitor at the State Police dispatch office. When the freeway operations center detects an incident that can be picked up on one of the system cameras, the picture is sent to the state police monitor where they see the nature of the incident, initiate the appropriate response and continue to monitor the situation until it is cleared. A number of systems are now going to color cameras to enhance the detail and viewability of the pictures. The additional unit cost is small and the durability of the color cameras is equivalent to black-and-white cameras.

#### **Call Boxes**

New cellular and solar technologies have improved the reliability and reduced the maintenance problems associated with call boxes. Two of the larger new projects are currently being installed in Florida and California. The Florida DOT is installing call boxes on 1 mile spacing on all rural interstate highways. In California several counties have adopted an optional motorist assistance program authorized by the legislature. Funding comes from a \$1 surcharge on vehicle registration fees. Orange County has completed the installation of more than 1,000 call boxes on 1/4 mile spacing on freeways in that jurisdiction. The construction, maintenance and response costs are funded from the \$1 surcharge. All of the calls are received and the responses are initiated by the California Highway Patrol. Los Angeles County has operated an extensive call box system for many years on freeways as have a number of other state and local jurisdictions throughout the U.S.

#### **Toronto Construction Project**

The reconstruction of high volume freeways presents special traffic management problems. Since capacity is already reduced

by the construction activities, the impact of incidents is further magnified. In connection with a project to reconstruct a major freeway in Toronto, Canada, a unique incident detection and verification technique was employed. Eight towers were built along an 8 km section of roadway that was undergoing resurfacing and bridge deck rehabilitation. The towers were manned by student workers during peak traffic periods. In 20 weeks, almost 2,200 incidents were observed. The total incident management program also included dedicated police and service patrols, off-highway accident investigation sites, and a central command center to coordinate and control operations. The cost of the incident management program was \$340,000, about 20% of the cost of all traffic control and 3% of the construction cost. The duration of lane blocking incidents was reduced by 50% and the benefit-cost ratio was conservatively calculated as 3.5:1.<sup>5</sup>

### **Other Surveillance Systems**

Comprehensive and effective incident detection can be accomplished without loop detectors, call boxes and other electronic devices installed on or along the highway. There exists in every area a myriad of information sources that can be tapped at little cost to gain timely, accurate information on incident occurrence. These sources include CB, public vehicles with radios, police reports, and cellular telephone. The latter may well grow into one of the more comprehensive incident detection techniques available. The key to making use of these sources is a communications center or information focal point where trained personnel can interpret the bits and pieces of information to form a picture of events and then follow-up on and monitor the response.

One of the complicating factors with such an operation is that many drivers who report incidents via CB and cellular telephone don't know their exact location. Some have only a vague idea of where they are. In the No. Virginia area the two cellular companies, Bell Atlantic and Cellular One, the Virginia Department of Motor Vehicles, Fairfax County, Arlington County and the Northern Virginia Planning District Commission joined together to fund and implement a public information program to educate cellular users on the proper use of 911 to report emergencies. In an addition to an educational brochure and poster aimed at users, the program included the development of a special set of instructions and training for operators. The instructions and training were designed to make the operators aware of the special considerations necessary to handle cellular calls effectively. Included were specific questions to ask to help determine the exact nature and location of the incident.

### **Fairfax County Police Traffic Information Center**

In Fairfax County, Virginia, the County Police have, as part of a traffic management program covering nonfreeways, established an inexpensive but very effective Traffic Information Center (TIC). Using equipment that was formerly used only for training and emergency exercises in the Public Safety Communications Center (PSCC), two officers and a PSCC dispatcher monitor all

traffic related incidents from 6:30 to 8:30 am and 3:30 to 6:30 pm. The TIC has direct and dedicated radio contact with the police helicopter and controls the response of the Traffic Division's motorcycle units whose responsibilities include providing rapid additional manpower to major accidents and incidents during peak traffic periods. The TIC also tracks activities of the Virginia State Police, the VA Department of Transportation and the police in adjacent jurisdictions, and provides regular traffic reports to radio stations and a traffic reporting service, Metro Traffic.

All of the equipment and resources employed in this program were already in use when the TIC was established. The PSCC received and dispatched all police, fire and rescue calls and still does. Each dispatcher, however, controlled only one or two of the seven district stations and only knew what was occurring in the area under his or her control. The helicopter always flew during the rush hours but was seldom advised of traffic problems. The crew saw little response to their own reports because of a variety of radio frequencies. The TIC monitors only traffic related incidents and is able to coordinate the response among the patrol officers, the helicopter, the motorcycle units and adjacent jurisdictions. The TIC tracks an average of about 30 incidents each peak period on major commuter routes. It is estimated the average incident duration has been reduced from 70 minutes to 45 minutes since the program began.<sup>6</sup>

### **Response and Clearance Actions**

#### **Highest Return for the Dollar**

Since the greatest benefit (next to reducing the number of incidents) is achieved through a reduction in the duration of incidents, improved response and clearance actions offer a high payoff and should be among the first considerations in the development and implementation of an incident management program. Substantial reductions in response and clearance times can be achieved through the implementation of fast removal policies and procedures that require little direct costs. In many ways though, response and clearance actions are the most difficult to implement. Changing long standing policies and procedures is not easy under the best of circumstances, and in this case there are liability issues and a multitude of public and private agencies and groups involved. Incorporating the fast removal concept as a priority in operating policies and procedures, and reinforcing it through training and other agency activities, is one of, if not the, most effective incident management strategies available.

#### **Push Bumpers**

In most areas one or more enforcement agencies have the primary responsibility for responding to and clearing incidents, and police officers are the first responders. Since most incidents are minor, especially during peak traffic periods, installing push bumpers on police vehicles is an effective tool. Minor in-lane incidents can be moved to the shoulder or nearest off ramp. The issue of damaging the vehicle being pushed or damaging the agency vehicle can be mitigated with training on

proper techniques. Most police agencies that have adopted push bumpers, accept an occasional claim or damaged vehicle as inevitable but warranted from a public safety standpoint.

#### **Columbus, Ohio Police Response**

In Columbus, Ohio the Columbus police, who have responsibility for the freeways in that city, have carried this concept a step further. During peak traffic periods, police carry gas and water containers in the trunks of their cars and the cars are equipped to allow jump-starting stalled vehicles without having to raise the hood. In addition, when they are available, city owned and operated tow trucks are stationed near freeway bottleneck and high accident locations. All of these actions are designed to get the motorist, his or her vehicle and the police officer out of traffic as quickly as possible.

#### **Service Patrols**

Service patrols are one of the most effective incident management techniques available. Service patrols not only reduce response and clearance times, but can reduce detection time as well when they are operated on a roving basis. Limited for many years to mostly bridges and tunnels, service patrols have been initiated by the state highway agencies on freeways in cities in Virginia, Minnesota, Texas, Florida, Maryland, Illinois (E.St.Louis) and California in the past few years. Generally, the patrols carry gas, water, and a few tools. Most of the vehicles are driven by maintenance personnel and generally operate during weekday commute periods, but some also operate on weekends and in connection with special events. The granddaddy of service patrol operations in the U.S. is the Illinois DOT Emergency Traffic Patrol in Chicago. The "Minute Men", as they are called, patrol about 100 miles of freeway 24 hours a day, 365 days a year and provide well over 100,000 assists a year. In addition, the Illinois DOT fleet of response vehicles in Chicago includes heavy cranes, a sand spreader, an extricator truck and other equipment as part of a comprehensive program which has evolved since it began in 1961 with a couple of pickup trucks. In 1987 ITE selected the Chicago Area Freeway Traffic Management Program for its annual Transportation Achievement Award.

#### **Privately Sponsored Patrols**

In the Northeast U.S., Samaritania, Inc. operates corporately sponsored patrols in 8 cities in New York, Massachusetts, Rhode Island and Connecticut and is expanding to other cities. The patrols are funded by private companies as a public relations strategy. The vans operate during weekday peak commute periods and are equipped with tools and some used auto parts to permit minor temporary repairs. All of the drivers give traffic reports over local radio and T.V. stations and frequently spend their "off-hours" speaking to senior citizen groups and others about what to do when disabled on a freeway. In Seattle, Washington, several radio stations jointly fund and operate service patrols. In Houston in connection with several freeway reconstruction projects, the Automobile Dealers' Association donated six vans to

be operated as service patrols. The vans are operated by sheriff's deputies during peak travel periods and operating expenses are funded with construction funds as a traffic mitigation measure.

### **Competition with Private Industry**

Direct public agency involvement in clearing incidents, be it with push bumpers, service patrols or other means, is viewed by some as being in competition with private wrecker services. This is simply not the case. Incident management is an appropriate and responsible use of public funds and resources to protect the operational integrity of the highway system. A lane blocking incident on a 6-lane freeway reduces the freeways' capacity by 50%+ in the direction with the incident and 20%+ in the opposing direction due to rubbernecking. None of the public agencies involved in these programs will tow or push vehicles beyond the shoulder or nearest off-ramp. Clearing an incident as quickly as possible is in the public interest from both a public safety standpoint and from the standpoint of maximizing the huge investment of public funds in the Nation's freeway system.

### **Public/Private Wrecker Agreements**

In most areas incident clearance and towing are performed by private companies under the direction of the responsible police or highway agency. There are a variety of formal and informal arrangements employed by enforcement agencies to improve timely and adequate response. The most common of these are rotational lists, franchise contracts or some combination of the two. Under a rotational list arrangement, an area is typically divided into zones and one or more companies are selected to service each zone. To be included on the list, wrecker companies must meet equipment, insurance, storage and other requirements established by the police agency. Franchise agreements give companies exclusive rights to operate in a specified area. Franchises are generally, but not always, awarded on a bid basis with the low bid being the tow rate. Regardless of the type of arrangement, better service is provided where the agreements are actively managed and enforced and emphasis is placed on fast response times. Reference 7 provides a good discussion of actual examples of different types of wrecker agreements. Copies of this paper are available from the Office of Traffic Operations, FHWA, HTO-32, Washington, D.C. 20590.

### **Locating and Responding to Incidents**

To better pinpoint the exact location of an incident for responders, several agencies have erected 0.1 milepost markers on urban freeways. This not only helps in incident situations but allows more accurate accident location reporting. Another useful technique is an inventory of fire hydrants adjacent to freeways and placing markers at the R/W fence near the closest hydrant. In one jurisdiction the fire department, when called to a freeway incident, sends one unit to the incident scene and the other units proceed directly to the nearest hydrant via surface streets. Another problem for fire fighters when there is no

water source on the freeway is noise walls. Maryland and Florida have built doors into some noise walls to allow access to adjacent hydrants.

### **Motorist Education Programs**

The motorist can also play a significant role in reducing the duration of incidents and most importantly, in reducing the number of incidents. Studies indicate that the great majority of freeway stops are voluntary, and the majority of the involuntary stops are due to running out of gas and minor mechanical problems that could have been avoided. Several agencies have undertaken programs to better educate and inform the driver about the danger of stopping on freeways. Minor accidents present a special problem because most drivers think they are required to stop immediately and wait for a police officer before they can move their vehicle. At least 38 states have laws that conform with the language of the Uniform Vehicle Code and Model Traffic Ordinance that states drivers should stop as close to the accident scene as possible "without obstructing traffic more than is necessary".<sup>8</sup> In addition, many police agencies no longer investigate property damage only accidents. To make motorists more aware of this, the Florida DOT has erected signs on some freeways reminding drivers to "Move Accident Vehicles From Travel Lanes". Florida, Texas, Washington, Minnesota, and New York are constructing or planning Accident Investigation Sites which are located adjacent to but off the freeway where motorist can exchange information and police can conduct accident investigation away from traffic.

### **Liability Considerations**

The question of liability in connection with fast removal policies is viewed as a major issue by many public agencies. The issue is most troublesome when commercial loads are involved. An example might be an overturned truck, blocking one or more lanes, that is carrying glass containers of some commodity. Uprighting or off loading the cargo can take hours. While there are no hard and fast rules, the best overall solution may be to push the trailer and cargo off to the shoulder and then allow the trucking company to come back when traffic is light to pick up the remains. Undoubtedly additional damage will be done to the trailer and the cargo beyond what was caused by the trailer overturning. This is in fact one of the more common fast removal policies practiced in at least a dozen states. The courts have upheld these actions although few have reportedly even been challenged in court. State courts are different, of course, but this experience indicates that the liability issue may be more of a perceived problem than a real one.

Sometimes fast removal is not appropriate. In Fairfax County, Va. and other jurisdictions, incidents that are not blocking lanes are not allowed to be cleared during peak periods if removal would require blocking lanes. The incident is simply left in place until traffic volumes are lower.

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## **Clearing Major Incidents**

One way to assure the timely and efficient removal of incidents is for the responsible public agency, police or DOT, to have experienced people who can take charge of and direct clearance activities. Unfortunately, the best training ground for the wide variety of incidents that occur on our highways is on-the-job. Due to personnel turnover, experienced people may or may not be available to respond to a particular incident. In the Ft. Worth District of the Texas Department of Highways and Public Transportation, a position with job responsibilities that include the clearance of major incidents has been established. Through years of experience, the District's Safety Officer can assess the situation rapidly, determine what action and equipment is needed, and knows where the needed equipment is available. Like any specialized job, there is no substitute for experience when time is of the essence.

Incidents involving fires and hazardous or toxic materials require complex clean up and public safety considerations that simply do not lend themselves to rapid clearance. Fast, accurate identification of the material does speed up the appropriate response and is important from a public safety and environmental standpoint. With all major incidents, an accurate initial assessment of the situation is necessary to set other preplanned elements of an incident management plan in motion, i.e. motorist information and alternate routes. A post incident critique with all of the agencies that were involved has been found to be effective in improving interagency coordination and cooperation, a key to effective incident management.

## **Traffic Management & Motorist Information**

### **Preplanned Traffic Management**

There are many priorities at an incident scene, and often managing traffic is not at the top of the list. Injuries, fire, accident investigation, and other immediate needs take precedence, but all of these activities have to take place under traffic. Of necessity then, traffic management is a part of the process. The most effective traffic management strategy is fast incident detection and removal. But for even short duration incidents, effective traffic management reduces the impact of the incident. Traffic management planning and implementation takes time. That time can be consumed at the incident scene or in advance in a calmer environment. Periodic meetings and practice exercises among police, fire, highway, EMS and other responders to develop traffic management and response plans will significantly reduce the time it takes to implement these strategies when an incident does occur. Such meetings often have another benefit. The various individuals get to know each other which makes it easier for them to work together when the time comes. It's also better to work out differences of opinion in a meeting room than on a freeway where the consequences of inaction are much more detrimental.



### **Preplanned Alternate Routes**

Diversion of traffic becomes necessary when an incident blocks most or all of the roadway for a long period of time. Alternate routes frequently involve streets that are under the jurisdiction of local governments. Local officials may object to diverting freeway traffic onto local streets, but when the freeway is blocked, it is going to happen anyway. Effective alternate route planning involves identifying more and less desirable routes, identifying bottlenecks or potential problems along the routes, developing signing and other traffic control plans and coordinating responsibilities among agencies. The Maryland SHA, Md. State Police, and Montgomery and Prince Georges Counties police and traffic staffs have developed plans for closures anywhere on the Capital Beltway (I-95/495) in the Washington D.C. area. The plans include preferred alternate routes, sign locations, signal timing modifications, and each agencies' responsibilities. The SHA fabricated all of the signs that would be necessary to divert and direct traffic along alternate routes in the case of a total freeway blockage. These signs are kept in trailers at several locations around the Beltway for ready access

Caltrans District 7, in Los Angeles, and the California Highway Patrol in cooperation with other local jurisdictions, have developed alternate route plans for over 3,500 locations in the L.A. area. The District has also established a Major Incident Response Team which is equipped with variable message sign trucks, a portable HAR transmitter, and other traffic control devices. The Team responds to incidents lasting two or more hours that block two or more lanes, and is responsible for traffic management at these major incidents. Alternatives cannot be designed for every conceivable situation. When an incident does occur, however, decisions can be made much more quickly and effectively if preplanning has taken place.

### **Motorist Information Systems**

Diversion is not limited to alternate routes. Informed motorists can make informed decisions like diverting around or away from an incident site, delaying or changing the time of a trip, or even changing travel modes. To make such decisions the motorist must receive the information in time act on it. Even if an incident can't be avoided, informed motorists are more tolerant of delay when they know the reasons for it. Variable message signs, both fixed and portable, Highway Advisory Radio, and ties with commercial radio stations are all being used by various agencies to advise motorist of incident situations. No single technique is adequate by itself to reach all motorist. The more effective systems use every means available to communicate with drivers. Regardless of the mode, however, the key to effective motorist information is timely, accurate information. As a result, surveillance is an integral component of motorist information.

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SYSTEM TYPE AND LOCATION	DETECTION & VERIFICATION						RESPONSE				MOTORIST INFO				GENERAL COMMENTS	
	OPER CENTER	SENV PATROL	ELECTRONIC	CCTV	CITIZEN CALL	CALL BOXES	OTHER	TEAMS	WRCKER AGRMT	AGENCY EOMT	OTHER	ALT ROUTES	HAR	MEDIA		VMS
<b>CORRIDOR SYSTEMS</b>																
Dallas, TX, I-75	P	P		P			P	P					P	P	P	Const oriented-will become perm
Dayton, OH I-75												X		X		
Delaware Interstate						X										Call boxes
El Paso, TX/I-10			P	P				X	X	X	X	X			X	Construction oriented-will be perm
Florida rural I						X										Call boxes
NW Indiana I-80	P		P	P				P					P	P		Borman Expy-Impl. plan under development
Ft. Lauderdale/I-95								X								Const oriented, Fwy Management Team
Los Angeles/I-10	X	X	X	X	X	X	P	X	P	X	P	X	X	X	X	"Smart" Corridor Demonstration Project
Maryland(West)/US40					X			X	X	X	X	X	X		X	Init phase of CHART
Maryland/US-50	X	X			X		X	X	X	X	X	X	X	X	X	"Reach-the-Beach" Program
Michigan/I-75					X			X				X				Mich DOT/St Police Dist 6 - nonurban I
NJ Turnpike	X	X	X	P				X	X	X	X	X		X	X	Expansion/upgrade of system underway
NY/Long Island Expy	X	X	X	P	X			X	X	X	X	X		X	X	INFORM-30 mile x 5 mile corridor
NY State Thruway	X	X		P	X			X	X	X		P	X	X	X	559 miles of Toll Road Plan under devel
Pittsburgh I-376	P	P	P	P			P	P							P	Study completed by PaDOT
Penn Turnpike						P										Call boxes planned, tunnel systems
Rhode Island/I-95						X		X				X			X	Public/private Team
<b>BRIDGES, TUNNELS, AND SPOT LOCATIONS</b>																
Baltimore Tunnels	X		X	X			X		X	X		X	X	X	X	Md Transportation Authority
Boston, MA I-93/90	P	P	P	P	P		P	P	P	P	P	P	P	P	P	
Buckman Br, I-295 Jacksonville, FL		X						X	X	X						Florida DOT
Duluth, Mn I-35 and tunnels	X		X			X			X	X					X	Operated by State Police
Eisenhower Tunnel I-70, Colorado	X		X	X					X			X			X	Colorado Dept. of Hwys.
East St.Louis, IDOT		X			X	X			X			X	X			Miss River brs & adj. rwys.
Eliz. River Tunnels Norfolk/Ports., VA	P	X	P	P	X	X	X		X				X	P		
Escambia Bay Brs(2) Florida I-10/US98	X					X		X	X						X	
Hampton Rd.Br/I-64 and Tunnel, VA	X	X	X	X	X		X	X		X	X		X	X	X	
Howard Franklin Br. Tampa, FL	X	X	X	X		X		X	X			X		X	X	
James River Br/SR17 Newport News, VA	X	X		X	X	X			X	X			X			4 mi. of 4-lane divided with no shoulders, ADT=23,000
Lehigh Tunnel, Penn. Turnpike	X	X					X		X						X	
Lincoln & Holland Tunnels, GW Bridge	X	X	X	X			X		X	X	X	X	X	X	X	Port Authority of NY&NJ
Mobile,AL I-10/US98	X			X												
Oakland Bay Br (SF)	X	X	X	X		X	X	X		X	X			X	X	
Sunshine Skyway, FL	X			X		X		X	X			X		X	X	
Tappan Zee Br, NY	X	X		P	X			X		X		X		X	X	3 mi. long across Hudson River
Triborough Bridge & Tunnel Auth., NY	X		P	X		X			X				X	X		7 Bridges, 2 Tunnels

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X = In-Place                      P = Planned or Proposed  
 \* Citizen reports via cellular, CB, other

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