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16. Abstract  Freeways that are already operating at or near capacity are becoming more congested because of frequent incidents such as accidents, disabled vehicles, etc. In an effort to initiate an incident management program in Virginia, information from other states concerning incident management techniques was obtained for the purpose of helping understand the nature of the problem along with ways of combating it. Suggestions for the initiation of a program are also presented.			
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## INCIDENT MANAGEMENT PROGRAM FOR VIRGINIA

by

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(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

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## INTRODUCTION

In view of the overwhelming statistics concerning the quantity of and the consequences of incidents on freeways around the country, it was felt that a concerted effort is necessary in Virginia to ensure that incidents are dealt with in a professional, expedient manner. This report will briefly address the detection of and response to freeway incidents and summarize what several states have accomplished in alleviating the problems associated with these incidents. It will also discuss the team concept for dealing with incidents.

Traffic congestion results from two primary causes. First, bottlenecks caused by design features and the inability of the road to handle the volume, such as morning and afternoon peak traffic loads. This type of congestion is referred to as "recurring" since it occurs regularly. The other cause is random events such as accidents, disabled vehicles, spilled loads, or other extraordinary events that reduce the capacity of the freeway. This type of congestion accounts for over half of all freeway congestion. This paper addresses the management of the problems associated with these unpredictable incidents.

Incident Management

Incident management involves minimizing the impact of incidents on traffic congestion and reducing the probability of secondary incidents. This is accomplished by:

- o reducing the time required to detect an incident
- o reducing the time required to respond to an incident
- o efficiently and properly managing personnel and traffic
- o reducing the time to clear the incident.

The importance of time may be seen from an analysis of delays caused by accidents or other lane blockages in Los Angeles. During off-peak hours, each additional minute taken to correct the problem extended the duration of congestion by four or five minutes. During peak periods, this factor can be as high as fifty to one.

Incident Detection Time

Detection involves recognition and notification of an incident. Incident detection time is the time from the moment an incident occurs until the time it has been detected and reported to the proper agency. Vehicular incidents are normally detected through:

- o patrol vehicle's reports (police, service, maintenance, etc.)
- o emergency telephones or call boxes
- o CB radio
- o electronic surveillance
- o closed circuit TV monitoring.

The availability of these methods varies with location. Some areas have closed circuit monitoring capabilities, whereas others must rely on notification by police or motorists. For minor incidents, such as breakdowns and minor accidents, the detection time is often the longest. Significant reductions in delays are possible by improving detection techniques, and this should be a primary goal of the incident management program.

#### Incident Response Time

The time required to respond to an incident is measured from the moment of detection until assistance arrives at the site. This time can vary significantly depending on such factors as:

- o the nature of the incident relative to the resources necessary for clearance (location, type, severity)
- o the location and availability of the assistance resources
- o the traffic conditions encountered enroute to the incident
- o the handling of traffic relative to available capacity (ramp control, detours, motorist information).

#### Clearance Time

The time taken to restore the road to full capacity is the clearance time. This time starts when the response units reach the incident and ends on departure. Activities that occur during the clearance time include the following:

- o first aid and removal of injured
- o accident investigation
- o fire control
- o vehicle removal and debris cleanup
- o placement and removal of traffic control.

#### Incident Management Program

The primary objective of an incident management program is to minimize the impact of freeway incidents. Around the country, there is a significant amount of information and expertise from existing freeway incident management programs. A summary of those programs in the states of Illinois, California, Maryland, Michigan, Texas, New York, and Florida follows. This information comes from a variety of recently initiated and well-established programs. Although it may be difficult and inadvisable to fashion a program in Virginia after any existing program, the lessons learned from successful programs may be of help in formulating a program in Virginia.

Chicago

Incident management for the Chicago area freeway system is handled primarily through the Illinois Department of Transportation's Emergency Traffic Patrol. This patrol, which has been in existence since 1961, provides mobile surveillance and responds to freeway incidents on 100 centerline miles and 718 lane miles, 24 hours a day, 7 days a week. The patrol provided 107,924 expressway motorist assists in 1985. Assists in a typical year include the following:

		<u>%</u>
Gasoline	5,000	5
Mechanical	30,000	28
Tire repair	14,000	13
Cooling system	6,400	6
Accidents	12,350	11
Other	40,250	37
	<u>108,000</u>	<u>100</u>

The patrol has 50 "minutemen" and 9 supervisors working rotating shifts. The equipment fleet now includes eight special units, including a crash crane and three wreckers, in addition to the basic patrol units. There are 35 emergency patrol vehicles which are diesel-powered with a single-axle, short wheel-base chassis, a 20,000-lb capacity hydraulics tow rig, and a heavy steel push bumper. All vehicles carry fuel, water, air, etc. Common types of incidents encountered include:

- o stalled vehicle on a shoulder with driver present
- o stalled car blocking a lane on pavement
- o abandoned vehicle blocking a lane
- o pedestrians
- o debris
- o minor accidents
- o personal injury accidents
- o major truck accidents.

Surveillance/Control: The instrumented network operated by the IDOT Traffic Systems Center (TSC) covers 110 miles and contains 1,650 detectors. There are 70 centrally supervised ramp metering stations. Ramp metering is under construction for 21 additional locations as part of various freeway reconstruction/resurfacing projects. The median barrier wall duct/cable system has thus far allowed the conversion of 49 leased surveillance data channels to IDOT hardware.

Whenever traffic trouble is spotted through the TSC surveillance system, the procedure is to request through the Communications Center radio dispatcher the closest available patrol truck to investigate the site of the traffic flow disruption.

Changeable Message Signs: The first sign system has been operational for almost five years. A one-line, 32-character (18-inch), disc-matrix sign is bridge-mounted in advance of a 5-mile section of dual roadways under electronic surveillance. The sign is used to display real-time information concerning downstream traffic conditions. Initial planning has

begun to provide nine more changeable message signs, which would comprise the first stage of a 30-sign network.

Traffic Reports: The comprehensive network of radio and TV stations using traffic reports provided through hookups with the IDOT TSC computer has experienced no major recent changes. Seven media users have their own direct transmit/receive and/or receive-only terminal hookups. One of these users furnishes traffic reports to more than 35 additional media outlets. The IDOT computerized reports provide congestion and travel time information as often as every five minutes around-the-clock. Special messages, including commuter rail transit information, suburban bus information, and Illinois State Police bulletins are added as warranted through keyboard use. One radio station has recently added its own color-coded traffic map, driven by the IDOT sensor feed, to its "showcase" downtown street-level studio.

### Los Angeles

Major Incident Response Team: Caltrans District 07, which includes Los Angeles, Orange, and Ventura Counties, has an operational unit called the Major Incident Traffic Management Team. This team, which was started in 1971, responded to 214 major incidents in 1984 (4.1 per week at an average duration of 3.4 hours). These incidents caused approximately 359,570 vehicle hours of delay to the motoring public.

The primary purpose of the team is to furnish as rapidly as possible equipment and manpower to aid in the management of traffic at or near major traffic incidents. A major incident is any condition unpredictable in time and location that severely reduces the capacity of the highway system. This condition could be weather (fog, wind, snow, flooding), natural disasters, accidents or other conditions that would likely cause accidents and severe congestion. Early warning, alternate route signing, etc. are provided by this team. This team does not duplicate normal Caltrans maintenance functions but supplements those functions with emphasis on traffic flow.

The team may consist of as few as three persons equipped with two sedans and one changeable message sign truck. The size of the team for a particular incident is determined by the team leader and is based on need. On very large incidents, the majority of the team's twelve sedans and eleven changeable message sign trucks have been used.

Organizational Structure: The team has twelve sedans and eleven sign trucks; it consists of the team leader (associate transportation engineer), two support/spotters (assistant transportation engineers), and two sign truck drivers (transportation engineering technicians.)

This primary group, when not operating at major incidents, has other functions and responsibilities such as: traffic management planning and operation for major special events, disaster planning, research and development of new traffic management techniques and equipment, preparing operational and evaluation reports dealing with major incidents and special events, preparing project reports, and lending support to other units in traffic operations-systems.

The remaining nine support/spotters and nine sign truck drivers are assigned to various groups within the Traffic Operations Branch and perform routine traffic engineering functions. They are utilized for traffic management activities on an as-needed basis.

Coordination With Other Agencies: Usually, the California Highway Patrol is the first unit to arrive at the scene of an incident, and it is therefore the agency relied on for notification and information. Because of this, it is imperative that the traffic officer in the field be aware of the capabilities and operations of the Major Incident Traffic Management Team.

### Maryland

In 1986 Maryland established a freeway Incident Management Plan for the Capital Beltway (I-95/I-495 at Washington, D.C.) in Prince George's and Montgomery counties. The objective of the plan was to provide a set of standard operating procedures for coordinating the efforts of individual agencies. The primary agencies include the State Highway Administration (SHA), the counties, DOT, police, and fire & rescue. The State Fire Marshal's office, Metro, utility companies and affected cities and towns are also involved.

These agencies detect, respond to, and clear the incident as quickly as possible. The plan covers:

- o procedures and guidelines for communication between agencies
- o assignment of lines of authority
- o assignment of the specific tasks of each agency
- o assessment of incident severity
- o determination of alternate routing plans
- o traffic control
- o public relations
- o determination of traffic control devices
- o handling of public information.

Lines of authority are as follows:

- o Maryland State Police (MSP) is in charge of the incident site.
- o Prior to MSP arrival, SHA ranking employee is in charge.
- o MSP may delegate certain decision making to others having expertise; however, MSP remains in charge.
- o SHA will respond to MSP requests for assistance; however, SHA will perform in a manner consistent with SHA Policies, procedures, and guidelines.

- o Establishment of lane closures, road closures, alternate routes, and detours shall be done jointly by MSP, SHA, and county authorities and may involve other public roads without the concurrence of affected local jurisdictions.

The plan provides details on the handling of incidents on the I-95/I-495 Beltway by breaking the highway into sections between exits and supplying maps, traffic-control, alternate routes, etc. for each section of highway.

### Michigan

Michigan developed an incident management program for the Flint, Saginaw, and Bay City urbanized areas, which involves 100 miles of I-75 freeway. The program was developed by a steering committee formed in 1978 to assist the State Safety Commission. Members include:

- o the commanding officer of the Michigan State Police
- o other personnel from Michigan Department of State Police
- o Department of Transportation
- o Department of State.

The primary task was to develop a detour plan for occasions when sections of the freeway had to be closed. It was felt that detour routes and signs should be pre-selected along with police assistance to adequately and safely guide traffic.

A freeway closure book that covers the following was created:

- o detour routes
- o telephone numbers of people to contact
- o map of region six
- o closure responsibilities and procedures
- o segment closure maps
  - closure points
  - number of police control points
  - detour signing route
  - existing traffic controls
  - agency listings/telephone numbers.

Immediate Closure: The first police agency to arrive at the scene is to report the incident to the nearest State Police Post. They are also to report medical and fire equipment needs.

The State Police post that receives the distress call is to contact other police agencies to arrange for the necessary additional officers to secure the incident scene, handle blocked freeway traffic, and direct traffic down the designated detour route. They are also to contact the appropriate maintaining agency as designated by the plans and inform them of the location and nature of the incident, the detour route to be used, the anticipated length of time that the freeway may be closed, and the need for transportation assistance in signing, barricading, or other traffic control. They are also to contact District Headquarters.

Once the freeway is closed, the State Police will assume the role of the closure coordinating unit. The State Police will contact radio, television, and the press. The Michigan Department of Transportation District Office in Saginaw, the State Fire Marshal, and the Emergency Services Division of the State Police Coordinator will be contacted by the State Police Coordinator as needed. Usually the State Police Coordinator will be an officer from the Traffic Services Division at post headquarters.

When the incident has been cleared, the Closure Coordinator will make the decision to reopen the freeway after checking with the affected parties.

Closure Authority: The Michigan Motor Vehicle Code provides police agencies the control of all traffic when conditions exist that are hazardous to the traveling public; i.e., dangerous conditions requiring immediate actions for public safety, serious accident scenes, severely reduced visibility, extensive damage to the roadway or flooding, etc. The "Fire Prevention Act" requires all accidents or incidents involving "hazardous materials" to be reported to the State Fire Marshal. Actions to be taken will be determined by the State Fire Marshal in cooperation with the Fire Department and/or Police Department.

- o A temporary closure under police authority in excess of one hour will be coordinated with the responsible road agency (county/state) and State Highway officials.
- o Incidents requiring a detour of traffic from the state highway system will be coordinated with designated state highway officials as soon as possible, preferably prior to re-routing traffic to an alternate route.

Detroit Traffic Surveillance: Detroit has been involved in traffic surveillance/detection since 1955. As one of the pioneers in the field, they used closed circuit television for freeway surveillance on the John Lodge Expressway. Since that time, their incident management program has developed so that many independent groups are involved in incident detection. Often citizen band radio messages from the general public are provided to radio stations and to the State Police. The SCANDI system, a project of the Michigan Department of Transportation, uses traffic detectors and television cameras located on the Detroit freeways to detect incidents. SCANDI has direct communication with the State Police via telephone and television to provide information quickly so that the freeway can be quickly cleared. In addition, there are 69 motorist-aid telephones on one freeway that provide direct communication with the State Police. There are also nine changeable message signs that are used to warn motorists and suggest alternate routes. Aerial surveillance information provided by local radio stations is also used.

### Texas

In Texas the ability to achieve improved operations and safety with an organized effort was difficult because of the number of agencies involved and the number of organizations within these agencies. Because of a lack

of coordination and organization among agencies, Corridor Management Teams were organized in 1975. Their objectives were as follows:

- o to improve communication, cooperation, and coordination among agencies
- o to utilize available traffic operations expertise and finances (city, county, state, federal and public transportation) in order to obtain benefits for the road user
- o to manage traffic along corridors.

The following were important in making incident management teams a success in Texas:

- o Only by a team effort were the above objectives accomplished.
- o The teams met regularly on a set date and at a set time, and the same team members attended the meetings.
- o The teams generally consisted of personnel who were authorized to speak for their respective organizations.
- o The members of the teams (e.g., traffic engineer, major or captain rank enforcement officer, maintenance engineer, assistant city manager, assistant city engineer, transit operations manager) were responsible for carrying out the activities assigned to them by the administrator.
- o The teams were not alike; their size and representation varied to suit different circumstances.
- o The teams improved communications between the participating agencies.
- o The teams provided a source of expertise and knowledge.

The teams are involved in the planning and review of traffic operations and safety. Their activities include:

- o analysis of traffic conditions along corridor arterials and isolated problem locations with special attention to locations with congestion and a high rate of accidents
- o development of improved design for congested locations and locations with a high rate of accidents through utilization of agency personnel (this can also include increased enforcement)
- o traffic management planning for major incidents along freeways and major arterial street corridors
- o traffic management for special events and inclement weather conditions
- o traffic management through and around construction work zones and during maintenance operations activities.

It was concluded that Corridor Management Teams in Texas have proven to be of considerable assistance in increasing communications, cooperation, and coordination and have permitted cities to focus on problems with the combined expertise and funding capability of the many governmental and public transportation agencies involved in traffic operations within urban areas.

## Long Island

Incident management on Long Island was initiated in 1985 because of the lack of a proprietary interest in the management of and response to incidents. Organizing was difficult because of the multi-jurisdictional responsibilities for traffic and roads, which is typical of densely populated suburban areas. The reluctance of any one organization to assume overall responsibility and the lack of coordination during an incident led to significant congestion problems and an effort to do something about it.

One of the main issues that had to be resolved in setting up an incident program was the line of responsibility for managing an incident. Since one agency could not take the lead and direct the other agencies, it was decided that all parties would have to work together. With this in mind, a task force was formed with the following goals:

- o to develop better coordination among organizations
- o to become familiar with each organization's resources and personnel
- o over a period to develop standard operating procedures that would ensure that the groups work together
- o to make suggestions for additional training that would augment the current incident management capabilities.

The task force is now a committee that meets monthly to review incidents that have happened and constantly modify agency coordination.

Also, it was decided that efforts would be concentrated on the Long Island Expressway initially to simplify the task of coordination.

The experience on Long Island shows:

- o that it is very important to establish that incident management is a critical activity and to have the policy announced by the highest level of local and state government
- o that in a multi-jurisdictional situation, a coordinated incident management effort can work successfully
- o that efforts are appreciated by the public and elected officials who, in turn, may provide additional funds for those efforts.

## Tampa

Tampa's approach to incident management is unique since a consultant was hired to assist in setting up their program.

The first step was the establishment of the Tampa Freeway Management Team, which consisted of FDOT, city and county traffic engineering and police, sheriff, fire, highway patrol, and AAA. It was assigned the following tasks:

- o compile a list of local contacts for dealing with potential problems
- o identify the location and the availability of equipment needed for a freeway emergency

- o develop contingency plans
- o develop alternate routes
- o establish interagency agreements
- o hold debriefings of incidents to help improve operating procedures
- o develop recommendations for improved operating procedures
- o understand how best to work with the media.

The recommendations made by the Tampa Freeway Management Team are as follows:

- o Experiment (6 months) with peak-period service patrols on two interstate highways. Two DOT pickup trucks should be used with drivers from DOT. The trucks should be equipped to deal with common vehicle disablements (flat tires, gas, overheating, etc.).
- o In the implementation of the 911 system, coordinate with those agencies responsible for the system to ensure that motorists with mobile phones can be accommodated (cellular phones are a potentially valuable method of rapidly detecting incidents).
- o Investigate the possibilities of electronic surveillance and control.
- o Compile a list of personnel and equipment resources.
- o Pursue the acquisition of velcro-type variable message signs for use at major incidents.
- o Develop written information on freeway management to be included in the training for police, highway patrol, fire, and DOT personnel.
- o Develop preplanned alternate routes.
- o Equip FHP and other police agency vehicles with push bumpers, and develop a policy on the use of push bumpers.
- o Install accident investigation sites at two or three locations.
- o Evaluate TRAVALERT, which allows for the police or highway patrol dispatchers to make announcements over special radio receivers in the event of an incident.
- o The team should provide appropriate input to planning and design studies to ensure that freeways can be efficiently managed (extra right-of-way for accident investigation).

It is felt that one of the major benefits of freeway management is the interaction among agencies as a result of the monthly meetings. There is a better understanding of what each organization does and the constraints under which they operate.

#### Incident Management Team

Freeway incidents occur on transportation facilities provided by many agencies, and it is important that these agencies work together. This is best accomplished by a team approach. The necessary people and resources should be assembled in a cooperative effort to coordinate and manage activities required for reducing freeway congestion.

The success of an incident management team starts with the selection of responsible and responsive members. Members should represent the agencies associated with the transportation facility and include those with

authority to make decisions and commit their agencies to a course of action. Having someone in charge as a team leader is important.

Also, a key is to get together before an emergency and plan how each agency can coordinate its work with that of the other members of the team. The goal is to get the traffic flow back to normal as quickly as possible.

It is then necessary that a team establish basic objectives, which typically include the following:

- o minimize delay associated with freeway incidents by reducing detection, response, and clearance time
- o minimize safety impact resulting from incidents
- o provide management of personnel and traffic at the scene
- o provide information to the public
- o identify the scope relative to the type of incident (minor and/or major), and identify the areas of concern (statewide, regional, corridor, etc.).

An incident management program cannot be successful unless there is a cooperative attitude among the agencies involved. The working relationship among traffic engineering, maintenance, emergency services, and enforcement is critical.

#### Incident Management in Virginia

There is no doubt that incident management within the state is of vital importance and that a formal coordinated program is necessary to deal with congestion caused by the ever increasing number of freeway incidents.

Based on the experience of other states and agencies, it is important that an incident management program has a clear line of authority and be well coordinated. It is imperative that there be cooperation between the agencies in working toward a common goal. Problems should be identified, and operating procedures should be developed.

Presently, several things are being done in incident management in Virginia. Northern Virginia has a sophisticated freeway surveillance system in which cameras, detectors, etc. provide for the rapid detection of incidents. This system also includes ramp metering, variable message signs, and advisory radio.

Recommended procedures for dealing with incidents seem to be limited to Northern Virginia where the state police have issued correspondence relative to traffic management on the interstate system. Also, traffic incident management for I-95 in the Fredericksburg area has been initiated by the VDOT.

It is not clear what is the best way to set up a formal program in Virginia; however, since there is an awareness of the importance of having a program and there is interest in it, it is probably just a matter of coordination. This coordination should come from a task force of individuals representing the different agencies involved with the

transportation facilities. These individuals should be interested in the control of nonrecurring congestion, have a knowledge of variables surrounding incident management, and have authority to make decisions. This group should meet and decide the best way an effective incident management program could be established.

Since there are large urban areas or corridors in Virginia, it would seem logical to establish incident management programs for each area. These areas, which include Northern Virginia, Richmond/Petersburg, and Tidewater, generate high traffic volume along with major congestion, both recurring and non-recurring. Also, consideration should be given to establishing programs for smaller urban areas such as Charlottesville, Danville, Fredericksburg, Roanoke/Salem, and Williamsburg.

There should be some form of communication between area programs within the state for the purpose of sharing information, ideas, expertise, etc.

Upon the establishment of each program, it is suggested that attention be given to the following items:

- o Set objectives relative to minimizing the impact of incidents on traffic congestion.
- o Establish lines of communication between agencies, and define roles and responsibilities.
- o Have an incident management document outlining operating procedures, alternate routes and maps, along with a list of names and telephone numbers of people to contact.
- o Availability of facilities and equipment within each program area for detecting and responding to and removing incidents, along with the need for additional or special equipment.
- o Pay special attention to the handling of public information.
- o Meet regularly to discuss future plans and procedures and to analyze past incidents to determine areas of strengths and weaknesses.

Through the cooperation of the Virginia Department of State Police and the Virginia Department of Transportation a task force is presently being formed to address the issue of incident management for the Richmond Metropolitan area. The objective of this task force will be to develop contingency plans for emergency situations involving the heavily traveled routes.