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**Federal Highway
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Freeway Incident Management Handbook

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16. Abstract

This handbook was written to assist responsible agencies in managing the ever increasing number of roadway incidents.

It has been designed to aid:

- Transportation officials with operational responsibility in state and local departments of highways, traffic or transportation
- Police, fire and emergency medical services personnel
- Environmental protection officials
- Tow truck operators and
- Administrators involved with managing roadway incidents.

The handbook will serve as a guide for agencies wishing to initiate an effective incident management program. It will prove useful in both rural and urban regions by presenting a menu of responses from which the appropriate selections can be made.

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Typical Incident

Traffic Incidents

Every day, traffic incidents impede mobility on urban, suburban and rural highways. As a result, it costs substantially more for the travelling public to use these roads. A delivery truck, delayed because of a stalled vehicle or flat tire up ahead, can cost an employer an estimated $25 an hour. Multiply this millions of times a year, and the staggering cost of roadway incidents becomes clear.

These costs impact everyone, not just commercial drivers who lose valuable time on the road. Millions of dollars are lost every year by commuters and other travellers caught in the traffic jams. The California Department of Transportation (CALTRANS) estimates that over 50 per cent of all motorist delay on the freeway system is incident related. With passenger car drivers wasting an estimated $6 per hour when stuck in traffic, everyone loses. Society as a whole is the loser too, when fuel is unnecessarily burned and increased pollutants foul the air.

These cost factors affect all population centers, from the smaller to medium size cities to major metropolitan areas.

Incidents prove particularly vexing because of the randomness of their occurrence. Motorists can deal with recurrent congestion by planning for the daily delays they face during the morning and evening rush hours. However non-recurrent congestion due to an accident, stall or spilled load leads to unexpected delay and magnifies driver frustration.

And the problem shows every sign of becoming worse. Data from the Highway Performance Monitoring System (HPMS) shows an annual increase of over 20 per cent in incident delay between 1984 and 1987.[1] Since building new roads for the most part is economically and environmentally unacceptable, our existing highway network must be used as efficiently and economically as possible.

Need for Incident Management

Incidents are not like the weather (although they are sometimes caused by it). Something can be done about them. In fact, government can do a lot

about them and gain a great deal of credit when it does. The nation's roadways are among the most visible parts of its infrastructure and when operated efficiently will bring praise to the agencies responsible.

Incident management is the spectrum of activities involved in detecting, responding to and clearing roadway incidents. It is the coordinated preplanned use of human and technological resources to restore full capacity after an incident occurs, and to provide motorists with information and direction until the incident is cleared. Incident management programs vary widely in cost and sophistication, but all share the following common elements:

- Detection
- Verification
- Response
- Removal
- Traffic Management
- Information to Motorists

At the least, incident management can save the public untold hours and dollars; at best it will save lives by minimizing the time that dangerous obstructions remain on our roadways.

Purpose

This handbook was written to assist responsible agencies in managing the ever-increasing number of roadway incidents. It has been designed to aid:

- Transportation officials with operational responsibility in State and local departments of highways, traffic or transportation,
- Police, fire and emergency medical services personnel,
- Environmental protection officials,
- Tow truck operators,
- Administrators involved with managing roadway incidents.

The handbook will serve as a guide for agencies wishing to initiate an effective incident management program. It will prove useful in both rural and urban regions by presenting a menu of responses from which the appropriate selections can be made.

Organization of Handbook

The remainder of the handbook is devoted to:

- A general discussion of the roadway incident problem and solutions,
- How to get an incident management program started,
- Details of incident management techniques,
- Administrative aspects including financing, promotion, and evaluation.

Each handbook chapter stands alone and the user may read any one in any sequence desired. For example, if no further convincing is needed on the magnitude of the problem, the reader can skip directly to Chapter 3 to learn how to set up a program.

CHAPTER ONE - THE PROBLEM

Figure 2
Impact of Minor Accident

Definition

An incident *is any non-recurrent event which causes reduction of roadway capacity or abnormal increase in demand.*

Impact of Incidents

In this section terminology is introduced and some figures presented to show how much incidents affect the way freeways operate.

The most common types of incidents cause capacity reductions as shown in Table 1. Reductions from 26 to 79 percent were experienced in Houston on the three-lane Gulf Freeway depending on the type of incident.[2]

The table illustrates the dramatic effects on roadway capacity caused by even one stalled vehicle. These capacity reductions result in congestion, delay and possibly secondary accidents.

Table 1
Typical Capacity Reduction

INCIDENT TYPE	CAPACITY REDUCTION (PERCENT)
Normal flow (three lanes)	—
Stall (one lane blocked)	48
Noninjury accident (one lane blocked)	50
Accident (two lanes blocked)	79
Accident on shoulder	26

Table 2
Incident Frequencies

CITY	MILES	PERIOD	LANE BLOCKING INCIDENTS PER WEEK	
			TOTAL	PER MILE
Houston	6	6am-7pm	13	2.2
Chicago	135	24 hrs	360	2.7
Toronto	5	6am-7pm	17	3.4

Therefore it is vitally important to minimize the time that a capacity reducing incident remains on the roadway. Studies have shown that delay to motorists increases geometrically with the time it takes to clear an incident. In other words, allowing a stalled vehicle to block a lane for a half hour rather than 15 minutes can result in four times the delay to motorists.

It has been estimated that a one-lane blockage on the Gulf Freeway lasting 18 minutes would cause 800 vehicle-hours of delay. [2] If efficient incident management reduced that 18 minutes to 9, only 200 vehicle-hours of delay would result.

Put another way, the California Department of Transportation (CALTRANS) estimates that for each minute the time to clear blocked lanes is reduced, a motorist's delay is reduced by four or five minutes.[25]

These examples illustrate the major impact that everyday occurrences such as stalled vehicles have on our highway system. And these incidents do occur every day as shown in Table 2 by typical frequencies of lane blocking incidents in some major metropolitan areas.[2][3]

Table 3 shows a summary of all types of incidents occurring on a five (5) mile, twelve lane section of Highway 401 in Toronto carrying an Average Daily Traffic (ADT) volume of 270,000.[3] The Toronto data indicates a rate of approximately 19 incidents per million vehicle miles. Other data shows that incident rates on urban freeways range from 40 to 200 incidents per million vehicle miles.[1]

These figures only begin to show the magnitude of the incident problem. CALTRANS estimates that delay to motorists resulting from incidents, amounts to over 200,000 hours or the equivalent

Table 3
Incidents on 5 mile Section of Highway 401, Toronto, June 8 - September 4, 1987

INCIDENT SEVERITY	INCIDENT TYPE						TOTAL		NO. PER WEEK
	REPORTABLE ACCIDENTS		NON-REPORTABLE ACCIDENTS		NON-COLLISION INCIDENTS				
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%	
Shoulder Blocking	93	47	50	67	1332	93	1475	87	113
1 Lane Blocking	85	43	22	30	83	6	190	11	15
2 Lane Blocking	16	8	2	3	3	<1	21	1	2
>2 Lane Blocking	3	2	0	0	2	<1	5	<1	<1
TOTAL	197	100	74	100	1420	100	1691	100	

of a million dollars *each day*. [25] If the current annual 15 percent increase in congestion continues, total delay from incidents is projected to exceed 1/2 million vehicle hours per day by the year 2000.

Incident-caused congestion can also lead to secondary accidents by causing unexpected stops or slowdowns. In Minnesota, 13 percent of all peak period accidents on one Minneapolis freeway were caused by a previous incident. [4] Clearly, reducing the period of congestion caused by an incident would reduce this type of accident.

Another problem is the danger to motorists, police officers and other response personnel who are out of their vehicles as a result of an incident. Studies have shown that 20 to 30 percent of freeway pedestrian fatalities are a result of disabled vehicles.[5]

Incident Types

Incidents may be *predictable* or *unpredictable* as shown in Table 4.

Table 4
Incident Types

PREDICTABLE	UNPREDICTABLE
• Maintenance Activities • Construction • Special Events (ball games, fairs, parades, Olympics, concerts)	• Accident • Stalled Vehicle • Weather (rain, ice, snow, fog) • Bridge or roadway collapse • Spilled load

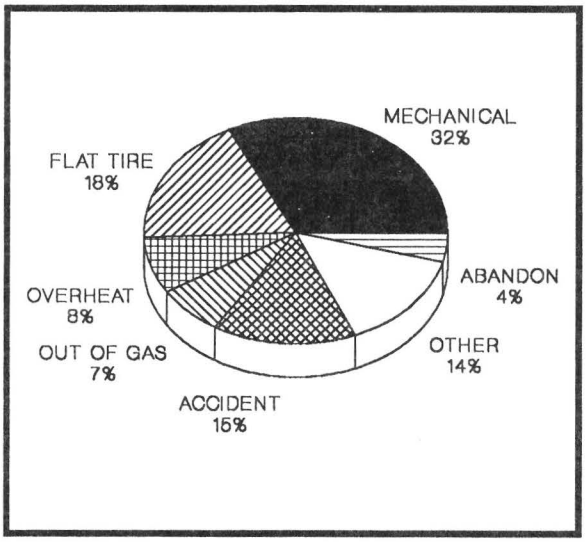


Figure 3
Incident Type Distribution (Percent)

Note: All incident types result in capacity reduction except special events which cause abnormal demand increases.

The previously mentioned Toronto study reported a breakdown of incidents as shown in Figure 3.[3]

Incidents may be *minor* or *major*. Table 5 shows characteristics of each, although exceptions to these criteria will of course occur.

Table 5
Incident Magnitudes

CHARACTERISTIC	MINOR	MAJOR
Duration	<1/2 hour	>1/2 hour
Blockage	Shoulder area only	One or more travelled lanes
Contribution to Overall Incident Caused Delay	65%	35%

As seen in Table 5, about 2/3 of all incident caused delay results from minor incidents. In Minneapolis-St. Paul, stalls account for almost 80 percent of all freeway incidents.[1] Major incidents, while causing less overall delay, are usually more costly in human and economic terms. Delay averages 2,500 vehicle hours for each accident in California and often an entire roadway can be blocked creating congestion of long duration.[25]

Times of Incident Occurrences

As might be expected, incidents exhibit similar peaking characteristics to traffic volumes, and the Toronto study reported an hourly breakdown of incidents as shown in Figure 4.

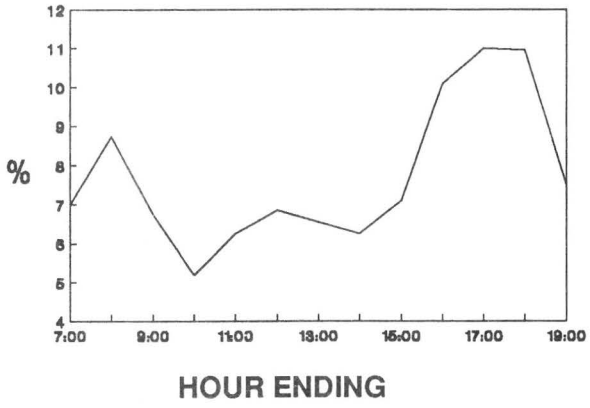


Figure 4
Temporal Incident Occurrence

A log of major incidents showing start and clearance times in the Northern Long Island, N.Y. Corridor (INFORM) is shown in Table 6.

Quantifying the Problem

The magnitude of the delay caused by any incident can be computed knowing demand volumes, remaining capacity during the incident and duration.

To quantify this delay, traffic volumes and incident durations can be graphically represented, as shown in Figure 5. The horizontal axis is a timeline indicating the occurrence of incident-related events and the overall duration of their impact on traffic flow. The vertical axis is the cumulative traffic volume--the sum of the vehicles passing any given point on the freeway in a defined time period.

The demand flow or volume--the total number of vehicles using the freeway at a given time--is represented by the slope of L1. When an incident occurs (Time A), the reduced roadway capacity (L2) is less than the demand flow because of a lane blockage. This reduced capacity remains in effect unti the incident is cleared from the freeway (Time B). At that time, the queued traffic can begin to flow at a "getaway" capacity (L3) approaching the freeway's capacity. When the last vehicle in the queue reaches the normal flow speed and traffic resumes flowing at the demand volume (Time C), the effects of the incident are over.[6]

Factors Affecting Incident Duration

A number of factors determine the magnitude of incident-caused delay, which is represented by the shaded area in Figure 5. Only some of these factors can be influenced by freeway incident management techniques. Other factors, such as the freeway's capacity and demand flow, generally are fixed by external environmental circumstances such as the number of lanes and time of day. Unless an incident occurs just before or at the end of a peak period or traffic is diverted during an incident, the demand flow rate is assumed to remain constant for the duration of the incident.

Two factors that can be influenced by incident management techniques are the reduced capacity past the incident and the incident's total duration. Effective onsite traffic management techniques

Table 6
INFORM Incident Summary for August 1989

DATE	START TIME OF INCIDENT	CLEARING TIME OF INCIDENT	CONFIRMATION AND TIME	ROADWAY DIRECTION COUNTY	NEAREST EXIT	DESCRIPTION	TIME D.O.T. NOTIFIED	DURATION OF RELATED DELAYS	V.M. SIGNS USED (sign #'s)
01-Aug-89	925	1035	925 NYCDOT	LIE WB Qns	x31	Accident		1:10	10,48,12,16,21,23,24
01-Aug-89	1246	1347	1302 NCHP	LIE EB Nass	x42	Overturned step van & auto, left lane closed		1:16	13,26,20,15,43,10,6,3, 63,70,74
02-Aug-89	715	800	720 SCHP	LIE EB Suff	x50	Acc. car spun out, rt & ctr lanes closed		0:45	9,11,13,69,70,44,61
02-Aug-89	800	830	809 NYSP	LIE EB Nass	x25	Pole down, live wire trapping occupant pole cleared at 820		1:30	55,56,64,48,66,61,63
04-Aug-89	1644	1939	N/A	LIE WB Suff	x56	3 car accident in left lane		0:55	67,1
05-Aug-89	1935	1946	1937 LSPD	LIE EB Nass	x33	Acc., center & left lanes closed 1937-1946		0:34	24,16,12,10,28,30,31, 19,18,21
11-Aug-89	455	707	515 NYCPD	LIE WB Qns	x29	Overturned TT, all lanes closed w/b 557-808	NYCDOT 456	into rush	16,24,33,25,28,30,31, 64,65,10
11-Aug-89	902	925	N/A	LIE EB Nass	x32	2 car acc., rain, left lane closed	Duty Off. 615 Reg Dir 622	0:23	55,52,51,62,63,49,56, 57,45,46
12-Aug-89	835	848	830 NCHP	LIE EB Nass	x40	2 car acc., on shoulder		0:13	20,26,15,19
12-Aug-89	1458	1600	1535 SCPD	LIE WB Suff	x51	Overturned vehicle in right lane		1:02	3,2,9,69,44,61,72,5, 60,59
14-Aug-89	1418	1515	1420 NCHP	LIE EB Nass	x40	Car fire, right lane closed		0:57	43,41,39,51,52,20,19, 12,17
15-Aug-89	1737	1834	1737 NCHP	LIE EB Nass	x40	Overturned TT, 3 lanes closed x40 1737-1834	Reg Dir 1737 Duty Off. 1745	2:08	20,26,32,51,57,52,55, 56,19,22
16-Aug-89	840	846	842 NCHP	LIE EB Nass	x38	2 car acc., left lane blocked		0:15	22,26,32,27,29,31,10, 12,16,26
16-Aug-89	1100	1200	1112 NCHP	LIE EB Nass	x46	2 car acc., left & center lanes closed		1:00	20,15,13,70,72,71,3,6
16-Aug-89	1523	1600	1523 SCHP	LIE EB Suff	x52	Car acc., left lane closed			5,9,40,42,69,70,7,8,9, 11,13

Table 6 (cont'd.)
INFORM Incident Summary for August 1989

DATE	START TIME OF INCIDENT	CLEARING TIME OF INCIDENT	CONFIRMATION AND TIME	ROADWAY DIRECTION COUNTY	NEAREST EXIT	DESCRIPTION	TIME D.O.T. NOTIFIED	DURATION OF RELATED DELAYS	V.M. SIGNS USED (sign #'s)
17-Aug-89	1142	1300	N/A	LIE WB Nass	x37	3 cars locked together, left lane		1:52	10,12,16,48,14,18,73,71
18-Aug-89	2201	2231	2201 NYCDOT	LIE WB Qns	x23	Car fire		0:30	57,33,34,66,25,28,30, 14,18,21
19-Aug-89	1230	1310	N/A	LIE WB Suff	x50	Jack-knifed TT, right & center lanes closed		0:40	2,3,59,60,37,67
20-Aug-89	1350	N/A	1349 NYSPD	NSP EB Nass	x31	Car accident		into rush	52,55,50,20
23-Aug-89	724	809	732 NCHP	LIE EB Nass	x39	Accident		1:28	73,71,10,12,14,16,20, 26,32,19
26-Aug-89	805	903	814 NCHP	LIE EB Nass	x43	Overturned van, center and left lanes closed		0:58	11,13,15,71,20,26
26-Aug-89	1027	1122	1031 JHK	LIE WB Nass	x40	Accident on shoulder		0:55	10,12,14,71,43
27-Aug-89	255	300	300 NCHP	LIE WB Nass	x34	Multi vehicle acc. w/injuries LIE w/b closed form 3:20-5:33	Duty Off. 335 Albany 320	0:35	12,24,16,10,14,18,21, 23,25,43
27-Aug-89	1158	1233	1158 NYSPD	LIE WB Nass	x38	3 car accident		0:35	44,47,13
27-Aug-89	1923	120	1923 SCHP	LIE EB Suff	x46	Head on collision at exit to Vets Hwy. All lanes closed on Vets & NSP in both dir.	Duty Off. 1923 State 1840	5:57	38,40,44,47,59,60,69, 70,68,1,6
28-Aug-89	708	815	709 SCHP	LIE WB Suff	x58	4 car accident, left lane closed			1
28-Aug-89	1004	1145	1007 NCPD	LIE WB Qns	x28	A car and truck accident in right lane		1:41	33,24,16,34,10,12,46, 53,31,48
28-Aug-89	1350	1401	N/A	LIE WB Nass	x39	Accident, right lane closed		1:40	10,12,16
29-Aug-89	2218	2239	N/A	LIE EB Nass	x46	2 car, rear ender, rt & ctr lanes blocked		0:21	11,13,44,61

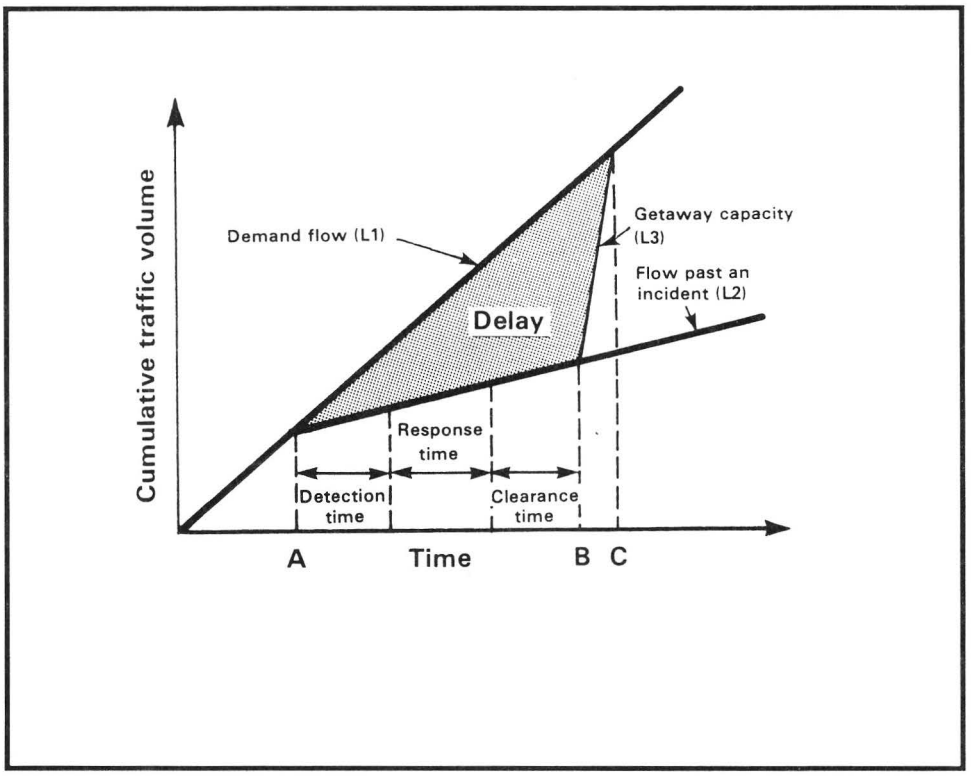


Figure 5
Quantifying Incident Delay

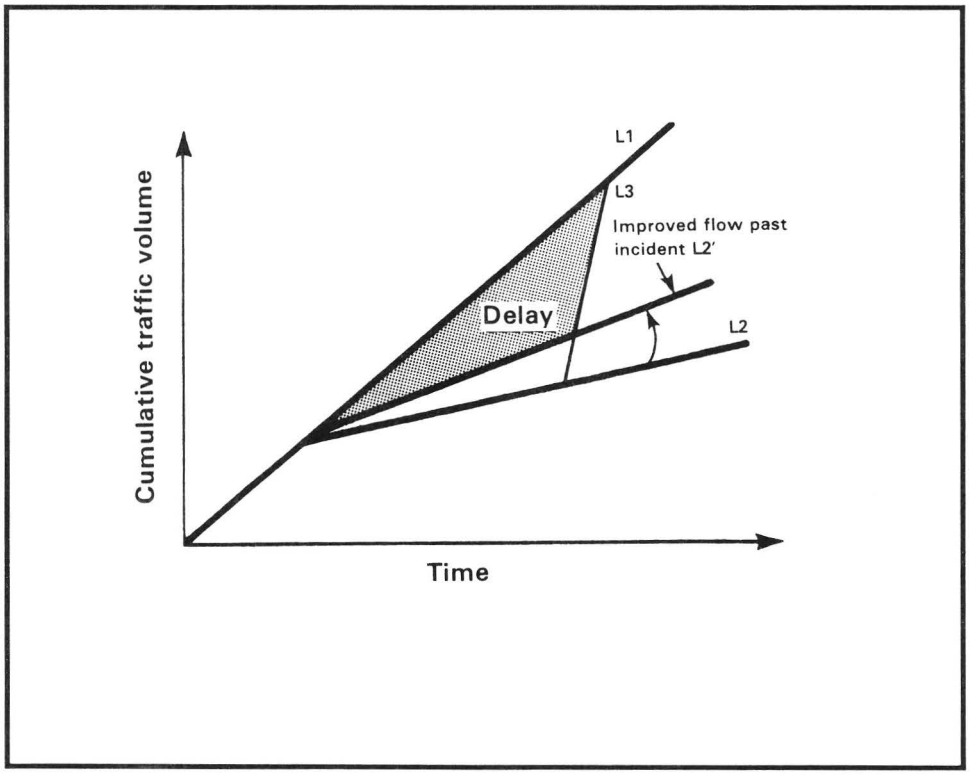


Figure 6
Delay Reduction Caused By Increasing Flow

optimize use of whatever freeway capacity remains after the incident. Graphically, this is represented in figure 6 by an increase of the slope of the reduced roadway capacity L2 to create an improved flow rate L2′.

Another factor influencing total delay is the time from the moment the incident occurs to the time it is cleared from the freeway. This time interval AB can be expressed as the sum of the detection, response, and clearance times as shown in Figure 5. Obviously, minimizing any of these times through efficient incident management will result in less total delay.[6]

Incident management programs need, therefore, to focus on ways to reduce:

- The time to detect incidents,
- The time to identify the nature of an incident,
- The time to respond with appropriate personnel and equipment to deal with any particular incident,
- The time to clear the incident and restore roadway capacity,
- Traffic demands during the incident by instituting a variety of traffic management measures.

CHAPTER TWO - THE SOLUTIONS

Figure 7
Variable Message Sign
Throgs Neck Bridge, Long Island, New York

Definitions

The nature of any particular incident will naturally dictate the measures to be used to deal with the incident. In general, six major tasks will have to be accomplished if incident management is to be effective:

Detection - *Determination that an incident of some nature has, indeed, occurred. This information needs to reach that location where response can be initiated.*

Verification - *Determination of the precise location and nature of the incident as well as the display, recording, and communication of this information to appropriate agencies.*

Response - *The activation, coordination, and management of the appropriate personnel, equipment, and communication links and motorist information media as soon as there is reasonable certainty that an incident is present.*

Removal/Restoration of Capacity - *Removal of wreckage, debris, spilled materials, etc. from the roadway and restoring the roadway capacity to its pre-incident condition.*

Traffic Management - *Application of traffic control measures in the area of the incident site including: lane closures and openings, establishing and operating alternate routes, diversions, parking of emergency vehicles and ensuring safety of incident victims, motorists and emergency personnel.*

Information to Motorists - *Activation of various means of communicating incident site traffic conditions to motorists.*

Table 7 provides a listing of a variety of measures which have proven to be effective in accomplishing the six major tasks of a comprehensive incident management program.

As can be seen, a host of measures are available. Not all are applicable to every incident or to every jurisdiction, nor is each equally effective everywhere. However, a blend of these measures will produce significant benefits in terms of reduced delays at incident sites. Each of these measures are discussed in greater detail in the remainder of this handbook.

Table 7
Incident Management Measures

INCIDENT MANAGEMENT					
REDUCE DURATION			RESTORE/MAINTAIN CAPACITY	REDUCE DEMAND	
DETECTION	VERIFICATION	RESPONSE	REMOVAL	INFORMATION TO MOTORISTS	TRAFFIC MANAGEMENT
Electronic/ computerized detection Enforcement personnel/patrols Maintenance/ construction/ other personnel Service patrols Fixed observers at strategic locations Transit, taxi, trucking organizations Traffic reporters/ commercial traffic information services Aerial surveillance Motorists • Call Boxes • Cellular telephone/ "hot" lines • CB radio	Assimilate information from: • Enforcement personnel/patrols • Courtesy patrols • Service patrols • Closed-circuit TV • Citizens Band Radio • Traffic Reporters • Aerial surveillance • Cellular telephone • Emergency call boxes • Other Display/record information Communicate information to appropriate agencies	Pre-planning Enforcement Agencies Response teams Service Patrols Fire, medical, environment, maintenance, other Inter-agency communication Specialty teams (Haz-mat) Tow truck agreements Commercial Alpha-Numeric Pager Strategic location of materials and equipment	Appropriately equipped response vehicles Training of response personnel Service patrols Off-freeway accident investigation sites Push aside/remove later (push bumpers) Defer removal until off-peak Rapid removal policies	Diversion information • Variable message signs – Permanent – Portable • Highway advisory radio – Permanent – Portable • Commercial Alpha-Numeric Pager • Media outlets – Commercial radio – Cable TV – Print Media – Other media	On-scene traffic management • Lane closures/reopenings • Freeway closure/reopening Implement pre-planned alternate routes

CHAPTER THREE - HOW TO GET STARTED

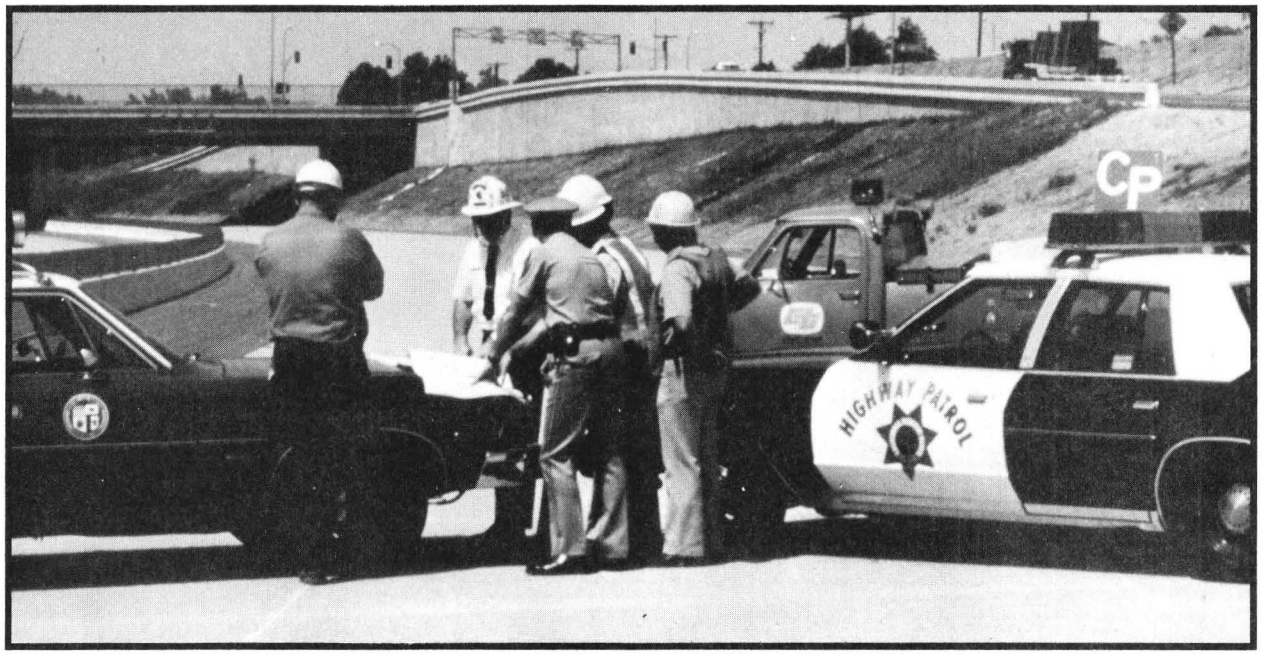


Figure 8
Field Meeting of Traffic Management Team

Project Initiation

While the precise procedure for initiating an incident management program will vary from region to region, there are certain steps which are usually necessary. Scanning Table 7 in the previous chapter indicates that incident management techniques involve many different agencies. Thus the appropriate 'blend' of solutions for each region will require a high degree of coordination among the relevant agencies. Therefore the prime objective in getting started is to establish a framework for the required inter-agency coordination.

The first step is to identify those officials and agencies likely to have a vested interest in establishing an incident management program. These may include:

- Elected Officials
- State DOT
- County/City DOT
- Transit Operators
- Local Jurisdictions
- Police Departments
- Highway Patrol
- Independent Authorities
- Fire, Rescue
- Emergency Services
- Environmental Protection Agencies
- Towing Services

As an example, TRANSCOM, operating in Metropolitan New York and New Jersey, coordinates the agencies illustrated in Figure 11.

The next series of steps are summarized as follows:

- Prepare and circulate memorandum summarizing problem and indicating need for established incident management policy. Use FHWA Incident Management videotape as part of this process
- Gain support of highest official(s) in region.
- Have highest officials call meeting of agencies previously identified as involved in the incident management process.

Figure 9
Multi-Agency Coordination in TRANSCOM

Table 8
Sample Agenda for Kickoff Meeting

1. **Summary of Problem**
2. **Identification of Incident Management Issues**
   - Multi-jurisdictional aspects
   - Need for coordination
   - Responsibilities
   - Allocating resources of each agency
   - Others
3. **Action Items**
   - Agree that incidents are a serious problem and should receive high priority attention
   - Agree to allocate resources to improve inter-agency coordination
   - Establish task force with representation from each agency to prepare coordinated incident management plan
   - Establish date for interim and final reports to agency heads and selected officials.
   - Designate report preparer.
4. **Set next meeting date to review Task Force interim report or earlier if desired.**

- Prepare agenda for meeting. See Table 8 for sample.
- Obtain agreement at meeting on major action items.

Task Force Assignment

The result of the first meeting should be a general consensus on the importance of incident management and the need for intensive inter-agency coordination and planning. The task force should focus on those aspects considered most needed for the particular region. Items shown in Table 9 are typical of those usually requiring early attention.

Avoiding Pitfalls

With effective incident management consisting of a lot of common sense, the question often arises, "why hasn't it been done before?" Many impedi-

Table 9
Typical Task Force Early Action Items

- Define roles/responsibilities
- Identify legal issues and need for inter-agency agreements
- Adopt Task Force procedures
- Establish inter-agency communication contact points
- Determine need for outside consultant services and sources of funding
- Identify high priority tasks
- Visit other regions to observe incident management programs
- Inventory available resources (equipment and personnel)
- Identify improvements in current incident management procedures
- Identify new incident management techniques for the region
- Prepare interim report

ments can be readily overcome as indicated in Table 10. If any of these conditions exist in your region, they must be addressed to ensure a successful outcome.

Traffic Management Teams

A natural outgrowth of the Task Force can be the establishment of permanent traffic management teams. Traffic management teams have been formed in several regions to plan overall traffic management and coordinate response to roadway incidents.

Traffic management teams are normally permanent groups which meet regularly to evaluate and improve coordinated incident response and address other traffic problems as well. This team can evolve from the Task Force originally set up to inititate incident management.

Table 10
Overcoming Impediments to Starting an Effective Incident Management Program

IMPEDIMENTS	MITIGATION
• Shared responsibility/authority among agencies.	• Acceptance of a "team" approach. Recognition that no one agency need be "in charge".
• Overlapping of roles.	• Development of an agreed on coordination plan through written agreements of understanding or interagency agreements.
• Incompatibility among jurisdictions in operational objectives.	• Joint development of coordination plan to ensure each jurisdiction's requirements are met. Allow each jurisdiction to make decisions relevant to its own operations.
• Lack of understanding of problem.	• Provision to management of information including this handbook, its references and companion FHWA videotape.
• Random nature of incidents with resulting lack of continuous management attention to problem.	• Continuous flow of information, recommendations and experience in other regions.
• Costs	• Information on benefits including low cost measures.

Examples of traffic management teams are found in Florida, Texas and Long Island, New York.[33, 34, 35, 36]

Florida

As of July, 1990, there were seven active freeway management teams in Florida in the areas surrounding Tampa Bay, Jacksonville, Orlando, Miami, Fort Lauderdale, Palm Beach, and Daytona Beach. Teams meet monthly with the following objectives:

- Increase awareness and develop personal relationships among all parties involved in response to freeway incidents.
- Coordinate activities to provide the most effective and efficient approach to servicing freeway incidents.
- Assist in the development of an overall plan for coordination of team activities and response to incidents.
- Assist and support other team members in obtaining support and resources required in the overall coordinated effort.
- Critique past efforts of the team in responding to major freeway incidents and develop modifications and revisions to the overall coordinated effort.
- Review and advise the Department of Transportation on the maintenance of traffic plans associated with major freeway reconstruction activities.

Team members include:

- Traffic engineering at the City, County and State levels
- Police enforcement at the City, County and State levels
- Highway maintenance at the State level
- Emergency medical and fire rescue
- News media
- Special interest groups such as American Automobile Association
- Environmental protection agencies
- Local emergency preparedness organizations
- Wrecker services
- Florida Department of Transportation (FDOT) weight enforcement
- Local military groups
- Metropolitan planning organizations

Typical output of FDOT traffic management teams are shown in Table 11.

Texas

As of June, 1990, there were 24 traffic management teams operating in Texas. These include the 9 largest cities and 15 others. Typical composition of the teams is shown in Table 12. The Texas teams focus on managing traffic in corridors, i.e., a system of roadways which interact and serve as alternate routes to each other.

Teams coordinate actions in the following areas:

- Work zone operations
- Route improvements
- Normal operations
- Emergency planning
- Special event traffic handling

Guidelines for successful team meetings are:

- Regular monthly or bimonthly meetings
- Attendance by the same personnel each time
- Informal interaction

Table 11
Florida DOT Early Team "Products"

- Prepared alternate route maps (first generation).
- Modified pickup truck with hinged sign frame for incident management.
- Added two service patrol wreckers weekdays (six hours) for the operation on a bridge. FDOT equipment and drivers are being used but will be replaced by contract services.
- Planned for two additional service patrol vehicles (non wreckers) to begin service soon on another bridge.
- Installed emergency locator markers on a test section of I-95 in Miami for purpose of more accurate reporting of incident sites by one on-site agency to another responding agency. These will be small signs on existing sign and lighting poles. Also to be tried will be painted info (route number, roadway direction, and milepost to one tenth of a mile) on median barrier. (Similar signs recently seen on I-475 in Toledo, Ohio.)
- Formulated plans to get "fire-fighting" water to top of multi-level interchange: possible pipe only, through which water will be pumped during times of need only.
- Made provisions in noise barrier walls for running fire hose from neighborhood fire plugs to an incident site on the freeway (fire fighting, flushing, and washing).
- Installed special signs or markers along the edgeline and/or freeway fence showing closest neighborhood fire plug.
- Assisted (by letter of endorsement) local sheriff's budget request for additional helicopter aircraft.
- Selected preliminary locations for off-freeway accident investigation sites.
- Installed median signs to strengthen motorist's knowledge of state statute, "Accident Vehicles Must be Moved from Traffic Lanes".
- Improved statewide, standard sign being developed (via Orlando Team) concerning previous item, "Move Accident Vehicles from Travel Lanes".
- Successfully orchestrated an "olympian" sized planned event in Miami with numerous federal, state, local and Vatican agencies who developed a plan for a two-day visit by Pope John Paul and President Reagan in September, 1987. The team chairman played a major role via a special traffic management plan.
- Developed special traffic redirective provisions by special U-turns beneath the I-275, Howard Frankland Bridge, for total or one-direction bridge closure during major incidents. Since the 8 to 9 foot clearance will only clear an estimated 85 to 90 percent of the vehicles, "overheight" detectors were installed.
- Invited an F.C.C. engineer to monthly meetings to explain more about emergency communications which was an acknowledged weak link in freeway management at the FDOT, FHP, and local agencies because of inadequate, antiquated equipment and need for special equipment (and possible frequencies) for direct inter-agency communication during a major incident.
- Developed interest for both portable, changeable message (matrix) signs for mainline communication with drivers about incidents ahead and for diversion route signs (usually, roll-up, reflective, with Velcro message changeability). One FDOT District (Tampa) is ready to requisition the latter.

- Prepared agenda
- Reaching verbal consensus
- Requirement that team members must be able to commit their agencies' resources

Long Island, New York

On Long Island, monthly meetings of police and transportation officials are held to coordinate incident management. Plans are developed to improve detection, response, and clean up. Standby maintenance crews are on duty from 5:00 AM to 7:00 PM to respond to calls from the police. An hour of response time is saved in the early morning hours compared to the previous system of calling in crews from their homes.

Identification of Incident Management Techniques

One of the Task Force or traffic management team early action items is to identify which incident management techniques are most suitable for the region. To assist in this task, the following chapters discuss incident management techniques which have achieved success to date. Techniques are presented according to their categories: detection, verification, response, removal, traffic management and information to motorists.

Table 12
Agencies Represented on Teams in Texas

JURISDICTION	AGENCY	BEAUMONT	CORPUS CHRISTI	FORT WORTH	SAN ANTONIO	HOUSTON
STATE	Traffic	●	●	●	●	●
	Design			●		
	Maintenance		●	●		
	Highway Patrol	●	●			●
COUNTY	Engineer		●		●	●
	Sheriff				●	●
CITY	Traffic	●	●	●	●	●
	Police	●	●	●	●	●
	Fire	●				●
	Transit				●	●
OTHER	Naval Air Station		●			
	Traffic Safety Assoc.				●	
	Railroad				●	

CHAPTER FOUR - DETECTION/VERIFICATION

Figure 10
Closed Circuit TV for Incident Verification

Definitions

Detection - *Determination that an incident of some nature has, indeed, occurred. This information needs to reach that locaion where response can be initiated.*

Verification - *Determination of the precise location and nature of the incident. as well as the display, recording and communication of this information to appropriate agencies.*

Objectives

Rapid detection is necessary to minimize the period of time (duration) in which capacity is reduced. Proper verification is required to reduce the time to activate an appropriate response and direct the response to the scene.

Thus an *effective detection/verification* system requires:

- means of detecting or sensing that an incident has occurred
- a focal point or operations center for the fusion of detection information arriving from multiple sources
- communications links from the operations center to agencies which are sources of incident detection information and agencies which are receivers of incident information (i.e. those with responsibilities to respond to incidents)
- means of display and recording of incident information

Techniques

A variety of detection and verification techniques are available as listed in Table 13.

Table 13
Detection/Verification Techniques

TECHNIQUE	DEFINITION	ADVANTAGES	DISADVANTAGES	REFERENCE
Motorist Cooperative Media	Use of Emergency Telephones, Call Boxes, CB radio, Cellular Telephone (911).	Uses commercial information services.	Is dependent on motorist input.	Appendix E
Commercial Traffic Information	Use of organizations such as Shadow Network (Commercial Traffic reporting service.)	Requires no cost to agency.	May not be all inclusive. Is limited to resources of commercial organization.	
Fleet Operators	Use of transit, taxi and truck drivers to report and verify incidents.	Requires no cost to agency. Provides large number of observers.	Relies on conscientious drivers.	
Patrol Vehicles	Use of vehicles patrolling for enforcement or maintenance purposes to report incidents to operations center.	Serves both detection and verification functions. Uses on-going patrol operations.	May require additional personnel/vehicles to maintain patrolling frequency during congested conditions. May delay detection due to non-uniform headway between patrols. May impede verification when congestion slows patrols.	
Service or Courtesy Vehicles	Use of special vehicles which provide assistance for common breakdowns (fuel, flat tire, jumpstart, push off roadways).	Can detect and verify incidents on its beat, although primarily a response technique.	May provide sporadic reports. Depends on location of fleet vehicles.	Appendix C.
Fixed Observers	Use of observers positioned on tower or buildings along the highway to observe incidents.	May be useful interim measure. May be useful for detection and some verification.	Is labor intensive. Provides limited area of coverage. Requires construction of towers, or available observation sites. Is limited to mild weather conditions.	3.

Table 13 (cont'd.)
Detection/Verification Techniques

TECHNIQUE	DEFINITION	ADVANTAGES	DISADVANTAGES	REFERENCE
Aerial Surveillance	Use of helicopters and small planes to report incidents.	May be useful for detection and verification.	Requires large capital investment. Has high operations cost. Provides delays in detection until plane passes over incident.	Appendix E
Electronic Surveillance	Use of sensors placed along the roadway to detect the presence of vehicles and automatic processing of this data to determine congestion. Includes induction loops, magnetometers, sonic and wide area detection systems.	Can continuously monitor entire roadway section. Provides rapid detection, especially in high volume conditions.	Requires large capital investment. Has long lead time in designing and implementing system. Has high maintenance costs. Cannot detect non-congestion causing incidents.	8, 9.
Closed-circuit television (CCTV)	Use of television cameras placed along the roadway.	Serves as effective verification technique allowing rapid determination of nature of incident. Serves effectively in bridge/tunnel applications where length of required coverage is limited.	Has limited effectiveness as detection technique due to possible operator inattention. Requires large capital investment. Has high maintenance cost. Requires coaxial cable or fiber optic interconnect.	
Automatic Vehicle Identification (AVI)	Potential use of AVI equipped vehicles to measure travel time between monitoring stations. (Potential application)	Does not require sensors in roadway.	Requires reasonably large sample of AVI-equipped vehicles. (Large travel times may be indicative of either incident or heavy volume.)	

Selection

As seen in Table 13, many different detection/verification techniques are available. The responsible incident management agencies must select from this list the most appropriate for its region. Many in the list are relatively low cost and generally would be good candidates for initiating a project. Some of the techniques involve existing resources and services. For these, the primary task would be coordinating these resources in order to funnel the information into a Traffic Operations Center (See Chapter 5).

Table 14 shows a series of application criteria and indicates how each technique meets the criteria.

Table 14
Application Criteria for Incident Detection/Verification Techniques

APPLICATION CRITERIA	MOTORIST COOPERATIVE MEDIA	COMMERCIAL TRAFFIC INFO	FLEET OPERATORS	PATROL VEHICLES	SERVICE PATROLS	FIXED OBSERVERS	AERIAL SURVEILLANCE	ELECTRONIC SURVEILLANCE	CCTV
Senses incidents automatically								●	
Is independent of regular patrols	●	●	●			●		●	●
Is independent of motorist cooperation		●	●	●	●	●	●	●	●
Provides verification	●	●	●	●	●	●	●		●
Provides two-way communications with motorist	●				●				
Allows stopped motorist to summon assistance	●								
Has no requirement for dedicated communications system	●	●	●		●	●	●		
Requires no addition of equipment/vehicle by another agency	●	●	●		●	●		●	●
Has no limitation during inclement weather	●		●	●				●	
Has low to moderate initial cost	●	●	●	●	●	●			
Has low to moderate operating costs	●	●	●						
Provides consistent detection throughout roadway								●	

CHAPTER FIVE - RESPONSE

Figure 11
Houston Courtesy Patrol

Definition

Response - *the activation, coordination and management of the appropriate personnel, equipment, communication links and motorist information media as soon as there is reasonable certainty that an incident is present.*

Objectives

Early and effective response is critically important to the incident management process. Timely response reduces the incident duration and therefore the roadway's reduced capacity operating condition. This in turn reduces delay to the motorist and minimizes the time that unsafe conditions exist. An effective response plan begins with the establishment and then the continuous evolution of the following:

- Inter-agency coordination
- A general approach to managing incidents
- Working relationships among agencies
- Communication links between agencies
- Detailed procedures
- Post-incident critiques to refine the operation and improve working relationships between agencies.

Pre-Planning

Timely response requires the development of a response plan. In developing this plan, the working relationships among participating organizations will be established, thus nurturing a key element of incident response: inter-agency coordination. The plan must address at a minimum, those aspects shown below:

- Definition of roles of responding agencies
- Description of inter-agency communication links

Table 15
Incident Response Plan

SECTION	FUNCTION
Participating Agencies	• Lists all participating agencies and telephone number of incident management coordinator. • Lists other participating agencies.
Summary	• Describes major plan elements.
Levels of Implementation	• Describes series of levels of incident management intensity and conditions under which each level is to be invoked.
Traffic Management	• Describes communications procedures for each roadway section, agencies to be informed, diversionary routes, traffic control locations, local and regional signing.
Resources and Responsibilities	• Lists each agency, contact numbers, key personnel, responsibilities and other pertinent information.
Media Contacts	• Lists each media contact, contact numbers, key personnel, responsibilities and other pertinent information.
Team Coordinators	• Lists all involved agency coordinators and telephone numbers.

- Detailed procedures
- Resource files
- Logistics (deployment of equipment/services)

A response plan should consist of at least seven main sections as summarized in Table 15.

Table 16 shows the Table of Contents from a response plan prepared by TRANSCOM, the incident management coordination agency for the New York/ New Jersey metropolitan area. Appendix A provides sample pages from this document (Reference 10).

The plan should be continuously updated to assure its accuracy. TRANSCOM periodically stages drills to test the plan. Drills include:

- A communication drill which tests that all the pre-established links are functional.
- A communications and deployment drill which tests both communications links and the dispatch of personnel and equipment.

Response Techniques

Inter-Agency Communications

A key element to effective response is the establishment of communications links among the participating agencies. These links can take several forms, each with its advantages and disadvantages as shown in Table 17. Most likely a combination

Table 16
Response Plan

Table 17
Inter-Agency Communications Links

TYPE	ADVANTAGES	DISADVANTAGES
Telephone	• Is simple to implement. • Is least costly to implement.	• May be disrupted during emergencies. • May be difficult to reach agency during emergencies due to lines being tied up by other calls.
Leased Telephone Lines	• Is not subject to telephone traffic on phone system's network.	• Has cost of leased lines.
Dedicated Owned Cable	• Has lower operating cost than leased line with same advantage.	• Has possibly high capital cost unless existing owned cable is used.
Commercial Pager	• Can "broadcast" message to participating agencies. • Reaches incident management coordinator directly. • Does not require personnel to make calls.	• Has cost of using commercial paging service. • Is not completely reliable. Misses transmission during inclement weather. • May garble message.
Radio	• Makes use of agency's existing radio system. • Reaches field personnel directly.	• Has cost if system not already in use. • Has range limitation. • Is subject to interference • May not have frequencies common to other agencies.
Data Modem	• "Broadcasts" message. • Can display message on screen at participating agencies. • Does not require personnel to make calls.	• Has cost of modems and computers. • Gives no assurance that message will be seen.

of several different links will be used in any particular region. The important point is that they be reliable and capable of functioning in a wide range of emergency conditions. Periodic testing of the links is advisable to ensure that they will be functional at all times.

Figure 14 shows the communications links, predominantly leased telephone lines, established in the Chicago area between the Traffic Systems Center and other agencies in the region.

Traffic Operations Center

The establishment of a "focal point" or operations center for the *fusion* of detection information arriving from several sources is the first step in coordinating data gathering throughout the region and managing the response to the incident. Typical locations include:

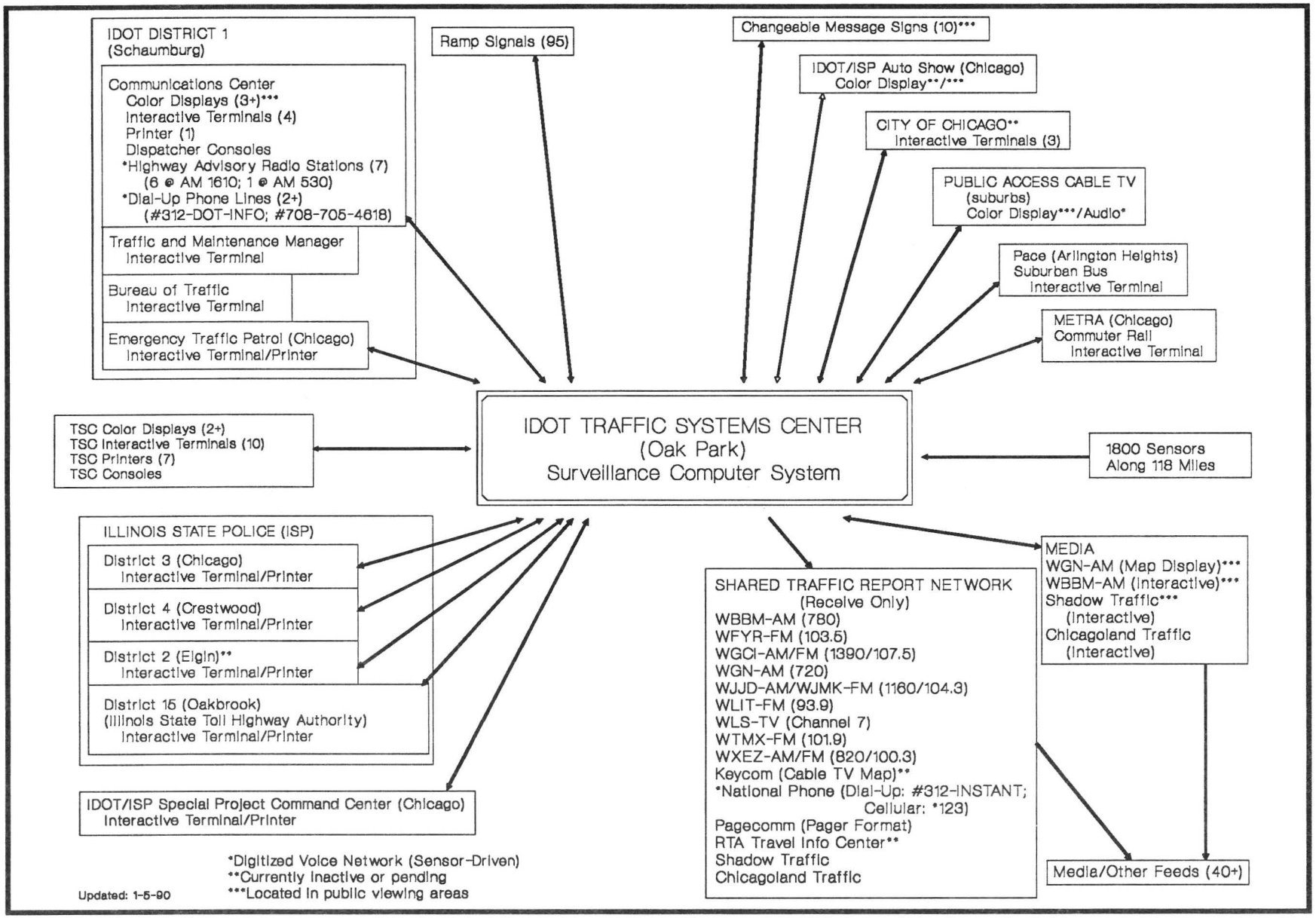


Figure 12
IDOT TSC Computerized Traffic Information Network

- Computer Traffic Control Center
- DOT Maintenance Dispatch Office
- Police Dispatch Center
- Designated Area or Room at DOT Office

Figure 15 shows an operations center in the New York/New Jersey metropolitan area. Factors in selecting an appropriate location are:

- Available space at agency facilities
- Integration with existing dispatch operations
- Integration with existing traffic control operations
- Lease or acquisition cost
- Centrality of location
- Impact of location on communications costs
- Visibility for public relations purposes

Response Services

A number of means of responding to incidents are available and are summarized in Table 18 along with their advantages and disadvantages.

Service Patrol

Freeway service patrols utilize public or private vehicles (i.e., pickup trucks, vans, or tow trucks), and operate on mobile patrol or on standby to handle incidents and provide motorist assistance. The primary objectives of service patrols are to minimize the duration of an incident by its fast removal, and to reduce the risks to motorists and response personnel.[7]

Service patrols range from basic motorist assistance programs, as provided by police agencies in Richmond, Virginia and Columbus, Ohio to highly sophisticated emergency and incident handling programs such as the Illinois Department of Transportation (IDOT) service patrol program in

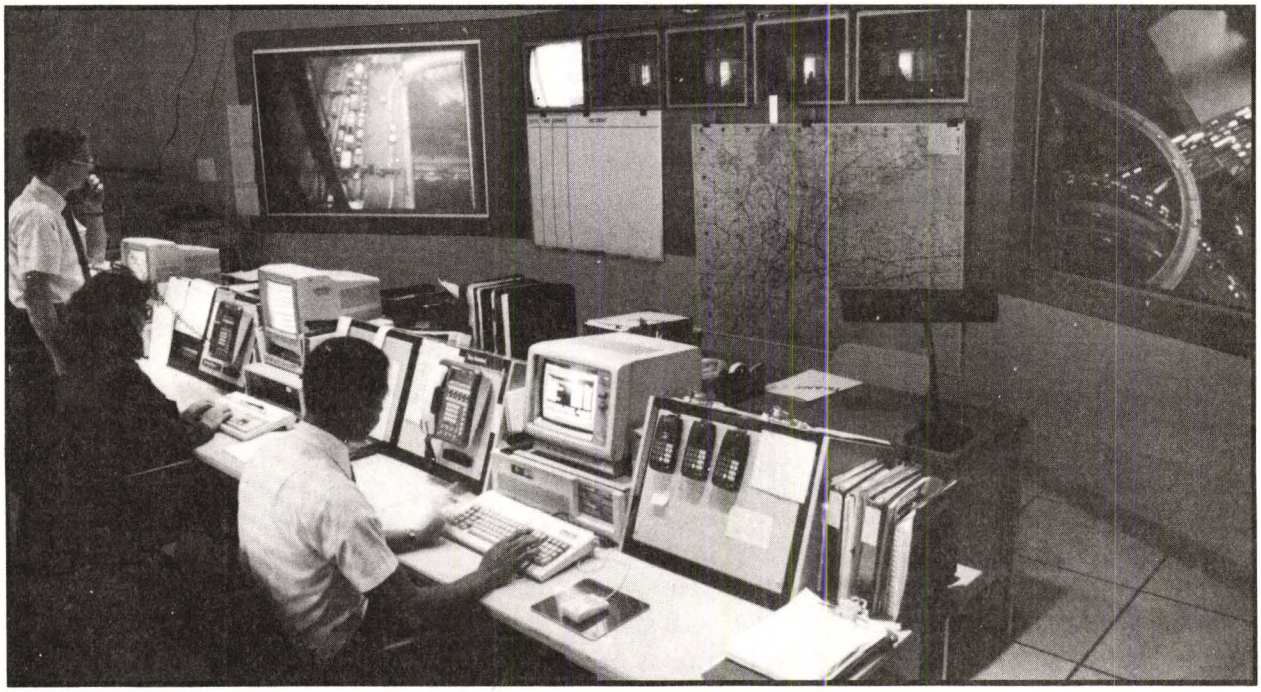


Figure 13
TRANSCOM Operations Center

Table 18
Response Service Characteristics

	SERVICE PATROL	COURTESY PATROL	POLICE PATROL
Capabilities/ Function:	• Uses patrol vehicles with gasoline, water, pressurized air, jumper cables, fire extinguisher, first aid, tools, jacks, broom, push bumpers.	• Is usually less extensive than service patrol. • Can provide up to 15 assists per day per vehicle. • Usually operates weekdays, morning and evening peak periods.	• Serves as incident response coordinator. • Requests other response vehicles. • Performs accident investigation. • Pushes disabled vehicles onto shoulder.
Advantages:	• Solves minor problems/breakdowns. • Provides quick removal from travelled lane. • Provides regular, frequent assistance • Provides incident verification; occasional detection.	• May be operated by public agency. • Can be funded by private enterprise such as major gasoline company, bank, store, radio station or auto dealer (example, Samaritan program).	• Can be based on existing patrol presence or dedicated freeway patrol. • Has law enforcement presence. • Provides accurate verification. • Uses police communications. • Uses police car push bumper.
Disadvantages:	• Incurs cost to agency for equipment and personnel if agency operated or contracted.	• If privately operated, is not under control of agency. • Assists individual motorist, but does not focus on restoration of capacity.	• If not a dedicated freeway patrol, places law enforcement as first priority rather than incident management. • Is costly if adequate number of patrols provided.

Chicago. Many service patrols, have been initiated to serve bridges, tunnels, or some other restricted highway facility. Due to higher volumes on all freeways and the success of the IDOT Emergency Traffic Patrol (ETP) on the metropolitan Chicago freeway system, the benefits of service patrols in responding to incidents have been demonstrated on all types of freeway facilities.

Service patrols assist in incident detection by providing visual detection and listening to CB radios or other sources relaying traffic information. In addition, service patrols help to verify incidents, assess the response needed, and verify possible false incidents sensed by electronic loop detectors.

Service patrols are also very effective in reducing clearance times. Patrol operators handle most minor incidents without additional assistance. They also work as part of a team to handle major incidents. The use of service patrols will often

remove many incidents before they become real problems, or at least significantly reduce their duration on the roadway. Minor repairs can be made more quickly and safely than when motorists have to seek help on their own. Most, if not all, service patrol vehicles are equipped with push bumpers capable of moving automobiles, and many trucks, off the roadway to the shoulder (or off the freeway) where additional service can be provided. In the case of major incidents and accidents where vehicles cannot be readily moved from the roadway, service patrols support other response personnel or agencies in clearing vehicles or other debris, directing traffic, or in providing a buffer between the incident site and the traffic.

Finally, trained service patrol operators are prepared to manage the incident scene and provide needed motorist information. This role may include:

- Directing traffic at the scene,
- Setting up an alternate or detour route,
- Providing emergency medical assistance until additional help arrives,
- Coordinating communications among the various responding agencies,
- Providing traffic reports or other information to highway or enforcement personnel, local media, or the public, or
- Providing emergency transportation to motorists and response to medical personnel.

Some service patrol operators will also assist in educating the public about safe driving and roadway practices by meeting with civic groups, clubs, organizations, and others either after or between shifts.

Examples of service patrols and courtesy patrols (discussed in the next section) are shown in Table 19.

Figure 16 shows a Houston service patrol vehicle jointly funded by public and private sponsors.

Figure 14
Public/Private Funded Service Patrol

Table 19
Patrol Examples

LOCATION	AGENCY	PATROL TYPE	NAME	EQUIPMENT	COVERAGE	HOURS OF OPERATION	NUMBER OF ASSISTS	COST	OPERATION
Howard Frankland Bridge (I-275) Tampa, FL	Florida DOT	Bridge Service	None	2 wreckers	3 Miles	6-10 am 3-7 pm	8/day	$157,000/yr. $75/hr.	Contract
Buckman Bridge (I-295) Jacksonville, FL	Florida DOT	Bridge Service	None	2 medium duty pick ups		5 am - 9 pm/ weekdays 10 am - 7 pm/ weekends	7.5/day	$214,000/yr. $42/hr.	Maintenance Division
Hampton Roads Bridge Tunnel/ James River Bridge (I-64) Southeastern VA	Virginia DOT	Bridge/ Tunnel Service	None	Dual purpose tow trucks with hydraulic wheel lifts (no manual hookup of bars or clamps)	10 Miles	365 days/year	Hampton Roads 6000/year; James River 3000/year	$100,000/yr.	Virginia DOT
Columbus, OH	Columbus Police Department	Service	None	Specially equipped police cruisers	88 Miles	N/A	N/A	N/A	Columbus Police Department
Richmond, VA	State Police	Service	None	Refurbished backup police cruisers staffed by motorist aid officers (not sworn police officers)	N/A	Weekdays	N/A	N/A	Virginia State Police
Seattle WA	Local Radio Stations KOMO, KIRO	Service	None	3 service patrol vans (KOMO) 1 van (KIRO)	N/A	5:35-8:35 am 3:30-6:30 pm weekdays	N/A	N/A	Private

Table 19 (cont'd.)
Patrol Examples

LOCATION	AGENCY	PATROL TYPE	NAME	EQUIPMENT	COVERAGE	HOURS OF OPERATION	NUMBER OF ASSISTS	COST	OPERATION
Houston, TX	Harris County Sheriff's Office/ Houston Automobile Dealers Association	Service	None	6 vans provided by automobile dealers	N/A	16 hours/ weekday	3.6/hour 3700/ 3 months	$693,000/yr.	Harris County Deputy Sheriff's
Chicago, IL	Illinois DOT	Service	Minute-men	35 emergency patrol vehicles, 9 light duty 4x4s 3 heavy duty tow rigs, 1 crash crane, 1 extricator truck	100 Miles	24 hours/day 365 days/year	100,000/ year	$33-$35/ assist	Illinois DOT
Los Angeles, CA	California DOT	Service	Orange Angels	6 trucks	I-5 between Lake Forest Dr. and Grand Ave. S.R. 55 between MacArthur Blvd. & Seventeenth St.	6 am - 7 pm/ weekdays		$61/hr.	Contractor (2 contracts)
Twin Cities, MN	Minnesota DOT	Courtesy	High-way Helpers	5 heavy duty pick ups	N/A	N/A	4400/year	N/A	Minnesota DOT
Various Northeast Cities	Private Sponsor	Courtesy	Samar-itan	One 3/4 ton van	8-25 miles/ day	6:30-9:30 am 3:00-6:00 pm weekdays	1500-9000 assists/yr.	$100,000/yr.	Samaritan, Inc.

Typical Duties of Service Patrol Operators

Some of the typical duties that service patrol operators are assigned and trained to handle are shown in Table 20.[11, 12]

A complete description of the Illinois DOT Service Patrol is given in Appendix C.

Courtesy Patrol

Courtesy patrols provide motorist assistance on freeways usually with light duty pickup trucks or vans. Typically, the courtesy patrol provides gas, water, jump starts and pushes. They usually operate on weekdays during the morning and evening peak periods, but sometimes during off-peak periods as well. They can provide from 5 to 15 assists per day per vehicle depending on hours of operation.

Courtesy patrols can be funded either publicly or through the private sector.

Public agencies providing this service are Virginia DOT, Maryland SHA, Texas SDHPT and Minnesota DOT. Examples are shown in Table 19. Private courtesy patrols are best exemplified by the Samaritan program which is discussed in the following paragraphs.

Samaritan Program

The professional Samaritan is a community service which is corporately subsidized.

The Samaritan vehicles are Ford or Chevrolet three quarter or one ton vans in appropriate colors, with sponsoring company logo prominently displayed on all sides. Standard equipment includes: safety lighting such as strobes with "lollipop" lights to protect the disabled motorist or accident scene, a communications system, and a push bar to remove the disabled motorist from the travelled way.

The van is equipped with:

- Gasoline, motor oil, transmission fluid and water.
- Spark plugs, distributor caps, radiator hoses, fan belts, wires and other spare parts.
- Fire extinguishers.
- Master mechanics tool set.

It is designed for safety and temporary emergency repairs.

The front of the van is a communications station, with a citizen's band radio, a two-way AAA radio, a radio to call in traffic reports, a cellular telephone and scanner.

The van is also equipped with emergency first aid equipment, push bar and tow ball.

The Samaritan patrols from 150 to 300 miles per day, each rush hour, looking for disabled vehicles. Seventy to 90 per cent of disabled motorists encountered return to the road at no cost.

Samaritans apply Emergency Medical Training at accident scenes, direct lost motorists, routinely remove road debris, provide traffic information to metropolitan radio stations, and describe unusual weather conditions.

The Samaritan is a native of the patrol area and receives two to four months of intensive training with experienced Samaritans. Areas of concentration include: safety, emergency mechanics on the highway, traffic pattern analysis and reporting, emergency medical technician course and certification, and basics of counseling and interviewing techniques.

A Samaritan will never pass any person or car stopped along the assigned limited access highway. In those situations where the Samaritan is unable to correct the problem, the van's mobile phone and two-way radio provide direct access to people who can.

Table 20
Typical Duties of Service Patrol Operators

- Continuously patrol a designated area seeking disabled vehicles, stranded motorists, debris in the roadway, spilled loads, accidents, obstructions to traffic, and other potential hazards or abnormal occurrences and notify appropriate highway and enforcement personnel of the location and nature of the situation.
- Assist motorists by towing and/or pushing disabled vehicles off of the roadway; provide gasoline or water, change tires, provide jump starts with booster cables, perform minor repairs when and if possible.
- Notify enforcement authorities of abandoned vehicles along the roadway - note location, make, color, body type, license number, and whether or not the vehicle is impeding traffic. If not impeding traffic, tag the vehicle for removal under local regulations. If it is impeding traffic, notify enforcement personnel that: (1) they will remove the vehicle if so authorized, or (2) immediate assistance is required if they are not authorized.
- Assist at freeway accident scenes by providing emergency first aid, notifying enforcement agencies, removing damaged vehicles from the roadway, supplementing or providing traffic control at the scene, assisting in extricating injured motorists, providing and/or coordinating communications at the scene, providing motorist information, traffic reports.
- Remove debris from the roadway - accident or otherwise, or call for assistance for more complex cleanups.
- Assist in setting up, maintaining, and removing emergency detour routes required because of an incident.
- Assist in the management of traffic in construction and maintenance zones by performing normal service patrol activities and by providing protection to highway workers.
- Report on property damage to the highway system.
- Provide traffic reports to highway agencies, news agencies, and other traffic sources for distribution to motorists.
- Provide travel information and motorist aid to lost or stranded motorists.
- Provide emergency transportation to stranded motorists.
- Remove pedestrians from freeways, bridges, and tunnels, and provide emergency transportation where needed.
- Assist at major accident scenes and other disasters, providing personnel, equipment, and traffic control support.
- Observe work zone traffic controls set up by other agencies and contractors and report on any problems encountered, unauthorized lane closures, or unauthorized work.
- Provide any other assistance as requested by State and/or local enforcement agencies (Highway Patrol, State Police, City Police, Sheriff's Department, etc.).
- Maintain an established service patrol log, completing an entry for each incident encountered and/or handled.

Figure 15
Samaritan Van

Figure 17 illustrates a Samaritan van.

Further information on the Samaritan program can be obtained from Samaritania, Inc., 77 Millbury Street, Grafton, MA 01519; (508) 839-9663.

Service/Courtesy Patrol During Major Highway Reconstruction

Several jurisdictions have initiated or supplemented existing service/courtesy patrols during major highway reconstruction projects as a traffic management measure. Examples are shown in Table 21.

Funding of Service/Courtesy Patrols

Service patrols can be sponsored and/or operated by public or private agencies, or they can be contracted out to private contractors by a State (or local public) agency. One of the critical factors affecting the operation of service patrols is where they are located in the organizational structure of an agency. In cases such as the IDOT ETP, the patrol has a separate budget that competes with all other operations and maintenance sections. For other patrols, such as the Florida DOT bridge patrols, regular maintenance funds are used, or sometimes diverted, to pay for the services. In the Minneapolis/St. Paul area, the routes for the Highway Helpers actually overlap more than one maintenance district. This required that agreements be worked out to maintain consistent service to the public. Still others like the Samaritan and Seattle radio patrols are paid for directly by private sector sponsors.

Service or courtesy patrols are eligible for Federal-aid Primary, Urban, and Interstate 4R funds - depending upon the Federal-aid system which benefits from the program. Eligible costs are for establishing the service patrol (e.g., capital costs for vehicles, garages, etc. and other startup costs). Day to day operations costs are not eligible at this time. The only exception to this is when service patrols are operated as part of the traffic management program during major highway reconstruction. In fact, as part of the contract requirements, a DOT may operate or have a contractor furnish service patrol vehicles which can become State property after the project ends, provided the state meets certain Federal requirements.

Benefits of Freeway Service/Courtesy Patrols

In Chicago, the Illinois DOT has estimated that the Emergency Traffic Patrol (ETP) has cut the time needed to clear major incidents in half due to the equipment and training they have available. This reduction improves to about one-fourth of the time needed for very complex incidents due to some of the unique heavy-duty equipment the ETP has procured over the years. As its benchmark, the Illinois DOT states that the absolute maximum time required to respond to any incident will be 35 minutes any day of the year. This baseline "level of service" is used to determine and justify the staffing and equipment needs, as well as the patrol limits that will be used. If a desired patrol expansion requires a base response time greater than 35 minutes, the expansion is postponed until funding is available to provide for the additional personnel and vehicles needed to maintain the 35 minute maximum.

The Samaritan program estimates that as a result of their patrols, between 70 and 90 percent of all incidents occurring on their routes are handled (from detection to clearance) in 30 minutes or less. The Florida DOT also estimates that its Jacksonville patrol has reduced the response time from 15-20 minutes for police and 30-60 minutes for DOT personnel to 10 minutes or less overall since the patrol began.

Major Incident Response Teams

A major incident response team (MIRT) is the combination of law enforcement, traffic engineering, maintenance and other relevant personnel which collectively manages a major incident. The MIRT can be formed by the Traffic Management

Table 21
Service/Courtesy Patrols During Highway Reconstruction

LOCATION	PROJECT	PATROL TYPE	EQUIPMENT	HOURS OF OPERATION	OPERATOR
Fort Lauderdale, Broward County FL	I-95 Reconstruction	Service	Vehicle with hydraulic and cable tow rig, water, gasoline, battery cables, cellular telephone.	6 am - 7 pm Monday thru Saturday	Construction contractors furnish vehicles and operators according to special provisions in construction contract.
Chicago, IL	Dan Ryan Expressway Reconstruction	Service	4x4's with push bumpers used by police along with ETP and more frequent patrols.	24 hours 7 days/week	4x4's: Police ETP: Illinois DOT
Hartford, CT	Reconstruction of freeways in Hartford area.	Courtesy	Samaritan vans	Morning peak thru 11 pm	Connecticut DOT contracts with Connecticut National Bank to provide Samaritan patrols during major freeway reconstruction.

Team or directly by the involved agencies if no formal Traffic Management Team exists. The team is responsible for assessing the situation at each incident, and, using the response plan previously developed and the team members' experience, making decisions on precisely how the incident should be handled. The team decides:

- Where traffic will be detoured.
- How and when the wreckage will be cleared.
- How and when repairs to the roadway will be made.
- When roadways can be partially opened.

Each agency then carries out its part of the overall plan.

Possible agencies represented on major incident response teams are:

- Law enforcement
- Traffic engineering
- Highway maintenance
- Fire
- Ambulance
- Tow truck
- Toxic materials control
- Others

Experience in Los Angeles has demonstrated the value of establishing an on-site command post for the team at a major incident. Each agency assigns a representative to the command post; in this way the individual actions are blended together into an overall, coordinated incident management team.

The California Department of Transportation (CALTRANS) incident response teams in Los Angeles are comprised of about two dozen volunteers, all with a traffic engineering background and all of whom have other regularly assigned duties in the Traffic Operations functions. Teams operate similarly to a volunteer fire department -- members take equipment (vehicles, sign trucks, signs, flares) home with them, are on call 24 hours a day, and go into action when an incident is expected to block two or more freeway lanes for two or more hours. Team personnel, along with police, maintenance, and other emergency personnel meet at the incident site and actively manage the situation. Team members have enough authority to make decisions at the scene without excessive consultation with their superiors. Providing help for the injured, clearing the wreckage, repairing damaged facilities, detouring traffic, and keeping the public informed of the situation are all carried out in a coordinated manner.

Cost of the major incident response team program in 1986 was $115,000 of which $72,000 was recovered from those parties who caused the accidents. [14]

The CALTRANS response teams responded to over 250 major incidents in 1989.

In Seattle, Washington, incident response teams have been established, but the DOT has gone even further by instituting a full time position, *incident management engineer*.

Hazardous Material Response

An increasing number of roadway incidents involve hazardous materials. Some 75 percent of hazardous materials incidents on roadways involve flammable liquids or gases. Hazardous materials can sometimes be identified by the placards on a vehicle, but the absence of a placard does not necessarily mean the absence of hazardous materials. The primary rule for identifying and dealing with hazardous materials is "leave it to the experts". Fire departments are trained and equipped for dealing with hazardous materials. The first on the scene of an incident involving hazardous materials must follow some general guidelines. The presence of hazardous materials may be quite evident just from observation, and a spot judgment will need to be made of whether to cordon off the scene or stop traffic. The highest priority action is to inform the appropriate fire department.

To provide guidelines to responding personnel, a hazardous material (haz-mat) response plan should be developed. The haz-mat plan aids in coordinating response of the various agencies involved to assure protection of life and property, while expediting return to normal roadway operations. Items such as communications, haz-mat response vehicles, personal protection equipment and training should be covered. Table 22 presents an outline of a possible Haz-mat plan. A set of guidelines for a first responder as well as other references pertaining to hazardous materials are found in Appendix G.

Table 22
Hazardous Materials Plan

1.0 Introduction

2.0 Response At Site

2.1 Information to be gathered

2.1.1 Specifics of spill
- Liquid/gaseous
- Description of leak
  - Rate of flow/quantity spilled
  - Odor
  - Color
  - Density
- Type of container
  - Box, box trailer
  - Tanker type
- Precise labels from truck
  - UN numbers
  - Company name

2.1.2 Drainage systems in area
- Ditches
- Bodies of water

2.1.3 Weather conditions

2.1.4 Traffic flow
- Number of lanes open/blocked

2.2 Communications

2.2.1 Communications with central command post
- Need for constant updating

2.2.2 Communications with other agencies
- Fire
- Other police
- Ambulance
- Environmental protection
- Other

2.3 Securing the scene
- Establish field command post
- Cordon off area
  - Green zone
  - Yellow zone
  - Hot zone
- Types of vehicles to position in each zone
- Implement traffic diversion plans

3.0 Response At Central Command Post

3.1 Query field personnel to obtain all relevant information on spill

3.2 Notify other agencies
- Environmental Protection Agency
- Local Boards of Health

3.3 Notify local contractors if required for clean-up

3.4 Notify personnel on scene as to protection required

3.5 Notify media

3.6 Utilize available literature and guides
- USDOT Guidebook Chemtrec Center, Washington, D.C.

3.7 Notify shippers

APPENDICES:
Drills and Training
State Regional Coordinators
County Offices - Boards of Health
Traffic Control Guidelines
Blank Forms for Environmental Protection Agencies
Radiation Accidents
References to Laws and Regulations
List of References

CHAPTER SIX - REMOVAL

Figure 16
Heavy Duty Wrecker

Definition

Removal/Restoration of Capacity - *Removal of wreckage, debris, spilled materials, etc. from the roadway to restore the roadway capacity to its pre-incident condition.*

Objectives

The roadway and adjoining areas must be cleared to minimize disruption to the traffic stream. Effective removal requires availability of the necessary equipment and personnel and the means for rapid dispatch to handle all types of incidents. It requires the expertise and judgment to assess when and how the removal operation is to be carried out.

Pre-Planning

As with other aspects of incident management, effective removal begins with the preparation of a detailed plan. Procedures should be worked out in advance for all incident types so that each can be dealt with efficiently. A list of possible scenarios should be prepared along with the desired complement of equipment and personnel for each. Table 23 shows a typical list of possible incidents and Table 24 shows the resources necessary to deal with them.[31]

Liability

Liability in connection with fast removal policies is viewed as a major issue by many public agencies.[1] The issue is most troublesome when commercial loads are involved. When a truck overturns, blocking one or more lanes, uprighting or off loading its spilled cargo can take hours. The most expedient solution may be to push the trailer and cargo to the shoulder and allow the trucking company to pick up the remains when traffic is light. This is one of the more common fast removal policies practiced in at least a dozen states, although additional damage to the trailer and cargo may occur. The courts have generally upheld these actions although few have been challenged.

Table 23
Required Resources For Incident Removal

INCIDENT TYPE	EQUIPMENT	PERSONNEL	CONTACTED VIA
Stall (Car)	Service Patrol	• Service Patrol Driver	• Radio (frequency)
Stall (truck)	Tow Truck	• Tow Truck Driver • Police	• Telephone • Radio (frequency)
Overturned Tractor-Trailer	Heavy-Duty Wrecker	• Wrecker Driver • DOT • Police	• Telephone call by DOT Maintenance • Telephone • Radio (frequency)
Hazardous Material Spill	Various. Depends on material.	• Hazardous material cleanup company • Office of Emergency Services • Fire Department • Police • DOT	• Telephone • Telephone • Radio (frequency) • Radio (frequency) • Telephone

Private Wrecker Services

Arrangements between public agencies and private wrecker operators usually take the form of either rotation lists (See Table 25) or contractual agreement (See Table 26), or a combination of both. Rotation lists are usually established on an informal basis with no written contracts but may be administered based on a local ordinance.

A more controlled approach uses formal contracts with private wrecker operators.

Two approaches to bidding such contracts exist. The first, utilized by Orlando, involves the contractor placing a bid based on towing rates. The low bid is accepted and the bid rates are made part of the contract. The second approach, used by San Antonio, consists of a contractor bidding a fee to be paid to the public agency for the exclusive right to provide service. Towing rates are set by the agency and included in the invitations to bid.

All contracting agreements contain certain common requirements of the contractor. These include minimum equipment rosters, storage space, insurance, response time, licensing, etc. Equipment requirements usually include specifications calling for the availability of at least one heavy duty wrecker. Twenty-four (24) hour availability and specified response times (usually 30 minutes) are standard features of all contracts. Other provisions, however, vary for different contracts.

The material in this section is derived primarily from Reference 15. Appendix D provides a list of contacts for further information on the agreements in each location.

Accident Investigations

Accident investigations are a necessary part of police activities, but should be conducted in such a way as to minimize disruption to freeway traffic flow. Guidelines to minimize the impact of the accident investigation are as follows:

- **Sensitivity to traffic flow** - Police must be made aware of the possible impact the investigation will have on traffic. Conducting an accident investigation on the shoulder of the freeway can reduce traffic throughput by 30 percent. During rush-hour, just a simple accident investigation can cause traffic to back up one additional mile for every 15 minutes the accident remains on the shoulder.

- **Investigations off the freeway** - Where possible, police should conduct the accident investigation off the freeway. If the vehicles can be driven, locations can often be found that are much safer, quieter and less disruptive to traffic than the shoulder of the freeway itself. Possible locations are:
  - Shoulder of the nearest off-ramp

Table 24
Options for Providing Incident Removal Resources

TYPE	ADVANTAGES	DISADVANTAGES
Tow Trucks	• Can clear most incidents. • Has low cost if franchised operation.	• Is costly to purchase and operate, if agency owned. • Must assure compliance with operational standards, if franchised.
Heavy-duty Wreckers	• Can clear major incidents. • Usually is warranted for short section with high volume trucking (e.g. tunnel or bridge).	• If agency owned, is very costly to purchase and operate. • May be used relatively infrequently, except in major metropolitan areas. • May not provide sufficient revenue to cover costs in smaller regions if agency owned.
Service Patrol	• Provides rapid clearance of most incidents. • Provides revenue to agency if franchised or fee for service. • Incurs no cost to agency if provided by private enterprise.	• Incurs cost to agency if not privately funded. • Cannot remove all incidents. • Provides less control by agency if service is provided by private enterprise.
Police Patrol	• Can remove disabled vehicles if equipped with push bumpers. • Can be built on existing presence. • Is based on existing communications systems.	• May restrict removal efforts due to law enforcement responsibilities. • Requires costly use of highly trained personnel. (Some jurisdictions, such as Virginia State Police, use non-sworn personnel to handle motorist assists, thus reducing costs.)

Table 25
Wreckers Called Via Rotational List
(No Formal Agreement)

LOCATION	JURISDICTION	NUMBER OF ZONES	WRECKER CALLED	SELECTION CRITERIA	ORDINANCE	LICENSE REQUIRED	INSPECTION	COMMENTS
Detroit, MI	City	6	• Requests primary operator in each zone. • Call another operator from authorized list if primary operator is unable to respond. • Permits motorist to select specific operator if response time is reasonable.	• Response time. • Past performance (subjective). • Equipment.	Yes	Yes	No	
Fort Worth, TX	City Police Department	6	• Uses rotation basis. • Permits motorist to select specific operator, if licensed.	• Response time (subjective). • Dropped to bottom of rotation if unable to respond.	Yes	Yes	Yes	
California	California Highway Patrol	8 Divisions in State each divided into smaller areas as necessary.	• Uses rotation basis (five operators) • Maintains other operators on waiting list. • Permits motorists to select own operator after removal from travel lane (police push bumper).	• 15 to 20 minute response time (dropped from rotation if response time inadequate). • Sufficient equipment • Heavy duty wreckers.	None	N/A	N/A	
Minneapolis, MN	State Patrol	14	• Uses rotation basis. • Establishes two or three operators to cover each zone.	• Response time (dropped from rotation after 3 late responses). • Equipment storage space. • Dropped from rotation for overcharging.	None	N/A	Yes	Problems obtaining good response.

Table 26
Wreckers Called Via Agreement

LOCATION	JURISDICTION	NUMBER OF ZONES	CONTRACT/AWARD PROCEDURES	SPECIAL REQUIREMENTS OF AWARD	METHOD OF SETTING AND COLLECTING FEES	ORDINANCE	COMMENTS
Orlando, FL	Police Dept.	4	• Uses single contract with one company to handle peak hour (7-10 AM, 4-6 PM). • Permits motorist to select from up to 6 towers per zone for non peak hours ("citizens preference"). • Does not allow requests for other operators. • Requires bid to be submitted showing qualification and rates. • Places all qualified bidders on list.	• During peak hour, dispatches wrecker before confirmation that one is needed. • Charges no fee unless tow is made.	• Establishes rate as part of contract • Makes collection contractor responsible after vehicle is removed from freeway.	City	23 separate operators hold "citizens preference" contracts. Too many for effective supervision.
Long Island, NY	N. Y. Dept. of Transportation	6	• Establishes single contract for each of the six sectors.	• Requires contractors to operate State-registered repair facility located in sector. • Requires repair rates to be reasonable.	• Requires maximum tow rate that is part of contract be shown to motorist at time to tow. • Requires contractor to honor at least one major credit card. Cannot refuse service if motorist unable to pay immediately. • Cannot require collateral for release of towed vehicle. • Cannot require motorist to sign damage waiver.	None	Contract is detailed and protective of motorist interests.
San Antonio, TX	City	1	• Uses single city wide contract for 5 years.	• Requires twelve auto wreckers be available at all times with increased equipment availability from 7 AM to 7 PM.	• Requires fees set in contract be reviewed annually. • Impounds vehicles of motorists who are unable to pay. • Requires city to pay contractor and assumes responsibility for collection of fee.	City	Operating satisfactorily since 1977.
New Jersey Turnpike	N. J. Turnpike Authority	N/A	• Has contracts with 31 operators. • Does not use competitive bidding. • Awards through review process based on location, equipment, personnel, reputation.	• Requires contractor to pay 5% of gross receipts to Authority. • Must have own repair facility. • Must honor other destination request. • Must file repair with NJTA and be reasonable. • Must be located within 5 miles of interchange. • Requires two contractors per interchange.	• Uses rates specified by NJTA. • Makes contractor responsible for collecting fee and removing vehicle to designated repair facility.	None	

- A low-volume street near the off-ramp
- A parking lot at a vacant or under-used building
- A corner of a large shopping center or office building parking lot, church parking lot or other similar facility (permissions may need to be worked out beforehand)
- Formally designated "accident investigation sites". (See next section.)

- **Removal of Vehicles and Dispatching of Wreckers** - When necessary to complete the investigation on the freeway, police should keep it as brief as possible and minimize disruption to traffic. Vehicles should be removed from the travel lanes as soon as possible after recording the basic evidence. After attending to the immediate needs of the injured, a call should be placed for wrecker services to expedite the removal of vehicles. If wreckers are needed to remove vehicles from the freeway lanes, police should make it known that a rapid response is needed. Wrecker services may be more responsive when they know that time is critical to restoring traffic flow.

Accident Investigation Sites*

Accident Investigation Sites (AISs) are special designated and signed areas off the freeway or roadway where drivers of damaged vehicles can exchange information, and police and motorists can complete the necessary accident forms. These areas are located so that the motorists involved in the accident, the investigating police, and tow truck operators are out of view from freeway or roadway drivers. This reduces "rubbernecking" which is a major cause of congestion at a freeway or roadway accident scene. The AISs are sometimes located under a freeway overpass, on a side street or parallel frontage road, or in a shopping center parking lot out of view of freeway or roadway traffic.

The first AIS system was installed in Houston, Texas in 1971. The Texas State Department of Highways and Public Transportation (SDHPT) and the Texas Transportation Institute (TTI) developed and implemented an AIS system adjacent to the I-45 Gulf Freeway in Houston in conjunction with a corridor traffic management system. Sixteen AISs were implemented within a six mile section of the freeway.

Eight of the sites were located on city streets adjacent to the freeway; two were located on city streets under the freeway; one was located off a city street on freeway right of way; and five were on previously unused space under freeway structures.

Expected Benefits and Advantages of AIS

Expected benefits to be derived from the use of accident investigation sites are:

- Reduced motorist delay
- Reduced vehicle operating costs (e.g., gasoline consumption),
- Reduced secondary accidents,
- Reduced pedestrian accidents and
- More efficient use of the public agencies' personnel.

Experience with AISs in Houston resulted in a benefit-cost ratio of 28:1 during the first year of operation. Data indicated that the potential benefit-cost ratio could be as high as 35:1.

*The material in this section has been extracted from a brochure produced by the Minnesota Department of Transportation entitled *Accident Investigation Sites*.

Criteria and Typical Layouts

Table 27 indicates the criteria for selecting an AIS.

Table 27
Accident Investigation Site Criteria

- Easily accessible
- Concealed from freeway or roadway motorists
- Well marked
- Located near high accident areas
- Low construction costs
- At least 1,000 feet of space
- Sufficient lighting
- Telephone

Figure 19 illustrates three typical accident investigation site layouts. Other layouts are possible including widening of off-ramps to provide space for the AIS. Figure 20 shows signs directing motorists to the sites.

Ordinances Relating To Incident Removal*

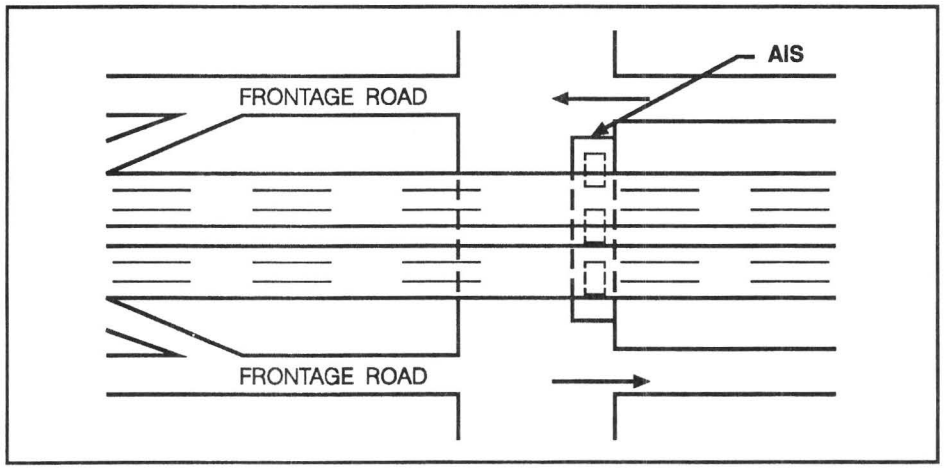
The Uniform Vehicle Code and the Model Traffic Ordinance are a model set of traffic laws and ordinances that are prepared and periodically updated by the National Committee on Uniform Traffic Laws and Ordinances. The Uniform Vehicle Code is a set of motor vehicle laws reflecting the "best" local, state and federal laws and regulations, as judged by the National Committee, and is a guide for states in preparing and updating motor vehicle laws. The Model Traffic Ordinance is a companion document which contains a set of motor vehicle ordinances for municipalities. It provides a comprehensive guide or standard for cities and counties to follow in reviewing and revising their traffic ordinances. Section 10-103 entitled, "Accidents Involving Damage to Vehicle or Property" of the Uniform Vehicle Code addresses the issue of minimizing the adverse effect of accident vehicles to traffic. The section states:

> The driver of any vehicle involved in an accident resulting only in damage to a vehicle or other property which is driven or attended by any person shall immediately stop such vehicle at the scene of such accident or as close as possible, but shall forthwith return to and in every event shall remain at the scene of such accident until he has fulfilled the requirements of (section) 10-104. *Every such stop shall be made without obstructing traffic more than is necessary* (emphasis added). Any person failing to stop or comply with said requirements under such circumstances shall be guilty of a misdemeanor and, upon conviction, shall be punished as provided in (Section) 17-101.

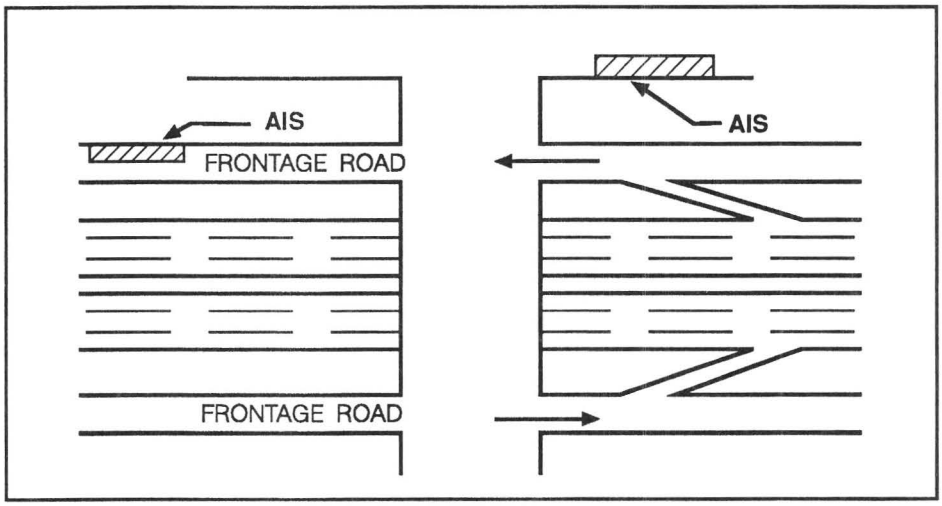
Interestingly, the provision that every such stop shall be made without obstructing traffic more than is necessary has been part of the National Code since 1956. However, as of 1983, the following 19 jurisdictions did not have the requirement in their codes: Alaska, California, Connecticut, Delaware, Kentucky, Louisiana, Maine, Massachusetts, Missouri, Nebraska, New Hampshire, New York, North Carolina, Ohio, South Dakota, Vermont, Washington, Wisconsin, and the District of Columbia. At least three states, Texas, Georgia and Florida, (see Table 28) expound upon the requirement to minimize the adverse effects of accidents of traffic flow.

Texas is the only state that specifically addresses the use of Accident Investigation Sites. The Texas Uniform Act Regulating Traffic on Highways as contained in the Texas Motor Vehicle Laws, specifies the following provision for property damage only accidents:

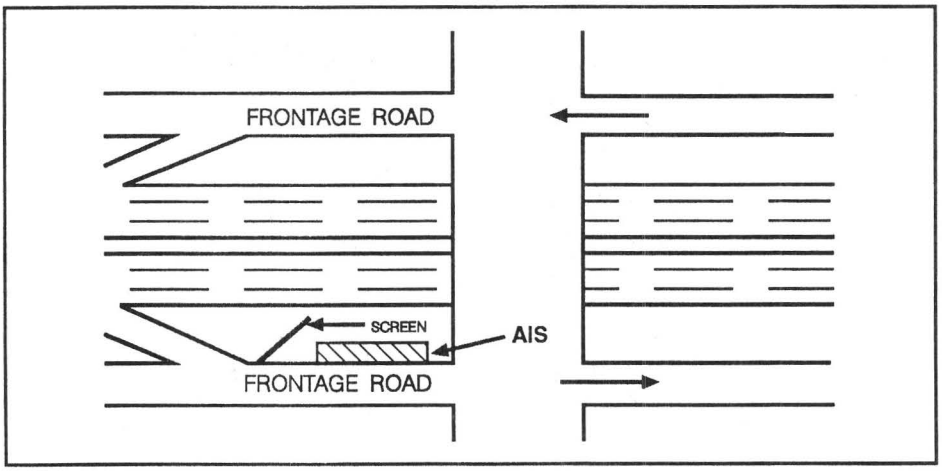
*This section is based on Reference 28.



Type 1, Under Freeway AIS



Type 2, City Street AIS



Type 3, Frontage Road AIS

Figure 17
Typical Accident Investigation Site Layouts

...when an accident occurs on a mainlane, ramp, shoulder, median, or adjacent area of a freeway in a metropolitan area and each vehicle involved can be normally and safely driven, each driver shall move his vehicle as soon as possible off the freeway main lanes, ramps, shoulders, medians, and adjacent areas to designated accident investigation site, if available, a location on the frontage road, the nearest suitable cross street, or other suitable location to complete the requirements of Section 40, so as to minimize interference with the freeway traffic. Any person failing to stop or comply with said requirements under such circumstances shall be guilty of a misdemeanor.

Georgia adopted a law providing that when accidents occur on expressways in metropolitan areas, drivers or occupants with licenses must remove the vehicles from the roadway into a safe refuge on the shoulder, emergency lane or median when the vehicle can be normally and safely driven without further damage or hazard. A person who moves a vehicle in compliance with this law is not regarded as being at fault merely because he or she moved it.

Large cities have also taken measures to reduce the impact of accident vehicles on freeways. For example, Houston enacted an ordinance in 1978 because "vehicles left standing or parked on main-travelled portions of freeways constitute a grave and undue hazard to the travelling public and impede the flow of traffic..." The ordinance, in part, reads:

...Any commissioned police officer of the City is hereby authorized to remove, or cause to be removed any vehicle:

(1) parked or standing in or on any portion of a main-travelled lane or ramp of any freeway within the city limits...

Such ordinances provide the police added written authority to take action necessary to minimize the adverse impacts of disabled vehicles on the mainlanes.

Figure 18
Accident Investigation Site Signing

Table 28
Florida Incident Removal Statute References and Drivers Handbook

FLORIDA TRAFFIC LAWS
Florida Statutes 1985

Disabled Vehicle Due to an Accident

316.027 *Accidents* involving *death* or personal *injuries*.-

(1) The driver of any vehicle involved in an accident resulting in injury or death of any person shall immediately stop such vehicle at the scene of the accident, or as close thereto as possible, and shall forthwith return to, and in every event shall remain at the scene of the accident until he has fulfilled the requirements of S.316.062.

(2) Any person willfully failing to stop or to comply with the requirements of subsection (1) under such circumstances is guilty of a felony of the third degree, punishable as provided in s. 775.082 s. 775.083, or s. 775.084.

(3) The department shall revoke the operator's or chauffeur's license of the person so convicted.

(4) Every stop shall be made without obstructing traffic more than is necessary, and if a damaged vehicle is obstructing traffic, *the driver of such vehicle shall make every reasonable effort to move the vehicle or have it moved so as not to obstruct the regular flow of traffic.* Any person failing to comply with the provisions of this subsection shall be punished as in s. 316.655

316.061 *Accidents* involving *damage* to vehicle or property.-

(1) The driver of any vehicle involved in an accident resulting only in damage to a vehicle or other property which is driven or attended by any person shall immediately stop such vehicle at the scene of such accident or as close thereto as possible, and shall forthwith return to, and in every event shall remain at, the scene of the accident until he has fulfilled the requirements of s. 316.062. Any person failing to stop or comply with said requirements shall, upon conviction, be punished by a fine of not more than $500 or by imprisonment for not more than 60 days or by both such fine and imprisonment. Not withstanding any other provision of this section, $5 shall be deposited in the Emergency Medical Services Trust Fund created in s. 401.34(4).

(2) Every stop shall be made without obstructing traffic more than necessary, and, if a damaged vehicle is obstructing traffic, *the driver of such vehicle shall make every reasonable effort to move the vehicle or have it moved so as not to block the regular flow of traffic.* Any person failing to comply with the provisions of this subsection shall be punished as provided in s. 316.655.

316.063 Duty upon damaging unattended vehicle or other property.-

(1) The driver of any vehicle which collides with, or is involved in an accident with, any vehicle or other property which is unattended, resulting in any damage to such other vehicle or property, shall immediately stop and shall then and there either locate and notify the operator or owner of the vehicle or other property of his name and address and the registration number of the vehicle he is driving, or shall attach securely in a conspicuous place in or around the vehicle or other property a written notice giving his name and address and the registration number of the vehicle he is driving, and shall without unnecessary delay notify the nearest office of a duly authorized police authority. Every such stop shall be made without obstructing traffic more than is necessary. If a damaged vehicle is obstructing traffic, the driver shall make every reasonable effort to move the vehicle or have it moved so as not to obstruct the regular flow of traffic. Any person failing to comply with the provisions of this section shall be punished as provided in s. 316.655.

Disabled Vehicle Due To Any Reason

316.071 Disabled vehicles obstructing traffic. Whenever a vehicle is disabled on any street or highway within the state or for any reason obstructs the regular flow of traffic, the driver shall move the vehicle so as not to obstruct the regular flow of traffic or, if he cannot move the vehicle alone, solicit help and move the vehicle so as not to obstruct the regular flow of traffic. Any person failing to comply with the provision of this section shall be punished as provided in s. 316.655.

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Accidents-What Are Your Responsibilities?

Move your car if it is blocking traffic. If your car is blocking the flow of traffic, you must move it. If you cannot move it yourself, you must get help or call a tow truck. This is true anytime your vehicle is blocking the flow of traffic, whether it has been involved in an accident or not.

CHAPTER SEVEN - TRAFFIC MANAGEMENT

Figure 19
On Site Traffic Management

Definition

Traffic Management *is the application of traffic control measures in the area of the incident site including: lane closures and openings; establishing and operating alternate routes; diversions; parking of emergency vehicles and ensuring safety of incident victims, motorists and emergency personnel.*

Objectives

The objectives are the timely evaluation of traffic conditions and the application of appropriate traffic management strategies to mitigate the effects of the incident.

Traffic management is normally required for major incidents, i.e., those blocking one or more travelled lanes and of more than 1/2-hour duration. [24]

Pre-planning

Pre-planning is essential to effective traffic management during an incident. Major aspects of the plan are:

- Scene management
- Alternate route planning
- Traffic control guidelines
- Timing of removal
- Special event planning

The plan should include a manual such as Reference 16 for distribution to law enforcement personnel and others who will be actively involved in traffic management at the incident site.

Important to the evolution of the traffic management plan are post-incident critiques, in which evaluation by the participating agencies leads to modification and refinement of the plan.

Traffic Management Techniques

Scene Management

The first step towards efficient traffic management during an incident is establishing control at the incident scene. This will promote safety for both the public and emergency personnel and minimize confusion in what can be a chaotic situation.[29]

Table 29 lists elements needed for effective scene management. Through experience, each region may modify or add to this list.

The previously mentioned post-incident critiques can be used to refine scene management procedures. Guidance for setting up critique sessions is presented in Table 30 which is adapted from Reference 16.

Use of Helicopters

Several jurisdictions, including Fairfax County, Virginia, California Department of Transportation (Caltrans), and Montgomery County, Maryland, use helicopters to aid incident scene management and routine traffic management.

Fairfax County employs a helicopter to monitor traffic flow, and pinpoint specific areas of congestion. It flies whenever the Fairfax Traffic Information Center (TIC) is in operation (weekday peak periods) and reports directly to the TIC via a dedicated radio frequency.

As part of its Major Incident Traffic Response Team, Caltrans employs the use of helicopters. A California Highway Patrol (CHP) pilot, an observer and a Caltrans traffic engineer hover above

Table 29
Requirements For Incident Scene Management

ELEMENT	FUNCTION	REQUIREMENTS
Command Post	• Serves as Coordination and Information Center.	• Select best location for observation. • Use enforcement vehicle. • Consider use of motorhome vehicle for major incidents.
Scene Manager	• Supervises requests for all personnel and equipment. • Communicates with traffic management center. • Supervises communications with media.	• Is designated in advance as part of traffic management plan.
Training	• Provides smooth scene management.	• Train officers, supervisors, manager, other responders.
Agency Representatives	• Supervise responsibility of each agency. • Coordinate activities with scene manager and other agencies.	• Is designated in advance as part of traffic management plan.

the scene of an incident, and aid in making on-the-spot traffic management decisions.

Based on the severity of the incident which is causing congestion on the freeway, a decision is made whether to request the helicopter. Once requested, the CHP helicopter heads immediately to pick up a Caltrans traffic engineer from the district office in Los Angeles. With a traffic engineer on board, Caltrans and the CHP can simultaneously observe an emergency situation and make synchronous decisions to alleviate freeway congestion caused by the major incident. A CHP helicopter pilot can switch to the same radio frequency used in Caltrans emergency vehicles to allow for constant, up-to-date communication between the two agencies.

Annual sports and entertainment events such as the Rose Bowl, Super Bowl, Los Angeles County Fair, Renaissance Pleasure Faire and some of the University of Southern California football games draw many thousands of spectators to one location and result in traffic congestion on the freeways. At such events, CHP helicopters also take to the air to assist both CHP and Caltrans in traffic manage-

Table 30
Guidance for Post-Incident Critiques

CRITIQUE ITEM	GUIDANCE
Selection of Incident	• Normally involves only major incidents. • May review less severe incidents if there is a significant lesson to be learned. • May include a critique for a specific incident suggested by an agency.
Set-up of Debriefing	• Require the agency suggesting the debriefing to notify the Freeway Management Team leader at least one week prior to the scheduled meeting.
Format of Debriefing (may vary depending upon the incident)	• Recreate incident chronology. • Ask each agency to indicate what it believes to be the positive and negative aspects of the operation. • Encourage suggestions on possible improvements to be made. • Following the presentation by each agency, encourage discussions on resolving any issues that arise. (All discussions should focus on the lessons learned and what changes should be made, if any, the next time. The discussion leader must seek to maintain a positive tone to the meeting. It is not to be a finger-pointing session, but a constructive team effort.)
Graphics Aids	• May vary. • Use videotapes that are helpful, if available. • Use a simple chalkboard sketch. • Always display an area roadway map with the area of interest shown on an overhead projector or slide, if possible.
Documentation	• Assign an agency representative to document the results of the critique. (The report need not contain elaborate details of the chronology, but should focus on the lessons learned.) • Include report in the normal meeting minutes that are circulated to all the team members.

Table 31
Alternate Route Criteria

ITEM	CRITERIA	POSSIBLE REQUIREMENTS
Freeway Detour Point	• Determine capacity of intersection at foot of ramp.	Manual control of signal at foot of off-ramp.
Surface Street Network	• Determine capacity of alternate routes. • Indicate possible unsuitability because of residential character, schools, hospitals, other. • Examine accident records on alternate.	Traffic officers, turn restrictions, parking prohibitions, signal timing changes during diversion and trailblazers.
Freeway Re-entry Point	• Determine capacity of intersection at foot of ramp.	Trailblazers and stockpiling of signs.

ment which results in more efficient use of the freeways and a reduction in accidents.

Major incidents are responsible for 30 to 35 percent of all delays caused by traffic congestion on the freeways. Typically, it takes 42 minutes to clear a major incident from the freeway without the use of the CHP helicopter and other traffic management techniques. Utilizing the helicopter and other electronic surveillance equipment cuts the amount of time down to 21 minutes. A Los Angeles area freeway surveillance and control project study by Caltrans showed that a 65 percent reduction of congestion caused by major incidents alone could save motorists $19 million annually.

Alternate Route Planning

For major incidents, a key aspect of traffic management is diversion of freeway traffic onto surface streets or other freeway routes to by-pass the incident site.

Insofar as possible, these alternates should be preselected for all sections of the freeway, although modifications may have to be made depending on conditions at the time of the incident. With proper planning, little time will be wasted in the field deciding where to detour traffic and the use of unsuitable routes can be avoided.

Appendix B outlines the steps needed to develop an alternate route plan. Table 31 shows some of the considerations entering into the choice of alternate routes. A typical alternate route map is shown in Figure 22 (taken from Reference 16). These maps should be distributed in loose-leaf form to law enforcement and other appropriate agencies. Revised sheets can then be distributed as conditions change on the surface street network.

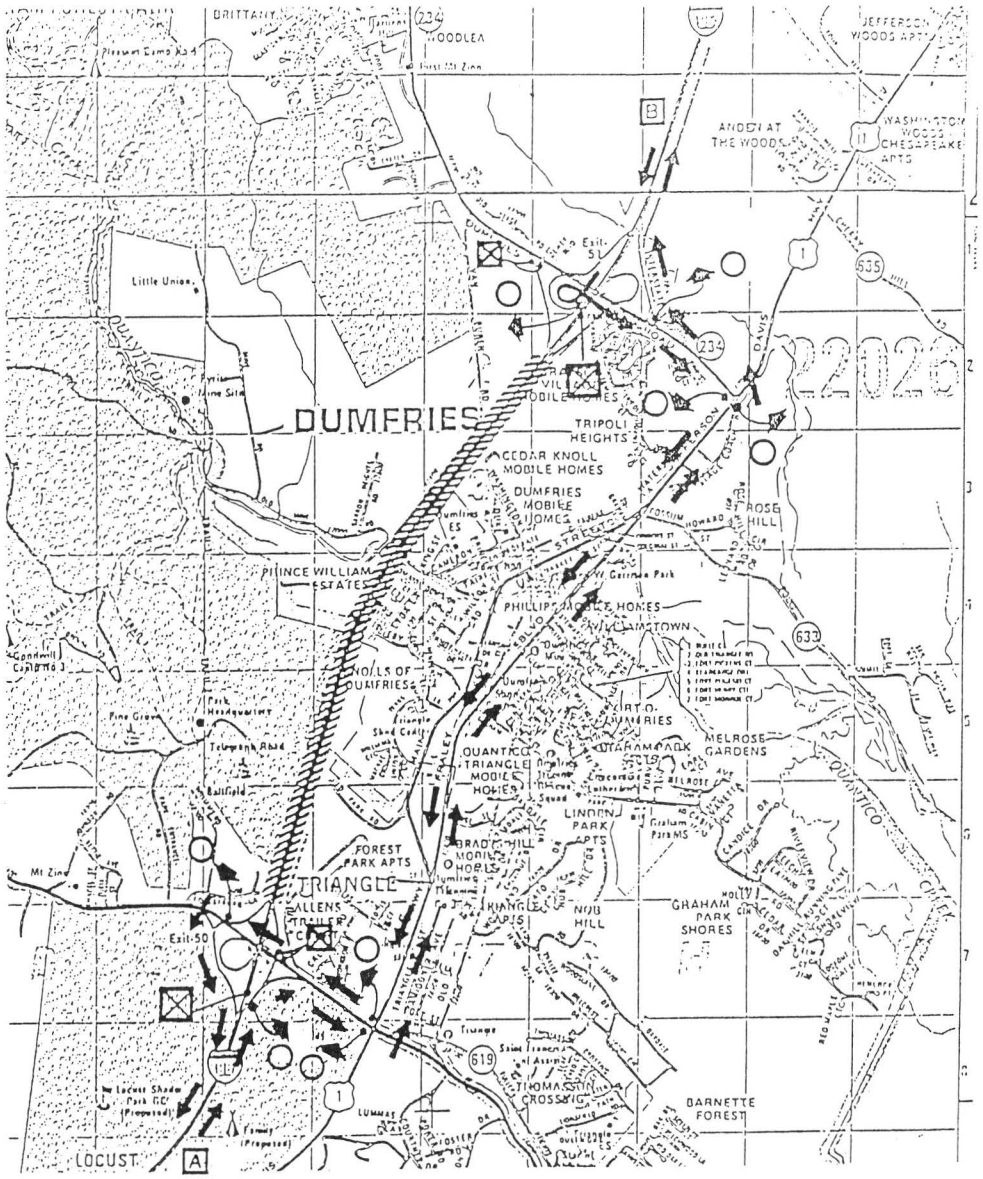
Traffic Control Guidelines

For effective traffic management during major incidents, the region may wish to develop traffic control guidelines for law enforcement and other responding personnel at the incident scene. Reference 18 summarizes traffic control guidelines developed by the Texas Transportation Institute. Samples from this document are presented below.

The guidelines are for major incidents on urban freeways i.e. those involving more than a single patrol vehicle and/or operating agency to handle the incident effectively .

The management of traffic flow during a major freeway incident requires techniques for:

- Increasing capacity past the incident site; and



LEGEND

- LIMITS OF CLOSURE
- PRIMARY ALTERNATE
- SECONDARY ALTERNATE
- A — VARIABLE MESSAGE SIGN
- POLICE OFFICER
- DETOUR SIGN (PRIMARY)
- DETOUR SIGN (SECONDARY)
- SIGNALIZED INTERSECTION
- CLOSED RAMPS/ROADS

SHEET 53

I-95

ALTERNATE ROUTE PLAN

BETWEEN: Dumfries Road

AND: Fuller Road

Figure 22
Alternate Route Map

LAST REVISION _____

ALTERNATE ROUTING INSTRUCTIONS - Sheet 53

I-95 NORTHBOUND

Closure: Between ramp from Fuller Rd. and ramp to Dumfries Rd.

Primary NB Alternate: Exit to EB Fuller Rd.; turn left on Route 1; turn left on Dumfries Rd.; re-enter I-95

VM Sign A: I-95 CLOSED/FOLLOW DETOUR*

No. Detour Signs: 4

I-95 SOUTHBOUND

Closure: Between ramp from Dumfries Rd. and ramp to Fuller Rd.

Primary SB Alternate: Exit to EB Dumfries Rd.; turn right on Route 1; turn right on Fuller Rd.; turn left on ramp to re-enter SB I-95.

VM Sign B: I-95 CLOSED/FOLLOW DETOUR*

No. Detour Signs: 4

SPECIAL INSTRUCTIONS

Median shoulders OK for traffic? _____ Yes _____ No

Outside shoulders OK for traffic? _____ Yes _____ No

Regional Diversion Signing: I-95 CLOSED/FROM DUMFRIES RD/TO FULLER RD*

*NOTE: If I-95 is not closed, use I-95 BLOCKED, ACCIDENT ON I-95 or other words appropriate to the circumstances. For regional diversion signs on I-270 or I-95 in Maryland, add "IN VIRGINIA" to sign message.

Figure 20 (cont'd.)
Alternate Route Map

- Reducing (or managing) demand on freeway segments affected by the incident.

In those situations where traffic volumes are relatively low and adequate freeway capacity exists, traffic flow may be maintained through the incident scene by:

- Use of the freeway shoulders;
- Merging techniques;
- Re-timing frontage road signals or manually controlling traffic through frontage road intersections; or,
- Contraflow operations, in special situations.

The freeway shoulder can be used as an interim measure to increase capacity until the incident is removed from the freeway. The decision to use the freeway shoulders is based on the following considerations:

- The shoulder is paved and there is at least 10 feet of clearance from the far edge of the shoulder to the edge of the incident.
- The use of the shoulder for traffic will not interfere with emergency vehicle requirements.
- There are no unusual geometrics on the roadway, such as an on-ramp that would conflict with traffic on the shoulder.

Manually-controlled merging should be limited to those lanes that absolutely require it to get traffic past the incident. Merging lanes should be regulated according to the number of vehicles queued in each lane. Also, manually-controlled merging requires that special attention be given to ramp movements to avoid problems on adjacent roads.

Contraflow diversion involves use of lanes on the opposite side of the freeway and may be applicable when one direction of the freeway has been completely closed by an incident.

General personnel requirements for utilization of uniformed police officers for each of these basic techniques are outlined below.

1. **Use of Shoulders.** Use of the freeway shoulders to increase capacity should be implemented by uniformed police officers to ensure motorist compliance. The officers should be positioned at the upstream end of the taper. Normally, two officers would be required. In addition to the uniformed officers, one to two highway agency personnel may be used to position traffic control devices (flares, cones, etc.)

2. **Manually-Controlled Merging.** Manually-controlled merging should generally be directed by uniformed police officers. The officers should be positioned at the upstream end of the taper. As a general rule-of-thumb, the number of police officers needed may be assumed to equal two more than the number of lanes closed. Highway agency personnel may be used to position and remove cones and flares.

3. **Contraflow Diversion.** Contraflow operation will, in most cases, be the responsibility of the local transportation agency. Personnel requirements for contraflow operations will vary, but typically a minimum of six transportation agency personnel (including one traffic engineer) and three uniformed officers will be required.

   Staffing requirements for diversion will include personnel to place signs and cones, personnel for traffic control at exit ramps and intersections (if off-freeway diversion is used), and personnel at the incident site. Generally , a minimum of 5 and possibly as many as 10 individuals would be needed, depending on the severity and duration of the incident. The majority of the personnel required would typically be available from the local transportation department. The primary responsibility of uniformed police personnel would be at the incident site and at the freeway entry and exit points in the immediate vicinity of the incident.

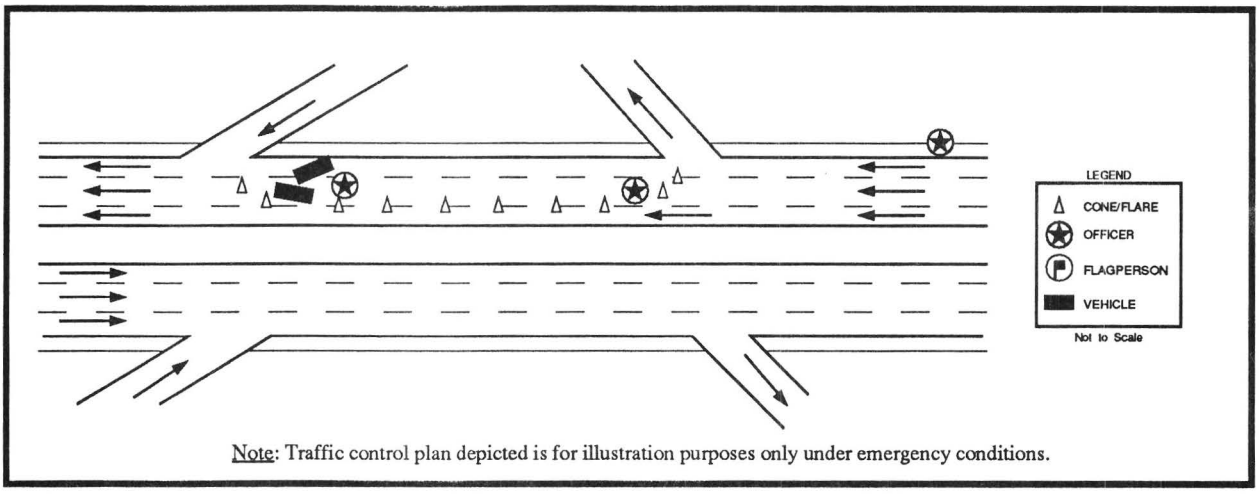
Since the primary objective of incident management is to restore freeway traffic services as quickly and as safely as possible, the effectiveness of

incident management techniques utilizing police officers should be measured in terms of:

(1) How quickly the incident can be cleared and normal traffic services restored; and (2) how effective the techniques are in preventing or minimizing secondary incidents. These measures provide a means of calculating the delay experienced by motorists as a result of the major freeway incident and can be used to assess the overall effectiveness of various incident management techniques utilizing police officers to assist with traffic control.

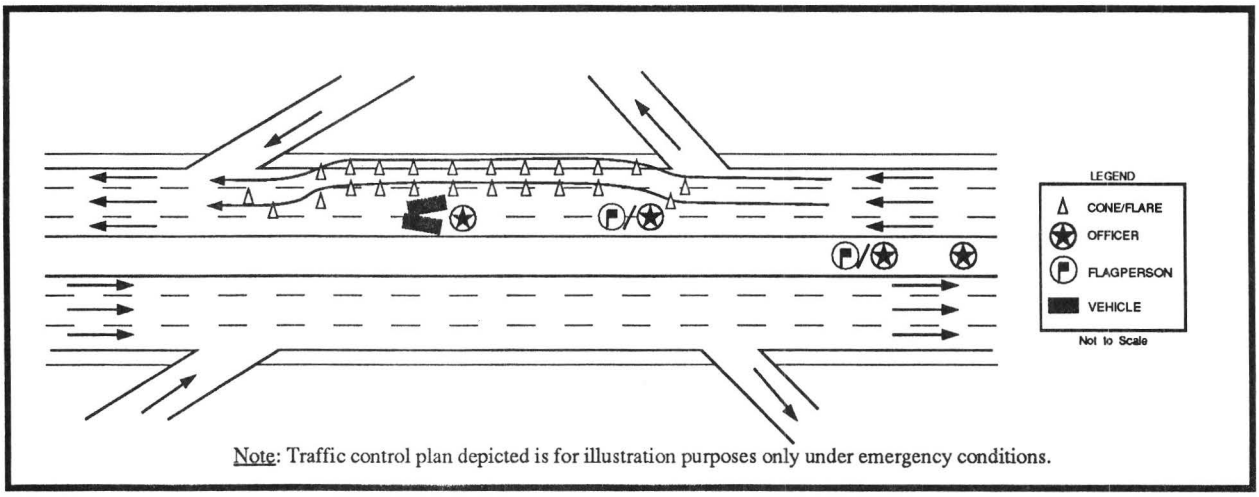
Examples of Typical Set-ups

Figures 23-26 illustrate typical applications of freeway incident management techniques utilizing police officers. Figure 23 depicts an incident requiring patrol personnel to implement a manual merging of traffic into the remaining open freeway lane. One officer should always be positioned to protect the incident site while the other officers are



Note: Traffic control plan depicted is for illustration purposes only under emergency conditions.

Figure 21
Example Set-Up for a Freeway Incident: Manual Merge



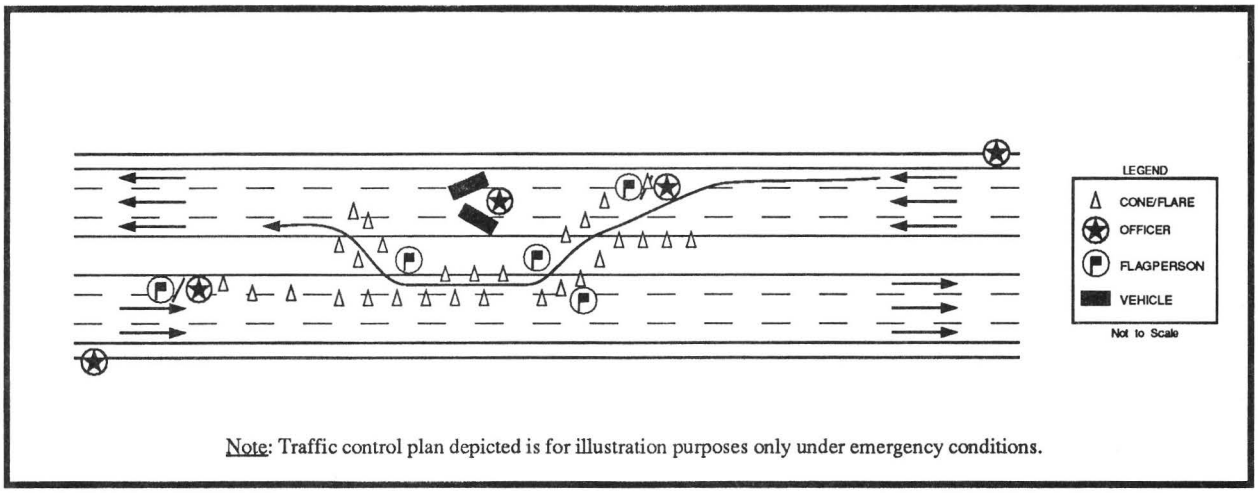
Note: Traffic control plan depicted is for illustration purposes only under emergency conditions.

Figure 22
Example Set-Up for a Freeway Incident: Shoulder Usage

responsible for traffic control associated with the merge transition, or diversion if necessary. Transportation agency personnel, as available, should provide assistance with placement of traffic control devices and flagging support.

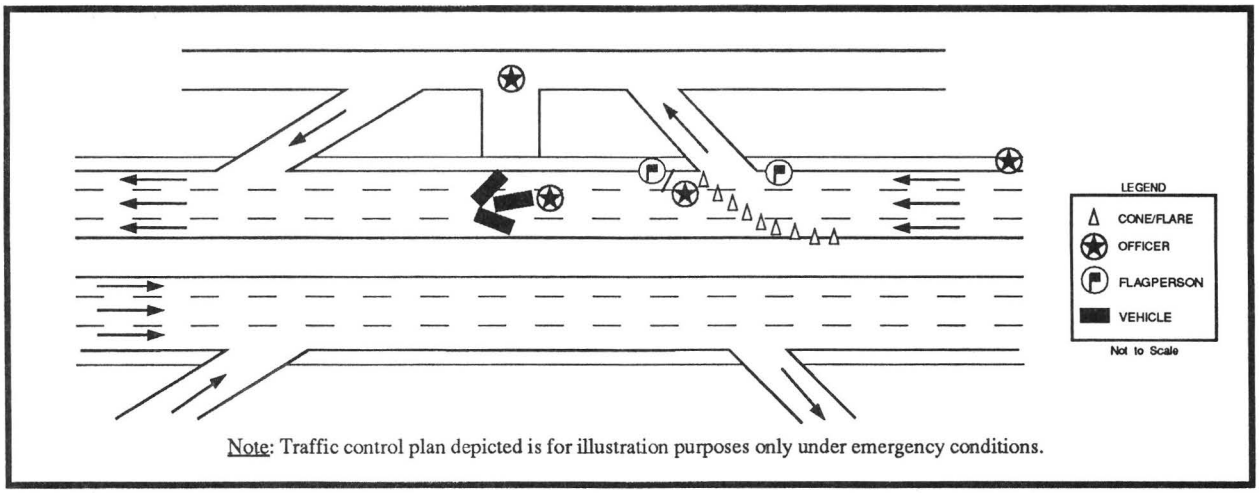
Figures 23 and 25 provide two examples of freeway incident management to utilize available capacity. Figure 24 presents a freeway incident blocking the inside lanes. Police officers are utilized to transition traffic into the remaining open lane and along the shoulder for an additional lane. Figure 25 shows a major incident closing the freeway. Officers and/or flag personnel are located to transition traffic to take advantage of capacity in the opposite direction. Obviously, this scenario would only be possible where there was no median obstruction.

In either case of shoulder usage (Figure 24) or contraflow diversion (Figure 25) extensive signing and flagging support is needed in addition to uniformed officers. The exact requirements for both police and other support is dependent upon the duration of blockage, location of the incident, and time of day (peak, off-peak).



Note: Traffic control plan depicted is for illustration purposes only under emergency conditions.

Figure 23
Example Set-Up for a Freeway Incident: Contraflow Diversion



Note: Traffic control plan depicted is for illustration purposes only under emergency conditions.

Figure 24
Example Set-Up for a Freeway Incident: Ramp Diversion

Figure 26 illustrates a major incident necessitating complete freeway closure. Officers arriving at the location protect the site and request other emergency support. Where continuous frontage roads exist, traffic may be diverted onto the nearest connecting exit ramp and routed around the incident. Officers may be needed at other positions, which are site specific, to safely and efficiently implement the diversion to minimize delay.

Timing of Removal

In certain types of incidents, the removal process may be more disruptive to traffic than the incident itself.

For example, removal of a tractor-trailer may require complete roadway closure even though the overturned vehicle may only be partially blocking the travelled lanes. In these cases judgment is required to possibly defer removal operations until after the peak period rather than further reduce capacity during the peak.

Reference 30 analyzes the deferral of incident removal and its effect on delay.

Special Event Planning

The handling of a special event, such as a sports event, fair, or concert require the same attention from a traffic standpoint as the occurrence of an incident created by an accident, stall, or maintenance/construction activity. Proven traffic management techniques should be applied from the earliest planning stages through the actual event so that congestion associated with special events can be significantly reduced.

Before the event, good traffic management plans need to be prepared, procedures and working relationships need to be developed to bring about the essential coordination, and personnel and equipment to implement the plans need to be in place. During the event, traffic management teams need to actively implement and carry out the plan.

Table 32 lists the key activities required to efficiently plan for a special event.

Example

The 1986 U.S. Open Golf Tournament.

The 1986 U.S. Open Golf Tournament held at the Shinnecock Hills Golf Club on the South Fork of Long Island, New York during the week of June 9 through 15, 1986, gave dramatic proof that the application of traffic management techniques for a special event does work. One of the biggest stories of the U.S. Open was the anticipation of traffic delays and horrendous traffic jams that never occurred. The 1986 U.S. Open was held approximately 90 miles east of Manhattan in Shinnecock Hills, Town of Southampton, New York. As shown in Figure 27, the Club is located on the north side of the major east/west highway, Suffolk County Road 39 which is approximately 2 miles east of the terminus of the limited access facility, State Route 27.

Major traffic management concerns included:

- Coincidence of event with heavy recreational summer traffic
- Only two crossings over Shinnecock Canal
- Only one major east/west roadway

A study following the general steps outlined in Table 32 was conducted and a traffic management plan developed. The study revealed that additional roadway capacity would be necessary to accommodate the peak traffic flow conditions. Furthermore, a carefully designed parking management plan was developed to distribute the traffic destined for the event.

The parking management plan utilized available parking facilities to: (a) efficiently distribute the flow of traffic, (b) minimize the superimposition

Table 32
Special Event Planning

Identify Major Concerns

- Limited access to site
- Limited capacity of roadways feeding site
- Potential "Hot Spots"
- Coincidence of event with commuter or recreational peak periods
- Parking availability
- Transit service

Assemble Representatives from Participating Agencies

- Assign task groups
- Develop working relationships among agencies
- Obtain inputs into development of special event plan
- Prepare Traffic Impact Study and Traffic Management Plan
- Engage consultant if external resources are required.

Assess Impact of Event on Affected Roadways

- Review event schedules
- Estimate attendance
- Estimate modal split
- Assemble existing traffic data
- Estimate directional distribution of event generated attendance
- Assign traffic to approach roadways
- Compute composite traffic comprising event and non-event generated traffic
- Compare to capacity of approach roadways
- Identify problem locations

Prepare Traffic Management Measures

- Identify mitigating measures
  - Diversion to underutilized approach roads
  - Designated parking lots with shuttle bus service
  - Separation of pedestrian, automobile and shuttle bus traffic to the extent possible
  - Bus-only ramps and streets
  - Temporary signing
  - Portable signing to direct motorists to available parking
  - Special bus lanes
  - Temporary one-way streets
  - Parking restrictions
  - Traffic officer placement
  - Signal timing
  - Highway advisory radio use
  - Left turn restrictions
  - Radio communications
  - Aerial surveillance
  - Temporary metering
  - On-site traffic management
  - Temporary lane control
  - Temporary command center
- Establish media contacts and assign representatives
- Prepare information, brochures, releases

Implement Plan

- Assign traffic management teams
- Build in flexibility to modify plan on-site as required
- If multi-day event, hold critique sessions each day to improve operations
- Provide information to media

Evaluate Plan

- Hold critique session
- Identify shortcomings and possible solutions
- Identify future special events

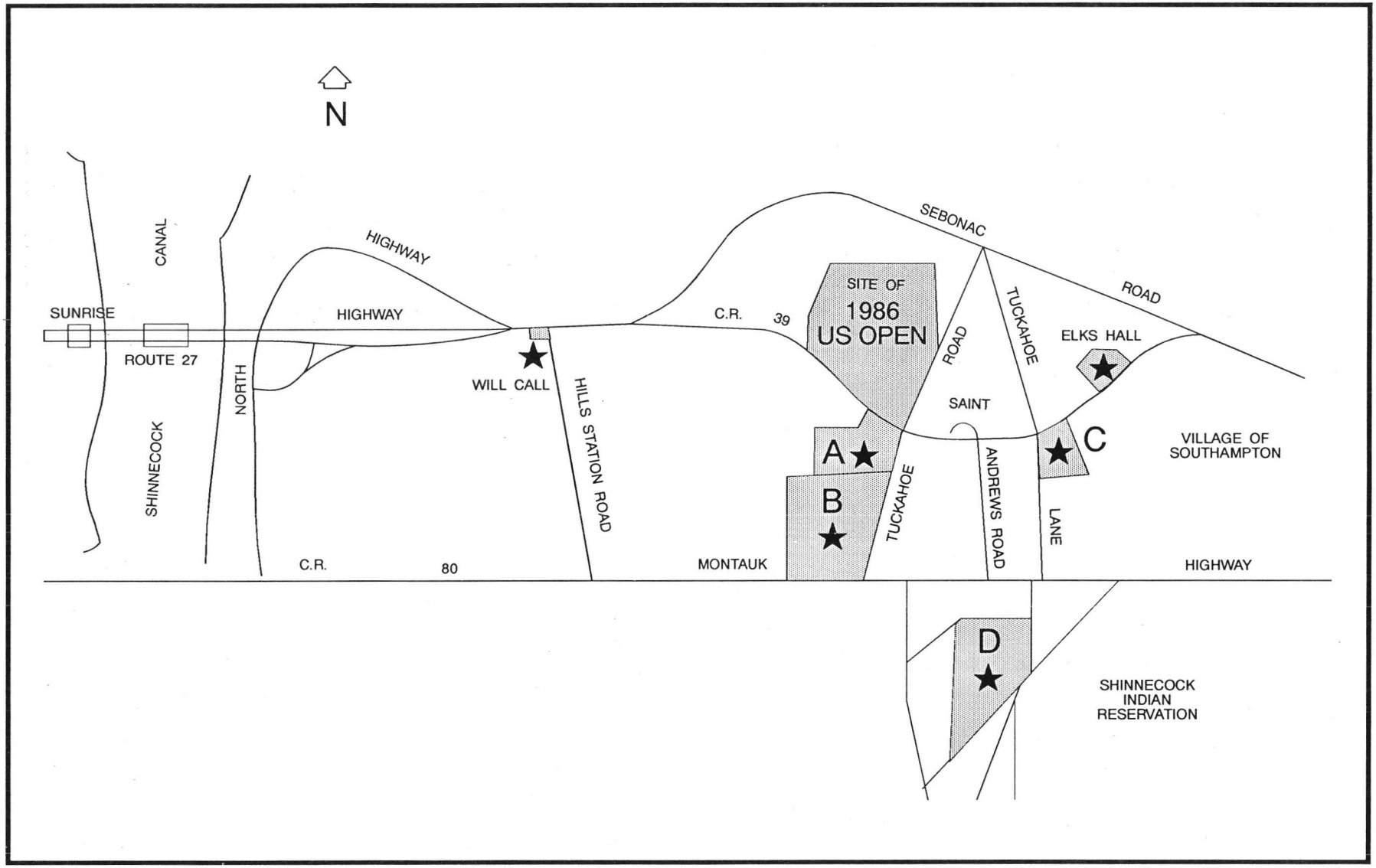


Figure 25
Site of U.S. Open Golf Tournament

of traffic flow on a single roadway section, and (c) separate the pedestrian, automobile, and shuttle bus traffic. Figure 27 shows the four major parking areas. Parking Lots A and B were located on the site of Southampton College. Parking Lot A was assigned for preferred parkers, while Parking Lot B was assigned to season ticket holders. In addition, the major parking lot facility (Parking Lot D) was located on the Shinnecock Indian Reservation. This lot was assigned to season ticket holders and daily ticket holders. Parking Lot C was established for the staff and volunteers at the U.S. Open.

People using Parking Lots A and B were directed to walk to the site. In order to avoid pedestrian/vehicular conflicts with an at-grade crossing of C.R. 39, which separates Parking Lots A and B from the golf course, the Suffolk County Department of Public Works erected a temporary pedestrian overpass over C.R. 39 to link these two locations. The construction of the pedestrian overpass was essential in order to keep the traffic moving on the adjacent roadway network.

To transport people from Parking Lots D and C, a shuttle bus operation was established.

Passengers of the Long Island Railroad utilized the Southampton College station and walked directly across the pedestrian overpass into the tournament site. A separate bus unloading and loading area for press and corporate buses was established along the northerly section of Parking Lot A with the pedestrian overpass being used to enter the golf course. Other public bus transportation operations were directed to the rear of the golf course with a separate unloading and loading area being established so the mass transportation operations and the shuttle bus operations were separated from the major automobile traffic.

In designing the access locations for the parking facilities, the entrances and exits were located as far as possible away from the major intersections so that the vehicles could exit immediately from the roadways without disrupting the flow of traffic on the roadways. In this manner, backups and delays were avoided.

Table 33
Traffic Management Techniques at the
1986 U.S. Open Golf Tournament

- Route marker/destination signing
  - color coded letter symbols
  - diversion via arrow change
- Reversible 3 lane operation to provide additional capacity for peak traffic flows on normal 2 lane roadway
- Highway advisory radio
  - status, information, diversion
- Establishment of command center
- Left turn restrictions
- Radio communications
- Aerial surveillance
- Exclusive bus roadway
- Specific roadway assignment
- Traffic flow control
  - override of traffic signals
  - manual coordinated movement system
- Metering system
  - bus capacity
  - walking time
  - parking lot metering
- On-site traffic management

Other key elements of the Traffic Management Plan are indicated in Table 33. Table 34 shows messages broadcast over a temporary highway advisory radio system installed at the golf club. Figure 28 shows instructions that were distributed with tickets to the U.S. Open. Further details on traffic management of this special event can be found in Reference 17.

Conclusion

Each special event is unique. Therefore, traffic control should be jointly planned by all responsible agencies, including individuals representing the event sponsor, the area transportation agency, and the police agency with local jurisdiction. Considerations in this planning process should include route capacities, modifications to traffic control devices, locations requiring real-time, manual control of traffic, and staffing requirements for police and other support.

The keys to successful handling of a special event are:

- Development of a good traffic management plan
- Input and participation of involved agencies
- Implementation of plan
- On-site traffic management
- Ability to modify the plan to accommodate real-time traffic.

Table 34
Highway Advisory Radio Messages

PURPOSE	MESSAGE
Overnight Messages	Welcome to the 1986 U.S. Open Highway Advisory Radio located at 530 on your AM dial. This station will be providing constant updated information on traffic and parking conditions throughout the 1986 U.S. Open.
Arrival message: Eastbound Reversible Lane Operation	Welcome to the 1986 U.S. Open Highway Advisory Radio. Please follow signs to your specific parking destination. The 3-lane operation on Route 27, Sunrise Highway, and Route 27A, Montauk Highway, consists of two eastbound lanes and one westbound lane. All through eastbound traffic use center lane. All traffic reduce speed to 30 miles per hour.
Transition Message: Changing Operation from 2 Eastbound Lanes to 2 Westbound Lanes.	Welcome to the 1986 U.S. Open Highway Advisory Radio. All traffic on Route 27A, Montauk Highway, and Route 27, Sunrise Highway, stay to your right. Do not use the center lane. All traffic in the cone areas reduce speed to 30 miles per hour.
Departure Message: Westbound Reversible Lane Operation	Welcome to the 1986 U.S. Open Highway Advisory Radio. The 3-lane operation on Route 27, Sunrise Highway, and Route 27A, Montauk Highway, consists of one eastbound lane and two westbound lanes. Westbound traffic use two lanes. All traffic reduce speed to 30 miles per hour in the coned areas.

PREFERRED PARKING
(Blue and Hospitality Stickers Only)

From the West: Route 27 to C.R. 39. Stay in right lane on C.R. 39. Turn right onto Tuckahoe Road. Make right turn into Parking Lot A.

From the East: C.R. 39 to Tuckahoe Lane. Turn left onto Tuckahoe Lane and continue to Montauk Highway. Turn right onto Montauk Highway. Follow signs for Parking Lot A.

FOLLOW BLUE SIGNS TO PARKING LOT A

SEASON TICKET
HOLDERS PARKING

From the West: Route 27 to C.R. 39. Use two lanes on C.R. 39. Turn right onto Tuckahoe Road. Turn right onto Montauk Highway and follow red signs to Parking Lot B.

From the East: C.R. 39 to Tuckahoe Lane. Turn left onto Tuckahoe Lane and continue to Montauk Highway. Follow green signs to Parking Lot D. If travelling from the East from the Village of Southampton, use Hill Street (Montauk Highway) and turn left into the Shinnecock Indian Reservation and into Parking Lot D.

FOLLOW RED SIGNS TO PARKING LOT B

FOLLOW GREEN SIGNS TO PARKING LOT D

VOLUNTEER/STAFF PARKING
(Yellow Sticker Only)

From the West: Route 27 to C.R. 39. Use center lane on C.R. 39. Turn right into Parking Lot C at Tuckahoe Lane.

From the East: C.R. 39 to Tuckahoe Lane. Turn left onto Tuckahoe Lane to Parking Lot C.

FOLLOW YELLOW SIGNS TO PARKING LOT C

Figure 26
Directions to Motorists

COUPONS, DAILY TICKETS, AND TICKET PURCHASES PARKING

From the West: Route 27 to North Road Exit (Exit 66). At end of ramp, turn left onto North Road. Continue to Montauk Highway and turn left onto Montauk Highway. Continue east on Montauk Highway past the Southampton College and turn right into the Shinnecock Indian Reservation and into parking Lot D.

FOLLOW GREEN SIGNS TO PARKING LOT D

From the East: C.R. 39 to Tuckahoe Lane. Turn left onto Tuckahoe Lane. Continue south to Montauk Highway. Follow green signs to Parking Lot D. If travelling from the east from the Village of Southampton, use Hill Street (Montauk Highway) and turn left into the Shinnecock Indian Reservation and into Parking Lot D.

WILL CALL

From the West: Route 27 to C.R. 39. Stay in right lane. Turn right just past the Texaco Gas Station onto Hills Station Road. Make a right turn into the Windward Motel.

From the East: Travel west on Montauk Highway and turn right on Hills Station Road. Turn left into the Windward Motel.

FOLLOW BROWN SIGNS TO PARKING LOT D

Exit the Will Call area by turning left onto Hills Station Road and right onto C.R. 39. Turn right onto Tuckahoe Road and follow signs to Parking Lot A (Preferred Parking) and B (General Parking).

BUS DROP-OFFS (Independent Buses)

From the West: Route 27 to C.R. 39. Stay in the center lane. Turn left onto Sebonac Road. Continue on Sebonac Road. Follow instructions of police and the signs to the bus drop-off area.

From the East: C.R. 39 past Golf Course. Turn right onto Sebonac Road. Follow police instructions and signs to the bus drop-off area.

NOTE: Shuttle buses will run from Parking Lots C and D to the U.S. open site.

Figure 26 (cont'd.)
Directions to Motorists

CHAPTER EIGHT - INFORMATION TO MOTORISTS

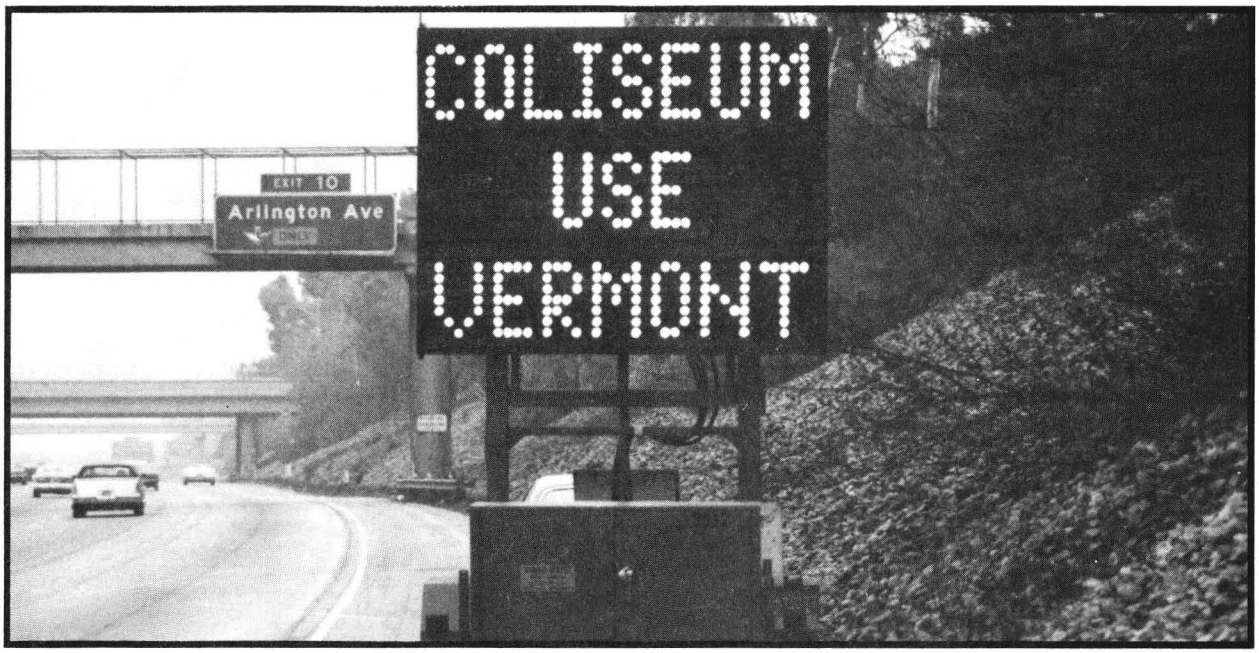


Figure 27
Trailer Mounted Variable Message Sign

Definition

Information to motorists *is the activation of various means of communicating incident site traffic conditions to motorists.*

Objectives

To set up effective communication with motorists and activate the communication channels most appropriate for each incident.

Techniques*

Motorists need to receive information on traffic conditions and suggested adjustments to normal travel patterns in order to fully realize the effectiveness of an incident management plan. They also will have a greater tolerance for the delay if kept informed and can therefore plan for the added travel time. An added benefit is the reduction in secondary accidents as motorists become alerted to the existence of congested conditions.

For motorist information to be useful and credible, it must be both accurate and timely.

Several methods of effectively providing information to motorists are being used in today's incident management systems:

Signing

Variable or changeable message signs, on freeways or surface streets, are a particularly effective means of getting information to the motoring public. Truck mounted or trailer mounted variable message signs have also been used effectively in incident management; these can be quick-

*This section is based on material in Reference 25.

ly located, and moved about as needed for a particular incident. (See Figures 29 and 30.)

Several technologies are being used in variable message sign systems - rotating disk, light emitting diode (LED), fiber optics, rotating drum, bulb matrix, liquid crystal, and cloth panels - each with varying degrees of effectiveness. An essential feature is present in each system; the capability of changing messages quickly (in most cases by remote control) in order that information can be provided to motorists in a timely manner.

Fixed message signs have long been used to inform motorists of long-term situations, such as temporary road closures or restrictions for construction and for maintenance work where conditions do not change appreciably, or in marking bypass routes around incident sites. They are also effective in giving the motoring public advance information regarding upcoming projects, in order that adjustments in travel can be made. (See Figure 31.)

Highway Advisory Radio

These systems are designed to broadcast information on traffic conditions in a particular area to those motorists (only) travelling in that area and

Figure 28
Truck Mounted Variable Message Sign

who have immediate need of the information. One such system uses low-powered transmitters, placed at intervals along the freeway or at key trouble spots to broadcast a signal covering a two to three mile radius; another uses a buried cable along the freeway to send the signal. Motorists are informed through freeway signs that information is being broadcast; they then must tune their car radios to the proper frequency to receive the broadcast.

In California and Texas, truck mounted highway advisory radio units are being used in incident management by the California Department of Transportation and the Texas State Department of Highways and Public Transportation. (Figure 32). These mobile transmitters are generally located in the vicinity of an incident, accompanied by signs informing the public that traffic informtion is being transmitted and to change their radio dials to pick up that information. Highway advisory radio systems have also been widely used in other locations and in a variety of ways to broadcast traffic information to motorists. In general, this has been a very effective approach for communicating information to the travelling public.

Commercial Radio

Another means of passing traffic information to motorists is through the use of commercial radio

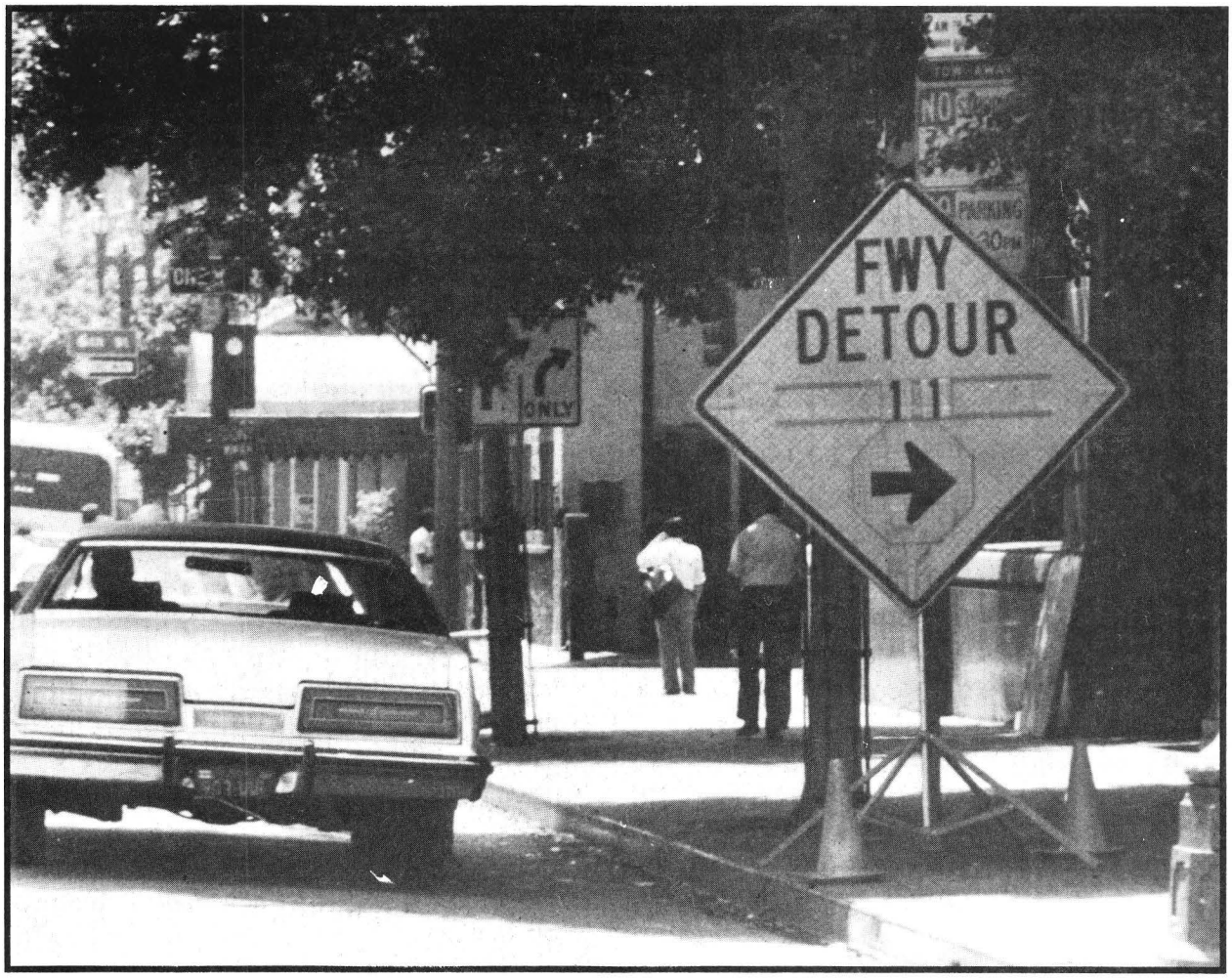


Figure 29
Fixed Message Sign on Alternate Route

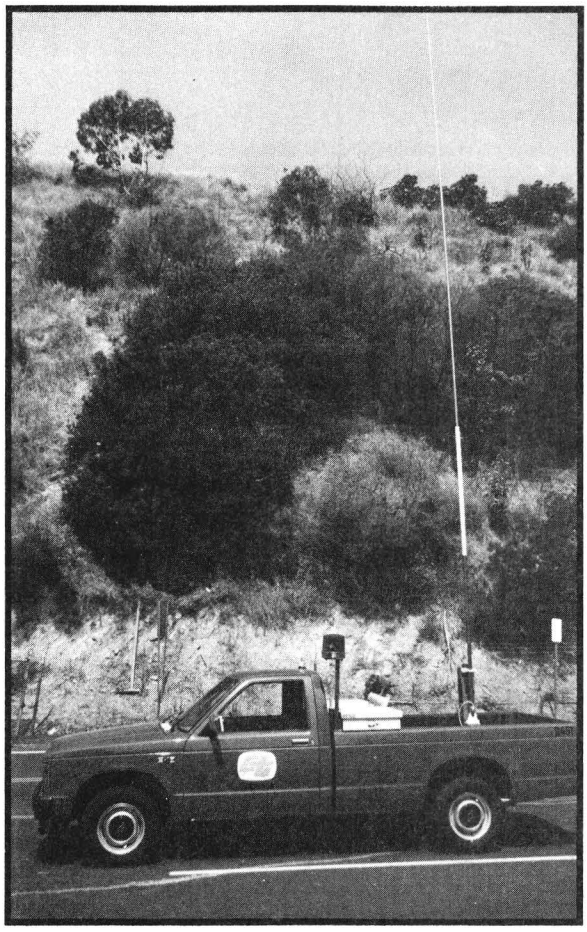


Figure 30
Truck Mounted Highway Advisory Radio

stations. Many stations report on traffic conditions as part of their regular broadcasting format; many have traffic air-watch or ground patrol units giving firsthand accounts on traffic. Motorists are accustomed to tuning to these stations to learn of traffic conditions.

In several incident management systems operating today, information about incidents and traffic conditions is being quickly provided over the telephone, via teletext hookups or through electronic visual displays to commercial radio stations for transmission to the motoring public. Pre-arranging for the transmittal and broadcast of information is essential to smooth operation during an incident; procedures and equipment for getting information to the stations need to be in place; formats have to be worked out. Providing timely, accurate information in a usable, understandable form is a key in getting that information passed on to the public.

Print Media

Newspapers are an excellent means of providing traffic information to the public, particularly in those cases where advanced notice of traffic management plans for construction and maintenance activities, special events and for long-term incidents (such as a bridge collapse) is being given. Another effective means of providing information in advance is through the use of brochures, pamphlets and flyers distributed to affected freeway users.

Citizen Band Radios

A widespread network of vehicles is currently equipped with citizen band radios. This network provides one more means to pass on information to motorists. This approach has been used on a limited basis in the Chicago area during a period of extraordinarily heavy rainfall and extensive flooding of the freeway system.

Cable T.V.

The INFORM freeway surveillance and control system on Long Island, New York is developing a Visual Traffic Information Project (VTIP). INFORM will produce a computerized map of the freeway network displaying speeds in a color code (green - greater than 40 mph; yellow - between 20 and 39 mph; and red - under 20 mph). This map, along with another page of incident information, will be accessible from a PC and modem and plans are being made to broadcast it on a local cable T.V. station.

Cellular Telephone

A system in Chicago, Illinois uses computer generated voice broadcasts which can be accessed by dialing *123 cellular. (This information can

also be obtained via conventional telephone by dialing 312-DOT-INFO.)

Alpha-Numeric Pager

Traffic information can be "broadcast" to subscribers on alpha-numeric pagers. TRANSCOM, in the New York area, uses this means of communication to inform other agencies of incidents and other traffic related information.

In-Vehicle Route Guidance

A current FHWA project called Pathfinder will test the feasibility of electronically linking traffic data with dynamic map displays mounted on automobile dashboards. (See Figure 33.) A two-way communications link will transmit data on congestion due to incidents or other causes to the in-vehicle screen. An in-vehicle computer synthesized voice will also advise motorists of traffic conditions. Similar systems are being developed in Europe and Japan. These systems may well revolutionize motorist information if current trends continue.

The advantages and disadvantages of each motorist information technique are summarized in Table 35.

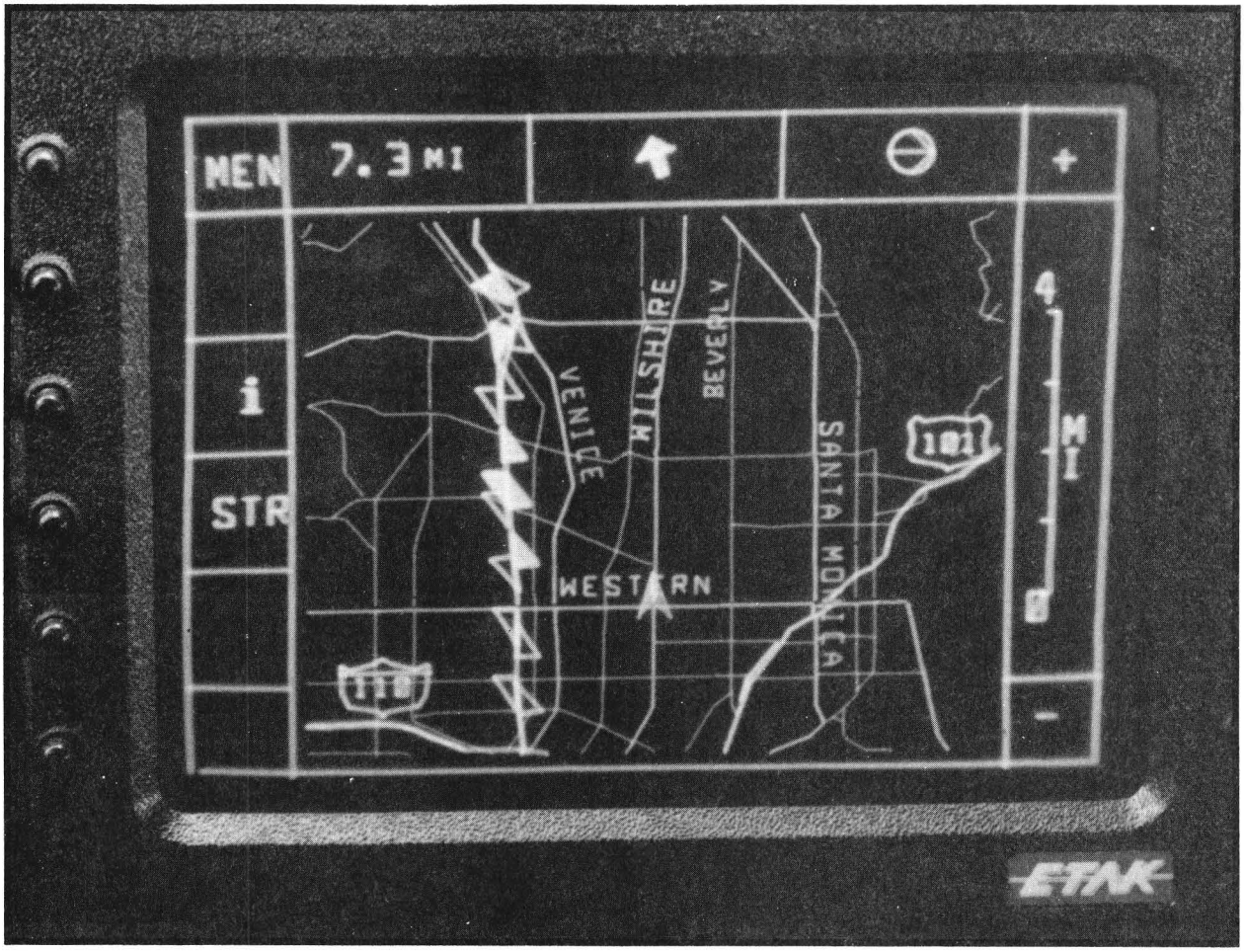


Figure 31
In-Vehicle Route Guidance

Table 35
Motorist Information Media

MOTORIST INFO MEDIA	ADVANTAGES	DISADVANTAGES	REFERENCE (For Further Information)
Variable Message Signs	• Reaches all motorists at sign location. • Requires no in-vehicle equipment. • Can be remotely and automatically updated. • Provides timely information with frequent updates. • Can be at fixed locations or portable (truck or trailer mounted).	• Has limited content due to human limitations in absorbing visual message • Requires supporting structure • Visibility can be affected by ambient conditions. • Limits communication to those points where (fixed) signs are located.	19, 20, 31
Highway Advisory Radio (audio signing)	• Can provide more detailed message than variable message sign. • Has larger area of coverage than VMS. • Can be remotely and automatically updated. • Can broadcast message to specific area where information is needed. • Can be at fixed location or portable (truck or trailer mounted). • Is usually less costly than VMS and supporting structure.	• Requires motorists to have working radio and requires tuning to broadcast frequency	21, 22, 31
Commercial Radio	• Reaches large segment of motorists. • Permits cost to be borne primarily by private sector. • Permits information from traffic operations center to be automatically transmitted to commercial stations.	• May delay reports to fit into station's programming. • Requires reports to be area wide. • Does not target information to specific locations. • Requires motorists be tuned to station broadcasting traffic information.	

Table 35 (cont'd)
Motorist Information Media

MOTORIST INFO MEDIA	ADVANTAGES	DISADVANTAGES	REFERENCE (For Further Information)
Print Media	• Is effective for conveying info on construction and maintenance activities, special events and long-term incidents. • Can be newspapers or brochures/ pamphlets distributed to freeway users.	• Provides no real-time information.	
Citizens Band Radio	• Has large number of vehicles, especially commercial, equipped with CB.	• Requires CB equipped vehicle. • Requires means of transmitting.	
Commercial Cable TV	• Can display traffic conditions graphically. • Is effective for pre-trip planning.	• Reaches small segment of motorists.	
Cellular Telephone Conventional Telephone	• Permits motorist to dial in for info when it is needed, either at home by conventional telephone or in the vehicle by cellular phone. • Can target information to specific areas using voice response systems. • Recognizes that number of cellular telephones are expanding rapidly.	• Requires cellular telephone equipped vehicle when on the freeway. • Has cost to motorist for call.	Appendix E
Alpha/Numeric Pagers	• Provides automatic alerting of motorists.	• Is limited to subscribers.	
In-Vehicle Route Guidance	• Can provide detailed traffic and diversion information in graphical or text format.	• Requires sophisticated in-vehicle equipment.	23, 31

Techniques often are used in combinations, each complementing the other. The more effective systems use every means available to communicate with drivers.

Effective planning will define procedures so that the appropriate information channels are activated according to what type of incident has occurred.

Table 36 indicates the types of advance planning to be undertaken so that information can be conveyed to the motorist in the most accurate and timely manner as possible.

Table 36
Advance Planning For Motorist Information

TECHNIQUE	PLANNING REQUIRED
Variable Message Signs	• If messages are not computer selected, establish responsibilities for message selection and display. • Establish criteria for message selection/display. • If portable, establish dispatch procedures.
Highway Advisory Radio	• If messages are not computer selected, establish responsibilities for message composition and recording. • Establish criteria for message selection and activation. • If portable, establish dispatch procedures.
Commercial Radio and Commercial/Cable TV	• Set up means for transfer of info to radio/TV stations. • Meet with station managers to establish guidelines for reporting frequency. • If information not transmitted by computer, set up procedures and responsibilities for message transmission.
Print Media	• Define formats for press releases. • Set up procedures and responsibilities for issuing press releases.
Cellular Telephone	• Set up procedures and responsibilities for message updating and recording.

CHAPTER NINE - FINANCING

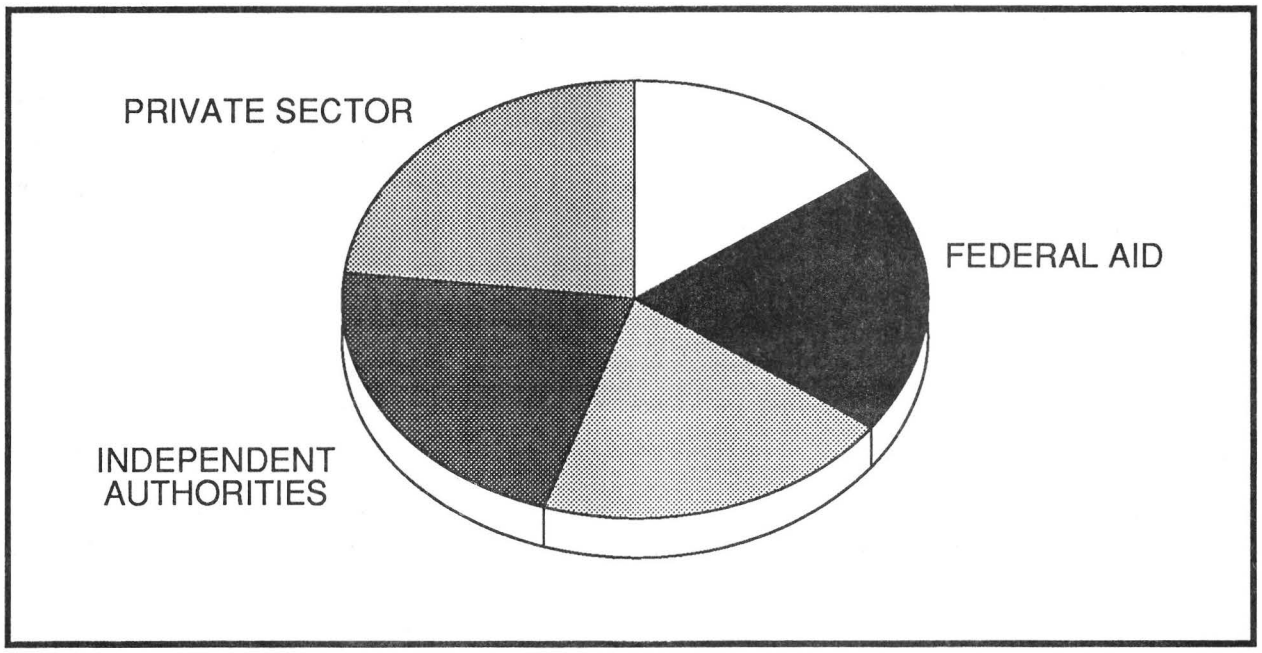


Figure 32
Typical Incident Management Funding Breakdown

Funding Sources

Since incident management is usually a multi-jurisdictional responsibility, funding will usually come from multiple sources, as well. Both the public and private sectors should be considered as possible funding sources. Funding sources include:

Public

- Federal-aid
- Independent Authorities
- State
- Local
- Transit Agencies

Private

- Gasoline Companies
- Commercial Radio and TV
- Cable TV
- Auto Clubs
- Trucking Organizations
- Insurance Companies
- Banks

Federal Funding

Appendix F describes Traffic Management Strategies which are eligible for Federal-Aid Construction Funding in Urban Areas. This document should be read in its entirety to determine those strategies related to incident management which could be eligible for federal funding. For additional information on Federal-aid funding, contact the Federal Highway Administration Division office in your state. Some items which are definitely relevant to incident management are:

- Public Information
  - Highway advisory radio and designated CB channels. (Day-to-day operations are not eligible except during major highway reconstruction).
  - Pamphlets, maps, etc., at rest areas, truck stops, truck inspection sites, and weigh stations in conjunction with major highway reconstruction or to implement a new project.
  - Other reasonable public information and promotion expenses, including personnel costs incurred in conjunction with any of

the following traffic management strategies.

- Traffic Engineering and Operational Improvements
  - Construction of "pullouts" for enforcement, disabled vehicles, and accident investigations.
  - Motorist aid systems.
  - Central operations/communications facilities for less sophisticated (i.e., noncomputerized) traffic surveillance and incident management programs. Eligible equipment could include radios, telephones and other equipment to monitor existing agency and interagency communications systems, dedicated telephone numbers for incident reporting and motorist services, and computer equipment and software data base, graphics, etc.
  - Variable message signs.

Private Funding

Many regions are benefiting from privately funded incident management measures.

Sponsorship of Courtesy Patrols

Privately funded courtesy patrols have been established in many localities. Although these services are designed to benefit individual motorists, they enhance incident management by expediting response and removal of lane-blocking vehicles and aid in detection/verification as well.

The previously described Samaritan program reports that in 1989 more than ten New England cities had operating courtesy patrols. Sponsors include:

- A large drug chain
- Two banks
- A gasoline company

The Houston Motorist Assistance Program benefited when the Houston Automobile Dealers Association purchased six vans for $85,000 and contributed $8,000 toward the cost of two-way radios.

Courtesy patrols are sponsored by two radio/T.V. stations in Seattle, Washington.

Fee For Service

Some localities recover a portion of their service patrols by charging a fee when service is rendered.

In 1986, the California Department of Transportation recovered over 60 percent of the cost of its response teams from the parties causing the incidents.[14] This is done by filing a "Completion Notice and Stores Withdrawal Report" with the District's Accounting Office for billing to the responsible parties.

The Chicago Emergency Traffic Patrol presents an invoice for $5.00 if the motorist has been supplied with gasoline.

Many localities have procedures in place for billing motorists when they are responsible for damaging public property. By transferring this principle to cost recovery for incident cleanup, an agency can at least partially fund equipment purchased for this purpose.

CHAPTER TEN - EFFECTIVENESS OF EXISTING SYSTEMS

Figure 33
Locations of Incident Management Projects

Incident Management in various forms is currently in place at about 50 locations throughout North America. Table 37, prepared by the Federal Highway Administration, summarizes the features and status of each system identified to date. [26]

Of those listed in the table, several systems can serve as excellent examples of different levels of incident management. "Area wide" denotes a regional system comprising several freeways both parallel and intersecting. Surface street facilities may be included as well. "Corridor" level systems include a group of parallel roadways, both limited access and surface street. A system on a specific facility is usually confined to a bridge or tunnel. Examples include:

Area Wide

- Chicago
- Los Angeles
- Seattle
- Minneapolis

Corridor

- Michigan I-75
- New York/Long Island
- Los Angeles I-10

Specific Facilities

- Howard Frankland Bridge - Tampa, FL
- Hampton Roads Bridge Tunnel - Norfolk, VA

Table 37
Incident Management Programs in the United States

SYSTEM TYPE AND LOCATION		DETECTION & VERIFICATION							RESPONSE				MOTORIST INFO				GENERAL COMMENTS
		OPER. CENTER	SERVICE PATROL	ELEC-TRONIC	CCTV	CB RADIO	CALL BOXES	OTHER	TEAMS	WRCKR. AGRMT.	AGENCY EQMT.	OTHER	ALT. ROUTES	HAR	MEDIA	VMS	
AREAWIDE SYSTEMS	Anaheim, CA	X		P	P		X		X			X	P	P	P	P	Integrated Freeway/ Arterial System
	Chicago, IL	X	X	X	X	X		X	X		X	X		X	X	X	Illinois DOT
	Cincinnati, OH																Feasibility study underway
	Columbus, OH																System under development
	Connecticut																Feasibility study underway
	Detroit, MI	X		X	X	X	X			X					X	X	Major expansion underway
	Fairfax, Co. VA	X						X	X	X			P		X		Nonfreeway - County Police
	Fort Worth, TX	P	X	P	P			P	X	X		P	P	P	X	X	20 year project; over 260 mi. of freeways
	Georgia	X						X			X				X		Georgia DOT, major incidents
	Houston, TX	P	X	P	P				X				P		X	P	20 year project; over 555 mi. of freeways
	Jacksonville, FL		X						X	X		X	X		X		Corridor Management Team
	Los Angeles, CA	X	P	X	X		X	X	X	X	X	X	X	X	X	X	450 miles of freeway
	Massachusetts Fwys	P				X	X	X	P			X	P				Boston Central Artery/Tunnel
	Miami, FL								X	X			X		X		Feasibility study
	Minneapolis/ St. Paul, MN	X	X	X	X	X	P		X	X		X		X	X	X	Systems expansion underway
	Milwaukee, WI																Feasibility study underway
	Northern Virginia	X	X	X	X	X			X	X			P		X	X	
	Phoenix, AZ	P		P	P				X	X			P			P	20 year project
	Richmond, VA								X								System under development

X = IN PLACE P= PLANNED OR PROPOSED

Table 37 (cont'd.)
Incident Management Programs in the United States

SYSTEM TYPE AND LOCATION		DETECTION & VERIFICATION							RESPONSE				MOTORIST INFO				GENERAL COMMENTS
		OPER. CENTER	SERVICE PATROL	ELEC-TRONIC	CCTV	CB RADIO	CALL BOXES	OTHER	TEAMS	WRCKR. AGRMT.	AGENCY EQMT.	OTHER	ALT. ROUTES	HAR	MEDIA	VMS	
AREAWIDE SYSTEMS	San Antonio, TX	P		P	P				X								
	San Diego, CA	P	X	X					X		X			P	X	X	
	San Francisco, CA	P	X	P	P		P		X		X			X	X	P	20 year plan
	Seattle, WA	X		X	X				X	P		X	P	X	X	X	FAME Project
	Tampa Bay, FL	P		P	P				X	X			X	P	X	P	2 Corridor Management Teams
	Tidewater Area, VA	P		P	P				X		X		P	X	X	P	Tie fwy systems w/existing bridges
	TRANSCOM, NY/NJ	X						X	X			X	P		X		14 Agencies
CORRIDOR SYSTEMS	EL Paso, TX/I-10			P	P				X	X	X	X	X			X	Const. oriented, will be permanent
	Fort. Lauderdale,FL/I-95								X								Corridor Management Team
	Los Angeles, CA/ I-10	X	X	X	X	P	X	P	X	P	X	P	X	X	X	X	Smart Corridor Demo Project
	Maryland (West)/ US-40								X				X				
	Maryland/US-50		X			X			X		X		X		X		"Reach the Beach" Program Capital Beltway, Wash. D.C. Area
	Maryland/I-95 & 495		X						X		X					P	
	Michigan/I-75								X				X			X	DOT District 6
	NJ Turnpike	X	X	X	P					X	X		X		X	X	
	NY/Long Island Expwy	X		X	P	X			X	X	X		X		X	X	INFORM-30 mi x 5 mi Corridor
	NY State Thruway	X	X		P	X			X	X	X		P	X	X	X	559 mi. of Toll Road
	Orlando, FL/I-4		X	X			X		X	X			X		X		2 Corridor Management Teams
	Rhode Island/I-95								X				X			X	

X = IN PLACE P= PLANNED OR PROPOSED

Table 37(cont'd)
Incident Management Programs in the United States

SYSTEM TYPE AND LOCATION		DETECTION & VERIFICATION							RESPONSE				MOTORIST INFO				GENERAL COMMENTS
		OPER. CENTER	SERVICE PATROL	ELEC-TRONIC	CCTV	CB RADIO	CALL BOXES	OTHER	TEAMS	WRCKR. AGRMT.	AGENCY EQMT.	OTHER	ALT. ROUTES	HAR	MEDIA	VMS	
BRIDGES, TUNNELS AND SPOT LOCATIONS	Baltimore, MD, Tunnels	X			X						X		X	X	X	X	
	Eisenhower Tunnel I-70, CO	X		X	X						X		X			X	
	East St. Louis, IDOT		X			X	X				X			P	X		
	Elizabeth. River Tunnels Norfolk/ Portsmouth VA	P	X	P	P	X	X	X			X				X	P	
	Escambia Bay Brs, (2) I-10/US98	X					X		X	X						X	
	Hampton Roads, Bridge & Tunnel/ I-64 VA	X	X	X	X	X		X	X		X			X	X	X	
	Howard Franland Br Tampa, Florida	X	X	X	X		X		X	X			X		X	X	
	James River Br/SR 17 Newport News, VA	X	X		X	X	X				X						4 mi. of 4-lane divided with no shoulders.
	Lehigh Tunnel Penna. Turnpike, PA	X	X	X	X		X				X					X	
	Lincoln & Holland Tunnels, NY/NJ	X	X	X	X			X		X	X			X		X	
	Oakland Bay Bridge, CA	X	X	X	X		X	X	X		X	X			X	X	
	Sunshine Skyway, FL	X			X		X		X	X			X		X	X	
	Tappan Zee Bridge, NY/NJ	X	X		P	X			X		X		X		X	X	3 mi. across Hudson River
	Triborough Bridge & Tunnel Auth., NY	X		P	X		X				X				X	X	7 Bridges, 2 Tunnels
	Albany, NY		X														Corporate sponsored vans operated by Samaritania, Inc.
	Boston, MA		X														
	Bridgeport, CT		X														
	Hartford, CT		X														

X = IN PLACE P= PLANNED OR PROPOSED

Table 37 (cont'd)
Incident Management Programs in the United States

SYSTEM TYPE AND LOCATION		DETECTION & VERIFICATION							RESPONSE				MOTORIST INFO				GENERAL COMMENTS
		OPER. CENTER	SERVICE PATROL	ELEC-TRONIC	CCTV	CB RADIO	CALL BOXES	OTHER	TEAMS	WRCKR. AGRMT.	AGENCY EQMT.	OTHER	ALT. ROUTES	HAR	MEDIA	VMS	
BRIDGES, TUNNELS & SPOT LOCATIONS	New Haven, CT		X														Corporate sponsered vans operated by Samaritania, Inc.
	Stamford, CT		X														
	Providence, RI		X														
	Westchester Co, NY		X														
CALL BOXES	Los Angeles Co, CA						X										County Opt, - Auto. Reg. Surcharge
	Orange County, CA						X										
	Riverside Co, CA						P										
	San Bernardino Co, CA						P										
	San Diego Co, CA						P										
	SF Bay Area, CA						P										
	Ventura Co, CA						X										
	Connecticut, I-91						X										
	DE/I-95, 295, & 495						X										360 push button boxes/1 mile spacing
	Florida Turnpike						X										
	Florida Rural Interstates						X										434 push button boxes/1-mile spacing
	Louisiana, I-10						X										64 push button boxes/2-mile spacing
	MA/I-93, 95, & 91						X										
	New York/I-87						X										

X = IN PLACE P= PLANNED OR PROPOSED

Expected Benefits

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.[3] Substantial reductions in response and clearance times can be achieved through the implementation of fast removal policies and procedures that require minimal costs. 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.

Quantifiable Benefits

No consistent standard has yet evolved to compare the effectiveness of existing incident management systems. Various jurisdictions have reported benefits from their systems but they are not directly comparable. Typical reported benefits include:

- Chicago — 108,000 motorist assists/year
- Los Angeles — $500,000 in reduced delays
- Los Angeles (Olympics Special Events Management) — Peak Period volumes down 6% Peak Period truck volumes down 6-15%
- Long Island — One hour saved in average response time by having standby crews to perform emergency clean-up
- Minnesota — 2,000 assists provided by "Highway Helpers" in six months
- Los Angeles — Response team program experienced a 10:1 benefit/cost ratio
- Houston — Accident Investigation Sites experienced a benefit/cost ratio of 28:1
- Houston — Motorist Assistance Program clears approximately four incidents per peak hour.[27]
- Toronto — The use of human observers for incident detection and verification in the Highway 401 Incident Management Project resulted in a benefit/cost ratio of 3.5:1

Unquantifiable Benefits

The following unmeasurable benefits are derived from incident management:

- Reduced frustration and inconvenience to the individual motorist involved in an incident.
- The removal of vehicles from the shoulder, thus reducing collision potential.
- Reduction in the number of motorists who abandon their vehicles and become pedestrians on the highway.
- A reduction of noxious fume emissions due to reduction in delay.
- The public relations benefits and the overall public perception that the government does indeed care about traffic management, and is taking positive steps in that direction.

CHAPTER ELEVEN - EVALUATION

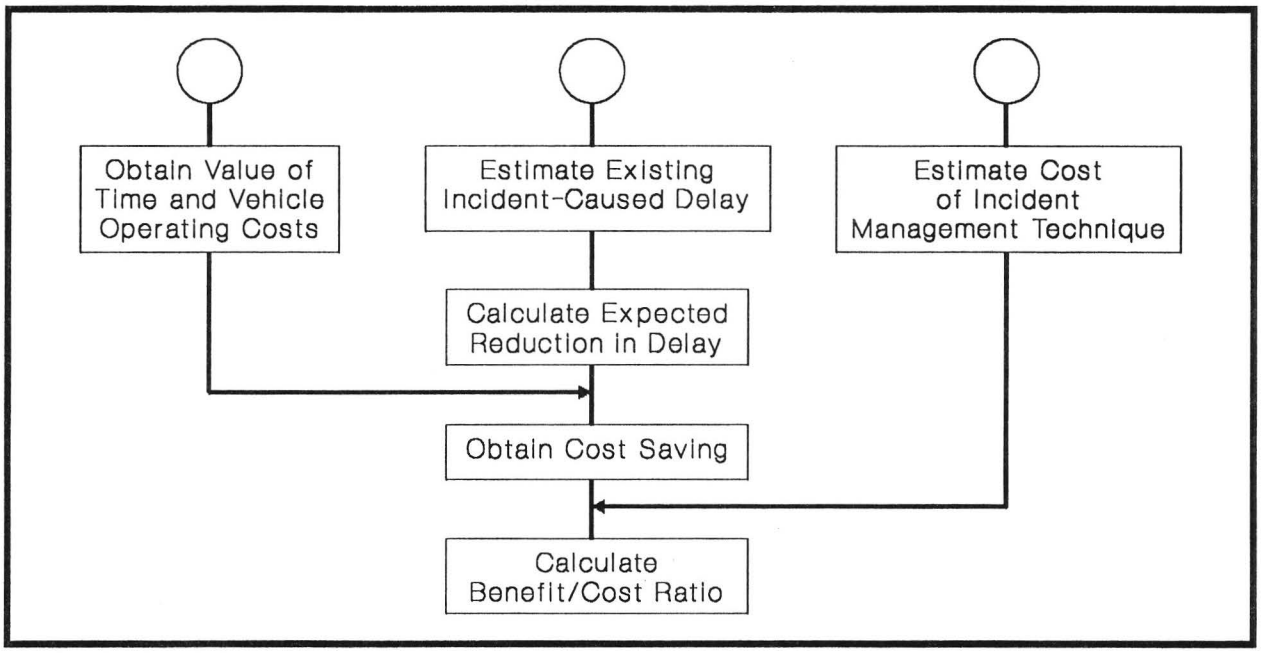


Figure 34
Evaluation Methodology

Definition

The Benefit *of an incident management technique is the delay saved to the motoring public converted to monetary value. This is compared to the cost of operation and the resulting benefit/cost ratio evaluates the technique's effectiveness.*

Objective

This chapter outlines a procedure for evaluating the use of incident management techniques and is based on Reference 8.

Estimate Existing Incident-Caused Delay

Benefits of each proposed incident management technique will be computed in terms of overall delay. To do this, specific information must be known and analyzed. For example, if a dedicated freeway patrol is the technique under consideration, two factors must be known: the headway between patrols and the ability of patrols to detect incidents that have occurred in the other travel direction. Once identified, the time necessary for a dedicated patrol to detect an incident can be estimated.

Next the amount of incident-caused delay must be estimated. To do this, the number of incidents must be estimated, as well as the time duration for an average incident under existing conditions. On existing freeways, data can be collected on incident occurrence. Data on lane-blocking incidents is shown in Chapter 1.

Calculate Expected Reduction in Delay

Delay is one of the best and most common measures of congestion, because it is cumulative. Delays at differing points on the freeway can simp-

ly be added to provide a total number of vehicle-hours of delay for each technique. The calculation of the expected reduction in delay is determined using the basic principle of evaluating the results of excessive demand. (See Chapter 1).

The calculation of delay for non-recurring congestion is complex because the demand and capacity may both change, and the degree and duration of these periods of reduced capacity are dependent upon the type of incident, and the detection, response, and incident removal time of the freeway management system. However, calculations have been automated for various cases. (See Reference 6).

More detailed evaluations of delay reductions can be obtained via simulation models such as:

- TRAF
- FRESIM/INTRAS
- FREQ
- CORQ-CORCON
- CORFLO
- KRONOS

See Reference 32, for example, for a description of various freeway simulations.

Obtain Value of Time and Vehicle Operating Costs

If the evaluation is to be performed in terms of vehicle-hours of delay alone, or it is an evaluation intended to reduce a specific problem (for example, accidents), then this step may be skipped. However, if the evaluation is to include a dollar value, a value of time and a vehicle operating cost must be used. Vehicle operating costs can be obtained from the American Automobile Association and the American Trucking Association. Operating costs for 1987 were:

- Medium-sized autos: $6/hour
- Trucks: $25/hour

The values are subject to considerable fluctuation; thus, any values used should be current. The value of time is somewhat subjective and there are many different techniques and methods used in its calculation.

If any specific value has been used by the local agency on other projects, it would be reasonable to use this value.

Obtain Cost Saving Due to Reducing Delay

This step involves taking the expected reduction in delay, separating the vehicle delay into truck and auto components, and then using vehicle operating costs and the value of time to put a dollar value on the savings due to reducing delay.

Estimate Cost of Each Option

The best estimate of the costs associated with the technique under consideration must be obtained. These costs depend upon the type of technique and its degree of sophistication. Some techniques are very inexpensive as they merely involve initiating an agreement between two agencies. Others require administrative effort but no capital expenditure on hardware; an example of this would be the production of a hazardous materials manual.

Calculate Benefit/Cost Ratio

With the dollar value of annual benefits and the annual cost, a benefit/cost ratio can be computed.

Summary

The analysis of techniques that may be incorporated into a freeway incident management system involves a number of steps to evaluate their relevance, benefits, and costs. The major steps in this process are:

- Estimate benefits of each technique
  - Calculate expected reduction in delay
  - Obtain value of time and vehicle operating costs
  - Obtain cost saving due to reducing delay
- Estimate cost of each technique
- Calculate benefit/cost ratio

Example

A benefit/cost analysis was performed for the human observer Incident Management Project conducted in 1987 by the Ontario Ministry of Transportation.[3] The study was conducted on a section of Highway 401 in Toronto. An adaptation of this analysis is summarized below:

1. Derivation of Society Cost of Incident Delay

An estimate of the society cost created by incident delay utilizes a computer model* which simulates queue growth and dissipation by applying a demand volume to roadway capacity before, during and after a lane blocking incident. The model calculates queue length and vehicle delay created by the reduction in capacity due to a lane blocking incident.

The vehicle delay can then be transformed to a society cost using a formula which considers wasted fuel, driver and passenger time, and commercial vehicle time lost.

The major variable involved in the calculation of society cost is the incident duration. All other factors in the estimate were held constant in order to standardize and simulate peak hour conditions.

2. Assumptions and Constants

The following outlines the assumptions used in the calculation:

- Duration of single lane blocking incident with Incident Management Project (I.M.P.) in place is 17 minutes
- Duration of single lane blocking incident without I.M.P. in place is 38 minutes
- Peak Hour Volume on Highway 401 for three lane section is 5220 veh/hour
- Capacity on Highway 401 for three lane section is 6000 veh/hour
- Capacity on Highway 401 for three lane section with a single lane blocking incident is 4000 veh/hour
- Traffic stream is composed of 88% passenger vehicles and 12% commercial vehicles
- Space occupied in a queue by a passenger vehicle and commercial vehicle is 26 feet (8m) and 58 feet (18m), respectively
- Cost of fuel is $1/gallon
- A stationary vehicle will use 0.85 gallons of fuel per hour
- The time cost of a stationary passenger vehicle and commercial vehicle is 6 dollars/hour and 25 dollars/hour, respectively
- The average number of single lane blocking incidents in any peak hour is 0.476 incidents/hour
- Five peak hours per day; five days per week; IMP had twenty week duration

* Reference 3 does not state which model was used, but the model described in Reference 6 would be satisfactory for this type of analysis.

3. Society Cost due to Incident Delay: Without I.M.P.

The 38 minute single lane blocking incident would result in a maximum queue length of 1.44 mi. (2.33 km). The queue would take 58 minutes to dissipate after the incident was cleared. The total delay is calculated as 610 vehicle hours. (These figures are outputs of a delay model such as Reference 6.)

Society cost of this delay can be computed as follows:

(0.88 passenger veh. x $6/hour + 0.12 commercial veh. x $25/hour + 0.85 gallons x $1/gallon) x 610 veh. hours = $5566.

Society cost for the twenty week period is therefore:

$$\frac{\$5566}{\text{incident}} \times 0.476 \frac{\text{incidents}}{\text{peak hour}} \times 5 \frac{\text{peak hours}}{\text{day}}$$

$$\times 5 \frac{\text{days}}{\text{week}} \times 20 \text{ weeks} = \$1{,}324{,}700$$

4. Society Cost due to Incident Delay: I.M.P. Operation

The 17 minute single lane blocking incident would result in a maximum queue length of 0.64 mi. (1.04 km). The queue would take 26 minutes to dissipate after the incident was cleared. The total delay is calculated as 122 vehicle hours and has a society cost of $1,113.

Society cost for the twenty week period is therefore:

$$\frac{\$1113}{\text{incident}} \times 0.476 \frac{\text{incidents}}{\text{peak hour}} \times 5 \frac{\text{peak hours}}{\text{day}}$$

$$\times 5 \frac{\text{days}}{\text{week}} \times 20 \text{ weeks} = \$264{,}900$$

5. Society Cost Savings by I.M.P.

A comparison of the estimated society cost due to incident delay shows that the I.M.P. significantly reduces the cost which would have been incurred had it not been in place.

The savings is calculated as:

$$\begin{array}{r} \$1{,}324{,}700 \\ \underline{-\ 264{,}900} \\ \$1{,}059{,}800 \end{array}$$

6. Benefit/Cost Ratio of I.M.P.

The benefit cost ratio is calculated by comparing the savings in society cost to the cost of I.M.P. operation.

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{\$1{,}059{,}800}{\$\ 283{,}000} = 3.7$$

This benefit/cost ratio of 3.7 is considered to be a conservative estimate of the true value of operating an I.M.P.

CHAPTER TWELVE - PROMOTION

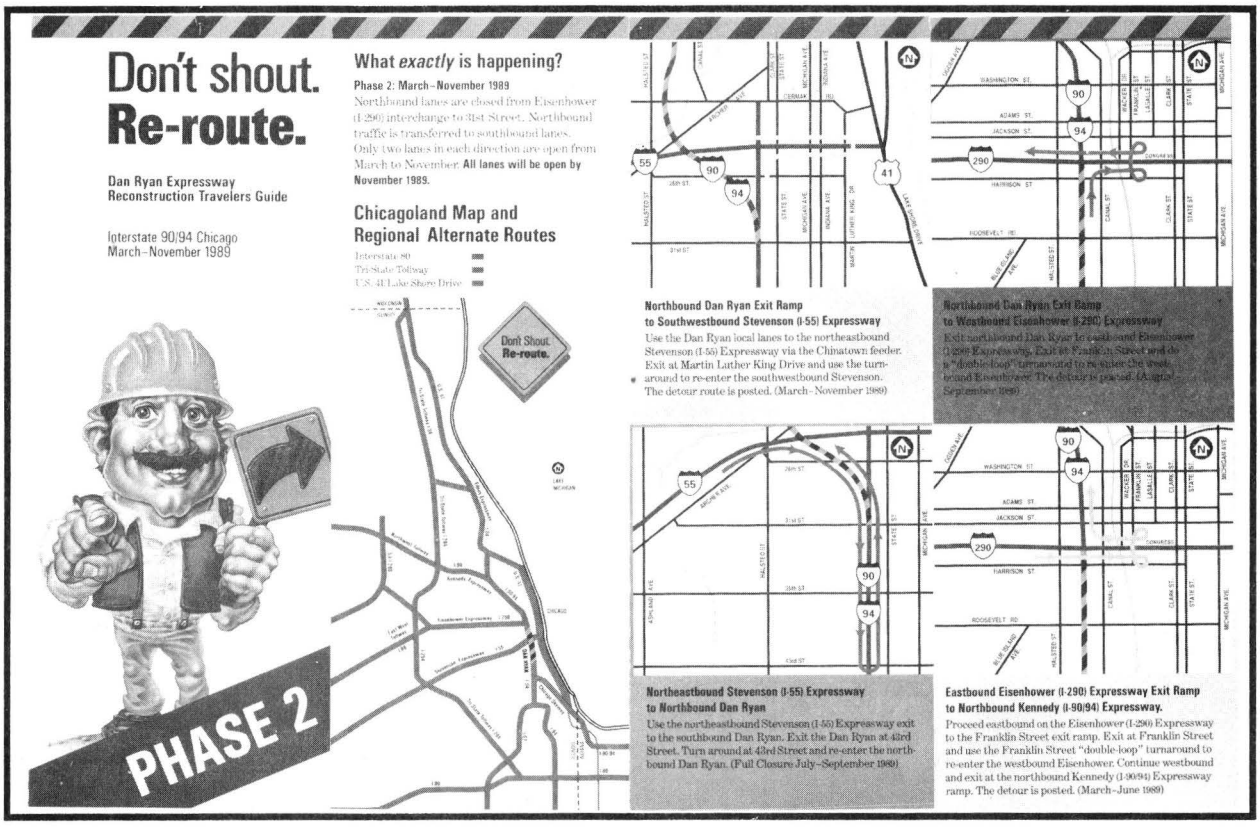


Figure 35
Promotional Brochure

Definition

Promotion *is the use of various media to inform transportation officials and professionals as well as the public on the need for incident management.*

Objectives

Promotion is required to encourage elected officials and Department of Transportation executives to place high priority on incident management. Promotion to the public is also needed to gain acceptance for incident management techniques as they are implemented.

Promotional Strategies

Many possible strategies can be used to enhance the initiation and acceptance of incident management in a particular region. Potential promotional avenues include:

- Press releases
- News conferences
- Public service announcements
- Freeway signing
- Informational brochures
- Videotapes
- Use of public access cable TV
- Engagement of public relations agency

Table 38
Incident Management Promotional Materials

TITLE	TARGET	DATE	ORGANIZATION	PURPOSE	MEDIA	CONTACT
Don't Shout, Reroute Dan Ryan Expressway Reconstruction Travel Guide	Public	March/ Nov 1989	Illinois DOT and Federal Highway Administration	• Advises of mitigation during Chicago's Dan Ryan (I-90/94) Reconstruction. • Provides background info, construction schedules, maps of alternate routes, sources of traffic info, hotline and other telephone numbers.	12 page color glossy brochure	Illinois DOT 445 Harrison St. Oak Park, IL 60304
Freeway Management in the State of Florida	Public	Nov 1987	Florida DOT	• Describes Freeway Management initiative • Describes Freeway Management Teams	6 page brochure (1-8½" x 11")	State Traffic Engineer, Florida DOT- Mail Station 36 605 Suwannee St. Tallahassee, FL 32399
North South I-94 Freeway Improvement Project	Public	1989	Wisconsin DOT	• Advises of mitigation during Milwaukee's I-94 reconstruction. • Describes construction areas, ramp closures, alternate route maps, telephone numbers, sources of traffic info.	8 page color brochure (1-8½" x 14")	Wisconsin DOT P. O. Box 649 Waukesha, WI 53187
Accident Investigation Sites	Public	March 1990	Minnesota DOT	• Describes Accident Investigation Sites	4 page brochure (1-8½" x 11") both sides	Traffic Systems Management/Safety Traffic Engineering - Room 313 Transportation Building St. Paul, MN 55155
Open Roads	Trans-portation Officials	1990	FHWA	• Promotes Incident Management	Videotape	FHWA
Traffic Management System in Fort Worth	Trans-portation Officials	1990	District 02 Texas SDHPT	• Describes Traffic Management program	Videotape (12 minutes)	Supervising Traffic Engineer Texas SDHPT PO Box 6868 Fort Worth, TX

Each of these techniques can be effective and the choice will depend upon the particular application and the agency's standard procedures.

Development of Promotional Materials

In developing promotional materials, existing materials should be reviewed first. Both the Federal Highway Administration (FHWA) and individual States have published brochures relating to various aspects of incident management (see Figure 38, for example). In addition, FHWA has produced a videotape, *Open Roads,* designed for transportation and other officials. Table 38 provides a listing of some of the materials recently produced by various organizations.

After reviewing the available materials, the agency should proceed through a series of steps to prepare a brochure. These are presented in Table 39.

Table 39
Steps in Preparation of Brochure

- Identify Target Audience
- Establish Method of Distribution and Required Number of Copies
- Establish Budget
- Prepare Draft Copy
- Review Draft Internally
- Engage Professional Graphics Designer to Prepare Final Brochure
- Review Draft Brochure
- Prepare Bid for Printing
- Award Printing Contract
- Distribute Brochures

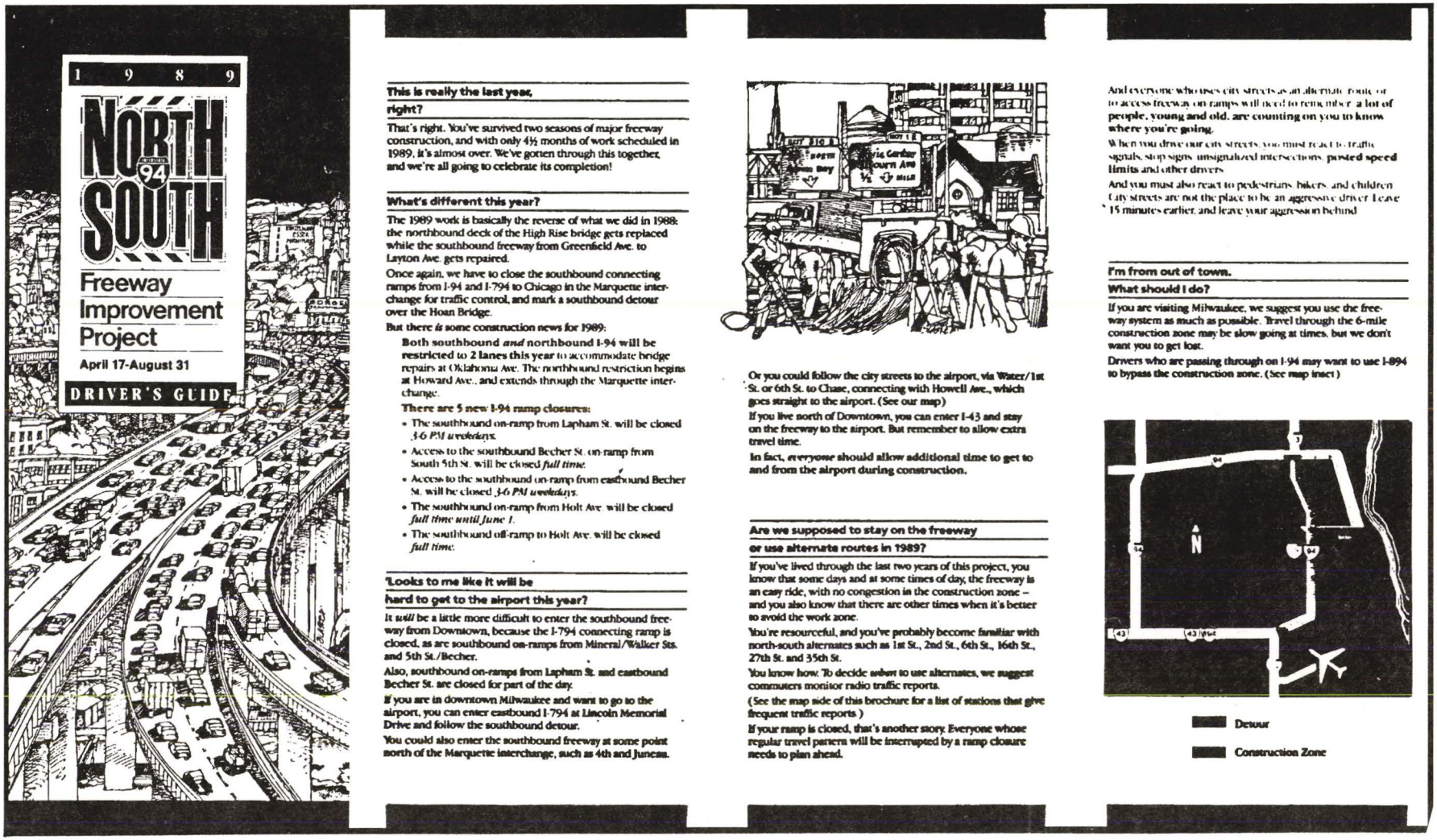


Figure 36
Additional Promotional Brochure

APPENDIX A

TRANSCOM
Incident Management Plan

I-287, NEW YORK STATE THRUWAY
THROUGH ROCKLAND COUNTY

FROM: EXIT 15, SUFFERN

TO: TAPPAN ZEE BRIDGE, NYACK

The preparation of this report has been financed in part by the U.S. Department of Transportation, Federal Highway Administration. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Incident Management Plan

Regional Highway Segment:

New York State Thruway, Interstate 287,
Rockland County
From Interchange 15, Suffern
To Tappan Zee Bridge, Nyack

Responsible Agencies:

New York State Thruway Authority
Coordinator: H. Peter Gustafson, P.E.
Director of Traffic Engineering
P.O. Box 189
Albany, New York 12201
518-436-2838

New York State Police - Troop T
Coordinator: Major Bruce Arnold
Commanding Officer
Troop T Headquarters
P.O. Box 189
Albany, New York 12201
518-436-2791

New York State Department of Transportation
Coordinator: Frederick Slade, Jr., P.E.
Supv. Traffic Operations Center
901 Bedford Road
Pleasantville, NewYork 10570
914-747-1118

Rockland County
Coordinator: Donald McGuire
Director, Office of Emergency Management
Fire Training Center
Firemen's Memorial Drive
Pomona, New York 10970
914-354-8259

TRANSCOM
Coordinator: John M. Ashe
Manager, Incident Management Planning
25 Journal Square
Jersey City, New Jersey 07306
201-963-4033 (Office)
1-800-TRAFFIC
(Operations Information Center)

Participating Agencies:

Bergen County Police

Clarkstown Police Department

New Jersey Highway Authority -
Garden State Parkway

New York State Department of Transportation

New York State Police - Troops F, K, T

New York State Thruway Authority

Nyack Police Department

Orangetown Police Department

Palisades Interstate Park Commission

Port Authority of New York and New Jersey
George Washington Bridge

Ramapo Police Department

Rockland County Department of Public Transportation

Rockland County Office of Emergency Management

Rockland County Sheriff's Department

Sloatsburg Police Department

South Nyack Police Department

Spring Valley Police Department

Suffern Police Department

Tarrytown Police Department

Triborough Bridge and Tunnel Authority
Bronx Whitestone Bridge
Throgs Neck Bridge
Triborough Bridge

Westchester County Department of Public Safety

Summary of Plan

This plan of coordinated management of traffic around and away from road closing incidents concerns the highway corridor of the New York State Thruway, Interstate 287, between its Interchange 15 in Suffern, and the Tappan Zee Bridge.

Projections of traffic indicate that, by the year 1995, the average daily traffic through the corridor may reach 76,000 vehicles. These projections, coupled with recent increases in the number of road closing incidents involving tractor trailers and tankers, make it imperative to plan for the management of traffic around and away from such incidents.

Regional Diversion of Traffic

By virtue of the cooperative spirit growing amongst the consortium of transportation agencies of the region in conjunction with the formation of the Transportation Operations Coordinating Committee, TRANSCOM, it is now more easily possible to call for help in diverting traffic.

When a major incident occurs on the Thruway in Rockland County, requests will be made for the large, over the roadway, changeable message signs, now operated by the New York State Thruway at the Tappan Zee Bridge, the Port Authority at the George Washington Bridge, and the Triborough Bridge and Tunnel Authority at the Throgs Neck, Bronx Whitestone, and Triborough bridges, to warn motorists of the problem, and recommend alternate routes to be used by them.

In addition, a request may be made to the Bergen County Police for the use of their Variable Message Sign (VMS) sign trucks to be placed at appropriate locations. Depending upon the location and direction of the road closing event, the New Jersey Highway Authority, operator of the Garden State Parkway, will be requested to display messages on their portable VMS vehicles to warn motorists approaching the region what has taken place.

Local Diversion of Traffic

The traffic plan which follows sub-divides the Thruway from exit to exit. It is arranged sequentially with northbound sections followed by southbound sections. One or more alternate routes for traffic is provided.

Degrees Of Implementation

When an incident occurs which causes all lanes of the highway to be closed in a certain direction, a series of actions will take place, the extent of which will depend upon the time of day, the day of the week, and the estimate of how soon it will be before the roadway is cleared and returned to service.

When an incident occurs which causes congestion to a lesser degree than a full roadway closure, only partial implementation of this plan would be necessary. Using this plan as a basis for decisions, traffic control may be implemented by the corridor management team to as severe a degree as is warranted by the situation.

Levels of Implementation of Traffic Management Plans

A series of five levels of implementation have been established which reflect the increasing intensity of traffic management required in relation to the magnitude of the incident that has taken place. As the level of implementation gets higher, it is important that all steps in the preceding level(s) have taken place prior to, or are being accomplished concurrently.

The actions to be taken as an incident escalates are described below. An estimate of the level of operations which should be implemented, based upon the hour and day of the week, is at the end of this section.

Level 1

The Preparation

Whenever an incident takes place that has serious implications, all operation centers should be notified and an initial preparation made to handle a more serious event in case it develops.

- A message should be transmitted to appropriate agencies on the TRANSCOM network.
- Alternate Routes within the section of the corridor in which the incident has occurred are to be inspected to see that they are clear to handle the expected increase in traffic. Unless any department reports a problem such as a utility company digging up the road or other impediment, the 1st Alternate Route of the plan will be used as the Primary Alternate.

Level II

The Incident Can Be Handled at the Local Level

Traffic is light and the incident is expected to be cleared before there would be a heavy traffic demand on the roadway.

- Level I action must be taken.
- TRANSCOM notifies Shadow Traffic of the Primary Alternate Route to be used for localized traffic. Shadow is requested to recommend to commuters who normally used the I-287 corridor to switch to mass transit or to carpool for the day.
- Agencies prepare for the need for extra traffic coverage. (Who will work longer; who will be called in early?)
- Police patrols uncover any permanently mounted alternate route markers.

Level III

Voluntary Diversion of Traffic is Necessary

There is sufficient volume of traffic so that congestion has already occurred and it would be timely for motorists to use the local alternate routes that have been set up to get past the incident.

- Level I and II actions must be taken.
- TRANSCOM notifies Shadow Traffic and recommends that trucks use Alternate routes around the I-287 Corridor.
- Local agencies commit personnel to agreed to emergency posts to PREVENT Grid Lock.

Level IV

Mandatory Diversion of Traffic is Necessary

With assistance from regional agencies helping to divert traffic away from the corridor: At this level, sufficient congestion is affecting the surrounding highways leading toward the corridor, and the extent of the incident is such that it will be in the best interest of the motorist to spend the extra time to use the recommended regional diversion to get to the other side of the incident.

- Level I, II, and III actions must be taken.
- TRANSCOM advises Shadow Traffic of the ramp closings and local alternate routes which are now necessary.
- TRANSCOM requests the Regional agencies to set messages on their permanently installed Changeable Message signs (CMS).
- Variable Message sign (VMS) trucks are requested to take up their previously agreed to positions and display their messages.

Level V

Long Term Diversion of Traffic is Necessary

At this level, the incident is of such magnitude that the roadway will be closed for a long period of time, and one or more days of alternate operation can be expected.

- All previous levels of action must be taken.
- Special signing is prepared for long term diversion.

Action Levels of Incident/Implementation

TIME OF DAY	ESTIMATED DURATION	LANES CLOSED 1	2	3	ACTION
Midnight	1 Hour	--	--	I	CLASS "A" ACTIONS
to 0500	2 to 4 Hours	--	I	II	
	More than 4 Hours	II	II	III	
0500 to 1100	1 Hour	I	II	V	CLASS "B" ACTIONS
and	2 to 4 Hours	III	IV	V	
1400 to 2000	More than 4 Hours	III	IV	V	
1100 to 1400	1 Hour	I	II	IV	CLASS "C" ACTIONS
and	2 to 4 Hours	II	III	IV	
2000 to Midnight	More than 4 Hours	III	IV	IV	

Note: The grid above is intended for use on Monday thru Friday. For Saturday, Sunday and Holiday, Class "A" will be used from 2100 to 0800. Class "C" will be used from 0800 to 2100.

APPENDIX B

Alternate Routing Plan Scope Of Work

Introduction

The purpose of this project is to develop an Alternate Routing Plan to provide the framework and guidelines for responding to incidents that require closure of section(s) of the freeway system,. Traffic will be re-routed onto the adjacent surface street system that parallels the freeway, and allowed to re-enter at the next appropriate interchange.

Specifically, the plan will: 1) identify alternate traffic routes between each interchange on the system; 2) establish authority and responsibility of the Department of Transportation, police agencies, and other affected agencies, and 3) document the notification process and standard procedures to be utilized for implementing the alternate route(s) and later removal following the termination of the incident period.

Project Scope

The system between ___ and ___ shall be covered.

Tasks

Task 1

Assemble and Index Data

Data required to develop the Alternate Routing Plan shall be assembled and indexed. This will include the following:

- Roadway maps and plans
- Location of maintenance shops
- Location of police jurisdictions
- Traffic data
- Volumes on freeway system and ramps as well as on potential alternate routes
- Accident summary records at critical locations on alternate routes
- Existing signing on freeway and alternate routes

Task 2

Establish Alternate Route Criteria

Criteria shall be established under which alternate routes shall be selected. These include:

- Length of alternate versus freeway route
- Jurisdiction of detour (i.e. number of travelled lanes, number of signalized intersections, number of turns, number of left turns, number of route changes
- Accident history
- Capacity

Criteria shall be established for alternates which are:

- Long-term
- Short-term

Task 3

Identify Preliminary Alternate Routes

Assemble a set of preliminary detour routes and sketch on 8 1/2" x 11" sheets.

Task 4

Drive And Videotape Preliminary Alternate Routes

Each preliminary alternate route shall be driven and critical sections or junctions videotaped. Critical turn areas shall also be videotaped. Total

distance of each route will be measured by car odometer or a distance measuring instrument as necessary, and recorded. Relevant features and characteristics shall be recorded such as structures with limited overhead clearance, and weight restrictions, or route number changes.

Task 5

Revise Preliminary Alternate Routes

Based on the data and experience of driving the preliminary alternate routes, a revised set of alternate routes will be prepared. These will be presented as simplified maps on 8 1/2" x 11" sheets with explanations and descriptions of significant features.

Task 6

Identify Problem Areas

A list of alternate routes shall be compiled indicating any problem sections. The problem section will be keyed to the simplified map of the detour route. These problems will include:

- Significant delays
- Limited fuel availability (diesel and conventional)
- Overhead clearance limitations
- Structures with weight restrictions
- Residential areas
- School, hospital, church zones
- High accident zones
- Heavy pedestrian flows
- Tight turn radii
- Locations where temporary signals may be necessary will be identified.

Task 7

Identify Commercial Vehicle Restrictions

Alternate routes with vehicle restrictions shall be compiled including weight, length, height and any other restrictions.

Task 8

Determine Signing

The following aspects of signing shall be analyzed and recommendations made:

A. On Freeway

- Type (i.e. Velcro; small semi-permanent; large guide)
- Storage (stockpiling; locations of stockpiles; computerized inventory)
- Fabrication (by Agency; by contractors)
- Placement
- Erection (truck mounted; permanent folding sign, post requirements)

B. Off Freeway

- Permanent trailblazers
- Placement (location on detour routes from diversion point to the next entrance ramp)
- Temporary signing
- Storage (stockpiling; locations of stockpiles; computerized inventory)
- Fabrication (by Agency; by contractors)
- Placement
- Erection (truck mounted; permanent folding sign; post requirements)

C. Trailer Mounted Variable Message Signs (VMS)

- Assess the need for trailer mounted VMS.

Task 9

Assess Highway Advisory Radio

The use of highway advisory radio (HAR) will be assessed for use in emergency alternate routing. Aspects to be explored are:

- Permanent HAR locations
- Truck mounted HAR
- Compatibility with other operations
- Construction
- Weather advisory

Included in this task will be plan to utilize a public telephone number to convey alternate route information.

Task 10

Develop Operational Procedural Guide For Termination Of Alternate Routes

An operational procedural guide shall be developed. This guide shall be targeted to enforcement and other personnel with incident traffic management responsibilities. The guide shall notify, identify and explained each affected party's duties at the specified interchange including where signs are stored and who is to erect them both on and off the freeway.

The assistance and concurrence of the involved officials shall be obtained in development of this guide. The following aspects shall be included:

- Responsible parties and duties
- Maintenance
- State police patrols
- Roadside service to disabled vehicles
- Retrieval of signs and/or temporary covering
- Storage
- Replacement
- Restocking of maps

Task 11

Develop Notification Procedures

Notification procedures shall be developed that will allow the alternate routes to be updated on a continuous basis if affected by construction of a permanent or long-term nature, closures of surface street routes, bridge limitations or other factors.

Task 12

Estimate Costs

Cost to implement the procedures, identified for alternate routing shall be estimated. These costs shall include:

- Signs
- Printing
- Material
- Trucks
- Other equipment

APPENDIX C

Illinois Department of Transportation Emergency Traffic Patrol (I.D.O.T)

The Illinois Department of Transportation Emergency Traffic Patrol (ETP) "Minutemen" provide mobile surveillance and respond to freeway incidents on 100 centerline miles or 718 lane miles including ramps, of the Chicago-area expressway system, 24 hours a day, 7 days a week.

The primary objective of the Emergency Traffic Patrol is to respond to any disruptive incident on the Chicago Expressway System and take immediate corrective action to restore the normal traffic flow. Expressway incidents can range from major truck accidents to spilled loads or disabled motor vehicles. Currently (1987) the Unit has 50 Minutemen and 9 Supervisors working rotating shifts.

Services

The Emergency Patrol Vehicles (EPV's) are equipped for and the Minutemen are trained to handle almost any traffic incident likely to occur on Chicago-area expressways, including accidents, disabled vehicles and small fires. Types of incidents encountered in 1986 are given in Table 40. The service is termed emergency because assistance is directed toward actual emergencies and hazardous situations. Enough help is provided to remove or reduce the exposure to high-volume, high-speed traffic. Towing is only provided to relocate vehicles to shoulders or frontage roads; the motorist or police must arrange for towing from there.

The Minutemen are not mechanics but will assist with some minor mechanical problems such as dirty fuel filters. They provide gasoline, water, air for tires and occasionally lend small tools, which help many disabled motorists get to a service station or garage on their own. All patrol services are free of charge except for gasoline. Upon receipt of 2 gallons of emergency gas, a motorist is presented with an invoice requesting that $5.00 be mailed to the state.

Specific duties of Minutemen are presented in Table 41. Patrol driver equipment is shown in Table 42, while typical operations are shown in Table 43.

Table 40
EPV Assist Characteristics

TYPES OF INCIDENT	1986 TOTALS
Vehicle disabilities*	57,843
Abandoned vehicles	18,090
Accidents	12,535
Debris	3,891
Nondisabilities/other	3,120
Pedestrians	902
Fires	397

* Vehicles disabilities were of the following problem type.

PROBLEM	PERCENT
Engine or mechanical	37.0%
Tire	27.0%
Electrical system	14.0%
Cooling system	11.0%
Out of gas	7.0%
Unknown other	4.0%

Emergency Traffic Patrol Fleet

The patrol fleet includes 35 EPV's, nine light utility trucks, three heavy duty tows, one crash crane, one tractor-retriever, a sand spreader and a heavy rescue and extrication truck. In 1986 the EPV Fleet logged more than 1.5 million miles on the expressway system handling 100,741 incidents or assists. Typical EPV equipment is shown in Table 44, while other equipment is described in Table 45.

Table 41
Specific Duties of Minutemen

1. **Assist at accident scenes** by rendering first aid, calling for police, fire ambulance, or special equipment services, helping extricate trapped or injured persons, supplementing police traffic control and **removing accident vehicles from the roadway.**

2. **Remove** accident and non-accident **debris** from the roadway or call for extra clean-up help and special equipment, sand oil slicks, salt roadways, remove or assist with the removal of dead animals.

3. **Assist motorists** by towing disabled vehicles and abandoned vehicles from **hazardous** locations, provide gasoline, tire changing aid for motorists including the physically handicapped, water for overheated radiators, lend tools or assist with minor repairs and if necessary transport motorists off the expressway.

4. **Establish emergency** traffic **detours** by placing appropriate temporary traffic cones, barricades, flares, signs and lights and closing ramps or lanes.

5. **Assist** at special expressway **maintenance or construction work** by protecting workers and assist in placing traffic controls.

6. **Report traffic information** to the Communication Center for distribution to the IDOT Traffic Engineers and the news media.

7. **Report state property damage** including signs, fencing, guardrail, inoperative signals or lighting, pavement defects, and drainage problems.

8. **Provide travel information** by giving directions, road conditions and map reading assistance to motorists seeking aid.

9. **Warn pedestrians** to keep off the expressway and notify enforcement authorities when persons or vehicles do not voluntarily comply with their requests.

10. **Assist at disaster scenes** with personnel, equipment and traffic controls.

11. Provide **surveillance** of **lane closures** put up by contractors, maintenance and outside agencies. Check that all contractors have authorization and proper traffic control devices in place. If any unauthorized lane closures are found, Minutemen will be directed to remove the closures and direct the work crews to leave the freeway.

Patrol Assignments

There are 12 patrol assignments on overlapping shifts as shown on Table 46. (A map of the Chicago Area Expressway System is shown in Figure 39.) The patrol routes also overlap to increase coverage of high-incident sections such as the 2-mile-long bridge, without shoulders on the Dan Ryan Expressway. Supervisors patrol the entire system in light utility trucks and provide supervision, guidance and assistance to the Minutemen. They also coordinate special traffic operations, such as changing the direction of traffic flow on the reversible lanes of the Kennedy Expressway. The complete Emergency Patrol organization structure is shown in Figure 40.

Training

To handle the various duties and hazards common to urban freeway operations, personnel receive special training in patrol procedures and operational techniques. Periodic classes provide training in advanced first aid, CPR, fire fighting, basic auto extrication, state and city police coordination, radio communications, lane closures, traffic control, heavy equipment use and emergency recovery procedures.

Cost

Illinois DOT estimates that the ETP costs approximately $33-$35 per assist to operate, based on an average of over 100,000 assists per year.

Table 42
Patrol Driver Equipment
(minimum issue)

ITEM	NO.
Toolbox	**1**
Wire (stove pipe)	**1**
Wrench sets	**2**
Flashlight	**1**
Hammer	**1**
Safety goggles	**1**
Common pliers	**1**
Hazardous Materials Guide Book	**1**
Channel lock pliers	**1**
ITEM	NO.
Rain jacket	**1**
Wire cutter	**1**
Rain pants	**1**
Adjustable 10-in. wrench	**1**
Phillips screwdrivers	**2**
Linoleum knife	**1**
Electric tape	**1**
Red Reflective Jumpsuits	
Summer	**3**
Winter - with liner	**3**

Table 43
Typical Operations

1. Stalled Vehicle on a Shoulder with Motorist Present

EPV stops behind the vehicle and inquires as to the problem. If it appears to be a major mechanical problem like a slipping transmission or blown engine, the motorist is transported to the nearest telephone to make his/her own towing arrangements.

If the problem is less serious, e.g. broken water hose, flat tire, dirty fuel filter or empty gas tank, an attempt to correct the problem is made, even temporarily, to get the motorist off the freeway under his/her own power. Minutemen are instructed to try not to spend more than 15 or 20 minutes with these situations.

2. Stalled Car Blocking a Lane of Pavement Or Ramp

(Motorist Present)

The Minuteman pulls the EPV behind the car, and informs the motorist that the vehicle will be pushed to a shoulder. The motorist is told to close the hood, put the vehicle in neutral, unlock the steering wheel and listen to instructions given via the EPV's P.A. System. This procedure also holds for flat tires even if the motorist is reluctant to drive on a flat. Minutemen are prohibited from working on vehicles while on the pavement. Once the vehicle is safely on the shoulder the Minuteman assists as needed.

The above procedure applies only to cars. EPV's are prohibited from pushing any type of truck, so all trucks are towed off.

3. Abandoned Vehicles Blocking a Lane of Pavement or Ramp

The Minuteman quickly pulls in front of the abandoned unit and hooks onto it as fast as possible. If a truck, the brakes are released, and the vehicle towed to a shoulder.

There may be some damage to the vehicle during this relocation but the safety of employees and other highway users is paramount.

When the vehicle is moved off the pavement to a shoulder or to a frontage road a radio call is made to I.D.O.T.

The Dispatcher is given a description of the vehicle, license plate number and location to which it was towed. This information is relayed to the police at once.

4. Pedestrians

EPV's stop and pick up pedestrians, and transport them to the nearest safe location off the freeway, usually the next exit. If the pedestrian or hitchhiker does not cooperate, the I.D.O.T. Dispatcher will call for a Trooper.

5. Minor Property Damage Accidents

The Minuteman calls for a trooper and then instructs the motorists to drive their vehicles onto a shoulder or onto a frontage road and exchange information and wait for police. If the vehicles are not driveable, the EPV tows them off.

The Minuteman sweeps up the accident debris and opens the traffic lanes as quickly as possible. All badly wrecked or burned vehicles are immediately towed off the freeway to frontage roads to reduce lingering congestion due to gapers.

Table 43 (cont'd.)
Typical Operations

6.Debris

A) Debris on a shoulder, e.g. household furniture or wood pallets. I.D.O.T. Dispatcher contacts the Maintenance Yard for its pick-up and disposal.

B) Debris on the pavement, e.g. a large truck tire or car hood: An EPV is called to remove the object from the pavement, and immediately places it on the shoulder and calls the Maintenance Yard for later disposal.

C) Sludge; scrape up as much as possible and apply large amounts of sand and let traffic run on it until it dries.

D) Truck spills load; the first EPV or Police Unit gives the I.D.O.T. Dispatchers a description of the load so the proper equipment and personnel can be deployed. Some recent spilled loads are:

Steel Coils	Yard Tractor
Concrete Blocks	Tubs of Cheese
Turkey Parts	Plastic Pellet
Cattle	Sunflower Seeds
20 Junk Cars	Water Pipe
Gravel	Live Chickens
Metal Shavings	Garbage
Cabin Cruisers	
Drums of Unknown Chemicals	

7.Personal Injury Accidents

The Minuteman calls for a trooper and a fire ambulance. Aid is rendered to injured persons as needed while waiting for the ambulance. When all injured parties are removed, the roadway is cleared.

8.Major Truck Accidents

To handle frequent truck accidents, I.D.O.T. takes a very aggressive posture in its response to and clearance of major accident scenes.The first EPV operator on the scene is the key person. He/she must analyze the incident and advise all other responding agencies. The priority items are: exact locations? lanes blocked? number of vehicles? hazardous cargos? injured persons? fuel spilled? upright or overturned?

With this information, the proper equipment can be deployed and the Media and Highway Advisory Radio Broadcasts can alert motorists. Just as in an auto accident, vehicles won't be moved until injured parties have been extricated and it has been determined that there are no hazardous materials involved. If a truck is overturned, usually it must be uprighted to be moved; this will be done while loaded. I.D.O.T. will not keep lanes blocked for companies to unload their cargos.

The wreckage is then towed completely off the freeway to the first exit to reduce the lingering effects of gapers and additional traffic delays while private tows pick up the vehicles.

When heavy trucks overturn, as much as 200 gallons of diesel fuel can be dumped onto the pavement. It is very important to keep this material or any other combustible liquid out of the highway drains and sewers. Sand or earth should be used to dike around inlets and spread to absorb the fuel.

Avoid the use of water hoses which only compound the problem.

Table 44
EPV Equipment

ITEM	NO.
Complete first aid kit	1
Tripod Bumper Jack	1
20-lb purple K powder fire extinguisher	1
20-lb. CO_2 fire extinguisher	1
2-1/2 gal. water extinguisher (summer)	1
Traffic signs:	
KEEP RIGHT	1
KEEP LEFT	1
STOP	2
Traffic Cones, 28"	10
Red Flag	1
Fire axe	1
Fusees	36 min.
Pry bar	1
Highway maps	10
5-gal. water can (summer)	1
2-gal. emergency gas cans (Gasohol)	2

ITEM	NO.
Whisk Broom	1
Paper Towel	1 roll
Truck air brake release kit	1
Shovel	1
Snatch blocks, 20 ton	2
Street Broom	1
100 ft. of 1/2-in. rope	1
Bags of Sand	10
1/4-in. sash cords, 3'	1
Bags of Salt (winter)	10
3/8-in. Alloy tow chain, 12"	1
Hand Cleaner	1
1/2-in. Alloy chain, 12' (tow)	1
Air Hose w/fittings	1
Lug wrench	1
Tire chocks	2
Rubber mallet	1
Battery Jumper Cables	1

Table 45
Emergency Patrol Equipment

THE EPV

The EPV has evolved to its present design over the 24 years since the Division of Highways started the Unit. Currently there are 35 EPV trucks which form the fleet's backbone. The EPV is diesel powered and has a single axle short wheelbase chassis. It has a multi-compartment body, a 20,000 lbs. capacity hydraulic tow rig and heavy steel push bumper.

The drive line and frame are reinforced to allow an EPV to tow even a loaded truck tractor semi-trailer off the expressway. In addition to the on board equipment listed elsewhere, it has a P.A. system, IDOT radio and in the near future will be equipped with Illinois Service Patrol low band 42.5 MHz radios.

The truck has an engine mounted compressor for filling flat tires, releasing trailer air brakes and can be used to operate recovery lift air bags.

UNIT NUMBER 921 (Popeye)

Oshkosh, WB 1600, 6x6 Crash Crane. Equipped with a 40,000 lb., 180 Degree Swing Crane. Powered by a Waukesha, 780 cu. in. 240 hp. Gasoline Engine. 5 Speed main and 3 Speed aux. transmission. Acquired in April, 1981 from Federal Surplus through the Federal Highway Admin. Was used by the Navy on Air Craft Carriers and Naval Air Stations to retrieve crashed tactical aircraft. Approximate Replacement Value: $250,000.00. Unit used twice weekly.

922

I-H Built, Military Specification, 6x6, M246 Wrecker Originally equipped with 20,000 lb. hydraulic boom, was converted to 80,000 lb. Holmes "850" Wrecker in early 1984. Powered by a Mack diesel Engine, Turbo charged with 5 speed main and 2 speed aux. transmission. Approximate Replacement Value: $175,000.00. Unit used daily

923

I-H Built, Military Specification, 6x6, M62 Wrecker equipped with 20,000 lb. Rotating Hydraulic Boom and a 45,000 lb. Rear Drag Winch. Powered by a Continental Multi-fuel Engine with 5 speed main and speed aux. transmission. Acquired in January, 1979 from Illinois Air National Guard through E.S.D.A. at no cost. Approximate Replacement Cost: $175,000.0. Unit used daily.

946

1971 Kaiser, Jeep Built Military 6x6 truck tractor, originally an M813 Flat Bed Cargo Truck, was converted to present configuration utilizing a 30,000 lb. Hydraulic Winch and Sliding 5th Wheel. Powered by Cummins Diesel Engine with a 5 speed manual transmission and 2 speed aux. transmission. Used to tow abandoned trailers or lift and tow semi trailers that have come uncoupled from their tractor. Acquired November, 1983 from Dept. of Admin. Services, Federal Surplus. Approximate Replacement Cost: $100,000.

Table 45 (cont'd.)
Emergency Patrol Equipment

953 - RESCUE UNIT

1976 International with Utility Body. Modified and equipped over several years in our shop.

PNEUMATIC

- **3** 300 cu. ft. high pressure air cylinders with Cascade System, Regulator and Hose Reel.
- **1** 100,000 lb. Air Bag Lifting Set w/Dual Controls
- **2** Air Impact Metal Cutter
- **1** Air Impact Wrench (3/8" Drive)
- **1** Air Drill w/Carbide Hole Saws

ELECTRIC

- **1** 7000 Watt Gasoline Generator (110 & 220v)
- **2** 500 Watt Quartz Floodlights w/stands & ext. cords
- **2** 1500 Watt Quartz Floodlights w/stands & ext. cords
- **1** Electric Chain Saw (2 hp., 14" bar)
- **1** Electric Reciprocating Saw
- **2** 500 Watt Portable Work Light
- **2** 6v Battery Hand Lanterns
- **1** 12 v 1000 lb. Winch (Bumper Mount)

HYDRAULIC

- **1** R5-10 Extrication Set w/Hyd. Spreader & Wedge
- **1** 20 ton Hyd. Pump w/rams & Accessories
- **2** 20 ton Hyd. Vehicle Jack
- **1** Hurst "Jaws of Life" Rescue Tool w/Spreader & Cutter
- **2** Hurst Hydraulic Rescue Rams

FIRST AID

- **1** Fully Equipped Medical Trauma Case
- **3** Full Back Boards
- **2** Short Spine Boards
- **3** Aluminized Rescue Blankets
- **2** Self Contained M.S.A. Breathing Tanks
- **2** Acid Suits

OTHER

- **1** 12" Gasoline powered Circular Rescue Saw
- **1** Oxygen - Acetylene Cutting Torch
- **2** 20 lb. ABC "Purple K" Fire Ext.
- **2** 2000 lb. Cable hand winch

HAND TOOLS

Forcible Entry Bar	Rope
Axe	Pry Axe
Wood Cribbing	Sledges
36" Bolt Cutter	Chains
Air Craft Shears	Wrecking Bars
Brake Release Tools	Shovel
Hearing Protectors	Safety Goggles
Screwdrivers	Pliers
Handsaws	Wrenches

Table 46
Emergency Traffic Patrol Assignments

ASSIGNMENT NUMBER			LIMITS OF PATROL
1.	Edens Expressway	(I-94)	Addison to Lake
2.	Kennedy Expressway	(I-90 & 94 & 190)	US 12-45 to North
3.	Kennedy Expressway	(I-90 & 94)	Jackson to Lawrence (and Ohio/Ontario border)
4.	Dan Ryan Expressway	(I-90 & 94)	North to 35th Street
5.	Dan Ryan Expressway	(I-90 & 94)	Local Lanes, Lake to 55th Street (and Franklin Extension)
6.	Dan Ryan Expressway	(I-90 & 94)	Express Lanes, Canalport to 71st Street
7.	Dan Ryan Expressway	(I-90 & 94)	51st St. to 95th Street
8.	I-57 Calumet Expressway	(I-94)	87th St. to 127th Street 87th St. to 147th Street
9.	Eisenhower Expressway	(I-290)	Wells to Laramie
10.	Eisenhower Expressway	(I-290)	Cicero to US 45
11.	Stevenson Expressway	(I-55)	Lake Shore Dr. to Cicero
12.	Stevenson Expressway	(I-55)	Damen to First Avenue

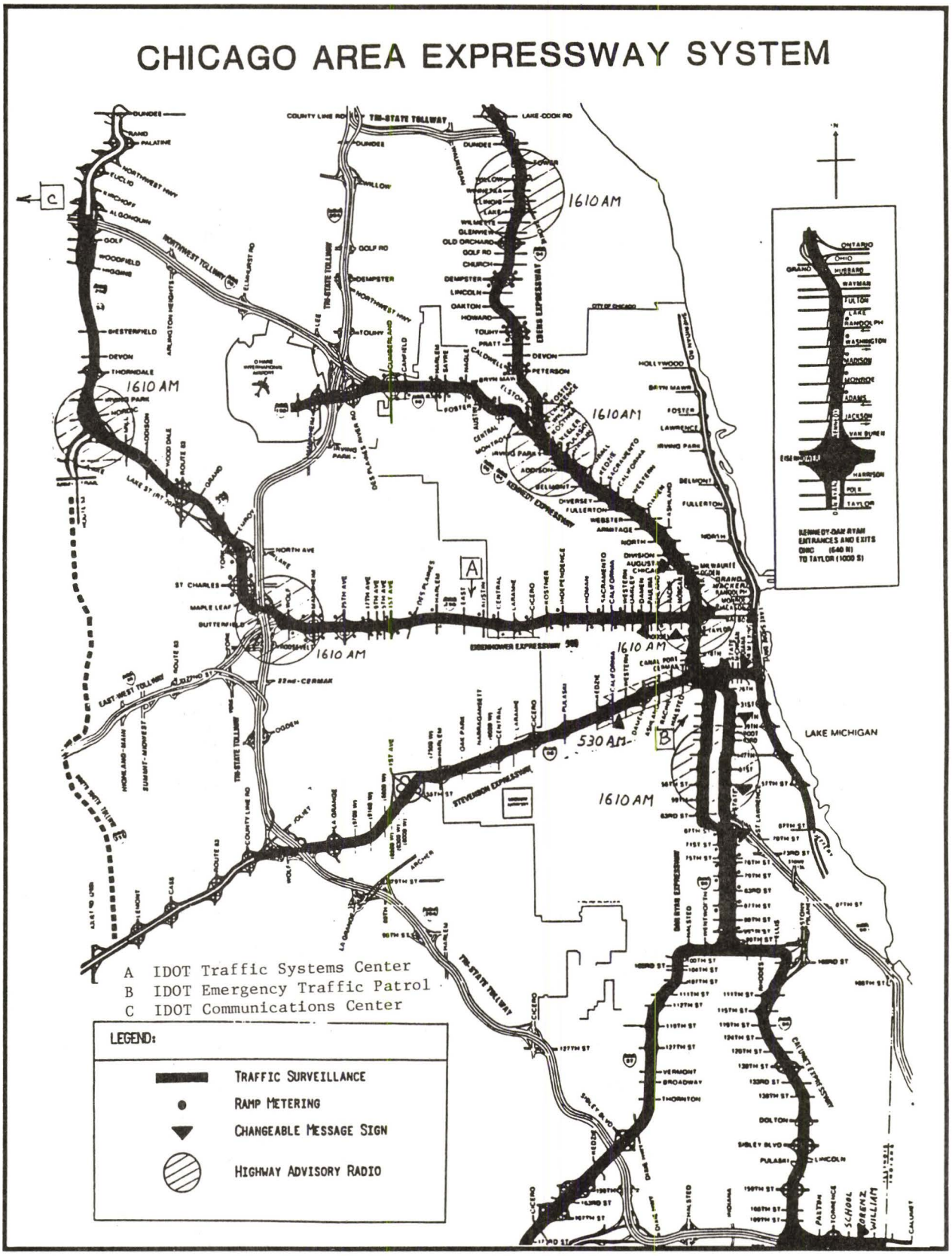


Figure 37
Chicago Area Expressway System

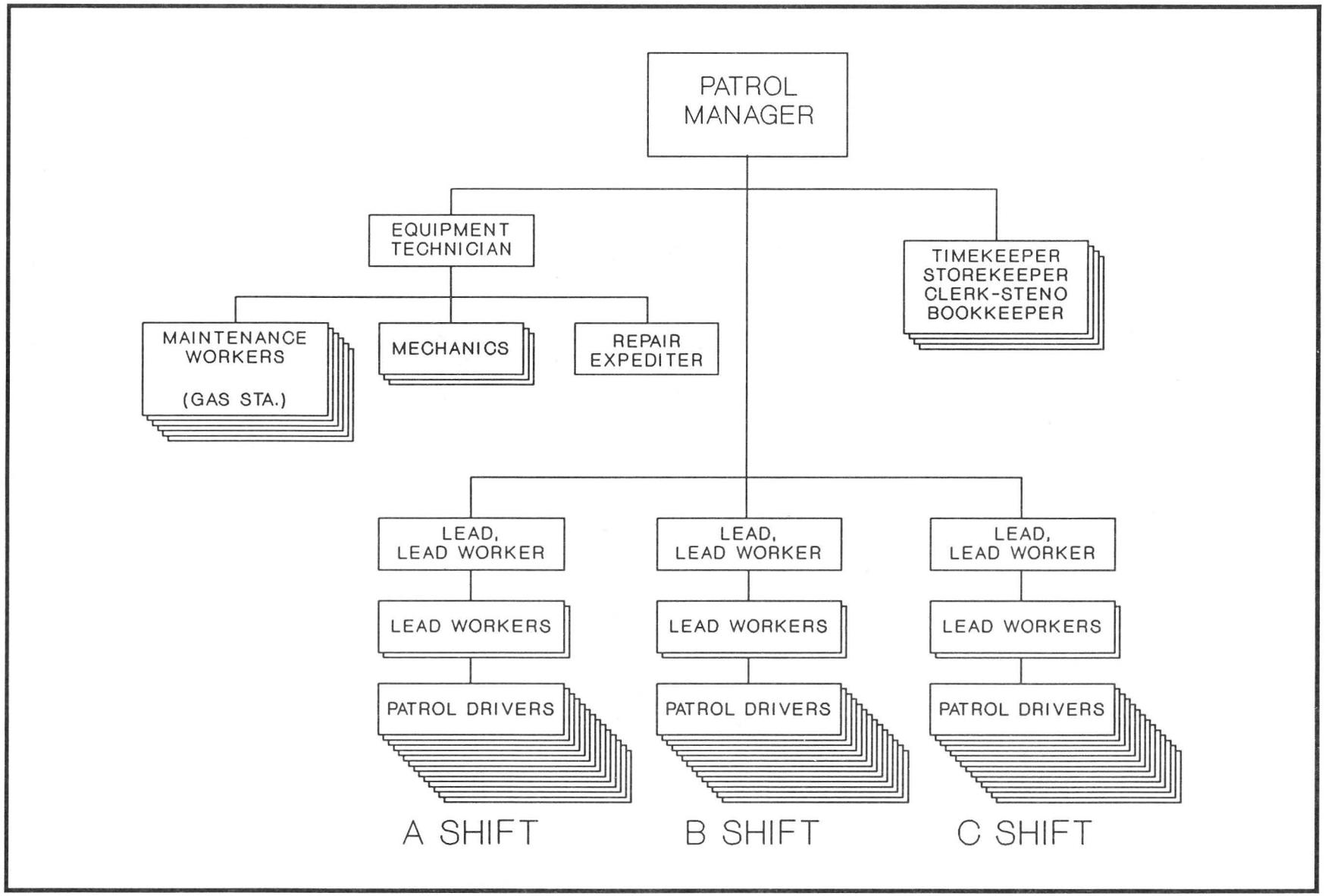


Figure 38
Emergency Patrol Organization

APPENDIX D

List of Contacts on Towing Agreements

Captain George B. MacNamara
Management Services Division
City of Orlando Police Department
100 South Hughey Avenue
Orlando, Florida 32802-0913

Sergeant Bob Newson
Traffic Operations Section
City of Orlando Police Department
100 South Hughey Avenue
Orlando, Florida 32802-0913

Inspector Greenslate
Detroit Post, Michigan State Police
1200 6th Street
Detroit, Michigan 48226

Captain K. R. McDonald
Fort Worth Police Department
1100 Nashville
Fort Worth, Texas 76105

Mr. Michael Monohan
Director,
Traffic Engineering Division
City of Minneapolis
Room 211, City Hall
Minneapolis, Minnesota 55415

Sergeant J. Pozero
San Antonio Police Department
443 Ninth Street
San Antonio, Texas 78215

Ms. Marie Milnes
Administrative Officer, Region 10
New York State Department
of Transportation
New York State Office Building
Veterans Memorial Highway
Hauppauge, New York 11788

Lt. John Kielbasa
Traffic Operations Control
California Highway Patrol
120 South Spring
Los Angeles, California 90012

Mr. William McGraw
Manager, Emergency Services
New Jersey Turnpike Authority
Box 1121
New Brunswick, New Jersey 08903

Lt. Stack/Captain Kittridge
Minnesota State Patrol
2005 Lilac Drive, North
Golden Valley, Minnesota 55422

APPENDIX E

Use of Cellular 9-1-1

The growing number of cellular mobile telephones has created an opportunity to greatly increase the speed with which traffic incidents and other emergencies are reported to police and emergency response agencies via the 9-1-1 emergency telephone number. This technology has brought about the need for cooperation among local and state traffic safety and emergency response agencies, the cellular and landline telephone companies, and cellular phone users.

With the development, dissemination and understanding of certain basic guidelines for the reporting of highway emergencies by citizens having access to cellular telephones, state and local highway safety and emergency response agencies will:

- Maximize a timely opportunity to reduce total response time by enlisting the "eyes and ears" of on-the-scene "good samaritans" with immediate access to 9-1-1 emergency communication centers, thus shortening citizen reporting time of accidents and other highway emergencies; and

- Reduce the risk that misuse and abuse by cellular customers will compromise the fast and reliable operation of the 9-1-1 system.

One approach to utilization of the cellular telephone network for incident management is to form a Cellular 9-1-1 Work Group, to advise in the development of cellular 9-1-1 public education materials. This can be comprised of representatives from local government public safety offices, the two cellular phone companies authorized to operate in any one region, the local landline telephone company, independent cellular phone retailers, the State Police and other organizations.

Typical Outputs of the Work Group

1. Cellular 9-1-1 Calling Policy. This document is a set of instructions to 9-1-1 operators describing the special considerations necessary to handle cellular 9-1-1 calls effectively.

2. Cellular 9-1-1 Public Education Brochure. The purpose of this document is to educate cellular phone users about when it is appropriate and how to use 9-1-1 effectively from a cellular phone. The brochure can be distributed by the two cellular phone companies to their subscribers and by other interested parties (i.e. Department of Motor Vehicles, libraries, Chambers of Commerce, etc.)

3. Cellular 9-1-1 Public Education Poster. The poster contains much the same information as the brochure and can be distributed by the cellular phone companies for display by their dealers and installers.

A Cellular 9-1-1 calling policy implemented in Northern Virginia is presented in the following pages.

Cellular 9-1-1 Calling Policy

APRIL 1987

1. Definitions

The following are definitions of terms used throughout the calling policy.

Public Safety Answering Point (PSAP) - the designated emergency operations center where calls are initially received.

Call Taker - the person in the PSAP who answers 9-1-1 calls.

Cellular 9-1-1 - any call to the 9-1-1 emergency number made from a mobile car telephone.

Enhanced 9-1-1 - a telephone system, which provides for selective routing of a call to the appropriate PSAP through the use of computerized data bases. The Enhanced system automatically provides the call taker with a display of the address and telephone number from which the call is being made.

2. Information the Call Taker Needs To Know

Once The Enhanced 9-1-1 System and cellular 9-1-1 calls are linked together, cellular calls to 9-1-1 will require treatment that is different from regular 9-1-1 calls. Unlike most calls received through the Enhanced 9-1-1 system, calls from cellular phones will appear as default routings. No address will appear on the call taker's screen; the phone number will default to 911-0000. Call takers need to be aware of these differences in order to process cellular 9-1-1 calls effectively.

Location

- Call takers will have to determine the location of the emergency.
- If the location of the emergency cannot be determined, location of the caller may be an appropriate substitute.

Phone Number

- Call takers also will have to determine the phone number of the caller, should a call back be necessary. The call taker should ask for the full 10-digit cellular telephone number (area code plus 7-digit phone number).
- Cellular callers who live in other areas and are just passing through the Washington metropolitan area are called "roamers". The PSAP operator cannot directly call back a "roamer" using the 10-digit cellular phone number.

The following step-by-step procedures will allow PSAP call takers to identify "roamers" and initiate successful call backs, when required.

If the caller's area code is not 202, 301, or 703; the caller is a "roamer". To initiate a call back to a "roamer", the PSAP call taker must call the roamer port number: 382-7626.

After dialing the roamer port number, the call taker will hear a second dial tone. After the second dial tone, he/she should dial the full 10-digit cellular phone number (area code plus phone number). At this point, the PSAP call taker may be connected with the "roamer".

If after following this procedure the PSAP call taker does not reach the "roamer" but instead gets a recorded message saying "the customer is unavailable" or "the number has been misdialed", he/she should hang-up and dial the alternate roamer port number: 440-7626.

After calling this number, the call taker will hear a *second* dial tone. After the second dial tone, he/she should dial the full 10-digit cellular phone number (area code plus phone number). At this point the PSAP call taker should be connected to the "roamer".

Role of the PSAP Call Taker in Call Backs

- Public education materials, distributed throughout Northern Virginia and the Washington Metropolitan region, will instruct the cellular caller to initiate the call back when prematurely disconnected from the PSAP call taker.
- The PSAP call taker is expected to initiate the call back to a "roamer".

3. Training of Call Takers

PSAP commanders agree to provide the necessary training to instruct call takers in the special information and procedures required to process cellular 9-1-1 calls.

4. Information About Cellular 9-1-1 For The Caller

Public education materials designed for cellular telephone users will cover the following points:

Need for sound judgment in the use of 9-1-1

- The definition of a 9-1-1 emergency situation is subject to interpretation. What may not constitute an emergency in one setting, nay qualify in another. The caller is urged to use sound judgment in the use of the 9-1-1 emergency number.

When to use 9-1-1 from a cellular phone

- Calls to the 9-1-1 number are to be made only in situations that (1) involve a life in danger; chance of bodily harm --or-- (2) require immediate emergency medical, fire or police response.

Some examples of emergency situations that would be appropriate to report on 9-1-1 include:

- Traffic accidents with injuries
- Brush fires
- Chemical spills
- Fallen power lines
- Sudden illnesses, such as heart attack or stroke

When not to use 9-1-1 from a cellular phone

- While certain occurrences encountered while driving may be annoying or unsettling, 9-1-1 should only be used for the type of life-threatening emergencies described above. Any other use of 9-1-1 constitutes misuse. False alarms and other abuses will tie up 9-1-1 lines, making them unavailable for legitimate emergencies. Misuse of the 9-1-1 system is a violation of the law.

Some examples of situations in which it would be *inappropriate* to use 9-1-1 include:

- Running out of gas
- Being broken down by the side of the road
- Minor fender-bender accidents without injury
- Public safety calls for non-life-threatening situations

Alternative to using 9-1-1 for non-emergency calls

- As an alternative to dialing 9-1-1, the cellular caller is requested to dial "0", for assistance in non-emergency situations. The telephone company operator can connect the caller with help for automotive malfunctions or with the non-emergency numbers of the police and fire departments, when appropriate.

Role of the Call Taker

- The call taker is trained to collect the information necessary to respond quickly to the caller's emergency. The caller must be ready to answer the call taker's questions, but should let the call taker control the conversation. Additional, unnecessary information provide by the caller will slow response to the emergency.
- The call taker will indicate when it is okay to hang up the phone. The caller should not hang up until the call taker has taken the relevant information and indicates that help will be dispatched.

What to do if disconnected

- If the caller is cut off while reporting the emergency, and is uncertain whether all the relevant information was received by the call taker, the caller should immediately re-dial 9-1-1 and explain the situation to the PSAP call taker who answers the phone.

5. Information the Caller Should Be Prepared to Provide to Describe the Emergency

To ensure effective service the caller needs to be aware of the types of information the PSAP call taker is likely to request.

Phone Number

- The call taker will ask for the full 10-digit cellular telephone number (area code plus phone number). Call takers do not automatically call back everyone who places a call to 9-1-1; they only call back in those situations where clarification or more information is needed.

Nature of the Emergency

- The phone will be answered "Name of Jurisdiction, 9-1-1. What is your emergency?" At this point the caller describes the emergency -- auto accident with injury, brush fire, overturned tanker truck, etc. The call taker also may ask:

  Are there any injuries? If yes, how many? How many vehicles are involved? What kind of vehicles? Is there any fire? Does there appear to be any liquid spilled or a cloud visible?

Location of the Emergency

- The call taker also will ask for the location of the emergency. Reporting of the location of the emergency must be as accurate as possible, and should be described using the following types of information (as appropriate).
  - Jurisdiction where the emergency is located (i.e. Alexandria, Montgomery County, D.C., etc.)
  - If on a major highway; the name of the highway (i.e. Interstate 395, George Washington Parkway, etc.)
  - The lane of traffic in which the incident is located (i.e. outer loop, northbound, heading in/out, etc.)
  - Location on the highway in relation to intersecting and/or crossing roadways (i.e. in the northbound lane of Shirley Highway between Glebe Road and Washington Blvd., etc.)
  - Proximity to an entrance/exit ramp (i.e. on the inner loop of Interstate 495, just past the exit ramp for eastbound Route 50/Arlington Blvd., etc.)
  - Visibility of a landmark (i.e. on the southbound lane of Interstate 66 approaching the Theodore Roosevelt Bridge near the Kennedy Center, etc.)

6. Training of Callers

Information the caller needs to know will be communicated through the brochure for cellular telephone users and various other public education activities.

7. Publicity

Members of the Cellular 9-1-1 Work Group agree to publicize the appropriate use of the 9-1-1 emergency telephone number from cellular phones.

8. System Misuse

Members of the Cellular 9-1-1 Work Group agree to monitor the prevalence of system misuse and work toward its elimination.

APPENDIX F

Traffic Management Strategies Which Are Eligible for Federal-Aid Construction Funding In Urban Areas

Typical urban area traffic management strategies which are eligible for funding with Federal-aid Primary, Urban, and Interstate 4R funds, depending upon the Federal-aid system which benefits from the strategy employed, are contained in the following, but not necessarily all-inclusive, list:

I. Public Information

- Highway advisory radio and designated CB channels. (Day-to-day operations are not eligible except during major highway reconstruction).

- Pamphlets, maps, etc., at rest areas, truck stops, truck inspection sites, and weigh stations in conjunction with major highway reconstruction or to implement a new project.

- Other reasonable public information and promotion expenses, including personnel costs incurred in conjunction with any of the following traffic management strategies.

II. Traffic Engineering and Operational Improvements

- Preliminary engineering for alternative analysis, environmental assessment and reports, traffic analysis, traffic engineering analysis, project data collection and evaluation, and design.

- Construction engineering, including project evaluation undertaken as part of a specific construction project.

- Right-of-way acquisition and relocation assistance.

- Utility relocation where a State has the authority to pay (i.e., where normal eligibility rules apply).

- Physical improvements to roadways, intersections, and interchanges, such as:
  - Lane or shoulder widening, reconstruction or other width modifications, construction of shoulders or additional lanes (thru or turn), median barriers, and channelization.
  - Resurfacing, restoring, rehabilitating, and reconstructing roadway sections.
  - Installation, upgrading, and rehabilitation of signing, traffic signals, pavement markings and delineation, variable message signs, retroreflective pavement markers, mileposting and ramp identification for incident identification, and other traffic control devices.
  - Grade separations for railroads, pedestrians, or vehicles.
  - Frontage roads at selected locations provided they are used to divert traffic from congested main lanes in order to improve the traffic flow on the main lanes.
  - Reconstruction of restrictive segments which prevent full utilization of existing capacity along a route.
  - Removal, reconstruction, or replacement of structures which restrict traffic flow.
  - Construction of separate traffic lanes and necessary facilities:

  - To accommodate passengers at transit terminals and intermediate stops,
  - To accommodate carpools, vanpools, and buses,
  - To accommodate the loading, unloading, and movement of trucks, and/or
  - To permit high occupancy vehicles to pass freeway ramp metering and control devices.
- Construction of truck weighing and inspection areas and facilities. (Truck safety inspection areas and facilities must be located at weigh stations.)
- Construction of "pullouts" for enforcement, disabled vehicles, and accident investigations.
- Installation of radar/photo-radar enforcement equipment.
- Establishment of tow truck and/or service courtesy patrols. (Day-to-day operations are not eligible except during major highway reconstruction.)
- Lighting.
- Motorist aid systems.
- Fire protection systems.
  - Traffic control signalization (computerized and non-computerized).
- Installation and removal of traffic signals and related studies.
- Making signals more responsive to traffic conditions, such as with traffic actuated control.
- Communications for signal systems, such as interconnect telephone leased lines, radio, or cable TV, either as part of a new system or to retrofit an existing system.
- Installation of modern control and detection equipment to replace older actuated equipment so as to increase reliability, reduce maintenance requirements, and facilitate more effective operation.
- Projects to develop new timing plans for improving and optimizing signal operations in existing signal systems.
- Upgrading of traffic signals to meet the visibility and operational requirements of the MUTCD and selective improvements at other problem locations.
- Providing separate lane controls for high occupancy vehicles, trucks, or emergency vehicles.
- Providing priority treatment for buses at signalized intersections.
- Variable message signs and special signal facilities for operating variable turn lanes and/or traffic lanes, or to provide lane controls for high occupancy vehicles.
- Freeway surveillance and control systems, including CCTV, vehicle detectors, and a central operations facility. (Day-to-day operations are not eligible except during major highway reconstruction or for a start-up period for new projects.)
- Central operations/communications facilities for less sophisticated (i.e., noncomputerized) traffic surveillance and incident management programs. Eligible equipment could include radios, telephones and other equipment to monitor existing agency and interagency communications systems, dedicated telephone numbers for incident reporting and motorist services, and computer equipment and software data base, gaphics, etc.
- Variable message signs.
- Ramp metering.
- Lane control signals.

III. High Occupancy Vehicle (HOV) Lanes

- Preliminary engineering.
- Right-of-way acquisition.
- Construction of new lanes or designations of existing lanes.

- Reconstruction of shoulders or medians, and/or modifications to ramps, intersections, or barriers to accommodate new HOV lanes.

- Construction of turnouts needed for enforcement activities on high occupancy vehicle lanes.

- Minor physical improvements to accommodate designated HOV lanes.

- Signing, pavement markings, and other traffic control devices.

- Initial inspection or monitoring of use, including special equipment, to ensure that HOV lane designations are effective and operating properly.

IV. Ridesharing

- Manual or computerized systems for locating potential ridesharing participants and informing them of opportunities for participation, including:
  - Computer hardware and software costs.
  - Related installation costs, including labor.
  - Specialized procedures to provide ridesharing opportunities to older or handicapped persons.

- Loans for the acquisition of vanpool vehicles.

V. Parking Facilities

- Inside the CBD:
  - Purchase or lease of existing parking spaces and/or construction of new parking spaces for carpool and vanpool parking only.
  - Replacement parking on a one for one basis where implementation of a Federal-aid project requires the removal of on-street parking in an area which has a critical shortage of parking spaces.

- Outside the CBD:
  - Designation of existing parking facilities.
  - Purchase or lease of existing parking space.
  - Initial or renewal costs for leasing parking space or acquisition of easements or restrictions, such as at shopping centers and public or private parking facilities.
  - Preliminary engineering for parking facilities.
  - Necessary modifications to existing parking facilities.
  - Purchase or lease of land for new parking facilities.
  - Normal construction activities for new fringe or corridor parking.
  - On-site signing and pavement markings.
  - Trail blazers.
  - Passenger loading areas, including shelters.
  - Lighting, fencing, landscaping, etc.

APPENDIX G

Hazardous Materials Publications

The following publications and handout materials are available and may be obtained by writing to:

Department of Transportation
Research and Special Programs Administration
400 Seventh Street, S.W.
DHM-50
Room 8104
Washington, D.C. 20590

Please enclose a self-addressed mailing label to expedite your order. For further information telephone (202) 366-2301.

****

Note: Any of the guides and training handouts listed below may be reproduced without permission as long as the document is not changed in any way. If the document is changed or translated, then the DOT logo may not appear on the document.

Guides and Training Handouts

All About Radioactive Materials Packages
A guide for supervisors at cargo terminals. Provides basic information on how to handle radioactive materials packages properly and how to prevent unnecessary radiation exposure of cargo handlers during the normal course of their work. In addition, this booklet contains information on what to do in case of an accident. October 1984.

Dot Specification Cylinders Shipping Containers
Intended to serve as an aid for in-house use (for shippers, carriers, or enforcers) when reviewing hazardous materials procedures. August 1986.

Dot Specification Metal Portable Tanks
A training aid for in-house use to assist shippers, carriers, and enforcers of the hazardous materials regulations. Includes definitions, general requirements, and intermodal (IM) portable tanks special requirements.

Fibreboard Containers Common Terminology
Definitions of common terminology and examples of box styles and markings. June 1987.

Dot Specifications For Plywood Boxes
Requirements for DOT Specifications 19A: Wooden Boxes, Glued Plywood Cleated and Specification 19B: Wooden Boxes, Glued Plywood Nailed. September 1987.

Dot Penalty Actions Resulting From Violations Of Hazardous Materials Regulations
Offenses and penalties of shippers and carriers involving the transportation of hazardous materials and radioactive materials enroute. DOT/RSPA/OHMT-89/04. New edition published each year.

Examples Of Typical
Dot Specification Fiber Drums
Specifications for dry and liquid products and determining proper fiberboard strength, examples of markings. September 1987.

Fireboard Containers Common Terminology
Definitions of common terminology and examples of box styles and markings. June 1987.

Guide for Brokers, Forwarding Agents, Freight Forwarders and Warehousemen
An aid for in-house use when reviewing your hazardous materials procedures. June 1987.

Guide for Carriers
An aid to assist "for hire" carriers and "private carriers" of hazardous materials. June 1987.

Guide For Hazardous Materials Shipping Papers
Designed for in-house use when reviewing hazardous materials shipping paper requirements. December 1987.

Guide For Reuse Of Packagings
(Boxes, Kegs, Cylinders And Steel Drums)
An in-house training aid for use when reviewing the requirements on the reuse of containers abstracted from Code of Federal Regulations, Title 49, parts 100-177. September 1987.

Guide for Manufacturers and Vendors of Hazardous Materials Containers
Intended to serve as an aid for in-house use when reviewing compliance procedures in the manufacture of containers. June 1987.

Guide for Markings
Prepared as an aid to shippers and carriers of hazardous materials who have a need to know about the proper marking on the outside of shipping containers. December 1987.

Guide for Preparing Hazardous Materials Incident Reports
Instructions and requirements on filling out the DOT Form F 5800.1, "Hazardous Materials Incident Report". January 1990 (revised).

Guides For The Inspection Of...
...Hazardous Material Shipments
...Hazardous Waste Shipments
...Mc-306 Cargo Tanks
...Spent Nuclear Fuel Shipments
...Radioactive Material Shipments
These five guides were produced to provide a uniform procedure to apply the Federal Hazardous Materials Regulations contained in Parts 171-179 of 49 CFR. They are designed to serve as a basis for vehicle inspection and may be modified by the states to fit their regulations. The procedures may be used for training purposes or as an aid to the actual inspection process. Target audience - state enforcement personnel. November 1988 (revised)
* Note: Limited distribution to industry.

Guide for Shippers
An aid to assist shippers of hazardous materials which includes step-by-step instructions to aid compliance with applicable DOT Regulations pertaining to the shipment of hazardous materials. June 1987.

Hazardous Materials Definitions
Intended as a training aid for all interested parties who may become involved with hazardous materials. Abstracted from the Code of Federal Regulations, Title 49, Parts 100-177. December 1987.

Hazardous Materials Information Exchange - User's Guide
Provides detailed instructions on the operations of the electronic bulletin board features. DOT/RSPA/OHMT/89-03. August 1989 (revised).

How To Handle Radioactive Materials Packages
A guide for cargo handlers, published by the Department of Transportation and the Nuclear Regulatory Commission. May 1983.

Indicators Of Hazardous Materials Shipment Violations
A partial listing of items you as an enforcer, shipper, container manufacturer, or carrier can use to spot-check for compliance with the DOT Hazardous Materials Regulations. July 1986.

Radioactive Materials Definitions
Intended as a training aid. Definitions abstracted from Title 49 of the Code of Federal Regulations, Parts 100-177, Section 173.403. November 1987.

An Overview of the Federal Regulatory Scheme for Hazardous Materials Transportation
DOT/RSPA/OHMT-89/05. August 1989.

Hazardous Materials Transportation Regulatory and Enforcement Programs - A Governor's Guide
August 1989.

Brochures and Leaflets

Chart 9
Color illustrations of Hazardous Materials Warning Labels and Placards, including information on international placarding, international labeling, and UN/NA identification number system. November 1988.

Hazardous Materials Transportation Act
Public Law 93-633, 93rd Congress, H.R. 15223. January 3, 1975.

Hazardous Materials Transportation Safety Newsletter
Quarterly publication.

International System of Units (si) for Radioactive Materials in Transportation
Intended to aid persons in understanding the relationships between the International System of Units (SI) and the customary units for radiological measurements. July 1987.

The National Oil and Hazardous Substances Response System
A brief description of the National Oil and Hazardous Substances Response System. February 1988.

Research and Special Programs Administration - Office of Hazardous Materials Transportation
A functional description of the Office of Hazardous Materials Transportation. June 1988.

Reports

Annual Report on Hazardous Materials Transportation
Overview of the year's activities within the Department's Hazardous Material Regulatory Program. Published each year.

A Review of the Department of Transportation Regulations for Transportation of Radioactive Materials
An overview of the regulations governing the transportation of radioactive material shipments. 1983.

Community Teamwork: Working Together to Promote Hazardous Materials Transportation Safety
Designed to provide ideas on how to develop a hazardous materials transportation safety program at the most economical cost. For State and local fire, police, emergency service/civil defense, transportation, public safety and environmental protection officials. May 1983.

Illinois Spent Nuclear Fuel Transportation
This pamphlet was prepared for the U.S. Department of Transportation by the State of Illinois. The purpose of the pamphlet is to demonstrate the comprehensive inspection/escort procedures for irradiated nuclear reactor fuel shipments through the state. The inspection procedures described are similar to guidelines already established for radioactive material shipments in general and include only a few aspects which are unique to these types of shipments. July 1984.

Lessons Learned
A report on the lessons learned from state and local experience in accident prevention and response planning for hazardous materials transportation. December 1989.

The following reports are available from:

U.S. Department of Commerce
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4785

Manual for Small Towns and Rural Areas to Develop A Hazardous Materials Emergency Plan
Phase II-Final Report. January 1986. DOT report number DOT/OST/P-34/86/041. NTIS #3 PB 86-227402 A07/A01.

Options for Gathering Information About Shipments of Radioactive and Other Hazardous Materials
Final Report. June 1986. DOT/RSPA/DHM-61-87-2.

Risk Assessment/Vulnerability Users Manual for Small Communities and Rural Areas
March 1986 (revised). DOT/OST/P-34/86/043. NTIS #3 PB 86-223831 A07/A01.

Risk Assessment/Vulnerability Validation Study
Volume 2. Appendices: II Individual Studies. Phase III - Final Report. June 1983. DOT/OST/P-34/86/042. NTIS #3 PB 86-2444 A11/A01.

Transportation of Hazardous Materials
Urban Consortium for Technology Initiatives. September 1980. DOT-I-80-46. NTIS #3 PB 82-262353 A03/A01.

Videotapes

A Hazardous Incident. . .
the First Responder
30:00 minutes; explains the proper procedures and awareness for responders to a hazardous material incident who are first on the scene. Basic approach, identification and communication methods are outlined. The video discusses and explains the proper use of shipping papers, the DOT Emergency Response Guidebook and the NFPA 704 recognition standard.

Awareness for Initial Response to Hazardous Materials Incidents
18:00 minutes; designed to give potential first-on-scene responders an awareness of the classification, identificaiton and transportation of hazardous material, and initial response procedures to take in the event of a hazardous materials incident. Topics of discussion include hazard classes, shipping papers, labeling, placarding, UN/NA I.D. marking, intermodal transportation (air, water, rail and highway) and first-on-scene response procedures.

Hazardous Materials Workshop - "Hazmat Spills: Evacuate Or Attack"
45:00 minutes; a panel discussion on the railroad transportation of hazardous materials. Includes the film, "Bleve".

PLANNING, TRAINING, COMMUNICATING SPECIALISTS
2100 Raybrook, S.E., Suite 109, Grand Rapids, MI 4950

A Hazardous Materials Incident
1st Responder Study/Reference Guide

When responding to any accident, spill or fire scene, the first responder should always ask himself...

Might this be a HAZARDOUS MATERIALS INCIDENT... containing Flammable, Toxic, Reactive or Corrosive materials??

If the possibility exists, the First Responder...
SHOULD

A. APPROACH and Remain... UPWIND.
B. Secure the Scene... check for ignition sources
C. IDENTIFY... from a distance, using binoculars if possible.
D. COMMUNICATE... to your dispatcher what you are able to identify from a distance.

1 IDENTIFICATION PROCEDURE

1. Locate any SHIPPING PAPERS if available from carrier personnel.
2. If not available, the First Responder should REMAIN UPWIND and using binoculars...
   Locate a:
   - Placard or ID Number
   - Product Name
   - Carrier name
   - Vehicle Name
   - License Number
   - NFPA Identificaton Diamond* (for stationary storage tanks)
   - What is the Container Shape?

Communicate any of this information available to your dispatcher. He will contact other professionals, who will help.

2 IF YOU CANNOT IDENTIFY THE MATERIALS from a distance... which of these conditions exist?

A. With no LEAKS, SPILLS, FIRES or BADLY DAMAGED CONTAINERS:

1. Approach Cautiously ... using self contained breathing apparatus & full fire turnout gear.
2. Obtain Needed Identification... from the site.
3. Withdraw All People... and communicate identification to your dispatcher.

Figure 39
Hazardous Materials Guidelines for First Responder

B. With a LEAK, SPILL, but **NO FIRE**:
Approach ONLY with specially trained, properly trained personnel... to gain identification.

If those personnel are not available...

- consider down wind evacuation
- contact state agencies _____
  _____
  _____
- contact CHEMTREC 1-800-424-9300 for assistance.

C. When there's a CONTAINER WITH **FIRE** IMPINGING ON IT!

1. **Withdraw** from the area
2. Notify fire and police dispatchers
3. Consider area evacuation
4. Ask for assistance from...
   - state agencies _____
     _____
   - contact CHEMTREC 1-800-424-9300... for assistance

THIS CAN BE A MOST HAZARDOUS SITUATION RESULTING IN B.L.E.V.E. CONDITIONS, ETC...

3 COMMUNICATION PROCEDURE

Key Things to Communicate:

A. Scene Location... **specifically**
B. **Any** Shipping Paper Information (see "Identification Procedures For Hazardous Materials" Training Guide)
C. Any Placards?
D. The Hazard Class(es)
E. 4 Digit ID Number(s)
F. Shipper or Carrier Names
G. Container Shape
H. Any Injuries or Exposures?
I. What about the Weather?
- wind speed
- direction
- forecast?

J. Any Streams, Rivers or Lakes nearby?
K. Any Leaks, Spills or Fires?
L. What's the eminent danger?

Figure 39 (cont'd.)
Hazardous Materials Guidelines for First Responder

4 **EVEN AT AN INCIDENT WITH...**

A. Known Hazards
B. Identified materials
C. and Specially trained/equipped personnel available...

...the First Responder **still** must:
SECURE THE SCENE.
- Block all necessary roads
- Evacuate persons from immediate site
- Restrict onlookers **including the media.**

5 **WHEN HANDLING OR CONTAINING HAZARDOUS MATERIALS:**

1. Contain Materials... **do NOT FLUSH** it away

2. Block Sewers or Accesses to streams or bodies of natural water.

6 **RESCUE TIPS**

ATTEMPT TO RESCUE **ONLY** IF POSSIBLE WITHOUT ENDANGERING **ADDITIONAL** LIVES.

Consider...
- Explosion
- Fire
- Contamination or Exposure

...potentials

WHEN CONTEMPLATING RESCUE:
Consider...
- the **whole picture**
- with the Latest Information

...before allowing rescue personnel into the site.

REMEMBER:

A HAZARDOUS MATERIALS INCIDENT CAN PROVIDE UNUSUAL AND OFTEN DIFFICULT TO RECOGNIZE PERILS TO THE EMERGENCY RESPONSE PROFESSIONAL.

Figure 39 (cont'd.)
Hazardous Materials Guildelines for First Responder

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