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PROMOTIONAL ISSUES RELATED TO OFF-SITE ACCIDENT INVESTIGATION

Research, Development, and Technology

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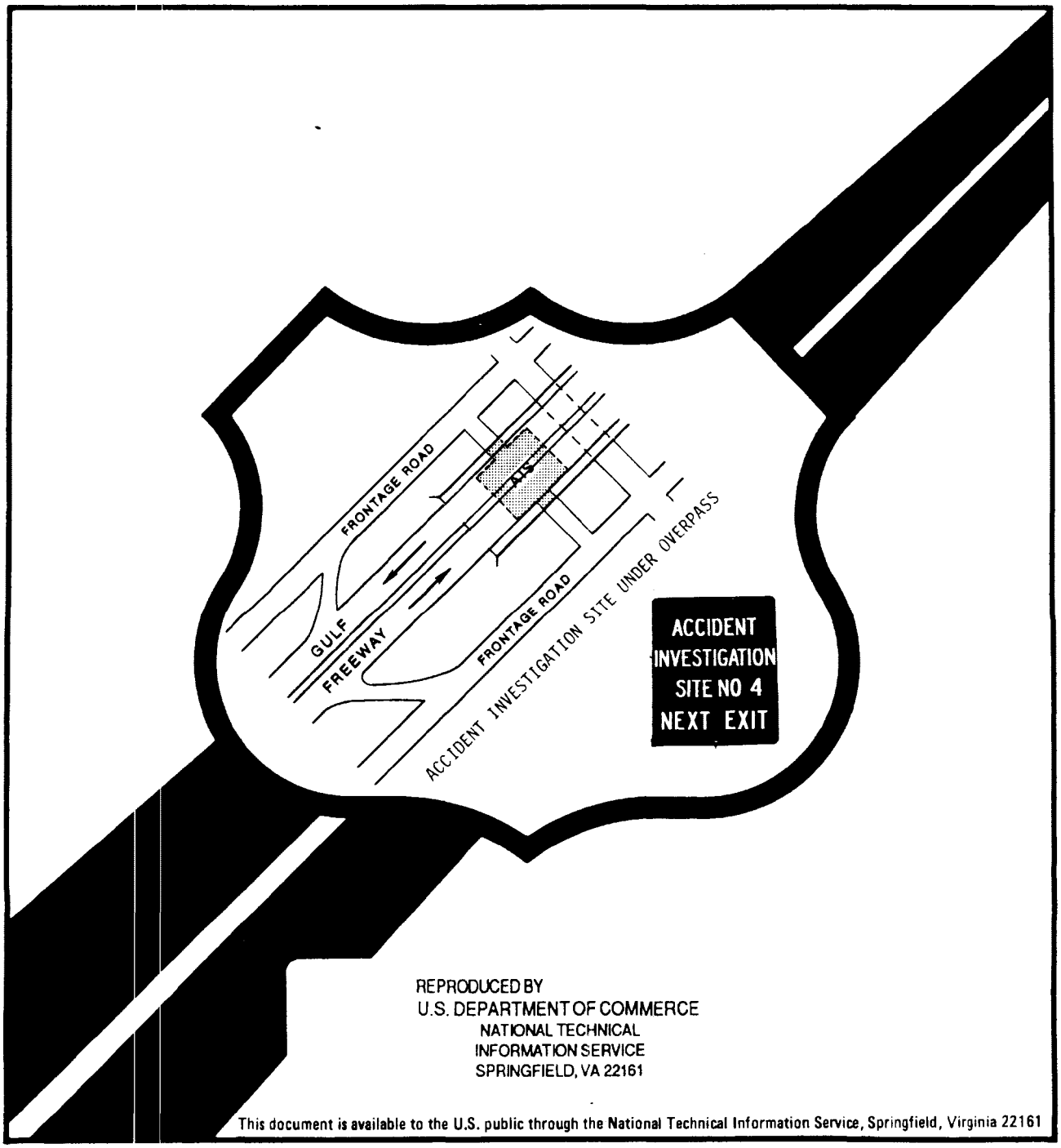

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16. Abstract

The research documented in this report involved a review of legal and insurance issues relative to off-site accident investigation locations, referred to as Accident Investigation Sites (AISs), through library searches and contact with a limited number of individuals/organizations/agencies involved in the coordination or administration of legal and insurance matters as related to traffic accidents. In addition, the literature regarding the use of AISs was reviewed.

AISs are low-cost special designated and signed areas off the freeway where damaged vehicles can be moved, motorists can exchange information, and police and motorists can complete the necessary accident forms. These areas are located such that the motorists involved in the accident, the investigating police and the tow truck operators are out of view from freeway drivers. Thus "rubbernecking" and consequently, freeway congestion, is reduced. Freeway congestion is also reduced because the motorists involved in property-damage-only accidents have a place where they can move their vehicles while waiting for the police investigators to arrive.

Experiences with AISs in Houston, Texas 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, that is, $35 return for every $1 invested.

The AIS concept is applicable for a variety of metropolitan area traffic management strategies. Three broad categories of situations are as follows: 1) No electronic surveillance and control traffic management system exists; AISs can be implemented. 2) An agency is planning to implement an electronic freeway surveillance and control traffic management system; AISs can be included as part of the overall system. 3) Existing urban freeway networks which have operating electronic surveillance and control traffic management systems; AISs can be added.

The report identifies and discusses the administrative, location, design, operational, legal and insurance issues that must be addressed by highway and police agencies in order to successfully implement and operate AISs.

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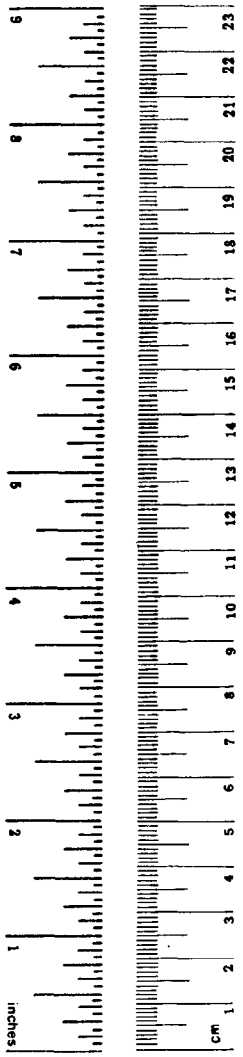
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

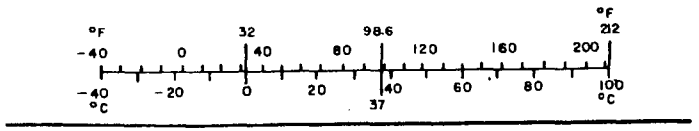
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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1. INTRODUCTION

Objectives and Scope of Study

The objectives of this research were to:

1. Review the methodology and the legal and insurance issues involved in the use of off-site accident investigation locations adjacent to freeways;
2. Summarize the reviewed material for use by jurisdictions in making use of off-site accident investigation locations; and
3. Summarize the legal and insurance issue material for Federal Highway Administration use in preparing material to encourage state, local jurisdictions and drivers to use off-site accident investigation locations for the exchange of information regarding minor non-injury, property damage only (PDO) accidents.

The research involved a review of legal and insurance issues relative to off-site accident investigation locations through library searches and contact with a limited number of individuals/organizations/agencies involved in the coordination or administration of legal and insurance matters as related to traffic accidents. In addition, the literature regarding the use of off-site accident investigation locations was reviewed.

Background

Urban Mobility

Streets and highways are essential for the vitality of urban areas. The primary objective of streets and highways is to provide safe and efficient movement of persons, goods and services.

Freeways are major highways that provide urban mobility for effective business and commerce. Although freeways constitute 2% of the urban roadways, they carry 40% of the trips.

Freeway Incidents

Increased growth in most urban areas has overtaxed existing highway facilities; however, innovative approaches to traffic management have improved urban mobility during the rush hours. Nevertheless, the frequency and random occurrence of incidents (e.g., accidents, spills, and disablements) on urban freeways are causing major problems because of their adverse effects in terms of heavy congestion, delays and secondary accidents .

Characteristics and Effects of Freeway Incidents

The frequency of incidents on urban freeways and their subsequent adverse effects in terms of congestion, delays, and secondary accidents have been well documented by several authors including Wilshire and Keese, Lynch and Keese, Goolsby, DeRose, Urbanek and Rogers, and Dudek (1-7). Studies of a six-mile section of the Gulf Freeway in Houston (ADT = 120,000) by Goolsby (3) revealed that approximately 13 lane-blocking incidents occurred per week between 6 a.m. and 7 p.m. On the average, at least one major incident occurred each week.

The effects of lane-blocking incidents are significant. Goolsby (3) reported approximately 80% of the incidents on the six-lane (three lanes in each direction) Gulf Freeway reduced the directional capacity of the freeway by at least 50% (Table 1). Also, a one-lane blockage on the three-lane section of the freeway resulting from an accident or stalled vehicle reduced the capacity by 50%, although the physical reduction in usable lanes was only 33%. An accident that blocked two of the three lanes (67% reduction) reduced the traffic flow capacity by 79%. Also significant is the fact that when the accident vehicles were removed from the operating lanes to the shoulder where accident reports were prepared, the freeway traffic flow capacity was reduced by 26% even though no lanes were physically blocked. The reduction in capacity was the result of "rubbernecking" by curious motorists passing through the area.

The time of day an incident occurs is also important. For example, an incident occurring at the beginning of the peak period will cause more delay than one occurring at the end of the peak period. Figure 1 shows the periods of the day a typical urban

Table 1. INCIDENT EFFECTS ON A THREE-LANE FREEWAY SECTION*

Condition	% Closure	% Capacity Reduction
Normal	0	0
Stall (1 Lane)	33	48
Accident (1 Lane)	33	50
Accident (2 Lanes)	67	79
Accident (Veh on Shoulder)	0	26

* Adapted from Reference 3.

freeway is most susceptible to severe congestion due to an incident.

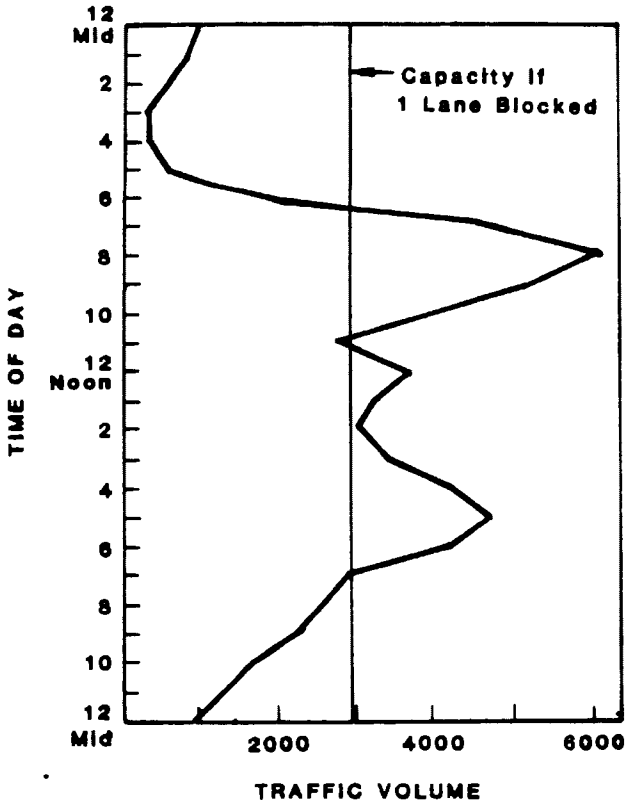

Figure 1. Urban Freeway Hourly Volume Pattern

The consequences of accidents and other incidents are congestion, delay, shock waves in the traffic stream, secondary accidents, and other adverse effects. Figure 2 illustrates some of the relationships involved. It is assumed in Figure 2 that an accident occurs on a three-lane section of an urban freeway at 7 a.m. (beginning of peak period). The total delay that results is the area between the normal traffic demand curve and the actual flow through the incident area (capacity flow).

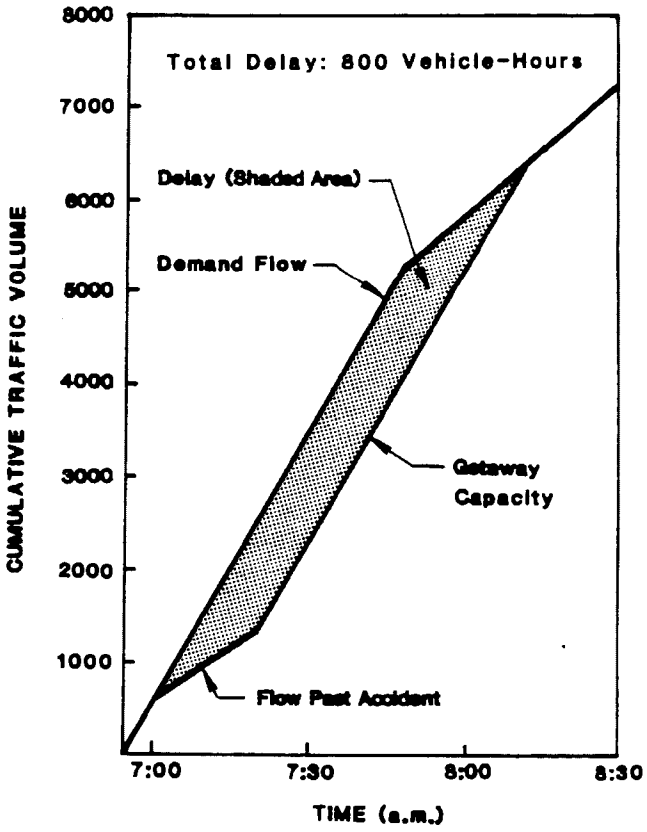

Figure 2. Example Of Delay Caused By An Accident Blocking One Lane

When the accident occurs, the slope of the capacity curve drops, reflecting a reduction in freeway traffic flow capacity from 5,660 to 2,830 vph. The slope of the capacity curve returns to normal when the accident vehicles are removed from the freeway at 7:20 a.m.--20 minutes later. This hypothetical accident would result in approximately 800 vehicle-hours of delay.

This example helps to illustrate the degree to which frequency and duration of incidents affect the operations of a freeway. The more frequently incidents occur, the more frequently added congestion will occur. The longer the incident duration, the more severe the delay.

Accidents that require police or wrecker assistance, or minor accidents where the drivers refuse to move their vehicles off the freeway lanes until the police arrive, often block traffic for considerable time periods. Studies conducted by the Texas Transportation Institute (TTI), for example, indicated that an average accident requiring (or waiting for) police assistance blocks one or more freeway lanes for an average of 19 minutes (3). An additional 25 minutes is required to complete the accident investigation.

Solution Approach

From a traffic management viewpoint, when an accident or other incident occurs on an urban freeway, the vehicles and/or debris must be removed as quickly as possible. Approaching freeway traffic (demand) should be intercepted before it reaches the reduced capacity area caused by the incident and redirected to routes with excess capacity. In addition, drivers must be warned of the slowed traffic ahead.

Freeway incident management systems are frequently employed by highway and police agencies to "combat" congestion and safety problems resulting from accidents. It consists of a coordinated and preplanned approach used to restore freeway traffic to normal operation after an incident has occurred by using human and mechanical resources. The approach involves a systematic process for:

1. Detecting any incident,
2. Identifying the scope (i.e., number of vehicles involved, number of lanes affected, severity of the accident, anticipated time of the lane closures, etc.) and needs (e.g., police, fire department, wrecker and maintenance equipment and personnel) relative to the incident, and
3. Providing appropriate response to aid the motorists involved and to minimize the adverse effects of the incident by clearing the incident as quickly as possible.

One major low-cost approach to minimizing the adverse effects of freeway accidents is the use of off-site accident investigation locations, referred to as Accident Investigation Sites (AISs). Off-site AISs are special designated and signed areas off the freeway where damaged vehicles can be moved, motorists can exchange information, and police and motorists can complete the necessary accident forms. These areas are located such that the motorists involved in the accident, the investigating police, and tow truck operators are out of view from freeway drivers. This reduces "rubbernecking" which is a major cause of congestion at a freeway 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 traffic.

The first AIS system was installed along the Gulf Freeway in Houston, Texas in 1971 (8). The benefit/cost ratio for the first year of AIS operation in Houston was 28:1. Data indicated that the potential benefit/cost ratio could be as high as 35:1, that is, $35 return for every $1 invested in AISs. These very significant reported benefits lead the Federal Highway Administration to sponsor the research reported herein on "Promotional Issues Related to Off-Site Accident Investigation."

Minimizing the Effects of Freeway Accidents

There are two ways to minimize the adverse effects of freeway accidents:

1. Reduce the severity and duration of the reduction in freeway capacity by clearing the vehicles involved in the accident from the traveled lanes as soon as possible, and

2. Remove the distractions (accident, police and wrecker vehicles) from the roadside.

The use off-site AISs contribute positively to both of these objectives. The scenarios discussed below and summarized in Table 2 and Figures 2 through 5 are useful in illustrating the importance of reducing the severity and duration of freeway lane blockages resulting from accidents and of removing the accident vehicles from view of freeway motorists.

Consider for Scenario 1 (Figure 3), the Base Example, a PDO accident occurring at 7 a.m. and blocking one lane of the freeway. The vehicles remain on the freeway for 20 minutes while the motorists wait until the police accident investigators arrive at 7:20 a.m. When the police arrive, the vehicles are moved to the shoulder. The vehicles, motorists and police remain on the shoulder for 20 minutes until 7:40 a.m. while the investigation is being conducted. The freeway traffic is still moving at less than normal capacity while the vehicles are on the shoulder because of "rubbernecking".

The total delay to the traffic (shaded area in Figure 3) for this scenario is approximately 1180 vehicle-hours. The freeway is heavily congested until 8:23 a.m.--83 minutes after the lane was first blocked.

For Scenario 2, consider the same traffic conditions as Scenario 1 but a situation where the PDO accident occurs, blocks one freeway lane and the vehicles are moved completely off the freeway to an AIS rather than to the shoulder when the police arrive at 7:20 a.m. The freeway returns to normal capacity when the vehicles are moved to the AIS (Figure 4). Eliminating the distraction of a 20-minute accident scene on the shoulder decreases the total delay in comparison to Scenario 1 by 380 vehicle hours (from 1180 to 800 vehicle-hours), and shortens the duration of congestion by 11 minutes (from 83 to 72 minutes).

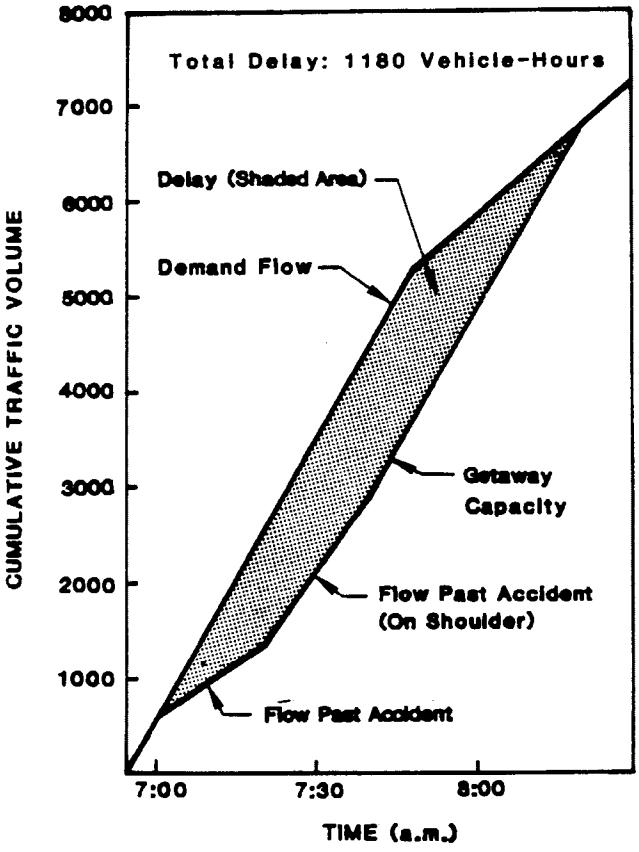

Figure 3. Accident Scenario 1

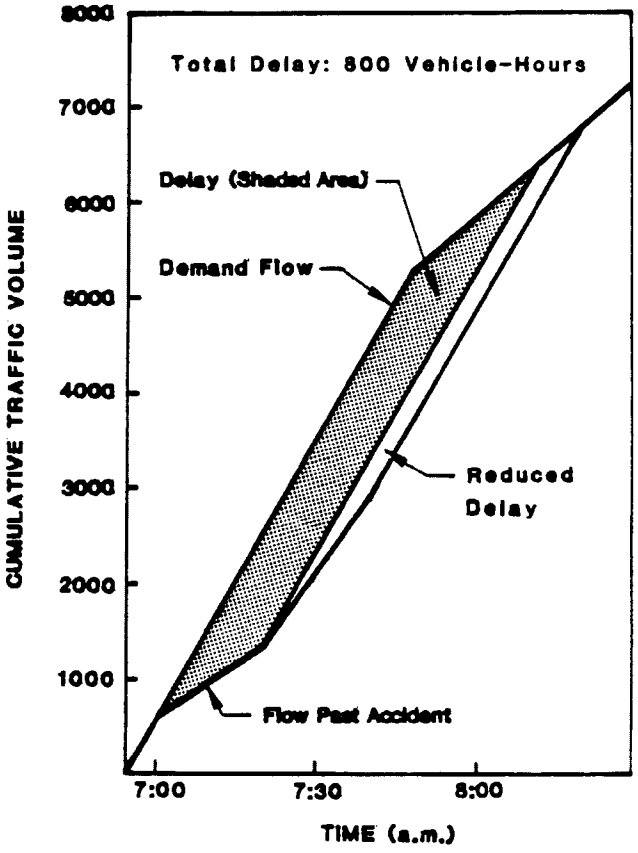

Figure 4. Accident Scenario 2

For Scenario 3 (Figure 5), consider that after an initial inspection of damage and exchange of information, the motorists involved in the PDO accident move the vehicles to the shoulder and the lane is cleared for travel after only 4 minutes rather than 20 minutes as in Scenario 2. The accident vehicles remain on the shoulder for 16 minutes until the arrival of the police. At that time the accident vehicles are moved to an AIS. Because the motorists moved their vehicles from the freeway travel lanes in 4 minutes rather than 20, delay to freeway traffic in this Scenario in comparison to Scenario 2 is reduced by an additional 340 vehicle-hours (from 800 to 460 vehicle-hours) and the duration of congestion is reduced by another 9 minutes (from 72 to 63 minutes). In comparison to Scenario 1, the Base Example, there is a reduction of 720 vehicle-hours of delay and 20 minutes of congestion.

Scenario 4 (Figure 6) is even a more desirable condition which could result if the persons involved in the PDO accident were familiar with the AIS system and could contact the police and wrecker service from the AIS location. After the 4 minute initial information exchange period, the accident vehicles are moved directly to an AIS rather than the freeway shoulder lane. The total delay in this case in comparison to Scenario 3 is reduced by an additional 300 vehicle-hours (from 460 to 160 vehicle-hours) and the congestion would be reduced by an additional 8 minutes (from 63 to 55 minutes). In comparison to Scenario 1, the Base Example, delay is reduced by 1020 vehicle-hours and congestion is reduced by 28 minutes.

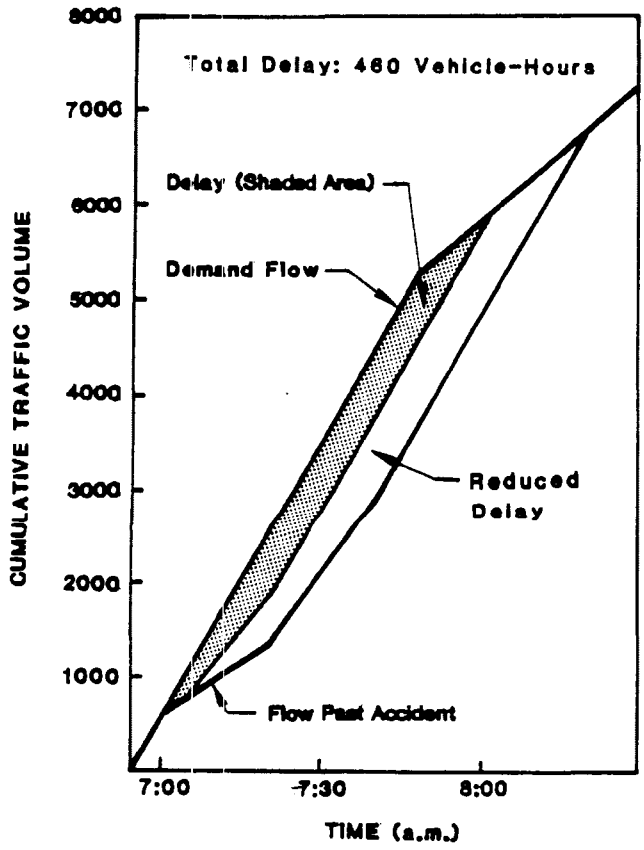

Figure 5. Accident Scenario 3

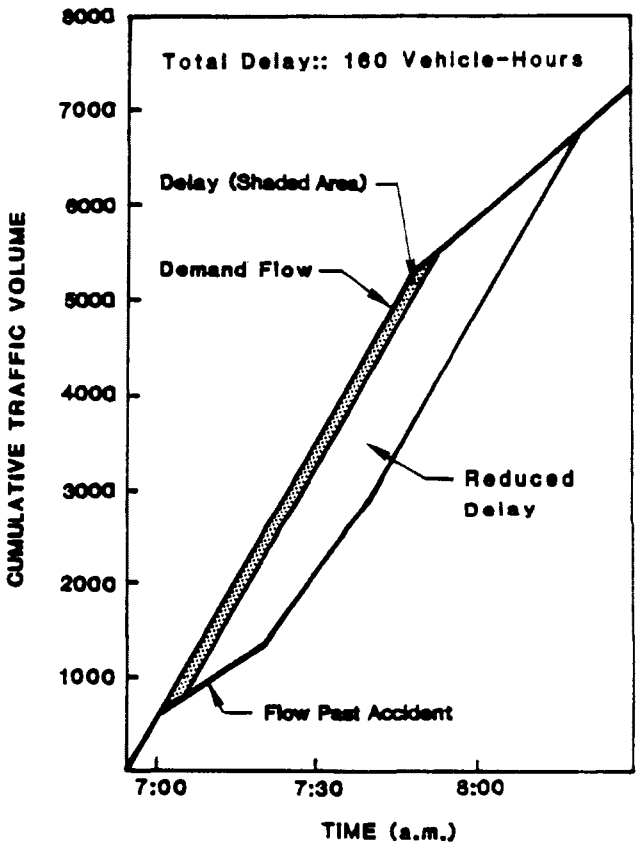

Figure 6. Accident Scenario 4

Table 2. EFFECTS OF ACCIDENTS ON FREEWAY AND SHOULDER

Scenario	Time On Freeway (Min)	Time On Shoulder (Min)	Time At AIS (Min)	Delay (Veh-Hrs)	Congestion (Min)
1	20	20	0	1180	83
2	20	0	20	800	72
3	4	16	20	460	63
4	4	0	36	160	55

Primary Considerations

In summary, the primary considerations in reducing the congestion and safety impacts of accidents and other incidents is to:

1. Remove the involved vehicles off the freeway lanes as soon as possible, and
2. Move the involved vehicles off the freeway out of view of freeway motorists.

AISs play a key role in accomplishing the above.

Study Methodology

As previously stated, the research reported herein included a literature search and interviews with a limited number of individuals/organizations/agencies involved in the coordination or administration of legal and insurance matters related to traffic accidents. Interviews were conducted with representatives from the following individuals/organizations/agencies:

1. City attorney from a large city,
2. Chief justice, district supreme court of appeals,
3. Assistant attorney general and former judge, municipal court,
4. Automobile club,
5. Insurance association,
6. Insurance company,
7. Private company with a large fleet of vehicles,
8. Urban freeway traffic management centers from two states (New York and Virginia), and
9. Traffic (corridor) management teams from five cities in Texas.

The traffic management centers and teams normally included members of the traffic engineering and planning divisions of the city and/or state DOT, local transit authority, and city or state police. The interviews coupled with the authors' first-hand experiences with designing, implementing, and evaluating AISs, a combined 50 years of experience developing and implementing urban freeway corridor traffic management systems and 25 years of state highway and transportation department experience in traffic design and operations were the primary sources for the information contained in this report.

2. IMPLEMENTATION OF ACCIDENT INVESTIGATION SITES

Experiences with AISs

Houston

As previously mentioned, the first AIS system was installed in Houston, Texas in 1971 (8). The Texas State Department of Highways and Public Transportation (SDHPT) and 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. The purpose of the AIS system was to provide a place out of view from the freeway motorists where police officers could investigate accidents and/or where motorists could exchange information. Texas law requires police investigation only for injury and fatality accidents although drivers must complete and submit accident report forms.

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. Two or more guide signs were erected on the frontage road and city street approaches to the sites to direct the motorists and to identify the AIS locations by number. No signs were placed adjacent to the traveled lanes of the freeway. An example of an AIS located under a bridge structure in Houston is shown in Figure 7.

The Houston AIS system was designed to be used by the Houston Police Department to direct the motorists involved in a minor accident to drive to the nearest site at which the investigation would be completed. The police were provided with booklets containing maps showing all of the site locations and with directions on how to exit the freeway to reach the closest site (Appendix A).

During the initial media releases, the public was advised to drive to the closest AIS if the vehicles were operational; however the public was reluctant to move their vehicle from the accident scene without being directed to do so by the police. No telephones were installed with the AIS system.

Figure 7. AIS Under Bridge Structure

Records, kept as part of the Gulf Freeway Surveillance Project, revealed that the AIS system was used extensively by the police during the first two years. During the first year of operation, the AIS system was used for accident reporting for 40% of the 851 accidents reported in the study area. In addition, another 176 (21%) investigations were conducted at other off-freeway locations.

Benefits of the AIS system during the first year included $203,000 savings from delay reductions since freeway congestion cleared faster when accidents were out of sight, and $25,000 savings attributed to a reduction in secondary accidents. The annual cost for installation and maintenance of the sites was estimated to be $8,000, resulting in a benefit/cost ratio of 28:1 (8).

Even though the usage of the AIS system during the first year was very successful, accident records indicate that an additional 25% of all accidents could have been moved to the AIS system, or to other off-freeway locations. These data suggest that the potential benefit/cost ratio may be as high as 35:1.

The AIS system was very successful during the early months of operation for a number of reasons. The system was

well designed by the staff of the Gulf Freeway Surveillance Project that included representatives of the Houston Police Department as well as the SDHPT and TTI.

The Gulf Freeway was monitored electronically by vehicle detectors and a closed circuit television system. When an incident occurred on the freeway, a police officer in the control center could call a police patrol unit by telephone or radio, provide information on the location and nature of the incident, and suggest which AIS could be used for the accident investigation. Even if the central control officer was not involved in the reporting of an incident, the surveillance project was well known to the police department.

The surveillance staff had requested and received cooperation and assistance from the police in the collection of data on many projects for several years. Thus, the procedure for collecting data from the police accident investigators to assess the effectiveness of the AIS system was also instrumental in maintaining a high level of usage by the police.

The forms used to record the use and the non-use of the AIS system (Appendix B) were collected and analyzed weekly by the surveillance project staff and the results were provided to the Chief of the Traffic Bureau of the Houston Police Department. The monitoring process was continued for two years until 1973 when the the first phase of a major freeway rehabilitation project was initiated on the Gulf Freeway. The Surveillance and Control Project was then shut down, and the recordkeeping of the AIS usage was discontinued.

During the next seven years, the redesign and reconstruction of the Gulf Freeway changed the access patterns to and from the frontage roads. The original AIS design was keyed to the exit ramps for quick and direct movement from the freeway shoulders. Some of the sites that were located under the freeway served both directions of freeway traffic flow, while the others on the adjacent streets served only one direction.

Even though the construction activities severely restricted movement in the area, the AIS system was never officially taken out of service. However, as the reconstruction work progressed, most of the sites were rendered inoperative. The few that were unaffected by the construction were not maintained, and the signs and pavement markings were not replaced when they deteriorated or were destroyed. The booklets with the maps that were provided the police were not updated or replaced. In general, the original AIS system was allowed to phase out by attrition (Table 3).

Some of the AIS system has been included in current plans for the reconstruction of the Gulf Freeway. One site under the freeway was redesigned and reconstructed when an interchange was improved. An innovative design combined the AIS parking area with the roadway for the U-turn movement. Another special site under the freeway has been preserved during the reconstruction and will be placed back into service as soon as the freeway construction is completed. The other special sites under the freeway have been taken out of service and are not scheduled to be replaced because of the lack of access.

The Houston District Office of the SDHPT will not reinstate the full AIS system as described in Reference 8, since some of the locations are no longer functional. But plans are underway to replace the signs for all existing AIS locations, to upgrade one of the existing parking areas, and to implement new sites.

The SDHPT is committed to the AIS concept. It is a low-cost high-benefit strategy. However, it must be supported by the policing agency to receive the type of maintenance by the SDHPT the system requires. To get the active support of the police, formal requests for AIS use and periodic reviews of the usage rates are required. The supervisors of the accident investigation section of the police department must also be supportive of the AIS concept. In Houston, this type of support is expected and the system should be back in full operation as soon as the freeway construction on the Gulf Freeway is completed in 1987. Other Houston freeways that are now being reconstructed will also have AIS systems installed.

TABLE 3. STATUS OF THE ORIGINAL HOUSTON ACCIDENT INVESTIGATION SITE SYSTEM

Site Number	Site Type*	Direction Served	Status of Location	Status of Signs **
1	1	North	Removed from service	Removed
2	1	North and South	Closed temporarily	Removed - TBR
3	1	North and South	Closed temporarily	Removed - TBR
4	2	North	Closed temporarily	Removed - TBR
5	2	South	Removed from service	Removed
6	2	North	Closed temporarily	Removed - TBR
7	2	South	Closed temporarily	Removed - TBR
8	2	North	In service	Needs repair-TBR
9	2	South	Closed temporarily	Removed - TBR
10	2	North	Removed from service	Removed
11	1	South	Removed from service	Removed
12	1	North and South	Closed temporarily	Removed - TBR
13	1	North and South	In service (new)	Removed - TBR
14	2	South	Closed temporarily	Removed - TBR
15	2	North	In service	Needs repair-TBR
16	2	South	In service	Needs repair-TBR

* Type 1 - Special Constructed Site; Type 2 - Existing Parking Areas
** TBR - Signs to be replaced after AIS placed back in service

San Antonio

In 1980, the San Antonio District of the SDHPT, working closely with the San Antonio Police Department, identified 13 candidate locations on the freeway system that had high accident experience. Four AISs were installed at the more accessible locations. Each AIS site had telephones (Figure 8) with direct lines to the police dispatchers.

The objective of the AIS System in San Antonio was to get the motorists involved in minor accidents to drive to the AIS and place a call to the police department for assistance and to wait at the site for the investigator to arrive. The public was informed of the new AISs through a media campaign, newspaper articles, and television and radio announcements. SDHPT representatives participated on talk shows to explain the operation and to answer questions. Also, directional guide signs were erected on the freeway.

In spite of these efforts, the system was not used by the public for various reasons: 1) motorists did not become familiar with the system even though the media campaign was conducted; 2) motorists were unwilling to move their vehicles before the police arrived; and 3) motorists were concerned that by moving their vehicles, they would lose their insurance coverage.

Also, the system was not always used by the police after arriving at the

Figure 8. Telephone To Police Dispatcher

scene of an accident. Some accident investigators preferred to use the shoulder and outer separation near the accident scene, instead of removing the vehicles to an AIS.

The current status of the AIS system in San Antonio is that two of the four sites have been removed and a third site will soon be removed from service because of freeway reconstruction. All of the telephones were removed because of vandalism. The SDHPT considers the remaining locations to be operational. The signs, pavement and lighting are being maintained. However, the San Antonio Police Department does not consider the system to be operational.

The concept of voluntary removal of vehicles from the freeway by the drivers prior to the arrival of the police has not worked well at any of the cities in Texas. The lack of support by the San Antonio Police can be traced to three factors:

1. The police captain in charge of the accident investigation at the time the AIS system was installed was in favor of the system. When he was promoted, his successor did not encourage his staff to use the sites.

2. Personnel changes at the San Antonio District Office of the SDHPT further reduced the level of support. This was the result of a lack of communication rather than a lack of interest by the new personnel of the SDHPT.

3. There was no formal reporting or feedback system on the usage of the AIS system, so the usage rate continued to fall.

There are current plans to install a few AISs at other locations that have good access and visibility (to discourage vandalism and to enhance motorist safety). These sites will be located with the assistance of the police department, and the SDHPT anticipates a higher participation by the police accident investigators.

Dallas

In May 1981, the City of Dallas installed an AIS system on the North Central Expressway (US 75). The system consists of 10 sites located on the streets adjacent to the freeway. Signs were erected on the freeway, frontage road and side streets to direct the motorists to the sites and to identify the locations by number.

The AIS system was designed to be used by the Dallas Police Department to direct the motorists off the freeway to the sites to exchange information and to complete the investigations. Guide signs were placed on the shoulders of the mainlanes of the freeway to serve as a reminder to the police of the AIS system. Guide signs were also placed at the exit ramps, intersections and the curb sites.

The experience to date has been less than was expected. There is no strong emphasis given to the Dallas Police Department to use the AIS system. There are no monitoring or evaluation processes to determine the benefits resulting from the system; the opinions of the police and city transportation officials place the usage rates at 10 to 15% of the accidents that could be moved.

The North Central Expressway is scheduled for reconstruction during the next five years. Traffic control plans will result in most of the emergency shoulders being removed for travel lanes during reconstruction. The AIS system, or some form of quick incident removal procedures, will be implemented while the freeway is being upgraded. The SDHPT will include some form of AIS in the Traffic Control Plan.

El Paso

In June 1986 the El Paso District of the SDHPT installed an AIS system on I-10 east of the central business district. The system consists of 10 sites, located on the eastbound frontage road, between the frontage road and the right-of-way line. These locations, although not completely out of sight of the freeway motorists, are far enough removed to lessen the impact of the scene on freeway traffic capacity.

The sites are well designed to provide a safe area for the vehicles and the occupants. Signs were not erected on the freeway but were placed on the frontage roads and at the sites. Guide signs were placed at the frontage road intersections to direct traffic from the westbound lanes to the AISs by way of U-turn lanes.

The sites are in well lighted areas, downstream of freeway exit ramps and near public telephones. Signs at the AIS provide telephone numbers for contacting the police department and the AIS identification number.

An intensive media campaign was conducted by the El Paso Police Department when the sites were opened in June. There is no formal procedure underway at this time to monitor the use of the system, but SDHPT officials plan to make a survey of their usage and the benefits in order to justify the expansion of the system.

Summary of Knowledge Gained from Texas Experience

Experiences in Texas have shown that AISs are low-cost highway improvements that result in significantly high benefits to motorists. The benefit/cost ratio for an AIS system in Houston, for example, was 28:1. Data suggest that the potential benefit/cost ratio may be as high as 35:1.

The experiences in Texas have also highlighted the need for effective management techniques. Recommendations based on the experiences in Texas are incorporated into AIS administrative, location, design and operation issues discussed in Chapter 3.

3. CURRENT PROMOTIONAL ISSUES RELATED TO ACCIDENT INVESTIGATION SITES

Administrative, Location, Design and Operation Issues

Administrative

Lead Agency

The traffic and transportation agencies of cities, counties and states have the authority to design, construct and maintain AISs on their property, and to acquire the rights (through agreements) to use private commercial parking areas for these purposes. To develop an effective AIS system in an urban area, the involved agencies should include, as a minimum, the department of transportation and the policing agencies that will use the AIS system. Also, a lead agency (usually the state department of transportation) should be designated to be responsible for the design and implementation of the AIS system for the total freeway network. One approach to the successful development and operation of an AIS system is through a local Traffic Management Team.

Traffic Management Teams (9)

A Traffic Management Team brings together professionals from the various traffic-related agencies in the area and helps them to work together to solve the area's traffic problems. The team improves the overall traffic operation and safety in the freeway corridors by coordinating the activities of the principal operational agencies in the urban area. Essential to the team's successful operation is the communication, coordination and cooperation which can be realized through working side by side on the team. Because of these relationships and activities, the Traffic Management Team is a logical focal group for the administration, design, implementation and operation of an AIS system.

The State of Texas is an example of the success of Traffic Management Teams. The first Traffic Management Team in Texas was officially formed in 1975. There are currently 12 teams operating in the state. These teams cover the seven largest metropolitan areas and the nine largest cities as well as other smaller areas. The rapid spread of the team concept and the wide acceptance among the large cities in Texas indicates that it is a very beneficial concept. Emphasis on the need for the team approach was recently reemphasized by several governmental agencies during a national conference on "Corridor Traffic Management for Major Highway Reconstruction" which was held in Chicago on September 28-October 1, 1986.

It is difficult to say specifically which agencies should be represented on a local Traffic Management Team because different cities have different situations. However, some agencies are almost always included on the team. These include the city and state traffic engineering offices, city and state law enforcement agencies, and the local transit authority. Other agencies and divisions should be included if they are significantly involved in the operation of the freeway corridor(s).

Distribution of Responsibilities

The responsibilities that each agency assumes in the day-to-day operation of AISs will be based on the organizational structures of each agency and the interagency operational structure within the city. In addition, specific interest of individuals and agencies will be influential in determining specific responsibilities.

Expected Benefits and Advantages of AISs

The monetary value of AISs fall into five groups:

1. Reduced delay to freeway motorists,
2. Reduced vehicle operating costs (e.g., gasoline consumption),
3. Reduced secondary accidents,
4. Reduced pedestrian accidents, and
5. More efficient use of the public agencies' personnel.

Delay and Operating Costs--Through the early removal of incidents from the traffic lanes and the removal of the vehicles out of sight of freeway motorists, AISs reduce delay time of freeway motorists and vehicle operating

costs, particularly during the peak traffic periods. Examples of the reduced delay benefits of removing incidents occurring during the peak period to AISs were presented in Chapter 1.

Monetary benefits of AISs resulting from reduced delay and vehicle operating costs are determined by comparing the estimated delay and operating costs that would be expected if AISs did not exist and comparing it with the delay and operating costs assuming AISs did exist. Analytical procedures and simplified computer programs are available to assist highway agencies in evaluating the delay and vehicle operating cost reductions and the monetary values of the reductions based on the time of day the incidents occur and length of time they affected freeway traffic. For example, an analytical procedure for estimating freeway traffic congestion and calculating delay similar to the procedure used in Chapter 1 was published by Morales (10). A microcomputer program using an interactive LOTUS 123 spreadsheet was also developed and is available for general use. Memmott and Dudek (11) developed a computer program called QUEWZ for determining delay and road user costs associated with delay and vehicle speed changes associated with stop-and-go driving in congested traffic. The program was developed for evaluating the effects of lane closures at freeway construction and maintenance work zones but can also be used for evaluating the effects of freeway incidents. Two major advantages of this computer program is that the information necessary to run the program can be easily obtained by highway agencies and road user costs are automatically calculated.

Another approach to estimating the delay associated with freeway lane blockages is to use simple arithmetic. Subtracting the estimated traffic volume moving through the lane blockage section of the freeway from the estimated demand volume each hour, results in an estimate of the number of vehicles trapped in the stop-and-go traffic during the hour. Multiplying the number of vehicles in the congestion by a time factor produces an estimate of vehicle-hours of delay. The arithmetic procedure is illustrated in Appendix C.

There are acceptable monetary values of time that can be applied to the computations of delay. For example, in Texas as of August 1985, the average value of time for passenger vehicles was $10.55 per vehicle-hour and for trucks $19.25 per vehicle-hour (12). The value of time is affected by the the composition of traffic and changes in the monetary value of the dollar. Therefore, the above values must be adjusted regularly. An example of detailed analyses of the value of vehicle travel time can be found in Reference 12.

Secondary Accidents--Each freeway incident has the possibility of causing a secondary accident, (i.e., an accident involving a stopped, parked or disabled vehicle. Information concerning the number of secondary accidents that occur on a given section of freeway are difficult to obtain. Therefore, it may be necessary to make an estimate based on experiences elsewhere. Since the monetary benefits of reducing secondary accidents will most likely be relatively small in comparison to reduced delay and vehicle operating costs, the error associated with this estimating procedure may not be too critical. One reference (13) estimated that in 1973, 144 secondary accidents occurred in a 64-mile network of freeway system in Houston.

Monetary values can be placed on the cost of accidents. Accident cost statistics can be found in reports produced by the National Highway Traffic Safety Administration (14) and National Safety Council (15). In addition, highway agencies and research organizations periodically publish reports summarizing accident costs (16). Rollins and McFarland (16) estimated that the costs for rural accidents as of July 1985, were $1,151,100 per fatal accident, $13,900 per injury accident and $1,700 per PDO accident. For urban areas the estimated costs per accident were $1,077,700 for fatals, $11,400 for injury accidents and $2,000 for PDO accidents.

Pedestrian Accidents--AISs also have the potential for reducing pedestrian accidents. A California study (17) concluded that 43% of all the pedestrians struck on freeways were on the facility because their vehicle was either disabled or involved in a prior accident. In the absence of similar data in the local area, the California percentage can be used to estimate the potential reduction in the number of pedestrian accidents that occurred based

on the number of total pedestrian accidents on the freeways to be serviced by AISs.

Efficient Use of Personnel--AISs can benefit local and state agencies by more efficient use of personnel. For example, by providing a refuge for motorists involved in accidents, encouraging them to move their vehicles to AISs before the police arrive, and providing telephone communications at the AISs, police will have additional time to attend to other responsibilities. Therefore savings might be realized by reducing manpower requirements.

Location and Design

There are no standards of design for AISs, but guidelines for determining locations for sites and desirable site construction and operation features have been developed from experiences with operational sites by some of the traffic management teams in Texas and by the authors, and are summarized in this section of the report.

Access and Distance

The AIS locations must be easily accessible from the freeway. There must be a minimum of turns and distance to travel after leaving the freeway. The most desirable location is within one block of the freeway exit ramp terminals.

Location Alternatives

The following four alternatives for locations of AISs have been used:

1. Constructed sites on the freeway right-of-way out of the view of freeway traffic. These sites may be located under bridge structures (Figure 7, Chapter 2) or in the outer separation of the freeway.

2. Construct sites between the frontage road and the right-of-way line.

3. Existing parking facilities on private commercial property abutting the freeway right-of-way (Figure 9).

4. Public curb parking spaces on local streets (Figure 10) or frontage roads in the vicinity of the freeway.

An example of the location and a layout for a site out of view of freeway motorists constructed in Houston on the Gulf Freeway right-of-way is shown in

Figure 9. AIS On Private Commercial Property

Figure 10. AIS On City Street

Figures 11 and 12. The access to the site and the drainage are simplified with this design and the 85 by 30 ft (26 by 9 m) parking area is more than adequate. An innovative design that combines an AIS with a U-turn lane constructed under a bridge structure is shown in Figure 13.

The advantages of locating AISs in the outer separation of the freeway are that there is direct access from the main lanes (and the frontage roads when available) and the potential locations are not dependent on the location of the exit ramps. When AISs are located in the outer separation, they should be shielded by some type of screen to keep the accident and emergency vehicles out of sight of freeway motorists. The screens can be constructed of natural or man made materials. A disadvantage of using the outer separation is that the sites may not provide as much protection from traffic as the other alternative locations, but they offer benefits over the normal shoulders for accident investigation. Also a potential problem with using screens to hide accident vehicles, as expressed by one state, is that the AISs could be very susceptible to collecting debris.

The second, third and fourth alternative locations may not always be completely out of sight of freeway traffic, but even when visible, the disruption factor is significantly reduced when the accident scene is removed by some 50 to 100 ft (15.2 to 30.5 m) from the traveled lanes.

The need for cooperation with local jurisdictions and private property owners when installing and operating AISs cannot be overemphasized. It is rare when all AISs can be located on state- or city-owned right-of-way.

Police Involvement in Site Location and Design

Since the freeway patrol officers are essential to a successful system, local police should be involved in locating and designing AISs. Because of their intimate knowledge with the freeway corridor and their experience with accident investigations, the patrol officers are in the best position to help select locations that will optimize the use of AISs. Police inputs to design will enable the highway agencies to include features that will also enhance the probability of AIS usage.

AIS System Continuity

Because of the experimental nature of previous AIS systems, AISs previously were installed on only a small segment of the metropolitan freeway system in the cities where they were implemented. Experience has shown that although AISs are beneficial, an incomplete system can sometimes have an adverse effect on the use of AISs by motorists. Having an accident on a freeway, let alone a given section of freeway where AISs may be located, is somewhat of a rare event for most motorists; therefore, motorists may not have too many opportunities to use an AIS. Thus, motorists are inclined to forget about the existence of the AISs that are located on a small segment of the freeway system.

Installing a complete system of AISs throughout a metropolitan area within a relatively short time frame may not always be possible because of constraints such as funding. However, it may be possible to install AISs in selected freeway sections where accident frequencies are the highest. Frequent advertisements and public information announcements in these cases are necessary in addition to the normal freeway AIS signing to remind motorists of the specific segments of the freeways where AISs are located.

Size

An AIS should have space for parking a minimum of 5 vehicles (one police car, two damaged vehicles, and two wreckers). Additional space is desirable in order to accommodate multi-vehicle accidents and additional wreckers, but provisions can be made for emergency parking on streets for these situations. Therefore, a typical constructed site or private parking area (off-street) should have a minimum of 1,000 square feet (304.8 sq m) of parking space, and curb parking sites should be a minimum of 100 ft (30.5 m) in length.

Signing and Marking

Signs can be placed on the freeway in advance of the exit ramp (Figure 14) and on the frontage roads (Figure 15) and local streets (Figure 16) as re-

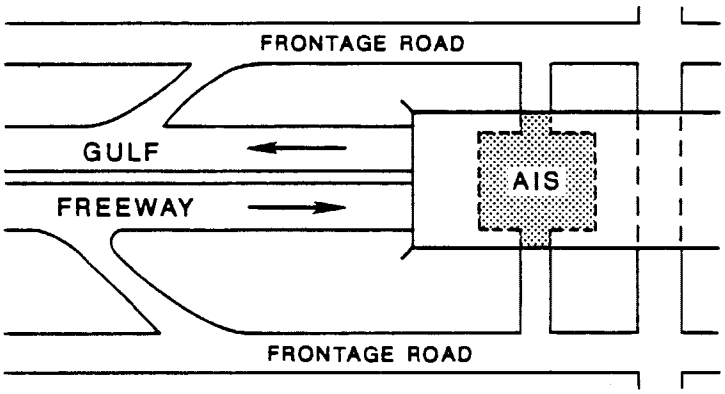

Figure 11. AIS Under Overpass

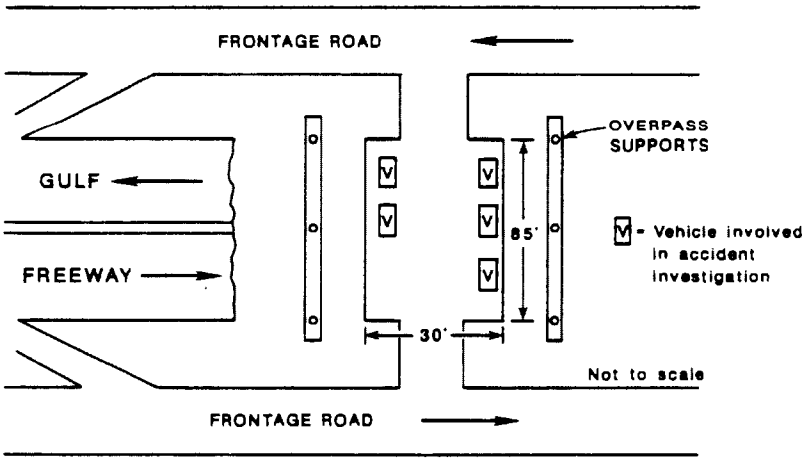

Figure 12. AIS Schematic

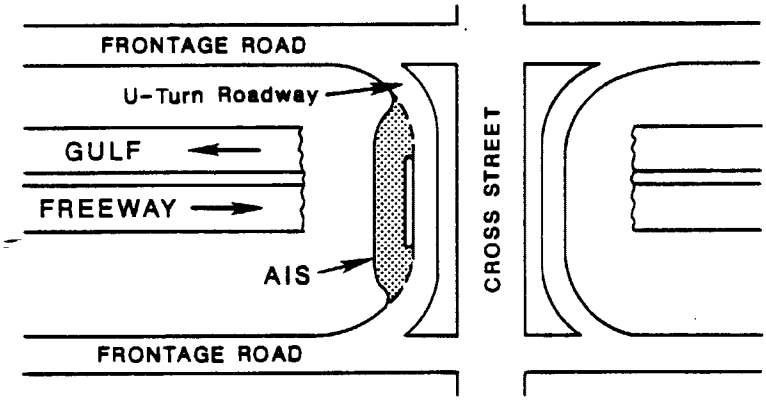

Figure 13. AIS Combined With U-Turn Roadway

Figure 14. AIS Signing On Freeway

Figure 16. AIS Signing On Local Street

Figure 15. AIS Signing On Frontage Road

quired to trailblaze drivers to the AISs. These signs also serve as a reminder to the public and the police of the AIS system. The sites should be identified on the signs by a number. "No Parking" signs should also be placed at the sites to lessen the misuse of the sites as parking areas. Supplemental pavement markings may be required on private parking areas and curb parking

Communications from AIS

If the public is to use the AIS system prior to the arrival of an accident investigator, some form of telephone communications must be provided. For the sites within the freeway right-of-way, a dedicated telephone system to the police dispatchers office should be provided (Figure 8, Chapter 2). On the private parking areas and/or local streets, public telephones may be provided within walking distance of the site. Public telephones could also be provided at the sites on the freeway right-of-way to allow motorists to contact other sources of help or to make personal or business calls.

Security

Concern for the personal safety of motorists who use the "out-of-the- way" parking areas must be considered in the design and location of the sites. High risk areas should be avoided if possible. The sites should have paved surfaces and good illumination for night usage. Street lights and telephones

promote safety. Other techniques that can be used to improve security are:

1. Have the sites checked regularly by police, highway maintenance crews and emergency service crews;

2. Park emergency and maintenance vehicles in or near the sites when they are not on patrol or in service (e.g., during lunch);and

3. Place the sites near locations that will have high volumes of vehicle and pedestrian traffic (e.g., near a bus stop).

Operation

Selling Concept To Individual Police Officers

One of the first activities to ensure successful use of AISs is to make sure individual police officers understand the benefits of AISs and will support the use of the AIS system. Accident investigation is not a favored function of many police departments. Some police officers complain that it consumes substantial time and manpower in the field and in the courtroom. Positive efforts on the part of highway and police supervisors are essential to overcome the problem with some accident investigators who prefer to complete reports at or near the scene of the accident because they believe it reduces the time to complete the paperwork and it enhances the accuracy of the report and possible court testimony. Positive efforts are also necessary to overcome some investigators' preferences to move several vehicles to the shoulder of the roadway, than to a site several hundreds of feet off the freeway. They believe it is more hazardous to lead a platoon of vehicles from the freeway, than to conduct the investigation adjacent to a lane of moving traffic. The operations agency must change these attitudes on the part of individual police officers in order to have a successful AIS system

Formalized Instruction and Information

To obtain high AIS usage rates, the freeway police patrols and accident investigation units must be convinced of the merits of the AIS system and provided with:

1. A description of the AIS system and instructions on how and when to use the sites (Appendix A),

2. A map of AIS locations and a description of the use of the sites (short forms may be made available to distribute to the motorists involved in accidents) (Appendix A), and

3. A procedure for monitoring the use of the AIS system (Appendices B and D).

Public Information

As previously noted, information concerning the location and use of AISs must be given to the motoring public. All sources of information transfer should be used (e.g., radio, television, newspaper, etc.). In addition to special brochures for distribution to the public, press release packages should be prepared for the media so that they have all the information necessary for disseminating to the public via all media modes. Motorists and media must be made aware of the AIS system during the early phases of development (i.e., planning and design phases) so that they are able to provide input if necessary. Motorists must be reminded of the AIS system periodically so that they become familiar with the locations of the sites and their expectations concerning the use of the sites and the overall improvements to freeway traffic. An example of a news release is shown in Appendix E.

A video tape demonstrating the intended use of the AISs would also be helpful to enhance public understanding and to encourage motorist use of the sites.

Monitoring and Feedback

Chances are, in spite of careful planning and the direct involvement of the police in designing and locating the AISs, certain sites or site characteristics may be found to be less than acceptable after a period of use. A formalized process of feedback from the patrol officers concerning any problems with the sites followed by a reply and/or action by the highway agency is very important if the sites are to be regularly used by the police investigators. Feedback can be obtained by

using the monitoring procedure discussed in Appendix D and the feedback form shown in Appendix B.

Freeway Incident Management

AISs can provide considerable benefits even without formalized Freeway Incident Management approaches. Significant benefits can accrue in reduced delays and increased safety merely by having the AISs available for accident investigations. Sophisticated electronic surveillance systems are not required in order to reap significant benefits from AISs.

However, the primary consideration in reducing the congestion and safety impacts of accidents and other incidents is to remove the involved vehicles off the freeway lanes as soon as possible, and to move the involved vehicles off the freeway out of sight of freeway motorists. Consequently, one issue is to encourage motorists involved in PDO accidents to move their vehicles off the freeway as quickly as possible rather than waiting for the police to arrive before the vehicles are removed. Desirably, the vehicles should be moved to AISs. If efforts to encourage motorists to move off the freeway lanes are unsuccessful, then surveillance approaches to detect incidents may be necessary to reduce the delays and safety problems associated with PDO accidents on freeways.

Surveillance systems are effective in detecting accidents and other incidents sooner, thus reducing their overall adverse effects since police and other emergency vehicles can be dispatched to the incident scene faster. There are a number of surveillance options that can be used to detect accidents/incidents, either individually or in combination, each with different degrees of cost and effectiveness (18). A key issue that must be considered is the time it would take to detect accidents when using one or more of the surveillance techniques. The options are as follows (5):

1. Increased Police Patrol Frequency: Increasing the number of patrolling vehicles during periods when an incident would cause significant delay.

2. Peak Period Motorcycle Patrol: Same as above, only using motorcycles (which have greater mobility than patrol cars traveling through congestion) to obtain the additional patrol frequency during peak periods.

3. CB Radio Monitoring: Capturing the freeway incident information by monitoring the CB radio and ensuring that the information obtained is forwarded to the proper response service.

4. Service Patrol: Increasing the existing patrol frequency with publicly or privately operated service vehicle patrols or tow trucks.

5. Stationary Response Vehicle: Strategically placing response vehicles, such as tow trucks, along the freeway at vantage points so that the driver can detect incidents and immediately respond.

6. Aircraft: Using public (police) or private (radio station) aircraft to patrol and detect incidents.

7. Call Boxes: Installing roadside communication devices that can be activated by motorists to alert the proper authority that an incident has occurred and that a response is required. Two types are available: coded pushbutton or two-way voice systems. Two-way voice systems (special telephones or commercial telephones) have proven to be more effective than pushbutton systems.

8. Closed Circuit Television: Using CCTV to detect incidents. (Considered as a low-cost FIM technique only on bridges, in tunnels, or at high-accident locations.)

9. Loop Detectors: Employing sensors buried in the roadway to detect incidents. Usually installed as part of a more sophisticated electronic surveillance and control system.

10. Volunteer Observers: Using individuals at vantage points to detect incidents in critical locations and to report to the appropriate agency.

11. Cellular Telephones: Urban areas with the 911 emergency number system can promote use (without charge to individual motorists) of the mobile telephones.

Legal and Insurance Issues

Ideally, for effective Freeway Incident Management, it is desirable to move the vehicles involved in PDO accidents off the freeway lanes as soon as possible, even before the police arrive, to minimize the adverse effects of the lane blockages. However, interviews with highway and police agencies, insurance companies and association, automobile club, lawyers and judges revealed an obstacle that must be overcome. These agencies, organizations and individuals indicated that a majority of the motorists believe that it is illegal to move their vehicles before the police arrive, even if the distance traveled is a few feet to the shoulder of the roadway. In addition, it was reported that most motorists believe it is necessary to wait for the police to arrive before moving the vehicles so that the insurance requirements would be satisfied.

Moving a vehicle prior to the arrival of a police officer is not normally a violation of the the law in most states. In fact, the opposite may be true. Laws in some states explicitly require that vehicles involved in non-injury accidents (PDO) should be moved so as to not interfere with traffic on the traveled way. In contrast, traffic laws in other states are not explicit on the issue. An assistant attorney general in Texas stated that since PDO accidents seldom go to trial, there is no reason for not moving minor accidents from the roadway before the police arrive. However, the perceptions of motorists concerning legal and insurance requirements and the specific requirements of several private and public fleet operators, result in actions on the part of motorists involved in PDO accidents that are in conflict with Freeway Incident Management objectives.

This section of the report summarizes the legal and insurance issues that impact upon: 1) motorists moving their vehicles off the travel way before the police arrive, and 2) moving the vehicles to an AIS to conduct the accident investigation and to complete the necessary accident forms. The conflicts resulting from private and public fleet operators' policies and insurance company instructions are also discussed.

Traffic Laws and Ordinances

Most states and municipalities use the Uniform Vehicle Code and the Model Traffic Ordinance as guides to setting up traffic laws and ordinances (19). These publications were prepared and are 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.

The provision that **Every such stop shall be made without obstructing traffic more than is necessary** has been part of the National Code since 1934. 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 (19). At least two states, Texas and Georgia, expound upon the requirement to minimize the adverse effects of accidents on traffic flow.

Texas is the only state that specifically addresses the use of AIS (19) The Texas Motor Vehicle Laws, specifies the following provision for PDO accidents (20):

> ...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 moved it (19).

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 (21):

> ... 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 main-lanes.

Removing Vehicles - An Old Problem

In spite of the laws relative to removing vehicles from freeway lanes, observations have indicated that many drivers generally wait until police officers arrive at the scene before moving their vehicles. This problem is not new to freeway operators.

In the early 1960s Lynch and Keese (2), concerned about the fact that most drivers did not remove their vehicles from the freeway lanes after an accident, contacted various police departments. In the survey of 33 cities throughout the nation, 27 reported having no ordinance prohibiting a driver from removing his/her damaged vehicle from the freeway traffic lane before the police arrived.

In further pursuance of the problem, accident investigating officers of four Texas city police departments were asked to furnish information on all freeway accidents on the following questions:

1. Did the operator drive his/her vehicle to the freeway shoulder after the accident, but before the police arrived?

2. Could the operator have driven to the freeway shoulder after the accident, but did not?

Results of this questioning revealed that in the cities that did not require the vehicles to remain in place before investigators arrived, 50% of those vehicles able to move, remained in place. Reasons given by the drivers were usually:

1. Fear of violation of law, or
2. Possible loss of insurance claims.

From all indications, drivers were not fully educated as to what action they could or should take. Based on the results of the more recent interviews for the study reported herein, the problem has not changed in more than 25 years. Therefore, encouraging motorists to move their vehicles off the travel way before the police arrive is a formidable challenge.

Fleet Operators

Government Agency and Private Company Policies and Procedures

Government agency and private company policies and procedures for operating their own fleet vehicles are oftentimes counterproductive to the AIS concept and efficient traffic management. Therefore, government and private policies and procedures should be evaluated at the local level and measures should be taken to change them if conflicts exist.

For example, the policies of several cities and states specify that government fleet vehicles involved in accidents should not be moved prior to an on-site investigation and report conducted and prepared by the police. Some states require that the investigation be conducted by the state police and not by the local police. The policies do not actually discourage employees from using AISs, but they require that employees leave the vehicles on the roadway for extended periods of time until the police arrive.

Another example of government conflict with FIM objectives is local or state police fleet vehicle policies. Many police departments require a department representative to photograph or videotape the police vehicles involved in accidents before the vehicles are removed from the travel way.

Reporting procedures required by private companies with fleet vehicles are usually more stringent than the local and state motor vehicle laws. The reasons for extensive procedures are to protect the organization in case of legal action, to be accountable to the taxpayers/owners of the organization in the use of the equipment, and to provide a measure of employee and/or departmental performance.

The public welfare would be better served if government agencies and private companies were encouraged to amend their accident reporting procedures to encourage their employees to remove vehicles involved in PDO accidents from the travel way as quickly as possible. In particular, governmental agencies that are responsible for the safe operation of streets and highways should have fleet vehicle accident procedures that are consistent with efficient traffic management objectives.

Government Agency Accident Reporting Information Guides

Most state and city agencies place brochures or checklists in fleet vehicles to remind their employees of the procedures to follow after an accident. Procedures are also contained in departmental or employee office handbooks. However, information from selected states and cities reviewed by the research team indicates that state and city agencies are not explicit enough concerning the movement of fleet vehicles involved in PDO accidents from the freeway lanes prior to the arrival of the police. Information guides do little to encourage employees to move their vehicles. In fact, the brochures and checklists from some states and cities--even those with state or city codes that require removal-- seem to indicate that the vehicles should be left on the freeway until the police arrive. Consequently, many state and city employees--as is the case of the average driver--are not aware of the actions they need to take concerning moving the vehicles off the lanes. It was the perception of the government representatives interviewed by the research team that most government employees would tend to leave their vehicles on the mainlanes until the police arrived.

City and state agency brochures, checklists and handbooks should be examined and revised, if necessary, to ensure that employees have explicit instructions concerning the removal of vehicles off the travel way. In addition, information concerning the use of AISs should also be incorporated into the procedures.

Insurance Agencies

Insurance Agency Policies

Representatives from three insurance agencies interviewed by the research team agreed that most motorists believe that they should not remove their vehicles from the travel way until the police arrive regardless of the type of accident. They also indicated that no insurance company policies would be violated by the removal of a policyholder vehicle involved in a PDO accident off the freeway to an AIS prior to the arrival of the police. Motorist perceptions and insurance company policies concerning vehicle removal have changed very little since the studies by Lynch and Keese.

Lynch and Keese (2) in the early 1960s requested insurance companies to give opinions concerning the possible loss of insurance claim of an individual due to the removal of his/her vehicle from the traffic lane before police arrived. In a letter from Mr. Robert N. Gilmore, Jr., General Counsel for the Association of Casualty and Surety Companies, he said:

> I am not aware of any published policy statement with respect to the removal of damaged motor vehicles. Certainly, insurance companies would not and cannot take the position that the interest of safety should be disregarded because removal of damaged vehicles might make claim investigations more difficult. Obviously, there are many cases where removal of damaged vehicles is necessary in order to avoid further accidents.
>
> I would not want to say, categorically, that damaged vehicles should always be promptly removed from the traffic lanes. In certain cases, the accident may be of such type or so severe that the traffic in any event would be detoured. Under those circumstances, it might be desirable from the standpoint of scientific analysis of how the accident happened to avoid removal until after qualified investigators arrived at the scene. On the other hand, there could be clear-cut cases where this is not only unnecessary, but highly undesirable since we know that damaged motor vehicles can cause all kinds of traffic difficulties and very likely additional accidents if they are not promptly removed from the traffic lanes.

The National Association of Independent Insurers of Chicago, Illinois further emphasized the position which they stated in a letter from Mr. Clyde Cecil, Assistant Secretary:

> We do not believe that a satisfactory adjustment of a claim would be jeopardized by removing a vehicle immediately after an accident. Frankly, we are not aware of any of our member companies taking this position and that in the interest of preventing any additional accidents would want the damaged vehicle to be removed from the lane of traffic as soon as possible.

In spite of these statements in the 1960s, there still is a reluctance by many drivers to move their vehicles from freeway lanes until police investigators arrive.

Insurance Company Advice and Printed Information

Although each insurance agency interviewed indicated that no insurance company policies would be violated by the removal of a policyholder vehicle to an AIS, the insurance companies do little to encourage their policy holders to move their "driveable" vehicles off the freeway travel way following PDO accidents. Verbal advice is generally contrary to company policy. In addition, the examples of brochures and written instructions furnished to their policyholders do not include explicit instructions to remove the vehicle from a freeway lane for PDO-type accidents.

The primary obstacles appear to be the high priority in the written instructions placed on contacting the appropriate police agency and the high priority drivers give to avoidance of accepting fault for the accident, which is perceived to be a consequence of removing the vehicle without authorization by the investigating police officer.

In response to questions concerning perceptions of insurance adjusters to

the use of an AIS (removal of a vehicle) prior to an investigation and report by a police officer, the general opinion offered was that the best procedure is to not move the vehicle; moving the vehicle can have an adverse effect on the outcome of adjustments.

Insurance agencies appear to be most protective concerning the welfare and optimum protection against possible fault (responsibility) of their insured. This is only natural with the potential problems of payment of damages and resulting insurance rate increases for policyholders.

One concern that may be an underlying cause for caution in use of an AIS expressed by insurance agency representatives is the indefinite description of criteria or clear definition of what type of accident involves Property Damage Only to which the AIS concept does apply. It may be difficult for a motorist to rationally define or assess a PDO accident without assuming great risk (fault or possible lawsuit), if there is an injury that is not apparent to those involved in making a decision to remove a vehicle from a freeway lane.

Police Response to Accidents

Because of other pressing priorities, police agencies are changing their modus operandi concerning accident response and investigation. These changes can impact (both positively and negatively) on the implementation and use of AISs.

Police in many large cities, for example, do not issue tickets associated with PDO accidents, but they do issue citations for 1) no driver's license or 2) no insurance card. Also, many state and city police agencies no longer respond to most PDO accidents, particularly during emergency conditions (e.g., severe inclement weather). For example, of six large cities in Texas, only one police department (San Antonio) responds to all PDO accidents.

In March 1986, the City of Austin joined Beaumont, Dallas, and Fort Worth in establishing policies to limit their response to accidents involving injuries or vehicles requiring special assistance. Austin initiated this action so that the police can concentrate on crimes against persons and serious collisions. In 1985, the City had over 33,000 collisions. Police who responded to accidents involving minor damage and no injuries spent a minimum of 30 minutes taking information and writing a report (22). Austin police officers are dispatched to collisions to check for proper licenses, injuries or criminal violations. If an officer finds no injuries or criminal violations, he gives the drivers the "blue form" to fill out. The drivers must mail their reports to the Department of Public Safety.

The trend toward the police not responding to PDO accidents and non-issuance of traffic violations following an accident, reinforces the need to encourage motorists to move their vehicles off the freeway lanes, and in particular, off the freeway to AISs when they exist.

Accident Information Collection

Initial Collection Before Vehicle Removal

Some of the law enforcement officers interviewed expressed concern that by encouraging motorists to move their vehicles to an AIS before the police arrive may provide some motorists greater opportunities to leave the area completely instead of moving to an AIS. Some law enforcement officers fear that AISs may increase the already high frequency of hit-and-run accidents. For example, of the 22,095 accidents that occurred in Fort Worth during 1985, 4,203 (25%) were hit-and-run.

In order to minimize the potential for hit-and-run situations, motorists could be instructed to exchange some basic information before moving the vehicles off the freeway lanes. Basic information (e.g., names, addresses, telephone numbers, license plate numbers, insurance companies, etc.) could be exchanged within a few minutes prior to moving the vehicles to an AIS. Programs of instruction regarding the

advisability of this initial information exchange could be made available through the media and through the state motor vehicle agency and insurance company material distributed to motorists.

Additional Information Collection After Removal to AIS

More complete information can be exchanged and collected at the AIS when not exposed to traffic. This includes information necessary for accident forms and insurance purposes.

Opinions of Judge , Attorney and Police

In the opinions of a chief justice of a district supreme court of appeals, an assistant state attorney general and police in New York, Texas and Virginia interviewed by the research team, there are no legal or insurance requirements that prevent the movement of vehicles involved in PDO accidents from the traveled way to a shoulder or to an AIS location, even if they are pushed off the lanes. All the information for purposes of establishing traffic violations can be obtained after the vehicles are moved from the freeway. Police from one city stated that most freeway accidents during the peak hours are rear-end type, and violations are not that difficult to determine in most cases.

Insurance Agency Opinions

The three insurance agencies interviewed indicated that, for PDO accidents, all necessary information for insurance purposes can be obtained after the accident vehicles are moved from the freeway, and there are no insurance company policies violated in removing the vehicles prior to police arriving at the scene. However, it would be good practice to exchange basic information before the vehicles are moved off the freeway.

Effect of PDO Accident Severity on Removal

For PDO accidents where the involved vehicles can be driven, the vehicles should be moved to the shoulder or an AIS as soon as possible to minimize the adverse safety and congestion impacts of the other motorists on the freeway. A major PDO accident may prevent one or more vehicles from moving under its own power, and therefore, the motorists must wait for a push or for towing assistance.

Pushing Vehicles by Police or Highway Agency

A city's operations, according to the state assistant attorney general interviewed, can be classified into two basic functions: governmental and proprietary. These functions can be further classified into the following:

1. Governmental
   - Police
   - Fire
   - Traffic Control

2. Proprietary
   - Street Construction
   - Maintenance
   - Water Treatment, etc.

A city would not be held liable for damages caused by functions that are classified as governmental.

According to the state assistant attorney general, if the city performed the act of pushing a vehicle from the roadway--even a police vehicle with special bumpers--this could be judged to be a proprietary function, and the city could be liable for damages caused by the removal of the vehicle (Ref: Shilling vs. City of Houston). Also, for PDO, there are no legal or insurance requirements that prevent the motorists from being pushed from the traveled way to a shoulder or to an AIS location. If further damage or if injury results from the action of being pushed, there is a question of liability. This could be construed as a proprietary function and the person or agency that is involved in the clearance procedure may be liable.

Police interviewed from six jurisdictions in New York, Texas and Virginia indicated that there have been no specific legal problems as a result of pushing disabled vehicles off the freeway traveled way with special push bumpers. The gain in reduced motorist delay and increased safety by removing

the disabled vehicles off the traveled way, according to the police, far outweighs any potential damage that may be caused to a vehicle while it is being pushed. However, the city attorney interviewed in a large midwest city indicated that the city has no vehicles equipped to push disabled vehicles and has no intention to push disabled vehicles because of liability elements.

Removal Methodology

Towing Fees

Perhaps the most critical issue relative to private enterprise that concerned the insurance agencies, judges, attorneys, transportation officials and private fleet operators interviewed was related to towing. The primary concern was associated with towing fees. If a vehicle is to be towed from the freeway to an AIS, the intermediate stop by a wrecker at an AIS may be perceived to constitute one tow, and moving the vehicle from the AIS to an auto service center a second tow with an additional charge. The questions that must be resolved deal with the amount and payment of potentially two tows and the waiting time involved at the AIS.

Procedures and pay schedules may also need to be evaluated to account for the additional time required by wrecker operators while waiting for the drivers and/or police to complete their discussions, investigations, and reports at the AISs prior to towing to an auto service center.

Fleet operators, both public and private, and auto club members may have their own agreements with tow truck operators for on-call service. These agreements may complicate the procedures for towing and would need to be evaluated when local towing ordinances are being developed.

The importance of good wrecker service in metropolitan areas is well recognized. One major city, for example, indicated that 38% of all reported accidents require a wrecker. Most people interviewed agreed that private enterprise should handle the towing service. However, city codes to regulate towing services must be developed and enforced.

4. PLANNED AND POTENTIAL AIS IMPLEMENTATION

As noted in Chapter 1, the authors visited and interviewed traffic management teams from 5 cities in Texas and representatives from traffic management centers in New York and Virginia, namely, the Long Island (IMIS) and Virginia I-66/I-395 projects. Legal, insurance and related issues were reviewed with regard to the past, current, planned and/or potential use of AISs. The results of the interviews were incorporated into the discussions in the previous chapters of the report.

Chapter 4 summarizes the planned implementation of AISs in Texas and discusses the potential of AISs implementation associated with the Long Island and and northern Virginia surveillance and control projects. These two projects were selected by FHWA because they are among the most visible of the new traffic surveillance and control projects in the United States. They are typical of most systems and, although the discussion of issues focuses on these two projects, it becomes apparent that the statements could be echoed toward other systems.

AIS Implementation

The AIS concept is applicable for a variety of traffic management system strategies in metropolitan areas. Traffic management strategies can range from very basic low-cost systems to highly sophisticated electronic traffic surveillance and control systems. The important things to consider are that use of AISs in all cases will: 1) reduce the time that incidents are blocking lanes on the freeway and 2) reduce the time that vehicles and motorists involved in accidents are in the view of freeway motorists. Thus, the normal adverse impacts of freeway accidents in terms of congestion, delay, energy consumption, air pollution, etc. can be minimized.

Three broad categories of situations are as follows:

1. No electronic freeway surveillance and control traffic management system exists; AISs can be implemented. (Examples: Houston, San Antonio, Beaumont, El Paso).
2. An agency is planning to implement an electronic freeway surveillance and control traffic management system; AISs can be included as part of the overall system. (Example: Fort Worth).
3. Existing urban freeway networks which currently have operating electronic surveillance and control traffic management systems; AISs could be added. (Examples: Chicago, Dallas, Denver, Detroit, Long Island (IMIS), Los Angeles, Minneapolis, New Jersey Turnpike, Tampa, San Diego, Seattle, Virginia (northern), etc.).

AIS Planning for Texas Freeways

The plans for AIS implementation and operation in Houston, San Antonio, Dallas and El Paso were discussed in Chapter 2. In addition to these cities in Texas, plans are underway to install AISs in freeway corridors in Fort Worth.

AIS Potential for Long Island, New York IMIS Freeways

The Integrated Motorist Information System (IMIS) is installed in the Northern Long Island Corridor which is served by two major east/west roadways--the Long Island Expressway (I-495) and the Northern State/ Grand Central Parkway combination. This latter roadway changes name from Northern State Parkway in Suffolk and Nassau Counties to Grand Central Parkway to the west as it enters New York City. The corridor, approximately 35 miles (56 km) in length and 5 miles (8 km) in width, includes portions of three major counties in the metropolitan New York area--Queens (a portion of New York City), Nassau and Suffolk.

The system was designed to meet a number of goals, including the following:

1. Reduced energy consumption,
2. Decreased and more predictable travel time,
3. Reduced accident rate,
4. Reduced time of detection and removal

of capacity reducing incidents,

5. Improved throughput, and

6. Reduced air pollution.

IMIS is one of the most sophisticated electronic traffic surveillance and control systems in the United States. Freeway incident management is one of the prime features of IMIS. The capability of detecting incidents electronically with over 2,000 traffic sensors installed in the pavement throughout the corridor in combination with 1) the anticipated rapid response by police and emergency vehicles and 2) rapid removal of vehicles from the traveled lanes and shoulders, will result in a freeway incident management system that will surely help meet the goals of IMIS.

The use of AISs in the corridor could result in more benefits by removing the affected vehicles off the roadway to locations out of view of expressway and parkway motorists. Because of the extremely high traffic volumes in the corridor, the congestion that results when an accident occurs and when the accident vehicles and police are on the shoulder is substantial. Therefore when AISs are used, the benefits in terms of reduced delay and secondary accidents, improved throughput, reduced energy consumption and air pollution, can be very significant.

The electronic surveillance system can be helpful in assessing some of the benefits both before and after AISs are installed. The impacts of incidents can be determined by measuring traffic characteristics 1) during normal conditions, 2) while the accident vehicles are on the traveled lanes, 3) while accident vehicles are on the shoulder, and 4) after the vehicles are moved to an AIS.

There are indications that police at some locations in the corridor are already moving accident vehicles from the roadway to off-roadway sites in order to conduct accident investigations. An AIS system would broaden and formalize the procedure.

Location of AIS

Exit ramps on the Long Island Expressway and the Northern State/Grand Central Parkway are approximately one mile apart, making access to potential AISs at one-mile intervals. Although Expressway and Parkway egress may not present a problem, limitations on space in some of the areas may not allow the agencies to install an AIS near every exit. However, although space may not be available in all sections of the Expressway, frontage roads, park & ride lots, and two rest areas are available where AISs could be located; In contrast, the Parkway does not have as many places for implementation.

Moving Disabled Vehicles Off the Traveled Way

Nassau County police have special push-bumpers and are under orders to move disabled vehicles. Nassau police push vehicles off the traveled way; private tow companies do the rest. The county has service patrols and special tow trucks that can be used if needed.

The New York DOT at the present time has towing franchises for the parkways and is working toward a private franchised tow company because they can be regulated by the DOT.

Moving Vehicles Off Traveled Way Prior To Police Arrival

New York State law requires motorists involved in an accident to stop immediately at the scene, or as close to the scene as possible without obstructing the flow of traffic, and to exchange information (e.g., names, addresses, drivers' license numbers, and vehicle registration numbers)(23).

The primary source of information for New York motorists of the correct actions to take following an accident is the New York State Driver's Manual which is used in preparation for the written portion of the driver's license examination. A major problem with the current approach of informing the public is that most motorists took the examination for the driver's license several years ago and do not know current policy. For the IMIS corridor operational plan to encourage motorists involved in PDO accidents to move their vehicles off the expressway or parkway lanes before the police arrive, improved information and procedures could be developed to inform or remind motorists of the proper actions. The electronic

changeable message signs at frequent intervals could be used to inform motorists of the AIS system.

Information could explain both the legal and insurance rights and obligations of motorists. It would be desirable to solicit the support and assistance of insurance companies to dispel uncertainty motorists have regarding moving vehicles off the lanes following PDO accidents.

AIS Potential for Northern Virginia Routes I-66 and I-395

The northern Virginia system is also one of the most sophisticated electronic traffic surveillance and control systems in the United States. AISs in the freeway corridors could result in additional benefits at relatively low cost. In contrast to most other electronic surveillance systems, the northern Virginia system has closed circuit television (CCTV) which allows control center observers to rapidly identify the extent of the incident and the needed emergency services. Thus, incidents can be removed much faster than at locations where CCTV is not used. With the capability for rapid detection, validation and assessment of incidents, freeway operations could be enhanced even further by having AISs strategically located where the accident vehicles can be moved following rapid response to the accidents.

The combination of electronic and CCTV surveillance in the northern Virginia freeway corridors also makes these corridors prime locations for 1) studying the effects of lane blockages caused by accidents on the traveled way, 2) studying the effects of accidents when the accident investigations are conducted while the vehicles are on the shoulder, 3) determining the cost/effectiveness of AISs, and 4) verifying the frequency of use of AISs.

Moving Vehicles Off The Traveled Way Prior To Police Arrival

Virginia State law (Statute 46.1-176) requires motorists involved in PDO or other types of accidents to stop near the scene of the accident without obstructing traffic (24).

> The driver of any vehicle involved in an accident in which a person is killed or injured or in which an attended vehicle or other attended property is damaged shall immediately stop as close to the scene of the accident as possible without obstructing traffic and report forthwith to the state police or local police authority and, in addition, to the person struck and injured if such person appears to be capable of understanding and retaining the information, or to the driver or some other occupant of the vehicle collided with or to the custodian of other damaged property, his name, address, driver's license number and the registration number of his vehicle.

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TEXAS HIGHWAY DEPARTMENT
CITY OF HOUSTON
TEXAS TRANSPORTATION INSTITUTE
PROJECT
139

LOCATIONS OF ACCIDENT INVESTIGATION SITES

IH-45
(GULF FREEWAY)
Dowling Street to Broadway

LEGEND

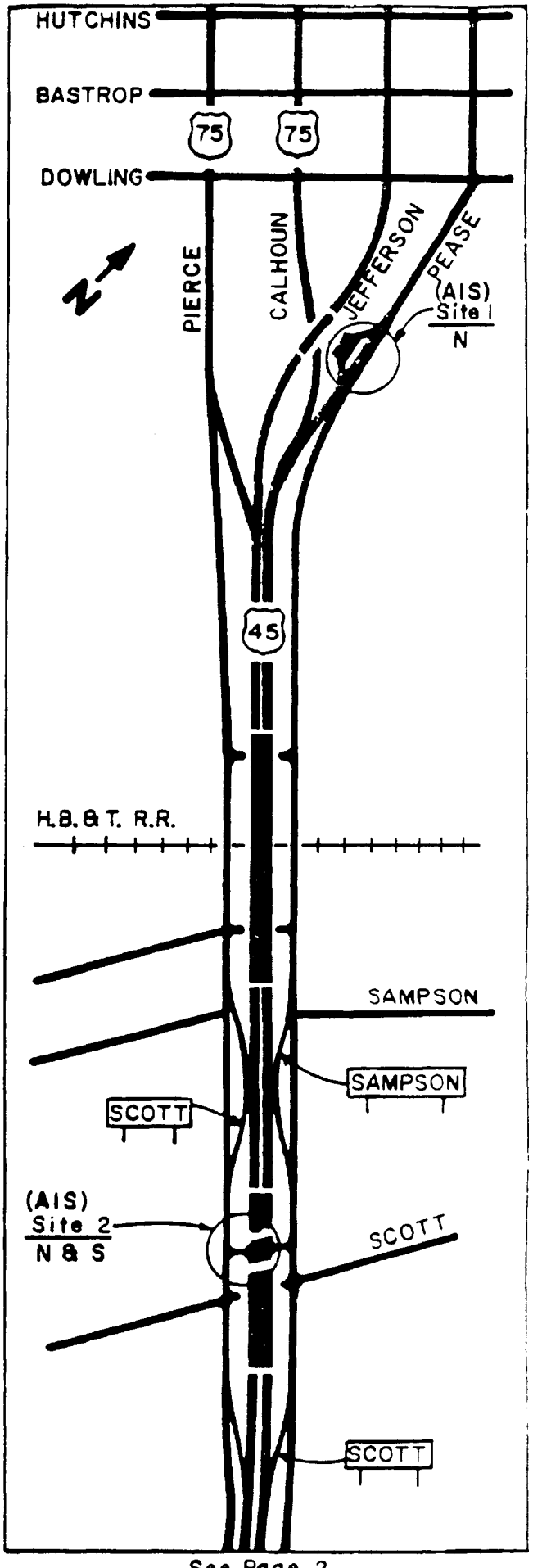
Accident Investigation Site

N—Accessable North Bound
S—Accessable South Bound
N & S — Accessable North & South Bound

Note:

Sites 2,3,5,6,11,12 & 13
Located Under Structures

Sites 1,4,7,8,9,10,14,15 & 16
Located on City Streets
Adjacent to Freeway



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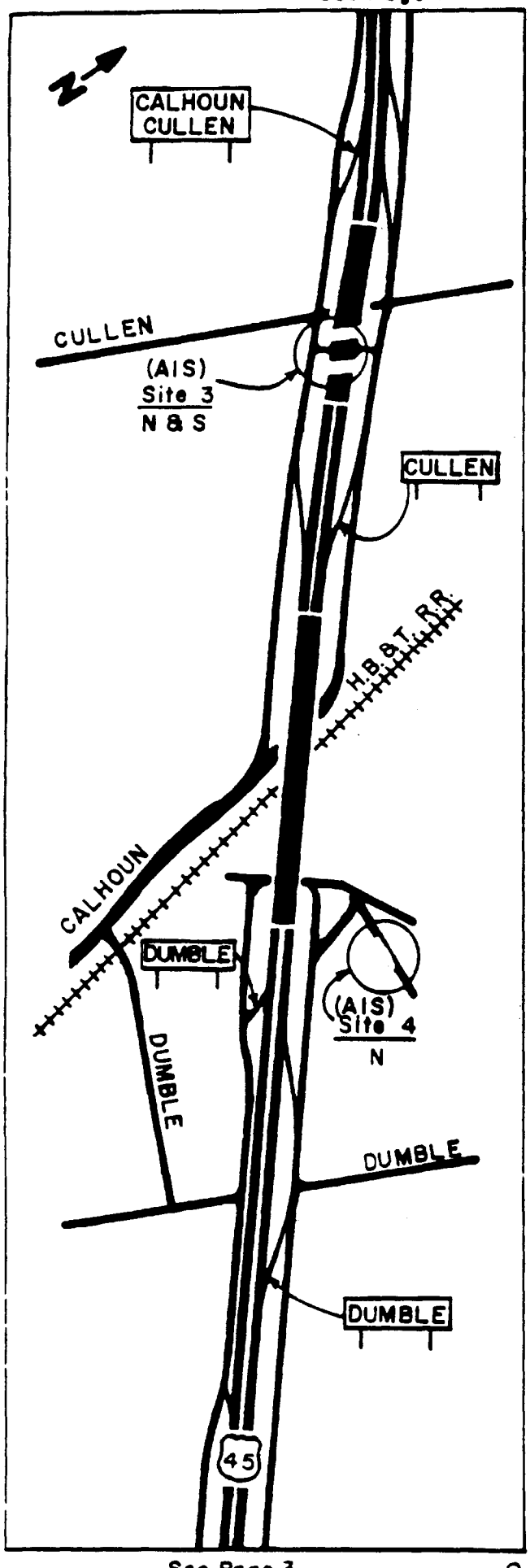

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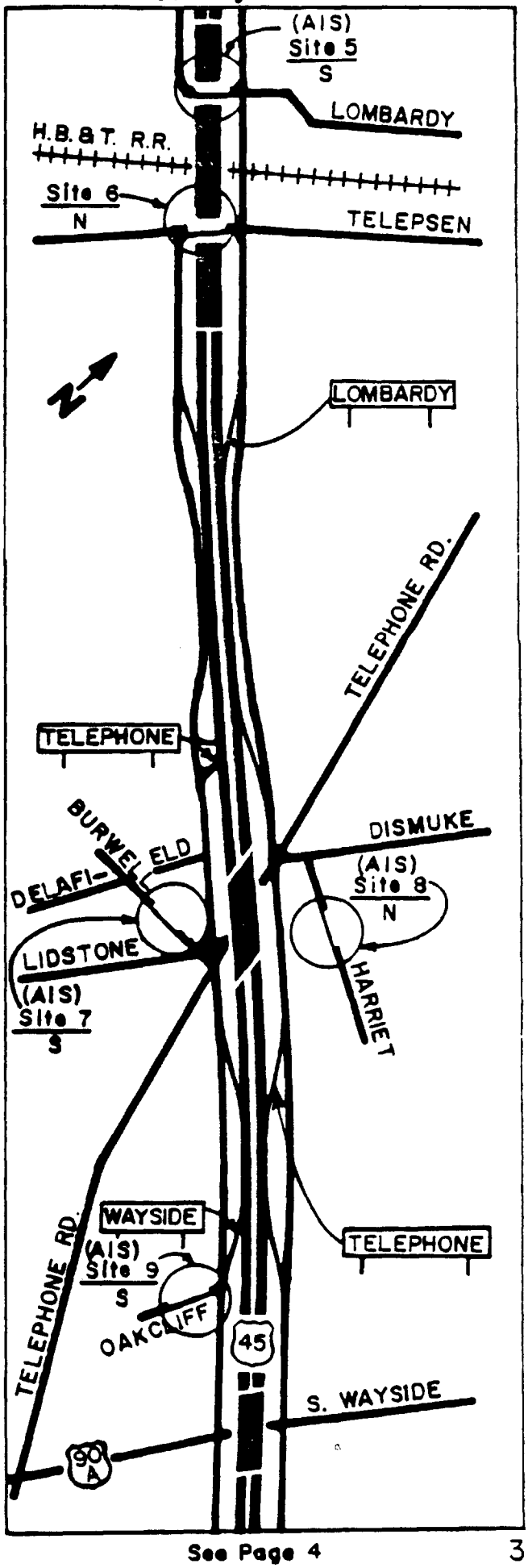

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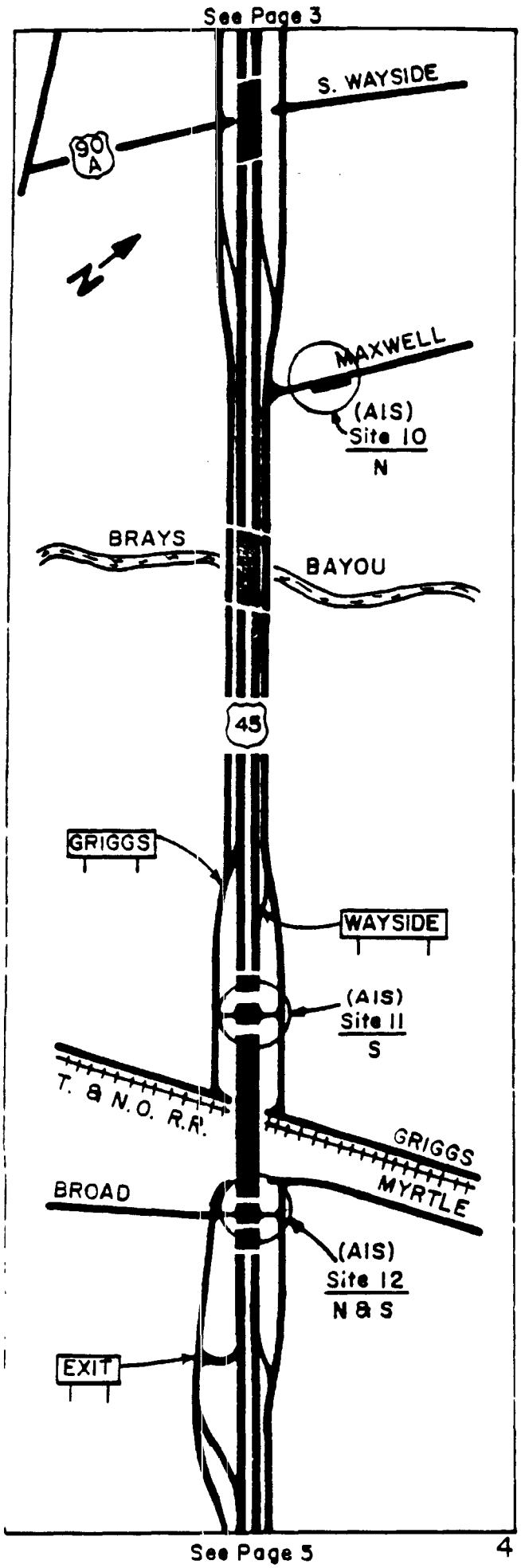
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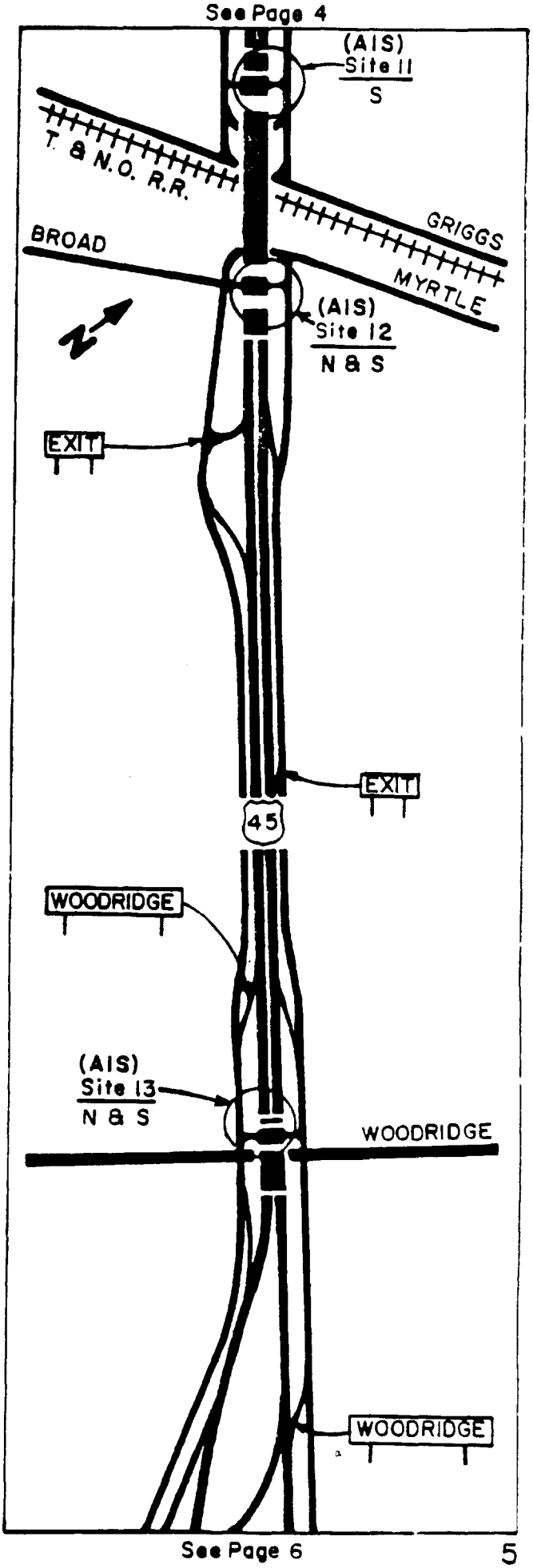
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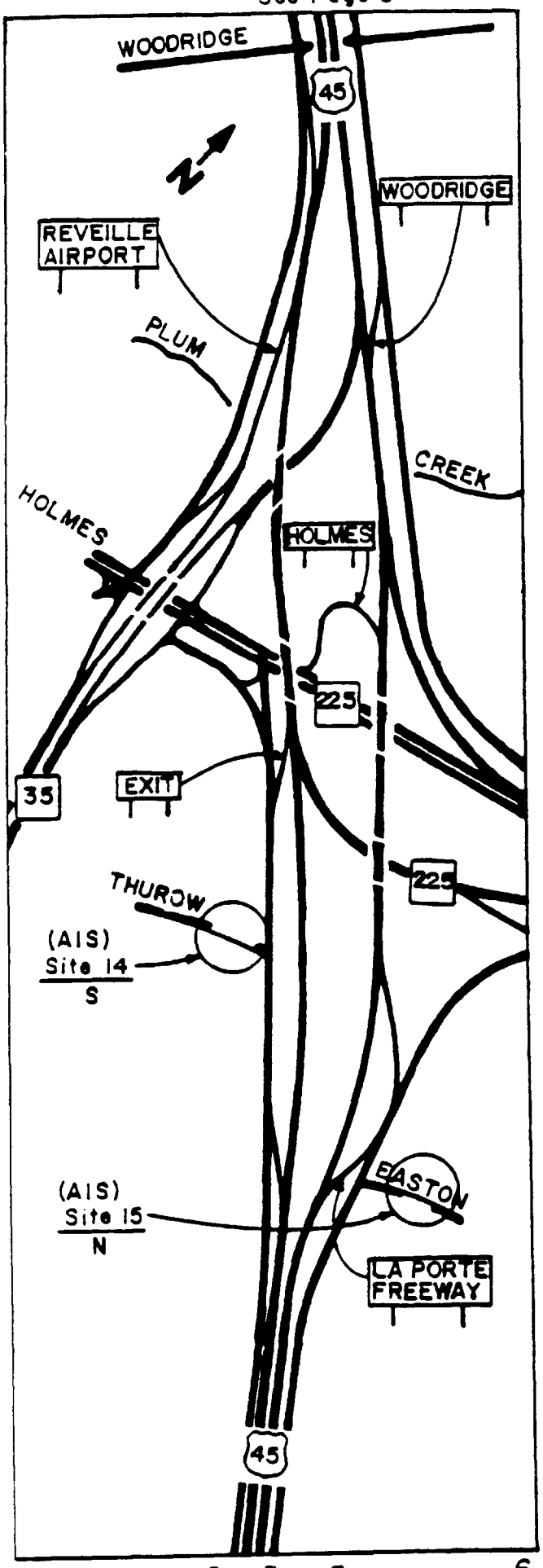

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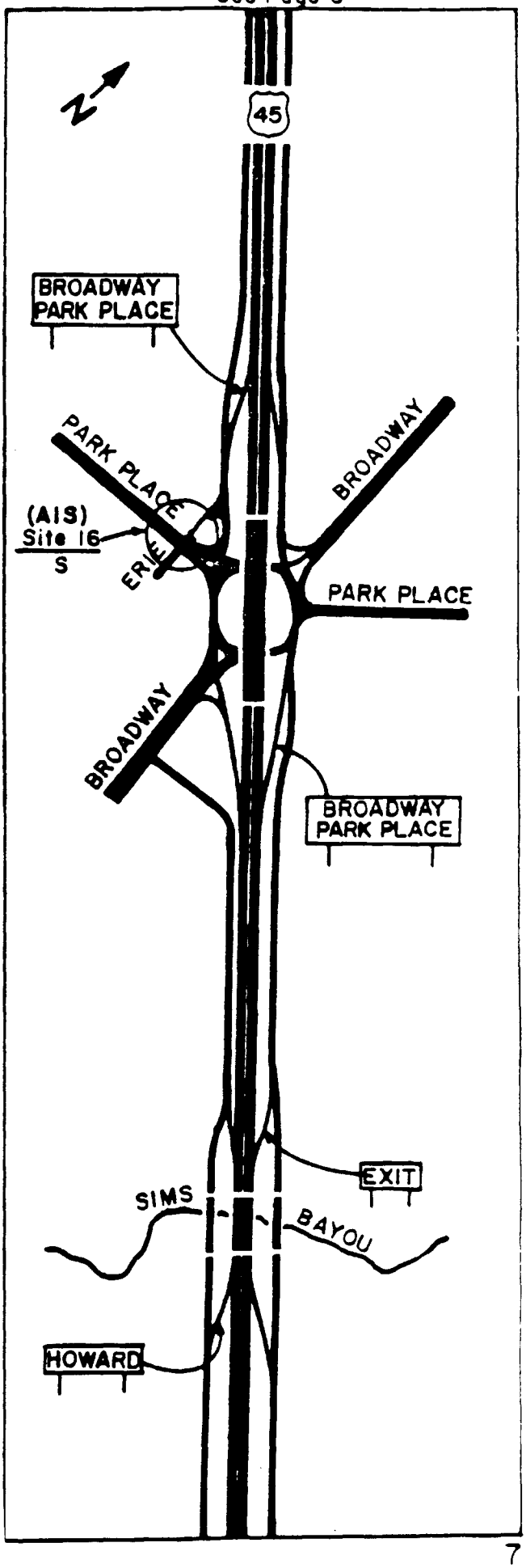

APPENDIX B
HOUSTON POLICE DEPARTMENT
SUPPLEMENTAL FREEWAY ACCIDENT
REPORT FORM

Complete For ALL accidents Investigated On Freeways

1. Freeway (name)_____

2. Date_____ Time _____ AM_____ PM_____

3. Accident Investigation Site No. _____ (if used)

4. Approximate Location of Accident: Block No. _____

5. Location of Investigation

_____ Shoulder	_____ Accident Investigation Site
_____ Frontage Road	_____ Median
_____ City Street	_____ Other _____

6. In View of Traffic?

_____ Yes _____ No

7. How Long Did Investigation Take?

_____ Minutes

8. Remarks _____

Signed _____

Investigating Officer

APPENDIX C
ARITHMETIC PROCEDURE FOR ESTIMATING DELAYS DUE TO AN INCIDENT

Scenario:

Demand Volumes: 7:00-7:50 a.m. = 5660 vph
7:50-9:00 a.m. = 3000 vph
Incident Capacity = 2830 vph
Normal Capacity = 5660 vph

Accident occurs at 7:00; Moved to AIS at 7:20

Time Beg.	Time end	Demand Volume (Veh/Min)	Actual Volume (Veh/Min)	Number of Veh Stored	Cumulative Number of Veh Stored
7.00	7.01	94	47	47	47
7.01	7.02	94	47	47	94
7.02	7.03	94	47	47	142
7.03	7.04	94	47	47	189
7.04	7.05	94	47	47	236
7.05	7.06	94	47	47	283
7.06	7.07	94	47	47	330
7.07	7.08	94	47	47	377
7.08	7.09	94	47	47	425
7.09	7.10	94	47	47	472
7.10	7.11	94	47	47	519
7.11	7.12	94	47	47	566
7.12	7.13	94	47	47	613
7.13	7.14	94	47	47	660
7.14	7.15	94	47	47	708
7.15	7.16	94	47	47	755
7.16	7.17	94	47	47	802
7.17	7.18	94	47	47	849
7.18	7.19	94	47	47	896
7.19	7.20	94	47	47	943
7.20	7.21	94	94	0	943
7.21	7.22	94	94	0	943
7.22	7.23	94	94	0	943
7.23	7.24	94	94	0	943
7.24	7.25	94	94	0	943
7.25	7.26	94	94	0	943
7.26	7.27	94	94	0	943
7.27	7.28	94	94	0	943
7.28	7.29	94	94	0	943
7.29	7.30	94	94	0	943
7.30	7.31	94	94	0	943
7.31	7.32	94	94	0	943
7.32	7.33	94	94	0	943
7.33	7.34	94	94	0	943
7.34	7.35	94	94	0	943

7.35	7.36	94	94	0	943
7.36	7.37	94	94	0	943
7.37	7.38	94	94	0	943
7.38	7.39	94	94	0	943
7.39	7.40	94	94	0	943
7.40	7.41	94	94	0	943
7.41	7.42	94	94	0	943
7.42	7.43	94	94	0	943
7.43	7.44	94	94	0	943
7.44	7.45	94	94	0	943
7.45	7.46	94	94	0	943
7.46	7.47	94	94	0	943
7.47	7.48	94	94	0	943
7.48	7.49	94	94	0	943
7.49	7.50	94	94	0	943
7.50	7.51	50	94	-44	899
7.51	7.52	50	94	-44	855
7.52	7.53	50	94	-44	811
7.53	7.54	50	94	-44	767
7.54	7.55	50	94	-44	723
7.55	7.56	50	94	-44	679
7.56	7.57	50	94	-44	635
7.57	7.58	50	94	-44	591
7.58	7.59	50	94	-44	547
7.59	8.00	50	94	-44	503
8.00	8.01	50	94	-44	459
8.01	8.02	50	94	-44	415
8.02	8.03	50	94	-44	371
8.03	8.04	50	94	-44	327
8.04	8.05	50	94	-44	283
8.05	8.06	50	94	-44	239
8.06	8.07	50	94	-44	195
8.07	8.08	50	94	-44	151
8.08	8.09	50	94	-44	107
8.09	8.10	50	94	-44	63
8.10	8.11	50	94	-44	19
8.11	8.12	50	69	-19	0
8.12	8.13	50	50	0	0
8.13	8.14	50	50	0	0
8.14	8.15	50	50	0	0
8.15	8.16	50	50	0	0
8.16	8.17	50	50	0	0
8.17	8.18	50	50	0	0
8.18	8.19	50	50	0	0
8.19	8.20	50	50	0	0

Vehicle-Minutes = 47807
Vehicle-Hours = 797

APPENDIX D
FEEDBACK AND MONITORING AIS SYSTEMS

To determine the effectiveness and benefits of the AIS systems, there are needs for information of the frequency and rate of usage of the sites. The police who respond to accident scenes are the best source for this information. Although police in general and accident investigators in particular are opposed to the addition of any additional paperwork,a brief form can be devised that should take no more than 2 or 3 minutes to complete. The form used for the Houston Surveillance Project was shown in Appendix B. It is important that each patrol vehicle be supplied with the forms. These forms may be combined with the booklet and maps that are provided to the police to explain the location and use of the AIS system.

The completed forms should be collected by the AIS manager at frequent intervals and the results reviewed with the supervisor of the traffic investigation section. To obtain information on the rate of usage, the number of total accidents in the same area as the AIS must be obtained. For those systems that attempt to get the motorists to voluntarily move from the freeway to the AIS prior to notifying the police, the remarks section should include the responses of the public as to their reasons for moving or not moving to the AIS system.

These forms will also be helpful in monitoring the operations of the police investigators and determining their reasons for not using the AIS system. The most common reasons cited by the field investigators are:

1. The length of investigation was too short to justify moving the vehicles.

2. Under the prevailing conditions, the officer determined that the investigation could more safely be conducted adjacent to the freeway mainlanes.

3. The accident investigator forgot about the AIS system, or did not know where the nearest site was located.

Most of these reasons can and should be answered by the supervisor of the accident investigators. First, there should be no investigation that is too short that it should not be removed from the freeway and freeway shoulder as soon as possible. Second, the AIS systems major advantage is to put the officer and motorists into safer situations than the area adjacent to the moving lanes of a freeway. Third, the purposes of the signs, bulletins and maps are to remind the police of the location of the sites. Frequent reminders to new and old investigators could be provided in various forms.

An alternative to the special short form for recording AIS usage would be to use the normal accident report form for the inclusion of statements on the potential use of an AIS site. If the report form can be modified to include a

specific question concerning AIS usage, this would provide a constant reminder to the investigator of the system. In the absence of a modified form, investigators could be directed to include the required information in the remarks section on location of the accident, a statement of the use or non use of the AIS system. This second approach will not be as successful as the use of the special form because it does not immediately call attention to the need for using the AIS system.

A third method for monitoring the use of the AIS system would be to use personal contacts with the officers involved with accident investigation and to use an interview method at frequent intervals to obtain the information. This is obviously less desirable for several reasons, but often it is the only method to get information.

To get the public to use the AIS system prior to the arrival of the police investigator, they must be informed of the system and the actions that they should take. Most of the projects issue news releases when the systems are first opened. However, project personnel oftentimes fail to follow up with subsequent public relations actions to remind the public of the use and benefits of the AIS system. An example of a news release is shown in Appendix E.

APPENDIX E
NEWS RELEASE

The Texas Highway Department in cooperation with the City of Houston Police Department and the Department of Traffic and Transportation recently constructed 16 sites along a section of the Gulf Freeway for accident investigation purposes. These sites, constructed along the freeway between Dowling Street and Broadway Boulevard, are to be placed into operation by the Houston Police Department on Monday, June 12, 1971.

Studies conducted by the Texas Transportation Institute and the Highway Department have indicated that an average minor accident on Freeways directly affects traffic for some 41 minutes. The removal of an accident to a location out of view of the freeway would have the net effect of screening the accident and removing the "gapers block" for an average of 25 minutes. This in turn would result in renewed flow on the freeway and reduced secondary collisions.

The Police Department advises that motorists involved in minor accidents where their cars are driveable should move to one of these sites before calling the police. The sites, accessible from the frontage roads, are marked by blue signs and are constructed under grade separations or on existing city streets.

By quick removal of the accident to these sites, traffic flow along the freeway can recover, minimizing the usual stop-and-go operation on the freeway.

The City of Houston and the Texas Highway Department solicit your cooperation in the use of these sites. The sites, now termed experimental, will become permanent and expanded if good results are obtained.