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16. Abstract A two year study to develop guidelines to respond to major freeway incidents was conducted for the Texas Department of Transportation. The objective of this study was to establish guidelines to be applied statewide in large and small cities for the preparation of an incident management plan or the improvement of an existing incident management plan. This manual is intended to be used as a resource document for transportation related agencies responding to roadway incidents in Texas. In addition, appropriate steps are outlined for effective interagency communication and cooperation in incident response. Guideline results for traffic management response to major freeway incidents were established. These results were used to develop incident management plan guidelines for the Houston, Austin, and Beaumont areas of Texas. Evaluation of these case studies by their respective Traffic Management Teams are documented in this report.					
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**TRAFFIC MANAGEMENT
IN RESPONSE TO MAJOR FREEWAY INCIDENTS, VOLUME II**

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TEXAS TRANSPORTATION INSTITUTE
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College Station, Texas 77843-3135



IMPLEMENTATION STATEMENT

This study is sponsored by the Texas Department of Transportation. The major objective of the study is to develop guidelines that can be applied statewide in large and small cities for the preparation of an incident management plan or the improvement of an existing incident management plan. These guidelines were utilized in the development and evaluation of incident response plans for three Texas cities which are included in appendices to this report.



DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the official views of the Federal Highway Administration or the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. The engineer in charge of the project was Michael A. Ogden, P.E. #77485.

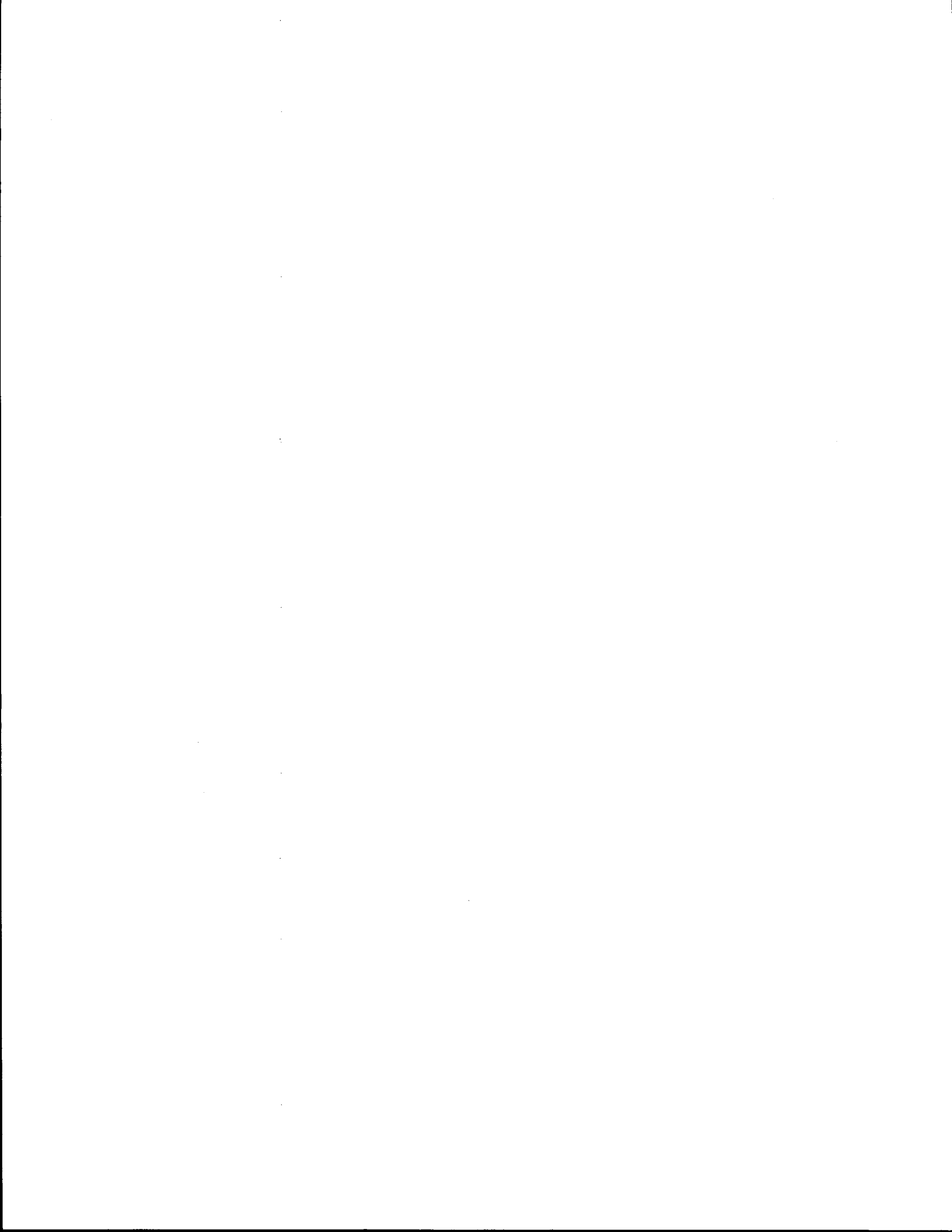


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SUMMARY

Travel demands for trucks and automobiles continue to increase while the rate of expansion of the roadway networks decreases. While the rate of incidents may stay constant or, in some cases, even fall, the number of incidents and their impact on mobility and safety will multiply with the increased demands, particularly in urban areas. The safety of the roadway is related to incidents and dependent on their frequency and length of time that they affect traffic operations. The significance of this work is the fact that there exists today the facilities, the equipment, and knowledge to improve incident management. Incident management is a complex problem because it involves many different agencies. Incidents cannot be easily predicted. Likewise, the location and severity can not be known until information is transmitted from the incident scene. However, there are better means of communication to employ quicker procedures for clearing a roadway and a more effective means of controlling traffic approaching an incident. What is needed is a plan to improve the overall response to incidents and commitments on the part of the agencies and the persons involved in incident management to implement the plan. However, it is not realistic to expect that one plan will apply equally well to every area. Therefore, the design of this study will provide guidelines for the development of plans by the local agencies.

The objective of the study is to develop guidelines that can be applied statewide in large and small cities, in Texas, for the preparation of an incident management plan or the improvement of an existing incident management plan. Likewise, three incident management plan case studies are to be developed for three urban areas in Texas (i.e., small, medium, and large areas).

Early research efforts have been focused on recommendations of incident management procedures or quantifying impacts of incidents (i.e., delay or congestion impacts of incidents). In addition, limited documentation and/or evaluation on the development and implementation of an incident management plan for a given area is available.

Two questionnaires were developed to investigate the state-of-practice and incident response criteria throughout Texas. These questionnaires were administered by phone.

An incident inventory and classification process was done to evaluate the historical data provided in the questionnaires. These included incident rates and incident characteristics (i.e., by frequency, time of day, severity, type, and duration).

Management and response requirements were also identified for detection, response, and clearance parameters. A framework (or flow-chart) was also developed to address these criteria for small, medium, and large urban areas in Texas.

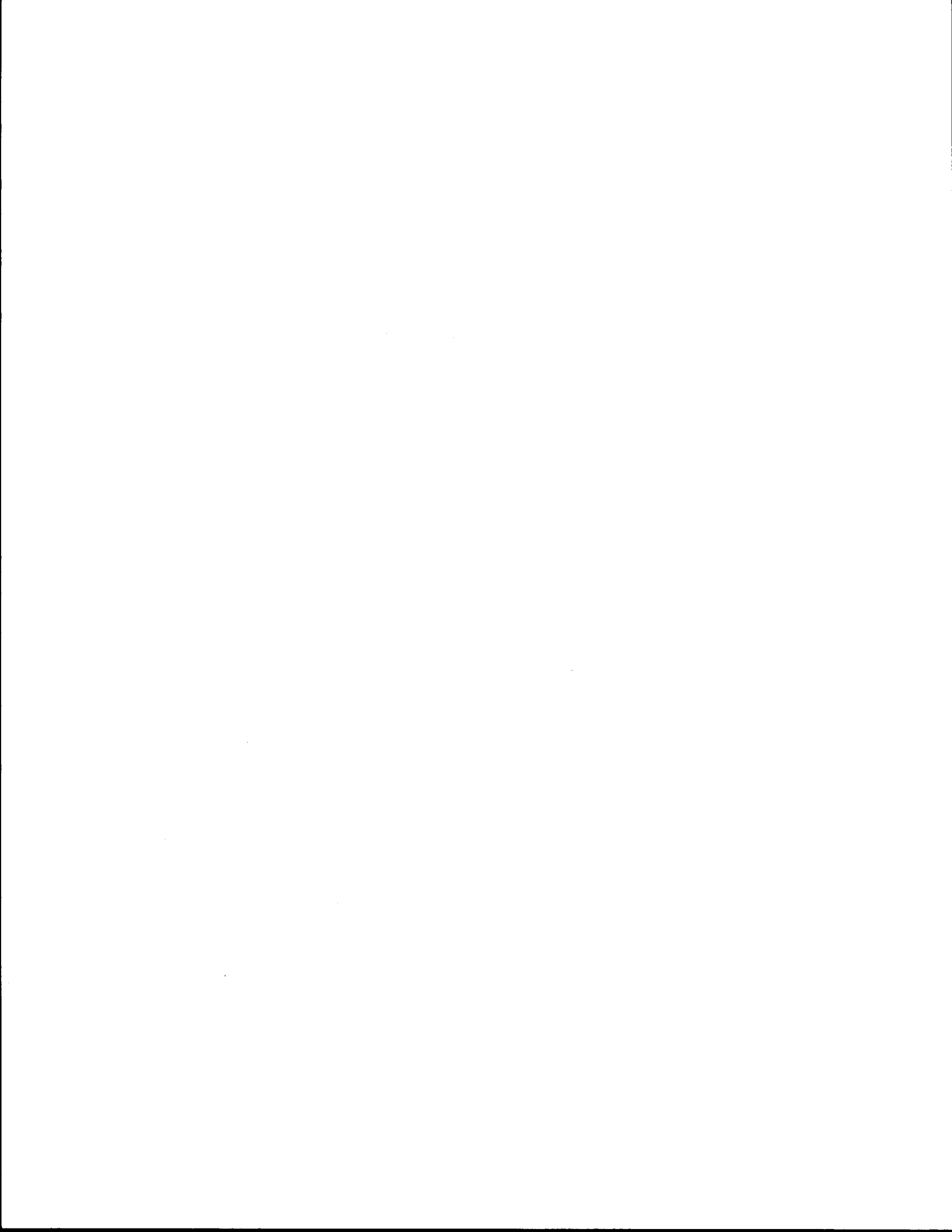
The application of advanced technologies for incident response were also investigated to cover: Geographic Information Systems, Total Stations, Automatic Vehicle Identification/Locator, Highway Advisory Radio, Closed Circuit Television, and Changeable Message Signs.

Guidelines for improvement of agency response to incidents were then developed based on the above mentioned information. Specific guidelines are suggested in the areas of incident pre-planning, classification structure, cooperative agreements, and communication protocols. A practical step-by-step process is also outlined for TxDOT response to an incident as well as the identification of documented incident data statistics by each agency for historical reference. Diversion strategies, vehicle/cargo removal policy, and agency training are also discussed.

These results were then utilized to develop Incident Management Plan Guidelines for the Houston, Austin, and Beaumont areas. These plans were evaluated by their local Traffic Management Teams. This report presents the results of this evaluation process.

APPENDIX A

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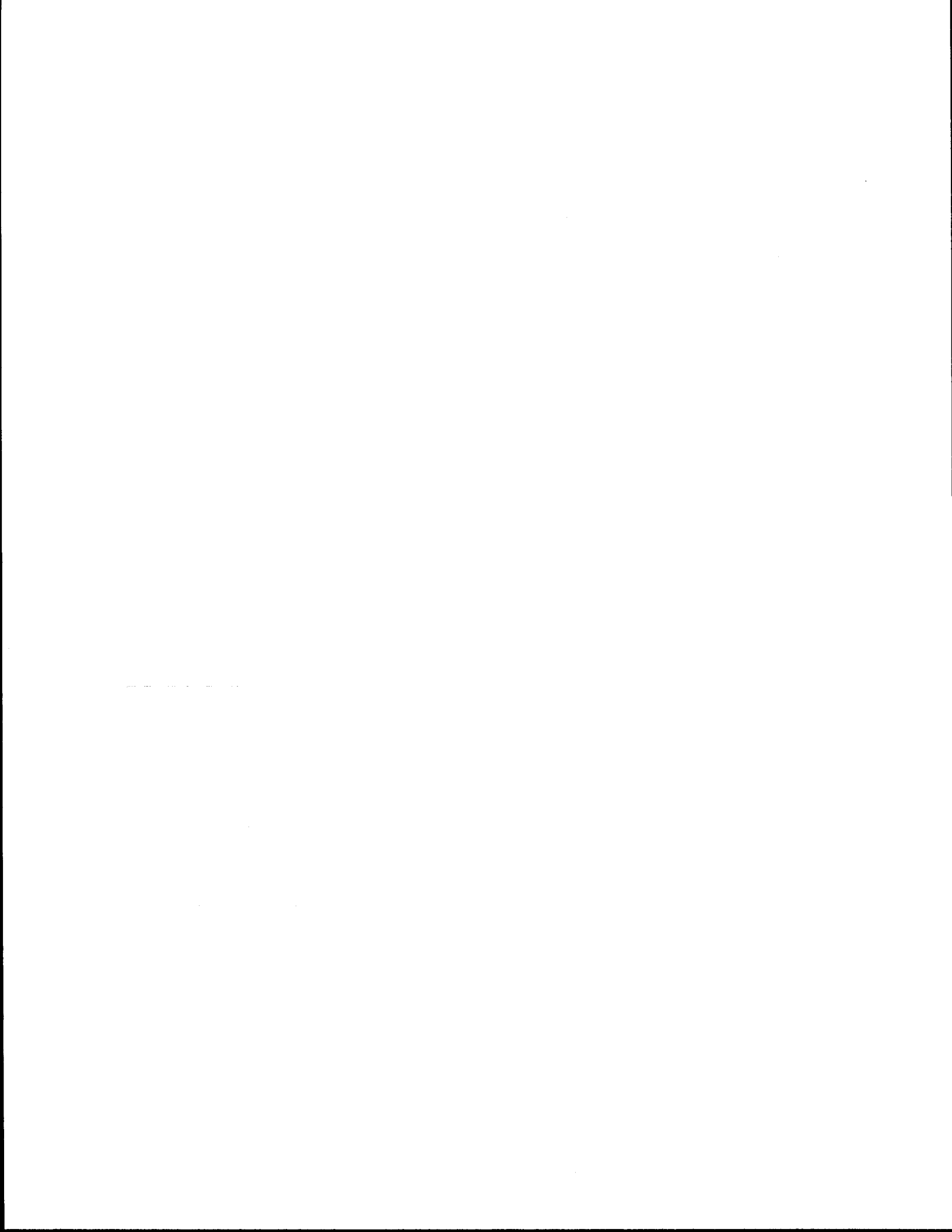
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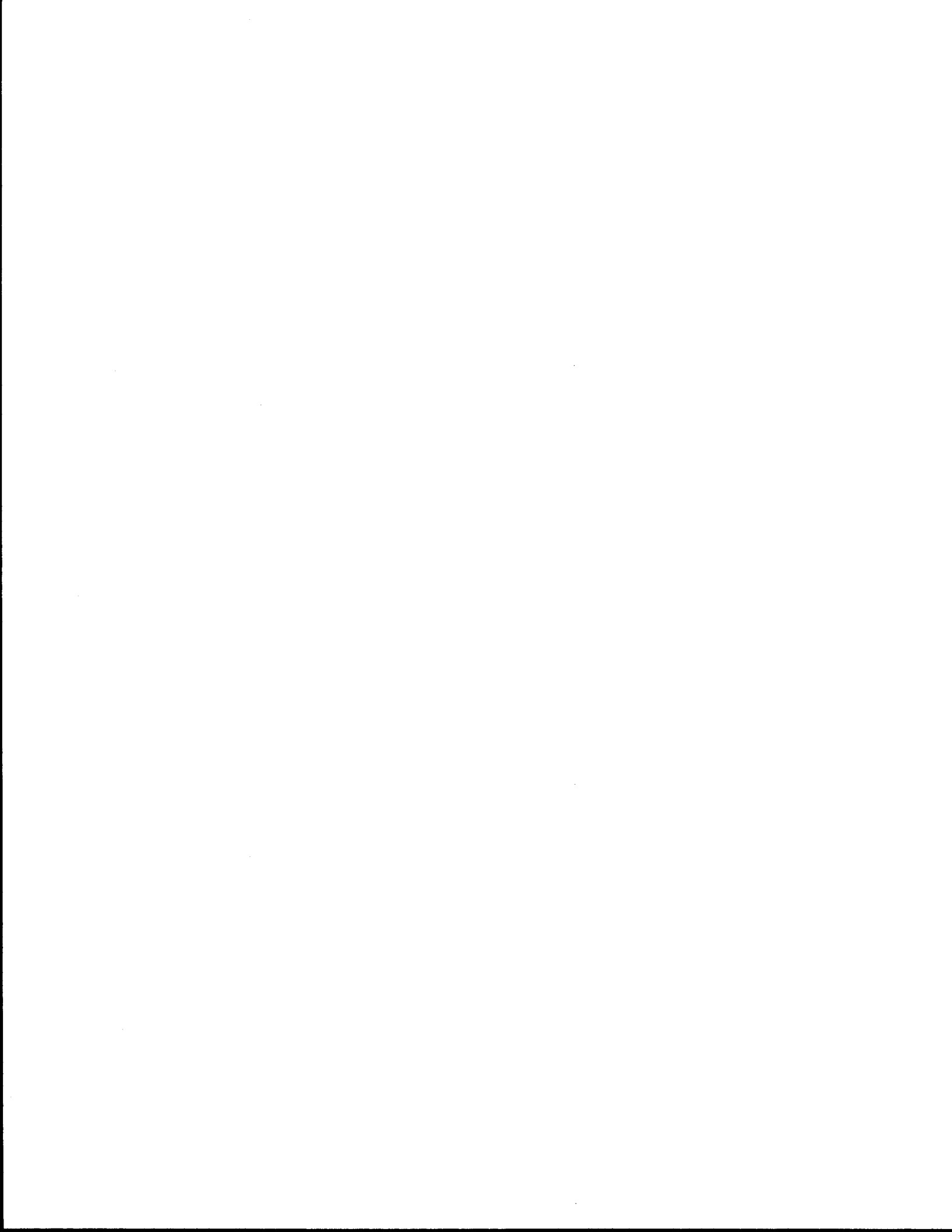
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APPENDIX B

Incident Response Questionnaire



El Paso

Fire Department

- 1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

Large trucks can be troublesome and time-consuming to clean up, but Lt. Fernandez of the Fire Department thinks El Paso does a good job of responding to incidents involving large trucks. Even hazardous materials do not pose a big threat due to their preparedness.

El Paso Towing and Wrecker Service has the current contract for incidents involving large trucks. They have multiple heavy-duty tow trucks that can respond as needed. Lt. Fernandez noted that this usually is not a problem, and recalled an incident involving two tractor-semitrailers and a passenger car that caused a fire upon impact. This tow service responded quickly and got it cleaned up in a short time. If, for some reason, this firm is tied up elsewhere when an incident occurs, the authorities can contact another tow service. The fire department owns its own tow truck also which can respond if needed, although it is usually reserved for the department's own vehicles. Lt. Fernandez did not know of any prequalification criteria that might be required of drivers and vehicles.

- 2. What types of problems exist in your area during incident response with respect to:**

Communications:

One of the problems encountered in El Paso in the initial notification process is erroneous information on the location of the incident. Fortunately, they often get multiple calls and even if information from one call is wrong other calls provide accurate information. The negative side of having a bad location is that a unit would be dispatched anyway when it might be needed elsewhere. Lt. Fernandez stated that this occurs as much as 30 percent of the time.

El Paso has problems with communications protocols, but it is expected to improve in the near future. Lt. Fernandez was not sure of the details of the new system which will be coming on-line, but it will allow several agencies to more easily be patched together during incidents. Their various systems currently have one channel which is set aside for this purpose, but connecting the various agencies appears to be a problem. The new system will not need to patch the various agencies together; it will have one channel dedicated for multi-agency communications.

Coordination:

No problems noted.

Control:

Who controls the scene at an incident? If hazardous materials are involved, the Fire Department controls the situation. Sometimes, depending on the situation, one agency will control until the responsible agency arrives. If police arrive first at a hazardous materials spill, they will control until the Fire Department arrives. For traffic control, the Police Department or Sheriff's Department is in charge, unless DPS needs to be called in.

Resource Management:

At one time, the Fire Department experienced problems when another agency was the first on the scene and misdiagnosed the need for a special piece of equipment. For example, they would notify the Fire Department that they needed to provide "jaws of life" to rescue someone from inside a vehicle. At that time, the Fire Department had only a few of these units and had to be careful not to send them out unless they were really needed. Providing the jaws where they were not really needed meant taking them out of service if another incident happened during that time period.

3. **How could you (your organization) improve the response techniques it currently has in place (specifics of self-improvement without any influence or changes by other organizations)?**

If I-10 has to be closed due to a hazardous materials spill, there is a parallel corridor called the Gateway for traffic diversion. According to Lt. Fernandez, there are no good staging areas near the freeway where dangerous trucks could be moved in order to resume traffic movement on I-10. As a general rule for non-hazardous materials, police get the vehicle moved as quickly as possible. It was not clear how aggressive these agencies have been in clearing the freeway, to compare them to, say, Ft. Worth.

4. **How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

One of the problems noted by Lt. Fernandez was that police and EMS use civilian dispatchers, and they might not be as efficient as one of the fire department lieutenants in putting together information about a particular incident.

5. **Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

N/A

6. **What types of incidents are the most difficult to deal with efficiently? Why?**

For some time, major fires were difficult because the other two major agencies did not support the Fire Department like they should have. Now, EMS stands by to assist if

a fireman needs special attention and police are likely to control people who might otherwise venture too close to the fire and interfere with the Fire Department.

One element which is different for the El Paso area is having Fort Bliss nearby. The city and the fort have a mutual aid agreement to assist each other when an incident occurs. The city usually gets a call from the fort immediately after military personnel hear about an incident. According to Lt. Fernandez, the military hazardous materials unit at Fort Bliss is very competent. According to Lt. Fernandez, freeways in El Paso are not equipped with electronic surveillance, communications, and control systems.

El Paso attempts to stay ready for incidents by having equipment and materials available when needed. Courtesy patrols are used to travel the freeways and provide motorist aid as needed. The El Paso City Street Department stores sand and keeps trucks loaded for the purpose of responding to incidents so that response time is reduced. They have a five-ton single unit truck as well as a tractor semitrailer which can be used for this purpose. They also have a front loader. In addition, the Fire Department keeps sandbags at their stations for use on hazardous materials spills if needed.

7. Current response time, is it acceptable?

The current Fire Department response time is three to five minutes. They have 55 seconds to clear the doors of their fire station; they are on the scene (anywhere in the city) within three minutes. To achieve this quick response, they have 27 fire stations throughout the city. By contrast, EMS has 10 units for the whole city. They require 10 to 27 minutes to get to the scene.

8. Cost (perceived and real) of incidents in your city?

No cost information available.

9. Political sensitivities which need to be considered?

Lt. Fernandez says there are the usual political sensitivities in El Paso such as each agency protecting its own "turf." A good example is the City of El Paso wants EMS under the control of the Fire Department, but EMS does not want this to happen. EMS wants to control hazardous materials, but the responding agency is the Fire Department by Federal edict. Also, the Police Department wants to control all its own communications, but they use civilian dispatchers. The Fire Department and EMS think their lieutenants can do a better job at dispatching than these civilians. There are power struggles in El Paso like in other cities, according to Lt. Fernandez

10. Budget which might be available for incident management?

No information available.

- 11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?**

Already discussed above.

- 12. Would you be able to attend a meeting of Incident Response professionals in Austin (possibly late 9/93) to discuss Incident Response Improvements state-wide?**

Someone involved in incident response would represent El Paso.

Contact: Lt. Fernandez
El Paso Fire Department
Telephone (915) 543-6186

Corpus Christi

1. **What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

No emphasis on any particular type of incident.

2. **What types of problems exist in your area during incident response with respect to:**

Communications:

Asst. Chief Bung stated that his 800 MHz trunk system is computer controlled which includes Fire Department, EMS, Police, and also regional transportation authority for communications with transit buses. The system also allows addition of other entities as they desire to join. For example, the Nueces County Sheriff's Department is coming on line soon; the Robstown Police Department is already on line, and some Constables are already on the system. Chief Bung mentioned that mutual aid can join the system also if they so desire. An example is DPS, which will be coming on line.

During a multi-response emergency, this system does a dynamic response grouping. The computer identifies responding units and generates a series of codes to put all included agencies on a common communications link. The police department has a van which becomes their command center and is linked to all participating agencies during an incident. Another communications system that is important in the Corpus Christi area is used by refineries to initiate communications regarding potentially hazardous situations. The police department convinced the refineries that it was in their best interest to join in this network. They still maintain their own inter-refinery communications network as well.

Chief Bung stated that when they purchased this system, it was state of the art. He still thinks it was a good investment and still serves their needs. Before this investment was made, their people talked to other knowledgeable people regarding which systems can perform desired functions. In their long-range plan, they intend to add tracking capabilities for member units to determine which units should respond and, in some cases, areas for some units to avoid (e.g., release of toxic materials).

When a 911 call comes into the police department switchboard, the response is based on the specific geographic area where the call originated. If it is within the city, the call goes to the police communications center. If it is in Nueces County, it goes to the Nueces County Communications Center. Refineries also call the appropriate center when there is a potential need. On the morning of this conversation, a refinery had a problem in a system which was imbalanced, so they decided to flare the gas. To alert the police (and local residents), they called in and told police what they planned to do. The message was that there was no problem but just to let the police know in case there were calls or complaints from local residents or passers-by. He admitted

that refineries notify police more often than they have to, but this errs on the conservative side and is desirable.

Mr. Taylor of EMS commented that communications are not a problem from his perspective.

Coordination:

Interagency communications are not a problem during the initial notification of an incident. It is apparent from Cmdr. Dickson's comments that calls regarding incidents are funneled through the Police Department's headquarters for police, fire, hazmats, and EMS. This is an 800 MHz system designed for use by all of these agencies.

Control:

The responsible agency at an incident scene is the Fire Department if a hazardous material is involved. Otherwise, it is the police department. The Fire Department would decide evacuation needs and extent. Police would carry out the evacuation.

TxDOT is strictly prohibited from getting involved in a hazmats spill unless it is a simple (rare) case of being at a scene when the incident occurs and TxDOT personnel have equipment immediately available to contain the spill. When the Fire Department arrives, they take charge of the incident scene when it involves hazardous materials. Then TxDOT moves aside.

Resource Management:

No particular problems noted.

3. How could you (your organization) improve the response techniques it currently has in place (specifics of self-improvement without any influence or changes by other organizations)?

Mr. Stringer of TxDOT has just finished a draft incident response plan; TxDOT is now awaiting editorial comments and input from the various agencies involved in response to incidents.

Another future agenda item is proposed chemical routes around the city. The goal of this ordinance will be to keep hazardous materials out of populated areas as much as possible. Currently, the main routes are not through populated areas, but a few are.

Commander Sullivan could not think of any major problems which need to be addressed to improve incident response. Because of their refinery operations in and near Corpus Christi, they are aware of the need and respond to the need for training on hazardous materials spills. They have worked closely with refineries to identify special needs and being prepared for emergencies. The City Police have one individual (Asst. Chief Bung) who responds to incidents to identify any hazardous

material. Chief Bung is preparing a manual that will help other police officers do the same thing and more. They anticipate placing a condensed version of the manual in each patrol vehicle to aid in the identification process.

Mr. Taylor of EMS stated that they are in the process of upgrading their equipment and are involved in training on new equipment. Otherwise, he thinks their situation is good and that they are very responsive to the demands placed on them. There has been some talk of changing to a 24-hour a day operation, but he did not say whether he thought that would become reality.

4. How could other organizations involved in incident management improve their response techniques to improve your organization's response?

None of the agencies in Corpus Christi keep sand loaded in case of chemical spills, but sand is readily available from the City Street Division or from TxDOT. This has never been a problem, according to incident response personnel. In some cases of crankcase oil spills, they are able to use a 100-pound bag of absorbent materials carried in some patrol cars for this purpose. According to Mr. Stringer of TxDOT, the district office is centrally located so response times are not lengthy. If the city needs materials, they simply contact TxDOT employees and ask for it. The maintenance foreman would normally be contacted first, but others might include the Resident Engineer and Traffic Signal Foreman. Other agencies that get involved are the State Division of Emergency Management and the local office of the Texas Water Commission.

5. Comments on the "Incident Management Framework (Decision Tree)" if applicable?

Not applicable.

6. What types of incidents are the most difficult to deal with efficiently? Why?

A concern that Commander Sullivan has involves the offloading of large tanker trailers after they have overturned. Sometimes, they cannot right the vehicle until it has been offloaded. In some cases, an explosion potential exists, and in other instances, a toxic gas release might be imminent. In one example involving propane, the offloading took 10 hours to complete. The special equipment required to remove the propane had to come out of Houston; this took 4 hours. Then, the offloading took 6 more hours to complete. He would like to purchase special equipment to save at least the four hours that is required to get the equipment from Houston. These trailers are equipped with a safety system that will only allow a very slow transfer of materials.

When heavy-duty tow trucks are needed, as sometimes happens for large tractor-semitrailers, there is a rotation list of approved operators. Actually, there are only three operators in the CC area who have large tow trucks. Sometimes, even these are

not sufficient to retrieve large trucks. In that case, larger cranes such as those used for construction purposes are called in.

None of the situations faced by EMS are any more problematic than others. They do, however, approach some chemicals with more caution than others.

7. Current response time, is it acceptable?

Response times for EMS are simply a function of distance; there appears to be little opportunity for improving response time.

8. Cost (perceived and real) of incidents in your city?

Cost information was not available.

9. Political sensitivities which need to be considered?

There are apparently few political sensitivities according to EMS personnel other than those found in any city of this size.

10. Budget which might be available for incident management?

Not provided.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

None mentioned other than those provided above.

12. Would you be able to attend a meeting of Incident Response professionals in Austin (possibly late 9/93) to discuss Incident Response Improvements state-wide?

Not asked.

Contacts:

John Stringer
TxDOT
TeXan 827-2225

Commander Don Dickson	Bill Taylor
Assistant Chief K.A. Bung	EMS Director
Corpus Christi Police Department	(512) 886-5228
(512) 886-2605.	

Ft. Worth

- 1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

Cleaning up a spilled load from an overturned tractor-semitrailer vehicle is often the most time consuming, although Ft. Worth is very aggressive in clearing the roadway to get traffic moving again. For returning overturned tractor-semitrailers to their upright position, there are three companies in Ft. Worth with air bags.

- 2. What types of problems exist in your area during incident response with respect to:**

Communications:

One of the big concerns Mr. Howard Hill currently has regarding incident response is communications with the Ft. Worth Police Department. They recently changed their radio system, but have not provided any radios to TxDOT, according to Mr. Hill. The new radios cost \$4,000 each. Mr. Hill needs two mobile units and two hand-held units. When asked why the FWPD changed their radios, Mr. Hill simply replied that these are upgraded units compared to the old units. Mr. Hill was confident that if TxDOT had the new radios, that they could provide significant support by being on the scene sooner. However, he said the Ft. Worth Police Department "Front Office" would not supply them.

Coordination:

In 99% of cases in Ft. Worth, notification occurs by 911 calls. The call goes directly to police dispatch who then calls EMS and the Fire Department, if necessary. If TxDOT knows about the incident, they also move immediately. If Howard Hill of TxDOT knows enough about the incident, he will immediately dispatch equipment to the scene even before he arrives to determine the need. Some of the police officers still communicate with him from the scene by means of mobile phones in their patrol cars. Not all patrol cars are equipped with mobile phones, however.

Control:

In most instances, police respond first unless the TxDOT Courtesy Patrol happens to see the incident first. TxDOT provides traffic control until the police arrive, then the police take charge. If the incident creates the need for clean-up, TxDOT does that. If there is a fire and/or if hazardous materials are involved, the Fire Department takes care of it. EMS will take care of injuries if there are any. TxDOT is in the process of entering into a contract with a private sub-contractor for handling hazardous materials.

Resource Management:

A loaded sand truck is available from TxDOT in Ft. Worth and ready to be dispatched to incidents when they occur. With the truck already loaded, TxDOT can get to the scene and get sand spread on a spill in 30 to 40 minutes. For (small) spills of diesel or other petroleum products, TxDOT uses microbes. They also carry two small cans of sand in the Courtesy Patrol vehicles. If a fuel tank is ruptured and there is a need to pump this fuel into another tank, the Fire Department does that.

- 3. How could you (your organization) improve the response techniques it currently has in place (specifics of self-improvement without any influence or changes by other organizations)?**

Not addressed.

- 4. How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

Mr. Hill said the Fire Department and EMS often block more lanes than are really necessary. Sometimes their impulse is to completely close the freeway. TxDOT attempts to convince them to keep at least two lanes open. Fire and EMS personnel perceive traffic as a hazard to their operation, so this continues to occur.

- 5. Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

Not applicable.

- 6. What types of incidents are the most difficult to deal with efficiently? Why?**

Mr. Hill responded to a question regarding what could reduce clearance time. He stated that hazardous materials take more time than non-hazmat incidents. Also, if there is a fatality, police take more time to investigate the scene. Mr. Hill stated that removal (moving) of the body must wait on the Medical Examiner, but it really does not need to, in his opinion. A scenario he suggested was have Emergency Medical personnel to place the body in the ambulance until the Medical Examiner arrives and keep traffic moving if there are lanes available and if traffic movement would not interfere with the investigation at the scene.

- 7. Current response time, is it acceptable?**

Are there any improvements needed to response time? TxDOT response time is acceptable because equipment can often be brought in from a worksite which is close by. For response time of police, ask Captain Judd. Mr. Hill estimated response time to be in the range of two to four minutes, or maybe five to six minutes at most. (I assume this means time to get underway following notification.) Response time for

TxDOT equipment is approximately one hour from the time they call from the site to request support.

8. Cost (perceived and real) of incidents in your city?

When asked the cost of incidents, Mr. Hill responded that no one had attempted to quantify all the elements to arrive at the total cost of an incident. He added that this would not be too difficult to do, but no one has put forth the effort to do it.

9. Political sensitivities which need to be considered?

Political sensitivities are sometimes a problem, according to Mr. Hill. He also commented that other agencies know what TxDOT wants. For the most part, Mr. Hill admitted that there is good rapport among the various agencies.

10. Budget which might be available for incident management?

Not addressed.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

Addressed above.

12. Would you be able to attend a meeting of Incident Response professionals in Austin (possibly late 9/93) to discuss Incident Response Improvements state-wide?

Yes.

Contact:

Mr. Howard Hill
Safety Specialist
District 2, TxDOT
(817) 370-6500

Ft. Worth

Police Department

- 1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

Hazardous materials cause us the greatest problem in response. This causes us quite a bit more time than just an 18-wheeler overturned.

- 2. What types of problems exist in your area during incident response with respect to:**

Communications:

No problems, according to Cpt. Judd.

Coordination:

If hazardous materials are involved, the police department responds if requested by the Fire Department.

Control:

Not addressed

Resource Management:

As far as Cpt. Judd could tell, resources are allocated on an equitable basis. However, to completely answer this question, he would have to know more about other agencies.

- 3. How could you (your organization) improve the response techniques it currently has in place (specifics of self-improvement without any influence or changes by other organizations)?**

The FWPD as a whole does a good job in responding to incidents. There are times when we need more personnel to respond to incidents, but the reality is that budgets are limited and departments do not get all the resources that they really need. We request support from other divisions if we have to. Obviously, this leaves them short-handed to do their job then.

- 4. How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

I cannot answer this question based on my current knowledge.

5. Comments on the "Incident Management Framework (Decision Tree)" if applicable?

Not applicable.

6. What types of incidents are the most difficult to deal with efficiently? Why?

Each incident must be considered on its own merit. Hazardous materials generally cause the greatest problem.

7. Current response time, is it acceptable?

Captain Judd does not know what their current response time is. It is different, based on how far away the nearest available unit happens to be at that time.

8. Cost (perceived and real) of incidents in your city?

There is no cost information available that Cpt. Judd is aware of.

9. Political sensitivities which need to be considered?

There are no politically sensitive areas that have to be dealt with, at least within the corporate limits of Ft. Worth. He alluded to possible problems outside the corporate limits, but he added that these have not "come to a head."

10. Budget which might be available for incident management?

There is no budget for this activity *per se*; if a department goes over their total budget in a given funding period, they go back to City Council and request an increase. Incidents are so unpredictable that it would be difficult to forecast them anyway.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

No improvements have been considered specifically for incident response that Captain Judd is aware of. Ninety-nine percent of incidents are at the discretion of the dispatcher. A notification call comes to the dispatcher, then he/she decides which agencies need to respond.

12. Would you be able to attend a meeting of Incident Response professionals in Austin (possibly late 9/93) to discuss Incident Response Improvements state-wide?

Yes.

Contact: Captain Grady Judd, Head, Traffic Division, Ft. Worth Police Department
(817) 335-4222

Ft. Worth

Fire Department

- 1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

The Fire Department has not run across anything recurring which has been a serious problem to them. There have been trains blocking their access a few times, but this seldom occurs.

- 2. What types of problems exist in your area during incident response with respect to:**

Communications:

They are using an 800 MHz trunk system which has a total of 40 channels, 20 of which are dedicated to safety. Everyone in the city of Ft. Worth is also on this system, so theoretically, there is no problem with communicating among agencies during incidents. All the key players are involved in this system. The dispatch function for emergency services is all in one building with each agency's dispatcher separated from the others by plexiglas. Sometimes rainy weather creates small problems with microwave transmission. Their system is relatively new, being installed only 8 months ago so they are still doing some minor troubleshooting. Any city services from police to fire to city transit is on the system. Units are programmable for flexibility. They can also use one of the five national public safety channels which can be initiated for communications within a one-mile radius of, say, a train derailment. This puts all the agencies in instant contact, but these communications are not repeated outside this radius.

Coordination:

Not addressed.

Control:

Not addressed.

Resource Management:

The entire city inventory is available to any agency during an incident. If heavy equipment is necessary (e.g., heavy crane), the Fire Department also has agreements with contractors to provide this equipment if not available through the city inventory. There are problems occasionally with not having the correct technical support. For example, the Fire Department might need a structural engineer and not be able to find one on short notice. So, in general, technical support is more of a problem than equipment support.

3. **How could you (your organization) improve the response techniques it currently has in place (specifics of self-improvement without any influence or changes by other organizations)?**

For the Fire Department, response times could be reduced by changing the computer system. The chief would have a PC in each station, a mini computer at the next command level, all tied into the mainframe downtown. Then, each station would get notification information on an incident instantaneously. Also, if they had "MDT" on fire trucks, they could get additional information on the incident enroute. For example, they might get general location information before departure, then might get the floor plan of the building enroute or more specific location information. At the very least, they need a PC in the battalion car hooked to a printer.

They have 35 fire stations that provide coverage for 300 square miles, and they have 4 more stations on the drawing boards. The chief thinks they could build one of the four tomorrow if city council would approve manpower money. They respond to 50,000 plus calls per year.

4. **How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

Communications policy between fire department and medics (EMS) could be better. In some incidents, the first responder is the Fire Department. EMS is initially on their own protocol. When they are, their dispatcher must be involved and tell them to change to another communications frequency. The EMS dispatcher might then say they cannot do that at this instant. So time is lost.

On the other hand, police and fire departments seldom have communications problems with each other. Police can hold certain calls 3 minutes and not dispatch. However, fire is seldom contacted on anything other than emergencies, so they move out. If they arrive at a scene (typically not on highway) and there is gunfire, the police might have elected to wait three minutes. Their firemen carry flak jackets because there is so much gunfire in response areas. These are policy issues between police and fire.

5. **Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

Not applicable.

6. **What types of incidents are the most difficult to deal with efficiently? Why?**

See number 1 above.

7. **Current response time, is it acceptable?**

Current average response time is 3.5 minutes. This is acceptable, but it might be reduced slightly given some of the comments provided elsewhere.

8. Cost (perceived and real) of incidents in your city?

The fire chief does not have costs broken down by different types of incidents. However, the cost of a fire truck plus crew (calculated for lease purposes) is \$750 per hour. The cost of the hazardous materials team is available from Deputy Commander Laymance who is the shift commander who oversees this team. His phone number is 871-6960. Also contact Jim Marx, telephone 871-6177, for costs of fire trucks in general.

9. Political sensitivities which need to be considered?

Only one incident would fit this category. It involved a military aircraft that crashed off the base, but military authorities thought at first that it was on base. Upon discovering that it was off base, they backed out of the fire department's way.

Sometimes police and perhaps TxDOT do not respond quickly enough to close a traffic lane or the entire freeway. The fire department has simply blocked the freeway with one of their fire trucks until the police get around to doing it. Two fire fighters have been killed in traffic. These two were off-duty and simply stopped to render aid when they were killed by passing traffic.

10. Budget which might be available for incident management?

Not available.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

The city stockpiles sand and other critical items at a city facility for use on incidents as needed. This could be the size of a pick-up load to a dump-truck load. The city also has an agreement with the State Highway Patrol to get materials from the McCart Street location (TxDOT District Office) if needed, but they normally do not need to do this. Chief Reynolds has the names and phone numbers of appropriate persons to contact if needed.

12. Would you be able to attend a meeting of Incident Response professionals in Austin (possibly late 9/93) to discuss Incident Response Improvements state-wide?

Yes.

Contact: Fire Chief Reynolds, Ft. Worth Fire Department
(817) 871-6800

MEMORANDUM

TO: Michael Ogden
FROM: Beverly A. Thompson
DATE: 14 September 1993
SUBJECT: Review Panel Interview
Houston Fire Department, Hazardous Materials Response Team

I contacted Captain Danny Snell with the Hazardous Materials Response Team (HazMat), Houston Fire Department (HFD). I interviewed him using the review panel questions. The following is a summary of his responses for each question.

1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?

The delay regarding an incident on a freeway or major roadway is dependent upon the nature of the incident. An overturned truck with no load spill may take only a few hours. However, a truck fire or hazardous materials spill will take longer. Occasionally, the delay is a result of contacting the owner of the vehicle in question in order to arrange clean-up.

2. What types of problems exist in your area during incident response with respect to:

Communication: HazMat has excellent communication capabilities both within the team and the entire HFD as well as with external agencies. They have a variety of communication capabilities including radios, mobile phones, on-board computers, and fax machines.

Coordination: HazMat ordinarily has few coordination problems when responding to an incident. However, occasionally, a vehicle may be involved that is owned by an individual company that does not have a contact person available whom HazMat can alert to the problem for remediation purposes. HazMat is not responsible for removing the vehicle. The company must handle that aspect of the incident.

Control: HazMat has few problems relating to control over an incident. It is known procedure as well as city ordinance that when the fire department arrives on the scene of an incident, it is in control. However, the larger an incident, the less

control HFD has. They can establish tight control over a small, localized incident. If an incident affects a substantial area (i.e., inbound and outbound directions of a freeway, etc.) they are limited in capability to completely cordon off the area and limit access to the incident.

Resource Management: HazMat has established an extensive database over the 14 years of operation. They have worked with so many different companies, including those that manufacture materials that are spilled, that they have the capability to quickly contact responsible parties in the event of an incident.

- 3. How could you (your organization) improve the response techniques it currently has in place (specifics of self-improvement without any influence or changes by other organizations)?**

Improvements within HazMat are a function of monetary resources as they are funded directly out of the general fund of the city. However, if resources were available, HazMat would probably start with establishing two (or more if possible) HazMat teams in remote areas of the city to better handle emergencies. Current operations are handled with one large team centrally located. Furthermore, it would be ideal to train the first responders to handle hazardous materials. However, the extent of information and equipment needed is beyond the scope and capability of the entire fire department.

- 4. How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

It is important that other agencies have the ability to quickly recognize the need for hazardous materials experts. They need to know who handles such incidents and where they can be reached. Outside of Houston, incidents involving hazardous materials are infrequent. It might be helpful for agencies in these areas to conduct drills and scenarios in order to recognize incidents when HazMat is needed.

- 5. Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

None. Not applicable.

- 6. What types of incidents are the most difficult to deal with efficiently? Why?**

Large, extensive spills are difficult for HazMat to handle efficiently. They are an emergency-related unit that is not geared towards remedial clean-up work. In such instances, HazMat must have a contractor conduct site clean-up.

- 7. Current response time, is it acceptable?**

The average response time for HazMat is about 16.3 minutes for the entire city. Approximately 60% of calls are to the eastern side of the city where response times are as low as 5 minutes. Response time is very satisfactory.

8. Cost (perceived and real) of incidents in your city?

Unable to answer.

9. Political sensitivities which need to be considered?

Few political issues are involved with HazMat. However, the household hazardous waste collection day arranged by the city (amnesty day) is political in nature. HazMat is involved, whereas the funds are allocated through the city budget. Clean-up is localized and specific voter groups and constituencies can be involved. However, no political sensitivities surround everyday operation.

10. Budget which might be available for incident management?

The entire budget for HazMat (personnel and operating expenses) is about 1.6 million dollars. However, only about \$110,000 of that is actual operating expenses for the HazMat team. They would support measures to improve incident management.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

HazMat is continuously upgrading its operations and services. However, with respect to those improvements mentioned in the list, HazMat is not involved in those operations. They fall under other jurisdictions.

12. Would you be able to attend a meeting of Incident Response professionals in Austin (possibly late 9/93) to discuss Incident Response improvements state-wide?

Captain Snell may possibly be able to attend. However, his going depends upon the time of the month. He will be out of the state from September 24th to 30th. If it is a one-day event, there is a possibility. However, travel requisitions take between 14 and 21 days to process. He would need plenty of notice.

Contact:

Captain Danny Snell
Houston Fire Department
Hazardous Materials Response Team
7825 Harrisburg
Houston, TX 77012
(713) 928-5806

MEMORANDUM

TO: Michael Ogden
FROM: Beverly A. Thompson
DATE: 20 September 1993
SUBJECT: Review Panel Interview
Austin Emergency Medical Services

I contacted Richard Harrington, Deputy Director of Austin EMS. I interviewed him using the review panel questions. The following is a summary of his responses for each question.

1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?

The component taking the longest for Austin EMS is on-site handling of the incident. It varies according to the severity of the incident and the degree of imprisonment in the vehicle(s). Transportation time to the scene is generally not a problem, although transportation time from the scene to the hospital may be as they serve 1044 mi² in the Austin area.

2. What types of problems exist in your area during incident response with respect to:

Communication: Austin EMS biggest concern is the inaccuracy of information relating to injuries at a site. They tend to either send too much or not enough support staff to a site in these cases. Also, when handling an incident outside the city limits, they must deal with inaccurate information regarding location as the calls are often received from cellular phones from individuals not familiar with the area.

Coordination: Austin EMS has direct electronic contact with the local police and fire department. Coordination in that instance is not a problem. However, they only have telephone communication with the local sheriff's department and the DPS.

Control: Austin EMS has few problems relating to control over an incident. They currently have an agreement with city agencies that they have control over the medical aspect of an incident. If they do have problems, it is in delineating roles, especially with incidents involving hazardous materials and severe casualties. They also tend to have problems outside city limits, since they must work with 14 different volunteer fire departments and EMS agencies. They tend to have turf battles.

Resource Management: Austin EMS has not had many problems in this area. They may run into problems when outside city limits at an incident involving a utility line. They may not immediately know which public utility company to contact regarding the incident.

3. **How could you (your organization) improve the response techniques it currently has in place (specifics of self-improvement without any influence or changes by other organizations)?**

More communications staff would be beneficial as well as more accurate maps of the city that are user-friendly regarding EMS operations.

4. **How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

Austin EMS would benefit from more joint training and regional coordination. Strategic planning would also improve operations.

5. **Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

None. Not applicable.

6. **What types of incidents are the most difficult to deal with efficiently? Why?**

Large and complicated incidents (i.e., high-speed, rollover involving an 18-wheeler, hazardous materials, multiple vehicles) are the most difficult to handle efficiently. The incident blocks the roadway for an extended period. Safety of EMS personnel becomes a problem as a result of rubber-necking. They also see inefficiency because of multiple and varied agencies on the scene.

7. **Current response time, is it acceptable?**

They have a goal for response time and currently do not meet it. They are not where they want to be. Up until this year, they have not been able to add units for five years. They are not losing ground, but they are not gaining much ground either.

8. **Cost (perceived and real) of incidents in your city?**

No direct costs are involved. However, indirect costs are felt when a large incident occurs. The more units that are tied up with such an incident, the more delay in handling subsequent calls. Resources must be reallocated city-wide, and delays can increase as a result.

9. Political sensitivities which need to be considered?

The entire EMS operation is political, since they are a branch of the city. Their entire funding is political.

10. Would you be willing to support measures to improve incident management?

Yes.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

Mr. Harrington currently serves on the Regional Advisory Council for Trauma in the Austin area. It is involved with establishing a critical incident control structure that is implemented on a local and state-wide basis. They are continuously updating techniques, operations, services. However, with respect to those improvements mentioned in the list, Austin EMS is not involved in those operations. They fall under other jurisdictions.

12. Would you be able to attend a meeting of Incident Response professionals in Austin (possibly late 9/93) to discuss Incident Response improvements state-wide?

Mr. Harrington may possibly be able to attend if he is in Austin at the time.

Contact:

Richard Harrington
Deputy Director
Austin EMS
P.O. Box 1088
Austin, TX 78767
(512) 469-2048

INCIDENT RESPONSE QUESTIONNAIRE

NAME Sam Pennartz *Phil Cooper TITLE District Maintenance Superintendent

ORGANIZATION TxDOT - San Antonio District PHONE (210) 615-5867

1. **What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

SAPD many time will handle all injuries and investigation before calling for assistance with clearance.

2. **What types of problems exist in your area during incident response with respect to communication, coordination, control, resources?**

Good relationship with SAPD - communication, coordination.

3. **How could you (your organization) improve the response techniques it currently has in place (specifics of self improvement - without any influence or changes by other organizations)?**

Dedicated resources for emergency response.

4. **How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

Good communications with SAPD

Night patrol - young officers hesitate to call/late

5. **Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

No Knowledge - N/A

6. **What types of incidents are the most difficult to deal with efficiently? Why?**

Large truck overturns requiring crane

7. Current response time, is it acceptable?

Day - 30 minutes

Courtesy patrol all TxDOT off-hours - 15 minutes

Night - 60 minutes

8. Cost (perceived and real) of incidents in your city?

No information.

9. Political sensitivities which need to be considered?

Wrecker contract - will call instead of TxDOT

10. Budget which might be available for incident management? Would you support measures to improve incident management?

No extra money - need additional funds.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

Ice plan for utilization of frontage roads - coordinate with SAPD

12. Would you be able to attend a meeting of Incident Response professionals in Austin sometime in the future to discuss Incident Response improvements state-wide?

Yes

INCIDENT RESPONSE QUESTIONNAIRE

NAME Bubba Needham

TITLE Director, Transportation Operations

ORGANIZATION TxDOT - Austin District

PHONE (512) 832-7053

1. **What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

Communication coordination such that needed equipment is requested quickly.

2. **What types of problems exist in your area during incident response with respect to communication, coordination, control, resources?**

Communication - all have different frequencies.

3. **How could you (your organization) improve the response techniques it currently has in place (specifics of self improvement - without any influence or changes by other organizations)?**

Formation of incident response team.

4. **How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

More aware of TxDOT available equipment.

5. **Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

No Knowledge - N/A

6. **What types of incidents are the most difficult to deal with efficiently? Why?**

Truck overturns.

Example: Crane overturn blocking both directions over median 4:00
Friday - 2 to 3 hour clearance.

7. Current response time, is it acceptable?

Day - 30 minutes maximum

Night - 45 to 60 minutes

8. Cost (perceived and real) of incidents in your city?

No information.

9. Political sensitivities which need to be considered?

Incident response part of IVHS project.

10. Budget which might be available for incident management? Would you support measures to improve incident management?

TxDOT overall support.

Limited district support due to construction budget cuts.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

Detection equipment inclusion in construction contracts.

12. Would you be able to attend a meeting of Incident Response professionals in Austin sometime in the future to discuss Incident Response improvements state-wide?

Sure, if schedule permits.

INCIDENT RESPONSE QUESTIONNAIRE

NAME Lt. John Stewart

ORGANIZATION Austin - Police Department

PHONE (512) 480-5208

- 1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

Emergency support response and activity, i.e., parking in lanes, etc.

- 2. What types of problems exist in your area during incident response with respect to communication, coordination, control, resources?**

Communication - knowing what equipment is needed and how to get it there.

- 3. How could you (your organization) improve the response techniques it currently has in place (specifics of self improvement - without any influence or changes by other organizations)?**

Street supervisors need training - young officers.

- 4. How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

24 hour communications for equipment.

- 5. Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

Has not seen decision tree to comment.

- 6. What types of incidents are the most difficult to deal with efficiently? Why?**

Tractor trailer overturns

Recent example - Friday 9:00 P.M., Down 3 to 4 hours, secondary accidents.

7. Current response time, is it acceptable?

2 minutes or less

8. Cost (perceived and real) of incidents in your city?

Only TxDOT numbers, no other.

9. Political sensitivities which need to be considered?

Believe supportive, put police priority on gangs, incident response on "back burner."

10. Budget which might be available for incident management? Would you support measures to improve incident management?

Lt. & 14 officers attended fed course - would like to send more supervisors.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

Yes, putting together plan right now -- major incident route diversion.

12. Would you be able to attend a meeting of Incident Response professionals in Austin sometime in the future to discuss Incident Response improvements state-wide?

Absolutely.

INCIDENT RESPONSE QUESTIONNAIRE

NAME Pat Siek

TITLE: Engineering Tech III

ORGANIZATION TxDOT - Houston District 12

PHONE: (713) 613-0307

- 1. What components of incident response (IR) create the greatest delays (or take the longest to complete) in order to clear an incident?**

Communication - delayed request for proper equipment, i.e., sand truck for spills, etc.

- 2. What types of problems exist in your area during incident response with respect to communication, coordination, control, resources?**

Improved communication. Need more and proper equipment on 24-hour. Incident response team currently underutilized.

- 3. How could you (your organization) improve the response techniques it currently has in place (specifics of self improvement - without any influence or changes by other organizations)?**

Need to improve response time at night. Need on-site TxDOT personnel to make clearance decision.

- 4. How could other organizations involved in incident management improve their response techniques to improve your organization's response?**

Contact incident response team directly, quicker - ask for proper equipment.

- 5. Comments on the "Incident Management Framework (Decision Tree)" if applicable?**

Look reasonable as conceptual approach.

- 6. What types of incidents are the most difficult to deal with efficiently? Why?**

Truck overturns - hesitant decision to clear cargo spill - fear of litigation.

7. Current response time, is it acceptable?

Day - 30 minutes OK

Night - 60 minutes OK

8. Cost (perceived and real) of incidents in your city?

Have not seen any #'s , need these #'s.

9. Political sensitivities which need to be considered?

Interaction/cooperation between law enforcement agencies.

10. Budget which might be available for incident management? Would you support measures to improve incident management?

Don't know if any dedicated funds - obviously would support.

11. Has your organization/agency ever considered specific improvements to the incident response techniques in your area?

Actively involved in all aspects of incident management - ICCF, HAR, AVI, Camera Surveillance.

12. Would you be able to attend a meeting of Incident Response professionals in Austin sometime in the future to discuss Incident Response improvements state-wide?

Sure.

October 22, 1993

MEMORANDUM

TO: M. Ogden

FR: J. Ullman

SUBJECT: Study 1345 Review Panel Interview
Ted East, Beaumont TxDOT

1. What components of incident response create the greatest delays?

TxDOT in Beaumont is not directly involved in incident response at this time, but do respond to requests for assistance from DPS or the Beaumont PD. In Beaumont, truck overturns and spilled loads can take a significant time to clear up, and the measurements involved during fatal accident investigations are also time-consuming.

2. What types of problems exist in your area during incident response with respect to communication?

Communication within TxDOT is handled via state radios. Between agencies, communication is adequate at this time (since police contact the other agencies when assistance is needed)

... coordination?

Mr. East believes TxDOT could contribute more significantly to IR, but they have not attempted to push their capabilities onto the other agencies. He said the Department's new HAR system will be going online very soon. Initially, he will be activating the system based on information he hears over the police scanners and such. Once they demonstrate to the PD the benefits of their system, he believes they will be more inclined to call upon TxDOT to assist in traffic management.

... control?

There are no control problems, as the PD has total command and makes all decisions regarding when to request assistance from other agencies.

... resource management?

Beaumont is a rather small urban area and has not had a problem with resources to date. If PD decides they need something to respond to an incident, they can usually get it fairly easily via a telephone call.

3. How could your organization improve the response techniques it currently has in place?

They have purchased and are initiating the HAR system on the freeways approaching Beaumont. Once in place, they could provide a significant benefit to long-haul truckers and motorists passing through Beaumont by routing them around the city. He believed they are very responsive to the PD when assistance is requested.

4. How could other organizations involved in IR improve their response techniques?

Mr. East felt that if the PD would become more reliant on TxDOT and maybe the city traffic department to assist in traffic management activities, they could focus their attention on the on-site issues. Also, they could possibly reduce the number of officers that need to respond to an incident (and the duration they are involved) and, thereby, free them to deal with other police matters.

5. Comments on the Incident Management Framework?

None, has not seen (I did not discuss in detail).

6. What incidents are most difficult to deal with efficiently?

There is nothing you can do about fatal accident investigation (measurements must be taken, etc.). Also, Haz-mat incidents are difficult because you have to be so careful and get the right people involved who know what they are doing.

7. Is the current response time to incidents acceptable?

As far as he can tell, response time is not a problem.

8. How extensive are the costs of incidents in their city?

Beaumont does not have a large number of incidents. Also, traffic conditions are generally low enough that an incident does not cause tremendous delays.

9. Are there political sensitivities which need to be considered?

No.

10. Do you have funds which might be available for improved incident management?

They have purchased the HAR system and respond to police department requests as part of their normal maintenance budget. They could make low-budget improvements (i.e., putting certain people on call in charge should an incident occur), but could not support large-scale hardware purchases out of their District.

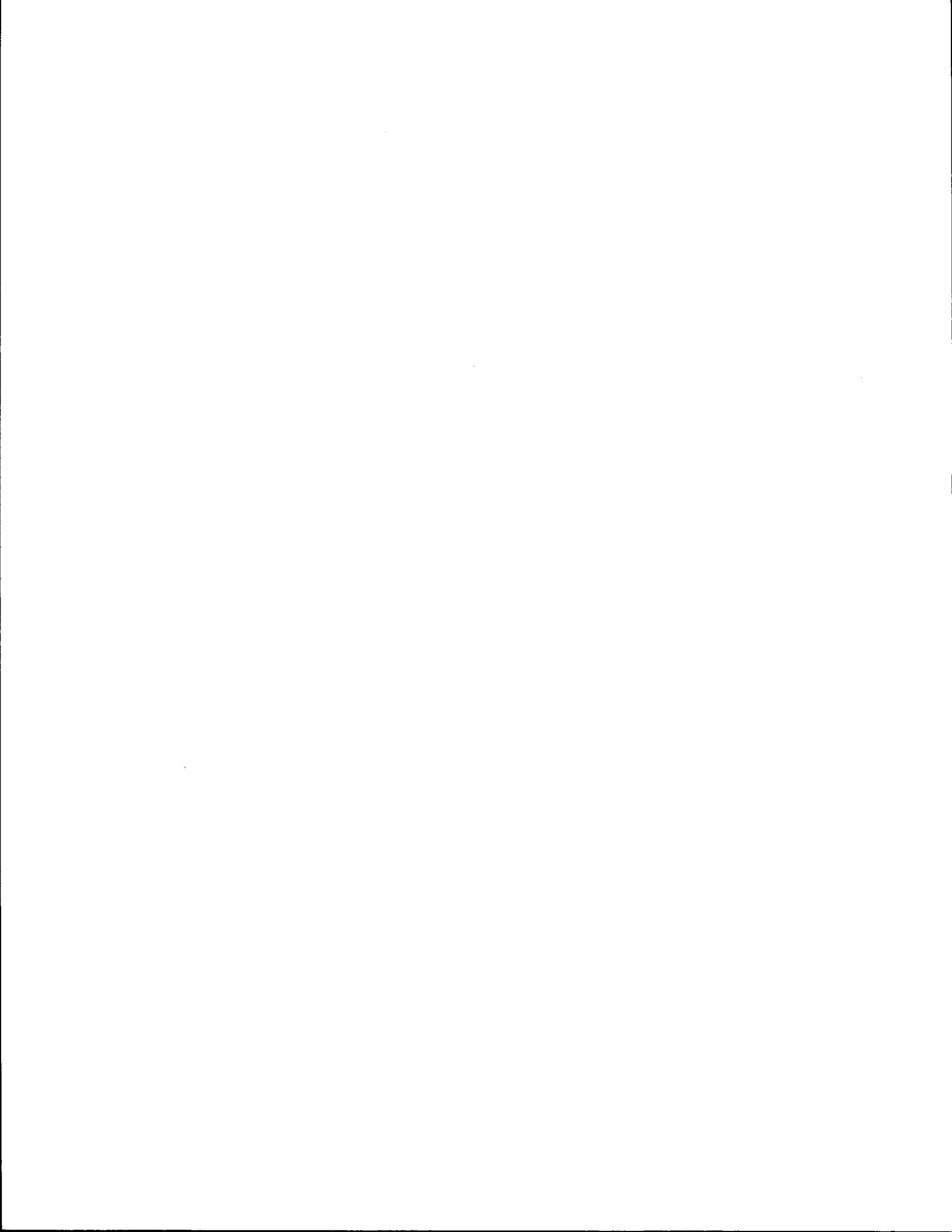
11. Has your organization considered specific improvements to the IR techniques?

Yes, (the purchase of the HAR system).

12. Would you be able to attend a meeting of Incident Response professionals in Austin sometime in the future to discuss Incident Response improvements statewide?

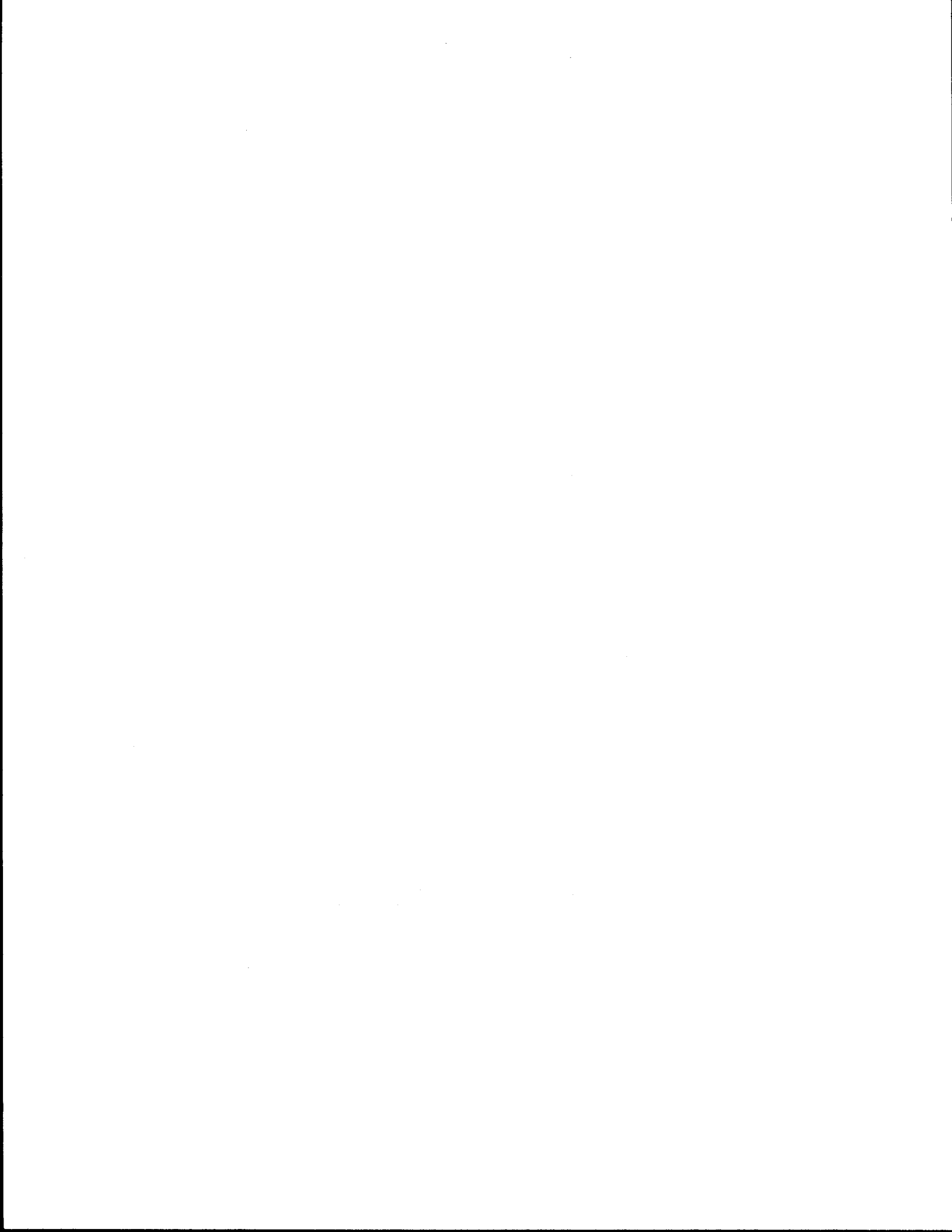
Sure.

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APPENDIX C

Incident Management Plan Guidelines- Houston Case Study



INCIDENT MANAGEMENT PLAN GUIDELINES - HOUSTON CASE STUDY

Submitted to the Houston Traffic Management Team:

Texas Department of Transportation
City of Houston
Metropolitan Transit Authority of Harris County
Houston Police Department
Houston Fire Department
Harris County Sheriff Office
Harris County Constable Office
Harris County Engineering Department
Harris County Toll Road Authority
Department of Public Safety
Houston-Galveston Area Council
Houston Traffic Management Center
Metro Traffic
Shadow Traffic
City of Pasadena

by

The Texas Transportation Institute
The Texas A&M University System
College Station, Texas 77843-3135

Sponsored by

The Texas Department of Transportation
in cooperation with
The Federal Highway Administration

June 1994

Introduction to the Incident Management Guidelines

Information received by the Houston Police Department (HPD) shows that there are approximately 87 major freeway incidents per year (or about 1.7 per week). These major freeway incidents are designated by HPD as those which initially had a significant impact in terms of blocking one or more freeway lanes for a duration longer than 30 minutes. Dealing with these major freeway incidents involves the response and coordination of several state and local agencies. Each agency has a specific role to play in the successful clearance of an incident. Preplanning for such events can improve response and clearance times of the incident, thus reducing the impacts upon traffic within the incident area.

Preplanning for incident response consists of the following steps:

- Establishing multi-agency consensus for incident response planning,
- Identifying common incident classification,
- Establishing interagency cooperation agreements, and
- Developing interagency communication protocols.

Multi-Agency Consensus

At the present time, requests for agency assistance are handled through the respective law enforcement agency dispatch and/or the Houston Traffic Management Center (HTMC). Requests for outside agency involvement are then communicated via the telephone. Houston has an organized Traffic Management Team (TMT) that meets monthly. Agency representatives are listed on the front of this report. Appendix A contains the TMT agency representatives and their respective telephone numbers.

Incident Classification

Every agency responding to an incident will address and view the incident according to their level-of-effort. There needs to be a common understanding, appreciation, and

classification of an incident so each agency is aware of their role and how that coordinates with other responding agencies. Houston does not currently have a common classification structure to anticipate the severity of an incident. Table C-1 shows a proposed incident classification scheme for the Houston area. It includes the type of incident, anticipated duration of lane blockage, and response required. Granted, every incident is different in its response requirements. However, a common (accepted) classification scheme will result in a potentially faster and more coordinated agency response effort.

Table C-1. Proposed Incident Classification Scheme for Houston

	Incident Classification				
	Level I	Level II	Level III	Level IV	Level V
Types of Incidents (examples)	Vehicle stall on shoulder	Vehicle stall in travel lanes	Minor accident (no injuries) Minor load spill	Serious accident (potential injuries) Spilled load (possible hazardous materials) Vehicle fire	Serious accident (with major injuries) Haz. material spill Several vehicles on fire
Anticipated Duration of Lane Blockage	None	0-30 minutes	30-60 minutes	60-120 minutes	> 120 minutes
Types of Response Activities	Motorist assistance	Motorist assistance with minimal on-site traffic control	Police assistance with on-site traffic control Possible implementation of traffic diversion strategies Debris removal	Police assistance with extensive on-site traffic control Fire department response Haz. mat. response Traffic diversion strategies Debris removal	Police assistance with extensive on-site traffic control Fire department response Haz. mat. response Traffic diversion strategies Neighborhood evacuation Debris removal

Establish Interagency Cooperation Agreements

The establishment of interagency agreements in the preplanning of incident management can decrease incident duration time significantly. A team effort needs to exist by all agencies to respond and clear these incidents. Most incidents call for the respective

law enforcement agency to take control of authority at the scene since they are usually first on-scene and have the obvious uniformed authority with the public. However, this is not always the case. There are specific incident situations where other agencies must take the lead (i.e., HFD at a hazardous materials spill - EMS when injuries are critical - TxDOT when freeway geometrics and/or appurtenances are potentially life threatening). These are just some examples of a potential shift in authority. However, there must be a concentrated effort by all agencies to work together to address an incident while continuing to move traffic in and/or around the incident area.

Communication Protocols

Communications between all agencies are crucial in responding to major freeway incidents. Because of the extensive size of the Houston area, there are numerous law enforcement, fire department, E.M.S., and city municipalities. There are occasions where incidents occur on or near boundary jurisdictions. This sometimes poses a problem when agencies perceive this as another agency "cutting into their turf." What should be first and foremost is addressing the needs to clear the incident and keep traffic moving, not disagreement over agency jurisdiction.

There are also some discrepancies or conflicts that can potentially cause problems and should be addressed. One problem TxDOT is experiencing are the requests for equipment and manpower assistance by the various law enforcement agencies involved in incident management. Police officers do not request the correct equipment to clear an incident. Therefore, TxDOT officials send the wrong equipment, thus, causing more delay. Due to this inappropriation of manpower and equipment, TxDOT will send a supervisor to the incident site to assess the scene and send for the correct equipment. Conversely, the police officers see this as a waste of time and would like TxDOT to send the equipment requested right away. The solution to this is three-fold. First, there must be significant training for law enforcement officers to assess an incident scene and request the appropriate equipment from TxDOT (see training subsection - later in this report). Second, TxDOT must trust the officer in the field to make the correct assessment. Third, there must be a significant amount of pre-

planning by all agencies so that the relationships and trust are in place when an incident does occur.

Another problem is that fire departments and towing companies have a tendency not to understand incident traffic control. These agencies are involved in specific assignments within incident management which typically do not include traffic diversion and control. A need exists for these agencies to understand these efforts and coordinate their responsibilities with traffic control measures. In addition, fire officials will advise traffic agencies and company representatives about cargo cleanup. However, unless the cargo is a hazardous material, they will not cleanup the spill. This is not the fault of fire officials. There needs to be some expansion of current legislation involving spilled cargo cleanup concerning the reimbursement and liability of the work. Instead of waiting for companies to send out their people or hire someone to cleanup a spilled load, use whatever measures are necessary to clear the roadway and restore traffic. Current legislation regarding this gives the State (which potentially means TxDOT) the authority to do so. However, many agency representatives are apprehensive to initiate cargo cleanup due to damaging the remaining cargo and the liability ramifications. A possible solution to this may be to have specific companies on retainer that could respond to an incident to handle this cleanup and then recover their costs from the companies whose vehicle(s) lost the load.

Documentation of Incidents

It is imperative that each agency document its involvement in handling any major incidents. This documentation can assist in identifying improvements that need to be made in response, equipment, and interaction with other agencies. A typical incident report form is presented in Figure C-1. Another major step towards improving incident response is to have a debriefing after each major incident or at least at the monthly T.M.T. meeting. At this time, the incident(s) can be discussed by the agencies involved while referring to each agency's incident report form. Potential improvement in all aspects of incident management can be addressed.

INCIDENT REPORT

DATE OF INCIDENT: _____ LOCATION: _____
 DIRECTION OF TRAVEL: _____ NUMBER OF LANES BLOCKED: _____ NUMBER OF LANES AVAILABLE: _____
 TIME OCCURRED: _____ TIME CLEARED: _____
 INCIDENT DESCRIPTION: _____

(ADDITIONAL SPACE ON BACK - INCLUDE DIAGRAM)

SHOULDER USED AS TRAVEL LANE: _____ (IF YES SPECIFY) _____
 TYPE & NUMBER OF VEHICLES INVOLVED: _____ PASS. CAR _____
 LIGHT TRUCK _____ MOTORCYCLE _____ SEMI-TRACTOR TRAILER _____
 VAN _____ VEHICLE WITH TRAILER _____ OTHER (SPECIFY) _____
 IF APPLICABLE - LOAD/CARGO INVOLVED: _____
 HOW AFFECTED: _____ LOST _____ SPILLED _____ SHIFTED _____ HAZARDOUS MATERIAL: _____
 (IF YES - GIVE TYPE) _____
 ROAD CONDITION: _____ DRY _____ WET _____ OTHER (SPECIFY) _____
 FWY. UNDER CONSTRUCTION? _____ (IF YES - SPECIFY) _____
 CONDITION: _____ LIGHT _____ DARK _____ LIGHT RAIN _____ HEAVY RAIN _____ OTHER
 (SPECIFY) _____
 NUMBER OF PEOPLE INJURED _____ NUMBER OF FATALITIES _____
 CITY OR STATE PROPERTY DAMAGES?: _____ (IF YES - SPECIFY) _____

AGENCY	TIME			ACTION TAKEN	EQUIP. USED
	NOTIFIED	ON-SCENE	CLEARED		

TOTAL FWY CLOSURE NECESSARY? _____ TIME STARTED: _____ TIME ENDED: _____
 DETOUR OR ROUTE DIVERSION USED? _____ (IF YES - SPECIFY) _____

ANY EXCESSIVE DELAYS IN AGENCY NOTIFICATION, RESPONSE OR EQUIPMENT? _____ (IF YES-SPECIFY)

ADDITIONAL INFORMATION: _____

REPORT PREPARED BY: _____ AGENCY: _____ DATE PREPARED: _____

** PLEASE USE BACK OF REPORT TO SUPPLY ADDITIONAL INFORMATION

Figure C-1. Incident Report Form

While the incident report documentation allows for potential improvements to be made, accumulation of this data also has historical value. In analyzing different urban areas around the state, the one major lacking information source was no historical accident database. By keeping track of major incidents, trends can be established to identify problematic areas and incident types. This information can also be used to predict future incidents as well as average duration response and clearance times. Houston does have some historical incident information. Appendix B includes a technical memorandum written for this study that presents incident information for the Houston, Austin, and Beaumont urban areas. HPD's incident information is by far the most thorough and comprehensive. However, there are still some facilities and times that are not covered by this information. Appendix C includes an annual report of the Houston Fire Department's Hazardous Materials Team. This information along with HPD's database provides a good example of the potential benefits of collecting this type of data on the incident report forms.

Clean Up Equipment

The use of proper equipment and materials can greatly reduce the duration time of an incident. Table C-2 presents a list of equipment and materials for an incident response vehicle. It is not possible to have all incident response vehicles equipped with the materials presented in Table C-2. However, by identifying critical accident locations, equipment and materials can be stored at strategic locations within state right-of-way where they can be easily accessed (i.e., under freeway overpasses).

To improve incident clearance time, there must be an improvement in towing service activities. Dedicated towing companies with the proper equipment to handle large vehicles must be identified. Rotation lists are usually used to secure these services. However, that sometimes requires additional time to wait for the towing equipment to arrive on-scene. In some areas, it could be warranted to secure the nearest towing service rather than the next one on the rotation list. In addition, prequalifying and periodically inspecting towing companies will insure that they maintain the proper equipment to handle large vehicles and major incidents.

Table C-2. Equipment and Materials for Transportation Agency Incident Response

Type of Equipment/Materials	Items
Containment Materials	<ul style="list-style-type: none"> • Trash can full of absorbent • Trash can full of sand • Trash can full of diapers (or white foam pads to absorb diesel or oil) • Shovel • Broom • Coveralls
Traffic Control Devices	<ul style="list-style-type: none"> • Traffic cones w/white reflective sleeves • Pylons • Traffic vests • Flashlight w/fluorescent cones for flagging • Flags • Safety vests • Flares and ignitor
Communication Devices	<ul style="list-style-type: none"> • Cellular telephone • Radio (low and high band), 3 or 4 extras
Other Equipment	<ul style="list-style-type: none"> • Spotting scopes to read hazardous material placards from a distance • Hard hats • Marking paint • Spotlight • Fire extinguishers (20 BC or larger) • First-aid kit • Backpack air blower • Electrical generator • High volume pump to remove fuel from overturned tanker trucks • Fuel tank sealant mastic • Vehicle mounted flood lights • Push bumper on incident response vehicles

The Motorist Assistance Patrol (MAP) is a vital link in responding to incidents in the Houston area. The role of MAP is to assist stranded motorists. However, there are occasions when the MAP officers are first on-scene at a major incident. The officers should assist where needed until additional support arrives at the incident site. At that point, the MAP officer should continue on his/her assigned duties to clear any secondary incidents that result from the major incident.

TRANSPORTATION AGENCY PREPARATIONS

Improved Readiness for On-Site Incident Response

There are many aspects of incident management that each agency can improve upon to reduce incident duration time. Some improvements can be made by just understanding some plans and technologies that are already in place and how these items can enhance incident management.

One such plan is the "Ice Plan" that TxDOT has in place for the Houston area. Severe winter weather rarely closes freeway facilities in the Houston area. However, preplanning for such an event will facilitate smoother implementation should such a thing occur. Appendix D includes a copy of the ice plan with the equipment requirements to initiate the plan.

There are several advanced technologies that are being used within the Houston area that can improve agency response to specific incidents. One such technology is a Geographical Information System (GIS). This advanced technology is being specifically tested along the I-45 (North) freeway corridor at IH-610 (North) loop. GIS offers an automated plan view of anything with an extensive database of information available to the user. TTI is coordinating this test at the I-45/IH-610 interchange to use GIS to store alternate route and diversion strategy plans. Specifically, if an incident occurs in one direction blocking several or all lanes, GIS can store in its memory and call up several diversion strategies given certain parameters (i.e., time of day, predicted incident duration, etc.). In addition, GIS can lay out the type of traffic control devices needed and manpower required to implement a diversion strategy. This is not an artificial intelligence type of tool. Rather, it is an extensive storage database file where thousands of diversion strategies can be stored for later use, thus, extending the pre-planning involved in the incident management process.

Likewise, Closed Circuit Television (CCTV) offers another advanced technology in the incident management field. Verification of an incident is one of the most crucial aspects of incident management. CCTV offers immediate surveillance of an incident so that critical

equipment and correct judgement can be used in assessing the incident scene. Limited CCTV is currently available with additional units and facility coverage available in the near future.

Other advanced technologies include the Automated Vehicle Identification (AVI) system, Changeable Message Signs (CMS), and Highway Advisory Radio (HAR). All of these technologies can or will be able to relay critical information to the motorist about incidents and what measures they should take.

All of these technologies and other incident response measures are useful in reducing the negative impacts of an incident. However, one measure that has worked well in other areas is an over-estimation of incident classification and the response of additional equipment even though it is immediately not warranted. This is where a historical database of incidents can be beneficial. There are certain incidents where in a majority of cases the severity will be increased because of difficulties experienced in responding to or clearing an incident. In these cases, it is crucial that they be recognized early on and that all agencies respond in an anticipated response to a more severe situation. Therefore, if the incident is elevated to a more severe situation, the manpower and equipment can be sent in advance, with no time wasted in sending for additional support. There are times when the additional support will not be needed. However, the incidents that do require the added support will justify this process by significant decreases in incident clearance and duration time.

Site Specific Traffic Management Planning for Incident Response

Site specific items addressing incident management procedures should be promoted to expedite and reduce the effects of the incident on the surrounding area. One method includes Accident Investigation Sites (AIS). TxDOT is currently reviewing designs of AIS for I-45 (North) freeway. These AIS include an area near each exit of the freeway where motorists, law enforcement officers, and tow companies can meet to exchange information and discuss the details of an accident. These AIS areas are located off freeway facilities within State right-of-way usually on or near the frontage road. The idea is to get vehicles off the freeway mainlanes where congestion is quick to build.

Additional work can and should be done in the area of pre-planing alternate route and diversion strategies (See Figure C-2). Since Houston has predominantly continuous frontage roads, incident congestion can be easily directed to these support facilities. However, there are areas where continuous frontage roads do not exist, and other alternate routes must be selected. This is an area where GIS might be of some use in storing these pre-determined strategies.

In cases of an incident fatality, the coroner must be present before the body(s) can be moved. Unfortunately, the coroner (or medical examiner) is not considered an emergency response unit. Therefore, they have a tendency to get caught in the congestion which develops as a result of the incident. A good method to expedite this process is to send a law enforcement (or emergency type) vehicle to escort the coroner. This allows the quickest access of the coroner to the scene.

Measurements typically taken at an accident scene are tedious and time consuming. However, due to fatalities, alcohol, drug use, or suspected felonies, they are required to be taken. Measurements that must be taken include: skid marks, highway curves, debris patterns, intersection locations, vehicle placements, and many others. Conventional measurements using a triangulation method with a tape measure can take from 1-4 hours to complete. One method that has been used in Washington State to expedite this requirement is "Total Stations." Total stations uses a computer measuring device similar to that used in general surveying. Distances are measured automatically in approximately 1/3 the time. The measurements can be taken over moving traffic so measurements won't shut down a facility completely. They are more accurate than the conventional method and are stored in a computer on-site for later evaluation and plotting in the office.

Visual clutter seems to be a major distracting factor when motorists drive by an incident. Even if it is a minor fender-bender, there are sometimes 10 or 20 emergency vehicles with lights flashing, thus, giving the appearance that a major incident has occurred. As much as possible, it is recommended that emergency vehicles limit their flashing lights.

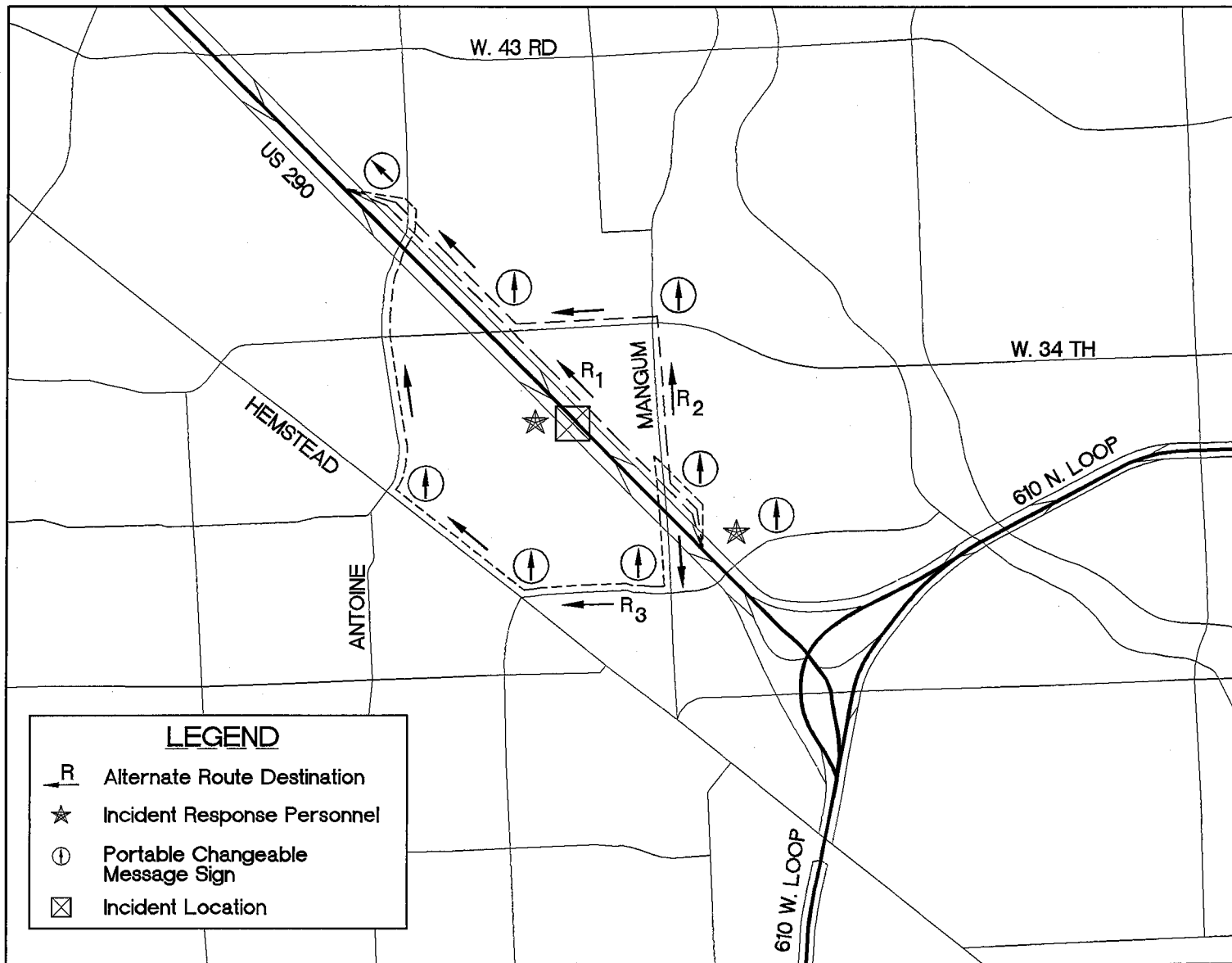


Figure C-2. Example of Incident Diversion Strategies

This is not always possible; however, it is crucial in restoring traffic to its optimum operating speed.

In addition to flashing emergency lights, the number of emergency vehicles on sight at an incident can be overwhelming. A method of working an incident from one side of the freeway has worked well for other areas. The technique is to establish with all agencies involved that the incident will be worked from the inside or outside lanes of the freeway. Further, restrict emergency vehicles to as few lanes as possible - preferably 1 or 2 lanes, including the shoulder. The concept is to allow movement of emergency vehicles to the scene while providing the maximum number of lanes and the opposing shoulder for traffic to continue to travel.

A centralized control facility is another aspect of improved incident management procedures. A multi-agency dispatch unit would provide a centralized point for all agencies to coordinate and communicate their efforts in an incident situation. Houston has an interim traffic management center where several agencies coordinate their activities. The permanent facility is to be constructed within the next two years. At that time all agencies involved in incident management and coordinated advanced technologies should be in place.

Training

Training can encompass many different aspects depending upon the agency and its involvement in dealing with incidents. Each agency representative should be thoroughly trained within his/her respective expertise. However, there needs to be a greater appreciation and/or understanding of all agencies in the aspects of traffic control and efforts needed to restore and keep traffic moving in and around an incident.

A training system or gathering of all agencies to deal with major incidents could be a positive step to improve incident management procedures. The Federal Highway Administration (FHWA) has a Demonstration 86 Project that promotes multi-agency involvement to improve incident management. However, it is basic in its approach, and its

success depends greatly on continued meetings of all agencies and support from all executives within the different agencies. One suggestion by agency leaders was to offer two training classes at two different times so that all emergency personnel could attend. The most important thing is that training continue for all agency personnel, that each agency understands what the other agencies are responsible for, and that there is a greater appreciation of traffic control needs to be addressed at every incident.

Benefits of Improvement in Incident Response and Clearance Time

An improvement in response techniques for incident management can reduce the detrimental aspects of vehicle congestion. Reduced congestion equates to less delay which means an improvement in air quality, not to mention reducing secondary incidents and savings of vehicle emissions and dollars to the motorist.

Appendix A

Traffic Management Team Members

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Appendix B

Technical Memorandum entitled, "Development of Guidelines for Traffic Management in Response to Major Freeway Incidents - Task 3. Incident Inventory" attached here. See **INCIDENT INVENTORY AND CLASSIFICATION** chapter in the body of the main report for data.

Appendix C

HOUSTON FIRE DEPARTMENT

HAZARDOUS MATERIALS RESPONSE TEAM

ANNUAL REPORT

1991

SUMMARY

The Hazardous Materials Response Team (HMRT) chalked up 520 hazmat incidents in 1991, but the number cannot be compared to hazmat incidents of the past. HMRT adopted the definition of the National Fire Incident Reporting System for hazmat incidents at the beginning of the year, and comparisons to past years are no longer valid without redoing old records -- which is not worth the effort.

Personnel turnover was greater this year than at any time since HMRT's inception in 1979. One-third of the team now has less than one year with HMRT. Most of the change resulted from a new shift that was added at mid-year. Also, the assistant coordinator position was finally filled.

HMRT no longer appears to be a step child of the Fire Department. All four pieces of its apparatus look first-class after acquiring a decent engine to replace Foam-22 and getting the utility truck repainted. No longer do the rigs of HMRT reflect the colors of the rainbow; they all have the white-over-red color scheme of the department.

Industry, once again, proved most generous with its continued support of HMRT. Two tank trucks were donated to the team this year and industry provided training for many members of the team at special hazmat schools. One company is showing interest in providing a much needed portable computer for the communication rig.

HMRT remains the focal point for the Fire Department's involvement with the Channel Industries Mutual Aid (CIMA) organization. The team continues to monitor calls for Houston resources and helped in the modification of four engines to class as CIMA Type 1 engines.

It was a successful and challenging year for HMRT, and there is no reason to believe that the team will not be equally successful in 1992. HMRT remains, as always, ready to face what the new year brings.

ACTIVITIES AND PLANS

Houston's Hazardous Materials Response Team (HMRT) experienced quite a change in 1991 with the addition of a fourth shift and a return of an old position, the assistant coordinator. Training continued as a high priority throughout the year, the foam engine changed faces -- twice -- and a chance for a new apparatus bit the dust. Unfinished and new projects fill the schedule as HMRT enters the new year.

New Shift Added

The Fire Department went to four shifts on May 25 and HMRT's minimum manning was upped by one. Personnel work less than the 46.7 average work week under the new schedule so they are assigned debit days to make up the time. Under the old 3-shift schedule, which was more than the 46.7 hours, each man had a platoon day -- an extra day off to reduce the time worked. Now he must periodically work one of his off-days, which increased daily manpower strength. Almost every day, someone from another shift is working. This enabled the team to increase minimum manning to seven.

Old Position Filled

An assistant coordinator was brought aboard this year after the promotion of one of the HMRT captains. The position had been abolished several years ago because filling the job with someone outside the team never proved satisfactory. It was decided to wait until someone within the team made rank before reestablishing the position, which occurred at mid-year. The assistant coordinator removes the detail from the coordinator who will devote his time to overall planning and doing the extra jobs he inherited during the early depression years.

Personnel Changes

Never has there been such a vast change of personnel within the team, as happened this year. Twelve new men were assigned to HMRT and nearly exhausted the list of trained technicians in the department. Four of the nine team members who received promotions this year had to accept assignments other than HMRT because there were no openings for the new ranks within the team. Almost a third of the team has less than one year with HMRT as 1991 fades into history.

A Bit of Trivia

The average age of the team is 36.5 years despite the influx of so many new men. (Of course, this is excluding the coordinator or the average age would shoot out of sight!). One of the technicians has passed the half-century mark and another nine members are over 40 years old. Only three of the team are under 30 years of age. C-Shift has the oldest average age and B-Shift the youngest.

Seminars Cancelled

Quarterly seminars, which are held four times each year, were cancelled after two quarters this year. Too much was taking place at mid-year because of the new shift to determine an exact adjustment of the schedule, so the seminars were suspended. Quarterly seminars are used to provide special training for the team as part of the retraining requirements of federal law. Resumption of the quarterly seminars is planned for next year.

Annual HMRT School

The Fire Training Academy was undergoing a transition during the time the annual school was scheduled so a decision was made to forego the school this year. But the decision was reversed after it was discovered that many of the trained technicians had been promoted and there were few left to fill vacancies. A school was held, but the hours of training had to be reduced.

(The training still met the requirements of federal law for hazmat technicians). Another school is planned for early next year to complete the normal hours of training. Eleven men attended the school (plus one man from the Port Authority), and there are now 16 trained technicians in the fire department to fill HMRT vacancies.

Technicians Ride Back

Trained technicians began riding with HMRT on one of their debit days during the last half of the year. It has been as long as two years before a technician, who gets no further training after hazmat school, is picked for the team. To prevent this happening in the future, technicians ride with the team on one of their debit days to experience an incident or two, train with the team, and review the equipment. Present plans call for technicians to ride with HMRT at least twice a year, which may not be often enough, but is an improvement over the past.

Rescue Companies Retrained

An incident where trained personnel were needed to help HMRT focused attention on the lack of hazmat-trained rescue personnel, who back up HMRT at major incidents. Personnel changes had reduced the number of personnel on rescue companies with hazmat training. As a result, rescue companies were immediately trained. All rescue personnel -- 42 men -- have now been trained in the use of chemical protective clothing, monitoring equipment, spill control, and decon. Future retraining will take place on a regular basis.

Outside Training

Industry has been more than generous this year with special training. Fifty-three members of HMRT received various types of training during the year. Following is a list of the training (and location) that the men received, the number of men attending, and the company providing the training:

CHEMTREC Workshop (Beaumont, TX)	1	Chemical Manufacturers Assoc.
AAR Tank Car School (Pueblo, CO)	1	Shell Oil Company
Emergency Mgmt. Techniques (Beaumont, TX)	8	Goodyear Tire & Rubber Co.
Tank Car & Spill Control School (Sweeny, TX)	3	Phillips Chemical Co.
Tank Truck Rollover School (College Sta., TX)	1	TX Tank Truck Carriers Assoc.
Corporate Firefighting School (Sweeny, TX)	4	Phillips Chemical Co.
Basic Technician School (Sweeny, TX)	2	Phillips Chemical Co.
Tank Truck School (Houston, TX)	33	Mission Transport Co.

New Training Aids

Two chemical tankers were added to the school this year and brings the goal of complete tank truck training at the Fire Academy one step closer to reality. Shell Oil Company donated an MC 331 tanker, and Matlack, Inc. donated an MC 306. This leaves but a corrosive tanker (MC 312) to round out the props. The MC 331, which has been modified to haul hazardous waste, will be restored to its original condition by the team in 1992. This requires replacing the plumbing with the proper valves and piping.

Radiological Exercise

The Office of Emergency Management involved HMRT in its annual exercise, which was a radiological incident. Some shortcomings showed up and were addressed in HMRT's training. Planned for early next year is an exercise at Lake Houston, a major water supply for the city. Several trains loaded with hazardous materials cross over the lake daily and the trestle is upstream from the water intake. The Local Emergency Planning Committee had put together a plan last year for handling a train derailment on the trestle and HMRT plays a key role in the plan, which the exercise will test.

Lost-Time Injuries

HMRT did not record one lost-time injury from handling hazardous materials in 1991. This was quite an improvement over the five lost-time injuries suffered last year and, hopefully, will continue throughout the new year.

Foam Engine Replaced

A "new" engine was assigned to HMRT in December to replace Foam 22, an old engine that took the place of the original foam engine, which was totalled in an accident last year. Earlier in the year, the team had modified the first replacement engine so it could emulsify diesel spills more quickly on freeways, a primary job of the wrecked foam engine. A portable pump was mounted in the basket and takes suction from the booster tank. The pump is piped to two spray bars which the team had fabricated and mounted under the frame. This permits the engine to emulsify as it is driven over a spill, and speeds the reopening of a closed freeway -- a top objective of the team. The original foam engine had but one spray bar and would have to make a second sweep over spills that were not easily emulsified. The second spray bar permits a double application of the dispersant in one sweep. Offloading and decon equipment were also transferred to the replacement engine.

It was not long before the engine was tagged the "Yellow Dog." The engine was inherited from a volunteer department which had been annexed into the city at some time during the turn of the century -- or so it appeared. The engine was painted yellow and not too dependable. Not much would be done to improve its dependability, nor to change the color, because it was such a relic. But the gripes from the team did not go unnoticed. In mid-December, the body shop foreman surprised HMRT with a newer truck painted in the department's red-white color scheme. The team has a lot of work ahead to transfer, once again, the portable pump, spray bars and all of the other equipment. Also, the team plans to fabricate and mount a stainless steel foam tank so the engine will have the foam capabilities of the original foam engine. The body shop also repainted the blue utility truck so all HMRT rigs are now the same color.

New Apparatus Delayed

Specifications for a new unit and a new foam engine have been put on hold. There was an outside chance that HMRT could encumber money for the new rigs this year so specifications were hastily prepared. Unfortunately, that outside chance never materialized. The team must now wait until the economic climate improves in Houston, hopefully before the units get too old.

Portable Computer

HMRT may finally get a computer aboard the communication rig (Unit 2) next year. The Local Emergency Planning Committee (LEPC) has accepted the challenge and is seeking a donor for a Mackintosh PowerBook 170 (portable computer) and a portable printer. One chemical company has already indicated a willingness to make the donation. Stauffer Chemical Company donated a computer for the rig several years ago but there is no way a desktop computer will work in HMRT's rig. LEPC was approached after Apple came out with a laptop computer, and because getting a new rig, which would accommodate a desktop computer, is out of the question.

A portable computer will provide access at every hazmat incident to tie to all reports and to general chemical information. Hazmat data are presently faxed to the scene when someone remains at the station. The station, however, is usually cleared for incidents that wind up really needing the data. An additional advantage of a portable computer over a desktop is that a portable computer can be used while the rig is in motion; use of a desktop computer must be postponed until the rig is parked at an incident. Chemical and facility data can be researched in route to the scene with a laptop.

Engines Modified for CIMA

Four 1500 gpm engines were modified this year to meet the specifications for Type 1 engines of the Channel Industries Mutual Aide (CIMA) organization. The four companies are Engines 223, 29, 42 and 44. Two of the engine companies are located north of the ship channel, and two are south of the channel. CIMA's water flow standard is 1500 gpm so the hose beds

were arranged to lay two 4" supply lines simultaneously. Adapters were furnished to make it possible to connect the lines to 5" Storz and 4-1/2" NST fittings, CIMA's standard for couplings. All four shifts were then indoctrinated in CIMA procedures. Since other fire companies and ambulances appear on CIMA alarm lists, department procedures were later developed for responding to CIMA emergencies and for requesting CIMA assistance.

In October, the four engine companies took part in CIMA's annual drills. The drills provided experience for the chauffeurs in moving water for CIMA incidents and pointed up shortcomings with the modifications. Additional fittings and hose had to be added to the engines. The engine companies also participated in five weekly training sessions with Lyondell Petrochemical Company the following month.

The CIMA radio must be monitored at all times, but fire alarm will not take on the extra burden, so HMRT continues to monitor the radio. A run schedule was developed for CIMA calls, and when a request for assistance comes in, HMRT must check the schedule and pass the information to fire alarm for dispatch. The procedure leaves much to be desired, but it will have to suffice, for now.

Ride-A-Long

Twenty-three technicians from industry and from other fire departments rode with HMRT during the year in the Ride-A-Long program. The hazmat technicians stay at the station where they work and train with HMRT and respond to hazmat incidents. Some of the riders came from Phillips Petroleum Company (Bartlesville, OK), Mobile Oil Corporation (Paulsboro, NJ), and from NASA.

Code Yellow Revival?

Two incidents occurred this year that makes one feel a need to bring back "Code Yellow," which was an attempt to have HMRT involved at railyard incidents. HMRT was not being called to railyard incidents unless the incident escalated, so an agreement was reached with the railroads:

the railroads would notify the fire department on every railyard incident and, for the "minor" incidents, HMRT would respond nonemergency. But, someone leaked the agreement to the news media and the agreement ended post haste.

One of the incidents to which Code Yellow may have changed the outcome was a release of 12,000 gallons of sulfuric acid from a tank car that had been bumped top hard in a railyard. It was not until the Texas Water Commission asked HMRT to monitor the incident -- five hours after the accident -- that HMRT became aware of the spill. HMRT was called to a second incident only after the driver of a tank truck could not figure how to offload a leaking tank car; HMRT was finally called to set up the transfer operations. Code Yellow could have prevented the delays in getting both incidents stabilized.

Extra Activities

HMRT was involved in a few extra activities during the year. One of the activities was a demonstration by the team in handling an overturned tank truck for the American Petroleum Institute at its annual conference in Houston. At three of the functions, HMRT was host for a railroad tank car seminar put on by the Houston Hazardous Materials Association, DOT's semi-annual Conference on Hazardous Material Disposal (COHMD), and one of EPA's Hazmat Response Schools. HMRT took part in the 1991 Southern Bulk Transport Show, the Bay Area Household Hazardous Waste Collection, the annual crisis management drill of Mobil Chemical Company, Exxon Chemical Company's emergency preparedness planning, and a review of the hazmat emergency plan for Houston Intercontinental Airport. Already the calendar is filling for events scheduled for early next year.

Spill Requests Soar

Requests for information about spills took a dramatic increase in 1991. Buyers are liable for hazardous wastes that are left at, or have contaminated, property they intend to purchase. HMRT is asked to search its records for spills that may have occurred. The number of requests have been going up over the years, but the requests jumped a whopping 300 percent this year:

almost 1100 individual sites this year over the 367 searches in 1990. It has almost reached a point where some charge is needed to compensate the city for the time spent searching past incidents. Depending on the location of a property, a search can tie up the computer for 15 to 20 minutes, and then there is the additional time required to get the details of any spills.

GENERAL STATISTICS

HMRT moved closer to the National Fire Incident Reporting System (NFIRS) this year by not recording those hazmat incidents that have been handled by fire fighters for decades. Comparing the 1991 data with previous years will not be accurate in some categories. Perhaps the switch to NFIRS will start to produce positive comparative data in the future. HMRT reporting has definitely not been static over the years; it experienced change year after year.

HazMat Responses

HMRT wound up the year with 520 hazmat incidents, compared to 682 incidents in 1990. The comparison is meaningless, however, because hazmat incidents that are excluded from NFIRS reporting were omitted this year. NFIRS does not classify hazmat incidents that have been traditionally handled by fire fighters. Those incidents involve domestic gas lines smaller than 2" in diameter and vehicle fuel tanks of less than 42-gallon capacity. Engine companies alone are routinely sent to these types of incidents, which number in the thousands each year, but HMRT is occasionally dispatched. Had these incidents been added to the total, as they were in past years, the number of hazardous incidents would be 667 this year, down 15 from the hazmat incidents recorded in 1990.

Total responses for HMRT in 1991 reached 746, two short of the total responses last year of 748 (See Appendix A). Seventy-nine of the responses were false alarms or scares or other incidents that turned out not to involve a hazardous material. Last year there were but 67 such incidents.

Response Time

Almost one minute was added this year to the average response time of HMRT in 1990. This year, the average response time for the team to arrive at a scene was 15.7 minutes, up from the 14.9 minutes recorded last year. Response time to mutual aid calls outside the city limits were included in the response time this year and may account for a small portion of the extra

time; mutual aid response time was excluded last year. The average response time is still acceptable for one company covering 578 square miles -- and beyond.

The longest time HMRT spent responding to an incident this year totalled 46 minutes and was three minutes less than the longest response time last year of 49 minutes.

Types of Incidents

Types of hazmat incidents are divided into eight categories (Figure C-3) and are as follows:

An explosion and fire at a tank cleaning facility this year was recorded (logically) as an Explosion. The natural gas explosion in a boiler room blew out a fire wall and ignited hexane vapors being washed from an intermodal tank in the adjacent room. The fire was quickly extinguished while HMRT contained the gas leak. There were 13 incidents classified as Explosion this year compared to 19 in 1990.

Titanium tubes inside a heat exchanger ignited as workers cut up the heat exchanger for scrap and became one of the 72 Fire incidents in 1991, up from 63 last year. Because of the deformation of the exchanger, caused by the heat, it was impossible to apply dry power effectively into the exchanger and the fire was allowed to burn out in the junk yard. This was done after HMRT determined the smoke from burning titanium is not toxic.

One of the 203 Spills for the year happened after an intermodal container was dropped into the hold of a ship. Some of the 76 drums of diphenylmethane diisocyanate were ruptured in the fall. A dock worker quickly removed the container and spread the balance of the 1500 gallon spill onto the dock. This compares to 235 spills in 1990.

Leaks are incidents where the release is so slow that the liquid only puddles on the ground; the release does not run off. One of the 14 such leaks this year involved methyl tert-

Type of Incident	1991	1990
Explosion	13	19
Fire	72	63
Spill	203	235
Leak	14	29
Release	95	235
Investigation	106	73
Sample/Pick Up	15	27
Radiation	2	2
NON Hazmat	147	-

Figure C-3. Types of Incidents

butyl ether bubbling from the two safety relief valves of an overfilled tank car in a railyard. HMRT transferred 200 gallons from the car before the valves reseated. Leaks accounted for 29 incidents last year.

Gaseous Release incidents registered a huge drop from 235 in 1990 to 95 this year. The drop resulted from the switch to NFIRS' hazmat definitions. One of the release incidents was a leaking cylinder of boron trifluoride inside a cargo van at a truck terminal. HMRT attempted to reach the cylinder by breaching a wall of the van, but the cylinder, buried among the load of mixed freight, was not where a company representative had said. HMRT finally had to move most of the freight to find and contain the leaking cylinder.

A freight van carrying 40 drums of nitromethane was involved in an accident on a major freeway. Police closed the freeway until an assessment was made by HMRT. No leakers were apparent so the incident was recorded as an Investigation, one of 106 times this year, compared to 73 investigations in 1990.

Sample/Pick Up is a category applied to incidents involving midnight dumpers and clandestine drug labs. Samples are pulled for analysis (and later disposal) or chemicals are retrieved. This year, chemicals from 12 incidents were carted to the disposal company, and samples were pulled at three of the incidents. The total for the year of 15 Sample/Pick Up incidents is down from 27 in 1990.

The number of Radioactive incidents remained the same as last year at two, both of which were insignificant.

Non-Hazmat are those incidents that are not classified as hazmat incidents by NRFIRS. The team responded to 144 such incidents, which included 126 natural gas releases. Seventeen gasoline spills and a single LPG incident. HMRT was needed to stabilize some of the incidents, but the size of pipe or capacity of fuel tank was less than NFIRS defines as a hazmat incident.

Multiple Incidents

HMRT was handling a leaking tank car of cyclohexane in a storage yard at the port when the team split for a second incident. Debris on the tracks had ruptured a diesel engine's fuel tank on the other side of town and resulted in the loss of 4000 gallons of fuel along the railroad right-of-way. This was one of 52 times that simultaneous hazmat incidents occurred this year, one more than last year when two or more incidents overlapped. Hazmat units are equipped identically for multiple incidents.

Types of Containers

Type of container is a category used to describe the container involved in an incident. (See Figure C-4). Several bags of caustic pellets fell from a truck and spread 400 pounds of the material along a freeway. HMRT recovered most of the spill, which accounted for 52 incidents in the Bottle/Pail/Bag category. This compares to 67 incidents last year. The category breaks down to: bottle/can 27; pail, 9; and bag/box, 16.

An employee failed to tighten a regulator on a 150-pound cylinder and 50 pounds of chlorine gas escaped before HMRT contained the release. The incident was one of 34 releases from a Cylinder in 1991, up from 28 last year.

Drum became the top container category this year with 86 incidents, up from 61 in 1990. One such incident occurred at a truck terminal where a drum of benzyl chloroformate was

Container Type	1991	1990
Bottle/Pail/Bag	52	67
Cylinder	34	28
Drum	86	61
Vehicle Fuel Tank	73	106
Intermodal Tank	5	3
Portable Tank	0	7
Process Tank	14	8
Storage Tank	15	25
Fixed System	63	162
Pipe	52	92
Tank Truck	15	21
RR Tank Car	14	15
Ship/Barge	2	2
Transformer	6	7
Well Component	2	3
Other	14	34

Figure C-4. Container Types

bulging dangerously. Dry ice was used to control the temperature of the product, which gives off phosgene if allowed to heat, but the shipper had failed to vent the drum. HMRT released the carbon dioxide buildup through the bung.

There were 73 incidents in the Vehicle Fuel Tank category this year, compared to 106 in 1990. Everyone of the incidents were truck saddle-tanks and generally involved a large spill or the fuel was spread a distance along a freeway or other major roadway.

An Intermodal Tank was not prepared properly for shipment and began to release butadiene after it arrived at the docks, at least that is when the release was noticed. HMRT tightened a loose flange on the container to conclude the incident, which was one of five intermodal portable tank incidents in 1991, up from three the previous year.

Portable Tank category drew a blank; there was not a single incident in 1990 where the container classed as a portable tank. Last year there were seven portable tank incidents.

A bad batch of refinery residue oil overheated in a Process Tank, and workers had to open the tank to relieve the building pressure. Four of the workers were transported to a hospital, and scores of people in the area were treated at the scene. The acrid release, which continued for six hours, was one of 14 incidents in 1991 involving process tanks. Last year, there were eight incidents.

Storage Tank is the category for fixed tanks and range from small underground tanks to huge 100,000+ bbl tanks. Vandals put a garden hose into an underground storage tank and floated 1800 gallons of gasoline from the tank. The gasoline flowed into a nearby bayou, but HMRT was able to boom most of the spill for removal with a vacuum truck. This was one of the 15 storage tank incidents in 1990, down from 25 last year.

As predicted last year, Fixed System dropped this year from its usual spot as the type of container involved in the most number of hazmat incidents. This resulted from the changeover to NFIRS, and natural gas lines on the consumer side of a meter are no longer counted. One of the fixed system incidents this year occurred at a refinery where a 6 inch feed line of low octane gasoline ruptured inside a heat exchanger. The fire was extinguished after the feed line was blocked in. There were 63 releases from fixed systems this year. A true comparison to last year's 162 fixed system cannot be made because domestic gas lines were omitted this year.

One Pipe incident in 1991 occurred after gasoline residue ignited as a crew was refurbishing an 18-inch pipeline. HMRT extinguished the fire with dry chemical while a deck gun cooled an adjacent 30-inch line. Pipe incidents reached 52 this year, compared to 92 in 1990.

A Tank Truck overturned making a U-turn under a freeway shortly after loading at a nearby gasoline terminal. HMRT used dome cover clamps to stop several leaking domes and plugged two leaking drains from between the tank compartments. About 100 gallons of gasoline

were lost. The team concluded the incident by drilling and offloading the balance of the 8600 gallon lading. The incident accounted for one of the 15 tank truck incidents this year, compared to 21 last year.

There were 14 railroad Tank Car incidents this year, one of which involved a derailment with four tank cars overturned. One of the cars was leaking acetic acid from the vacuum breaker valve. HMRT caught the acid in a plastic pail until the car was uprighted to stop the leak. Last year, there were 15 railroad tank car incidents.

An empty coal barge broke loose and slammed into a loaded barge of methyl tert-butyl ether tied to a loading dock in the ship channel. The collision ripped a hole in the MTBE barge and released about 180 barrels of product into the channel. This was one of two Ship/Barge incidents in 1991, the same number as last year.

Thieves drained the oil from a large electrical transformer in an attempt to steal the cooper wire. The spill marked one more for the Transformer category which wound up at six this year compared to seven last year.

One of the two incidents this year involving Oil/Gas Well was a nipple blowout from a Christmas tree on a gas well. There were three incidents in 1990 which were chalked up to the Oil/Gas Well category.

Batteries fell from a truck and spilled 15 gallons of sulfuric acid. HMRT neutralized the spill and checked Other category, which reached 14 this year, down from 34 in 1990.

HazMat Site

Fixed Property Use is divided into nine major categories and defines where hazmat incidents occur (Figure C-5). Residential property registered the largest drop from last year because of the switch to NFIRS' definition of a hazardous material. Domestic gas releases from pipe smaller than two inches in diameter were excluded from this year's figures and dropped the

Fixed Property Use	1991	1990
Public Assembly	2	1
Educational	11	11
Institutional	4	7
Residential	37	140
Store and Office	87	106
Basic Industry/Utility	53	51
Manufacturing	23	29
Storage	17	30
Special	286	307

Figure C-5. Comparison of Fixed Property Use

number of incidents that occurred on residential property to 37, a dramatic fall from the 140 residential sites recorded in 1990.

Special property was the site of most hazmat incidents in 1991, the same as last year. One reason for the large number of incidents is that road property, site of 38 percent of all hazmat incidents, is included in NFIRS' special property category (Figure C-6).

Special Property	1991	1990
Airport	2	4
Construction	1	4
Docks	11	9
Railroad	16	18
Road	196	307
Truck Terminal	10	7
Vacant	21	29
Water	22	8
Other	7	11

Figure C-6. Comparison of Special Properties on Which Hazmat Incidents Occurred

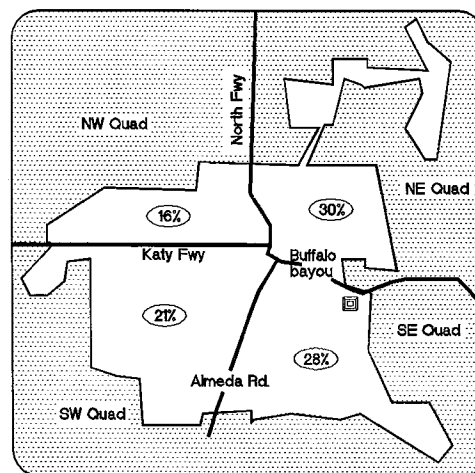
In HMRT reporting system, Road property is broken down to show freeways separately from streets. This is because hazmat incidents that occur on highways and freeways cause more problems in handling the incident. HMRT must also work a freeway incident until normal traffic flow has been restored, which requires going beyond the stabilization phase. There were 67 hazmat incidents on freeways this year in comparison to 87 in 1990. Street incidents reached 110 this year, almost the same as last year.

To balance the road property figure, Parking Lot, which falls under road property in NFIRS, recorded 19 incidents and brings the category to the total shown in Figure C-6.

HazMat By Quadrants

Figure C-7 shows a breakdown of hazmat incidents by city quadrants. Over the years, hazmat incidents have occurred in a fairly consistent pattern across the city. The eastern half of the city accounts for roughly 60 percent of the incidents, partly because this is where the major industrial sites, docks, and most railyards and truck terminals are located.

This year, incidents outside the city (OCL) are not included in the quadrants and account for the discrepancy in percentages. The missing five percent is due to OCL incidents.



(Location of the HMRT station is indicated by Maltese Cross)

Figure C-7. Percentage of Hazmat Incidents by City Quadrants in 1991

HazMat By Fire Districts

The top five fire districts for hazmat incidents are districts in the eastern half of the city -- which definitely is not surprising since 58 percent of the incidents occurred in that half of the city. District 20 topped the fire districts with 68 hazmat incidents, followed by Districts 45 and 19 with 47 and 44 incidents, respectively. (See Appendix B for the number of incidents recorded by all fire districts). Mutual aid calls to hazmat incidents outside the city hit 24 this year in comparison to 19 last year. One of the mutual aid calls was to an overturned intermodal container with 72 drums of diphenylmeth and diisocyanate. HMRT assisted in uprighting the container and checking the load for leakers.

Transportation Incidents

Thirty-nine percent of the hazmat incidents this year were transportation related, the same percentage as occurred last year. There were 202 transportation incidents in comparison to 262 in 1990. See Figure C-6 for a breakdown of the incidents by mode of transportation.

Transportation Mode	1991	1990
Tanker Truck	140	169
Tank Car	43	70
Rail	15	16
Ship	3	6
Air	1	1

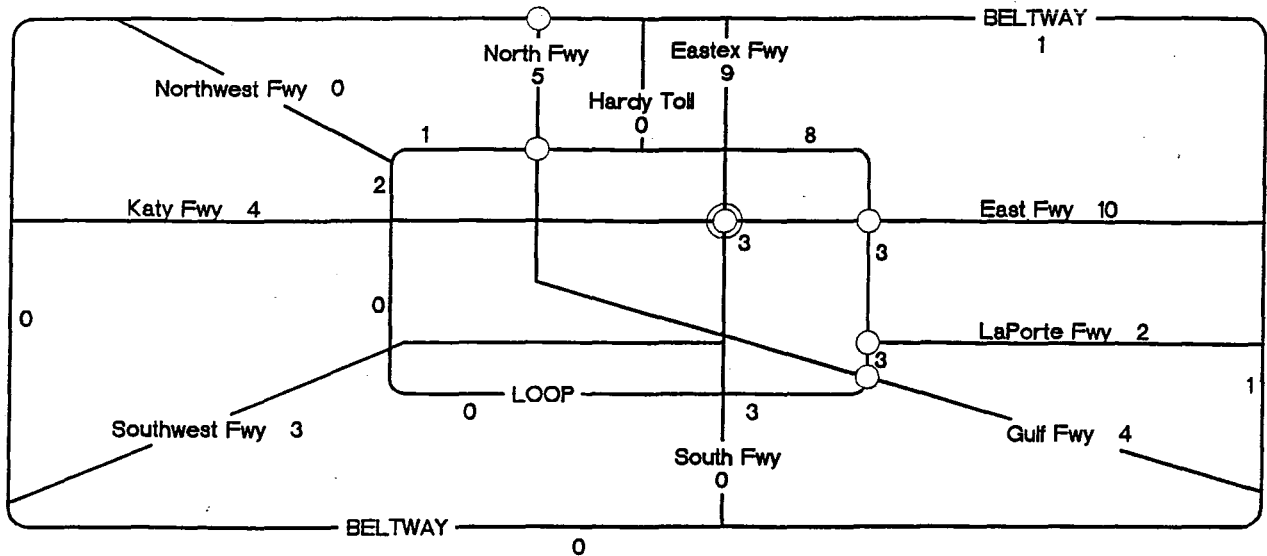
Figure C-8. Number of Incidents by Transportation Mode in 1990 and 1991

Freeway Incidents

Sixty-seven hazmat incidents occurred on the freeways, down from 87 incidents in 1990. More than one-half of the incidents were on freeways in the northeast quadrant of the city.

Registering the most hazmat incidents was the East Freeway with 10 incidents, down from 19 the previous year. Following closely behind the East Freeway were the Eastex Freeway and

the North Loop East with nine and eight incidents, respectively. Seven freeways experienced no incidents in 1991, a welcomed increase from only three that were free of incidents last year. Three of the freeway incidents occurred at the interchange of the Eastex Freeway and East Freeway. Five other interchanges experienced a single hazmat incident (Figure C-9).



Circles indicate one or more incidents at the interchange.

Figure C-9. Number of Hazmat Incidents on Freeways and Freeway Intersections in 1991

Clearing Closed Freeways

Returning a freeway to normal traffic flow after a hazmat incident has always been a major objective of HMRT. This was in mind when equipment and supply needs were determined and modified over the years. Fifteen times this year hazmat incidents to which HMRT responded had freeways closed. It took an average time of 2 hours, 42 minutes to return a freeway to normal traffic flow, compared to 2 hours, 25 minutes last year.

Two of the 13 incidents may have contributed to the slight boost of the average time to clear a freeway over the time spent last year. One of the incidents involved an overturned intermodal container loaded with 70 drums of toluene diisocyanate. After the container was uprighted, the container was moved to the carrier's nearby yard to check for leakers because rush hour had just begun. The incident already had the freeway interchange closed for nine and a half hours. The second incident was an overturned MC 307. It took six hours to drill and offload the 50,000 pounds of inedible tallow and steam clean the 500 gallon spill from the freeway.

Miscellaneous Data

The following statistics coincide with NFIRS' report, which is to be incorporated into the department's record system early next year. It was intended to start NFIRS' hazmat reports this year but procrastination of the HMRT coordinator let the time slip away. A meeting is scheduled with Fire Records immediately after the first of the year.

Physical State

There are three physical states of hazardous materials: solid, liquid and gas. NFIRS' forms seek the physical state of a chemical prior to its release. The state of the chemicals handled by HMRT in 1991 just before they escaped from their containers was: Solid , 29; Liquid, 255; and Gas, 124.

Release Factor

Factors which are present at the time and place of the incident that caused, or contributed to, the release of hazardous materials are listed in Figure C-10, along with a comparison to the previous year.

Release Factors	1991	1990
Intentional	28	29
Suspicious	6	7
Failure to Control	33	53
Abandoned	29	28
Misuse of Material	13	11
Mechanical Failure	84	145
Design Deficiency	3	4
Operational Deficiency	22	35
Collision Overturn	124	184
Natural Consideration	4	2
Unknown	42	55
Fire/Explosion	38	39
Other	5	4

Figure C-10. Comparison of Release Factors, 1991 to 1990

Response Actions Taken

Response actions are those things done by trained personnel to stabilize a hazmat incident. The special actions listed in NFIRS are not too realistic, and some revision will have to be made next year. Response actions taken by HMRT in 1991 (See Figure C-11) are included in but one category of NFIRS' hazmat report. Some adjustment of the report will be made next year so that NFIRS will receive data compatible with its system, and HMRT will still retain the individual response actions that it records.

Special Response Actions	1991
Absorb	57
Blank	1
Control Burn	2
Dam	4
Dike	32
Dilute	9
Disperse	8
Divert	3
Emulsify	92
Extinguish	43
Flare	1
Monitor	200
Neutralize	16
Overpack	15
Patch/Plug	67
Retrieve	21
Stop Flow	42
Transfer	25
Upright	18
Vent	6
Ventilate	35

Figure C-11. Special Response Actions in 1991

Chemicals Handled

HMRT handled 180 different hazardous materials this year, compared to 190 different chemicals in 1990. Other than gasoline, diesel, and natural gas, chemicals that were involved at five or more incidents in 1991 (and the number of times each chemical was involved) were: Acetylene (6); Anhydrous Ammonia (10); Ammonium Hydroxide (9); Hydraulic Oil (23), Hydrochloric Acid (8); Propane (21); Sodium Hydroxide (9); Sulfuric Acid (10); and, Waste Motor Oil (6).

Of the 180 chemicals this year, 14 were listed as extremely hazardous substances (EHS) by the Environmental Protection Agency (Figure C-12), compared to 18 extremely hazardous substances handled last year. One-half of the extremely hazardous substances showed up at more

Extremely Hazardous Substances Handled by HMRT in 1991
Arsenic
Aluminum Phosphide
Anhydrous Ammonia
Arsine
Chlorine
Chloroform
Hydrogen Sulfide
Methyl bromide
Nitric Acid
Phosphine
Potassium Cyanide
Sodium Cyanide
Sulfuric Acid
Toluene Diisocyanate

Figure C-12. EHS Handled by HMRT During 1991

than one incident: Anhydrous Ammonia (10); Chlorine (4); Chloroform (3); Hydrogen Sulfide (3); Nitric Acid (3); Sulfuric Acid (10); and, Toluene Diisocyanate (2).

HMRT Work Time

The total time HMRT spent handling hazardous materials incidents amounted to 656.8 hours, or 27 and one-third days, an increase over the total time worked last year of 603 hours. This averaged out to just short of 84 minutes that HMRT worked at each of the hazmat incidents this year, compared to the average time of 86 minutes last year.

The longest incident this year, almost 15 hours, occurred at a school district's cold storage warehouse. Some 500 pounds of anhydrous ammonia has leaked from the refrigeration system over a weekend. The release was stopped quickly but ventilation became the problem; it was impossible to keep the floors cleared after they were ventilated because the ammonia continued to gas off. The ammonia had saturated the building. Each floor had to be ventilated repeatedly. Operations were suspended after 15 hours, and HMRT returned the following morning with Big Blow -- a modified air boat used to ventilate buildings. In addition to Big Blow, smoke ejectors were employed in strategic spots throughout the building, and the warehouse was cleared later

the day. The incident compares to the longest incident last year of slightly over 10 hours at a fire aboard a Panamanian tanker in the ship channel.

Time of HazMat Incidents

The time when hazmat incidents occur has remained almost consistent over the years. Incidents happen more often during daylight hours, with the peak period occurring either during the 4 hour period prior to noon or the four hours just past noon. This year the peak occurred during the 4 hour block of time before noon: 0800 hours to 1200 hours. Figure C-13 pictures the number of hazmat incidents in 1991 that took place during various periods of time. Midnight to 0400 hours usually is the time of the least number of hazmat incidents, but this year it switched to the time-block just before midnight.

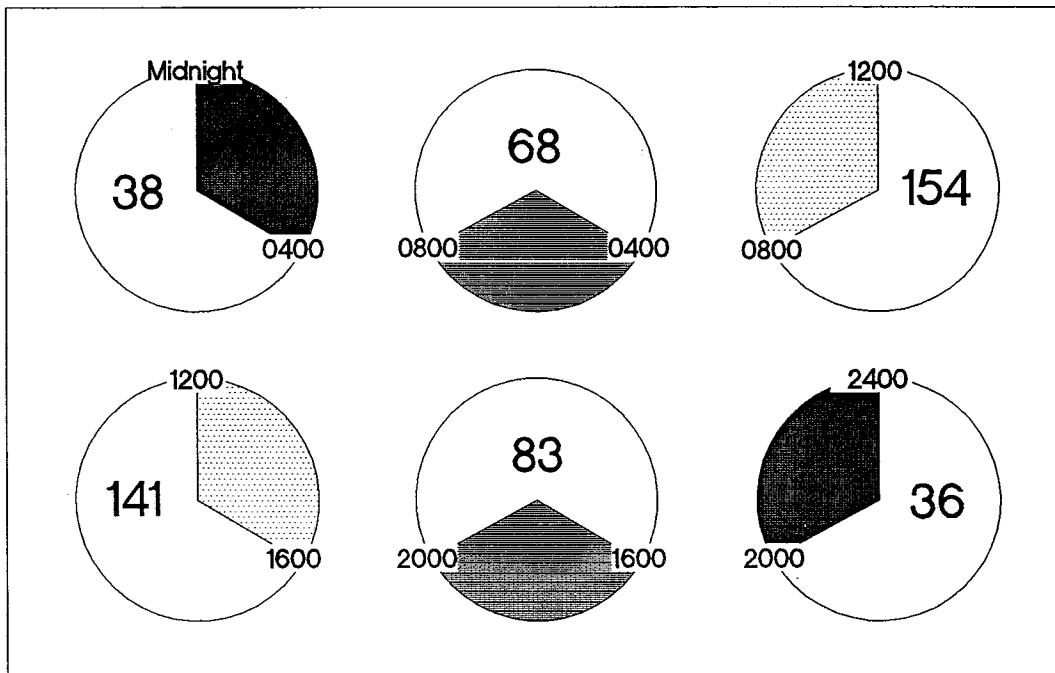


Figure C-13. Number of Hazmat Incidents During 1991 by 4-Hour Periods of Time

EPILOGUE

Nineteen-hundred, ninety-one was another successful year for the Hazardous Materials Response Team. Many goals were achieved during the year and the accomplishments can be credited to the hard work and dedication of each member of the team. Credit for the success is also attributed to the ever present generosity of industry and the total cooperation of the support divisions of the Fire Department. Even with this cooperation, however, HMRT's success would be difficult without the backing of the administration of the department, which has always been totally supportive of HMRT. The continued cooperation of so many is what permits the team, year after year, to fulfill its mission:

**THE PROTECTION OF CITIZENS,
THE ENVIRONMENT, AND PROPERTY
FROM THE RELEASE OF HAZARDOUS MATERIALS**

APPENDIX A - HAZARDOUS MATERIALS RESPONSE

Response By Shifts	1987	1988	1989	1990	1991
A - Shift	185	186	250	242	202
B - Shift	206	210	248	250	235
C - Shift	203	188	242	256	213
D - Shift (May 25)	-	-	-	-	97
Total HMRT Responses	594	584	740	748	746
Actual HazMat Incidents	499	510	667	682	520
Non-Rated Hazmat Incidents	-	-	-	-	147
Incidents with HMRT Action	362	350	446	429	471

APPENDIX B - HAZMAT INCIDENTS BY FIRE DISTRICT

District	Incidents 1991	Incidents 1990
05	36	37
06	31	32
08	39	61
19	44	51
20	68	69
21	13	23
26	41	57
28	23	37
31	36	51
34	13	32
45	47	70
46	33	40
64	12	17
68	11	36
69	11	24
70	16	35

APPENDIX D

Incident Management Plan Guidelines - Austin Case Study



Incident Management Plan Guidelines - Austin Case Study

Submitted to the Austin Traffic Management Team:

Texas Department of Transportation
The Austin Police Department
The Austin Fire Department
Emergency Medical Service
Department of Public Works and Transportation
Department of Public Safety
Travis County Sheriff's Department
Capital Metro

by:

Texas Transportation Institute
The Texas A&M University System
College Station, TX 77843-3135

Sponsored by the Texas Department of Transportation
in Cooperation with the Federal Highway Administration

July 31, 1994

INTRODUCTION

This case study uses I-35 from Rundberg Lane on the north to Ben White Boulevard on the south and including the downtown area of Austin. Part of this length of freeway includes a "double-deck" section where two lanes in each direction are elevated and the remaining lanes are at ground level. The elevated section poses particular hazards for incident response personnel, even for access on the opposite roadway because of the approximately 50-foot lateral distance between the two roadways. In some cases, a helicopter has been able to land on the freeway if there is complete control of traffic and there is no chance of vehicular interference.

The agencies required to assist in any particular incident are generally the same throughout the length of this section. In some cases, law enforcement personnel other than Austin Police Department (APD) are called in from other jurisdictions (e.g., Sheriff and Department of Public Safety). Spokespersons from the responding agencies provided much of the information for this case study.

PLANNING FOR MAJOR INCIDENT RESPONSE

Incident response planning consists of the following steps:

- Establishing multi-agency consensus for incident response planning,
- Identifying common incident classification,
- Establishing interagency cooperation agreements, and
- Developing interagency communication protocols.

Establishing Multi-Agency Consensus for Incident Response Planning

Austin has organized a Traffic Management Team (TMT) that meets monthly. The TMT has representation from: Texas Department of Transportation (TxDOT), the City of Austin (COA), APD, Travis County Sheriff's Department, Metro Traffic Control, Emergency Medical Service (EMS), Austin Fire Department (AFD), and others as the need arises. The TxDOT District Director of Transportation Operations chairs the TMT meetings.

Identifying Common Incident Classification

Each of the several agencies responding to an incident may view the incident and the way they respond in a slightly different manner. Austin does not currently use a common measure for indicating the severity of a given incident; however, such measure is desirable and is thus proposed for use. The measure that is expected to be most appropriate for all agencies is the duration of each individual agency's involvement in the incident. The duration of the incident decides the level, which is further described by the types of incidents that correspond to that classification, and the response activities that may be required. Table

D-1 shows five levels of incident classification, although cities the size of Austin might want to use only four. Five are typically used for larger cities.

Table D-1. Incident Classification Levels for Austin

	Incident Classification				
	Level I	Level II	Level III	Level IV	Level V
Types of Incidents (examples)	Vehicle stall on shoulder	Vehicle stall in travel lanes	Minor accident (no injuries) Major load spill	Serious accident (potential injuries) Spilled load (possible hazardous materials)	Serious accident (with major injuries) Haz. material spill Several vehicles on fire
Anticipated Duration of Lane Blockage	None	0 - 30 minutes	30-60 minutes	60-120 minutes	>120 minutes
Types of Response Activities	Motorist assistance	Motorist assistance with minimal on-site traffic control	Police assistance with extensive on-site traffic control Possible implementation of traffic diversion strategies Debris removal	Police assistance with extensive on-site traffic control Fire department response Haz. mat. response Traffic diversion strategies Debris removal	Police assistance with extensive on-site traffic control Fire department response Haz. mat. response Traffic diversion strategies Neighborhood evacuation Debris removal

Establish Interagency Cooperation Agreements

It is often useful to establish interagency cooperative agreements as part of major incident response planning. These agreements verify each agency’s commitment to work cooperatively during incidents and specify the types and amount of resources that each agency will be able to commit to incident response. The agencies in Austin that respond to incidents have agreed to work together in addressing problems created by incidents. They have agreed that leadership at the scene needs to be based on the specifics of a particular situation. For example, if TxDOT and APD are involved together, APD generally takes control. According to APD personnel, it is rare that TxDOT assumes the lead at the site. Also, according to EMS, the city has a Disaster Plan which specifies leadership based on the circumstances (e.g., tornado).

Austin has a good incident plan in place, according to some of the agency representatives interviewed. The plan prescribes who will be in charge, especially of certain aspects of the incident. If there are injuries, EMS is in charge, and other elements support them during this time. If hazmats are involved, the Austin Fire Department will be incident

commander. If it is a multi-vehicle pile-up, it will probably be a joint exercise. Upon being notified of an incident, APD, AFD, and EMS (and others as necessary) set up a command post to carry out any activities related to the incident. The responding agencies only use formalized response guidelines to address incidents on the "upper deck" of I-35, and they use hazmat protocols for overturned tanker trucks. Access to most elevated structures is particularly problematic for the Austin Fire Department.

Developing Interagency Communication Protocols

A coordinated multi-agency approach to incident response requires that officials from each agency be able to receive and pass along important information about the incident as it becomes available. This information flow process includes specific criteria concerning when each agency will be contacted, who the contact person(s) will be, and the appropriate method for communication. Appendix A includes the names of contacts for the I-35 corridor within the greater Austin area by agency and their telephone number.

Practically all agencies that get involved in incident response in Austin currently have, or will soon have compatible radios and other hardware so as to communicate with each other when an incident occurs. One current exception is the Austin Fire Department; they cannot currently communicate directly with the APD, and APD cannot communicate directly with them. The AFD must go through their switchboard to communicate with APD, although the Safety Chief assumes that the planned 800 trunk system will solve this problem when implemented. He was not certain of the time frame. Seven channels are needed by AFD alone, requiring additional channels beyond their current capacity for police and other agencies. The seven channels include three for incidents; one for air, fire, and rescue (required by the Federal Aviation Administration to be dedicated for this purpose); one for administrative purposes; and two non-emergency channels. These non-emergency channels can become emergency channels if necessary.

Despite the many positive comments received from agency personnel, there were some problems identified that need to be addressed. One problem that TxDOT is experiencing with notification causes them delay getting to the site. APD officers often wait until they have all criteria handled at the incident scene (i.e., assessment of accident, witness testimony documented and medical services provided, etc.) before requesting assistance from TxDOT personnel for clean-up. This causes problems for TxDOT personnel in finding the site because there is no clear evidence remaining to help identify the site. Besides, they sometimes need APD assistance at the site for traffic control.

One deficiency noted by City of Austin staff was that due to the urgency of getting many things done in a short time period, the APD does not have time to call absolutely everyone to notify them of the incident. This led to the suggestion that someone be appointed to ensure that all appropriate agencies receive notification in a timely and efficient manner. The APD would contact this person and then the person would call others.

Flow Chart. Effective communication and coordination among agencies is critical to the successful response and cleanup of an incident. It requires detailed preplanning with a key element being a central incident communication control point. This focal point, in some Texas cities, resides with police; in other cases, it may reside with TxDOT. In Austin,

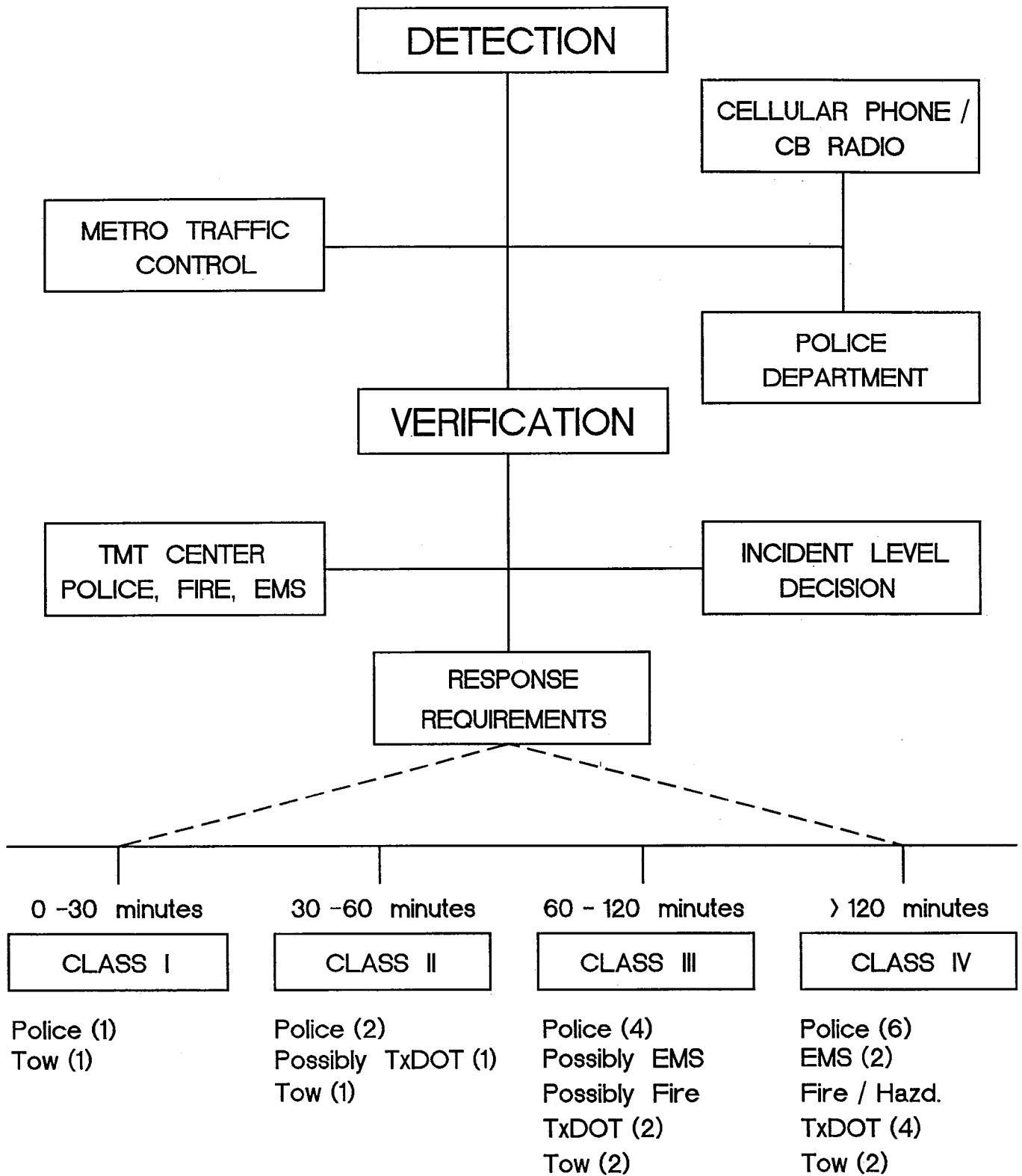
the focal point is generally with APD. A generalized flow chart for an incident in Austin is shown in Figure D-1. It begins with incident detection and it concludes with the final clearance report.

AFD utilizes a detailed Alarm Dispatch flow chart which also applies to EMS. To interpret this flow chart, some of the symbols and special nomenclature must be explained. First of all, AFD, APD, and EMS dispatchers are all located downtown in the same building in close proximity to each other. Each dispatcher monitors a computer screen, which is a CAD terminal, through which each one can communicate. CAD refers to Computer-Aided Dispatch, which utilizes a mainframe computer. When a telephone call is received by the dispatcher, he/she verifies the location, then logs a request for assistance (RA) to other agencies if appropriate. RA's can be sent or received by any of these dispatchers. EMS sometimes requests support from the Travis County Sheriff's Office (TCSO) and the Texas Department of Public Safety (DPS). Once the dispatcher has received verification of an incident and decides which personnel are closest or otherwise most appropriate to dispatch to the incident, he/she will probably use the city's pager system and possibly other systems as well. Zetron is the paging system used by AFD and EMS to reach units selected for response to the incident.

Initial notification of an incident occurs by telephone through the 911 system, and often by cellular telephone. In other cases, a law enforcement officer happened to be near the scene of the incident and notified dispatch. When the call is received, Emergency Medical Service, the Austin Fire Department, and Austin Police Department may all be involved. EMS, AFD, and APD might simultaneously receive the information they need to dispatch their respective units to the scene. EMS may get all the needed information quicker than police and drop off the line before police finish, or vice versa. In the case of fire or hazardous materials, AFD might be notified first. If AFD gets the notification before EMS, they will be the one to notify EMS and police. If other support is needed, such as traffic control devices, clean-up equipment, or a load of sand to absorb a spill, the dispatcher will contact either the City of Austin's Street and Bridge Department or the Texas Department of Transportation, or both. For freeway incidents, TxDOT is usually the responding agency.

Once the responding units arrive at the incident scene, they set up a command post comprised of agency representatives. The person in control of the incident scene at any particular time depends on the specific needs of that incident. APD is in control of traffic and of the scene, in general, unless injuries or hazardous materials are involved. If injuries are involved, EMS is in control until the patients are removed from the scene. If hazardous materials are involved, AFD is in charge of the incident. Control, even under these circumstances, is staggered, being passed from one agency to another, desirably in a coordinated fashion.

Common Map. A geographic and roadway location map that is common among jurisdictions is required for effective incident communication and response. This common map should be available to all potential responding agencies. It will allow detailed incident location and should indicate all origin options for agency response for both personnel and equipment. The map should be sufficiently extensive so as to allow formulation of detour routes, diversions, and alternate routes if needed. Austin does not use a common location



() No. of units required

Figure D-1. Austin Incident Response Flow Chart

map, and locating an incident based on a telephone conversation is further complicated by two different locating systems -- milepoint and block numbers. City agencies use the block number system, while TxDOT and other State agencies such as DPS use the milepoint system. Both the initial location of the incident and accident records require conversion from one system to the other.

Other Documents. Other necessary documents include complete and updated contact lists of TxDOT maintenance and traffic control personnel. This should be designated by day versus night contacts with responsible supervisors noted. Also, TxDOT should provide a list of available equipment for APD's use during incidents, and APD should ensure that all patrol officers have a copy of this list in their possession.

For incidents where large trucks are involved, APD maintains a rotation list of heavy-duty tow truck operators. They believe this method works very well to both provide quick response and ensure equitable treatment of all responsible tow truck operators. These operators work efficiently and generally possess the skills and experience required to quickly clear the roadway with as little delay as possible. Occasionally, a tow operator will delay response by first sending a person to evaluate the incident scene before dispatching the tow truck. Also, the tow unit might be some distance away from the incident scene when the need occurs, also causing delay. The ordinance specifies a minimum response time of 45 minutes, but APD officers believe that this time should be reduced. The APD also has a "request list" that the truck owner may use if he/she has a preference, rather than relying solely on the rotation list. The same rules apply for both methods, including proper equipment maintenance and purchasing a permit to operate in Austin. Tow truck operators in Austin are required by city ordinance to purchase a permit to operate, and their trucks must be inspected periodically.

Another important document used in Austin is a city ordinance that pertains to clean-up of the incident. AFD can require the owner of the vehicle(s) involved in the incident that caused a load spill to pay for a private company to come to the scene and completely clean up the material. A city ordinance allows the AFD to recoup costs of any materials they used in responding to and containing the incident. It does not allow them to recoup labor costs, however.

TxDOT has five people on a list for 24-hour contact by cellular pager and mobile phone for incident response. Three others can be contacted by home telephone only. TxDOT gets the initial call from either AFD or APD.

Clean-up Equipment. In Austin, the need for clean-up equipment is communicated from the officer at the scene to a dispatcher who then relays the request to TxDOT. Upon receiving notification of the incident, a TxDOT representative drives to the incident scene, assesses the situation, then drives back to the District Office to get the equipment needed. This initial drive to the site became necessary due to requests from entry level officers resulting in the wrong equipment being requested. However, the need for TxDOT to initially drive to the site should be closely scrutinized to determine its effect on response time. It will, no doubt, increase response time, and it will probably increase the time required to clear traffic lanes. However, the other issue of proper equipment selection by APD officers must

also be addressed. APD officers must learn what equipment is available from TxDOT, and they must be able to accurately assess what is needed based on a specific incident. Additional training will be essential, especially for entry level police officers. Finally, TxDOT must also be willing to trust the judgement of APD officers who place the call for clean-up equipment.

An example illustrates that some APD officers do not currently know what equipment is available from TxDOT to know what they can request. In a recent freeway incident involving a large truck loaded with crushed cars, the crushed cars came off the truck and fell onto the freeway. The APD officer used a small fork lift from another truck just behind the spilled load to reload the cars onto the flatbed truck. TxDOT had personnel on the scene who had a larger front loader that could have cleared the debris more quickly, but they were not used.

According to the AFD, the city of Austin keeps a sand truck loaded at all times, but there is still a delay in getting the driver to it and getting it rolling. TxDOT maintenance personnel also can get a loaded sand truck moving quickly when needed, but not all maintenance sections have dump trucks in sufficient numbers to keep one loaded at all times. Austin currently does not have a courtesy patrol, but it has been discussed.

TRANSPORTATION AGENCY PREPARATIONS

Areas in which transportation agencies such as TxDOT and COA can provide assistance are on-site response and alternate routing. These two elements can improve the agency's response preparedness for major incidents.

Improved Readiness for On-Site Incident Response

Transportation agencies can enhance their ability to assist in incident clean-up operations on-site by establishing response vehicles which can be dispatched without delay. Vehicles should be provided with equipment and materials as summarized in Table D-2. To facilitate access to these materials at the incident scene, each response vehicle should be loaded in a uniform manner, with a copy of the loading plan on board the vehicle for use by operating response personnel. All storage compartments and containers should have a label detailing their contents. Some of these items would be carried by a Courtesy Patrol vehicle, if Austin had such a service in place.

Dispatching extra equipment at the outset of an incident often saves time overall because of the reduced accessibility associated with traffic congestion later in the process. AFD currently dispatches the maximum amount of equipment they think they will possibly need for a particular incident. For example, if a tractor-trailer is involved, they automatically prepare for a hazardous material spill by dispatching the hazmat unit. The AFD Safety Chief emphasized that this constitutes a substantial response. The AFD has learned through experience that it does not save time to send just the minimal amount of equipment they think they will need. Their philosophy prefers to bring too much to the site rather than too little. Requesting additional units later requires the units to penetrate traffic queues, which is both difficult and time consuming.

Table D-2. Equipment and Materials for Transportation Agency Incident Response

Type of Equipment/Materials	Items
Containment Materials	<ul style="list-style-type: none"> • Trash can full of absorbent • Trash can full of sand • Trash can full of diapers (or white foam pads to absorb diesel or oil) • Shovel • Broom • Coveralls
Traffic Control Devices	<ul style="list-style-type: none"> • Traffic cones w/white reflective sleeves • Pylons • Traffic vests • Flashlight w/fluorescent cones for flagging • Flags • Safety vests • Flares and ignitor
Communication Devices	<ul style="list-style-type: none"> • Cellular telephone • Radio (low and high band), 3 or 4 extras
Other Equipment	<ul style="list-style-type: none"> • Spotting scopes to read hazardous material placards from a distance • Hard hats • Marking paint • Spotlight • Fire extinguishers (20 BC or larger) • First-aid kit • Backpack air blower • Electrical generator • High volume pump to remove fuel from overturned trucks • Fuel tank sealant mastic • Vehicle mounted flood lights • Push bumper on incident response vehicles

Getting the proper equipment to the scene for overturned large commercial vehicles may take several hours. When the new aluminum tanker trailers roll over, their load must be pumped into another tanker before uprighting the overturned tanker because these trailers are not strong enough to be uprighted while loaded. Getting a pumper from San Antonio or Houston while simultaneously getting another trailer to the site may require four to five hours. It is not unusual to spend 12 to 24 hours to get such an incident cleaned up.

Another option which some tow truck operators use for uprighting overturned trucks is air bags. These are large chambers which, when placed underneath an overturned truck and inflated pneumatically, can slowly lift the truck back onto its wheels. These are apparently not available in the Austin area, but if they were, they could expedite the clean-up process in many instances.

Elevated structures are very difficult for AFD response units. AFD staff stated apprehensions regarding access to 183/Mopac elevated structures. Even a minor incident (e.g., flat tire) on an elevated structure almost always results in a crash so it needs to be cleared quickly. Staff cited a recent incident in which a tractor-semitrailer caught fire and burned. If it had been on an overhead structure such as the elevated section of I-35, AFD could not have gotten to it, according to AFD staff. They cannot even access a vehicle in trouble from

the opposite side of the freeway on I-35 because the two sections are 50 feet apart. Starflight (helicopter) can land on the freeway only if there is full control of traffic. However, under extreme circumstances, this is the only means of getting assistance to motorists on structures.

The Austin TMT has developed an ice plan for accommodating traffic movement when icy road conditions prevail. Appendix B contains a copy of the plan used during the winter of 1994.

Site Specific Traffic Management Planning for Incident Response

Traffic management planning should be developed prior to the occurrence of incidents and in such detail as to show where and what types of signing and traffic control will be implemented and which agencies will implement them. In Austin, the frontage road system provides the most logical bypass alternatives when mainlanes become congested. Depending upon the location and the traffic demand at the time of an incident, it may be necessary to utilize other routing as well.

When additional traffic is diverted onto frontage roads, reprogramming the traffic signals is required to significantly relieve incident congestion. City of Austin personnel have promised to enter new timing plans at appropriate intersections if requested to do so; however, this is more difficult when a request comes during non-business hours. It requires a commitment from the city's public works administration, given that city signal personnel already have a full work load. The alternative is to have APD officers direct intersection traffic themselves, but this becomes less feasible as the number of intersections increase.

In other, more extreme cases, rerouting traffic to other parallel facilities besides frontage roads becomes necessary. Currently, Austin does not have a network of alternate freeways to serve as bypass routes during incidents, so the arterial street network must suffice. APD does not have a complete system of plans to reroute traffic at any point along the I-35 corridor because of the complexity of doing so. However, they have established some bypass routes, and they determine others as the need arises. If an incident occurs in the daytime, they are better staffed and equipped to handle it than at night.

The City of Austin already recognizes the need to initiate an incident response signal timing plan for the I-35 frontage roads; this is part of an IVHS Early Deployment study. If implementation follows, their administration must decide that this is important enough to make the personnel available. If bypass routing is implemented and signal retiming is carried out, one person would be required in the computer room to retime the signals, and one would need to go to the site and fine-tune the signals. This plan would probably involve at a minimum two changes in the affected intersections until the incident is cleared -- increase green time on the frontage road and increase the cycle length to 120 seconds. The signal supervisor has only three people assigned to him. He believes this is important enough for department heads to put a higher priority on it and communicate that to the appropriate personnel.

When traffic control devices are necessary for long term traffic control on mainlanes, the Austin Police Department requests lane closures to be installed by TxDOT. This is not

normally done because of the time required to set up traffic control (minimum three hours) and because APD officers are often available at the site to direct traffic. Another possibility for providing traffic control services for incidents is through private barricade companies; one such company recently offered to enter into a contract to provide this service in Austin.

In case of a fatality on the freeway, the coroner's arrival at the scene and his/her duties at the scene cause major delays. He/she drives an unmarked car to the scene so traffic delays are to be expected. One suggestion that might have merit, but which has apparently not been tried, is dispatching an emergency vehicle to bring the coroner to the site. This would have to be coordinated according to the coroner's schedule, because he/she might not be immediately ready to leave for the site upon being notified. Police (especially young officers) typically do not allow anyone to enter the fatality scene until all measurements are made. Measurements are time consuming, using a simple tape measure to establish a coordinate system. This process takes from 2.5 to 8 hours to complete. The cost of the field equipment required to make these measurements electronically is approximately \$15,000 if bought in quantity. (The list price is somewhat higher.)

One method of expediting this process of measurement at the incident scene uses systems called infrared "total stations." Total stations allow automatic distance measuring as found in general surveying techniques. The distances are then fed directly into a computer for further evaluation and plotting a scale drawing of the incident scene. In Washington state where this method is used for incident investigation, the State Patrol is required to perform a thorough investigation of any accidents involving fatalities, alcohol or other drugs, and suspected felonies. They also investigate any accident that they believe will be the subject of court action. Measurements that must be made include where skid marks start, end, or change direction; where highway curves begin or end; debris patterns; gouges and scrapes; locations of intersections; warning signs; and other potentially relevant details.

Comparisons of investigation time using total stations versus making manual measurements indicates that investigation times are reduced significantly with the use of total stations as a result of being able to make more measurements per unit time. Investigators can take over 70 percent more measurements per hour with total stations than with the coordinate method. Accuracy of measurements is also reported to be superior with total stations when compared to the other method. For freeway incidents, the use of total stations resulted in a reduction in the clearance time on the average of 51 minutes (131 minutes for total stations compared to 182 minutes for the coordinate method). The standard deviations for both methods were almost identical. The difference in the two mean values was determined to be statistically significant at the 95 percent confidence interval.

Other items that are important in the clean-up at the incident site include how response vehicles are parked, the direction the clean-up occurs, and quick removal of emergency vehicles after their need has expired. The response plan should dictate the sequence of working the incident -- either right to left or left to right. It should also specify that all response vehicles be parked on only one side of the freeway, with some limited exceptions. There should also be consideration given to the number of lights flashing, with an attempt to provide enough for warning of motorists but not more than is necessary. Too many flashing lights has a tendency to increase confusion. To make the scene safer, AFD, EMS, and other

vehicles should be removed from the incident scene immediately after their duties are finished.

Post-Incident Evaluation

Immediately following an incident, it is desirable for designated individuals to complete an incident report. The purpose of this report is to create a detailed record of the incident which would not otherwise exist, especially if no accidents were involved. Completing this report should coincide with a meeting of agency supervisors to discuss the incident and consider improvements to similar future incidents. One possible format for this report is provided in Appendix C. This report creates an evaluation tool to both reflect on the subject incident and to provide a record of the incident for future use. Historical records of incidents become important in quantifying the impacts of incidents and in assessing the impacts of policy and procedural changes.

Training

Training is an ongoing need due to rotation and turnover in incident response personnel. It is important for APD and other law enforcement officials to make the best decisions at the scene of an incident regarding who should respond and what equipment is needed. Often, rookie police officers need training to offset their lack of experience in knowing the type of equipment to be requested. Also, an EMS spokesman voiced the need to have joint training among the various agencies that respond to incidents. This would reduce the current problem of coordination by engendering an appreciation for the needs of the other agencies in fulfilling their responsibilities.

For any given course that is taught only once in Austin, there is a high probability that not all of the necessary personnel will be available. For example, perhaps half of the police officers who should attend would be available at any given time because the others are on duty. Therefore, a course such as the Federal Highway Administration's Incident Response Workshop should be taught at least twice so all police department shifts could attend. The other option that appeared to be attractive to APD was to incorporate this course, or one customized for their needs, into their academy. APD shift supervisors need to have access to a course on incident response and clean-up because they have little or no experience in incidents from previous assignments as they advance through the ranks.

Responsible persons must fully understand incident plans in order to make them work. An example cited was the ice plan for U.S. 183 which hinged on the mainlanes of 183 staying open. The ice plan was no longer effective when the mainlanes became icy and no longer passable. Therefore, its immediate reopening required a deicer, which, even though relatively expensive, could probably be justified through delay savings.

Appendix A

List of Agency Contacts During Incident Response

January 7, 1994

SUBJECT: EMERGENCY RESPONSE PERSONNEL

City of Austin
Electric Department
Austin, Texas 78701

Attention:

Dear Sir:

In an effort to assist your Department with wrecks, hazardous material spills and other emergency matters, on state maintained highways in the City of Austin, we are attaching a new personnel call sheet. This sheet will show the names to call as well as the areas that each section maintains.

As discussed with you previously, we feel that it would help both our Departments to be able to communicate by radio. Since your department operates in the 400 MGZ area and you have such a large number of radios, we would be willing to purchase four (4) radios that would operate on these frequencies. These radios would be placed in the foreman's and assistance foremen's vehicles in the Travis Central Maintenance Section. This section is the one that maintains IH 35, Loop 1 as well as US 183 & SH 71 between these major highways. In order to purchase these radios and be able to use them, we will need your written approval as well as which frequencies and what call number you wish for our personnel to use.

We have also discussed in previous meetings the matter of equipment that our Department has that would be able to assist in emergency situations. We are attaching a list of the different types of equipment that we have and the availability of these units. We would, however, like to stress that we prefer your Department to contact us and tell us what the nature of the emergency is and let us determine what equipment would best handle the job.

When a problem is encountered, please contact the maintenance section that maintains the specific area for assistance. If during work hours, call the office or supervisor for assistance. Office hours for the maintenance section are 8:00 AM to 5:00 PM. If you have a major problem or cannot get in touch with anyone from the section, you can contact me at the following numbers:

Office	832-7063	
Home	512-863-5342	
Digital Pager	483-3377 (24 Hours)	
Cellular Phone	217-6639	(Note this cellular phone is in my vehicle and will only be answered when I am in the vehicle)

If we can be of any assistance in these matters please do not hesitate to call me at 832-7063.

Sincerely,

C.E. (Gene) Stabeno
District Roadway Maintenance Supt. II

CES:gs
Attachments

cc: Tom Ohlendorf
Willie Haverland
Ed Kurtz
Aubrey Grumbles
Floyd Karstetter
Luther Toungate
Carl Burklund
Ed Schroeder

Tim Cheothem, P.E.
441 Meimardus
Austin, TX 78744
440-8444

Samileh Movasari
Transp. Public Works
505 Barton Springs
Austin, TX 78704
499-7010

Jim Dunkin
Electric Dept. Dispatcher
301 West Ave.
Austin, TX 78767
322-6633

January 7, 1994

SUBJECT: EMERGENCY RESPONSE PERSONNEL

City of Austin
Street & Bridge Department
Austin, Texas 78701

Attention:

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505 Barton Springs
Austin, TX 78704
499-7010

Jim Dunkin
Electric Dept. Dispatcher
301 West Ave.
Austin, TX 78767
322-6633

TXDOT EMERGENCY CALL LIST
PRESENTED TO CITY OF AUSTIN NOVEMBER 22, 1993
SEE ATTACHED MAP FOR AREA OF RESPONSIBILITIES

TRAVIS CENTRAL

Office Phone 832-7174
832-7171
Supervisor - Willie Haverland
Cellular Phone 940-3773

After Hours Call List:

Rudy Martinez	Digital Pager - 406-1504	Home -	512-440-1404
Travis Remmert	Digital Pager - 406-1581		512-251-0478
Jamie D. Witten			512-990-3947
Richard D. Hull			512-454-8941
Willie Haverland			512-273-2315

TRAVIS NORTH MAINTENANCE SECTION

Office Phone 331-5361
Supervisor - Floyd Katrstetter
Cellular Phone 940-3805

After Hours Call List:

Floyd Karstetter	Home -	512-218-9627
Sam Holguin		512-335-6338
Ken Smathers		512-259-0826
Phillip E. Morris		512-259-0873

TRAVIS EAST MAINTENANCE SECTION

Office Phone 929-7221
Supervisor - Ed Kurtz
Cellular Phone 940-3799

After Hours Call List:

David G. Mitchell	Home -	512-462-2534
Teddy P. Hernandez		512-459-5747
Robert Salas		512-288-4787
Charles Vaughn		512-255-3410
Edward J. Kurtz		512-459-9947
Janet Miley		512-244-6825

TRAVIS SOUTH MAINTENANCE SECTION

Office Phone 288-4761

Supervisor - Aubrey Grumbles
Cellular Phone 940-3812

After Hours Call List:

Aubrey Grumbles	Home -	512-264-2248
Gene C. Rice		512-288-0063
Richard Sanders		512-288-1361
Houston Petty		512-288-5106
Ricky L. Green		512-288-3651
Morris Goodnight		512-834-8393

GEORGETOWN MAINTENANCE SECTION

Office Phone 512-863-2842

Supervisor - Luther Toungate
Cellular Phone 940-3780

After Hours Call List:

Luther Toungate	Home -	512-863-5603
Ernest Bizzell		512-793-2220
Bobby West		512-863-2654
Alvin Moore		512-863-5296
John Miller		512-863-2984

SAN MARCOS MAINTENANCE SECTION

Office Phone 512-353-1061

Supervisor - Bill Murphy
Cellular Phone 940-3781

After Hours Call List:

Bill Murphy	Home -	512-353-5654
Edward Villapando, Jr.		512-353-8874
Hayden Haberer		512-353-1411

DISTRICT SIGNAL SHIP

Office Phone 832-7098
832-7200

After Hour Call List:

Rotated Digital Pager 483-2072
Rotated Cellular Phone 940-3788

IF NO ANSWER OR RETURN CALL, CALL THOSE ON THE LIST BELOW:

Gary Barnes	512-476-8474
Chuck Ansley	512-255-5299
Dale Turner	512-272-8643
Mike Davis	512-282-4920
Joe Tijerina	512-295-4614
Walt Lillard	512-266-8037
Mike Camus	512-251-9687
Fidel Garza	512-258-6847
Edward Schroeder	512-326-1890

TEXAS DEPARTMENT OF TRANSPORTATION
EQUIPMENT AVAILABLE FOR INCIDENT MANAGEMENT RESPONSE
November 23, 1993

TRAVIS CENTRAL MAINTENANCE SECTION

Loaders
Motor Graders
Arrow Boards
Message Boards
Fork Lift
5 Ton Crane
Road Sweeper
Street Sweeper (Pickup Sweeper)
Dump Trucks
Haul Trailers

TRAVIS EAST MAINTENANCE SECTION

Loaders
Motor Graders
Road Sweeper
Fork Lift
Arrow Boards
Dump Trucks
Haul Trailers

TRAVIS SOUTH MAINTENANCE SECTION

Loaders
Motor Graders
Road Sweeper
Arrow Boards
Dump Trucks
Haul Trailers

TRAVIS NORTH MAINTENANCE SECTION

Loaders
Motor Graders
Road Sweeper
Arrow Boards
Dump Trucks
Haul Trailers

GEORGETOWN MAINTENANCE SECTION

Loaders
Motor Graders
Road Sweeper
Arrow Boards
Dump Trucks
Haul Trailers

SAN MARCOS MAINTENANCE SECTION

Loaders
Motor Graders
Road Sweeper
Arrow Boards
Dump Trucks
Haul Trailers

SPECIAL CREWS (CONTACT MAINTENANCE SECTION)

Tr. Dozer
Dragline (35 Ton Link Belt)
Gradall
Track Loader

Note: The special crews equipment works throughout the District and may not be readily available at a specific time.

Haul Trailers

MEMORANDUM

DATE: December 10, 1993

TO: Files

FROM: Randall Dillard

SUBJECT: Emergency Services Fax Numbers

I talked with representatives of Austin EMS and the Austin Police Department to find out how we can better inform them of lane closures due to construction or maintenance. I asked them if it would be of benefit for us to provide them with a daily report of lane closures which are planned for the next day. They both said such a list would be helpful.

Jane at EMS (469-2050) said to fax the information to 482-9074.

Lt. Stuart at APD (480-5208) asked that we fax the information to their East Sub-station, fax number 385-7736, and to their North Sub-station, fax number 834-7933. Lt. Stuart said this would get the information to all APD patrol officers.

Debbie Pitts had talked with the Austin Fire Department last week. They asked that we fax the information to them at 477-5886.

I will work with District Maintenance to have these fax numbers added to the group dial on their fax machine.

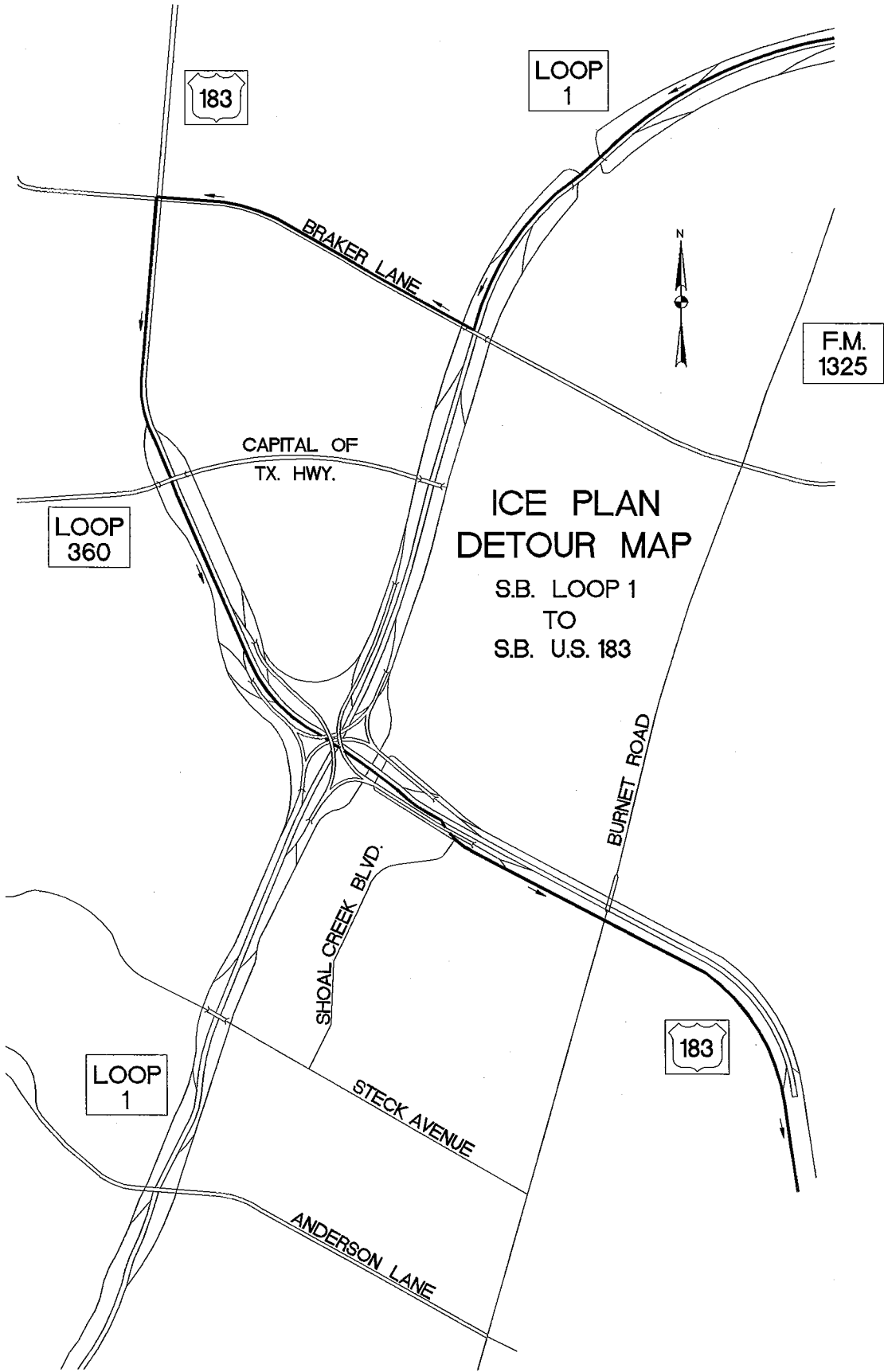
cc: Debbie Pitts
Tome Ohlendorf
Bubba Needham

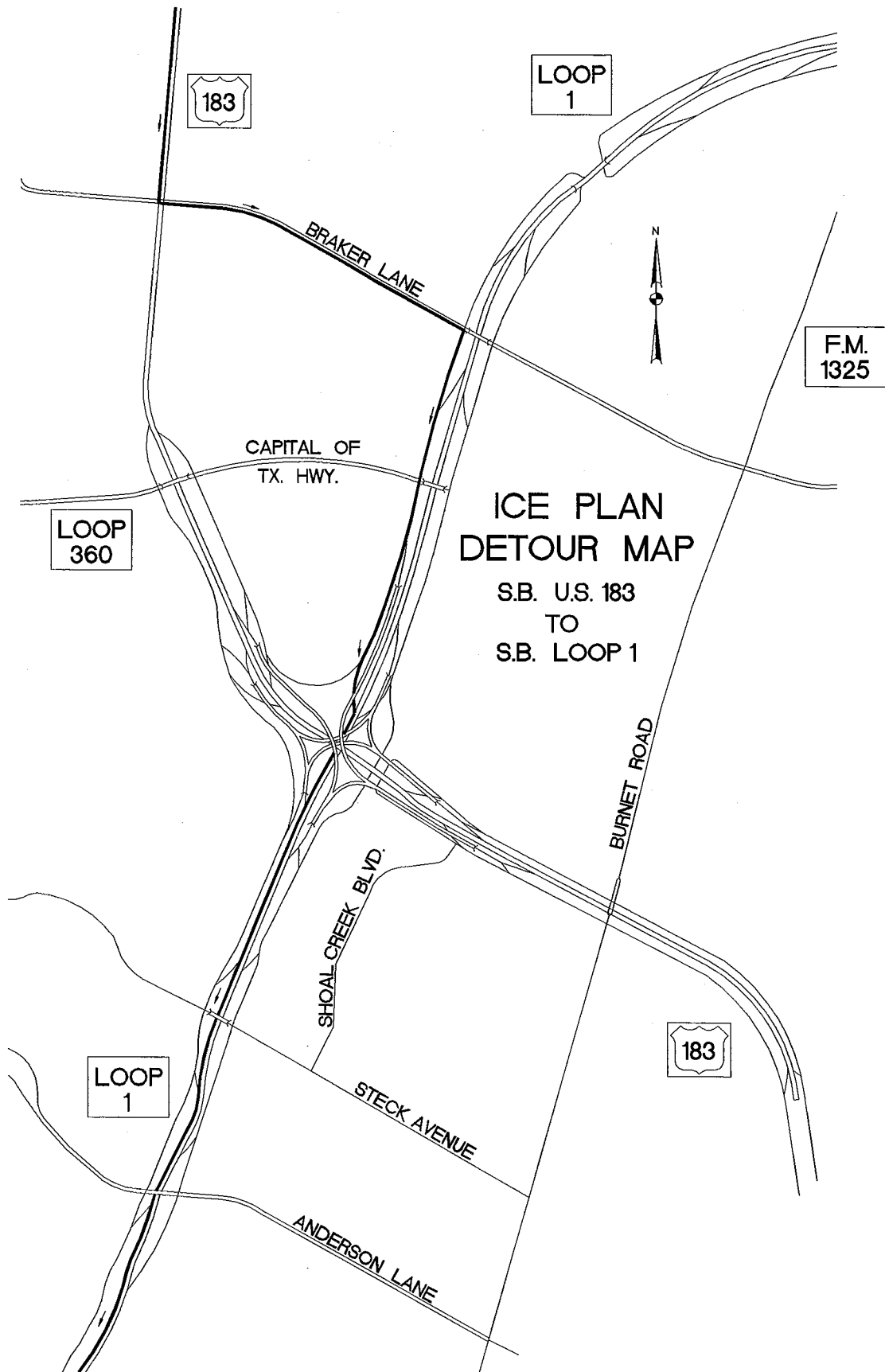
List of Additional Contacts

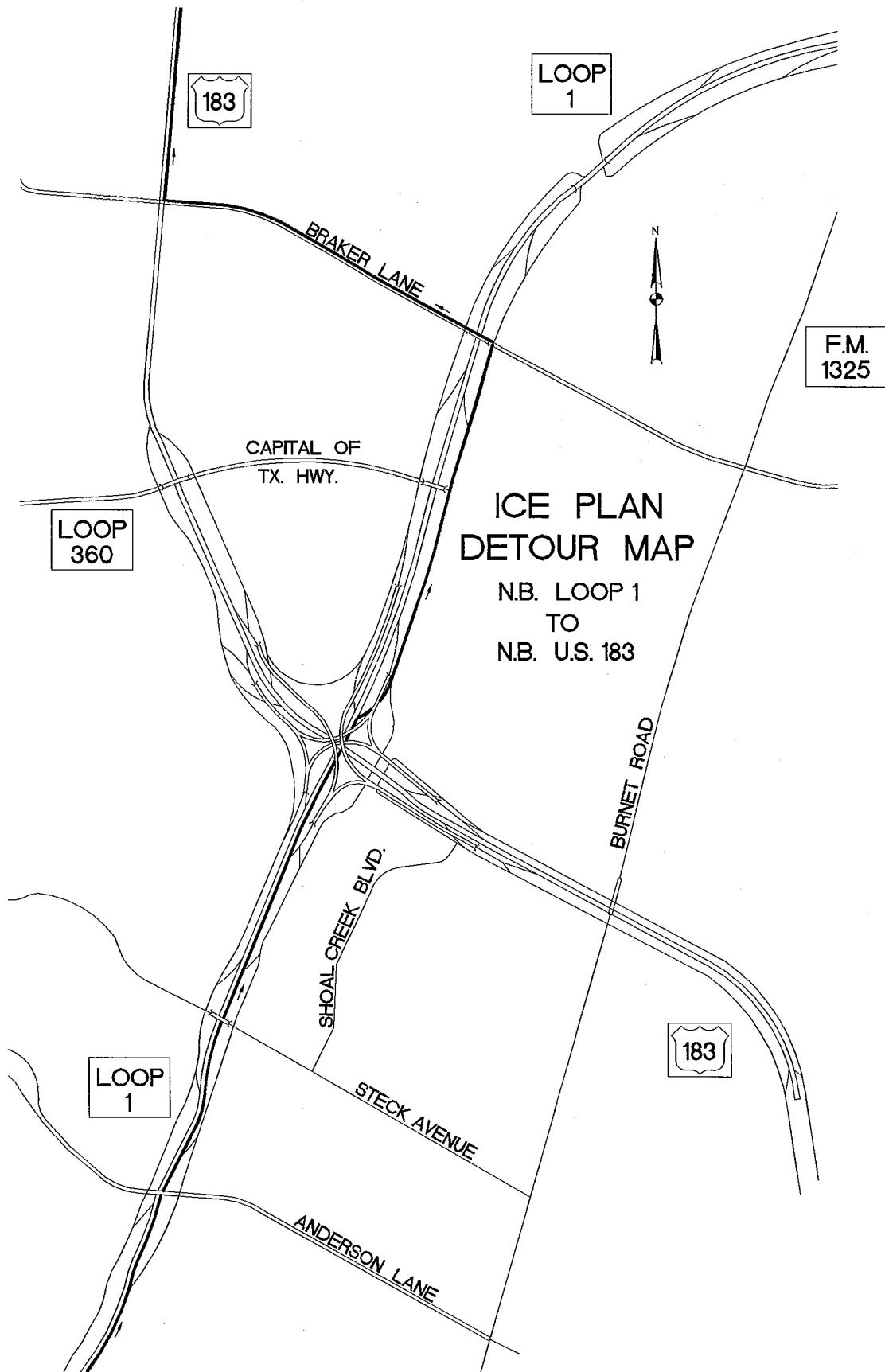
AGENCY NAME	CONTACT NAME	TELEPHONE NO.
Austin Street and Bridge	J.C. Wood	(512)440-8444
Capital Metro	Linda Jackson	(512)389-7536 (512)397-7894 Pager

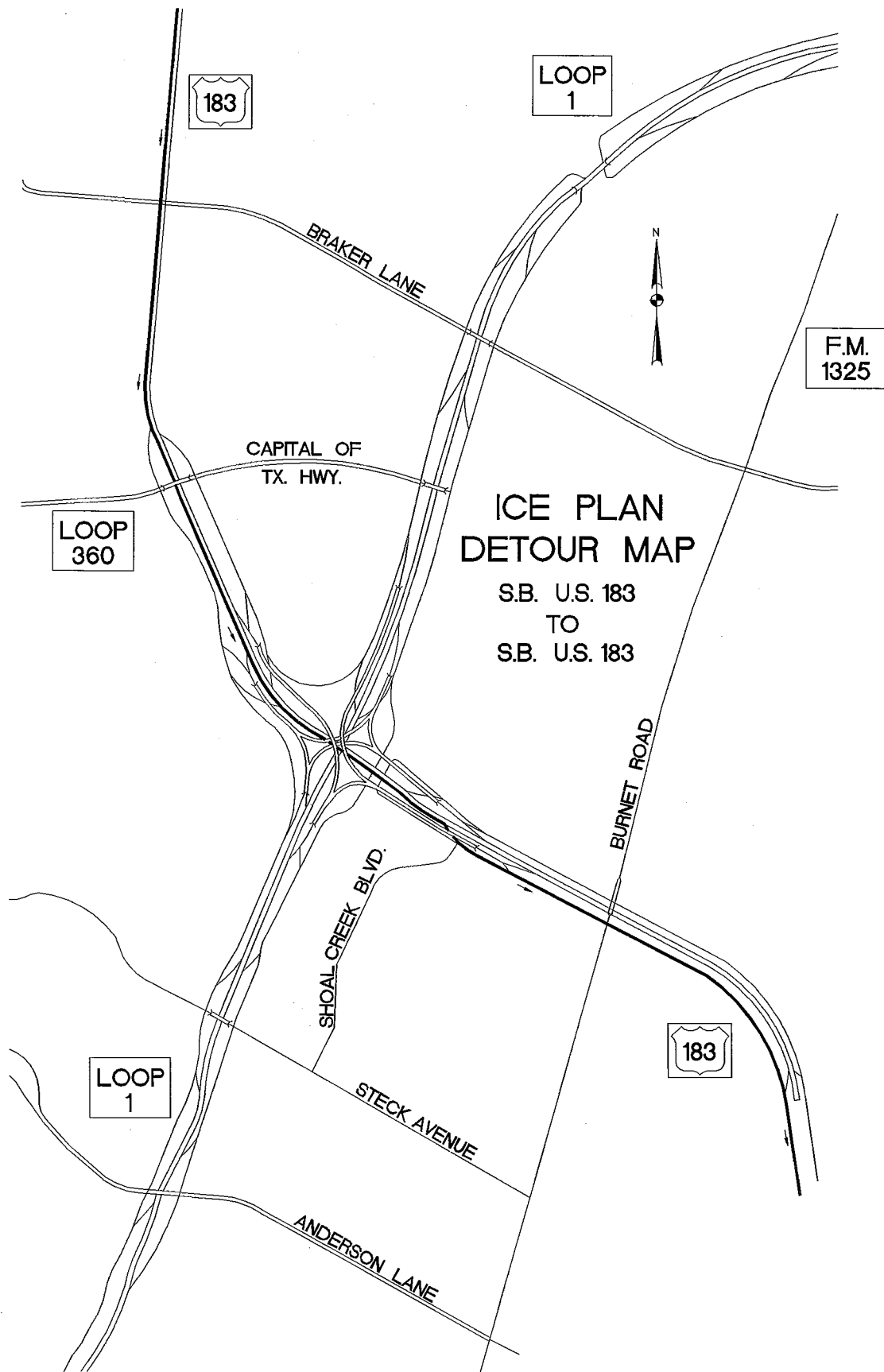
Appendix B

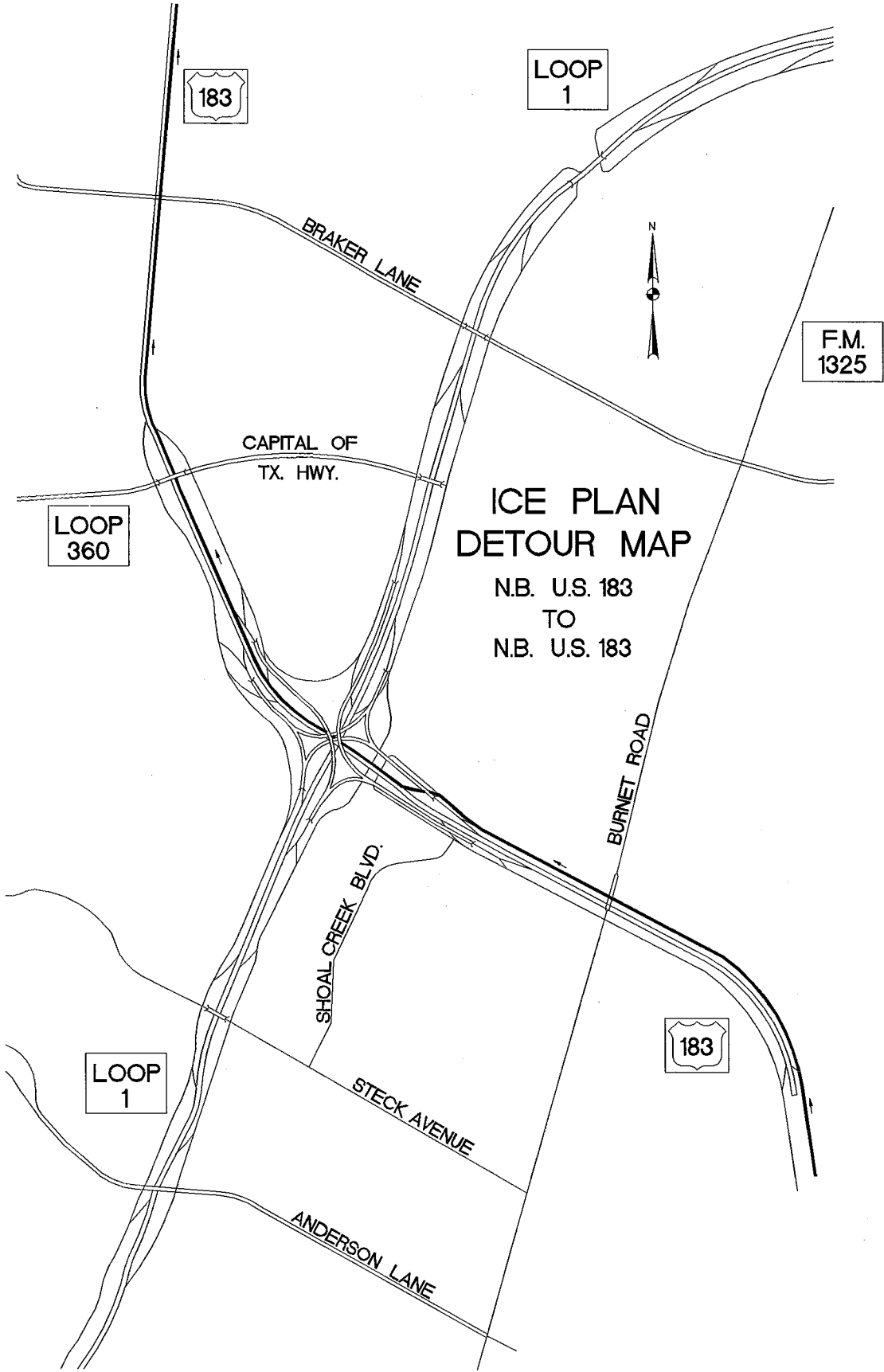
**Ice Plan for Accommodating Traffic
During Icy Roadway Conditions**

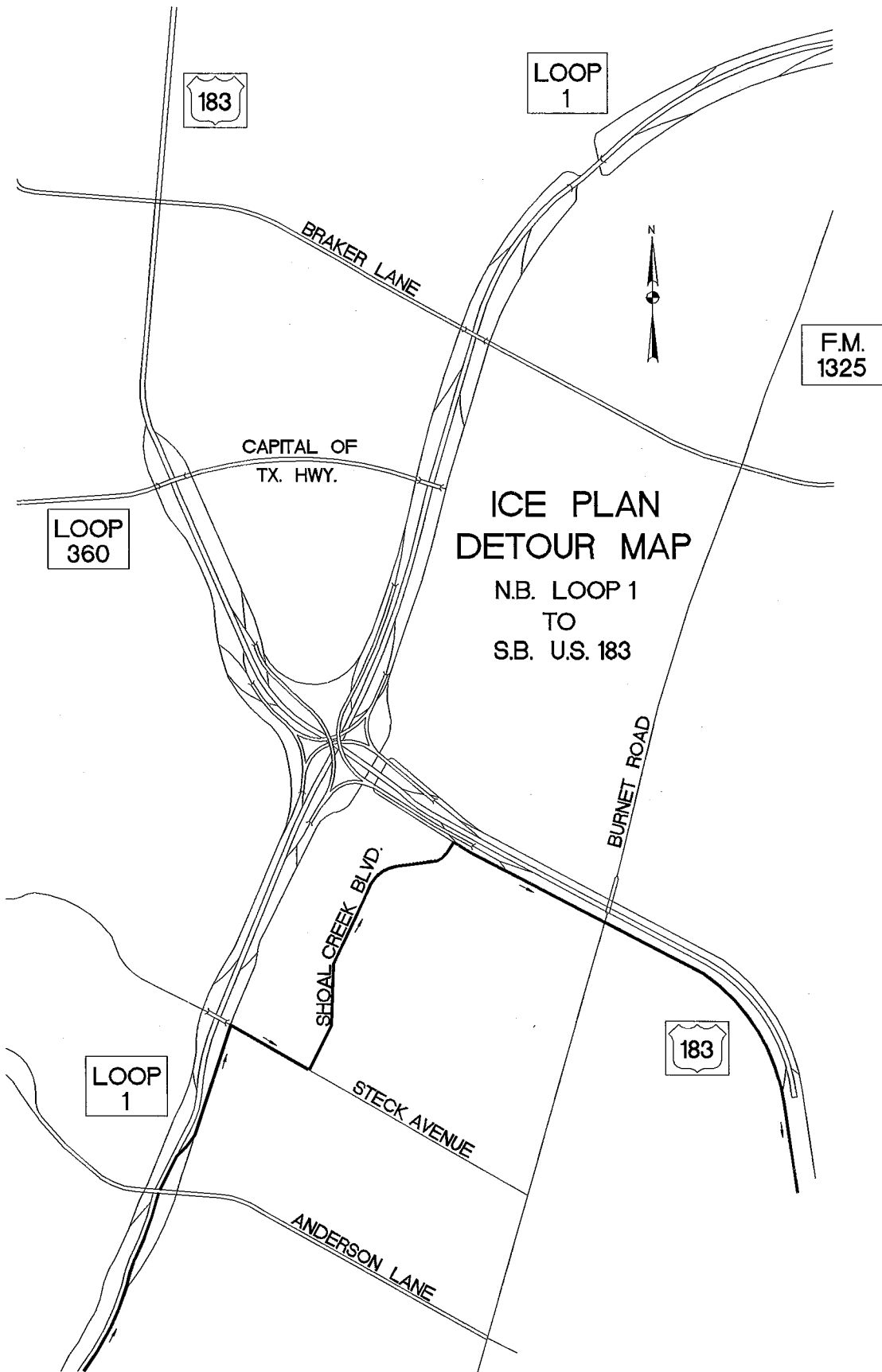


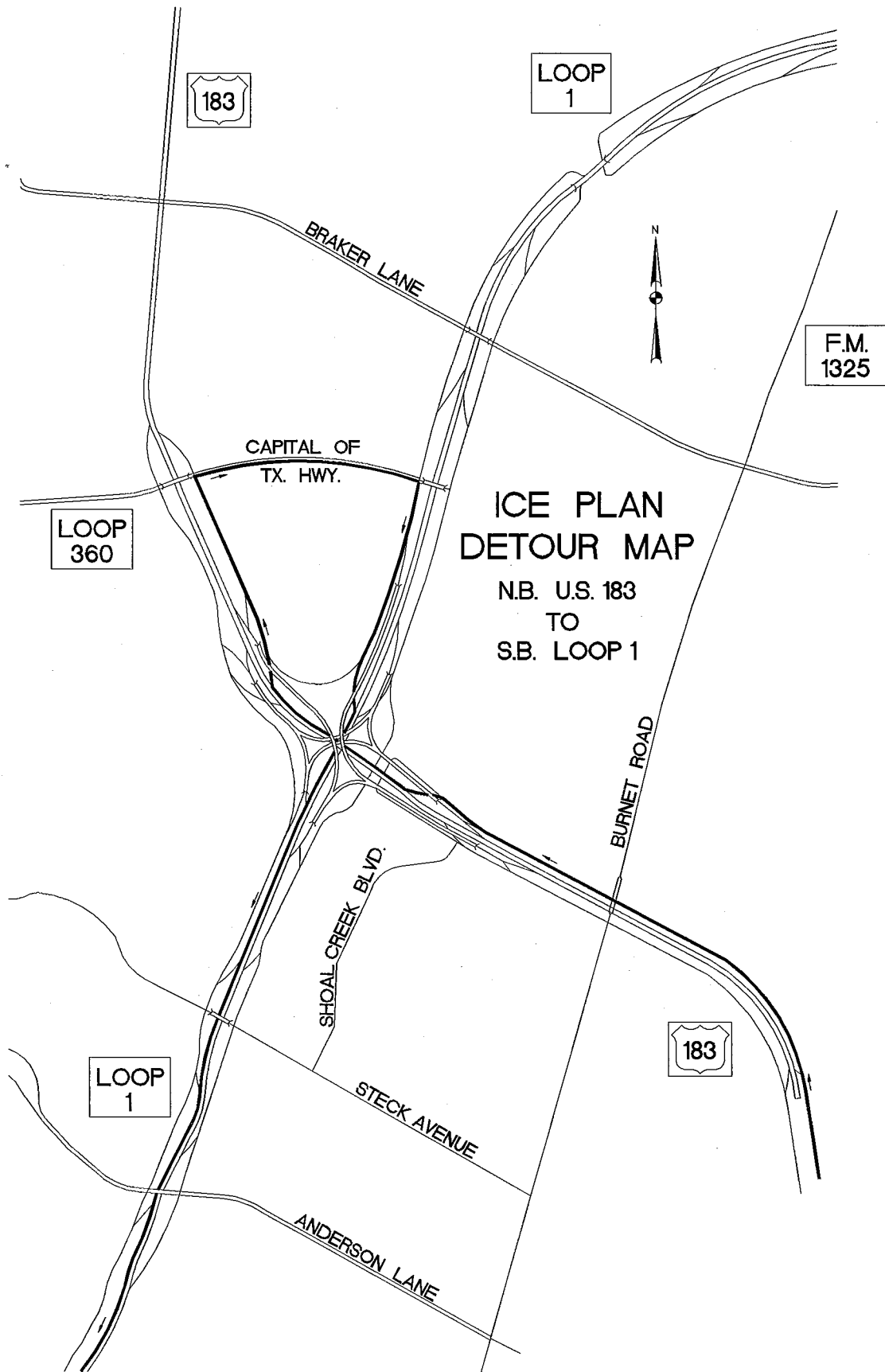












**AUSTIN TRANSPORTATION
PUBLIC INFORMATION GROUP**

November 13, 1992

Austin Roadway Ice Plan Briefing

Although Austin has not experienced icy conditions on its roadways in some time, the threat of bad weather looms each winter. In order to be prepared for emergency roadway conditions, an ice plan briefing has been scheduled.

On Wednesday, November 18 at 10 AM, a meeting will be held to discuss plans for moving traffic through Austin in the event of roadway icing this winter. The meeting will be held at the Texas Department of Transportation's District Right-of-Way hearing room at 1001 East Anderson lane (a map is attached).

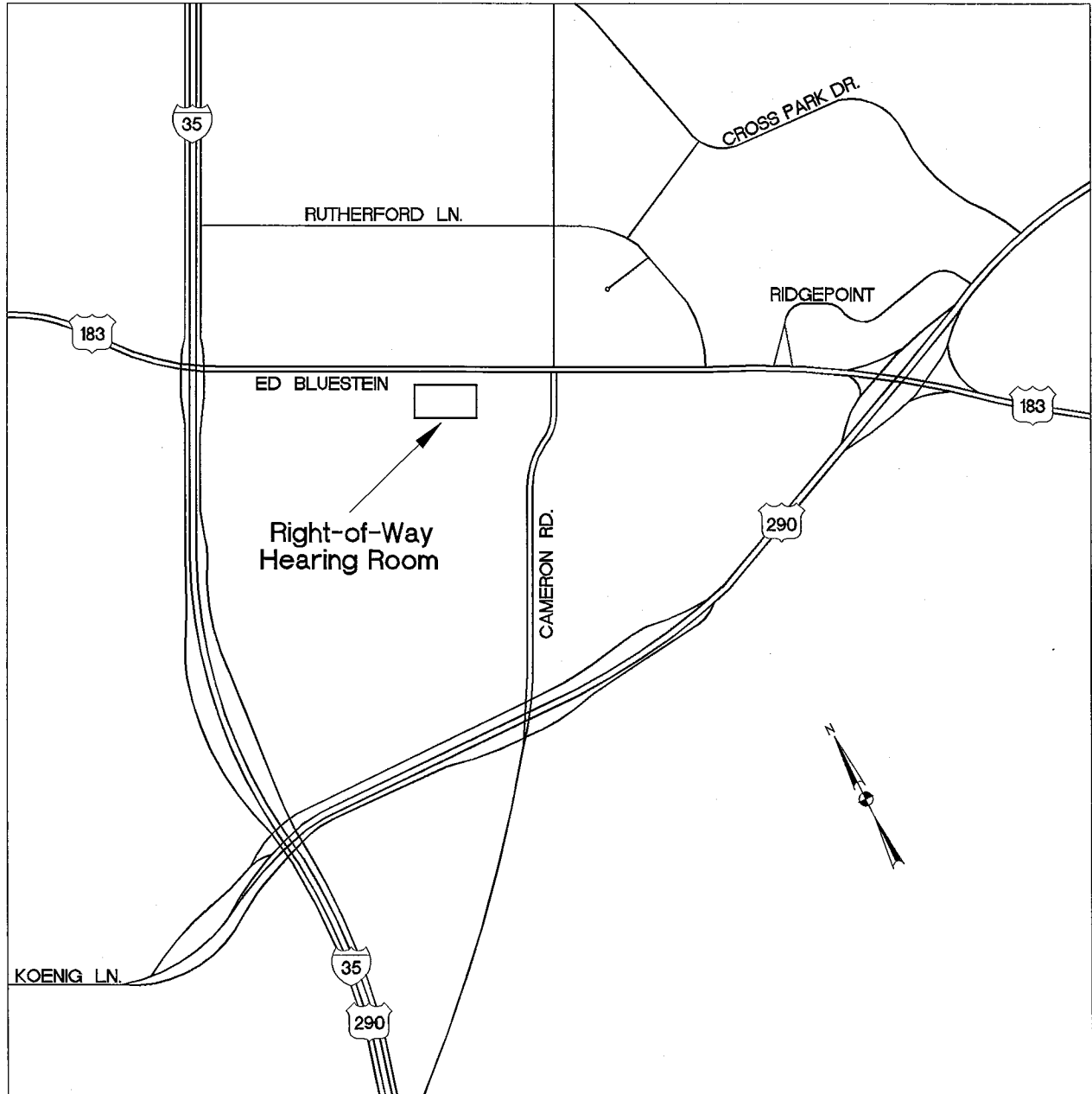
The meeting will involve presentations of plans for dealing with ice on area roadways. Representatives from the City of Austin, Travis County, and Texas Department of Transportation will be on hand to answer questions and provide information on possible trouble spots.

In particular, the Loop 1/U.S. 183 interchange and elevated sections of U.S. 183 over Burnet Road and Lamar Boulevard could be seriously impacted by icing. Parts of those highways are likely to be shut down if icing occurs. A detailed description of detours that will be necessitated by these conditions will be presented and handouts will be made available at the meeting.

Your participation is an important link to getting the message out so that accidents and traffic tie-ups can be kept to a minimum when these situations arise. If you or someone from your organization can attend the meeting, please feel welcome. If you cannot attend the meeting but would like a copy of the handout material, please contact Debbie Pitts at 832-7000.

For more information contact:

Texas Department of Transportation -- Randall Dillard or Debbie Pitts -- 832-7000
City of Austin -- Celeste Cromack or Ella Salazar -- 499-7039
Travis County -- Pete Baldwin -- 472-7483
Austin Independent School District -- Dan Roberts -- 926-7940
Capital Metro -- Howard Goldman or Julie Fernandez -- 389-7435



Blue & White Building at 1001 East Anderson Lane

Texas Department of Transportation Right-of-Way Hearing Room

LIST OF INVITEES
AUSTIN ROADWAY ICE PLAN BRIEFING

Media:

- Television -- Channel 24 -- Mike Deac & Mark Roase (459-6538)
Channel 7 -- Mike Snyder & Conner Vernon (495-7060)
Channel 36 -- Jim McNabb & Russ Rhea (469-0630)
Channel 42 -- Cindy Brooks (837-6753)
- Radio -- Metro Traffic -- Bill Southern (323-9518) (459-7375)
KLBJ -- Sam Cox, Andy Petroski, Janet Evans (832-4063)
KVET/KASE -- David Anderson (495-9423)
- Print -- Austin American Statesman -- Stuart Eskenazi & Sharon Jayson (445-3679)
Daily Texan -- (471-1576)
Pflugerville Pflag -- Terry Hagerty (251-5574)
West Austin News -- (459-9564)
West Lake Picayune -- Kathy Sargent (328-6470)
La Prensa -- (444-4855)
NAKOA -- (499-8740)
The Villager -- (476-0179)
Austin Minority Business Journal -- (835-8449)
Hill Country News -- Rick Hummell (258-4752)
Lake Travis View -- Wendell Holloman (266-3583)
Lake Travis Log -- Joe Singleton (267-4464)

Transportation & Emergency Service Agencies:

- City -- Public Works
Transportation (Dave Girard & Samelah Mozarari) -- (499-7010)
Signals (John Roscher) -- (479-8163)
Street & Bridge (J.C. Woods) (440-8536)
Water & Wastewater (Mike Howe) -- (322-2842)
Electric (Kathy Baumgardner) -- (322-6037)
Emergency Operations Center (Steve Collier & Joe Hidrogo) -- (370-2620)
Austin Fire Department (Kevin Baum, Kathy Brandeweigh) -- (477-5786)
EMS (Michael Morris, Dave Wertz, Richard Herrington) -- (482-9407)
- County -- Public Improvement & Transp. (Shyra Darr & Raymond Reed) (320-7425)
- State -- TxDOT (Traffic, Maintenance, Public Affairs)

Other -- Capital Metro (Ben Gomez, Lawson Albritton, William McLeod) -- (389-1283)
AISD - Transportation -- (926-0353)
AAA (Debbie Shaw) -- (442-5757)
Norm Trembly -- (335-6873)

Law Enforcement Agencies:

Austin Police Department (Gayle Phillips, Lt. John Stewart) -- (480-5269)
Travis County Sheriff's Department (Cathy) -- (322-4735)
Dept. of Public Safety (Trooper Tom Mobly, Captain Sherman) -- (873-3116)

North -- Sgt. Dan Thomas
South -- Sgt. Bob Short

Taxicab Companies:

American Cab -- (835-2946)
Austin Cab Co. -- (472-3408)
Roy's Taxi -- (482-0173)
Yellow Checker Cab -- (477-1484)

Other Interested Parties:

United Parcel Service -- (961-4020)
U.S. Postal Service -- Ron Mask (929-1280)
Austin Chamber of Commerce -- Crispen Ruiz (478-9615)

Major Employers in U.S. 183 area:

Texas Instruments -- Keith Thomas (250-6141)
IBM - Ed Adams -- (823-7876)
Balcones Research Center -- (222-8002)
3M -- Myra Novak (584-3417)

Q & A

QUESTIONS AND ANSWERS ABOUT AUSTIN'S ROADWAY FREEZE PLAN

If I want to know about roadway conditions in Austin, who do I call?

City, County, and State officials will make information available to the media and the public during severe weather emergencies. Your best bet is to tune into your favorite radio and television station for weather and roadway bulletins.

Contact the **Texas Department of Transportation** for highway conditions at 832-7000 between 8 AM and 5 PM weekdays or when serious emergency conditions exist at 832-7084 during evening or weekend hours. The department also operates an 800 number for information on travel in other parts of the state. That number is 1-800-452-9292.

Contact the **City of Austin** Street and Bridge Division at 440-8444 for information on city streets. During emergencies, the City of Austin Emergency Operations Center will operate a recorded listing of streets closed in severe weather; that number is 445-1996.

Travis County can be reached for information on county roadways at 472-7483 between the hours of 7 AM and 5:30 PM weekdays. If you need information during evening or weekend hours, contact the Travis county Sheriff's office at 473-9285.

How do I know if the road I need information on is a city, county or state roadway?

Most roadways within central Austin are maintained by the City of Austin.

Some exceptions include: Interstate 35, MoPac (Loop 1), Loop 360, U.S. 290, Research Boulevard (U.S. 183), Ed Bluestein Boulevard (U.S. 183), Koenig Lane (RM 2222), Bee Caves Road (2244), Ben White Boulevard (U.S. 290/Texas 71). These roadways are on the state highway system and are maintained by the Texas Department of Transportation.

Portions of other roadways in Austin are also maintained by TxDOT, they include: Burnet Road (FM 1325) -- north of U.S. 183, Lamar Boulevard (FM 275) -- north of U.S. 183, Martin Luther King Boulevard (FM 969) -- east of Airport Boulevard, Airport Boulevard (State Highway 111) -- east of I-35, Congress Avenue (Loop 275) -- south of Ben White Boulevard, Manchaca Road (FM 2304) -- south of Matthews Lane.

Outside the Austin area, in areas not within other city's limits, as a general rule in Travis County if the roadway name has a number in it, it is on the state's roadway system (i.e., U.S. 183, Interstate 35, RR 2222, FM 1826, Loop 1, etc.). Otherwise it is likely to be a county roadway.

What if I want to report a dangerous roadway situation?

Your local law enforcement will probably be the best place to start.

Austin Police Department -- 911
Travis County Sherriff's Office -- 473-9285

What roadways in Austin are most likely to experience problems during an ice storm?

Elevated structures and bridges are most susceptible to icing. For that reason, the upper level lanes of Interstate 35, and elevated ramps and overpasses on U.S. 183 at Loop 1, Burnet Road and Lamar Boulevard, along with the ramps and overpasses on U.S. 290 at Loop 1 may be closed when ice forms. The U.S. 183/Loop 1 interchange will probably be most heavily impacted if a serious ice storm hits. Maps of possible lane closures and detours are included in this packet.

In addition, steep hills such as the one on Spicewood Springs Road may pose problems.

How will the local authorities respond to the onslaught of an ice storm?

City of Austin

The City of Austin has an emergency operations plan which covers ice and snow conditions as well as flooding or other situations which result in the closing of roadways.

In the Public Works and Transportation Department, this plan allows supervisors to call personnel back so that barricades can be placed, roads sanded, and other appropriate action taken. During the winter, sand and barricades are stockpiled in locations throughout the city to enable the crews to sand roadways quickly, and if necessary, barricade areas such as the hill on Spicewood Springs Road.

To learn more about the City of Austin's plan for roadway operations during ice or flood conditions, contact Tim Cheatham, Street and Bridge Division, 440-8444. For general information about services and projects of the Department of Public Works and Transportation, contact Celeste Cromack, 499-7039.

Travis County

In the event of severe weather, Travis County's Public Improvement and Transportation Department activates members of its Emergency Response Team to deal with hazardous road conditions. In times when severe weather is forecasted, the P.I.T.D. prepares crews and equipment in advance in order to provide a quick response.

For more information about the county's roadway plan, contact Pete Baldwin at 472-7483.

Texas Department of Transportation

The Austin area is serviced by the Austin District of the Texas Department of Transportation (TxDOT). TxDOT has four maintenance offices within Travis County which enable it to respond quickly to emergency conditions in all sections of the Austin area. When threatening conditions exist, the maintenance foreman from each section will keep a close eye on road conditions. When necessary, emergency crews and vehicles will be dispatched to sand icy roadways and place barricades when needed.

For more information about the Austin District, contact Randall Dillard at 832-7000.

Will school buses be running if ice is on the roads?

The Austin Independent School District will evaluate all information provided from all agencies and Transportation staff input to determine whether school bell times should be delayed or school cancelled due to icing conditions. If minor safety concerns are determined in relation to bridge closings; school buses will be scheduled on alternative routes to avoid the problems. For further information contact AISD Transportation Department at 926-7940.

INCIDENT REPORT

DATE OF INCIDENT: _____ LOCATION: _____
 DIRECTION OF TRAVEL: _____ NUMBER OF LANES BLOCKED: _____ NUMBER OF LANES AVAILABLE: _____
 TIME OCCURRED: _____ TIME CLEARED: _____
 INCIDENT DESCRIPTION: _____

(ADDITIONAL SPACE ON BACK - INCLUDE DIAGRAM)

SHOULDER USED AS TRAVEL LANE: _____ (IF YES SPECIFY) _____
 TYPE & NUMBER OF VEHICLES INVOLVED: _____ PASS. CAR _____
 LIGHT TRUCK _____ MOTORCYCLE _____ SEMI-TRACTOR TRAILER _____
 VAN _____ VEHICLE WITH TRAILER _____ OTHER (SPECIFY) _____
 IF APPLICABLE - LOAD/CARGO INVOLVED: _____
 HOW AFFECTED: _____ LOST _____ SPILLED _____ SHIFTED _____ HAZARDOUS MATERIAL: _____
 (IF YES - GIVE TYPE) _____
 ROAD CONDITION: _____ DRY _____ WET _____ OTHER (SPECIFY) _____
 FWY. UNDER CONSTRUCTION? _____ (IF YES - SPECIFY) _____
 CONDITION: _____ LIGHT _____ DARK _____ LIGHT RAIN _____ HEAVY RAIN _____ OTHER
 (SPECIFY) _____
 NUMBER OF PEOPLE INJURED _____ NUMBER OF FATALITIES _____
 CITY OR STATE PROPERTY DAMAGES?: _____ (IF YES - SPECIFY) _____

AGENCY	TIME			ACTION TAKEN	EQUIP. USED
	NOTIFIED	ON-SCENE	CLEARED		

TOTAL FWY CLOSURE NECESSARY? _____ TIME STARTED: _____ TIME ENDED: _____
 DETOUR OR ROUTE DIVERSION USED? _____ (IF YES - SPECIFY) _____

ANY EXCESSIVE DELAYS IN AGENCY NOTIFICATION, RESPONSE OR EQUIPMENT? _____ (IF YES-SPECIFY)

ADDITIONAL INFORMATION: _____

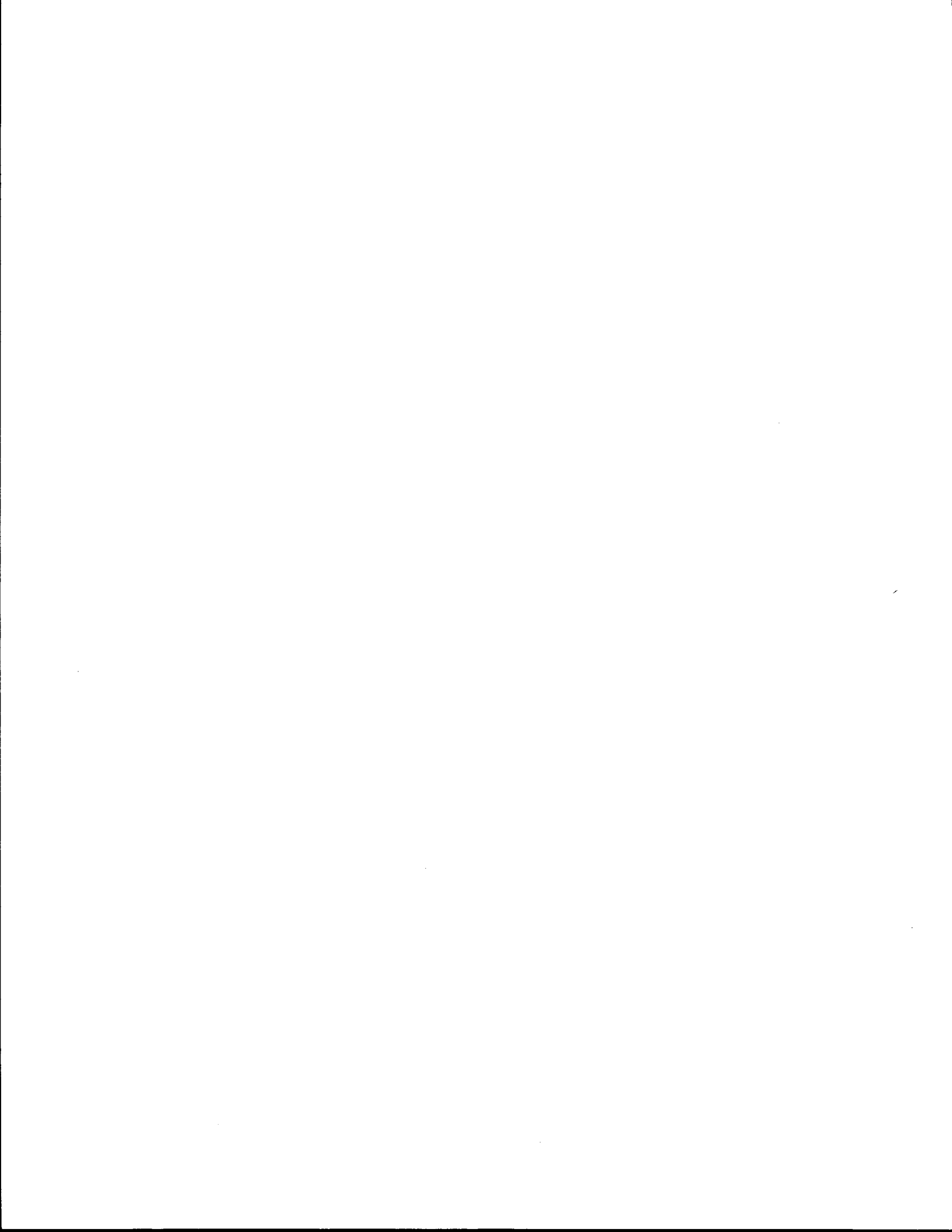
REPORT PREPARED BY: _____ AGENCY: _____ DATE PREPARED: _____

** PLEASE USE BACK OF REPORT TO SUPPLY ADDITIONAL INFORMATION



APPENDIX E

Beaumont Major Freeway Incident Response Plan



BEAUMONT MAJOR INCIDENT RESPONSE PLAN

Beaumont Traffic Management Team:

Beaumont Police Department

Beaumont Department of Transportation and Public Works

Texas Department of Transportation

Beaumont Fire Department

Texas Department of Public Safety

June 1994

OVERVIEW OF BASIC INCIDENT RESPONSE PROCEDURES

Major freeway incidents within Beaumont are relatively rare events, but can include major accidents involving multiple vehicles or fatalities, vehicle fires, and spilled loads or overturned trucks. Although they are rare, major freeway incidents, when they do occur, typically involve the response of several state and local agencies. Many different activities may need to be carried out for any given incident (medical assistance, debris removal, legal documentation, traffic management, evacuation of nearby residents, etc.). These activities should be coordinated and accomplished as quickly and safely as possible so that the impact upon traffic conditions can be minimized.

This manual documents major freeway incident response procedures for the Beaumont area from the standpoint of mitigating the effect of the incident upon traffic conditions. Although procedures for emergency medical assistance to injured persons, fire control, hazardous material response, etc., are already well established and carried out by the appropriate agencies, it is important to recognize that these activities must be coordinated so as to minimize the total duration of the incident and thus its impact upon traffic. For example, it is important to identify and request as quickly as possible what special equipment may be needed by any one agency to assist injured persons, remove debris from the freeway, etc.

Agency Involvement

The principal agencies involved in major freeway incident response within the Beaumont city limits include the following:

- Beaumont Police Department
- Beaumont Fire Department
- Beaumont Transportation and Public Works Department
- Texas Department of Transportation
- Texas Department of Safety

Other agencies and companies in the private sector (particularly tow truck operators) may also be involved occasionally. The Beaumont Police Department typically assumes control responsibility upon arrival at the incident site. The officer in charge determines the types of assistance required and contacts police dispatch to request that assistance from the appropriate agencies. This includes a determination of the type of on-site and any off-site traffic management procedures required.

Interagency Communication Protocols

At the present time, requests for agency assistance is handled through BPD Dispatch to other agencies via the telephone. Appendix A contains the telephone contacts of key personnel at each agency.

Incident Classification

Procedures relevant to the response and management of freeway incidents in Beaumont are dependent upon three pieces of information:

- 1) whether or not the incident involves the total closure of one or both directions of travel on the freeway,
- 2) the expected duration of the closure, and
- 3) the location of the incident on the freeway network.

The traffic characteristics and layout of the freeway corridors in Beaumont are such that most incidents can be handled with normal on-site traffic control procedures as long as one or more lanes of traffic can be accommodated past the incident site. Experiences suggest that the voluntary diversion by local drivers will be enough to keep freeway traffic congestion at tolerable levels, if they can be warned upstream of the incident site. For incidents where all lanes in one or both directions of travel on the freeway are blocked, traffic can be handled adequately by routing traffic off of the freeway at the first exit upstream of the blockage, along the adjacent frontage road past the incident site, and then back onto the freeway at the first entrance ramp downstream. This requires additional set-up time, however, and is feasible only if the total closure is expected to last more than one

hour. Furthermore, driver notification upstream of the incident site is even more critical to alert them of the unusual maneuvers that will be required.

Finally, if an incident blocks all freeway lanes at a location where the frontage road is discontinuous past the incident site, traffic must be diverted off of the freeway and frontage road onto the arterial street system. This requires even more time to set up, and so becomes feasible only for those incidents where the total closure is expected to last two hours or more. For this type of traffic management strategy, detailed plans are needed and should be consulted to determine whether additional enforcement is required for traffic control off-site. Driver notification is particularly critical for these types of incidents and should be initiated as soon as possible.

Given these constraints and demands placed upon the various agencies involved in incident response, the following incident classification system is identified:

Level 1: Traffic flow possible past incident site

Level 2: Total freeway closure where frontage road is continuous, duration of closure is expected to exceed 1 hour

Level 3: Total freeway closure where frontage road is discontinuous, duration of closure is expected to exceed 2 hours

Major traffic control considerations for each incident level are discussed in the following sections.

Incident Reporting

Much can be learned from past experiences when it comes to responding to major freeway incidents. Detailed records should be kept of each major incident. This should be completed by all agencies participating in response, and by Beaumont Police Department Dispatch. An incident reporting form is provided in Appendix B. Copies of this form should be completed after each major incident and circulated among members of the Beaumont Traffic Management Team so that problems and potential improvements can be discussed.

LEVEL 1 INCIDENTS

For Level 1 incidents, emphasis is on the safe and orderly movement of traffic past the incident site. Efforts should focus on implementing traffic control procedures that make use of as much of the freeway facility as possible while still ensuring the safety of incident response personnel.

Key Considerations

- The officer in charge can designate which side of the freeway response personnel should park their vehicles (preferably on the shoulder) so that necessary response vehicles can maneuver more easily into the incident region. This also ensures that as many travel lanes as possible may be used for traffic flow past the site.
- A typical traffic control set-up for Level 1 incidents is provided in Figure C-1.
- During higher volume times (i.e., rush hours), consideration should be given to the potential use of the emergency shoulder past the incident site. Figure C-2 illustrates the use of this technique.
- If the incident is to last for more than two hours and generates some congestion upstream of the incident site, TxDOT should be contacted to activate the Traveler Information System (TIS). TxDOT should be notified of the exact location and direction of travel of the incident so that the information can be incorporated into the radio message for travelers. A sample message for a Level 1 incident is provided in Appendix D.

LEVEL 2 INCIDENTS

Level 2 incidents involve the complete closure of one or both directions of travel on the freeway for an hour or more. These conditions require that motorists be diverted from the freeway to the frontage road at the first available exit ramp upstream, past the incident site via the frontage road, and back onto the freeway at a downstream entrance ramp.

Key Considerations

- A typical traffic control plan for routing traffic onto the frontage road is shown in Figure C-3.
- Additional enforcement personnel may be needed to manually control traffic at high-volume signalized intersections along the frontage road.
- Advance driver notification of conditions can reduce traffic demands at the site and increase driver awareness of the unusual situation. TxDOT should be notified to activate the TIS, again providing specific information concerning the location of the incident and the direction of travel. A typical message for a Level 2 incident is provided in Appendix D.
- Local radio stations can also serve as a means of driver notification. The TxDOT public information coordinator may be contacted to notify these stations as well about the incident location.

LEVEL 3 INCIDENTS

Level 3 incidents are limited to locations where the adjacent frontage road is discontinuous. Total freeway closures at these locations require that drivers be diverted from the freeway onto the arterial street system. Whereas local drivers are generally capable of finding their way around the incident in these situations, long-distance travellers passing through Beaumont (particularly on I-10) require assistance in finding suitable arterials as alternative routes as well as in finding their way back onto the freeway.

Key Considerations

- Unique traffic control plans for alternative routes are required for each Level 3 incident. A list of Level 3 incident locations is provided in Table 1. For each incident location identified in Table 1, the corresponding Level 3 traffic control layout (alternative route plan) is identified in Appendix C.
- Driver notification via the TxDOT TIS must also be tailored to the needs of each specific location. Table 1 also identifies specific TIS messages (listed in Appendix D) that correspond to the alternative route plans. Use of changeable message signs should also be considered, in some cases, to reach those drivers not receiving notification via TIS.
- The TxDOT Public Information Officer should be notified of all Level 3 incidents so that contacts with local radio stations can be made. If the closure occurs in the eastbound direction of I-10 and is expected to last more than 4 hours, consideration should be given to contacting the METRO and SHADOW traffic information services in Houston to help notify long-distance travelers (through the Houston media) of the problems in Beaumont.

Table E-1. List of Level 3 Incident Locations

Incident Location	Traffic Control Plan	TIS Message
I-10 Westbound @ LNVA Canal	Figure C-4	Figure D-3
I-10 Eastbound @ LNVA Canal	Figure C-5	NA
I-10 Westbound Connector to US-287 Eastbound (Cardinal Drive)	Figure C-6	Figure D-4
US-287 Westbound Connector to I-10 Westbound	Figure C-7	NA
I-10 Eastbound @ Mo. Pac./ So. Pac. Rail Line	Figure C-8	Figure D-5
I-10 Westbound @ Mo. Pac./So. Pac. Rail Line	Figure C-9	Figure D-6
I-10 Eastbound @ So. Pac. Rail Line	Figure C-10	Figure D-7
I-10 Westbound @ So. Pac. Rail Line	Figure C-11	Figure D-8
US-69/US-287 Eastbound @ LNRA Canal	Figure C-12	NA
US-69/US-287 Westbound @ LNRA Canal	Figure C-13	Figure D-9

NA Use of TIS not applicable to this situation

APPENDIX A: KEY CONTACT PERSONNEL FOR INCIDENT RESPONSE

Table A-1. List of Agency Contacts

Agency	Name	Telephone No.
Beaumont Police Department	J. R. Smith	880-3845
Beaumont Fire Department	James Downing	898-0484
City of Beaumont - Dept. of Transportation and Public Works	Jim Cline	880-3725
TxDOT	Ted East, Traveler Information System	892-7311
TxDOT	David Hearnberger, Director of Maintenance	898-5723
TxDOT	Janet Manley, Traffic Engineer	898-5768
TxDOT	Duane Browning, Area Engineer	898-5772
TxDOT	John Pitre, Maintenance Supervisor	892-4160
TxDOT	John Hurt, Public Affairs	898-5745
DPS	Jerry May	898-0770
METRO Traffic Information Service (Houston) ^a	Operations	(713) 621-5600
SHADOW Traffic Information Service (Houston) ^a	Operations	(713) 871-8282

^a To inform drivers from Houston travelling on eastbound I-10 to or beyond Beaumont

APPENDIX B: INCIDENT REPORTING FORM

INCIDENT REPORT

DATE OF INCIDENT: _____ LOCATION: _____
 DIRECTION OF TRAVEL: _____ NUMBER OF LANES BLOCKED: _____ NUMBER OF LANES AVAILABLE: _____
 TIME OCCURRED: _____ TIME CLEARED: _____
 INCIDENT DESCRIPTION: _____

(ADDITIONAL SPACE ON BACK - INCLUDE DIAGRAM)

SHOULDER USED AS TRAVEL LANE: _____ (IF YES SPECIFY) _____
 TYPE & NUMBER OF VEHICLES INVOLVED: _____ PASS. CAR _____
 LIGHT TRUCK _____ MOTORCYCLE _____ SEMI-TRACTOR TRAILER _____
 VAN _____ VEHICLE WITH TRAILER _____ OTHER (SPECIFY) _____
 IF APPLICABLE - LOAD/CARGO INVOLVED: _____
 HOW AFFECTED: _____ LOST _____ SPILLED _____ SHIFTED _____ HAZARDOUS MATERIAL: _____
 (IF YES - GIVE TYPE) _____
 ROAD CONDITION: _____ DRY _____ WET _____ OTHER (SPECIFY) _____
 FWY. UNDER CONSTRUCTION? _____ (IF YES - SPECIFY) _____
 CONDITION: _____ LIGHT _____ DARK _____ LIGHT RAIN _____ HEAVY RAIN _____ OTHER
 (SPECIFY) _____
 NUMBER OF PEOPLE INJURED _____ NUMBER OF FATALITIES _____
 CITY OR STATE PROPERTY DAMAGES? _____ (IF YES - SPECIFY) _____

AGENCY	TIME			ACTION TAKEN	EQUIP. USED
	NOTIFIED	ON-SCENE	CLEARED		

TOTAL FWY CLOSURE NECESSARY? _____ TIME STARTED: _____ TIME ENDED: _____
 DETOUR OR ROUTE DIVERSION USED? _____ (IF YES - SPECIFY) _____

ANY EXCESSIVE DELAYS IN AGENCY NOTIFICATION, RESPONSE OR EQUIPMENT? _____ (IF YES-SPECIFY)

ADDITIONAL INFORMATION: _____

REPORT PREPARED BY: _____ AGENCY: _____ DATE PREPARED: _____

APPENDIX C: TRAFFIC CONTROL PLANS

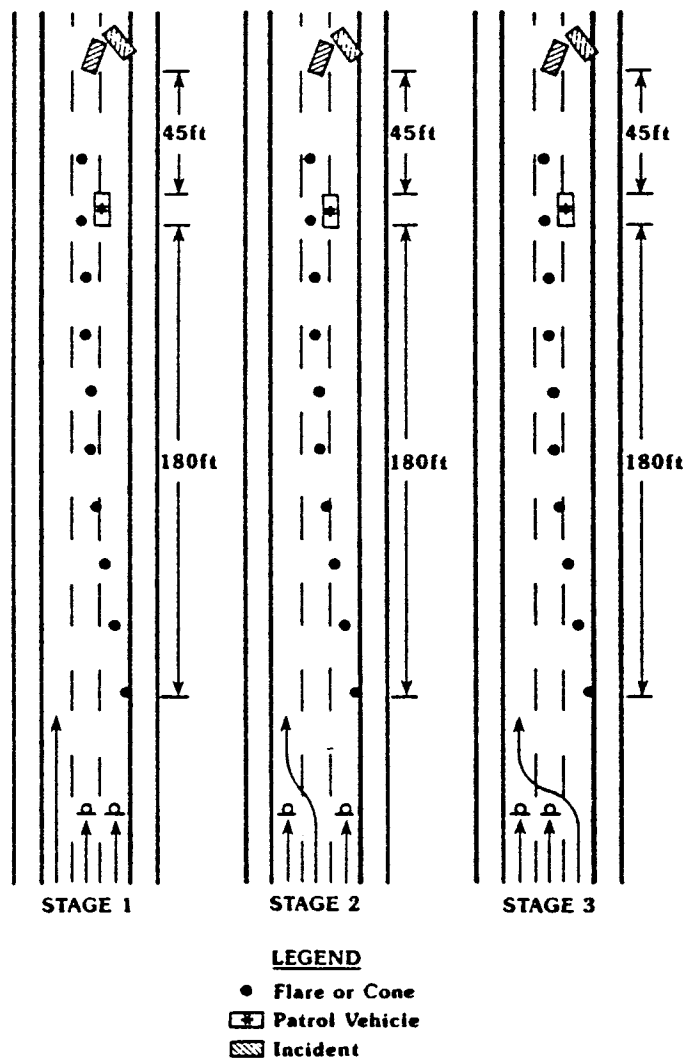
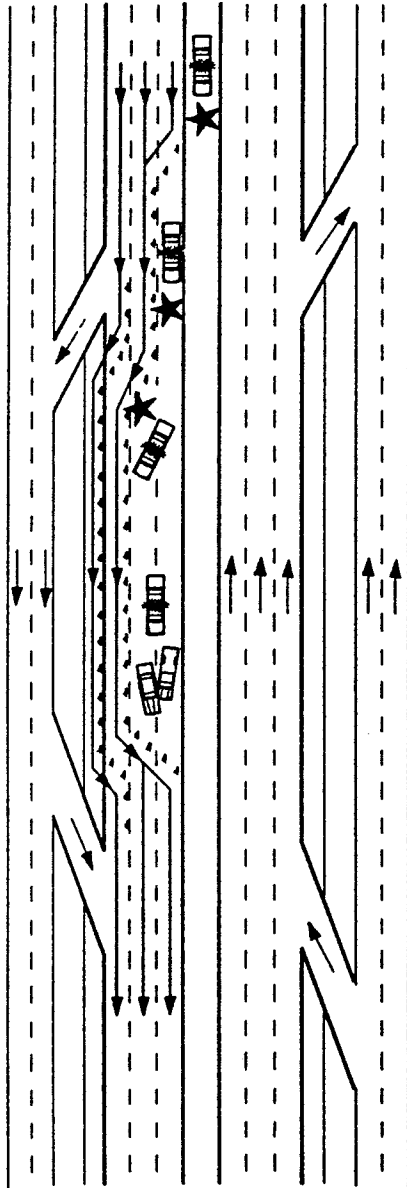


Figure C-1. Level 1 Incident: Typical On-Site Traffic Control



LEGEND

- ★ Flagman
- Officer
- ▭ Vehicles
- ▲ Cones/Flares

Not to Scale

Figure C-2. Level 1 Incident: On-Site Traffic Control Using Shoulders

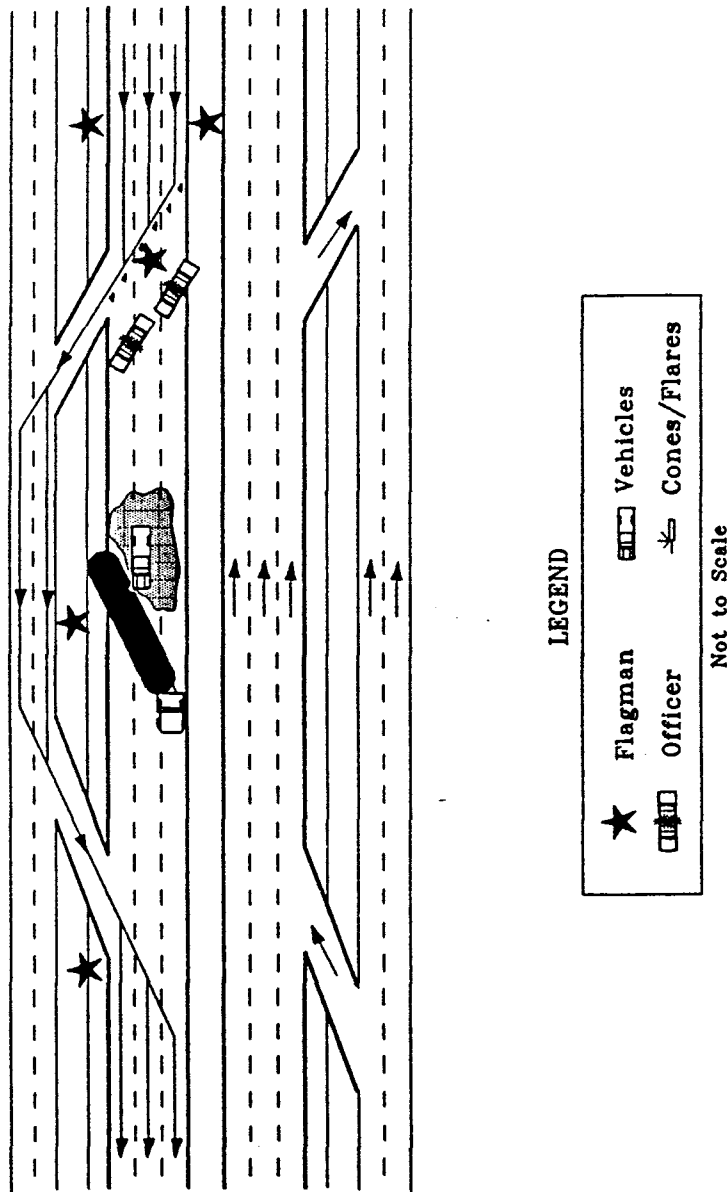
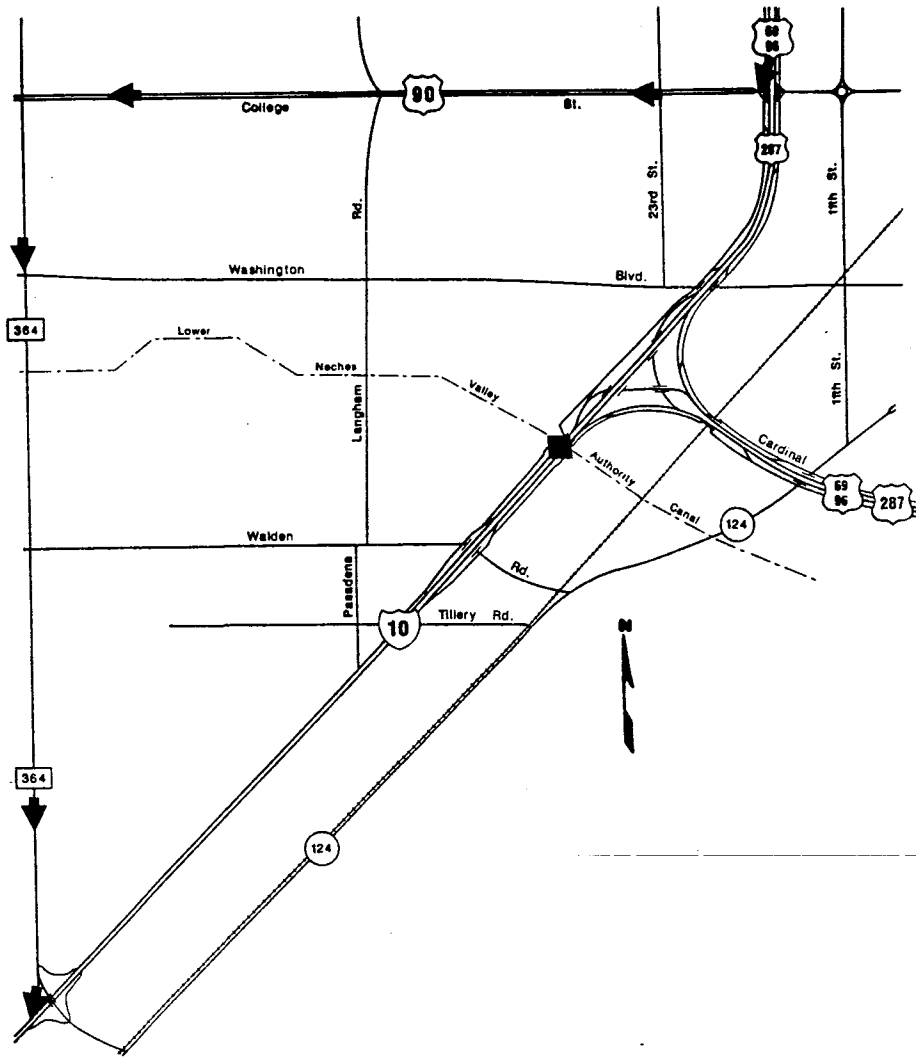


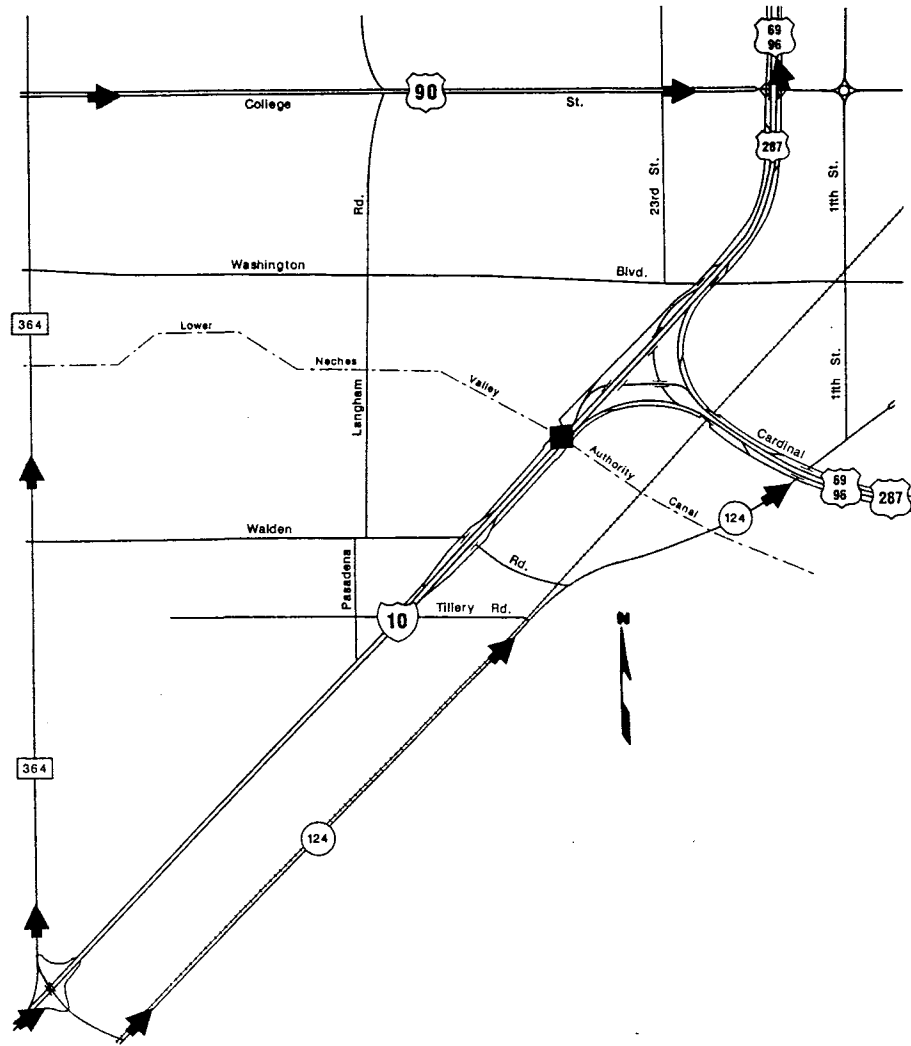
Figure C-3. Level 2 Incident: Traffic Diversion to Frontage Road



◆ Incident location

➔ Diversion route

Figure C-4. Level 3 Incident: Closure of I-10 Westbound at LNVA Canal



◆ Incident location ➔ Diversion route

Figure C-5. Level 3 Incident: I-10 Eastbound Closure at LNVA Canal

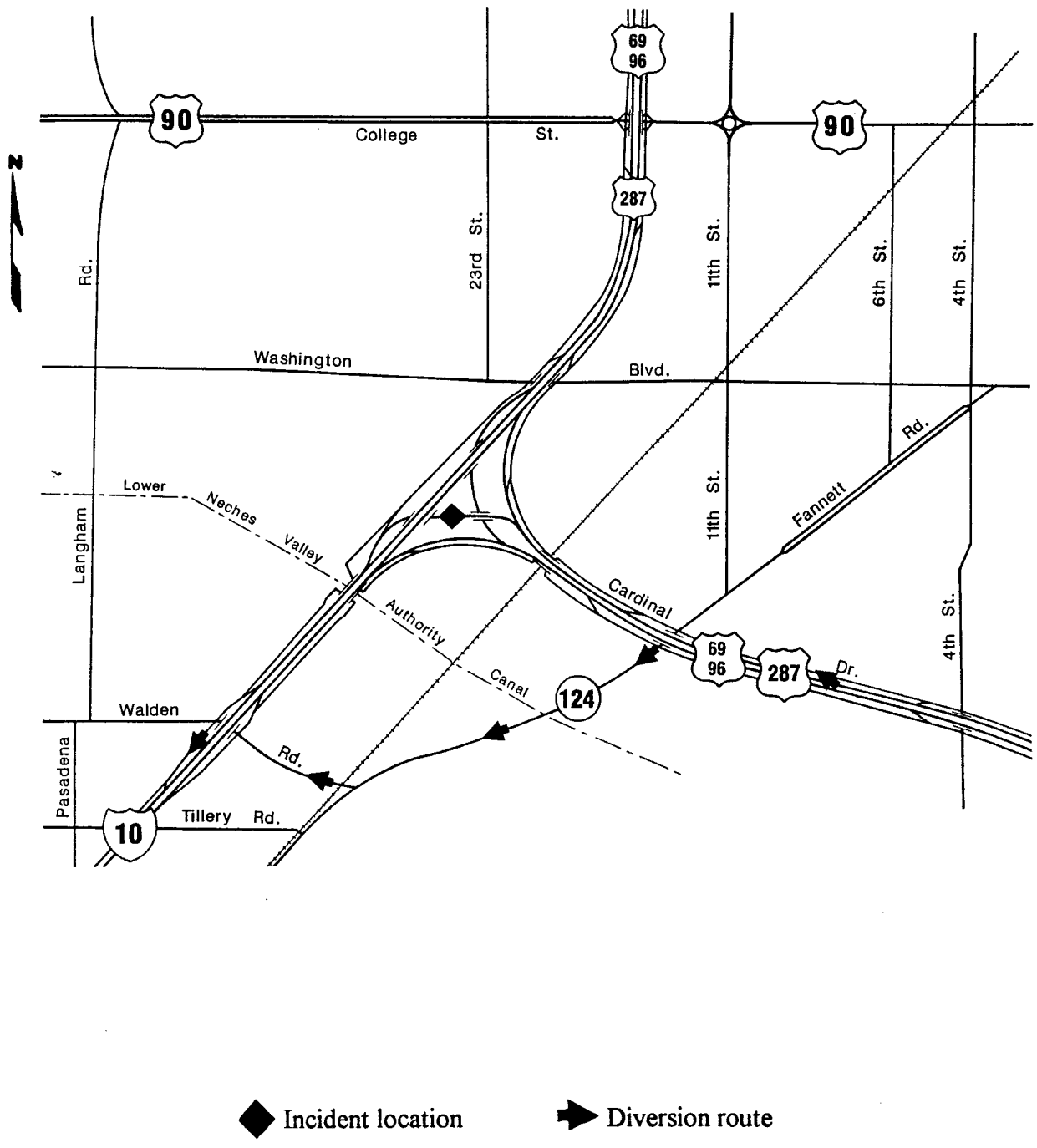
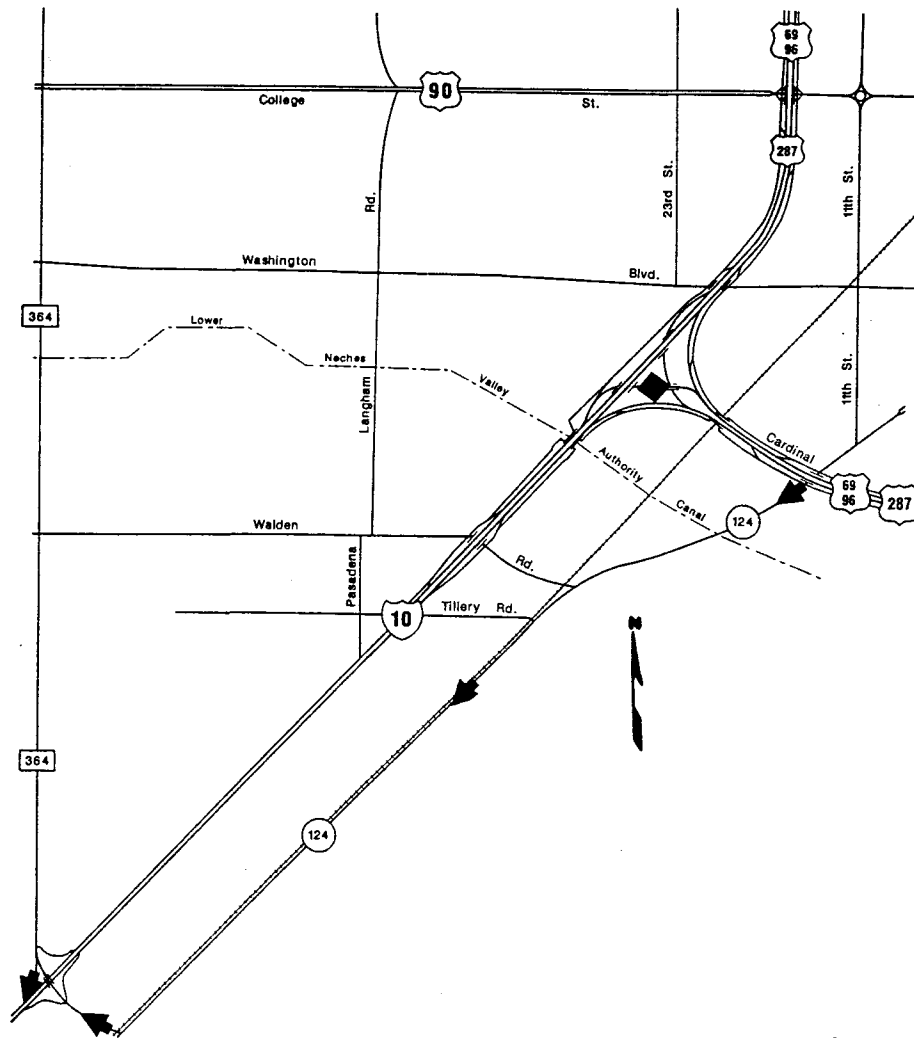


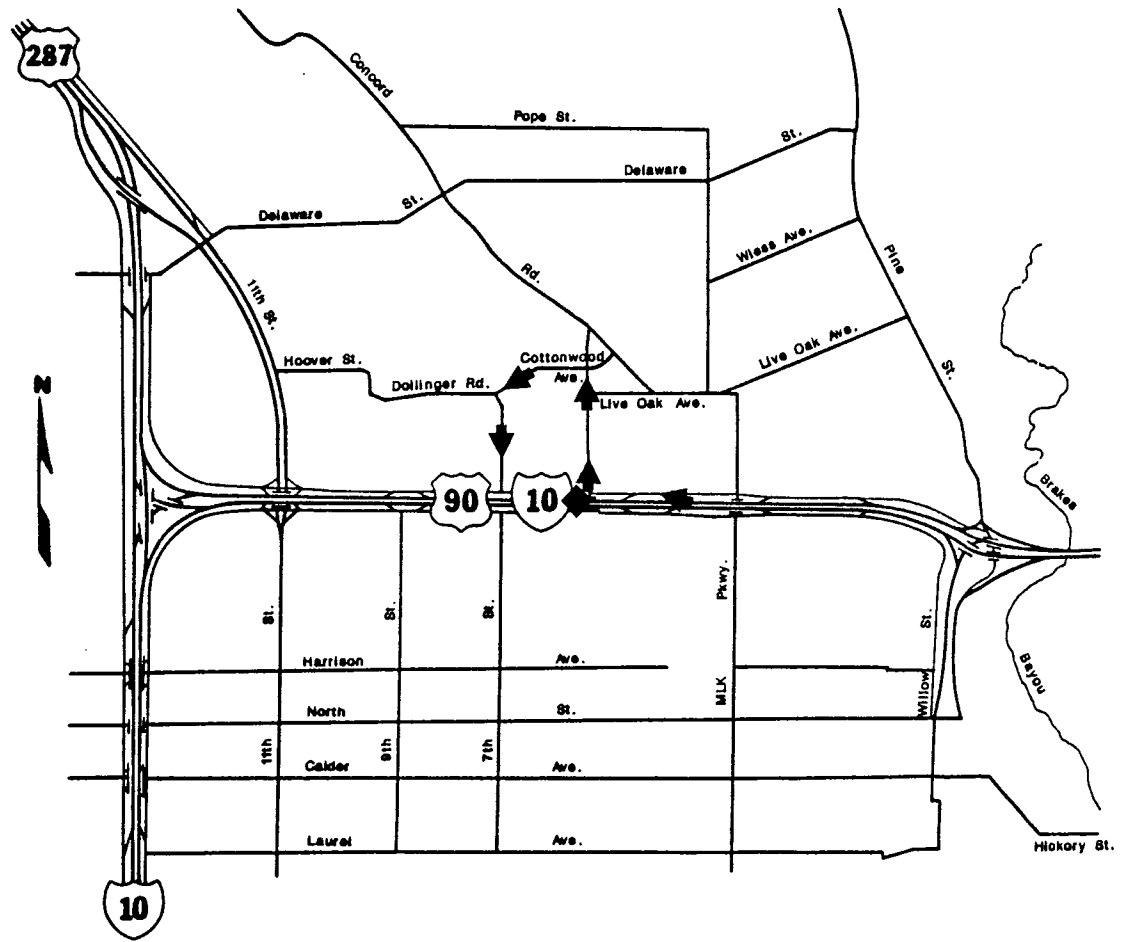
Figure C-6. Level 3 Incident: Closure of I-10 Westbound Connector to US-287 Eastbound (Cardinal Drive)



◆ Incident location

➔ Diversion route

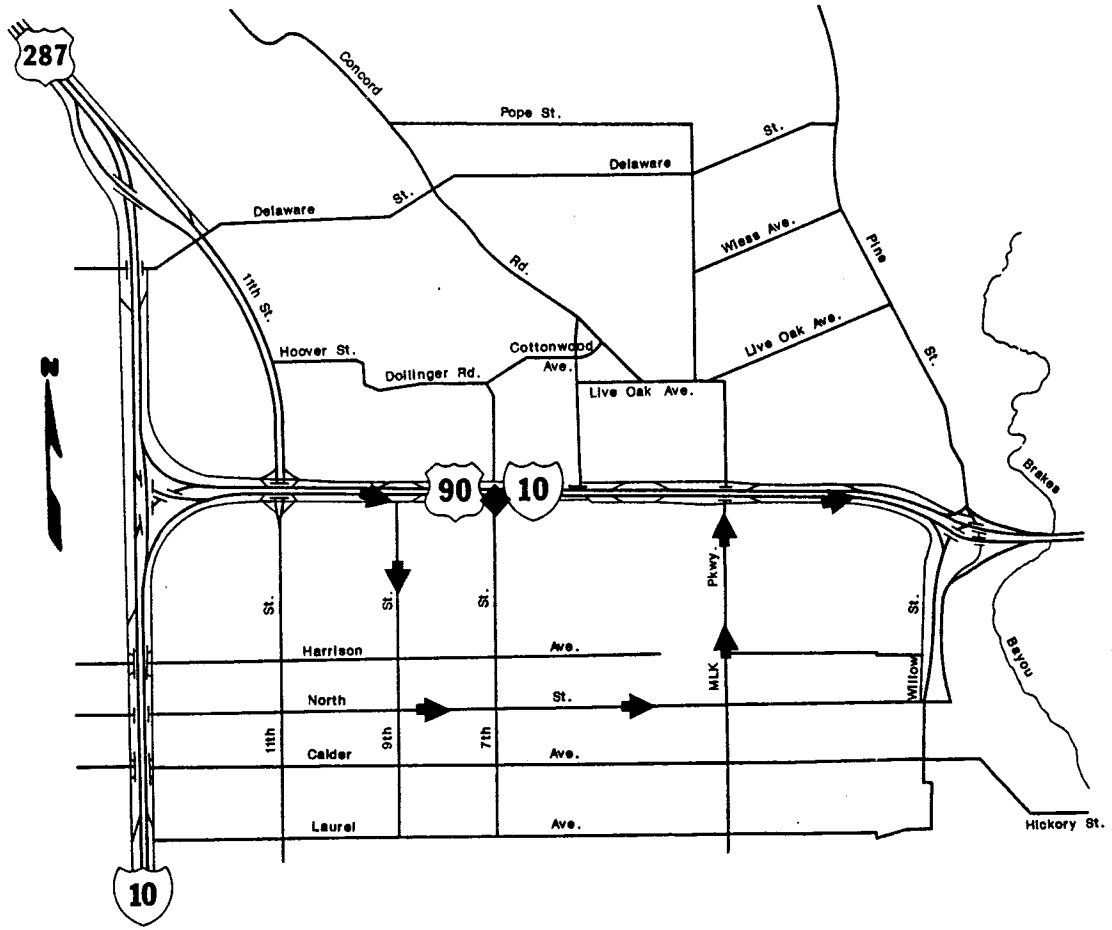
Figure C-7. Level 3 Incident: US-287 Westbound Connector to I-10 Westbound



◆ Incident location

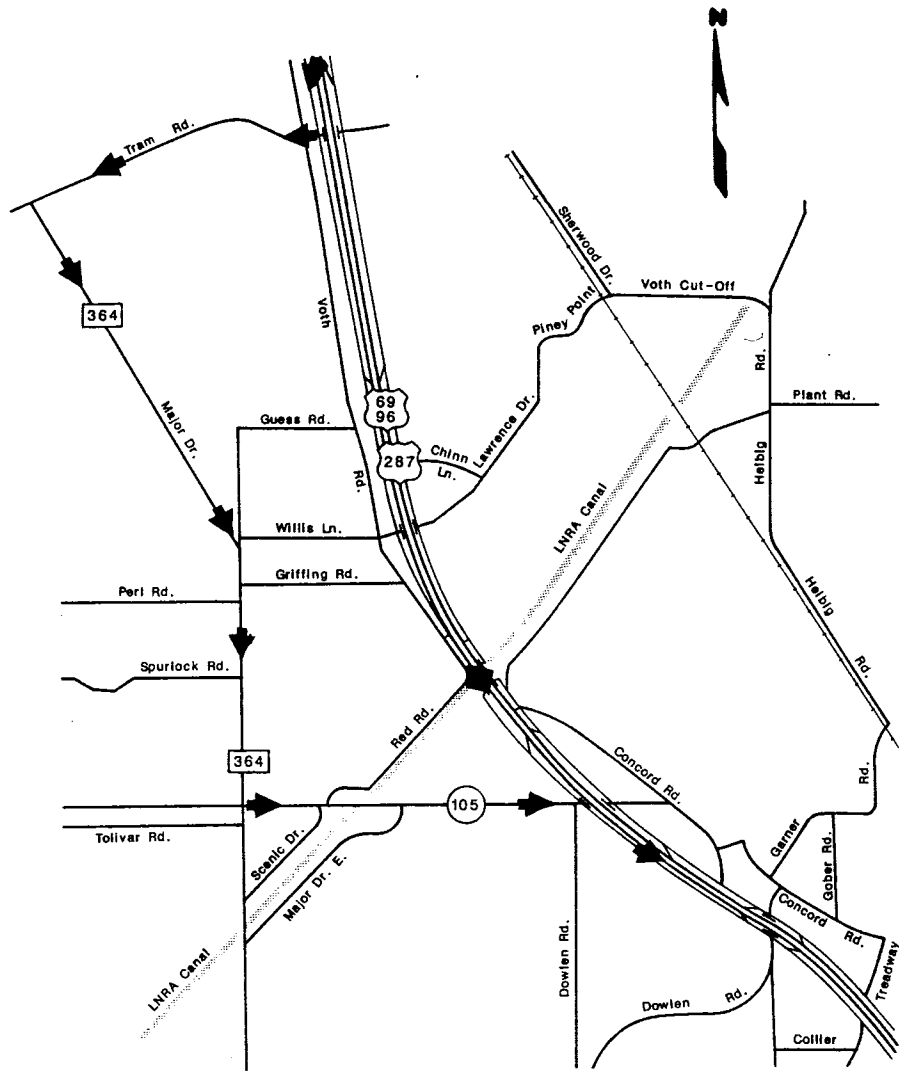
➔ Diversion route

Figure C-8. Level 3 Incident: I-10 Eastbound at Southern Pacific Rail Line



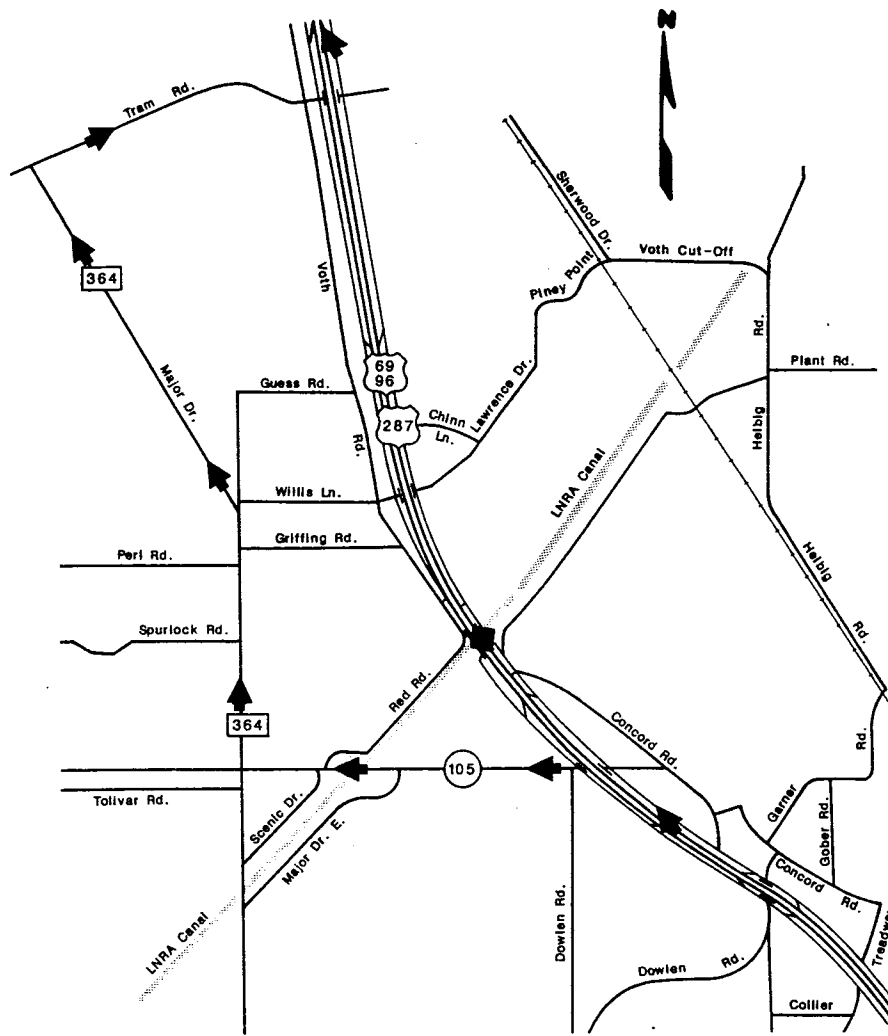
◆ Incident location ➡ Diversion route

Figure C-9. Level 3 Incident: I-10 Westbound at Southern Pacific Rail Line



◆ Incident location ➔ Diversion route

Figure C-10. Level 3 Incident: US-69/US-287 Eastbound at LNRA Canal



◆ Incident location

➔ Diversion route

Figure C-11. Level 3 Incident: US-69/US-287 Westbound at LNRA Canal

APPENDIX D: BEAUMONT TRAVELER INFORMATION SYSTEM

The Beaumont Traveler Information System (TIS) is a highway advisory radio system operated by TxDOT. The TIS provides all agencies in Beaumont with a means of communicating information in real-time directly to freeway drivers. Three antennas and notification signs are located over I-10 and US-69. Figure D-1 shows these locations. Each of these locations can be operated independently of the others, if necessary.

The figures that follow provide sample messages for broadcast under the different incident levels. These messages are based on human factors guidelines that have been developed for highway advisory radio. For levels 1 and 2, the focus is on warning drivers of special conditions downstream so that they will use extra caution when approaching and passing through the incident site. For level 3 incidents, specific instructions are provided to assist drivers as they divert.

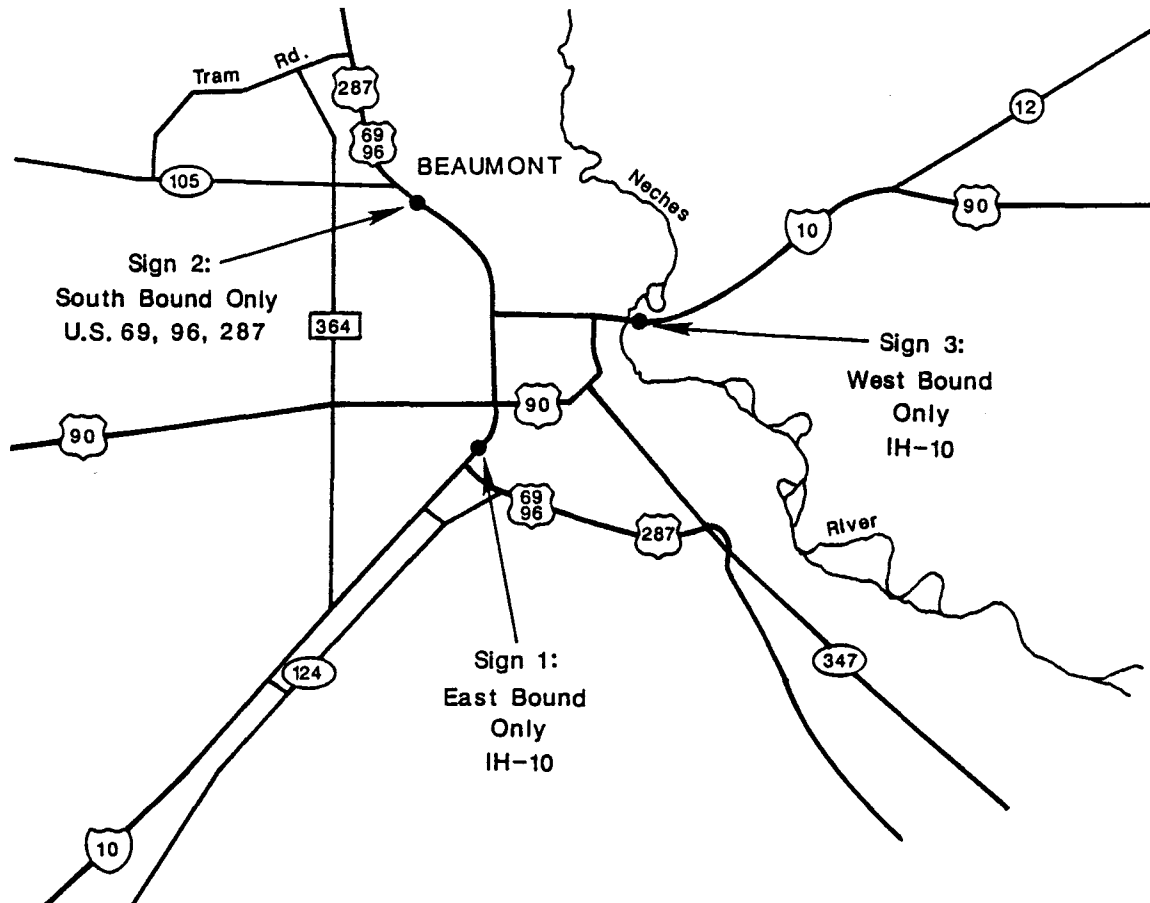


Figure D-1. Locations of the TIS Antennas and Signs

SAMPLE LEVEL 1 INCIDENT MESSAGE

ATTENTION [freeway and direction of travel] TRAFFIC;
AN [accident, spilled load, etc.] HAS OCCURRED ON [freeway] AT [location];
PLEASE USE CAUTION AS YOU APPROACH THIS LOCATION;
LOCAL DRIVERS MAY WISH TO AVOID THE AREA.

SAMPLE LEVEL 2 INCIDENT MESSAGE

ATTENTION [freeway and direction of travel] TRAFFIC;
AN [accident, spilled load, etc.] HAS BLOCKED [freeway] AT [location];
ALL TRAFFIC MUST EXIT TO THE FRONTAGE ROAD AT [nearest upstream cross-street];
LOCAL DRIVERS SHOULD AVOID THIS AREA IF POSSIBLE.

Figure D-2. Sample Messages for Level 1 and 2 Incidents

ATTENTION WESTBOUND I-10 TRAFFIC;
AN ACCIDENT HAS CLOSED INTERSTATE 10 WESTBOUND AT THE NECHES VALLEY
CANAL BRIDGE;
ALL I-10 TRAFFIC MUST EXIT AT WASHINGTON BOULEVARD;
PROCEED WEST ON WASHINGTON BOULEVARD TO LANGHAM ROAD;
TURN SOUTH ON LANGHAM AND PROCEED TO WALDEN ROAD;
TURN EAST ON WALDEN ROAD AND RETURN TO INTERSTATE 10;
LOCAL DRIVERS SHOULD AVOID THIS AREA IF POSSIBLE.

**Figure D-3. TIS Message for Level 3 Incident on I-10 Westbound at LNVA Canal
(broadcast on antennas 2 and 3).**

ATTENTION US-287 EASTBOUND TRAFFIC;
AN ACCIDENT HAS CLOSED THE RAMP FROM I-10 WESTBOUND TO US-287
EASTBOUND;
US-287 TRAFFIC SHOULD EXIT AT WASHINGTON BOULEVARD;
TURN EAST ON WASHINGTON AND PROCEED TO 11TH STREET;
TURN SOUTH ON 11TH AND PROCEED TO FANNETT ROAD;
TURN RIGHT ON FANNETT ROAD TO RETURN TO US-287;
LOCAL TRAFFIC SHOULD AVOID THIS AREA IF POSSIBLE.

**Figure D-4. TIS Message for Level 3 Incident on I-10 Westbound Connector to US-287
Eastbound (broadcast on antennas 2 and 3)**

ATTENTION I-10 EASTBOUND TRAFFIC;
AN ACCIDENT HAS CLOSED I-10 EASTBOUND AT THE BRIDGE OVER THE MISSOURI
PACIFIC RAILROAD;
ALL TRAFFIC MUST EXIT AT COLLEGE DRIVE;
TURN EAST ON COLLEGE DRIVE AND PROCEED TO 11TH STREET;
TURN NORTH ON 11TH STREET AND PROCEED TO LIBERTY AVENUE;
TURN WEST ON LIBERTY AVENUE AND RETURN TO THE FREEWAY;
LOCAL TRAFFIC SHOULD AVOID THE AREA IF POSSIBLE.

Figure D-5. TIS Message for Level 3 incident on I-10 Eastbound at Missouri Pacific/Southern Pacific Railroad Overpass (broadcast on antenna 1)

ATTENTION I-10 WESTBOUND TRAFFIC;
AN ACCIDENT HAS CLOSED I-10 WESTBOUND AT THE MISSOURI PACIFIC
RAILROAD BRIDGE;
ALL TRAFFIC MUST EXIT AT HARRISON AVENUE;
TURN EAST ON HARRISON AND PROCEED TO 11TH STREET;
TURN SOUTH ON 11TH AND PROCEED TO COLLEGE DRIVE;
TURN WEST ON COLLEGE DRIVE AND RETURN TO THE FREEWAY;
LOCAL TRAFFIC SHOULD AVOID THE AREA IF POSSIBLE.

Figure D-6. TIS Message for Level 3 Incident on I-10 Westbound at the Missouri Pacific/Southern Pacific Railroad Overpass (broadcast on antennas 2 and 3)

ATTENTION I-10 EASTBOUND TRAFFIC;
AN ACCIDENT HAS CLOSED I-10 EASTBOUND AT THE SOUTHERN PACIFIC
RAILROAD BRIDGE;
ALL TRAFFIC MUST EXIT AT 9TH STREET;
TURN SOUTH ON 9TH ST. AND PROCEED TO NORTH STREET;
TURN EAST ON NORTH AND PROCEED TO MARTIN LUTHER KING PARKWAY;
TURN NORTH ON MARTIN LUTHER KING PARKWAY AND RETURN TO THE
FREEWAY;
LOCAL TRAFFIC SHOULD AVOID THE AREA IF POSSIBLE.

**Figure D-7. TIS Message for Level 3 Incident on I-10 Eastbound at the Southern Pacific
Railroad Overpass (broadcast on antennas 1 and 2)**

RELATED REFERENCES

1. McCasland, W.R. et al. *Guidelines for Response to Major Freeway Incidents - Response Manual*. Report No. FHWA/TX-94/1345-1 (Draft). Texas Transportation Institute, College Station, Texas. February 1994.
2. Reiss, R. A. and W. M. Dunn, Jr. *Freeway Incident Management Handbook*. Report FHWA-SA-91-056. Federal Highway Administration, Washington, D. C. July 1991.
3. A Short Course on Police Officer Traffic Control for Incident Management. Prepared by the Texas Transportation Institute for the Texas Department of Transportation and Federal Highway Administration. April 1990.
4. Dudek, C.L. and R. D. Huchingson. *Manual on Real-Time Motorist Information Displays*. Report No. FHWA-IP-86-16. Federal Highway Administration, Washington, D. C. August 1986.

