Freeway Incident Management for Medium-Sized Urban Areas (Phase II)

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16. ABSTRACT

As a continuing effort of the Washington Department of Transportation (WSDOT) in freeway incident management, the purpose of this project is threefold: (1) to collect data/information for the implementing and coordinating freeway incident management strategies, (2) to prepare an incident response manual with all available data, and (3) to format the available data for possible use in a suitable expert system. The area covered by this study extends from the Four Lakes Interchange (Exit 270) on the west to the Idaho State Line (Exit 299) on the east.

An advisory committee with representatives from all the agencies involved with freeway incident management acknowledged the needs in coordination, staffing, and training. Information was mostly gathered through interviews with the various agencies, from accident reports supplied by the WSDOT, and Computer Aided Dispatch logs from the WSP.

An Incident Response Manual (IRM) was then prepared, focusing to provide a framework for the freeway incident management process to facilitate the coordination of the different agencies who play various roles in the process. The manual also provides information specific to the study area in regard to resources for incident response, and detour routes in case of closure of any section of the 30-mile stretch of Interstate 90. The software package KnowledgePro was recommended as a development tool quite to develop a computer version of the IRM.

Along with the basic Freeway Incident Management (FIM) framework of the Incident Response Manual (IRM), the following recommendations are specific actions that will facilitate different facets of the overall operation of freeway incident management:

- Spokane City Traffic Engineering Department: prepare different contingent traffic signal plans to match the FIM effort.
- Spokane City, County, and WSDOT: provide after-hours staffing for incident response; have a small maintenance crew to provide equipment for incident clearance from as early as 4:30 a.m. to as late as 7:30 p.m.
- Fire Departments: incident response training should be improved so that the operating procedures and equipment employed would suit the needs of the incident at hand.

For this IRM to be implemented practically, the following considerations should be made:

- The packaging of the IRM should be weather resistant and capable of surviving the rigors of use in the field; it should be printed on some type of card paper and then laminated.
- The IRM can be coded into a computer form for possible use on a laptop computer with a development tool such as KnowledgePro, which is a marriage of hypertext and a rule-based expert system.
- The IRM should be updated on a regular basis; information can be updated and disseminated to all relevant agencies by having an advisory committee with a representative from each agency meet on a regular basis to evaluate incident response strategies and update the IRM.

Finally, in order for a multi-organizational, multi-jurisdictional situation, such as the freeway incident management process, to function well, it is important to establish, within the local and state government, some policies that would regard incident management as a critical activity and would foster interagency cooperation.

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Research Project GC 8720, Task 6
Incident Management—Urban Areas

FREEWAY INCIDENT MANAGEMENT FOR MEDIUM-SIZED URBAN AREAS (PHASE II)

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FREEWAY INCIDENT MANAGEMENT FOR MEDIUM-SIZED URBAN AREAS (PHASE II)

SUMMARY

As a continuing effort of the Washington State Department of Transportation (WSDOT) in freeway incident management, the purpose of this project is threefold: (1) to collect data/information for implementing and coordinating freeway incident management strategies, (2) to prepare an incident response manual with all available data, and (3) to format the available data for possible use in a suitable expert system. The area covered by this study extends from the Four Lakes Interchange (Exit 270) on the west to the Idaho State Line (Exit 299) on the east.

An advisory committee with representatives from all the agencies involved with freeway incident management was formed. The specific needs that everyone in the advisory committee acknowledged were those of coordination, staffing, and training.

Information was mostly gathered through interviews with the various agencies, especially with Washington State Patrol (WSP) and WSDOT personnel. Many of the data and information were extracted from accident reports supplied by WSDOT and Computer Aided Dispatch logs from the WSP.

An Incident Response Manual (IRM) was then prepared. The selection of material to be included in the manual was based on the needs identified by the advisory committee. The focus was to provide a framework for the freeway incident management process to facilitate the coordination of the different agencies who play various roles in the process. The manual also provides information specific to the study area, particularly resources for incident response and detour routes in case of closure of any section of the 30-mile stretch of Interstate 90.

Various expert system shells were investigated to determine their feasibility for a knowledge-based expert system for freeway incident management and their suitability for our specific application. The software package KnowledgePro was selected as a

development tool quite uniquely suitable for our purpose. Its abilities to develop hypertext-based expert systems and interactive linkages between text and graphics displays merited the selection. With such a development tool, the IRM could be easily coded into a computer version.

CONCLUSIONS AND RECOMMENDATIONS

Although a preliminary form of an Incident Response Manual (IRM) has been prepared, providing a basic communication structure for Freeway Incident Management (FIM), the efficient implementation of freeway incident management strategies still depends on certain essential facilities to be in place.

The following recommendations, directed to the agencies that are involved in freeway incident management, are specific actions that will facilitate different facets of the overall operation of freeway incident management:

- Spokane City Traffic Engineering Department: prepare different contingent traffic signal plans to match the FIM effort.
- WSDOT: provide after-hours staffing for incident response; have a small maintenance crew to provide equipment for incident clearance from as early as 4:30 a.m. to as late as 7:30 p.m.
- Fire Departments: incident response training should be improved so that the operating procedures and equipment employed will suit the needs of the incident at hand.

For this IRM to be implemented practically, the following should be considered:

- The packaging of the IRM should be weather resistant and capable of surviving the rigors of use in the field; it should be printed on some type of card paper and then laminated.
- The IRM can be coded into a computer form for possible use on a laptop computer with a development tool such as KnowledgePro, which is a marriage of hypertext and a rule-based expert system.
- The IRM should be updated on a regular basis; information can be updated and disseminated to all relevant agencies by having an advisory committee

corridor where incidents have a high potential to occur. Five specific actions were recommended:

1. structure the database and, if necessary, identify and complete any missing data needed;
2. prepare an incident management manual capable of being updated on a regular basis;
3. form an incident management team; and
4. format the data/information for use in a knowledge-based expert system.

The purpose of this project was to act on the above recommendations. In this phase the focus of work was again directed toward the Spokane I-90 section shown on Figures 1 and 2. The experience, conclusions, and recommendations derived from this investigation could possibly be transferred to other medium-sized urban areas with operational freeway characteristics similar to those prevailing in Spokane.

RESEARCH OBJECTIVES

Considered to be an extension to the incident management work described above, this project had the following objectives:

1. to obtain additional information for implementing and coordinating freeway incident management strategies;
2. to prepare an incident response manual with all available data; and
3. to format the available data for possible use in a suitable expert system.

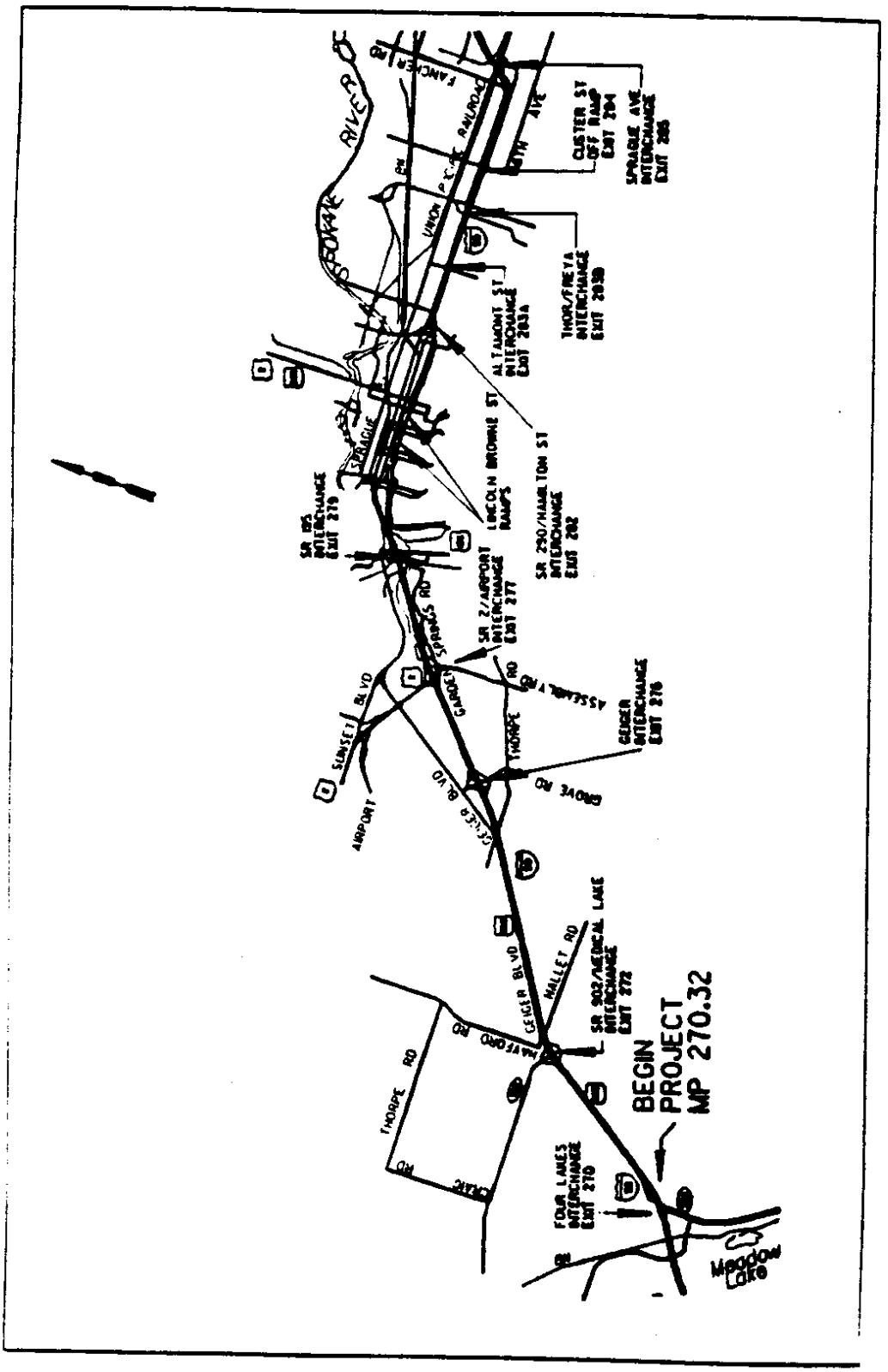

Figure 1. Project Vicinity Map - Exit 270 to Exit 285

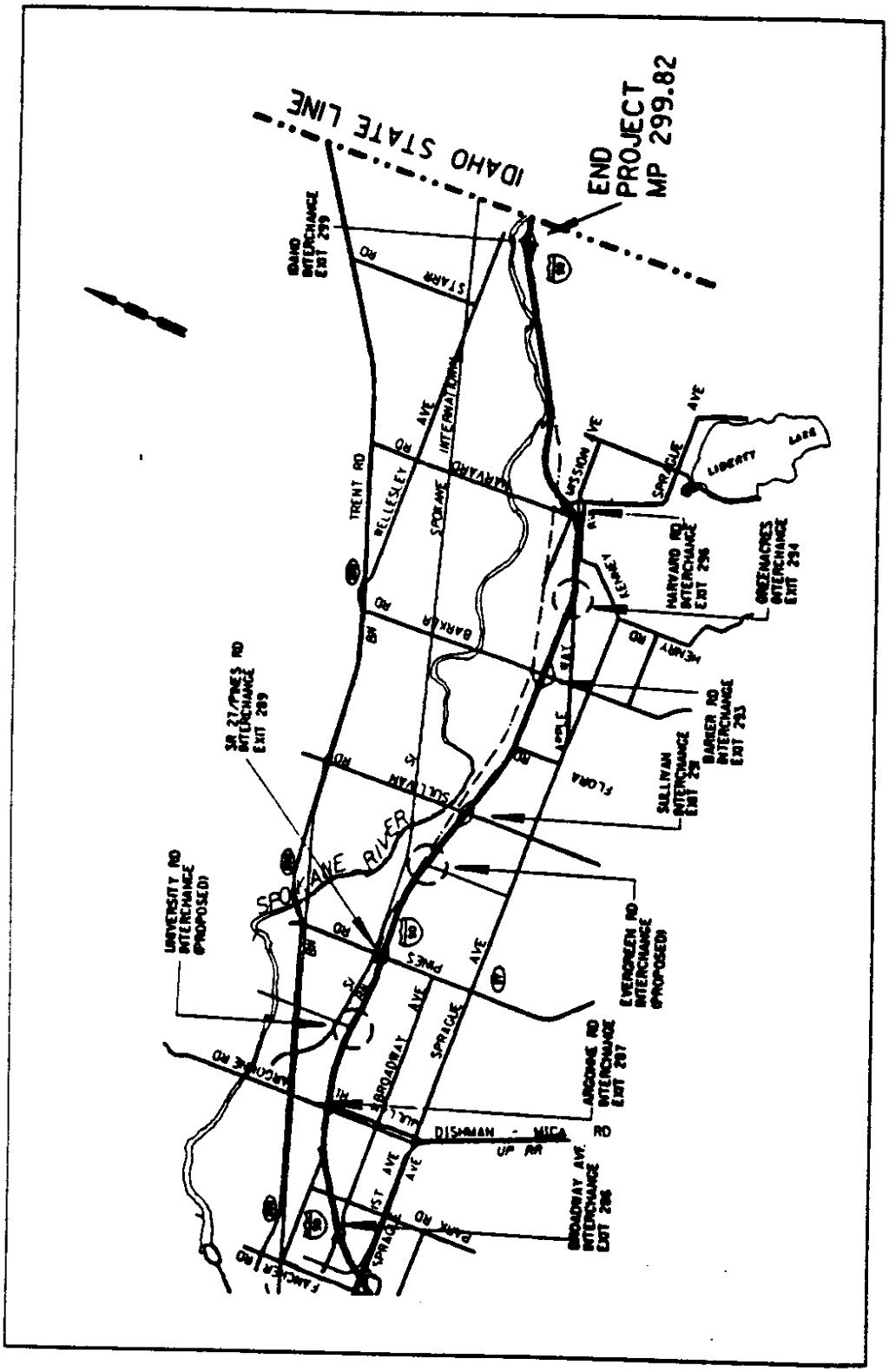

Figure 2. Project Vicinity Map - Exit 286 to Exit 299

REVIEW OF PREVIOUS WORK

INTRODUCTION

An effective and efficient process to manage freeway incidents and to reduce resulting delay depends heavily on effective incident response, a demanding task given the relative lack of incident management experts and the insufficient coordination among the various transportation and other supporting agencies. Often, freeway incident management involves multi-organizational, multi-jurisdictional responsibilities for traffic, roads, and other incident response support facilities such as fire and police departments. Within the limits of the project area were the Spokane Fire Department, two fire districts, the Spokane City Police, the Spokane County Sheriff, the Spokane County Department of Emergency Services, the Washington State Department of Ecology, the Washington State Department of Transportation (WSDOT), and the Washington State Patrol (WSP). Although all these agencies had played an important role in incident response, with the exception of the WSP, none of them had seen it as "their job" or responsibility. Thus, a lack of coordination and organization had led to unnecessary delay in incident response.

BACKGROUND

Interviews conducted in the previous phase of this project of the different organizations involved in freeway incident response indicated that the current system worked fairly well in most cases, except for a few flaws. (2) However, it was evident that each agency saw the carrying out of its own specific tasks or technologies as its only concern, with little regard for, or knowledge about, how and where it fit into the freeway incident management process as a whole. What was missing was the coordination of these resources in an open and mutually supportive manner.

A recent study on the incident management strategies used in Seattle, Wash., showed that even with one of the best freeway incident management programs, better

jurisdictional coordination could improve the freeway incident management efficiency. In particular, education and awareness programs were identified as a very cost-effective approach to enhancing this facet of incident management. (3)

An incident management program on Long Island, N.Y., has focused on answering very similar questions: Who should be responsible? Which agency should be in charge? Who should determine how to divert traffic and develop detours? Is there any way the incidents can be cleaned up sooner? The essence of these questions is, again, how to improve the incident management process by coordinating relevant agencies and resources. To tackle these questions, the policy was established that incident management is a critical activity, and the policy was announced by the highest level of local and state government; then much of the program's effort was devoted to the establishment of a multi-jurisdictional, coordinated incident management effort. (4)

Applications of expert systems to freeway incident management have been attempted as the artificial intelligence technology, especially in the area of expert systems development, has gained significant popularity in the last few years. The prototype expert system that is currently being developed in the Texas State Department of Highways and Public Transportation is focused primarily on automated detection, including evaluation of both the incident and the traffic situation of the neighboring network, to generate different response strategies. (5)

Such a system requires all the detection systems, as well as computerized ramp controls and arterial network signals, to be in place. Unfortunately these are not available in the Spokane area at present.

A similar system, being studied in California, also dealt with detection and surveillance of incidents on the freeways. While these experiences were not readily applicable to our situation, they helped us understand the potentials of KBES applications in freeway incident management. The study also pointed out that some of the advantages of the knowledge-based system include training of young engineers, serious

communication between human experts, and optimal selection of improvement on freeway incident management strategies. (6)

PROCEDURES AND DISCUSSION

The procedures in this project can be divided into three parts, namely, those for data collection, those for producing an incident response manual, and those for investigating the feasibility of applying computer technology to freeway incident management.

DATA COLLECTION

The purpose of the data collection effort was twofold: (1) to identify the needs of or areas of deficiency in the freeway incident management process, and (2) to gather the data identified in the previous phase of the project and add to them the information and data needed for the production of the incident response manual.

In order to identify the areas of deficiency in the current system, an advisory committee with representatives from all the agencies that were involved with freeway incident management was formed. This committee comprised four engineering and maintenance personnel from the WSDOT, a lieutenant and a communications officer from the WSP, fire chiefs from the two fire districts within the study area, the Spokane city traffic engineer, and the principal investigator of this project.

The advisory committee meetings readily confirmed the findings from the interviews done in the previous phase of this project. The specific needs that everyone acknowledged were those of coordination, staffing, and training.

Since the WSP had thus far had the primary responsibility for responding to freeway incidents and coordinating support and clear-up actions, the data collection was started with them. Log records from their Computer Aided Dispatch (CAD) system were collected for the most recent typical months of the winter and summer seasons. These were used to identify how WSP carried out the present response and coordination process. Although very few of these reports contained enough details to show definite patterns, they presented a rough picture of the sequence of actions for responding to different types of incidents with various degrees of severity. Lastly, the logs showed the times required for

responding to incidents and clearing of the incidents, which averaged a little over 13 minutes and 49 minutes, respectively. These numbers can serve as a base line for comparison when improvements, such as use of the incident response manual, are implemented.

The previous project phase identified only the existence and availability of much of the data/information. In this project, all the data/information were actually compiled to be analyzed and organized for the production of the incident response manual. Besides the accident/dispatch reports from the WSP, other data/information included detour routing for possible closure of any section of the 30-mile stretch of freeway, detailed maps for the I-90 corridor within the study area, and accident reports for the last five years, all from the WSDOT; contact name and telephone number lists for freeway incident management; a Department of Emergency Services Communication Diagram; and resource lists for emergency accommodation, ambulance services, hospitals, tow services, and airports, from the WSP.

INCIDENT RESPONSE MANUAL

With the wealth of information compiled from the data collection effort came the more complex task of organizing, sorting, and analyzing it for the preparation of an incident response manual. Two major steps constituted the procedure to produce this manual: (1) determining what information to include in the manual and in what format it should be presented, and (2) producing the manual, with considerations for size, binding, and other physical properties.

The primary user of the incident response manual, as suggested by the advisory committee, would be the WSP. Special meetings were held with WSP personnel to collect their opinion on the information necessary at the site of a freeway incident. They indicated that on-site incident management is initiated with the arrival of the primary response vehicle, a patrol car. The incident is either detected by the trooper or reported by other

sources to the WSP. In the latter case, the dispatcher at the central communications unit informs the trooper of the occurrence of the incident. The trooper assesses the situation and determines appropriate actions to protect persons and vehicles involved in the incident, while maintaining the traffic flow approaching the incident. One of the four officers of supervisory level, such as a lieutenant, is always available either at the scene or in communication with the scene to direct any appropriate actions for clearing the incident. Usually, this officer alone has the knowledge or information for the coordination of other agencies for emergency services.

This system not only puts the burden on only one officer, thus bearing the risk that one of these experienced personnel might not be available, but also gives little, if any, knowledge to other emergency service agencies about the whole freeway incident management process.

Structuring the knowledge/information that these supervisory officers possess and writing it in a manual would help to resolve the above problem greatly. The information needed in the manual would be mainly concerned with what and who to contact; where certain resources or clearance equipment were available; and information for the coordination of other agencies such as towing services, ambulances, road maintenance units of the WSDOT, signal control traffic engineering personnel, and the local police for traffic control in case of a closure to a certain section of the freeway.

WSP also indicated that the fire departments, which are often called to the scene of severe incidents, have standard operating procedures that greatly increase durations and impacts because they typically bring out a whole convoy of emergency vehicles and block off additional lanes. There is a definite need for the fire departments to tailor their operations and training to match the specific needs of freeway incident management.

Secondary users of the incident response manual would be all the other agencies that were involved with freeway incident management. Meetings were held with both individual agencies and with the advisory committee. A common concern among them was

where each of them fit into the freeway incident management process. They needed to know the stage the freeway incident management process was at when they were called upon by the WSP to respond to an incident. Critical examinations of the WSP's CAD log reports and their Unusual Occurrence Manual (UOM) were carried out to extract this information.

Much of the data/information collected from the WSP and the WSDOT, such as contact lists or detour routes, were neither prepared for the purpose of freeway incident management nor for the specific study area. Thus, the information for the specific objective and area of this project was selected and reformatted to assure easy and quick reference to only the relevant material.

For more expeditious reference to the detour routes, all the descriptions of detour routes supplied by the WSDOT were plotted on maps to be included in the incident response manual.

To reduce the response time for tow services, all the tow companies on the WSP's rotation list that serviced the I-90 section under study were listed according to location so that the closest company could be called to respond, instead of the one at the top of the current rotation system of the WSP. Several tow companies located near each other could go on a short rotation list for the section of freeway nearest to them. Only five of the tow companies had the equipment for towing large trucks, and they were highlighted on the list for easy reference.

For ease of production, the size chosen for the incident response manual was 8.5" x 11". To ease further development and updating, the manual should be bound in a loose-leaf format. Lastly, so that the manual can stand up to rugged field conditions and possible adverse weather, all the sheets in the manual should be laminated with some weather-resistant material.

APPLICATION OF COMPUTER TECHNOLOGY

The methodology for developing an expert system essentially consists of six steps: (1) identifying the problem and characterizing its participants, resources, and goals; (2) selecting the expert system tool; (3) collecting data and structuring the database; (4) implementing the expert system; (5) validating the rules; and (6) identifying the weaknesses and limitations of the expert system. (7)

The scope of this project covered the first three steps of the above expert system building process. The first step has already been discussed in detail in the previous sections. With the problem identified earlier, a knowledge-based expert system was seen as a computer version of the incident response manual. This system should be able to perform the following two tasks:

1. Upon the interactive (or menu driven) input of the incident description, it should guide the user through a chain of actions to respond to the situation; and
2. It should provide quick access to and display different information, both in text and graphics form.

With these tasks, and the third step of the expert system building process in mind, several expert system building tools, or shells, were investigated. Among the several shells that were investigated, including Leonardo, Level5, and KnowledgePro, the latter was found to be most suitable for our application.

Because the application will have to search for and select appropriate responses according to the type, location, and severity of incidents, and display a lot of text and graphics information, KnowledgePro is quite uniquely suitable—it is a development environment, a programming language, and an information-management tool. (8) It is described as "a knowledge-based system development environment that incorporates rules, graphics, hypertext, and database access." (9) At its most basic level, hypertext is a database management system (DBMS) that lets the user connect screens of information

using associative links. At its most sophisticated level, hypertext is a software environment for collaborative work, communication, and knowledge acquisition. Hypertext products mimic the brain's ability to store and retrieve information by referential links for quick and intuitive access. (10)

KnowledgePro uses production rules with an inference-engine usually available in an expert system shell. However, its interaction of hypertext and expert systems brings some unique advantages to our application in knowledge representation. On the one hand, hypertext gives the user flexibility to choose any path through the knowledge base, accessing quickly any specific information that may be required; one the other hand, the expert system steers the user down a path that is determined by the responses to a set of questions preset by the developer. By combining the features of both kinds of technology, KnowledgePro makes it possible for two-way communication to take place. The expertise of the WSP officers can be presented to the user in a way that this expert thinks will be most appropriate. The user can also arbitrarily explore in some other directions to suit the specific situation. (8)

Lastly, another added advantage to KnowledgePro is that the incident response manual in printed form can be very readily coded into a knowledge base. Thus the future development of the incident response manual into a computer form can be done with very little restructuring.

APPLICATION AND IMPLEMENTATION

The application and implementation of this study are in three areas: (1) the Incident Response Manual, (2) recommendations on facility and organizational improvements, and (3) the application of computer technology.

INCIDENT RESPONSE MANUAL

Appendix A of this report is a copy of a preliminary form of the Incident Response Manual (IRM). For the manual to be implemented, several practical issues should be considered:

- The packaging of the IRM should be weather resistant and capable of surviving the rigors of use in the field; it should be printed on some type of card paper and then laminated.
- For ease of reference, each of the different sections could be printed on a different color of paper.
- The IRM should be updated on a regular basis; information can be updated and disseminated to all relevant agencies by having an advisory committee with a representative from each agency meet on a regular basis to evaluate incident response strategies and update the IRM.
- To facilitate updating, the IRM should be bound in a loose leaf format so that any addition or deletion of pages can be done easily.

FACILITY AND ORGANIZATIONAL IMPROVEMENTS

Even with the IRM on hand, several critical facility and organizational improvements could greatly enhance the effectiveness of the IRM and ultimately the freeway incident management process. The following recommendations, directed to different agencies that are involved in freeway incident management, are specific actions that will facilitate different facets of the overall operation of freeway incident management:

- Spokane City Traffic Engineering Department: prepare different contingent traffic signal plans to match the FIM effort. The current signal system in Spokane, even with the computer-controlled downtown network, does not have contingent signal plans to cope with a heavy traffic flow that is diverted from a closed section of the freeway.
- WSDOT: provide after-hours staffing for incident response; have a small maintenance crew to provide equipment for incident clearance from as early as 4:30 a.m. to as late as 7:30 p.m.. The current systems do not have any maintenance personnel outside of office hours. Equipment for cleaning up incidents will not be available if the incidents occur even a little before the morning rush or after the evening peak.
- Fire Departments: incident response training should be improved so that the operating procedure and equipment employed will suit the needs of the incident at hand.
- A freeway incident management advisory committee should be set up with representatives from every organization. The function of this committee will be to evaluate incident response strategies and update the IRM periodically. Members should therefore meet on a regular basis, e.g., semi-annually, for this purpose.

Finally, in order for a multi-organizational, multi-jurisdictional situation, such as the freeway incident management process, to function well, it is important to establish, within the local and state government, some policies that regard incident management as a critical activity and that foster inter-agency cooperation.

APPLICATION OF COMPUTER TECHNOLOGY

With the advent of microcomputer technology, computers are getting smaller and more portable. The installation of portable computers on patrol cars is a conceivable option

in the near future. In fact, computer systems that can be installed in patrol cars and linked through communication channels to the central dispatch computer already exist. The IRM can be coded into a computer form, for possible use on a laptop computer, with a development tool such as KnowledgePro, which is a marriage of hypertext and a rule-based expert system. The IRM, which is already stored in digital form, can easily be imported into the expert system shell with minimal editing.

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APPENDIX A

INCIDENT RESPONSE MANUAL

SCOPE OF MANUAL

The scope of this manual covers the Interstate 90 corridor extending from Exit 270, the Four Lakes Interchange, on the West to Exit 299, the Idaho Road Interchange, on the East. Since the freeway incident management effort is a multi-organization one, it affects not only the freeway, but also the adjacent arterial network.

The focus of this manual is primarily on the facilitating the responding and clearing of incidents on the freeway. The main concern is to maintain the traffic flow on the freeway. This is achieved by either clearing any obstructions expeditiously, or diverting traffic to planned detour routes, or a combination of both.

While traffic control and safety are the primary concerns, the coordination of the supporting services of the freeway incident management effort is equally important to accomplish the primary objective. Thus the coordination/resources information form an essential part of this manual.

HOW TO USE THE MANUAL

The three main sections contained in this manual are: coordination flow charts, coordination/resources information, and maps on detour routes.

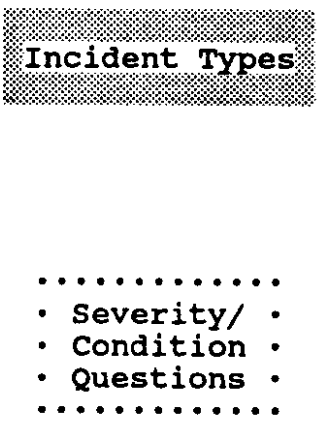
The flow charts provide a framework for coordination and communication between the various organizations that might be involved in the freeway incident management process. While they present some guidelines for the primary incident response unit, which is the WSP in our case, the flow charts also point out, to other supporting organizations, how they fit into the whole process.

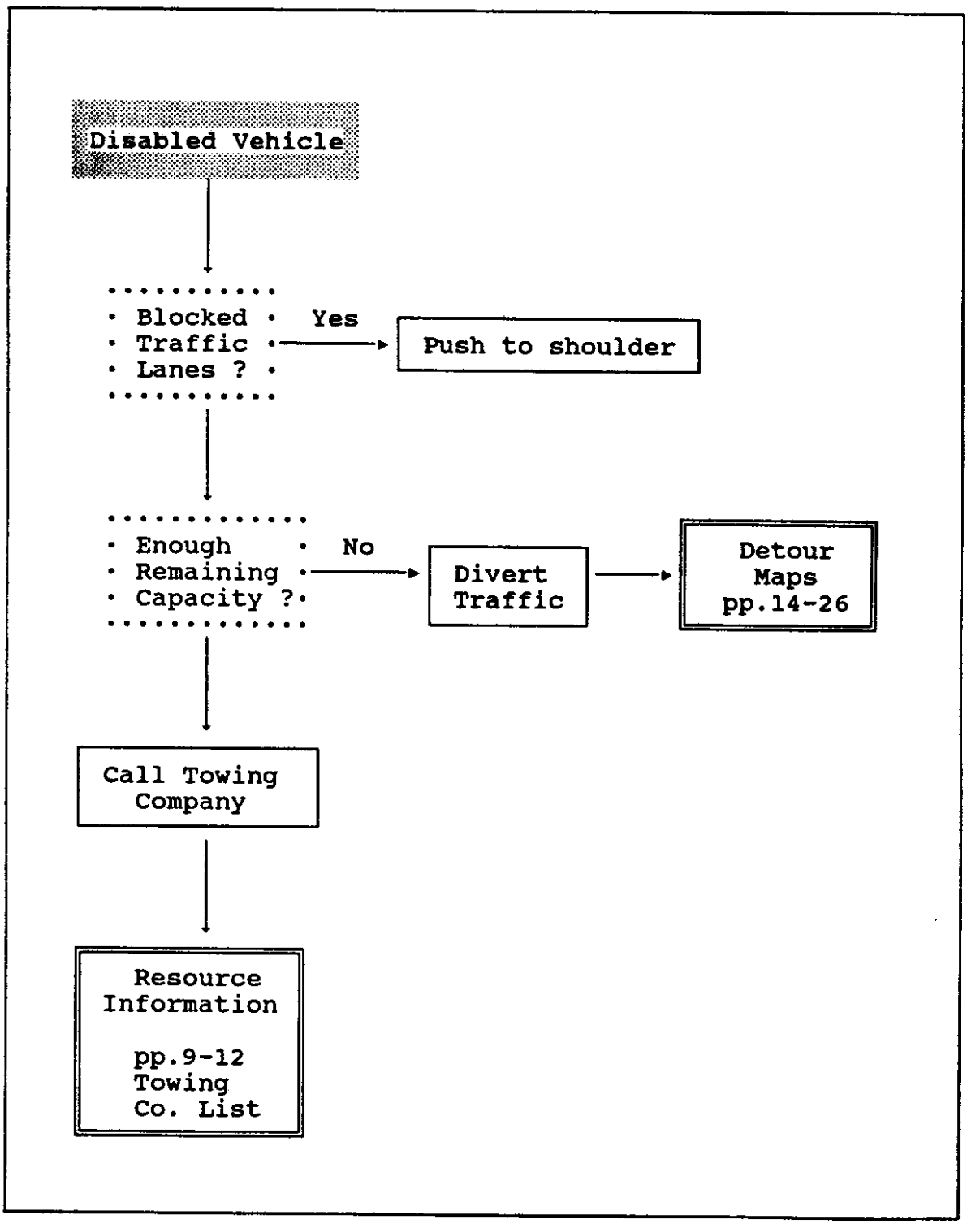
The coordination/resources information are specific to the I-90 corridor within the Spokane County. Refer to the table of contents, and turn to the section that details the resources needed for the particular incident/location at hand.

The maps of detour routes are arranged according to exit numbers, running from the west to the east. In the case of closure of any section of the freeway, the detour routes can readily be looked up from the table of contents.

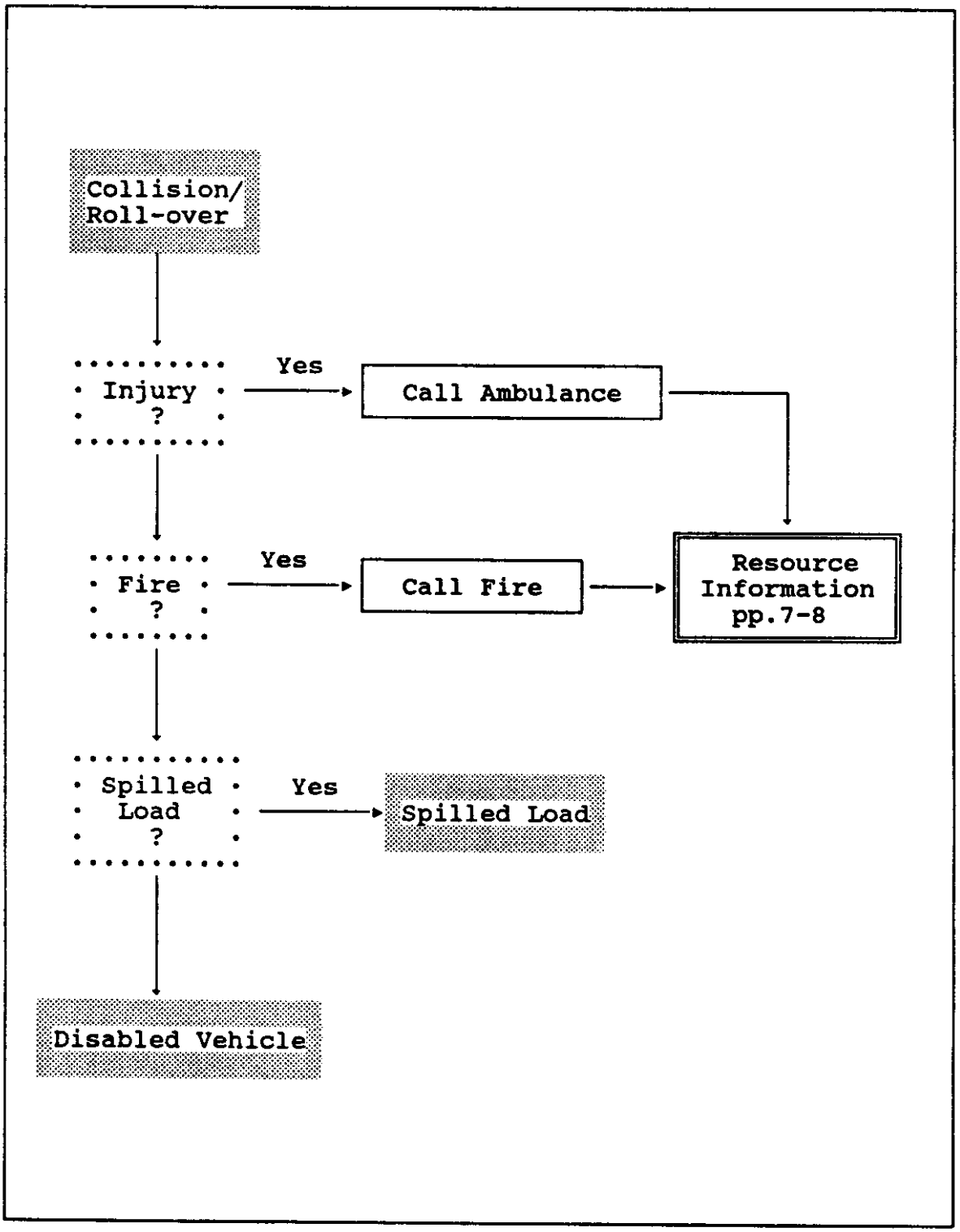
ORGANIZATION CHARTS

Legend for organization flow charts

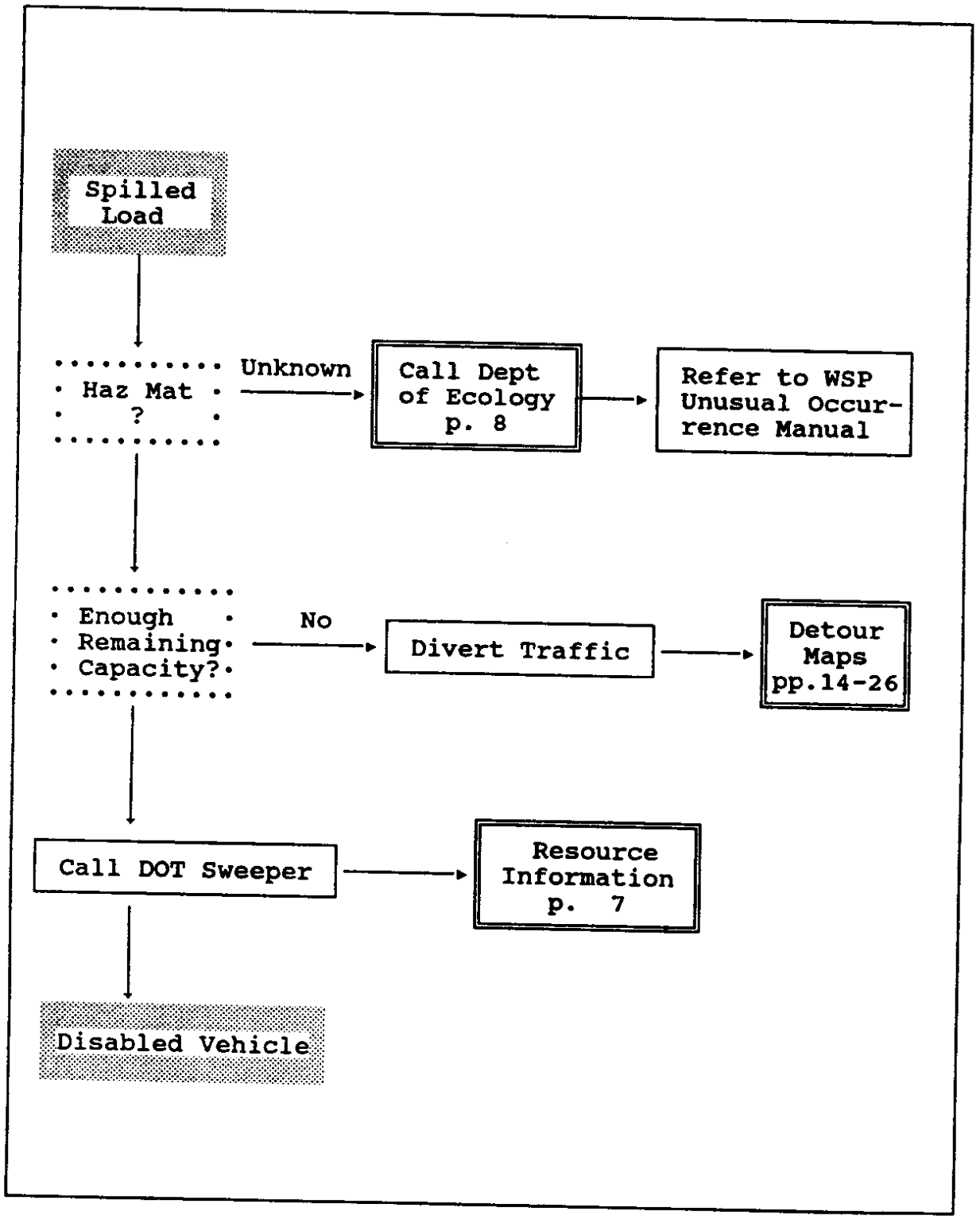



Disabled Vehicle
Blocked Traffic Lanes ?
Yes
Push to shoulder
Enough Remaining Capacity ?
No
Divert Traffic
Detour Maps pp.14-26
Call Towing Company
Resource Information
pp.9-12 Towing Co. List

ORGANIZATION CHARTS (continued)



ORGANIZATION CHARTS (continued)



COORDINATION/RESOURCE INFORMATION

Ambulances:

Name	Location	Phone No.	No.
Fairchild Hospital	Fairchild AFB	247-5661	4
Fairchild Surv. Schl.	Fairchild AFB	247-5414	1
Spokane Ambulance	West 915 Sharp	328-6161	5
Lifebird	Deaconess Hospital	458-7170	1
Mercy Ambulance	West 16 Gray Ct.	326-8111	5

Department of Emergency Services:

Lieutenant Earl Brown	West 1205 College	456-2204

Equipment for Incident Clearance:

Spokane County Road Dept	N 2321 Flora	926-3509

Vehicle/Equipment	No.
10-yd Dump Truck Sander	2
5-yd Dump Truck Sander	5
5-yd Dump Truck	3
2.5-yd Loader	1
Sweeper	2

WSDOT	N 2714 Mayfair	456-3000

5-yd Dump Trucks	15
3/4 Shovel & Crane	1
2.5-yd Scoopmobile	1
Wayne Sweeper	1
1-yd Front End Loader	2
3-yd Wabco Loader	1

Fire Departments:

Spokane Fire Dept	W 44 Riverside	456-2694 (911)
District 10	(4-Lakes to Havana)	299-3846
District 1	(Havana to Stateline)	928-1700

Helicopter - Medivac "MAST"

Fairchild AFB	Operations Command Post 2-way radio pager	247-2427 455-7400 326-4900
Army Guard	24-hour Hotline 2-way radio pager	458-5513 455-0412
Lifebird	Deaconess Hospital	458-7171
Heartflite	Sacred Heart Hospital	458-5364

Hazardous Material Spill Response:

Department of Ecology: N 4601 Monroe Suite 100

24-hour emergency spill response	456-2926
Hazardous substance information hotline	800-633-7585
Chem Trec	800-424-9300

Hospitals:

St. Lukes Hospital	S 711 Cowley	838-7278
Sacred Heart Hospital	W 101 8th	455-3344
Deaconess Hospital	W 800 5th	458-7100
Holy Family Hospital	N 5633 Lidgerwood	482-2460
Valley General Hospital	E 12606 Mission	924-6650
Veteran's Hospital	N 4815 Assembly	328-4521
Shriner's Hospital	N 820 Summit	327-9521

Police Departments:

Washington State Patrol	W 6403 Rowand	456-4101
Spokane Police (Traffic)	Public Safety Bldg	456-4211
Spokane County Sheriff	Public Safety Bldg	456-2311 (911)

Cheney Police	611 2nd, Cheney	838-1589
Medical Lake Police	124 Lefevre, Med. Lake	299-5122

Towing Companies:

listed according to location and proximity to the specific freeway section, and from West to East

the ones in **bold** print are equipped for towing large trucks

Between Exit 270 and Exit 272

Goodners Towing	Four Lakes	747-7791
Rouse Towing	**East 19 Ermina**	**325-4594**

Between Exit 272 and Exit 276

Goodners Towing	Four Lakes	747-7791
Andersons Chevrolet	4th and Maple	747-8985
Rouse Towing	**East 19 Ermina**	**325-4594**

Between Exit 276 and Exit 280

Spurlocks Auto Center	West 720-14 Airway Heights	244-3666
Andersons Chevrolet	4th and Maple	747-8985
McHughs Chevron	North 1202 Monroe	325-3879
Rouse Towing	**East 19 Ermina**	**325-4594**

Between Exit 280 and Exit 281

Andersons Chevrolet	4th and Maple	747-8985
McHughs Chevron	North 1202 Monroe	325-3879
Divines Towing Service	West 203 3rd	455-8622

Custom Towing	East 34 Trent	624-7321
Division Hill Towing	East 19 Ermina	326-5815
Rouse Towing	**East 19 Ermina**	**325-4594**

Between Exit 281 and Exit 282

Divines Towing Service	West 203 3rd	455-8622
Custom Towing	East 34 Trent	624-7321
Division Hill Towing	East 19 Ermina	326-5815
Rouse Towing	**East 19 Ermina**	**325-4594**
Slims Towing	**East 2014 Broadway**	**534-3209**

Between Exit 282 and Exit 283

Custom Towing	East 34 Trent	624-7321
Slims Towing	**East 2014 Broadway**	**534-3209**
Bateman Auto-Towing	East 2406 Trent	534-0387
Alexanders	**East 3129 Trent**	**535-1531**

Between Exit 283 and Exit 286

Slims Towing	**East 2014 Broadway**	**534-3209**
Bateman Auto-Towing	East 2406 Trent	534-0387
Alexanders	**East 3129 Trent**	**535-1531**
Artistic Body & Fender	East 6504 Trent	535-5838

Between Exit 286 and Exit 287

Artistic Body & Fender	East 6504 Trent	535-5838
Slims Towing	**East Trent & Argonne Rd**	**928-8500**
Farr Towing	East 9702 Sprague	926-7039

Rouses Valley Towing	**North 2621 University Road**	**928-3609**

Between Exit 287 and Exit 289

Slims Towing	**East Trent & Argonne Rd**	**928-8500**
Farr Towing	East 9702 Sprague	926-7039
Rouses Valley Towing	**North 2621 University Road**	**928-3609**
Wallys	North 3619 Cement	924-7635

Between Exit 289 and Exit 291

Rouses Valley Towing	**North 2621 University Road**	**928-3609**
Wallys	North 3619 Cement	924-7635
Pat's Towing	East 13701 Trent	926-4708
East Valley Towing	East 14921 Trent	922-2727
Jim Larkin Chevron	North 1104 Sullivan	924-5522

Between Exit 291 and Exit 299

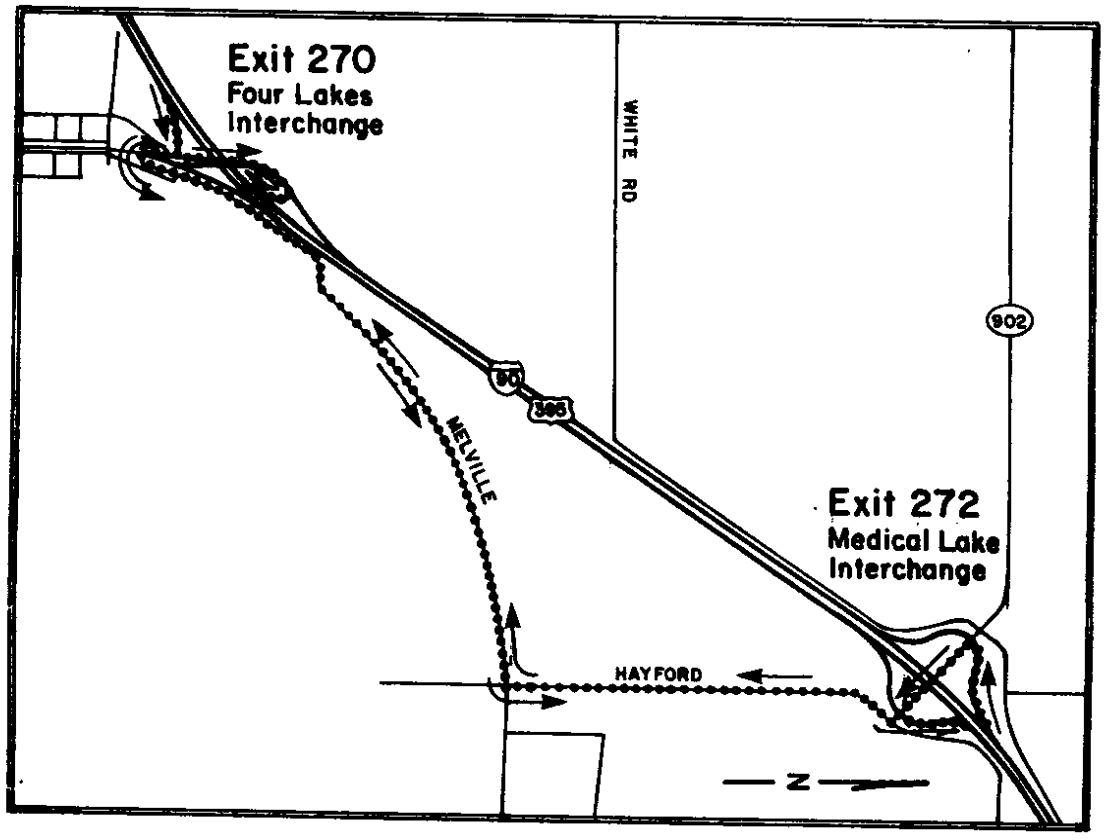
Rouses Valley Towing	**North 2621 University Road**	**928-3609**
East Valley Towing	East 14921 Trent	922-2727
Jim Larkin Chevron	North 1104 Sullivan	924-5522

Traffic Engineering:

WSDOT	N 2714 Mayfair	456-3000
Spokane County	N 811 Jefferson	456-3600
City of Spokane	W 808 Spokane Falls	456-2633

MAPS: DETOUR ROUTES

The following maps highlights the detour routes suggested by the WSDOT engineering staff. Each of the following pages shows one section of I-90, containing two interchanges, and its adjacent arterial network. In the event that the section of freeway between the two interchanges is closed due to an incident, the traffic flow can be directed via the detour routes and redirected back to the freeway at the next on ramp.



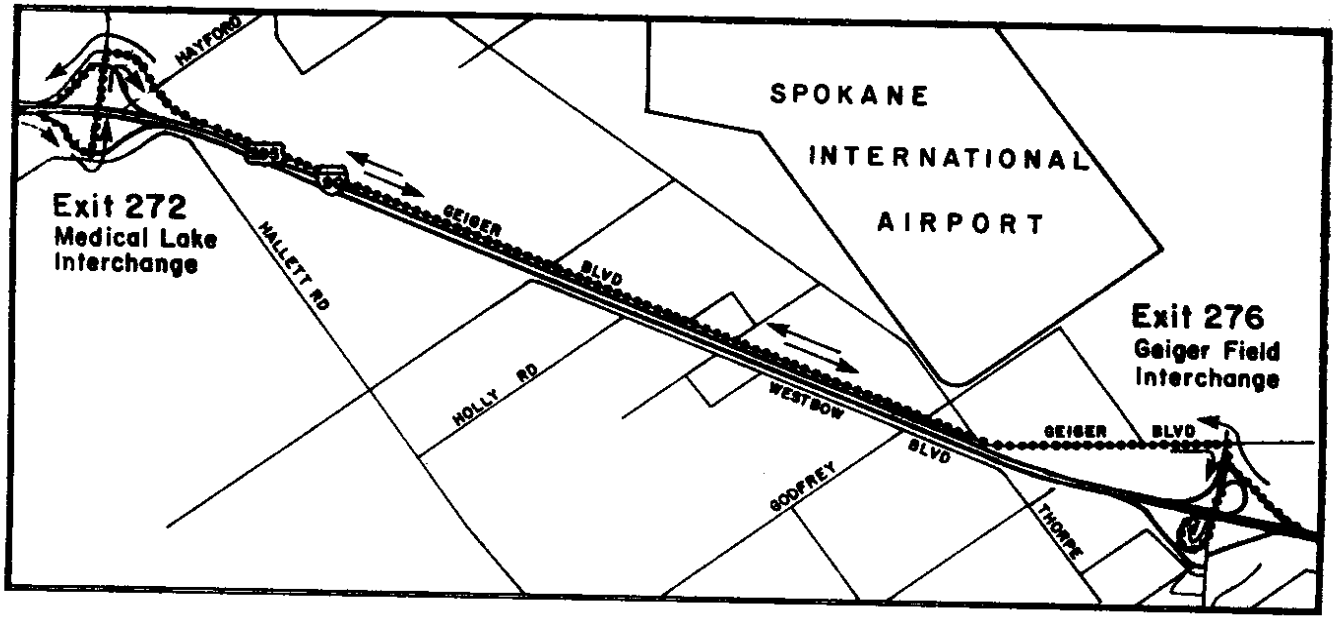
Eastbound

at Exit 270 EB ramp terminal, turn right
at Melville Rd, turn left
at Hayford Rd stop, turn left
at Hallet Rd stop, turn left
at SR 90 EB on-ramp, turn right

Westbound

at Exit 272 WB ramp terminal, turn left
at Hayford Rd stop, turn right
at Melville Rd stop, turn right
at 904 stop, turn right
at SR 90 WB on-ramp terminal, keep left

Figure A1. Exit 270 Four Lakes Interchange to Exit 272 Medical Lake Interchange



Eastbound

at Exit 272 EB ramp terminal, turn left

at Hayford Rd, turn right

at Grove Rd, turn right

at SR 90 EB on-ramp, turn left

Westbound

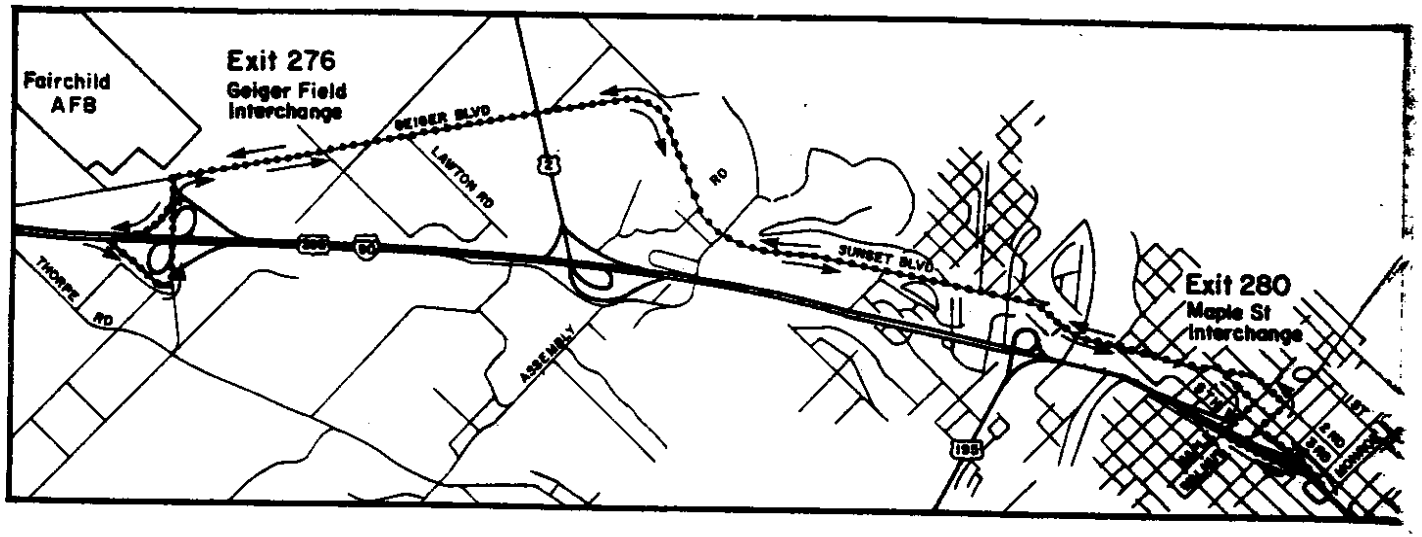
at Exit 276 WB ramp terminal, turn right

at Geiger Rd stop, turn left

at SR 902 stop, turn left

at SR 90 WB on-ramp, turn right

Figure A2. Exit 272 Medical Lake Interchange to Exit 276 Geiger Field Interchange



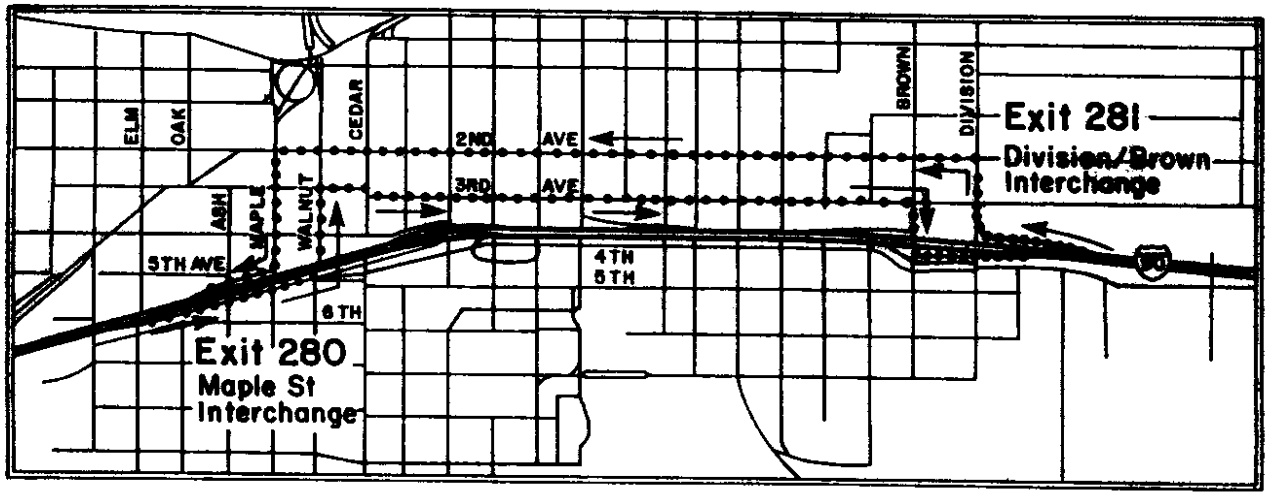
Eastbound

at Exit 276 EB ramp terminal, turn left
at Geiger Blvd stop, turn right
at Sunset Blvd merge into old US 2
at 3rd Ave and Maple St signal, turn right
at Freeway Ave South signal, turn left
at Walnut St signal EB on-ramp terminal, go straight

Westbound

at Walnut St. ramp terminal stop, turn right
at 2nd Ave signal, turn left
follow Diagonal St - Sunset Blvd
left to SR 195 Exits left lanes
Geiger Blvd left lane
at Grove Rd, turn left
at SR 90 WB on-ramp terminal, turn right

Figure A3. Exit 276 Geiger Field Interchange to Exit 280 Maple St. Interchange



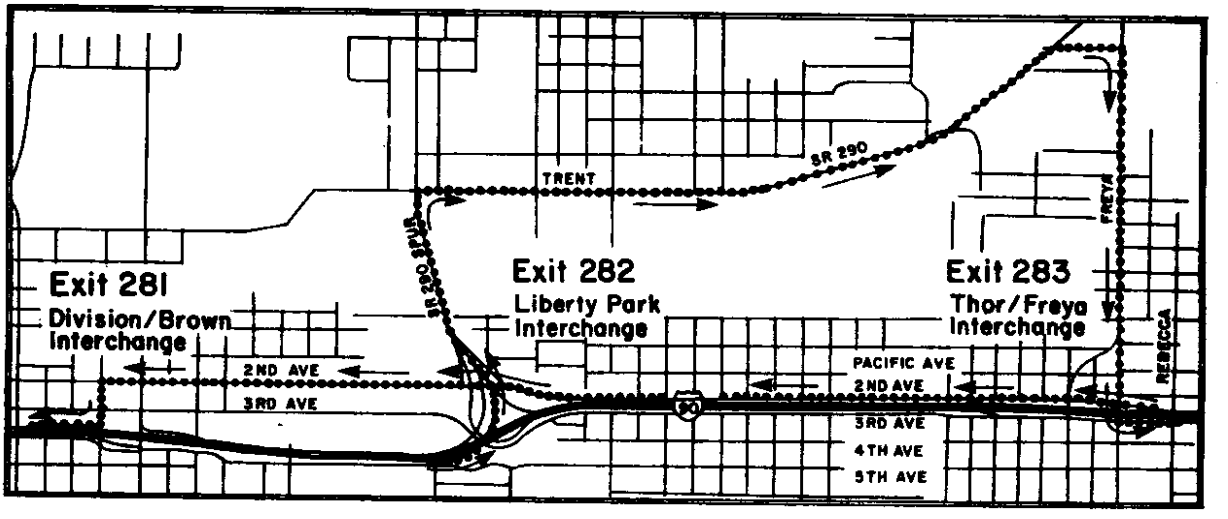
Eastbound

at Exit 280 EB ramp terminal
(Maple St signal), go straight
at Walnut St signal, turn left
at 3rd signal, turn right
at Brown St signal, turn right
at SR 90 EB on-ramp, keep left

Westbound

at Exit 281 WB ramp terminal
(3rd Ave signal), go straight
at 2nd Ave signal, turn left
at Maple St signal, turn left
at SR 90 WB on-ramp, turn right

Figure A4. Exit 280 Maple St. Interchange to Exit 281 Division/Brown St. Interchange



Eastbound (close EB ramps and Walnut, Monroe & Browne Sts)

at Exit 281 EB ramp terminal, Division St signal, turn left

at 3rd Ave, turn right

at Sprague Way, turn left along Diagonal to Sprague

at Altamont signal, turn right

at 3rd Ave signal, turn right

at SR 90 EB on-ramp, turn left

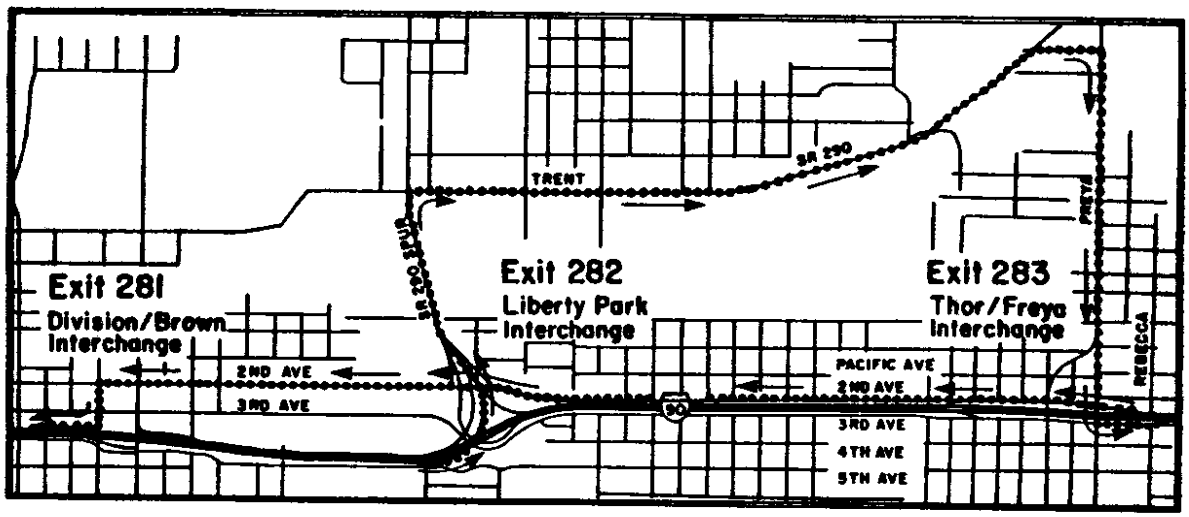
Westbound

at Exit 282B (2nd Ave - Helena St) proceed on 2nd

at Browne St signal, turn left

at SR 90 WB on-ramp terminal, turn right

Figure A5. Exit 281 Division/Brown St. Interchange to Exit 282 Liberty Park Interchange



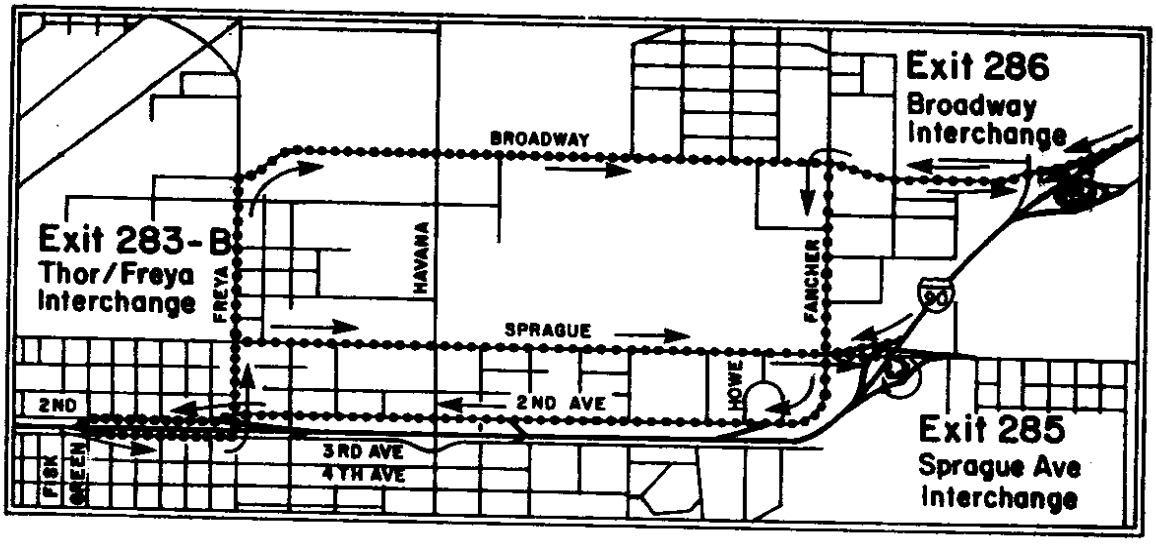
Eastbound

at Exit 282 EB proceed across SR 290 spur
at Trent Ave signal, turn right onto Trent
at Freya St signal, turn right
proceed to 3rd Ave signal, turn left
at SR 90 EB on - ramp, turn left

Westbound

At Exit 283 WB ramp, proceed on 2nd
re-enter SR 90 WB on-ramp at either
Fisk, Napa, or Browne Sts

Figure A6. Exit 282 Liberty Park Interchange to Exit 283 Thor/Freya Interchange



Eastbound

at Exit 283B EB ramp onto 3rd, go straight

at Fenya St, turn left

at Sprague Ave (at Broadway) signal, turn right

proceed on Sprague Ave (Broadway) pass Fancher St

at SR 90 Exit 285 (Exit 286) EB on-ramp, keep right

Westbound

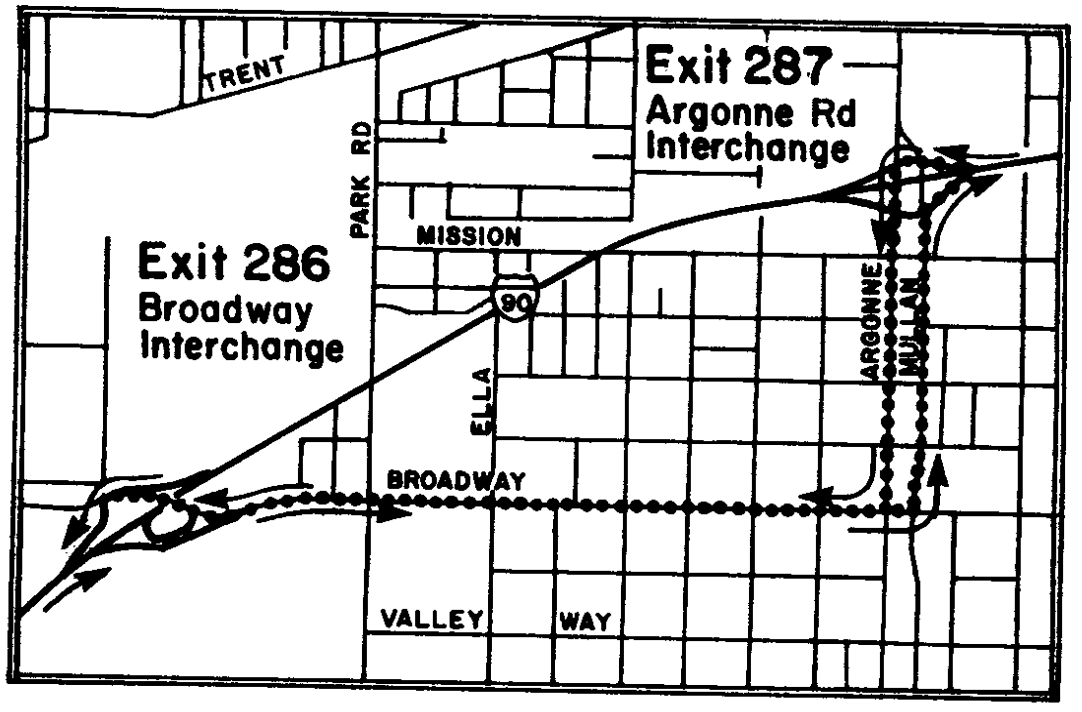
at Exit 285 (Exit 286) WB, proceed on Sprague (Broadway)

at Fancher Rd, turn left

at 2nd Ave, turn left

at SR 90 Exit 283B WB on-ramp, keep left

Figure A7. Exit 283 Thor/Freya Interchange to Exits 285 (& 286) Sprague (& Broadway) Interchanges



Eastbound

at Exit 286 EB ramp terminal signal, turn right

proceed on Broadway

at Mullan Rd signal, turn left

at SR 90 EB on-ramp signal, turn right

Westbound

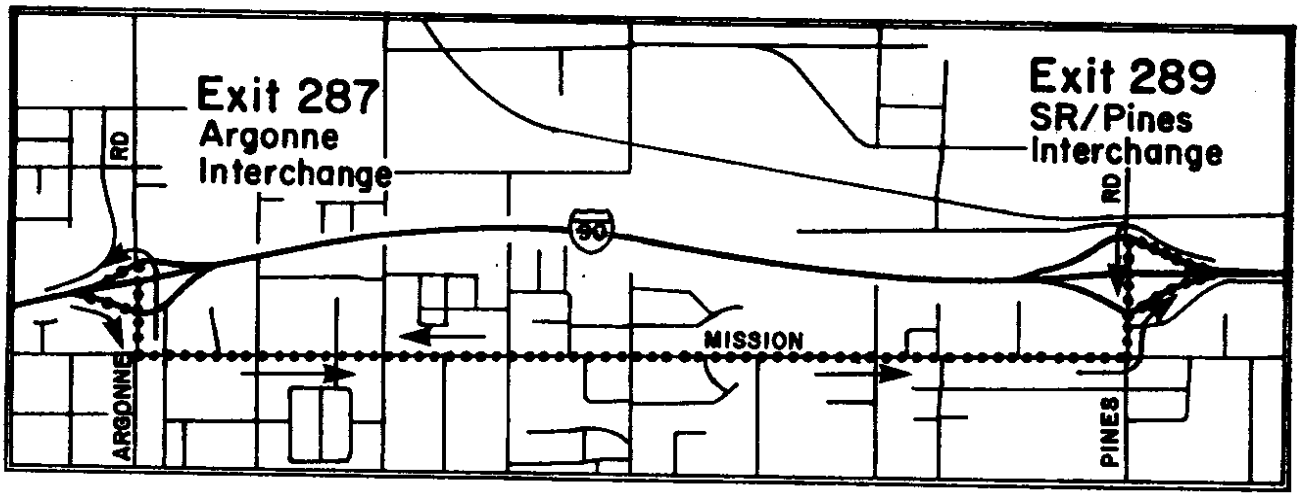
at Exit 287 WB ramp terminal signal, go straight

at Argonne signal, turn left

at Broadway signal, turn right

at SR 90 WB on-ramp terminal, turn left

Figure A8. Exit 286 Broadway Interchange to Exit 287 Argonne Interchange



Eastbound

at Exit 287 EB ramp terminal signal, turn right

at Mission Ave signal, turn left

at Pines Rd signal, turn left

at SR 90 Exit 289 EB on-ramp, turn right

Westbound

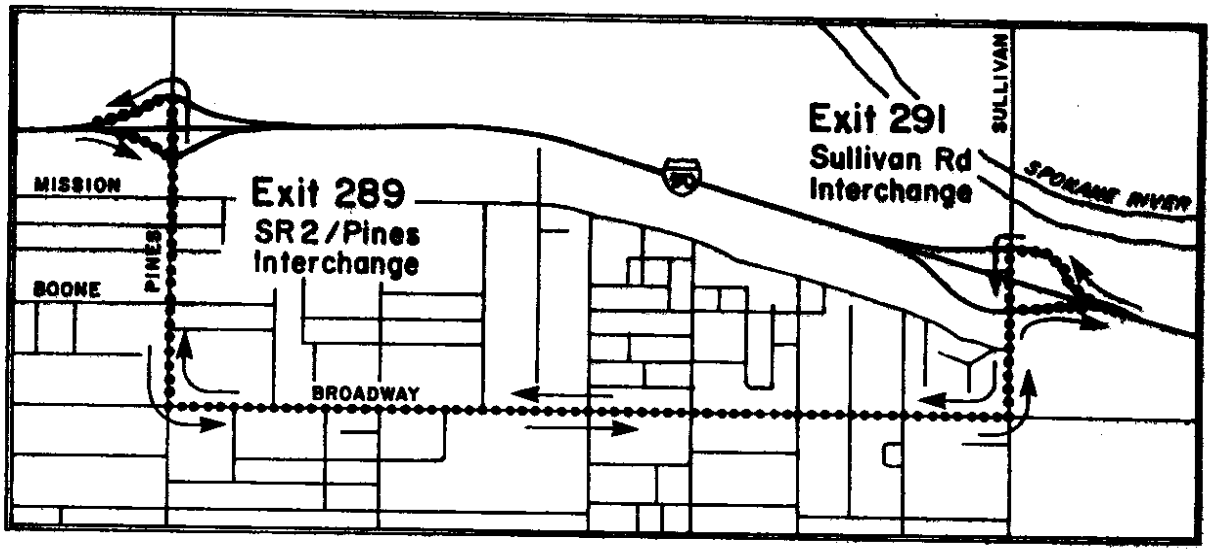
at Exit 289 WB ramp terminal signal, turn left

at Mission Ave signal, turn right

at Mullan Rd signal, turn right

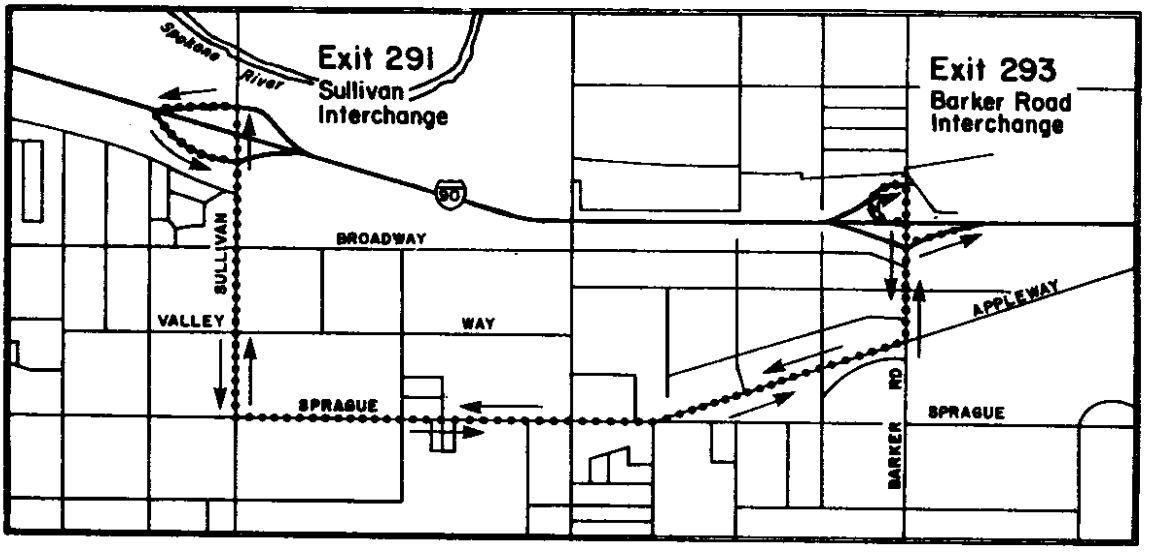
at SR 90 WB on-ramp terminal, turn left

Figure A9. Exit 287 Argonne Interchange to Exit 289 SR 27/Pine Interchange



Eastbound	Westbound
at Exit 289 EB ramp terminal, turn right	At Exit 291 WB ramp terminal signal, turn left
at Broadway signal, turn left	at Broadway signal, turn right
at Sullivan Rd signal, turn left	at Pines signal, turn right
at SR 90 Exit 291 EB on-ramp, turn right	at SR 90 WB Pines on-ramp signal, turn left

Figure A10. Exit 289 SR 27/Pine Interchange to Exit 291 Sullivan Interchange



Eastbound

at Exit 291 EB ramp terminal, turn right onto Sullivan Rd

at Appleway signal, turn left

at Baker Rd signal, turn left

at SR 90 EB on-ramp, turn right

Westbound

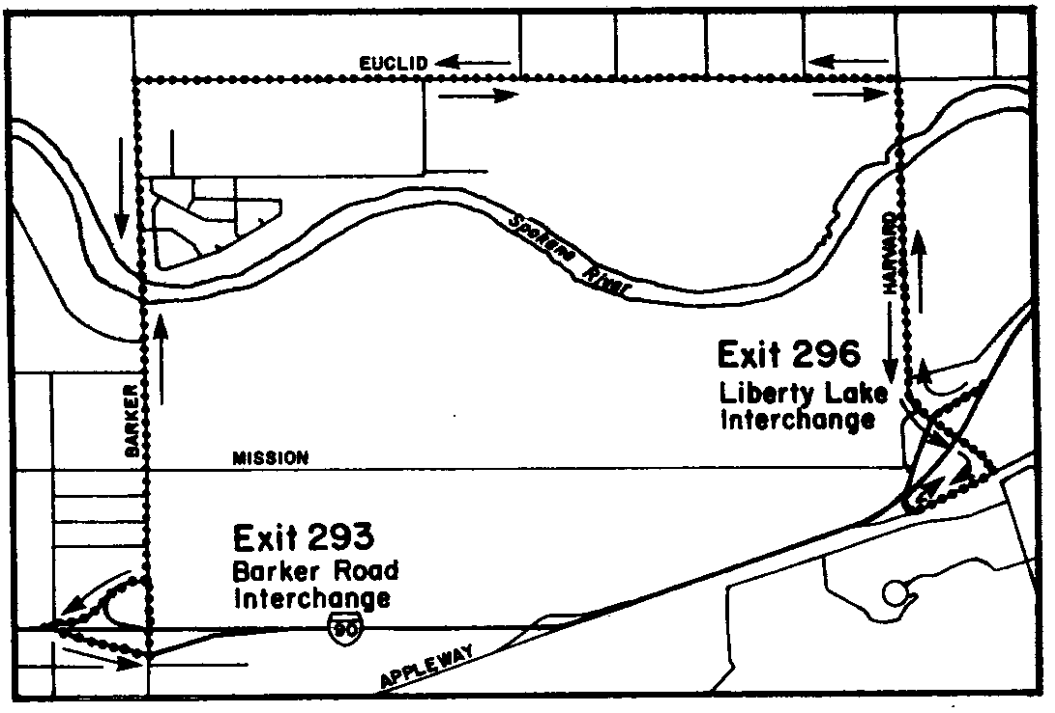
at Exit 293 WB ramp terminal, turn right onto Baker Rd

at Appleway signal, turn right

at Sullivan Rd signal, turn right

at SR 90 WB on-ramp signal, turn left

Figure A11. Exit 291 Sullivan Interchange to Exit 293 Baker Rd. Interchange



Eastbound

at Exit 293 EB ramp terminal, turn left onto Baker Rd

at Euclid Ave, turn right

at Harvard Rd, turn right

at Appleway, turn right

at SR 90 EB on-ramp, turn right

Westbound

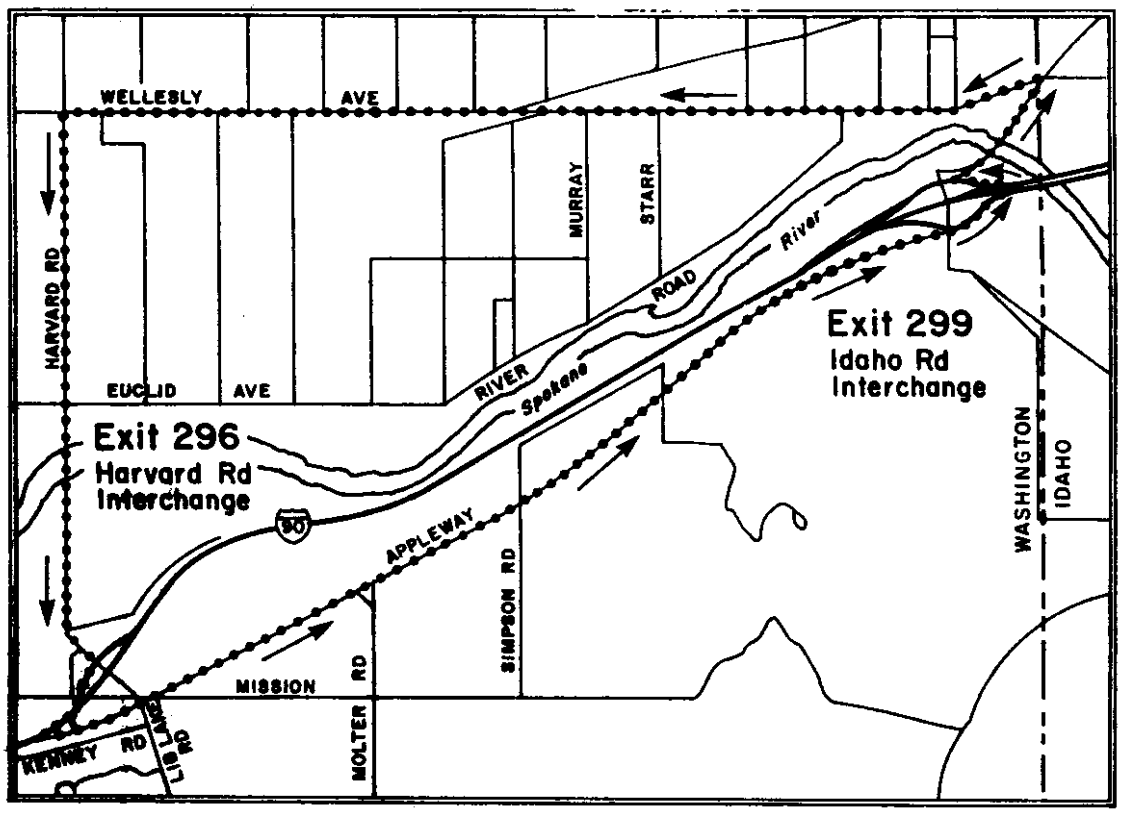
at Exit 296 WB ramp terminal, turn right onto Harvard Rd

at Euclid Ave, turn left

at Baker Rd stop, turn left

at SR 90 WB on-ramp terminal, turn right

Figure A12. Exit 293 Baker Rd. Interchange to Exit 296 Liberty Lake Interchange



Eastbound	Westbound
at Exit 296 EB ramp, to Harvard Rd/Liberty Lake Rd	at Exit 299 WB ramp terminal, turn right
proceed EB on Appleway	at Idaho Stateline Rd, turn left onto Wellesley Ave
at SR 90 Exit 299 EB on-ramp, re-enter freeway	at Harvard Rd, turn left
	at SR 90 WB on-ramp, turn left

Figure A13. Exit 296 Liberty Lake Interchange to Exit 299 Idaho Road Interchange

GENERAL INFORMATION

The information in this manual should be updated periodically, preferably not less than once every six months, in order that it can be refined. This should be done as a joint effort of the different agencies that are involved in the freeway incident management process. An advisory committee with at least one representative from each agency should be formed. This committee should meet on a regular basis to review and evaluate freeway incident management strategies that were used, and update or improve the information contained in this manual.