Development of an Emergency Response Guide for Washington State Department of Transportation Highway Maintenance Managers

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16. ABSTRACT

This report details the research involved in developing the *Emergency Response Guide for Highway Maintenance Managers*. The *Emergency Response Guide for Highway Maintenance Managers* details WSDOT's emergency management procedures and describes how managers should respond to and handle emergencies resulting from natural or technological disasters that impact the transportation system and associated physical plants. The guide further describes WSDOT's emergency related organizational roles and responsibilities.

This report describes the information contained in each section of the guide, identifies the sources of the information, and outlines the procedures the authors used to obtain the information. This report also contains recommendations for improving WSDOT's emergency preparedness.

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DEVELOPMENT OF AN EMERGENCY RESPONSE GUIDE FOR WASHINGTON STATE DEPARTMENT OF TRANSPORTATION HIGHWAY MAINTENANCE MANAGERS

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The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Transportation Commission or Department of Transportation. This report does not constitute a standard, specification, or regulation.

TABLE OF CONTENTS

Section **Page**

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

SUMMARY

In September 1991, WSDOT initiated a project to improve its preparation for and response to major transportation disruptions caused by natural or man-made disasters. The objective of this project was to supply WSDOT maintenance personnel with information on emergency response and recovery operations. The result of the project was the *Emergency Response Guide for Highway Maintenance Managers* (December 1992). This guide should improve WSDOT's emergency preparedness by providing highway maintenance officials with information about

- responsibilities of the department and department personnel,
- acquisition of resources,
- emergency declarations and emergency work,
- establishment of command centers,
- proper communication lines,
- response to hazardous materials incidents, and
- federal assistance.

The guide details specific emergency activities and standardizes emergency procedures during a disaster. The guide also assists maintenance managers in obtaining appropriate resources by providing contact numbers for key officials and agencies.

CHAPTER 2

CONCLUSIONS AND RECOMMENDATIONS

During the research conducted for the development of the *Emergency Response Guide for Highway Maintenance Managers* (hereafter referred to as the *Emergency Response Guide*), several problem areas were identified. These problem areas, along with recommended solutions, are discussed below.

COMMUNICATION

With the uncertainties surrounding the effectiveness of the uncompleted 800 MHz radio system, communication represents the most significant problem area. Because channels have not been assigned, it is impossible to evaluate the system's ability to provide effective communication during a major emergency. The existing low band, 47 MHz, system and high band, 150 Mhz, system do not provide acceptable emergency radio communication.

The Department should consider purchasing additional cellular phones. Cellular phones were effective in providing partial communication during the 1989 Loma Prieta earthquake in California. Cellular phones equipped with their own antennae and repeater systems should not be subjected to saturation. WSDOT site inspectors and other emergency response field personnel should be equipped with cellular phones for communication from the site. Cellular phones should also be used for non-emergency communications so that key officials have a greater number of available channels on the 800 MHz system.

Amateur radio should also be considered for backup communication. A list of Department personnel with amatuer radio licenses should be developed so that officials can obtain amateur radio services during an emergency.

EMERGENCY HIGHWAY TRAFFIC REGULATION

The Department presently does not have a guide for regulating emergency highway traffic. The Department's *Emergency Highway Traffic Regulation Plan* is no longer used because it emphasizes radiological hazards associated with nuclear wars. (1) While the "Washington State Comprehensive Emergency Management Plan," contains general responsibilities for WSDOT, it does not contain specific procedures for regulating emergency highway traffic. (2) Emergency highway traffic regulation is necessary so that essential resources can be transported during major emergencies, and the Department may be required to provide it. The Department should update its emergency highway traffic regulation plan and produce a traffic regulation guide to assist maintenance personnel in providing traffic control. The *Guide for Emergency Highway Traffic Regulation* published by the FHWA contains stategies for traffic regulation. (3) This guide should be used as a reference to produce the Department's traffic regulation guide.

EMERGENCY MANAGEMENT OFFICER

Preparing emergency response plans for the Department requires coordination among several WSDOT departments and many Department officials. While the majority of operations will be conducted through the Maintenance Department, daily maintenance issues prevent Headquarters maintenance officials from devoting all their time to emergency planning. To assist maintenance officials, an emergency management officer should be appointed to improve the Department's emergency preparedness. This officer would be responsible for coordinating activities for various WSDOT departments and personnel and for coordinating plans with local, state, and federal agencies.

EMERGENCY RESPONSE PLAN

The *Emergency Response Guide* is not intended to be an emergency response plan for a District. Instead, each District should produce an emergency response plan containing procedures and contacts specifically for that District. The *Emergency Response Guide* is

intended to assist each District in producing a plan by providing general information on emergency response and recovery operations during a major disaster.

COMMAND CENTERS

The office of the Chief Maintenance Engineer is not large enough to serve as the WSDOT Headquarters Command Center and is inadequate for coordinating the Department's emergency response operations. Similarly, District Maintenance Offices are inadequate for the establishment of District Command Centers. During an emergency, a large number of officials may report to the command centers to receive instructions or to assist in coordinating response activities. Officials may also find it easier to coordinate activities if all pertinent personnel are working in the same area. To accommodate additional personnel, command centers should be established in large conference rooms. The rooms should be equipped with large, statewide highway maps, large tables or desks, and several telephones. In addition, separate meeting rooms for the press should be established away from the command centers.

RESOURCES

The WSDOT *Equipment Information Systems Manual* lists all the equipment available to the Department. (4) However, it does not list the equipment at each maintenance shed. The District Operations Engineer must contact the District Equipment Superintendent to inquire about the availability of certain equipment. If the equipment is not available within the District, either the Equipment Superintendent or the Operations Engineer will contact an Equipment Superintendent in another District. To expedite the process of obtaining appropriate equipment for an area during an emergency, one option is for all managers in the Maintenance or Operations division of the Department to obtain equipment lists of all equipment at each maintenance shed. These lists can be obtained from the Equipment and Facilities Office at Headquarters.

A second option is to produce an equipment database that will allow maintenance managers to locate the equipment closest to the emergency site. The database should include heavy equipment available at each maintenance shed and should be updated continuously to indicate the status of each piece of heavy equipment.

A directory of equipment rental companies with state contracts is also needed. The directory should contain information on the type of equipment and materials available from each company. This list will assist officials in quickly locating appropriate equipment and materials during an emergency.

CHAPTER 3

INTRODUCTION

Transportation system emergencies caused by natural or man-made disasters can seriously affect an area's commerce and can threaten the very livelihood of its citizens. Highways are indispensable arteries of the national economy and defense; of regional and local agriculture, industry, and commerce; and of individual livelihood, social interchange, and recreation. (3) For the Washington State Department of Transportation (WSDOT), an emergency is an unexpected, serious situation caused by an accident, natural disaster, or other unforeseen occurrence that places an existing state highway or a Department-controlled property in jeopardy or renders the highway impassable in one or more directions and that requires prompt reconstruction, repair, or other work. (5) An emergency may or may not lead to a proclamation by the Governor of a "State of Emergency."

The vast majority of incidents that impact the transportation system are routinely handled at the District level on a regular basis. Incident response trucks are available in several Districts to respond to incidents and provide traffic control at the scene. Most of these incidents involve motor vehicles caught in accidents that have released gasoline or diesel fuel to the environment. However, when an extraordinary disaster occurs, such a flood, fire, volcanic eruption, or earthquake, the need to properly manage local, state, and federal resources intensifies.

Over the last several years, a number of catastrophic events have underscored the importance of WSDOT's ability to respond to these emergencies. These events include widespread flooding of lowlands and river valleys, the eruption of Mount St. Helens, avalanches and rockslides in the mountain passes, damage to bridges on vital highways, and major railroad chemical spills adjacent to state highways. Events in other parts of the country, such as the 1989 Loma Prieta earthquake in California and Hurricane Hugo in South Carolina, have also emphasized the importance of emergency preparedness. These

events have placed lives and property in danger and have impeded the transportation of goods and emergency services.

For the Department of Transportation, the goals of emergency response are as follows:

- minimize loss of life and property,
- protect the integrity of the state operated highway system and related facilities,
- repair and open damaged highways and facilities as quickly as possible,
- assign key personnel at disaster sites to oversee operations and provide consistent information to the Districts and Headquarters,
- cooperate with other agencies at the local, state and federal level, and
- keep the Secretary of Transportation, Transportation Commission, Governor and Legislature informed of the situation.

In September 1991, WSDOT initiated a project to improve its preparations for emergency response and recovery operations. The objective of this project was to supply WSDOT maintenance personnel with the information needed to obtain Department emergency response goals. The project collected information on emergency response and recovery operations to improve the Department's ability to prepare for, respond to, manage, and clear up emergencies on the state's roadways. The result of the project is the *Emergency Response Guide for Highway Maintenance Managers* (hereafter referred to as the *Emergency Response Guide.*) The guide provides documents and procedures for dealing with emergencies. The *Emergency Response Guide* is intended to expedite emergency response and recovery operations by increasing the speed with which appropriate resources are called to an area and standardizing the procedures for response and recovery operations. Specifically, the guide accomplishes the following:

- defines and outlines the legal responsibility and obligations of the WSDOT in assisting other agencies and private citizens during an emergency,
- assigns authority and responsibility to Headquarters and District personnel during an emergency,
- details procedures for emergency declarations and emergency repairs,

- details the methods for using resources on short notice,
- provides information on establishing command centers,
- identifies communication lines to utilize during an emergency,
- provides information on the dissemination of information to the public and the media,
- outlines emergency response procedures for WSDOT maintenance personnel,
- provides information on responding to hazardous materials incidents, and
- details the methods for obtaining federal assistance.

The guide is not intended to be an emergency response plan for a District. Rather, it is intended to provide the background documents needed during an emergency and to provide the information necessary to develop an emergency response plan.

This report details the research involved in developing the *Emergency Response Guide*. The research included meetings with WSDOT officials; participation in emergency response drills; and the collection and evaluation of emergency response documents, state statutes, and disaster damage reports.

The report begins with a literature review of emergency transportation planning and then provides an analysis of hazards in Washington state that may necessitate the use of the *Emergency Response Guide*. The report then details the information contained in each area of the guide and identifies the sources of the information and the procedures used to obtain it.

CHAPTER 4

REVIEW OF LITERATURE ON EMERGENCY TRANSPORTATION

The purpose of reviewing the literature concerning emergency transportation following a major disaster was to recognize and understand some of the issues that need to be addressed in planning emergency response and recovery activities. The literature reviewed for this project provided some background, guidelines, and insight for developing an emergency response guide. The literature can basically be categorized into four types: federal guidelines, state guidelines, research reports, and post-disaster assessments.

EMERGENCY TRANSPORTATION PLANNING

Natural and man-made disasters such as earthquakes, volcanic eruptions, floods, and wars have occurred throughout history, resulting in human suffering and loss of property. People have repeatedly attempted to mitigate the effects of disasters by planning for them. In most instances, transportation has assumed a critical role in emergency planning.

For the most part, transportation means roads. One of the earliest examples of large-scale emergency transportation planning for roads involved traffic regulation during World War II. During the war, the British faced disaster when hordes of refugees clogged roads and immobilized troops. (3) Transportation of essential personnel and materiel was hampered and needed top priority. Out of necessity, the European allies developed and practiced a system of traffic regulations during the war. The United States Army devised its own system, called by the military "highway traffic regulation." (3)

Fueled by the Cold War, defense officials perceived a need for highway traffic regulation and transportation planning in the United States in the event of a nuclear attack. The Civil Defense Act of 1950 assigned the Bureau of Public Roads, now the FHWA, to devise a nationwide system of emergency highway traffic regulation for implementation by

civilian authorities. To further this program, the FHWA required that each state prepare highway traffic regulation plans and update them when necessary.

FEDERAL GUIDELINES

To assist states in preparing highway traffic regulation plans, the FHWA published the *Guide for Emergency Highway Traffic Regulation*. (3) Originally, the guide emphasized radiological hazards on highways following a nuclear attack. The guide has been revised periodically to compensate for the diminishing threat of a nuclear attack and can now be applied to other man-made and natural disasters. The guide includes information on issues such as

- emergency highway traffic regulation,
- organizations involved in emergency planning,
- evacuation planning,
- emergency operating centers,
- traffic regulation centers,
- regulated routes and road permits,
- role of the military, and
- nuclear radiation hazards to highway transportation.

Federal assistance during major emergencies is addressed in the "Robert T. Stafford Disaster Relief and Emergency Assistance Act." (6) In 1988, Public Law 93-288 was amended by Public Law 100-707 and retitled the "Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288," as amended. (6) The Stafford Act authorizes the federal government to assist states in responding to natural and man-made disasters upon a Governor's request for a Presidential declaration of "emergency" or "major disaster." Federal assistance is automatic upon a Presidential declaration. A Presidential declaration also allows state highway agencies to request disaster relief funds through the Federal Emergency Management Agency (FEMA) for damaged roads that are not part of the federal aid system.

Provisions for federal assistance during catastrophic events under the Stafford Act are addressed in the "Federal Response Plan." (7) This plan provides information and guidance to federal agencies assisting local and state governments. The plan is based on the assumption that state and local forces do not have the resources to carry out emergency response operations necessary to save lives and protect property. Specifically, the plan is intended to accomplish the following:

- establish fundamental assumptions and policies,
- establish interagency coordination mechanisms to facilitate the immediate delivery of federal response assistance,
- incorporate the coordination mechanisms and structures of other appropriate plans and responsibilities into the overall response,
- assign specific functional responsibilities to appropriate federal departments and agencies, and
- identify actions federal departments and agencies will take to manage the federal response in coordination with the affected state.

A significant result of this plan is the assignment of federal departments into 12 Emergency Support Functions (ESFs). The 12 ESFs serve as the primary mechanism through which federal response assistance is provided to the states. The twelve ESFs are

- ESF #1 — Transportation
- ESF #2 — Communications
- ESF #3 — Public Works and Engineering
- ESF #4 — Firefighting
- ESF #5 — Information and Planning
- ESF #6 — Mass Care
- ESF #7 — Resource Support
- ESF #8 — Health and Medical Services
- ESF #9 — Urban Search and Rescue
- ESF #10 — Hazardous Materials
- ESF #11 — Food
- ESF #12 — Energy

Each ESF is headed by a primary federal agency and assisted by several other federal agencies to provide the necessary resources. Each primary federal agency is assisted by a lead state agency at the local level. The United States Department of Transportation (USDOT) is the primary federal agency for ESF #1. The state department of transportation serves as the lead state agency to assist the USDOT locally. The purpose

of ESF #1 is to coordinate federal transportation support to federal, state, and local governments that require transportation capacity to perform their disaster recovery operations.

STATE GUIDELINES

Guidance for state and local governments to obtain federal assistance is provided in the *Disaster Assistance Guide for Local Governments.* (8) State agencies that control state property may request assistance in protecting those properties in essentially the same manner as local governments. State highway agencies may request assistance in the form of federal highway disaster funds. Highway disaster funds are available from FEMA to restore roads that are not part of the federal aid system and from FHWA to restore roads on the federal aid system. (Under the Intermodal Surface Transportation Efficiency Act of 1991, the federal aid system will be replaced by the National Highway System.) Highways and bridges that are part of the federal aid system have been constructed or are maintained with the use of federal highway funds.

As one of the conditions for receiving federal funds, each state was directed by the FHWA to prepare a highway traffic regulation plan for emergency situations. To meet this requirement, the Washington State Department of Transportation (WSDOT) published the *Emergency Highway Traffic Regulation Plan.* (1) The plan is a guide for emergency highway traffic regulation and assigns specific duties to Department officials. However, because the plan was published in 1974, it is now considered out-of-date and no longer recognized as an authoritative document. The plan has also not been updated. Instead, the Department has adopted the "Washington State Comprehensive Emergency Management Plan" as a guide for emergency response operations. (2) This plan is intended to provide guidance to all state agencies in an emergency. It details authority, functions, and responsibilities to establish cooperation among local, state, and federal governments, as well as public and private organizations. The plan provides a list of general WSDOT responsibilities. The specific activities to accomplish these responsibilities have been left

for the Department to determine. Presently, the Department does not have a guide for these activities.

The department does have a manual about response to incidents that happen regularly. However, the document is not a statewide emergency response guide for natural and man-made catastrophes. WSDOT's "Incident Response Guide" outlines steps for the department's Incident Response Teams to follow in handling incidents. (9) The guide provides procedural guidelines, general information, contact lists, and reference material for incident response operations. It is intended to be used for incidents that last less than four hours and only for incidents that occur in District 1.

To deal with catastrophic events, the California State Department of Transportation (CALTRANS) developed an emergency management plan separate from the state's plan. The *CALTRANS Emergency Management Handbook* provides information to department officials at both the Headquarters and District levels. (10) Because of the frequency of earthquakes, CALTRANS has emphasized emergency preparedness. The handbook represents one of the most comprehensive emergency guides for any state highway agency. Specifically, the handbook accomplishes the following:

- defines the department's emergency response policies,
- provides guidelines for implementing the Department's Emergency Plan,
- describes specific response activities,
- assigns explicit responsibilities to specific department individuals,
- provides a list of statewide Emergency Operations Centers, and
- describes the department's communication capabilities.

RESEARCH REPORTS

A number of research reports have been published to assist state and local governments in planning for transportation emergencies. One report, "Benefits of Advance Planning to Meet Transportation Emergencies," identified several factors that must be considered for emergency planning. (11) These factors include

- identifying lines of authority and communication,
- interagency coordination and response, and
- identifying and assigning personnel and equipment needs.

The report stated that planning for transportation emergencies involves creating scenarios, and in many cases, planning can only be done in a general sense because it is nearly impossible to predict where or when a disaster will occur.

Two research reports published by the Texas Transportation Institute for the Texas Department of Transportation provided some guidelines and planning strategies for highway agencies during major transportation emergencies. The first report, "Synthesis of Traffic Management for Major Emergencies," presented issues, strategies, and procedures for transportation management during major emergencies. (12) The report addressed topics such as

- legislative and legal issues,
- coordination between and within agencies,
- personnel and equipment resource assessments,
- transportation network evaluation,
- communication systems,
- public information, and
- right-of-way clean-up and repairs.

The second report, *Planning Guidelines for Major Transportation Emergencies*, described how highway agencies can better prepare themselves to handle major transportation emergencies. (13) Like the first report, this report addressed issues concerning public information, resource assessment, coordination within and between agencies, and transportation system evaluation. This report also provided a planning framework for major transportation emergencies. Figure 4-1 shows the framework developed in the report. Under this framework, emergency preparedness planning is divided into three phases of the emergency: the time before, the time during, and the time after an emergency. The framework describes some objectives, preparations, and actions that a highway agency may undertake during each phase of the emergency.

Phase of Emergency	Agency Focus of Emergency Responsibilities	Description of Agency Emergency Actions	Preparations to Enhance Agency Actions
Prior to the Emergency	• Move to "alert" emergency response status • Prepare the transportation system to facilitate mobility and endure emergency conditions	• Implement an emergency transportation plan • Monitor status of impending emergency conditions • Initiate response efforts when appropriate	• Evaluate transportation system and develop action plan • Establish person or agency to designate initiation of emergency response efforts
During the Emergency	• Maintain mobility of the transportation system to the extent possible • Support other agency roles in efforts to minimize loss of property and life	• Identify and respond to problems in the transportation system as they arise • Notify public of transportation problems • Provide personnel, equipment, and supply assistance to other agencies • Manage outlay of equipment and personnel resources	• Establish interagency coordination and mutual-aid agreements • Establish intraagency and interagency communication networks • Develop and maintain personnel and equipment resource list • Develop methods of notifying the public of conditions of the transportation system
After the Emergency	• Restore transportation system to pre-emergency conditions • Support regionwide clean-up and repair efforts	• Assess damage to transportation system and prioritize repair efforts • Assist other agencies in damage assessments	• Identify protocols and documentation procedures for receiving assistance • Develop mechanisms for prioritizing recovery needs in the transportation system

Figure 4-1. Framework for Major Transportation Emergencies

POST-DISASTER ASSESSMENTS

Highway agencies often lack experience in responding to transportation emergencies because of the low frequency of catastrophic events. In planning for these events, agencies often use simulated disaster drills and post-disaster assessments from previous events. Post-disaster assessments allow highway agencies to speculate on the kinds of resources and response activities that may be needed for a similar emergency in the region. The assessments also help agencies to avoid problem areas identified from previous disasters.

One of the most destructive catastrophes in the Northwest was the eruption of Mount St. Helens. The Mount St. Helens explosion was the greatest volcanic eruption in the conterminous United States in historic times. (14) The book "Warning and Response to the Mount St. Helens Eruption" overviewed the problems involved in planning for and dealing with a major disaster. (14) It described response operations conducted by local, state, and federal agencies, including the activities of the Washington State Department of Transportation. It also identified response problems encountered by these agencies, such as

- lack of information,
- lack of equipment and facilities,
- lack of funds,
- lack of coordination with other agencies,
- lack of manpower,
- lack of public cooperation, and
- problems with the news media.

In 1989, two major disasters provided useful lessons for emergency response planning: the Loma Prieta earthquake and Hurricane Hugo. After the 1989 Loma Prieta earthquake, several post-disaster reports identified areas that need to be improved in planning for this type of emergency. One report, "Transportation Operations Following the 1989 Loma Prieta Earthquake," included a description and assessment of CALTRANS operations following the earthquake. (15) The report described four major areas of

response activities conducted by CALTRANS: traffic management, operational improvement projects, coordination and dissemination of roadway closure information, and data collection. CALTRANS maintenance forces were heavily involved in operational improvement projects such as restriping roads that lead to alternative bay crossings. The department was praised for accelerating emergency road closures. Following the earthquake, road closures that normally required the approval of the Deputy District Director of Operations could also be approved by the Operations Branch Chief at the CALTRANS command center. CALTRANS officials were also commended for maintaining a record on the status of the roadway network. Road closure updates were distributed to command center personnel and other interested parties, including the media.

The report also identified a number of areas that needed improvement. One major area was communications. Communications among field personnel and the EOC were hampered because of the limited service provided by telephone lines, cellular phones, and CALTRANS radio. Other areas that needed improvement included facilities, equipment, power, information dissemination, intra- and interagency coordination, training, and media relations. To meet these needs, the report recommended the establishment of transportation operations centers (TOCs) for the development and implementation of transportation management plans. The goal of TOCs is to facilitate the best use of the remaining transportation network for emergency operations. The report recommended that the TOCs be staffed by liaisons from city and state agencies involved in transportation, such as CALTRANS, city police departments, and the state patrol.

In an unpublished intra-agency report entitled "Lessons Learned from the Loma Prieta Earthquake," CALTRANS maintenance officials identified problem areas they encountered during the earthquake. (16) Problem areas identified included

- need for a dedicated power source for the Emergency Operations Center,
- need for high priority status with power and telephone companies,
- need for more cellular phones,

- "dead" spots in radio coverage,
- radio congestion,
- need for a meeting place with the media away from the work area,
- need for frequent press conferences for up-to-date status,
- need for large conference rooms,
- need for additional personnel and resources from Headquarters and other Districts,
- need for food and accommodations for EOC staff,
- need for tight security,
- need for contracts for emergency work and rental equipment,
- need for a database of vendors that could supply specialized equipment and services,
- provisions for the use of equipment donated by private contractors,
- coordination of damage assessment teams,
- coordination of search and rescue operations, and
- requests for Emergency Relief Funds.

The article "AFTERSHOCK: Dealing with the Highway Crisis After the Loma Prieta Earthquake" described some response activities conducted by CALTRANS and public transit agencies to mitigate the effect of the earthquake on the highway network. (17) The earthquake provided a reminder that transportation in many parts of California is dependent on bridges, tunnels, and landslide prone highways. The same situation exists in Washington state. The article emphasized the need for agencies to address and improve intra- and interagency coordination and communication.

Local response activities were addressed in the paper "Emergency Traffic Operations during the 1989 Earthquake." (18) This paper described how the city of Cambell, California, dealt with events of the earthquake and evaluated the response activities of the city. Some of the problems confronted by the city can be used to assist

local governments in responding to other emergency situations such as major fires, toxic spills, and hurricanes. (18)

Another major disaster in 1989 was Hurricane Hugo. The paper "Hurricane Hugo — Evacuation and Repair" described hurricane response operations in North and South Carolina. (19) Of the 26 deaths blamed on the hurricane, only 13 occurred during the storm. The rest occurred during clean-up efforts. South Carolina public officials attributed this minimal loss of life to the development and execution of an emergency preparedness plan designed to deal with a variety of natural disasters. Lessons learned from Hurricane Huge included the following:

- Stockpile essential equipment such as portable generators and chain saws.
- Formulate sheltering strategies for key staff and equipment.
- Ensure the evacuation plan is implemented.
- Make arrangements to use state signal crews for signal repairs.
- Prioritize repair efforts.
- Install portable generators at key intersections to power signal controllers.
- Compromise standard operating procedures to get traffic controls back on-line quickly.

These lessons might be applied to other emergencies involving mass evacuation and repair operations.

CHAPTER 5

HAZARD ANALYSIS

The purpose of a hazard analysis is to identify a region's potential natural and man-made disasters. Identifying specific hazards and their possible effects on the region is the first step in planning for transportation emergencies. (13) This hazard analysis is specifically designed to inform the Washington State Department of Transportation about the potential effects of hazards on the highway network.

The *Emergency Response Guide* is intended to address major disasters that involve the coordination of local, state, and federal resources. These disasters are classified as Level II and Level III emergencies. The following classification system is used to determine the magnitude of the emergency:

- **Level I**

  Level I incidents involve isolated accidents that are routinely handled at the District level almost regularly. These incidents may require District incident response teams to provide traffic control at the scene and, in some instances, to assist the State Patrol in clearing the roadway. WSDOT's "Incident Response Guide" provides information on responding to Level I incidents. (9)

- **Level II**

  Level II emergencies involve situations that cannot be resolved with resources from the impacted District. These emergencies involve several agencies and sometimes more than one District. WSDOT Headquarters, District, and Area Command Centers may be activated to respond to the emergency. Level II emergencies may require a proclamation of "State of Emergency" by the Governor and a request for a Presidential declaration of "emergency" or "major disaster."

- **Level III**

  Level III emergencies involve catastrophic events that require massive amounts of resources from local, state, and federal governments. The state Emergency Operations Center is activated to coordinate emergency management and recovery operations. A WSDOT Headquarters Command Center is activated to coordinate WSDOT operations. Level III emergencies involve a proclamation of "State of Emergency" by the Governor and a Presidential declaration of "emergency" or "major disaster."

Natural and man-made hazards that are capable of producing Level II and Level III emergencies in Washington state are listed in Table 5-1.

NATURAL HAZARDS

Avalanches

Avalanches in the state's mountains are common during the winter. Often, avalanches occur on mountain highways, requiring the WSDOT to remove snow. The Department may also be requested to assist in search and rescue operations.

The avalanche season begins in November and usually continues into June or July. In the high alpine areas of the Cascade and Olympic mountain ranges, the threat of avalanches continues throughout the year. One reason that avalanches present such hazards is that avalanche safety has not been a significant factor in the design or construction of mountain highways. (20) The costs of removing avalanches from the state's six highways through the Cascade Mountain Range total about $300,000 each year. (20)

Table 5-1 — Natural and Man-Made Hazards in Washington State

Natural Hazards	Man-Made Hazards
Avalanches	Chemical stockpile incineration
Earthquakes	Dam failures
Forest fires	Fixed nuclear facilities
Floods	Hazardous materials incidents
Landslides	Nuclear war
Severe local storms	Search and rescue emergencies
Tsunamis	
Volcanic eruptions	

Earthquakes

Each year more than 1,000 earthquakes occur in Washington. Fifteen to twenty of these earthquakes cause enough ground shaking to be felt. (21) Since 1840, there have been 67 recorded earthquakes with a Richter scale magnitude of 4.0 or higher. Figure 5-1 shows the location and magnitude of these earthquakes. Seismologists categorize earthquakes of magnitude 5.0 as moderate, magnitude 6.0 as large, magnitude 7.0 as major, and magnitude 8.0 as great. The eastern part of Washington state has historically had infrequent, smaller earthquakes up to a magnitude 6.0. The western part of the state has had more frequent and larger earthquakes. Most of these earthquakes are believed to have resulted from the subduction of the Juan de Fuca plate beneath the North American plate (see Figure 5-2). The largest earthquake Washington state could experience would be caused by the sudden movement of these two plates past one another. The result could be an earthquake exceeding a magnitude 8.0.

A major earthquake in the Puget Sound region would most likely cause severe damage to the state's highways. The 1989 Loma Prieta earthquake in California provided a graphic reminder of the damage an earthquake can bring to a transportation network. In the event of an earthquake of similar magnitude, WSDOT should expect to be prepared for the following types of emergency response and recovery activities:

- search and rescue operations,
- debris removal,
- roadway and bridge repairs,
- personnel and equipment mobilization,
- detour and road block establishment,
- traffic regulation,
- power restoration to traffic signals, and
- emergency response coordination with state and local agencies.

Forest Fires

Forest fires burn an average of 6,488 acres annually, resulting in a resource loss of about $2 million in the state. (20) The fire season is typically from May through October. The Department of Natural Resources (DNR) may request WSDOT to assist it in suppressing and controlling forest fires by providing heavy equipment. Forest fires may

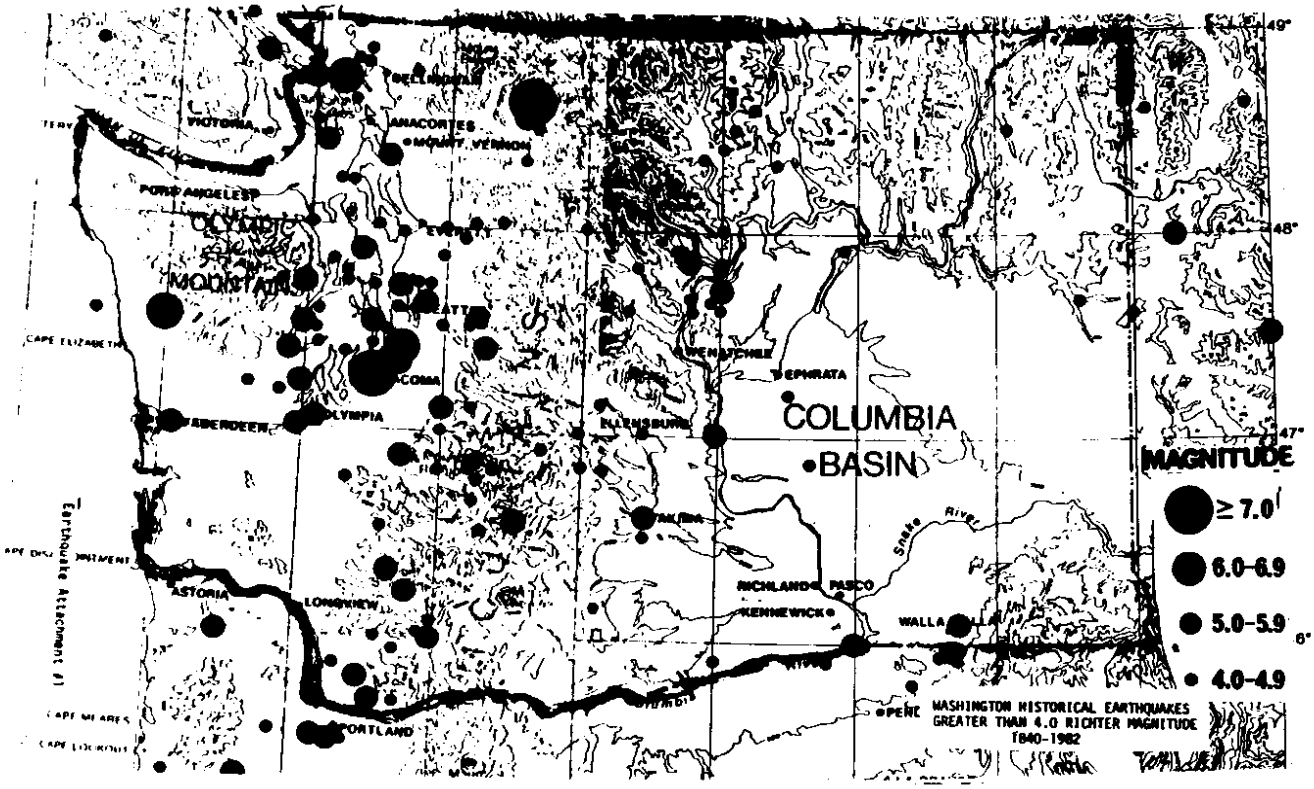

Figure 5-1. Location of Earthquakes in Washington State (19)

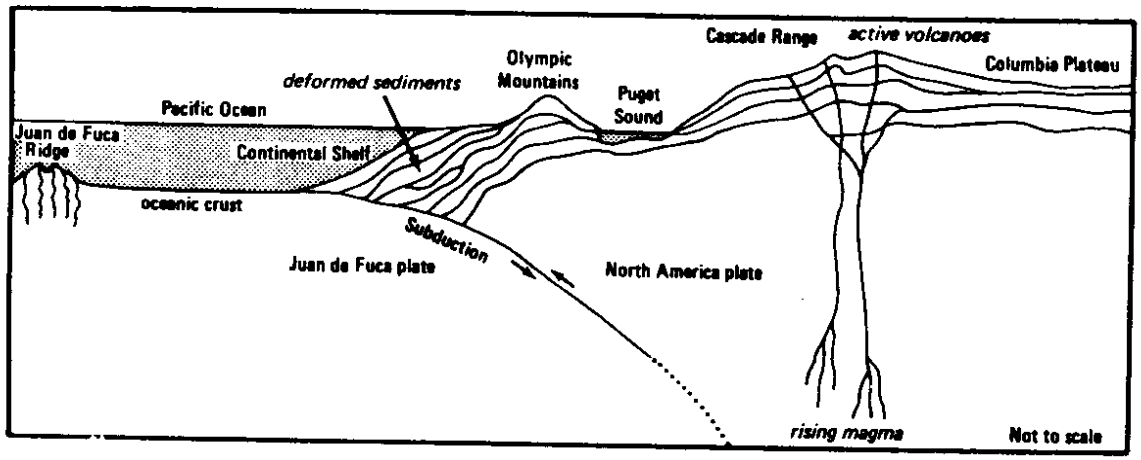

Figure 5-2. Subduction of the Juan de Fuca Plate Beneath the North American Plate (20)

also require WSDOT to erect barricades and detours, implement traffic restrictions, and assist in evacuation and search-and-rescue operations.

Floods

Of all the hazards identified for the state, Washington is most prone to flooding. (20) The state is subject to three types of floods: 1) building floods from heavy, prolonged rain or melting snow, 2) flash floods from extremely heavy rainfall in a short time period, and 3) wind-driven flood tides along coastal areas.

In 1990, flood waters completely covered sections of Interstate 5 near Chehalis (Figure 5-3). WSDOT conducted road repairs, road closures, and barricading. The Department should also be prepared for sandbagging and possible search-and-rescue operations for future flooding situations.

Landslides

Small landslides regularly occur on many of the mountain highways. These hazards often require WSDOT to conduct cleanup activities. Larger slides can occur when dormant slide masses are reactivated by earthquakes or by heavy, prolonged precipitation. Large landslides over the Cascade Mountain passes can cause significant traffic disruptions on the main mountain highways and may require substantial Departmental cleanup efforts.

Severe Local Storms

Severe local storms include tornadoes, blizzards, snow, ice, hail, wind, and dust storms. The major consequence of severe local storms is immobility. Roadways are closed, traffic accidents occur, and motorists are stranded. Washington is subject to severe storms each year, particularly snowstorms. A severe snowstorm in 1990 left several inches of snow and ice on the roadways, affecting transportation in Seattle for several days (Figure 5-4). In 1991, a severe dust storm on Interstate 5 near Bakersfield, California, resulted in many accidents involving dozens of automobiles, prompting officials to close a portion of the highway for two days. In Washington, the threat of dust storms is especially

prevalent in the eastern part of the state. These types of events may require WSDOT to undertake debris removal and incident response activities.

Tsunamis

Tsunamis are sea waves generated by an abrupt movement of large volumes of water during seismic activity. In 1964, a tsunami generated by an Alaska earthquake destroyed a small bridge across the Copalis River in Grays Harbor County and caused $115,000 in damages in Washington state. (20) No fatalities were reported in Washington; however, the tsunami killed 103 people in Alaska, four in Oregon, and 12 in California. A tsunami generated by a major earthquake between the Juan de Fuca and North America plates or in the Shumagin Islands region of the Aleutians could create a large local tsunami on the Washington coast. Table 5-2 shows the source and wave heights of previous tsunamis. A tsunami could cause damage to roadways and generate the need for roadblocks and detour routes. In the event of a large tsunami, evacuation of residents might also be required.

Volcanic Eruptions

The last catastrophic volcanic eruption occurred when Mount St. Helens erupted on May 18, 1980. The eruption released an amount of energy equivalent to the serial detonation of 27,000 Hiroshima-size bombs at a rate of nearly one per second for 9 hours. (14) The explosion also sent a plume of ash 63,000 feet into the air, scattering ash over the eastern part of the state. After the eruption, WSDOT set up barricades and roadblock signs. The Department also removed ash from the roadways. The total cost of clean-up activities was roughly $363 million, most of which the federal government incurred. There are four "active" volcanos in which eruptions could occur: Mt. Baker, Mt. Hood, Mt. Rainier, and Mt. St. Helens. Federal, state, and local governments have written emergency response plans or hazard assessments for each of these volcanos. WSDOT should be prepared to mobilize heavy equipment, signs, barricades, and personnel in the event another volcanic eruption occurs.

Table 5-2. Source and Wave Heights of Past Tsunamis (20)

Selected Tide Stations	Eastern Aleutian 1946 M_s 7.4	Kamchatka 1952 M_w 9.0	Central Aleutians 1957 M_w 9.1	Southern Chile 1960 M_w 9.5	Southern Alaska 1964 M_w 9.2	Central Aleutians 1986 M_s 7.7
Tofino, British Columbia	1.9	2.0		4.6	8.1	
Neah Bay, Washington	1.2	1.5	1.0	2.4	4.7	0.6
Crescent City, California	5.9	6.8	4.3	10.9	13.0+	0.03
San Francisco, California	1.7	3.5	1.7	2.9	7.4	

+Tide guage went off scale.

MAN-MADE HAZARDS

Chemical Stockpile Incineration

On April 30, 1997, the U.S. Army will begin incinerating chemical weapons at the Umatilla Army Depot in northeast Oregon. Although the army depot is located in Oregon, the hazard zone extends into the southeastern region of Washington state. WSDOT is currently working with the Department of Emergency Management in developing an emergency preparedness plan for communities in southeast Washington to manage the potential hazards associated with the destruction of these weapons.

Dam Failures

Dam failures can be caused by flooding, misoperation, poor construction, lack of maintenance, vandalism, terrorism, or earthquakes. In 1965 the Lake Marcel Dam failed, releasing most of the lake and a large volume of dam material through a ruptured outlet conduit. The water and debris temporarily closed a section of SR 203. (20) There are about 970 private and federally owned or licensed dams in Washington, many of which are more than 50 years old. The Department of Ecology has warned that failure of dams could occur about once every 2 years under the current dam inspection program. Significant damage and possible destruction of some roads and bridges could result from such a failure.

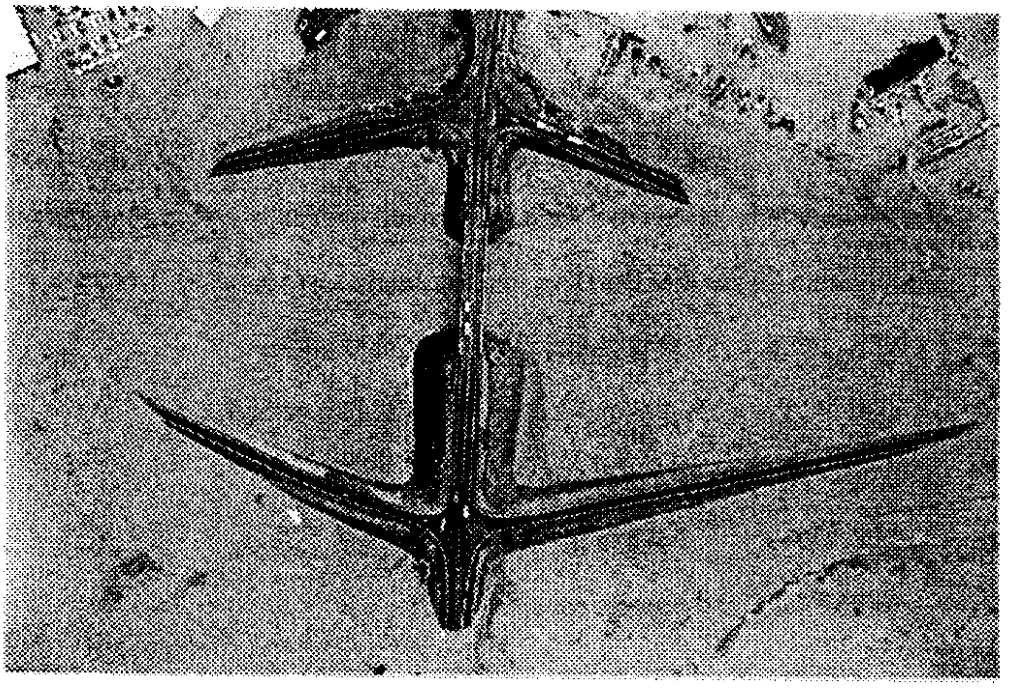

Figure 5-3. Flood Waters over I-5 (Photo from the Seattle Times Co.)

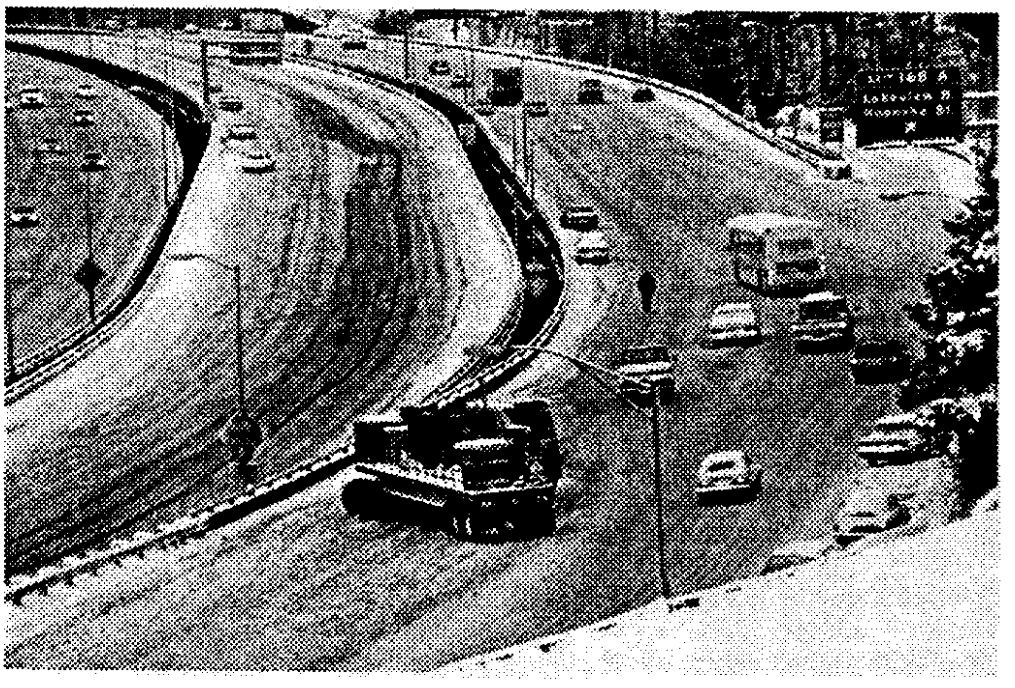

Figure 5-4. Snowstorm in Seattle (Photo from the Seattle Times Co.)

Fixed Nuclear Facilities

The most significant accident involving a fixed nuclear facility in the United States occurred at Three Mile Island in Pennsylvania. During the accident, small amounts of radioactive material were released from the power plant. In Washington state, the potential for radioactive release exists at five fixed nuclear facilities:

1. U.S. Navy nuclear propulsion reactors at Bangor,
2. U.S. Navy nuclear propulsion reactors at Bremerton,
3. Trojan nuclear power plant,
4. U.S. Department of Energy reactor, and
5. WPSS Hanford power reactors.

A nuclear power accident would require immediate evacuation of the general population within the immediate vicinity. WSDOT might be asked to assist in establishing evacuation routes and setting up roadblocks and detours. The Department is also obligated to perform radiological monitoring to determine whether the levels of radioactive particles are high enough to warrant the implementation of emergency highway traffic regulations.

Hazardous Material Incidents

Hazardous materials include petroleum products, chemicals, radioactive substances, and other poisonous or flammable substances. Dangerous substances are continually transported through the state by trucks and trains. Most hazardous material incidents are transportation related and involve petroleum products. A hazardous material emergency can occur in any place, at any time, with no advance warning. Hazardous material accidents can range from isolated minor incidents to full-scale disasters. WSDOT is primarily involved in hazardous material accidents occurring on the highways. The Department is responsible for providing traffic control and regulation at the accident scene. It may also be requested to provide assistance to other agencies at the scene, such as the fire department or the State Patrol.

Nuclear War

The most devastating disaster that could happen to mankind is nuclear war. Nuclear war could result in millions of casualties and complete destruction of the transportation network, immobilizing all essential services. Although the threat of nuclear war has decreased in the past few years, it is still perhaps the most significant hazard in emergency transportation planning. The threat of nuclear war placed a great awareness on the need for emergency transportation planning and prompted the establishment of many of the emergency transportation planning documents in use today. Concepts that were originally intended as a response to a nuclear war were adapted for use in the event of other man-made and natural disasters.

Search and Rescue Emergencies (SAR)

Search and rescue emergencies include looking for and, if possible, rescuing those who have been lost, injured, disoriented, or killed as a result of a natural or man-made disaster, such as an avalanche, snowstorm, flood, forest fire, automobile accident, or aircraft accident. WSDOT must provide assistance in SAR operations when other agencies request it.

CHAPTER 6

ELEMENTS OF THE EMERGENCY RESPONSE GUIDE

RESPONSIBILITIES AND OBLIGATIONS

During an earthquake drill conducted in October 1991 (Exercise 91-B), WSDOT officials were requested to perform duties that officials later discovered were not legal obligations of the Department. To prevent this problem from occurring during a real emergency, highway maintenance managers expressed the need to formally define WSDOT responsibilities during major emergencies. In defining the legal responsibilities of the Department for the *Guide*, the authors reviewed a number of state statutes and state agency documents. The responsibilities contained in the *Guide* were taken from the following sources:

- WSDOT *Emergency Response Procedures*, (22)
- RCW 47.01.260. Authority of the department,
- RCW 70.136.050. Persons and Agencies rendering emergency aid in hazardous materials incident — Immunity from liability — Limitations,
- RCW 38.52. Emergency management, and
- "Washington State Comprehensive Emergency Management Plan." (2)

WSDOT *Emergency Response Procedures*

WSDOT's *Emergency Response Procedures* contains most of WSDOT's responsibilities during a major emergency. (22) This document directs the WSDOT to perform the following operations:

1. Assist the Washington State Patrol and local law enforcement activities at the emergency site by
   a. providing vehicle traffic control,
   b. providing access control, and
   c. providing assistance in rerouting vehicle traffic around or away from the affected area.

2. Provide a representative to the state Emergency Operations Center (EOC).

3. Provide air or ground transportation for DSHS, Governor's staff, DEM staff, and other state personnel and equipment on state right-of-way.

4. Support the functional role of the WSDOT outlined in the "Washington State Comprehensive Emergency Management Plan" upon request of the Department of Emergency Management (DEM).

5. Provide public information personnel to support state emergency public information activities as directed.

6. Provide rest stops to support evacuation.

7. Support re-entry and/or recovery operations within the role of the WSDOT.

RCW 47.01.260. Authority of the department

Under this statute, WSDOT has the authority to exercise all the powers and perform all the duties necessary for the protection of state highways. Specifically, the statute directs the Department to perform the following activities:

1. Perform all duties necessary, convenient, or incidental to plan, locate, design, construct, improve, repair, operate, and maintain state highways, bridges and other structures, culverts, drainage facilities, and channel changes.

2. Allow or disallow bills for any work or services performed or for materials, equipment, or supplies furnished.

3. Remove or take actions to reduce the hazard of any structure, device, or natural or artificial thing declared to be a public nuisance that exists on the right-of-way of any state highway or off the right-of-way in sufficiently close proximity to the highway that could endanger the traveling public.

4. By authority of the Secretary, close or restrict any portion of any state highway whenever its unrestricted use or continued use by vehicles would greatly damage that state highway.

This statute is especially important to maintenance officials because during the earthquake drill there was confusion over whether the Department could work off the right-of-way. This statute authorizes the Department to work off the right-of-way, as long as the work is done sufficiently close to the highway and is necessary to protect that highway.

RCW 70.136.050. Persons and Agencies rendering emergency aid in hazardous materials incident — Immunity from liability — Limitations

This statute is often referred to as the "Good Samaritan" law. The statute addresses the role of WSDOT in emergencies involving hazardous materials. The law was enacted to encourage any person or public agency to provide emergency assistance to a hazardous materials incident command agency. Along the state and interstate highway corridors, the Washington State Patrol is the designated incident command agency. Under the "Good Samaritan" law, WSDOT can provide assistance to the incident command agency without being held liable for civil damages resulting from its assistance. While it encourages emergency assistance, the law does not make assistance mandatory.

RCW 38.52 Emergency management

This statute addresses overall emergency management by the state, and delegates authority to specific officials and organizations. WSDOT officials were mainly concerned about whether this statute addressed the issue of providing services during natural emergencies. In the opinion of the State Attorney General, this statute directs WSDOT to extend its services and facilities upon the request of the Governor or the executive heads of the political subdivisions of the state. A formal rental agreement or other contract providing compensation for WSDOT's services does not have to be executed in advance. This finding is important to WSDOT maintenance personnel because it legally obligates the Department to provide services even though a contract has not been signed. However, maintenance personnel have been instructed to insist that the request for Department services comes from the Governor or the executive head of the civil defense organization; the board of county commissioners or the county executive in the case of King County; or the mayor or manager of a city. (26)

Washington State Comprehensive Emergency Management Plan

The Washington State Comprehensive Emergency Management Plan lists responsibilities that WSDOT must perform upon a request from the Division of Emergency

Management during an emergency. The plan directs the Department to perform the following duties:

1. Determine the usable portions of the state highway network and coordinate and control emergency highway traffic regulations in conjunction with the Washington State Patrol, the military department, the highway users group, and the Department of Emergency Management.

2. Reconstruct, repair, and maintain state highways, bridges, and alternate routes, and coordinate the mobilization of personnel and equipment required for emergency engineering services related to state highways.

3. Maintain liaison with the Washington State Chapter of the Associated General Contractors of America and with construction and equipment rental companies.

4. Provide initial damage assessment estimates on state and local highway facilities (both on and off the federal aid system) as a member of the Preliminary Damage Assessment (PDA) Team.

5. Participate on Damage Survey Report (DSR) Teams to inspect federal aid and non-federal aid system highway facilities damaged by a disaster.

6. Conduct aerial reconnaissance and photographic missions.

7. Coordinate emergency air transportation for personnel and essential supplies.

8. Provide damage estimates on public and private airports as a member of the Preliminary Damage Assessment (PDA) Team.

9. Provide public information support to the Office of the Governor and the state Department of Emergency Services during emergency and recovery operations.

10. Provide communications resources in support of statewide emergency operations.

11. Provide radiological monitoring at district facilities and from mobile units.

HEADQUARTERS AND DISTRICT PERSONNEL RESPONSIBILITIES

Assigning responsibilities to personnel at both the Headquarters and District level during an emergency should reduce confusion over which officials are responsible for performing specific tasks. Officials should then know their responsibilities and who to contact. The idea to designate responsibilities to specific personnel resulted from a review of the *Caltrans Emergency Management Handbook.* (10) The handbook assigns

emergency responsibilities to Caltrans Headquarters and District personnel. The *Caltrans Emergency Management Handbook* was especially useful because the titles and roles of many Caltrans managers are similar or identical to the titles of WSDOT managers. (10) Responsibilities for a number of WSDOT personnel were adopted directly from the Caltrans manual. The applicability of these responsibilities was first verified by WSDOT officials before they were incorporated into the *Emergency Response Guide.*

A second source used to identify personnel responsibilities was WSDOT's *Standing Operating Procedures* (SOPs). (27) These procedures establish the disaster organization within the WSDOT and specify the personnel, procedures, and resources to be utilized to prepare for and respond to natural and man-made disasters. The SOPs specify responsibilities for the following Headquarters and District level officials:

- Secretary of Transportation
- Assistant Secretary for Operations
- Emergency Management Liaison Officer
- State Maintenance Engineer
- District Administrators
- State and District State Aid Engineer
- Radio Systems Manager

A third source that helped identify responsibilities was *A Guide For Emergency Highway Traffic Regulation.* (3) The FHWA published this guide to assist officials in regulating highway traffic during an emergency. This guide was useful in recommending actions for WSDOT maintenance managers because WSDOT's *Emergency Highway Traffic Regulation Plan* (1) is considered out-of-date and is no longer used for emergency situations. The FHWA guide included information on responsibilities such as:

- maintaining the current status of highways in the affected area,
- establishing control posts and staging areas,
- placing appropriate traffic regulation signs and barricades,
- maintaining adequate lighting and personnel at staging areas,
- developing road-use permits,
- developing priority work schedule, and
- maintaining communication with highway user organizations.

Originally, the authors intended to assign only maintenance personnel responsibilities. However, they realized that during an emergency, maintenance personnel

would have to work with personnel outside the Maintenance Department. Emergency respondents would also need to understand which division of WSDOT would be responsible for particular activities.

Responsibilities Identified for Headquarters Officials

Secretary of Transportation

- Declare all emergencies that require the authority of the Secretary.
- Provide information to the Transportation Commission.
- Respond to the disaster in accordance with the Commission's guidance and established Department policy.

Deputy Secretary of Transportation

- Act on behalf of the Secretary of Transportation during the Secretary's absence or as directed by the Secretary.

Assistant Secretary for Operations

- Maintain contact and provide incident information to the Secretary and the Deputy Secretary.
- Respond to disasters in accordance with the Secretary's guidance and established Department policy.
- Provide overall direction and control for response and damage assessment operations.

Chief Maintenance Engineer

- Serve as primary point of contact with District Administrators, District Operations Engineers, Liaison Officer, and Assistant Secretary for Operations.
- Assign an Emergency Management Liaison Officer to the state Emergency Operations Center (EOC).
- Inform Assistant Secretary for Operations of incident status.
- Manage WSDOT incident response.
- Prioritize transportation lifelines to be maintained or reconstructed.
- Determine the resources (equipment and personnel) available for emergency response operations and assign resources to impacted areas. Notify District Administrators and/or District Operations Engineers outside the impacted area if resources are needed from other districts.
- Maintain current status of all highways in the impacted areas.

- Identify and assess communication lines available during emergency operations.
- Record all data regarding damage location and estimated cost repair.
- Coordinate recovery activities with FHWA if necessary.
- Coordinate recovery activities with FEMA if necessary.
- Develop 24-hour staffing schedule for WSDOT personnel at the state EOC.
- Coordinate the use of rest areas with District Operations Engineers to support evacuation.

Emergency Management Liaison Officer

- Serve as primary point of contact with the Department of Emergency Management (DEM).
- Report to the state Emergency Operations Center (EOC) and manage WSDOT emergency operation when requested by the DEM.
- Advise DEM of disaster policies and capabilities of the WSDOT.
- Provide the state EOC with status reports of WSDOT field operations.
- Provide incident information to the Secretary of Transportation through the offices of the Chief Maintenance Engineer and the Assistant Secretary for Operations.
- Coordinate aeronautics service requests with the Assistant Secretary for Aeronautics.

Aeronautics — Assistant Secretary for Aeronautics

- Coordinate aeronautical services required by a declared emergency.

Aeronautics — Aeronautics Program Manager

- Maintain contact with the Chief Maintenance Engineer.
- Perform disaster operations assigned to the Division.
- Coordinate emergency reconnaissance and photographic missions of division aircraft.
- Brief pilots on the nature of the missions.
- Report results of emergency missions to the Chief Maintenance Engineer.

Aeronautics — Division Liaison

- Provide notification support within the Aeronautics Division.

- Coordinate emergency air transportation for personnel and essential supplies.

- Coordinate the requests from the Chief Maintenance Engineer for aircraft support with the appropriate division personnel and other state and federal agencies.

- Coordinate aerial reconnaissance and photographic missions.

- Coordinate damage assessment operations on public and private airports and provide damage estimates to the Preliminary Damage Assessment (PDA) Team .

Aid — Assistant Secretary for Local Programs

- Coordinate the activities of the PDA Teams and Damage Survey (DSR) Teams (DSR) to conduct inspection of damaged highway facilities. (Teams are composed of federal, state, and local engineers.)

- Record and report data regarding damage locations, surveys, description, and estimated cost to the DEM Public Assistance Coordinator. (Data are provided by reports from District Local Programs Engineer.)

- Upon completion of on-site damage assessments, submit official damage estimates to the DEM Public Assistance Coordinator.

- Maintain contact with the DEM.

- Coordinate damage reports with the Chief Maintenance Engineer.

Communication — Radio Systems Manager

- Provide communication resources and support such as communications engineering, personnel, and equipment to support statewide emergency operations.

- Coordinate communication capabilities with the DEM and the Chief Maintenance Engineer.

- Maintain survivability or make repairs to the communication system.

Construction — Chief Construction Engineer

- Assist Districts in maintaining liaison with the Washington State Chapter of the Associated General Contractors of America when requested by the Districts.

- Maintains liaison with construction and equipment rental companies when requested by the Districts.

Equipment — Equipment and Facilities Administrator

- Coordinate and direct the activities of the Equipment and Facilities Office.

Equipment — Transportation Equipment Manager

- Maintain statewide inventory of all equipment available for emergency response and recovery operations.
- Locate available equipment through coordination with District Maintenance Superintendents and Supervisors.
- Assist Districts and the Chief Maintenance Engineer in locating and obtaining resources.

Public Affairs — Public Affairs Director

- Provide information to the media and the public concerning the status of disasters and the condition of the highways.
- Support the state Emergency Public Information Officer at the state EOC.

Responsibilities at the District Level

District Administrator

- Respond to the emergency in accordance with existing Department policy.
- Establish the District Command Center, if needed, to coordinate and supervise emergency operations within the District.
- Maintain communications with the Chief Maintenance Engineer.
- Coordinate activities for assigning detours and removing debris from the roadway.
- Coordinate personnel and equipment for emergency engineering functions, including plans, specifications, and cost estimates.
- Perform procedures necessary for accomplishing emergency repair work.
- Maintain liaison with the Washington State Chapter of the Associated General Contractors of America.
- Maintain liaison with local construction and equipment rental companies.
- Provide available personnel and equipment to other Districts if requested.
- Report initial damage surveys, including location, description, and estimated cost of the damage to the Chief Maintenance Engineer in Olympia.
- Assign personnel as members of the Preliminary Damage Assessment Team upon request by the DEM Public Assistance Coordinator.
- Assist representatives from the FHWA in determining the magnitude of the damage caused by the disaster.
- Review response procedures in the Emergency Response Checklist.

District Operations Engineer

- Establish the District Command Center at the District Maintenance Office or at an Area Office when requested by the District Administrator.
- Serve as Emergency Response Manager at the District level.
- Report all highway conditions to and maintain communication with the District administrator and the Chief Maintenance Engineer.
- Advise emergency response strategies to the District Administrator.
- Provide assistance to the District Administrator on emergency response coordination and operations.
- Evaluate preliminary disaster information and determine the extent of damage.
- Determine the resources (equipment and personnel) available for emergency response operations.
- Assign resources to impacted areas.
- Coordinate services required for performing road repairs and implementing traffic control devices, such as signs and barricades.
- Review the response procedures in the Emergency Response Checklist.

Aid — District Local Programs Engineer

- Perform preliminary damage assessment for local highways with local and federal officers.
- Serve as primary point of contact for preliminary damage assessment between the WSDOT and local agencies.
- Report initial damage surveys, including the location, description, and estimated cost of the damage to the State Local Programs Engineer in Olympia.

Equipment — District Equipment Superintendent

- Report to the District Command Center if possible or maintain communication with the District Operations Engineer at the District Command Center.
- Maintain District-wide inventory of available equipment and equipment operators for emergency response and recovery operations.
- Locate available equipment through coordination with District Maintenance Superintendents or Area Supervisors.
- Coordinate activities to provide available equipment to impacted areas.

- Review response procedures in the Emergency Response Checklist.

Maintenance — Maintenance Superintendents and Supervisors

- Perform emergency response activities listed in the WSDOT Maintenance Manual.
- Maintain inventory of available equipment at the area offices for use in emergency response and recovery operations.
- Maintain communication with the District Operations Engineer and the District Equipment Superintendent at the District Command Center.
- Review response procedures in the Emergency Response Checklist.

EMERGENCY DELEGATION OF AUTHORITY

In identifying personnel responsibilities, WSDOT officials also felt the need to assign emergency authority to individuals in the event that the Secretary and Deputy Secretary were unable to report to or contact Headquarters. Emergency activities, such as emergency declarations, often require authorization by the Secretary. WSDOT's Directive 01-03, "Emergency Delegation of Authority," provides a list of WSDOT officials who can take over the role of the Secretary when both the Secretary and Deputy Secretary are unable to perform the Secretary's duties. The list was updated and edited by maintenance officials for the *Emergency Response Guide*. Currently, all responsibilities and authorities of the Secretary that may be properly delegated are assigned to the Department official highest on the following list:

1. Assistant Secretary for Operations
2. Assistant Secretary for Management Services
3. Assistant Secretary for Marine Transportation
4. Assistant Secretary for Transit Research and Intermodal Planning
5. District Administrator of the impacted District

EMERGENCY DECLARATIONS AND EMERGENCY WORK

Emergency declarations are necessary to expedite the response and recovery process. WSDOT Directive 07-45, "Emergency Declarations and Emergency Work,"

assigns authority to specific officials for declaring emergencies and outlines procedures for accomplishing temporary repair work. An emergency declaration allows the Department to undertake emergency repair work using state forces or contractors selected by one of three methods: force account contract, contract without bid, or contract with bid without advertisement. Table 6-1 outlines the methods the department can use to accomplish emergency work.

DISASTER MAINTENANCE

Emergency declarations, while necessary for quick response to reopen or repair a roadway, may not designate charges to the Maintenance Information Control System 4000 budget series. To reduce confusion, WSDOT's Chief Maintenance Engineer defined the conditions that warrant the use of the 4000 series. The 4000 series can be charged under the following conditions:

1. Significant widespread damage has occurred as a result of a storm or other major "act of God," requiring emergency declarations for adequate response.

2. A storm or other event has impacted local agencies or property owners and, while not greatly inflicting damage on WSDOT facilities, requires a high level of response for traffic control or other actions by WSDOT.

Table 6-1 Methods for Accomplishing Emergency Work

Engineer's Estimate of Cost of Temporary Repair	State Forces	Force Account Contract	Contract without Bid	Contract with Bid without Advertisement
$50,000 and under (District Administrator declares emergency)	Yes	Yes	Yes	Yes
Over $50,000 (Secretary declares emergency)	No	Yes	Yes	Yes

RESOURCES

The availability of resources was one of the greatest concerns of WSDOT maintenance officials. Locating and mobilizing resources are major elements of emergency response and recovery operations. The most important resources WSDOT identified for emergency operations were personnel and heavy equipment such as bulldozers, cranes, and road graders. The Department has four primary contacts through which resources can be obtained: the WSDOT maintenance department, private rental companies, state agencies, and the military.

WSDOT Resources

For WSDOT, the most convenient method of acquiring resources is through its maintenance department. WSDOT equipment is readily available for moving to other locations in the event of an emergency. The *Equipment Information System Manual* (M-13-01-07) contains a list of all the equipment available to the Department. (4) Equipment on this list may be located and obtained by contacting District Equipment Superintendents. Equipment inventory lists all equipment for each maintenance shed can also be used to locate equipment. These lists can be obtained through the Equipment and Facilities Office in Olympia.

Personnel can also be moved to other Districts during an emergency. The Department has directed that during a catastrophic event, all personnel must ensure the safety of their families and loved ones before reporting to work. The Department recognizes that employees will be concerned about their family members and will probably not be effective in the office or in the field until the safety of their family members has been secured. In their absence, personnel from areas outside the impacted region may be requested to fill in. The responsibility for providing personnel to other Districts is that of the District Administrators.

Equipment Rental Companies

Heavy equipment can also be obtained through private rental companies. WSDOT has contracts with a number of equipment rental agencies. The following WSDOT directives provide further information on using resources from private companies:

- D07-45, "Emergency Declarations and Emergency Work"
- D27-02, "District Level Contracts for Highway and Local Agency District Ad and Award Construction Projects"
- D51-30, "Highway Maintenance Contracts — $30,000 or Less"

However, WSDOT has no directory of equipment rental companies that lists the type of equipment available from each company that would assist officials in quickly locating the equipment during an emergency.

Another issue that developed during this project was evidence of self insurance. In requesting rental equipment, the owner of the equipment may require evidence of self-insurance from the Department. The Department has two options to satisfy this requirement. One option is to provide a certificate of insurance to the owner. However, this process may take too much time, as requests for certificates of insurance must go through the Division of Risk Management. The preferred option is to furnish the owner with a copy of a letter indicating that the state of Washington, including all its agencies and departments, is self insured for all exposure to tort liability, general liability, property damage liability, and vehicle liability, as outlined in the Risk Management Act (RCW 43.19.19362). If this option is not acceptable to the owner, then a certificate of insurance must be obtained.

State Agency Equipment

The use of other state agency equipment can be coordinated through the Department of Community Development, Division of Emergency Management (DEM). For small, isolated incidents that do not require activation of the state Emergency Operations Center, the agency may be contacted directly. The Division of Emergency Management can also

provide sandbags for emergency situations. Table 6-2 shows the number and location of sandbags stockpiled by the Division of Emergency Management.

One agency that WSDOT maintenance officials identified as capable of provding useful resources is the Department of Natural Resources (DNR). Heavy equipment belonging to the Department of Natural Resources is primarily used to suppress and control forest fires. However, WSDOT may request the use of DNR equipment for other emergency relief operations if the equipment is not in use. Requests for state agency equipment must be made by WSDOT's Chief Maintenance Engineer to the Manager of Division of Fire Control at the Department of Natural Resources.

Military Resources

The state may use military resources during certain, designated natural and man-made emergencies. However, military assistance can only be obtained if all state and local resources, including those from the private sector, have been committed, exhausted, or are inadequate for the task. In some cases, military assistance can be obtained without a Presidential declaration of "emergency" or "major disaster."

Table 6-2. DEM Stockpile of State Sandbags

Location	Sandbags	Location	Sandbags
Camp Murrary (Warehouse)	10,000	Mason	5,000
Asotin	2,500	Okanogan	5,000
Benton	5,000	Pacific	5,000
Chelan	5,000	Skagit	5,000
Clallam	5,000	Snohomish	5,000
Cowlitz	5,000	Spokane	5,000
Ferry	5,000	Wahkiakum	2,500
Grant	5,000	Walla Walla	5,000
Grays Harbor	5,000	Whatcom	5,000
Jefferson	5,000	Whitman	5,000
Lewis	5,000	Yakima	5,000

To obtain military resources, WSDOT officials have been instructed to submit a request to the Chief Maintenance Engineer, who will notify the Division of Emergency Management. The Duty Officer at the DEM will then notify the appropriate military officer of the request for military resources. Military resources are provided by the National Guard and the Department of Defense.

National Guard

The mission of the National Guard is to provide military support to civil authorities for the preservation of life, prevention of human suffering, and the restoration of public services during state emergencies or on the order of the Governor. (8) Support capabilities of the National Guard include

- roadblocks and traffic control,
- mobile and fixed communication,
- emergency evacuation (land/air),
- perimeter security/quarantine,
- delivery of supplies,
- disaster search teams,
- aerial reconnaissance,
- civil disturbance operations (e.g., riots, protests), and
- emergency shelter.

Department of Defense

The Department of Defense (DOD) includes the U.S. Army, U.S. Navy, U.S. Air Force, and U.S. Marine Corps. Both the regular and reserve components of each branch are part of the DOD. The National Guard does not become a part of the DOD until activated for federal duty by the President. The U.S. Coast Guard is a component of the U.S. Department of Transportation but becomes part of the U.S. Navy during wartime.

The Department of Defense has adopted the following policy regarding its role in assisting state and local governments during peacetime civil emergencies (28):

1. The federal government will provide orderly and continuing means of supplemental assistance to state and local governments to alleviate the suffering and damage that result from civil emergencies.

2. Upon the declaration of a major disaster or emergency by the President, the Director of the FEMA, or designees, the Associate Director for Disaster Response and Recovery or FEMA Regional Directors may direct any federal agency to provide assistance to state and local governments by

a. using or lending equipment, supplies, facilities, personnel and other resources;

b. distributing medicine, food, and other consumable supplies; and

c. rendering emergency assistance.

3. Use of DOD military resources in civil emergency relief operations is limited to those resources that are not immediately required for the execution of the primary military mission.

Only equipment and supplies that the DOD has declared surplus (i.e., not immediately required for military missions) may be loaned or donated to state and local governments.

Without a Presidential declaration, DOD assistance can be obtained in the following cases (8):

1. life is endangered and the needed military resources are available,

2. a mutual aid agreement has been executed with local DOD commanders, or

3. military Assistance to Safety and Traffic (MAST), Search and Rescue (SAR), or Explosive Ordnance Disposal (EOD) services are needed.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is a functional branch of the U.S. Army. In the Pacific Northwest, the USACE is organized into district offices in Seattle, Walla Walla, and Portland. District offices are under the military command of the USACE North Pacific Division Commander in Portland, Oregon. The primary function of the USACE in this region is flood fighting and flood mitigation activities. Flood fighting activities may include the following:

- temporarily raising the height of levees with sandbags,
- strengthening flood control works with armor rock,
- evacuating people and livestock,
- providing assembly of plants and supplies (e.g., sandbags, plastic sheeting),
- providing 24-hour technical assistance during the event, and
- removing logs, debris, and ice jams.

The USACE can also provide additional sandbags if the supply of state sandbags has been exhausted.

COMMAND CENTERS

The establishment of command centers is a vital part of emergency operations. The centers serve as communication and coordination hubs for the management of emergency response and recovery operations. The primary command center for the entire state is the state Emergency Operations Center (EOC) in Olympia. Plans are under way to expand the center and add additional communication systems.

State Emergency Operations Center

The state EOC is the central point for statewide coordination of emergency response and recovery efforts. The state EOC is activated by a declaration of emergency by the Governor or upon the request of the director of the Division of Emergency Management (DEM). A representative from the WSDOT Maintenance Department reports to the state EOC upon its activation and coordinates WSDOT activities with other agencies for ESF #1-Transportation. Coordination of operations within WSDOT takes place from the Headquarters, District, and Area Command Centers.

Headquarters Command Center

The Headquarters Command Center is established in the office of the Chief Maintenance Engineer. The center is activated during significant events that escalate over time to require a significant expenditure of resources. The center is staffed by Headquarters Maintenance Office engineers. The Headquarters Command Center may be activated without the activation of the state EOC. The primary functions of the center are to determine the status and condition of all highways in the state following a catastrophe and to coordinate activities with the District Command Centers. Engineers at the Headquarters Command Center should expect to conduct the following activities:

- Identify and evaluate the availability and capacity of usable highways in the impacted region.
- Develop a state situation map showing damaged or destroyed highways and indicate which highways can be used as alternate routes.
- Inform the public and media of highways closed because of damage or radiation.

- Estimate traffic demand for essential movements for the entire highway network.
- Issue road-use permits for regulated highways and coordinate permit issuance and recognition with other states for interstate travel.
- Coordinate efforts to erect signs and barricades on restricted or closed routes.
- Inform all District Command Centers of regulated routes within their boundaries.

District Command Centers

District Command Centers are located in District Maintenance Offices and are staffed with District Office engineers and personnel to the extent possible to maximize the number of maintenance personnel in the field. District Command Centers are intended to serve as staging areas and communication centers for coordinating instructions within the District and with the Headquarters Command Center. These centers can also be a point of contact with the press and public. District Command Center personnel should be expected to conduct the following activities:

- Receive guidance and information from the Headquarters Command Center regarding emergency operations.
- Identify and evaluate the availability and capacity of usable highways within District boundaries.
- Conduct periodic traffic counts on major highways to determine whether the traffic volumes are approaching the capacity of the highways. As the volume reaches capacity, administer partial or complete emergency highway traffic regulation.
- Notify the Headquarters Command Center if emergency highway traffic regulations are administered.
- Develop a situation map showing damaged or destroyed highways in the District and indicate which highways can be used as alternate routes.
- Inform the Headquarters Command Center of all highway capacity reductions and closures within District boundaries.
- Inform the public and media of highways closed because of damage or radiation.
- Estimate traffic demand for essential movements for the highways within the District.

- Coordinate the issuance of road-use permits for regulated highways with the Headquarters Command Center.
- Coordinate efforts to erect signs and barricades on restricted or closed routes.
- Establish Area Command Centers to assist in emergency operations.
- Coordinate emergency operations with other state, county, and city agencies in the area.

Area Command Centers

Area Command Centers should be established at Area offices in regions impacted by the disaster or at offices participating in emergency response operations. These centers should be staffed with Area office personnel to allow maintenance personnel to perform field activities. For isolated incidents, activation of Headquarter and District Command Centers may not be necessary, as operations may be initiated from the Area office nearest the incident. During large-scale disasters, Area Command Centers should support District Command Centers by conducting the following activities:

- Receive guidance and information from the District Command Center regarding emergency operations.
- Maintain a situation map showing damaged or destroyed highways in the area and indicate which roads can be used as alternate routes.
- Assist the District Command Center in conducting periodic traffic counts on major highways to determine whether the traffic volume is approaching the capacity of the highway. As the volume reaches capacity, inform the District Command Center of the need for partial or complete emergency highway traffic regulation.
- Assist the District Command Centers in emergency operations in the area.
- Notify the District Command Center when any changes or events affect emergency operations in the area.

COMMUNICATIONS

Communication is perhaps the most important element in emergency planning. Without an operable communication system, coordination of emergency response and recovery operations is severely hindered. WSDOT uses three communication systems: radio units, telephones, and cellular phones.

Radio Units

A radio system that can provide effective communication during an emergency is necessary to expedite response operations. Recognizing this fact, WSDOT is currently in the process of replacing its low band, 47 MHz, system and high band, 150 MHz, system with an UHF band, 800 MHz radio system. The 800 MHz system is supposed to provide effective emergency communication by designating one channel for emergency communication. However, maintenance officials expressed concern about the effectiveness of the future radio system during an emergency and requested research into the system.

The 800 MHz system is capable of cross connecting with the State Patrol and other systems for direct mobile to mobile communications. When completed, the radio system will have 16 "systems" (mountain top repeater sites) with 11 "groups" per system for a total of 176 possible channels. (Portable radios will only have 14 systems). Each division (i.e., maintenance, bridge, engineers) will be assigned to one of these groups. For example, the maintenance department in Seattle might be assigned to system 1, group 5. Because the Department expects to assign some groups to more than one system (i.e., overlapping channels) to allow communication within the same group through the entire state, the total number of channels will be less than 176. Ideally, the radios should be able to switch to the proper system once the user has crossed into another zone. One of the major benefits of the new system is that the radio will be constantly communicating with the repeaters to find an open channel and will only allow one user on the channel at any given time. This will eliminate unwanted chatter. The new system will also allow portable units to communicate with mobile units. Both units will also be able to communicate with the phone system and will most likely have SCAN capability.

The 800 Mhz system is scheduled to be completed in District 1 and along the I-5 corridor from Seattle to Portland by September 1992. Completion of the entire state system is not expected until 1995. (29) However, uncertainties about the proposed system still exist.

During a training session for the 800 Mhz system, maintenance personnel expressed some concern about the system. One of their concerns was whether the radios would be equipped with a "talk around" function. The "talk around" function allows two units to communicate between each other without interference from a third party. This is especially important to flaggers who need to communicate with each other for two-way traffic control through a construction or hazard zone. During a disaster in which the highway system had been damaged or under repair, traffic control would be needed. For flaggers to have this "talk around" feature, two units would have to be given a system and a group number. No other units could be programmed with these numbers. The disadvantage of this function is that no one else could communicate with the flaggers. For a user to contact someone in another group, the radio unit must be programmed for that group. If the unit is not programmed, the user must then call the dispatcher.

Another potential problem is radio switching. Each radio unit will be programmed with specific systems and group numbers. Supervisors and others with specially programmed units could not change vehicles or portable units unless they informed the dispatcher of the change. Otherwise, they could not be contacted during an emergency unless the radio had access to the emergency channel.

This issue leads to the problem of channel assignments. For an official to have access to the emergency channel, the radio unit must be programmed for it. Although system and group assignments have not yet been made, a problem could occur if some officials involved in emergency operations did not have access to the emergency channel. On the other hand, if too many officials had access to the channel, then the channel could become saturated and hinder emergency communication.

Telephones

Regular phone lines may become saturated during an emergency and may only be able to provide limited service. If phone lines are destroyed by a natural disaster, service may become nonexistent. Pay phones are part of the emergency communication system

and have priority in receiving service over private phone lines. Pay phones might be used by employees to contact family members if regular phone lines became saturated.

Cellular Phones

Cellular phones can also be used for emergency communication. WSDOT site inspectors and other emergency response field personnel should have cellular phones for communication from the site. The cellular phone system may be subjected to call congestion and thus limit the number of users in the network. Cellular units equipped with their own antennae and repeater systems should not be affected by saturation. Cellular phones should be used by emergency management office personnel for non-emergency communications to make available to key field personnel a greater number of channels on the 800 Mhz system.

EMERGENCY NOTIFICATION

Communication among key officials and organizations is helpful in coordinating response and recovery operations. Figure 6-1 provides a flowchart of the emergency notification process for WSDOT officials. This flowchart quickly informs the Emergency Management Liaison Officer of the officials who need to be contacted to coordinate response and recovery activities. An emergency call directory is also useful for contacting key officials. The directory should include the titles and names of the officials, their work and home phone numbers, and their radio identification numbers.

Communication among WSDOT organizations was addressed by the Emergency Response Task Force. The organizations include Headquarters, District Offices, and the Public Affairs Office.

Internal Headquarter Communications

Headquarter communications should be conducted as necessary to keep up to date the Assistant Secretary of Operations, the Public Affairs Officer, and the Office of the Secretary on the status of emergency operations.

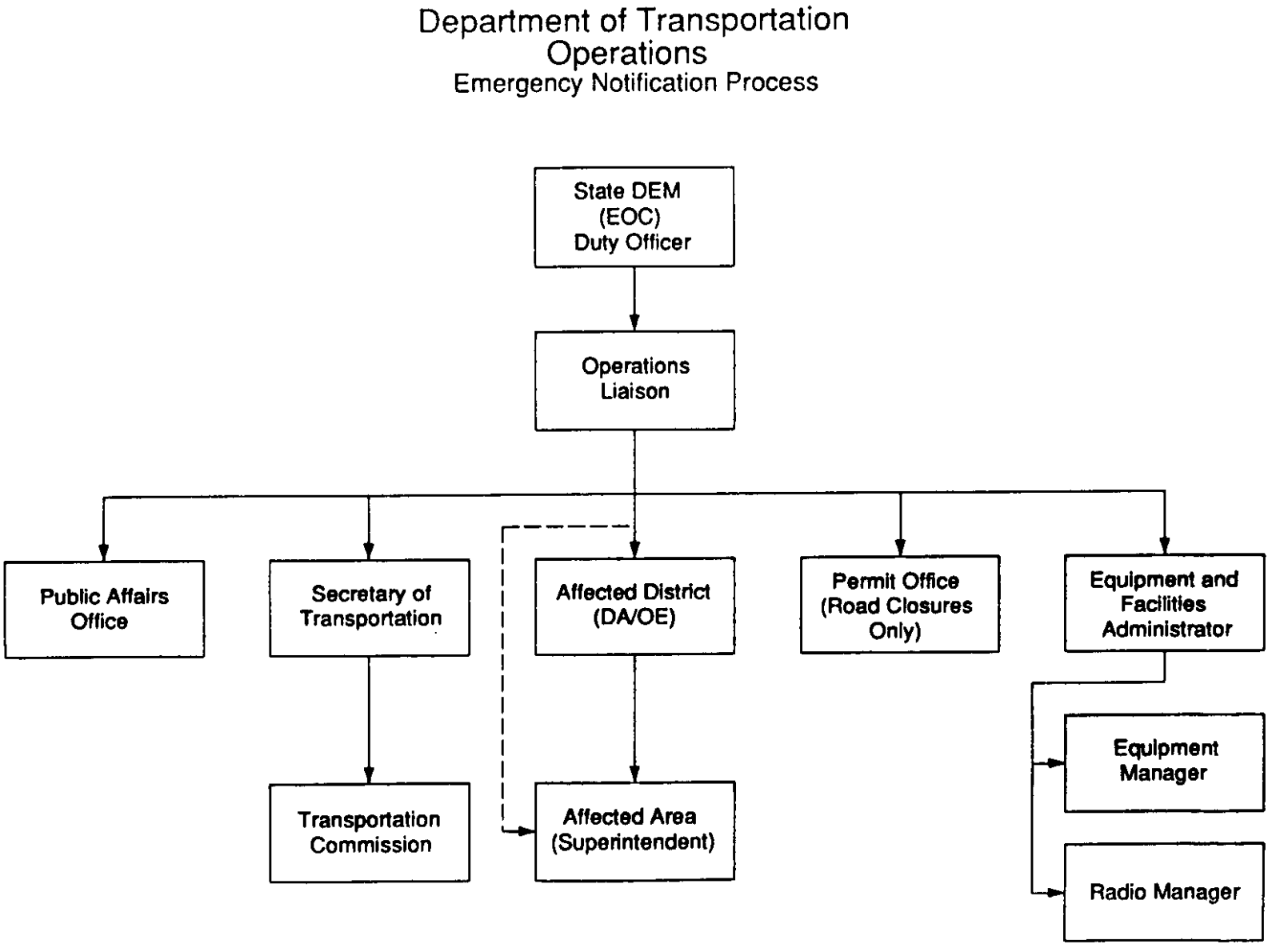

Figure 6-1. WSDOT Emergency Notification Process

District to Headquarter Communications

District road closures that exceed four hours because of weather or other significant events should be reported to the Chief Maintenance Engineer. If the Maintenance Office cannot be contacted, the Public Affairs Office should be contacted. During extended emergency operations, the Division of Emergency Management may request that Headquarters provide personnel to staff the state EOC. The District Offices should then establish a point of contact for communication with the WSDOT staff at the state EOC if maintenance officials are absent from the Headquarters Command Center.

District to District Communications

Communication between Districts should be conducted to the extent necessary to coordinate the status of routes connecting Districts and to request resources from other Districts. In most emergencies, only a few Districts are impacted. Non-impacted Districts should be contacted if additional material, equipment, or personnel are needed.

Communications with the Public Affairs Office

The Public Affairs Office (PAO) should also be informed of road conditions or significant events. If the Maintenance Office cannot be contacted, PAO should be contacted. PAO will provide phone numbers for contacts outside of normal working hours and will communicate with the media during disaster situations when normal lines of communication are not available.

PUBLIC INFORMATION

Dissemination of information to the public and the media can be a critical part of emergency operations. When done properly, information dissemination can be useful to both the public and the WSDOT. The public needs to know what to do during an emergency, while WSDOT can benefit from the public's awareness of the situation. For instance, the people will want to avoid a hazardous area for their own safety, while the Department will more easily be able to conduct emergency operations in the hazardous area

without the presence of the public. The easiest way to inform the public is through the media. At times, the media can also be an integral part of the communication system. The media may be able to provide communication capabilities that cannot be provided by WSDOT communication systems. During the 1989 Loma Prieta earthquake, for example, many Caltrans workers relied on radio and television news bulletins to learn what had happened and what they needed to do.

It is difficult to determine the amount and type of information that need to be disseminated to the public or media, as each situation requires different actions. WSDOT officials requested instructions on how to disseminate information to the Public Affairs Office or directly to the media to reduce the potential for distribution of inaccurate or conflicting information.

In the event of a catastrophic or emergency incident, WSDOT Headquarters officials should contact the Director of Public Affairs at Headquarters. District 1 officials should contact the District 1 Public Affairs Officer, and Washington State Ferries officials should contact the WSF Public Affairs Office. All other Districts should report to the Headquarters Public Affairs Office. The Public Affairs Office has prepared a checklist of questions that officials should be prepared to answer during an emergency. The questions include the following:

- Who can the Public Affairs Office contact on site for additional information and updates? How can the Public Affairs Office reach that person?
- What happened?
- Were there any injuries or fatalities? If so, how many and how severe are the injuries?
- When did it happen? (Exact times are important if available.)
- What is the nature and magnitude of the damage?
- How did the incident occur?
- What is its effect on traffic? When will traffic flow be fully restored?

- What has to be done to correct the situation? How long will it take? What kinds of skills and equipment will be required? Is there an estimate on the cost to repair?
- How many WSDOT people are on site to help? Are other emergency services or assisting agencies on site? (State Patrol, utility companies, paramedics, etc.)
- Is there anything extraordinary about the incident or its containment that the public would find interesting?
- Is someone immediately available on site who can provide updates and talk with the media?

In some situations, the Public Affairs Office will not be available, or WSDOT officials at the scene will need to contact the media directly. Conflicts with the media can develop when officials unaccustomed to working with the media suddenly become overwhelmed with hordes of reporters and cameras at the site. The media's responsibility is to ascertain the situation and provide objective and responsible reporting to the public on the basis of the best available information. Some officials may forget the importance of the media's role in covering an emergency and become frustrated with their presence. Others may be eager to assist the press but may be reluctant to admit that they do not know the details of the situation. These attitudes can result in erroneous information. To address these potential problems, WSDOT may soon adopt a manual developed by the Emergency Management Institute entitled "Media Issues." (30) The manual is a comprehensive guide for emergency response personnel on dealing with the media during a major disaster.

EMERGENCY PROCEDURES FOR MAINTENANCE PERSONNEL

WSDOT Maintenance officials requested that emergency procedures be outlined for maintenance field personnel and supervisors, since maintenance personnel are most likely to be involved in response operations during a major emergency. The WSDOT *Maintenance Manual* lists emergency procedures for field and office personnel. (31) This section summarizes these procedures.

Maintenance crews usually encounter emergencies associated with transportation accidents and hazardous material spills. (31) WSDOT personnel at the scene of an incident

have been instructed to take only the emergency actions required to protect human life and property until the State Patrol has gained control of the situation. The State Patrol has responsibility for safety measures at an accident site and for coordination of the clean-up of spilled substances. However, the State Patrol may request assistance from WSDOT personnel to clean up an accident site.

Before helping with the removal or coming into contact with spilled material, maintenance workers should first verify from the placard or manifest that the material is not toxic or explosive. If the placard is not visible, workers should approach the truck only if they are certain that no personal hazard exists.

Maintenance Field Personnel

Maintenance crews have been directed to take the following actions upon encountering a hazardous condition on the roadway:

1. Advise the superintendent of the problem and request aid from the Washington State Patrol.

2. Take sufficient precautionary actions to protect yourself and crew from continued exposure to the hazardous condition.

3. Physically close the highway or restrain traffic from entering the hazardous area.

4. Survey the situation and report the exact location, cause, and extent of the closure to the division or district Maintenance Office or its supervisor or lead technician by radio or other means of communication.

5. If the spilled substance is identified and is spreading toward additional traffic lanes or is likely to cause ground water damage, take actions to absorb or confine the spill, using careful judgment. Avoid contact with known hazardous substances or with those of unknown chemical properties.

6. Remain in the area to safeguard traffic until proper traffic control devices have been installed or until you are relieved by the foreman, the lead, or a Washington State Patrol trooper.

7. Patrol for stranded motorists in the isolated area when other traffic has been controlled.

Maintenance Superintendents and Supervisors

Maintenance superintendents and supervisors have been directed to take the following actions:

1. Coordinate the personnel and equipment required to physically close a highway or restrain traffic from entering a hazardous area.

2. Make a complete report of the closure to the District Maintenance Engineer by radio or other means of communication as quickly as possible.

3. Ensure that the hazardous section of highway is not left unguarded and that patrols are run to determine that no one is stranded in the isolated area.

4. Provide detours around partial closures only if it is safe to do so. Whenever possible, establish detours on existing state routes. Local roads should be used only after surfaces, bridges, and overhead clearances have been investigated to determine possible traffic restrictions. Detours must be signed, and other traffic control devices (such as barricades and flashing lights) must be installed. Position flaggers at barricade points when necessary.

5. Arrange to advise Seattle radio so that the closure can be announced on the Department's public service and communications networks.

6. If the Washington State Patrol requests a closure, and the local superintendent is not available, contact the District Maintenance Engineer or District Administrator to advise him or her of the Washington State Patrol's request and to provide recommendations.

7. Reopen the roadway when the physical blockage has been eliminated or the hazardous conditions that caused the closure have subsided.

8. Advise the Division Superintendent, Maintenance Engineer, or District Administrator of the reopening by the fastest means available.

9. Arrange to relay notice of the reopening to Seattle radio to ensure that information on the public service and communication network is current.

HAZARDOUS MATERIALS INCIDENTS

Hazardous materials incidents represent a common hazard to maintenance personnel responding to the site. Field personnel have been instructed to report all hazardous materials incidents occurring on the highways to the Department of Ecology and all radioactive materials incidents to the Department of Health, Division of Radiation Protection. For large hazardous materials emergencies, WSDOT may be requested to participate in the response operations. Incidents involving WSDOT response should be

reported to the WSDOT HAZMAT Coordinator. In coordinating HAZMAT response operations, the following agencies may be involved:

- **Washington State Patrol/Hazardous Waste Unit**

  The Washington State Patrol is responsible and should be contacted for safety measures at an accident site, coordination of the clean-up, and possible evacuation.

- **Department of Ecology**

  All hazardous materials incidents on highways should be reported to the Department of Ecology (DOE). The DOE has set up 24-hour reporting numbers for the northwest, southwest, central, and eastern regions of the state.

- **Division of Emergency Management**

  The Division of Emergency Management (DEM) can also be contacted for hazardous materials spills. The Duty Officer at the DEM will assist in contacting the proper authorities.

- **CHEMTREC and NRC**

  The Chemical Transportation Emergency Center (CHEMTREC) and the National Response Center (NRC) work cooperatively to provide 24-hour assistance to emergency responders and all others handling hazardous materials. (32) The centers can provide expert advice from government and industry specialists. Callers can be transferred between both centers to obtain the needed services.

  CHEMTREC is a service of the chemical industry that ensures the industry's capabilities are available in emergency situations. (32) The shipper or manufacturer of the material can usually be contacted through CHEMTREC for assistance on the materials.

  The NRC is the single federal government center to which release of hazardous substances should be reported. Government specialists can be contacted through the NRC. Federal law requires that anyone who releases a reportable quantity of a hazardous substance into the environment immediately notify the NRC. (32)

- **Washington Emergency Response System (WERS)**

  All radioactive materials incidents should be reported to the Department of Health, Division of Radiation Protection. The Department of Health (DOH) has set up WERS to notify the state of all radiation transportation accidents. Through WERS, the State Radiation Emergency Response Team can be activated for field assistance. A radiation specialist will also provide assistance on the phone.

- **U.S. Department of Energy at Hanford**

  The Department of Energy should be contacted for incidents involving radioactive material from the Hanford nuclear power reactor.

RADIOACTIVE MATERIALS INCIDENTS

In responding to radioactive materials incidents, workers have been requested to observe the following safety measures:

- Restrict access within 150 feet of radiation source.
- Stay upwind of fire or explosion.
- Reduce exposure by
  - Increasing distance from the source.
  - Limiting time near the source.
  - Placing heavy, solid objects between the radiation source and people.
- Detain personnel and equipment until they can be checked for radioactive contamination.
- Warn medics if the injured may be contaminated.

SPECIAL CASE: TRANSURANIC WASTE (TRU)

Transuranic waste is a special type of radioactive waste. TRU wastes are the result of U.S. defense programs and are exempt from regulation by the Nuclear Regulatory Commission. (33) TRU waste consists of alpha emitting particles, which will not cause external harm. However, internal damage is possible if alpha particles are inhaled. Eating, smoking, drinking, or breathing without an oxygen mask in the limited access area may result in internal damage. To measure alpha particles, special equipment is needed. The CD V-700, CD V-715, and pocket dosimeters only measure beta and gamma particles, not alpha particles.

TRU wastes are packaged in 55-gallon metal drums and placed in a specially designed transuranic package transporter called a TRU PACT II. TRU PACT IIs are transported by truck or rail car. A truck transporting TRU waste houses a satellite receiver

that enables states to know the truck's location at all times. In the event of an accident, the state and the military are notified immediately that the truck has stopped at an unassigned area. Transportation accidents involving TRU waste should be reported to WERS, the Washington State Patrol, and the U.S. Department of Energy at Hanford.

REPORTING PROPER INFORMATION

In reporting hazardous materials incidents, callers should provide as much of the following information as possible:

- caller name and call back number,
- on-scene contact person and phone number,
- location and description of event,
- name of material released or any identifying information,
- status of the event (ongoing or over),
- any life threatening situation, and
- container type, labels, truck/railcar number, shipping papers, or other identifying information.

EMERGENCY TRAFFIC CONTROL

In providing traffic control at a hazardous materials incident, WSDOT personnel should apply the following checklist of procedures:

1. Report to the Incident Commander from the state patrol.
2. Get guidance on the need for an exclusion perimeter and the distance involved.
3. Establish the perimeter, using rope, barricades, vehicles, etc.
4. Redirect pedestrians and vehicles around the perimeter, and keep onlookers, news media, and others away from the exclusion area.
5. Direct media to the public information post.
6. Request assistance as needed.
7. Be prepared to remove persons hindering emergency operations.

8. Be prepared to expand the perimeter if the situation escalates.

9. Hold anything that goes into the hot zone and decontaminate it before it exits the area.

FEDERAL DISASTER ASSISTANCE

All federal agencies have the authority to assist local and state authorities in situations involving direct and immediate threats to life or threats of major property damage. However, all federal assistance is supplemental to state effort and can only be used if state and local forces, including those in the private sector, have been committed, exhausted, or are inadequate for the task.

Federal assistance after a Presidential declaration of emergency or major disaster is automatic. In some instances, federal assistance for disasters not involving a Presidential declaration can also be obtained.

The *Disaster Assistance Manual* published by the Washington State Department of Community Development, Division of Emergency Management, provides information on obtaining federal disaster assistance (34). This manual addresses federal assistance provided by The Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288, as amended).

Federal Highway Disaster Funds

Disasters can cause extensive bridge and roadway damage beyond the state's financial ability to respond. When an emergency exceeds the state's capability, federal assistance can be requested. Two sources for federal highway disaster funds are available:

1. The Federal Emergency Management Agency (FEMA) under Public Law 93-288, as amended by PL 100-707, the Robert T Stafford Disaster Relief and Emergency Assistance Act of 1988, for the restoration of damaged roads and bridges off federal aid systems.

2. The Federal Highway Administration (FHWA) under Title 23, USC, Section 125, for the restoration of damaged roads and bridges on federal aid systems.

As a result of the Intermodal Surface Transportation Efficiency Act of 1991, the federal aid system will be replaced by the National Highway System. Damaged roads and bridges on the National Highway System are eligible for FHWA funds.

Federal Emergency Management Agency (FEMA)

Federal funds for damaged roads and bridges that are not on the federal aid system are obtained through FEMA and the federal and state public assistance program after a Presidential declaration of "emergency" or "major disaster." If the damage is such that a Presidential declaration is appropriate, the Governor will make such requests on the basis of federal, state, and local damage assessments.

Federal Highway Administration (FHWA)

Federal funds for damaged roadways and bridges that are on or part of the federal aid system (National Highway System) are obtained through FHWA. These funds are available after a Governor's proclamation of "state of emergency." A Presidential declaration of "emergency" or "major disaster" is not necessary. FHWA assistance is obtained in the form of Emergency Relief Funds.

Emergency Relief Funds

Emergency Relief Funds are intended to assist highway agencies in the repair or reconstruction of highways, roads, and trails that have suffered serious, unusually expensive damage as a result of a major natural or man-made disaster. (35) Emergency Relief Funds can only be obtained for facilities that meet all of the following criteria:

1. The damage is the result of one of the following:

    a. A natural disaster over a wide area, such as a flood, hurricane, tidal wave, earthquake, severe storm, or landslide.

    b. Catastrophic failure from any external cause as long as the failure was not the result of an inherent flaw in the facility and the failure was sudden and caused a disastrous impact on transportation services. (Examples of such failures include a massive slide induced by an earthquake or a bridge failure caused by vehicular impact.)

2. The repair or reconstruction work proposed for participation with Emergency Relief Funds is located on one of the following facilities:

   a. Highways on the federal aid system (National Highway System)

   b. Federal roads as defined by various classifications in 23 U.S.C. 101.

3. The natural occurrence is sudden, unusual, and causes serious damage to federal aid facilities.

4. The extent of serious damage to federal aid facilities is over a wide area.

CHAPTER 7

IMPLEMENTATION

The *Emergency Response Guide* provides direction for implementing the Department's emergency management procedures. This guide is immediately usable by maintenace officials for responding to and managing emergencies that impact the transportation system. The guide should also be used to produce an emergency response plan for each District.

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