SEERPlan Manual

Structural Engineers Emergency Response Plan

A Publication By
The National Council of Structural Engineers Associations

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SEERPlan

Structural Engineering Emergency Response Plan

National Council of Structural Engineers Associations

Contents

Introduction & History of the SEERPlan

A Need is Defined

On Tuesday, September 11, 2001, terrorists attacked the twin towers of the World Trade Center in New York City, which ultimately resulted in the collapse of both of the quarter-mile high towers. This collapse produced a pile of debris weighing more than two billion pounds, injured and killed thousands of people and damaged hundreds of adjacent buildings.

At the request of the City of New York, the Structural Engineers Association of New York (SEAoNY) organized teams of structural engineers to provide assistance in a variety of efforts. The National Council of Structural Engineering Associations (NCSEA) also organized teams of volunteers from outside of New York to supplement the teams formed by SEAoNY. These engineers played a significant role in the assessment of the damaged buildings and in the search and rescue efforts immediately following the attack. The American Society of Civil Engineers (ASCE) expressed the sentiments of many when it recognized the extraordinary performance of SEAoNY. ASCE noted that SEAoNY's rapid response in organizing professionals to volunteer their services for the people of New York during the demolition and removal procedures demonstrated the highest ideals of the profession.

At the conclusion of his work at Ground Zero, Gus Domel compiled his thoughts and lessons learned into a document published by NCSEA titled "World Trade Center Disaster: Structural Engineers at Ground Zero."

The document initiated discussions within NCSEA for the need to create a committee to prepare a plan for engineers to use to ensure an immediate, efficient and effective response to any large disaster. In November of 2001, NCSEA formed the Structural Engineering Emergency Response (SEER) Committee. Mike Tylk, president of NCSEA at the time the committee was formed; Sanjeev Shah, current president of NCSEA; and the other NCSEA board members should be commended for their willingness to commit to this project and more importantly, for providing direction in solidifying the mission of the committee. This document would not exist without their support.

After the committee was created, NCSEA proceeded to appoint members to the committee with experience in disaster response while also providing representation across various geographical locations within the United States. The current members of the SEER Committee are listed on the following page. Each and every committee member has made a major contribution to this document. In addition, we would like to thank the original committee members who collaborated on the first edition of this document. Please see below for a list of the founding members of the NCSEA SEER Committee.

We would also like to thank those who provided their services in the review of the document and preparation of the manual cover. Their names are listed in the appendix. Their comments were useful and helped provide direction and clarification during the preparation of the document.

Recent History

The need for engineering assistance was again highlighted in 2005 following the devastation caused by Hurricane Katrina in the Gulf Coast of the United States. As the built environment was again severely impacted, thousands of structures needed to be assessed and reviewed for the safety of their occupants.

In the fall of 2008 the United States was impacted by Hurricane Ike. As the need for engineering assessments was again brought to the forefront, the NCSEA voted to re-establish the SEER committee In order to revise and update the SEER Manual and again establish outreach to the various member organizations.

More recently, following the aftermath of the earthquakes in Haiti and Chile there was another need for engineering support. By collaborating and sharing “leads” with the American Society of Civil Engineers, SEER was able to provide lists of NGOs that were seeking engineering assistance to the membership of NCSEA. This international request was a new situation for SEER and one that will be the focus of ongoing efforts.

In recent months, collaboration between the National Council of Structural Engineers Associations, The American Society of Civil Engineers, The American Institute of Architects and The American Public Works Association has lead to the development of more comprehensive multi-disciplinary building assessment teams and establishment of standardized training and certification efforts for disaster response by Design Professionals. *We*

encourage all SEER committees to reach out to the local chapters of the above-listed organizations when establishing their SEER committee and pursue collaborative efforts with these allied professionals.

Additional Acknowledgments

The committee would like to recognize those associations and government agencies that were pioneers in the formation of disaster building assessment teams, and continue to provide their respective states with significant numbers of trained personnel.

SEAs are strongly encouraged to reach out to these groups when developing their own plans. These groups are considered examples of best practices in the field of emergency response by design professionals:

- State of California Emergency Management Agency Safety Assessment Programs (CalEMA SAP)
- Structural Engineers Association of California (SEAOC)
- Structural Engineers Association of Washington (SEAW)
- Structural Engineers Association of Oregon (SEAO)
- Missouri SAVE Coalition
- Rhode Island A/E Emergency Response Task Force

Lastly, we would like to thank the Applied Technology Council (ATC), Council of Structural American Engineers (CASE) and the Federal Emergency Management Agency (FEMA). These organizations provided committee members and/or provided published information useful to the committee. The quality of our document was achieved in part by their contributions.

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PART I:

Developing a Local SEERCommittee

Chapter 1

How to Use the SEERPlan

1.1 Introduction

This document, referred to hereafter as the SEERPlan (Structural Engineering Emergency Response Plan), has been prepared under the direction of the National Council of Structural Engineering Associations (NCSEA) with assistance from the Council of American Structural Engineers (CASE). The SEERPlan is a reference to be used by Structural Engineering Associations and other qualified Design Professionals at the state or local level to implement a Structural Engineering Emergency Response Program (SEERProgram). The purpose of having a SEERProgram in place is to be ready to respond with structural engineering expertise in a time of emergency. The expertise to be provided to governmental entities in charge of an emergency response will primarily be in the form of assessing structures to determine whether and to what extent they have sustained damage from a disaster or similar event.

By relying on the expertise of the NCSEA National SEERCommittee, Structural Engineering Associations (SEAs) can develop a program in a more efficient manner than would be possible if starting from scratch. NCSEA believes that a nationally linked system of SEA managed programs, formatted along the same general framework, will best serve the public's interest in the time of need. Similar to Federal programs that utilize a common organizational methodology, this program structure facilitates an integrated effort by multiple associations when a major disaster occurs.

1.2 History

Structural engineers on the west coast have experience in responding to earthquakes and have developed organizational systems to coordinate rapid post-earthquake evaluation of buildings and other structures by volunteer engineers. Despite advances in some regions, such systems are not currently as prevalent elsewhere in the country, or organized for disasters other than earthquakes.

The World Trade Center disaster demonstrated that mass mobilization of volunteer engineers from the private sector is essential in large-scale disasters that overwhelm the technical capabilities of local authorities. Although volunteer engineers contributed a great deal to that effort, we learned from the experience that the engineering community is largely unprepared for dealing with such disasters and that advanced planning would have allowed for a more effective response. Many of the technical skills for responding to disasters already reside in private sector engineering firms, but in most cases there are no organizational systems in place to quickly mobilize that knowledge in the event of a major disaster.

State SEAs can facilitate the availability of engineering knowledge in times of major disasters with some advance planning and coordination with local emergency management authorities. These basic procedures apply to a range of different disasters, not just seismic events.

1.2.1 Intended Scope of the Response Effort

This manual only marginally addresses the intended scope of a SEERProgram response; this is a very important issue and needs to be clearly defined at the outset of the manual.

In preparing the New York SEERProgram, SEAoNY decided that the mission should be “to provide rapid mobilization of volunteer structural engineers from the private sector to assist local emergency management agencies in responding to disasters of such a magnitude that the technical capacities of the government agencies that normally handle such events are overwhelmed.”

A SEERProgram is not intended to provide free engineering services when needed by a municipality, and it is not intended to augment inherent weaknesses in a city’s technical ability to respond to emergencies. In most emergency situations, engineers within the local agencies should to be able to handle the technical challenges. If the agencies don’t have sufficient in-house skills, they should make arrangements with outside firms to provide those skills on an as-needed contract basis.

A SEERProgram is intended to address only the special case of disasters of such a scope that a large-scale engineering response is required, the local authorities are overwhelmed, and the engineering manpower requirements are beyond that which can be provided by a reasonable number of local firms.

A SEERProgram response is intended to be of limited duration, typically several days to a week. If assistance is needed from the private sector for more than this period of time, a more formal arrangement needs to be established with the authority having jurisdiction (AHJ), and the program should cease to be a volunteer effort.

1.2.1 Limitations of the SEERProgram

Some of the limitations to keep in mind are as follows:

- The SEER engineers are providing back-up support to the local authorities; they are not managing the disaster.
- The SEA is not "doing" the engineering work; instead, it is basically acting as an "employment agency" matching willing volunteers with those who need volunteers.
- SEER engineers have no authority to inspect buildings or post buildings unless they are given that authority by the local AHJ.
- SEER engineers provide technical support to fire, police and rescue crews ... they do not perform search and rescue.
- Most practicing engineers have considerable experience designing new buildings, some experience renovating existing buildings and little to no experience evaluating structures that are partially collapsed or in imminent danger of collapse. It takes considerable training to evaluate this latter category, and it will likely be beyond the scope expertise of most SEERProgram engineers. Groups such as the FEMA Urban Search & Rescue task forces, and the Army Corps of Engineers have been trained for such situations; if they are on site, then they handle these conditions.

1.3 Where to Start

Refer to Figure 1.1 for a visual explanation of the methodology and personnel assignments involved in turning this SEERPlan into a working SEERProgram. It will be helpful to refer back to Figure 1.1 as you work through this SEERPlan.

1.3.1 Definition of Terms

The following definitions are presented in an order designed to help the reader gain a sense of the SEERPlan

NCSEA
National Council of Structural Engineering Associations

Organization Phase
The pre-planning stage of the SEERPlan

Response Phase
The assessment phase of structural damage following a disaster

SEERPlan
The document you are reading; it is the blueprint for establishing local or regional SEERPrograms

National SEERCommittee
NCSEA members responsible for preparing the SEERPlan, and, on an ongoing basis, providing assistance to SEAs implementing SEERPrograms

SEA
Structural Engineering Association at the state or regional level, the starting point for organizing a state or regional SEERProgram (SEAs throughout the United States and Canada are related to one another through NCSEA.)

SEERProgram
The active and ongoing implementation (by SEAs) of the ideas found in the SEERPlan; to be ready to respond with structural engineering expertise in the time of a disaster

SEA SEERCommittee
The first official organization of SEA members into a SEERProgram, all other preparations flow from this group

Primary Group Coordinators
Members of the SEERProgram assigned prior to a disaster, with specific planning responsibilities

SEERCenter
The command post location specific to a disaster, which is staffed by SEERProgram members

SEERTeam
Teams of engineers who conduct emergency structural assessments

AHJ
Authority Having Jurisdiction over the emergency response

US&R
Urban Search and Rescue

1.3.2 Establishing an SEA SEERCommittee

The first step in turning the ideas presented in this SEERPlan into a functioning SEERProgram, ready to respond to emergency situations with

structural engineering expertise, is to establish an SEA SEERCommittee. Specific guidelines for the size and makeup of the SEERCommittee are not given here; however, a minimum of three individuals with good organizational skills is a good starting point. The first task of the committee members should be to read through this plan in its entirety.

1.3.3 Information Found in the Remaining Chapters

Chapter 2—SEERProgram Organizational Structure
Information on the suggested committee structure to put in place during the organizational phase of the SEERProgram.

Chapter 3—SEERProgram Personnel
Information on the Primary Coordinator assignments to be made by the committee structure, as well as general information regarding volunteers who will only be called upon if and when an emergency situation arises (the response phase)

Chapter 4—SEERCenter Management
Information regarding the organization and operation of a SEERCenter. Especially useful for the Logistics Committee and SEERCenter Coordinator.

Chapter 5—Building Structure Assessment
Informational starting point to develop qualifications and training requirements for volunteers assessing building structures after disasters.

Chapter 6—Transportation Structure Assessment
Informational starting point to develop qualifications and training requirements for volunteers assessing transportation structures after disasters. Should be read in sequence with Chapter 5.

Chapter 7—Site Communication and Documentation
General information for organizational and response phase SEERTeam members.

Chapter 8—Post-Disaster Evaluation
Information helpful in evaluating a SEERProgram response and improving any shortcomings encountered.

Chapter 9—Media Information
General information for all SEERProgram members, especially the Media Coordinator.

Chapter 10—Equipment
Equipment list starting points useful for all SEERTeam members, especially the Equipment Coordinator. Note that additional equipment requirements or suggestions are found in other chapters as well.

Chapter 11—Safety Issues
A must read for all SEERTeam members in the organizational phase, including those volunteers who will only participate actively in the response phase.

Chapter 12—Legal and Insurance Issues
A must read for all SEERTeam members at the time of volunteering. All issues raised should be reviewed with legal counsel.

Chapter 13—FEMA's Urban Search and Rescue Plan
An overview that helps SEERProgram volunteers (who will likely be responsible only for structure assessments) understand the larger emergency response environment.

Chapter 14—Coordination with Emergency and Other Agencies
Useful information, especially for all organizational phase volunteers.

Chapter 15—Information Resources
A substantial listing that is supplemented by information found at the end of Chapters 5 and 6.

Chapter 16—Forms
Sample forms as referenced in the various other chapters.

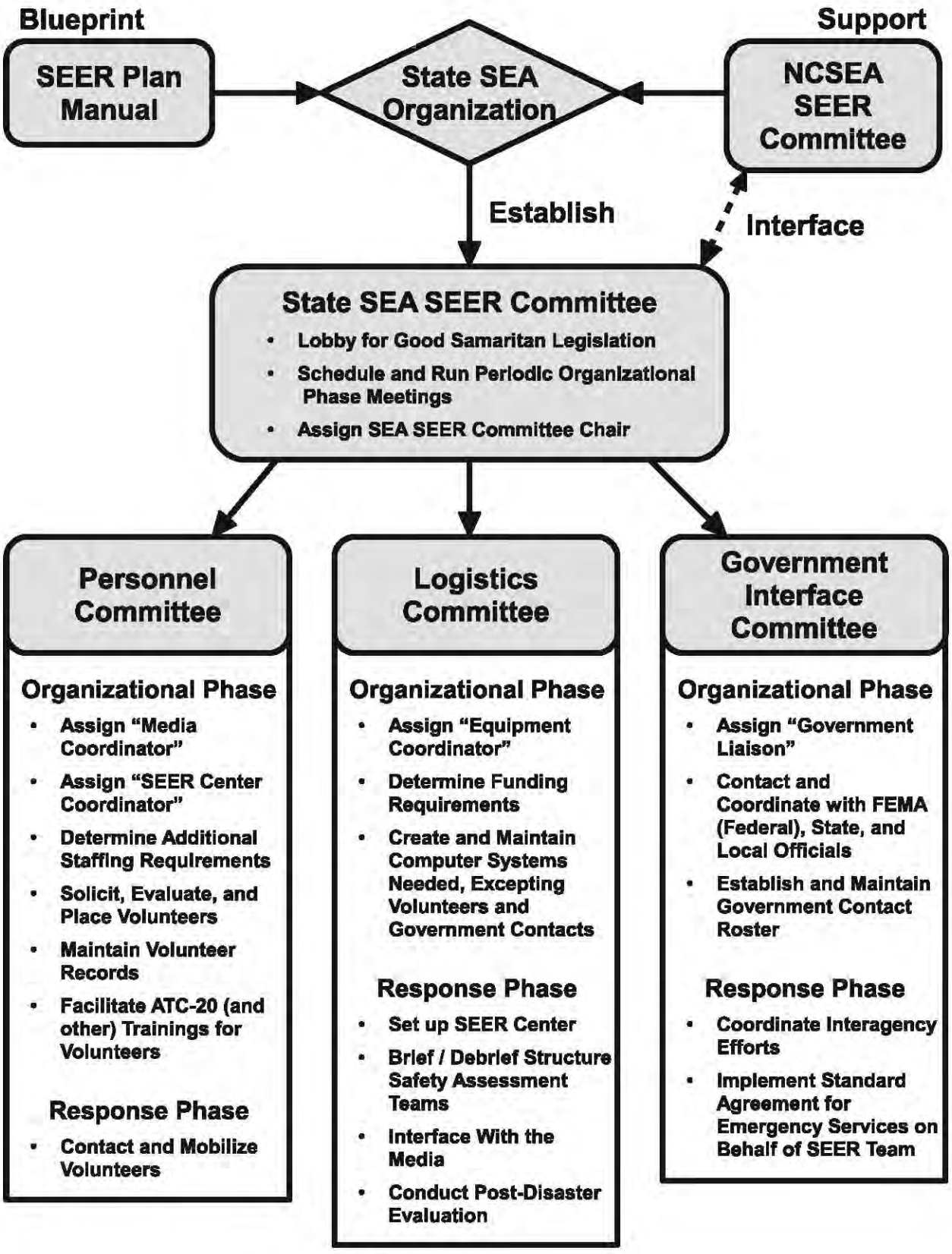


Figure 1.1 Implementing the SEERProgram

CHAPTER 2

SEERProgram Organizational Structure

2.1 Introduction

Chapter 2 presents a general outline of the various tasks and responsibilities that should be divided up among the local SEERCommittee during both the organizational phase and the response phase.

One of the primary weaknesses of any emergency management program is the lack of organizational motivation over time as most disaster situations occur infrequently. The SEERCommittee should assert itself to stay focused throughout the planning and organizational stages even if several years occur without the need for a response. The success of any emergency response system or organization lies in the planning stages.

2.2 National SEERCommittee

The NCSEA National SEERCommittee will serve as a point of coordination for SEERPrograms from across the country. It is not the intent of NCSEA to control, manage, or function as the entity with which the public or the local authorities will interface. NCSEA will function, if necessary, as a coordinator or facilitator should multiple Structural Engineering Associations (SEAs) be required to work in concert and will be an additional resource for personnel and logistical assistance.

The National SEERCommittee, under the direction of a chair appointed by the NCSEA president, will establish and maintain a database of SEA program specifics, such as contacts, organizational structures, and capabilities. The chair is responsible for the coordination of the national effort to assist SEAs with developing SEERPrograms.

2.3 SEA SEERCommittee

The SEA SEERCommittee is the impetus behind the establishment of a SEERProgram. The SEA SEERCommittee should comprise motivated individuals that are well trained and experienced with disaster responses.

The SEERCommittee should appoint a Chair with primary responsibility, as well as provide for alternates.

The primary responsibilities of the SEA SEERCommittee include the following:

- Maintaining proper ties with the NCSEA National SEERCommittee Chair
- Establishing a Personnel Committee
- Establishing a Logistics Committee
- Establishing a Government Interface Committee
- Lobbying state legislators for Good Samaritan legislation (reference Chapter 12 Legal and Insurance Issues)

The primary duties of the SEA SEERCommittee are performed during the organizational phase of a SEERProgram.

Members of the committee may also serve on the committees described below, as Primary Coordinators (reference Chapter 3 SEERProgram Personnel), as members of Structure Assessment Teams (reference Chapters 5 and 6) or in any other role.

2.4 Personnel Committee

The Personnel Committee is responsible for staffing for both the organizational and response phases of the SEERProgram, based on interaction with the various Primary Coordinators and other committees. In addition to local SEA members, the Personnel Committee may seek volunteers from other professional organizations such as architecture groups and other engineering associations.

2.4.1 Organizational Phase Responsibilities

Soliciting Volunteers

The Personnel Committee uses whatever means it deems appropriate for the procurement of volunteers. The SEA newsletter, web site and mailings are all appropriate vehicles for this purpose, as are articles written about the SEA SEERProgram for industry publications.

Evaluating Volunteers

The Personnel Committee is charged with the evaluation of volunteers for their suitability to fill specific job positions. Chapter 3 provides suggestions for recommended levels of experience and training for volunteers.

Placing Volunteers

The Personnel Committee places personnel in the positions that they are deemed qualified for and in which they can best contribute. Each SEA should evaluate the possible disaster response needs for their state along with the estimated number of volunteers and allocate volunteers accordingly.

Maintaining a Database of Volunteer Records

A program's effectiveness will greatly depend on the ability of the coordinators to communicate with the volunteers. Personnel records that contain the individual's phone numbers, address, place of employment, expertise, age, sex, a general physical description, a digital photograph, next of kin and other pertinent and useful information should be maintained in a computer database (on more than one computer) and in hard copy files. Form 1 in Chapter 16 is an example of a registration form that could be used for volunteers.

It is suggested that regular email correspondence or newsletters, even if brief with limited information, be sent out on a regular quarterly basis to volunteers. This is a good reminder to the volunteers of their commitment and keeps them interested in the program.

Many emergency response agencies have also had success setting up a phone tree system for fast communication during a disaster response. If such a phone system is set up, it should be tested yearly.

Assigning a Media Coordinator

Reference Chapters 3 (SEERProgram Personnel) and 9 (Media Information).

Assigning a SEERCenter Coordinator

Reference Chapters 3 (SEERProgram Personnel) and 4 (SEERCenter Management).

2.4.2 Response Phase Responsibilities

Notifying Volunteers When Needed

The Personnel Committee is responsible for notifying volunteers when their services are required. Email lists and phone lists should be developed, tested and categorized for efficient use. In the aftermath of a disaster, time is of the essence, and effective communication with the volunteers is essential. The timing of the notification should be consistent with the actual need for service. Requests for volunteers should be staged with due consideration given to the immediate need. In a widespread disaster, such as a hurricane

or earthquake, volunteers may also be victims. Redundancy within the program is necessary in order to ensure coverage of positions.

2.5 Logistics Committee

The Logistics Committee has several responsibilities during both the organizational and response phases of a SEERProgram. During the organizational phase it is important that the committee anticipate and plan carefully for their response phase responsibilities, as they will assume the front line position (with the SEERCenter Coordinator).

2.5.1 Organizational Phase Responsibilities

Assigning an Equipment Coordinator
Reference Chapters 3 (SEERProgram Personnel) and 10 (Equipment).

Determining Funding Requirements
The funding required to implement a SEERProgram should not be cost prohibitive as the effort will be undertaken by volunteers and the purchase of significant items is limited since many can or will be donated in a time of need. Nevertheless, the Logistics Committee will need to work with all other committees and Primary Coordinators to evaluate their needs and to determine a means for providing for them. Funding requests should be forwarded to the SEA SEERCommittee for action, and if approved, the Logistics Committee is responsible for purchasing.

The Logistics Committee contacts local vendors where appropriate and seeks commitments to furnish items at no cost to the program. These commitments are to be reaffirmed on an annual basis.

Creating and Maintaining Computer Record Keeping Systems
The effectiveness of the SEERProgram greatly depends on developing and maintaining an efficient and up-to-date computer system. The Logistics Committee is responsible for making sure that the necessary computer equipment is available. With the availability of computers today, this should not be an issue. Sooner, all data should be kept secure but readily accessible by the SEERCommittee when needed for a response situation. For this reason, computer savvy volunteers, especially those familiar with IT communication issues such as networking and data transfer, are a good fit for this committee.

Although responsibility for assimilating volunteer information lies with the Personnel Committee, and assimilating government contact information

with the Government Interface Committee, the Logistics Committee can likely assist the others by incorporating their gathered information into a computer database.

Creating and Maintaining an Equipment List for the SEERCenter

The Logistics Committee is responsible for setting up and operating the SEERCenter during a response. The equipment needed for this operation will primarily include standard office supplies and equipment that would be readily available at the time of a disaster. However, a list of such supplies should be prepared during the planning stages.

2.5.2 Response Phase Responsibilities

Setting Up and Operating the SEERCenter

The Logistics Committee secures temporary quarters for use as a SEERCenter while providing services after a disaster. Multiple locations, linked via communication devices, may be required in the case of a widespread disaster. The Logistics Committee should prepare a list of potential locations in high-risk areas so as to minimize the response time.

In addition, members of the Logistics Committee are responsible, with the SEERCenter Coordinator, for management and oversight of SEERCenter staff, as furnished by the Personnel Committee.

Reference Chapter 4 (SEERCenter Management) for additional information.

Interfacing with the Media

Interfacing with the media will primarily be the responsibility of the Media Coordinator, however, the SEERCenter staff will likely provide the support needed (press releases, etc.). Reference Chapters 3 (SEERProgram Personnel) and 9 (Media Information).

Briefing and Debriefing Structure Assessment Teams

SEERCenter staff is responsible for briefing and debriefing Structure Assessment Teams. Reference Chapter 4 (SEERCenter Management) for additional information.

Conducting Post-Disaster Evaluations

Reference Chapter 8 (Post-Disaster Evaluation) for additional information.

2.6 Government Interface Committee

2.6.1 Organizational Phase Responsibilities

Assigning a Government Liaison
Reference Chapter 3 (SEERProgram Personnel).

Coordinating with Local, State, and Federal Authorities
The Government Interface Committee prepares a list of contact personnel at the local agency (the AHJ) that would be charged with incident management in the event of a disaster. This local agency would typically be the Office of Emergency Management (OEM). In most large municipalities, either an Office of Emergency Management or other joint command has been established to manage logistics for any large incident requiring a multi-agency response. Therefore, a dialogue with the city OEM, or equivalent lead agency (fire department, police department, etc.), is critical to the success of a SEERProgram.

It should be noted that most city agencies are very dynamic in nature, and personnel and staffing often change due to budget cuts, streamlining or election of new city leadership. Most senior positions in city agencies are appointees; therefore a change in mayor or commissioner may lead to a change in other high-ranking personnel. It is of paramount importance to have a current list of position, rank or title of your agency contact(s)/liaisons, as the individual staff member that you make initial contact with may not be employed in that position when a disaster strikes. Every effort should be made to maintain a regular dialogue with your agency contact.

In addition, the Government Interface Committee should utilize the OEM to establish contact with the fire department, police department, other local law enforcement, health department, building department, local cooperative utilities and other allied group personnel so that all of the responding agencies are aware of the SEERTeam and its role prior to an incident.

It is entirely possible that a disaster, either natural or manmade, might involve multiple municipalities or areas that fall largely under **state** authority. A roster of the state agencies mirroring those local agencies discussed above should be developed and maintained (in particular, the State Office of Emergency Management). It is very important that all entities that would have authority over a disaster site be aware of the SEERProgram prior to an incident.

After a large-scale disaster, local and state authorities may request **federal** help, which could cause a Federal Response Plan (FRP) to be activated. The Federal Emergency Management Agency (FEMA) is responsible for coordinating the many agencies that implement an FRP. After a SEERPlan has been implemented, the Government Liaison or another representative of the Government Interface Committee should contact the local FEMA Region's Response and Recovery Division to inform them of the existence of volunteer SEERProgram. All additional contact with federal agencies should be coordinated with the FEMA Region and/or the Disaster Field Office (once the FRP has been implemented) to ensure that proper protocol is maintained.

2.6.2 Response Phase Responsibilities

Coordinating Inter-Agency Efforts

During a response, the Government Liaison, in concert with the SEERCenter Coordinator, assumes responsibility for day-to-day contact and coordination with other (primarily governmental) agencies.

Reference Chapter 14 (Coordination with Emergency and Other Agencies) for additional information.

Implementing Standard Agreement for Emergency Services

Reference Chapter 12 (Legal and Insurance Issues) for additional information.

CHAPTER 3

SEERProgram Personnel & Qualifications

3.1 Introduction

Chapter 3 presents a general outline as to the qualifications of individuals who should be appointed in the organizational phase of a SEERProgram. Although the job descriptions are associated with single individuals, there may be occasions whereby two or more individuals, working together, may fulfill one position.

At the time of publication of this manual, a set of proposed Resource Types for Disaster Response Engineers is being reviewed by the FEMA NIMS Integration Center. The purpose of these Resource Types is to establish the basic minimum level of knowledge, skills and abilities that individuals engaging in SEER activities should possess. Please refer to www.fema.gov/emergency/nims for current information and updates regarding these and other response requirements. The categories below correspond to the current FEMA Disaster Response Engineer criteria. Note, the Type I and Type II personnel classifications (Resource Types) are reserved for Urban Search & Rescue-trained Structures Specialists.

3.2 Participant Categories

3.2.1 Type III Disaster Response Engineer

Type III participants are those who possess considerable experience in the design and construction of structures. They should be capable of making important decisions based on limited information. They should be able to function in the role of coordinator or lead a team of technical personnel in performing assessments of structures. Typically, project managers or senior design engineers fill this role.

3.2.2 Type IV Disaster Response Engineer)

Type IV participants are engineers familiar with the design of structures and familiar with construction. They should be adept at reading and understanding construction drawings of all disciplines. They should possess the experience necessary to distinguish structural distress from normal serviceability

deficiencies on a building or structure. In the case of an emergency response, Level II participants will typically be supporting members of a Structure Assessment Team, although exceptions are expected.

3.2.3 Other Participants (Type V Disaster Response Engineer)

Other participants can vary in experience and capability to suit the needs of the operation. Other participants include clerical personnel and individuals willing to perform non-technical tasks, such as running errands and making deliveries of supplies, answering telephones and general duties associated with the operation.

These individuals may come from an engineering office, but don't necessarily have to. In the case of an emergency response, these participants are typically SEERCenter staff members.

3.3 Primary Group Coordinators

Primary Group Coordinators are Level I participants with good management and communication skills, capable of directing technical and non-technical personnel. To provide redundancy within the program, it is likely that two people will need to share each position.

3.3.1 Equipment Coordinator

The Equipment Coordinator is responsible for acquiring, storing and maintaining the equipment necessary for the operation of the SEERProgram. This person is responsible for filling the requests for equipment from the other Primary Coordinators and from the Logistics Committee.

Reference Chapter 10 (Equipment) and other chapters for additional information.

3.3.2 Media Coordinator

In the aftermath of any disaster the public thirst for information is unquenchable. The ability to speak with the media and convey accurate information that neither understates nor overstates the situation is critical for the individual(s) assigned to this position.

With a variety of participants working on a variety of fronts, there may be differing reports unless it is reported by one common person. It is important that the reports are professional, concise and unified. Any technical differences shall be handled off-line and discretely so as not to add confusion to the situation.

There shall be no media discussions by any participant unless prior approval is received by the AUJ.

Reference Chapter 9 (Media Information) for additional information.

3.3.3 SEERCenter Coordinator

The SEERCenter Coordinator must be well organized and able to make decisions under pressure. Duties for this position include the assigning of tasks as necessary to organize, staff and maintain the SEERCenter throughout the time it is in operation. Unlike certain other positions within the SEERProgram, this position requires an individual who can stay at his post throughout the time it is open, relieved only by an alternate. It is therefore important for this individual to be in a career position that will allow him to seek a leave of absence from regular employment if the emergency response requires it.

Reference Chapter 4 (SEERCenter Management) for additional information.

3.4 Government Liaison

The Government Liaison is responsible for determining which government agencies will be involved in post-disaster relief efforts and coordinating SEERProgram efforts with those agencies. The Government Liaison does not necessarily need to be an engineer, but must be thoroughly familiar with the role of the SEERProgram and the manner in which government agencies at the local, state and federal levels operate. Due to the importance of maintaining protocol as it applies to governmental authority, this person should be attentive to detail.

3.5 SEERProgram Staffing Estimates

Four committees are staffed in the organizational phase of a SEERProgram, along with three Primary Coordinators and one Liaison (reference Figure 1.1). Assuming small committees (two to three), quality participation and some participants serving in both lead and alternate positions, it may be possible to establish a program with as few as 10 to12 active participants.

The number of participants needed for the response phase of a SEERProgram can vary greatly depending on the magnitude and location of the emergency. Large metropolitan areas obviously have a greater potential for large-scale disaster and greater demand for participant engineers than less densely

populated areas. Nevertheless, all areas should have a prepared emergency response participant list. In addition, the actual number of engineers able to respond will be significantly less than the participant list because of personal or professional responsibilities at the time of a disaster.

The Personnel Committee should enlist as many participants as are willing to participate to be ready for a meaningful response.

3.6 Qualifications of Participants for ATC-20 and ATC-45 Building Assessments

A wide variety of organizations provide participant personnel to assist in post-disaster safety assessment of structures. The background and expertise of these participants can vary widely. Depending on the organization and how they intend to train and organize their participants, different levels of qualifications may be needed for the organization to provide some level of capability and expertise by their participants. The Applied Technology Council and some of the state Structural Engineers Associations who routinely organize and train large numbers of ATC-20 and ATC-45 trained participants have established some direction for qualifications as a participant inspector for safety evaluation of disaster damaged structures.

3.6.1 Applied Technology Council Guidelines

The guidelines established by the Applied Technology Council for qualifications of Damage Inspectors for Rapid Evaluations suggest using personnel with at least five years experience in general building design, construction or inspection. The ATC programs are fairly general in nature, and therefore the expertise of a structural engineer is not necessarily required. However, personnel with a basic knowledge and familiarity with building construction are required so that structural damage or other unusual features resulting from damage can be readily recognized.

3.6.2 Additional Qualifications

Please note, in order to comply with the NIMS Resource Typing standards, there are additional prerequisites for SEER volunteers. The intent of these training programs is to better equip the SEER participants for the type of environments that they will be working in and to provide an understanding of the operation of the public sector emergency response systems in place. These requirements include:

- California EMA Safety Assessment Program (SAP)

or the

- ICC Disaster Responder Course
- Online FEMA NIMS Courses:
  - IS-100
  - IS-700
  - IS-800
  - IS-803
  - IS-809
- CPR Certification
- A Physical Examination to determine fitness for duty.
- Understanding of GPS Operations and the U.S. National Grid System.

Additional participant qualifications may be required depending upon the conditions of the actual participant activities and the environment where the participants will be performing those activities. Some environments may potentially contain hazardous conditions or materials that may require additional training and/or equipment in order to safely enter the area and perform the activities. Conditions could include work at elevated locations or in confined spaces that may require additional training and/or equipment in order to safely perform activities. Such environments may simply contain such items as airborne particulates including debris dust that may be hazardous when inhaled without the use of the proper air filter device. These environments may also contain other hazardous materials including asbestos, petroleum products (fuel oils for example), lead and/or a variety of other potentially hazardous chemicals. Performing activities in environments that could potentially contain harmful materials may require additional training and/or equipment. Without the proper training and experience, a well intended participant could enter into a potentially hazardous environment and become another victim.

The following is a partial list of potential additional training and equipment that may be required in order for participants to safely and appropriately perform their assignments:

- Hazardous Material Training
- Hazwoper Medical Surveillance
- Respirator Medical Surveillance
- Asbestos Awareness Training
- Lead Awareness Training
- Confined Space Training
- Fall Protection Training

- Authorized Climber Training
- Proper Respirator Equipment
- Other Proper Personal Protective Equipment, (PPE), including eye protection, hard hat, steel-toed boots and other boots that may be appropriate, gloves as appropriate, hearing protection, high visibility clothing, appropriate clothing/protective overalls, etc.
- Environmental Assessment Devices, such as a multi-gas meter to determine the levels of certain gases.
- Lighting such as flashlights, headlamps, etc.

Participants are to be part of the solution and not add to the problem. In the area of scene safety and environmental hazards, for many of the well intended participants, unless they are adequately experienced and properly trained, they will not know what it is that they don't know! They will not realize that they are crossing the threshold of a dangerous condition until it is too late. While it is not the intent that all participants become experts in OSHA regulations and/or environmental toxicology, it should be the intent that all participants should have adequate training and experience to know when they are crossing that threshold and for that participant to be able to ask appropriate questions to appropriate other parties regarding the safety measures that should be taken to enter into the environment to perform their assignments safely without putting themselves or others into harm's way.

Site Safety Officers and site environmental professionals will determine the requirements to enter and work in the site. It is up to the participant to understand the requirements and to ask the appropriate questions regarding the site hazards.

Refer to OSHA and other sources for additional safety requirements that may be applicable.

3.6.3 Qualifications for Transportation Structure Assessment Volunteers

Since post-incident transportation structure assessment is not a full-time job for anyone, there are no accepted qualifications for engineers who perform this task. By default, Federal Highway Administration (FHWA) standards for in-service bridge inspections should be used for post-incident assessments. These requirements and procedures are fairly well developed and refined after many years of use. These FHWA requirements should be met in addition to those specified for a Type III Volunteer in Section 3.2.

An FHWA assessment/inspection team is usually composed of a minimum of two persons. The use of two people is for safety reasons in the event one

person is injured. Team leaders, at a minimum, should have successfully completed a National Highway Institute (NHI) Bridge Inspection class be professionally registered. Other requirements, as determined by the SEA Oversight and Personnel Committees, may be required as well. Transportation maintenance personnel may make good candidates to round out teams.

Examples of Participant Staffing Requirements

After the 9/11 attacks, the Structural Engineers Association of New York (SEAoNY) coordinated approximately 350 participating structural engineers to assist at the World Trade Center site and surrounding areas. This number included 10 to 15 staff members who worked in the temporary engineering emergency office. During the five days after the event, the emergency engineering operations were staffed 24 hours a day.

Earthquakes widely range in magnitude and related structural damage. As a result, so does the engineering response. During the 2001 Nisqually Earthquake near Seattle, 10 to 15 engineers performed assessments for over seven days. On the other hand, the 1994 Northridge Earthquake and the 1989 Loma Prieta Earthquake required a much larger structural assessment response. Approximately 2,400 and 2,800 man-days, respectively, were required. This number included not only participating structural engineers but also architects, building officials, and other construction related participants.

In Northridge, the number of participants for Los Angeles alone averaged just fewer than 200 per day for 12 days following the event. An additional 10 to 15 participants were assigned per day to each of the three surrounding cities.

Smaller scale disasters warrant smaller emergency responses. For example, six to 12 participating structural engineers assisted with assessments for approximately three days following a 1999 snowstorm in Seattle, Washington.

PART II:

Emergency Response Operations

CHAPTER 4

SEERCenter Management

4.1 Introduction

A SEERCenter is a physical space created to serve as a resource and communication center for SEERTeam members responding to a disaster or emergency. Figure 4.1 shows the organization of the SEERCenter and its integration into the SEERPlan. The SEERCenter may be established as soon as practical after an emergency occurs, but SEERTeam members should not be deployed unless requested to do so by the AHJ responsible for the emergency site.

Some emergencies may not warrant the establishment of an entire, separate SEERCenter; this determination is at the discretion of the AHJ.

4.2 SEERCenter Logistics

4.2.1 Staffing Needs and Rotation

The SEERCenter should be staffed by volunteers dedicated to its operation, if possible, and not by SEERTeam members with structure assessment responsibilities. Overall command falls to the SEERCenter Commander, and his or her backup. Following the same Incident Command System (ICS) structure the Federal, State and Local responders will employ, a SEERCenter Commander should never be directly in charge of more than seven (7) personnel. If more personnel are required, mid-level managers will be inserted in the system to maintain this ratio. The SEERCenter Commander position should be assigned during the implementation of a SEERProgram by the Personnel Committee, as defined in Chapters 2 and 3. This person must be able to make decisions, delegate tasks and communicate effectively.

The SEERCenter also needs staff to answer phones, send and receive email, maintain records, file correspondence, maintain databases and attend to other clerical work. Utilizing volunteers who are familiar with these skills is vital to a well-run operation. Volunteers without these skills can also

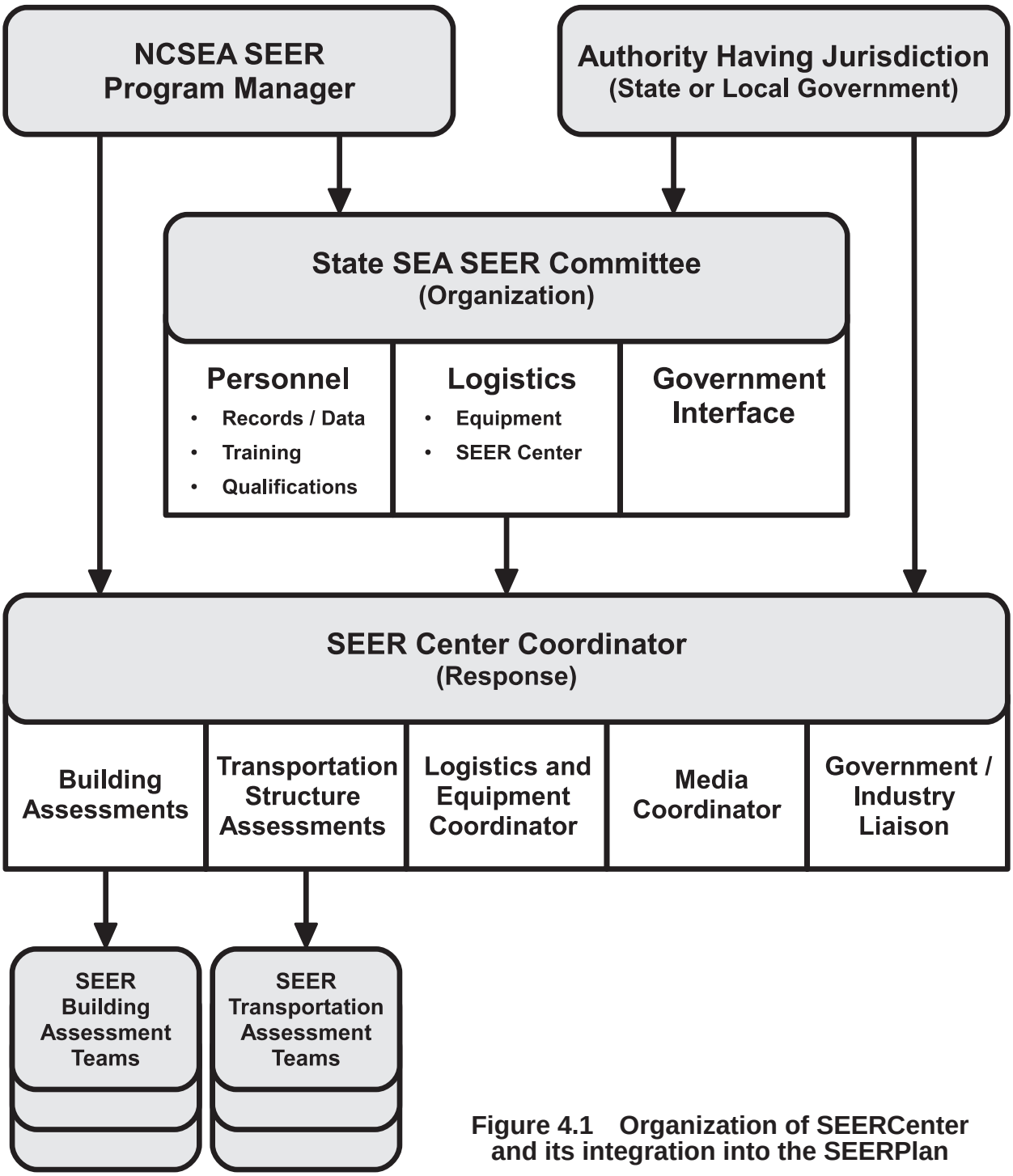
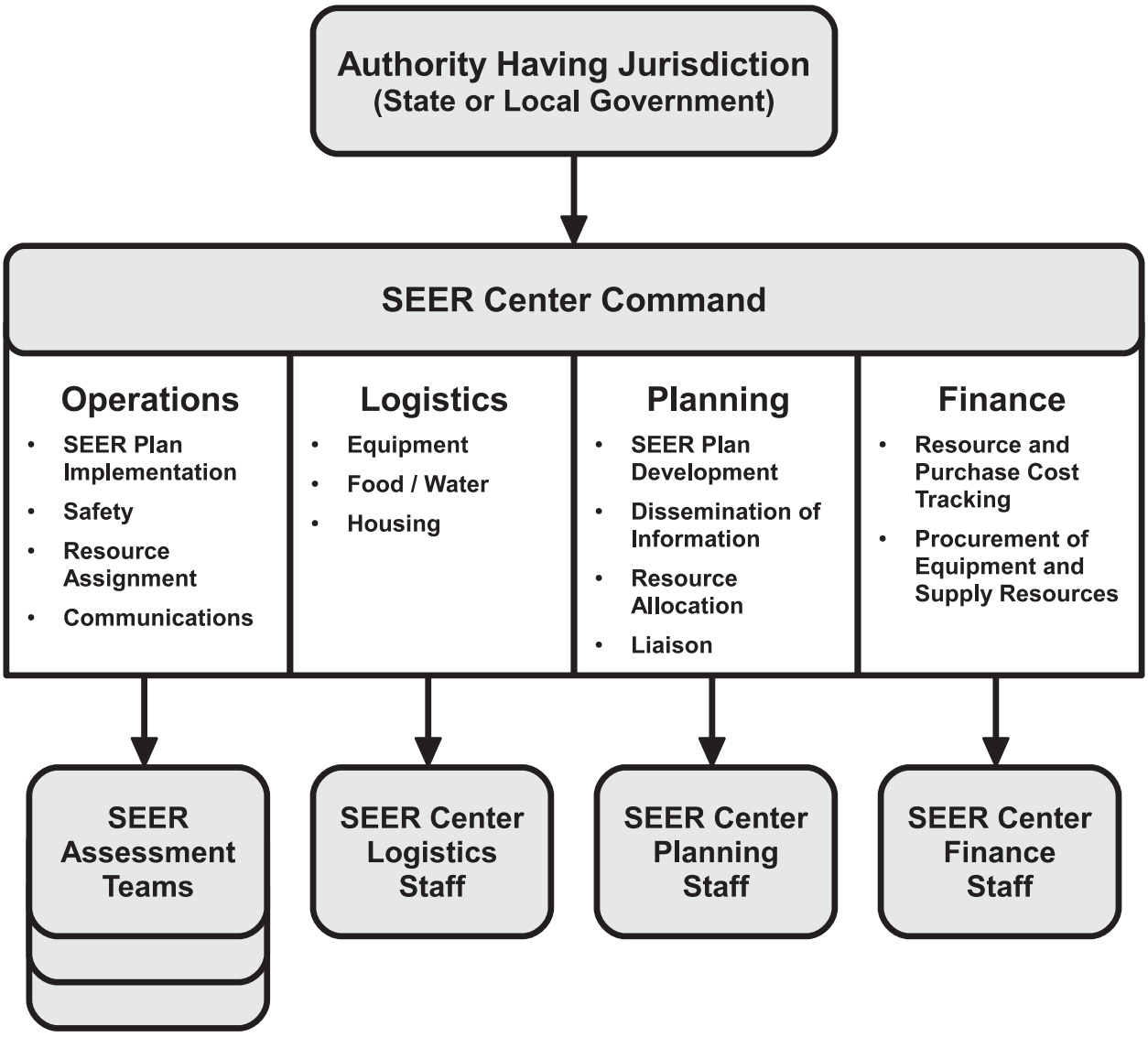


Figure 4.1 Organization of SEERCenter and its integration into the SEERPlan

be useful but will need time and coaching to come up to speed. Keeping systems and procedures simple helps volunteers learn with minimal instruction.

Exact staffing levels depend on the emergency at hand. Staff rotations should be scheduled as soon as possible based on a one-week time period and reevaluated every two or three days for the duration of the emergency. Time for briefings between rotations should be



incorporated, as well as scheduled time off for rest. Keep in mind that if 24-hour coverage is required, the AHJ may require that two 12-hour shifts are needed rather than three eight-hour shifts. While volunteers may not be accustomed to this long of a shift, it has been demonstrated that a 12-hour shift is more effective than three eight-hour shifts.

4.2.2 Staff Training

The SEERCenter staff should be familiar with the National Incident Management System (NIMS) and Incident Command System (ICS) structure that is employed by all levels of responders. The NIMS/ICS system is intended to be a flexible organization with specific staff assignments and tasks. The system is organized such that if staff members understand the specific functional groups, they can simply plug themselves into the group

where their skills are best suited or required. This provides the most efficient method of providing assistance to the AHJ.

Free training on the ICS and many other response functions are available online through the Federal Government at http://training.fema.gov/IS/crslist.asp.

Required courses for all Federal, State and Local responders include:

- IS-100 Introduction to the ICS
- IS-200 ICS for Single Resources and Initial Accident Incidents

Required courses for Federal Responders includes:

- IS-700 Introduction to the National Incident Management System (NIMS)
- IS-800 Introduction to the National Response

In addition to the mandatory training outlined in Chapter 3, additional suggested courses for SEERCenter staff includes:

- IS-208 State Disaster Management
- IS-230 Principles of Emergency Management
- IS-244 Managing Disaster Volunteers
- IS-288 Role of Volunteers in Emergency Management
- IS-292 Disaster Basics
- IS-317 Introduction to Community Emergency Response Teams (CERT)

4.2.3 Location

The SEERCenter needs to be close enough to the disaster site to access it, but far enough away to be unaffected by service disruptions or changes in the size and/or scope of the disaster event. It should be within walking distance of the site, if possible, and should be available 24 hours a day.

It may also be necessary to relocate the SEERCenter quickly to a location if its current location suddenly becomes in the path of an event or the location is required by the AHJ. For this reason, it is recommended that the SEA SEERCommittee pre-select several sites in heavily populated urban areas. In many cases, a SEERTeam member's office space is an effective choice, if the space can provide the items discussed in the next section. A temporary structure such as a tent or motor home may also be an alternative as this facility could be quickly relocated.

4.2.3 Equipment Needs

The equipment listed below for use in a SEERCenter is largely self-explanatory (refer to Chapter 10 for additional equipment and uses

associated with an emergency response). The SEERCenter Commander and Equipment Coordinator should jointly discuss and determine the means to have ready access to each of the standard items.

Non-standard items, such as structural drawings, maps and aerial photographs specific to the emergency site, are likely to be obtained during the incident. To the extent that items may need to be purchased the Equipment Coordinator should request and coordinate funding through the Logistics Committee.

- Photocopy machine
- Fax machine
- Printer
- Scanner
- Laptop (if possible) computers with power cords
- Phone jacks and data cables to hook laptops directly to an outside ISP and/or broadband cards.
- Telephones (cellular and land line backup)
- AM/FM and Emergency Broadcast System radio
- Handheld 2-way radios
- Digital still and video cameras with extra memory cards if necessary
- Carbon paper as a backup for providing duplicate copies of handwritten documents
- Clipboards
- Dry erase marker boards and markers
- Bulletin boards
- Office supplies including printer and copier paper, large sheets of paper for laying out plans and/or diagrams on a wall, tape, pins, markers, pens and pencils, etc.
- Non-perishable food, water, blankets
- Emergency generator with fuel
- Flashlights
- Ample supply of batteries for above equipment

Other items needed include contact information for SEERTeam volunteers, SEERTeam Primary Coordinators, emergency and government agencies, National SEERCommittee members, etc., as assembled by the Personnel and Logistics Committees. All of this information should be in the possession of all organizational phase members of the SEERTeam, including the SEERCenter Commander.

4.3 SEERCenter Functions

4.3.1 Organizational Functions

As stated previously, if the SEERCenter should be organized following the formal Incident Command Structure (ICS) system, this will enable the SEERCenter to coordinate the effective use of all of the available resources under a system that lends consistency across other agencies, fosters efficiency and provides direction during a response.

The ICS organization is built around five major components:

- Command
- Planning
- Operations
- Logistics
- Finance/Administration

These five major components are the foundation upon which the ICS organization develops. They apply during a routine emergency, when preparing for a major event, or when managing a response to a major disaster.

In small-scale incidents, all of the components may be managed by one person, the SEERCenter Commander. Large-scale incidents usually require that each component, or section, is set up separately. The flexibility of the ICS system is that each of the primary ICS sections may be divided into smaller functions as needed.

The ICS organization has the capability to expand or contract to meet the needs of the incident, but all incidents, regardless of size or complexity, will have a Command function.

Command

The command function is directed by the person in charge at the incident, in this case in charge of the SEERCenter. Major responsibilities for the SEERCenter Commander may include but shouldn't be limited to:

- Establishing the SEERCenter and the SEERcenter functional structure.
- Determining SEERCenter operational objectives and assessing priorities
- Insuring health and safety of all SEER personnel
- Maintaining accountability for all SEER personnel, as well as for task accomplishment
- Establishing and maintaining an effective liaison with outside agencies and organizations

- Maintaining a manageable span of control
- Managing incident resources
- Coordinating the activities of the SEERCenter with outside agencies
- Authorizing the release of information to the media
- Keeping track of costs

An effective SEERCenter Commander must be assertive, decisive, objective, calm and a quick thinker. To handle all of the responsibilities of this role, the SEERCenter Commander also needs to be adaptable, flexible and realistic about his or her limitations.

The SEERCenter Commander also needs to have the capability of delegateing positions appropriately as needed for an incident. Initially, the SEERCenter Commander will be the senior SEER personnel to arrive at the scene. As additional SEERTeam members arrive, command will transfer on the basis of who has more experience and is better capable of managing the SEERCenter.

At transfer of command, the outgoing SEERCenter Commander must give the incoming SEERCenter Commander a full briefing and notify all staff of the change in command.

As incidents grow, the SEERCenter Commander may delegate authority for performing certain activities to others, as required. When expansion is required, the SEERCenter Commander may establish other **Command Staff** positions such as Information Officer, Safety Officer, Liaison Officer.

- The Information Officer handles all media inquiries and coordinates the release of information to the media with the Public Affairs Officer
- The Safety Officer monitors safety conditions and develops measures for ensuring the safety of all assigned personnel
- The Liaison Officer is the on-scene contact for other agencies assigned to the incident

The SEERCenter Commander will base the decision to expand (or contract) the ICS organization on three major incident priorities:

- Life safety. The SEERCenter Commander’s first priority is always the life safety of the SEER personnel and the public.
- Plan stability. The SEERCenter Commander is responsible for determining the SEERPlan will minimize the effect that the SEERPlan may have on the other responding agencies.

- Property conservation. The SEERCenter Commander is responsible for minimizing damage to property while achieving the SEER objectives.

As incidents become more involved, the SEERCenter Commander can activate additional **General Staff** sections such as Planning, Operations, Logistics and/or Finance/Administration), as necessary.

Planning Section

The Planning Section is responsible for the collection, evaluation, dissemination, and use of information gathered by the SEERTeam.

The Planning Section Chief reports to the SEERCenter Commander and is responsible for the creation of the SEERPlan, which defines the evaluation activities and resource utilization for a specified time period.

The Media Coordinator or Liaison would report directly to the Planning Section Chief when this section is implemented.

Operations Section

The Operations Section is responsible for carrying out the evaluation activities described in the SEERPlan.

The Operations Section Chief reports to the SEERCenter Commander and assigns the SEERTeam resources in order to effectively accomplish the SEERCenter Commander's objectives. The Operations Section Chief's main responsibilities are to insure the safety of the SEERTeam and to execute the Planning Chief's SEERPlan. This entails developing clear communication between the SEERTeam and SEERCenter staff.

The Communications Officer would report directly to the Operations Section Chief when this Section is implemented.

Logistics Section

The Logistics Section is responsible for providing facilities, services, equipment and materials to implement the SEERPlan. This Section is also responsible for obtaining properly trained personnel to accomplish the objectives of the SEERPlan. This section takes on great significance in long-term or extended operations.

Finance Section

While SEERCenter activities are volunteer-based, it is important to understand that financial management and support may be required.

The Finance Section is critical for tracking incident costs and reimbursement accounting. Unless costs and financial operations are carefully recorded and justified, reimbursement of costs is difficult, if not impossible.

The Finance Section is also responsible for procuring equipment, materials and resources required to accomplish the objectives of the SEERPlan.

Each of these functional areas can be expanded into additional organizational units with further delegation of authority as the incident grows in order to maintain the span and control guide of seven personnel. They also may be contracted as the scope of incident is reduced.

4.3.1 Communication

Facilitating communication with SEERTeam members is one of the primary functions of the SEERCenter Operations Section staff. Creating and maintaining a bulletin board for posting information and developing information packets means staff will not need to explain everything to each new SEERTeam volunteer as they report to the site. Posting drawings, maps and aerial photographs helps those performing structure assessments get oriented before they start out in the field.

Staffing information, directives from the SEERCenter Commander, the AHJ, or other emergency response personnel regarding immediate tasks at hand, weather reports, news releases, etc., can also be posted to provide background information. Refer to Chapter 7 (Site Communication and Documentation) for additional information.

Communication with the AHJ is equally important as the SEERCenter exists to assist them. The Government Liaison or the SEERCenter Commander must keep the AHJ informed of progress in the field as well as account for the whereabouts of all volunteers. This is more critical at more dangerous disaster sites as procedures may vary from one shift to the next.

The SEERCenter should use one common email address for all incoming and outgoing email to simplify management of email by multiple people and to simplify filing and retrieval of email messages. In most cases, a SEERTeam member's email address should be used because it can be remotely accessed from a laptop computer, thereby rendering the address effective immediately.

Written email requests for help or additional information should be as specific as possible to avoid being asked for clarification and also to avoid unneeded information. Requests for additional volunteers should be specific regarding

the level of experience and skills required. If teams of engineers are needed, it should be requested that they are preassembled and that only the team leader make contact with the SEERCenter Commander or staff.

Only the Media Coordinator or the SEERCenter Commander should answer questions from the press (print or broadcast) or give approval for press releases. Refer to Chapter 9 (Media Information) for additional information.

4.3.2 Procedural Items

4.3.2.1 Contacting Volunteers

Immediately after a disaster occurs the Logistic Section staff should begin making phone calls, using a telephone tree system (see Form 2 in Chapter 16) to locate volunteers that are available for service. If the SEERCenter location has been determined, volunteers can be directed to report there, if not, a temporary location can be used.

It is important for the SEERCenter staff to have in its possession the volunteer database (computer and hard copy) established by the Logistic Section. This database includes essential contact information, such as full name; nickname; home and work addresses; home, work and mobile phone numbers; fax numbers; home and work email addresses; emergency contact information; licensure information; years of experience and special qualifications or areas of expertise. This information should be verified as each volunteer reports to the SEERCenter and is assigned responsibilities. Refer to Chapter 16.

4.3.2.2 Prioritizing Tasks at Hand

The SEERCenter Commander and staff, in conjunction with the AHJ, should prioritize the tasks to be performed by SEERTeam members. This task may be delegated to the Operations Section Chief. Needs may include building structure assessment, transportation structure assessment, water structure assessment, assistance to search and rescue operations or other tasks, such as data collection, shoring design, structural load checks for heavy equipment support and demolition assistance.

An easily searchable database is also helpful here in assigning experienced people to a given task.

4.3.2.3 Holding Daily Briefings

Briefings for SEERTeam members should be scheduled at regular intervals. An ideal time to hold briefings is during shift changes to provide volunteers

with the latest and best information possible on current site conditions and activities. This time slot also serves to alert the SEERCenter staff if a team or individual has not reported back from the field. The SEERCenter Commander should also hold briefings with the AHJ, reporting information in two directions to keep SEERTeam members and AHJ staff apprised of each other's activities.

4.3.2.4 Record Keeping

Keeping good records of SEERTeam member field deployments is an important safety measure and the responsibility of the Planning Section in coordination with the Operations Section. To do so, SEERCenter staff should create and maintain an Activity Log.

In addition to tracking personnel, the Activity Log should account for all activities and incoming/outgoing correspondence related to SEERCenter operations. It should also contain sections for ATC Evaluation Forms (see Chapter 16, Forms 4 and 5) and meeting (briefing) minutes.

The Activity Log can be created electronically, using simple word processing or elaborate project management software, or manually by simply writing in a spiral notepad, but either way all activities should be tracked.

Other items that the SEERCenter staff should organize and document include the following:

- Structural drawings of affected building and transportation structures
- Maps, aerial photographs, legal descriptions, etc.
- Utility information and contacts
- Files for post-disaster follow-up items
- Photographs
- Video/newspaper archives

4.3.3 Closing the SEERCenter

When it comes time to close the SEERCenter, several clean-up chores need to be performed. Computer files, Activity Logs and the information listed in the previous section should be archived.

Also, while events are still fresh in the minds of volunteers, a final debriefing meeting should be held to collect feedback and identify items they believe can be improved on. Comments should be incorporated into the post-disaster follow-up file and the SEERProgram should be revised as needed. Reference Chapter 8 (Post-Disaster Evaluation) for additional information.

4.3.4 Chaos Control

Chaos—difficult communications, overwhelming incoming information, scarcity of reliable information and exhausted staff—may be overwhelming at times. SEERTeam members need to be able to improvise to address each new need.

Chaos may also reduce one's ability to function. Although chaos cannot be eliminated, it can be managed so that everyone may work more effectively. Putting straightforward and simple systems and procedures into place as soon as possible helps volunteers know where to find things, who to report to and what to do with incoming information. It helps to keep in mind that volunteers in a chaotic situation appreciate someone telling them exactly what they need to do so that they can dive in and know that they are making a contribution.

Ten good rules to reduce chaos are as follows:

- Understand who your supervisor is and make sure he or she knows where you are at all times
- Understand your role in the overall SEERPlan
- Follow the SEERPlan effectively and do things correctly the first time
- Remain flexible, calm and maintain a sense of humor
- Respond decisively and truthfully
- Delegate tasks when getting overwhelmed
- Show patience and compassion by listening
- Demonstrate leadership, confidence and responsibility
- When unsure of an assessment, confer with fellow SEERTeam members
- Maintain outstanding documentation records and insure this information is transferred properly

CHAPTER 5

Building Structure Assessment

5.1 Introduction

Natural and manmade disasters such as earthquakes, floods, windstorms, bomb blasts, aircraft crashes and other terrorist incidents may result in extreme loading to structures and therefore widespread damage. After a disaster, there is an immediate need for structural assessments to keep people from entering damaged buildings or otherwise using unsafe structures in which the damage may not be readily apparent. One of the goals of the SEERProgram is to assess these damaged structures and get people and businesses back into safe buildings.

The legal entity for regulating building construction and determining safe occupancy for most buildings in the United States is the local building department at the city or county level. Many times, however, this responsibility shifts to the local fire marshal or fire service professional in command at the time of the incident. Experience has shown that these entities quickly become overwhelmed by the need for structural inspections and typically add temporary manpower to perform emergency safety inspections. Temporary manpower may take the form of outside consultants hired by the building department or by volunteers responding to the disaster scene. Furthermore, many building inspectors, plan reviewers, building officials, fire-service professionals and other volunteers are not structural engineers, and the structural damage that is typically encountered in these post-event inspections may be beyond their expertise.

In 1973, a nonprofit corporation named the Applied Technology Council (ATC) was created to develop and promote user-friendly engineering resources and applications for use in mitigating the effects of natural and man-made hazards on the built environment. To avoid previous inconsistencies in the post-disaster safety inspections of buildings, the ATC developed a methodology to help ensure a consistent level of rapid safety inspections by building departments, volunteers and experienced structural engineers alike. This manual, entitled *Procedures for Post-Earthquake Safety Evaluations of Buildings (ATC-20),* was developed in the late 1980s, and was first published in 1989. In the late 1990s, the ATC commenced development of another project entitled *Safety*

Evaluations of Buildings after Wind Storms and Floods. These documents have become the de facto standard for rapid safety inspections of buildings and other structures in the United States. The New York City Building Department and volunteer engineers used the ATC system and methodology in 2001 to perform rapid safety evaluations of the surrounding buildings impacted by the collapse of the World Trade Center twin towers.

The remainder of this chapter provides insight and informational resources for use by the Personnel Committee in placing and training volunteers to perform building structure assessments. All organizational phase volunteers should be familiar with this information, as well as that found in Chapter 6 (Transportation Structure Assessment), at a minimum.

5.2 Overview of the ATC Program

5.2.1 Basic Program

The ATC-20 and ATC-45 programs are a systematic approach to performing rapid structural safety assessments of damaged buildings or other structures, and then applying a posting or placard to the building in order to inform the public of the risks involved with occupying the damaged structure. The program uses a relatively uniform methodology to ensure consistency in structural safety evaluations. In addition, the building posting system uses RED, YELLOW and GREEN placards to provide uniform and clear communication with the building tenants, owners and general public about the hazards present at the damaged structure. Some jurisdictions have customized and refined the program further by developing other color placards such as WHITE (to denote specific hazards to utilities) or ORANGE (to denote additional information).

The Applied Technology Council encourages adoption of the ATC program to provide a more uniform approach and methodology to perform safety assessments of damaged structures while engaging volunteers with a broad spectrum of experience in the inspection of damaged buildings.

5.2.2 Assessment Procedure

The ATC assessment procedure utilizes four distinct “phases” or “levels” of inspection: Structure Identification, Rapid Evaluation, Detailed Evaluation and Engineering Evaluation; each phase being more in-depth and time-consuming than the phase before.

The Structure Identification Phase is typically performed by the local emergency response or management personnel. This phase is intended to identify the size

and scope of the affected area and begin the process of assigning resources to where they are needed. SEERProgram personnel may be in the process of assembling during this phase, but are unlikely to be an active part of it.

Once the affected area has been identified, the Rapid Evaluation Phase may commence. The intent of this phase is to identify the structures within the affected area whose condition for sustained occupancy is obviously “safe” or obviously “unsafe.” These evaluations will typically be performed by building officials and/or SEERProgram structural engineers. These evaluations are just cursory in nature and should not last any longer than 15 to 30 minutes per structure. Buildings that cannot be easily and categorically classified as either “safe” or “unsafe,” are deemed to be of “limited use.” These structures are then flagged for the next phase or level of assessment.

The Detailed Evaluation Phase is then performed on the structures that were not obviously “safe” or “unsafe” during the Rapid Evaluation Phase. Detailed evaluations are usually performed solely by SEERProgram structural engineers and may take several hours per structure. This is a detailed, in-depth, inside-and-out review and assessment of the damaged structure. The goal of this evaluation, however, is still to determine the safety of the structure for sustained occupancy. The intent is not to provide repair recommendations or temporary shoring schemes for the building owner.

The last phase mentioned by the ATC assessment procedure is the Engineering Evaluation. This phase is performed by structural engineers retained by the individual building owners. This evaluation may last days, weeks or months and involves detailed calculations and drawings for the repair of the structure. This Engineering Evaluation phase is beyond the scope of the SEERProgram.

The intent of evaluating structures under this system follows the old emergency response moto, “do the greatest good for the greatest number.” Following a disaster, manpower is limited and time is of the essence. These resources, therefore, must be used efficiently considering the bigger overall picture. For example, if a team performing Rapid Evaluations stopped to perform a Detailed Evaluation on a questionable structure, they may leave tens of structures unassessed at the end of the day in order to perform that one Detailed Evaluation. Keeping the big picture in mind, that Rapid Evaluation team should have flagged the questionable structure for further review and continued with the remainder of their assessments. Figure 5.1 is a flow chart indicating how these various levels of evaluation coincide with one another. Figures 5.2 through 5.4 are sample inspection placards as provided by ATC.

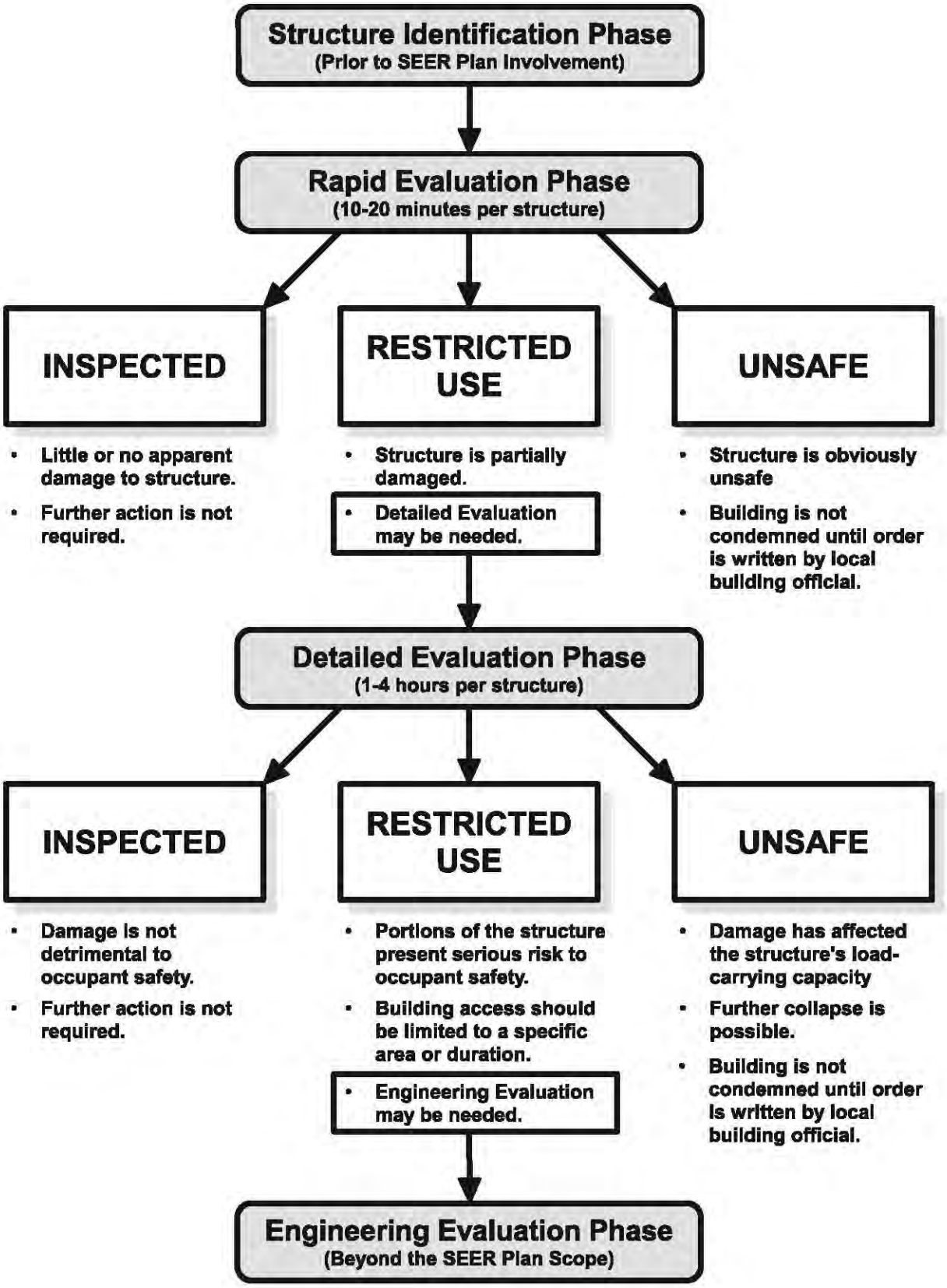


Figure 5.1 The ATC assessment procedure

Figure 5.2 "Inspected" Green Placard (ATC, 1989a)

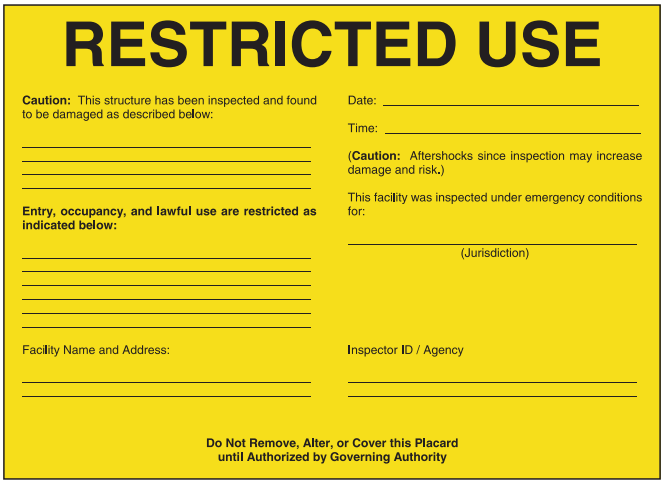


Figure 5.3 "Restricted Use" Yellow Placard (ATC, 1989a)

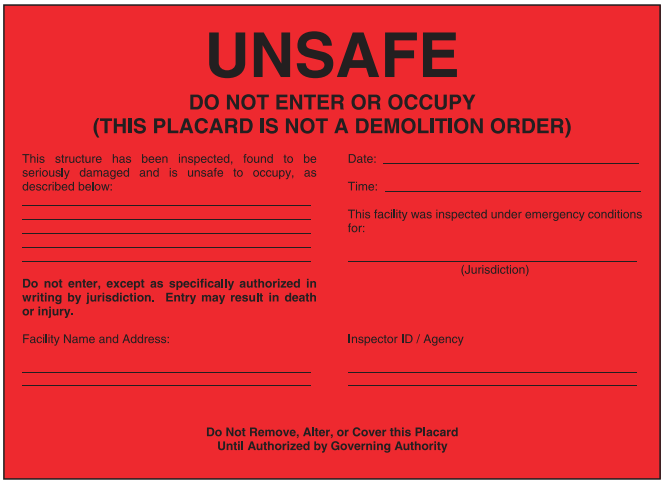


Figure 5.4 "Unsafe" Red Placard (ATC, 1989a)

5.2.3 ATC Program Objectives

The principal objectives of the ATC-20 and ATC-45 programs are as follows:

* Ensure the public safety
* Protect structures and property
* Provide a consistent evaluation and placarding methodology
* Permit re-occupancy of structures in a timely manner
* Keep the public informed

5.2.4 ATC Field Manuals

The ATC-20 and ATC-45 field manuals present extensive information on the various rapid and detailed inspection methodologies. There are inspection checklists, evaluation and posting criteria and exploded view images of typical buildings that describe typical features and where to look for damage. In addition, there are chapters on each of the major construction materials and other features. The chapters include the following:

- General Procedures for Building Safety Evaluations
- Rapid Evaluation Methods
- Detailed Evaluation Methods
- Engineering Evaluation Methods
- Inspection of Wood Frame Structures
- Inspection of Masonry Structures
- Inspection of Tilt-Up Structures
- Inspection of Concrete Structures
- Inspection of Steel Frame Structures
- Inspection of Geotechnical Hazards
- Inspection of Nonstructural Hazards
- Special Issues for Essential Facilities
- Human Behavior Following Earthquakes
- Field Safety for Engineers

ATC Field Manuals can be obtained directly through the Applied Technology Council at: www.atcouncil.org.

5.2.5 Hazard (Loading) Types

Although the ATC-20 and ATC-45 programs were initially devised to perform rapid evaluations of earthquake, wind storm and flood-damaged buildings, it has been widely used by engineers, architects and building departments to assess building damage from many sources. Considering the special

nature of the various types of extreme loads placed on buildings and the resulting damage, the ATC program may also be used to investigate building damage caused by any one of the following additional disaster types:

- Snow or Ice Storms
- Fires
- Floods or Tsunamis
- Blasts or Crashes
- Terrorist Incidents

CHAPTER 6

Transportation Structure Assessment

6.1 Introduction

Transportation structures exist throughout the country, in rural and urban areas. These structures can be as minor as a short-span municipality bridge or as major as a world-class suspension or cable-stayed bridge. The general public uses these structures daily and rarely questions their safety. Rapid assessment of these structures is critical following a disaster since they may exist along evacuation routes and can impede evacuation or the movement of emergency personnel and supplies into the disaster zone.

States that generally are not affected by natural disasters may have very little preparation for natural disasters and are likely to concentrate on accidental vehicle impacts. Although a vehicle impact creates a similar need for assessment, it is more likely to be localized, usually affecting only one structure. A widespread event may tax the abilities of State Transportation Departments to carry out assessments in a timely manner.

Very little information on the procedural aspects of transportation structure assessment exists within the Emergency Response Plans prepared by various government agencies. Most emergency plans rely on the experience and education of the personnel who implement them to carry out the assessments. The in-service bridge inspections required at a two-year interval by the Federal Highway Administration provide a foundation for assessment procedures. Although the bridge inspection procedure contains elements that affect the service life of the structure, the process can be expedited by neglecting items that do not affect the strength of the structure.

The United States Army Corps of Engineers (USACE) publication, *Bridge Safety Program,* states “These (Special) inspections are necessary after bridges experience significant events such as hurricanes, earthquakes, fires, floods or collisions or when conditions warrant them.” The SEERProgram Personnel Committee is tasked with identifying participants to perform transportation structure assessments, which are similar but possibly abbreviated versions of a Special Inspection. Participants may be

transportation engineers, building engineers trained to perform building structure assessments (reference Chapter 5) or transportation maintenance personnel familiar with structures in their area, which can be a tremendous resource when determining if damage is new or from a previous incident.

6.2 Objectives of Transportation Structure Assessments

Most bridges are more likely to be damaged by a natural disaster rather than a terrorist attack. The density of bridges, with the exception of highly urbanized areas, is low enough that a concerted effort to damage the transportation system would be extremely difficult. Terrorist attacks are more likely to occur at vital links between areas that cannot be easily detoured. Most of these vital links are of high importance and usually have staff on hand to maintain the bridge. These staff members would most likely be the first responders after a disaster.

Most transportation structure assessments conducted on an emergency basis by participants are made on “average” bridges. Average bridges are common and widespread, and the damaging incident is likely to be from natural causes, such as earthquakes, floods, hurricanes or tornados. Historically, earthquakes and floods produce the greatest widespread damage to bridges that would require a large labor force to conduct rapid assessments.

The first and foremost objective of a transportation structure assessment is to ensure public safety. Transportation structures create links across natural and manmade features such as waterways and highways. The assessment of these structures and the actions taken following the assessment are crucial to ensure the public can travel safely, and that emergency personnel can reach critical areas to provide assistance.

If a structure is damaged but not destroyed, protection of the structure becomes secondary to public safety. Protection may include the placement of emergency shoring to stabilize or reinforce a damaged structure. Closing the structure to heavy loads and reducing traffic speeds are other ways of protecting structures from further damage.

The third objective of a transportation structure assessment is restoring the flow of traffic across bridges. Initial efforts should focus on structures that serve critical areas. Coordination with local or state Emergency Management Centers will be necessary to determine routes critical to the response effort. The effort to restore traffic to these critical routes could

consist of declaring the structure safe, repairing the structure or the rapid/temporary replacement of a structure.

6.3 Emergency Response Plans

Many public agencies have an Emergency Response Plan (ERP) on file. The ERP is likely large and most comprehensive at the state level and smaller toward the local level. States in seismic- and flood-prone areas likely have more comprehensive plans dealing specifically with the post-disaster assessment of structures, much of which has grown out of necessity and experience. States not usually affected by natural disasters are less likely to have comprehensive plans to deal with widespread damage.

Many states have bridge inspectors or engineers on hand and will call on them first in times of need. Personnel residing in or near the impacted area may be dispatched directly to the area for purposes of early reconnaissance.

Emergency preparedness at the county level varies greatly. Counties in highly urbanized areas will likely have an ERP and personnel on hand that equal or exceed the capabilities of the state. Rural counties may have very little preparation. Further clouding the issue is the fact that different states have significantly different hierarchies for controlling transportation systems. Some states contain County Highway Departments that are independent, while others are state controlled at a local level.

Emergency preparedness at the local agency level will likely vary as much or more than at the county level. The likely result is a lack of appropriate manpower necessary to rapidly assess structures during a widespread disaster.

6.4 Transportation Structure Assessment Procedures

Since 1971, the FHWA has, through its Bridge Inspection Program, mandated that consistent, comprehensive bridge inspections be performed at prescribed intervals. FHWA's Bridge Inspectors Reference Manual is an excellent source for guidance on bridge inspections. Inspection procedures should be modified to eliminate routine maintenance items, such as paint condition, as they are not important to post-disaster assessment. Common sense and judgment need to be used in performing the inspection.

Bridges are generally spread out over large areas, and disasters that are severe enough to damage bridges will likely damage roads as well, making it difficult to reach the bridges. Consideration should thus be given to the use of four-wheel-drive or all-terrain vehicles. In times of severe need, the Emergency Management Coordinator may call in the National Guard to provide assistance.

6.4.1 Items to Be Assessed

Transportation structure assessment tasks can be carried out in any order; however, it is suggested that a typical inspection sequence be developed to provide a routine that is easy to remember and follow. A general list of items to be considered follows:

Roadway and Deck Elements
- Bridge approach pavements
- Bridge decks
- Railings
- Electrical items

Superstructure Elements
- Bridge Deck
- Primary structural members (girders and beams)
- Secondary structural members (diaphragms and bracing)
- Bearings and hangers
- Anchorages
- Utilities supported from the structure

Substructure Elements
- Abutments
- Piers
- Footings
- Wing walls
- Retaining walls

Channel and Waterway Elements
- Riprap protection
- Scour
- Bank erosion
- Freeboard

Movable Bridges
- Gearing
- Shafts and couplings

- Bearings
- Brakes
- Drives
- Counterweights
- Span locks
- Strike plates and shoes

6.4.2 Items to Look for and Document

Sources of potential threat should be identified. For example, spalled concrete on the underside of the bridge deck or superstructure could pose a hazard to motorists traveling under the structure. Utilities supported from the structure could be loose or damaged and pose a potential threat.

If the bridge crosses a waterway, the waterway should be examined to determine if it poses any threat to the structure. Scour should be kept in mind, since scour occurs during high flow events and usually cannot be seen during the event. This is an area where engineering judgment is crucial to determine the safety of a structure.

Sketches and written descriptions should be prepared and photographs taken to document damage observed at each structure that is assessed. The documentation should be concise yet detailed enough for accurate reference during a later assessment or to be useful for designing repairs.

The FHWA has prepared a standardized Damage Assessment Form (reference Chapter 16 Form 7 http://www.fhwa.dot.gov/cadiv/docs/daf_forms.pdf). The form is self-explanatory and fairly basic. The information entered into the form tracks work performed on an emergency basis and records recommendations for permanent restoration work. The forms should be filed at the SEERCenter at the conclusion of each assessment, along with the assessment outcome, as defined in section 6.5 below.

6.4.3 Safety Issues

When performing assessments, it is possible that many structural elements may be in less-than-ideal condition. SEERTeam members should ask themselves, “Is this bridge SAFE to use?” keeping in mind that the presence of many types of damage does not necessarily render a bridge unsafe. Complicating matters is the question of whether the observed damage is new or from a previous incident. Past inspection reports, if available, or personnel with prior knowledge of the structure can be of great help.

Assessments should always be performed with safety of the team in mind. The possibility of further events occurring, such as aftershocks, could further

damage or destabilize the structure. The team should avoid operations on or under the structure until making an assessment of its stability.

6.4.4 Follow-up Assessments

During events such as floods or earthquakes, ongoing monitoring may be necessary to assess the continued integrity of transportation structures. If possible, the original assessment team should perform subsequent monitoring visits. If not possible, the follow-up assessment team should have all the information from the first assessment for their use. The monitoring assessment should be conducted in a similar manner to the initial assessment.

6.5 Assessment Outcomes

An assessment for each transportation structure results in one of four possible outcomes, as follows:

6.5.1 Unrestricted

Little or no damage to the structure. Any damage is cosmetic only and has no effect on the load-carrying capacity of the structure. Repairs or further monitoring is unnecessary unless conditions change (aftershocks, etc.).

6.5.2 Load Rated

Damage to the structure is severe enough to cause a restriction in loading on the structure. The structure is safe for vehicles under the load rating to use for an indefinite period of time. This outcome requires the preparation of calculations to determine the safe load-carrying capacity of the structure.

6.5.3 Repair

Damage to the structure requires repair before the structure can be used. Coordination with local or state agencies is necessary for the closure of the structure and for the design and construction of the repairs. Calculations will likely be necessary along with close coordination with personnel performing the repairs. Design flexibility may be necessary in order to utilize on-hand or easily obtainable materials to complete the repairs.

6.5.4 Closed

The structure is damaged to an extent where repairs are not feasible. The structure is indefinitely closed to traffic. Coordination with local or state agencies is necessary to properly close the structure to traffic. Proper barricading will be necessary to ensure safety of the public. Thought should be given to closure methods to ensure that a person cannot simply move the

signs and proceed across the closed bridge. Rerouting information should also be provided at the closed bridge to redirect traffic to open facilities.

With any of the four outcomes, the AHJ must constantly be apprised of the condition of the transportation system. The closure or restriction of portions of the system can greatly affect emergency operations. Transportation of heavy equipment may be necessary to aid in rescue/recovery efforts and must be routed to utilize structures with adequate capacity.

6.6 Concluding Thoughts

Transportation structure assessment is of great importance. The information currently available on this subject is widely varied. Researching and mimicking emergency response preparations from areas with a history of significant natural disasters can provide the framework for an effective response.

Contact with Emergency Coordinators at various levels of government serves multiple purposes. Through this contact, SEERTeam members will understand how mobilization and coordination of emergency workers and other participants is handled and understand the command structure that they interact with. At the same time, information can be provided to Emergency Coordinators as to the purpose of the SEERProgram. This contact will help overcome one of the most difficult obstacles a SEERTeam faces, that of having its contact information incorporated into ERPs, thus ensuring it will be called on in times of need. Remember, if a SEERProgram is unknown by those in control of an emergency response (AHJ, Emergency Coordinators), it will remain an untapped resource.

CHAPTER 7

Site Communication and Documentation

7.1 Introduction

Chapter 7 provides information regarding the methods for communication in the field and for site documentation. Following a disaster many means of communications may be disrupted, including land telephones, cell phones, email, mail, deliveries and even foot-traffic. Although most disruptions are temporary, some may take longer to fix. For example, phone and data service in portions of lower Manhattan remained erratic for months after the World Trade Center disaster. However, accurate and timely communication among SEERTeam members in the field and those that they are serving is essential. In addition, consistent, accurate and efficient documentation of the structures that are being evaluated is most critical.

7.2 Onsite Communication

7.2.1 Daily Briefings

At these scenes, there are many potential activities that may be occurring at the same time in the general area that structural assessments are taking place. These could include debris removal, erection of shoring and/or bracing, construction restoration, tours of the scene by other parties, etc. It is important that all of these activities be orchestrated such that they do not interfere with each other. Effective communication of all activities in the area is essential to the safe and timely execution of those activities. Briefings are an essential component of effective communications at the scene.

There may be several different “briefings” that could occur at any scene. These may include representatives of overall site safety, environmental assessment, construction, search and rescue, recovery, owners, insurance companies, forensic investigators, local/state/federal governmental agencies including local building departments, fire marshals, ATF, OSHA, CSB and others. It is important that there be representation from the SEERTeam at the appropriate site briefings to coordinate the structural assessment activities with other site activities taking place.

SEERTeam briefings should be held at least twice a day (or at each shift change), so that all members understand the assignments for the day, who is being deployed, and which area of the site is being covered. A concise, one-page Action Plan should be presented and discussed. At least one member from each Structure Assessment Team, or the designated coordinator for a number of teams in a larger incident, should be required to attend the briefings. If work is performed in daylight hours only, the second meeting would serve only as a debriefing meeting.

In order to provide for the safety and accountability of team members, prearranged check-in times and locations (including alternate locations should the primary location be compromised for any reason), should be specified, such as every several hours and/or immediately after significant field events (for example, aftershocks in a seismic event).

7.2.2 Field Communications Plan

A detailed field communications plan should be distributed and discussed at the daily briefings. The plan should contain contact numbers of all SEERTeam members, the chain of command and emergency contact numbers. In addition, the plan should include an alternate means of communication, in case the planned means are interrupted (even if the alternate system is to use runners).

7.2.3 Cellular Telephones

In past incidents the use of cellular telephones was limited for the first day or so following the event.

As long as enough cells are in operation or are quickly repaired, cellular telephones are the most practical means of communication.

7.2.4 Amateur (HAM) Radio Networks

It is relatively easy to qualify for a Technical, Amateur License. Small radios can be purchased relatively inexpensively.

Depending on location, there may be enough repeaters in one's area to have an emergency network set up in advance of a disaster. (Repeaters are radio devices that receive, amplify and re-transmit radio broadcasts so that handheld and other low-power radios can effectively transmit over larger distances.)

Following the 1989 Loma Prieta Earthquake in the San Francisco Bay area an emergency network was set up when the phone system failed. It

allowed emergency workers to immediately receive their assignments from the State Office of Emergency Services.

Contact your local chapter of the American Radio Relay League (www.arrl.org) to inquire about existing emergency radio networks in your region.

7.2.5 Handheld Radios

Radios using the 400mhz and 800mhz emergency frequencies should not be used for post-disaster safety evaluation. Following most incidents there will be too much emergency radio traffic in this bandwidth.

Handheld FM transceivers (such as FRS or GMRS radio units) can be used as a safety tool for short distance radio communications between SEERTeam members. They are especially useful for maintaining communications when a team is traveling in more than one vehicle. They should be carried by anyone who enters a damaged building, assuming that another team member with a radio is standing by outside the structure. Individuals using them need to be trained to use efficient, clear text messages.

Interference may be a problem, and they may not be effective in metal buildings or deep inside heavy structures.

Also, it should be remembered that all unsecured radio communication could be monitored by others.

7.2.6 Safety Whistles

All SEERTeam members should be required to carry a safety whistle and understand the following standard safety warning signals:

- One blast means “Stop, Be Quiet and Listen for Instruction” (QUIET)
- One long followed by one short blast means “Resume Activity” (O.K.)
- Three short blasts means “Evacuate Immediately” (OUT-OUT-OUT)

Additional signals may be needed for other communication.

7.2.7 Face-to-Face Communication

Wherever possible, face-to-face and voice communication should be used in the field. This especially applies when one SEERTeam member has entered a structure while others are maintaining safety observer positions outside.

7.3 Site Documentation

7.3.1 Post-Disaster Forms and Placards

The AHJ usually determines the type of forms to be used to record and post structure assessment data. Some AHJs use electronic forms that may be filled out using handheld computers (PDA). Then the data can be efficiently transferred to a database system at the end of each work period.

The city of Glendale, CA, has instituted the use of PDAs for post-disaster and other reporting. The U.S. Army Corps of Engineers is also planning on using PDAs in post-flood and all other post-disaster reporting.

7.3.2 Activity Logs

With the flurry of activity after a disaster, it is easy for one's mind to blur one activity into another. Therefore, each Structure Assessment Team should be required to keep an hourly log of activities, as an accurate record may become important at a later date. The reporting need not become burdensome, and one may carry a small, waterproof notebook and then transfer the information to a standardized form at the end of the work period.

A Field Activity Log is provided in Chapter 16, Form 8. It is useful for recording major activities during each shift and also helps transfer information between groups of engineers during shift changes.

7.3.3 Personnel Accountability

In the response phase to a disaster one cannot overemphasize personnel accountability. All members of a SEERTeam need to be accounted for at all times, so that they may receive and send communications to the SEERCenter. Many of the individual engineers may not be familiar with the need for accountability, and may not understand the possible consequences of poor communication and control. They will need to be convinced that accountability is essential in reducing their risk during their term of service. Proper risk management of an emergency situation requires good command and control.

The essential elements of an accountability system are as follows:

- A reliable check-in, checkout system to indicate all responders' current duty locations. This can be as complicated as an electronic system using bar codes or as simple as a "T" card system where every individual is represented by a 3 x 5 or "T" shaped card that is shifted from one place to another on a board to indicate if an individual is "in the field," "off site/at Home," etc. The individual's card should list his or her contact information.

- A pre-determined, interim check-in procedure to maintain continual contact with all responders. The check-in interval should not be greater than two hours and could be accomplished using cell phones. If phones are not operating, runners can be used to provide this vital communication link. With the potential for aftershocks, secondary hazardous materials releases, and delayed explosions or fires, communication must be maintained between the field responders and their coordinators. Also changes in instruction and information can be more efficiently disseminated.
- A pre-determined evacuation plan with escape routes, meeting locations (including alternate meeting locations) and check-in procedure to provide for accountability if a secondary disaster occurs. One needs to be prepared for the worst in order to minimize the risk of needless exposure while searching for missing responders.

7.3.4 Assessment Team Accountability

Assuming that a Structure Assessment Team consists of two to four individuals, each member needs to be able to account for fellow team members at all times. If it becomes necessary to enter a structure, no more than 50% of responders should be inside at any time, and a pre-arranged method of communication should be maintained between the inside and outside team members. Regardless of the method (radio, cell phone, direct voice) it should be verified by communications checks as the inside individual moves into more confining sections of the structure. If communications cannot be maintained, then no one should be allowed to remain inside the structure.

7.3.5 GPS Tracking

Handheld Global Positioning Satellite (GPS) units could be used to find directions and/or determine precise locations following a disaster. After most destructive windstorms in which road signs have been displaced, GPS units have proven to be very useful. These devices can also be used to determine the location of responding engineers as another accountability tool.

7.3.6 What Not to Say

Members of the SEERTeam may be exposed to information obtained at the scene regarding actual conditions and situations that should not be communicated to others that are not on the SEERTeam or the appropriate scene managers. Discussions of any site-specific information to family, friends, co-workers, etc. should be limited to very generic discussions of the activities and other information that has already been reported in the press. All discussion with any members of the press should be done by the appropriate SEERTeam members that are assigned to issue press statements.

CHAPTER 8

Post-Incident Debriefing

8.1 Introduction

Following the completion of a disaster response assignment and the SEERTeam has demobilized, the Logistics Committee should review the successes and failures of the incident in order to prepare better for the next emergency. The key issues/questions to answer include the following:

- Mitigation—From a structural engineering standpoint, how could an incident of this type be avoided in the future?
- Preparation—What could be done now, before the next incident, to increase preparedness of the SEERTeam?
- Response—What individuals or organizations could provide assistance with future incidents, and what will their role be?

Answering the above questions after each incident response will help the SEERTeam be better prepared for future events.

8.2 Evaluation of a Response

Ideally all SEERTeam members should be invited to a group discussion about future improvements to the response. For large emergencies, it may be more effective to have several discussions among different participants (SEA SEERCommittee, Primary Group Coordinators, etc.). A summary of the meeting(s) should be provided to the SEA SEERCommittee and the National SEERCommittee Chair, as well as be distributed down to all SEERTeam participants. Discussions should revisit all aspects of the response, including complex issues like interaction with government agencies and field safety, as well as more mundane details like record-keeping procedures and dealings with media personnel.

Mitigation, preparation and recovery phase actions should also be reviewed. Questions to answer include the following:

- Were any mitigation efforts effective in limiting the damage of this emergency?

- Were preparations by the SEERTeam adequate?
- After review of the documentation created following the last emergency did any of the same issues reappear?

Evaluation should occur as soon as possible after the response. Where long-duration response is necessary, evaluation should not wait until the end of the response, but rather be performed on an ongoing basis throughout the duration of the response.

8.3 Procedure

The procedure for evaluating a response and debriefing responders should include a detailed description of the emergency and a time line sequence of events. Items to review include SEERCenter procedures, logs and field reports; field protocol procedures and safety measures; equipment lists; personnel requirements; phone logs and media relations. Comprehensive documentation regarding each of the above items should be prepared for review by the SEA SEERCommittee and distributed to all SEERTeam members. Follow through should include documenting recommended solutions and assigning responsibility for implementing corrective actions.

Once proposed corrective actions have been discussed and agreed upon by the SEA SEERCommittee, they need to be communicated to all SEERTeam members in the format of an After Action Report (see Appendix for an example of an AAR) in preparation for the next emergency. The SEA SEERCommittee should update the SEERProgram and assign corrective tasks to the appropriate subcommittees. This is also a good time to update SEERTeam records and schedule training classes. Changes made to the SEERProgram should also be reviewed with the appropriate AHJ, the National SEERCommittee Chair, other emergency responders and industry or interdisciplinary groups.

8.4 Additional Post-Emergency Tasks

Photo archiving and other data collection with an eye toward future research and education can be extremely helpful to the understanding of the technical aspects of an emergency. The same information may also be helpful in future training programs. Information to be logged with a photo or video includes the photographer's contact information; the date, time and

circumstances of the photo or video and any remarks the photographer feels might be relevant.

Some emergencies may suggest other types of data collection; for example, steel salvaged from the WTC site or an investigation into roof failures after Hurricane Andrew. Ideas for continuing education or future research studies should be documented and forwarded to the appropriate SEA committee and to the National SEERCommittee Chair. Even if funded research is not immediately planned, SEAs can provide a forum for their members to more fully understand structural issues.

Last, but not least, the efforts of all the SEER participants should be acknowledged. If possible a press release with acknowledgments should be issued to the local newspapers or broadcast media stations. These press releases are a good means for including ideas for the community at large regarding preparedness and response. If the public understands the role SEERTeams play in providing effective response to disaster, they are more likely to support and facilitate our efforts.

CHAPTER 9

Media Information

9.1 Introduction

Because disasters are considered newsworthy, journalists (television, radio, print) are on the scene almost immediately and file reports from the earliest stages. For the most part, the conduct of journalists is very professional, but at times in their quest for a story on deadline they may become overly aggressive in their pursuit of information. Realizing this, it is prudent to recognize the important role the press has and plan ahead to develop effective interaction with the media in order to disseminate controlled, timely, and accurate information to the public.

9.2 Designation of a Media Coordinator

An important position to be filled on a SEERTeam is that of Media Coordinator. When choosing the individual(s) to fill this position look for the following characteristics:

- Confident.
- Comfortable in front of a camera.
- Big picture thinker
- Good listening skills
- Good written and verbal communication skills

The Media Coordinator has many and varied duties. Chief among them is acting as a liaison between SEERTeam members, in the field and at the SEERCenter, and the media relations arm of the AHJ.

In the early stages of a disaster response, the Media Coordinator coordinates on a day-to-day basis with the AHJ. The media will be interested in all aspects of a disaster and their focus will likely be spread between several public agencies and service organizations, as well as medical personnel. As information is assembled or made known by SEERTeam members, either in the field or acting in support roles, the Media Coordinator needs to package and disseminate it in a timely manner.

The preferred method of disseminating information is through written press releases or fact sheets. Items that might be relevant to report, depending on circumstances, could include the following:

- The makeup and role of the SEERTeam
- Information regarding the damaged structures, such as time of design, structural systems and construction materials, structure specifics such as overall height/weight, etc.
- Results of structure assessments by SEERTeam members (only if authorized to release by the AHJ)

The media coordinator will need to work with the logistics committee during an event to insure it has access to power, phone lines, and internet connectivity as needed.

9.3 General Guidelines for Interacting with Media Personnel

As stated in the introduction to this chapter, the media play an important role in society by providing information to the public. All SEERTeam members should recognize this fact and ensure that interactions with journalists be conducted in a professional and respectful manner. Although the Media Coordinator will be the front line representative dealing with the press, it is important that all SEERTeam members review and act in accordance with the following items.

9.3.1 General

In general, the following guidelines apply when SEERTeam members interact with the media.

- Refrain from talking to the media when approached but instead refer them to the Media Coordinator.
- Behave in a professional manner at all times, and do not tolerate less from media representatives.
- Recognize that when speaking to any member of the press you represent the SEERTeam; therefore stick to factual information and consensus opinions.
- Keep personal opinions to yourself when in the presence of the press.
- Keep an accurate log of all media contacts and distributed information. Form 10, Media Log, in Chapter 16 is an example. It is important to include contact information for all media personnel so that new press releases may be distributed appropriately.

9.3.2 Press Releases and Fact Sheets

Press Releases and Fact Sheets

Press releases can be used to provide answers and updated information to the media and public in a concise and controlled manner.

Writing a Press Release

When writing a press release, it should always answer the basic questions of Who, What, Where, When, Why and How. The press release should be concise, but yet informative enough to answer all of these questions as they apply to the SEER operations. Only a very basic understanding of the situation should be assumed from the readers as it is unknown what other background or prior knowledge they have of the situation. Some basic questions that should be addressed by the press release include the following:

1. What occurred (description of disaster and its effects in general)?
2. Why the participation of the SEER volunteers was requested?
3. Who requested the SEER volunteers and who are we currently reporting to?
4. When did the incident occur and how long have SEER volunteers been involved?
5. Where are SEER volunteers currently working?

Additional information should be added as deemed appropriate by the Media Coordinator. The information should be updated at least daily or more frequently if required by the situation.

Some additional information for writing comprehensible press releases includes the following:

- The beginning of the press release should include “For Immediate Release” or “For Release on Month, Date, Year.” Always include the date and time of the press release.
- A point of contact with phone number and/or email address should be listed clearly near the top.
- The first paragraph should provide answer to all the basic and important questions of the SEER volunteers involvement. Details can be added later.
- Unless absolutely necessary, press releases should be less than one page in length. As noted earlier, the most important information should always be included within the first paragraph.

- Provide factual statements. Nothing should be over exaggerated or overstated as this will only cause confusion, skepticism and concern later.
- Referenced quotations can be added to show interest and a personal side of the press release.
- Provide specific examples of the work being done.
- Avoid the use of technical terms or jargon. If technical engineering terms must be used, include an adequate definition or explanation.
- Add "###" at the end of the release to let the users know they have received the entire release.
- Never type a press release in all caps or use exclamation points.

Most importantly, make the press release complete with information but keep it concise. A lot of information will be distributed to media outlets during a disaster, and it is best to avoid extraneous details. Also, always proofread a release several times before sending out.

Distributing a Press Release

The preferred method of distributing press releases would be to pass them directly to the AHJ for their distribution to the media. However during a disaster, the AHJ will likely have numerous other media requests and may not be able to handle the additional workload of distributing the information from the SEERProgram.

A simple plan of keeping printed and PDF copies of the updated press release on hand so that they can be given to media personnel is probably the easiest and most practical method. Other more advanced options could include an email mailing list where updated press releases are sent out or a website with posted updates. This would insure that the latest information is available to the media outlets.

Website services are available for mass distribution of press releases to media outlets. A fee is normally levied for this service. In most cases, this will be overkill for the SEERProgram.

The Media Coordinator should have knowledge of all releases to media outlets before they are distributed. A master index of all releases should be maintained so that a history of them can be referenced on short notice if needed.

Fact Sheets

Fact sheets are another version of press releases. Fact sheets can include a short description of the SEERProgram and its purpose. It can also include

information such as the number of volunteers on-site and the number of volunteers available. Fact sheets can be prepared prior to an event as part of the planning process, so that they are ready for use in the time of a disaster.

9.3.3 Interviews

The following guidelines apply to interviews with the media:

- Check the credentials of anyone requesting an interview.
- Determine the scope of an interview before agreeing to it. Prepare and rehearse answers to the questions you expect, and use the interview to convey the items you consider relevant and important to the public.
- Make sure you are aware if the interview is going to be broadcast live or edited and shown later.
- Make your own recording of audiotaped interviews to ensure that you have an accurate record of what was said.
- Keep answers to questions simple and brief. If it is necessary to use technical or jargon terms in the interview, define or explain them for clarity to the viewer and interviewer.
- Provide specific stories and anecdotes of the work that the SEER volunteers are conducting.
- Anticipate and prepare to answer difficult questions.
- Dress neatly for scheduled on-camera interviews and wear items that clearly identify you as a SEERTeam member.
- Always be promptly on time for interviews.
- Speak clearly and avoid nervous gestures.
- Once a question is asked, take your time to prepare your thoughts and compose an answer. Speak clearly and deliberately.
- Be friendly and professional. Do not show frustration or anger or respond in a defensive manner.
- Try not to use the phrase “No Comment” as it is often construed to mean that you are hiding something. If you do not want to answer a question, silently wait for the next, or refer the interviewer to someone else.
- Stay away from speculative answers and only answer questions that you clearly know the answer to. If necessary, you can refer the interviewer to other parties if you cannot answer the questions factually.
- If the interviewer paraphrases your comment back to you, and you are not comfortable with their interpretation, state that you will let your words speak for themselves.
- If you realize that you have made a mistake, take time to correct it.

- Reserve the right going into an interview to stop it at any time you feel the questioning has become unprofessional or abusive.
- Remember that nothing is ever really “Off the Record.” Do not say anything that you do not want in print or broadcast as part of an interview.
- Standing up during phone interviews is a useful way to stay focused during the conversation and your voice clear.
- Offer the interviewer your contact information should he/she have any questions following the interview.

CHAPTER 10

Equipment

10.1 Introduction

Following are several categorized equipment lists, which supplement equipment needs spelled out in other chapters of the SEERPlan. The Equipment Coordinator should evaluate each and determine which items individual SEERTeam members should provide, which will be provided by the Logistics Committee, and which the AHJ should provide.

10.2 Essential Personal Protective Equipment

The following personal protective equipment is required for the engineer to perform structural assessment at a collapse site.

- Helmet/hard hat (Helmet should have reflective sticker stating "Structural Engineer")
- Protective leather work gloves
- Protective glasses or goggles
- Hearing protection
- OSHA-approved steel toe work boots
- First Aid kit
- Cyalume light sticks (12-hour duration)
- Rain gear/extra clothing
- Dust or other respiratory masks

(The need for respiratory protection will eventually be determined at the site by the proper health authorities. SEERTeam members must be aware of the risks involved with a delayed determination and the possibility of hazardous materials at the site, and therefore should take appropriate precautions. It should be noted that as per OSHA and other national codes and standards, full-face and half-face Air Purifying Respirators (APRs) are required to be fit-tested to each user. As such, it is recommended that this procedure be performed as part of initial SEERTeam planning and training.)

10.3 Functional Equipment and Tools

The following list describes the different tools and equipment necessary to perform structural triage and evaluation. Items that are considered essential are marked (E). Other items are suggested.

- Backpack or fanny pack (E)
- Equipment belt or vest (E)
- Safety vest (E)
- Flashlight with extra batteries (E)
- Safety whistle (E)
- Laser pointer (E)
- Clipboard (E)
- Graph paper and/or inspection forms (E)
- Pens/pencils (E)
- ATC-20 Field Guide
- Measuring tape 30-inch
- Compact binoculars 7- to 16-power x 25 or 12 x 25
- Geology hammer
- Plumb bob with 200-inch line
- Smart level 24-inch
- Calculator
- Digital camera
- Leatherman all-purpose pocket tool
- Crack monitors
- Epoxy paste to glue crack monitors
- Marking paint
- Rope
- Portable radio
- Voice-activated recorder with blank tapes and extra batteries
- Magnetic compass
- Waterproof paper and notebook

10.4 Essential Equipment Often Provided by the AHJ

- Street maps
- Posting placards with staple guns or tape
- Yellow “Do Not Cross The Line” tape
- Communications equipment (2-way radios)
- Emergency names and telephone numbers

10.5 Personal Items

Following are items that SEERTeam members will require to be self-sustaining and not be a burden to the system. It is assumed the engineer will be onsite for one to three days. Again, items that are considered essential are marked (E). Other items are suggested.

- Photo ID (driver's license, etc.) (E)
- Identification as a licensed engineer (E)
- Credit cards, cash, pocket change for pay phones (E)
- Personal hygiene supplies (E)
- Prescription medication (E)
- Cellular phone (E)
- Canteen with water
- Water purification tablets
- Candy bars, power bars, etc.
- Sleeping bag
- Knee pads
- Sunscreen
- Sunglasses
- Insect repellant
- Latex gloves
- Hand disinfectant
- Rain poncho

CHAPTER 11

Safety Issues

11.1 Introduction

This chapter presents general information regarding safety in disaster areas. General information regarding Occupational Safety and Health Administration (OSHA) regulations will be presented, along with more detailed information about safety particular to disaster areas. Note that nothing presented herein should imply that this is a standard or is the proper and only way to proceed. Each disaster must be dealt with in an individual manner, and no single approach applies. Those involved in structure assessments need to proceed with caution and make logical and educated choices when evaluating risks. Some disaster events may be "typical" smaller scale events while others may present themselves on a larger scale, possibly on a magnitude never before encountered by most or any of the participants (such as the World Trade Center or Katrina events). The goal is to have the fundamental safety issues that can apply to any and all disasters, regardless of the magnitude.

Two aspects of safety, the global aspect and the personal aspect, should be considered when working in the area of a disaster. The global safety aspect involves situations that exist because of the overall site conditions and debris removal. The personal safety aspect involves situations related to individual issues of safety. Both aspects are discussed in this chapter.

On a typical construction project, a safe working environment can be successfully achieved because there is time to review means and methods, safety protocols can be implemented, and hazards can be identified prior to the start of work. This is likely not the case for a disaster site. Each disaster brings with it a variety of dangers that cannot be easily identified or rapidly mitigated. New dangers may also develop at a disaster site as time progresses due to fires, aftershocks from earthquakes, changing weather conditions, shifting of structures, etc.

There are complications occurring at disaster sites other than just the limited preplanning time. For instance, disaster zones often present more congested conditions than those normally encountered in construction

zones. In urban areas, the use of several cranes to assist in search and rescue efforts and debris removal may be necessary when they would not even be considered on a normal construction site. Also, debris removal may need to move at a faster-than-ideal pace to facilitate search and rescue.

Safety in a disaster zone involves a risk-versus-reward evaluation. The acceptable risk to try to achieve a certain reward is different for different tasks and personnel. Firefighters accept a high risk when they enter a fire-engulfed structure to save those trapped inside. FEMA Urban and Search and Rescue teams are trained professionals who must evaluate the risk, consider the chance of success and then determine the appropriate action.

The risk taken by SEERTeam members should be analyzed in a different manner. Those performing structure assessments should only perform activities that have minimal personal risk involved. The primary difference between search and rescue operations and structure assessments is that the former involves the saving of lives, and the latter involves the safety of property. For SEERTeam members, the risks shall be measured against the reward while realizing these are not life-and-death situations,

11.2 Personal Safety

It is highly desirable to perform structure assessments in groups of at least two, and preferably four engineers, as stated in Chapter 7. This allows one or two engineers to remain outside the structure during interior inspections and, therefore, able to provide assistance if an injury or entrapment occurs. Also, it should be noted that the determination of structural integrity is often a judgment call, and having teams of two or more engineers allows for feedback when making these types of decisions. Remember, it is always best to err on the side of caution.

Strict safety guidelines should be adhered to when performing structure assessments. ***An engineer should walk around the entire building when performing the exterior assessment.*** If the integrity of the structure appears questionable, the structure should not be entered, thus preventing endangering the inspector or others. When a disaster occurs, limited resources must be used to address all response aspects of the emergency, including search and rescue, assisting the injured, helping those displaced from their homes by the disaster, etc. If the evaluating engineers turn into a victim, become trapped or are injured, then they have become a drain on the emergency response system and could possibly put others in harm's way should a rescue or recovery of the engineers become necessary.

It is possible that unknown chemical substances may be encountered during an assessment. These could include certain building materials such as asbestos, formaldehyde, lead and fiberglass that may have been exposed to the environment due to the structural damage. It may also include stored chemicals that have escaped from their containers or processing chemicals that may have escaped from delivery lines or storage containers. Even simple household chemicals that spill and are mixed with other chemicals may create a dangerous environment. If there is a question as to the environmental safety of entering a building, it is best to err on the side of caution. All buildings that have undergone structural damage should be considered to have environmental hazards until it can be documented otherwise. The documentation should be provided by those with the proper qualifications and experience. Additional training on the part of the structural engineer is an important tool to assist in the identification of a potentially dangerous environment.

The presence of certain gases, such as hydrogen sulfide, especially in confined spaces, has lead to avoidable multiple deaths at sites. In the presence of hydrogen sulfide, people will quickly be overcome and be unable to remove themselves from the scene. Others in the area, noticing the overcome individuals, with all of the best intentions, quickly run to aid the victims, only to be overcome themselves, thus becoming victims, themselves. This can continue until all of the available people in the area have become victims, until the gas has dissipated or until a properly trained individual identifies the situation and takes proper steps to mitigate the damages by only entering the area with proper breathing equipment, back-up personnel, extrication equipment and environmental assessment equipment.

Check for MSDS sheets at each facility and with the responding fire department for information on potential hazardous materials at each location.

Equipment suggested for those performing structure assessments is addressed in Chapter 10, as well as elsewhere in the SEERPlan.

11.3 Occupational Safety and Health Act

In 1970 the Federal Government enacted the Occupational Safety and Health Act to provide a safe environment for workers. As part of the Act, the Secretary of Labor was given the authority to set standards for safe working conditions. Safe working standards for the construction industry are contained in the Code of Federal Regulations Part 1926. These OSHA

standards were developed for general construction sites and do not address disaster sites. It is beyond the scope of this SEERPlan to determine the applicability of these regulations to a disaster site for structure assessments. Nevertheless, useful information is contained in these regulations, and they will be discussed briefly herein.

For reference, the subparts of the Code of Federal Regulations Part 1926 are as follows:

Subpart A General
Subpart B General Interpretation
Subpart C General Safety
Subpart D Occupational Health
Subpart E Personal Equipment
Subpart F Fire Protection
Subpart G Signs & Barricades
Subpart H Material Handling
Subpart I Tools
Subpart J Welding & Cutting
Subpart K Electrical
Subpart L Scaffolds
Subpart M Fall Protection
Subpart N Cranes, Derricks and Similar
Subpart O Motor Vehicles
Subpart P Excavations
Subpart Q Concrete and Masonry
Subpart R Steel Erection
Subpart S Underground Construction
Subpart T Demolition
Subpart U Blasting
Subpart V Electric Power Transmission
Subpart W Rollover Protection
Subpart X Stairways and Ladders
Subpart Y Diving Operations
Subpart Z Hazardous Materials

11.4 Disaster Site Safety Issues

Review of the OSHA construction regulation subparts listed above reveals that many apply to a typical disaster site. Some of the items contained in

various subparts, which may apply to structure assessments, are discussed in the following paragraphs.

11.4.1 Fall Hazards

Fall hazards are a primary concern when using scaffolds and ladders or when working on roofs or near open excavations. In an emergency response situation there may not be time to identify and mitigate all fall hazards; however, being aware of the following dangers reduces the potential for injury.

11.4.1.1 Scaffolding

Some common injuries related to scaffolding include planking failure, slipping and falling and injury from falling objects. Make sure that all Structure Assessment Team members are aware of the following items prior to using scaffolds.

- The access route to the top of the scaffold must be unobstructed and must appear safe, keeping in mind that climbing the cross bracing may be dangerous.
- The scaffold legs must be supported on base plates of proper material, which will not crush or slide.
- The scaffold must be plumb and braced, and possibly tied to an adjacent stable structure, to prevent it from swaying or tipping.
- It is best if the scaffold is very near the location of the work. This protects against falling between the scaffold and the work area. In most cases, OSHA allows no more than 14 inches between the scaffold platform and work area unless guardrails are used.
- Ladders on scaffold platforms must be used with caution unless the working area is wide enough to prevent a falling hazard, and the scaffold is laterally braced to keep it from swaying under the thrust from the ladder legs.

11.4.1.2 Ladders

Ladders come in a variety of types (A-Frame, extension, fixed, etc.). Emergency work may preclude the time to obtain the optimal ladder. Some things to consider when using ladders are as follows:

- A quick inspection of the ladder should be performed to identify any broken rung, split members, corrosion or faulty components.
- The top of a stepladder should not be used as a step.
- When using a portable ladder to access an upper landing surface, the ladder side rails should extend three feet above the point of access.

If this is not possible then the ladder should be secured at its top to a rigid support.
- At least one hand should be kept free to grasp the ladder when moving up or down. Carrying material that may prevent hands from being free or cause one to lose his or her balance should be avoided.

11.4.1.3 Roof Hazards

It is important to concentrate on your environment when on a roof to avoid accidentally walking off the roof edge or falling through an opening. Some things to consider when working on a roof are as follows:

- Skylights and skylight openings should be noted. It is safest to assume that a skylight is unable to support one's weight. Walking backwards should be avoided, as this may cause one to unexpectedly step on a skylight or a roof opening.
- The location of the edge of the roof should be noted. If there is concern of a distraction then a second person should monitor one's actions to avoid a walk off.
- Some roofing materials may actually span over an area where the actual roof structure has failed. This spanning roofing material may carry its own weight for a period of time, but may not carry any additional imposed loading such as the weight of people or of water that may tend to accumulate ("pond") in this area. These areas could be a danger for anyone on or under this area. Once identified, these areas should be properly marked, (above and below) to reduce the potential danger for others.

11.4.1.4 Fall Protection Systems

Fall protection systems fall into two categories active and passive. Active systems include the use of a harness and lanyards as well the use of devices that restrain a person from getting too close to the edge of a hazard. Passive systems include the use of guardrails and safety nets. In an emergency situation there is likely insufficient time to use a passive system; therefore, an understanding of active systems, particularly the harness and lanyard, is recommended.

Following is some useful information regarding the use of harnesses and lanyards:

- Fall protection systems should be used anytime a fall of more than six feet is possible.
- Only full body harness systems should be used. Safety belts are not an acceptable method for fall arrest.

- The harness should be inspected for unacceptable wear and tear, and shock absorbers in lanyards must not have already been deployed.
- A lanyard should be attached to a solid structural support.

Once any equipment is used in a fall event, it shall be permanently taken out of service.

11.4.2 Crane Operations

The presence of cranes on a construction site can pose a variety of hazards. Types of accidents that can occur include being struck by objects dropped during crane lifts, being hit or crushed by moving payloads and the tipping over of the crane itself. On typical construction sites there are controls in place to help reduce the chance of these accidents. These safeguards include hiring only properly trained operators, using cranes that have been regularly inspected and hiring only experienced riggers.

Structure Assessment Teams may be present in areas where cranes are operating. There are no assurances that the cranes and their operators are qualified for the work they are doing. For this reason, assessment team members need to be cognizant of the crane operations if they're not able to stay clear of them.

Structure Assessment Team members should be alert to avoid being near cranes that are involved in the following:

- Long reaches with the crane boom
- Cranes on unleveled ground
- Cranes working close to excavations
- Cranes working close to overhead power lines
- Cranes performing picks that cannot be directly viewed by the operator

There may be a case in which a structure assessment is performed from a crane-suspended personnel platform (a "man basket"). Note that OSHA prohibits the use of these platforms in construction situations unless it is impossible to do otherwise. Issues to consider when using a crane-suspended platform include the following:

- Fall protection must be attached to the crane block or platform frame.
- Occupants must stay safely in the platform when it is in motion.
- A crane operator must remain at the controls at all times the platform is occupied.
- A crane operator must have direct view of the platform or of a signal person that has a view.

- A crane-suspended platform should not be used in inclement weather.
- A crane-rated capacity at lift radius divided by four must be used and a full cycle testing must be completed before lifting.
- Platforms must contain no more than four persons at one time.
- Free fall options must not be used.
- Cranes must not travel with personnel on the platform.

11.4.3 Power Lines

On construction sites care must be taken to avoid contacting overhead and buried power lines. When a disaster occurs there is the added possibility that the collapse of a structure has damaged the electrical power source. The best scenario is to have the power transmission system de-energized. The other event that may cause power line problems is when construction equipment contacts a power source.

Approximately half of all power line contacts occur because of the use of heavy equipment, with the majority being caused by cranes. Contacts by ladders and items being carried account for about a third of the contacts.

Contacts with power lines by heavy equipment do not normally injure the equipment operator. However, injuries may occur to those standing near the equipment since they do not have the insulation protection of the tires that the operator does. It is estimated that 10 people on the ground are injured by power line contacts for every one operator injured. For this reason it is recommended that if a power line contact occurs, those on the equipment should stay on the equipment unless there is a fire. If an operator must leave the equipment, he or she should jump to the ground keeping feet close together and shuffling away with very small steps.

Those not operating equipment must be cognizant of any equipment getting too close to a power source. Also, entering an area where anyone is injured by a power line contact should be avoided until the power has been disconnected.

11.5 Closing Comments

Identifying hazardous materials is not the responsibility of SEERTeams. But from a personal safety standpoint it is prudent to understand the placarding system in a general sense. The labeling system shown in Figure 11.1 is from NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response, published by the National Fire Protection Association. The system is intended to provide basic information

for fire fighters, emergency responders and other personnel, to help them make decisions whether to evacuate or commence control procedures.

All participants in the actual assessment process should carry with them to the scene a list of all of their training certifications and other documentation such as medical surveillance records that may be required to perform these duties. All certifications and documentation should contain dates in order to assure that they are current.

11.6 Additional Sources

Specific safety training or knowledge should be tailored to the locations of the potential disaster. Sources of information for safety publications and training are listed below:

Occupational Safety and Health Administration
OSHA
U.S. Department of Labor
200 Constitution Avenue NW
Washington, DC 20210
Telephone: (202) 693-1648
http://www.osha.gov

National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143
Telephone: (630) 285-1121
http://www.nsc.org

Construction Safety Council
4100 Madison Street
Hillside, IL 60162
Telephone: (800) 552-7744
http:///www.buildsafe.org

National Society of Safety Engineers
1800 E. Oakton
Des Plaines, IL 60118
Telephone: (847) 699-2929
http:///www.asse.org

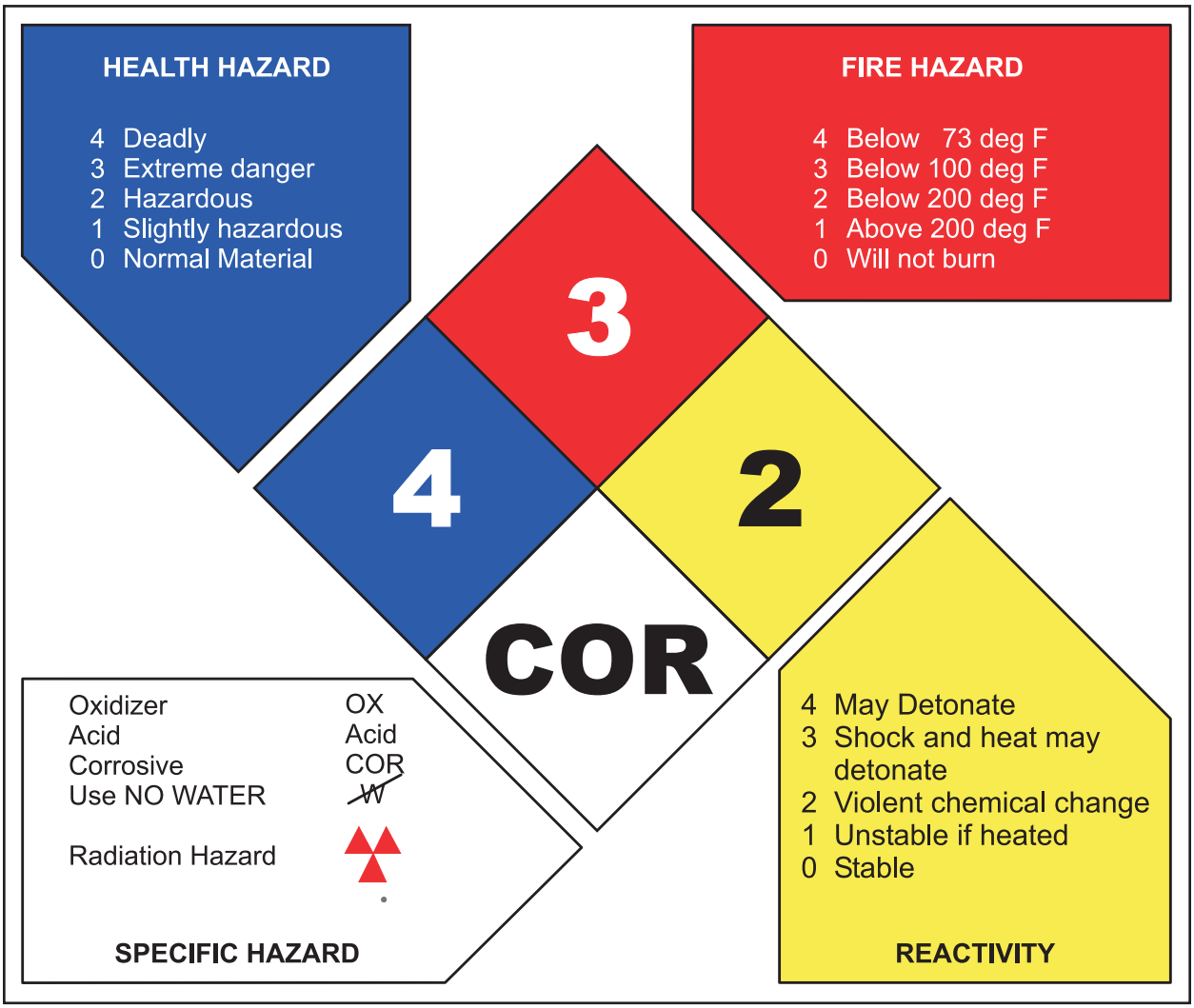


Figure 11.1 Placard for Identifying Hazardous Materials (NFPA 704)

CHAPTER 12

Legal and Insurance Issues

12.1 Introduction

As evidenced by the immediate response of structural engineers to the terrorist attacks of September 11, the first instinct of many professionals was to assist those in need without particular regard to their own liability. Fortunately, those who volunteered their services in New York City and Washington, D.C., performed their duties heroically, with no further loss of life occurring during rescue operations. Had there been additional fatalities, legal proceedings naming volunteers would have likely ensued. This chapter raises legal and insurance issues that should be considered prior to involvement on a Structure Assessment Team (or US&R Team, for that matter).

It cannot be overemphasized that these issues should be reviewed with legal counsel and an insurance broker to ensure that actions taken are compatible with the state laws and insurance coverage.

12.2 Risks Associated with Emergency Services

12.2.1 Working Conditions

Structural engineering services in the wake of a disaster primarily involve search and rescue operations and structure assessments. The predominant risk associated with both tasks is the need to provide timely decisions under extremely tight time constraints. Often, some decisions need to be made on the spot, with limited or no documentation about the existing structure in question, and with limited design/analysis tools at the engineer's immediate disposal. To make matters more difficult, the physical and emotional environment at a disaster scene may be very chaotic, especially in the immediate response phase. This reality leads to decisions being made under extremely stressful conditions.

12.2.2 Search and Rescue Operations

Search and rescue operations present many short-term, immediate risks. Chief among these is bodily injury to self, fellow rescue workers and disaster victims due to the less than desirable working conditions. As noted

elsewhere in this plan, FEMA Urban Search & Rescue (US&R) teams provide major support for large-scale search and rescue operations. (See Chapter 13 for more information.)

However, as seen in the 2001 response at the World Trade Center, disasters of previously unimaginable magnitudes may require the involvement of SEERTeam volunteers. Usually, the SEERTeam members serve on a Structure Assessment Team, but sometimes they may act in a supporting role to a US&R team. Because of the significant and specific challenges involved in this type of operation, it is prudent that SEERMembers receive and maintain appropriate comprehensive training similar to ATC-20.

12.2.3 Structure Assessments

Structure assessments expose the engineer to both immediate and long-term risks. Venturing into potentially damaged buildings presents a clear and present danger for bodily injury. Likewise, on-the-spot decisions regarding the stability of a structure or its associated components made under the conditions described above pose obvious and immediate risks compared to providing traditional engineering design/analysis services under calmer circumstances. The long-term risk associated with structure safety assessment stems from the short-term nature of initial assessments. Structural damage judged not to pose an immediate collapse threat may pose long-term strength or serviceability issues. For this reason it is important to define short-term assessments as just that; non-emergency professionals should provide long-term assessment as soon as it is safe and practical to do so.

12.3 Insurance Issues Specific to Emergency Services

The primary insurance-related issue involved in participating on a SEERTeam is making sure that one volunteers as a corporation and not as an individual acting alone. Acting on behalf of a company with professional liability insurance may keep that insurance in force for services provided in emergency situations unless specifically noted otherwise. Likewise, Worker's Compensation insurance should also remain in effect to cover injuries, provided the SEERTeam member acts on behalf of his or her company.

It remains to be seen how insurance companies will react and adjust coverages in the future when and if lawsuits are brought against professional volunteers acting in emergency situations. It is foreseeable that sureties might create special rider policies that cover these types of services. Regardless, now and in the future it is recommended that SEERTeam

members notify their insurance agents of their potential involvement and discuss any specific concerns and policy adjustments required.

12.4 Recommendations for Action

12.4.1 Types of Emergency Responders

Catastrophes generally can involve two types of responders. The first type of responder is the professional who by happenstance is close to the scene and assists in the heat of the moment. These are voluntary responders. The second type are professional responders who often arrive at the scene within hours or days of the incident.

The voluntary responders lack the luxury of time or business purpose to prepare and protect themselves. In most states there are laws, Good Samaritan statutes, designed to ameliorate some of the liability exposure. Other than the Good Samaritan laws, these professionals have limited ability to protect themselves. But this does not mean that they should not take steps to minimize risk. Generally these professionals render aid and play a very limited role at the scene of a catastrophe and then return to their usual practice. These professionals immediately following their initial response should prepare or have legal counsel prepare a letter identifying the discrete role of the professional in terms of the extent of any investigation and the short duration of their services. The letter should also admonish the appropriate official(s) or property owner(s) of the need for more exhaustive investigations and assessments and the potential risk for failing to do so.

The second class of responders are those professionals who respond as part of a wider business plan and who have contracted to respond or have developed business relationships for responding to emergencies. Often, these professionals serve at the behest of governmental entities, insurers and other institutions that have interests in damaged property. These professional responders together with their legal counsel should consider the recommendations raised in section 12.4.2. These professional responders with the luxury of time should work with the parties who would hire them to negotiate and reach agreements in advance of an emergency. This advance preparation should reduce their exposure to risk.

12.4.2 Develop a Standard Agreement for Emergency Services

In the absence of uniform legislation that protects all emergency respondents from legal action resulting from their non-negligent actions, it is highly recommended that a standard agreement be developed for implementation prior

to or during an emergency response. This is true whether or not one receives payment for his or her services, as the primary intention of an agreement in this situation is to limit undue risk by invoking waiver and indemnity provisions.

Chapter 16 includes example emergency agreements as starting points. Form 11 is written as a letter agreement and may be easier to implement than the short-form agreement, Form 12.

When developing and implementing a standard agreement it is important to give due consideration to the factors listed below. ***Again, these issues should be reviewed with legal counsel and an insurance broker to ensure that actions taken are compatible with state laws and insurance coverage.***

12.4.2.1 Defining the Scope of Services to Be Provided

In the wake of a disaster the scope of site services to be provided by SEERTeam members generally falls under the category of "Structure Assessment," and less often, "Search and Rescue Assistance." As stated previously, unless specifically trained in search and rescue operations, this type of service should be avoided. If trained to provide search and rescue assistance, it may be prudent to add the qualifying phrase "under the direction of [State; FEMA; fire department personnel; etc.] after the word assistance. In any event, that development of a specific scope of services in the early stage of a response is difficult if not impossible to define in more than general terms.

12.4.2.2 Payment and Time Limitations

It may sound callous to some to think of asking for payment for professional services under emergency conditions. However, consider the significant engineering efforts involved in the aftermath of the WTC and Pentagon disasters, and it becomes clear that long-term involvement without compensation could have serious financial consequences. Also to be considered is whether accepting payment for services could disqualify engineers from Good Samaritan legislation intended to provide protection to volunteers. In this situation, one should consider leaving payment out of an agreement enacted in the immediate aftermath of an emergency but specify a short-term time limitation for the contract. At that time, when the situation at the emergency site is likely to be more ordered, an agreement with a defined scope of services may be renegotiated and payment options considered.

12.4.2.3 Implementing the Standard Agreement

Imagine reporting to an emergency scene with a form agreement in hand and trying to obtain a signature. It could take some time and effort to locate

the party with controlling legal authority to execute the agreement, and under emergency conditions using precious time for this task could be wholly inappropriate. Now imagine that every engineer responding to the event is doing the same thing, and you understand that agreements for short-term professional services should be put into place with the appropriate authorities in the SEERProgram organization and implementation phases, prior to an actual emergency.

One difficulty is defining who actually has controlling legal authority over an emergency scene. Elsewhere in this document this party is identified as the Authority Having Jurisdiction (AHJ). In legal terms, the controlling legal authority is identified (for purposes of implementing an agreement) as the "Client." The Client could be one of several entities, such as the state, FEMA, the fire department or others. As SEERTeam members at state or regional levels implement a SEERProgram it is suggested that a standard, standing letter agreement be presented and implemented on a standing basis with each identified group, starting with the Emergency Management divisions of government where the SEERTeam is prepared to respond.

A second difficulty in implementing an agreement for emergency professional services is defining the "Consultant." Participation on a SEERTeam should be on a corporate basis, for reasons related to insurance coverage, as identified above. However, listing corporations as the "Consultant" could have the effect of broadening the definition of the SEERTeam beyond those individuals who have the proper training and are specifically active participants. Therefore, it is recommended that each regional or state SEERTeam maintain an up-to-date listing of "Consultants" and copy the list to all parties with which it has executed standard agreements when changes are made. The list would include corporations and all participating employees from each with their qualifications ("Structure Assessor" or, less likely, "Search and Rescue Assistant").

12.4.3 Lobby Controlling Authorities for Legal Protections

Many states have Good Samaritan laws on the books that give protection to citizens trying to help others in the event of a fire or accident. Some states have enacted specific legislation to protect engineers and other professionals in the wake of an emergency, while others have blocked these types of efforts. The SEA SEERCommittee, as a part of implementing a SEERProgram, should lobby its specific state legislators to sponsor and push through legislation with this provision (reference Form 13 in Chapter 16 for sample model language).

CHAPTER 13

FEMA's Urban Search and Rescue Plan

13.1 Introduction

This chapter provides information regarding the Urban Search and Rescue Response System that was developed under the direction of the Federal Emergency Management Agency (FEMA) in 1990. Structural engineers serve within this system as trusted and integral parts of each Urban Search and Rescue Task Force. Engineers who serve as part of the local SEERTeam need to be aware of the existence and operation of these engineers and the US&R Task Forces on which they serve. The US&R Task Forces are normally deployed to a disaster site within 24 hours and may remain engaged up to 30 days. The US&R engineers serve as federal employees in direct support of search and rescue operations. It is possible that mutually supportive interaction may be required between the US&R and SEERTeam engineers. This chapter provides SEERProgram participants with some history and background about US&R in order to facilitate that possible future interaction.

13.2 History

In 1990, The Federal Emergency Management Agency (FEMA), invited a selected group of roughly 200 professional and volunteer first responders to a conference in Seattle, Washington. Their purpose was to begin to define and initiate a Federal Urban Response System, based within local fire agencies. During this meeting, the basic outline of the FEMA Urban Search and Rescue system was developed.

The concept of a network of multi-disciplined, well trained and equipped, Urban Search Task Forces was proposed. It was agreed that the Task Forces would be distributed across the United States. Each of the teams would be identical in staff personnel, equipment and training.

The configuration was to include individuals with a wide range of skills and backgrounds. Each would be comprised of an identical group of 62

individuals with specialties in the areas of Search, Rescue, Medical, and Technical Support.

Each of the teams has the same cache of equipment. (Today, the cache has grown to about 70,000 lbs. and requires nine or 10 air force pallets to transport it.)

Each team would be expected to attain the same level of training. This training would eventually be developed for each of the specialty areas, such as structures specialist, heavy rigging and heavy rescue specialist.

All of the teams were designed to be self-sustaining. The search and rescue teams could not rely on what, if any, supplies would be available locally during a time of deployment. It was decided that members of the teams should be willing to be deployed from their home city for a period of 10 days. The teams would carry enough supplies and food to be self-sustaining for up to 72 hours. From the time of deployment, the teams were organized to work around the clock. The teams were split into two groups, each working alternate 12-hour shifts.

The teams were located on a regional basis across the nation. In order to ensure an acceptable response time, team members should have been able to reach their designated military air base within six hours of notification. At that point, air flight or other appropriate travel arrangements would be made, and the team would travel together to the disaster site.

Today, the configuration of each Task Force has grown to 70 members, with the addition of two Safety and eight Hazardous Materials (Hazmat) Specialists to enhance capability when responding to incidents involving weapons of mass destruction. Figure 13.1 shows the staff breakdown of the 70 members.

The original group of 200 conference attendees was asked to serve on numerous working groups to develop a detailed description of each task force individual position. The working groups created the following documents, which provided the written outline for the Task Forces.

US&R Position Descriptions and Checklists
US&R Operational System Description
US&R Equipment Cache List

In 1991, individual fire agencies were asked to submit applications to become part of the National Response System. The individual fire agencies

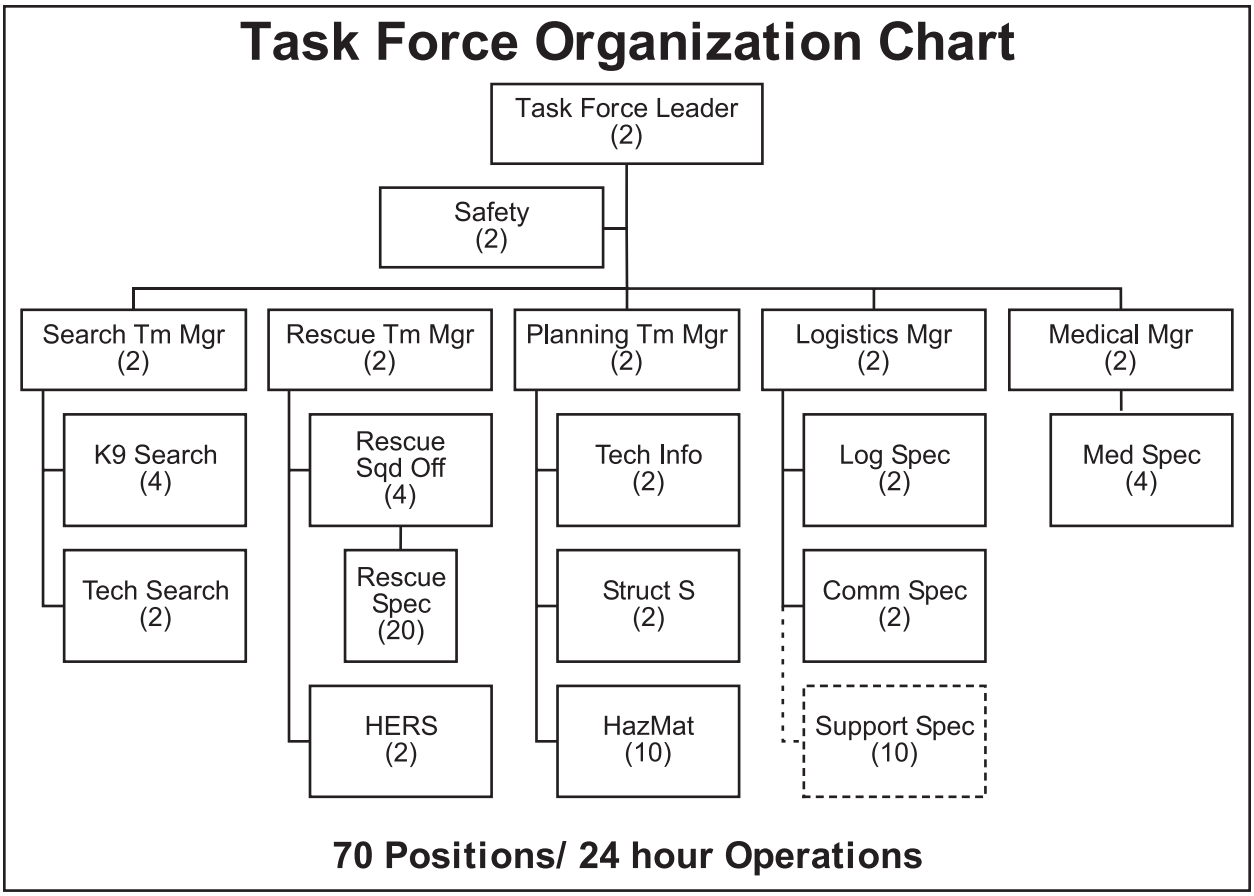


Figure 13.1 Task Force Organization

were expected to partially fund the startup groups. Upon acceptance in the National Response Systems, they would receive limited, matching funds.

Initially, 33 agencies responded, and of those 25 were chosen. During the late 1990s an additional three Task Forces were added to bring the total to 28. Figure 13.2 shows the location of the teams that currently make up FEMA's National Response System.

13.3 System Operation

The Urban Search and Rescue Task Forces are not automatically deployed to every emergency. The Federal US&R System is activated and deployed only after local authorities have determined that a disaster that overwhelms their response capabilities has occurred. In order to activate any part of the Federal Emergency Response System, the AHJ, normally the local Mayor, will request help, through his state's established procedures. At this point,

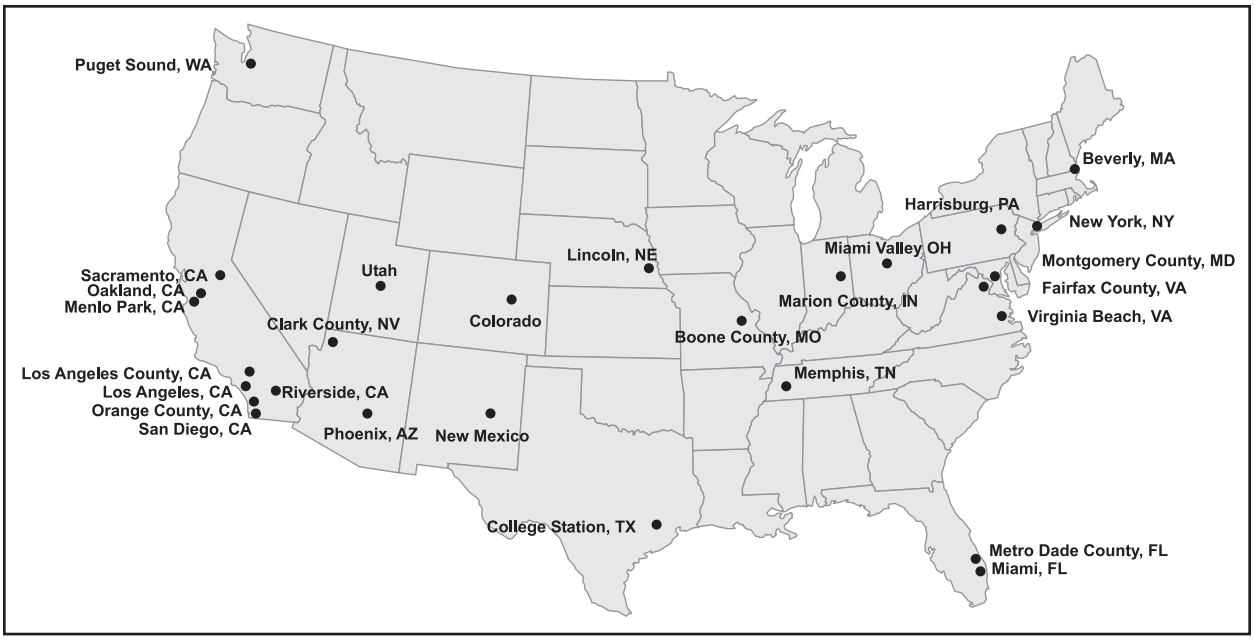


Figure 13.1 FEMA US&R Task Force Organization

the President of the United States declares a National Disaster, and the Federal Response Plan is implemented.

The Federal Response Plan, a legislative government plan, outlines the following 12 Emergency Service Functions. The lead agency for each Emergency Service Function is listed in parenthesis (refer to Section 13.4, Acronyms).

ESF 1 Transportation (DoT)
ESF 2 Communications (NCS)
ESF 3 Public Works and Engineering (DoD/USACE)
ESF 4 Firefighting (DoA/FS)
ESF 5 Emergency Management (DHS/FEMA)
ESF 6 Mass Care, Housing and Human Services (ARC)
ESF 7 Logistics Management and Resource Support (GSA)
ESF 8 Public Health and Medical Services (DHHS)
ESF 9 Search and Rescue (DHS/FEMA)
ESF 10 Oil and Hazardous Materials Response (EPA)
ESF 11 Agricultural and Natural Resources (DoA)
ESF 12 Energy (DoE)
ESF 13 Public Safety and Security (DoJ)
ESF 14 Long Term Community Recovery (DHS/FEMA)
ESF 15 External Affairs (DHS)

By the time the Federal Response System is implemented, the local emergency personnel are likely to have established a base operation center. The local Emergency Operations Center (EOC) is established to manage the disaster.

The AHJ also designates the Incident Commander (IC), and it is assumed that the incident will be controlled using the Incident Command System (discussed in Chapter 14).

To provide for the efficient deployment of the requested federal assets, a Federal Disaster Field Office (DFO) is established at a location agreeable to the AHJ. In addition, federal authorities appoint a Federal Coordination Officer (FCO), and a Federal Emergency Response Team (ERT) is assigned to staff the DFO. The state may also choose to establish an independent DFO, but more often collocates within the Federal FCO or Local EOC.

Based on the needs of the AHJ, the assistance of FEMA US&R Task Forces may be requested. In many cases several of the closest US&R Task Forces would have been alerted shortly after the disaster occurred and have already begun preparations for deployment.

In any large incident an additional group of specialists are immediately deployed as the FEMA US&R Incident Support Team (IST). This group is intended to arrive at the incident first and provide for the efficient transition of the US&R Task Forces into the local response.

A Unified Command should be set up under the Incident Commander to manage the multi-agency response. In addition, a Memorandum of Understanding (MOU) would be drafted to briefly outline the functions that local and Federal US&R personnel are expected to perform. This establishes a clear chain of command so that all parties understand how they are to interact and participate in the emergency response.

Once the FEMA US&R Task Forces arrive, they establish a Base of Operations (BoO) and deploy in one of the following modes:

- Blitz Mode—with all members working simultaneously for 24 hours or more
- Shift Mode—Task Force members work overlapping 13-hour shifts in each 24-hour period to provide a one-hour overlap at each shift change
- A combination of Blitz and Shift Modes—the initial 24-hour on period is followed by alternating shifts

An Incident Action Plan (IAP) is established for each operational period, and coordinating meetings are held at shift changes. In addition, planning meetings are held to anticipate and provide for needs likely to arise.

Each Task Force deploys with two engineers (Structure Specialists), and the IST is staffed with a minimum of two additional Structure Specialists. The engineers attached to the IST provide services in support of the Task Force Structure Specialists. These services include, for example,

- Performing initial building triage activities
- Interfacing with local engineers and contractors
- Obtaining existing structure drawings and other useful documentation
- Developing prioritized hazard reduction plans
- Developing building monitoring plans and coordinating their implementation
- Coordinating the deployment and work of additional engineers responding to the incident

Assistance from the IST engineers allows the Task Force Structure Specialist to focus on the following tasks, in direct support of their individual search and rescue (SAR) activities:

- Deployment with the Search & Reconnaissance Team
- Providing hazard assessment of their assigned structure and rubble area
- Providing sketched plans to define local hazards
- Providing direct aid to Search and Rescue personnel by developing access strategies
- Provide and devise mitigation alternatives

13.4 Acronyms

AFR	Air Force Regulation
AHJ	Authority Having Jurisdiction
ARC	American Red Cross
BoO	Base of Operations
CDC	Centers for Disease Control
CIS	Community Information System
DFO	Disaster Field Office
DHHS	Dept. of Health and Human Services
DHS	Department of Homeland Security
DMAT	Disaster Medical Assist Team

DoA	Dept. of Agriculture
DoD	Dept. of Defense
DoE	Dept. of Energy
DoT	Dept. of Transportation
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERT	Emergency Response Team
ESF	Emergency Support Function
EST	Emergency Support Team
FEMA	Federal Emergency Management Agency
FS	Farm Services
FCO	Federal Coordinating Officer
FRP	Federal Response Plan
GSA	General Services Administration
GIS	Geographic Information System
IAP	Incident Action Plan
IC	Incident Command
ICP	Incident Command Post
IST	Incident Support Team
JIC	Joint Information Center
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NCS	National Communications System
NDMS	National Disaster Medical System
PHS	Public Health Service
POA	Point of Arrival
POC	Point of Contact
POD	Point of Departure
TFCP	Task Force Command Post
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
US&R	Urban Search and Rescue

CHAPTER 14

Coordination with Emergency and Other Agencies

14.1 Introduction

Chapter 14 provides the Structural Engineer with information in the manner that emergency and other agencies coordinate, operate and communicate in an emergency. This is typically done through the National Incident Management System (NIMS) and the Incident Command System (ICS), which is described in Section 14.2 and shown in Figure 14.1. The chapter provides vital information on the command in an incident to facilitate communication and coordination with the other agencies. Understanding NIMS and ICS is critical to the success of any SEERProgram. Most likely, a SEERProgram will be only one very small component of what is likely a

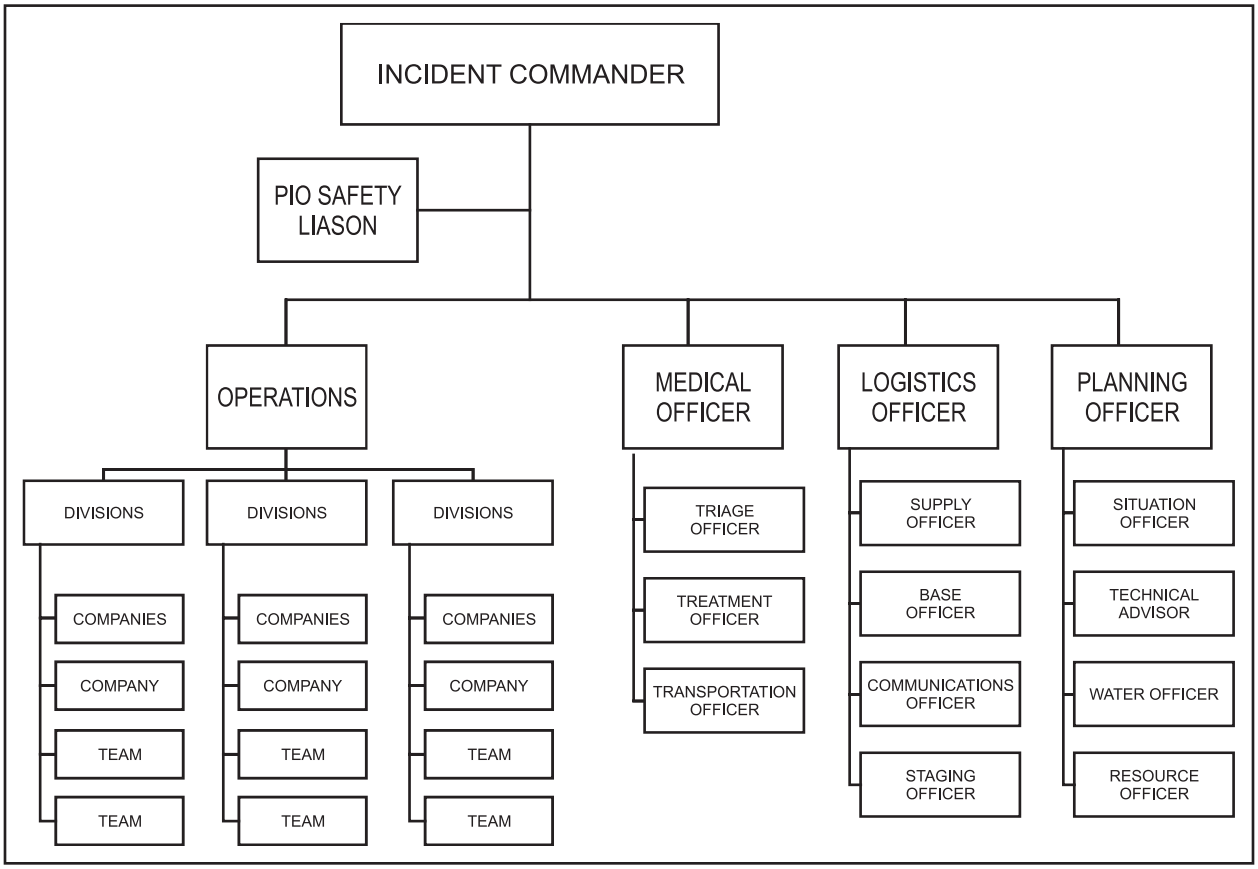


Figure 14.1 Incident Command System

very large incident response effort comprised of numerous local, state and federal agencies. As such, the SEERTeam member needs to understand the importance of a single command structure and the Chain of Command and how the SEER participants fit into the system.

Unlike most construction projects where the engineer is usually one of the "leaders" on a project site, within the ICS structure on a large-scale incident, the engineer will be taking direction from several other individuals and will not be "in charge."

On February 28, 2003, President Bush issued Homeland Security Presidential Directive 5. HSPD 5 directed the Secretary of Homeland Security to develop and administer a National Incident Management System. NIMS provides a consistent nationwide template to enable all government, private-sector, and nongovernmental organizations to work together during domestic incidents.

NIMS is a comprehensive, national approach to incident management that is applicable at all jurisdictional levels and across functional disciplines. The intent of NIMS is to:

- Be applicable across a full spectrum of potential incidents and hazard scenarios, regardless of size or complexity.
- Improve coordination and cooperation between public and private entities in a variety of domestic incident management activities.

NIMS Concepts and Principles

NIMS provides a framework for interoperability and compatibility by balancing flexibility and standardization.

- NIMS provides a flexible framework that facilitates government and private entities at all levels working together to manage domestic incidents. This flexibility applies to all phases of incident management, regardless of cause, size, location or complexity.
- NIMS provides a set of standardized organizational structures, as well as requirements for processes, procedures and systems designed to improve interoperability.

NIMS Components

NIMS is comprised of several components that work together as a system to provide a national framework for preparing for, preventing, responding to and recovering from domestic incidents.

These components include:

- Command and management.
- Preparedness.
- Resource management.

- Communications and information management.
- Supporting technologies.
- Ongoing management and maintenance.

Command and Management

NIMS standard incident management structures are based on three key organizational systems:

- The Incident Command System (ICS) defines the operating characteristics, management components and structure of incident management organizations throughout the life cycle of an incident
- The Multiagency Coordination System, which defines the operating characteristics, management components and organizational structure of supporting entities
- The Public Information System, which includes the processes, procedures and systems for communicating timely and accurate information to the public during emergency situations

Preparedness

Effective incident management begins with a host of preparedness activities. These activities are conducted on a “steady-state” basis, well in advance of any potential incident. Preparedness involves a combination of:

- Planning, training and exercises.
- Personnel qualification and certification standards.
- Equipment acquisition and certification standards.
- Publication management processes and activities.
- Mutual aid agreements and Emergency Management Assistance Compacts (EMACs).

14.2 Incident Command System

The Incident Command System, is a nationally recognized organizational methodology and command structure that permits the interaction of many different entities, agencies, departments, etc., and allows them to function as a cohesive unit during an emergency response. This paramilitary chain-of-command system clearly defines who is in charge of an incident. While developed based on military and federal agency responses, due to its efficiency and inherent system of accountability, many private sector companies now emulate an ICS structure for their everyday operations.

It is important to understand that regardless of the number of agencies involved at an incident, there should be a single ICS established, with a

single individual, or group of individuals, in charge of all decision making at that incident.

The SEERProgram's conformance with the ICS protocols and adherence to the established chain of command is imperative for a successful and safe deployment of SEERTeam members.

The ICS is a management process enabling an agency such as a fire department to effectively and efficiently control resources at incidents. The ICS, if developed and used properly, reduces property and life loss through effective organizational control. An ICS enables an agency to produce standard predictable results at any incident. The ICS fulfills these requirements through the assignment of specific duties to specific positions by allowing flexibility for organizational growth if the incident escalates. The ICS gains much of its strength and flexibility by using personnel with technical and/or organizational capabilities relative to the incident. Acceptance of the system requires a spirit of cooperation and teamwork by all personnel.

The ICS provides a method for the expansion of resources needed to address the incident as the incident increases in size or as resources arrive. It is a system that may be applied to small or large incidents.

The ICS directives describe the standard procedures that apply to any incident within the framework of local conditions, capabilities, limitations or problems.

14.2.1 ICS Operating Requirements

The following are system operating requirements for the Incident Command System.

- The system's organizational structure must be able to adapt to any incident that the agencies respond to.
- The system must be able to expand in a logical manner from an initial attack to a major incident.
- Implementation of the system should have the least possible disruption to emergency operations.

14.3 Command Procedure

The effective functioning of personnel requires clear decisive action on the part of the Incident Commander. This procedure identifies the standard operating procedures to be employed in establishing command and

operating a command post. It also fixes responsibility for the command function and its associated duties on one individual.

Command procedures are designed to accomplish the following:

- Fix the responsibility for command through a standard identification system.
- Ensure that strong, direct and visible command is established as early as possible on all incidents.
- Outline the activities and responsibilities of command.
- Provide a system for the orderly transfer of command.

Command procedures are designed to offer a practical framework for incidents and to effectively integrate the efforts of all members. The time involved to implement the ICS should produce time savings through effective incident control. An officer assuming command can quickly perform the standard procedures if they are well known to him.

14.4 Organization Structure

A Unified Command under the ICS consists of the following five line system components and the command staff.

- Incident Command—overall system command and management
- Operations—management and supervision of tactical suppression and rescue field operations
- Logistics—logistical support of incident operations
- Planning—operational planning
- Finance—responsible for funding for sustained operations
- Command Staff—key activities (not part of the line organization)

The ICS organization is activated at the moment of incident dispatch, with the system components and associated functions activated and deactivated based on the needs of the incident. Several functions may be performed by one individual in less complex situations. On a small fire, for example, the Incident Commander might perform all ICS responsibilities. Conversely, under large or complex situations, responsibilities for a control level position or function may be divided between two or more individuals. The key element of the system is that only one ICS organization exists per incident, regardless of the number of agencies involved.

The Command is responsible for developing an organizational structure utilizing standard operating procedures as soon as possible after arrival.

The size and complexity of the organization structure is determined by the incident.

The ideal structure of a complex incident should include the following four levels:

- Strategy Level (Command)
- Control Level (Operations)
- Tactical Level (Divisions)
- Task Level (Companies)

14.4.1 Strategy Level (Command)

Strategy level (command) refers to those functions necessary for overall control and accomplishment of strategic objective. The Command level should be staffed by the highest-ranking department officers. The Incident Commander activates the appropriate levels of the system as necessary.

14.4.2 Control Level (Operations)

Control level (operations) refers to those organizational elements in situations that are complex enough to require an intermediate or control level in the organizational structure. Operations is a level that may be implemented when Command finds it necessary to group divisions together to lessen Command's span of control. Generally, Operations assumes command of several divisions and reports to Command. Chief Fire Officers would normally staff this level. The Operation commanders should plan and control the functions of several divisions.

14.4.3 Tactical Level (Divisions)

Divisions are identified as the immediate tactical level of command in the organization structure. Chief Fire Officers or Captains, who concentrate on the more specific areas and tasks to meet the operational objectives, normally command Divisions. Generally, several companies are assigned to each Division, with the Division Commander reporting to an Operations Chief, or if the Operations level has not been established, reporting directly to Command.

14.4.4 Task Level (Company or Team)

Task level in the organizational structure refers to company functions or operations that contribute to the achievement of division objectives. The company officer or team leader reports to the appropriate division.

14.5 Personnel

14.5.1 Incident Commander

The Incident Commander, who is responsible for overall operations management, including activation of the ICS organization in accordance with incident needs, heads the ICS. The Incident Commander is supported by a Command Staff and assisted in the preparation of strategic plans by the Operations, Emergency Medical Services, Logistics and Planning.

The Incident Commander is responsible for the command function at all times. The term Command in this procedure refers to the person and the function. The Incident Commander may conduct planning meetings with appropriate personnel to ensure accomplishment of incident objectives.

The Incident Commander is responsible for the following tasks:

Initial Tasks (those tasks common to most incidents that have not reached major proportions)

- Assume command.
- Transmit a brief initial radio status report.
- Make an initial size-up of the situation.

Continuing Tasks (those tasks that occur during an incident beyond the scope described above. For example, a major fire, building collapse, hazardous materials incident, etc.)

- Establish a Command Post.
- Assign companies and division level functions.
- Continue to evaluate attack efforts and take appropriate actions, including the sounding of multiple alarms and/or calls for special service companies.
- If relieved by a superior officer, give a concise briefing on the situations and actions taken.
- Remain with him until reassigned.

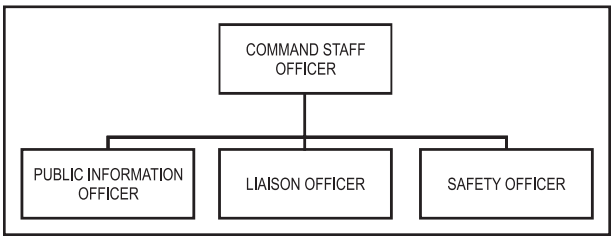


Figure 14.2
Command Staff Officer Responsibilities

14.5.2 Command Staff Officer

The Command Staff Officer reports to the Incident Commander and is responsible for key activities that are NOT part of the line organization. The scope of responsibility of the Command Staff Officer is wide in range, covering such activities as Public Information, Incident Safety and Incident Liaison (see Figure 14.2).

The ***Public Information Officer*** (PIO) reports to the Command Staff Officer, formulates and releases information about incident to news media and other agencies with the approval of the Incident Commander; provides press identification for the incident scene, prepares an initial news release as soon as possible, contacts PIO offices of assisting agencies to coordinate activities, provides liaison between media and incident personnel and, if appropriate, arranges press briefings.

The ***Liaison Officer*** also reports to the Command Staff Officer. He or she interacts with incident personnel and those outside action agencies who are accomplishing various functions at the incident scene, provides identification of liaison personnel for the incident and monitors the incident for current or potential interagency problems.

The ***Safety Officer*** also reports to the Command Staff Officer. He or she monitors the incident scene to identify actual or potential unsafe operations, investigates related injuries and accidents that involve personnel operating at the incident, advises incident personnel in regard to unsafe conditions or operations and makes recommendations for procedural changes to correct unsafe procedures or operations subsequent to the incident.

14.5.3 Operations—Suppression and Rescue

Operations are responsible for the management, direction and execution of all tactical operations related to the incident. Tactical Divisions are organized by geographical and/or functional assignments.

Divisions may be composed of several companies and/or teams (see Figure 14.3). Companies and teams may be assigned specific tasks. (Teams are made up of personnel from various companies.)

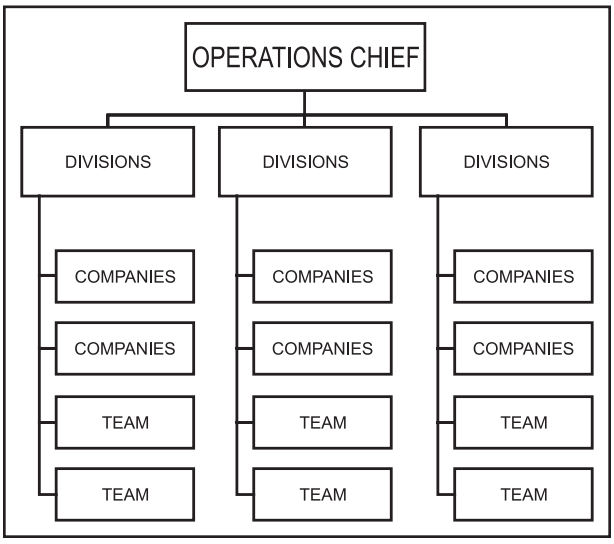


Figure 14.3 Tactical Divisions

The ***Operations Chief*** is responsible for managing, directing and executing all suppression and rescue operations related to the incident (for example, control the fire, stop the leak, rescue victims, etc.). He or she must maintain communications with the Division Commanders who report directly to him/her. From these reports, he or she determines the operational strategies and resources required.

The Operations Chief reports to the Incident Commander to keep him/her informed of progress being made and resources required.

Division Commanders are assigned a geographical area or general function. The Division Commanders assign specific tasks to their companies or teams. Division Commanders report to the Operations Chief.

14.5.4 Logistics

Logistics Operations provide those facilities, services and materials necessary to support suppression and rescue and EMS operations. Support functions include planning and staffing incident personnel requirements, communications, fueling, maintenance, repair and management of unassigned apparatus and personnel.

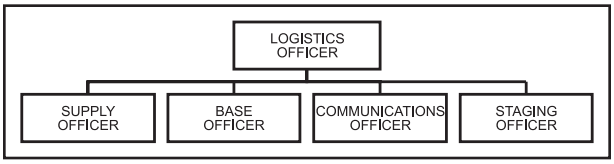


Figure 14.4
Logistics Officer Responsibilities

The ***Logistics Officer*** (see Figure 14.4) provides all support needs to the incident. The Logistics Officer orders all resources from off-incident locations. He or she also provides facilities, transportation, supplies, equipment maintenance and fueling, feeding of personnel and communications. The Logistics Officer reports to the Incident Commander.

The ***Supply Officer*** is responsible for ordering, receiving, storing and processing all incident-related resources, personnel and supplies.

The Supply Officer has basic responsibility for all offincident ordering, including the following:

- Set up Command Post
- All tactical and support resources (including personnel)
- Feeding of incident personnel

The Supply Officer is also responsible for providing the locations and the personnel to receive, process, store and distribute all supply orders. The Supply Officer reports to the Logistics Officer.

The ***Base Officer*** is responsible for the following:

- Maintenance and repair of primary tactical equipment, vehicles and ground support equipment
- Fueling of all mobile equipment
- Providing of transportation services in support of incident operations.

During major incidents, the Base Officer, in addition to a primary function of maintenance and services of all mobile vehicles and equipment, also maintains a transportation pool. The Base Officer must also provide the Logistics Officer with current information on the status of all vehicles, equipment, their locations and capability. The Base Officer reports to the Logistics Officer.

The ***Communications Officer*** is responsible for the most effective use of assigned communications equipment and facilities, supervision and operations of the incident communications center and distribution and recovery of communications equipment assigned to incident personnel. The Communication Officer reports to the Logistics Officer.

The ***Staging Officer*** establishes and identifies a location in or near the incident area. This location should be away from the danger zone, large and easily identifiable, readily accessible for large equipment and many personnel, so arranged that resources can be easily dispersed, tightly controlled and capable of being relocated.

The Staging Officer should maintain a current inventory of all resources available in the staging area. The Staging Officer reports to the Logistics Officer.

14.5.5 Planning Operations

Planning Operations collect, analyze and report information relating to the incident, such as incident history, current situation, prediction of probable course of incident events and preparation of alternative plans.

The ***Planning Officer*** (see Figure 14.5) gathers and analyzes all data regarding operations. He or she predicts the probable course the incident may take and prepares primary and alternate strategies for the Incident Commander.

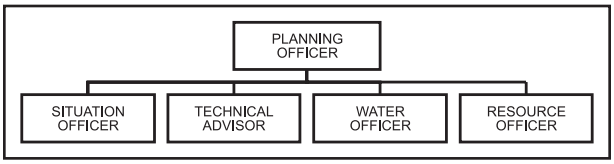


Figure 14.5
Planning Officer Responsibilities

The ***Situation Officer*** is responsible for collecting, processing and organizing situation information; preparing situation summaries and developing projections and forecasts of future events related to the incident. The Situation Officer reports to the Planning Officer.

The Technical Advisor provides technical specialists and advisors, which may be called upon, depending on the needs of the incident. Technical specialists and advisors could include the following:

- Hazardous materials team member for chemical spills
- Gas company advisor for gas leaks
- Structural engineer for high-rise incidents or building collapse

The Technical Advisor reports directly to the Planning Officer.

The ***Water Officer*** is responsible for water supply for the incident. He or she identifies strengths and weaknesses in the system, and identifies secondary sources of water supply. The Water Officer reports to the Planning Officer.

The ***Resource Officer*** is responsible for keeping track of all resources not committed at the incident. He or she keeps the Incident Commander updated on this information. The Resource Officer reports to the Planning Officer.

14.5.6 Emergency Medical Operations

Medical operations are responsible for the management coordination and direction of all operations related to the medical treatment and care of victims of an emergency incident.

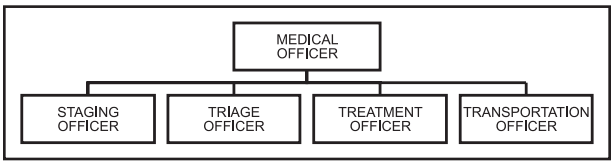


Figure 14.6
Medical Officer Responsibilities

The ***Medical Officer*** (see Figure 14.6) is responsible for the management and coordination of the medical operations. He or she establishes and develops the appropriate organization structure for medical operations, which may include the staging, triage, treatment and transportation. The Medical Officer reports to the Incident Commander.

The ***Staging Officer*** establishes the location of the staging area and directs incoming units. The Staging Officer coordinates with transport a location for BLS and ALS patients. They also maintain a "Unit Staging Log" and a reserve of at least two BLS and two ALS transport vehicles.

The ***Triage Officer*** determines the location of the triage sector and ensures that each victim is given a rapid triage assessment and is triage tagged. The Triage Officer reports progress to the Medical Officer.

The ***Treatment Officer*** is responsible for locating a suitable treatment sector area and reporting that location to the staging, triage and medical

sectors. The Treatment Officer also ensures that each victim is tagged indicating priority, and evaluates resources required for patient treatment and reports these needs.

The ***Transportation Officer*** is responsible for determining patient transportation requirements and obtaining appropriate transportation. The Transportation Officer also establishes ambulance staging (if command has not already done so) and loading areas, communicates with communication centers or hospitals to obtain medical facility status and treatment capability and coordinates patient allocation and transportation with the Treatment Officer, the communication center and hospitals, keeping a record of the number of patients sent to each hospital. He or she removes and saves the bottom two copies of the field report, reporting to the Medical Officer when the last patient has been transported. The Transportation Officer establishes and operates a helicopter landing site if applicable. The Transportation Officer reports progress to the Medical Officer.

14.6 Transfer of Command

The first officer to arrive assumes command until relieved by a ranking officer.

The first arriving District Chief assumes command after transfer of command procedures has been completed.

Assumption of command by a higher-ranking officer is discretionary. Notification of change of command is given over appropriate radio frequencies.

Within the chain of command indicated above, the actual transfer of command is regulated by the following procedures.

The officer being relieved briefs the officer assuming command, indicating the following:

- General situation status
  - Incident location, conditions and extension
  - Effectiveness of control and stabilization efforts
- Deployment and assignments of operating companies
- Appraisal of needs for additional resources

The arrival of ranking officers strengthens the overall command functions. All officers should exercise their command responsibilities in a supportive manner that ensures a smooth transition and the effective ongoing function of command.

14.7 Command Post Operation

A command post may be set up at any incident that the Incident Commander determines there is a need. A command post should be set up at all multiple alarms, major transportation accidents, hazardous materials incidents or natural disasters. The purpose of a command post is to coordinate operations, simplify communications procedures, provide logistical support and assist the Incident Commander.

Usually, the command post is set up in front of the incident in a highly visible location.

Some incidents may require a second command post. For example, in a high-rise fire on the upper floors, a forward command post would be set up two floors below the incident. (In this situation, the forward command post is referred to as the Operations Post.)

The incident may also require a fire/police cordon in the immediate vicinity of the incident, and no one except authorized personnel will be permitted to enter the cordon limit. A minimum area of traffic control is established in all directions from the disaster limits for approximately two blocks. Traffic corridors should be established for emergency vehicles to allow access to and from the disaster area.

14.8 Standard Description of the Emergency Scene

Getting a mental picture of an entire operation can sometimes be extremely difficult. However, communications and operations can be more efficient, when everyone concerned understands certain descriptions of the incident area. This is accomplished by assigning each side of the emergency incident a specific name. The FRONT (designated by the location of the Command Post) of the fire building or fire area is called SIDE A. Proceeding in clockwise manner, the left side of the incident (or fire area) is called SIDE B. The rear or backside of the incident (or fire area) is called SIDE C. The right side of the incident (or fire area) as you face the front is called SIDE D. (See Figure 14.7).

This system of lettering the sides around the fire building or fire area remains the same regardless of direction or points of the compass. Therefore, if it is announced on the radio that SIDE B is on fire, one would know that it was the building to the immediate left of the fire building. If told there were people trapped in SIDE D, one would immediately know that they were in

the building to the immediate right of the fire building.

In multi-story occupancies, floors are indicated by numbers (Number 6 indicates 6th floor). When operating in levels below grade, such as basements, numbers are also used. The difference is that the term subfloor is used to indicate the level below grade (for example, subfloor #1 indicates the first floor below grade).

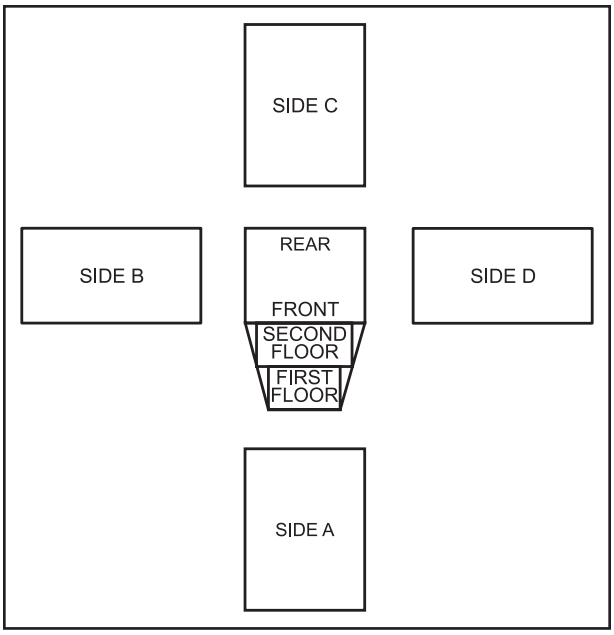


Figure 14.7
Bird's Eye View of Fire Building

14.9 Participating Agencies

14.9.1 Local Fire Rescue Departments

In an emergency that involves hazardous conditions, injury and or loss of life, the local fire department is in charge of the scene. The local fire department typically remains in charge throughout the operations at the scene until victims have been removed from the scene and conditions are made safe to the general public. At that point, another local agency, such as the police in a crime scene, would be left in charge of the scene.

Fire departments operate with a semi-military type of format in which there is a chain of command. During an emergency operation, personnel follow the incident command system to establish control of resources and personnel in a chaotic situation. The typical fire department hierarchy is shown in Figure 14.8.

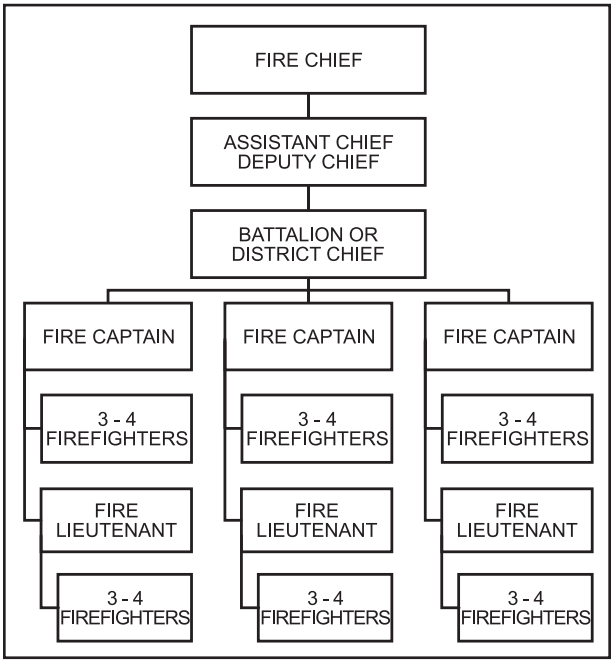


Figure 14.8
Fire Department Command Structure

14.9.2 Chain of Command

Chain of command refers mainly to the communication and direction subordinates and supervisors established within the agency. Communications must go through each level of the command hierarchy until it reaches the point where the request can be handled. For

example, the Incident Commander requests that an operation be performed at a certain sector. This in turn would be communicated to the Operations Commander which in turn would be communicated to the Sector Officer which in turn would be communicated to a Company Officer within that sector and directly in charge of a company. The Company Officer and crew would then proceed with the task at hand.

In the same manner, the chain of command rule works in the opposite direction. For example, say the Company Officer encounters difficulty in proceeding with the operation and is unable to accomplish the objective. He or she would report this to the Sector Officer who would report it to the Operations Commander who would report it to the Incident Commander.

At any point within the chain of command, if the officer at a certain level feels capable of adjusting or completely changing the operation without going further up the chain of command, he or she may do so. For example, the Operations Commander may stop the communication at his level and redirect the Sector Officer to have his or her crew do another operation that may meet the same objective. The Incident Commander may not know about the change in operation but will be notified when the objective is met or if it cannot be met at all. The Operations Officer would not communicate the new orders directly to the Company Officer performing the task. He or she would communicate this to the Sector Officer who would in turn communicate it to the Company Officer. It is extremely important to keep those levels between the command level and the task level informed of the operations. The Chain of Command works hand in hand with the Incident Command System.

14.10 Structural Engineers and the Fire Department

Most firefighting that involves firefighters is structural firefighting. With this in mind, the firefighter should have a basic understanding of building structures and the way in which materials behave under adverse conditions.

Considering that firefighters inhabit structures when they are in their weakest state or are experiencing severe loading conditions, the firefighter should have some type of training in structural engineering concepts, structural load paths the reaction of materials to fire. Unfortunately, many training programs fall short in the presentation of these critical concepts.

The engineer can provide an invaluable service to the fire department with regard to sharing information and technical knowledge. To offer training,

structural engineers could approach their local departments with the following guidelines in mind.

- The department's Training Officer can be contacted. A willingness on the part of the structural engineer could be expressed to assist the department in training of firefighters in building construction, structures, collapse assessment and mitigation and adverse effects of fire on a structure.
- Is the local fire department involved in a state or federal level Urban Search and Rescue Program? If so, an inquiry could be made about the requirements to become a Structures Specialist on the team. Training seminars could be provided for members of the team and others could be encouraged to attend. US&R trained firefighters should be included.
- The structural engineer should request to spend time (if allowed by the department) at the fire stations and if possible respond to alarms thereby becoming familiar with the work of the firefighter. This would allow the engineer to design a course that would most benefit the firefighter.
- The structural engineer should interview firefighters about their concerns regarding structures. The engineer may be surprised to find out that those structural systems that may be most efficient in the design of a structure are a detriment during a structural collapse or fire.

Once involved with the fire department in a training capacity, the fire department may develop confidence in the engineer. In smaller departments, an engineer may be included in large emergency responses where the expertise of a structural engineer is required. In larger departments, professionals from the local building departments would typically be utilized.

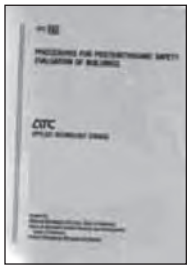
The engineer should also attempt to become involved in the closest local, state or federal Urban Search and Rescue Team. Such teams have positions for six structural engineers requiring two of these engineers during a deployment. Due to the intensive and extensive training and time commitments required of the Structures Specialists, it is usually difficult to fill the six trained positions. The positions require that the engineers be registered in their states in structural engineering. In addition, the engineers must go through training before they can be deployed. The time commitment and training required make this a serious commitment for the engineers. In addition, most engineers are in private practice and must make themselves available to respond within six hours of being notified. See Chapter 13—FEMA's Urban Search and Rescue Plan for additional information on US&R task forces.

CHAPTER 15

Information Resources

The following list represents selected references that may be useful in the development of response programs and the training of engineers for emergency condition surveys of structures. This list is not intended to be comprehensive, but rather is a broad overview of document types, in addition to a listing of the various organizations that are involved in post-incident response programs. In most cases, these organizations have additional information and resources listed on their web sites. Note that the NCSEA does not infer any approval, recommendation or endorsement of the following documents, authors or organizations by inclusion herein.

15.1 Building Condition Assessment Documents



TITLE

ATC-20: Procedures for Post Earthquake Safety Evaluation

ABSTRACT

This report provides procedures and guidelines for making on-the-spot evaluations and decisions regarding continued use and occupancy of earthquake-damaged buildings. Written specifically for volunteer structural engineers and building inspectors, the report includes rapid and detailed evaluation procedures for inspecting buildings and posting them as “inspected” (apparently safe), “limited entry” or “unsafe.” Also included are special procedures for evaluation of essential buildings (*e.g.,* hospitals) and evaluation procedures for nonstructural elements and geotechnical hazards

ORDERING / ADDITIONAL INFORMATION

Applied Technology Council
555 Twin Dolphin Drive, Site 550, Redwood City, CA 94065
650.595.1542 FAX 650.593.2320
www.atcouncil.org

TITLE

ATC-20-1: Field Manual: Post-earthquake Safety Evaluation of Buildings

ABSTRACT

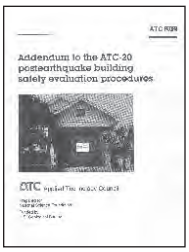
This report, a companion Field Manual for the ATC-20 report, summarizes the post earthquake safety evaluation procedures in brief concise format designed for ease of use in the field.

ORDERING / ADDITIONAL INFORMATION

Applied Technology Council
555 Twin Dolphin Drive, Site 550, Redwood City, CA 94065
650.595.1542 FAX 650.593.2320
www.atcouncil.org

TITLE

ATC-20-2: Addendum to the ATC-20 Procedures for Post Earthquake Safety Evaluation



ABSTRACT

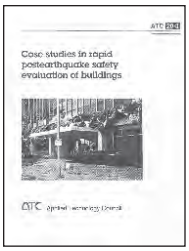
This report provides updated assessment forms, placards, and procedures based on in-depth evaluation and review of the application of the ATC-20 methodology following five earthquakes from 1989 to 1994.

ORDERING / ADDITIONAL INFORMATION

Applied Technology Council
555 Twin Dolphin Drive, Site 550, Redwood City, CA 94065
650.595.1542 FAX 650.593.2320
www.atcouncil.org

TITLE

ATC-20-3 Case Studies in Rapid Post Earthquake Safety Evaluation

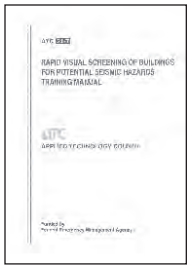


ABSTRACT

The report illustrates 53 case studies using the ATC-20 Rapid Evaluation procedure, including 21 from the 1989 Loma Prieta earthquake and 12 from the 1994 Northridge event. Rapid Evaluation is the first, and many times the only, safety evaluation performed. Each case study is illustrated with photos and describes how a building was inspected and evaluated for safety and includes a completed safety assessment form and placard.

ORDERING / ADDITIONAL INFORMATION

Applied Technology Council
555 Twin Dolphin Drive, Site 550, Redwood City, CA 94065
650.595.1542 FAX 650.593.2320
www.atcouncil.org



TITLE

ATC-21-T: Rapid Visual Screening of Buildings for Potential Seismic Hazards Training Manual

ABSTRACT

This training manual facilitates the presentation of the contents of the ATC-20 and ATC-20-1. The training materials consist of 160 slides of photographs, schematic drawings and textual information and a companion training presentation narrative coordinated with the slides. Topics covered include posting system; evaluation procedures; structural basics; wood frame, masonry, concrete, and steel frame structures; nonstructural elements; geotechnical hazards; hazardous materials and field safety.

ORDERING / ADDITIONAL INFORMATION

Applied Technology Council
555 Twin Dolphin Drive, Site 550, Redwood City, CA 94065
650.595.1542 FAX 650.593.2320
www.atcouncil.org

TITLE

ATC-45: Field Manual: Safety Evaluation of Buildings after Wind-storms and Floods

ABSTRACT

The procedures are based on those already developed for earthquakes and published in ATC-20 and include, in appendices, guidance for safety inspection after damaging windstorms and floods. The report provides interim procedures and guidelines to determine if damaged buildings can be safely occupied. Posting procedures and placards are recommended.

ORDERING / ADDITIONAL INFORMATION

Applied Technology Council
555 Twin Dolphin Drive, Site 550, Redwood City, CA 94065
650.595.1542 FAX 650.593.2320
www.atcouncil.org

TITLE

ATC-26-3a: U.S. Postal Service Field Manual: Post Flood and Windstorm Safety Evaluation of Postal Buildings (available only to governmental agencies)

ABSTRACT

This report has a pocket notebook format and was specially prepared for USPS use. It is adapted from ATC-20 and ATC-26-2

ORDERING / ADDITIONAL INFORMATION

Applied Technology Council
555 Twin Dolphin Drive, Site 550. Redwood City, CA 94065
650.595.1542 FAX 650.593.2320
www.atcouncil.org

BIBLIOGRAPHIC REFERENCE

EERI 96-01: *Post Earthquake Investigation Field Guide*
ISBN 0-943198-54-2

ABSTRACT

Covers a great variety of subjects from geosciences to engineering, emergency management and social sciences. It emphasizes careful advance planning, outlines procedures for team coordination, describes responsibilities of project participants and offers guidelines for specific data collection in the field. It contains various forms, international information sources and contact names, pre-departure checklist and recommendations for further research.

ORDERING / ADDITIONAL INFORMATION

Earthquake Engineering Research Institute (EERI)
499 14th Street Suite 320, Oakland, CA 94612-1934 USA
Phone (510) 451-0905 Fax (510) 451-5411
www.eeri.org

BIBLIOGRAPHIC REFERENCE

FEMA Building Performance Assessment Team (BPAT) Reports—*various incidents*

ABSTRACT

The BPAT Program utilizes the combined resources from a federal, state, local and private sector partnership to study building performance as part of FEMA's national mitigation effort. The BPAT reports are a summary of the

lessons learned from the team's response to a disaster incident. Reports are available from many recent natural and man-made disasters.

ORDERING / ADDITIONAL INFORMATION

FEMA Publications and Distribution Facility: 1-800-480-2520
http://www.fema.gov/mit/bpat/

BIBLIOGRAPHIC REFERENCE

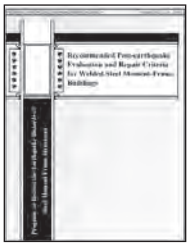
FEMA 306—*Evaluation of Earthquake Damaged Concrete and Masonry Buildings*

ABSTRACT

Reviews inspection methodologies and damage assessment protocols for concrete, unreinforced and reinforced masonry structures.

ORDERING / ADDITIONAL INFORMATION

FEMA Publications and Distribution Facility: 1-800-480-2520
http://www.fema.gov/



BIBLIOGRAPHIC REFERENCE

FEMA 352—*Recommended Post-Earthquake Evaluation and Repair Criteria for Welded Steel Moment-Frame Buildings*

ABSTRACT

Discusses the analysis of damage to steel moment-frame structures including an assessment of damage and risk of continued occupancy.

ORDERING / ADDITIONAL INFORMATION

FEMA Publications and Distribution Facility: 1-800-480-2520
http://www.fema.gov/

15.2 Fire Service and Urban Search and Rescue Documents

TITLE

USACE Structures Specialist Field Operations Guide (STS FOG)

ABSTRACT

This manual is a summary of information included in the Structures Specialist training program provided to the FEMA US&R team Structures Specialists. The manual contains logistics information, in addition to shoring design criteria and other useful structural reference information.

DOWNLOAD / ADDITIONAL INFORMATION

www.disasterengineer.org

TITLE

Collapse of Burning Buildings: A Guide to Fireground Safety

ABSTRACT

Reviews types and causes of fire-induced building collapse and fireground strategy and tactics for safe operations.

ORDERING / ADDITIONAL INFORMATION

Dunn, Vincent
1998 PennWell Publishing, ISBN 0878149031

TITLE

Building Construction for the Fire Service, Third Edition

ABSTRACT

A comprehensive overview of building construction types and hazards from a fire-service perspective.

ORDERING / ADDITIONAL INFORMATION

Brannigan, Francis L
2001, National Fire Protection Association, ISBN: 087765381X

TITLE

Building Construction Related to the Fire Service, Second Edition

ABSTRACT

A training manual with basic information about how buildings are designed and constructed and how this relates to fire control and prevention.

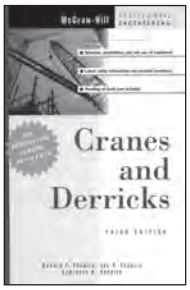
ORDERING / ADDITIONAL INFORMATION

International Fire Service Training Association (ISFSTA),
1999, IFSTA Fire Protection Publications, ISBN 0-87939-162-6

15.3 Engineering, Construction and Forensic References

TITLE

Cranes and Derricks, 3rd Edition



ABSTRACT

A comprehensive overview of the capabilities, advantages and disadvantages of all types of cranes and derricks.

ORDERING / ADDITIONAL INFORMATION

Shapiro, et. al.
1999; McGraw-Hill Professional Publishing; ISBN: 0070578893

TITLE

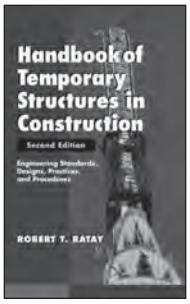
Handbook of Rigging, 4th Edition

ABSTRACT

A broad overview and guide regarding the selection and use of various rigging systems and tools including wire rope assemblies, scaffolds, cranes, derricks, hoists, etc.

ORDERING / ADDITIONAL INFORMATION

Rossnagel, et. al.
1988; McGraw-Hill Professional Publishing; ISBN: 0070539413



TITLE

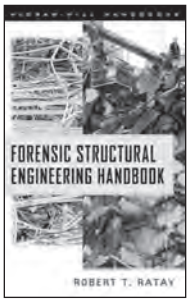
Handbook of Temporary Structures in Construction

ABSTRACT

Compendium of information covering the design, construction, inspection and maintenance of temporary structures such as cofferdams, earth-retaining structures, slurry walls, underground supports, scaffolding and bridge falsework.

ORDERING / ADDITIONAL INFORMATION

Ratay, et. al.
1996; McGraw-Hill Professional Publishing; ISBN: 0070512612



TITLE

Forensic Structural Engineering Handbook

ABSTRACT

A review of the engineering analysis of structural defects and failures in steel, concrete, timber and masonry structures, stone and precast cladding, foundations and retaining walls and temporary structures.

ORDERING / ADDITIONAL INFORMATION

Ratay, et. al.
2000; McGraw-Hill Professional Publishing; ISBN: 0070526672

TITLE

Forensic Engineering Investigation

ABSTRACT

Describes methodologies used by engineers and scientific investigators to evaluate 21 common types of failures and catastrophic events, including wind damage to structures, vehicle accidents, fires, explosions, lightning damage and industrial accidents.

ORDERING / ADDITIONAL INFORMATION

Noon
2000; Lewis Publishers, Inc.; ISBN: 0849309115

TITLE

National Association of Demolition Contractors Demolition Safety Manual

ABSTRACT

A complete reference of safe practices for demolition operations.

ORDERING / ADDITIONAL INFORMATION

National Association of Demolition Contractors
16 N. Franklin Street, Suite 203, Doylestown, PA 18901-3536
(800)-541-2412 Fax: (215)348-8422
http://www.demolitionassociation.com/

15.4 Other Useful Resources

FEMA—Guide for All Hazard Emergency Operations Planning
http:www.fema.gov.pte/slg101.pdg

National Response Team (Multi-agency Haz-Mat Response)
www.nrt.org

United States Environmental Protection Agency
http://www.epa.gov/ebtpages/emeremergencyresponse.html

The American Red Cross Disaster Services
http://www.redcross.org/services/disaster/

United States Department of Justice
http://www.usdoj.gov/

United States Department of Defense
http://www.defenselink.mil/

CDC/NOISH Suggested Guidance for Supervisors at Disaster Rescue Sites
http://www.cdc.gov/niosh/emhaz2.html

NEMA (National Emergency Management Association)
www.nemaweb.org

California Governor's Office of Emergency Services
http://www.oes.ca.gov/

Washington State Comprehensive Emergency Management Planning Guide
http://www.wa.gov/wsem/3-peet/plans/

15.5 Transportation Structure References

United States Army Corps of Engineers—Periodic Safety Inspection and Continuing Evaluation of USACE Bridges
http://www.usace.army.mil/inet/usace-docs/eng-regs/er1110-2-111/toc.htm

Federal Highway Administration (FHWA)
- Bridge Inspector's Training Manual/90 (FHWA-PD-91-015)
- Safety Inspection of In-Service Bridges Participant Notebook (FHWA-HI-94-031)
- Bridge Inspector's Manual for Movable Bridges (FHWA-IP-77-10)
- Culvert inspection manual Supplement to the Bridge Inspector's training manual (FHWA IP-86-2)
- Available at: http://isddc.dot.gov/

CALTRANS (California Department of Transportation)
- Instructions for Emergency Response
- Available from: CALTRANS, Division of Structures, Office of Structure Maintenance and Investigations

MDOT (Michigan Department of Transportation)
- Metro Region Bridge Emergency Management Plan

15.6 Other Preparedness Programs

There are a significant number of information resources and other preparedness programs available regarding post-disaster building hazard assessment by various government, private and non-profit agencies. The following is a brief summary of other preparedness programs and a list of organizations that can be contacted directly for additional information.

ASCE Critical Infrastructure Response Initiative (CIRI)
The ASCE Board of Direction established the Critical Infrastructure Response Initiative (CIRI) following the tragic events of September 11, 2001. Through CIRI, ASCE hopes to establish strategies and guidelines to assess U.S. infrastructure vulnerability, make infrastructure renovation to resist terrorist assaults a priority, identify research and development needs for new approaches to protecting critical infrastructure, develop retrofit designs to mitigate damage from disasters, develop new approaches to design and construction and improve disaster preparedness and response.

The Infrastructure Security Partnership (TISP)

Following the tragic events of September 11, 2001, the U.S. Army Corps of Engineers (USACE) created The Infrastructure Security Partnership (TISP). TISP consists of an "association of associations and agencies," a partnership, to collaborate on issues related to the security of the nation's built environment. The Partnership will act as a national asset facilitating dialogue on domestic infrastructure security and offering sources of technical support and sources for comment on public policy related to the security of the nation's built environment. The Partnership will collaborate on issues related to the security of the nation's built environment and leverage members' collective technical expertise, research and development capabilities. It is a fundamental goal of the Partnership to reach and include all stakeholders potentially affected by any disaster and to provide technical assistance and information to the Office of Homeland Security.

Society of American Military Engineers (SAME) FAST START Program

The FAST START plan is an interactive readiness program that endeavors to support government at all levels in its emergency preparedness capabilities. The Society of American Military Engineers (SAME), in cooperation with its corporate members/firms, has published a FAST START plan template to help organizations come to the aid of governments and citizens in time of national emergencies, including natural and manmade disasters. The FAST START plan outlines how civilian architectural and engineering firms, construction contractors, materials suppliers and other firms can interact with military and government construction agencies to effectively respond to any major emergency.

Building Occupancy Resumption Program (BORP)

The Building Occupancy Resumption Program was developed by the City of San Francisco Building Department in the mid 1990s to allow building owners to "pre-register" their buildings with the building department to allow for more rapid post-earthquake inspections by the owner's structural engineers.

Seattle Disaster Aid & Response Teams (SDART)

The Seattle Disaster Aid & Response Teams is a program started by the City of Seattle that provides a framework for local communities and neighborhoods to organize disaster response and recovery teams to perform light search and rescue and rapid building safety inspections. SDART is designed to promote this neighborhood organization and preparedness.

FEMA Urban Search and Rescue (US&R)

The FEMA Urban Search and Rescue Program is a first response program set up by FEMA to assist state and local jurisdictions with heavy rescue

operations in the aftermath of declared disasters. See Chapter 13 for additional information.

FEMA Building Performance Assessment Teams (BPAT)

The FEMA Building Performance Assessment Teams (BPAT) program is set up and funded by FEMA to investigate, record and document damage of buildings after disasters to improve the current state of practice to avoid future losses after significant disasters.

EERI Learning from Earthquakes Program (LFE)

The EERI Learning from Earthquakes Program (LFE) is a multidisciplinary program funded by grants from the National Science Foundation to investigate, collect information and document damage from significant earthquakes all over the world. The basic intent of the program is to reduce the loss of life, property and economic impacts from future earthquakes by documenting damage and implementing lessons learned.

Structural Engineers Associations

The structural engineers associations on the west coast of the United States have been particularly active in emergency preparedness activities and performing emergency building safety assessments for various local and state agencies following major earthquakes and wind and snowstorms. These organizations already have organizational structures in place, have implemented “Good Samaritan” laws and have developed procedures to perform these emergency safety assessments on a volunteer basis. They regularly provide ATC-20 training to their members and other organizations upon request.

Structural Engineers Association of California
1730 I Street, Suite 240
Sacramento, CA 95814-3017
(916) 447-1198
(916) 443-8065 FAX
info@seaoc.org

Structural Engineers Association of Oregon
P.O. Box 3285
Portland, OR 97208
(503) 399-7312
(503) 587-0337 FAX
email: seao@seao.org

Structural Engineers Association of Washington
P.O. Box 72
Southworth, WA 98386
(206) 682-6026
www.seaw.org

15.7 Safety Training and Reference Sources

Occupational Safety and Health Administration (OSHA)
U.S. Department of Labor
200 Constitution Avenue NW
Washington, DC 20210
Telephone: (202) 693-1648
http://www.osha.gov

National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143
Telephone: (630) 285-1121
http://www.nsc.org

Construction Safety Council
4100 Madison Street
Hillside, IL 60162
Telephone: (800) 552-7744
http:///www.buildsafe.org

National Society of Safety Engineers
1800 E. Oakton
Des Plaines, IL 60118
Telephone: (847) 699-2929
http:///www.asse.org

FEMA Emergency Management Institute
National Emergency Training Center
16825 South Seton Avenue
Emmitsburg, MD 21727
Telephone (301) 447-1000
Fax (301) 447-1052
http://training.fema.gov/EMIWeb/

CHAPTER 16

Forms

16.1 Introduction

The following forms are intended for use during the organizational and response phases of an emergency. The forms may not be comprehensive or detailed enough for all emergencies but are a good starting point for basic organization and assessment record keeping.

16.2 List and Description of Forms

Form 1. Volunteer Interest Profile Form (2 pages)
It is important to have an up-to-date database of SEER volunteers prior to a disaster. The Volunteer Interest Profile Form was adapted from similar versions used by SEAONC and SEAOI. The Interest Profile Form can be customized to meet local requirements and database needs.

The Interest Profile Form can also be used to obtain current information during a disaster. As volunteers arrive at the SEERCenter, they should fill out an updated profile form with their current information.

Form 2. Phone Tree for Emergency Response (Organization/Response)
This form should be used to contact engineers for disaster response. All SEER volunteers should be provided with an updated copy of the phone tree regularly and/or it should be posted on the web. At a minimum, the phone tree should be tested yearly.

Each local office of emergency management agency or potential authority having jurisdiction should be given the names of the SEERCommittee Chair along with two to three coordinators with regularly updated information.

Expand or collapse the tree as necessary. However, each person should only be responsible for contacting three to four other SEER volunteers.

A good way to separate engineers into groups in a state is to divide them into regions by area code.

Note that you should continuing working your way down the phone tree list until you reach someone who is able to continue the calls further down the chain, then go back and keep trying to contact the people you missed.

Form 3. SEER and Emergency Personnel (Response)
During a disaster, it is critical to know the point of contact for each group. This form should be filled out and updated prior to a disaster. During a disaster it should be displayed prominently in the SEERCenter and other important operation centers.

Form 4. ATC-20 Rapid Safety Assessment Form (Response)
The Rapid ATC Evaluation Form should be used for initial building and transportation structure assessments. The latest version of the form can be downloaded from ATC's website at www.atcouncil.org.

Form 5. ATC-20 Detailed Safety Assessment Form (2 pages)
The Detailed ATC Evaluation Form should be used for secondary building and transportation structure assessments. The latest version of the form can be downloaded from ATC's website at www.atcouncil.org.

Form 6. ATC Placards (Response)
The placards shown were developed by the Applied Technology Council (ATC) and are typically posted on buildings after assessments. Official Placards will be supplied by the AHJ. PLACARDS SHOULD ONLY BE USED IF REQUESTED BY AND UNDER THE AUTHORITY OF THE AHJ. The AHJ may decide to use its own version of an assessment placard.

The placards should be printed on red, yellow, or green paper as noted at the bottom of the forms.

Form 7. Transportation Evaluation Form (Response) (3 pages)
A sample transportation assessment form is provided. The California Division of the Federal Highway Administration created the form.

Form 8. Field Activity Log (Response) (2 pages)
Each Group Coordinator at the end of each shift should complete the activity log. The log notes which activities were assigned, completed or still need attention. It also records the team members and any additional areas that may need attention. Based on FEMA ICS 214 form.

Form 9. Incident Log-In / Log-Out Form (Response)
An accurate log of teams and volunteers who are on-site along with their locations should be recorded at each shift change. This record is

very important in order to account for all volunteers in the event of a second emergency.

Form 10. Media Activity Log (Response)
The Media Coordinator should keep a list of all information that is disseminated and to whom it is given. An up-to-date Media Activity Log will allow the Media Coordinator to update the media and information is updated or changes.

Form 11. Letter Agreement for Emergency Professional Services (Response)

Form 12. Short-Form Agreement for Emergency Professional Services (Response) (2 pages)

Form 13. Sample Model Language for Good Samaritan Law (Organization)

Form 1. Volunteer Safety Assessment Engineers

SEER Directory for **YOUR STATE**

Please use this form to indicate your desire to participate as a Volunteer Safety Assessment Engineer. Fax or send completed forms to: **YOUR SEA ORGANIZATION STATE**
YOUR NAME
YOUR ADDRESS
YOUR CITY, STATE
facsimile: **YOUR FAX**

☐ Please add my name to the Volunteer Safety Assessment Engineers Directory—I have read the SEER Emergency Volunteer Expectations and have completed the profile update.

Signature: _____ Date: _____

Name: _____

Employer: _____

Work Address: _____ Work Cell Phone/Pager: _____

Work Phone: _____

Work e-mail: _____

Home Address: _____

Home Phone: _____ Home Cell Phone/Pager: _____

Home email: _____

Licensure
☐ Reg. **YOUR STATE** Structural Engineer (SE)
☐ Reg. **YOUR STATE** Professional Engineer (PE)
☐ Reg. **YOUR STATE** Engineer-In-Training (EIT)
☐ Reg. **YOUR STATE** Architect (RA)
☐ Contractor
☐ Other: _____
_____ —Years of Experience

Areas of Expertise
☐ Residential
☐ Commercial buildings
☐ High-rise structures
☐ Transportation structures
☐ Utilities and related structures
☐ Surveying
☐ Evaluation of existing buildings

Emergency and Assessment Training
☐ FEMA or USACE Urban Search and Rescue Structural Specialist Training
☐ ATC-20
☐ OSHA Training
Please specify: _____
☐ First Aid/ CPR Training
☐ Other: _____

Other skills or equipment access that may be of use in an emergency situation:
_____
_____
_____

Special medical conditions:
_____
_____
_____

Do you have any travel restrictions if requested to volunteer out of state: ☐ Yes ☐ No

SEER Emergency Volunteer Expectations *for* YOUR STATE

YOUR SEA ORGANIZATION appreciates your commitment to the Safety Assessment Volunteer program. If you have any questions or concerns regarding the program please contact **CONTACT A** at **CONTACT A EMAIL,** or **CONTACT B** at **CONTACT B EMAIL.**

YOUR SEA ORGANIZATION recognized the importance of structural engineers needed for structural disasters, natural or man-made. In an effort to organize structural engineers throughout the state, **YOUR SEA ORGANIZATION** had requested that all interested individuals complete and return the Volunteer Safety Assessment Engineers' form.

Because of the unknown problems incurred in a disaster situation, **YOUR SEA ORGANIZATION**cannot specifically assign tasks before the incident. Instead this program is the starting point for a list of available and qualified engineers should the need arise. In the event of an emergency, the local authorities of the affected area may request the aid of the Volunteer Safety Assessment Engineers through **YOUR SEA ORGANIZATION. YOUR SEA ORGANIZATION** will then assess the need and expertise of engineers required for the situation and as appropriate contact those listed in the directory. This will allow for a timely and organized deployment of structural engineers.

The primary role task of the volunteer services provided by **YOUR SEA ORGANIZATION** will be post-event structural damage assessment of immediately affected and/or surrounding buildings. This includes quickly determining the issue of safe occupancy, potential for collapse, and other related hazards. Volunteers should be familiar with ATC-20. Specifics will be discussed at future training or the emergency field office.

You should have the following equipment readily accessible at both work and home: hard hat, gloves, flashlight, work boot and/or walking shoes, tape measure, water bottle, clipboard, pens, cell phone, camera and film. Also, it is important to have personal identification and a photocopy of your engineering license.

Any member of **YOUR SEA ORGANIZATION** can volunteer as a Safety Assessment Engineer. There is work for all members regardless of their level of experience. **YOUR SEA ORGANIZATION** will staff the emergency accordingly.

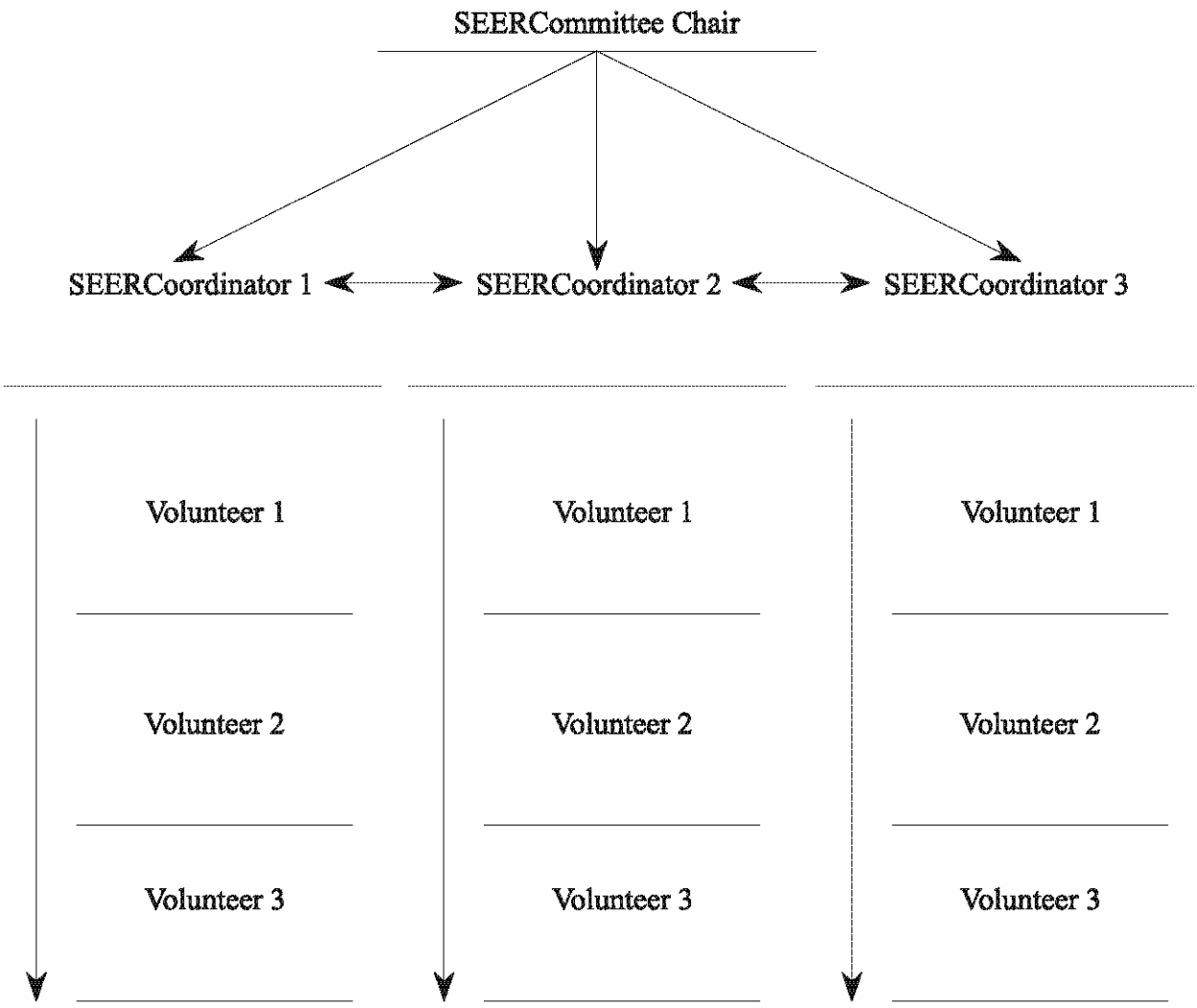
It is recognized that design professionals cannot, on short notice, leave their families and jobs for an indefinite amount of time. In general, volunteers will be asked to commit to two days. It is also recommended that you request advance consent from your employer.

An emergency may be the result of a tornado, earthquake, explosion, act of terrorism, or other related event. Please provide all applicable information on the profile form. In the time of an emergency, contact information other than at work may be needed. The information you provide will only be used by **YOUR SEA ORGANIZATION** and local authorities for emergency situations.

Please remember that you are a volunteer and a professional. You will be evaluating structures for people whose lives have been disrupted. You are expected to remain sensitive to this fact throughout your assignment.

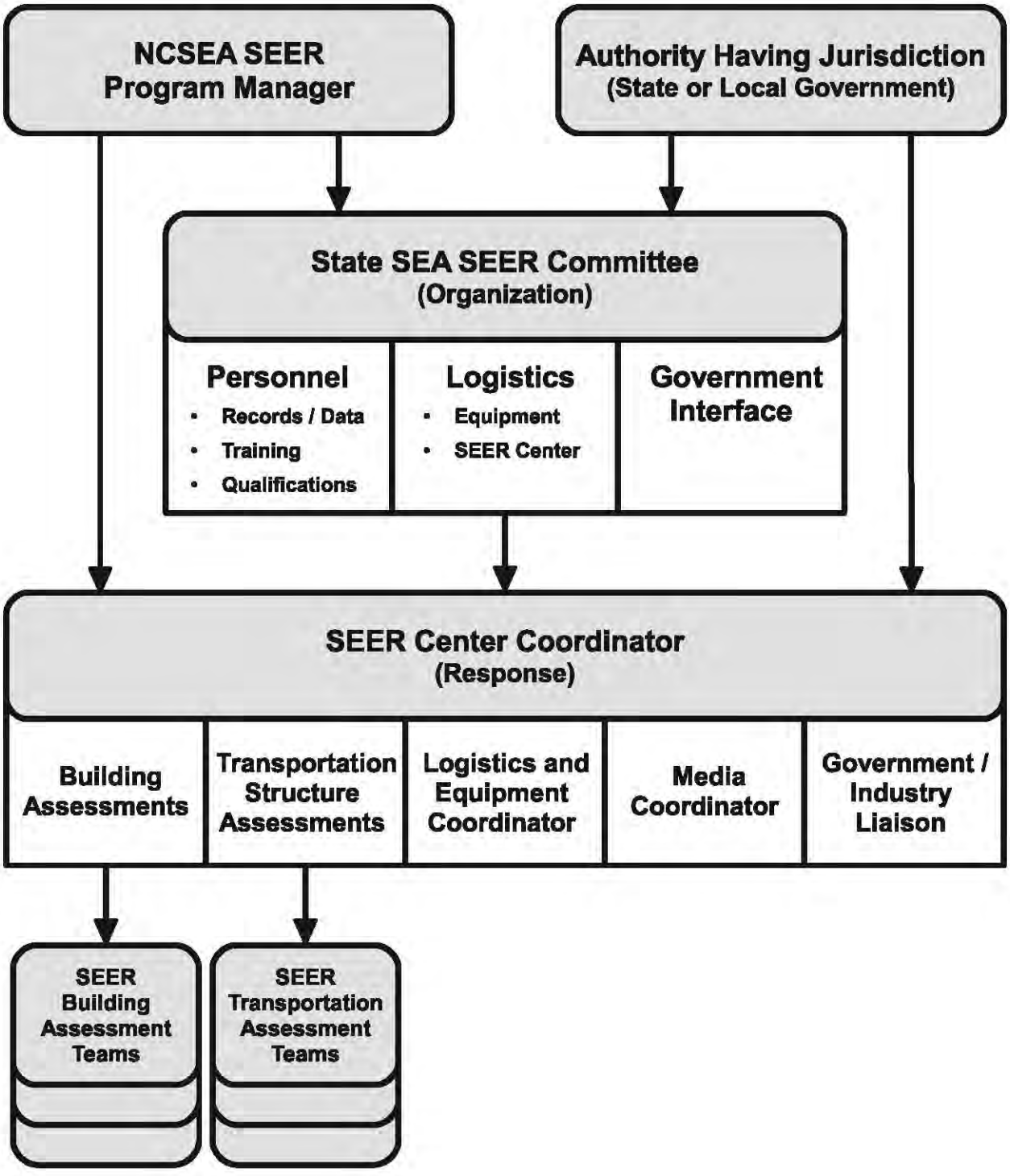
Volunteer Safety Assessment Engineers will not be in competition with paid services by local consulting engineers. This program is designed to provide an initial rapid assessment of structures for safety concerns and hazard mitigation. These assessments may require further evaluation by paid consulting engineers after the initial assessment response. **YOUR SEA ORGANIZATION** is currently collecting information on safety assessment training. You will be contacted of any such events.

Form 2. SEER Phone Tree



**Set up a separate phone tree for each area code in the state*

Form 3. SEER and Emergency Personnel during Response Phase



Form 4

ATC-20 Rapid Evaluation Safety Assessment Form

Inspection

Inspector ID: _____ Inspection date and time: _____ ❑ AM ❑ PM

Affiliation: _____

Building Description

Building Name: _____

Address: _____

_____

Building contact / phone: _____

Number of stories above ground ____ below ground ____

Approx. "Footprint area" (square feet) _____

Number of residential units: _____

Number of residential units not habitable: _____

Type of Construction

❑ Wood frame
❑ Steel frame
❑ Tilt-up concrete
❑ Concrete shear wall
❑ Unreinforced masonry
❑ Reinforced masonry

Primary Occupancy

❑ Dwelling
❑ Other residential
❑ Public Assembly
❑ Emergency Services
❑ Commercial
❑ Offices
❑ Industrial
❑ Other: _____
❑ Govt.
❑ Historic
❑ School

Evaluation

Investigate the building for the conditions below and check the appropriate column.

Observed Conditions:	Minor/None	Moderate	Severe	Estimated Building Damage (excluding contents)
Collapse, partial collapse or building off foundation	❑	❑	❑	❑ None
Building or story leaning	❑	❑	❑	❑ 0–1%
Racking damage to walls, other structural damage	❑	❑	❑	❑ 1–10%
Chimney, parapet, or other falling hazard	❑	❑	❑	❑ 10–30%
Ground slope movement or cracking	❑	❑	❑	❑ 30–60%
Other _____	❑	❑	❑	❑ 60–100%

Comments: _____

_____

Posting

Choose a posting based on the evaluation and team judgment. *Severe* conditions endangering the overall building are grounds for an UNSAFE posting. Localized *Severe* and overall *Moderate* conditions may allow a RESTRICTED USE posting. Post INSPECTED placard at main entrance. Post RESTRICTED USE and UNSAFE placards at all entrances.

❑ **INSPECTED** (Green placard) ❑ **RESTRICTED USE** (Yellow placard) ❑ **UNSAFE** (Red placard)

Record any use and entry restrictions exactly as written on placard: _____

_____

_____

Further Actions Check the boxes below only if further actions are needed.

❑ Barricades needed in the following areas: _____

_____

❑ Detailed evaluation recommended: ❑ Structural ❑ Geotechnical ❑ Other: _____

❑ Other recommendations: _____

Comments: _____

_____

Form 5

ATC-20 Detailed Evaluation Safety Assessment Form

Inspection

Final Posting from page 2

Inspector ID: _____
Affiliation: _____
Inspection date and time: _____ ❑ AM ❑

❑ Inspected
❑ Restricted Use
❑ Unsafe

Building Description

Building Name: _____
Address: _____
_____
Building contact / phone: _____
Number of stories above ground ____ below ground ____
Approx. "Footprint area" (square feet)_____
Number of residential units: _____
Number of residential units not habitable: _____

Type of Construction

❑ Wood frame
❑ Steel frame
❑ Tilt-up concrete
❑ Concrete frame
❑ Concrete shear wall
❑ Unreinforced masonry
❑ Reinforced masonry
❑ Other: _____

Primary Occupancy

❑ Dwelling
❑ Other residential
❑ Public Assembly
❑ Emergency Services
❑ Commercial
❑ Offices
❑ Industrial
❑ Other: _____
❑ Govt.
❑ Historic
❑ School

Evaluation

Investigate the building for the conditions below and check the appropriate column. There is room on the second page for a sketch.

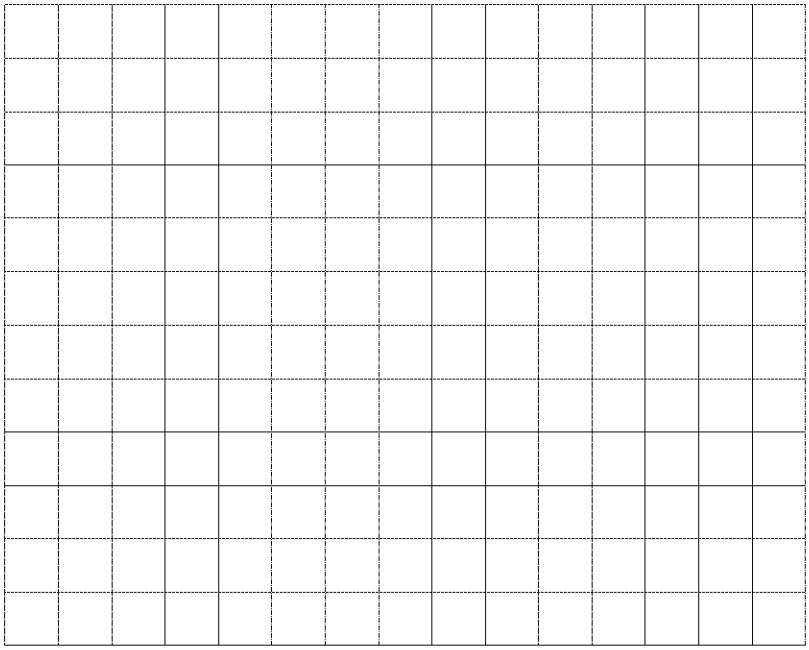
	Minor/None	Moderate	Severe	Comments
Overall hazards:				
Collapse or partial collapse	❑	❑	❑	_____
Building or story leaning	❑	❑	❑	_____
Other _____	❑	❑	❑	_____
Structural hazards:				
Foundations	❑	❑	❑	_____
Roofs, floors, (vertical loads)	❑	❑	❑	_____
Columns, pilasters, corbels	❑	❑	❑	_____
Diaphragms, horizontal bracing	❑	❑	❑	_____
Precast connections	❑	❑	❑	_____
Other _____	❑	❑	❑	_____
Nonstructural hazards:				
Parapets, ornamentation	❑	❑	❑	_____
Cladding, glazing	❑	❑	❑	_____
Ceilings, light fixtures	❑	❑	❑	_____
Interior walls, partitions	❑	❑	❑	_____
Elevators	❑	❑	❑	_____
Stairs, exits	❑	❑	❑	_____
Electric, gas	❑	❑	❑	_____
Other _____	❑	❑	❑	_____
Geotechnical hazards:				
Slope failure, debris	❑	❑	❑	_____
Ground movement, fissures	❑	❑	❑	_____
Other _____	❑	❑	❑	_____

General Comments: _____

ATC-20 Detailed Evaluation Safety Assessment Form — Page 2

Building name: _____ Inspector ID: _____

Sketch (optional)
Provide a sketch of the building or damage portions.
Indicate damage points.



Estimated Building Damage
If requested by the jurisdiction, estimate building damage (repair cost ÷ replacement cost, excluding contents)

- ❑ None
- ❑ 0–1%
- ❑ 1–10%
- ❑ 10–30%
- ❑ 30–60%
- ❑ 60–100%
- ❑ 100%

Posting

If there is an existing posting from a previous evaluation, check the appropriate box. Previous posting:

q INSPECTED q RESTRICTED USE q UNSAFE Inspector ID:_____ Date:_____

If necessary, revise the posting based on the new evaluation and team judgment. *Severe* conditions endangering the overall building are grounds for an Unsafe posting. Local *Severe* and overall *Moderate* conditions may allow a Restricted Use posting. Indicate the current posting below and at the top of page one.

❑ **INSPECTED** (Green placard) ❑ **RESTRICTED USE** (Yellow placard) ❑ **UNSAFE** (Red placard)

Record any use and entry restrictions exactly as written on placard: _____

Further Actions Check the boxes below only if further actions are needed.

❑ Barricades needed in the following areas: _____

❑ Engineering Evaluation recommended: ❑ Structural ❑ Geotechnical ❑ Other: _____

❑ Other recommendations: _____

Comments: _____

ATC-45 Rapid Evaluation Safety Assessment Form

Inspection

Inspector ID: _____ Inspection date: _____

Affiliation: _____ Inspection time: _____ ☐ AM ☐ PM

Areas inspected: ☐ Exterior only ☐ Exterior and interior

Building Description

Building name: _____

Address: _____

_____

Building contact/phone: _____

Number of stories: _____

"Footprint area" (square feet): _____

Number of residential units: _____

Type of Building

☐ Mid-rise or high-rise ☐ Pre-fabricated
☐ Low-rise multi-family ☐ One- or two-family dwelling
☐ Low-rise commercial

Primary Occupancy

☐ Dwelling ☐ Commercial ☐ Government
☐ Other residential ☐ Offices ☐ Historic
☐ Public assembly ☐ Industrial ☐ School
☐ Emergency services ☐ Other: _____

Evaluation

Investigate the building for the conditions below and check the appropriate column.

Observed Conditions:	Minor/None	Moderate	Severe
Collapse, partial collapse, or building off foundation	☐	☐	☐
Building significantly out of plumb or in danger	☐	☐	☐
Damage to primary structural members, racking of walls	☐	☐	☐
Falling hazard due to nonstructural damage	☐	☐	☐
Geotechnical hazard, scour, erosion, slope failure, etc.	☐	☐	☐
Electrical lines / fixtures submerged / leaning trees	☐	☐	☐
Other (specify) _____	☐	☐	☐

Estimated Building Damage (excluding contents)

☐ None
☐ >0 to <1%
☐ 1 to <10%
☐ 10 to <30%
☐ 30 to <70%
☐ 70 to <100%
☐ 100%

☐ See back of form for further comments.

Posting

Choose a posting based on the evaluation and team judgment. Severe conditions endangering the overall building are grounds for an Unsafe posting. Localized Severe and overall Moderate conditions may allow a Restricted Use posting.

☐ **INSPECTED** (Green placard) ☐ **RESTRICTED USE** (Yellow placard) ☐ **UNSAFE** (Red placard)

Record any use and entry restrictions exactly as written on placard: _____

_____

_____

Number of residential units vacated: _____

Further Actions Check the boxes below only if further actions are needed.

☐ Barricades needed in the following areas: _____

_____

☐ Detailed Evaluation recommended: ☐ Structural ☐ Geotechnical ☐ Other: _____

☐ Substantial Damage determination recommended

☐ Other recommendations: _____

_____

☐ See back of form for further comments.

ATC-45 Detailed Evaluation Safety Assessment Form

Inspection

Inspector ID: _____ Inspection date: _____

Affiliation: _____ Inspection time: _____ ☐ AM ☐ PM

Final Posting
from page 2

- ☐ Inspected
- ☐ Restricted Use
- ☐ Unsafe

Building Description

Building name: _____

Address: _____

_____

Building contact/phone: _____

Number of stories: _____

"Footprint area" (square feet): _____

Number of residential units: _____

Type of Building

- ☐ Mid-rise or High-rise
- ☐ Low-rise multi-family
- ☐ Low-rise commercial
- ☐ Pre-fabricated
- ☐ One- or two-family dwelling
- ☐ Other: _____

Primary Occupancy

- ☐ Dwelling
- ☐ Other residential
- ☐ Public assembly
- ☐ Emergency services
- ☐ Commercial
- ☐ Offices
- ☐ Industrial
- ☐ Other: _____
- ☐ Government
- ☐ Historic
- ☐ School

Evaluation

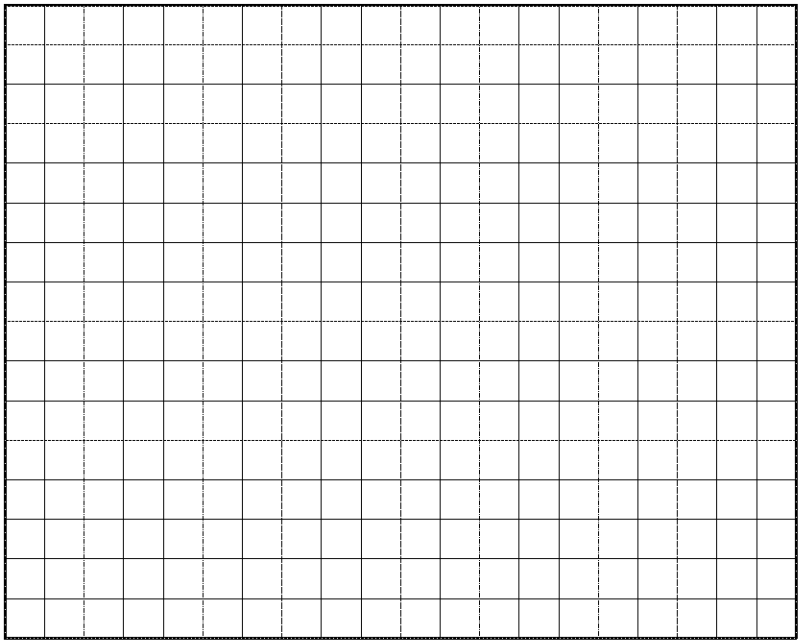
Investigate the building for the conditions below and check the appropriate column. There is room on the second page for a sketch.

	Minor/None	Moderate	Severe	Comments
Overall hazards:				
Collapse or partial collapse	☐	☐	☐	
Building or story lean or drift	☐	☐	☐	
Fractured or displaced foundation	☐	☐	☐	
Structural hazards:				
Failure of significant element/connection	☐	☐	☐	
Column, pier, or bearing wall	☐	☐	☐	
Roof/floor framing or connection	☐	☐	☐	
Superstructure/foundation connection	☐	☐	☐	
Moment frame	☐	☐	☐	
Diaphragm/horizontal bracing	☐	☐	☐	
Vertical bracing	☐	☐	☐	
Shear wall	☐	☐	☐	
Nonstructural hazards:				
Parapets, ornamentation	☐	☐	☐	
Canopy	☐	☐	☐	
Cladding, glazing	☐	☐	☐	
Ceilings, light fixtures	☐	☐	☐	
Stairs, exits, access walkways, gratings	☐	☐	☐	
Interior walls, partitions	☐	☐	☐	
Mechanical & electrical equipment	☐	☐	☐	
Elevators	☐	☐	☐	
Building contents, other _____	☐	☐	☐	
Geotechnical hazards:				
Slope failure, debris impact	☐	☐	☐	
Ground movement, erosion, sedimentation	☐	☐	☐	
Differential settlement	☐	☐	☐	

Continue on page 2

Building name: _____ Inspector ID: _____

Sketch
Make a sketch of the damaged building in the space provided. Indicate damage points.



Estimated Building Damage
(excluding contents)

- ☐ None
- ☐ >0 to <1%
- ☐ 1 to <10%
- ☐ 10 to <30%
- ☐ 30 to <70%
- ☐ 70 to <100%
- ☐ 100%

Posting
If there is an existing posting from a previous evaluation, check the appropriate box.

Previous posting: ☐ INSPECTED ☐ RESTRICTED USE ☐ UNSAFE Inspector ID: _____ Date: _____

If necessary, revise the posting based on the new evaluation and team judgment. *Severe* conditions endangering the overall building are grounds for an Unsafe posting. Local *Severe* and overall *Moderate* conditions may allow a Restricted Use posting. Indicate the current posting below and at the top of page one, whether the posting has been revised or not.

☐ **INSPECTED** (Green placard) ☐ **RESTRICTED USE** (Yellow placard) ☐ **UNSAFE** (Red placard)

Record any use and entry restrictions exactly as written on placard: _____

Number of residential units vacated: _____

Further Actions Check the boxes below only if further actions are needed.

☐ Barricades needed in the following areas: _____

☐ Engineering Evaluation recommended: ☐ Structural ☐ Geotechnical ☐ Other _____

☐ Substantial Damage determination recommended

☐ Other recommendations: _____

INSPECTED

LAWFUL OCCUPANCY PERMITTED

This structure has been inspected (as indicated below) and no apparent structural hazard has been found.

☐ **Inspected Exterior Only**

☐ **Inspected Exterior and Interior**

Report any unsafe condition to local authorities; reinspection may be required.

Inspector Comments:

_____
_____
_____
_____

Facility Name and Address:

_____
_____

Date: _____

Time: _____

(**Caution:** Aftershocks since inspection may increase damage and risk.)

This facility was inspected under emergency conditions for:

_____
(Jurisdiction)

Inspector ID / Agency:

_____
_____

(GREEN PLACARD)

Do not Remove, Alter, or Cover this Placard until Authorized by Governing Authority

RESTRICTED USE

Caution: This structure has been inspected and found to be damaged as described below:

_____
_____
_____
_____

Entry, occupancy, and lawful use are restricted as indicated below:

_____
_____
_____
_____
_____
_____

Facility Name and Address:

_____
_____

Date: _____

Time: _____

(**Caution:** Aftershocks since inspection may increase damage and risk.)

This facility was inspected under emergency conditions for:

_____
(Jurisdiction)

Inspector ID / Agency

_____
_____

(YELLOW PLACARD)

Do Not Remove, Alter, or Cover this Placard until Authorized by Governing Authority

RESTRICTED USE

Caution: This structure has been inspected and found to be damaged as described below:

_____
_____
_____
_____

Entry, occupancy and lawful use are restricted as indicated below:

☐ **Do not enter the following areas:**
_____

☐ **Brief entry allowed for access to contents**

☐ **Other restrictions:**_____
_____

Facility Name and Address:
_____
_____

Date: _____

Time: _____

(**Caution:** Aftershocks since inspection may increase damage and risk.)

This facility was inspected under emergency conditions for:

_____
(Jurisdiction)

Inspector ID / Agency

_____
_____

(YELLOW PLACARD)

Do Not Remove, Alter, or Cover this Placard until Authorized by Governing Authority

UNSAFE

DO NOT ENTER OR OCCUPY
(THIS PLACARD IS NOT A DEMOLITION ORDER)

This structure has been inspected, found to be seriously damaged and is unsafe to occupy, as described below:

_____
_____
_____
_____
_____

Do not enter, except as specifically authorized in writing by jurisdiction. Entry may result in death or injury.

Facility Name and Address:

_____
_____

Date: _____

Time: _____

This facility was inspected under emergency conditions for:

_____
(Jurisdiction)

Inspector ID / Agency

_____
_____

(RED PLACARD)

Do Not Remove, Alter, or Cover this Placard
Until Authorized by Governing Authority

Form 7 Transportation Evaluation Form

U.S. Department of Transportation Federal Highway Administration—California Division Damage Assessment Form (DAF)—Title 23	Report No._____ Sheet No._____ of_____ Disaster No._____

Applicant	County	Inspection Date:
Location of Damage (Name of Road and Post Mile) Caltrans Maintenance EA_____ Special Designator_____		Federal-Aid Highway? ___Yes (if no, ineligible for ER) Map No._____ State Highway on Forest Highway System? ___Yes (Possible ERFO)
Road/Bridge Data Bridge No._____ Type_____ Traveled Way: Width_____ Type_____ Shoulder: Width_____ Type_____		State/Local Route No.
Description of Damage:		ADT (Existing) Photos Roll # Picture #

COST ESTIMATE

	Type of Repair	Description of Work	Summary Cost
EMERGENCY	EMERGENCY OPENING (EO) TO DATE ___State Forces ___Local Forces ___Contract		
	EMERGENCY OPENING (EO) WORK REMAINING ___State Forces ___Local Forces ___Contract		
		Subtotal Emergency Opening	$
	PERMANENT RESTORATION (PR) Recommended Method of Work: ___State Forces ___Local Forces ___Contract		
	NOTE: PRIOR AUTHORIZATION (APPROVED FNM-76) IS REQUIRED TO PROCEED WITH PERMANENT RESTORATION	Subtotal Permanent Restoration	$

Environmental Clearance: EO Categorical Exclusion ____ Further Environmental Study ____ NOTE: Environmental clearance for permanent restoration is conducted through normal Federal-aid project procedures.	Preliminary Engineering (10% of PR) .. $ Construction Engineering (15% of PR). $ Right-of-Way ..... $
Stewardship: ___Exempt (E) ___FHWA Oversight (N)	TOTAL ESTIMATED COST ..... $ (EO+PR+PE+CE+R/W)
Recommendation: ___Eligible ___Ineligible	FHWA Engineer Date
Concurrence: ___Yes ___No	State Engineer Date
Concurrence: ___Yes ___No	Local Agency Engineer Date

Original: Caltrans District Copies: FHWA, Office of Local Programs (local roads), Federal Resources (state hwy), HA23 Coordinator (state hwy)
FHWA DA Form (CA Rev 1/18/2001)

U.S. Department of Transportation
Federal Highway Administration
California Division
Damage Assessment Form (DAF)
Title 23, Federal-Aid Highways

Report No. _____
Sheet No. _____ of _____
Applicant _____
_____

Quantity	Unit	Labor, Materials, and Equipment	Unit Price	Cost

U.S. Department of Transportation **Federal Highway Administration** California Division Damage Assessment Form (DAF) **Title 23, Federal-Aid Highways**	Report No. _____ Sheet No. _____ of _____ Applicant _____ _____

Sketches and/or Narrative

Miscellaneous FHWA Approvals

Reflects available information for contracts at the time of DAF preparation. A revised DAF is not required for changes—use normal Federal-aid procedures to adjust for changes with approval (per Stewardship) based on documented justification

Describe:

Form 8. SEER Field Activity Log

Incident Name: _____

Date: _____ **Operational Period:** _____

Primary Group Coordinator:

_____

Team Members:

_____

_____

_____

_____

_____ **Prepared By:** _____

Activities Assigned/Completed

Task 1.

_____

Comments:

☐ Needs further work ☐ Completed ☐ Needs immediate attention

Task 2.

_____

Comments:

☐ Needs further work ☐ Completed ☐ Needs immediate attention

Task 3.

Comments:

☐ Needs further work ☐ Completed ☐ Needs immediate attention

Task 4.

Comments:

☐ Needs further work ☐ Completed ☐ Needs immediate attention

Additional activities not originally assigned, buildings needing attention, or areas of concern:

Form 9 Incident Log-In / Log-Out Form

Team #	Volunteer Name	Location of Assessments	Start Time	Finish Time

Form 10. Media Activity Log

NEWSPAPER

Contact Name	Phone #	Fax #	Address
Information Provided:			
Contact Name	Phone #	Fax #	Address
Information Provided:			

TELEVISION

Contact Name	Phone #	Fax #	Address
Information Provided:			
Contact Name	Phone #	Fax #	Address
Information Provided:			

RADIO

Contact Name	Phone #	Fax #	Address
Information Provided:			
Contact Name	Phone #	Fax #	Address
Information Provided:			

OTHER

Contact Name	Phone #	Fax #	Address
Information Provided:			

Form 11.

Letter Agreement for Emergency Professional Services

The Client understands that emergency conditions exist because of *(name of disaster)*. The Client further recognizes that time and circumstances do not permit the Consultant to perform his or her services with the degree of skill and care normally provided under non-emergency circumstances. The Client desires, however, to have the Consultant use reasonable efforts to perform his or her services under these emergency conditions. In consideration of the substantial risks to the Consultant in performing these emergency services for or on behalf of the Client, the Client agrees to the fullest extent permitted by law to indemnify and hold harmless the Consultant against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from the Consultants providing emergency services on behalf of the Client excepting only those damages, liabilities or costs arising directly from the negligence or willful misconduct of the Consultant.

In addition, the Client agrees, to the maximum extent permitted by law, to waive any claims against the Consultant arising out of the performance of these emergency services.

The Client acknowledges that (1) the Consultant has discussed the risks and difficulties of performing services under the existing emergency conditions; (2) the Client is aware of the legal implications of agreeing to the waiver and indemnity provisions; and (3) the Client enters into this Agreement freely and without reservation.

Offered by:

_____
signature *date*

_____
printed name/title

_____
name of consulting firm

Accepted by:

_____
signature *date*

_____
printed name/title

_____
name of client

Form 12.

SHORT-FORM AGREEMENT FOR EMERGENCY PROFFESSIONAL SERVICES

Date: _____

Consultant/Address:

_____

_____

Client/Address:

_____

Project Location:

_____

Description of Services to Be Provided:

_____

_____

_____

Professional Fee:

_____

Billing Terms:

_____

Payment Terms:

_____

Retainer (payable upon execution of this Agreement):

_____

Special Conditions:

_____

_____

The Terms and Conditions on the reverse of this form, when initialed by both parties, are incorporated and made part of this Agreement.

Offered by:		**Accepted by:**	
_____		_____	
signature	*date*	*signature*	*date*
_____		_____	
printed name/title		*printed name/title*	
_____		_____	
name of consulting firm		*name of client*	

Terms and Conditions

Performance of Services: The Consultant shall perform the services outlined on the reverse side of this Agreement and on the attached Exhibit _____ in consideration of the stated fee and payment terms.

Additional Services: For additional services not included above, the Consultant shall be compensated as follows:

Access to Site: Unless otherwise stated, the Consultant will have access to the site for activities necessary for the performance of the services. The Consultant will take reasonable precautions to minimize damage due to these activities, but has not included in the fee the cost of restoration of any resulting damage and will not be responsible for such costs.

Retainer/Billing Payment: The Client agrees to pay the Consultant for all services performed and all costs incurred. Prior to the provision of services, the Client shall deposit a retainer of $_____ with the Consultant. Invoices for the Consultant's services shall be submitted, at the Consultant's option, either upon completion of such services or on a monthly basis. Invoices shall be due and payable upon receipt. If any invoice is not paid within 15 days, the Consultant may, without waiving any claim or right against the Client, and without liability whatsoever to the Client, suspend or terminate the performance of services. The retainer shall be credited on the final invoice. Accounts unpaid 30 days after the invoice date may be subject to a monthly service charge of 1.5% (or the maximum legal rate) on the unpaid balance. In the event any portion of an account remains unpaid 60 days after the billing, the Consultant may institute collection action and the Client shall pay all costs of collection, including reasonable attorneys' fees.

Indemnification: The Client shall, to the fullest extent permitted by law, indemnify and hold harmless the Consultant, his or her officers, directors, employees, agents and subconsultants from and against all damages, liability and cost, including reasonable attorneys' fees and defense costs, arising out of or in any way connected with the performance of the services under this Agreement, excepting only those damages, liabilities or costs attributable to the sole negligence or willful misconduct of the Consultant.

Waiver: In addition, the Client agrees, to the maximum extent permitted by law, to waive any claims against the Consultant arising out of the performance of these emergency services, except for the sole negligence or willful misconduct of the Consultant.

Information for the Sole Use and Benefit of the Client: All opinions and conclusions of the Consultant, whether written or oral, and any plans, specifications or other documents and services provided by the Consultant are for the sole use and benefit of the Client and are not to be provided to any other person or entity without the prior written consent of the Consultant. Nothing contained in this Agreement shall create a contractual relationship with or a cause of action in favor of any third party against either the Consultant or the Client.

Certifications, Guarantees and Warranties: The Consultant shall not be required to execute any document that would result in the Consultant certifying, guaranteeing or warranting the existence of any conditions.

Limitation of Liability: In recognition of the relative risks, rewards and benefits of the project to both the Client and the Consultant, the risks have been allocated such that the Client agrees that, to the fullest extent permitted by law, the Consultant's total liability to the Client for any and all injuries, damages, claims, losses, expenses or claim expenses arising out of this Agreement from any cause or causes, shall not exceed $_____. Such causes include, but are not limited to, the Consultant's negligence, errors, omissions, strict liability, breach of contract or breach of warranty.

Initialed: _____ *Consultant* _____ *Client*

Ownership of Documents: All documents produced by the Consultant under this Agreement are instruments of the Consultant's professional service and shall remain the property of the Consultant and may not be used by the Client for any other purpose without the prior written consent of the Consultant.

Dispute Resolution: Any claims or disputes between the Client and the Consultant arising out of the services to be provided by the Consultant or out of this Agreement shall be submitted to nonbinding mediation. The Client and the Consultant agree to include a similar mediation agreement with all contractors, subconsultants, subcontractors, suppliers and fabricators, providing for mediation as the primary method for dispute resolution for all parties.

Termination of Services: This Agreement may be terminated at any time by either party should the other party fail to perform its obligations hereunder. In the event of termination for any reason whatsoever, the Client shall pay the Consultant for all services rendered to the date of termination, and all reimbursable expenses incurred prior to termination and reasonable termination expenses incurred as a result of termination.

It is agreed the above terms and conditions are incorporated into and made a part of the Agreement on the reverse side of this sheet.

Initialed: _____ *Consultant* _____ *Client*

Caution: *The clauses that appear on this form are examples only and do not reflect variations in law among the fifty states. Consult your attorney for legal advice on specific wording applicable in your jurisdiction.*

Form 13.

Sample Model Language for Good Samaritan Law

This legislation applies to engineers assisting emergency response workers in situations where aid is given or services rendered in an emergency, accident or disaster response setting.

When engineers, in good faith, render services or assistance at the scene of an emergency, accident or disaster, no liability may be imposed for any civil damages arising out of or in any way connected to the rendering of such emergency services. There is no protection, however, for gross negligence or willful or wanton acts or omissions.

Caution: *Consult your attorney for legal advice on specific wording applicable in your jurisdiction*