NATIONAL CENTER FOR EARTHQUAKE ENGINEERING RESEARCH
State University of New York at Buffalo

Proceedings from School Sites: Becoming Prepared for Earthquakes

Commemorating the Third Anniversary of the Loma Prieta Earthquake

Edited by

Frances E. Winslow and Katharyn E.K. Ross
National Center for Earthquake Engineering Research
State University of New York at Buffalo
Red Jacket Quadrangle
Buffalo, New York 14261

Technical Report NCEER-93-0015

August 16, 1993

This workshop was partially supported by the National Science Foundation under Grant No. BCS 90-25010 and the New York State Science and Technology Foundation under Grant No. NEC-91029.

Proceedings from
School Sites: Becoming Prepared for Earthquakes

Commemorating the Third Anniversary of the Loma Prieta Earthquake

held at
San Jose State University
College of Engineering
on
October 6, 1992

Edited by Frances E. Winslow[1] and Katharyn E.K. Ross[2]
August 16, 1993

Technical Report NCEER-93-0015

NCEER Project Number 91-6531

NSF Master Contract Number BCS 90-25010
and
NYSSTF Grant Number NEC-91029

1 Director, Office of Emergency Services, City of San Jose
2 Education Specialist, National Center for Earthquake Engineering Research

NATIONAL CENTER FOR EARTHQUAKE ENGINEERING RESEARCH
State University of New York at Buffalo
Red Jacket Quadrangle, Buffalo, NY 14261

Table of Contents

Part I

Introduction

1-1 The School Site: Keystone to Earthquake Preparedness

PB94-154275

The School Site: Keystone to Earthquake Preparedness

by Francis E. Winslow
Director, Office of Emergency Services, City of San Jose

The Bay Area Has Its Faults

The Bay Area is home to several major active earthquake faults, including the San Andreas, the Hayward and the Rogers Creek. Each of these faults has the potential to cause severe disruption of public and community services when it ruptures. The public schools will be a keystone to local community earthquake response, both as community shelter sites, and as custodians of children until parents or guardians arrive. To fulfill these dual responsibilities requires extensive planning and site preparedness.

The goal of *School Sites: Becoming Prepared for Earthquakes* was to provide basic information to assist school site administrators in developing comprehensive plans for their facilities and personnel. While there is a great deal of basic information on school planning available, there is not one comprehensive document that addresses planning and response organization in one volume. The Katz Act requires school sites to have a comprehensive plan for earthquake preparedness and response, but resources to create such a plan must ordinarily be assembled from a variety of agencies. This one day conference was to serve as a clearing house for information so that school site administrators could become aware of existing resources, meet some of the area's experts in school planning, and interact with colleagues who were developing similar plans.

What Faults?

Regardless of the experience of the Loma Prieta earthquake, many educators living in the Bay Area still do not have basic scientific information to enable them to understand the earthquake threat to the area, and how this effects school sites. Fault maps alone do not adequately interpret the shaking intensity, liquefaction threat, and anticipated rupture zones associated with a major quake in a built-up area. A conference presentation with expert speakers provides an opportunity for sharing more detailed information about earthquake effects specific to school sites and to the concerns of school administrators.

Hands-on workshops enable educators to become team leaders in their own schools as the site response plan is developed. There is a large collection of written materials regarding medical planning, search and rescue techniques, and plan writing. However, making this material respond to the specific needs of a school site may challenge the knowledge of the school site administrator. Various successful programs exist that have taken the general information and tailored it to school site needs. Working with the creators of these programs gives school administrators the opportunity to gain insight into how school teams are created, how they function, and how training can be offered within the time and financial constraints of most districts.

Living in the Fault Zone

Bay Area school children all know that they live in "earthquake country." The problem is that most of them do not know what that means. Many school children have some confusion regarding the causes of earthquakes, and most school children cannot anticipate the effects they will experience in different locations. Without this information it is difficult for them to develop safe and appropriate responses to the inevitable slip of the earth's plates. Curriculum materials are available to introduce children at all grade levels to the scientific and sociological information needed for earthquake safety. However, few educators have had the opportunity to become familiar with these resources and incorporate them into classroom teaching.

Earthquake education cannot be confined to a brief segment of the science curriculum, but must be further integrated into other aspects of the standard curriculum. Classroom teachers labor under the restrictions of limited class time and financial shortages in trying to include earthquake education in a variety of subject areas. Governmental and educational entities have basic materials available for little or no cost, but learning about the sources can be difficult. "Making the curriculum quake safe" was a goal of this workshop, as well. Sharing resource data and successful techniques with classroom teachers may result in integrating personal safety issues, psychological impact information and scientific knowledge about earthquakes more thoroughly into the classroom schedule.

Building Blocks for Successful Planning

The conference was organized to provide all participants with the building blocks needed for a successful earthquake preparedness program at the school site. The day began with a presentation on the earthquake threat to Bay Area schools by Richard Eisner, the manager of the Bay Area Regional Earthquake Preparedness Project, now manager of the Central Region of the Governor's Office of Emergency Services. From his background as a planner and architect, Mr. Eisner could share critical, factual information on the relationship between the physical and built environment of the Bay Area. It is important for people who experienced the Loma Prieta Earthquake in 1989 to realize that it was only a moderate earthquake, centered far south of the built-up metropolitan sections of the Bay Area. Ruptures on faults closer to high density developments would have dramatically different effects on communities and schools.

School buildings in California have had special structural safety codes since the Long Beach Earthquake resulted in passage of the Field Act. Extra safety features are included in the construction of schools because of the large, vulnerable population housed there for six to seven hours a day. In addition, these facilities will provide critical shelter sites for impacted communities. However, many senior educators and administrators have no information to assist them in making decisions regarding the reoccupancy and reuse of these buildings after an earthquake. Dennis Bellet of the Office of the State Architect (OSA) shared engineering information regarding building safety. He also introduced a document created by OSA to be used by senior site administrators after an earthquake to determine the structural safety of the school building.

Reoccupancy of school buildings is important for child safety and school population security. The building provides shelter from heat, rain, cold and wind, all of which can create health risks to children. It also provides a safe place to keep children while an orderly student release program occurs. A school plan should be based on the ability to use the building after a quake unless unusual physical circumstances exist in the neighborhood. Without a useable building, rational plans would require the development of alternative shelter sites and security plans, both of which are costly and difficult to manage. Another part of the workshop helped to acquaint educators with the safety features included in their buildings, and the guidance document to enable them to judge the safety of their particular building after a damaging earthquake.

Planning for the appropriate placing and securing of the contents of a school building is also an important part of an earthquake safety plan. The non-structural elements of a building will be moved around by the Earth's shaking. Improperly placed or unsecured items will become missiles or falling hazards. A safety plan for eliminating hazards through placement and restraint is a basic element of classroom safety. Dr. Guna Selvaduray of the San Jose State University College of Engineering provided an illustrated lecture that demonstrated appropriate and practical safety precautions for the classroom. Many of these projects can be accomplished at little cost by volunteer teams of parents, or through student self-help. Proper placement of heavy objects and furniture with a tip hazard can go a long ways toward resolving many of the most dangerous hazards. Proper storage of hazardous materials is a critical safety precaution, and essential if the school building is to be re-used.

Just Do It!

Once educators have a sound scientific basis for their planning decisions, action teams are needed to get the school community prepared to respond. Someone must make an earthquake response plan that is appropriate for the specific school site. Such planning must begin with a threat analysis, and include knowledge of the existing plans in the surrounding neighborhood and political jurisdiction. A team of emergency planners from the Santa Clara Emergency Management Association provided instruction in making a school site plan. Sample plans and detailed documentation were provided to those who attended this session.

Regardless of how safely the facilities are made, injury to students and staff during an earthquake is still a probability. Glass will shatter, objects may fall, regardless of the steps taken to minimize this threat, and people may panic and react improperly. Life saving steps must be taken by school site personnel, as community help will be overwhelmed by the size of a major earthquake's community-wide impact. Sally Snyder, R.N., B.S.N., and Julie Rose, R.N., B.S.N., M.P.A. shared their medical and planning expertise with participants. Topics included ways to involve students and staff in becoming prepared to give first aid to colleagues, triage of the injured, and the role of the American Red Cross in medical care at shelter sites.

After the shaking stops, schools will be evacuated while safety teams check the structure for safety hazards and missing students and staff. UCLA Extension has developed a comprehensive workshop in Search and Rescue that provides hands-on experience in developing and implementing a Search and Rescue team for the school site. The plan considers the small number of adults available at the average school site, the even smaller number who are trained in lifting, and the fact that few people have great upper body strength, as well as competence in repairing utilities. Alternatives to strength and previous experience have been developed so a competent team can be a part of the school site response. Search and Rescue will save the lives of people who have been injured, and will provide knowledgeable advice to the site administrator regarding reoccupancy of the building. UCLA's presentation showed that every site can develop its own expertise for the essential parts of Search and Rescue.

Sharing it All with the Students

Earthquake preparedness and planning is not an "adults only" activity. Students can be integrated into the program, beginning with personal responsibility for their own safety and preparedness. There is a wealth of curriculum materials currently available to support classroom teachers in their efforts to teach students appropriate behaviors. Experts from the National Center for Earthquake Engineering Research, Bay Area Earthquake Preparedness Project, Math/Science Nucleus, and local schools demonstrated techniques and materials with a comprehensive approach to earthquake education, appropriate for kindergarten through twelfth grade. Students who have good earthquake knowledge will be more likely to behave appropriately in an earthquake. They can also serve as earthquake safety ambassadors to their families and their communities. With appropriate information they will carry their earthquake safety learning over into adulthood when they will be community leaders and responsible for households of their own.

Students can act as teachers in their own classrooms, particpate on site emergency response team, be "buddies" in evacuations and to younger students, help develop the emergency plan for a school site, and assist with classroom safety modifications. They can be both environmental and project helpers. By their personal safety behavior, students can be the key to the success of a school site earthquake preparedness plan. Integrating them into the project, through classroom instruction, will add a valuable resource to the school site emergency response team.

Conclusions

Californians live on the edge of the dynamic "Ring of Fire." The beauty of the state - its dramatic coastal scenery and majestic mountains - are testimony to the ever changing Earth. As we enjoy the natural beauty and pleasant climate we must recognize that the forces that formed these attributes continue to be at work. Earthquakes are an inevitable part of life, but proper planning and education will go far to mitigating their damaging effects. Educators have a unique opportunity to inform the next generation about coexisting peacefully with their dynamic Earth. *School Sites: Becoming Prepared for Earthquakes* was a first step in sharing the wealth of information with Bay Area educators. Even though the Bay Area has its faults, we can choose, through the application of our knowledge, to live in it safely.

Part II

Setting the Stage

The Earthquake Threat to Schools in the Bay Area

by Richard K. Eisner
Director, California Office of Emergency Services Earthquake Program

The Bay Area has been the site of many earthquakes over geologic time. It marks the meeting point of the North American and Pacific Plates, whose north/south movements in opposition to each other create a dynamic sub-surface environment. The San Andreas Fault, marking this plate boundary, is one of the strongest and most active of faults. In addition, the Hayward and Calaveras Faults cross heavily populated areas of the region, posing a threat to lives and property. Each of these faults has the potential to cause earthquakes of significant magnitudes.

The Field Act requires that all school buildings be built to seismic safety codes, with enforcement of these construction standards by the Office of the State Architect. The Katz Act requires all public schools, and most private schools, to make earthquake preparedness and response plans. Is all the effort worthwhile? Just how significant is the threat of life and safety of school children and school personnel?

Performance of Public Schools in the Loma Prieta Earthquake of October 17, 1989

by John F. Meehan
Consulting Structural Engineer, Office of the State Architect/Structural Safety Section

Introduction

The Loma Prieta earthquake tested the seismic resisting capacity of many public school buildings in the central coast area of California. Public school buildings, including many older school buildings designed and constructed to earlier code requirements and some pre-1933 buildings which were subsequently retrofitted, performed very well when they were subjected to severe ground shaking on October 17, 1989.

The design and construction requirements enforced by the Office of the State Architect/Structural Safety Section (OSA/SSS) are intended to produce safe school buildings which will not collapse during earthquake motion. Minor, repairable structural damage with some nonstructural and content damage can be expected. This limited level of damage has been considered acceptable because the cost of construction would be prohibitive if public school buildings were designed and constructed to withstand forces generated by the maximum anticipated earthquake without this limited damage.

Injury from potential nonstructural hazards such as falling light fixtures can be avoided by the defensive body positioning of classroom occupants. Standard duck and cover drills, taught in many public schools, limit injuries to students and teachers. Inexpensive, simple bracing and anchoring of nonstructural elements by school district staff can further limit injury and property damage.

Higher performance standards have been developed for hospital buildings because hospital patients are not expected to be ambulatory. In addition, hospital buildings need to be available for treatment of injured people after an earthquake and thus more stringent standards for maintaining operational capability are justified.

The Earthquake

The magnitude 7.1 earthquake occurred on Tuesday, October 17, 1989, at 5:04:15.24 p.m., Pacific Daylight Time. This was the largest earthquake to have occurred in Northern California since the 1906 San Francisco earthquake. Ground motion from the Loma Prieta earthquake was felt from Los Angeles to the California-Oregon border and east to the Sierra foothills, an area of approximately 400,000 square miles. The greatest earthquake damage occurred at locations of the most violent shaking and to structures whose structural dynamic properties coincided with the site ground motions. These locations were in the Santa Cruz, Los Gatos, Watsonville, and Gilroy areas and other areas where the soil and geologic conditions amplified the ground motions. The latter areas included the Marina District of San Francisco and the downtown area of Oakland where the elevated highway structures collapsed. Destruction was widespread and affected many older buildings, such as the Pacific Garden Mall in Santa Cruz and apartment buildings in the Marina District of San Francisco.

Only two larger earthquakes have occurred in the United States since 1906. They were the 8.4 magnitude earthquake in Anchorage, Alaska on March 27, 1964, and the 7.5 magnitude earthquake in Kern County, California on July 21, 1952.

The Loma Prieta earthquake occurred on a segment of the San Andreas fault system. The epicenter was located at 37°2' North latitude and 121°53' West longitude in the Santa Cruz mountains. The fault rupture hypocenter occurred at a depth of about 11 miles below the surface of the ground. The rupture then spread along the San Andreas fault about 26 miles, in northwest and southeast directions, and upward about eight miles, stopping about 3.7 miles below the surface of the earth. The rupture plane has a dip or a slope off the horizontal of about 70° +/- 10° in a southwesterly direction. The displacement at the hypocenter was approximately 7.5 feet total with components of 6.2 feet horizontally and 4.3 feet vertically in the plane of the rupture.

Surface cracks[1] were found throughout the Santa Cruz mountain area and particularly across and along Summit Road. Examples of these cracks could be seen in the front yard of a home at the north side of Summit Road about a mile from the Loma Prieta Elementary School and at the Loma Prieta Elementary School. Even though the ground cracks are not fault traces, they can be destructive to the buildings under or near where they occur.

Earthquake damage to dwellings in the Santa Cruz mountain area near the Loma Prieta Elementary School was extensive. A recently constructed wood frame dwelling with plywood sheathed walls was destroyed by the earthquake. This damage was caused by a combination of violent earthquake shaking and the force of the moving soil mass from a landslide which struck the rear of the house. Soil slip failures like this illustrate the necessity of geologic hazard investigations for construction sites in known active earthquake areas prior to the design of structures for these sites. Education Code Sections 39002 and 39002.5 for K-12 public school buildings and Section 81033 for community college buildings mandate geologic hazard studies prior to proposed school building construction work.

In 1988, a geologic hazard report was prepared for the proposed expansion of the Loma Prieta Elementary School. The geologic investigation of this school site disclosed numerous surface expressions of the fault motion, considered to be serious hazards to the existing school buildings. No major structural damage was observed at Loma Prieta Elementary school buildings due to violent shaking experienced at the site during the October 17, 1989 earthquake. Minor structural damage and considerable nonstructural damage was found after the earthquake. Structural damage partially resulted from ground surface cracking and separation at two surface expressions of the fault. The damage consisted of cracked concrete foundations and floor slabs, wall plaster cracking, and a few broken window panes. The performance of the Loma Prieta Elementary School buildings illustrates the importance of requiring geologic hazard investigation of school sites. It also verifies the level of performance standards and the seismic safety requirements adopted by OSA/SSS. The Loma Prieta Elementary School relocation will be to an acceptable new site

[1] These ground surface cracks are considered surface expressions of the fault motion and are not considered fault traces because the actual fault movement terminated some 3.7 miles below the surface of the ground.

within the district and is dependent on the availability of funds for purchase of the land and construction of new facilities.

After the earthquake, observation of the taller trees in the area near the Loma Prieta Elementary School site revealed an unusual condition. The tops of two trees behind the school were broken off. The damaged tree tops indicated violent ground shaking for an extended period which caused these tall trees to vibrate in a whipping motion. Unfortunately, there were no strong motion earthquake recording instruments installed in the vicinity of the school.

Field Act

Since 1933, all California public school buildings, Kindergarten through 12th grade, and all community colleges have been constructed under the provisions of the Field Act. The Field Act is part of the Education Code and is found in Sections 39140 through 39159 for K-12 schools and Sections 81130 through 81147 for community colleges. The enforcement of the Field Act and the building standards adopted pursuant to it has been delegated to OSA/SSS. Very briefly, the more significant provisions of the Field Act are:

1. Plans and specifications and other construction documents for all new public school buildings or for additions or alterations for which the construction cost exceeds $20,000 must be approved by OSA/SSS. Alteration or addition projects costing more than $10,000, but less than $20,000, have limited requirements under the Field Act.

2. A California registered architect or structural engineer must be in charge of both the design and preparation of project drawings and specifications and observation of construction.

3. OSA/SSS is given the authority to adopt building standards for public school buildings. These standards are intended to ensure the safety of the occupants and limit the potential damage to the structure and its contents. All design and construction work must conform to the adopted standards.

4. Public school buildings must meet disabled access as well as fire and panic requirements.

5. OSA/SSS is authorized to collect fees for plan review services performed.

6. All public school construction projects must be continuously inspected by a competent inspector approved by OSA/SSS.

7. Observation of construction must be performed by OSA/SSS and the responsible architects and engineers.

8. The responsible architects, engineers, inspectors, testing laboratory engineers and contractors must provide verified reports to OSA/SSS, indicating that materials used and the work of construction meet the provisions of the approved construction documents in all respects.

9. Any person submitting a false report or anyone who violates any provision of the Act is guilty of a felony.

Other Functions of OSA/SSS

This report primarily records the performance of public school buildings in the Loma Prieta earthquake. OSA/SSS has several other responsibilities relative to earthquake safety in buildings. OSA/SSS provides plan review and construction observation for all acute care hospital buildings and certain skilled nursing home facilities, consulting services to the Office of Statewide Health Planning and Development, and recommends hospital project inspector approvals. OSA/SSS also adopts regulations and provides plan review and construction observation for all state owned or leased essential services buildings. OSA/SSS also provides engineering services to the Office of Emergency Services following an earthquake or other disaster.

Hospital buildings constructed under the provisions of the Hospital Seismic Safety Act, enacted in 1972, performed in an excellent manner during the Loma Prieta earthquake.

Damage

This document cannot report in detail all damage to public school buildings in the area affected by the Loma Prieta earthquake. The more significant types of damage of general interest and the overall performance of public school buildings will be discussed.

First, there was a displacement in the roof line of a classroom wing at the Loma Prieta Elementary School. The classroom wing was constructed in 1960 in compliance with Field Act standards. The displacement was the result of a ground surface heaving under the classroom wing. The floor slab and foundations are also cracked at this location. The north wall of the adjacent classroom wing was undamaged. Bungee cords added to the library book shelves prevented displacement of the books during the earthquake. At the C.T. English Middle School, located about one-fourth mile from the Loma Prieta Elementary School, an exterior plywood joint separated. In the Los Gatos High School library, books were strewn about. There is a need for properly designed and anchored shelving. Book shelves are usually installed by the school district after the building is constructed and without OSA/SSS design review and installation supervision.

Older Certified Public School Buildings

Several school buildings in the area affected by the earthquake were constructed prior to the enactment of the Field Act. These buildings had been subsequently strengthened or retrofitted to meeting building regulations which were less stringent than current building standards. The three-story Branciforte Elementary School in Santa Cruz was built about 75 years ago, well before the 1933 Field Act. This building was retrofitted in 1956. The structural system performed very well although plaster fell in several locations it was supported by wood lath backing. Wood lath is no longer permitted in new construction and must be removed when public school rehabilitation projects are undertaken. Soquel Elementary School is about 50 years old and was constructed during the early years of the Field Act. This building also had plaster fall from old wood lath backing. A heating radiator also fell off the wall.

John O'Connell High School in San Francisco is an old pre-Field Act building, originally constructed in the 1920's. It was retrofitted in 1950. There were extensive structural cracks in the exterior reinforced concrete walls and damage to the unreinforced, hollow clay tile interior partitions which were permitted to remain at the time to retrofit work was done. Unreinforced hollow clay tile walls have low strength and a limited capacity to carry load. These walls are stiff and carry lateral loads until they crack and fail in a brittle manner. Wall cracks open and threaten collapse of the wall and also produce loose pieces which fall and are a hazard to the occupants. Unreinforced clay tile walls are no longer permitted.

Watsonville High School's main building was constructed in 1917, prior to the Field Act; and some rehabilitation work was done in 1935. This building experienced extensive plaster damage where the plaster was installed over wood lath. This building suffered damage to the heavy Spanish roof tile and large window glass areas. While the building was being surveyed to determine the extent of the earthquake damage, it was learned that there were other structural deficiencies which will require correction or may lead to eventual abandonment of the building.

Investigation of several other older school buildings revealed structural deficiencies which will require strengthening.

The above are but a few examples of how public school buildings, retrofitted during the early days of the Field Act, performed during this earthquake. Building codes have undergone significant changes based on recorded evidence from earthquakes in the last 20 years. Also, the construction industry has seen many changes in the use of building materials since 1933. It would be prudent to examine all school buildings constructed or retrofitted during the early days of the Field Act. These buildings need to be examined to determine if they possess the necessary design and material strength and stiffness to perform adequately in future earthquakes or if the lack of proper maintenance or deterioration has reduced their strength.

In the late 1960's and early 1970's, structural engineers learned that concrete rigid frame construction requires sufficient ductility to resist earthquake forces effectively. Concrete construction must be capable of bending or deflecting without breaking up the concrete core within the confining reinforcing and causing disintegration of the concrete members. Current building codes require ductile concrete designs for new construction. Ductility is achieved by requiring special confining reinforcing at beam column joints of concrete frame structures. Pre-1976 concrete nonductile frame buildings should be investigated and strengthened when appropriate in order to prevent collapse when the next earthquake strikes California.

Earthquake Shelters in School Buildings

Eighty-nine school buildings were investigated and found acceptable for operation as emergency shelters for people who had been displaced from their earthquake damaged homes. Many of these school buildings were used as shelters for several weeks following the earthquake.

General

It is reported that 62 people were killed, 3,757 people were injured, 23,406 homes were damaged and more than 12,000 people were made homeless by the Loma Prieta earthquake (Networks Earthquake Preparedness, 1990). It is estimated that damage to private property amounts to over $3.3 billion and to public property $2.3 billion. Immediately following the earthquake, estimates of losses prepared by public school districts requesting Federal Emergency Management Agency assistance totaled $70 million.

The California Strong Motion Instrumentation Program (Report OSMA 89 06) reports that the strong ground motion during the Loma Prieta Earthquake lasted up to 15 seconds as recorded at various locations. In a 13-story steel frame building with strong motion instrumentation, the duration of the period of shaking was recorded to be over 100 seconds. The largest recorded acceleration was nearly 1.25 g on the roof of a four-story reinforced concrete building in Watsonville. The roof of this building experienced a horizontal force equivalent to 25% greater than the force of gravity or the horizontal force at the roof was about 125% of the weight of the roof. This is the largest acceleration ever recorded in an earthquake worldwide.

Three school buildings in the affected area were equipped with strong seismic motion recording instruments. The largest recorded roof acceleration was 0.87 g, with 0.33 g on the ground, at the Saratoga West Valley Mission Community College gymnasium building which is a one-story building of reinforced concrete walls with a wood framed roof. This building sustained no damage even though the actual recorded accelerations were much greater than the accelerations used for design. Generally, one-story structures in Seismic Zone 4 are designed for a lateral force of 19% of the force of gravity, with ductility and safety factors in design and materials enabling collapse prevention up to and over three times this force level if the structure is properly detailed. Buildings that remain standing at force levels of 4.5 times design levels are a testament to good design and construction. The other schools with strong motion recording instruments were located in Redwood City and Piedmont where the maximum accelerations on the roof were recorded at 0.19 g and 0.18 g respectively.

Conclusions

The Loma Prieta earthquake demonstrates that the Field Act provisions result in good performance by public school and community college buildings. Even though the earthquake repair costs totalled in the millions, most of these funds were spent for cosmetic repairs such as filling plaster cracks, repainting, suspended ceiling replacement, repair of cabinets, bracing and anchorage of equipment, etc. Unfortunately, there is no breakdown to pinpoint actual structural repair costs; but it is believed this amount is very low. The largest single cost item will be for the repair of the John O'Connell High School. The repair for this facility is estimated to be about $15.8 million.

Because buildings certified under the Field Act are known to perform well, they carry with them the expectation that they will be available for use as evacuation shelters after disasters. The Marina Middle and John Swett Schools, both in San Francisco's heavily damaged Marina District, and the C.T. English Middle School in the Loma Prieta area, were used as shelters or disaster centers immediately after the earthquake. Other public school buildings were established as shelters elsewhere.

School personnel, engineers, architects, and the public in general acknowledge that public school buildings are considered to be the buildings most able to survive earthquakes. Students and teachers in public school buildings will be reasonably safe from injury during an earthquake, particularly if they follow the procedures practiced in "duck and cover" exercises.

References

CSMIP Strong Motion Records from the Santa Cruz Mountains (Loma Prieta), California Earthquake of 17 October, 1989. California Division of Mines and Geology, Office of Strong Motion Studies. Report OSMA 89 06.

Lessons Learned from the Loma Prieta, California Earthquake of October 17, 1989. U.S. Geologic Survey Circular 1045.

Networks Earthquake Preparedness. (Winter 1990). 5(1). Bay Area Regional Earthquake Preparedness Project.

How School Buildings Perform in Earthquakes

by H.P. Campbell
Chief Structural Engineer, Office of the State Architect/Structural Safety Section

and

Dennis E. Bellet
Code/Research Engineer, Office of the State Architect/Structural Safety Section

On March 10, 1933 at 5:55 p.m., the Newport-Inglewood fault slipped, resulting in the collapse of several school buildings. Only 30 days later, the Field Act was signed into law. This landmark piece of legislation provided for the establishment of a procedure to be followed in the design and construction or alteration of public school buildings used for elementary, secondary or community college purposes. The principle provisions of the Act require that: (1) plans be prepared by qualified architects and engineers, (2) designs be reviewed by an independent state agency, (3) construction be continuously inspected by a qualified person, (4) the responsible architects and engineers observe the construction, and (5) all parties concerned file verified reports that the approved plans were complied with in construction. This slide presentation showed how well school buildings performed in recent earthquakes when subjected to strong ground motions. It also showed how subsequent amendments have enhanced the Field Act and improved the seismic performance of public school buildings.

Whenever a building has been subjected to strong ground motions from moderate and large earthquakes, an evaluation of the possible damage to the building is required. As part of this presentation, workshop participants were taken through the step-by-step process of post-earthquake damage evaluation and reporting procedures for California schools.

Post-Earthquake Damage Evaluation and Reporting Procedures: A Guidebook for Schools[1]

by Dennis E. Bellet
Code/Research Engineer, Office of the State Architect/Structural Safety Section

Pete Wilson
Governor, State of California

Richard Andrews
Director, Governor's Office of Emergency Services

Sandra Smoley
Agency Secretary, State and Consumer Service

John Lockwood
Director, Department of General Services

and

Harry C. Hallenbeck
FAIA, State Architect

Introduction

The Office of the State Architect, Structural Safety Section (OSA/SSS), is responsible for the post-earthquake evaluation of public school buildings (Kindergarten through community colleges) in California. OSA/SSS acts in an advisory capacity to the school district. The final authority as to whether a school building is to be reoccupied or not, lies with the school district. Immediately following a damaging earthquake, power, communications and transportation routes may be disrupted and keep OSA/SSS engineers from making timely post-earthquake safety evaluations. The procedures suggested in this guidebook are intended to assist on-site school personnel in:

1. Discovering possible earthquake damage hazards before a qualified engineer arrives at the school site,

2. Reporting building conditions to OSA/SSS to assist in establishing a priority list for site visits by structural engineers.

[1] This guidebook was printed in January 1993. The information contained in it is consistent with procedures established in ATC-20 "Procedures for Post-earthquake Safety Evaluation of Buildings" as developed by the Applied Technology Council. The recommendations and suggestions included in this document are intended to improve earthquake preparedness, response and recovery. The contents do not necessarily reflect the views and policies of the Federal Emergency Management Agency and do not guarantee the safety of any individual, structure, or facility in an earthquake situation. Neither the United States nor the State of California assumes liability for any injury, death or property damage which occurs in connection with an earthquake.

It is the policy of OSA/SSS to have post-earthquake safety evaluations performed by California registered structural engineers at all school sites that report damage. School districts are encouraged to make prior arrangements with a local, California registered, structural engineer holding a valid OES Disaster Service Worker card to perform a post-earthquake evaluation of their facilities using the procedures established in ATC-20 "Procedures for Post-earthquake Safety Evaluation of Buildings." The ATC-20 document can be purchased from the Applied Technology Council, 555 Twin Dolphin Drive, Suite 270, Redwood City, CA 94065-2102, (415) 595-1542. The school district is still expected to report to OSA/SSS in accordance with the procedures of this pamphlet.

This inspection procedure is designed for use by individuals with some building construction or inspection experience; however, the procedure can be used by anyone during an emergency. School districts should assign personnel at each campus, faculty as well as maintenance staff, to perform these inspections. Training of prospective inspectors is strongly encouraged.

It has proven very beneficial to keep a set of structural drawings for permanent school buildings on-site, preferably in an easily accessible location. These plans are then available to the structural engineers for post-earthquake use and can assist on-site personnel in identifying the structural systems.

Use of Judgment Required

In areas of severe earthquake shaking, collapsed buildings or falling debris pose substantial danger to students, faculty and staff. Strong aftershocks, that can also dislodge building material, usually follow damaging events. The first priority is protection of the building occupants; therefore, if damage is suspected, appropriate evacuation procedures of occupants to a safe refuge area should be completed before this preliminary damage inspection is undertaken. When evacuation is necessary, the inspector should perform a rapid inspection of the route to make sure it is accessible and unobstructed. If the established evacuation route is blocked, or otherwise inaccessible, an alternate route will need to be developed.

If a building is clearly hazardous, no one should enter it, other than for search and rescue. Clearly, no inspector should enter a building that is near collapse, or where there has been a hazardous material release (e.g., damaged asbestos fireproofing, toxic chemical spill), or take any other undue risks.

The inspection of a school campus should proceed if the level of ground motion was large enough to cause books to fall off shelves. Many factors, in addition to the magnitude of an earthquake, may contribute to the shaking intensity the building may experience. Large earthquakes at great distances and nearby small earthquakes can cause ground motions strong enough to damage buildings.

Use of judgment is essential in the evaluation of damaged buildings. Not every dangerous situation is covered by the guidelines and procedures given here. In situations for which no guidance has been provided, or when guidance furnished is not appropriate for the situation, the inspecting teams must rely on their collective experience and judgment.

Inspectors must be conscious of their own safety and that of their team members at all times. Inspectors should work in teams of at least two. In this way, help is readily available in case a student is discovered or one member of the team is trapped or injured. If the partner can not provide immediate assistance, he or she can go for help.

When conducting preliminary damage assessments, inspectors should be alert to the potential of falling objects, both inside and outside of buildings. Outside a building, parapets, glass, building ornamentation, and other types of attachments may fall. Inside a building, ceilings, piping and ductwork, light fixtures, and heavy furniture, such as file cabinets and bookcases, may move or fall. These elements may fall of their own accord at any time during the earthquake, during an aftershock, or after the shaking stops. Inspectors should be prepared to "duck, cover and hold" in the event of aftershocks.

A fundamental assumption in the evaluation process is that the structure must be capable of withstanding at least a repetition of the earthquake that caused the initial damage without collapse and without additional risk from falling (or other) hazards. It should be emphasized, however, that *this is a minimum requirement* and a difficult engineering assessment to make. Therefore, this initial, non-technical assessment guideline will provide for a cursory estimation of the safety of damaged buildings. If the inspection team is unsure as to the significance of the damage observed, errors on the side of safety of the students is advised.

Inspection Procedure

If an earthquake may have caused damage to a facility, building occupants should be evacuated through pre-established evacuation routes, if they are accessible and clear, to a safe refuge before a preliminary damage assessment is conducted.

Step 1: Survey the Building from the Outside

1. Try to determine the structural system, i.e. the skeleton of the building.

   For example: Structural systems are wood studs with plywood sheathing, brick masonry walls, concrete block masonry walls, concrete walls, concrete posts and beams, steel posts and beams, and steel posts and beams with diagonal steel braces.

2. Examine all accessible sides of the structure for damage. Particular attention should be paid to those buildings with the irregular shapes noted in Figures 1 and 2 on the following pages. Damage to the structural system will typically telegraph through nonstructural finishes. For example, cracks in stucco or plaster finishes are assumed to be equal in size to the cracks in the structural system hidden behind the finish.

   A. Wood studs with plywood sheathing: New gaps between plywood sheets 1/8" or larger, nail heads pulled out, or cracks 1/8" or larger in stucco over plywood, are indicators of possible severe structural damage.

   B. Brick masonry walls, concrete masonry walls or concrete walls: Cracks 1/8" or larger indicate possible severe structural damage.

C. Concrete columns and beams: Hairline cracks are generally not considered dangerous unless widespread. Exposed steel reinforcing, spalling of the concrete, or severe cracking indicate possible severe structural damage.

D. Steel posts, beams, diagonal braces and/or trusses: Any buckling or bending (usually indicated by cracked or chipped paint) or any bolt failures or cracked welds indicate possible severe structural damage.

3. Look for indicators of excessive horizontal movement in exterior walls which may result in a building being out-of-plumb, i.e. the top of the wall not in line with the bottom of the wall. Two typical indicators are broken glass in windows and jammed doors. A building can move excessively without breaking windows or jamming doors and still be out-of-plumb. Standing 20 to 30 feet from the corner of the building, look along all four edges of the building, checking for locations where the building is leaning. An offset from the top to the bottom of a wall, beyond what may have existed prior to the earthquake, of 1" or more, may indicate severe structural damage.

4. Examine exterior nonstructural elements, such as brick veneer, exterior cladding, overhangs, canopies, parapets, signs, and ornamentation, for damage before evacuating or re-entering the building. Exterior cladding could be metal panels or precast concrete panels.

5. Look for new fractures in the foundation or exposed lower walls of the building.

Step 2: Examine the Surrounding Site for Geotechnical Hazards

Geotechnical hazards are conditions which affect the supporting soils around and under buildings. Geotechnical hazards may be off campus. The school district should be contacted for any geotechnical hazard information which is to be added to the school's emergency preparedness plan.

1. Look for cracks, bulged ground and vertical ground movements in the area (see Figure 3).

2. Examine hillside areas, above and below the site, for landslide displacement or debris encroaching onto the site (see Figure 3).

3. Remember that geotechnical hazards can extend over an area of several buildings or sites.

4. When geotechnical hazards are suspected, a detailed evaluation must be made by a team, including a geotechnical engineer or geologist, before a decision can be made about reoccupying the building.

Step 3: Inspect the Structural System from Inside the Building

Has the vertical or lateral load-carrying capacity of the structure decreased significantly?

1. Before entering the building, look to see if anything could fall on you or if the building is in an imminent state of collapse. *Do not enter obviously unsafe buildings.*

2. Ceiling panels may be removed to view the structural system, but any destructive exploration, such as cutting a hole in a wall, must be done only when authorized by the school district.

3. Look in stairwells, basements, mechanical rooms, and other exposed areas to view the structural system. (See the second step in Step 1 for additional guidance).

4. Examine the vertical load-carrying system.

   For example: Look for situations in which (1) a post may show signs of damage; (2) the floor or roof beams have begun to pull away from their supports; or, (3) the slab or beam system has been damaged.

5. Examine the lateral load-carrying system. Any new offset such that the walls at any level are out-of-plumb with the wall below means some structural damage has been sustained. (The new offset would be one directly attributable to the earthquake.) Look for situations in which a diagonal brace has buckled, bowed or cracked, or where walls have bowed or cracked.

6. Inspect the basement for fractures and uneven settlement. Also inspect basement floors and exterior walls for cracks and bulges.

7. Examine every floor, including basement, roof, and penthouse.

8. Gypsum wallboard (sheetrock) and painted plywood walls show signs of distress if the nailheads show, generally at the edge of the wall. If just a few nailheads show, usually the strength of the wall has not decreased. However, if many nail heads show or the shank of the nail is visible, the strength of the wall has decreased significantly.

Step 4: Inspect for Nonstructural Hazards

1. Look inside the building for damage to nonstructural elements such as ceilings, partitions, light fixtures, roof top tanks and other interior elements. Damage to these nonstructural elements could either indicate structural damage, or pose a threat to occupants.

Step 5: Inspect for Other Hazards

1. If damage to elevators is suspected, or if the elevators will not operate (seismic switch has been tripped), they should not be restarted without first being inspected by a qualified elevator inspector.

2. Look for spills or leaks in areas of stored chemicals or other hazardous materials. *Do not* attempt to handle these materials yourself. Restrict building or area use accordingly.

3. If there is damage to fire protection and detection equipment, it may be necessary to restrict building use. Notify the local fire department.

   For example: Look for damage to sprinkler systems, piping, and smoke detection components of signal systems.

4. Inspect the stairs to verify they are stable, and inspect exists for jammed doors and obstructions.

Step 6: Determine the Need for Locking or Barricading Buildings and Priorities for Notification

1. If conditions 1 through 4 of the preliminary evaluation criteria (see Table 1) have been met, make sure everyone is out of the building, lock the building and prevent access.

2. If conditions 5 through 8 of the preliminary evaluation criteria exist (see Table 1), then the hazard area must be barricaded or locked to prevent access. If the potential falling hazard or hazardous material is outside the building, some form of barricading should be established to make students, faculty and staff aware of the hazards and keep them well away from the condition. If the conditions exist inside the building, locking the building to prevent access should be sufficient.

3. Explain the locked and/or barricaded areas to faculty, students, staff and parents. Post an explanation of the reasons for locking the area near the entrance and include a contact name and phone number for parents, teachers, and post-earthquake inspection engineers.

4. Report the school site condition to the school district using the reporting codes established in Table 2.

5. If conditions result in a need to reoccupy some of the school buildings before a structural engineer has evaluated the safety of the building, do not occupy obviously unsafe structures. Reoccupancy of gymnasiums and multipurpose rooms is not encouraged as these structures are most difficult to inspect and generally are subject to higher stresses than individual classroom buildings. More modern buildings are generally more earthquake resistant than older buildings.

Caution: Aftershocks can cause additional damage. After each significant aftershock, all occupied buildings should be re-inspected.

Reporting Procedure

1. School staff or personnel complete preliminary inspection and, based on inspection results, determine appropriate reporting code using Table 2.

2. Report to school district using reporting codes. If communication is not available to the school district, report directly to the County Superintendent of Schools or the County Office of Emergency Services.

3. School districts receive reports from schools and fill out School District Post-earthquake Damage Reporting Form (copy attached). In the event of smaller earthquakes, where communication is available, the school district should contact the Office of the State Architect, Structural Safety Section directly.

4. School districts submit report to the County Superintendent of Schools or, if communication is not possible, directly to the County Office of Emergency Services.

5. County Superintendent of Schools receives reports from school districts and fills out the County Schools Post-earthquake Damage Reporting Form.

6. The County Superintendent of Schools or County Office of Emergency Services reports to the Office of the State Architect.

7. All county Superintendents of Schools in counties that have had shaking intensity sufficient to knock books off shelves should file a report.

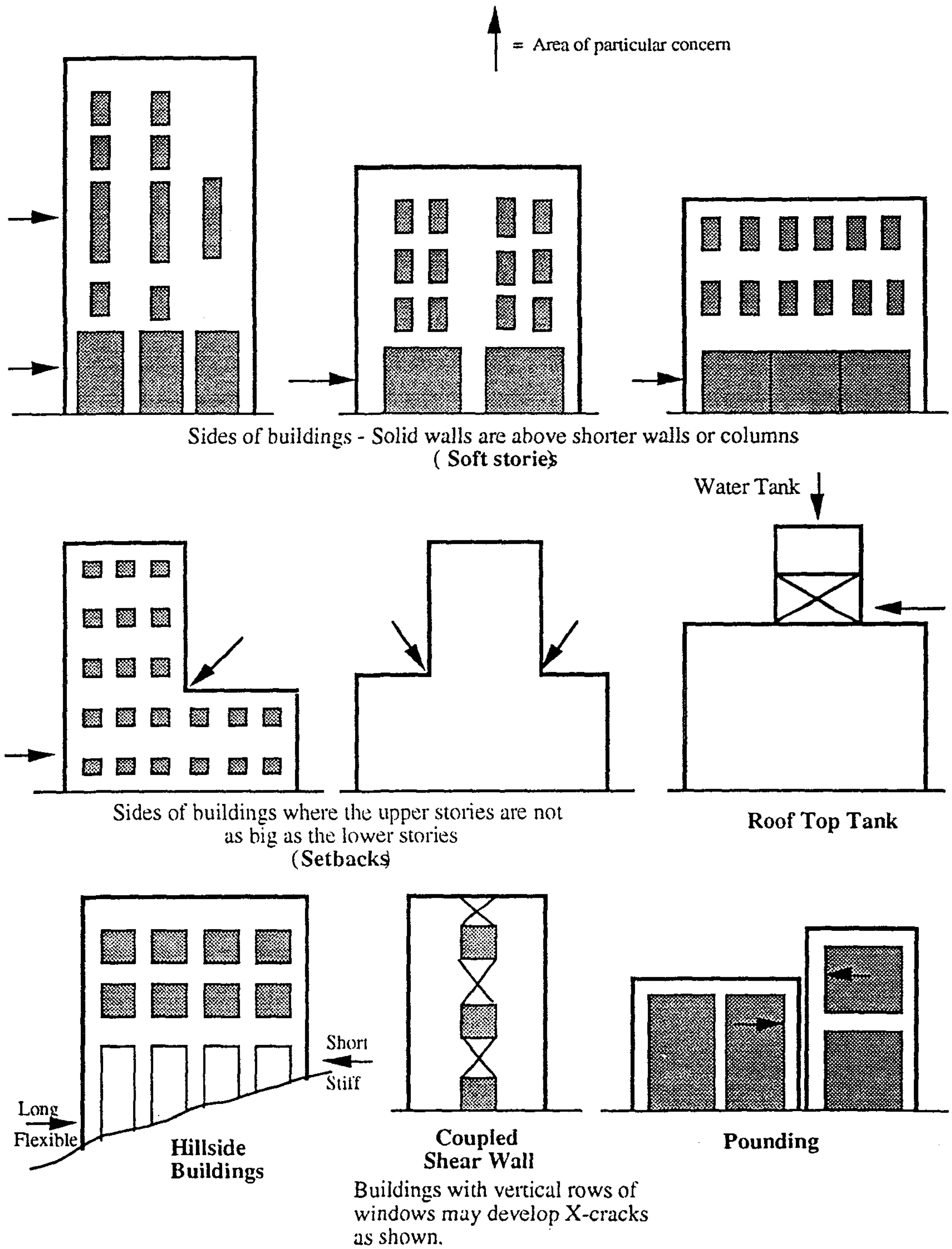


Figure 1: Structural systems with irregular shapes when viewed from any side.

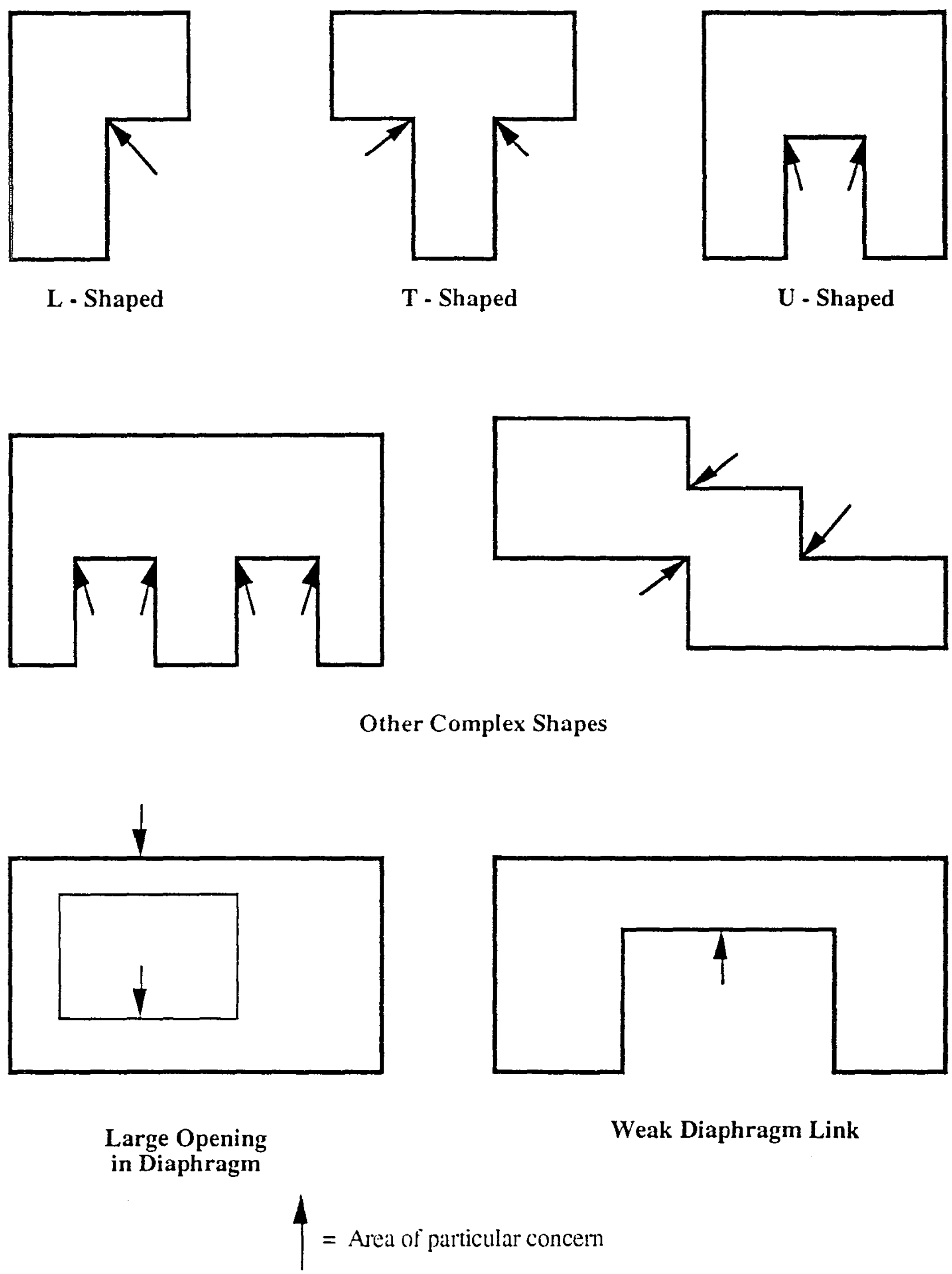


Figure 2: Buildings with irregular shapes when viewed from above.

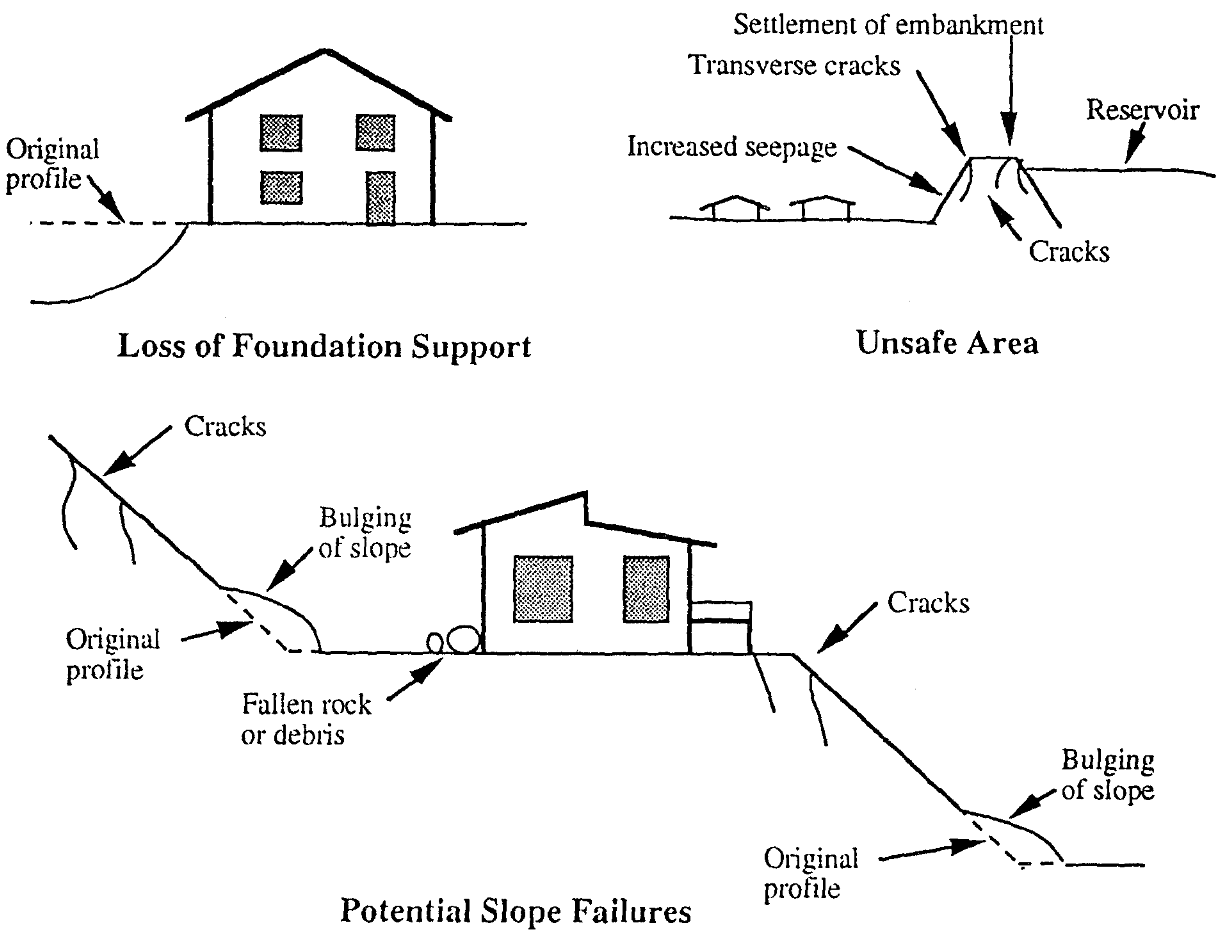


Figure 3: Inspection points for some geotechnical hazards.

Table 1 Preliminary Evaluation Criteria

This table will be used to determine the condition of a building and to give guidance on appropriate action.

CONDITION	ACTION
1. Building has collapsed, partially collapsed or moved off its foundation.	**DO NOT OCCUPY PREVENT ACCESS**
2. Building or any story is leaning significantly.	**DO NOT OCCUPY PREVENT ACCESS**
3. Obvious severe damage to primary structural members, severe leaning of walls or other signs of severe distress present.	**DO NOT OCCUPY PREVENT ACCESS**
4. Large cracks in ground, massive ground movement, or slope displacement present which are under, or near, the building and are a hazard to the building.	**DO NOT OCCUPY PREVENT ACCESS**
5. Obvious parapet, chimney or other falling hazard present.	**BARRICADE TO PREVENT ACCESS TO THE AREA**
6. Other hazard present (e.g., toxic spill, chemical spill, asbestos contamination, broken gas line, fallen power line).	**BARRICADE TO PREVENT ACCESS TO THE AREA**
7. Air duct terminals, ductwork, light fixtures lenses or florescent bulbs fallen or dislodged. Suspended ceiling system grid members fallen or dislodged. Broken windows. Overhead mechanical equipment supports or bracing dislodged.	**BARRICADE TO PREVENT ACCESS TO THE AREA**
8. Although no damage is yet apparent, areas with overhead elements similar to those indicated in condition 7 may also fall in an aftershock; therefore, they are also a possible hazard.	**BARRICADE TO PREVENT ACCESS TO THE AREA**

Table 2 Reporting Codes for Entire School Site

Use these codes in reporting to the school district. These codes will be used by OSA/SSS engineers to make a priority listing for inspections by structural engineers. Use one rating code for the entire school site. Use the highest reporting code applicable to the situation of any single building.

Code	Condition
	Priority:
(P1)	1. Sites identified as possible community shelters.
(P2)	2. Sites showing any structural or nonstructural damage to any building which students and teachers have re-occupied the building or intend to do so within 24 hours.
	High:
(H1)	1. Sites showing severe structural damage to any building or ground movement hazards as defined by conditions 1 through 4, Table 1.
(H2)	2. Sites showing any structural or nonstructural damage which students and teachers intend to re-occupy between 24 and 48 hours after the earthquake.
	Moderate:
(M1)	1. Sites showing any structural damage to any building or that have overhead hazards as defined by conditions 5 through 8, Table 1.
(M2)	2. Sites showing any structural or nonstructural damage which students and teachers intend to re-occupy between 48 and 72 hours.
	Low:
(L)	Sites showing any structural or nonstructural damage which students and teachers intend to re-occupy 72 hours or more after the earthquake.
	Routine:
(R)	Sites showing no damage and very few, if any, books and objects have fallen off shelves.
	No Report:
(NR)	Sites where no report has been made due to lack of communication.

School District Postearthquake Damage

School	Address	Contact Person/ Title	Phone #	Rating									Class Restart Date
				P1	P2	H1	H2	M1	M2	L	R	NR	
School District	Address	Contact	Phone #										District Totals

Priority

(P1) 1. Sites identified as possible community shelters.

(P2) 2. Sites showing any structural or nonstructural damage to any building which students and teachers have re-occupied the building or intend to do so within 24 hours.

High

(H1) 1. Sites showing severe structural damage to any building or ground movement as defined by condition 1 through 4, Table 1.

(H2) 2. Sites showing any structural or nonstructural damage which students and teachers intend to re-occupy between 24 and 48 hours after the earthquake.

Moderate

(M1) 1. Sites showing any structural damage to any building or that have overhead hazards as defined by conditions 5 through 8, Table 1.

(M2) 2. Sites showing any nonstructural or structural damage which students and teachers intend to re-occupy between 48 and 72 hours.

Low

(L) Sites showing structural or nonstructural damage which students and teachers intend to re-occupy 72 hours or more after the earthquake.

Routine

(R) Sites showing no damage and very few, if any, books and objects have fallen off shelves.

No Report

(NR) Sites where no report has been made due to lack of communication.

County Schools Postearthquake Damage

School District	Address	Contact Person/ Title	Phone #	Rating									Class Restart Date
				P1	P2	H1	H2	M1	M2	L	R	NR	
County	Address	Contact	Phone #										County Totals

13

Priority

(P1) 1. Sites identified as possible community shelters.

(P2) 2. Sites showing any structural or nonstructural damage to any building which students and teachers have re-occupied the building or intend to do so within 24 hours.

High

(H1) 1. Sites showing severe structural damage to any building or ground movement as defined by condition 1 through 4, Table 1.

(H2) 2. Sites showing any structural or nonstructural damage which students and teachers intend to re-occupy between 24 and 48 hours after the earthquake.

Moderate

(M1) 1. Sites showing any structural damage to any building or that have overhead hazards as defined by conditions 5 through 8, Table 1.

(M2) 2. Sites showing any nonstructural or structural damage which students and teachers intend to re-occupy between 48 and 72 hours.

Low

(L) Sites showing structural or nonstructural damage which students and teachers intend to re-occupy 72 hours or more after the earthquake.

Routine

(R) Sites showing no damage and very few, if any, books and objects have fallen off shelves.

No Report

(NR) Sites where no report has been made due to lack of communication.

Nonstructural Hazard Mitigation for Schools

by Guna S. Selvaduray
Associate Professor, Materials Engineering Department, San Jose State University

Abstract

Nonstructural hazard mitigation is an expedient manner by which schools can minimize earthquake damage to their equipment and facilities. This paper first defines what "nonstructural" means, and then provides the motivation for nonstructural hazard mitigation. Typical examples of nonstructural damage during earthquakes is then described, with a special emphasis on damage incurred by schools. Hazard reduction techniques that are applicable to schools are then described, with specific recommendations on what can be done in the office and classroom environment, how the potential of hazardous materials incidents occurring can be reduced, and how mechanical equipment can be anchored.

Introduction

Being centers of learning and education, schools are the single resource without which a society cannot survive and progress. The motivation for earthquake preparedness in schools should therefore be quite obvious - they form one of the basic pillars that support society.

Earthquake preparedness for any organization can be divided into two broad categories. One category covers managerial aspects such as the formulation of a disaster plan, implementation of evacuation exercises, etc. The other category covers engineering aspects which include geologic site analysis, structural analysis of buildings, seismic upgrading of buildings, nonstructural hazard mitigation, and so forth. This paper discusses the issues pertaining to *nonstructural hazard mitigation*, with special emphasis on applications for schools.

What is "Nonstructural"?

Most structures (buildings) are made up of three components: the structural components, nonstructural components, and building contents.

The *structural* components are those that are load bearing. Without these components, the building would not be able to stand up. When a building collapses during an earthquake, it is said to have suffered structural damage. Quite frequently, buildings can have suffered structural damage during an earthquake and still not have collapsed. In such cases, the structural damage is partial, i.e., the structural components in certain parts of that building would have been damaged.

The *nonstructural* components are those that make the building habitable. These components include the partition walls, ceilings, light fixtures, HVAC system, heating system, windows and the myriad of other fixtures that are necessary to make a building "complete."

Building contents make the building or structure functional. These are generally installed by the occupants and are necessary if they are to perform their stated function. Typical examples of building contents are furniture, computers, laboratory equipment, and so forth. The spectrum of items included under this category will invariably depend upon the occupants and their purpose for occupying the building.

For the purposes of this paper, the nonstructural components and building contents are treated as belonging to one category.

Why "Nonstructural Hazard Mitigation?"

News coverage of earthquake hazards generally tends to focus on major or total damage of buildings and structures. This generally tends to occur when one or more of the following three conditions are met: (i) The earthquake is sufficiently large; (ii) The structure experiences a sufficiently large level of ground shaking; (iii) The structure is sufficiently weak.

For every structure that collapses during an earthquake, literally thousands of other structures experience shaking without undergoing structural damage. Typically, the nonstructural components and building contents in these structures would be damaged.

Experience has also shown that during moderate earthquakes, which are far more numerous than major earthquakes, the physical damage suffered is generally nonstructural in nature. Though hard data is still not available, it has been stated that "Total economic loss from nonstructural performance failure could easily be as high as ten times the construction value of the building, because of loss of equipment, loss of inventory, and loss of use of the facility until it can regain its operational capabilities" (EERI, 1984, p. 3).

Although no paper focusing on the nonstructural damage that occurred in schools during an earthquake has been published in the open literature, it is quite well known that schools have indeed incurred such damage. Perhaps the most widely known example thus far is the damage that occurred in Coalinga High School during the Coalinga earthquake (Tierney, 1985). During the Loma Prieta earthquake, it was found that a large number of schools had damage in their laboratories, which led to the occurrence of hazardous materials incidents (Perkins & Wyatt, 1991).

This paper briefly identifies typical nonstructural components that are prone to damage, and outlines "solutions" that can be implemented to minimize the risk of damage. The topic is divided into the following major groupings for further discussion: (i) Office and classroom furniture, including computers and windows; (ii) Laboratories and other sites where hazardous materials are stored; and (iii) Mechanical equipment. Reitherman (1985) and McGavin (1981) have covered this topic in significantly more detail, and the interested reader is referred to these publications. A more condensed publication of the same topic, but focusing on schools and containing a checklist suitable for professionals conducting a hazard identification survey has been published by BAREPP (1990).

Damage to Nonstructural Components

The most common cause of damage to nonstructural components is "tipping" or falling over. This is typical of items that are relatively slender, such as bookshelves. Another example of items that can fall over and cause damage are laboratory chemicals. Although both bookshelves and laboratory chemicals are damaged by "falling down," the root cause of their falling down is quite different. In the case of bookshelves, the cause is the result of its geometric configuration, i.e., the base is narrow relative to its height. In the case of laboratory chemicals, it is the lack of restraint to keep them on the shelf that causes damage. The mechanism that results in damage to computers is the same as that for laboratory chemicals, although the consequences may be significantly different.

The overall approach to nonstructural hazard mitigation consists of (i) tieing the nonstructural component to a structural member so that differential motion between the two can be eliminated, (ii) changing the configuration of the nonstructural component so that it would be less prone to damage during an earthquake, or (iii) providing sufficient restraints so that items do not fall off their normal locations.

Office and Classroom Environment

The most common items in offices and classrooms that would be prone to damage during earthquakes are bookshelves and storage racks, filing and storage cabinets, computers, ceilings, lighting fixtures, windows, photocopying and other office machinery, and decorative items such as wall decorations and potted plants.

Bookshelves and storage racks typically have a geometric configuration that renders them unstable during ground shaking. In general, if the height is two times greater than the narrowest base dimension, the piece of furniture or equipment would be considered to have an unstable configuration.

The most effective means of preventing bookshelves from falling over during an earthquake is to anchor them to the wall. In the process of anchoring, it is important to make sure that the bookshelf is anchored to the studs in the wall, or to a structural wall. When bookshelves are anchored to dry wall, and not to the studs, there might not be enough restraining force to prevent the bookshelf from falling over.

Storage racks, if they are individually placed, can be restrained in a manner identical to bookshelves. However, if the storage racks are in a library environment, then the problem is more complex. They should be cross-braced in both directions and also anchored to a structural floor.

Filing and storage cabinets pose problems that are similar, and yet different, from those posed by bookshelves and storage racks. Four- and five-drawer filing cabinets and storage cabinets tend to have a height that is more than two times the narrowest base dimensions and, as such, are inherently unstable. These can be anchored to walls in a manner similar to bookshelves.

However, filing cabinets, even those with two drawers, pose an added problem. If the drawers open during ground shaking, an otherwise stable geometric configuration is immediately rendered unstable because the center of gravity shifts. This has resulted in filing cabinets falling over. It is therefore important to use filing cabinets that have latches capable of holding drawers shut during ground shaking.

According to the criterion of geometric stability, *computers* are quite stable. The main cause of damage to computers is their sliding off desk tops and falling down on the floor. The ensuing impact damages the computer. A number of restraints for computers have been developed, including the use of hook-and-eye fasteners.

A common mode of damage to *ceilings* is racking of the T-bars that support the acoustic tiles and lighting fixtures. The result is warping of the T-bars, and falling down of acoustic tiles and lighting fixtures. The last of the three could be a potential threat to life safety, due to their weight and the fact that they carry a current. Lighting fixtures should be supported directly from the structural ceiling, or other structural members contained within the ceiling, and not be supported on the T-bars.

Fracture of *window glass* due to deflection of the building can be particularly hazardous because of shards that fly out. Large panes of glass are more hazardous than smaller panes, such as those contained in louvers, because of the amount of stored energy. Prevention of glass fracture itself can be very expensive, without providing any guarantees. However, prevention of dispersion of the fractured shards is more easily achieved. The most common approach to prevention of shard dispersion is to adhere plastic films onto glass panes. The tensile and adhesive strength of the plastic film generally determines the effectiveness of the film in retaining fractured shards.

Office machinery such as photocopying machines also tend to have a stable geometric configuration. However, if these machines are mounted on wheels, they will tend to roll around and could result either in impact damage, or blocked entries and exits. These machines are also usually placed a few inches to a foot away from walls and therefore do not lend themselves to being anchored to walls. Such equipment, therefore, needs to be anchored to the floor.

Decorative items such as wall hangings and potted plants, especially those placed on top of bookshelves or filing cabinets, are not only prone to damage, but could also pose a life-safety threat. Wall hangings should be securely mounted, for example, with closed eye-hooks, and preferably to a stud in the wall. Potted plants should either be provided with sufficient restraints to prevent their displacement, or be removed all together.

Hazardous Materials

The usual location of hazardous materials in schools, is the laboratories, especially the chemistry laboratories. Items to focus on here include compressed gas cylinders, laboratory chemicals, and gas pipes.

The most useful practice in preventing damage due to *laboratory chemicals* spills is good housekeeping. Therefore, the first rule is to keep incompatibles separated. The second rule is to provide secondary containment so that spilled reagents will be contained and not cause further damage. The third rule is to make sure that all reagents are returned to their original location after use, rather than be left on counter tops and laboratory benches. Chemicals and reagents that are usually placed on shelves should also be provided with restraints, such as shelf lips, to prevent their falling off the shelves.

Compressed gas cylinders themselves are quite sturdy and no example of cylinder damage during an earthquake is known to the author. However, the pressure regulator and the tubing that is attached to compressed gas cylinders are significantly weaker than the cylinder body itself, and are therefore prone to damage if the cylinder falls over. Clamps used to restrain cylinders to laboratory bench tops have come loose during an earthquake because the frictional force between the clamp and the laboratory bench top is insufficient to hold the cylinder. Compressed gas cylinders are therefore best restrained to either a structural wall or to the studs within a nonstructural wall.

Gas pipes can pose a significant threat if they are ruptured, and therefore deserve special attention. In addition to the laboratories, natural gas would be used in the kitchen/cafeteria and also for mechanical equipment such as water heaters or boilers. One of the main causes of gas pipe damage is differential motion between the equipment using gas and the building. All equipment using natural gas should therefore be anchored to the building so that the problem of differential motion can be either eliminated or minimized. In addition, the use of flexible pipes at locations where the gas pipe is connected to the equipment provides for a certain amount of movement without rupture.

Mechanical Equipment

Major items in this category would include water heaters, furnaces and boilers, HVAC equipment such as air handlers and chillers, and shop equipment such as lathes and other machine tools. This equipment is generally heavy, and can pose a range of problems.

As stated earlier, the movement of water heaters and boilers can result in the rupture of gas pipes. Another motivation for protecting water heaters and boilers is that they can prove to be a valuable source of water that is constantly replenished, and therefore fresh.

The movement of heavy equipment can also result in damage to other equipment or personnel. The force exerted by a moving body is directly proportional to the acceleration under which it is moving and its weight. Therefore, the heavier the equipment, the greater the force it would exert when it impacts something else.

In view of the weight, and the seriousness of impact should it occur, all mechanical equipment should be seismically restrained. It is best to have a qualified engineer design seismic restraints that are sufficiently adequate for restraining such equipment.

Conclusion

Nonstructural hazard mitigation is a very cost-effective approach to reducing earthquake caused damage. Most of these hazard reduction measures can be implemented via a "self-help" approach. Especially in the case of moderate earthquakes, the extent to which nonstructural hazard mitigation measures have been taken will determine the speed of the recovery process and the number of days the school would be closed. This paper has outlined some of the more common categories of nonstructural hazard mitigation measures that are appropriate for school officials to implement. The specific items in each school may vary and therefore, school officials responsible for earthquake hazard mitigation should be knowledgeable about the full range of equipment in their respective schools. Especially for heavy equipment, and other dangerous items, it is recommended that competent professional help be sought to aid in the process of hazard mitigation.

References

Bay Area Regional Earthquake Preparedness Project. (1990). Identification and reduction of nonstructural earthquake hazards in California schools.

Earthquake Engineering Research Institute. (1984). Nonstructural issues of seismic design and construction. Publication No. 84-04, p 3.

McGavin, G. L., (1981). Earthquake protection of essential building equipment. NY: Wiley Interscience.

Perkins, J. B., & Wyatt, E. G. (1991). Loma Prieta data base. Oakland, CA: Association of Bay Area Governments.

Reitherman, R. K., (1985). Reducing the risks of nonstructural earthquake damage: A practical guide, Southern California Earthquake Preparedness Project.

Tierney, K. J., (1985). Report on the Coalinga earthquake of May 2, 1983. Report No. SSC 85-01. Seismic Safety Commission, California.

Identification and Reduction of Nonstructural Earthquake Hazards in California Schools

by Marjorie Greene
Senior Program Planner, California Office of Emergency Serivces Earthquake Program

Dennis E. Bellet
Code/Research Engineer, Office of the State Architect/Structural Safety Section

and Sarah K. Nathe
Project Planner, California Office of Emergency Services Earthquake Program

Introduction

This paper, and the accompanying reprint in Appendix B, are intended to help identify nonstructural hazards at the school site and to show how those hazards can be reduced. Nonstructural hazards can occur in every part of a building and all of its contents with the exception of the structure. In other words, nonstructural elements are everything *but* the columns, beams, floors, load-bearing walls, and foundations. Common nonstructural items include ceilings, lights, windows, office equipment, computers, files, air conditioners, electrical equipment, furnishings, and anything stored on shelves or hung on walls. In an earthquake, nonstructural elements may become unhooked, dislodged, thrown about, and tipped over. This can cause injury and loss of life, extensive damage, and interruption of operations.

Ever since the Field Act of 1933, public school buildings in California have been constructed according to stringent seismic design codes. However, attention was not given to nonstructural hazards until relatively recently. Title 24 of the California Code of Regulations now prescribes some nonstructural seismic safety elements for new construction in public schools, but many nonstructural hazards are still not covered. The reprint in Appendix B can be used by both public and private schools to determine the extent of nonstructural hazards in their facilities. This booklet provides a checklist that contains the nonstructural hazards known to be dangerous or problematic in earthquakes. School administrators and engineers may carry the checklist with them as they survey a school site. After the survey is complete, any checked NO boxes represent hazards in need of correction.

In parentheses after each hazard listed, there is either a brief solution or a numbered reference. The numbers refer to solutions provided in the handbook that illustrate how to restrain or anchor nonstructural elements and thereby reduce their hazardousness. The illustrations contain the specifications necessary in order to correct the particular nonstructural hazard.

For some items, the fix is fairly complicated, and (A/E) indicates that an architect or engineer should be consulted. (LS) after an item draws attention to the fact that it is a life safety hazard and should be a high priority for correction. Items in italics are generally already taken care of if they were part of recent state-approved construction in public schools.

The handbook was developed jointly by staff at the Bay Area Regional Earthquake Preparedness Project (BAREPP), (now the California Office of Emergency Services) and the Structural Safety Section of the Office of the State Architect. An earlier BAREPP publication by Robert Reitherman, **Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide**, was adopted to address specifically those nonstructural hazards most common in California schools.

Any questions about the use of this information should be directed to Dennis Bellet, Code/Research Engineer, at the Office of the State Architect in Sacramento, (916) 445-8730.

Part III

Search and Rescue Teams For Schools: Train The Trainer

3-1 Search and Light Rescue Teams for Schools

3-2 Getting the School Prepared

3-3 School Search and Rescue Team

Abstract

The normal emergency response infrastructure can easily be overwhelmed by a wide area catastrophic event, and there's a significant time lag before assistance from outside agencies reach the impacted area. In the initial hours and days following a major disaster, an impacted community must deal with a variety of problems which threaten the physical, emotional, and economic well being of its members. Personal preparedness and community self help are crucial elements of any disaster plan.

In this workshop, participants learned to organize the disaster response within their school by conducting a systematic search for lightly trapped and injured victims, and administering lifesaving first aid.

Search and Light Rescue Teams for Schools

by William M. Cody
Instructor, School Earthquake Preparedness Program, UCLA Extension

and

Carol Goldberg
Coordinator, School Earthquake Preparedness Program, UCLA Extension

Introduction

The term disaster is most appropriately defined as an event, which overwhelms the capabilities of the local resources. The devastation caused by a major earthquake can readily overload the normal emergency response infrastructure over a wide spread area. Mobilizing and deploying additional resources throughout the impacted area will take time and many sites will undoubtedly experience significant delays before professional emergency assistance is available. During that time, the turmoil in terms of death, suffering, and destruction can extend well beyond the initial damage caused by the tremblor.

In the initial hours and days following a disaster, the schools may be obligated to cope with a variety of problems that threaten the physical, emotional, and economic well being of the community. The disaster plans adopted by many communities have designated the schools as shelters and/or casualty collection points. Therefore, schools must be prepared to handle not only their own immediate predicaments, but the problems associated with a potentially large influx of casualties and displaced neighbors.

The path to recovery must start with personal preparedness and a viable disaster response plan that emphasizes community self-help. Taking an integrated approach to the disaster response will benefit everyone by establishing a cooperative progressive venture.

The hierarchy of needs following a disaster includes:

1. Assessing the immediate environment
2. Evacuating to an area of safety
3. Searching for missing students and associates
4. Triaging injured victims
5. Removing non-ambulatory victims from damaged areas
6. Rescuing lightly trapped victims
7. Providing medical care for all injured victims
8. Establishing communications with local authorities
9. Transporting severely injured victims to available hospitals
10. Initiating shelter operations for displaced individuals and families

Each of these steps must be addressed by the disaster plan.

In structuring the school's disaster response, take advantage of the basic organizational units already in place. The classrooms, offices, library, and cafeteria are normally under the direction of a responsible person. During a disaster or other emergency, the students will naturally look to their established leaders for help and direction. Training instructors and staff to handle basic emergency responsibilities will reduce confusion and set the stage for the best possible resolution of the crisis.

Adapt a floor warden type system to the school's disaster response plan. Initiate search, triage, and rescue at each of the smallest organizational units. Then expand the response to include the entire system, i.e. classroom/office, wing/floor, building, quadrant, and campus. Time is a critical element in any emergency, but during a disaster, it becomes even more crucial. Victims must be located and their injuries cared for as quickly as possible. If teachers are trained to perform a preliminary damage and hazard assessment as they are evacuating their students from the building, it will expedite the overall search and rescue endeavor by providing the site manager with valuable data. This information could prevent emergency response team members from unnecessarily exposing themselves to injury by reentering an unoccupied or high hazard area. Timely reports will also assist in reducing the time required to locate and respond to problems.

Develop a buddy system between teachers in adjacent classrooms. One teacher can lead both groups of students to the designated safe area, while the second teacher quickly searches each room for non-ambulatory injured victims. Upon finding an injured victim, the teacher needs to immediately perform a primary patient assessment, treat any life threatening injures, and tag the victim according to established triage guidelines. Many lives could be saved by simply providing an airway, controlling external bleeding, and treating the victim for shock.

Institute an Emergency Response Team (ERT) program to train teachers, staff, and administrators how to effectively perform and direct basic emergency functions such as evacuation, hazard reduction, damage assessment, systematic search, triage, basic first aid, victim removal, light rescue, wound care, patient management and sheltering. The initial actions of on-site personnel can make a difference in the outcome for many victims. Help your personnel to become prepared through proper training and regular practice.

Organizing the Disaster Response

There are three phases to any disaster: before, during, and after. The time prior to the event is the preparation stage. This time must be spent developing and implementing a comprehensive disaster plan. It involves a wide variety of panning and preparation activities such as purchasing disaster supplies, performing nonstructural hazard mitigation, and conducting training drills and exercises. Currently, there is no way of accurately predicting when or where an earthquake will strike. Therefore, planning and training activities should be part of an on going preparedness process.

The second phase occurs during the event. This is the reaction stage. In the case of an earthquake, it is the time to direct people to find a safe location and "duck, cover, and hold" until the shaking stops.

Phase three is the response and recovery stage. This stage also moves forward in steps. Once the shaking stops, it is time to evacuate the buildings and begin organizing the response effort. Immediately following the initial evacuation, all the teachers should call roll and deliver their status reports to the command post. It is essential that the command post is established during the evacuation phase so that there is one central location where all communications are directed. The command post will collect and record all the information about the incident. The site manager and support staff will analyze the situation, prioritize the problems, and assign personnel to handle specific tasks. Concurrently, the specialized fire, medical, and search and rescue teams can assemble and collect the equipment needed to tackle the more complex problems.

The first priority following the evacuation must be to stabilize the environment. This involves critical activities such as: performing damage assessment surveys, shutting off damaged utilities, extinguishing small fires, prohibiting entry into damaged buildings, determining a safe perimeter, instituting safe access corridors for both pedestrians and vehicles, limiting access to the command post, establishing the casualty collection and medical treatment areas, and setting up sanitary facilities.

The search and rescue phase involves locating victims, assessing their condition, treating their life threatening injuries, and moving them to a safe location where they can receive additional medical treatment. These treatment areas should be located close to a vehicle access corridor so that patients can be evacuated to a medical treatment facility or hospital at the earliest opportunity.

The medical care phase goes on continuously throughout the duration of the incident until all victims are accounted for and have received definitive medical treatment. The medical activities involve: triaging injured victims, treating life threatening injuries (ABC's), bandaging wounds, splinting fractures, packaging patients for transportation, initiating a wound care and infection control program, and providing psychological support services.

With all of these activities occurring almost simultaneously, it is essential that a strong command and control organization be an integral part of the disaster response. The command post should be established and staffed at the earliest possible point to assure coordination and to furnish the necessary support.

Establishing a Team

Many disaster plans establish specialized teams to perform fire suppression, utility management, hazard reduction, search and rescue, and medical care. Although each of these functions is important, developing single function teams may be counter productive and waste valuable time and resources. It may be more helpful to think in terms of entry teams, treatment area teams, and support teams. This type of orientation prepares each team to accomplish multiple tasks as different kinds of problems are encountered. For example, when the search and rescue team finds a victim, they should immediately assess the patient, treat any life threatening injuries and tag him/her according to established triage protocols. If the medical team encounters a fire, they should attempt to extinguish it if possible. Since the mission of the entire Emergency Response Team (ERT) is "to do the greatest good, for the greatest number, in the shortest amount of time," it is paramount that any team finding a high priority problem attempt to handle it regardless of their designation or assignment.

The search and rescue (SAR) team is, by definition, an entry team. Their goal is to locate all trapped and/or injured victims, treat any life threatening injuries, and then remove as many victims as possible to a safe location without causing any further injuries to the victims or injuring themselves in the process. To accomplish this goal, they must be trained in several specialties and take a disciplined approach to problem solving. Safety must be instilled in all team members. To be effective, they must be a part of the solution, not a part of the problem.

When instituting a SAR team, look for individuals who are physically fit, have good mechanical aptitude, and are capable of providing emergency care to injured victims. Establish a leader and chain of command based on ability and experience. Assemble a cache of rescue tools and equipment. Locate it in a safe area away from the buildings. Get facility maps and radio communications equipment. Conduct regular training exercises to familiarize team members with all areas of the facility, the potential hazards, the appropriate use and limitations of their tools, and acceptable radio procedures.

Rescue Situations as a Result of Structural Failure

The tasks involved in a search and rescue operation range from simple debris removal to complex technical operations requiring specialized tools and training. It is important that ERT members are able to recognize the four types of rescue situations resulting from structural failure and understand their limitations for performing a rescue that requires specialized training and equipment.

1. Injured but not trapped - 50% (spontaneous rescuers)
   A. Victims are located on the surface, either inside or outside the building.
   B. Their injuries are most often caused by falling or being hit by falling debris.
   C. Rescue is readily accomplished by moving the victims to a safe location and treating their injuries.

2. Nonstructural entrapment - 30% (ERT teams)
   A. The building is damaged, but retains its structural integrity.
   B. Victims are trapped by building contents.
   C. Location and removal is readily accomplished using hand tools.
   D. Remove victims to a safe location and treat their injuries.

3. Void space, nonstructural entrapment - 15% (emergency service teams)
   A. The building is severely damaged and has suffered a partial or complete collapse. This is a hazardous and dangerous situation.
   B. Victims are trapped in void spaces created by the collapsed structure.
   C. Securing the structure, locating the victims, lifting the debris, and removing the victim requires special tools and training.
   D. These rescues usually take about four hours.

4. Entombed - 5% (USAR teams)
   A. The building is severely damaged and has suffered a partial or complete collapse. This is a hazardous and dangerous situation.

B. Victims are trapped by structural components like floors, walls, and roofs.
C. Securing the structure, locating the victims, lifting, removing, or breaching the structural components, and removing the victim requires special tools and training.
D. These rescues usually take more than four hours, eight hours is the average.

It should be obvious that these last two rescue situations far exceed the capabilities of the ERT. What the SAR team can do to assist these victims is to make contact with them, attempt to pinpoint their location, assess their situation, endeavor to get professional help, and then reassure them that help is on the way.

Experience has shown that 80% of all trapped and injured victims are rescued by spontaneous volunteers and ERT search and rescue teams. Unfortunately, many of these well-intentioned rescuers are killed or injured because they lack appropriate training, equipment, and leadership. The ERT program should provide your personnel with the skills and resources they will need to achieve success.

Search and Rescue Skills

Search and rescue skills for ERT members can be broken down into several discrete areas.

1. Tools and equipment
2. Team work and organization
3. Size-up, reconnaissance, and damage assessment
4. Hazard assessment and reduction
5. Systematic search methods and marking conventions
6. Locating methods
7. Triage and life saving medical procedures
8. Extrication principals and practices
9. First aid and patient packaging

The training in these basic skill areas should stress safety. ERT members will be required to make some very difficult decisions during a disaster, and they should not make those decisions without performing a risk versus benefit analysis. They must understand the dangers involved in rescue work and take precautions necessary to stay alive. All team members must think safety and act safely!

Personal Protective Equipment

All SAR team members should have the following personal protective equipment and supplies:

hard hat
heavy leather work gloves
work boots
dust mask
eye protection
identification vest
flash light with extra batteries
rope bag
knap sack and/or fanny pack
first aid kit
water
food bars
tape
marking pens and note pad
extra clothing
utility knife

Rescue workers should not unnecessarily expose themselves to injury. The few minutes required to don protective equipment will pay dividends in terms of comfort and effectiveness. All team members should wear their protective equipment during training exercises as well as actual incidents. This will help them become more secure in their emergency role and promote safety consciousness. It will also help others to identify them as being specially trained.

Rescue Tools and Equipment

Rescue tools and equipment should be cached and stored in a safe location away from the buildings. The cache should include:

crow bars	sledge hammers	fire axes
pry bars	claw hammers	ladders
shovels	assorted nails	wood saws
hydraulic jacks	screw drivers	hack saws
cribbing blocks	pipe wrenches	traffic cones
wedges	pliers	barricade tape
ropes	flash lights	tarps
leather gloves	extra batteries	blankets
hard hats	cyalume light sticks	stretchers

It is not sufficient merely to procure these tools and supplies. Rescue workers need to know how to utilize ropes, knots, and lashings. They must be able to employ levers and jacks for lifting and moving heavy objects. They need to have experience using cribbing and shoring materials for stabilizing collapsed and/or damaged structures to ensure the safety of both rescuers and victims during a rescue operation. They need to learn about how buildings are constructed, how they collapse, and the types of hazards associated with different types of buildings.

The SAR team should conduct regular training sessions that start with basic skills and work up to resolving simulated disaster problems. This will provide team members with an opportunity to hone their skills through practice. It will also help team members to develop the confidence they will need to complete their mission in the aftermath of the disaster. It will promote and enhance safety by helping them to become familiar with the applications and limitations of their specialized equipment.

Team Work and Organization

Rescue work is not merely individual acts of heroism. It is a well-organized team approach to problem solving under extreme conditions. The command and control system must utilize a structure that is adaptable to a variety of situations and capable of expanding to meet the demands of any size emergency. It should also ensure that a reasonable span of control is maintained by operating units. The Incident Command System (ICS) used by many emergency response agencies is a good model to follow. Without this type of organizational system, there is often wasteful duplication of effort while vital tasks and support functions are left undone.

A disaster coordinator/site manager should be designated. He or she should be located at the command post and is responsible for planning the overall incident strategy and coordinating the assignments of each functional group. Each functional group, such as search and rescue, medical, fire suppression, communications, and logistics, should have a team leader. The team leaders should be located close to their respective operational areas and are responsible for coordinating the activities of their assigned units.

The team leader must know the physical condition and capabilities of each team member. He/she should ensure that all members are properly equipped for their assigned tasks. He/she should review all known conditions, suspected hazards, and define the team's objectives when briefing members prior to deployment. He/she must keep abreast of changing conditions and relay that information to the rest of the team. He/she should establish communications with the command post and keep the site manager apprised of progress, problems, needs, and other important information.

A safety officer should be assigned to monitor activities and conditions during any extended rescue operation. He/she should not be actively engaged in the operation since it is his/her responsibility to watch out for hazardous conditions and unsafe actions by the other rescuers.

The most basic part of any team organization is the buddy system. Rescue work is potentially dangerous and no one should work alone. Work in teams of two and stay together. Buddies need to look out for their partner's safety and maintain a constant awareness of their surroundings.

Establish some standard operating procedures (SOP'S) for the SAR teams. This will help to reduce confusion and strengthen the initial response. The use of standard terminology and prearranged signals will improve communications and enhance safety. Good team work is an essential component of the search and rescue operation, and it must be emphasized during drills and exercises.

Size-up, Reconnaissance, and Damage Assessment

Earthquakes have a way of unexpectedly rearranging the environment. The natural tendency is to start restoring some sort of order quickly. But, before committing any resources it is important to stop and analyze the situation. Obtaining an approximate idea regarding the extent of damage and number of casualties will assist the site manager and team leaders in developing the search and rescue plan.

Start with the basics. There are several known facts that provide valuable information about the scope of the disaster. The time of day, the day of the week, the type of building construction, and the use of the building, supply important clues about potential problems. Obtain a list of known victims and locations from the command post if it is available.

Identify the hazards. Survey all four sides of the building. In addition to structural integrity and potential for collapse, the SAR team must be concerned about the presence of natural gas, water, steam, electricity, hazardous materials, glass, dust, debris, and other rescuers reentering the building. Look for warning placards, secure all entry points, and shut off the utilities as necessary. A good rule of thumb is: "If there is structural damage, reduce the hazard to rescuers by shutting down utilities before entering the building."

Prioritize the problems. Once the hazards have been identified, it is important to assess the potential for things to get worse. Fires, gas leaks, damaged power lines, spilled hazardous materials, and unstable structures will all have a direct impact on the initial actions of the SAR team. The environment must be stabilized prior to implementing any search and rescue activities.

Evaluate your personal situation. What can you do by yourself? Is there additional help available? What can you expect from them? Can you send anyone to get help? How long will it take before that help reaches the scene? What will be the extent of the problems by the time help arrives? Your personal situation may alter your priorities.

The next step is to develop an action plan that will "Do the most good, for the greatest number of people, in the shortest amount of time." The first 24 hours are the most critical period in any rescue operation, because the victims' chances for survival significantly diminish the longer they are trapped. The actions taken during the initial disaster response can often mean the difference between life and death. Decide what needs to be done and determine who is available to do it.

Once a plan has been developed, it must be communicated to the people who come to your assistance. Be specific. Tell people exactly what must be done, and assign specific tasks which will help achieve the established goals and objectives.

Next, take action. Work safely and work together.

Finally, assess your progress. Are the established objectives being attained? If not, why? What else needs to be carried out? What jobs are not getting done? Is there anyone available to perform those tasks? By periodically assessing progress, the plan can be adapted to the changing demands of a dynamic incident.

Taking a methodical approach to size-up and reconnaissance will increase the effectiveness of the ERT.

Systematic Search Methods and Marking Conventions

The importance of properly analyzing the situation can not be over emphasized as each of these factors will have a direct impact on the actual search plan. If it is light and there is good visibility, searching will be much simpler. If it is dark, searching becomes more difficult. It increases the risk of injury for the rescuers. It will take more time, more rescuers, and more equipment. This is where knowing the building really pays off, particularly if the earthquake has rearranged things. Preplanning provides valuable information about where things were located before the disaster, and it simplifies the job of finding them again.

A map or floor plan is helpful in a search and rescue operation because areas can be marked off after being searched, and it provides a convenient place to keep notes about discoveries. It also helps to ensure that time and effort are not wasted repeatedly searching areas which have previously been covered. For this reason, it is important that the areas themselves are marked. One commonly used scheme is to mark the door or wall next to the doorway with a diagonal slash before entering a room or area to begin a search. This lets other rescuers know that someone has gone into that room or area to search. Chalk or marking pens work well, but anything that makes a visible, contrasting mark on the wall or door is satisfactory. For drills or exercises, masking tape works well because it is easy to remove and doesn't leave a permanent imprint. Make the marks large, at least a foot in length, so that there is no confusion about whether or not an area has been searched.

When the area has been thoroughly searched and the team is ready to move on, convert the diagonal slash into an X. This lets other rescuers know that the area has been completely searched and that no one is left inside. If all the victims found in the area could not be rescued and removed, do not complete the X. Make a note of how many victims were found, how many were rescued, how many are left, what condition they are in, and what it will take to complete the rescue. Identify this note with a room number and/or location description, because other rescuers will need to return to this location and finish the job as soon as practically possible. It is important to include the time the rescue team left the area because conditions change and victims deteriorate.

It is best not to get involved in any extended rescue operations during the initial search phase. Rescue the lightly trapped victims and reassure the more heavily trapped victims that other rescuers are coming with the tools needed to rescue them. This reassurance is extremely important because it will provide the victim with hope of rescue and the will to survive.

The first 24 hours is the most critical period of the rescue operation. It is often referred to as the golden day, because a victim's chances for survival significantly diminish the longer he/she is trapped. Therefore, in order to do the most good, for the greatest number of victims, the rescue effort must be prioritized by working from the simple surface casualties to the complex technical rescues. The more complex rescues usually require many highly skilled people working many hours to rescue one person, whereas many lightly trapped or injured people can easily be rescued by rescuers using simple hand tools and basic first aid in a relatively short time.

The situation will dictate which specific search techniques are most appropriate, but there is one important safety practice which is essential. That is the buddy system. A potentially dangerous environment is no place for solo operations. Stay together and look out for one another.

Part of the problem in any search operation is that it is very easy for the searchers to become disoriented and lost themselves. This is particularly likely to happen if it is dark or smoky. For that reason, it is important to establish a reference point. Upon entering a room with poor visibility, set a light at the doorway. Then, follow the wall to either the right or the left by keeping one hand in contact with the wall. If forward progress is impeded, simply turn around, put the other hand on the wall and retrace your footsteps to the entry point. The search pattern can be extended by having one buddy remain in contact with the wall, while the other partner holds onto either his free hand or a length of rope stretched between the two partners.

Another method is to tie a guide rope to the entry point. This allows the searcher more mobility since it is only necessary to follow the rope back to the starting point. The buddy should remain at the entry point to monitor the rope and take up the slack. If visual contact is lost, then both team members should try to maintain voice contact. A pre-established set of signals can be used to relay status via the rope. The code word OATH is an easy way to remember what the signals mean.

1 tug = O for OK, everything is ok
2 tugs = A for Advance, give slack
3 tugs = T for Take up, pull in the slack
4 tugs = H for Help

Locating Methods

The simplest method of locating a victim is to establish either visual or voice contact. Before entering an area and attempting to make contact with any suspected victims, make a quick visual survey and call out, "Is any body in here?" If you get an answer, that provides a place to start. Once someone is located, they may be able to provide valuable information about the situation before the quake hit, such as the number of people in the room, their possible locations, and any hazards that might exist.

If the area is large or there is a possibility that victims may be trapped within the rubble, use triangulation to help pinpoint their location. Position several rescuers around the perimeter of the search area with flashlights. The team leader calls for silence and everyone listens carefully for any sound. Attempt to establish voice contact by calling out and then listening. If any sound is heard, point the beam of the flashlight in the direction of the sound. Where the light beams intersect should be the approximate location of the victim. Close down the circle and repeat the process to verify the location. Sound can travel in unexpected ways within debris piles and damaged structures, so take the time needed to establish the most likely location of the victim before digging.

Triage and Life Saving Medical Procedures

The medical skills needed during a disaster differ from every day first aid in two ways. First, there are usually many more victims than there are trained rescuers and/or medical facilities. Second, victims will be under the rescuers' care for a much longer time. 9-1-1 may not be working. Paramedics may not be able to respond. Roads and hospitals may be damaged. Therefore, in order to achieve the goal of "Doing the most good, for the greatest number of people, in the shortest amount of time," certain medical priorities must be established. This process of prioritization is called *triage*.

Triage is a French verb meaning "to sort." Applying this concept of sorting to a disaster setting with many casualties requires that injured victims be assigned a treatment priority based on the severity of their injuries and their probability for surviving. If all victims are rapidly assessed and any life threatening injuries are treated immediately, patient mortality can be reduced.

The guidelines for assessing and tagging victims are found in the Simple Triage and Rapid Treatment (START) system developed at Hoag Memorial Hospital in Orange County. The START system evaluates each victim in terms of respiratory status, circulatory status, and mental status. Patients are then classified and tagged as *immediate, delayed*, or *dead* according to three simple observations. The basic triage exam is as simple as A-B-C. Assure that the patient has an open *air way* and is *breathing*. Evaluate *circulatory status* using the blanch test. Assess *mental status* by having the victim follow a simple command.

Initiate the triage process by directing all victims who are able to walk, to move to a designated safe area. Those victims who are able to comply with these instructions are designated as walking wounded and tagged *delayed* because they are breathing, have an adequate blood pressure, and can follow a simple command. The rescuer then evaluates the non-ambulatory victims by working his/her way around the room from patient to patient.

The first step is to assess respirations. Is the victim breathing? If no, attempt to reposition the victim and establish an air way. If the victim does not resume breathing spontaneously, tag him/her as *dead.* If the victim begins breathing on his/her own or if the rate is greater than 30/minute, tag the victim *immediate* and move on to the next victim.

If the rate is less than 30, assess the circulatory status using the blanch test. This test provides a rough estimate of blood pressure without having to search for a pulse or use any special equipment. If capillary refill is delayed greater than two seconds, tag the patient *immediate* and move on to the next victim.

If capillary refill is normal, assess mental status by asking the victim to "squeeze my hand." If the victim fails to follow this simple command, tag her/her *immediate* and move on to the next victim. If the victim passes all the tests, he/she is tagged *delayed.*

After performing the primary assessment and tagging the victim, control any external bleeding using direct pressure and treat the victim for shock. The walking wounded can be used to administer this treatment. This simple A-B-C primary assessment can be performed rapidly and many patients can be evaluated in a short period of time.

Extrication Principles and Practices

Once the victims have been located and triaged, the task of rescuing them begins. Rescue is really a combination of several tasks. The victims must be removed from their entrapment, their injuries must be treated using basic first aid, and then they must be moved to a safe area without further injury. Simultaneously, it is important not to create an unstable condition which could cause the rescuers to become trapped or injured.

Some general rules to observe during any rescue operation are:

1. Plan ahead.
2. Keep the exit way clear.
3. Reduce the number of rescuers inside to a minimum.
4. Start at the top and work down.
5. Remove debris carefully and pile it out of the way.
6. Mark debris piles to prevent other rescue teams from searching though them again.

The **Basic Rescue Skills** handbook developed by Emergency Preparedness Canada (partially reprinted in Appendix C), has some excellent diagrams and descriptions of specific rescue skills. Other sources of information on specialized rescue skills include: **Rescue Skills and Techniques** published by the Department of Defense - Office of Civil Defense and **Rescue Systems 1 & 2** course materials developed by California State Fire Training and Education System. Use these references as a general guideline for teaching specific skills and strive to develop proficiency through regular practice.

First Aid and Patient Packaging

A review of earthquake injury patterns indicate that the initial deaths and injuries are caused by falling building materials and collapsing structures. Head, neck, and back trauma, along with fractures, lacerations, and contusions account for the majority of serious injuries. Many victims die from physiological or psychological complications caused by either their injuries or entrapment. They often succumb to crush syndrome, cardiac problems, respiratory problems, hyper or hypothermia, dehydration, and/or shock if treatment is delayed.

The need for reliable first aid care at the disaster site cannot be overemphasized. Many victims who died in previous disasters, could have been saved if appropriate first aid measures were taken. Unfortunately, many victims are injured by well-intentioned rescuers during extrication efforts. Training in basic and advanced first aid could prevent these injuries and fatalities.

All ERT members should be able to:

1. Perform a primary patient assessment.
2. Recognize and treat life threatening injuries.
3. Triage patients according to the seriousness of their injuries.
4. Perform a complete head to toe patient examination.
5. Bandage wounds.
6. Splint fractures and sprains.
7. Assess and treat burn injuries.
8. Prepare patients for transportation.
9. Lift and carry patients without injuring either themselves or the patient.
10. Care for wounds to help prevent infections.
11. Set up and run an emergency medical treatment area.
12. Properly stock an emergency first aid kit and disaster medical cache.
13. Use common household items as improvised first aid supplies.

Conclusions

Disaster preparedness is not a one time event, it is a way of life. It starts with planning and is perpetuated through training. Everyone in the organization must learn to recognize potential hazards and take the steps necessary to enhance survival. They must be able to perform needed management, operational, and/or support functions during a crisis. The entire community must work together to achieve the goal of "Doing the most good, for the greatest number of people, in the shortest amount of time!"

Getting the School Prepared

by William Cody
Instructor, School Earthquake Preparedness Program, UCLA Extension

and John Moede
Instructor, School Earthquake Preparedness Program, UCLA Extension

The normal emergency response infrastructure can easily be overwhelmed by a wide area catastrophic event, and there's a significant time lag before assistance from outside agencies reach the impacted area. In the initial hours and days following a major disaster, an impacted community must deal with a variety of problems which threaten the physical, emotional, and economic well being of its members. Personal preparedness and community self help are crucial elements of any disaster response plan.

In this workshop, participants learned to organize the disaster response within their school by conducting a systematic search for lightly trapped and injured victims, and administering lifesaving first aid. Appendix C contains a partial reprint of <u>Basic Rescue Skills</u> by Emergency Preparedness Canada which provides illustrated guidelines.

Basic Search and Rescue Guidelines

Analyze the Situation

1. What *time* of day is it?
2. What *day* of the week is it?
3. What is the *building used* for?
4. What type of materials were used in *construction*?
5. Does the *weather* pose any special problems?
6. What types of *hazards* are there?
7. How large is the *search area*
8. *How many* people are *trapped*?

Remember, this is a continuous process performed by *all* team members!

Think Safety

1. Be a part of the solution, not a part of the problem.
2. *Always* work in pairs.
3. Wear your protective equipment.
4. *Communicate* with your partner, the team leader, and the victim.

Search Systematically

1. Use a systematic search pattern.
2. Mark the areas which have been searched.
3. *Never* search alone!
4. Keep accurate records.

Support Objects Which Are Being Moved

Block - Lift - Crib

Rescue

1. Start with the most lightly trapped victims first.
2. Move debris out of your exit route.
3. Assist the victim to safety. If it is necessary to drag or carry a victim, try not to inflict further injury. Stabilize any injuries *before* moving the victim, if possible.

Analyze The Situation
Stop, Look, Listen, and *Think*

Assess the Basics

1. Time of day
2. Day of the week
3. Type of construction
4. Use of the building

Identify the Hazards

1. Water
2. Electricity
3. Gas
4. Building integrity

Prioritize the Problems

1. Fire
2. Injuries
3. Trapped Victims

Evaluate Your Personal Situation

1. What can I do?
2. Is there any help available?
3. How long before help arrives?

Plan

Try to do the greatest good for the greatest number in the shortest amount of time

Communicate

1. Explain your plan to others
2. Assign specific tasks to your helpers

Take Action

Work safely and work together!

Assess Progress

1. Are you achieving your goals?
2. What else needs to be done?

Search and Rescue Checklist

In earthquakes around the world, 80-85% of all live victims have been rescued by family, friends or coworkers!

Preparation

1. Establish a search and rescue team.

2. When designating the search and rescue team, look for individuals that are physically fit and able to provide emergency care to victims.

3. Establish a leader and chain of command.

4. Get facility maps and radio communication.

Rescue Tools

Establish a cache and locate it in a safe area. A cargo container stored away from the main building is ideal.

- heavy leather gloves
- hard hat
- hard shoes or boots
- dust mask
- eye protection
- identification vest
- clipboard
- flashlights and extra batteries
- first aid kit
- first aid book
- stretcher/litter
- shovel(s)
- crow bar(s)
- sledge hammer
- hacksaw and blades
- wood saw
- pliers set
- claw hammer
- assorted nails
- adjustable crescent wrench set
- screwdrivers
- utility knife
- pipe wrench
- duct tape
- rope
- pry bar, 5-6'
- fire axe
- ladder
- hydraulic jacks, 20-50 ton

Situation Assessment

1. Make sure you are operating safely. It is important for the rescuer not to become a victim. "If you are not part of the solution, you are part of the problem."

2. Keep your purpose in mind at all times: to bring out buried victims alive.

3. Leader must assess the situation; accurate information can save lives.

4. Locate hazards: fires, downed wires, nature and extent of damage, presence of flammable chemicals, broken water pipes, broken sewage pipes (for health reasons) and the likelihood of further collapse.

5. Determine the type of collapse, survey the building.

6. Determine the location where live victims would most likely be found. First, go to areas where the majority of the victims should be located.

7. As volunteers show up, someone should be designated to coordinate their efforts. Volunteers, such as neighbors, may have needed equipment and valuable knowledge.

Safety Measures

1. Protective clothing should be worn at all times: hard hat, boots, gloves, flashlight, dust mask, eye protection, identification vest, etc.

2. No one works alone; use a buddy system; maintain constant watch over your "buddy."

3. No smoking, candles or fires near the collapse.

4. Do not move faster than is safe.
5. Protect victims from further danger.
6. Turn of electricity, gas and water to the collapsed building if necessary.
7. Leader must coordinate and control all operations and activities.
8. Maintain discipline of rescue workers and activities.
9. Clear the area of non-rescue involved persons.
10. Think before making a move!
11. Be aware that climbing on the collapsed building may further injure someone trapped underneath.
12. Following each aftershock, survey the collapse again.

The Search and Rescue Mission

1. Attempt to locate victims by last known locations.
2. All efforts should go toward rescuing surface victims and get them to the first aid area.
3. Systematically divide your search area into small sections such as buildings and then individual rooms.
4. Check each room thoroughly; closets, corners, etc.
5. Once a room or area is checked thoroughly, it should be marked with an "X" on the door or area using chalk or marker.
6. When necessary, call out to potential victims, keeping the area quiet and listening for a response. Also, try using a whistle or tapping as these sounds may help you to zero in on survivors.
7. When a survivor is located, attempt to keep his morale up by talking to him. Communicating with the injured will help them to cope with the situation.
8. Administer life saving first aid before removing and transporting to medical aid area.
9. Ask rescued victims about the possibility of any other victims in the area.
10. Direct workers to remove living casualties only until all are rescued, then return for the deceased.

11. Remove debris *carefully*; too many people on top of a pile of rubble can cause more damage than good.

12. Keep all rescue equipment in a safe area.

13. When professionals arrive on the scene, turn over command to them. Stand by to brief them and provide assistance when necessary.

Casualty Handling and Removal

1. Insure securing footing.

2. Hand stretcher from person to person if the path is hazardous.

3. Use planks or ladder over wide gaps.

4. Provide adequate light for rescuers.

These are not rules, but general guidelines. Teachers are going to have to take charge of the situation and improvise. Difficult decisions will have to be made.

A special thanks to the following individuals for preparing this search and rescue checklist for schools:

Mike McGroarty, Battalion Chief
La Habra Fire Department

Judith Drake, Neighborhood Watch
City of Fountain Valley

J.B. Hume, Search and Rescue Coordinator
Huntington Beach Police Department

Vic Subia, Captain
Huntington Beach Fire Department

Rich Dewberry, Fire Chief
and the Laguna Beach Fire Department

Glorria Morrison, Emergency Services Coordinator
City of Huntington Beach

Search and Rescue Skills Inventory

Tools

1. Ropes and knots
2. Axe
3. Pry bar

Recon

1. Size-up
2. Maps
3. Communications
4. Evacuation

Systematic Search Methods

Marking

Locating Methods

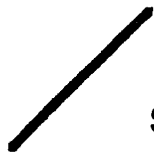
Triangulation

Extrication

1. Forcible entry
2. Lifting heavy objects
   A. levers
   B. cribbing
   C. shoring
3. Removing debris

Limitations

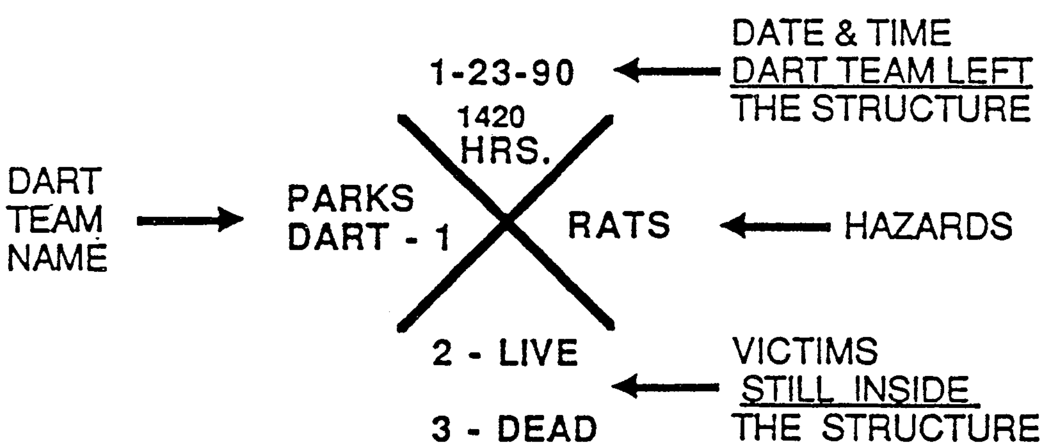
DART SEARCH MARKINGS



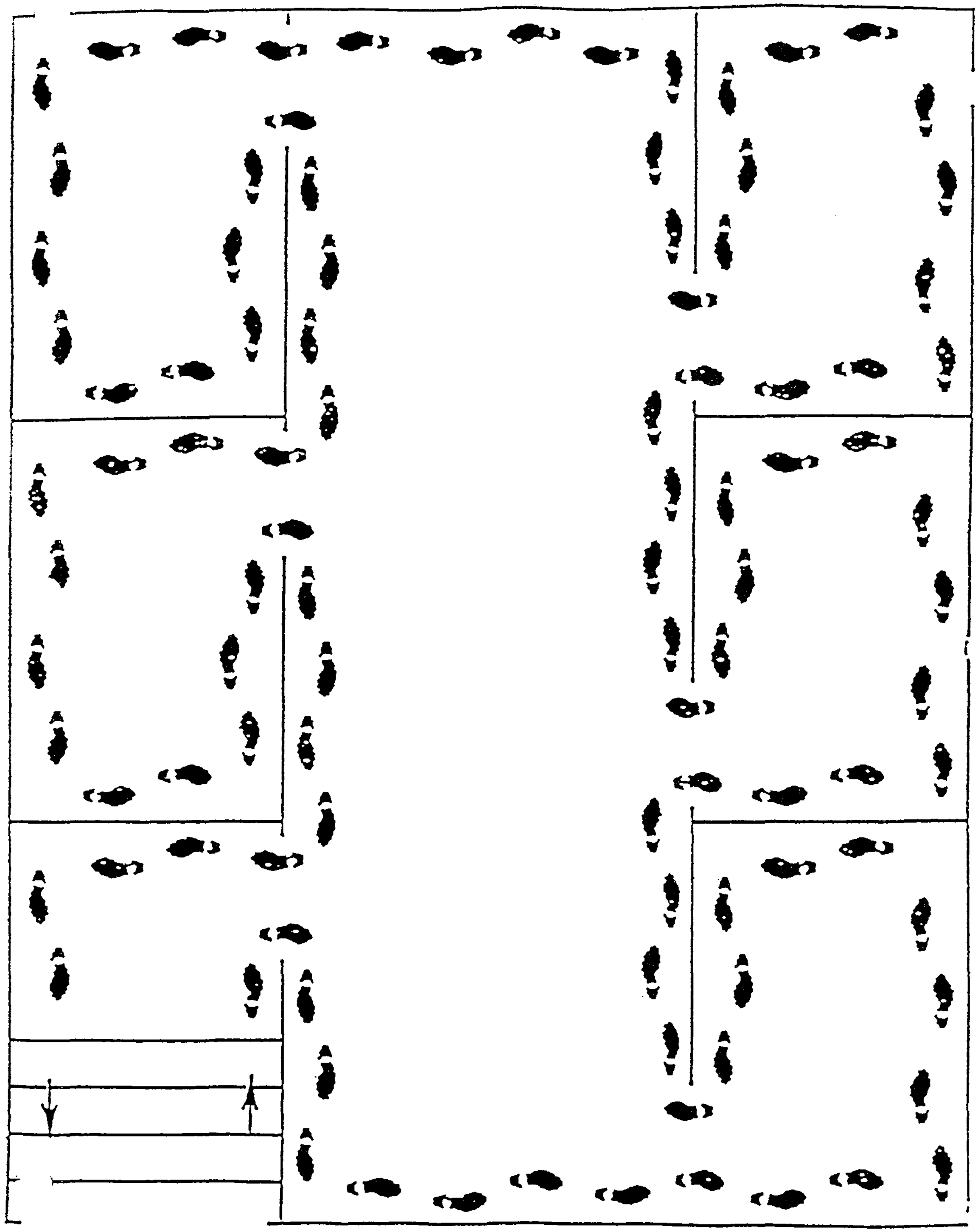
WHEN YOU ENTER
SINGLE SLASH
STRUCTURE OR ROOM

WHEN YOU EXIT
SECOND SLASH
STRUCTURE OR ROOM
(Identify victims & hazards)

MAIN ENTRANCE MARKING

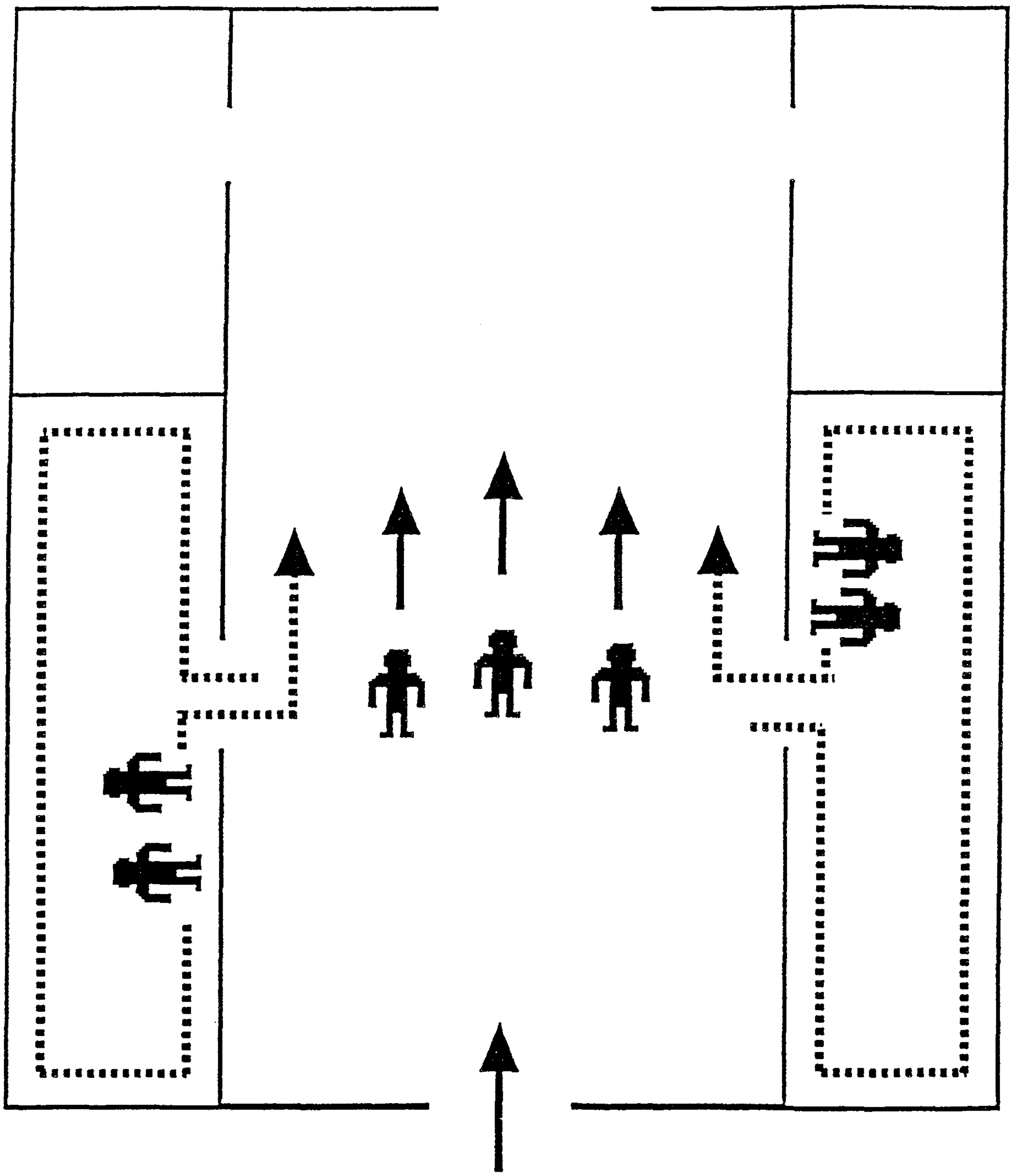


Reprinted with permission from Emergency Preparedness Canada



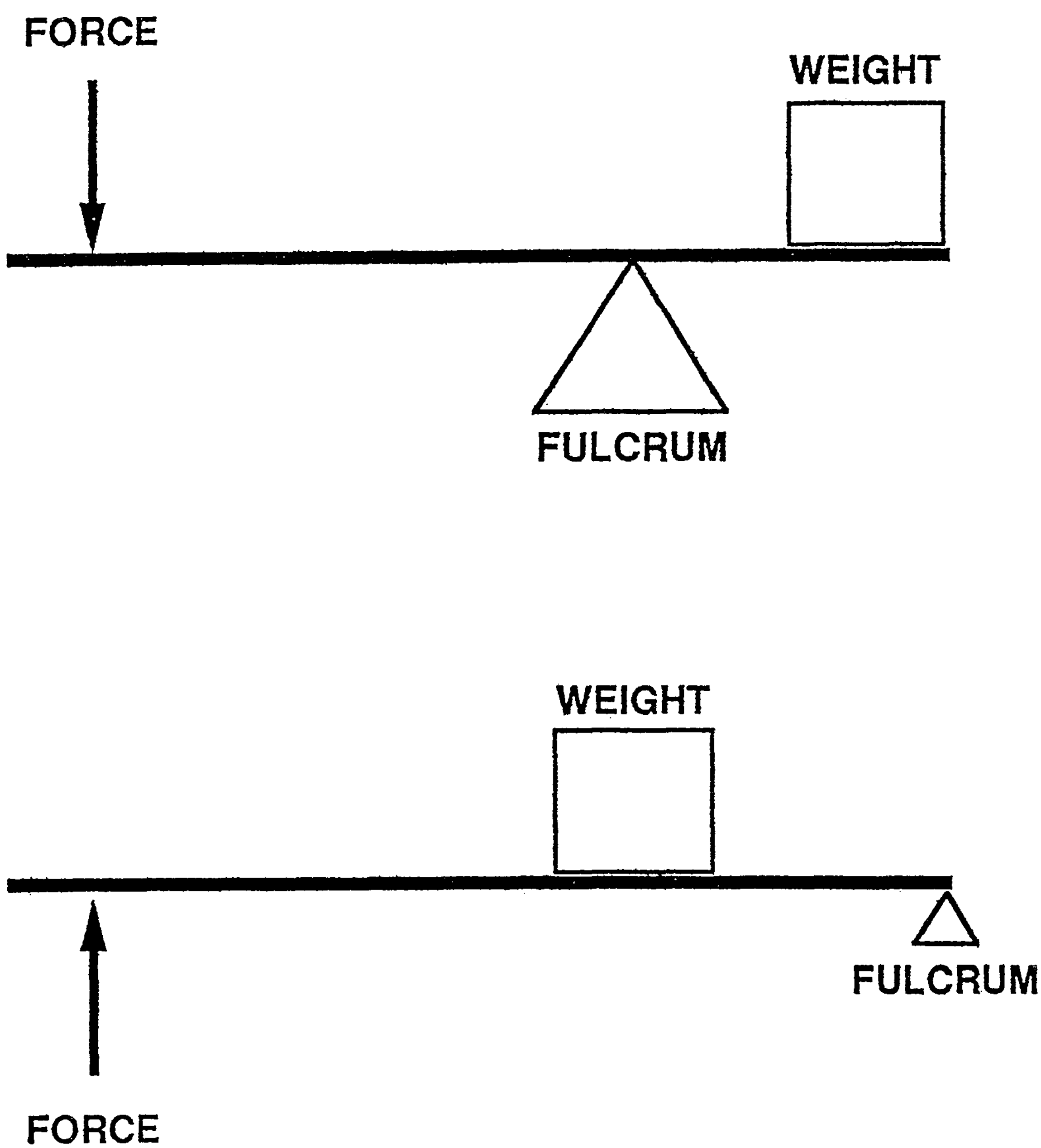
Reprinted with permission from Emergency Preparedness Canada

LINE SEARCH METHOD



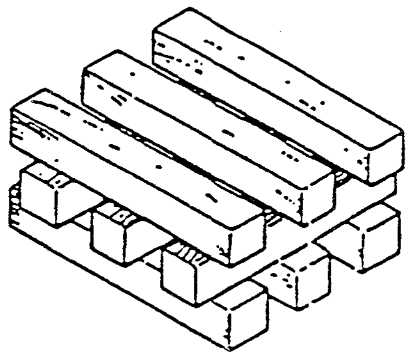
Reprinted with permission from Emergency Preparedness Canada

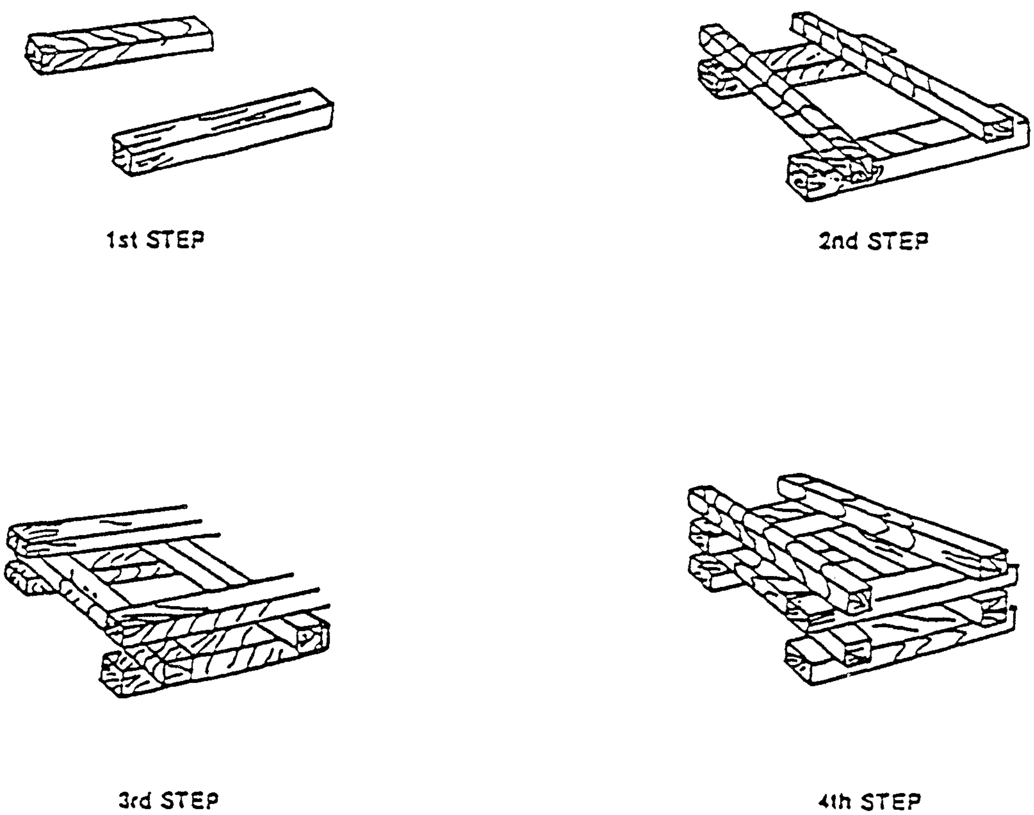
LEVERAGE



Reprinted with permission from Emergency Preparedness Canada

INTRODUCTION TO CRIBBING





BOX CRIBBING

Preliminary Damage Assessment of House Type Wood Frame Structures

Although structural evaluation of buildings is a job for trained building officials and engineers, some preliminary evaluation of small wood buildings may need to be done by properly informed community response teams. Properly designed wood structures have generally had a good earthquake performance record. Many of the dwelling failures that have occurred have been due to the lack of foundation anchorage, weak cripple walls, and chimney failures. Evidence of this type of hazard is reasonably easy to detect. The following information is intended to provide the ERT member with a brief description of the most common, previously observed failures. Keep in mind, that nothing is precise in damaged structures. Exceptions to all rules are common. Therefore, one should always try to play it safe. In addition, all damage assessment must be made in the context that strong aftershocks are probable.

General Description

The following hazards and inspection principles generally apply to single family residences and duplex or triplex units of one or two stories in height, and other small wood frame buildings under 2,000 square feet in size. Victorian homes may be four or even five stories in height. In densely populated urban areas, many two and three story residential buildings have open lower levels for parking garages. Construction typically consists of stucco, wood siding, or masonry veneer on the exterior walls and gypsum, plaster, or wood paneling on interior walls. Walls are typically 2x4 wood studs. Foundations are largely concrete or concrete block. Some older dwellings may be founded on brick with relatively weakly cemented joints. Older dwellings are often not anchored to their foundations, and chimneys in many homes may not be reinforced and/or tied into the framing. Modern wood dwelling construction includes split level houses on hillsides with cantilever portions supported on stilts.

Wood Frame Dwellings and Small Buildings Inspection List

Listed below are the suggested areas to examine during your hazard assessment survey. These are areas that have repeatedly been sources of significant damage in past U.S. earthquakes. Figure 1 indicates inspection points for a pre-1940 dwelling, a type that is often shifted off its foundation in a strong earthquake. Newer dwellings may also show significant damage.

1. Overall level of damage. Review structure for overall level of damage. Degree of residual racking of walls is an important indicator of damage level.

   Residual racing of 1 to 2 inches or more per story = *unsafe structure*
   Roof displaced from walls = *unsafe structure*

2. Foundation anchorage. Many older houses are not anchored to their foundations. Unanchored houses frequently move off their foundations under strong shaking and one should look for sign of movement. As a general rule, a house that has shifted off its foundation should be considered unsafe. On occasion however, there may be important exceptions to this rule because the life-safety risk in some situations may be negligible. For instance, if further vertical drop is not possible and if the house is otherwise intact, it may be safe to occupy the structure.

House off foundation = *unsafe structure*
Signs of movement = *limited entry*

3. Cripple walls. Cripple walls are generally short stud walls between the first floor and the foundation. Older houses with wood siding frequently experience cripple wall failure, and the first floor is displaced horizontally with respect to the foundation. Look for signs of racking or movement between the first floor and the foundation.

   Cripple wall failure = *unsafe structure*

4. Hillside homes. Many hillside homes are partially supported on posts. Often, posts are X-braced or single braced. Look for broken braces or connections, leaning posts, and the evidence of horizontal movement at the top of concrete piers. Look also for evidence of earth movement.

   Posts with lean of 1 to 2 inches = *unsafe structure*
   Broken bracing = *unsafe structure*
   Post or pier displacement = *unsafe structure*

5. Split-level separations. A number of modern houses involve split-level floor plans. Damage has occurred when rooms over garages have pulled away or even collapsed. Examine intersections between low roofs and upper floor walls.

   Separation = *unsafe structure*

6. Chimneys. Chimneys that extend above the roof level may break off. While these are generally not a threat to the safety of the structure as a whole, they may be a falling hazard, and the local area must be roped off. Occasionally, they fall inward onto the roofs or rafters, threatening the occupants. Chimneys that have been badly cracked by the initial quake can become lethal falling hazards in a strong aftershock.

   Chimney falling hazard = *unsafe area*

7. Masonry veneer. Masonry veneer often dislodges and falls, and any remaining damaged veneer must be regarded as a falling hazard. Eight foot high veneer in this condition is obviously more hazardous than the two or three foot high window sill type.

   Veneer falling hazard = *unsafe area*

8. Canopies and sun screens. Many older houses have canopies over the entrance. A number of these have collapsed and fallen over the entrance porches. Movement between canopy framing and ledger at house can cause loss of vertical support and possible collapse.

   Canopy or sunscreen separation = *unsafe area*

9. Other hazards. Figures 2 and 3 show additional hazards. Gas leaks associated with broken lines to water heaters, ranges, and furnaces are relatively common. If a unit has tipped over or slid a considerable distance, the house should not be entered until there is no danger of fire or explosion.

   Gas leak = *unsafe structure*

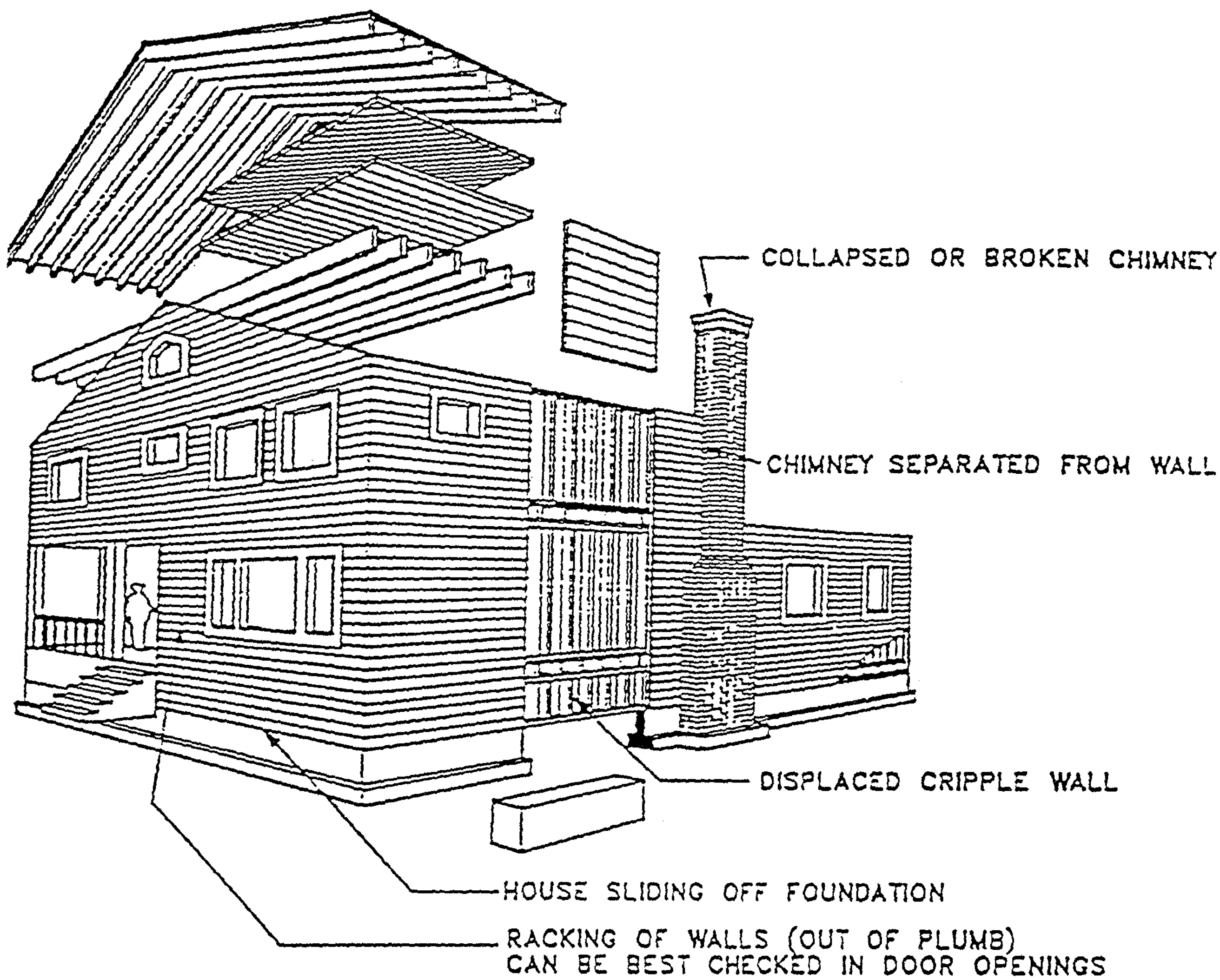


Figure 1 Inspection Points for Older Wood Houses

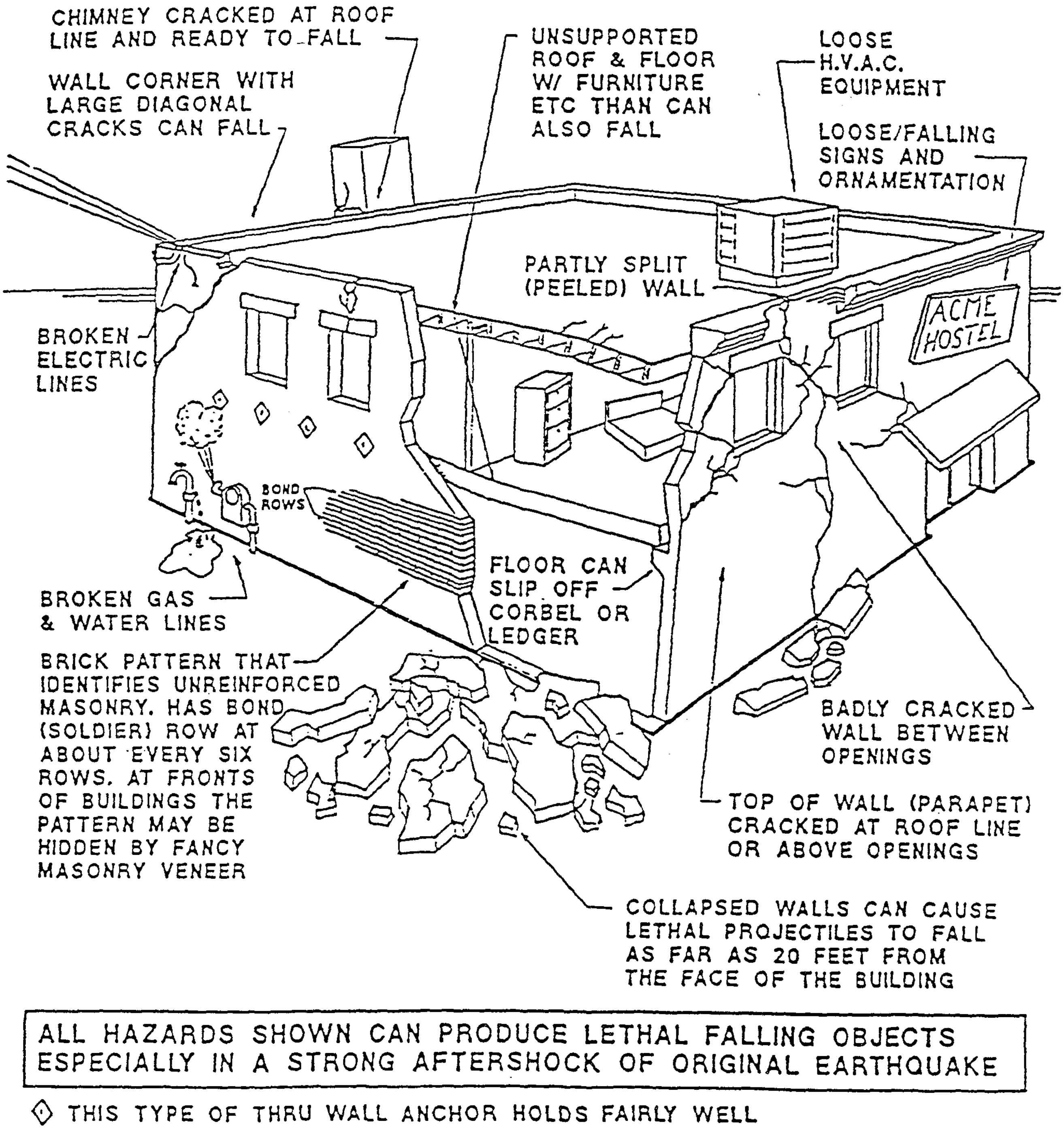


Figure 2 Heavy Wall Construction (URM) Hazards HW-HAZ

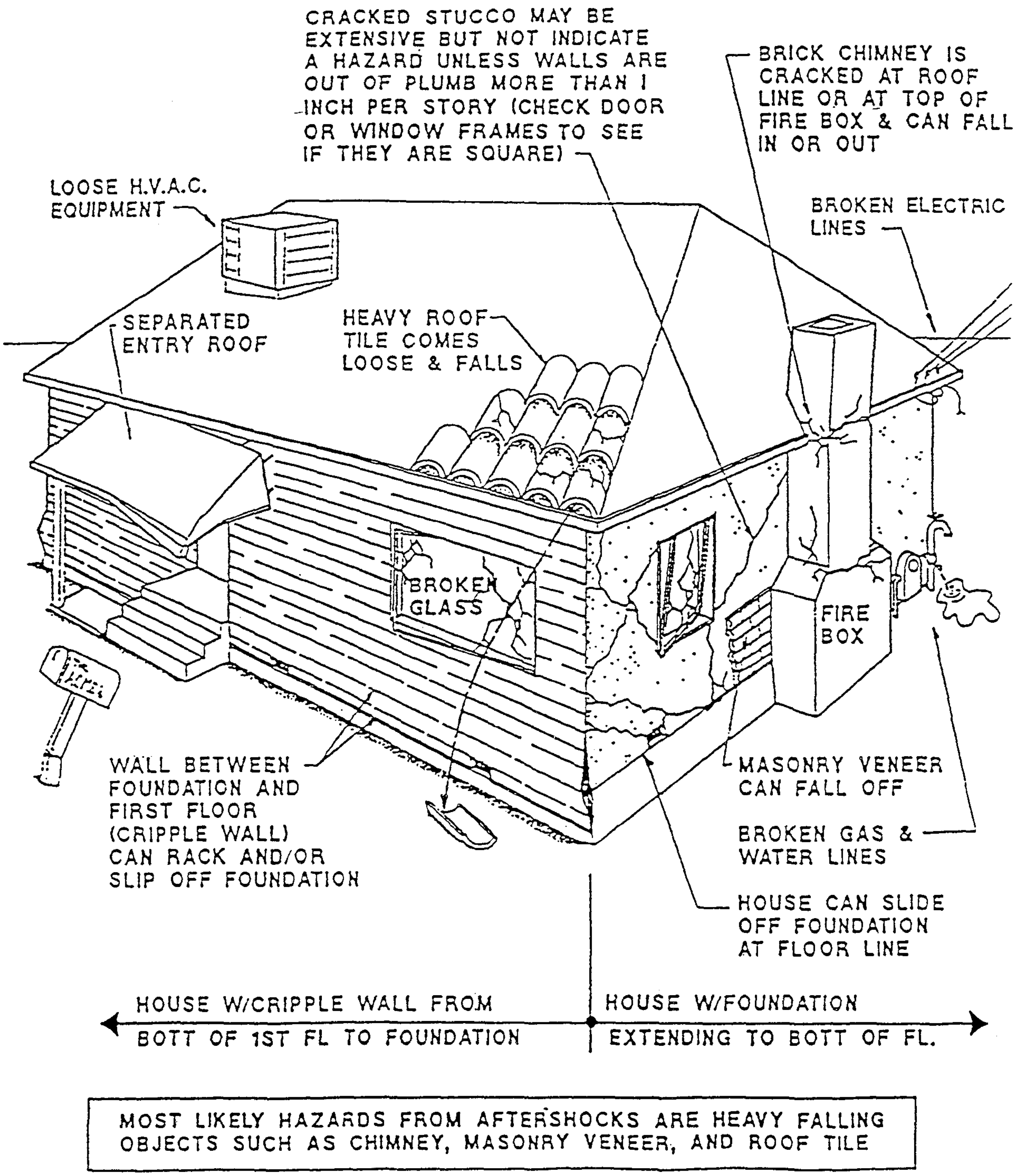


Figure 3 Light Frame House Hazards LF-HAZ

School Search and Rescue Team

by Frances E. Winslow
Director, Office of Emergency Services, City of San Jose

Physically capable staff members should be recruited to form a search and rescue team. Their tasks will require only basic training and light physical exertion.

Team Training

Search and rescue team members should receive formal training before performing their duties.

1. Standard first aid/CPR/triage training:
   American Red Cross, Medic First Aid, START triage are possible resources. Local paramedics may also be available to instruct staff in some of these skills. Special classes for schools may also be available through UC Extension Services in your area. Contact UCLA Extension for dates and times of the classes.

2. Fire extinguisher usage:
   Team members should know where the school fire extinguishers are located. They should have training in using the extinguishers to put out an actual fire. Ask the fire extinguisher vendor to provide this training when the extinguishers are being recharged each year, or arrange for training through the local fire department.

3. Damage assessment course:
   Training can be arranged through the chapter. Classes are offered on a regular basis, and can be specially offered for school staff together.

Team Duties

1. Survey the outside of the school buildings to determine if it is safe to re-enter the facility. See the "Postearthquake Damage Evaluation and Reporting Procedures for Schools."

2. Search all facilities for injured or trapped students or school personnel. This task is to be accomplished in teams of two. No team member shall proceed with the search unless accompanied at all times by his co-member. In pre-event planning, develop an accurate site plan that includes all closets, rest rooms, stage, offices, portables and storage areas. Divide the facility among the available teams, including all spaces. Pre-assign each team to an area consistently, and have that team practice searching that area in every drill. Have at least two "back-up" teams to fill in for absent or injured primary team members. Note: while high school students may join search and rescue teams with parental permission and pre-training, no elementary school student should ever be used in this capacity. However, student runners may be stationed at doorways and window

areas to receive messages from teams still in the building. These runners are especially important in summoning the stretcher team and additional rescue assistance.

3. Perform simple fire suppression, as appropriate, during building search. Small fires that can be extinguished by the use of a fire extinguisher or by simple smothering with a lid or blanket should be attempted. If the fire is caused by electrical damage, turn off the electricity to the building before attempting to suppress the fire. Remember that fire spreads rapidly. Never enter a room if the door is closed and hot to the touch, or the smoke level is below the doorknob. Request instruction in fire suppression from the local fire department.

4. Perform simple, life saving first aid during the initial building search. Bandage areas of severe bleeding, elevate, cover victims to ward off shock, and remove any crushing objects if the team of two can safely perform the task with cribbing equipment readily available in the classroom (books, furnishings). *Do not attempt to move any building components that are still an integral part of the building.* Heavy rescue must be performed by trained professionals to avoid injury to the rescuers and further harm to the victim. Report the location of injured or trapped personnel quickly to the search and rescue team coordinator who can request priority assistance through public safety channels.

Team Kits

Each member of the search and rescue team should have a kit with the following items:

dust masks hard hat work gloves sturdy shoes	These items provide protection for the team member.
carry bag with loop handles clipboard with school site map grease pencil attached to clipboard (for marking map) colored tape for marking checked areas flashlight walkie-talkie (optional)	These items allow the member to conduct and monitor the search.

As the search proceeds, use the colored tape to mark areas that have been checked, indicating the proper status: i.e., "cleared" or "assistance needed." Use the site map to accurately locate victims needing assistance to evacuate.

6-10 light sticks 6 heavy bandages with pins 6 pairs of surgical gloves zip lock plastic bag triage tags and pens 6 mylar blankets	These items provide care to trapped and/or injured people.

10 foot clothesline
fire extinguishers

Leave a light stick with anyone who has been located but must be left behind. The victim will be easier for the stretcher team to locate, and the light will provide psychological reassurance to the victim while he/she waits for additional assistance.

Make a triage tag for each victim as he/she is found, noting the condition on the tag and on the school site plan by color code. Provide a blanket, attempt to stop bleeding, and remove any nonstructural items that might further injure the victim in an aftershock. Use surgical gloves to care for someone who is bleeding. Carefully remove the gloves and dispose of them in the zip lock bag. All blood bearing waste must be segregated at the first aid station, marked, and disposed of through a medical waste hauler after the disaster.

Use the clothesline to gather any people left in the building who are mobile. Tie the clothesline around the waist of the first person or child located who is mobile, and hold the other end of the line with a slack of no more than six feet. As other people are located who can walk, add them to the space between the search team and the first person found, increasing the slack on the rope as necessary. These "found" people should stay with the search and rescue team until one of the following happens: 1) they leave the building at the end of the initial sweep; 2) they encounter another team that is ready to leave the building and can take responsibility for the "found" people; 3) they pass an exterior doorway on their regular route. Under no circumstances should the team deviate from the appointed route to deposit the "found" people at a doorway. Time used in this way could result in someone further along the route dying from loss of blood because his/her treatment was delayed.

School Facility Kits

Every school site should have a cache of emergency response supplies to support the search and rescue team. The supplies can be stored in a large wheeled trash can that is water proof. Supplies should include the following types of tools:

6 ton bottle jack
safety goggles
short handled axe
folding shovel
jab saw
12" hacksaw
pack of extra hacksaw blades
16 oz curved claw hammer
hammer: #3 hand drilling
screwdrivers: #2 Philips
#3 Philips
1/4 x 4"
cr 3/8" x 12

cold chisel
10" adjustable wrench
pliers: 8" long nosed
8" slip joint
9 1/2" arc joint
pipe wrench
6 lb. fire axe
24" bolt cutters
30" wrecking bar
d-grip shovel
pick
electrician's knife

Other supplies include:

tarps and cord	yellow barrier tape
candle lantern and candles	brass whistle
waterproof matches	duct tape
water bucket	stretchers or backboards

This material will support the team's efforts to assess safe entry to the building, locate trapped or injured people, and remove the people from the building to appropriate medical care.

Part IV

Earthquake Education Materials: Making the Curriculum Quake Safe

Abstract

Comprehensive earthquake preparedness activities in schools involve teaching about geological processes and earthquake dynamics to every student from Kindergarten on. Without radical revisions or eliminations, it is possible to integrate lessons about earthquakes into the requirements of the California Science Framework and into other parts of the curriculum. Among the many materials available to assist teachers are *Tremor Troop: Earthquakes*, a K-6 earth science curriculum developed by the National Science Teachers Association for the Federal Emergency Management Agency and the *Plate Tectonic Cycle* from the I. Science Mate Curriculum developed by Joyce Blueford. In order to be effective, it is crucial that the needs and capabilities of a classroom are matched with the available resource materials.

Makin' a Whole Lot of Shakin' Go On: Integrating Earthquake Materials into a K-6 Curriculum

by Sarah K. Nathe
Project Planner, California Office of Emergency Services Earthquake Program

Abstract

The National Science Teachers Association, under a contract from the Federal Emergency Management Agency, has developed a K-6 earthquake curriculum called *Tremor Troop: Earthquakes.* The focus of the curriculum is on physical science concepts and simple, hands-on experiments, but the lessons also include methods and subject matter from language arts, mathematics, social studies, music, and other fine arts. All activities can be carried out with inexpensive materials. The curriculum has six units, each of which is divided into three levels: one for grades K-2, one for grades 3-4, and one for grades 5-6. Each unit is preceded by a scope and sequence chart which gives the teacher a picture of the concepts in the unit and suggests how they can be integrated into many subject areas.

Introduction

In 1988, the National Science Teachers Association (NSTA) published *Tremor Troop: Earthquakes*, a K-6 earth science curriculum it had developed at the request of the Federal Emergency Management Agency (FEMA). The NSTA and FEMA had two primary goals: to introduce elementary teachers and their students to the innovative concepts of earthquake science, and to demonstrate both the consequences of earthquakes to communities and the need to prepare for them and reduce potential losses. The curriculum is dedicated to the proposition that students with a thorough scientific understanding of earthquakes are in a better position to prepare for and protect themselves from the effects of earthquakes.

The curriculum is based on recognized principles of holistic learning - the lessons are mainly hands-on experiments, and they include methods and materials from not only physical science, but also language arts, mathematics, social studies, music, and other fine arts. The experiments are designed to be carried out with simple equipment and materials found around the house. Nothing costly is required.

The curriculum is comprehensive enough to be adopted as a whole, and flexible enough to allow individual lessons to be used as supplements to any other curriculum.

Organization of the Curriculum

The curriculum has six units, five of which are divided into three levels: grades K-2, grades 3-4, and grades 5-6. The sixth unit is not subdivided since it presents information on safety and survival appropriate for every age and developmental ability. Recognizing that classes and individuals vary greatly, the curriculum always refers the teacher to similar procedures at different levels for consultation or inclusion.

Unit I, *Defining an Earthquake*, establishes a working definition of the phenomenon. In addition to scientific explanations, a lesson on legends from many lands offers an insight into cultural influences on people's perceptions of hazards and their causes.

Unit II, *Why and Where Earthquakes Occur*, describes the modern scientific understanding of the earth's structure. The theory of plate tectonics is explained and demonstrated through various lessons.

Unit III, *Physical Results of an Earthquake*, discusses in depth (pun intended) how earthquakes are but one part of the process at work on the crust and interior of the active earth.

Unit IV, *Measuring Earthquakes*, explains the wave movements generated by earthquakes, and introduces students to the methods of measuring the energy released and the action of the waves.

Unit V, *Recognizing Earthquakes*, details what happens to the natural and built environments during a quake, and elucidates both the patterns of damage and the techniques for reducing damages.

Unit VI, *Earthquake Safety and Survival*, provides information on what students, teachers, and parents can do to protect themselves before, during, and after an earthquake.

Other Features

At the beginning of each unit, there is a Scope and Sequence Chart of the concepts presented in the unit. It is extremely useful in that it provides the teacher with a comprehensive view of the unit, and indicates where the ideas in the lessons can be integrated into other areas of the curriculum such as language arts or social studies. The chart for each unit is presented in Tables 1-6.

In addition, a list at the beginning of each section tells the teacher what kinds of materials - from string and rubber bands, to light lumber, to jello - will be necessary for the activities therein. At the end of each unit are master pages to reproduce for transparencies, handouts, and worksheets. Lastly, a reference list suggests readings for both students and teachers who wish to gain a deeper understanding of the information in each of the units.

Availability

Single copies of *Tremor Troop: Earthquakes* may be obtained from the following addresses:

Federal Emergency Management Agency
Office of Earthquakes and Natural Hazards
Earthquake Education Program
500 C Street, S.W.
Washington, DC 20472

California Office of Emergency Services
Earthquake Program - Schools
101 8th Street
Suite 152
Oakland, CA 94602

It is also available from NSTA for $17.95, (800) 722-NSTA.

TABLE 1
SCOPE AND SEQUENCE CHART

Unit I: Defining an Earthquake

Level	Concept	Laboratory	Mathematics	Language Arts	Social Studies	Art
K-2	An earthquake is a sudden, rapid shaking of the Earth caused by the release of energy stored in rocks. Legends are traditional narrative explanations of natural phenomena which evolve when scientific explanations are not available.	Sand and box demonstration of earthquakes		Vocabulary development of earthquake words Original earthquake legends	Effects of earthquakes on model buildings Effect of earthquakes on people Cultures and legend origins	Illustrations of legends Illustrations of Earth's interior Mural making
3-4	An earthquake is a sudden, rapid shaking of the Earth caused by the release of energy stored in rocks. Legends are traditional narrative explanations of natural phenomena which evolve when scientific explanations are not available. Earthquake energy is released in the form of waves.	Silicone putty rocks Gelatin simulation of earthquakes		Earthquake legends Paragraph writing Class discussion	Map study of cultures associated with earthquake legends Map study of epicenters	Illustrations of earthquake causes Illustrations of earthquake legends
5-6	Earthquakes result from the build-up and release of energy stored in rocks. Earthquakes occur over much of the world and the United States. Various societies have produced earthquake legends to explain these natural occurrences.	Stick and erasers simulation of earthquakes Fault action game	Map scales to measure distances	Vocabulary development of earthquake words Earthquake legends Oral reading and note taking	Map study of earthquake locations Map study of cultures associated with earthquake legends Map study of state locations	Sign making Diagram making

TABLE 2
SCOPE AND SEQUENCE CHART

Unit II: Why and Where Earthquakes Occur

Level	Concept	Laboratory	Mathematics	Language Arts	Social Studies	Art
K-2	The Earth is made up of layers. Earth's outer layer is broken into pieces called plates. The movement of Earth plates is the cause of most earthquakes.	Egg analogy of the Earth layers Earth layer simulation game		Vocabulary development of earthquake words Creative writing	Map puzzle of Earth plates	Color, cut, and paste Earth plates Shape recognition of Earth plate puzzle
3-4	The Earth has a layered structure. Earth's outer layer, the lithosphere, is broken into pieces called plates. Convection currents in the mantle might be the cause of plate motion which results in earthquakes.	Egg analogy of Earth layers Hand movement simulation of Earth layer motion Convection current demonstration	Scale measurements Bar graph of Earth layers	Written description of Earth's interior Vocabulary development of earthquake words	Earth size and distances Map study of epicenter and plate locations	Color in Earth layer diagram Three dimensional model of Earth layers
5-6	The Earth has a layered structure and an outer layer broken into pieces called plates. Three basic movements take place at the edges of the plates. Plate movements create special surface features near the edges of the plates. Convection currents in the mantle may be the cause of plate movements.	Models of Earth plate motions Convection current demonstration	Scale model of Earth layers Metric measurement	Vocabulary development of earthquake words	Map study of epicenter and plate locations Geologic features of the Earth's surface	Model of Earth layers Epicenters map coloring

TABLE 3
SCOPE AND SEQUENCE CHART

Unit III: Physical Results of Earthquakes

Level	Concept	Laboratory	Mathematics	Language Arts	Social Studies	Art
K-2	Earthquakes cause changes in the Earth's surface.	Hand movement simulation of Earth plate motion Fault movement game Shoe box simulation of earthquake results	Math facts practice	Vocabulary development of earthquake words Vowel sounds	Features of a community Map making	Illustration of a community Model construction
3-4	Small-scale topographic changes are associated with plate movements. Earthquake activity causes small scale topographic changes.	Paper simulations of rock layers and models of faults Sand simulation of liquefaction Landslide simulation Cake simulations of fissures	Planes and angles recognition Measurement practice	Write-up of landslide activities Vocabulary development of earthquake words	Effects of faults, landslides, and fissures Geographic features locations	Fault model construction Slope model
5-6	Tectonic movements, including earthquakes, are among the major forces which create Earth's landscape. Mountains, plains, and plateaus are the major features of the continents. Many of the Earth's most significant landscape features are under the oceans.	Paper simulation of rock layer movement Mountain building simulation Ocean turbidity current simulation		Vocabulary development of earthquake words	Map study of plate boundaries	Shoreline model making

TABLE 4
SCOPE AND SEQUENCE CHART

Unit IV: Measuring Earthquakes

Level	Concept	Laboratory	Mathematics	Language Arts	Social Studies	Art
K-2	Earthquakes have different strengths. Earthquakes cause different amounts of damage.	Simulation of relative strengths of earthquakes	Ordinal numbers Concepts of most and least	Vocabulary development of earthquake words Label reading, picture matching Sequencing events	Effects of earthquakes on buildings and people	Coloring earthquake pictures
3-4	Earthquakes differ in the amount of energy they release. Earthquakes may be measured by their effects (intensity) or by the amount of energy they release (magnitude).	Coffee grounds simulation of earthquakes Seismograph simulation	Measurement of distances Graph of measurement data Roman numerals	Vocabulary development of earthquake words Written descriptions of Mercalli illustrations	Impact of earthquakes on society Biographical study of earthquake scientists	Illustrations of the Mercalli scale
5-6	Earthquake waves are either surface or body waves. Earthquake body waves are either primary or secondary. Earthquake waves detected by a seismograph are recorded as seismograms.	Slinky™ simulation of earthquake waves Shoebox and rubber band simulation of earthquake waves Seismograph simulation Earthquake wave simulation game	Ratio of earthquake wave speed Metric measurement of wave amplitude Computation, reducing fractions	Vocabulary development of earthquake words	Impact of earthquakes on society	Model designing

TABLE 5
SCOPE AND SEQUENCE CHART

Unit V: Recognizing an Earthquake

Level	Concept	Laboratory	Mathematics	Language Arts	Social Studies	Art
K-2	Earthquake and earthquake activity are relatively unpredictable. People may feel, see, hear, and smell the signs of an earthquake. Earthquakes affect people in many ways.	Singing and playing instruments Earthquake simulation		Earthquake songs and lyrics Earthquake vocabulary Feelings vocabulary	U. S. map study of earthquake locations Earthquake damage Quake-safe actions Quake simulation	Cut, paste, and color earthquake effects
3-4	Earthquakes and earthquake activity are relatively unpredictable. People may feel, see, hear, and smell the signs of an earthquake. Earthquakes affect people in many ways.	Earthquake simulation Evacuation drill	Time span associated with earthquakes Estimating Concept of one million Interpreting charts	Descriptions of earthquake effects Vocabulary development of earthquake words	Map study of earthquakes and locations of damage risk Earthquake damage and effects on people Discussing community response	Color keys on maps
5-6	Earthquakes and earthquake activity are relatively unpredictable. Some earthquakes result in large dollar amounts of damage. Scientists use isoseismals to compare the effects of different earthquakes. Earthquakes on the ocean floor sometimes cause giant seismic waves, or tsunamis.	Tsunami simulation	Graphing earthquake damage Scale and map distances	Earthquake effects descriptions Vocabulary development of earthquake words Comparison and discussion	Events during and after an earthquake Earthquake damage Map study of earthquakes	Construction of seashore environments for tsunami simulation

TABLE 6
SCOPE AND SEQUENCE CHART

Unit VI: Earthquake Safety and Survival

Parts	Concept	Laboratory	Mathematics	Language Arts	Social Studies	Art
1	Every environment contains potential earthquake hazards. Students can identify hazards and eliminate them or reduce their impact.	Classroom hazard hunt Home hazard hunt		Discussion and list making	Discussion of damage to buildings caused by earthquakes Hazard hunt and ways to reduce danger	Illustrations of earthquake hazards in classrooms
2	Students can increase their chances for survival in an earthquake by having essential supplies before they are needed. Students can help to assemble emergency kits of supplies for their classroom, home, and family vehicle. Students can help to inform others about earthquake safety and survival.	Safety kit preparation		Disseminating information to family and neighbors Group solutions Slogan writing	Discussion of essential items needed during evacuation Earthquake safety kits Poster distribution	Earthquake safety posters
3	Students can cope with hazards during evacuation. Students are responsible first for their own safety and can then help if others are injured. Students can cope with the disturbed environment and their own emotional reactions.	Evacuation drill		Hazard descriptions	Discussion of hazards during evacuation Giving aid to the injured Feelings and events after an earthquake Drop and cover procedures	Safety kit decorating

Ten Year Results of Integrating the Science, Math, and Technology Program (1982-1992)

by Joyce Blueford
Chairman of the Board, Math/Science Nucleus

Abstract

The Integrating Science, Math, and Technology (I. Science MaTe) Program is an innovative curriculum designed to teach academically challenging science to elementary (K-6) students. Its unique design allows teachers to learn with their students. Ten years of piloting the program at several sites in California and North Carolina concludes that children and teachers learn best when a structured curriculum (teacher initiated inquiry) is the main instructional philosophy. Other factors that increase overall learning is availability of hands-on materials, parent and administrative support, and an implementation plan of action.

Introduction

The initial idea of the Integrating Science, Math, and Technology Program began in 1981. The Minority Participation in the Earth Science (MPES) Program of the U.S. Geological Survey, Menlo Park, California, began collecting data on reasons why the ethnic backgrounds of geologists were not diverse; mainly consisting of American males with a northern European ancestry. The data seemed to indicate that women of all backgrounds and men of mainly African, Hispanic, American Indian and Asian heritage did not have the basic background to even consider geology as a career (Wallace, 1986). Male geologists also tended to come from parents with a professional background and could attribute their fascination with geology to family outings where natural sciences were the main focus (i.e. hiking in Yosemite or Grand Canyon).

Since we were interested in getting students in low income areas exposed to geological principles, we realized that we needed to develop a program that reached elementary children. We surveyed students on their attitude toward science in general. Our data was collected during 1,000+ visits to San Francisco Bay Area schools in approximately 20 school districts by conducting presentations to students with the teachers available. The grades ranged from kindergarten to sixth grade and included low and high income student populations. The research concluded that children's attitudes toward science are molded early in their educational career.

Students were surveyed by asking them to list their favorite subjects. As data accumulated (from approximately 10,000 students), it became obvious their favorite subjects were earth science based. We then asked children to rank different science subjects. The most liked were volcanoes, earthquakes, minerals, rocks, animals, and landslides. The least liked were chemistry and physics.

During the visits, several conclusions could be made. (1) Economic status of the school site seemed to be a critical factor in determining the overall level of science background. (2) Teachers, on the whole, did not have an adequate background to perform science experiments and discussion. (3) Materials were not available for teachers, especially in the low income schools. (4) Administrators were unaware of the need for a well balanced science curriculum. (5) Curriculum guides in science issued by the school district were inadequate.

In an effort to help educators find a solution, the MPES Program surveyed the majority of educational science materials available for elementary grades. The materials usually lacked a good foundation in the earth sciences. In many instances, the information was incorrect or out of date. We found it very disturbing that the topics children liked most were not explored in greater detail.

With this data, the MPES Program decided to design a school science program to guide teachers in developing a more rigorous hands-on program. The scope of the project began to evolve into more than just earth sciences so a new organization, called the Math/Science Nucleus (MSN), was created in 1982. Over 50 scientists and educators were the basis of the new tax-exempt organization. A grant from the Gerbode Foundation, San Francisco, provided seed money to hire Angela Montez as the first executive director. Under her leadership, along with the guidance of the Board of Directors, the Math/Science Nucleus and the U.S. Geological Survey (MPES Program) undertook the first pilot site that developed the I. Science MaTe program. A grant from the California License Plate Program provided money to continue developing the units within the curriculum as they were piloted in the schools.

Pilot Sites: Successes and Failures

Data from the original site showed an overall increase in science education as well as an overall increase in other subjects. Blacow Elementary School, Fremont, California was chosen as the first test site for several reasons. It had a diverse population and a bilingual program, as well as a very willing principal, Mr. John Melendez. There were few discipline problems with students, and the teacher population was willing to help develop a program. In 1983, Blacow Elementary School had approximately 625 students of low to moderate income.

The initial grant allowed the MSN and the USGS to obtain supplies and create several hands-on labs. One classroom was cleaned and fitted by parents and MSN volunteers. Local businesses donated some of the tables and other materials that were needed. A plan was developed by teachers, principals, parents, and scientists to decide what the goal of the year would be. The plan included a detailed progression of scientific concepts that we wanted the students to learn. These concepts would later evolve into the different cycles: Applied Sciences, Universe Cycle, Plate Tectonic Cycle, Rock Cycle, Water Cycle, and Life Cycle.

Angela Montez, a former MPES student with a degree in Environmental Science became the executive director of the MSN. Under her leadership and an active Board of Directors, which included Dr. J.R. Blueford (geologist), Ray Wong (biologist), Lyla Fries (community leader), Dr. D. Stronk (education professor), and Ken Parker (National Weather Service) a ten year strategy to develop a science program was formulated. The goal was to create a science program that challenged all students.

During the first year, a scientist was in the lab most of the day helping 4th, 5th and 6th grade teachers revise lesson plans and hands-on activities. The content was controlled by the scientist and the teacher helped with classroom management. This marriage created logical lesson plans that built up week after week. There was also a realization that students needed to be prepared for a lab and that a follow-up after the lab would help students retain their new skills. Existing science materials were assessed and incorporated, where possible. However, most materials were outdated, incomplete or inappropriate.

During the first year, a supply room connected to the new lab classroom was cleaned and all the weekly hands-on science kits were labeled, catalogued and stored in a easy method for retrieval. A library type system of material checkout (including kits) was also devised. By the end of the third year this room housed over 200 hands-on K-6 science kits and associated materials.

Student lab booklets for grades 3-6 were developed and revised during the three year pilot. These guides contained the lab sheets and instructions for the students to follow and record their lab results for each lesson. The booklets served as the basis for obtaining the students' letter grade. The end of the second year and during the third pilot year, materials were also developed for grades K-2. Eventually a lab manual containing pre-labs, during labs (including lab sheets), post-labs, vocabulary lists, classroom management techniques, updated science content and references emerged. This was the prototype of the 6 volumes of materials currently available: Applied Science, Universe Cycle, Plate Tectonics Cycles, Rock Cycle, Water Cycle, and Life Cycle.

A series of inservices, workshops and evaluation sessions were carried out through the three year pilot program. Grades K-2 and 3-6 were kept separate for most of these sessions. Input from teachers also developed other strategies. Books became a main feature in the program. Books were researched and incorporated into the pre- and post-labs of many of the K-6 science lessons. A book list for each topical area and grade level is now included in the curriculum guides. Troll Book Publishing Company donated a set of science books, to help us pilot the use of books.

The role of the classroom teacher changed from year to year. The first year, the teachers' role was to observe, take notes, participate in the workshops and evaluate the program. The second year, the teachers became responsible for helping during the labs (both in the lecture and hands-on activities) and continued the previous duties. Finally, the third year, teachers were responsible for conducting the labs themselves with MSN staff to assist and evaluate. However, this occurred on an irregular basis and only with teachers with a good background in science. Feedback from the K-6 teachers not only helped shape the science materials, but an ongoing evaluation process of the content took place through the three year pilot program by contacting mathematicians, biologists, meteorologists, paleontologists, geologists, chemists, and engineers from local industries. Unfortunately, the MSN did not keep track of the people that contributed.

In the lower grades, MSN was able to recruit parents with science backgrounds (nurses, persons with biology degrees) to help develop lesson plans for these grades. Kindergarten did not use the lab because the tables were too large; the 1st-3rd grades used the lab every other week.

Prior to the start of the program, we asked all students (except Kindergarten) about their attitudes toward science. The questionnaire was designed to evaluate student's impression of science. The results were dramatic. 1st - 4th graders felt science was fun (50%) although their scientific knowledge was poor. 5th and 6th graders felt that science was boring (80%). More dramatic in these upper grades was that girls overwhelming disliked science (95%). We asked the students to rank science with English, Social Studies, Mathematics, Art, and Physical Education. Science was the last on their list. After only one year of student participation in the newly developed I. Science MaTe Program, the students ranked science as their favorite subject, even the 5th and 6th graders! Parents were also given a questionnaire on their attitude toward science. Most knew that science was important for their children. However, most felt their own science background was inadequate.

The program was expanded and refined at Blacow Elementary for 2 more years. The overall test scores of the students on the California Achievement Test showed a 20% gain. The only new project that was initiated was the I. Science MaTe Program. There was no science assessment studies completed at this time because the California Assessment Program in Science (CAPS) was not readily available. Also, the goal of the project was to increase all skills, not just science. There was also a dramatic increase in the overall educational level of Blacow Elementary compared to the other schools in the district. The previous year, Blacow was 23rd out of 26 schools. Two years into the program, Blacow ranked 3rd out of 26!

In 1985, Othene Thomas, the Acting Superintendent of Ravenswood City School District, allowed us to start a pilot site in East Palo Alto. In the spring of 1985, we decided to work with Brentwood Oaks Elementary school where Mr. English was the principal. We completed the same steps we did at Blacow, meeting with teachers, parents and administrators. The plan was to start in the Fall, 1985. However, before it was implemented, a new superintendent, Dr. Charlie Mae Knight, was hired. She agreed to continue the project, but only with Garden Oaks, a 4th-6th grade school where Dr. Ida Carveth was the principal. Dr. Knight agreed to provided a full-time resource teacher if we fitted a lab and provided support. Under a grant from the Peninsula Community Fund and Stulsaft Foundation, we started the program after extensive cleaning and renovation of the lab room. Susan Dutcher was hired as the resource science teacher and helped refine lab activities. Discipline was a problem in Garden Oaks during the first few months of the program. Susan Dutcher and Dr. Carveth with a team from the USGS (Dr. Joyce Blueford, Leslie Gorden, David James, Lester Lacy, and Renata Tervalon) and from the MSN (Angela Montez) developed a classroom management strategy that allowed students who wanted to learn the opportunity to participate and denied the program to those who disrupted the class. The strategies are still working in 1992 at Garden Oaks, now Ronald McNair in honor of the astronaut that lost his life in the Challenger (space shuttle) disaster.

Susan Dutcher was evaluated by a team of teachers from the county of San Mateo in 1989 and received the Kent Exemplary award for science teaching of the I. Science MaTe program. The program was nominated by the National Science Foundation as an example of an ideal school. The I. Science MaTe was also recognized by the American Association for the Advancement of Science (AAAS) in their publication of programs for minority students.

The third pilot site was Federal Terrace in Vallejo, California. Students parents' were naval employees, resulting in a school of mixed ethnic background with very young parents living in government housing. Sara Tarr-Weaver of the U.S.Geological Survey set up a lab with the assistance of the U.S. Navy. Because of limited funds, this pilot site only confirmed that the labs worked, but monitoring of test results was not evaluated. The district paid for the materials because MSN was unable to secure material funds, although many grants were written.

Where the Schools Are Today

Our first test site, Blacow Elementary School, was discontinued in 1989 because of lack of administrative support from the district. *Since we were not an approved program by the state, there was no commitment from the district.* Also, the union negotiated 40 more minutes of preparation time, which forced most schools to make the prep time, science lab. The classroom teacher did not participate in the lab and the coordination by the new science resource teacher, who was not involved in the original program, was not maintained. The MSN and USGS decided to remove the pilot materials to other schools that were maintaining the program.

The Vallejo test site did not continue after 1989, because another program from the Lawrence Hall of Science received a large grant from National Science Foundation to pilot the FOSS program in Vallejo.

R. McNair in Ravenswood City School District was converted into a 5th-8th grade school in 1991. MSN had worked with the district in 1989, to develop a 7th and 8th grade extension of the I. Science MaTe. Susan Dutcher still uses the program with the same materials. Paulette Johnson, who oversees the restructuring of the district's educational program, continues to work with us and expand the program in the other schools. Belle Haven Elementary and Flood Elementary have used the program for two years. Currently, MSN is implementing the K-3 portion of the I. Science MaTe through a grant from Hewlett-Packard. A local consortium of Hewlett-Packard, Syntex, Alza, Sun Microsystems, U. S. Geological Survey, and the Heart Association has over 30 scientists assisting with the implementation of the K-3 program.

Evaluation of Pilot

The pilot program allowed us to determine the problems facing teachers and schools when they implement a program. There were many factors that helped us further design the product in use today. The factors are listed below.

1. *Language was not a problem as we initially predicted.* The material was hands-on, and children learned new vocabulary words with the material. Many words were Latin based, so many Spanish speaking children did not have a problem. Cooperative learning classroom management skills helped non-English speaking students team up with bilingual students. Separation during science lab was not a problem. We allowed students to write the answers on the lab sheet in their own language. Also, English is the official language of science and we have been approached by other countries to use our program.

2. *Children liked the hands-on components the most.* Teachers did not like the hands-on components. The majority of teachers preferred a textbook because it was easier. In addition, the teachers were the main stumbling block in program implementation because they felt incompetent to teach science. If individual teacher background was evaluated, it was easy to see why they felt this way. Their experience was inadequate. The educational system (especially higher education) did not require them to be science literate. In order to design a program that was teacher-friendly, we had to create pre- and post-labs that helped teachers learn science through

literature, art, or social studies. Therefore, over 350 literature books were included in the program to help guide teachers.

3. We recognized that teachers needed years of inservice to develop a good background in science. However, this was not possible. *Therefore, the program is designed to provide a means for teachers to learn with their students.* Since most teachers changed the grade level they taught many times in their careers, it was suggested that we create teacher manuals that allowed the teacher to see the entire breadth of the program. With this reasoning, the K-6 volumes were designed to be similar to the scope and sequence that we follow. The document, *What Works* (1987) also helped guide the development of the manuals.

4. *It was recognized that administrators were more important to the overall science program.* They needed to know the scope and sequence and to evaluate and provide the materials for the teachers. We wrote a booklet, *Implementation and Evaluation Procedures* (1991) that allowed the principal to recognize their role.

5. *It was recognized that curriculum directors needed to understand the scope and sequence, and the importance of this progression.* We found that administrators preferred to know what the schools are doing in science because they could plan events such as science and invention fairs around the scope and sequence.

Evaluation of Implementation Procedures

After the initial pilot at Blacow Elementary in 1983-84, an implementation plan of this program at other school sites needed to be investigated. Refinement of the curriculum, as well as an implementation plan, occurred contemporaneously.

Because American schools are found in urban, suburban and rural areas, it was important to investigate how implementation would occur in these different areas. We used National Science Teachers Association (NSTA) meetings to get teachers' opinions. The USGS and MSN hosted teacher workshops involving many areas in California and other states (1983-1986). We consulted with American Indian In Science and Engineering Society (AISES) to include reservation schools.

The following is a partial list of the areas investigated.

1. Hoppa Reservation, Humboldt County
2. Bakersfield Area
3. Sacramento Area
4. San Diego Area
5. Los Angeles Area
6. Denver Area
7. San Francisco Area
8. Washington D.C. Area
9. Fresno Area
10. New York City Area

These workshops gave us input from over 400 teachers concerning the type of program they would use at their school sites. We also recognized that there were other problems in inner city and rural schools that needed to be addressed if a program was to be successful.

The implementation model that we would eventually use agreed with the data presented in *What Works* (1987).

After the Pilot Phase

From 1985-1987, the board of directors of the MSN appealed to local and national grant giving agencies to fund improvement of the project. The MSN was not able to secure funds so the directors decided to develop a hard money based organization where most of the funds were derived from sales of products. Dr. Joyce Blueford resigned from the U.S. Geological Survey to develop a financial base for MSN on a volunteer basis. The Board of Directors decided that MSN should publish the I. Science MaTe curriculum books (draft editions) and use the money earned to continue refinancing the program. The marketing of products and the development of a teacher show room at the Fremont facility, would serve the MSN's goal of getting science into the schools. An inservice program to help educate teachers was also initiated. In 1991, the I. Science MaTe program was recognized as an exemplary program by ERIC (Dept. of Education).

James Gonzales, an intern in the MPES Program assisted the development of the program in low income areas. He piloted a 7th and 8th grade curriculum in Ravenswood Middle School in East Palo Alto, that was a lab extension of the K-6th program. He also assisted in developing an entire K-8 I. Science MaTe program at Flood Elementary School, a science magnet school in the Ravenswood City School District.

As our manual and products became organized, schools and districts began to request our assistance. Over the last 2 years (1990-1992) we have helped thousands of teachers in science workshops and worked with approximately 50 schools. We have reached many more through the teachers we have inserviced and who have purchased our products. Some school districts, such as Newark Unified, Franklyn-McKinley (San Jose), Sunol, and Lafayette, have been implementing the program over the last 2 years. They have used different funding sources to obtain materials. The only school where results are being monitored is Schilling School in Newark (Katherine Keleher). The results of her study for the 1990-1991 school year are in Tables 1, 2 and 3.

In 1992, we began implementing the program in several more schools including Ravenswood City School District after the school district reorganized into K-4 and 5-8 schools. A relationship with private and public corporations is also developing with Ravenswood and Franklyn-McKinley. This involves the following companies: Hewlett Packard, Syntex, Sun Microsystems, American Heart Association, X-Soft, Lockheed, NASA, and the USGS.

In 1991, Debbie Davidson, a former science consultant with the MSN started a pilot site in North Carolina. With guidance from Mr. Edmiston, principal of Troutman Elementary, (Iredale County School District), MSN successfully began its first school site in North Carolina. Preliminary data shows that the program has been an overwhelming success. The success at Troutman has propelled other parent groups to incorporate the I. Science MaTe program into their schools.

Lacy Elementary, in Wake County, has implemented the program throughout different grade levels. Lacy PTA has been instrumental in program implementation. Union Grove Elementary in Iredell County is using a combination of community donated funds and school funding to create the labs. There are currently about 10 schools throughout North Carolina using portions of the MSN program.

Conclusions

After 10 years of developing, revising, and evaluating the I. Science MaTe curriculum, it is apparent that a structured curriculum and implementation plan is most effective. Whether the school district is low, moderate, or upper income does not change the content of the curriculum, only the implementation plan. Children of all socio-economic backgrounds have the ability to learn high level science, if the logic and sequencing of the material is coherent.

Implementation plans to increase science at a school site must have well defined roles of both the principals and teachers. Without checks and balances, most science programs in elementary schools will show little increase of test scores.

References

Blueford, J., Davidson, D., & Gonzales, J. (1991). *Implementation and evaluation procedures of the I. Science MaTe Program.* Fremont, CA: Math/Science Nucleus.

U.S. Department of Education. (1987). *What works, research about teaching and learning.*

Wallace, J. H. (1986). *Minority participation in the earth sciences (MPES) program - 15 years of achievement.*

Table 1 Results from Schilling Elementary School

Schilling CTBS Science Comparison
5/90 to 4/91

GRADE LEVEL	NP GROWTH	NCE GROWTH
2nd - 3rd	+ 3.8	+ 1.8
3rd - 4th	+ 1.0	+ 1.8
4th - 5th	- 2.1	- 0.8
5th - 6th	+ 6.8	+ 3.4

GRADE LEVEL	% OF STUDENTS W/POSITIVE GROWTH
2nd - 3rd	33/66 = 50% (Based on NCE)
3rd - 4th	27/52 = 52% (Based on NCE)
4th - 5th	23/50 = 46% (Based on NCE)
5th - 6th	27/45 = 60% (Based on NCE)

Note: A student's scores were omitted from this compilation if *either* their 1990 *or* 1991 score was "1" (the minimum possible), as this indicates a mistake in filling out their answer sheet as opposed to a true reflection of their ability.

Table 2 Evaluation of Schilling Elementary School, Newark, California

Situation: Mrs. Keleher is the science laboratory teacher at Schilling Elementary School, Newark, California. Once a week, she teaches a hands-on lab to all children; the fifth and sixth graders come to lab twice a week. Mrs. Keleher has been the science teacher at this school for 5 years. The science room is full of wonderful displays and material that Mrs. Keleher has accumulated over the years. The I. Science MaTe materials were incorporated starting in September, 1990. The curriculum she followed previously was textbook based.

Evaluation procedure: Students were given a post evaluation sheet that asked them to qualitatively evaluate the materials, their likes and dislikes in the science program. They had to write their answers. J.Blueford evaluated the results. Below is a summary of these results.

QUESTIONS							
grade	# students	#1 more	#1 less	#1 same	#2 more	#2 less	#2 same
4	29	25	2	2	27	2	0
4	25	24	1	0	25	0	0
5	30	27	2	0	22	8	0
5	26	25	0	1	25	1	0
6	25	23	1	1	18	5	2
6	29	25	3	1	12	16	1
TOTAL	164	149	9	6	129	32	3

Question 1. Did you learn more science this year than last year?
Question 2 Did you want more or less science to be taught?

Evaluation: Most children felt they learned more science this year than last. The general sense of answers from other questions relate that children enjoyed the hands-on components more than the text book approach used the previous year. Children also wanted more science to be taught, which is also reflected in other answers on the questionnaire. Notice that students in the sixth grade were not overwhelming in favor of more science. Some of the answers to other questions reflected children who already had an attitude about science.

Table 3 Summary of Comments that were Repeated More Than 10 Times on the Written Answers

Fourth Grade
What do you like about lab: videos
What do you want more of: volcanoes, everything, rocks, body
How would you improve science: have science three times a week, make more labs; not enough time, not enough science; more displays, more supplies, buy more things, more hands-on labs, more microscopes
Do not like about lab: Did not like substitute teacher, writing the work
Do not like about classroom: My favorite thing was touching, and in classroom there is little touching.

Fifth Grade
What do you like in lab: experiments, going outside, microscopes, looking and touching "stuff"
What do you like in classroom: video or movies, otherwise, most didn't answer this question.
What do you want more of: rocks, earthquakes, science, plants, animals, environment, fossils, "messy" experiments, body, solar system
How would you improve science: like it longer, go on trips, science should be the whole week, get a new classroom, give money, more labs, less paper; more experiments and more equipment; get a big room and get more materials; more microscopes
Do not like about lab: waiting my turn, substitute that taught class; not enough materials; not enough time; did not like to write.
Do not like about classroom: too much lecture, too much reading, boring, when you copy from the board.

Sixth Grade
What do you like about lab: I liked touching and fooling around with the stuff, it helped me learn better.
What do you want more of: life cycle, earthquakes, microscopes, telescopes, nature, diseases, experiments, molecules, space, health, planets, fun experiments; equipment, earth
How would you improve Science: more science everyday, science an hour a day, 3 days of labs
"I liked the science lab because I like it when we work with many things in the lab. I hope we will have science all week now."
Do not like about lab: not enough time, writing on lab sheet, waiting for my turn
Do not like about classroom: boring talks, lectures, taking notes from board, homework
What don't you like: I didn't like mostly everything in the lab, I think that it was all boring. But I learned well from it.

Mrs. Keleher also did a detailed study of all the children's performance on tests. She found a dramatic increase in the 4th and 6th grade children; as much as an overall increase of 50%. The fifth grade did not show such dramatic results although there was a slight increase. In her report, Mrs. Keleher indicated that she felt other social factors were involved.

Earthquake Education Materials: Obstacles to Implementation

by Andrea S. Dargush
Assistant Director for Research and Education,
National Center for Earthquake Engineering Research

Abstract

Various types of earthquake education materials have been developed to instruct children in the elementary and secondary grades about earthquakes. The focuses of these materials range from the instruction of fundamental scientific principles which define the causes and effects of earthquakes to training in earthquake preparedness and response activities. In order to be effective, it is important to match the needs and capabilities of your classroom with the attributes of the resource materials. In evaluating these materials available it is likely that no one package will satisfy all the requirements of a classroom. This paper will suggest key issues which should be examined in order to match earthquake education resources with the needs and capabilities of the students. Some "hands-on, minds-on" classroom activities will also be offered, emphasizing the need for integration of science-technology-society issues in earthquake education.

An Overview of NCEER - Its Mission and Programs

The National Center for Earthquake Engineering Research was established in 1986 with a grant from the National Science Foundation and other contributions from the State of New York, participating academic institutions and private industry. NCEER was formed as a consortium of institutions with a mandate to address earthquakes as a national problem. Its mission is to conduct multidisciplinary research to effect reductions in damages and casualties resulting from earthquakes. NCEER addresses earthquake engineering research questions with particular attention to buildings, nonstructural components, lifelines, highways and bridges. Interrelated research in the areas of seismology, geotechnical engineering, risk analysis, intelligent systems and socioeconomics provides input to the primary project areas on related fundamental technical issues and innovative approaches.

NCEER recognizes that a substantial measure of the success of its research activities toward earthquake hazard mitigation is the degree to which knowledge and technological developments are transferred and research findings are effectively implemented by end users.

To accomplish this, the Center maintains an active knowledge and technology transfer and education program to disseminate information to the most appropriate audiences. These efforts include information resource services, publication of technical and general interest reports, public awareness activities, workshops for teachers and school administrators and technical seminars and conferences for practicing professionals. NCEER also places a strong emphasis on involvement of members of the practicing community in its research activities to guide the studies toward the most applicable end results.

These efforts have revealed a great need for earthquake education activities directed toward K-12 grade students, teachers and administrators. An inventory of earthquake education programs in the US conducted by NCEER Education Specialist Katharyn Ross (Ross, 1989) indicates that in spite of the moderate earthquake risk faced by 39 of the 50 US states, few states mandate earthquake education as a distinct part of the curriculum or require its inclusion as part of standard earth science instruction. In addition, fundamental science concepts are often misinterpreted by students, building misconceptions which can interfere with their abilities to fully comprehend necessary earthquake safety procedures. This may be further compounded by the fact that few elementary teachers assess themselves as well qualified to teach about earth science phenomena, such as earthquakes (Weiss, 1987).

Understanding natural phenomena, knowing what to expect, acknowledging the risk, and knowing how to prepare and respond to an earthquake are proven ways to mitigate loss of life and property. As shown in Figure 1, these are viewed by NCEER as critical elements of an effective earthquake education program. NCEER is helping to implement this kind of earthquake education through the following activities:

- Identification of key issues and obstacles to effective earthquake education,
- Compilation and dissemination of curricular materials,
- Provision of forums for exchange for those active in earthquake education and disaster preparedness,
- Community resource and information clearinghouse,
- Identification of psychological issues and approaches,
- Promotion of educational research, and
- Development of publications, curricular materials and "hands-on/minds-on" instructional activities

Table 1 summarizes the type of educational resources which are provided by NCEER.

In addition, NCEER activities echo the objectives of the National Science Foundation to develop future generations of scientifically literate adults and to produce increased numbers of capable scientists and engineers.

Available Earthquake Education Programs and Resources

Through its education program, NCEER has worked with other organizations involved with earthquake education, such as the Federal Emergency Management Agency, the National Science Teachers Association, and the Math/Science Nucleus to achieve these goals. This cooperation allows NCEER to more effectively share what is known about earthquake education, to promote earthquake science and safety programs and to help develop strategies to implement effective earthquake education programs.

Some notable examples of existing earthquake education programs are discussed elsewhere in this publication. Among them are:

- **Earthquakes: A Teacher's Package for K-6/FEMA 159.** This 250 page curriculum includes background material; sets of lessons and classroom activities for each of three grade levels (K-2, 3-4, 5-6) that support virtually all elementary subject areas. Designed for classroom teachers with

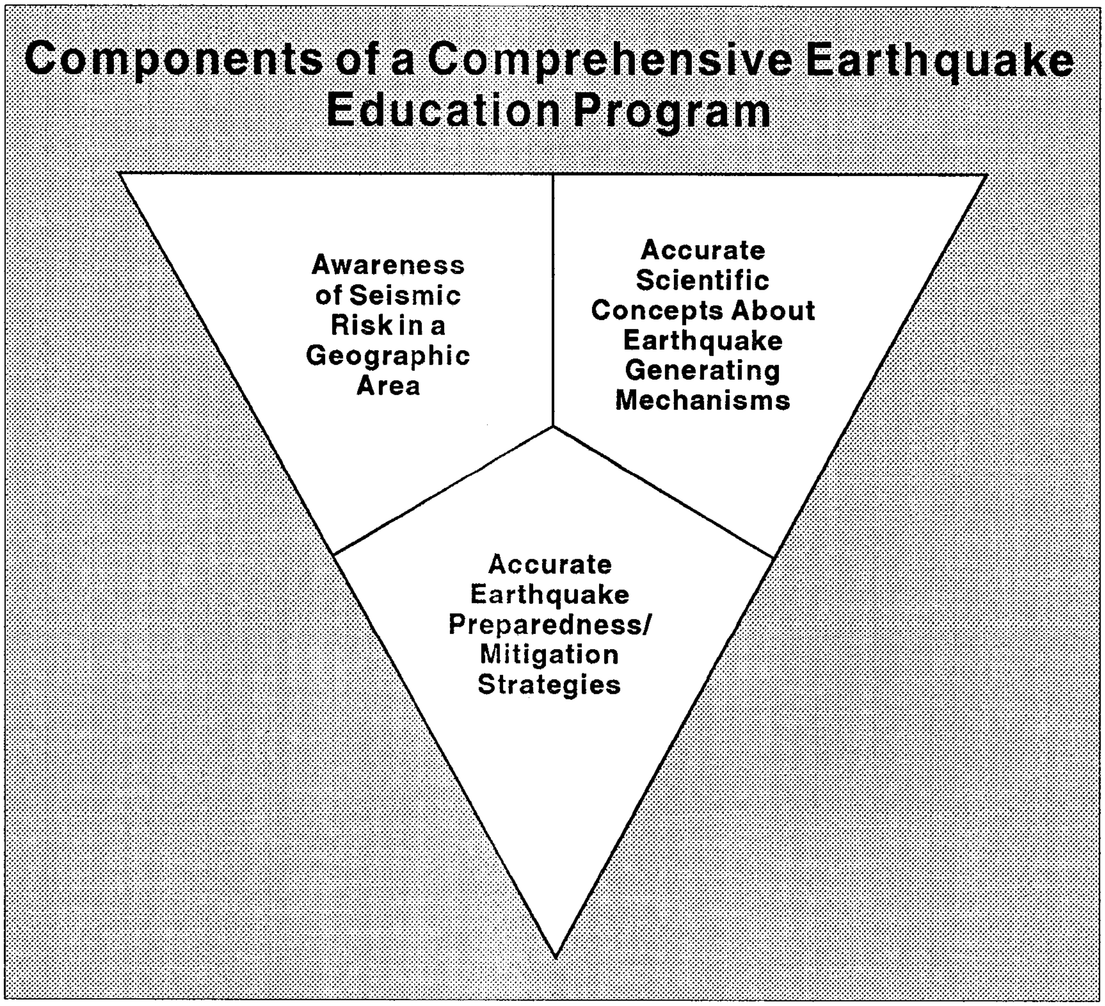


Figure 1 Components of a Comprehensive Earthquake Education Program

Table 1: NCEER Earthquake Education Resources

Resources	Extent	Audience
Library collection on earthquake engineering, earthquake hazard mitigation, disaster preparedness and earthquake education	Conference proceedings, books, journals, newsletters, clippings, brochures, pamphlets, films, videos, slides, codes, standards, and maps	- Students, K-post graduate - Researchers and academicians - Consulting and practicing engineers - Teachers at all levels - Public officials - General public
Reference and referral service in earthquake information	Literature surveys, provision computersearches, verification and location of obscure citations	- same as above
Training in earthquake education	Workshops, presentations, publications, information on how to teach specific concepts, activities that tie science and safety together, research related to how children can best learn important earthquake concepts	- School administrators, teachers and youth leaders
QUAKEKINE® database Other online and CD-ROM databases	QUAKELINE, CEDB, COMPENDEX, CITIS, NTIS, USGS, ERIC, etc. Access to BRS, DIALOG, STN, OCLC, RLIN and INTERNET	- Students, K-post graduate - Researchers and academicians - Consulting and practicing engineers - Teachers at all levels - Public officials - General public
Bibliographies on selected topics	Earthquake engineering, hazard preparedness and mitigation and earthquake education materials.	- same as above
Monthly Newsletter ***Information Service News***	Current awareness, new acquisitions, computersearches, and tables of contents	- same as above (mailed to over 500 national and international subscribers)
Support services	Interloan, photocopy, fax, e-mail, and phone	- Students, K-post graduate - Researchers and academicians - Consulting and practicing engineers - Teachers at all levels - Public officials - General public
Workshops, conferences, and training sessions on technical and non-technical earthquake hazard reduction issues and methodologies	Advances, approaches and applications of research in seismic hazards, earthquake engineering and earthquake mitigation policy issues	- same as above

little or no background in earth science, the six-unit package focuses on: Defining an earthquake; Why and Where Earthquake Occur; Physical Results of Earthquake; Measuring Earthquakes; Recognizing an Earthquake; and Earthquake Safety and Survival.

- Math/Science Nucleus has developed a hands-on K-6 science curriculum called **"Integrating Science, Math and Technology" (I. Science MaTe)**. The program emphasizes the development of critical thinking skills and understanding of science content through a grade-focused, scientifically rigorous look at volcanoes, earthquakes, and plate tectonics. Descriptions of 28 hands-on laboratory exercises are included and are incorporated within 84 lesson plans.

Of possible interest to participants in this workshop, is the educational framework developed by the State of California. The 1990 version emphasizes the need for a thematic instructional approach to science teaching to demonstrate the interrelationships between different subdisciplines of science. The **Science Framework for California Public Schools, Kindergarten Through Grade 12**, suggests various theme approaches to the instruction of earth science, life sciences and physical science, linked together and interwoven with relationships to technology and society. Themes described include: energy, evolution, patterns of change, scale and structure, stability, and systems and interactions. Teachers are however encouraged to develop others as appropriate. Earthquakes might be considered as a theme which might adapt well to this approach, providing the necessary structure to link science concepts, safety activities and socio-technological implications. Lessons are structured to be applicable to all grade levels, incrementally including aspects of the scientific method in the teaching exercise, from observing, communicating and characterizing phenomena to inferring implications and applying knowledge.

Obstacles to Effective Learning: Possible Pitfalls in Curricula

Fortunately for our school children, there are substantial programs such as these, in addition to the numerous others which have been developed to address earthquake science and/or safety issues. It is, however, essential to recognize that all earthquake materials are not the same, just as the learning profiles of all classrooms are not the same. Therefore, it is important to consider the capabilities of the students and the characteristics of an earthquake curriculum before embarking on an instructional program. Even the most thoughtfully developed program and hands-on activities and experiments cannot guarantee that the student will learn what is intended.

There are a number of potential pitfalls which may be encountered in using a particular curricular resource. They include the following:

- **Assumption of previous background**
  The experiential background of the students may not match that which is assumed by the curricular materials. A simple pre-assessment tool should be used to gauge the level of understanding of the students. A simple questionnaire might be used for this purpose, or a letter-writing or syntu composition exercise.
- **Absence of connection between scientific information and technological application**
  Students need to be able to understand where scientific theories and technological developments originate and to have some appreciation for the scientific method. This is especially important for students who learn earthquake safety and preparedness lessons in the context of a class outside the regular science curriculum, such as health.

- **Reliance on jingles and catchy phrases without sufficient underlying information**
  Because our knowledge of earthquake-generating mechanisms is not absolute, earthquakes can occur outside the context which might be presented in a classroom practice exercise. When instruction is based on rote memorization of facts or procedures, the student's conceptual understanding of earthquake cause and effect is underdeveloped, leaving him or her ill-prepared to make appropriate response decisions in situations other than that reviewed in class.
- **Over-reliance on student discovery of concepts**
  In order for discovery-learning to be effective, some initial conditions need to be set, accompanied by instruction of basic background information and terminology.
- **Duplicity of earth science vocabulary**
  Oftentimes earth science terms bear close ressemblance to words with distinct other meanings, such as fault, drift, etc. Students may try to reconcile these differences in meaning, leading to possible misconceptions. These terms and their different meanings in different contexts should be explained to the students.
- **Collective representation of disaster experiences causes difficulty in isolating and learning specific disaster knowledge**
  The curriculum that may be chosen may represent all disasters within the same instructional framework. Students may be unable to discern between appropriate disaster responses for earthquakes, tornados, hurricanes, etc. Studies conducted of students within an area which is subject to moderate earthquake risk suggest that students believe that response which is typical for tornadoes is equally appropriate for earthquakes.
- **Presentation of science and preparedness information in a psychologically-unsupportive way**
  The past experiences of students in disasters such as earthquakes may contribute to the way in which earthquake information is learned. These experiences should be considered when teaching about natural disasters.

There are additional positive actions which can be taken by teachers to counteract these pitfalls, such as using consistent messages - those procedures which are emphasized in the lesson should be reiterated in illustrations and in the classroom. In addition, teachers should take the initiative to model appropriate behavior by participating in, and not just leading, an earthquake drill. Where necessary, the curriculum should also be adapted to meet local classroom environments. It is also useful and informative to use earthquake education as a mechanism to introduce career perspectives in science and engineering.

Some Examples of Hands-on Earthquake Activities for the Classroom

The following activities provide hands-on experiences which may help students to understand more about earthquakes and their consequences. Expanded description of theses exercises appear at the conclusion of this paper.

Sand Investigation

The composition of sand is dependent upon the rock from which it is originally derived and grains can differ in size, shape and color. Many students may be unaware that these differences exist. This exercise encourages students to compare samples of sand which are taken from different regions of the country, and to formulate reasons for the differences between the samples, based on their places of origin. This exercise is intended to help students appreciate the differences in the composition of something which they may likely believe has the same form everywhere, sand.

Soil Composition Investigation

A similar exercise will encourage students to examine the differences in soil composition, which will exhibit even greater differences in grain size, shape and color. If possible, a soil-collecting field trip may serve to emphasize the differences in soils native to different areas. Students will be asked to document their observations, and where possible to speculate on the reasons for the differences in soil compositions from location to location.

Earthquake Shaking Table

Earthquake engineers conduct research to make buildings and other types of construction more resistant to ground motion. Often these ideas are tested under laboratory conditions to measure their effectiveness. Seismic simulators or "shaking tables" are frequently used to subject test structures to the same type of shaking they would experience during an earthquake. Simple versions may be built in the classroom to help students understand the scientific approach used by earthquake engineers and to observe the different ways structures may respond during earthquakes.

The Effect of Shaking on Buildings

This exercise will allow students to examine how buildings with different sizes and shapes perform differently when subjected to earth shaking. Structures may even be built to rest upon different types of soil foundations, illustrating the effects that soils may have on the vibrations experienced in a building, in terms of amplifying or damping the ground motion.

Syntus

A form of short Japanese poetry, syntus provide a creative outlet of expression for students. Students compose brief poems which describe their feelings about earthquakes, their perceptions of the effects or other related issues. Students may be more willing to discuss their impressions or concerns in writing than they would be verbally. The exercise also provides a mechanism to link language arts with science studies.

Conclusions

In spite of our technological advancements, accurate and timely earthquake prediction is still an achievement to be realized. The public needs to more fully understand the consequences of natural disasters and to know and appreciate the actions which can be taken to safeguard their lives and property. This understanding can be significantly advanced in elementary and secondary schools students by effective instruction of fundamental science concepts which relate not only to earthquakes but to other natural manmade and technological hazards. Effective earthquake education can promote critical thinking and at the same time a better appreciation of causes, effects and appropriate earthquake mitigation activities. In the short-term, this knowledge enables personal preparedness. It will ultimately contribute to the development of scientifically literate adults who are better able to make more well-informed decisions on earthquake-related scientific and technological policy issues which they might face - from endorsement of seismic design regulations to support of Federal spending for research. Lastly, effective earthquake education can ignite a curiosity and enthusiasm for science and engineering that may encourage selection of career paths in these areas.

References

Butts, Marilyn and Prescott, Stephanie, Editors, (1990). Science Framework for California Public Schools, Kindergarten Through Grade 12. California Department of Education.

Callister, J., Coplestone, L., Consuegra, G., Stroud, S. & Yasso, W. (1988). Earthquakes. Washington, DC: FEMA-159.

Dargush, Andrea S. (1993). Science/Technology/Society - A Framework for Enhancing K-12 Earthquake Education. Manuscript submitted, Fifth US National Conference on Earthquake Engineering.

Ross, K.E.K. (1991). Earthquake Education: Integrating Science and Technology. Science Teachers Bulletin.

Ross, K. E. K. (1992). Hands-on, Minds-on Earthquake Education: Curricular Options and Shaky Activities. Proceedings from Earthquakes in the Northeast - Are We Ignoring the Hazard? A Workshop on Earthquake Science and Safety for Educators. Technical Report NCEER-93-0005, pp 2-39 - 2-48.

Ross, K.E.K. (1989). Implementation of Earthquake Education in the United States: An Overview. Proceedings from the Conference on Disaster Preparedness - The Place of Earthquake Education in Our Schools. Technical Report NCEER-89-0017, pp 127 -151.

Weiss, I. R. (1987). Report of the 1985-86 National Survey of Science and Mathematics Education. Research Triangle Institute, Research Triangle Park, North Carolina.

Sand Investigation[1]

Objective: Students will understand that sand is not the same everywhere; there are identifiable differences in color, composition, size of particles, and texture.

Directions: Provide samples of different sands. Try to have sand that differs in color and grain size. If possible, plan a sand-collecting field-trip so students will have the opportunity to relate different sands to different sites. In the classroom, spread the samples on pieces of contrasting colored paper and give students magnifying glasses and a list of questions to answer. Provide small pebbles and soil samples for students to make particle size comparisons.

Other Variations: If you are not near sand beaches, you might want to collect different sand samples when you are on vacation. Empty plastic film containers make good storage cases. Once back in the classroom, a display of different sands can be made. Especially interesting for such a comparison are samples of sand from White Sands National Monument in White Sands, NM, Great Salt Lake in Utah, and the Animas River in Silveston, Colorado.

SAMPLE SAND RECORD CHART

SAND SAMPLE #1 ______________________________

Where is the sand from?

What color or colors is the sand?

Are all the particles the same size?

How many sizes can you find?

Are certain size particles one color while other size particles another?

If so, what do you think that means?

Draw a picture of how the sand looks under the magnifying glass.

[1] *More ideas can be found in "Earthquake Education: Integrating Science and Technology," by Katharyn E. K. Ross in the* *Science Teachers Bulletin, Spring, 1991*

Soil Composition Investigation[1]

Objective: Students will understand that soil is not the same everywhere; there are identifiable differences in color, composition, and size of particles.

Directions: Provide samples of different soils. Try to have soils that differ in color and amounts of organic matter, rocks, sand, and clay. If possible, plan a soil-collecting field-trip so students will have the opportunity to relate different soils to different sites. In the classroom, spread soil samples on pieces of paper and give students magnifying glasses and a list of questions to answer. Provide small pebbles and sand grains for students to make particle size comparisons.

Other Variations:

SAMPLE SOIL RECORD CHART

SOIL SAMPLE #1 ______________________________

What color is the soil?

Do the particles have rounded or sharp edges?

How do particles differ?

Is there anything living in the soil?

If so, what does it look like?

Draw a picture of how the soil looks under the magnifying glass.

---

[1] More ideas can be found in "Earthquake Education: Integrating Science and Technology," by Katharyn E. K. Ross in the Science Teachers Bulletin, Spring, 1991

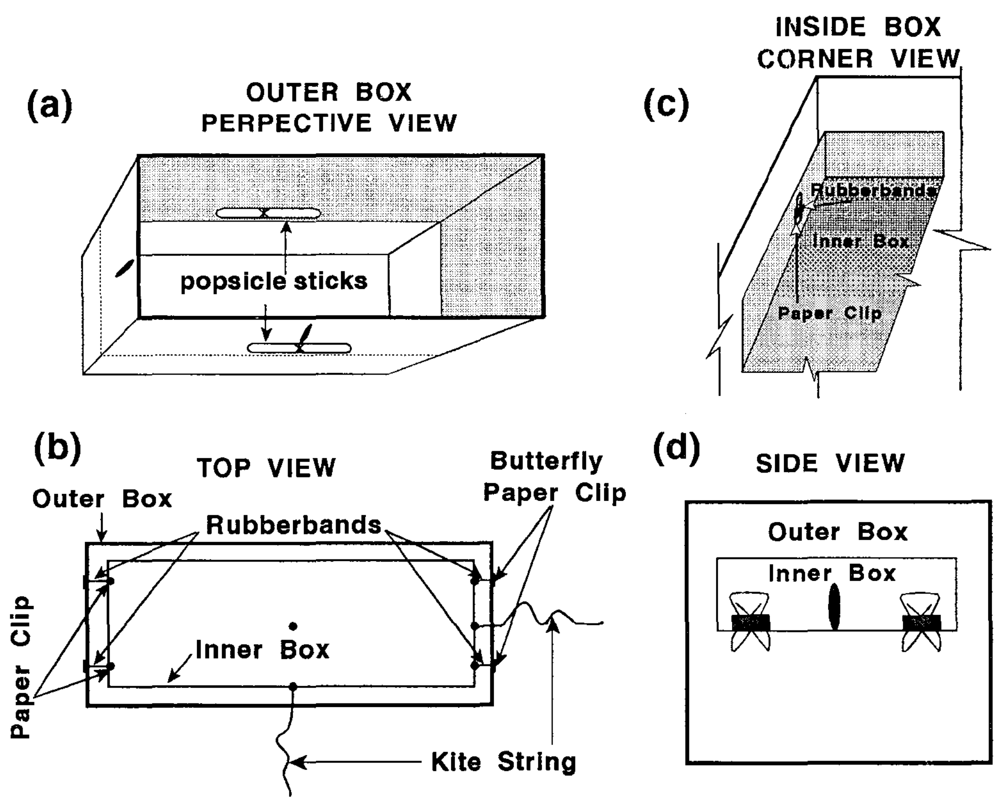
SHAKE TABLE DIRECTIONS

(Adapted by Walter Kutschke from the Northwest Earthquake Workshop for Teachers)

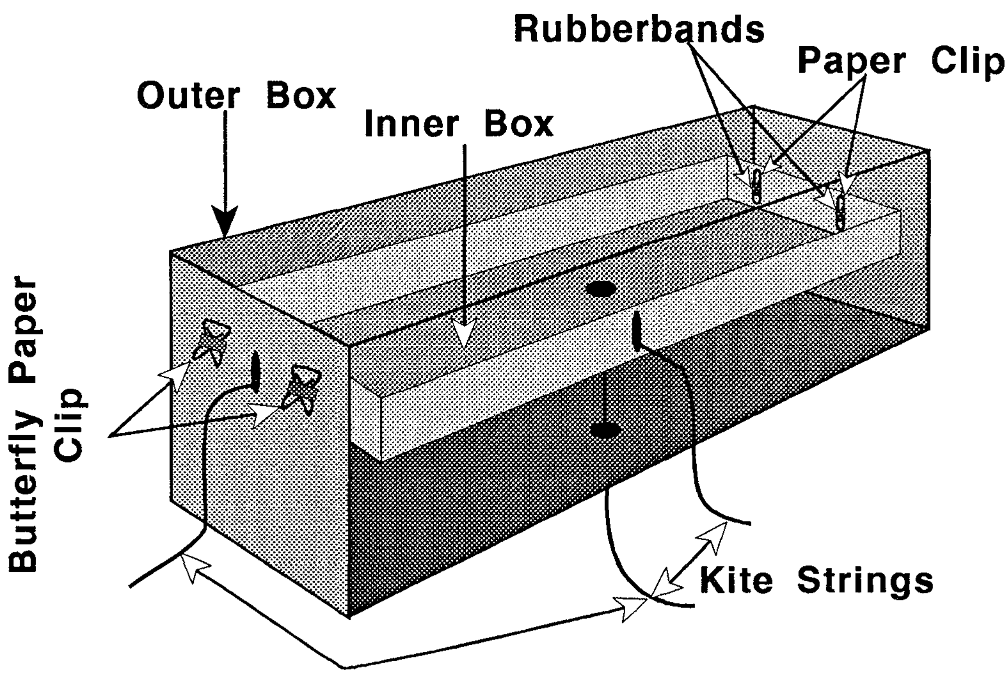
Materials:

Box insert
Box with top flaps cut off
Kite string or twine
Marker
Paper clips - (4 large size, 6 butterfly)
Popsicle sticks - (5)
Rubberbands - (4) heavy size
Ruler
Scissors
Washer

This shaker board consists of a box (with flaps cut off) and an inner box insert that will be the floor of the shaker board. The movement of the shaker board is done by pulling on the kite string from each end and underneath the box. The rubberbands also help simulate movement and shaking. The following illustrations detail how to make the shake table.



PERSPECTIVE VIEW



The Effect of Shaking on Buildings[1]

Objective: *Students will understand that a number of factors are involved in the construction of buildings that will withstand ground-shaking including building design, type of soil, water content of the soil, number of earthquakes the building has been through, and the duration of the earthquake.*

Assignment: Design a building that will withstand an earthquake in either soil, sand, fish gravel or a combination of these. Earthquake simulation is defined as 10 seconds of shaking on the homemade shake table. Measure the amounts of water and soil components. Design and build a building with materials provided and simulate an earthquake.

SAMPLE BUILDING DESIGN RECORD SHEET

TRIAL #1

What soil did you use?

How much?

How much water, if any, did you mix into the soil?

What materials were used for the building?

Draw a diagram of your building.

How well did your building withstand the earthquake?

What conclusions can you draw?

Follow-up Variations

How do repeated earthquakes affect your building?

How does a longer quake (i.e. 20 seconds) affect your building?

What is the effect of changing the amount of water in the soil mixture?

What is the effect of using the same design and changing some building materials?

---

[1] *More information can be found in "Earthquake Education: Integrating Science and Technology," by Katharyn E. K. Ross in the Science Teachers Bulletin, Spring, 1991*

SYNTUS

Syntus, short poems that originated in Japan, can be used to combine science and creative writing.

RULES OF WRITING A SYNTU[1]

- Line 1. One word only--the name of a geologic feature you're writing about.
- Line 2. A scientific observation about line 1, using only one of your senses (sight, touch, hearing, taste, or smell).
- Line 3. A thought, feeling, or evaluation about line 1.
- Line 4. Another observation about line 1, using a different sense from the one you used in line 2.
- Line 5. A one-word meaning for line 1.

In addition to encouraging creative writing, poems such as syntus can give a teacher an indication of students' conceptual understanding in a nonobtrusive way. For example, the following syntu, written by a third grader, indicates the student may be confusing earthquakes and volcanoes.

"Earthquake
Red Lava
I do not like earthquake
Rumbling
Hot"

[1] *Taken from Adventures in Geology by Jack Hassard, American Geological Institute, 1989.*

Earthquake Education at the Elementary School Level

by Guna S. Selvaduray
Assistant Professor, Materials Engineering Department, San Jose State University

and

Jason Tarshis
Teacher, Oster Elementary School, San Jose

Abstract

In order to raise the consciousness and knowledge level of the general public regarding earthquake safety and preparedness, it is necessary to begin this process at an early stage. The authors have found that this approach which has been tested in Japan, particularly in Shizuoka Prefecture, has proved to be very successful. At Oster Elementary School, special emphasis is placed on earthquake education every year during the September to October time frame. This paper describes the activities undertaken by one class of 28 students, half fifth and half fourth graders.

Introduction

The fifth grade classroom is an ideal location for comprehensive earthquake education. A six week curriculum on earthquake preparedness and scientific information integrates language arts, history, geography and art with elementary seismology and plate tectonics. The students are instructed to be "earthquake safe" with the involvement of their families. Rather than being frightened by earthquakes, the students are taught to recognize their dangers, be impressed with their power and to react appropriately when they occur. Once the unit is completed, the youngsters are encouraged to keep their folders at home for future reference.

The Earthquake Folder

Over a period of one month, the students were instructed on a variety of topics related to earthquakes. As instruction progressed, students were required to compile an *earthquake folder* of their own, which would serve to not only document what they were learning, but also measure the progress of their education. Homework assignments, based upon classroom instruction, were added to this folder. Topics included the geology pertaining to earthquakes, magnitude and intensity scales, faults in the San Francisco Bay Area, elementary plate tectonics, and identification of earthquake hazards in the home. Each student was also required to create an "earthquake legend" of their own. At the culmination of this unit, students were tested on the knowledge base.

Resources

A number of worksheets were used as part of this unit:

1. *Duck, Cover and Hold* - Self-explanatory. I perform drills weekly in my class and try to catch the kids off-guard (i.e., lining up for lunch, entering in the morning). As I tell them, "An earthquake doesn't care if you're sitting at your desk."

2. *Earthquakes: Whose Fault?* - Humorous sheet. Alleviates the fright factor associated with this subject.

3. *Loki and Baldur* - An earthquake legend. The students are then asked to create their own crazy legends and illustrate them. The art becomes the cover of the entire folder.

4. *Kukis of Assam* - Another earthquake legend.

5. *Improve your E.Q.* - Helps students recognize how prepared they and their families are for earthquakes. The students are first asked to fill out information in class. Next, they take it home and, with the help of their families, see how prepared their household is. At the end of the unit they are asked to reevaluate their own situation.

6. *Bedroom* - Students are asked to identify and color potential hazards in a typical bedroom. These can get fairly outlandish. One kid thought a roundish object on the nightstand was a donut that a person could choke on should she be eating it when the shaking commences. I have had some students come up with more than 50 hazards in a bedroom.

7. *Own Bedroom* - Students are asked to diagram their own rooms and evaluate them for earthquake safety.

8. *Earthquake Wave Data* - Helps kids understand the different kinds of waves that are generated by quakes. Students use a drawing compass to determine the epicenter of a quake.

9. *Earthquake Situations 1 to 4* - Students are placed in cooperative groups to dramatize various scenarios. The class then determines how well they handled the situations.

10. *Earthquake Situations 5 to 8* - See above.

11. *World Outline* - Used to show notable earthquakes and regions.

12. *U.S.A. Outline* - Used to show regions of earthquake risk in the United States in the future.

13. *World Outline* - Guide to #11. Shows two major earthquake zones and general location of two noteworthy quakes.

14. *U.S.A. Outline* - guide to #12. Shows rough estimations of areas susceptible to earthquakes in the future. Main point - Californians aren't the only ones who need to worry.

15. *Copycat Page 1* - Interesting facts about the earth.

16. *North America Outline* - Used to show historically significant quakes in the northwest hemisphere.

17. *North America Outline* - Guide to #16.

18. *Ring of Fire*

19. *California Outline* - Used to show California's vulnerability.

20. *Santa Clara County Outline* - Used to show proximity of San Andreas Fault to local cities.

21. *Santa Clara County Outline* - Guide to #20.

22. *Plate Edges*

23. *Where Is It?* - Shows some faults of California and the Bay Area. Can be used with #19.

24. *Earthquakes Rearrange the Scenery*

25. *Isoseismal Map* - Shows levels of shaking caused by the 1906 quake. Students should color in the different regions and note that strong shaking doesn't necessarily take place right next to the fault. Note how shaking was stronger in San Jose than in parts of San Francisco. Explain that, historically, San Jose was a relatively small city at the time.

26. *Seismometer* - Another humorous sheet.

27. and 28. *Modified Mercalli Sheet* - Differentiate between this scale and the Richter scale.

29. *Plates of the Earth's Crust* - Elementary plate tectonics.

30. *Inside The Earth*

31. and 32. *Copycat Pages 2 and 3* - Students can color in before and after shots of earthquake related scenes.

33. through 35. *Watch The Breakup Of Pangea*

Conclusion

In order to improve earthquake safety, it is necessary to educate the population on the various aspects of earthquakes. It is logical that such an education process be initiated at the elementary school level, and continued through tertiary education. By using the materials and techniques outlined here, the students have demonstrated their capability to grasp a wide variety of concepts related to earthquakes.

References

U.S. Geological Society
345 Middlefield Road
Menlo Park, CA 94025

Earthquake Resources Manual
Cambrian School District
4115 Jacksol Drive
San Jose, CA 95124

Earthquake
Planet Earth
Time-Life Books
541 N. Fairbanks Ct.
Chicago, IL 60611

"Alaska Quake"
Plastichrome Colour Picture
Boston, MA 02130

"Movers and Shakers"
State Farm Insurance Co.
Public Relations Dept. (E-8)
One State Farm Plaza
Bloomington, IL 61710-0001
(Free earthquake kit and video)

Earthquakes and Volcanoes
by Ruth Deery
Good Apple Inc. Box 299
Carthage, IL 62321-0299

Science Made Stupid
by Tom Weller
Houghton Mifflin Co.
2 Park Street
Boston, MA 02108

National Geographic, May '90

Newsweek, Oct. 20, 1989

For an excellent map of earthquakes, volcanoes, and plate tectonics ("This Dynamic Planet"), I would suggest writing to

U.S. Geological Survey
Map Distribution Box 25286
Federal Center
Denver, CO 80225

Acknowledgments

The authors wish to thank all the students in Room 14, Oster Elementary School, for their participation, and all the parents, for their support and cooperation.

Part V

Triage and Medical Planning at School Sites

5-1 The Role of the American Red Cross

5-2 Medical Planning for Schools

5-3 Critical Incident Stress Debriefings

Abstract

Being prepared to prevent injury as well as to care for students and staff with health/medical needs in a major disaster situation presents multiple challenges to educators. During this session, participants heard how one decentralized district implemented an ongoing preparedness program to address the medical and health issues related to disaster preparedness. Program outlines and resources were provided.

The workshop also discussed policy, as well as roles and responsibilities of the American Red Cross, specifically Disaster Health Services, related to medical care when schools become American Red Cross Shelters.

The Role of the American Red Cross

by Julie Rose
Volunteer Coordinator, American Red Cross, Santa Clara Valley Chapter

Introduction/History

The American Red Cross, founded in 1881 by Clara Barton, is a voluntary agency that was granted a charter on January 5, 1905, by the Congress of the United States, giving it the authority to act as the primary voluntary national disaster relief agency for the American people. The role of Red Cross was later restated in the Federal Disaster Relief Act of 1974, leading to the mandate "...the Red Cross has, in the field of disaster relief, both a legal and a moral mandate that it has neither the authority nor the right to surrender."

The Red Cross, however, cannot function alone in disaster relief efforts. Disaster relief efforts require the involvement of a variety of governmental and non-governmental agencies in order to meet the needs of disaster victims and their communities. Disaster relief efforts require preparedness planning on the part of all individuals, businesses, schools and health care agencies. These plans should include the capability to be self sufficient for up to 72 hours in the event of a catastrophic disaster.

American Red Cross Disaster Services

When a large disaster strikes in Santa Clara County, such as an earthquake, our chapter is usually activated by the Santa Clara County Office of Emergency Services, which becomes the Command Center. Our chapter director then works directly with the Office of Emergency Services to establish and activate needed services. Simultaneously, other disaster relief agencies are activated on an "as needed" basis.

Direct services provided by the American Red Cross include:

Damage Assessment - gathers information about the physical damage resulting from the disaster.

Mass Care - meets the basic needs of disaster victims by providing food, shelter and supplies.

Health Services - concerned with the medical and emotional needs of disaster victims and workers.

Family Services - provides emergency assistance enabling individuals and families to resume their pre-disaster lives.

Disaster Welfare Inquiry - gathers information about the areas and individuals affected by the disaster and makes this information available to concerned relatives through local chapters.

Disaster Health Services

Disaster Health Services functions under a set of regulations and procedures known as the ARC 3050, DHS - Preparedness and Operations. This policy states that "Disaster Health Services (DHS) provides emergency and preventive health services, including psychosocial support to disaster victims and workers." It continues, "The primary responsibility for the general health of a community in a disaster rests with the local public health authorities and local medical, nursing and health resources...Red Cross Disaster Health Services, as part of the Red Cross disaster preparedness and relief program and as part of the community's emergency response system, supplements the existing service delivery system for community health care." Therefore, based on this policy, American Red Cross Disaster Health Services is not responsible, nor is to be expected to take over and render medical care to students and staff that are injured.

Shelter Setting

Your school may be a selected site for a shelter in a disaster event. A mass shelter is a facility that is adequate to provide temporary shelter for groups of disaster victims unable to continue living in their pre-disaster living arrangements. In addition to providing food and a place to sleep, a shelter must be set up to provide basic medical and emotional support to the shelter occupants and workers. Duties of Disaster Health Services in a shelter setting include:

1. Determining the health needs of all shelter occupants and arranging to meet those needs by referring the seriously ill and injured for health care, treating minor illnesses and injuries and looking for unreported health problems of shelter occupants, and taking the necessary action to care for these problems.

2. Prevent pre-existing health from getting worse.

3. Refer persons to family services or community resources as necessary.

4. Follow up on care that has been provided and on referrals that have been made to ensure that needs have been met.

5. Assess the number and type of injuries and the age of the population affected, and plan preventive interventions.

6. Establish communications with other health care providers.

7. Be aware of any person who has a communicable disease, try to isolate him from the rest of the shelter occupants, and report noticeable trends in illness to the local health department.

8. Arrange for health care for infants, the elderly, or physically handicapped persons.

9. Arrange for medical coverage by a physician as needed.

10. Determine any needs for special diets and ensure that these needs are communicated to the mass care function.

11. Check to make sure that the conditions are sanitary in the shelter. The shelter manager should be consulted about these conditions.

12. Arrange for inspections of the shelter by public health officials, including inspections of food storage, preparation, and serving areas; restrooms; and health care areas.

13. Determine the mental health needs of shelter occupants and arrange for counseling if needed.

14. Work with the shelter manager or other administrators to ensure the security of all medical supplies and equipment.

15. Provide 24-hour medical coverage for the shelter occupants.

Sometimes, a high percentage of the shelter population has health care needs that require more than the amount of care DHS usually provides in a shelter. In this event, DHS should request that the chapter inform the local public health authorities about the problem. This is to reinforce that the health of the community is the responsibility of the local public health authority, not the Red Cross.

Disaster Health Services Personnel

DHS volunteers will include RNs, LVNs, physicians, physician's assistants, emergency medical technicians, mental health professionals and allied health workers, i.e. aides and certified first aiders all current in CPR. Each comes with their own clinical expertise which can vary greatly. Each must have current certificates and/or licenses and must work within the framework of Red Cross guidelines and procedures and their level of certification, training and experience.

Disaster Health Services Training

Volunteers should have training that can be most helpful during a disaster situation. Classes necessary to function in Disaster Health Services are first aid, advanced first aid, introduction to disaster services, and disaster health services I and II. It is suggested that DHS volunteers take additional ARC courses relevant to Disaster Health Services and keep themselves updated in their own clinical expertise. The general focus of training in disaster health services I is to assist staff to organize and administer the Disaster Health Services function on the chapter level and how the Disaster Health Services function is initiated on a larger operation. It helps identify preparedness measures that should take place on the local unit level and the applicable policies, regulations and procedures.

School nurses have attended the disaster health services I class and have found it helpful in assessing and setting up plans for their schools.

Disaster Health Services Protocols

Included in the ARC 3050 are the DHS protocols based on the second edition (1979) of the **Red Cross Advanced First Aid and Emergency Care** textbook. The protocols act as verbal orders and must be reviewed and signed annually by the volunteer medical consultant, and may be adapted to preferred local standards of medical practice. The protocols cover standards for history and clinical assessment, priorities in giving emergency care, classifying symptoms and conditions, managing chronic pre-existing health conditions, infection control guidelines, a symptoms and conditions index that guides a nurse through specific conditions and tables of norms. The approved protocols are to be followed:

1. In an emergency when no physician is available,
2. When specific orders for individual patients have not been written by attending physicians,
3. When the nurse is not able to reach the physician responsible for specific orders,
4. When access to a rescue squad or hospital has been disrupted.

When working in a Red Cross facility, a DHS volunteer may operate only within the scope of these protocols, providing they are trained to perform the procedure. Procedures not described or recommended in these protocols may not be performed, even if the person is trained to do so.

The attached protocols, noted as Attachment 6, are the protocols used within the Santa Clara Valley Chapter. They are approved, as is, by our volunteer medical consultant.

Disaster Health Services Supplies

Sufficient supplies are essential. Adequate supplies must be on hand and readily available. Quantities should be small enough to be handled, but large enough to sustain a facility for 72 hours or until additional supplies can be obtained. Attachment 2 in the packet serves as an excellent guide of suggested supplies but should be tailored to the population you expect to serve.

Preparedness

Personal preparedness is a must. If you and your family are not prepared and ready for a significant disaster, you will not be able to carry out your responsibilities at work. Earthquake frequency and resulting damage are unpredictable. We do not know, in advance, to what extent the services in our community will be affected or disrupted. Therefore, it is recommended that homes and workplaces are prepared to be self sufficient for at least 72 hours.

References

American Red Cross, (ed. 1979). *Advanced First Aid and Emergency Care Textbook*, The American National Red Cross.

American Red Cross Disaster Services Regulations and Procedures

- 3001 - Authority and Legal Status of Red Cross Disaster Services
- 3003 - Administrative Regulations
- 3031 - Mass Care - Preparedness and Operations
- 3050 - Disaster Health Services - Preparedness and Operations

Medical Planning for Schools

by Sally Snyder
Coordinator of Health Services, Irvine United School District

1. Potential Types of Injuries
   A. Mild to severe
      - bruises
      - lacerations
      - fractures, sprains
      - burns
      - foreign objects in eye
      - head injuries
      - varying levels of consciousness
      - internal injuries
      - puncture wounds
      - impaled objects
      - neck injuries
      - back injuries
      - respiratory problems
      - cardiac problems

2. First Aid Supplies
   A. General Considerations
      - types of potential injuries
      - first aid supplies already in the school
      - what school materials can be adapted and used in care of the injured
      - money
      - availability of storage space at the school
      - need for multiple storage areas within the school
      - alternate locations for first aid station
      - upset parents and/or other community members
      - students with special health needs (physical and emotional)
      - staff members with special health needs and/or family obligations

   B. Type of first aid supplies needed
      - gauze bandages - variety of sizes of squares and stretch roller
      - triangular bandages
      - band aids
      - tape (masking)
      - splints
      - antiseptic
      - eye irrigation solution

scissors
stretchers
disposable gloves
tweezers
instant ice packs
tylenol
baking soda
petroleum jelly
emergency foil blankets
non-water hand cleaner
first aid guide

C. Other supplies
record keeping forms
ball point pens
flashlight/light sticks
list of students with special health needs/medical problems

D. First aid supplies already in school
identify amount and location
determine additional supplies needed depending on size of school

E. School supplies which can be adapted for use as first aid supplies
books and magazines (splints)
notebooks (head protection when exiting building)
sanitary napkins (bandages)
paper towels (bandages)
health office disposable towels/blankets (blankets)
jackets, sweaters (as blankets, splints)
janitorial supplies (plastic bags for waste disposal)

3. Special Populations

A. Medication
3-day supply with required signed physician and parent requests

B. Physical health care services
supplies for 3-day time period

C. Plan for assisting physically impaired student/staff with vision, hearing, or mobility difficulties

D. Plan for assisting students with language barriers

E. Staff with special health needs

4. Trained Personnel

A. Characteristics of first aid team member
   - can make sound decisions while under pressure
   - can deal with injury situations

B. Training/skill competency
   - first aid
   - CPR helpful
   - triage
   - universal precautions
   - record keeping/documentation

C. Desirable
   - multiple people trained and assigned to insure coverage
   - practice in applying skills during simulated disaster situation

5. Plan and Practice

A. Develop a school site plan

B. Practice - refine - practice - refine

First Aid Supplies
(Per 50 Students)

50	triangular bandages
400	4 x 4 gauze pads
200	2 x 2 gauze pads
50	extra large bandaids
100	sanitary napkins
200	regular bandaids
30	2" kling
30	4" kling
50	eye pads
200	betadine swabs
200	zephirin swabs
3 rolls	1" masking tape
10	18" splints
10	24" splints
1	bandage scissors
1	tweezers
1	petroleum jelly
1	baking soda
1 pt.	antibacterial soap
1 pt.	alcohol
1 btl.	eye irrigation solution
1 btl.	tylenol
10	instant ice packs
50	wash'n dry towelettes
50	disposable blankets
25	trash can liners
4	injury record forms
5	ball point pens
50	triage tags

first aid book or chart
metal box container for supplies

Consider stocking enough supplies for 30% of the site population.

Triage

Triage means "to sort and prioritize." The triage system allows rescuers to identify victims at greatest risk for early death and to provide basic stabilization maneuvers. Victims with hypovolemia (diminished blood supply), respiratory distress, or altered mental status, are triaged into dead, immediate or delayed groups. First, rescuers carry out simply hemorrhage control and air way protection as they triage.

Mettag Description

Triage utilizes a tag system as a means of identifying the severity of the injury.

The Mettag consists of four color strips:

1. Bottom strip, *green*

    A. Injuries managed by first aid only (walking wounded)
    B. No hospital care needed

2. Second strip from bottom, *yellow*

    Needs hospital care but no hurry

3. Third strip from bottom, *red*

    A. Needs most emergent care
    B. Should receive attention before all others

4. Fourth strip from bottom, *black*

    A. Dead or nonsalvageable
    B. No CPR

Triage Plan of Action

1. Identify walking wounded and direct them to a designated area away from immediate danger. (In the school earthquake plan, this probably will have taken place prior to rescue attempt).

2. Steps of victim assessment:

    Step 1. Respirations/breathing/ventilation

    A. Open airway - no respiration
    B. Reposition - no respiration - black (dead)
    C. More than 30/minute - red (immediate)

D. Less than 30/minute - further evaluation
(go to Step 2)

Step 2. Circulation/perfusion/pulse
Tissue color test/capillary blanch test (a pressure placed on lips or nail beds and then released)

A. Does not regain color within two seconds - red (immediate)
B. Does regain color within two seconds - go to Step 3

or

Radial/wrist pulse (useful with reduced lighting)
A. Not palpable - red (immediate)
B. Palpable - go to Step 3
Control bleeding - walking wounded, or bystander, applies pressure

Step 3. Mental status/confusion (ability to follow simple directions)

A. Altered mental status - (unable to follow simple command, i.e., "squeeze my hand," "follow my finger," "open your eyes") - red (immediate)
B. Normal mental status (able to follow simple command) - yellow (delayed)

Disaster Drill and Preparation Schedule

Timeline for Evacuation Drills/Inservice

1. Drop - evacuate to lines then grass area.

2. Drop - line - grass
   Use alternate route out of the building. No light in building.

3. Drop - line - grass
   One teacher remains in class - buddy takes both classes out.
   Teachers decide who stays and who evacuates.
   First aid and search teams in action.

4. Parent education night : disaster planning

5. All teams activated, parent pick-up, activate extended student supervision.

6. Recertification of CPR/first aid/triage and fire extinguishers.

7. Drop - line - grass
   Missing students, injuries, fire in building, parent observation.

8. Unannounced drill
   Drop - line - grass
   Missing wounded students, buddies taking kids to grass, search team and first aid team in action.

9. Drop - line -grass - wounded - search - first aid - release gate in action with lead people injured/out. Re-enter the building, transfer first aid station. Activate ham radio operator volunteer.

Irvine Unified School District
DISASTER PREPAREDNESS - STUDENT MEDICATION

Dear Parents:

While improving and updating our Earthquake/Disaster Preparedness Program we realize that it would be vital to have a plan and all provisions on hand for students who regularly take prescribed medication during school hours.

To this end, we are asking all parents who have children on prescribed medication during school hours to telephone the school office with this information. Our plan is as follows:

1. Parent completes the form below and returns it to school to alert the school office that the child has a medical/health need that may be a concern during an extended school stay.
2. Office will send home to the parent two forms. One MUST be completed by the physician prescribing the medication. One MUST be completed by the parent.
3. Parent returns the two completed, signed forms to the school office with enough medication in the labeled prescription bottle, inhalers, or other health treatment devices to last four days in the event of an extended school stay.

These medications will remain in a locked cupboard with other emergency supplies. If there are changes during the year or new health concerns, please notify the office immediately.

Please note: This DOES NOT INCLUDE ITEMS SUCH AS ASPIRIN, VITAMINS, OR OVER-THE-COUNTER MEDICATION.

Thank you for your cooperation on this project. Please complete the form below at this time if this letter applies to you. You may also contact me with questions or interests at

Sincerely,

School Nurse

- -

During an extended school stay, my child's medication/health needs would be:

____

Type of prescribed medication: ________________________________

Name of child: ____________________ Teacher: ________________

I understand that the school office, upon receipt of this tear-off, will send two forms to me to have completed and returned. I understand that during an extended school stay, school personnel will not be able to administer my child's prescribed medication until I, as the parent, complete Steps 1-3 as mentioned in this letter.

Parent Signature: __________________________ Date: __________

PERSONAL PREPAREDNESS PLAN

____
Your Name

PERSONAL PLANNING:

1. ______________________ has agreed to check my house after a disaster and
(Name)
knows the location of my gas and water shut-off and how to turn it off, if necessary.

2. I have a personal emergency pack at school or in my car that includes:

   ______ Walking, heavy shoes (if not normally worn to work)
   ______ Sweater or jacket
   ______ Granola bars
   ______ Flashlight and batteries
   ______ Sunscreen
   ______ Light sticks

3. ______________________________________
(Names of relative and others)
have been told that if a disaster occurs during the school day that I will be staying at school until the disaster situation has stabilized (approximately 3 days).

4. ________ I have a 3-day supply of food and water stored at home or in my car.

5. ________ I have secured my water heater and furniture for earthquake movement.

6. ________ I have an emergency first aid kit especially for disasters.

7. ________ I have a portable radio and fresh batteries.

8. ________ I have a flashlight and fresh batteries.

9. ________ I keep heavy shoes under my bed.

FAMILY:

1. ______________________________ is the school(s) that my
[Name of school(s)]
children attend. I have contacted the school and know that they have a disaster plan to care for my children for 3 days or until picked up.

   ________ yes ________ no

2. ______________________ is the closest friend or relative to my child's school
[Name]
and has agreed to pick up my child and care for him/her until I can return. This person is so noted on my child's emergency card at school.

3. ______________________ cares for my child on a daily basis, and I have
[Name]
helped her be prepared to care for my child for 3 days if a disaster occurs during the school day.

START Triage Video can be obtained from:

Attention: Paramedic Dept.
Hoag Hospital
301 North Newport Blvd.
Newport Beach, CA 92663

Cost: $97.50 (includes tax and handling)
Will accept Purchase Orders
Telephone: 714-760-5687

Medic First Aid

Emergency Medical Planning, Inc.
P.O. Box 21738
500 S. Danebo Ave.
Eugene, OR 97402

Telephone: 503-344-7099
Fax: 503-344-7429

Met-tags available from:

California Chiefs Book Store
825 "M" St.
Rio Linda, CA 95673

Cost: $.30 each - Plus CA tax, plus 5% shipping/handling
(minimum $2.18 shipping/handling)
Will accept Purchase Orders
Telephone: 800-733-2314

Critical Incident Stress Debriefings

by Pat Jocius
Administrative Specialist, City of Cupertino

There are many methods to deal with a stress response syndrome. One of the most effective methods is through a Critical Incident Stress Debriefing (CISD). The CISD is an organized approach. It entails either an individual or group meeting between the rescue worker and a caring individual (facilitator) who is able to help the person talk about her/his feelings and reactions to the critical incident.

Basic Components of Debriefings

- Ventilation of feelings to the facilitator and evaluation of the intensity of stress response
- Support and reassurance from the facilitator
- Closure stage where resources are provided, a plan for further action is devised, etc.

Types of Debriefings

- **On the scene or near the scene**
  This is the briefest form of CISD. The facilitator should function as an observer/advisor and watch for developments of acute reactions. Consult the symptom checklist for these symptoms.

- **Initial Diffusing**
  This is a form of CISD that occurs within a few hours after a Critical Incident. It is usually led by a group leader and can be either pre-planned or spontaneous.

- **Formal CISD**
  This type of CISD is typically led by a qualified mental health practitioner within 48 hours of a critical incident.

  1. ***introductory phase*** - facilitator introduces her/himself
  2. ***the fact phase*** - participants introduce themselves
  3. ***the feeling phase*** - participants express feelings about the critical incident
  4. ***the symptom phase*** - participants analyze their own stress response syndromes
  5. ***the teaching phase*** - the facilitator teaches participants about symptoms to look for in self-evaluation and evaluation of others
  6. ***the re-entry phase*** - final assurances and plan of action are discussed

Critical Incident Symptoms
What To Look For

A critical incident creates a stressor outside the realm of usual human experience. As a victim of this type of stress, you can expect to experience the after effects to varying degrees. We also want to alert you to the fact that there is a ripple effect through your family, loved ones and also your co-workers. The acknowledgement of these emotional reactions helps to shorten recovery time and prevent complications through the natural healing process.

- ☐ Sense that life is out of balance
- ☐ Disbelief
- ☐ Flashbacks
- ☐ Sleep Disturbance
- ☐ Sadness
- ☐ Diminished or Increased Sexual Drive
- ☐ Minimization of the Critical Incident
- ☐ Anger/Irritability
- ☐ Forgetfulness
- ☐ Cold-like Symptoms
- ☐ Survivor Guilt
- ☐ Increased Substance Use
- ☐ Social Withdrawal
- ☐ Emotional Numbing
- ☐ Feelings of Being "Out of Control" or Fears of "Going Crazy"
- ☐ Loss of Feeling Secure in the World"
- ☐ Self-doubt
- ☐ Greater Belief in Superstitions and Predictions
- ☐ Hypervigilence, ie.constantly watching or listening for danger signs

Critical Incident Symptoms
What To Do

If you are experiencing any of the above symptoms, the following techniques may be of help. Do not hesitate to make contact with professional mental health services if these symptoms persist or get worse.

- ☐ Good nutrition which includes less processed foods, less salt, less sugar, less caffeine and more fruits and vegetables
- ☐ Adequate sleep and exercise
- ☐ Avoid new major projects (including starting a new diet or quitting smoking)
- ☐ Keep a familiar routine with familiar people and surroundings
- ☐ Don't push thoughts and memories of the event away. Go ahead and talk and talk or write or draw or compose or use some other form of self expression in order to deal with your feelings
- ☐ Watch only enough TV to get information, don't traumatize yourself with it
- ☐ Use humor, tell jokes, watch comic videos, etc., (be sensitive)
- ☐ Do some volunteer work
- ☐ Use positive self-talk such as "I am doing fine, things will get better, etc."
- ☐ Encourage and support co-workers, make conscious effort at compliments and teamwork
- ☐ When feeling tense or upset, take at least ten deep breaths and repeat as necessary
- ☐ Don't be embarrassed about a repetitious need to talk, be aware that some may not be able to listen to you because of their own emotional state
- ☐ Help yourself and others by joining a support group
- ☐ Take time out for fun, do something you have been wanting to do
- ☐ Take a hot bubble bath, read a good book, or listen to good music
- ☐ Take a break. Allow yourself time for pleasant fantasies, previous wonderful experiences or future exciting or interesting plans
- ☐ Participate in debriefings if available (A debriefing is an official assessment and evaluation of the situation and emotions.)
- ☐ If you feel you still need more help, seek professional assistance

How Children Act After a Disaster

Preschool
ages 1-5

Preschool: Ages 1-5

Children in this age group are particularly vulnerable to the changes in their routines and the disruption of their previously secure environments. Because they generally lack the verbal and conceptual skills necessary to effectively cope with sudden stress by themselves, they are particularly dependent on family members for comfort. In some cases they might be affected as much, or more by the reactions of parents and other family members as they are by the disaster. Responses might be geared toward re-establishing comforting routines, providing opportunity for non-verbal as well as verbal expression of the child's feelings, and lots of reassurance.

How Your Children Could Act and What You Can Do

Return to Younger Behavior

- Resumption of bedwetting
- Thumbsucking
- Fear of darkness
- Fear of animals
- Fear of "monsters"
- Fear of strangers

Physiological Reactions

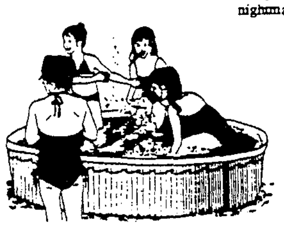
- Loss of appetite
- Overeating
- Indigestion
- Vomiting
- Bowel or bladder problems (e.g. diarrhea, constipation, loss of sphincter control
- Sleep disorders and nightmares

Emotional/ Behavioral Reactions

- Nervousness
- Irratability
- Disobediance
- Hyperactivity
- Tics
- Speech Dificulties
- Anxiety about separation from parents
- Shorter attention span
- Agressive behavior
- Exaggeration or distortion of disaster experience
- Repetitive talking about experiences
- Exaggeration of behavior problems

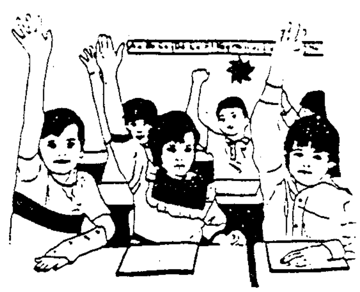
How to Help

- Give additional verbal reassurance and ample physical comfort (e.g. holding and caressing)
- Give warm milk and provide comforting bedtime routines.
- Permit child to sleep in parent's bed temporarily
- Provide opportunity and encouragement of expression of emotions through play activities



How Children Act After a Disaster

School Age 5-13



School Age: 5-13

Regressive reactions are especially common in the younger bracket of this age group. Children may become more withdrawn and/ or more regressive. They might be particularly affected by the loss of prized objects or pets. Verbalization and play enactment of their experiences should be encouraged. While routine expectations may be temporarily relaxed, the goal should be to resume normal functioning as soon as possible.

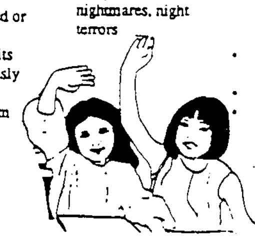
For those who are older, peer reactions are often very important. The children need acceptance from their friends. They need to know that their feelings and fears are normal. Anxiety and tension may appear in a number of ways including aggression, rebellion, withdrawal or attention seeking behavior. "Survivor's Guilt" might also emerge. Group discussion with peers and adults is effective in reducing the sense of isolation and in normalizing the child's feelings. Resumption of group activities, routines, and involvement in physical activity might also help.

Return to Younger Behavior

- Increased competition with younger siblings for parents' attention.
- Excessive clinging
- Crying or whimpering
- Wanting to be fed or dressed
- Engaging in habits they had previously given up
- Failure to perform chores, normal responsibilties

Physiological Reactions

- Headaches
- Complaints of visual or hearing problems
- Persistant itching or scratching
- Vague aches and pains
- Nausea, bowel problems
- Skin disorders
- Sleep disturbance nightmares, night terrors



Emotional/ Behavioral Reactions

- Fear of going to school
- Withdrawl from playgroup and friends
- Hyperactivity
- Withdrawl from family contacts
- Irritability
- Disobedience
- Fear of wind, rain, etc.
- Inability to concentrate and drop in level of school achievement
- Aggressive behavior (e.g. fighting with friends or siblings
- Repetitive talking about the experience
- Sadness over losses
- Antisocial behavior (e.g. stealing or lying)

How to Help

- Give additional attention and consideration, physical comforting
- Temporarily lessen requirements for optimum performance in school and home activities
- Provide opportunity for structured, but not demanding chores and responsibilities
- Encourage physical activity
- Encourage verbal expression of thoughts and feelings about the disaster
- Provide play sessions with adults and peers
- Rehearse safety measures
- Encourage the child to see and accept the disaster as part of life's varied experiences
- Encourage child to verbalize feelings of loss by grieving
- Encourage taking part in home or community recovery efforts

How Teens Act After a Disaster

Adolescent 13-18

Adolescent: Ages 13-18

Most of the activities and interests of the adolescent are focused on the peer group. Fear that feelings or reaction are unusual or unacceptable might push the adolescent towards withdrawal or depression. Psychosematic reactions are common. The adolescent might tend to resent the disruption of social activities and contacts. They may be frustrated by the lack of full adult control. Frustrations, anger or guilt might manifest themseves as irresponsible and/or delinquent behavior. Adolescents should be encouraged to maintain contacts with friends and to resume athletic and social activities. Group discussions are helpful in normalizing their feelings. They should also be encouraged to participate in community rehabilitation efforts.

How Your Teen Could Act and What You Can Do

Return to Younger Behavior

- Resumption of earlier behaviors and attitudes
- Decline in previous responsible behavior
- Decline in emancipatory struggles over parental control
- Decline in social interests and activities

Physiological Reactions

- Bowel and bladder complaints
- Headaches
- Skin rash
- Sleep disorders
- Disorders of digestion
- Vague physical complaints or exaggerated fears of physical problems
- Painful periods or cessation of menstruation.

Emotional/ Behavioral Reactions

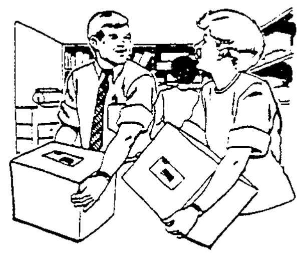
- Marked increase or decrease in physical activity level
- Expression of feelings of inadequacy and helplessness
- Delinquent behavior (e.g., stealing, vandalism)
- Difficulty in concentration
- Depression
- Isolation; withdrawal from family and peers

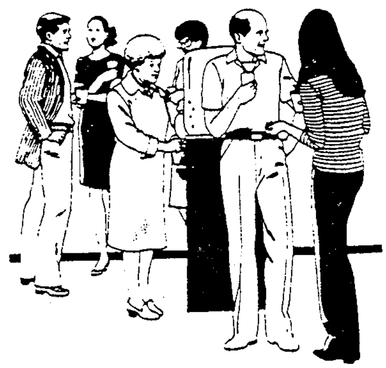
How to Help

- Encourage discussion of disaster experiences with peers and significant others
- Encourage involvement in rehabilitation and recovery efforts in the community
- Temporarily reduce expectations for level of school performance
- Encourage resumption of social activities, athletics, etc.
- Rehearse safety measures for future disasters

How Adults Act After a Disaster

Adults





Adults

Adults seem an unlikely group to have specific problems after a disaster. However, when they are under stressful conditions, they may exhibit some of the symptoms described below. It is important to watch for these symptoms in both immediate and post-disaster periods. For example, a family could lose its home and be forced to rebuild. This could cause an uncertain future and dash hopes for a comfortable retirement. It often takes a while for these conditions to sink in and possibly cause psychosomatic problems, relationship difficulties, and occupation dissatisfaction.

How You Could Feel and What You Can Do

Feeling and Behavior Symptoms

- Psychosomatic problems, ulcers, diabetes, heart trouble
- Withdrawal, anger, suspicion, irritability, apathy
- Loss of apetite, sleep problems, loss of interest in everyday activities
- Increase in verbal, physical and sexual abuse
- Exaggeration of existing behavior problems

How to Help

- Arrange for medical care for physical symptoms
- Persuade victim to talk with family physician, clergyman, friends, or to accept professional help
- Help find medical and financial assistance
- Keep channels of communication open with members of the family
- Help family to recognize signs of depression and need for professional counseling.
- Make hotlines available

Part VI

Key Issues In School Site Planning: Making a Plan

Abstract

Writing the emergency plan for a school site requires a comprehensive review of emergency planning and response issues. In this workshop, participants worked in small groups with a leader to review the components of a good emergency plan. They explored areas of special concern, looking at a variety of solutions that have been tried successfully by districts in California. Sample plans and a list of planning questions were included in the resources provided to the workshop participants.

Ten Keys to Emergency Operations Center Success

by Robert Bruce
Principal, Vista Verde Junior High School, Irvine, California

Communication and Situation Analysis

Centralized Control

Clear Goal, Approach, Purpose & Function

Specific Emergency Operations Center (EOC) Tasks

Adequate Staff & Clear Organization

Necessary EOC Support Items

Effective Layout With Set-up Guides

Operational Check Lists For Key EOC Staff

Maintenance, Training and Drills

Commitment and Teamwork

Irvine Unified School District (IUSD) Site Emergency Positions

- **Emergency Operations Center (EOC)**
  Principal
  Communicator
  Damage Assessment Coordinator
  Recorder-Runners

- **First Aid Area**
  Medical Team Leader
  Treatment Teams - 2 Persons Each
  Stretcher Teams - 4 Persons Each
  Morgue Officer
  Recorder-Runners

- **Search & Rescue Command Post**
  Search & Rescue Team Leader
  Security
  Sweep & Rescue Teams - 2 Persons Each
  Recorder-Runners

- **Student Release Command Post**
  Student Release Team Leader
  Records Clerk
  Recorder-Runners

- **Student Supervision Command Post**
  Student Supervision Team Leader
  Student Supervisors
  Recorder-Runners

- **Others**
  Security Team Leader
  Supply & Support Team Leader
  Extended Emergency Team Leader

General Duty Statement
All Team Leaders

- Trained, Qualified & Designated Leaders Lead
- Command Leadership Not Cooperative Style
- Assign Priorities to Multiple, Urgent Tasks
- Time is Short So Decide, Then Direct
- Uncertainty Risks Loss of Control
- Continuously Evaluate & Re-Assign Your People
- Keep Your Team Focused
- Do Not Become Distracted

General Duty Statement
IUSD Medical Team Leader

- Situation Briefing from Principal
- Establish First Aid Area
- Appoint Treatment and Stretcher Teams
- Coordinate Distribution of Medical Supplies
- Establish "Traffic Pattern" for Patients
- Coordinate Patient Movement
- Inform Principal About Patient Status
- Command Efficient Use of Medical Resources

Completing An Emergency Task

- One Person in Charge
- Huddle
- State the Objective
- Assign Specific Tasks
- Ask for Suggestions
- Supervise, Don't Do It!
- Record It

General Duty Statement
IUSD Principal

- Evacuate the School & Take Roll
- Establish Command Post & Assign Staff
- Determine Safety of Building
- Institute Search and Rescue
- Establish Resource Pool
- Report Life Threatening Damage & Injuries To DO
- Release Students
- Remain at School Until Released by DO

General Duty Statement
Site Communicator

- Hook Up Radio Outside
- District Roll Call in 5 Minutes
- Determine if Extension Lines Can Be Used
- Response-School & Extension Number if Working
- Second District Roll Call in 10 Minutes
- Report Life Threatening Damage & Injuries to DO
- Third District Roll Call in 30 Minutes
- Report Changes, Injuries and Damage

General Duty Statement
IUSD Search & Rescue Team Leader

- Situation Briefing from Principal
- Establish Command Post
- Coordinate Actions of Teams
- Assign Rescues-Type 1 & 2 Ok, 3 Report
- Record Injuries & Damage
- Advise Principal of Progress
- Coordinate Movement of Patients
- Assist with Triage & First Aid

General Duty Statement
IUSD Student Release Team Leader

- Situation Briefing from Principal
- Establish Student Release Command Post
- Assign Student Release Staff
- Complete Record Form & Send to Principal
- Establish Student Release Gate
- Verify Adult & Release Student
- Advise Principal of Progress

General Duty Statement
IUSD Student Supervision Team Leader

- Situation Briefing from Principal
- Establish Command Post & Assign Supervisors
- Tell Staff to Begin Emergency Assignments
- Keep Students Calm, Quiet and Together
- Locate Students for Student Release
- Tend to Minor Injuries
- Account for All Students
- Advise Principal of Progress

Student Accounting Procedures

At Information Center (Student Release Team)
- Staff writes down requests for student on 3x5 card
- Staff gives 3x5 card to student runner
- Runner checks for location of student at emergency operations team
- Runner delivers 3x5 card to student supervision team leader at the appropriate evacuation assembly area

At Evacuation Assembly Area (Student Supervision Team)
- Runner gives 3x5 card to supervision leader
- Supervision leader releases requested student to go with runner to the reunion area

At Reunion Center (Student Release Team)
- Before releasing, staff asks student the following questions (but not in the presence of the requesting adult)
  A. Do you know them?
  B. Do you trust them?
  C. Will you go with them?
  D. Do you think your parents would want you to go with them?
- If student is unwilling to go, they should not be released, and runner should return them to the assembly area supervisor.
- Student is released and disposition noted on the release form
- Staff notes disposition on the 3x5 card and gives to runner to return to the emergency operations center
- If student requested cannot be located, ease the requesting adult by stating "all students have not yet been accounted for. We will continue checking all student reporting stations."

At Emergency Operations Center (Emergency Operations Team)
- Student runner gives the completed 3x5 card to an emergency operations team member
- Student runner returns to the information center
- Emergency operations team <u>monitors</u> locations of all students
- Emergency operations team <u>keeps track</u> of all students released by the student release team

IUSD INJURY REPORT

SITE________________________ DATE_________________TIME_______

IMMEDIATE ASSISTANCE REQUIRED

____ NONE ____ MEDICAL ____ FIRE ____ SEARCH/RESCUE ____ OTHER PERSONNEL

CONDITION OF STUDENTS

___ ALL ACCOUNTED FOR ___ NO INJURIES ___ NO IMMEDIATE HELP REQUIRED

___ # MISSING NAMES:____

___ # TRAPPED IN BUILD. NAMES:____

___ # INJURED ____ # REQUIRING IMMEDIATE MEDICAL ATTENTION

NAME	TYPE OF INJURY	LOCATION

CONDITION OF STAFF

___ ALL ACCOUNTED FOR ___ NO INJURIES ___ NO IMMEDIATE HELP REQUIRED

___ # MISSING NAMES:____

___ # TRAPPED IN BUILD. NAMES:____

___ INJURED ____ # REQUIRING IMMEDIATE MEDICAL ATTENTION

NAME	TYPE OF INJURY	LOCATION

DAMAGE REPORT

STRUCTURAL NON - STRUCTURAL

FACILITY / AREA ______________________ DATE ________

COMPLETED BY ______________________ TIME ________

DANGEROUS CONDITION -------------------- IMMEDIATE THREAT TO PERSONNEL OR PROPERTY.

MODERATE DAMAGE -------------------- NEEDS ACTION TO RESTORE AS SOON AS POSSIBLE.

MINOR DAMAGE ------------------ WILL FUNCTION DURING EMERGENCY, NEEDS REPAIR.

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

☐ ☐ ☐ TYPE ______________ LOCATION ______________

IUSD EMERGENCY RESPONSE

WHO	WHAT	WHERE	WHY	WHEN	
NAME	ASSIGNMENT	AREA	PURPOSE	TIME IN	TIME OUT

STUDENT EMERGENCY INFORMATION

Dear Parents:

In recent years we have experienced a number of earthquakes, flooding, or mudslides in some of our neighboring communities. At Archbishop Mitty High School we want to be prepared for such emergencies. The main priority for all courses of action is the health and safety of students, faculty, and staff. To help us in our efforts to be prepared, please indicate below what your choice of action would be in an emergency.

( ) I/We live in the area near Archbishop Mitty High School and designate that my/our son/daughter be sent home.

( ) I/We live out of the immediate area of Archbishop Mitty High School and choose the following course of action in case of an emergency.

( ) I/We designate that my/our son/daughter be sent to the following relative or close friend near Archbishop Mitty High School

____

NAME ADDRESS PHONE NUMBER

( ) I/We prefer my/our son/daughter remain in the authority of the school until contact is made with the school.

Also, take the time now to sit down with your family and make decisions regarding what you expect your children to do, in case of a major emergency, should you be separated.

We thank you for your cooperation and involvement. Hopefully none of these plans will have to be implemented, but at least we will be prepared.

______________________________________ 9 10 11 12

NAME OF STUDENT & YEAR (CIRCLE ONE)

____

PARENT OR GUARDIAN SIGNATURE

DATE______________________

7/92

School District Emergency Communications: Critical Issues and Linkages

by Frances E. Winslow
Director, Office of Emergency Services, City of San Jose

Communication during a disaster must be rapid and efficient. Emergency planning should result in a design that achieves these ends, while facilitating the coordination of resources and activities. There are two aspects to emergency communications planning: policy decisions and systems design. The policy decisions address the "who, what, when and where" of an emergency situation. The system design addresses "how."

District Communication Policy

Each district should design a system for information transferral within the district. Ideally, each school should have a redundant communication capability with the District EOC. Schools should provide situation analysis information categorized critical, urgent and routine to the EOC staff. The incident commander in the District EOC should select information to be routed to the City EOC with the same priority designations. The District should act on issues related to school services, such as the need for additional personnel or construction resources, or the need to relocate students and staff to an alternative site. Only life safety demands for emergency response should be routed as "critical" to the City EOC. Examples would be a collapsed building with students or staff trapped inside, a hazardous materials event, or an out of control fire.

School districts should also maintain contact with the County Office of Education (COE). Mutual aid between districts for educational services could be facilitated through the County Office. Sharing of sites, staff and equipment are examples of district to district assistant that should not be referred to the City EOC, but could be more readily accomplished through County coordination of district needs. According to Jan Carey of COE, there is no emergency link available at present. However, the COE is trying to get four essential service lines that could be reserved for interdistrict/district-COE communication in an emergency. When these lines are installed, the COE will publish a directory of lines on a wallet size card with limited ^XC to top staff at COE and the districts. District offices should explore installation of their own essential services lines so that they will have priority in resumption of phone service after a disaster.

Emergency data routed to the City EOC will be analyzed by EOC staff and assigned a priority based on activities throughout the City. Given the ratio of public safety professionals to population, it is unlikely that every emergency situation will receive a "code 3" 911 response during a regional disaster, such as an earthquake. School sites and districts should plan for 72 hours of independent operation, including the provision of light search and rescue and first aid capabilities.

Communication System Design Alternatives

Telephones. Telephones are the primary link between school sites and the District, between the District and the County Office of Education, and between any of the sites and the City EOC. In a disaster other than an earthquake, phones should remain in service. In an earthquake, it is likely that phone service would be restored quickly to areas less effected by physical damage. The phone companies in California have created phone facilities that are engineered for seismic safety. Non-structural hazard mitigation, including securing computers and switching consoles, has given greater probability of use even after a major earthquake. According to local phone companies, major switching facilities in Santa Clara County have been designed to withstand earthquakes of magnitude 7.0 to 7.5.

Following Loma Prieta, the loss of phone service in most areas was caused by phones being off the hook, creating a "central office busy." If 10% or more of the phones are off the hook, service is lost to that exchange until phones are hung up or disconnected. The computer software that searches for off the hook phones on a day to day basis is overwhelmed by the quantity of off the hook phones after an earthquake, so hanging up or disconnecting unused phones is a vital part of service resumption.

How can a school site or district plan get the most benefit from the phone system? First, installation of essential services lines will assure the maintenance of service if part of the system has to be shut down, and rapid restoration if the service is lost. As long as the school building is habitable, the regular phone system should provide a reliable link to sources of help and information in emergencies other than earthquake. In an earthquake, phone service will be restored as rapidly as possible. In most areas, limited service will be available in a matter of hours to those with essential service lines. Essential services lines are designed for outgoing calls for assistance, and will not provide a link for parents or staff families to call in for information. It is critical to limit the use of these business phones to essential emergency calls. Staff members should keep a supply of change to use pay phones to contact family members following an earthquake. Since pay phones do not go through a central office, they usually are restored to service quickly.

Second, plan for the interruption of commercial power supplies. Some school systems rely on electrical power for operation of the phone system. Examples are PBX systems and phones with lights and hold buttons. To overcome loss of phone service due to loss of electrical power, a business phone line should be installed that terminates in a standard single line phone instrument. On site back-up power should be provided for any PBX system to keep it operational.

Cellular phone. Another alternative is a cellular phone for the principal, ideally a portable battery operated instrument that can be taken out of the building during an evacuation. The principal can contact sources of aid when the building cannot be inhabited, or when the population of the school has to be moved to an alternative site. Examples of such events would be a hazardous materials incident or flooding. The cellular line would allow the principal to remain in touch with the District office or City EOC as he/she moves to a shelter location. The cellular phone would also assist in the coordination of transportation resources, sheltering resources, or a parent information phone tree. If a principal determines that an earthquake has damaged a school so that it is unsafe, the cellular phone allows for coordination with the district from an outdoor location.

During the first hour after a regional emergency event, cellular phone service may be interrupted by increased demand, loss of power to cell sites, or dislocation of cells. However, experience in Loma Prieta indicates that once cellular phone users realize that they cannot call private homes or businesses because of central office busy, adequate cell space becomes available for emergency calls. Since cellular to cellular service is available as soon as the traffic load decreases, school sites and District EOC's should use the cellular phone number as the primary emergency information contact point.

Cellular phones are important, even if school is not in session. The principal can use the cellular phone from his/her home or car to contact the district personnel charged with emergency leadership, wherever they may be. A decision has to be made regarding whether to open the school, and when. Cellular phone contact to the Emergency Broadcast System allows rapid notification of parents and staff regarding plans for the school site.

Schools can solicit the donation of a used cellular phone from a parent, or a neighborhood company. Many real estate and insurance firms have upgraded to cellular phones with message machines and other features that schools do not need. They may be willing to donate unused, old equipment to the district for the tax deduction and good will in the community. Alternatively, a used cellular phone may be purchased for $200 to $300, and a new basic phone is not much more. Cellular service connections are available from Pacific Bell for emergency use. These offer a low monthly rate with a few minutes of air time per month for testing. If the system is activated, the cost of air time is higher than for regular cellular users. The advantage is that in most years, the few test minutes will be adequate, and annual costs will be kept down. Provision of cellular air time can be a priority item on the "wish list" from the PTA.

Commercial radios. Radios from another communication network that is effective in most types of disasters. Many districts have a commercial radio network already in place. The County Office of Education is working on developing a radio network for their own programs, according to Jan Carey. The school bus radios offer an effective radio alternative for many districts. The COE is planning on placing base stations at transportation centers throughout their service area, and using bus radios as links among schools and to the District EOC. COE "Disaster Preparedness Plan: Transportation Services" was issued in April, 1991, and provides useful reference information.

HAM radio. Amateur radio is an effective emergency communication linkage that is already in place in San Jose. The Radio Amateur Civil Emergency Services (RACES) has served San Jose for forty years, providing a critical information link between the community and the City EOC during emergencies and disasters. Licensed HAM operators monitor amateur bands, commercial bands and public safety bands from the EOC radio room. They broadcast over amateur bands to locations throughout San Jose and the region using antennas and repeaters.

Recently, a packet station was installed in the EOC radio room. Packet technology uses a terminal node controller (TNC) in place of a modem, and a HAM radio in place of a telephone to communicate information in written form from one computer terminal to another. Packet systems can be installed easily using any computer equipment, provided power is available for the computer. Most HAM radios are battery operated. There are several advantages to packet radio. The primary one is that by communicating a full screen of information in a burst, it conserves scarce air time. Second, a written list is more accurate than a list read over the radio where spelling or pronunciation may cause confusion.

Many citizens are HAM operators. Schools and districts can solicit among their students, staff and parents for licensed operators already connected to them. Alternatively, HAM clubs could be developed on school sites to encourage students and staff to study for the HAM test. RACES operators could be recruited for placement at District EOC's to provide communication to the City EOC.

In Irvine, HAM's for schools were recruited through a joint program of the City and the school district. The City organized and sponsored a "direct to tech" HAM radio license class, providing coordination and instruction. The students purchased their own books and meals during the two consecutive eight hour days. Those who passed the test signed a two year training contract with the City, promising to provide emergency HAM radio service to school sites. Anyone unable to fulfill the contract would reimburse the City at $100 for each unfulfilled year or part year. The result was 56 new HAM's in one weekend. PTA's can purchase a HAM radio to be kept in the principal's office for the use of the HAM assigned to the site if the individual cannot afford the investment personally. User gear is available through HAM clubs and swap meets. A new dual band radio costs about $350, less with quantity discounts and company incentive coupons usually given to new licensees.

Messengers. When electronics fail, lose power, or are unavailable, a messenger service is still a valuable means of information exchange. Cars and bicycles at school sites will make rapid movement of hand-carried messages possible in most circumstances. Messages can be taken to another school or public building site with communication capabilities. They can also be hand carried to the district office of EOC. Maps of alternative routes to probable information handling sites should be developed as part of the emergency planning effort, and be included in the emergency response packet for each school site. Only adults should be assigned messenger duty, as students should not be sent off campus unaccompanied by an adult during an emergency period. Student messengers are effective on the school site, but should never reenter the school building until the principal has determined that the building is safe for reoccupancy.

Communication success. The key to successful communication after a disaster is planning before the disaster. School sites and districts need to coordinate to create communication systems that are redundant and likely to survive anticipated emergency events. Districts should plan with each other, the County Office of Education, and the City EOC to coordinate communication systems. Earthquakes, hazardous materials incidents, floods and civil unrest are all possible events that may disrupt school sites. Help will be available to schools and districts only if plans have been made and equipment exercised for rapid, efficient communication of needs to public safety officials. Phone, radio or messenger will "keep us in touch."

CITY OF SAN JOSE - MEMORANDUM

TO:	District Superintendents San Jose School Districts	FROM:	Frannie Winslow Director, OES
SUBJECT:	Notification of Emergency Broadcast System of School Closures	DATE:	May 11, 1992

The Emergency Broadcast System is a principal source of information on school closures. Dave Williams, County EBS Chairman, would appreciate having a list of staff members authorized to announce school closures, and to notify the EBS of school closures. In addition to their names and titles he would like to have each school district select a code word that the EBS coordinator can use to authenticate the school closure announcement.

At your earliest convenience, please provide this information to:

Dave Williams
KSJX
County EBS Chairman
1420 Koll Circle
San Jose, CA 95112

This information will be kept on a Rolodex at the EBS coordination point. You will receive a confirmation of their receipt of your information, together with a list of after hours phone numbers for EBS notification.

I hope that this information will assist the Districts and EBS to develop an effective contact system and achieve a higher level of information security.

Basic Communications Information

Before the Disaster

1. Designate contact point for messages.
2. Pre-arrange for out-of-town contact.
3. Inform out-of-town friends and relatives not to attempt to reach you. You will get word to them via your pre-established contact.
4. Designate reporting location for all employees.

Immediately After Disaster

1. Check all telephone instruments to make sure they are on-hook.
2. Avoid using your telephone unless you have an absolute emergency.
3. If you must use the telephone, pick up receiver and leave it off-hook until you receive dial tone.

Do not flash receiver hook! This only delays your call...

Do not walk away from telephone with the receiver off. You will receive dial tone if the equipment is not damaged.

If you do not dial your telephone number quickly after receiving dial tone, you will not be able to make your call.

4. If someone from outside the area reaches you, have them call your contact point to activate your pre-plan. *Request that they not attempt to reach you again until the immediate disaster has passed.*

Until Full Communications are Restored

1. Continue to limit your telephone use.
2. When aftershocks occur, refrain from using your telephone.
3. Keep your contact outside the disaster area informed (if possible), and have your contact update friends and relatives outside the area.

Emergency Preparedness Employee Profile

Name:____

Communications Profile

Work Number:________________________

Home Number:________________________

Beeper Number:________________________

Cellular Number:________________________
fixed or remote unit (circle one)

Ham Radio Operator Call Letters:________________________

Family Contact Name:________________________

Number:________________________

In case of an evacuation the following is my call forwarding profile:

Voice Mail Yes/No (circle one)
If no please identify the number forwarded to and the location of the number

Telephone Number:________________________

Location:________________________

Response Skills:

Search and Rescue	Yes/No
CPR	Yes/No
First Aid	Yes/No
Police Background	Yes/No
Firefighting	Yes/No
Four Wheel Drive Vehicle	Yes/No

Work Response Profile

Skill	Nearest Location to Home

Telecommuting Capability

PC with modem	Yes/No
Terminal with modem	Yes/No
FAX	Yes/No

School Supplies: Preparing for the Children-
A Compendium of Lists

by Pat Jocius
Administrative Specialist, City of Cupertino

School preparedness supplies and student comfort kits come in a wide range of styles and contents. Each school site needs to evaluate existing resources, local threats, and student/staff population to make selections that are most appropriate. Various school districts have employed strategies that may be useful to other districts as models, or as concepts. The schools in Sunnyvale and Cupertino have developed a variety of approaches that will be useful to other educational institutions in the Santa Clara Valley. Parents, educators and students have all assisted in the development of these concepts and strategies.

Both Sunnyvale and Cupertino represent the implementation of an important link in preparedness: the schools and the local government have worked closely together to assess the needs of the school community, and to discover appropriate resources. The following lists and summary documents represent the innovation that has resulted from this creative partnership.

Classroom Emergency Backpack

These supplies (possibly donated by parents) would be kept in a backpack, tote bag, or other suitable container located near the exit. It would then always be taken when evacuating the room with students in any emergency situation.

The purpose of the backpack is to serve the immediate needs of the teacher and students. It may be some time before first aid or central supplies will be available.

Clipboard ($1.59) with:
- class roster
- school map showing location of fire extinguishers, gas, water, electric shutoffs; central first aid supplies; water storage; special equipment and tools
- school disaster plan, including chain of command, list of first aid trained staff, job responsibilities (emergency response teams)

Pencils (12) ($.99), pens (3), and fine line permanent marker ($.99)
Notebook ($.89)
Name tag for each student (3 dozen self adhesive name tags) (35 for $1.69) with broad marker ($1.49)
Drinking cups, small size (36)
Water, one gallon (stored near backpack) ($.89)
Soft bristle paint brush (for removing glass fragments) ($2.79)
Light sticks (5) ($2.98 each)
Tissues (purse size)
Space blanket ($2.98)
Plastic drop cloth ($1.79)
Red flag (emergency signal) ($1.98)
Whistle ($.98)
First aid supplies:

1 first aid wheel
2 paper tape (1") ($2.30)
2 paper tape (2") ($4.46)
1 antiseptic solution (green soap) (4 oz.) ($.43)
30 band aids (1") ($1.80)
1 small zip lock baggie full of cotton balls ($.05)
30 gauze pads (4x4) ($5.10)
36 pre-moistened towelettes (ind. wrap) ($1.80)
15 large safety pins ($1.05)
1 scissors (large-bandage) ($8.95)
1 tweezer (splinter forceps) ($7.80)
5 ABD pads ($2.80)
4 Kling roller gauze (2") ($2.20)
4 Kling roller gauze (4") ($4.60)
2 triangle bandages ($3.60)
3 sanitary napkins ($1.32)
2 cold packs ($2.22)
Compresses
Large plastic trash bags (5) ($.50)
Large fabric room number on poster
Student special health need information
Backpack ($10.00)

TOTAL: $85.00

Why Plan?
The Educator and Earthquake Preparedness

by Frances E. Winslow
Director, Office of Emergency Services, City of San Jose

Educators usually consider the needs of the children, the safety of school buildings, and the availability of response supplies when designing earthquake preparedness plans for schools. There is one other piece to the preparedness picture that enables all the rest to function effectively. Each member of the school staff must take responsibility to become personally prepared to face the obligation of earthquake response and recovery. This task has two phases: making a family plan, and making a personal preparedness kit.

Making a Family Plan

Educators need to start earthquake preparedness efforts at home with their own families. First, gather the family members to discuss what will happen during and after an earthquake. Explain the educator's obligation to remain in the classroom until released by the senior administrator. Review where other family members will be if they are not at home when the earthquake strikes. Consider how long it will be until they return home. Review all earthquake safety rules. Discuss good "duck and cover" spots in your home.

If some of the family members are small children, review carefully plans at day care centers or with baby sitters. Make sure they know it may be some time before a parent comes for the child. Be sure complete emergency release and contact information is provided, and that records are kept up to date. Check school age children's school emergency plans. Make sure that the school has a program to provide response and recovery supplies on site. Keep emergency contact information up to date, and be sure that school administrators know that you are obligated to remain at your job. Do not select anyone to be listed on your emergency release form unless you are sure that person can provide for your child's physical and psychological needs after an earthquake for the period of time it is likely to take you to get home.

Next, prepare your home. Survey your residence for hazards, and undertake a program of non-structural mitigation. Start by strapping the water heater and checking to see that the gas meter shut-off valve is working. Call the gas company to service the valve if it is stiff. Make sure that family members all know the location of the gas meter, and the safety rules for when and how to turn it off. Be sure no one tries to turn it on again.

Finally, develop an earthquake safety supply kit for the family. Assemble rescue tools, flashlights, and a checklist of "first tasks" in a container that everyone can handle. Develop a supply of food requiring little preparation that can be rotated through usual meals. Have a first aid kit with eye wash, eye pads, dust masks, absorbent bandaging and splint material in a sturdy container, preferably near the earthquake tool kit. Make sure that everyone knows the basic first aid rules, and include information on where to get medical help after an earthquake.

Making a Personal Preparedness Kit

The personal preparedness kit will make the response and recovery period after an earthquake much easier and could be a key to business resumption in the educational environment. Commercially available kits contain items such as food, water, first aid supplies and small rescue tools. "Car kits" can provide a good basis for the educator's personal kit. However, additional steps should be taken to make the kit really useful for the educational environment.

Ideally, each family member should have an earthquake kit at business or school. There should also be a kit in every car. Earthquakes strike when people are on the freeway, at the mall, at the theater, or driving in the country. A car kit may be the difference between life and death from severe bleeding, dehydration, or hypothermia.

The educator's kit should be kept under the desk in the classroom, tethered to a leg of the desk by sturdy cord. Remember that during an earthquake, everything is in motion. You will be holding on to the desk as it moves around the floor. If your kit is tethered to the desk, it will move along with you, providing ready access to supplies should you become trapped as a result of the earthquake. This kit need not duplicate everything in your car if you routinely drive to work. It should, however, contain first aid supplies for severe bleeding, and eye wash. Earthquakes are very dusty events. It should also contain a flashlight, a pair of work gloves, and a supply of water adequate for 12 hours. If you take prescription medication regularly for life-threatening conditions, a 24-hour supply of the medication should be in this kit. You should never leave the house with less than a three-day supply of such medication in a pocket or purse. These supplies should be rotated on the first of each month so that they are never out-dated.

Also, keep a supply of any patent remedies that you use regularly, especially when under stress: decongestants, headache remedies, indigestion remedies and so forth. Rotate the stock at least every six months.

In addition to these basic supplies, which can be stored in a small gym bag, other supplies should be kept, either on-site in a locker or in the trunk of your car. Most people dress in business clothes for teaching. Should search and rescue work be needed, these clothes may not be appropriate. A jogging suit and t-shirt provide a simple change of clothes that allows for freedom of movement. People assigned to search and rescue or first aid teams should ask their supervisors about getting coveralls through the district's central supply. If these are not available, a second jogging suit and t-shirt should be available in case the first set is damaged. When your jogging shoes are too worn for athletic use, add these to your supply along with two pairs of socks and a change of under clothing. Moist toilettes, a small bottle of mouth wash, deodorant, and tooth brush and tooth paste are welcome additions to the kit. Shaving and personal sanitation supplies should also be included.

The car kit should also include a roll of quarters. Before central office service is restored to phones, the phone company plans to bring mobile pay phone trucks into affected areas. These phones do not rely on the central office, and would allow you to reach the out-of-state contact to report your condition and learn about other family members. You will need change to use these phones. A pack of pre-stamped postcards is also useful. Mail service usually resumes very quickly, and you can use these cards to reassure other family members of your welfare so that they do not deluge the American Red Cross with health and welfare inquiries about you.

After a disaster, food is a psychological comfort item. Include chewing gum, hard candy, crackers, or other snack foods that will help you in a time of stress. Also consider activities that will help relax you in a stressful environment. Some people like to read, do crossword puzzles, or play cards. Select an activity that appeals to you and include the necessary materials in your kit. Also consider including a list of activities that you can do with the children in the classroom once the damage assessment has been completed. Word games, simple contests, and story-starters will help you keep the children calm and entertained while they await their parents.

From Aware to Prepared

Family plan making and personal comfort kit creation are entirely up to you. You have the information, now you should have the inspiration. Make this your first step on the path to earthquake preparedness in your school district.

Beat The Quake!
California Earthquake Preparedness Month
Plans to Make

FAMILY EMERGENCY PLAN

FIRE * POLICE * MEDICAL
DIAL 9-1-1

PLACES TO MEET IF FAMILY MEMBERS BECOME SEPARATED:

1. ______________________________
2. ______________________________
3. ______________________________

OUT-OF-TOWN RELATIVE FOR RELAYING MESSAGES TO FAMILY MEMBERS:

Name: ______________________________
Address: ______________________________
Phone: ______________________________

FAMILY INFORMATION:

FATHER'S WORK ADDRESS/PHONE: ______________________________

MOTHER'S WORK ADDRESS/PHONE: ______________________________

CHILD'S SCHOOL ADDRESS/PHONE: ______________________________

SCHOOL POLICY IS TO:
_____ HOLD CHILDREN
_____ RELEASE CHILDREN

CHILD'S SCHOOL ADDRESS/PHONE: ______________________________

SCHOOL POLICY IS TO:
_____ HOLD CHILDREN
_____ RELEASE CHILDREN

UTILITIES:

Gas Shutoff: ______________________________
Water Shutoff: ______________________________
Electrical Shutoff: ______________________________

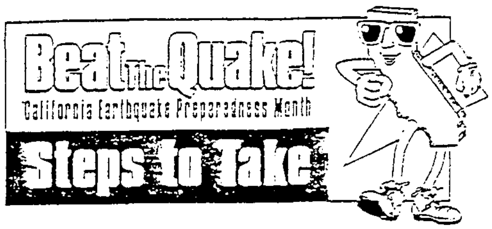
EMERGENCY SUPPLIES: (Type and Location) ______________________________

DOCTOR: ______________ DENTIST: ______________
HOSPITAL: ______________ AMBULANCE: ______________
MEDICAL INSURANCE NO.: ______________________________

NEAREST MEDICAL CENTER: ______________________________

NEAREST FIRE STATION: ______________________________

Poison Control Center: 299-5112



San Jose Earthquake Preparedness Month

Quake-Safe Home Checklist

- ☐ 1. Place beds so that they are not next to large windows.
- ☐ 2. Place beds so that they are not right below hanging lights.
- ☐ 3. Place beds so that they are not right below heavy mirrors.
- ☐ 4. Place beds so that they are not right below framed pictures.
- ☐ 5. Place beds so that they are not right below shelves with lots of things that can fall.
- ☐ 6. Replace heavy lamps on bed tables with light. nonbreakable lamps.
- ☐ 7. Change hanging plants from heavy pots into lighter pots.
- ☐ 8. Use closed hooks on hanging plants. lamps. etc.
- ☐ 9. Make sure hooks (hanging plants. lamps. etc.) are attached to studs.
- ☐ 10. Remove all heavy objects from high shelves.
- ☐ 11. Remove all breakable things from high shelves.
- ☐ 12. Replace latches such. as magnetic touch latches on cabinets. with latches that will hold during an earthquake.
- ☐ 13. Take glass bottles out of medicine cabinets and put on lower shelves. (PARENT NOTE: If there are small children around. make sure you use childproof latches when you move things to lower shelves.)
- ☐ 14. Remove glass containers that are around the bathtub.
- ☐ 15. Move materials that can easily catch fire so they are not close to heat sources.
- ☐ 16. Attach water heater to the studs of the nearest wall.
- ☐ 17. Move heavy objects away from exit routes in your house.
- ☐ 18. Block wheeled objects so they can not roll.
- ☐ 19. Attach tall heavy furniture such as bookshelves to studs in walls.
- ☐ 20. Use flexible connectors where gas lines meet appliances such as stoves. water heaters. and dryers.
- ☐ 21. Attach heavy appliances such as refrigerators to studs in walls.
- ☐ 22. Nail plywood to ceiling joists to protect people from chimney bricks that could fall through the ceiling.
- ☐ 23. Make sure heavy mirrors are well fastened to walls.
- ☐ 24. Make sure heavy pictures are well fastened to walls.
- ☐ 25. Make sure air conditioners are well braced.
- ☐ 26. Make sure all roof tiles are secure.
- ☐ 27. Brace outside chimney.
- ☐ 28. Bolt house to the foundation.
- ☐ 29. Remove dead or diseased tree limbs that could fall on the house.

School Preparedness Supplies and Student Emergency Comfort Kits

by Frances E. Winslow
Director, Office of Emergency Services, City of San Jose

If a disaster strikes while the children are at school, will your school be prepared to care for them? If the children need to remain at school for several days, are you prepared?

Many schools have requested parent participation in preparedness. Each child has been asked to make a comfort kit at home that he can leave at school from September through June. Schools should also have some preparedness items to assure the safety of all students, faculty and staff. It is important to provide guidelines to parents on what to include in the backpack, and to let the parents know what items the school has provided.

If funding is a problem, work with the PTA. The safety of the children is paramount, so emergency preparedness items deserve serious consideration in the PTA school gift budget. The local government may be able to assist the school district in developing a cache of basic supplies to be augmented by local efforts. This district should make emergency preparedness a priority, as well.

School Emergency Supplies

The following is a list of basic emergency preparedness supplies that every school should have.

1. Water.
2. First aid supplies.
3. Rescue supplies.
4. Principal's supplies - includes a bull horn, a whistle, an up-to-date list of students, faculty and staff; a supply of student release forms, rope, tarpaulin and cord, a lantern, a roll of plastic sheeting.
5. Classroom supplies - includes a flashlight and a battery-operated portable radio.
6. Sanitation.

Student Backpack Supplies

1. Food.
2. Clothing.
3. Medical items.
4. Psychological care items, i.e., a blanket, stuffed toy or similar security item, should be included for every child in the elementary school.

Emergency Supply Storage

Modern schools seldom have adequate space for storing the needed emergency supplies. Consider asking the PTA to purchase a storage shed for your property. It is a good idea to have the emergency preparedness items away from the building. Alternatively, a used sea-going cargo container may be purchased for under $3,000 at most ports and many railroad yards. A local business might donate a storage container that they no longer need.

Earthquake Emergency Kit: Student Backpack Supplies

Food. After an emergency, food is important for its psychological benefit. When making a child's emergency backpack, consider psychological value of food rather than worrying about balanced meals. Select foods that the child enjoys. Purchase packaging that is "flip-top" or "tear open." Avoid foods high in sugar, such as candy, and foods that cause thirst, as liquids will be in short supply. Select beverages that taste acceptable at room temperature. Avoid carbonated or sparkling drinks. Be sure that the child enjoys eating everything that is included in the pack.

Clothing. Include a sweater or jacket, a cap or sun visor, and a change of clothing, including under clothes and socks. A jogging suit is a good choice because it is comfortable to sleep in. Avoid including tight clothing or anything with loose decorations.

Medical Items. No medical items should be stored in backpacks. Children with special health concerns should be registered with the school nurse or principal. Parents and physicians should complete district-required paperwork to leave medication with the appropriate site administrator. It is the parent's responsibility to rotate medication supplies to keep them fresh. Only medications needed for life-threatening conditions should be administered under emergency conditions, e.g. insulin. Psycho-acting drugs should only be administered if the physician will sign a statement that they are needed, e.g. Ritilin.

Psychological Care Items. A blanket, stuffed toy or similar security item should be included for every child in elementary school. Older children should make their own choices of security items. A photo of the family together at a happy time will help the child feel more secure while he "waits" for parents to arrive at school, especially if he has to wait several days. Parents should include a list of the following phone numbers: daytime numbers for each parent, numbers and addresses for any other close relatives living in the area, and number and address of the family's designated out-of-state contact person. Be sure that every family has completed the student release permission form.

Work With Your City

Your local government has resources it can share with you. Members of your local government emergency preparedness staff can help you develop an appropriate supplies list for your school. They can help you plan and execute a drill, and act as evaluators. They can speak to faculty and PTA meetings, and give guest lectures to students in science classes. They can help you write proposals for local business donations. They can help you obtain additional information from federal and state emergency preparedness agencies, many of whom have school-related publications regarding preparedness. You can also work together to develop volunteer groups from the community to assist at the schools after an earthquake. American Red Cross trained shelter managers can be a buffer between the principal and the community members seeking assistance at the school because it is a "public building." Amateur radio volunteers can provide a communication link between the school and the local public safety agencies. Community groups might donate supplies or expertise to enhance your school preparedness program.

Plan and prepare...then you'll be ready for California's faults!

School Supplies: Finding the Funding

by Pat Jocius
Emergency Services Coordinator, City of Cupertino

and

Frances E. Winslow
Director, Office of Emergency Services, City of San Jose

Emergency response supplies must be stored on the school site to be effective in an earthquake. First aid supplies and water can mean the difference between life and death for students and staff. Staff and student comfort kits ameliorate the psychological and physical effects of the disaster. Acknowledging that this is true, the responsible school administrator is still confronted with a problem: how can supplies for an event that may never occur compete in the annual budget with the replacement of math books and the extra teaching aide? The answer: they can't - and they do not have to. The development of an appropriate supply cache can be accomplished in a number of ways that minimize the impact on the school operating budget, while providing improved levels of preparedness for the school site.

Getting the Price Down

Emergency supplies represent a large investment of funds. There are some strategies that may be employed to decrease the amount of funds that must be invested in emergency supplies. The following suggestions are proven techniques. Your own creativity will lead to the development of yet more strategies.

1. Band Together to Get Quantity Pricing

Other schools in the district, and other districts in the area, may be interested in purchasing the same emergency supplies that you need to acquire. A group order can be placed out for bid through one district to serve the needs of all the districts.

2. Use an Existing Contract

Ask vendors if they have a public contract in place with a school district that your district could join. During the late 1980's, the City of Los Angeles School District had a contract that other school districts could join to purchase kits and supplies that had been bid by Los Angeles. Small jurisdictions were able to take advantage of the quantity purchasing power of a large city school district.

3. Purchase State Surplus

Some emergency supply items may be available through state surplus outlets. Cots, blankets and tools are among the items that are often found at state surplus sales locations. Blankets that cost $4 each as new items from a catalog or store may be purchased for $.60 per pound through the state surplus system.

4. Solicit Donations from Local Citizens

Circulate a "wish list" among the school population. People may be willing to donate unused camping gear, cellular phones that have been replaced with more modern equipment, or other materials. All items donated to a school district are tax deductible charitable donations for income tax purposes. The Irvine Unified School District received a donation of camping supplies from a local firm that was going out of the camper rental business. This donation provided basic provisions for three school sites in the city. Other schools had good success in soliciting specified lists of items from the staff, parents and students, the people most closely concerned with enhancing emergency preparedness at each school site. A thorough cleaning of the garages and a few Saturdays at garage sales have netted impressive collections of sleeping bags, tents, and camping stoves for motivated schools.

Finding the Funding

Now that the price is right, money still has to be found to pay the bill, no matter how reduced from "full list." Some creativity, and some choices, can result in a cache of emergency supplies to meet the needs of the school community.

1. Find an Angel

In some communities, there may be an angel waiting for you. If there is only one major employer in a town, the firm may be willing to support earthquake preparedness as an extension of its employee services, since most of the students would be children of its employees. Alternatively, a major employer may see a donation of school supplies as a "good neighbor" gesture to those whose community the company shares. An example of this is the donation made by the Coca Cola Company to the school district in Southgate, California. Coca Cola donated the funds to supply all the items needed by Southgate's school district. In Irvine, the Irvine Company used its community foundation funds to purchase large first aid kits for the high schools in the community. You may find that local businesses have a charitable arm that might be willing to make a one time donation to the school district for emergency preparedness. Unions or employee organizations at local firms might also be a potential source of donated funds.

2. Seek Assistance from the City Council

In small cities, or new communities, the City Council may be able to assist the school district in acquiring a cache of supplies for the schools. Stating, "Children are our most precious resource," the City Council of the City of Irvine provided a one time gift of $26,000 in emergency supplies to the Irvine Unified School District for the elementary schools. By providing the basics (food, water and medical supplies) the Council hoped to encourage the District to join in providing communications equipment, storage facilities, and other enhancements to the supplies.

The current budget crisis in local government may preclude such a donation in the near future. However, many local governments have contracts to purchase materials at attractive prices. They may be legally able to allow the school district to join in the contract for items like search and rescue tools, barrier tape, tarps, and other items that the city uses in its routine business. The purchasing power of the city government may bring down the cost of some emergency supplies significantly.

3. Seek Sponsorship by a Civic Group

Civic groups may be seeking a project for the year. Inquire among school district staff to see which civic groups they have joined. Ask them to suggest school emergency supplies to their group as a project for one year's attention. Groups like the Junior League and Exchange Clubs have nationwide competitions for the best community projects for the year. With the right encouragement, they might see school emergency preparedness as a unique contribution to the community. These people might also volunteer time to assist with nonstructural hazard mitigation in the schools, or the gathering of donated items, as well as the actual donation of funds or items.

The City of Irvine has a successful program with the Junior League to provide volunteer training assistance in the community, where they bear the expense of the project as well as providing the volunteer time. A similar project could be developed for the schools.

4. Joint Venture with Your City

The City of Sunnyvale ARK program is a cooperative venture among the city, the school district and the American Red Cross, Santa Clara Valley Chapter. The city purchased the storage containers and the contents for neighborhood emergency response. Items include search and rescue gear, lighting sources, shelter materials, water and long term first aid supplies (bandaging materials and equipment). The schools donated the sites for the ARKs. The ARC has a Memorandum of Understanding with the schools and the city regarding the use of the ARK supplies. If the ARC opens a shelter and uses supplies from the ARK, under the supervision of an ARC trained shelter manager, the ARC will replace all the materials used for the emergency response.

The Sunnyvale program responds to the needs of the schools as members of the larger community. The children in the school are also citizens of that Sunnyvale neighborhood. Resources can be dispensed to them as citizens of that neighborhood.

5. Fund Raising

Selling pies or suncatchers, candy or car washes, these are the types of activities that the Parent Teacher Association has used for years to support the "extras" that schools have always needed. These fund raisers used to be directed at "nice to have's" like extra audio-visual equipment, science lab upgrades and class outings to amusement parks. Now these funds are often used for critical instructional materials, basic laboratory supplies, and essential aide services. Even in this financial climate, emergency preparedness can compete as a priority for the fund raising dollar. It may just have to take a more unique form.

University High School in Irvine stocked its emergency supplies, and provided Thanksgiving dinner to the homeless, as a joint project using a special event called "the Golden Plop." The school football field was divided into one foot squares, and each square was sold for $1. Two cows were borrowed for the afternoon of a bright fall day when the community gathered at the football field for the big event. The first cow to drop a "golden plop" into a square created a winning ticket holder who received a cash prize. The remaining proceeds from the land purchases were divided between the two "good causes."

Turtle Rock Elementary School took a more direct approach. They asked everyone in the neighborhood to contribute $5 toward stocking the emergency items there, explaining that the school would be a neighborhood information center, and communication asset, during a disaster. Since the school would benefit every citizen, it was in everyone's best interest to support the development of the cache.

In Almaden Valley, a community group held an Arts Fair in April to raise funds to stock their ARK and buy some community art. Musical groups performed, artists displayed their work, and community groups like the American Red Cross, San Jose Police and RACES amateur radio operators had displays.

Some emergency supply vendors have special fund raising programs for schools. Students can sell emergency preparedness materials to their families and neighbors. The profits from the sales are converted into emergency supplies to fill the school's needs.

Rummage sales, student work days, bazaars are all tried and true ways of finding the funding, and having fun at the same time. When a school makes emergency preparedness a priority, it can begin becoming prepared...step by step.

Appendix A
Sample Emergency Preparedness Plans

A-1 Cupertino Union School District Emergency Preparedness Sample Plan

A-2 Irvine Unified School District Eastshore School Emergency Preparedness Sample Plan

Cupertino Union School District
Emergency Preparedness Plan
Sample Plan

by Patricia Jocius
Administrative Specialist
City of Cupertino, California

After almost a year of committee meetings, the District Emergency Plan was written for the Cupertino Union School District. When brought before the school principals, it became obvious that it did not meet the preparedness needs of individual schools, only the district. So in the second year, another district-wide committee, made up of principals, parents, maintenance people, city emergency planner and teachers, wrote a *model* school site plan.

The model document gave schools a standardized format and guidelines for the creation of their own site plans. The model plan was given to the school principals in hard copy form and on a Macintosh computer disk. By having it on a computer disk, a plan could be written with the least amount of typing and original effort by school staff. All the Kindergarten through eighth grade schools in the district have Macintosh computers and were able to individualize the model plan on their own computers with their own site-specific personnel, maps, and job assignments by just "filling in the blanks."

Now, at the beginning of each school year, the revised, individualized school plans are sent back to the district office on disk or in hard copy form. The plans are current and available to all with the least amount of work. This gives schools more time to focus on emergency preparedness training and exercising of the plan. The following is the actual model school site plan given to the schools in Cupertino.

CUPERTINO UNION SCHOOL DISTRICT

____

(School Name)

EMERGENCY PREPAREDNESS SITE PLAN

1992-1993

Used with permission of

Patricia A. Lamson
Superintendent

Table of Contents

CUPERTINO UNION SCHOOL DISTRICT
EMERGENCY PREPAREDNESS PLAN

REVISIONS AND ADDITIONS

			PAGES BY NUMBERS		
CHANGE NUMBER	DATED	ENTERED	REVISED	ADDED	DATE EFFECTIVE
Original					
1	8/20/91	8/21/91	Table of Contents Page 45	Pgs. 45 & 46	8/21/91
2	8/92	8/92	Cover & Contents		8/92

Revised 8/92

SITE EMERGENCY OPERATIONS PLAN (EOP)

School	Principal
Semester/Year	Date (update annually)

OBJECTIVES

1. To provide for effective action to minimize injuries and the loss of life among students and school personnel in case of disaster during school hours.

2. To provide for the maximum utilization of school personnel and facilities to care for disaster victims.

3. To protect school property.

BOARD OF EDUCATION PUPIL PROTECTION POLICY

1. The safety of the students and school staff is of paramount importance. All actions taken shall bear in mind the safety and well being of both students and district employees.

2. Under no circumstances shall any child be released from the custody of school personnel, unless and until such may be done with complete safety.

3. Any adult calling for a pupil at a school site will be required to identify himself, or herself to an assigned staff member, before being permitted to take a pupil out of school. An accounting record of those pupils so released shall be kept.

Site Emergency Plan Requirements

Each Site Emergency Plan will be designed to a be a practical document for use during a declared emergency of such magnitude, i.e., earthquake, that the school would be isolated from immediate outside assistance.

The site manager, with assistance from parents and staff, will see to it that the information required by the plan is supplied, and that this information is reviewed and updated annually.

The site manager or designee has the ultimate responsibility for all local decisions in a disaster situation. The site manager must be available to all emergency teams, the emergency radio equipment, police and fire personnel, parents and the news media.

Through the site emergency teams, the site manager will assess building damage, casualties and facility status, and report same to the District Emergency Command Center.

Annual Review

Site emergency plans shall be reviewed annually. Because of the need for clear understanding of policies and procedures to be followed during an emergency, it is recommended that each site manager appoint an emergency preparedness committee to review the site emergency plan for the purpose of:

1. Updating staff assignments
2. Verifying status and location of supplies and equipment
3. Modifying site procedures
4. Planning for staff inservice activities
5. Reviewing emergency signals
6. Identifying students with special needs, and reviewing appropriate preparations and procedures for emergencies.

This annual review will be completed by September 30 and the principal's checklist will be submitted to the district disaster committee chair by October 17 of each year. The committee shall be composed of the site manager, at least two staff and two parents. Student membership is optional.

Staff Awareness

By September 30 each year, each site shall devote one staff meeting to emergency preparedness planning including staff team assignments, evacuation procedures and basic site and district policies during emergencies. The site plan or appropriate pages of the plan is to be given to each staff member by this date.

Community Awareness

Each site manager shall include in the first school packet sent home in the fall, a letter from the superintendent on emergency preparedness policies with emphasis on the need for student emergency release information as found on the registration card. Early in the fall, a parent meeting should be held to discuss the school emergency plan and to solicit materials and parent volunteers.

School Emergency Recall Plan

This site emergency preparedness plan deals primarily with emergency situations that occur during the school day. The possibility remains, however, that a severe earthquake could occur at night or on a weekend or holiday. If an earthquake were strong enough to cause structural damage to private homes, the Red Cross would use public school buildings for mass care centers. The high schools and middle schools have the highest priority for such use, with elementary schools much lower.

All public employees, however, could be pressed into service by city or county offices of emergency services. In that case, the district superintendent would be directed to secure district employees to open and work at the designated mass care centers. It shall be standing district policy that all site administrators and site custodians report in person to their work sites in the event of a declared emergency *or* a major earthquake.

The superintendent, or designee, would utilize the district directory to recall site personnel as needed.

School Organization

1. Principal/Site Manager Responsibilities

The principal of each school is responsible for all pre-disaster planning and preparedness for the school, subject only to the directions and guidelines issued by the district superintendent as identified in the district emergency plan. In the event of an emergency, the principal or the designated representative will assume overall direction of disaster procedures for the school.

2. Teachers' Responsibilities

All staff members are required by law to remain on site until released by the site manager/designee. Teachers will be responsible for the supervision of students in their charge. In discharging this responsibility, they will be governed by the specific directions or guidelines issued by the principal of their school.

In discharging their responsibilities, each teacher shall:

Pre-Emergency:

A. Know, understand, and keep current on the hazards of different disasters and the survival techniques for each.
B. Provide instruction and practice for pupils in the techniques of survival and the emergency procedures to be followed.
C. Keep readily accessible at all times the class roll/emergency list in order to take roll in an emergency.
D. Have planned activities (music; for K-5 teacher, games, lessons, etc.) for use during periods of confinement and to lessen possible tension and hysteria in a disaster situation.

Post-Emergency:

A. Direct evacuation to children under their supervision to inside or outside assembly areas, in accordance with signals, warning, written notifications, or intercom orders. Teachers must never leave an injured student.
B. Give commands during an earthquake or surprise attack.
C. Remain with the pupils until relieved by authority or school principal.
D. Take roll call when class is relocated as soon as conditions permit such action.
E. Report missing students to principal.
F. Administer first aid using classroom first aid kits as required.
G. Send students in need of additional first aid with responsible person to the designated first aid station.
H. Restore order and assist other teachers and children as needed.
I. If not on classroom duty with pupils, report at once to preassigned station or to the school Command Center.
J. As designated disaster service workers, all staff members are to remain on site until released.

3. Classified Staff Responsibilities

All classified staff members will familiarize themselves with the site emergency plan. They will remain on site and perform the duties assigned to them by the site manager.

Site Organization (During a Declared Emergency)

Each school site is required to incorporate into its site plan the following site requirements. All emergency team procedures must be included in the site plan. The format of the individual site plan is at the discretion of the principal/site manager. For example, some team assignments could be combined, if responsibilities do not conflict.

Command Center

The site manager or designee is the final authority at each school. He/she must be available for all decisions, information and authority during the time the schools are isolated.

Therefore, the site manager and the command center should be located in a central area, where the manager is available to radio, telephone, emergency equipment or personnel and parents.

The Command Center will begin to operate immediately after a disaster.

This is where the record keeping, communication, and major decision making will take place. The site manager or designee will be here.

While the Command Center is functioning, the emergency teams will carry out their functions and provide information to the site manager about the:

1. Condition of students
2. Condition of staff
3. Condition of facilities

This information is to be placed on the emergency status report and update forms and transmitted to the District Emergency Operations Center.

SCHOOL SITE EMERGENCY TEAMS

SCHOOL ____________________

SITE MANAGER

____

____

OPERATIONS CENTER

____

____

COMMUNICATIONS

____

____

FIRST AID

____

____

____

____

SEARCH & RESCUE

____

____

____

____

UTILITIES & HAZARD

____

____

____

____

CARE NEEDS:

SANITATION

____

____

FOOD AND WATER

____

____

SHELTER

____

____

WING COMMANDERS

____

____

____

____

____

____

____

____

____

____

TRAFFIC CONTROL

____

____

____

____

STUDENT RELEASE

____

____

____

____

(Each emergency team should have a plastic sleeve which has this sheet on one side, a site map on the inside, and their teams' checklist on the other side.)

Site: Command Center Team

If notified of a declared emergency from the superintendent's office, or if the site suffers a severe disaster, the site manager shall immediately implement the plans and procedures in the Site Emergency Plan.

The site manager shall:

1. Activate alarm - notify staff.
2. Activate Command Center.
3. Activate emergency teams.
4. Assess total school situation.
5. Make initial site assessment report to District Emergency Operations Center.
6. Check to see that site emergency teams are operating.
7. Assign messengers to needed areas.
8. Request help from 911 or District Emergency Operations Center.
9. Secure information from emergency teams - update site status reports.
   Report to District Emergency Operations Center.
10. Reassign team members to other duties as required when they finish initial assignment duties.
11. Monitor reports from teams to insure that:

    A. The campus is secure.
    B. The utilities are off or secure.
    C. The radio communications are operating.
    D. Traffic controllers are contacted if needed.
    E. The first aid center is functioning.
    F. Buildings have been searched for victims.
    G. The student release program is set up and operating.

The designated office staff shall:

1. Report immediately to the Command Center with:

    A. Master keys
    B. Current roster of students and staff
    C. Emergency forms and documents
    D. Two-way radio/communication equipment
    E. Office supplies to assist site manager
    F. Calendar/schedule of groups off campus

   These materials should be assembled prior to any emergency so that they are readily available.

2. Assume responsibility as directed by site manager.

Emergency Plan Checklist: Command Center

Site Manager of Emergency Services
Principal/Designee

Follow this checklist in the event of an emergency:

_____ Attend to immediate danger situations.

_____ Call 911 in the event of a fire, explosion, downed power lines, life and death medical situations.

_____ Determine Command Center location.

_____ Notify location for evacuation assembly area.

_____ Assess status of every student group.

- _____ Homerooms
- _____ Students in bathrooms, halls, office, library, other non-classroom sites
- _____ Any groups away from campus

_____ Develop priorities for immediate emergency attention.

_____ Monitor emergency teams.

- _____ Command Center
- _____ First aid team
- _____ Search and rescue
- _____ Utilities and hazards
- _____ Student release
- _____ Traffic control / security
- _____ Care needs (food, water, shelter, and sanitation)

_____ Check communications for availability.

- _____ Telephones

_____ Telephone three-digit extension (as designated in district plan)

_____ District radio system - silver suitcase (combination is your school 3-digit number)

_____ AM/FM radio, television (information will be broadcast on our local radio stations - KLOK-AM 1170, KEEN-FM 1370, KLIV-AM 1590, KEZR-FM 1065 and local TV station KNTV-Channel 11)

_____ Have 2 meter antenna and drop cord available for a ham operator

_____ Develop site status report.

_____ Report site status to district using 3-digit phone, if possible, if not using district radio system (in silver case).

_____ Develop statement for teachers to read to their students regarding the incident and what is expected of them, including what is being done to assure their safety. Inform students that they will be looked after by school people at the school, and that they are to remain with their groups until a parent or authorized adult picks them up.

_____ See that emergency information is with the student or the teacher.

_____ Assess care needs:

_____ Sanitation

_____ Food

_____ Water

_____ Medical, including any required evacuations

_____ Keep District Emergency Operations Center informed of your actions and your needs.

_____ Make provisions to replace or consolidate classes to allow rapid staff release.

_____ Plan schedules that provide relief for your disaster workers.

Site: Communications Team

The purpose of the communications team is to establish and maintain communications within the site and with the District Emergency Operations Center, 911 if necessary, and to monitor commercial radio stations. The team will report all information to the Command Center.

Minimum Staff Requirements

- Elementary schools - 1 staff member and student messengers
- Secondary schools - 2 staff members and student messengers

Preparation:

1. **Annually**

   A. Know how the three-digit system works and the phone tree procedures.
   B. Check the school radio to make sure it is operational.
   C. Select and train student messengers.

2. **In an emergency**, the communications team shall:

   A. Activate the alarm and notify the staff and students.
   B. Activate the communications line (phone, 3-digit, and 2-way radio in the silver suitcase).
   C. Have initial assessment report communicated to the District Emergency Operations Center.
   D. Assign messengers to needed areas.
   E. Request help from 911 or the District Emergency Operations Center.
   F. Report information from emergency teams and update site status reports to the District Emergency Operations Center.
   G. Continually update the site manager/Command Center.

Emergency Plan Checklist: Communications Team

_____ Activate the alarm and notify the staff and students.

_____ Activate the communications line (phone, 3-digit, and 2-way radio in the silver suitcase).

_____ Send initial assessment report communicated to the District Emergency Operations Center.

_____ Assign messengers to needed areas.

_____ Request help from 911 or the District Emergency Operations Center based on reports from the First Aid, Search and Rescue, and Utilities and Hazard Teams.

_____ Report information from emergency teams and update site status reports to the District Emergency Operations Center.

_____ Continually update the site manager/Command Center.

DISTRICT OFFICE: EMERGENCY 3-DIGIT SYSTEM CALL ROUTING

School's 3-Digit Number	School	In an Emergency School Tries This Number First to Contact the District	Alternate Number
677	Blue Hills	407	
694	Collins	406	
678	DeVargas	408	
679	Dilworth	410	
680	Eisenhower	445	
681	Faria A+	455	
682	Garden Gate	407	
683	Lincoln	406	
699	McAuliffe	406	
684	Meyerholz	408	
685	Montclaire	410	If the first 3-digit number is busy or unanswered use 405. It is a rollover number and can be picked up by several extensions.
686	Muir	445	
687	Nimitz	455	
688	Older	407	
690	Regnart	408	
691	Stevens Creek	410	
689	Stocklmeir	445	
693	West Valley	455	
695	Cupertino	407	
696	Hyde	406	
697	Kennedy	408	
698	Miller	410	
488	Portal	445	
DISTRICT ESSENTIAL LINE		996-9069	

(This is a district line to the district office Emergency Operations Center. It will be one of the first phone lines to be restored by Pacific Bell in the event of an emergency).

8/92

Site: First Aid Team

The purpose of the first aid team is to provide emergency and long-term first aid, to set up the first aid station near the Command Center (away from possible hazards) and to manage and utilize first aid supplies. (Note: Education Code Section 32200 states that "No school district employee shall be held personally liable for civil damages on account of personal injury to or death of any person resulting from civil defense and fire drills.") California law provides immunity under the Good Samaritan law. (See California Health and Safety Code, Article 4, Chapter 130, Section 1767.)

Recommended Staff Requirements: (first aid/CPR training for as many staff members as possible.)

- Elementary schools - three staff members
- Secondary schools - five staff members

Preparation:

1. **Annually:**

   A. Update first aid supplies to standards both for the first aid station and classroom first aid kits.
   B. Note on site map the location of all first aid kits and supplies.
   C. Develop triage procedures with first aid team members.
   D. In consultation with the principal/site manager, decide primary and alternate location for the emergency first aid center and morgue.
   E. Check classroom and school personnel emergency information cards.

2. **In an emergency**, staff on the first aid team shall:

   A. Set up the first aid station (non-teaching staff member).
   B. Evacuate classes to the assigned evacuation area.
   C. Transfer students and the enrollment/emergency data to buddy teacher.
   D. Report to the first aid station.
   E. Display first aid sign.
   F. Prepare first aid supplies for immediate use.
   G. Administer first aid as necessary.
   H. Supervise the use and distribution of first aid supplies.
   I. Notify the Command Center of staff and student injuries.
   J. Document treatment, time, and release of all injured on student card and school treatment log.
   K. Determine need for more extensive treatment and notify Command Center to call 911.
   L. Place emergency information on injured persons if not previously done by the classroom teacher.

Emergency Plan Checklist: First Aid Team

_____ A non-teaching staff member will set up the first aid station.

_____ Evacuate classes to the assigned evacuation area.

_____ Transfer students and the enrollment/emergency data to buddy teacher.

_____ Report to the first aid station.

_____ Display first aid sign.

_____ Prepare first aid supplies for immediate use.

_____ Administer first aid as necessary.

_____ Supervise the use and distribution of first aid supplies.

_____ Notify the Command Center of staff and student injuries.

_____ Document treatment, time, and release of all injured on student card and school treatment log.

_____ Determine need for more extensive treatment and notify Command Center to call 911.

_____ Place emergency information on injured persons if not previously done by the classroom teacher.

Site: Utilities and Hazards Team

The purpose of the utilities and hazards team is to check the utilities and identify hazards. The team shall do whatever is necessary to minimize further danger and report findings to the Command Center.

Minimum Staff Requirements:

- Elementary schools - one staff member
- Secondary schools - two staff members

Preparation:

1. **Annually:**

   A. Know location of and procedure for turning off water, gas, and electricity, and intake valve on water heaters.
   B. Know fire fighting procedures.
   C. Know location of and make sure fire fighting equipment (extinguishers, etc.) is in working order.
   D. Know locations of stored hazardous materials, including chemicals.
   E. Know location of shutoff tools, hard hats, dust masks and barrier tape.

2. **In an emergency**, the utilities and hazards teams shall:

   A. Secure necessary tools and hard hats and check the condition of the utilities and connecting pipes and lines and, if necessary, turn them off (each place pipes pass through concrete is a prime breakage point).
   B. Check the site completely for:

      - Fire and electrical hazards
      - Chemical hazards (chlorine storage)
      - Other hazards

   C. Make a note of structural and nonstructural damage when checking utilities or hazards. Report any identified damage to the Command Center.
   D. Notify site manager of hazards and services needed.
   E. Barricade or tape off hazardous areas.
   F. When site is secure, report to the Command Center for direction.

Emergency Plan Checklist: Utilities and Hazard Team

_____ Secure necessary tools and hard hats. Check the condition of the utilities and connecting pipes and lines and, if necessary, turn them off (each place pipes pass through concrete is a prime breakage point).

_____ Check the site completely for:

1. Fire and electrical hazards
2. Chemical hazards (chlorine storage)
3. Other hazards

_____ Make a note of structural and nonstructural damage when checking utilities or hazards. Report any identified damage to the Command Center.

_____ Notify site manager of hazards and services needed.

_____ Barricade or tape off hazardous areas.

_____ When site is secure, report to the Command Center for direction.

Site: Traffic Control/Security Team

Recommended Staff Requirements:

- Elementary schools - two staff members
- Secondary schools - four staff members

The district policy in a declared emergency is to provide supervision and care for students until it is safe to release them or until picked up by an authorized adult. To accomplish this, site personnel must take steps to patrol the site perimeter to keep students from leaving. If parents have followed the district's directions, students will have been told about this policy and should follow instructions of school personnel.

The traffic control/security team will require all students to remain on site until released. No physical force shall be used to restrain students intent on leaving. In that case, request student to give his/her name and stated destination. Report this information to the student release team.

Parents or other adults coming on campus should be directed to the student release area to have their student released to them.

The traffic control/security team shall be responsible for maintaining a clear entrance to the school for emergency vehicles and guiding cars to parking and student release areas.

Preparation:

1. **Annually:**

   A. Know location and alternative location(s) for entrances(s) for emergency vehicles and parking.
   B. Prepare emergency signs for directing people and vehicles.
   C. Know location of signs, barrier tape, walkie-talkies, vests, and flares.

2. **In an emergency**, the traffic control/security team shall:

   A. Obtain signs, barrier tape, walkie-talkie, vests and flares.
   B. Short of physical restraint, keep all students on campus until legal release.
   C. Direct authorized adults to student release area.
   D. Maintain a clear entrance to school for emergency vehicles.
   E. Direct vehicles to parking and student release areas.

Emergency Plan Checklist: Traffic Control/Security Team

_____ Obtain signs, barrier tape, walkie-talkie, vests and flares.

_____ Short of physical restraint, keep all students on campus until legal release.

_____ Direct authorized adults to student release area.

_____ Maintain a clear entrance to school for emergency vehicles.

_____ Direct vehicles to parking and student release areas.

Site: Search and Rescue Team

The search and rescue team members must search all areas on campus, building and grounds in a predetermined pattern shortly after the emergency has occurred and when it is safe to do so. The search and rescue team is divided into sub-teams of two each (buddy system for safety) who search for the injured or trapped and assess the safety of the various structures. Wing commanders (optional) report the status of their assigned areas to the Command Center (injuries, damage, etc.).

Recommended Staff Requirements: (Work in Pairs)

- Elementary schools - two staff members
- Secondary schools - four staff members

Preparation:

1. **Annually:**

   A. Train the search and rescue team.
   B. Choose wing commander for each building.
   C. Divide campus into predetermined sweep areas. Search and rescue team oversees areas handled by the wing commanders. The team is also responsible for all grounds, restrooms and day care center.
   D. Assign a walkie talkie to the search and rescue team.
   E. Know locations of search and rescue equipment.
   F. Identify and consult with special education, day care and itinerant staff to coordinate plans for location and rescue of their students.

2. **In an emergency**, the search and rescue team shall:

   A. Report to assigned area, obtain dust masks, hard hats, gloves, flashlights, goggles, tape and tools.
   B. Collect status reports from wing commanders at the Command Center.
   C. Report location of injured to Command Center and place red flags or cards near their locations.
   D. Cordon off all dangerous areas.
   E. Aid in the rescue of trapped/injured people.
   F. Continue to monitor as needed during emergency or return to students.
   G. Secure unsafe buildings/classrooms against re-entry. Post warning signs on unsafe buildings.

3. **Caution:**

   A. Proceed carefully - buildings may be unstable.
   B. Proceed quietly so calls for help can be heard.
   C. Call out when entering your area, then wait for an answer.
   D. Remain in voice contact with your partner at all times.

Emergency Plan Checklist: Search and Rescue Team

- _______ Report to assigned area, obtain dust masks, hard hats, gloves, flashlights, goggles, tape and tools and begin sweep.
- _______ Collect status reports from wing commanders at the Command Center.
- _______ Report location of injured to Command Center and place red flags or cards near their locations.
- _______ Cordon off all dangerous areas.
- _______ Aid in the rescue of trapped/injured people.
- _______ Secure unsafe buildings/classrooms against re-entry. Post warning signs on unsafe buildings.
- _______ Continue to monitor as needed during emergency or return to students.

Cautions:

1. Proceed carefully - buildings may be unstable.
2. Proceed quietly so calls for help can be heard.
3. Call out when entering your area, then wait for an answer.
4. Remain in voice contact with your partner at all times.

Site: Student Release Team

To expedite the release of students to their parents, a student release area should be established and procedures developed to provide for an orderly release process. The student release area should be away from the evacuation assembly area and parents should be required to follow release procedures. The most important task is to guarantee that documentation is kept about to whom each student is released.

Release methods will vary depending upon the physical site and numbers of students and staff. One approach is to establish one area for initial contact with adults/parents, and a second "reunion" area. The first area will check authorization for release on the student's emergency card. The parent will initial the card. Using walkie-talkies or student messengers, the student will be summoned to the reunion area. There, the student's name will be checked off the master roster by the staff.

A second approach is to release students by grade level, using staff members at each level, as appropriate. This approach also utilizes the student's emergency card, but offers the advantage of the grade-level teacher's familiarity with the students and parents. Each teacher involved in the release keeps track of the releases on his or her master roster.

Recommended Staff Requirements:

- Elementary schools - two staff members or individual teachers
- Secondary schools - four staff members or individual teachers

Preparation:

1. **Annually:**

   A. Maintain a current roster of all the students.
   B. Maintain a copy of the health and emergency card for each student which lists persons authorized to pick up student.
   C. Know where to obtain tables, chairs, writing supplies, and yellow barrier tape for delineating areas for student release and reunion areas, if applicable.

2. **In an emergency**, the student release team shall:

   A. Have parent/adult initial emergency card and indicate destination.
   B. If name does not appear on card, staff member shall note name and destination of student on master roster.
   C. Student will be summoned to release area or reunion area by messenger or walkie-talkie, or student will be released to the parent by the teacher.

Emergency Plan Checklist: Student Release Team (Centralized Release)

_____ Determine availability of supplies and safety of location for student release area and reunion area, if applicable.

_____ Set up tables, chairs, emergency cards, and master rosters in student release area. If using an initial contact area and a reunion area, set up equipment for these areas.

_____ Have parent/adult initial health and emergency card and indicate destination. If name of adult is not on emergency card, student will not be released.

_____ If adult's name is on emergency card, use walkie-talkie or messenger to summon student to release or reunion area.

_____ Note name and destination of student on master roster before releasing the student.

Emergency Plan Checklist: Student Release Team (Teacher Release)

_____ Have parent/adult initial health and emergency card and indicate destination. If name of adult is not on emergency card, student will not be released.

_____ If adult's name is on emergency card, teacher will release student to listed adult.

_____ Note name and destination of student on class roster before releasing the student.

Site: Shelter Team

The purpose of the shelter team is to provide any needed overhead shelters for the Command Center, first aid team, student release team, and long-term care. The shelter team will communicate with the utilities and hazards team prior to setting up overhead shelters.

Recommended Staff Requirements:

- Elementary schools - two staff members
- Secondary schools - two staff members

(May use upper grade student helpers if appropriate)

Preparation:

1. **Annually:**

   A. Know location of canopy shelters, stakes and necessary tools.
   B. Know how to put up the canopies.
   C. Know locations of all emergency team sites (see site map).

2. **In an emergency**, the shelter team shall:

   A. Check with the Command Center to determine what shelters are necessary.
   B. Retrieve canopies, needed tools, tables, chairs, etc.
   C. Set up first aid shelter first, then continue to other teams as needed.
   D. Check in with Command Center upon completion of duties.

Emergency Plan Checklist: Shelter Team

_____ Check with the Command Center to determine what shelters are necessary

_____ Retrieve canopies, needed tools, tables, chairs, etc. and bring to locations designated on site map for shelters

_____ Set up first aid shelter

_____ Set up other shelters as needed

_____ Check in with Command Center upon completion of duties

Site: Sanitation Team

The purpose of the sanitation team is to evaluate the condition of existing sanitary facilities and to provide additional sanitary facilities for students and staff if necessary.

Recommended Staff Requirements:

- Elementary schools - two staff members
- Secondary schools - two staff members

Preparation:

1. **Annually:**

   A. Determine type of alternate sanitary facility to be used (lined buckets or wastebaskets, portable folding toilets, or plastic bags in existing toilets).
   B. Plan for gender separation and use of plastic sheeting for privacy screen.
   C. Know where to obtain prepackaged wipes, toilet paper and other toilet equipment.

2. **In an emergency**, the sanitation team shall:

   A. Determine with site manager the suitability of using indoor bathrooms as latrines. Empty water and line with double trash bags (Do not flush toilets).
   B. Have toilet tissue available.
   C. Set up handwashing station using prepackaged wipes.
   D. To dispose of filled waste bags, put in garbage containers for later disposal.
   E. If not using toilets, set up alternate sanitary facilities with privacy screens and gender separation in location specified on site map.

Emergency Plan Checklist: Sanitation Team

_____ Check with Command Center before setting up sanitation area to determine availability of indoor bathrooms and sanitation supplies.

_____ Obtain supplies needed, including bags, prepackaged handwashing wipes, and toilet paper.

_____ If using indoor bathrooms, empty water and line with double trash bags (Do not flush toilets).

_____ Set up handwashing station using prepackaged wipes.

_____ To dispose of filled waste bags, put in garbage containers for later disposal.

_____ Set up privacy screens and gender separation screens as necessary.

Site: Food and Water Team

The purpose of the food and water team is to maintain a fresh supply of stored water in the district-supplied containers, and to distribute food and water to staff and students during a declared emergency.

Each classroom has five three gallon containers of water and each school has two 55-gallon containers of water centrally located. Clorox bleach for purifying classroom water is located in the school's first aid barrel. Use of the water must be tightly controlled in an emergency.

Several options are available for food. Sources include school lunches, snack packs stored for students in classrooms and food stored centrally.

Recommended Staff Requirements:

- Elementary schools - two staff members
- Secondary schools - two staff members

Preparation:

1. **Annually:**

   A. Water

   - Know location of water containers and siphon pumps
   - Survey water supply, including trapped water in hot water and toilet tanks
   - Assess water supply. By September 30, 1993, empty each 5 gallon water container and add 1 teaspoon of bleach to the new water. If you must use these water containers before September 30, 1993, add 1 teaspoon of bleach to the water and let it sit for 30 minutes before using the water.

     By December 30, 1993, empty the two 55 gallon water barrels and add one 7 oz. bottle of water preserver per barrel to the new water. This will maintain the water for five years.

   B. Food

   - The PTA will confer with the principal regarding food collection and storage on site.
   - Know where eating and drinking supplies are kept.
   - Assess food supplies (snack packs, central food supply and/or cafeteria food supply).

2. **In an emergency**, the food and water team shall:

   A. Monitor use of all water.
   B. Distribute food supplies as available and needed.

Emergency Plan Checklist: Food and Water Team

_____ Monitor use of all water.

_____ Provide necessary water to first aid shelter.

_____ Discuss with site manager and student release team the approximate number of students needing long term care so that appropriate rationing of food and water can begin.

_____ Set up handwashing station using prepackaged wipes.

Cupertino Union School District
Emergency Preparedness Procedure

Amendment to the California Administrative Code
Title 5, Section 560

Title 5, Section 560 of the California Administrative Code is amended to read:

Civil Defense and Disaster Preparedness Plan: The Governing Board shall:

A. Adopt a written policy guideline for use by schools of the district in formulating individual civil defense and disaster preparedness plans.

The policy guideline shall meet the criteria established in that part of the Civil Defense and Disaster Planning Guide for School Officials entitled, "Essential Characteristics of the School Planning Guide," published by the State Department of Education, and shall be subject to approval by the County Superintendent of Schools. The policy guideline shall be reviewed at least annually and revised as needed. Plans and revisions may be subject to review and approval by the State Department of Education.

B. Require the principal of each school in the district to formulate and submit to the district superintendent for approval a civil defense and disaster preparedness plan for that school. Each school plan shall satisfy the governing board's policy guideline, coordinate with the appropriate local government plan, be reviewed at least annually and be kept current.

C. Require each school to test its plan (other than fire drills) or each portion thereof on a rotating basis at least two times during the school year and keep a record of such tests. The record shall be maintained in a manner determined by the governing board, and available to the Department of Education upon request.

SITE: PRINCIPAL'S CHECKLIST

DUE BY: OCTOBER 17 EACH YEAR

SUBMIT TO: DISTRICT DISASTER PREPAREDNESS COORDINATOR

This is a checklist to help Principals organize and meet the site requirements mandated by the Cupertino Union School District Emergency Preparedness Plan.

It is recommended that each Principal appoint a Site Disaster Committee (comprised of staff, PTA, students optional), to help carry out the tasks of this checklist.

CHECK	REQUIREMENT
______	1. Read the District Disaster Plan, and know the responsibilities of the site manager
______	2. Designate a second-in-command and a backup.
______	3. Orient staff to District Disaster Plan, review site procedures (staff meeting)
______	4. Update site plan, assign staff responsibilities (complete staff roster sheet)
______	5. Schedule necessary training (First Aid, CPR, Search and Rescue)
______	6. Schedule drills: Elementary - one per quarter Secondary - one per semester
______	7. Complete Site Map. (See page 39)
______	8. Complete Site Hazard Survey
______	9. Collect Classroom Hazard Surveys
______	10. Submit a memo to the Director of Business Services for any noted hazard
______	11. Participate in test of District 2-way radio
______	12. Check battery-operated radios
______	13. Check location and condition of 2 meter radio antennae and the base for installing the antennae
______	14. Complete supplies and equipment inventory to include classroom emergency kits
______	15. Order supplies and equipment as necessary
______	16. Evacuation areas/alternates identified for all classes
______	17. Communications to parents and students about disaster procedures a. District Student Release Policy b. Emergency I.D. Tag and cover letter
______	18. Completed Emergency I.D. Tags collected and put into Classroom Emergency Kits
______	19. Assess food supplies: (Check as applicable) ___ Snack Packs ___ Central Food Supply (MRE's etc.) ___ Cafeteria Food Supply

Revised 8/92

PRINCIPAL'S CHECKLIST (Cont'd.)

______ 20. Assess Water Supply

___ By September 30, 1993 empty each 5 gallon water container and add 1 teaspoon of bleach to the new water. If you must use these water containers before September 30, 1993, add 1 teaspoon of bleach to the water and let it set for 30 minutes before using the water.

___ By December 30, 1993 empty the two 55 gallon water barrels and add one 7 oz. bottle of water preserver per barrel to the new water. This will maintain the water for 5 years.

________________________________ Signature ______________________

SCHOOL

Date ______________________

Revised 8/92

SITE AND CLASSROOM HAZARD SURVEYS

Non-structural hazards are caused by the furnishings and non-structural elements of a building. Anything that does not actually hold the building up is non-structural, including floors, ceilings, windows and all furnishings. In California schools, non-structural hazards represent the greatest threat to the safety of students and staff. Eliminating these hazards can reduce injuries significantly.

SITE: SITE HAZARD SURVEY

Principals are required to conduct an annual **Site Hazard Survey.** The survey should be completed early each fall, signed, and submitted to the District Disaster Committee Chair by October 17. (Please put N/A by any items that are not applicable.)

The purpose of the **Site Hazard Survey** is to check for safety hazards outside of the classroom. The survey shall include evaluation of interior and exterior portions of buildings as well as school grounds. (A qualified structural and/or civil engineer could be consulted where appropriate.)

The **Site Hazard Survey** shall include assessment of:

- ☐ 1. Proximity of toxic, flammable, corrosive, chemically reactive, or radioactive materials
- ☐ 2. Proximity of high voltage power lines
- ☐ 3. Likelihood and possible effects of flooding, soil liquefaction, and landslides
- ☐ 4. Probable safety of evacuation areas after an earthquake; proximity of gas, water, and sewer lines
- ☐ 5. Stability of water heaters (should be strapped)
- ☐ 6. In offices, multipurpose rooms, lounges, etc., check for tie-down of bookcases and shelving, heavy objects on high shelves, safety of interior hanging fixtures, tie-down and latches on file cabinets.
- ☐ 7. Objects that restrict people from moving to a safe place (tables and desks in hallways)
- ☐ 8. Janitorial areas: storage of tools and cleaning chemicals
- ☐ 9. Storerooms: heavy items stored on high shelves, shelving secured

Revised 8/92

- ☐ 10. Suspended ceiling tiles and runners: check with maintenance (runners should be secured to structural ceiling with heavy gauge wire attached diagonally)
- ☐ 11. Machine shop and woodshop: equipment should be bolted down
- ☐ 12. Cooking and serving area: refrigerators and ranges restrained, flexible gas connections.
- ☐ 13. Large and heavy office machines: restrained and located where they will not slide, fall off counters or block exits.
- ☐ 14. Sound system speakers and spotlights: secure
- ☐ 15. Furnaces or boilers: should be restrained
- ☐ 16. Trees: large trees leaning or in poor health should be supported or removed.
- ☐ 17. Compressed gas cylinders: secured top and bottom with a safety chain
- ☐ 18. Weight room/motor development room equipment: racks anchored and weights properly stored.
- ☐ 19. Laboratory chemicals on shelves: restrained.

The **Site Hazard Survey** has been completed, and measures have been taken to allow for removal or correction of hazards insofar as practicable.

____________________ SCHOOL

____________________ SIGNATURE

____________________ DATE SIGNED

Comments:

CLASSROOM HAZARD SURVEY

In September, each teacher shall assess his/her area for hazards. The **Classroom Hazard Survey** shall then be submitted to the Principal by September 30. The Principal shall submit Maintenance requisitions to have the work completed.

SCHOOL________________________ DATE________________

TEACHER________________________ ROOM #________________

Yes	No	N/A (Non-Applicable)	
❑	❑	❑	Are free-standing or wall shelves secured to a structural support?
❑	❑	❑	Are file cabinets bolted to a stud and do the drawers have latches?
❑	❑	❑	Or, is the file cabinet in a closet?
❑	❑	❑	Are heavy objects removed from high shelves?
❑	❑	❑	Are paints and chemicals on shelves restrained?
❑	❑	❑	Are aquariums located on a low counter or the floor away from seating areas and restrained with heavy-duty angle clips bolted to the counter or floor?
❑	❑	❑	Are computers fastened to work station?
❑	❑	❑	Are wall-mounted objects secured (maps, bulletin boards, clocks, chalkboards)?
❑	❑	❑	Are desks and tables located such that they will not slide and block exits?
❑	❑	❑	Are sound system speakers in elevated locations anchored to structure?
❑	❑ or	❑	Is the TV monitor securely fastened to a securely fastened platform?
❑	❑	❑	Is the TV monitor securely attached to a portable (rolling) cart with lockable wheels?
❑	❑	❑	Is the classroom piano secured against rolling during an earthquake?
❑	❑		I have read my school site plan and understand my responsibilities as a teacher.

Revised 8/92

Site Map

Obtain a Map of School and School Grounds

This combination plot map and floor plan will serve many purposes. It will be used to note potential hazards and the location of utilities, emergency equipment, and supplies. Further, it will provide a basis for:

1. Establishing an evacuation route.
2. Identifying two safe, open-space assembly areas.
3. Developing procedures for conducting emergency response activities (e.g. search and rescue, damage assessment, etc.).

Mark clearly, by name, the location of classrooms, library, and other activity rooms, restrooms, heating plant, hallways, and all doors and closets. In addition, locate:

1. Main shut-off valves for water and gas.
2. Electrical power master switch.
3. Stoves, heating/air conditioning equipment.
4. Chemical storage and gas lines in laboratories.
5. Hazardous materials stored by custodians and gardeners.
6. Portable, battery-powered PA equipment / radios /lighting.
7. Fire extinguishers.
8. First aid equipment.
9. Outside water faucets / hoses.
10. Overhead power lines.
11. Sewer lines.
12. Underground gas lines.
13. Location of two meter antennae and the base for installing the antennae.

PUT YOUR SITE MAP HERE

(Include emergency shutoffs, food, water, first aid supplies, fire extinguishers, tool storage areas and determine the location of fire hydrants and where emergency vehicles will be located.)

CUPERTINO UNION SCHOOL DISTRICT

SITE STATUS REPORT

Site_______________________________ Date__________ Time______________

Buildings assessment:

Building	Condition

Estimated numbers of persons on site who are: Dead_________ Injured___________

Number who have been evacuated _________

Are any site access roads closed? ____

*EOC manned? ______ Location____

Communications available: Phone_______ 3-digit ext. phone_______ Dist. Radio_____

2 metre antennae _________

Special problems/needs: ____

____

____

____

____

____

____

____

____

* Emergency Operation Center

CUPERTINO UNION SCHOOL DISTRICT
SCHOOL TREATMENT LOG

SCHOOL ____________________

DATE	TIME	TEACHER	PUPIL'S NAME	HEALTH PROBLEM	SERVICE GIVEN	TIME LEFT	PERSON TO WHOM RE-LEASED

Emergency Supplies

Red Cross and city disaster preparedness officials candidly predict that in the event of a major earthquake in Santa Clara Valley, damage would be so extensive to roads, overpasses and bridges that parents and students would be physically separated for several hours or possibly for days. The school will probably be the primary care giver until the civil defense system becomes operational.

First Aid Supplies

(These items shall be provided for each site:)

1 Bandaids, 3/4," box of 100
5 Steri-pads gauze pads, pkg 2" x 2"
16 Steri-pads gauze pads, pkg of 25 4" x 4"
2 Gauze roller 2" x 5 yd., doz.
1 Adhesive tape roll 1" x 10 yd.
1 Adhesive tape roll 2" x 5 yd.
1 Tongue depressors, box 500 (finger splints)
2 Elastic bandages 2" ankle wrap
13 Chemical cold pack, junior size
1 Bandage scissors, Lister 5 1/2"
1 Splinter forceps (blunt end 3 1/2")
1 Thermometer, external, Tele-fever
1 Thermometer, oral, with case
3 Safety pins, medium size, 1/2 pkg.
2 Antiseptic soap, 4 oz.
1 First aid manual
85 Sanitary napkins, individually boxed
1 Household bleach
2 Eyedroppers
20 Oval eye pads
1 Kleenex, 100 size box
4 Lightweight blankets
1 Flashlight
1 Stretcher per school
2 Emesis basins, med. size
24 Triangular bandage, non-sterile, with pins
12 Cardboard splints
1 Ammonia inhalants, pkg. of 10
1 Iso rubbing alcohol, 1 pint

Items found needing periodic replacement:

1 Bottle of 100 Tylenol, 325 mg.
1 Neosporin ointment, 1 oz. tube
1 Kaopectate and spoon, 8 oz. bottle
1 Hydrogen Peroxide, 16 oz.
1 Dacriose eye irritation solution, 4 oz.
1 Box backing soda
1 Iso rubbing alcohol, 1 pint

Emergency Equipment

Each site shall locate and inventory the following items so they will be immediately available in an emergency. This is a minimum list and schools should secure additional materials as needed to implement their school emergency plan.

1 Axe
Extra batteries (as needed)
1 Bull horn*
1 Can opener, manual
1 8" Crescent wrench
1 Crowbar*
12 Dust masks
6 Rolls of duct tape
6 Flash lights with batteries*
12 Pair of gloves*
1 Hammer
1 Hand saw
4 Hard hats
2 Knives, heavy duty
1 Lantern with batteries*
2 Rolls of masking tape
2 10 qt. pails
2000 Paper cups*
200 13 ga. Plastic bags
600 Plastic garbage bags - 1 per child for weather protection
1 Roll of plastic sheeting 4' x 100' (opaque) for privacy screens
4 Rolls of police tape
4 Portable folding toilet
1 Pot in which to boil water
1 Pry bar*
1 Roll of rope, nylon
3 Screw drivers
2 Shovel
100 Space blankets*
1 Roll of string
1 Tarp (large)
1 Transistor radio, AM/FM with batteries*
4-7 Walkie-talkies
6 Waste baskets
1 Pkg of waste basket liners
800 Pre-packaged wipes (for sanitation team)
1 Box or approx. 80 per classroom of Pre-packaged wipes (for use before eating)
1 Roll of wire, heavy duty

* District has provided

Note: Some of these items are not currently located at sites.

LIST YOUR ADDITIONAL SUPPLIES

SIDE 1

I.D.

NAME

AGE:

RECENT PICTURE

DATE OF BIRTH

NICK NAME	

MEDICAL

ALLERGIES: ____

BLOOD TYPE: ____

MEDICAL CONCERNS (INCLUDE PRESENT MEDS) ____

____

____

____

1/90

SIDE 2

NEXT OF KIN

PICTURES HERE PICTURES HERE PICTURES HERE

NAME		
RELATION		
HOME ADDRESS		
WORK ADDRESS		
PHONE (H)	( )	( )
PHONE (W)	( )	( )

OUT OF STATE CONTACT

NAME	
RELATION	
ADDRESS	
PHONE (H)	
PHONE (W)	

1/90

PUT IN A PLASTIC SLEEVE AND HANG AROUND THE STUDENT'S NECK. STORED IN THE EMERGENCY BAG IN THE CLASSROOM.

FIRST AID REPORT

INSTRUCTION:
CIRCLE MOST SERIOUS INJURIES
CHECK BEST DESCRIPTION OF INJURY

VICTIMS NAME:	AGE:	DOB:	SEX: M F	ALLERGIES.
LOCATION:	DATE:	TIME OF INCIDENT: AM PM		COMPLETED BY

FIRST AID GIVEN

OPEN **AIRWAY** · **BREATHING** · **CIRCULATION**

SCAN FOR URGENT INJURIES (SEVERE BLEEDING · CHEST WOUNDS)

TREAT FOR SHOCK

ASK

ANY ALLERGIES MEDICATIONS (LOOK FOR I D TAG)

WHAT HAPPENED

WHERE IT HURTS

TAKE

PULSE	RATE	NOTE IF. STRONG/WEAK; REGULAR/IRREG; ABSENT
RESPIRATION	RATE	NOTE IF SHALLOW, LABORED, NOISY

CHECK

SKIN	COLOR: OK PALE FLUSHED BLUISH RED	TEMP: OK HOT COOL COLD	MOIST: OK DRY CLAMMY
HEAD	SCALP: HEADACHE BRUISES SWELLING WOUNDS	EARS/NOSE: DRAINING FLUID CLEAR/BLOODY	EYES: EQUAL DILATED UNEQUAL CONSTRICTED / FACE: AIRWAY O K BROKEN BONES WOUNDS
NECK	PAIN, DEFORMITY, WOUNDS		

SIDE 2

FIRST AID GIVEN

CHECK

CHEST	WOUNDS, MOVEMENT, PAIN
ABDOMEN	WOUNDS, RIGIDITY, PAIN
PELVIS	FRACTURES, PAIN
EXTREMITIES	WOUNDS, DEFORMITY SENSATIONS, MOVEMENT PULSES BELOW INJURY
BACK	WOUNDS DEFORMITY, PAIN

STATE OF CONSCIOUSNESS: ALERT, CONFUSED, UNRESPONSIVE

RECORD

TIME A M / P M	PULSE RATE	PULSE STRONG, WEAK REGULAR, IRREG ABSENT	PULSE BELOW INJURY STRONG, WEAK, ABSENT	RESPIRATIONS RATE	RESPIRATIONS NOISY, LABORED DEEP, SHALLOW	PUPILS EQUAL SIZE REACT TO LIGHT	SKIN COLOR, TEMP. MOISTNESS	STATE OF CONSCIOUSNESS ALERT, CONFUSED, UNRESPONSIVE

DISPOSITION: (SENT TO HOSP (NAME), SENT HOME (WITH WHOM)	IF TRANSFERRED OUT TIME: DATE: BY WHO

PUT IN A PLASTIC SLEEVE AND HANG AROUND THE STUDENT'S NECK. STORED IN THE EMERGENCY BAG IN THE CLASSROOM.

Procedure for Dealing with School Emergencies

Comments

When an emergency occurs, stay calm. The site administrator, or her/his designee, needs to stop and take time to assess the situation (this can be done in the office or when she/he moves to the problem area). Resist the temptation to react to your anxiety. Instead, prioritize, list potential actions (i.e., what needs to be done immediately, what should be done next, etc.). After establishing the priorities, delegate responsibilities to people who are both available and competent to perform the assigned function. Follow the attached emergency checklist.

Remain visible and calm. The site administrator should remain free of specific duties which would encumber her/his ability to monitor the situation (the big picture) and make appropriate decisions. The outside agencies (fire department, police department, paramedics, etc.) will determine what action they will need to take and will expect the site administrator to do whatever needs to be done in order for the outside agencies to perform their duties quickly and efficiently (i.e., evacuating the students and staff from buildings, activating school emergency teams, etc.)

When the determination is made that an emergency does exist, call 911 emergency services first, then alert the district office and appraise them of the situation and the magnitude of the event. This will enable the district office to make decisions regarding communications, personnel and equipment needs. As the situation develops, keep the district office continually aware of any changes that may occur. If these actions are not taken immediately, you will find that your phone lines will probably be jammed with incoming and outgoing calls. To be certain that you have the most options for communication with the district office, we recommend that you assign someone to set up your emergency radio (silver case).

Dealing with the media adds a distracting dimension for the administrator. Before interacting with the press, contact the public information specialist. On site, he/she will become the conduit for information regarding the emergency. He/she will prepare a statement so that everyone is sharing the same information. Again, stay calm and avoid making any dramatic and/or alarming statements to the press. The media has the right to gather information and to speak to students and staff. They do not, however, have the right to interfere with the resolution of the emergency. Do not allow yourself to be distracted from your prime responsibility of managing the situation. A press area should be established some distance from the emergency area, to localize their movements and minimize their interference. The district's PIO (BA) will handle these arrangements.

All communications with the students and the staff need to be done in a calm, almost routine manner. In order to help minimize the potential for overreaction and/or panic, making your announcements in as normal a tone and style as possible will promote appropriate responses and actions from both students and staff.

If your situation requires students to be transported to a hospital or to be released from the campus, be sure that a cadre of highly competent staff members, who know the students and the record keeping system, are assigned to work directly with the emergency personnel on the release of students. At least one of these staff members should partner directly with the emergency services person involved in the student release.

Emergency Checklist

_____ Assess the situation.

_____ Take action to localize the problem. (Lock restroom, rope off the affected area, alert staff and students, etc.).

_____ Call 911 with a description of the situation.

_____ Take appropriate actions that are needed immediately.

_____ Call the superintendent's office and the district of business services with an assessment and/or description of the situation. Ask that the PIO be alerted at this point.

_____ Meet outside emergency personnel. Identify staging areas and needs.

_____ Designated office personnel should set up the emergency radio (sliver case) so that you have a direct link with the district office.

_____ Identify and assign a clerical person to work with the outside emergency team in a liaison capacity (she/he knows school routing, records, staff and students). This duty should be assigned *prior* to any emergency. (This will be critical as this person may need to record the destinations of students and staff who are removed from the campus.)

_____ If students need to leave the classroom due to their involvement in the emergency, be certain that their names and grade levels are recorded in the office, or, if seriously affected, at the staging area.

_____ Send emergency card (or a copy) to the staging area for every student who signed on the office list. These cards will be matched with the student in the staging area. (Alphabetize, if time permits.)

_____ Designate an office "manager" to carry out the site administrator's directions regarding internal and external communications, student releases, etc.

_____ Implement outside emergency team decisions based on current and changing data on the situation.

_____ The PIO (BA), or her designee, will work with the media in a place away from the staging area. (The press has a right to speak to students and staff, but not to interfere.)

_____ The site administrator determines what steps need to be taken based on the evolving situation. (Parents notified as soon as students are taken to hospital, evacuate the campus, establish control of people coming/going on/from the campus.)

_____ The site administrator should position herself/himself in an area where she/he is visible and accessible to the outside emergency personnel and the staff.

_____ If students are transported to a hospital, try to determine which hospital, *prior* to their leaving, if possible. (Parents will have to go to the hospital to get their child released.) The *original* emergency card, with the parent signatures, must accompany students to the hospital. The hospital should return the card to the parent when the student is picked up.

_____ The PIO (BA) will work with you to prepare a written statement regarding the situation, actions taken, etc. to share with parents, the public and the media.

_____ Secure staff members who will stay on campus to help with the emergency. (Answer phones, pick up staff members at the hospital, etc.)

_____ Conduct a debriefing meeting with key site and district office staff no later than four days after the event.

The Day After the Emergency

Meet with the staff before school to review the facts and acknowledge those who helped during the emergency. Have the staff discuss the facts with the students during the first part of the day and answer their questions accurately and without judgment. Refer students who appear to need more than the teacher can offer or feel she/he can adequately handle, to a counselor or administrator.

The site administrator should also work closely with the superintendent and the PIO regarding follow-up communications to parents and the community in general.

Irvine Unified School District Eastshore School
Emergency Preparedness Sample Plan

by Sharon DiNisi
Principal, Eastshore Elementary School, Irvine Unified School District

Eastshore School
Emergency Preparendess Plan
Table of Contents

Maps Showing Designated Emergency Locations

Evacuation
Student Supervision
Emergency Response Team Locations
Utility
Health Office/Supply Storage

Appendix

Classroom Safety Inspection
Custodial School Safety Check
Coping With Emotional Needs
List of School Emergency Equipment/Supplies
Teacher Backpack

Emergency Procedures

1. **Drop, cover and hold**

   Wait for all clear signal.
   Or teacher discretion.

2. **Evacuate the building**

   Check on buddy.
   Evacuate all walking wounded.
   Serious injuries are not moved.
   Take emergency backpack and clipboard.
   Go to assigned area on grass behind school.

3. **Line-up students/take roll**

   Distribute I.D. tags to students for them to wear.
   Send attendance count and I.D.'s of students not accounted for to the student supervisors.

4. **Report to team assignment**

   Student supervisors will take control of students.
   If you have another assignment, leave roll sheet with the persons supervising your class, and report to your team assignment.

Chain of Command

It is important to have an identified staff member ready to take responsibility in the event the principal is unavailable. This person will assume the leadership of the Command Post and coordinate the formation and actions of all teams.

Staff Training

Each staff member is required to:

1. Read the school emergency plan, and be aware of their responsibilities before, during and after a disaster, and know proper student release procedures.

2. Know the location of and procedures for utility shut offs (electrical and water). The head custodian is responsible for providing shut off tools. (See the utility shut off map).

3. Practice drop procedures and know evacuation routes.

4. Know their primary and alternate disaster team assignments and procedures.

5. Know their "buddy" teacher and their responsibilities in case of injury.

6. Be familiar with "Children's Reactions to Disasters."

7. Be sure their own family and home are prepared for an earthquake.

8. Be knowledgeable about basic first aid and CPR.

Student Training

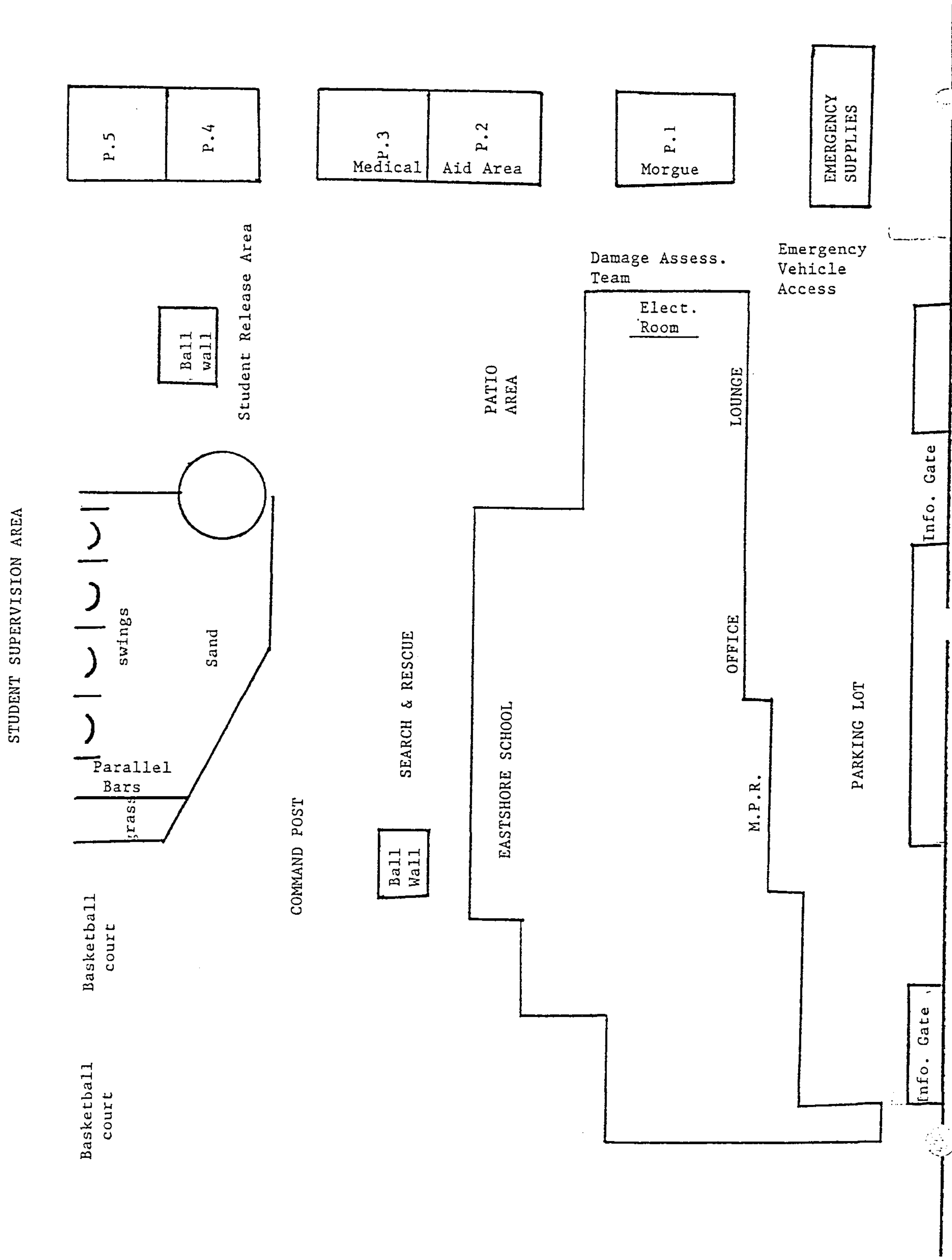
Each student should be aware of the emergency procedures related to disasters. They must know and practice the following:

1. "Drop" procedures.
2. Evacuation routes and procedures.
3. Their part in the school disaster plan.

Note: The principal will select a number of the most responsible students to act as "runners" (assistants or message carriers).

These runners will serve as messengers between the emergency information gate, and the student supervision and release emergency response and Command Post areas. They may also be used, as needed, in other activities.

It is the joint responsibility of students, parents, teachers, and the principal to be sure students know these procedures.


P.5
P.4
P.3
Medical
P.2
Aid Area
P.1
Morgue
EMERGENCY
SUPPLIES
Student Release Area
Ball
wall
Damage Assess.
Team
Emergency
Vehicle
Access
Elect.
Room
PATIO
AREA
LOUNGE
Info. Gate
STUDENT SUPERVISION AREA
swings
Sand
SEARCH & RESCUE
OFFICE
PARKING LOT
Parallel
Bars
grass
EASTSHORE SCHOOL
M.P.R.
COMMAND POST
Ball
Wall
Basketball
court
Basketball
court
Info. Gate

Designated Emergency Locations

1. **Command Post**

   A. Outside - basketball courts
   B. Inside - office

2. **Damage Assessment Team**

   A. In front of electrical room

3. **Search and Rescue Team**

   A. Command Post

4. **Medical Aide Treatment Area**

   A. Outside - inside PO 2 and 3
   Morgue - inside PO 1
   B. Inside - multipurpose room and stage

5. **Student Supervision and Release Areas**

   Student Supervision Area

   A. Outside - grass or black top
   B. Inside - classrooms/pod/library

   Student Release Area

   A. Outside - in front of Dolphin Club
   B. Inside - MPR

6. **Emergency Information Gate**

   A. Driveway entrance (parking lot)

7. **Support Team**

   A. Outside - near playground equipment
   B. Inside - kitchen

8. **Emergency Vehicle Access**

   Parking lot adjacent to trash bins
   Access for emergency vehicles (paramedics, police, fire, etc.)

Emergency Response Teams

The key element of the school site disaster plan is establishing and maintaining the following seven disaster teams. The specific duties of the teams are described in the following sections. Parents and support staff will be designated as alternates on the teams. The most important part of the school plan is to account for all students and staff and release students as soon as possible to the appropriate adult(s). Documentation is a key element of all team activity.

1. **Command Post**
   The principal, communications coordinator, information coordinator and volunteer coordinator coordinates the formation and actions of the other teams and communicates with the district office.

2. **Damage Assessment Team**
   This group shuts off utilities, secures the campus, and documents the nature and extent of damage to facilities.

3. **Search and Rescue**
   First Priority: One or more groups of staff are designated to "sweep" through buildings quickly and locate trapped or injured students or staff.

   Second Priority: Rescues injured staff and students. Reports to medical aid station to assist with rescue.

4. **Medical Aid Team**
   This team is trained in first aid and CPR. This team establishes the first aid treatment area and uses triage techniques to categorize patient injuries. Casualty reports should be sent to the Command Post as soon as possible after the disaster. Team leader is also responsible for covering and labeling dead bodies.

5. **Student Supervision and Student Release Team**
   First Priority: Staff members who are not assigned to another team, supervise two or more classes at the student supervision area. Area is secured with "caution tape." Administer to students minor first aid and emotional needs. Maintain crowd control.

   Second Priority: Staff is assigned to student release.

6. **Student Teams**
   Responsible fifth-sixth graders act as liaisons between teachers and emergency teams. Provide aid and comfort to other students.

7. **Support Team**
   Provides support to the other teams through the Command Post (communications, food and water distribution, sanitation, etc.)

8. **Emergency Information Gate**
   Staff answers questions and directs parents.

General Duty Statement - All Team Leaders

1. Trained, qualified and designated leaders lead.
2. Command leadership not cooperative style.
3. Assign priorities to multiple, urgent tasks.
4. Time is short, so decide, then direct.
5. Uncertainty risks loss of control.
6. Continuously evaluate and reassign your people.
7. Keep your team focused.
8. Do not become distracted.

Completing an Emergency Task

1. One person in charge.
2. Huddle.
3. State the objective.
4. Assign specific tasks.
5. Ask for suggestions.
6. Supervise, don't do it!
7. Record it.

General Duty Statement - Principal/Coordinator

1. Evacuate the school and take roll.
2. Establish Command Post.
3. Account for all students and staff.
4. Assign support staff and parent volunteers.
5. Determine safety of building.
6. Institute search and rescue.
7. Establish resource pool.
8. Report life threatening damage and injuries to DO (within five minutes).
9. Release students.
10. Maintain log of actions.
11. Remain at school until released by DO.

General Duty Statement - Site Communicator

1. Hook up radio outside.
2. District roll call in five minutes.
3. Determine if extension lines can be used.
4. Response-school and extension number if working.
5. Second district roll call in 10 minutes.
6. Report life threatening damage and injuries to DO.
7. Third district roll call in 30 minutes.
8. Report changes, injuries, and damage.

General Duty Statements - Information Communication (Command Post Liaison)

1. Situation briefing from principal.
2. Relay information/serve as messenger from the Command Post to individuals/teams.
3. Relay information from individuals/teams back to the Command Post.
4. Dispel rumors and verify validity of information as needed.

General Duty Statement - Damage Assessment Team Leader

1. Situation briefing from the principal.
2. Shut off utilities.
3. Secure the campus and put out fires.
4. Report and document all damage.
5. Report utility information.
6. Advise principal of progress.
7. Report to Command Post for reassignment.
8. Set up information gate.
9. Report to Command Post for reassignment.

General Duty Statement - Search and Rescue Team Leader

1. Situation briefing from principal.
2. Establish Command Post.
3. Coordinate action of teams.
4. Assign rescues - type 1 and 2 ok, 3 report.
5. Record injuries and damage.
6. Advise principal of progress.
7. Coordinate movement of patients.
8. Assist with triage and first aid.

General Duty Statement - Medical Team Leader

1. Situation briefing from the principal.
2. Establish first aid area.
3. Appoint treatment and stretcher teams.
4. Coordinate distribution of medical supplies.
5. Establish "traffic pattern" for patients.
6. Coordinate patient movement.
7. Inform principal about patient status.
8. Establish a "morgue" if necessary.
9. Command efficient use of medical resources.

General Duty Statement - Student Supervision and Release Team Leaders

Student Supervision Team Leader

1. Situation briefing from principal.
2. Account for all students (within five minutes).
3. Keep students calm, quiet and together.
4. Send accountability report to Command Post.
5. Combine class groups (if appropriate).
6. Tell staff to begin emergency assignments.
7. Tend to minor injuries.
8. May designate buddies to join each other.
9. Locate students for student release.
10. Advise principal of progress.
11. Select 10 fifth and sixth grade responsible students as runners.

Student Release Team Leader

1. Situation briefing from principal.
2. Establish student release command post (in...out).
3. Send runner(s) to student supervision area to locate students for release.
4. Verify identified child and adult.
5. Have parent sign back of student I.D. card.
6. Check off name on class roster.
7. File student I.D. tag in extended folder.
8. Advise principal of progress.

General Duty Statement - Emergency Information Gate Team Leader

1. Situation briefing from principal.

2. Park cars across driveway.

3. Establish crowd control and communication.

4. Answer questions and direct parents and emergency vehicles.

General Duty Statement - Support Team Leader

1. Situation briefing from principal.

2. Move emergency supplies to safe area if necessary or possible.

3. Issue emergency supplies to emergency teams as necessary.

4. Establish field latrines (as needed).

5. Upon request of command post, distribute food and water.

6. Advise principal of progress.

General Duty Statement - Student Supervision/Classroom Teacher

1. Duck, cover, and hold.

2. Check with your buddy.

3. Evacuate building and attempt to get everyone out.

4. Keep students calm, quiet, and together at class station - always display class name card.

5. Account for all students.

6. Forward accountability report to student supervisor(s) (within five minutes).

7. Pass out student I.D. tags and have students place them around their necks.

8. Seat your class to indicate that you are finished taking roll and each student is wearing their student I.D. tag.

9. Report to student supervision leaders for release to emergency assignments.

10. Tend to minor injuries at grade level station.

11. Locate students for student release.

12. Update roll sheets as students are released.

Emergency Response Team - Command Post Team

1. Duties

A. Coordinate attendance information from staff.
B. Coordinate all personnel and operations (roll call of team leaders).
C. Assign all emergency personnel or reassign as injuries or absences dictate.
D. Liaison with all off campus organizations including press on scene, Red Cross personnel, police and fire personnel on scene.
E. Communicate situation status to the district office on a regular basis as stated in procedures.
F. Maintain log of actions during emergency and complete accountability forms (*document all actions*).

2. Assignment

A. This team shall consist of principal, site communicator, parent volunteer coordinator, and staff as assigned.

3. Training

A. Staff will attend annual inservice training on emergency procedures/first aid/CPR/triage.

4. Equipment/Supplies

A. Communications
- Walkie talkie
- Portable radio with independent power supply
- Tape recorder and extra batteries
- Inventory of private radio equipment owned by staff or nearby parents

B. District civil defense and disaster plan
C. School emergency disaster plan
D. Current master list of students
E. Student emergency cards
F. School status forms, log of action forms, and maps of facility showing location of each station
G. Paper, pencil

5. Procedures - Emergency Phrase

A. *Document all actions taken, including time of day.*
B. Assess type and scope of emergency.
C. Determine threat to personnel and structures.
D. Determine need for evacuation and take appropriate action.
E. Establish command post.
F. Determine which emergency actions need to be activated (close campus, dispatch emergency teams, etc.)

G. Notify district office of emergency and keep them updated on a regular basis including:
   - Number of students/staff injured and extent of injuries.
   - Type and extent of damage to buildings and grounds (utilities, roofs, ceilings, etc.).
   - Actions taken by emergency teams and outside agencies.
   - List actions performed by outside agencies on campus.
   - Assistance required from district.
   - Establish time of next update.

H. Make periodic reports of confirmed information to staff and students.

I. Refer requests for assistance to appropriate emergency teams, including list and last known location of missing personnel to search teams.

J. Authorize student release team to begin releasing students.

K. Monitor location of all students (injured, missing, absent, released, etc.) with emergency card files and student I.D. cards.

L. Keep track of students released by student release team.

Note: One member of the command post should be designated as "information communicator" and act as liaison with emergency agencies.

SCHOOL STATUS FORM

1. FATALITIES: #________

2. INJURIES: Major (Can't care for): #________

   Moderate (Can care for): #________

3. MISSING PERSONS: #________

4. MEDICAL AID REQUIRED: a. ________ Manpower b. ________ Supplies

5. HEAVY RESCUE REQUIRED a. ________ Manpower b. ________ Equipment

6. OTHER ASSISTANCE NEEDED: ________

   ____

   ____

7. FACILILTIES:
   - A. Buildings collapsed (yes or no)
   - B. Water operational (yes or no)
   - C. Gas operational (yes or no)
   - D. Gas shut off (yes or no)
   - E. Sewage operational (yes or no)
   - F. Telephone operational (yes or no)

IUSD INJURY REPORT

SITE________________________ DATE________________TIME_______

IMMEDIATE ASSISTANCE REQUIRED

____ NONE ____ MEDICAL ____ FIRE ____ SEARCH/RESCUE ____ OTHER PERSONNEL

CONDITION OF STUDENTS

___ ALL ACCOUNTED FOR ___ NO INJURIES ___ NO IMMEDIATE HELP REQUIRED

___ # MISSING NAMES:____

___ # TRAPPED IN BUILD. NAMES:____

___ # INJURED ____# REQUIRING IMMEDIATE MEDICAL ATTENTION

NAME	TYPE OF INJURY	LOCATION

CONDITION OF STAFF

___ ALL ACCOUNTED FOR ___ NO INJURIES ___ NO IMMEDIATE HELP REQUIRED

___ # MISSING NAMES:____

___ # TRAPPED IN BUILD. NAMES:____

___ INJURED ____# REQUIRING IMMEDIATE MEDICAL ATTENTION

NAME	TYPE OF INJURY	LOCATION

MISSING PERSONS

NAME: ______________________________

LAST KNOWN LOCATION OR ACTIVITY ______________________________

____

GENERAL DESCRIPTION & CLOTHING ______________________________

____

NAME: ______________________________

LAST KNOWN LOCATION OR ACTIVITY ______________________________

____

GENERAL DESCRIPTION & CLOTHING ______________________________

____

NAME: ______________________________

LAST KNOWN LOCATION OR ACTIVITY ______________________________

____

GENERAL DESCRIPTION & CLOTHING ______________________________

____

LOG OF ACTIONS TAKEN

Date of this page: ______________________ Page number _____ of _____

TIME	REPORTING PERSON	INFORMATION/MESSAGE/ACTION TAKEN

Damage Assessment Team

1. Duties

A. Pick up supplies and put on protective clothing and gear.
B. Put out fires if possible; request assistance if needed.
C. Determine if the gas must be shut off; shut off if necessary.
D. Check other utilities: water, electricity, sewage, telephone (put telephones back on cradle).
E. Determine resources that are available for immediate use (power, telephone, water, sanitary conditions, etc.)
F. Move supplies to secure perimeter of student supervision area.
G. Check and document the nature and extent of damage to facilities.
H. Report damage and utility information to the command post.
I. Establish information gate.
J. When duties are completed, report to the command post for reassignment.

2. Assignment

A. Custodian and assigned staff.

3. Training

A. Location of utility shutoff valves and procedures and tools to shut them off.
B. Knowledge of all access points to campus and how to secure buildings.
C. Knowledge of fire protection equipment.

4. Equipment/Supplies

A. A master set of keys
B. Tools required to shut off utilities
C. 1 walkie talkie
D. Stakes, caution tape, hammer
E. 1 flashlight/lightsticks
F. 2 hard hats
G. 2 pairs of leather gloves
H. 2 dust masks
I. 1 first aid kit
J. 1 good knife
K. 2 backpacks
L. 2 mylar blankets
M. 2 rolls of duct tape
N. 1 stretcher
O. 1 large screwdriver
P. 1 large hammer
Q. 1 Phillip's screwdriver

R. 2 small crowbars
S. 1 adjustable wrench
T. 1 plier
U. 1 hacksaw
V. 1 package blades/hacksaw
W. 1 mini recorder
X. 1 shovel

Damage Assessment - First Priority

5. Procedures

A. Pick up supplies and put on protective clothing.
B. Report to team leader at electrical room to receive a debriefing.
C. Check utilities and shut off (if appropriate)
D. Move materials to student supervision area to secure perimeter.
E. Secure buildings (lock all external doors) and if necessary put out fires.
F. Determine availability of resources for immediate use (power, telephone, water, sanitary conditions, etc.)
G. Assess damage to buildings and record damage on damage reports.
   - Assess damage to primary wing, record damage on damage report, and report to command post via walkie talkie.
   - Assess damage to middle wing, record damage on damage report, and report to command post via walkie talkie.
   - Assess damage to upper wing, record damage on damage report, and report to command post via walkie talkie.
   - Assess damage to library, MPR, stage, office, lounge, and kitchen, report damage on damage report, and report to command post via walkie talkie.
   - Assess damage to portables, record damage on damage report, and report to command post via walkie talkie.
   - Put an "X" on external doors with duct tape and lock.
   - Check perimeter of the school for damage and record damage on damage report.
H. Report information to command post via walkie talkie.
I. Two team members report to information gate.
   - Move cars across driveways.
   - Communicate with community/parents.
   - Route emergency vehicles (fire, ambulance, and police).
J. Rest of team reports to command post for reassignment.

Damage Assessment - Second Priority

6. Procedures

A. Assess damage to primary wing, record damage on damage report, and report to command post via walkie talkie.

B. Assess damage to middle wing, record damage on damage report, and report to command post via walkie talkie.
C. Assess damage to upper wing, record damage on damage report, and report to command post via walkie talkie.
D. Assess damage to library, MPR, stage, office, lounge, and kitchen, report damage on damage report, and report to command post via walkie talkie.
E. Assess damage to portables, record damage on damage report, and report to command post via walkie talkie.
F. Lock doors and check perimeter of the school for damage.
G. Report to command post for reassignment.

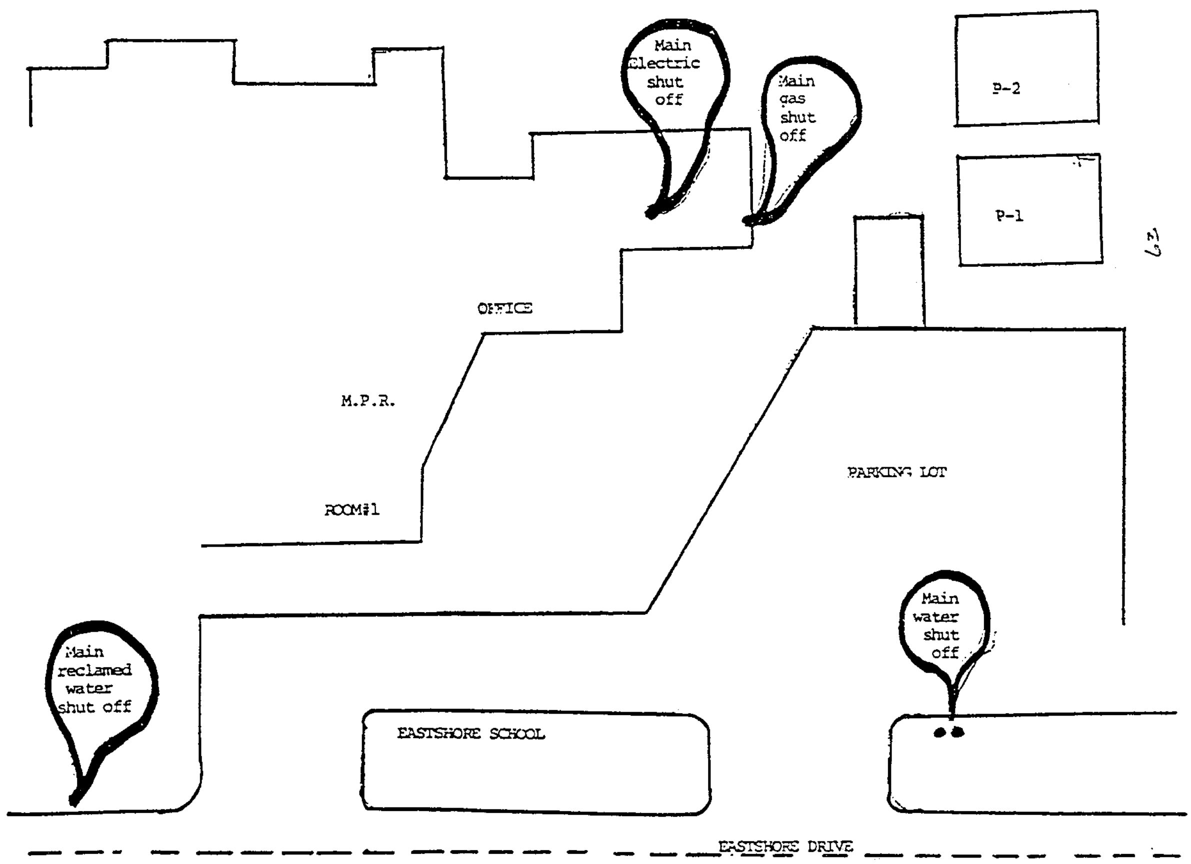
Utility Shut-Off Information

1. *Main water shut off (to conserve water in tank for emergency).* Turn off water at main valve. Wrench is located by the gas meter in the electrical room, which is opposite the dumpster.

2. Water shut off for school. The main water shut off is just down the sidewalk from the parking lot entrance. You can turn the wheel to shut off the main water supply. Use either the wrench or wheel. It is easier to use the wrench if a woman has to do it.

3. Shut off electricity. The main electrical shut off is located outside in the electrical room across from the dumpster area. Use key 23001 to open padlock on electrical door. Turn off small main switches, then main switch. The wheel and wrench are located by the gas meter.

4. Gas shut off. Take wrench located by turn off. Turn off gas. Shut off is marked in red. Gas meter is located in the electrical room opposite the dumpster.



DAMAGE ASSESSMENT FORM

SITE Eastshore BUILDING ______________________ DATE __________

General Condition of building (Circle One):

Severe Damage Moderate Damage Light Damage

Specific Structure Damage	Severe	Moderate	Light
Walls	Falling Down	Cracks	Standing
Doors	Jammed	Some Damaged But Operable	Easy to Open
Glass (windows)	Much Broken Glass	Cracks in Glass	Mostly Intact
Ceiling	Severe Damage To Ceiling Panels	A Few Fallen	Mostly Intact
Utilities/Electrical	Water Broken	Gas Smell	No Visible Problem
Foundation	Tilted-Moved	Cracked	Intact

Specific Non Structure Damage

Teacher's Desk	Overturned	Intact	
Students Desks	Damaged	Intact	
Tables	Damaged	Intact	
Lights	Don't Work	Work	
Chairs	Damaged	Intact	
File Cabinets	Overturned	Intact	

(Circle One)
BUILDING IS IS NOT REINHABITABLE

General Comments:

Emergency Information Gate

1. **Duties**

   A. Secure parking lot.
   B. Direct parents and emergency vehicles.

2. **Equipment**

   A. Information sign(s)
   B. Cars
   C. Walkie talkie
   D. Paper, pencil

3. **Procedures**

   A. Park car(s) across driveway.
   B. Be available to give and receive information.
   C. Allow emergency vehicles access and direct them to access area.

Search and Rescue Team

1. Duties

A. Pick up supplies and put on protective clothing.
B. Pick up *missing persons forms* from the command post.
C. Rescue victims and perform emergency first aid.
D. Load victims onto stretchers and transport injured to medical aid station (sixth graders can be used to transport victims).
E. Search *last known* locations of missing students and staff first.
F. Perform an organized search of all facilities.
G. Put an "X" on the doors of the rooms that have been completely searched.
H. When duties are completed, report to the command post for reassignment.

2. Assignment

A. Staff members trained and physically capable of performing light rescue and other duties listed above.

3. Training

A. Standard first aid/CPR/triage.
B. Fire extinguisher usage.

4. Equipment

A. 1 flashlight/lightsticks
B. 2 hard hats
C. 2 pair of leather gloves
D. Sturdy shoes
E. 1 walkie talkie
F. Clipboard and pencils
G. Stretcher
H. Fire extinguishers
I. Axe or crowbar
J. 2 mylar blankets
K. Shovels
L. Masking tape
M. 1 good knife
N. 1 large screwdriver
O. 1 large hammer
P. 1 Phillip's screwdriver
Q. 1 adjustable wrench
R. Pliers

S. 1 package blades/hacksaw
T. Mini recorder

5. Procedures

A. Report to command post to verify numbers of people missing.
B. Begin search with partner.
C. Inspect all classrooms, bathrooms, office, stage, portables, etc. for missing or injured.
D. Perform fire suppression and lifesaving first aid techniques as needed. Summon medical aid team and additional help as needed by walkie talkie or student runners.
E. Upon completion of search, report to command post and then begin second priority. (Rescue victims and transport them to medical aid area).

Note: Search teams should not be delayed by any particular victim or problem but should have other personnel take charge as soon as possible so that they can continue their search of entire grounds.

General Duty Statement - Search and Rescue Team Leader

1. Situation briefing from principal.
2. Establish Command Post.
3. Coordinate action of teams.
4. Assign rescues - type 1 and 2 ok, 3 report.
5. Record injuries and damage.
6. Advise principal of progress.
7. Coordinate movement of patients.
8. Assist with triage and first aid.

Medical Aid Team

1. **Duties**

   A. Establish first aid treatment area.
   B. Lay out supplies for easy access.
   C. Assist search and rescue team with transporting students to medical aid area.
   D. Triage (evaluate, sort, and prioritize) all victims with injuries.
   E. Provide emergency first aid.
   F. Report to the command post the major and moderate injuries.
   G. Inform command post of victims you are unable to handle so that requests for professional medical help can be made.
   H. Log all injuries on first aid log or triage tags.
   I. Establish morgue; cover and label bodies.

2. **Assignment**

   A. School nurse (if possible) and trained staff including one person for record keeping.

3. **Training**

   A. *Staff*
   Current first aid/CPR/triage
   Organization of an emergency first aid center

   2. *Student Runners/Stretcher Carriers*
   Procedures for moving victims

4. **Equipment**

   A. First aid kit (supplemental with major trauma supplies)
   B. Stretchers/wheelchair
   C. Blankets
   D. 1 box of paper blankets
   E. Flashlights
   F. Triage tags
   G. First aid records
   H. List of students with special medical problems
   I. Supplies for special needs students (medication, food for diabetics, etc.)
   J. Walkie talkie
   K. Plastic bags and sanitary napkins
   L. Field trip first aid box

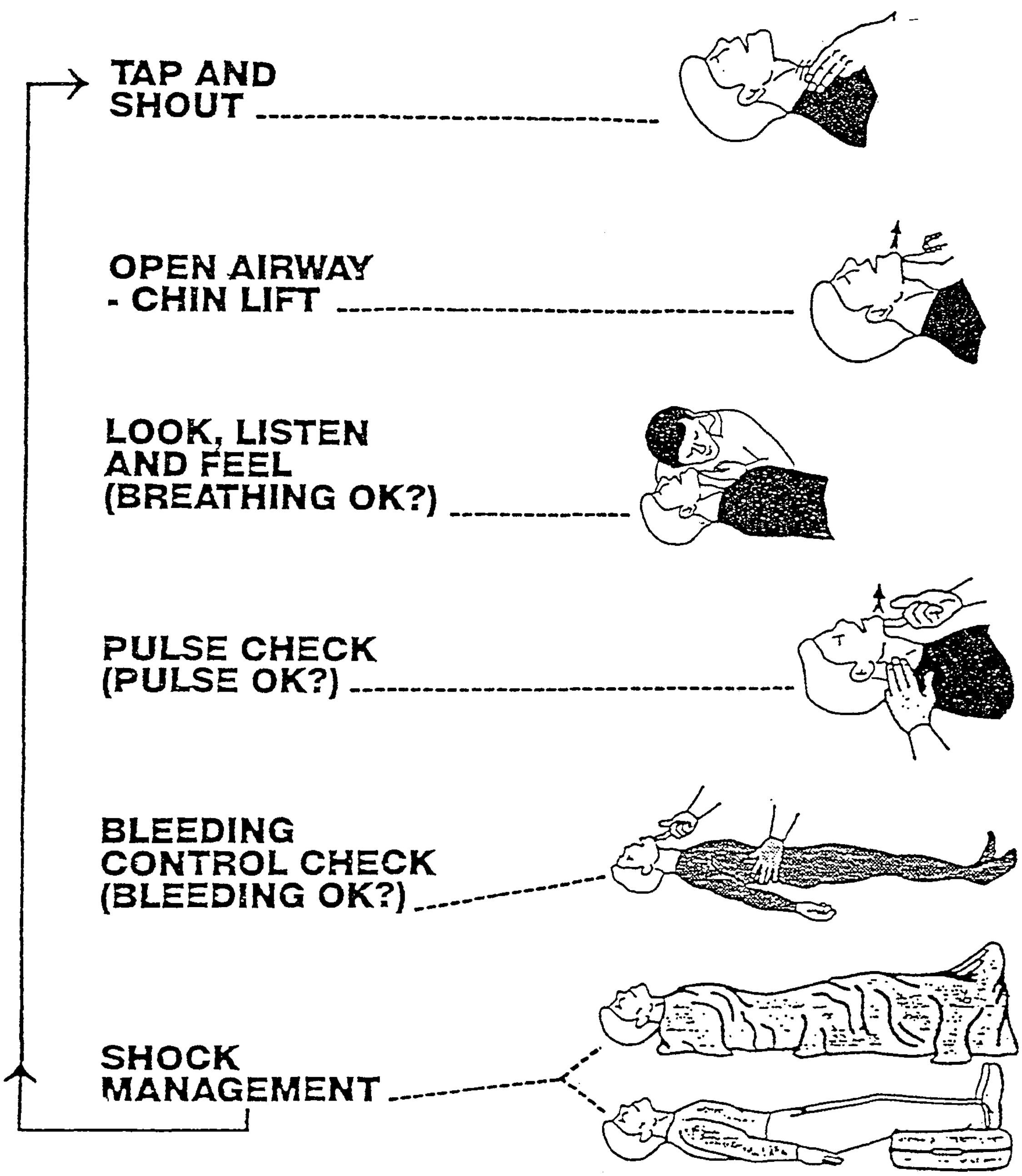
5. Procedures

A. Establish first aid treatment area.
B. Team leader to appoint walkie talkie intake, recorder, and director of first aid.
C. In conjunction with the command post, determine availability of emergency medical services.
D. Using simple triage and rapid treatment (S.T.A.R.T.) system and triage tags, sort patients as to immediate, delayed, ambulatory, or deceased.
E. Record keeper follows and fills out first aid record.
F. Treat immediate category patients and prepare for transport and/or appropriate care.
G. When outside emergency responders arrive, they must be fully briefed as to injury status (triage tags and first aid record).
H. Establish morgue area, if needed.
   - Major concerns are identification and preservation of the body and documentation as to cause of death.
   - Bodies should be covered, undisturbed, and located in an area away from surviving victims.
   - Care should be taken when selecting a morgue site since, according to state law, any area or equipment that comes in contact with the dead can never be used to prepare food again.

General Duty Statement - Medical Team Leader

1. Situation briefing from the principal.
2. Establish first aid area.
3. Appoint treatment and stretcher teams.
4. Coordinate distribution of medical supplies.
5. Establish "traffic pattern" for patients.
6. Coordinate patient movement.
7. Inform principal about patient status.
8. Establish a "morgue" if necessary.
9. Command efficient use of medical resources.

Primary Assessment Checksheet



FIRST AID RECORD

NAME	SX	TEACHER	ROOM	LOCATION OF INJURY	TYPE OF INJURY	TRIAGE PRIORITY			OUT TRANSPORT NAME/ NUMBER	EVACUATION DESTINA- TION

DATE: ______________ SITE: ______________ RECORDER: ______________

IUSD EMERGENCY RESPONSE

WHO	WHAT	WHERE	WHY	WHEN	
NAME	ASSIGNMENT	AREA	PURPOSE	TIME IN	TIME OUT

General Duty Statement - Student Supervision and Release Team Leaders

Student Supervision Team Leader

1. Situation briefing from principal.
2. Account for all students (within five minutes).
3. Keep students calm, quiet and together.
4. Send accountability report to Command Post.
5. Combine class groups (if appropriate).
6. Tell staff to begin emergency assignments.
7. Tend to minor injuries.
8. May designate buddies to join each other.
9. Locate students for student release.
10. Advise principal of progress.
11. Select 10 fifth and sixth grade responsible students as runners.

Student Release Team Leader

1. Situation briefing from principal.
2. Establish student release command post (in...out).
3. Send runner(s) to student supervision area to locate students for release.
4. Verify identified child and adult.
5. Have parent sign back of student I.D. card.
6. Check off name on class roster.
7. File student I.D. tag in extended folder.
8. Advise principal of progress.

Student Supervision and Release Teams

First Priority: Student Supervision

1. Duties

A. Take over supervision of students in classes where teachers have other assignments.

B. Keep students calm, quiet and seated together until released.

C. Tend to minor cuts/abrasions, etc.

D. Help locate students for release. (See release procedures.)

E. Begin activities or games to keep students occupied.

2. Assignments

A. All staff not assigned other specific emergency duties.

3. Training

A. Emergency preparedness plan.

4. Equipment/Supplies

A. Master list of students
B. Roll sheet
C. 2 bullhorns
D. Backpacks with supplies
E. Tape recorder with extra batteries
F. Stakes
G. Hammer
H. Caution tape

5. Procedures for Supervision

A. Keep students in class groups in student supervision area.
B. Begin activities or games to keep students occupied.

Second Priority Student Release

1. Duties

A. Release students to parents/authorized adults.
B. Verify adults and release students.
C. Document the release of all students.

2. Assignments

A. Selected staff members not assigned other specific emergency duties.

3. Training

A. Student release procedures

4. Equipment/Supplies

A. 2 tables with handles, pencils, paper, pen
B. 1 large release sign
C. 6 master list of students
D. Student I.D. tags
E. 1 bullhorn
F. 1 walkie talkie
G. Emergency cards
H. Alphabetized extended folder

5. Procedures for Student Release at Release Area

A. Set up two areas, check in and check-out.
B. Identify child and adult. If the adult is not the parent/guardian, or is not listed on the emergency card, the child needs to be asked the following questions before being released, and not in the presence of the requesting adult:
- Do you know this person?
- Do you think your parents would want you to go with this person?
- Do you trust this person?
- Do you feel comfortable going with this person?

If a student is unwilling to go, he or she should not be released.

C. Send runner to fetch student. Runner brings student back to check out station.
D. The adult signs the back of the student I.D. tag.
E. I.D. tags are filed alphabetically in extended file.

6. Procedures for Student Release at Student Supervision Area

If a parent should bypass the student release area and go directly to the supervision area, the teacher in charge should:

A. Request that the parent go directly to the release station.
B. If the parent refuses, then fetch the student and be sure the parent signs the I.D. tag and gives it to you.
C. Forward signed I.D. tag to the student supervision team leader.
D. The team leader will then send the signed I.D. tag to the release center for filing.

We need to establish procedures for release of bodies from the morgue area between portables 1 and 3 if needed.

A. Major concerns are identifications and preservation of the body and documentation as to the cause of death.

EASTSHORE ELEMENTARY SCHOOL

MAJOR EMERGENCY PREPAREDNESS RELEASE CARD

IN THE EVENT OF A MAJOR EMERGENCY, THE FOLLOWING INFORMATION IS BEING REQUESTED FROM YOU.

Student Name	Parent Name	Teacher's Name

Address	Home Phone #	Work Phone #

Does the father work? Yes ___ No ___ Approx. distance from school? ____________

Does the mother work? Yes ___ No ___ Approx. distance from school? ____________

Place an "M" for mother or an "F" for father if either parent has had training in the following:

_____ Red Cross first aid _____ CB radio or amateur radio operator _____ CPR

Would you be available to assist school personnel in the event of a major emergency? _____ Yes _____ No

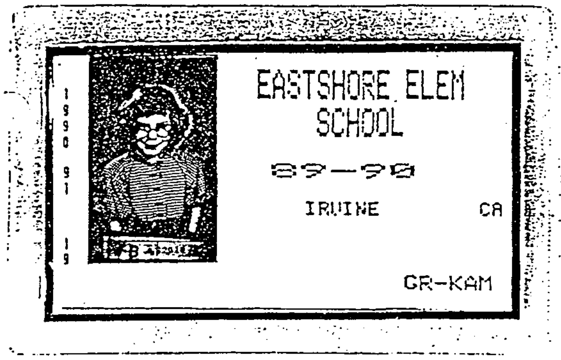
You give school personnel permission to release your child/children to the following people in the event of a major emergency (do not list yourself)

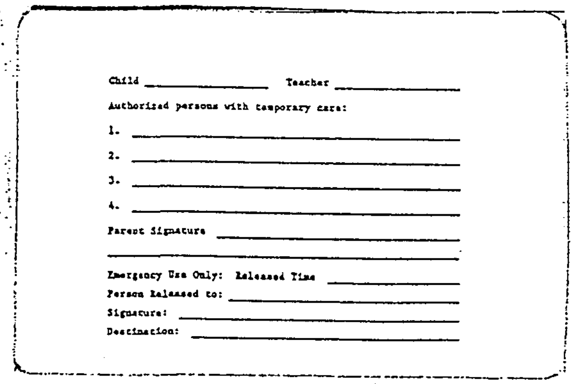
Name	Address	Phone Number
Name	Address	Phone Number
Name	Address	Phone Number
Name	Address	Phone Number

You give school personnel permission to release your child/children to the above or a friend, neighbor, co-worker, secretary, etc. representing you only in the event of a MAJOR EMERGENCY. The school will have on file the signature of the adult who picked up your child. The child will be asked:

1. Do you know this person?
2. Do you trust this person?
3. Do you feel comfortable going with this person?
4. Do you think your parents would want you to go with this person?

Parent signature	Date





Child ____________ Teacher ____________

Authorized persons with temporary care:

1. ____________
2. ____________
3. ____________
4. ____________

Parent Signature ____________

____

Emergency Use Only: Released Time ____________

Person Released to: ____________

Signature: ____________

Destination: ____________

Quieting Activities (Primary)

1. Read the group a story.

2. Tell a story or stories.

3. Play one of the following games:

   I Spy; 7-Up; Simon Says; Categories; Telephone; Riddle Me This; 20 Questions.

4. Sing some songs:

   Zipidee-Do-Da; Row, Row, Row Your Boat; Yankee Doodle; She'll Be Coming Around the Mountain; What Can the Matter Be; Bingo; It's a Small World; Puff the Magic Dragon; Twinkle, Twinkle Little Star; Old MacDonald.

5. Do fingerplays:

   The Bus Song; Eesntsy Weensty Spider; The Bear Went Over the Mountain; 10 Little Indians.

Quieting Activities (Upper Grades)

1. Read the group a story.

2. Tell stories.

3. Games:

   Math Bee (like Spelling Bee); Hammer, Scissors, Paper; 20 Questions; Going on a Picnic; Spelling Game (example, 7th letter in the word watermelon); Charades; Simon Says.

4. Songs:

   Kokaburra; Do Your Ears Hang Low?; In a Cabin in the Woods; We are the World; There She was Just a Walking Down the Street; Michael Row the Boat Ashore.

EASTSHORE SCHOOL
DISASTER PLAN
ACCOUNTABILITY REPORT

Class Period ________________

Name of Teacher/Supersvisor ______________________________ Room No. ________________

☐ EVERYBODY HERE
All students/personnel present at this Assembly Area station.

KNOWN ABSENTEES FOR TODAY ARE:

☐ PROBLEMS AS FOLLOWS:

1. There are walking wounded at this Assembly Area station. . . . . No ☐ Yes ☐ ________ Specify how many

2. There are injured students/personnel who belong at this station and had to be left in the classroom/on campus. . . . . No ☐ Yes ☐

Names or Numbers of Victims	Where Located

3. There are other students/personnel missing from this Assembly Area station. . . . . No ☐ Yes ☐

   Specify names:

4. There is additional documentation on reverse side of this report. . . . . No ☐ Yes ☐

SEND BOTH COPIES TO EMERGENCY OPERATIONS TEAM

Support Team

1. Duties

A. Provide communications, supplies, food, and sanitation services during the emergency.

2. Assignment

A. Selected staff members including custodial staff.

3. Training

A. Familiar with location of all emergency supplies and knowledge of what is available through the district.

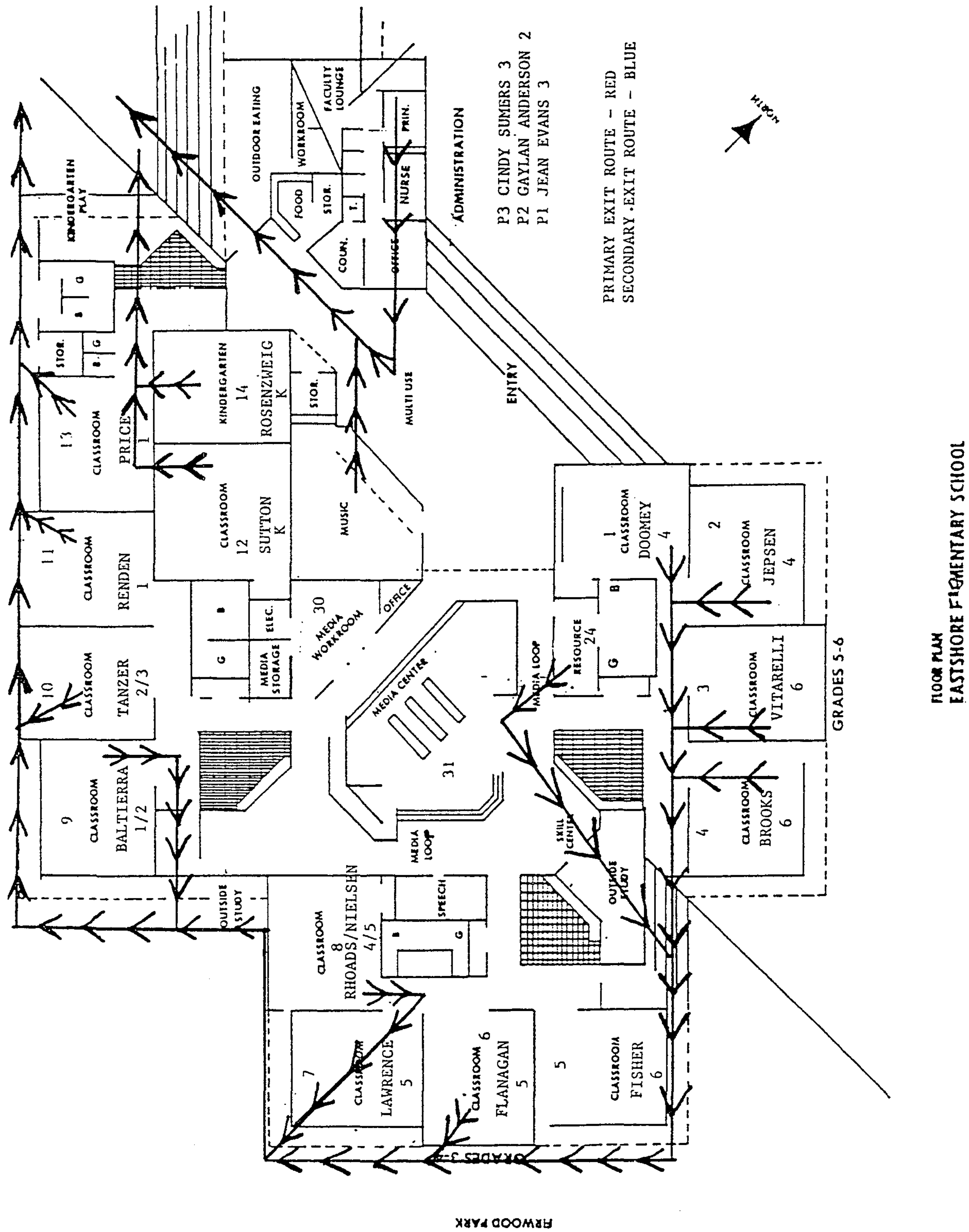
4. Equipment/Supplies

A. Walkie talkie
B. Inventory lists
C. Carts for transporting supplies
D. Tarps/tents
E. 4 small trash cans
F. 2 rolls of duct tape
G. 4 cardboard voting booths
H. 6 rolls of toilet paper
I. 1 box of small plastic trash can liners

5. Procedures

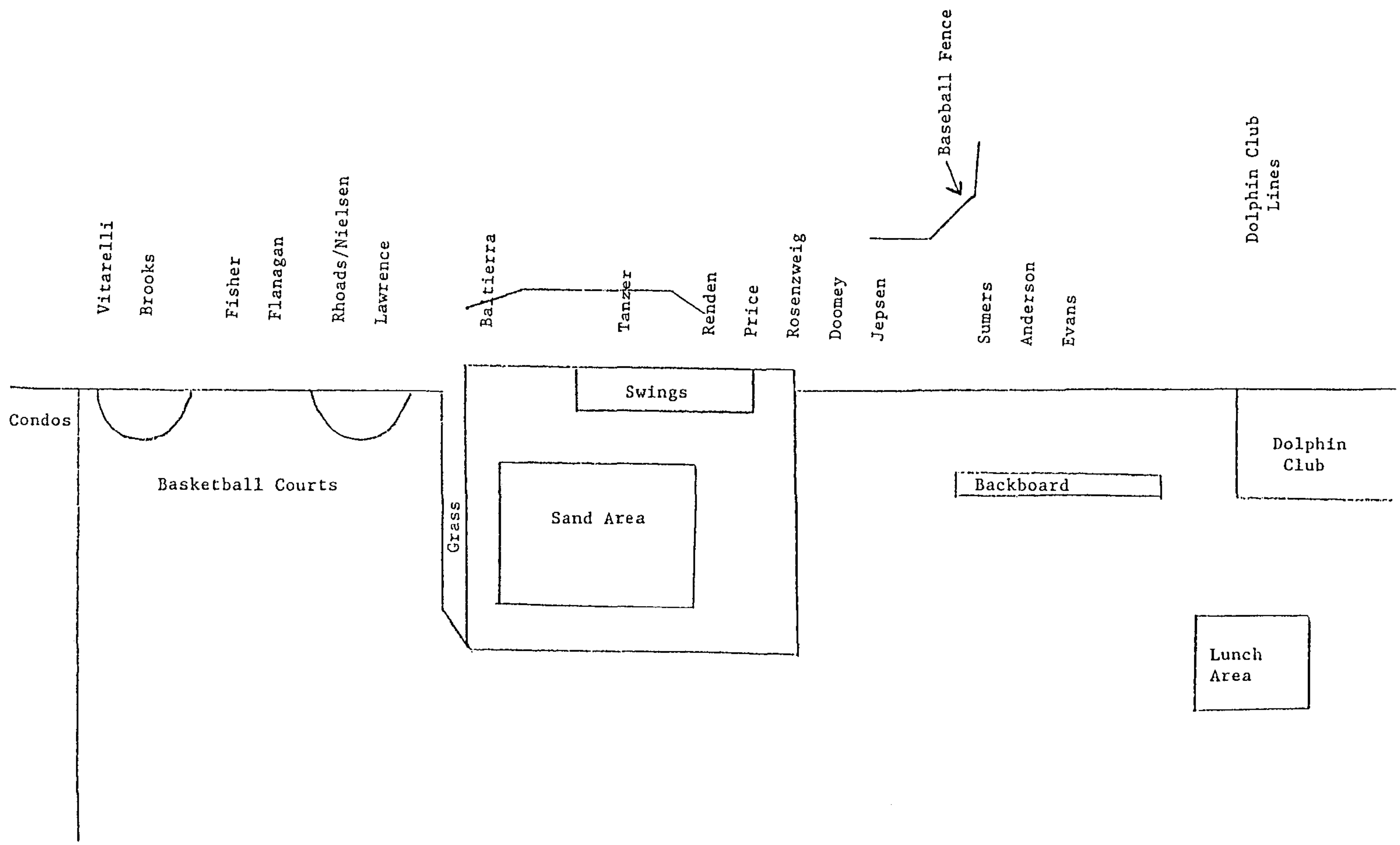
A. Team members should check emergency supply storage areas to evaluate survival status.
B. Move supplies to safe area if necessary or possible.
C. Issue emergency supplies to emergency teams as needed.
D. Coordinate ordering supplies from off campus with the command post.
E. Establish field latrines (male and female) as needed.
F. Upon request of the command post, team establishes schedule and method of food distribution.
G. Team sets up field kitchen if needed for extended emergencies.

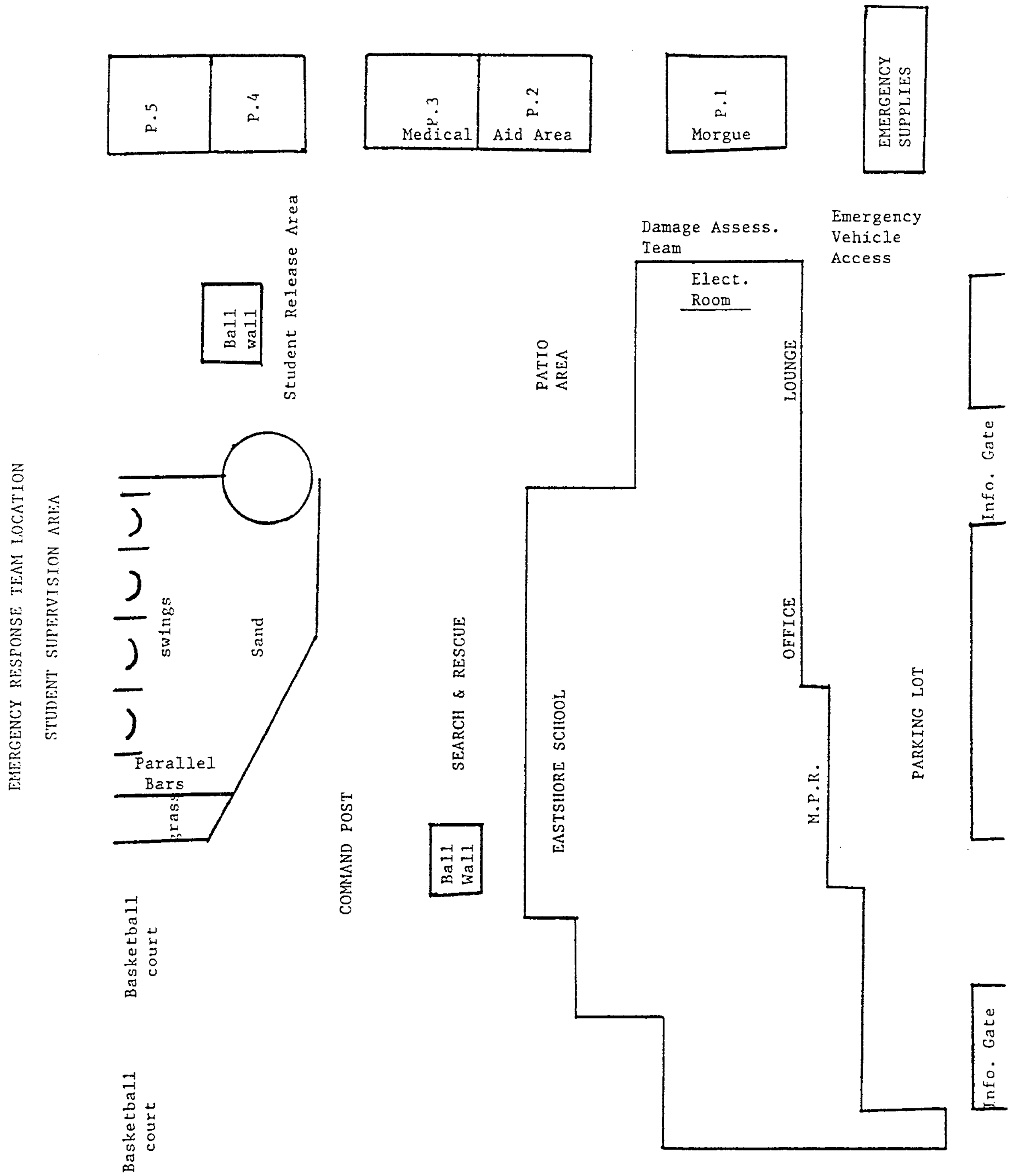
Maps Showing Designated Emergency Locations

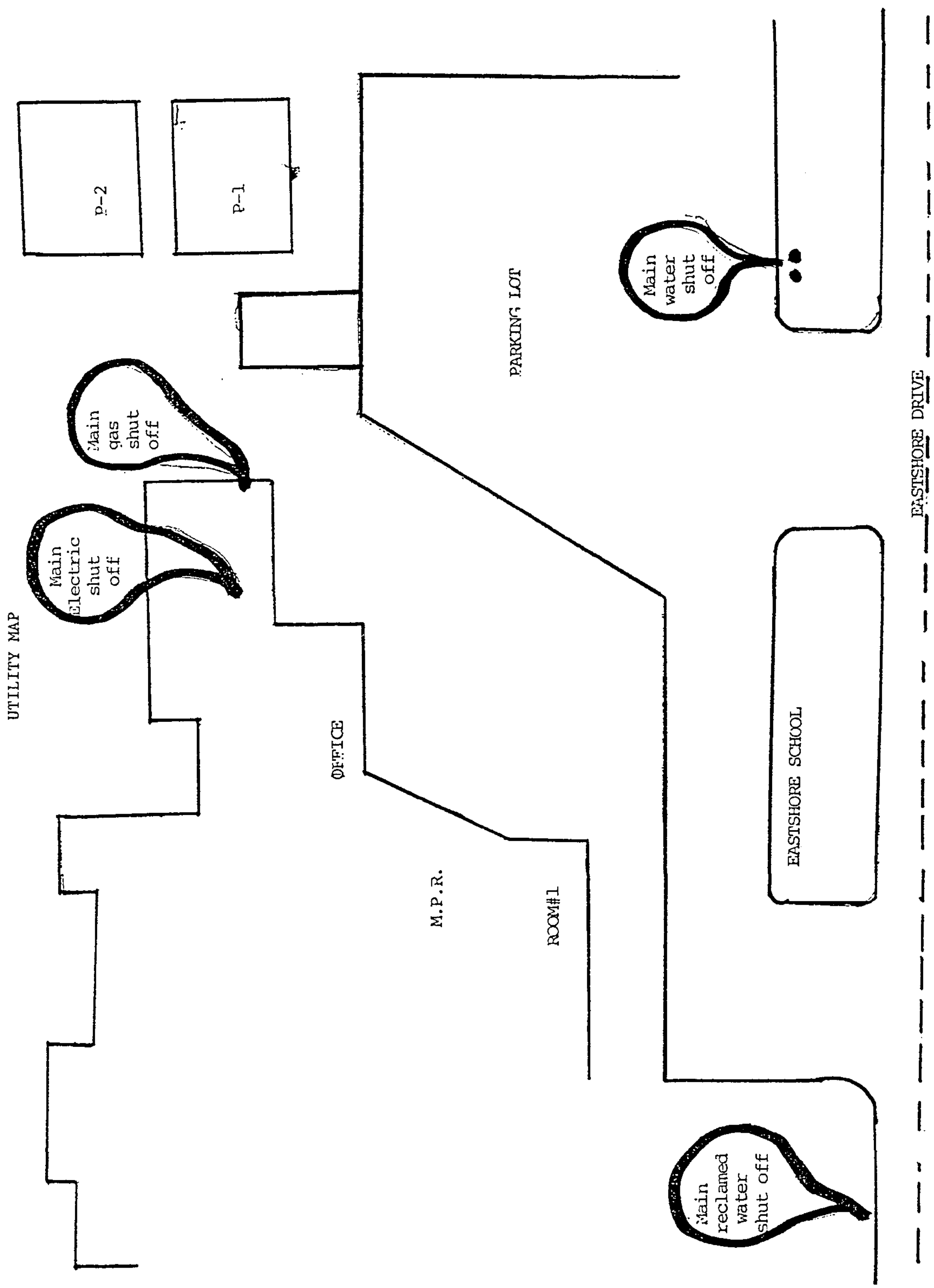

P3 CINDY SUMERS 3
P2 GAYLAN ANDERSON 2
P1 JEAN EVANS 3
PRIMARY EXIT ROUTE - RED
SECONDARY EXIT ROUTE - BLUE
ADMINISTRATION
ENTRY
MULTI USE
MUSIC
OFFICE
MEDIA CENTER
31
GRADES 5-6
CLASSROOM 1 DOOMEY 4
CLASSROOM 2 JEPSEN 4
CLASSROOM 3 VITARELLI 6
CLASSROOM 4 BROOKS 6
CLASSROOM 5 FISHER 6
CLASSROOM 6 FLANAGAN 5
CLASSROOM 7 LAWRENCE 5
CLASSROOM 8 RHOADS/NIELSEN 4/5
CLASSROOM 9 BALTIERRA 1/2
CLASSROOM 10 TANZER 2/3
CLASSROOM 11 RENDEN 1
CLASSROOM 12 SUTTON K
CLASSROOM 13 PRICE 1
KINDERGARTEN 14 ROSENZWEIG K
KINDERGARTEN PLAY
OUTDOOR EATING
WORKROOM
FACULTY LOUNGE
FOOD
STOR.
COUN.
NURSE
PRIN.
MEDIA WORKROOM 30
MEDIA STORAGE
ELEC.
RESOURCE 24
MEDIA LOOP
SKILL CENTER
OUTSIDE STUDY
SPEECH
FIRWOOD PARK
FLOOR PLAN
EASTSHORE ELEMENTARY SCHOOL

EVACUATION/FIRE DRILL MAP

Student Supervision Area (S.S.A.)

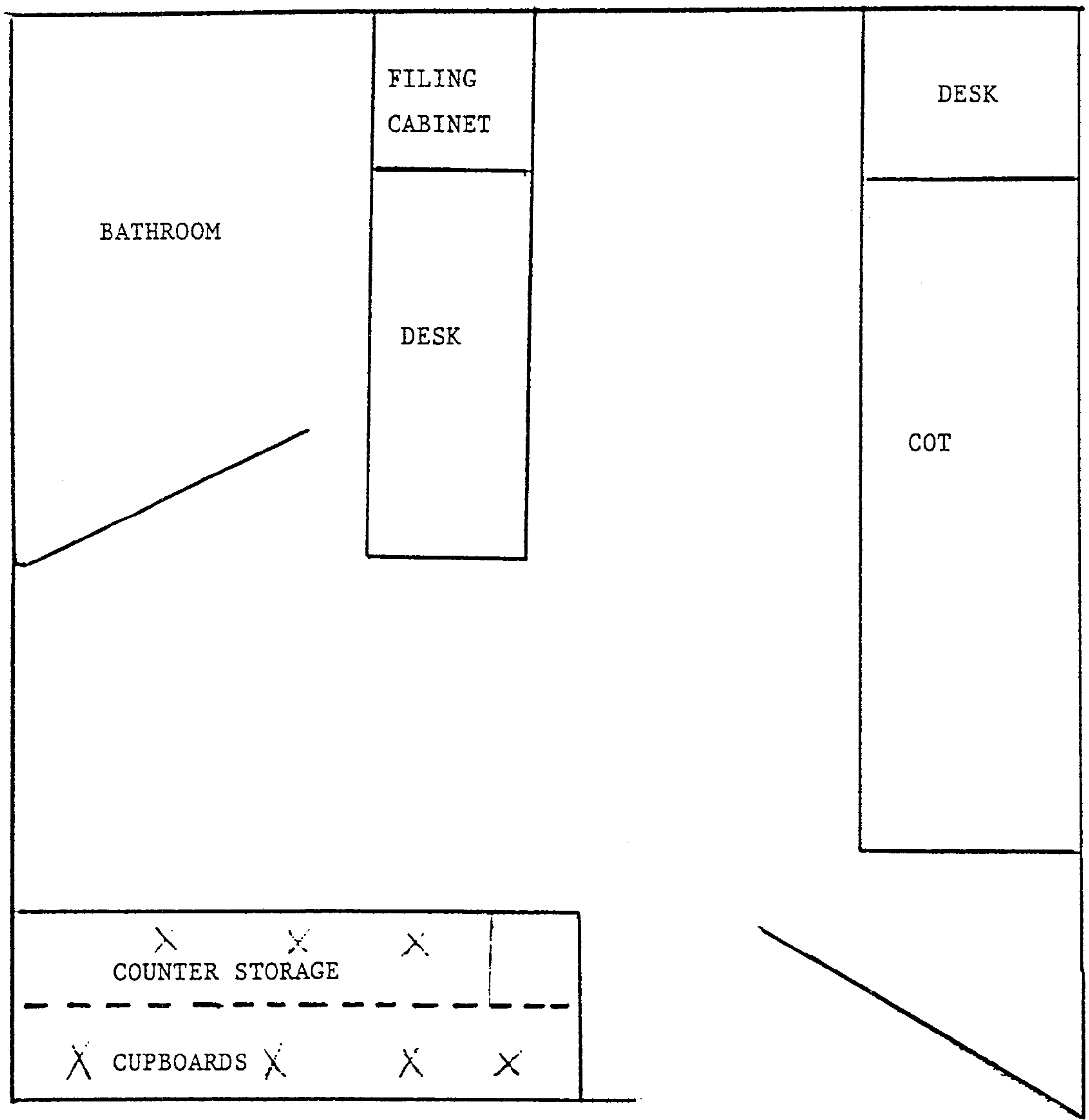



EMERGENCY RESPONSE TEAM LOCATION
STUDENT SUPERVISION AREA
P.5
P.4
P.3
Medical
P.2
Aid Area
P.1
Morgue
EMERGENCY SUPPLIES
Student Release Area
Ball wall
Damage Assess. Team
Emergency Vehicle Access
Elect. Room
PATIO AREA
LOUNGE
Info. Gate
swings
Sand
OFFICE
SEARCH & RESCUE
EASTSHORE SCHOOL
PARKING LOT
Parallel Bars
M.P.R.
COMMAND POST
Ball Wall
Basketball court
Basketball court
Info. Gate


UTILITY MAP
P-2
P-1
Main gas shut off
Main Electric shut off
PARKING LOT
Main water shut off
EASTSHORE DRIVE
OFFICE
M.P.R.
ROOM#1
EASTSHORE SCHOOL
Main reclamed water shut off

HEALTH OFFICE

EMERGENCY SUPPLY LOCATIONS



X INDICATED LOCATION OF SUPPLIES

Classroom Safety Inspection

School____________________________________ Room No._______________

Please inspect your room for the following conditions. Notify your immediate supervisor of any unsafe conditions.

All objects stored above shoulder level should either be secured in such a manner as to not easily tip or fall or be secured to wall surfaces. *Teacher Disaster Packet on wall near exit.*

_____ Store all heavy objects on the lowest shelves.

_____ Separate all glass objects in such a manner that they will not be jolted against each other or against other objects.

_____ Make certain that all overhead storage is properly secured.

_____ Store chemicals on low shelves. Laboratories can be extremely hazardous during a disaster situation.

_____ Inspect all areas for loose items that might tip or fall during an earthquake (including statues, display items, TV sets, etc.) and secure them to wall surfaces or locate them away from student seating.

_____ *Do not* allow access to doors or other exits to become blocked or partially blocked at any time by anything.

_____ *Do not* leave doors to storage cabinets open and unlatched when the cabinets are not in actual use.

_____ *Do not* allow flammable, combustible materials to be stacked or stored near exit doors.

____ *Do not* allow the over accumulation of flammable and/or combustible materials in classrooms, work rooms or other work places.

_____ *Do not* store flammable and/or combustible or other hazardous chemicals in such a manner as to allow the contents to mix if the containers are broken. (This is particularly true of chemicals which when combined will produce toxic gases or cause "instant fire.")

_____ *Do not* let glass containers of materials accumulate on counter tops or other work spaces; put them back into proper storage areas when you have finished using.

_____ *Do not* allow electrical cords to extend across walkways or exit ways. Remove them immediately after use and store them properly.

_____ *Do not* suspend flammable material or other objects from ceilings or from lighting pictures.

On the other side of this sheet, please note any problems that you have not been able to take care of. Please sign your name where indicated below to verify that your room inspection has been completed. Thank you.

Date:____________________ Instructor____

Eastshore School - Custodial School Safety Check

Yes **No**

_____ _____ 1. Objects stored above shoulder level are secured to walls or are stored in such a manner that they will not easily fall, or they are away from student seating. (TV monitors, plants, aquariums, etc.)

_____ _____ 2. All storage shelving and large cabinets are secured to wall surfaces.

_____ _____ 3. All heavy objects are stored on the lower shelves.

_____ _____ 4. All cabinets above shoulder level are secured with locks or latches when not in use.

_____ _____ 5. Flammable materials are not stacked or stored near exit doors, near electrical panels or water heaters.

_____ _____ 6. Access to doors or other exits are not blocked or partially blocked at any time.

_____ _____ 7. Suspended T-bar ceilings are cross-wired to roof (evident by X-crossed wires above ceiling).

_____ _____ 8. Any chemicals used in the classroom are stored in such a manner that if the containers are broken, the contents will not mix (particularly when the potential mixes will produce toxic gases or fire).

_____ _____ 9. Electrical cords are not extended across hallways or exits except when actually in classroom use.

_____ _____ 10. Teachers Disaster Packets are on walls near exit.

Note any special hazards on the back of this form.

Coping with Emotional Needs in a Disaster Situation

During a disaster, there may be persons who are overwhelmed by the event and have difficulty in coping with the situation and their emotions.

Fear is a normal reaction to any danger which threatens life and well-being. After a disaster, children may be afraid of recurrence, of injury, of death, of being separated from their family, and/or being left alone. After the child is relieved that nothing "serious" has happened to him/her, the emotional needs must be addressed.

1. Attempt to calm the child and maintain calmness.

2. Communicate confidence in yourself, as well as concern for the child. Show you care by your attitude.

3. Listen to what the child tells you about his fears.

4. Listen when he tells you about how he feels, what he thinks of what has happened.

5. Explain to the child, as well as you can, about the disaster, about the known facts, and again, listen to him.

6. Accept your own limitations in a relief role. *Do not attempt to be all things to all people. Do what you can and obtain additional help as needed.*

Coping with Young Children's Reaction to Disaster

1. Fear and Anxiety

A. Fear is a normal reaction to any danger which threatens life and well-being.
B. What are children afraid of after a disaster?
- They are afraid of recurrence or injury or death.
- They are afraid of being separated from their family.
- They are afraid of being left alone.

C. Teachers might ignore the emotional needs of the child once they are relieved that nothing "serious" has happened to their class.
D. One must recognize that a child who is afraid, is very frightened!
E. A first step for teachers is to understand the kinds of fear and anxiety a child experiences.

2. Advice to Teachers

A. It is of great importance for everyone, except the severely injured, to remain together.
B. The child needs reassurance by the teacher's words as well as his/her actions.
C. Listen to what the children tell you about their fears.
D. Listen when they tell you about how they feel about what has happened.
E. Explain to the child, as well as you can, about the disaster, about the known facts and again, listen to them.
F. Encourage them to talk.

3. Settling Down

A. Teachers should indicate to the child that they are maintaining control; they should be understanding but firm, supportive, and make decisions for the child. Their parents will come for them when it is safe.

Regressive Behavior

A. Bed wetting
B. Clinging to adults
C. Thumb sucking

4. Children respond to praise, and teachers should make a deliberate effort not to focus upon the child's immature behavior.

Specific fears

A. Refusal to go anywhere
B. Afraid of the dark
C. Afraid of going to sleep
D. Afraid of imaginary "monsters"

5. How can the teachers recognize when to seek additional help?

A. If a sleeping problem continues for more than a few nights, if the clinging behavior does not diminish, if the fears become worse, it is time to ask for professional advice.
B. Mental health professionals are especially trained to help people in distress. They can help parents cope with and understand the unusual reactions of the child. By talking to the parents and child either individually or in groups, a child's fears can be overcome more easily.
C. Teachers should also be aware of their own fears and uncertainty and of the effect these have upon the children.

Emergency Equipment/Supplies at Eastshore
Location: Brick Enclosure Beside Dumpster

1 mobile trash can 32 gallon 21" x 34"
4 highway emergency blankets 54" x 80"
1 100 foot nylon cord
6 hard hats
1 candle lantern
6 flashlights
1 hack saw
1 15'4" x 19'8" tarp
1 Indian chief axe
1 AM/FM radio
1 16 oz nail hammer
2 hacksaw blades
1 10" adjustable wrench
1 round point shovel
32 cases drinking water, 64 packets to a case
1 mall
1 axe
24 stakes
1 case trash can liners
3 cases plastic bags 33" x 39"
1 power stapler
14 AA batteries
2 bullhorns
3 mini recorders
12 fluorescent vests
4 impact goggles
4 tub candles
4 pairs of gloves
1 roll of duct tape
1 wrecking bar
1 six ton hand jack
1 box 3 piece plier set
4 screwdrivers
1 14" pipe wrench
9 nose masks
2 cases food, 24 to a case
2 square point shovels
1 bolt cutter
2 rolls of caution tape
1 case of toilet tissue
1 case of sanitary napkins
1 case of disposable blankets
2 walkie talkies
Battery charger
1 doz plain nylon pinnies - yellow
20 D batteries

Eastshore School Teacher Backpack

Envelope

1. Class roster
2. Accountability forms
3. Index card listing teacher responsibilities
4. Emergency team assignments and necessary forms
5. Student I.D. tag
6. Pencils, markers, paper
7. Whistle
8. Large teacher name sign
9. Activities for children

Teacher Backpack

First aid pouch:
- gloves x 2 pair
- band aids
- cotton balls
- first aid cream
- gauze - rolls and squares
- tape
- pins
- antiseptic wipes

Alcare can
Flashlight
2 batteries
Light sticks x 2
Drinking water x 4
Trash bag 1g
Kleenex
Triangular bandage
Polarshield blanket
Masking tape
Marking pen

Teachers to Put Into Backpack

School emergency plan
CPR/first aid books
Class list
Team assignment
Games, books, and activities selected by each teacher
Large grade level sign

Appendix B

Partial Reprint:
Identification and Reduction of Nonstructural Earthquake Hazards in California Schools[1]

developed by
California Office of Emergency Services Earthquake Program

and

Structural Safety Section
Office of the State Architect[2]

The following pages are reprinted from a handbook on the **Identification and Reduction of Nonstructural Earthquake Hazards in California Schools.** More information can be obtained by contacting the Office of Emergency Services (OES) Earthquake Program, 101 8th Street, Suite 152, Oakland, CA 94607.

---

[1] The initial publication of this document was supported by funding through a cooperative agreement between the Federal Emergency Management Agency and the California Office of Emergency Services. The recommendations included in this document are intended to improve hazard mitigation. The contents do not necessarily reflect the views and policies of the Federal Emergency Management Agency, the Governor's Office of Emergency Services, or the Office of the State Architect. The contents do not guarantee the safety of any individual, structure, or facility in an earthquake. Neither the United States nor the State of California assumes liability for any injury, death, or property damage that occurs in connection with an earthquake.

[2] The principal contributors to this paper were Marjorie Greene, Dennis Bellet, and Sarah Nathe. Graphics were produced by Kit Wong and Damian Robledo.

CHECKLIST

Use this checklist to complete a nonstructural hazards survey at a school site. Once the survey is completed, any checks in the NO boxes indicate items that are in need of correction.

YES/NO

EQUIPMENT AND FURNISHINGS

- ❑ ❑ Are desktop computers secured? (solution EF1a or b)
- ❑ ❑ Are the tops of tall (4- or 5-drawer) file cabinets secured to the wall? (solution EF2) **(LS)**
- ❑ ❑ Do file cabinet drawers have latches? (provide latches)
- ❑ ❑ Are large and heavy office machines restrained and located where they will not slide a few inches, fall off counters or block exits? (solution EF3a or b)
- ❑ ❑ Are wall-mounted objects over 5 lbs. connected to structural framing? (solution EF4)
- ❑ ❑ Are tall cabinets, bookshelves, coat closets attached to the wall or attached to each other? (solution EF5) **(LS)**
- ❑ ❑ Are desks or tables located such that they will not slide and block exits? (move them)
- ❑ ❑ Are tall storage racks cross-braced in both directions or, for racks significantly taller than wide, are there large anchor bolts connected to the concrete slab? (solution EF6) **(LS)**
- ❑ ❑ Are heavy or sharp wall decorations securely mounted, with closed eye-hooks, for example? (solution EF4)

YES/NO

- ❑ ❑ Are valuable, fragile art objects or trophies protected against tipping over, breaking glass or sliding off shelves or pedestals? (solution EF7)
- ❑ ❑ Are refrigerators or ranges restrained by built-in kitchen cabinetry or attachments to floor or wall? (solution EF2) **(LS)**
- ❑ ❑ Is floor-supported freestanding shop equipment secured against overturning or sliding? (solution EF8) **(LS)**
- ❑ ❑ Are fire extinguishers securely mounted? (solution EF9)
- ❑ ❑ Are potted plants or heavy items on top of file cabinets or other high locations restrained? (solution EF10)
- ❑ ❑ Are display cases or aquariums protected against overturning or sliding off tables? (solution EF1)
- ❑ ❑ Are weight room equipment and racks anchored and weights properly stored? (provide secured racks)
- ❑ ❑ Is freestanding equipment on wheels locked against rolling? (lock wheels)

HAZARDOUS MATERIALS

- ❑ ❑ Are compressed gas cylinders secured top and bottom with a safety chain? (solution HM1)
- ❑ ❑ Are laboratory chemicals on shelves restrained? (solution HM2) **(LS)**

(A/E) indicates an architect or engineer should be consulted. (L/S) indicates a life safety hazard.

Items in italics are generally already taken care of in public schools if they were part of recent, state-approved construction.

YES/NO

❑ ❑ *Are gas tank legs anchored to a concrete footing or slab?* (solution HM3) **(A/E) (LS)**

❑ ❑ Are containers of hazardous materials stored on braced storage racks or tall stacks? (provide secured storage) **(LS)**

❑ ❑ Do gas pipes have flexible connections? (provide flexible connections) **(A/E)**

OVERHEAD ELEMENTS

❑ ❑ *Does the suspended ceiling have diagonal bracing wires?* (solution OE1) (A/E) **(LS)**

❑ ❑ *Are the fluorescent light fixtures merely resting on the hung ceiling grid, without another support?* (solution EE1) **(A/E) (LS)**

❑ ❑ *Do pendant mounted light fixtures or chandeliers have safety cables?* (solution OE4) (LS)

❑ ❑ Will hanging light fixtures swing freely, not hitting each other if allowed to swing 45 degrees minimum? (fix or remove fixtures) **(LS)**

❑ ❑ Are decorative ceiling panels or latticework securely attached? (solution OE1)

❑ ❑ Will spotlights remain securely attached if shaken? (secure them)

❑ ❑ Are sound system speakers in elevated locations anchored to structure? (secure speakers)

❑ ❑ *Are suspended space heaters, especially gasfired, braced and/or have flexible gas connections?* (solution OE2) **(A/E)**

YES/NO

❑ ❑ Do hanging plants, mobiles, or displays have closed eye-hooks, and can they swing freely 45 degrees? (secure objects in safe locations, see solution EF4)

❑ ❑ Could chandeliers swing freely, not hitting each other, or windows, roof trusses, or walls? (immobilize or move chandeliers)

❑ ❑ *Are air distribution grills or diffusers securely mounted*? (provide anchorage)

❑ ❑ *Do large metal air distribution ducts, especially those suspended a few feet, have diagonal bracing?* (solution OE3) **(A/E)**

❑ ❑ Have heavy objects been removed from the tops of shelves? For 5 & 6 year olds, overhead objects are only 3 feet off the floor. (remove the objects) **(LS)**

ELECTRICAL EQUIPMENT

❑ ❑ Are fluorescent light bulbs and lenses fastened securely? (solution EE1)

❑ ❑ Are emergency battery-powered lights fastened securely on shelves? (secure batteries)

❑ ❑ Is essential communications equipment secured? (secure it)

MECHANICAL EQUIPMENT

❑ ❑ *Are the water heaters restrained*? (solution ME1)

❑ ❑ *Is the furnace or boiler restrained*? (solution EF8) **(A/E)**

❑ ❑ *Are there masonry incinerator chimneys on the school site that have not been reinforced*? (remove them) **(A/E) (LS)**

(A/E) indicates an architect or engineer should be consulted. (L/S) indicates a life safety hazard.

Items in italics are generally already taken care of in public schools if they were part of recent, state-approved construction.

Use this checklist to complete a nonstructural hazards survey at a school site. Once the survey is completed, any checks in the NO boxes indicate items that are in need of correction.

YES/NO

- ❑ ❑ *Are large diameter pipes braced or do pipes that cross expansion joints have accommodation for movement?* (solution ME2) **(A/E)**
- ❑ ❑ *Are fans, chillers, pumps, or other heating-ventilating-air conditioning equipment--typically found in mechanical rooms--restrained or mounted correctly?* (solution ME3a or b) **(A/E)**
- ❑ ❑ *Do the fire sprinkler risers have a v-brace to the wall, and do the large diameter sprinkler pipes have diagonal braces to the structure above?* (solution ME2) **(A/E)**

PARTITIONS

- ❑ ❑ Are freestanding, movable, partial-height partitions--especially if supporting bookshelves--adequately braced? (solution PA1)
- ❑ ❑ Have all unreinforced masonry partitions, usually brick or hollow tile walls in pre-1933 buildings, been removed? (remove them) **(LS)**
- ❑ ❑ Are light-weight drywall partitions that extend as high as the hung ceiling braced or supported by the structure above, particularly if these partitions are used as lateral support for tall shelving or cabinets? (solution PA3) **(A/E)**
- ❑ ❑ Are the clear panels in partitions made of plastic or safety glass? (replace with shatter-proof material or apply shatter-resistant film)

YES/NO

WINDOWS

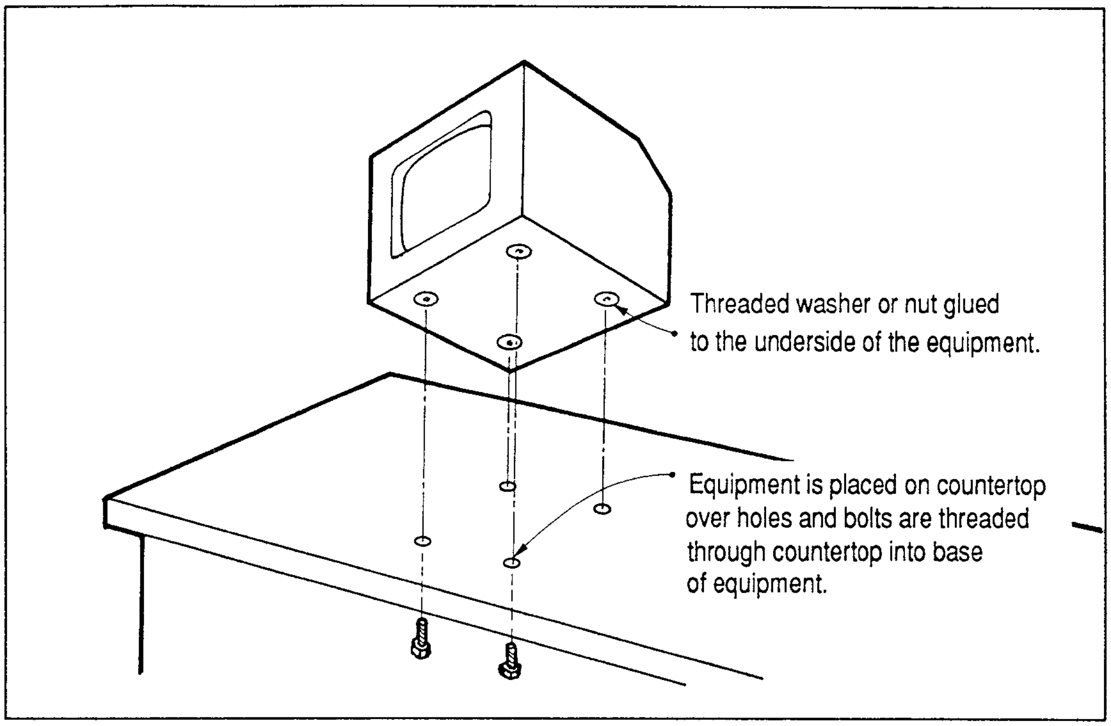
- ❑ ❑ *Are the large panes made of safety glass, and is it known if the mounting of the panes was designed by an architect/engineer to accommodate expected seismic distortion of the surrounding structure?* (apply shatter-resistant film)
- ❑ ❑ *Are transoms (glass panes over doors) of safety glass?* (apply shatter-resistant film)

EXTERIORS

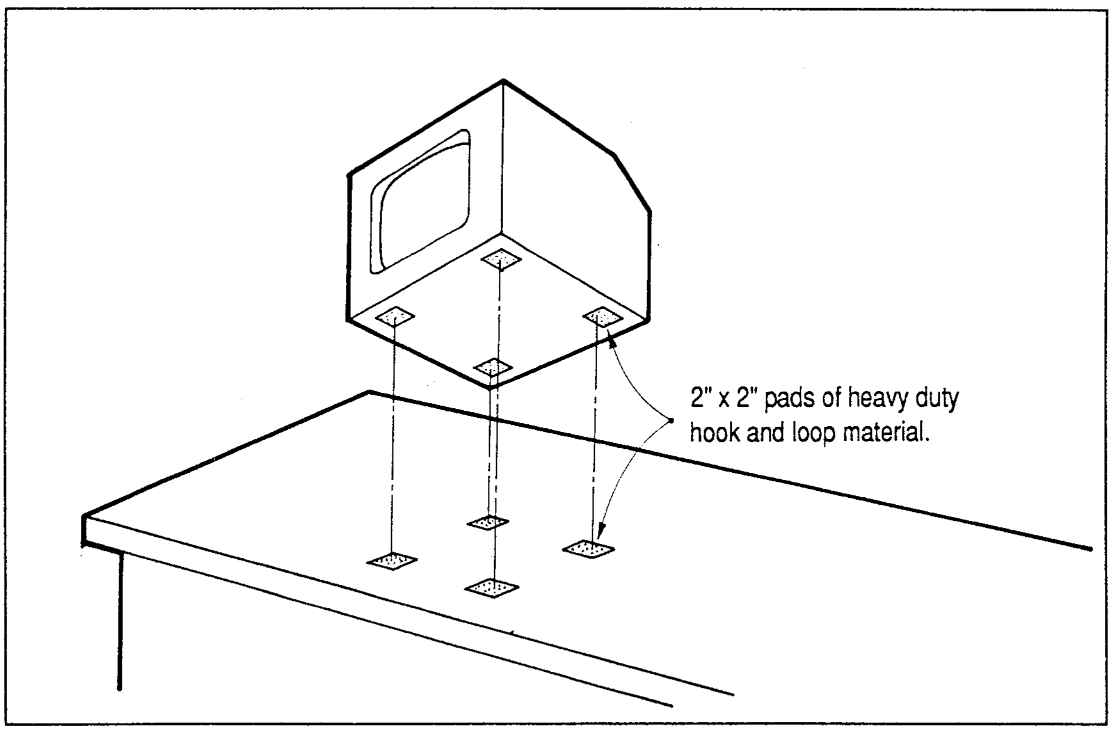
- ❑ ❑ Are decorations or appendages adequately attached? (solution E1) **(A/E)**
- ❑ ❑ Are statuary or decorative objects anchored? (solution E1) **(A/E)**
- ❑ ❑ Are tall backboards or fences supported by pressure-treated wood posts or galvanized metal posts? (provide anchorage to ground)
- ❑ ❑ *Are fences made of concrete, concrete block, stone or brick, adequately reinforced to resist earthquakes?* (reinforce or remove) **(A/E)**
- ❑ ❑ If large trees are leaning or in poor health are they supported? (support or remove trees)
- ❑ ❑ Is signage adequately secured, especially if heavy? (solution E1)

(A/E) indicates an architect or engineer should be consulted. (L/S) indicates a life safety hazard.

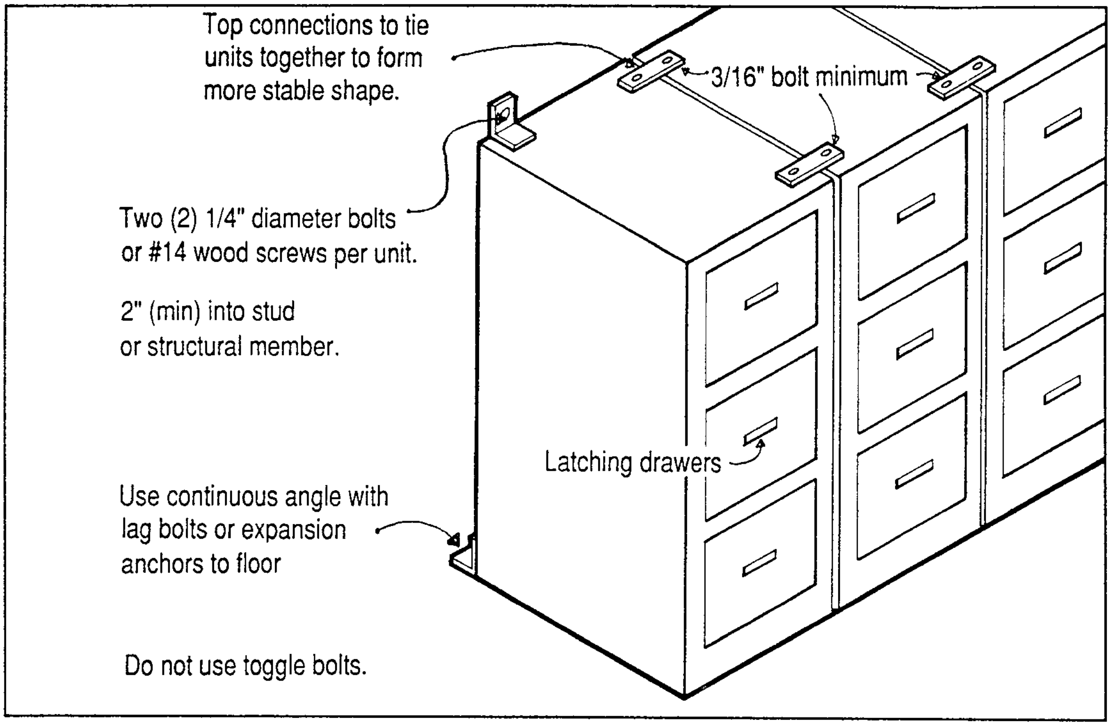
Items in italics are generally already taken care of in public schools if they were part of recent, state-approved construction.



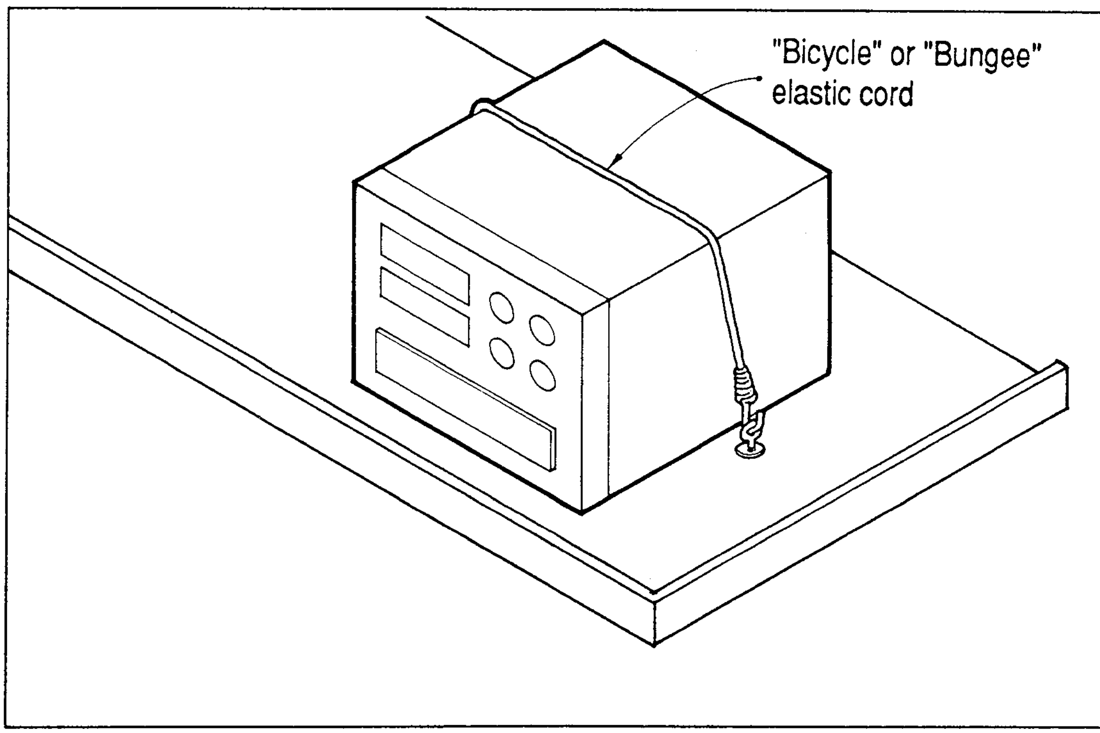
EF1(a) - FIXED ATTACHMENT OF EQUIPMENT TO COUNTERTOP



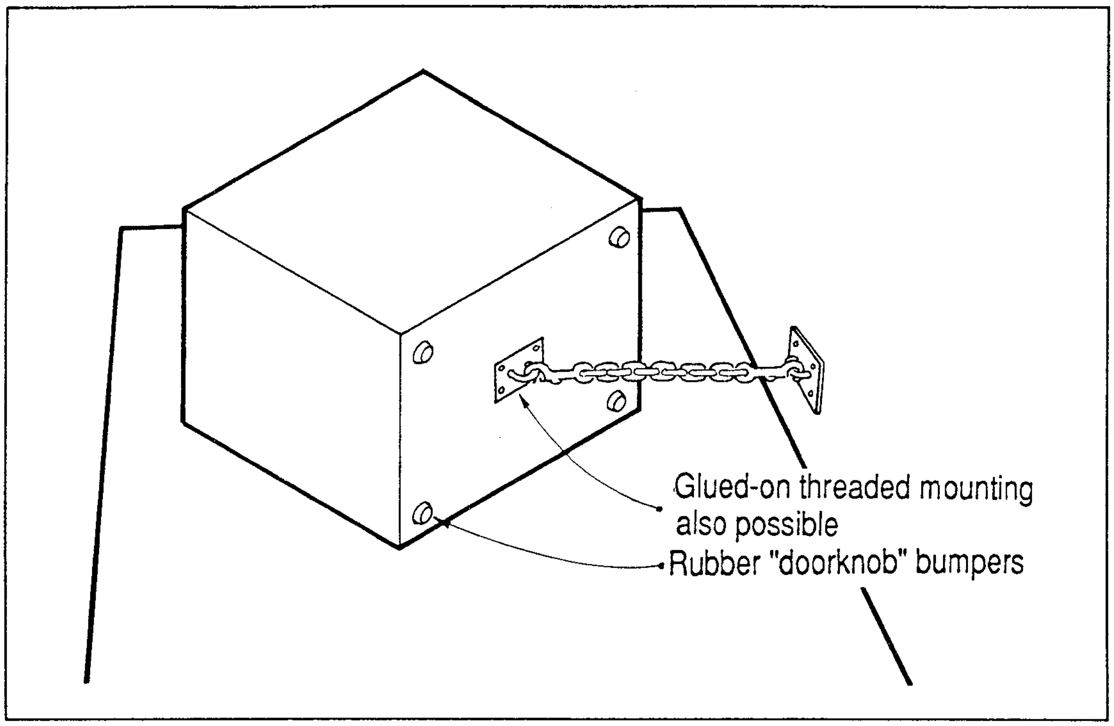
EF1(b) - REMOVABLE ATTACHMENT OF EQUIPMENT TO COUNTERTOP



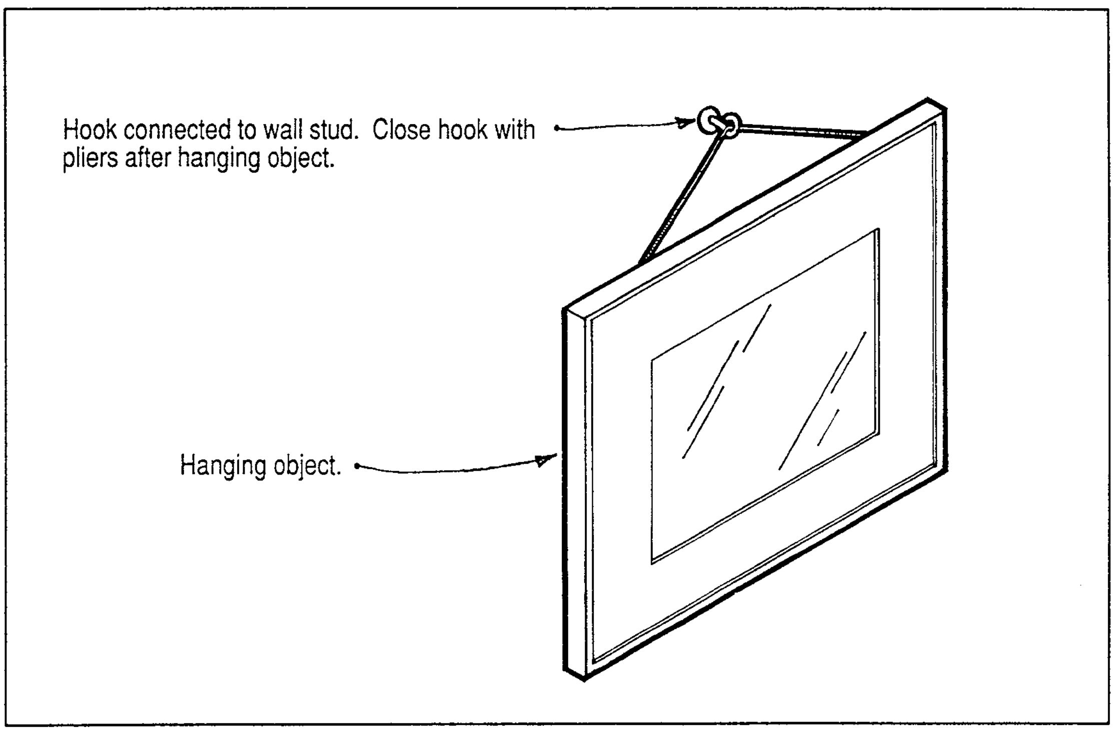
EF2 - CABINETS ATTACHED AT TOP, BOTTOM AND SIDES TO STRUCTURE



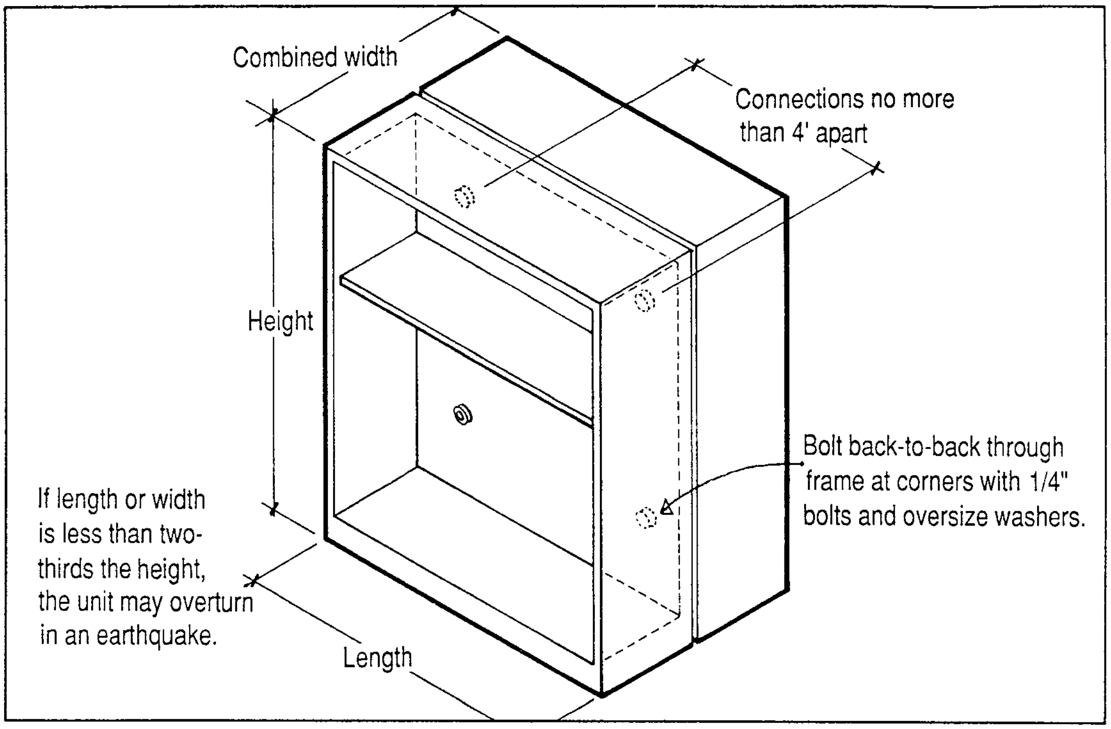
EF3(a) - TIE DOWN ATTACHMENT OF RADIO EQUIPMENT



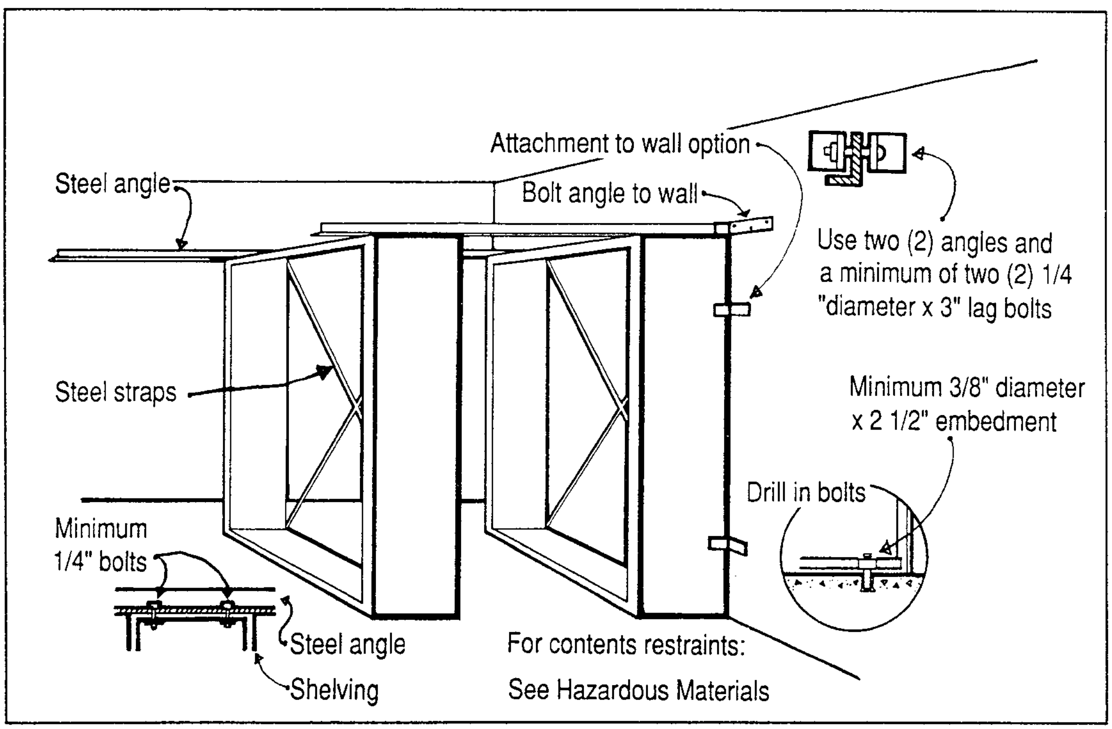
EF3(b) - DETACHABLE LEASH ATTACHMENT OF RADIO EQUIPMENT TO WALL



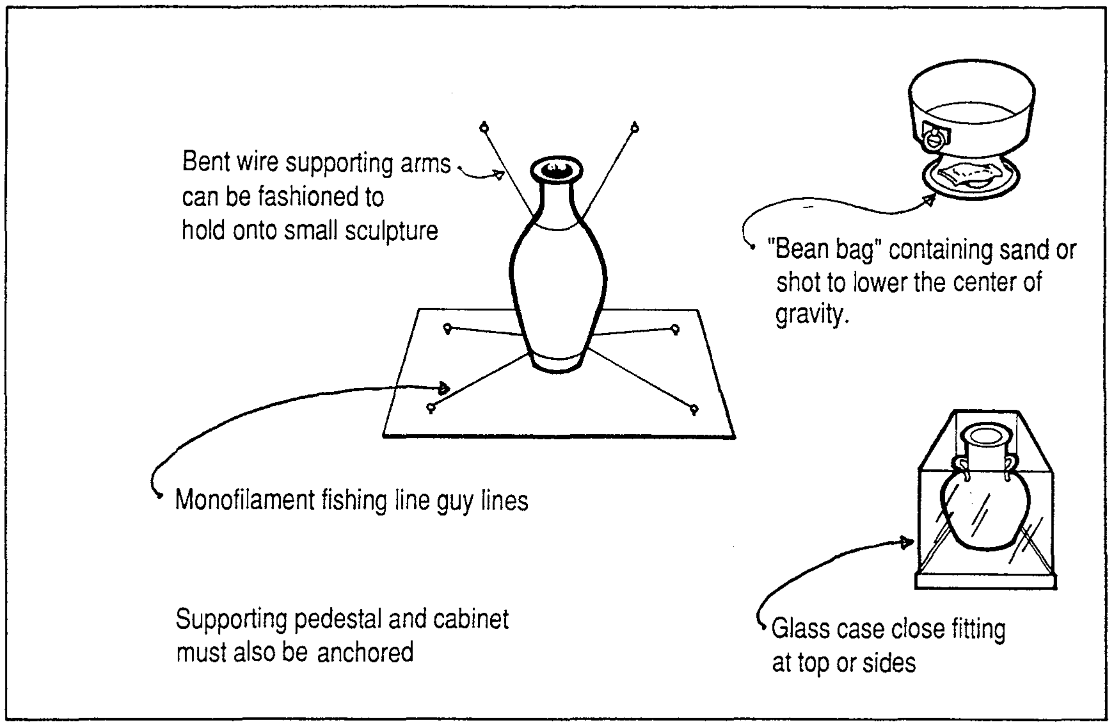
EF4 - ATTACHMENT OF SHELVES AND PICTURE FRAMES TO WALLS



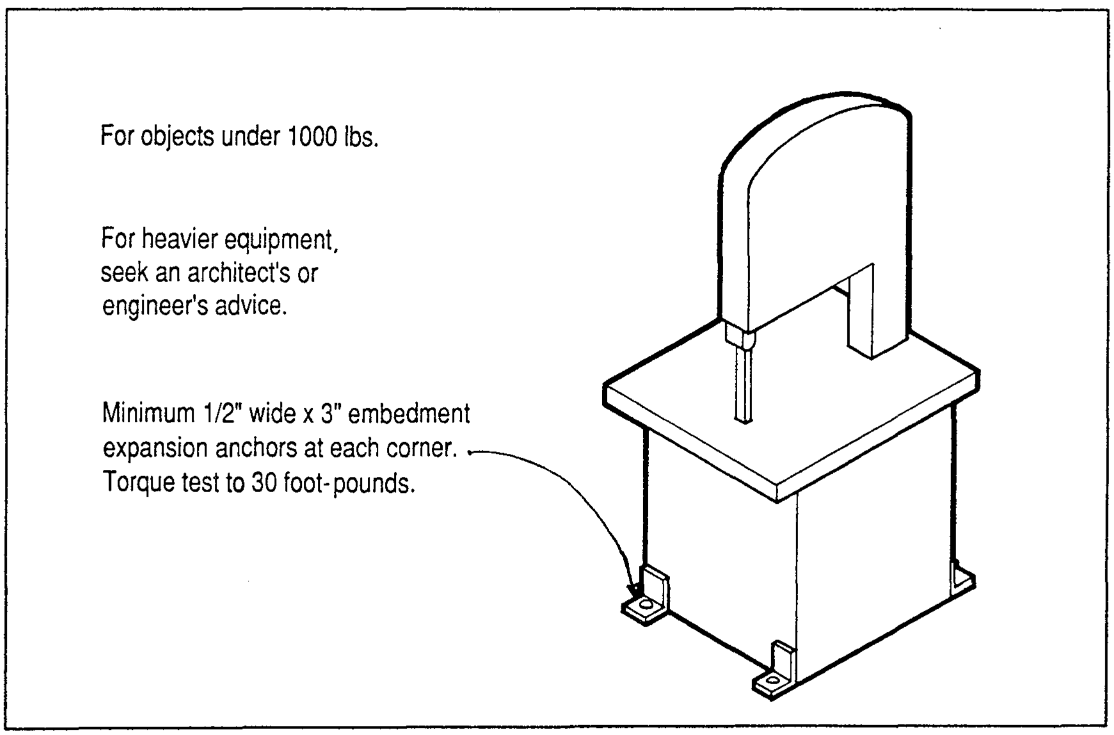
EF5 - BACK-TO-BACK ATTACHMENT OF BOOKCASES TO PREVENT OVERTURNING



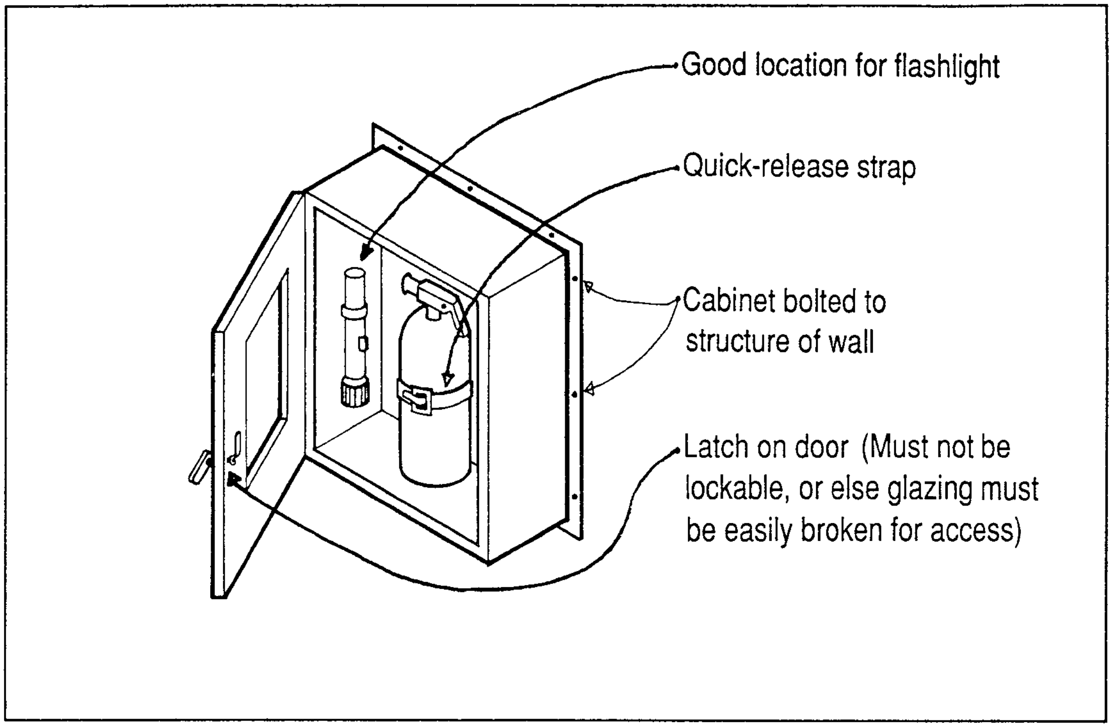
EF6 - BRACING OF LIBRARY SHELVING (STACKS)



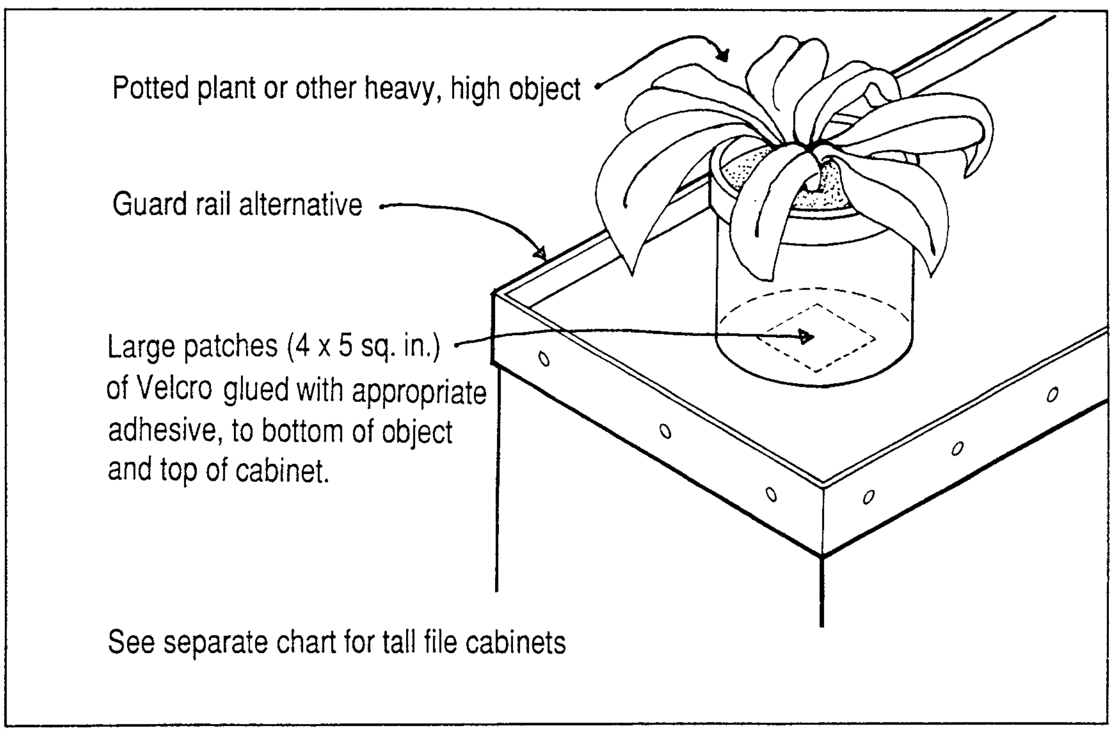
EF7 - BRACING OF FRAGILE DISPLAYS



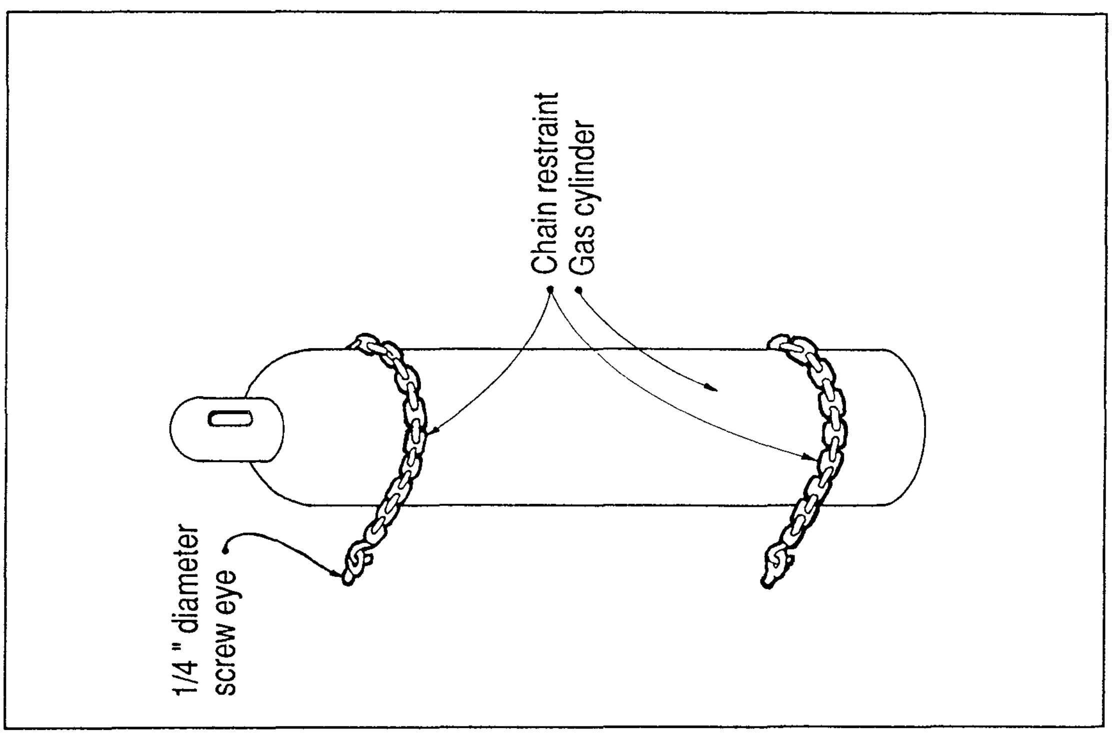
EF8 - BOLTING OF SHOP EQUIPMENT TO FLOOR



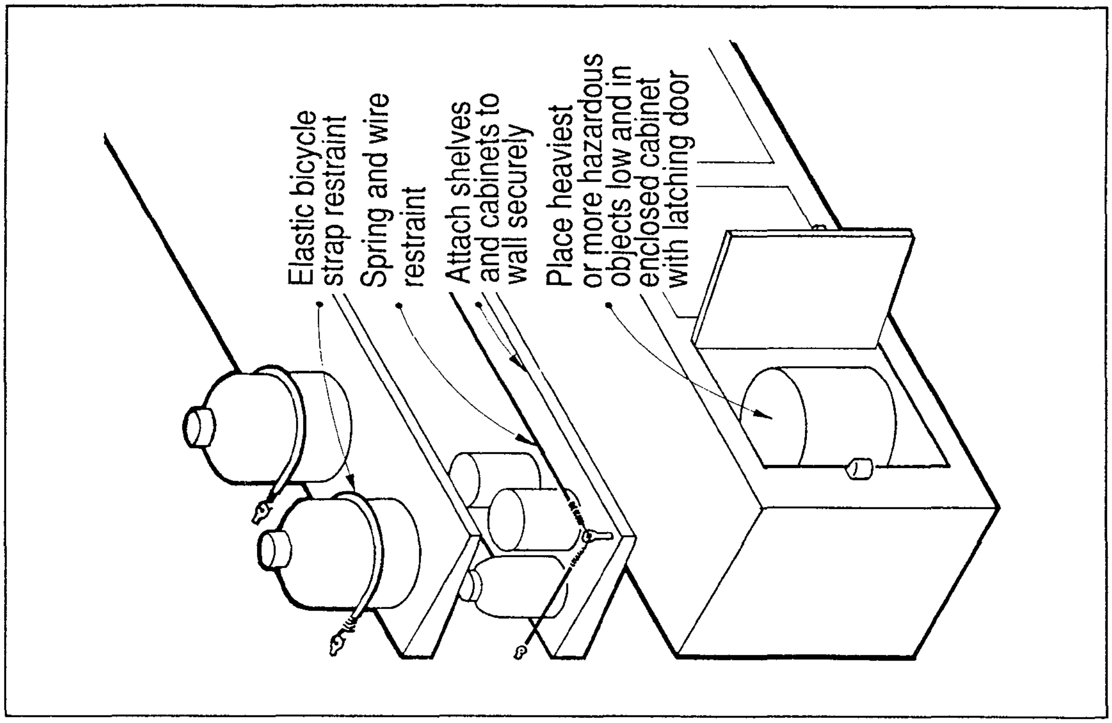
EF9 - ATTACHMENT OF FIRE EXTINGUISHER TO WALL



EF10 - GUARDRAILS TO CONTAIN FALLING OBJECTS

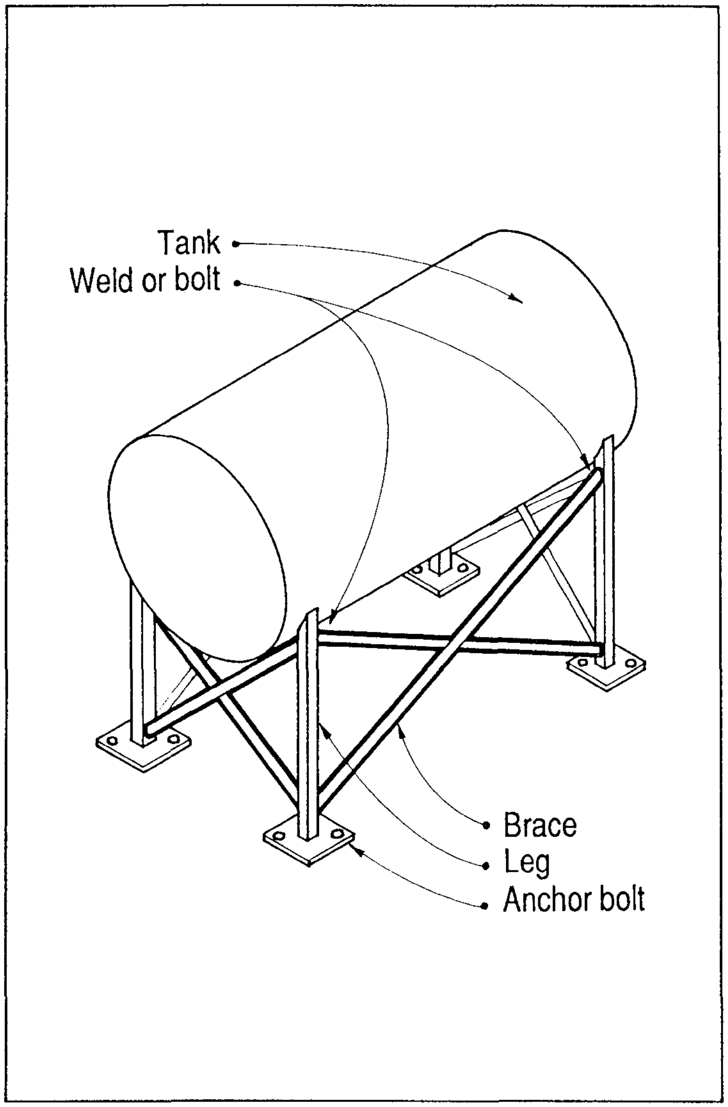


HM1-SAFETY CHAINS FOR BOTTLED HIGH PRESSURE GASES

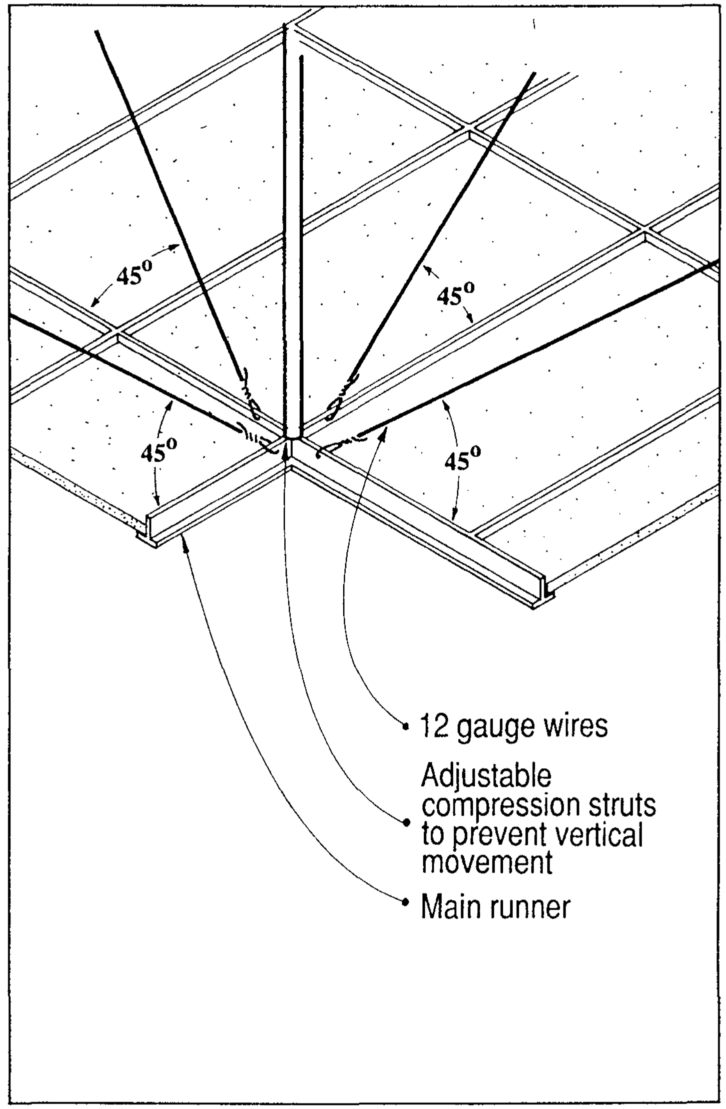


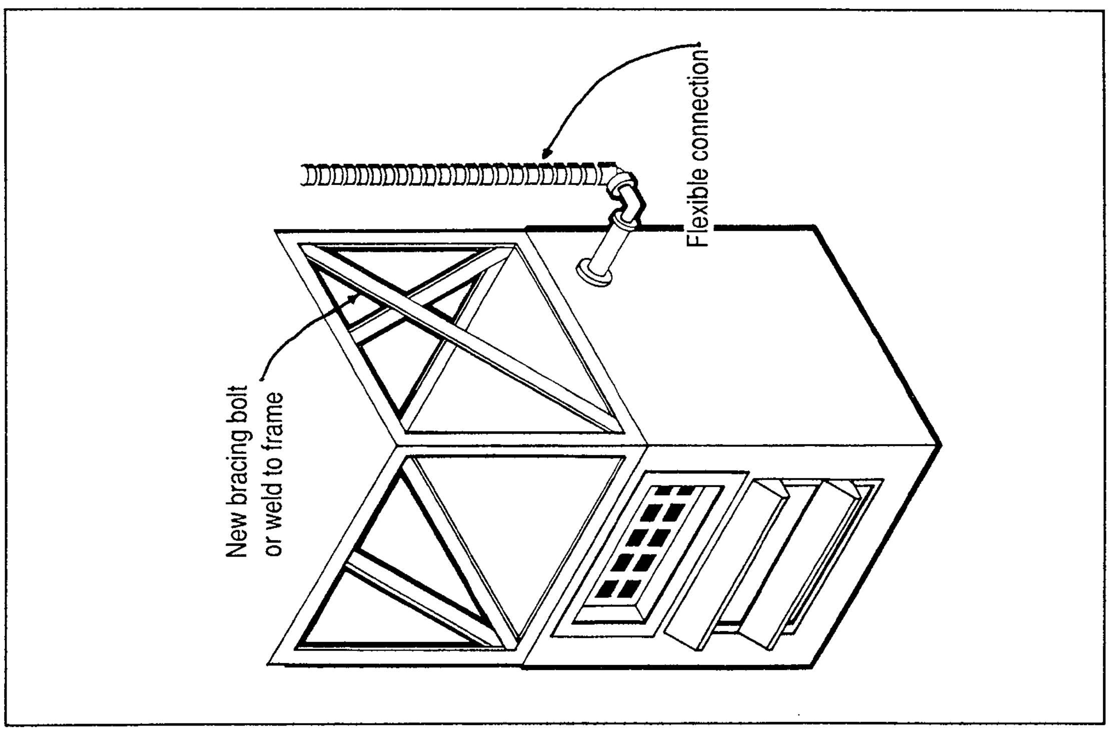
HM2-SAFETY RESTRAINTS FOR CHEMICAL STORAGE

HM3 - SEISMIC BRACING FOR ELEVATED TANKS

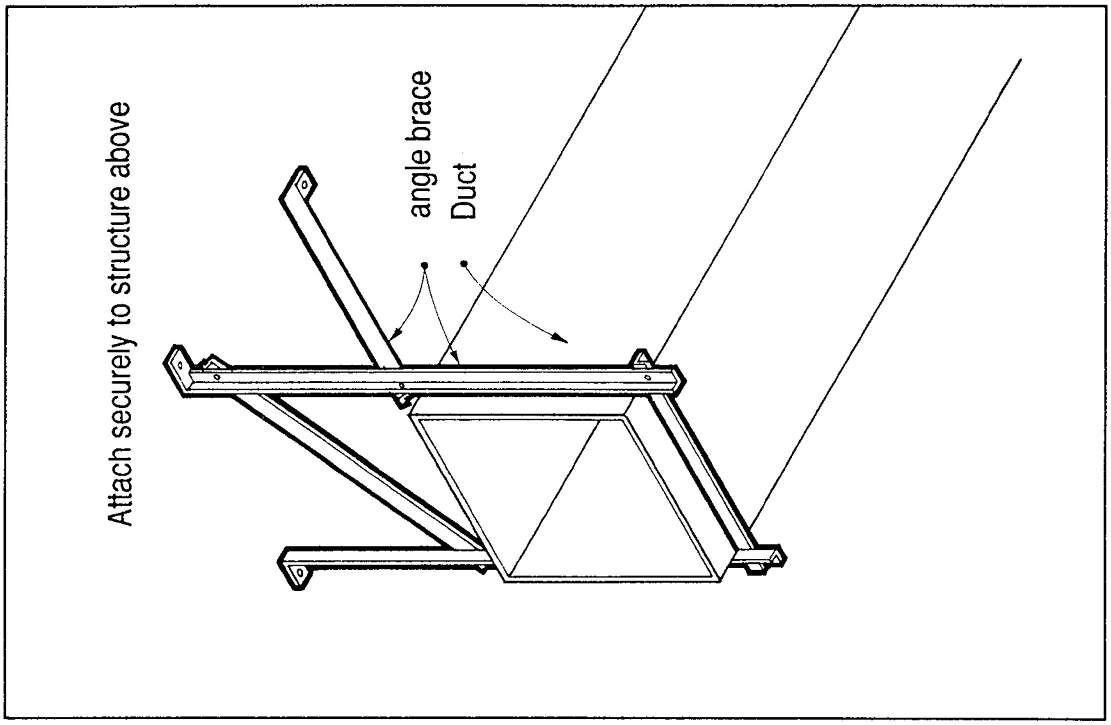


OE1 -SEISMIC BRACING FOR SUSPENDED CEILINGS



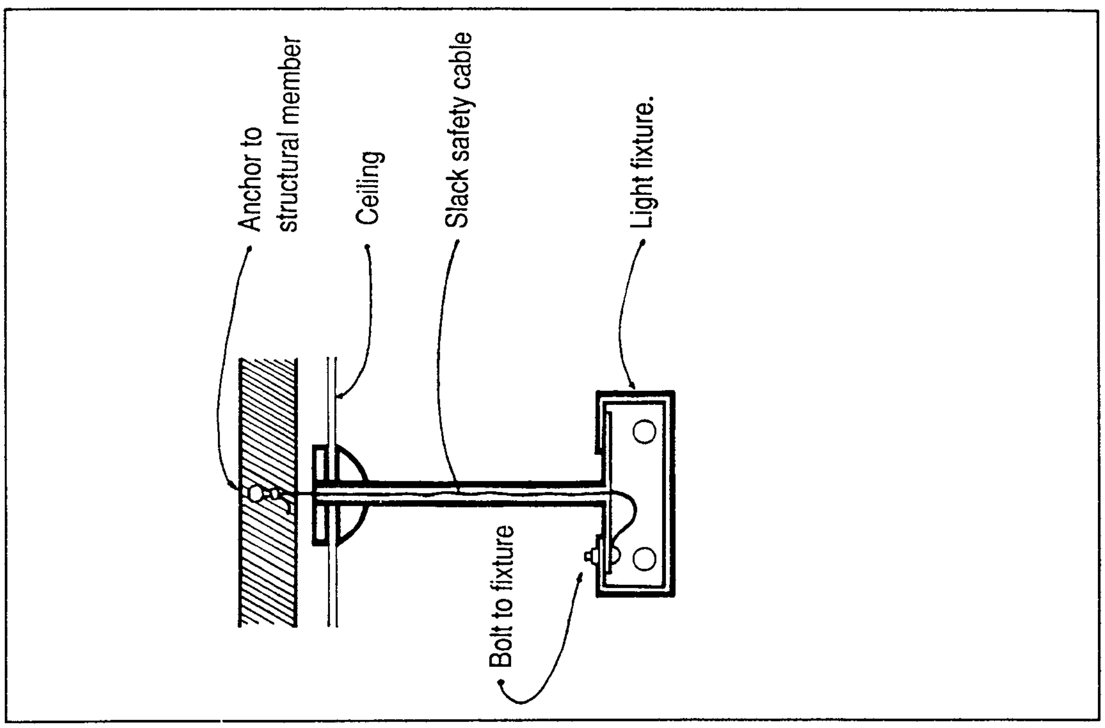


OE2- SEISMIC BRACING FOR SUSPENDED UNIT HEATERS

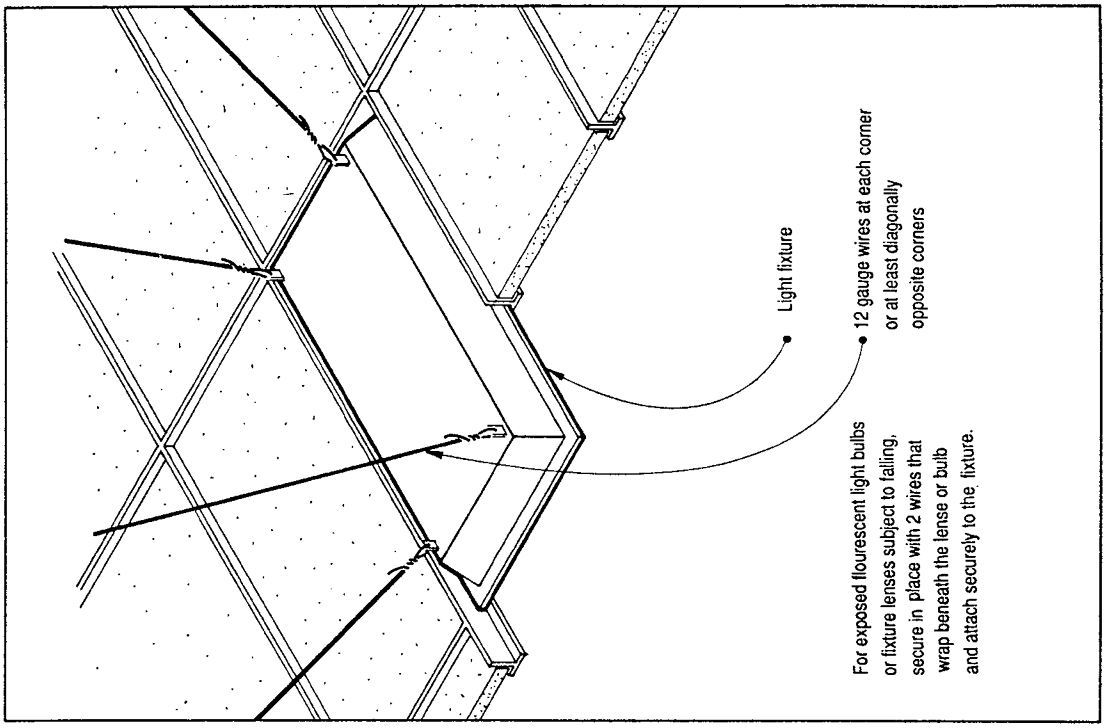


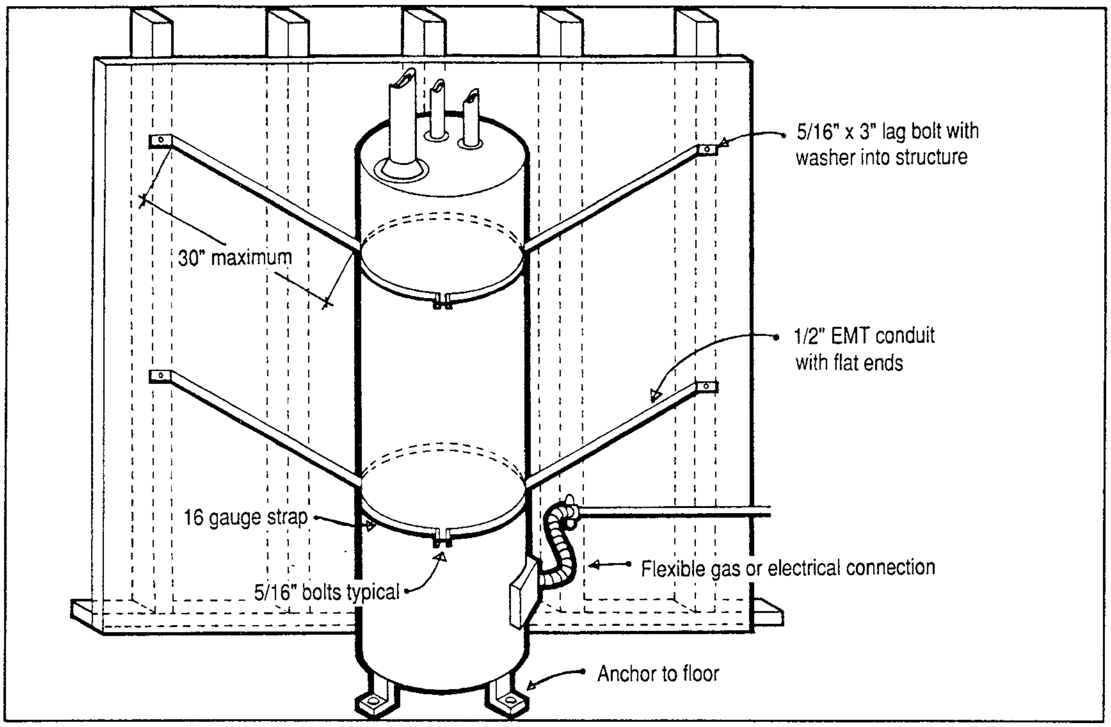
OE3 - SEISMIC BRACING FOR HVAC DUCT

OE4 - SAFETY WIRE FOR PENDANT LIGHT FIXTURE

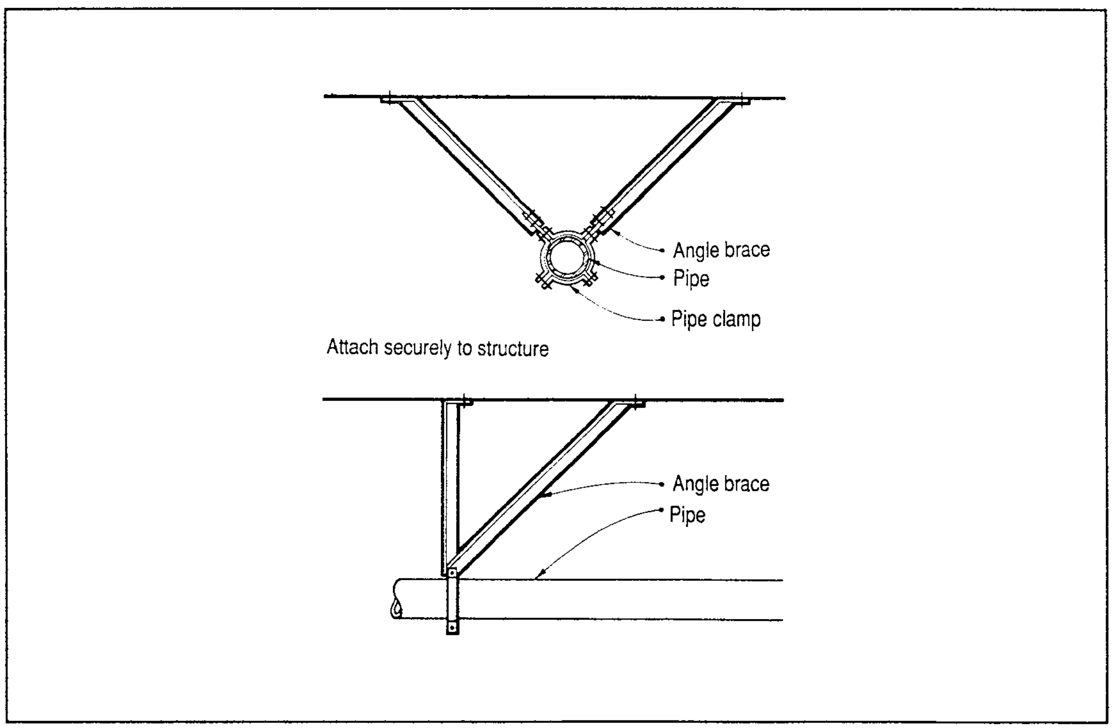


EE1 - SEISMIC SAFETY WIRES FOR LIGHT FIXTURES

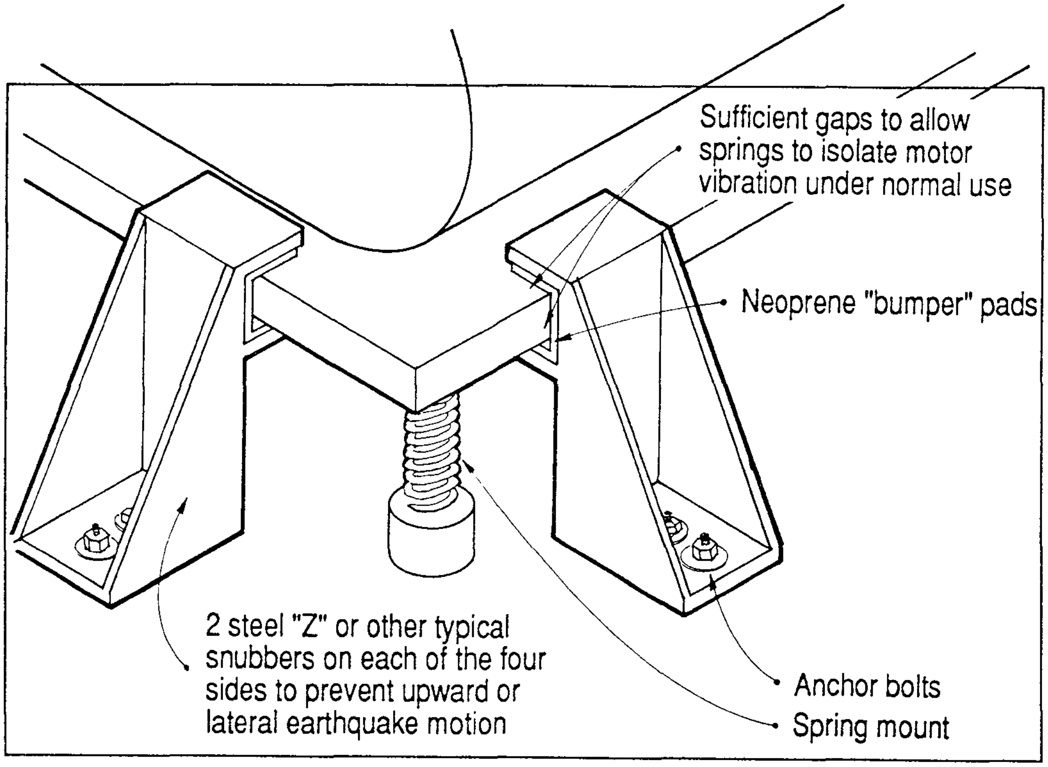




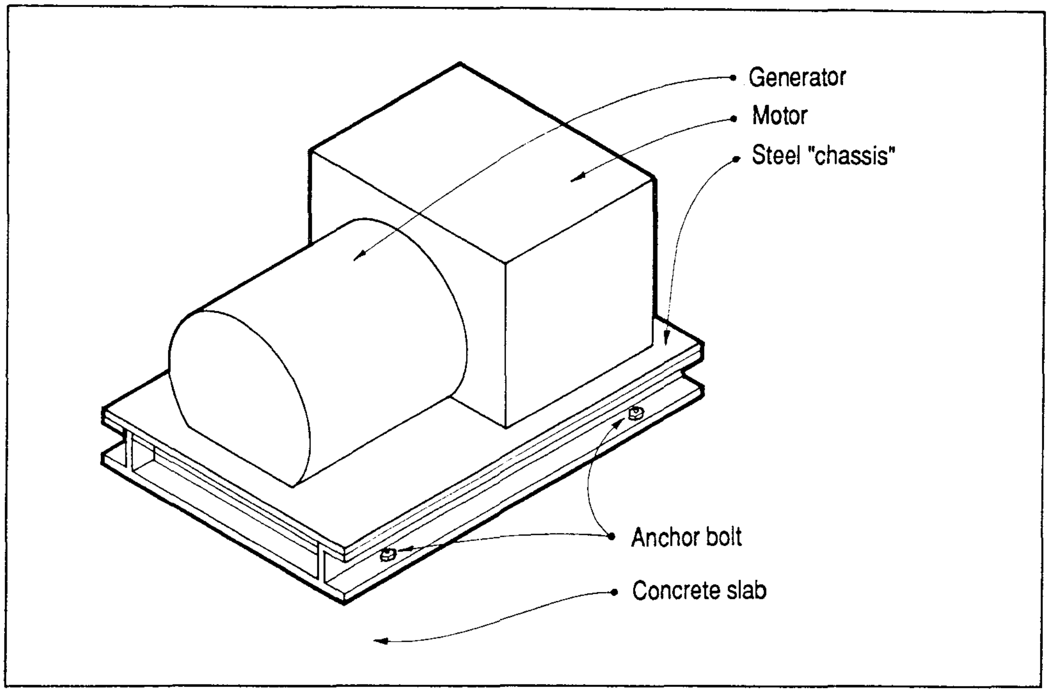
ME1 - SEISMIC BRACE SYSTEM FOR HOTWATER HEATERS



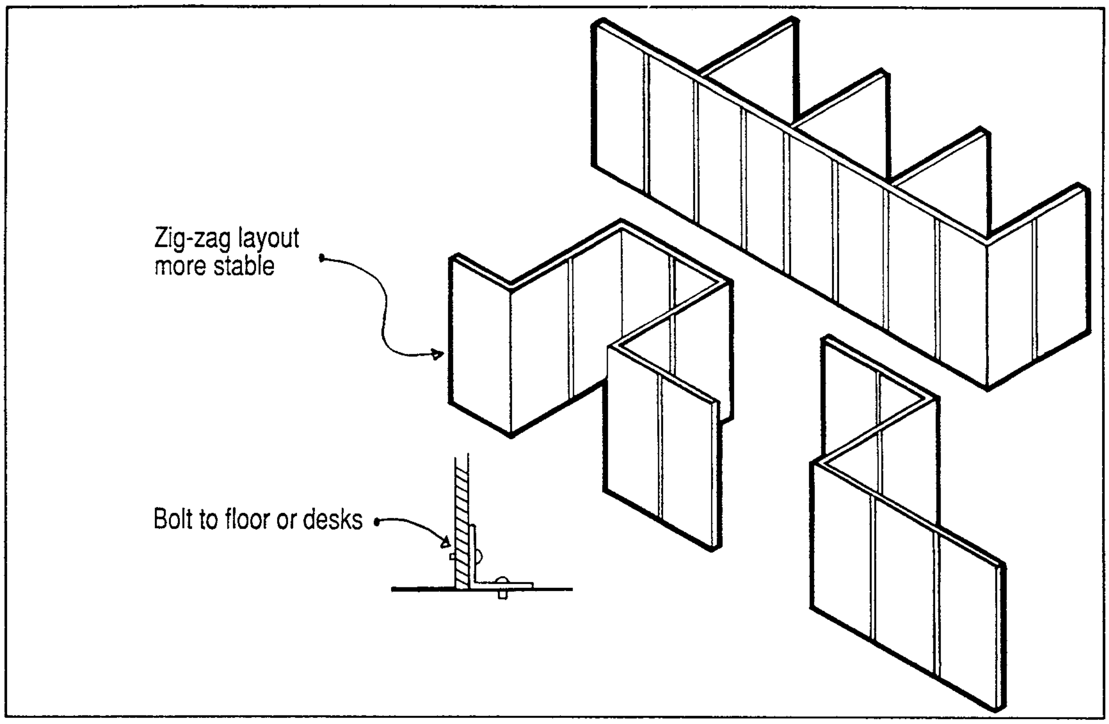
ME2 - SEISMIC BRACING OF PIPING



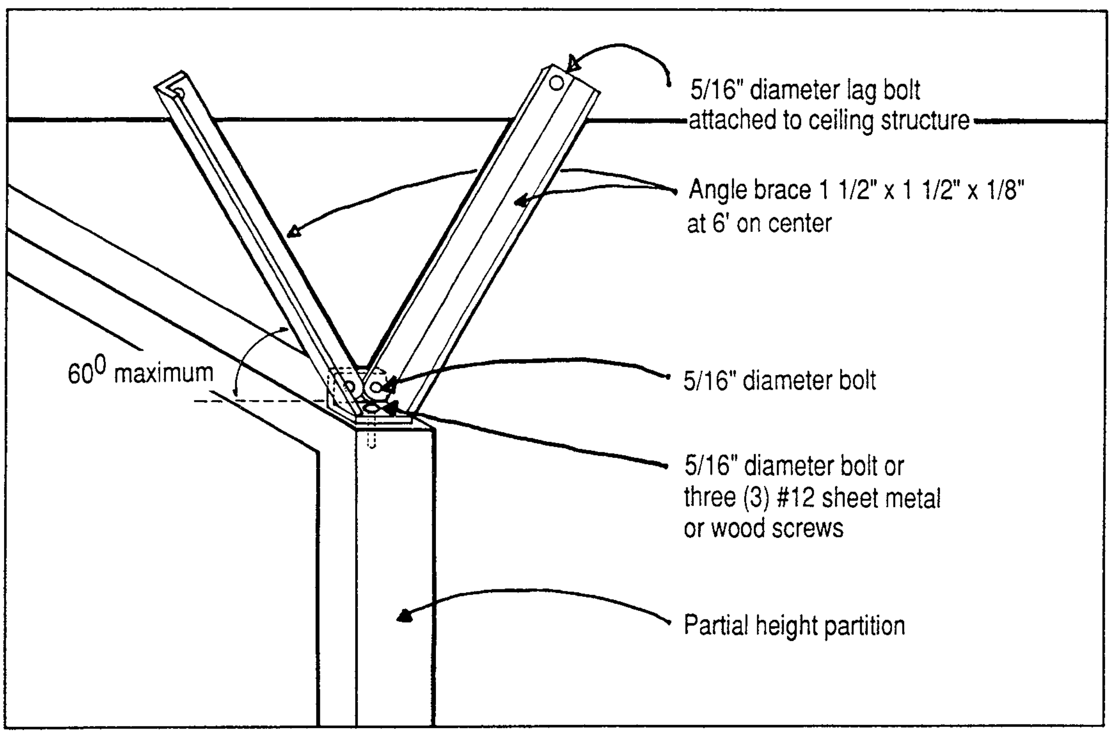
ME3(a) - SEISMIC SNUBBERS AND SPRING MOUNT FOR MECHANICAL EQUIPMENT



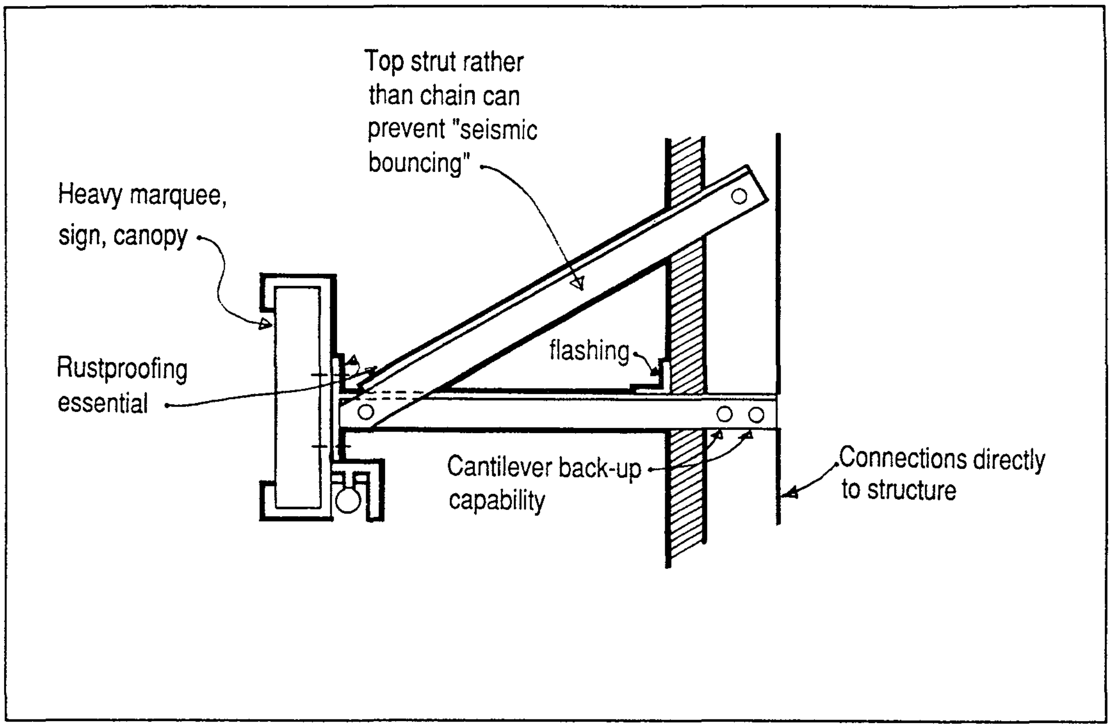
ME3(b) - ANCHOR BOLT AND CHASSIS SYTEM FOR MECHANICAL EQUIPMENT



PA1 - INTERLOCKING ARRANGEMENT FOR SEISMIC STABILITY



PA2 - SEISMIC BRACING OF NON-STRUCTURAL PARTITIONS AND ROOM DIVIDERS



E1 - BRACING OF CANTILEVERED MARQUEE OR SIGN

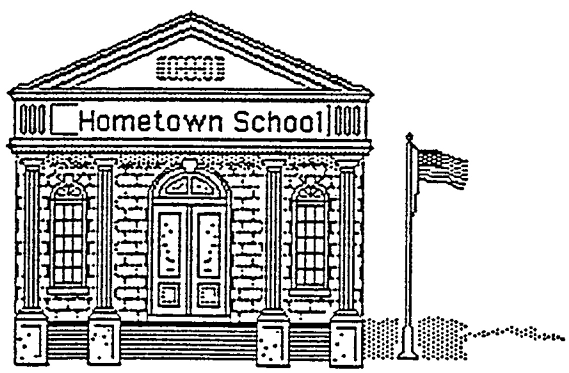
Appendix C

Partial Reprint: Basic Rescue Skills

by
Emergency Preparedness Canada

The following pages are reprinted from a handbook on **Basic Rescue Skills**. Copies can be obtained by contacting Director of Public Information, Emergency Preparedness Canada, 2nd Floor, Jackson Building, 122 Bank Street, Ottawa, Ontario, Canada, K1A OW6.

BASIC RESCUE SKILLS



Cat. No. D82-22/1988
ISBN 0-662-56250-X

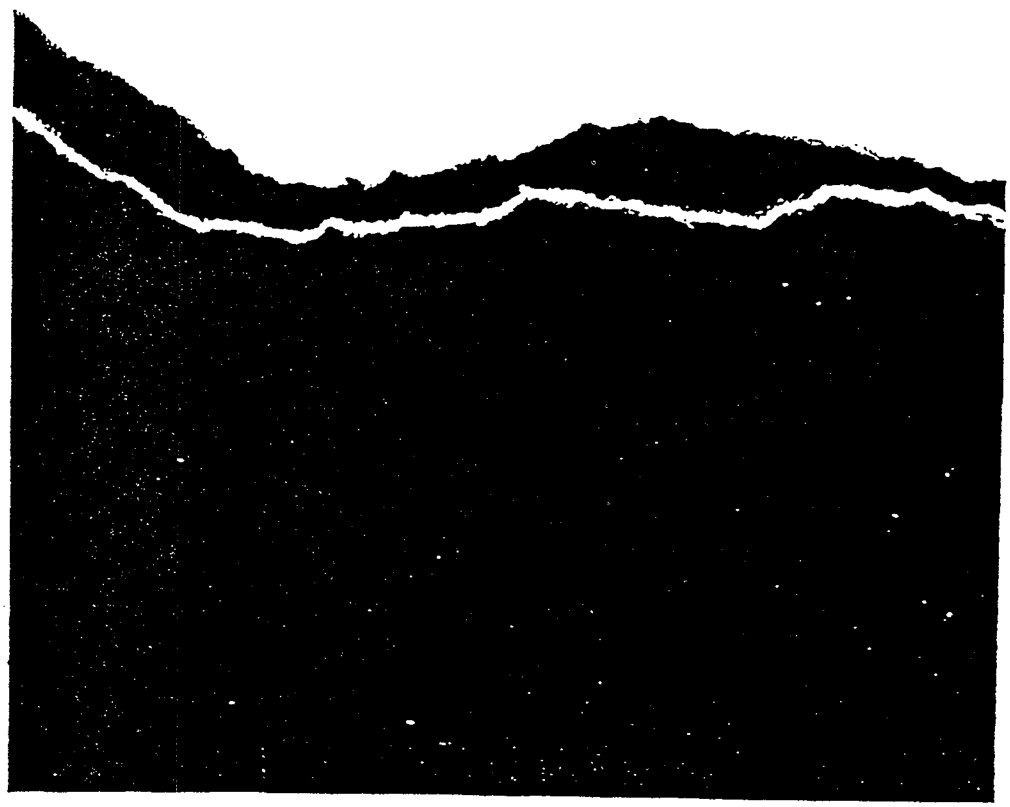
Reprinted from Basic Rescue Skills, Emergency Preparedness Canada

Introduction

In natural or man-made disasters people could be trapped in the wreckage of their homes or places of work. Many of them could die unless rescued quickly. Today, though there are dog teams and sophisticated listening devices available to help search for trapped people, the bulk of rescue work is still done by rescue teams. But it takes more than just willing hands to save lives. Untrained people may endanger themselves and those they are trying to rescue.

The purpose of this booklet is to familiarize you with the basic skills of rescue work. The techniques described may be learned and practised using the materials and know-how available in any community in Canada — city, town, village, factory or farm.

However, this is not a complete technical manual and those wishing to study this subject in more detail should seek further instruction. Much of the technical knowledge required for instruction in rescue work can be obtained from your municipal and provincial emergency measures organizations or fire services. These organizations have experienced personnel capable of advising or training others for rescue work in disaster.



Skills

Rescue workers should have a knowledge of ropes, knots and lashings. They should know how to use jacks and levers, chain hoists and ladders. They should learn about shoring up buildings with materials found on the spot. They should know how to handle casualties; a first-aid course is mandatory.

And, there is another thing they should learn...to stay alive while rescuing others. To do this they should understand something about the way buildings are constructed and how they collapse. They should learn to work as safely as possible in collapsed buildings, rubble and debris.

Building Construction

Most buildings are vulnerable to the effects of natural and manmade disasters such as tornadoes, earthquakes, floods or explosions. But the extent of the damage depends on the type of disaster and the construction of the building.

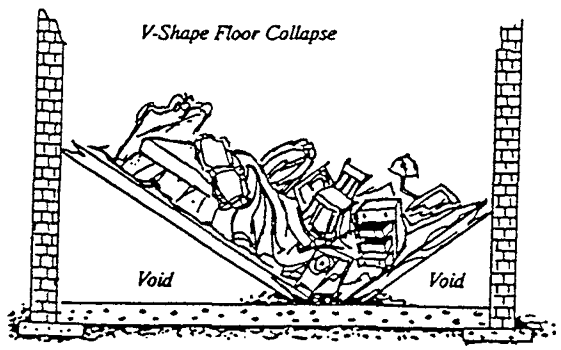
Modern factories and office buildings for example, are framed in steel and are more resistant to unusual violence than neighborhood business premises and homes. However, in a disaster such as a major earthquake, nearly every type of structure will be affected — some buildings will collapse and others will be left with weakened floors and walls. Remember that no matter what the scale of the damage, the techniques you use to rescue people remain the same.

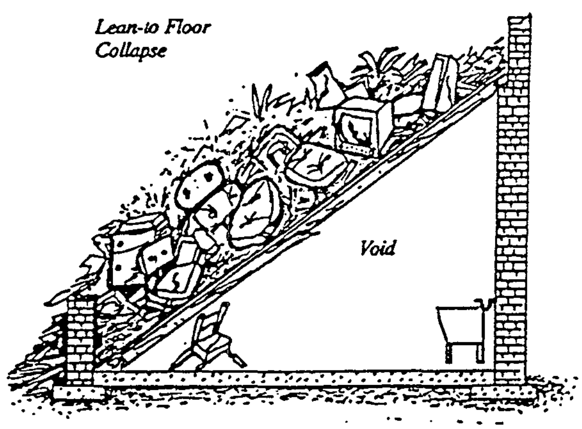
Rescue workers should understand the patterns in which particular types of buildings collapse, both for their own safety and that of others. They must also keep untrained people from poking around in the rubble and debris. This may cause further collapse and harm trapped survivors.

Types of Collapse and Formation of Voids

Most un-reinforced buildings collapse into more or less predictable patterns. Often the collapsing structure forms what we call **voids** where people may live for some time. Rescue workers should know how to locate and search these voids.

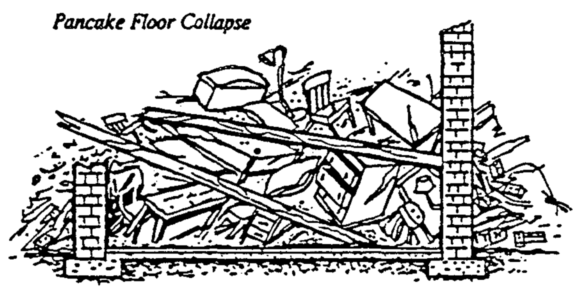
When a floor or roof or large sections thereof are supported on one side and collapse or sag on the other, they form a **lean-to collapse.**





When load-bearing external walls are weakened, destroyed or sucked outwards, the bulk of the debris falls on the ground or street. The floors, roof and some of the internal walls are deprived of support and collapse in a heap, separated only by the furniture and such portions of the walls as remain. This is called a **pancake collapse.** There may be voids formed by the furniture supporting the collapsed floors, and it is possible to crawl through these voids in comparative safety provided that such supports are not disturbed.

The floors of a house or building are not constructed to carry tonnes of wreckage and as a result when the weight of heavy loads, such as furniture and equipment, or rubble and debris, is concentrated near the centre of a floor, a **V-type collapse** may occur.



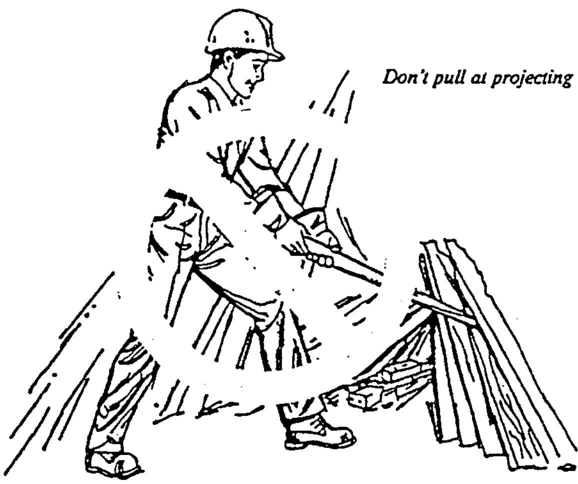
Precautions

Wear whatever protective equipment you can. Helmets, gloves, and the like may save your life. No matter how urgent the situation appears, never enter a damaged building without first getting advice from a rescue expert or making a careful study of the structure. You may be impatient about the delay, but the study will pay off. Concentrate on searching the fringes and trying to locate casualties by calling out. The standard call is, "Rescue party here. Can you hear me?" Remember, you won't help anybody by becoming a casualty yourself.

When you decide or are given permission to enter the building, tell someone where you're going or, better still, work with a partner. Move slowly and test each step. Walk close to walls. Walk backward and close to walls when descending stairs.

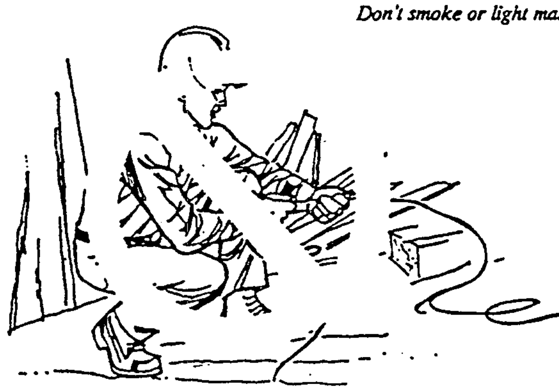
Look out for unsafe walls, blocked or jammed doors, weakened stairways, projecting glass fragments, splintered woodwork, projecting nails and spikes, escaping gas, flooding of basements and exposed wiring.

In short, don't trust anything and move quickly, but cautiously. Obey orders strictly.



Don't pull at projecting debris.

Don't smoke or light matches.



Don't touch any wires.

Don't throw debris aimlessly.

How to Acquire the "Supplementary Skill"

To stay alive in rescue work you must understand the dangers you may meet and the precautions you must take. This is the "supplementary skill."

In any neighborhood, new buildings are constantly going up and old ones are being torn down. Study them. Learn how houses are made.

To get experience at working in voids, you can simulate collapsed houses by building "rafts" of old lumber. Lean them against walls to form the type of void you want. Pile on old crates, etc., to make it realistic. With two such rafts you can simulate any type of void. You don't need a lot of money if you have a little imagination.

Rescue parties must often use whatever comes to hand. Learn to improvise. Make a list of the tools owned by neighbours. In particular, ladders, car jacks, axes, carpenters' tools, blankets, rope, first-aid supplies, garden tools, flashlights, helmets and gloves. Know where you can lay your hands on them at a moment's notice.

Rescue Skill No. 1

Knot Tying

Although there are other knots and hitches that can be used in rescue work, the ones mentioned here are the most common and should be learned if you are to be a good rescue worker. Lives may depend on your being able to tie the right knot securely at the moment it's needed in light or dark, rain or shine. You can practise these knots on a piece of clothesline or heavy cord.

Whipping

Although most ropes are now made from synthetic material, natural fibre (manila) rope is still being used. Before any work is done with natural fibre ropes the ends must be bound to prevent the strands from separating or fraying. This is normally done with a light cord and is called whipping. In an emergency a figure-of-eight knot may also be used.

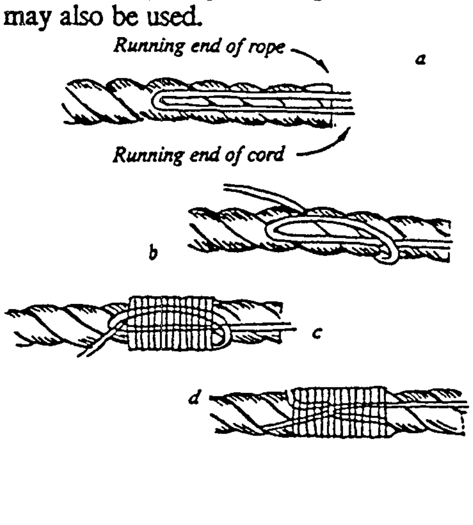
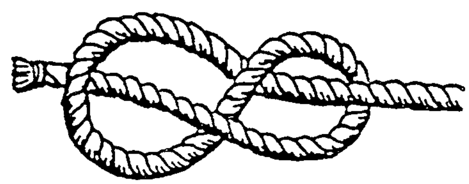


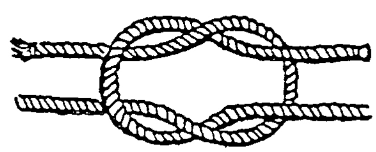
Figure-of-eight Knot

This is used mainly as a stop knot to prevent a free end of rope from running through a pulley or a block. It can also be used (temporarily) to prevent the end of a rope from fraying when the whipping has been lost.



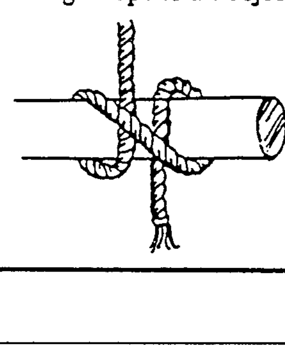
Reef-Knot

A useful knot for general purposes. Used mainly for joining ropes of equal thickness and for tying bandages.



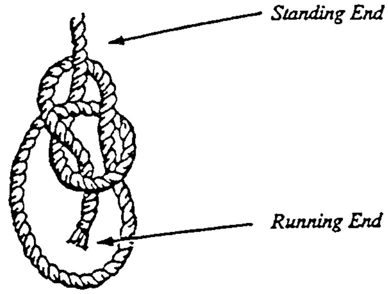
Clove Hitch

A quickly tied hitch which forms the basis of many securing knots. Useful for anchoring a rope to an object.



Bowline

The bowline makes a loop that won't tighten. Useful for lowering or raising casualties on stretchers.



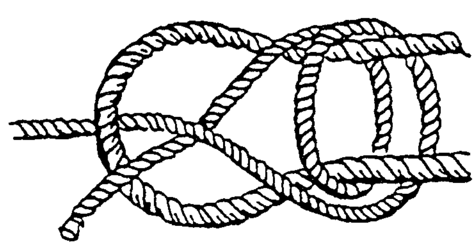
Sheet Bend

A sheet bend is used for joining two ropes of different sizes.

The double sheet bend is more secure than the single sheet bend and is used when there is a great difference in the size of the rope as shown here. In rescue work, a double sheet bend is used for tying all ropes together.

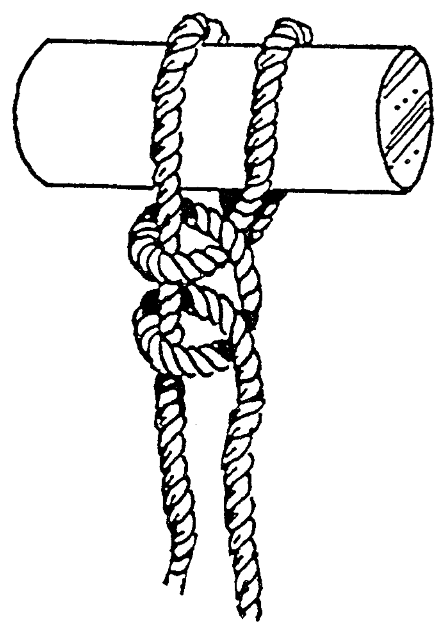
Both knots have the advantage that they do not slip when the rope is wet.

Double sheet bend



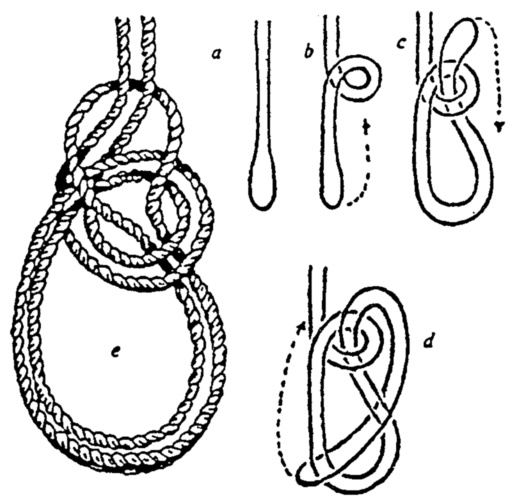
Round Turn and Two Half Hitches

This knot is used for securing a rope to a spar, picket or anchorage. It is particularly useful where guy lines are secured to pickets and an adjusting knot is required.



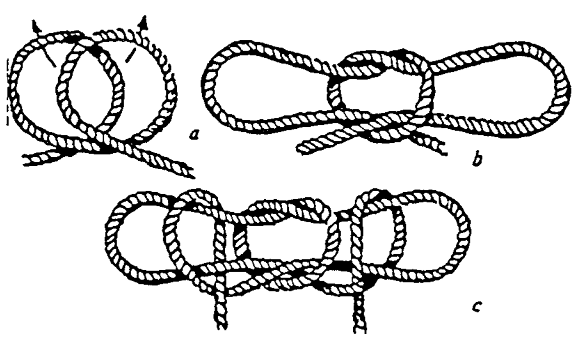
Bowline-on-a-Bight

This knot is used to form a sling for raising or lowering backboards, stokes/baskets, stretchers or ladders horizontally.



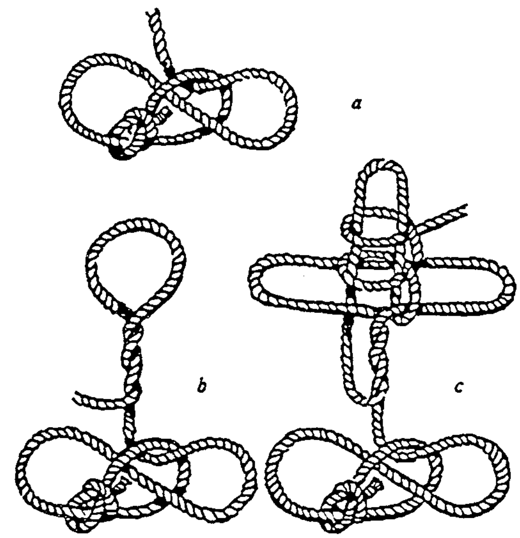
Chair Knot

The chair knot makes an ideal sling for the raising or lowering of an army stretcher.



Alberta Hitch

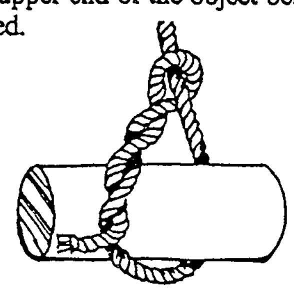
This knot makes an ideal life basket for raising or lowering a conscious or unconscious person in a vertical position.



Note: Second bight under loop around chest is deleted for simplicity of illustration.

Timber Hitch

This is a quickly made temporary knot used to secure a rope to a spar, plank or pole. When lifting spars, planks or poles this knot should be used in conjunction with a half hitch placed at the upper end of the object being raised.



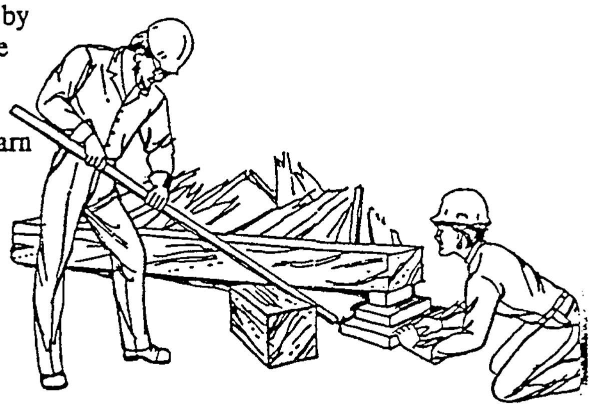
Rescue Skill No. 2

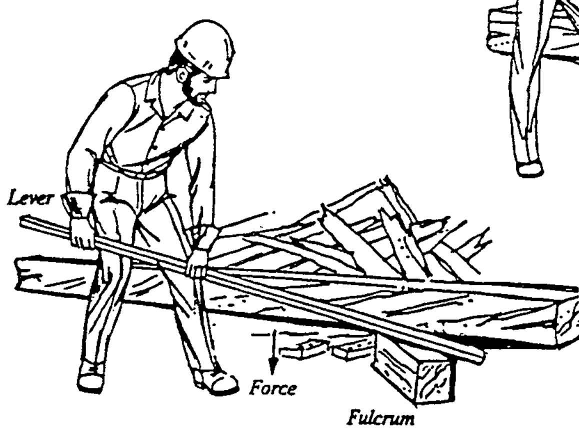
Use of Levers and Jacks

When buildings collapse, people are frequently pinned under falling debris. Often this debris is too heavy to lift by hand. You must, therefore, be able to use levers and jacks.

The best way to use a lever is to make a short lift. Then put in a secure block to hold the gain. Then another short lift and another block. Don't use levers casually. They can be dangerous.

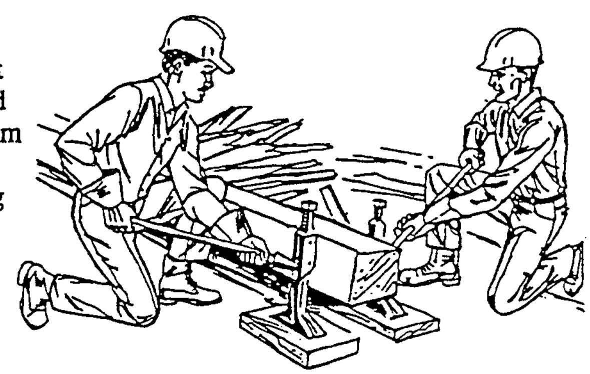
A lever is a device that gains power by sacrificing distance. Any sturdy piece of wood or metal will make a lever. Any solid object, such as a piece of masonry, makes a good fulcrum. Learn to improvise.





A jack is a mechanical device designed to lift heavy loads. You can use it in a more confined space than a lever. But it also needs care and practice to be used safely. You can practise using levers and jacks with equipment like this.

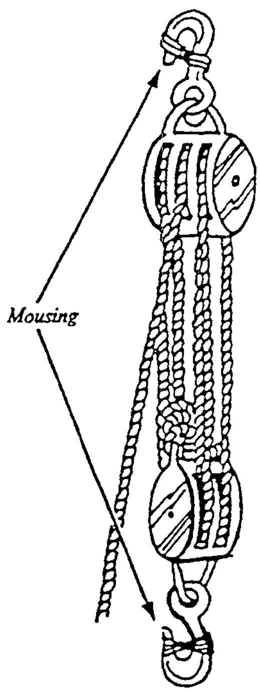
Make sure the fulcrum is placed so it won't sink under pressure. If the load slips or your lever collapses, the victim may be injured even more. Always work from a secure position, keeping both feet on the ground.



Rescue Skill No. 3

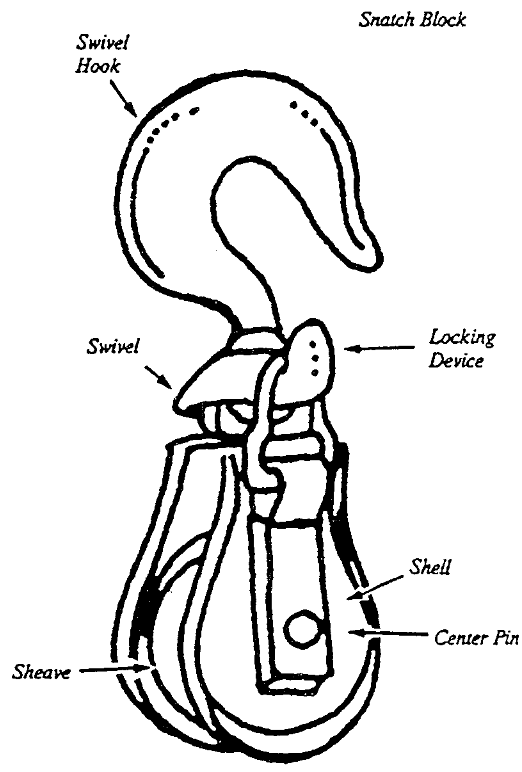
Blocks and Tackle

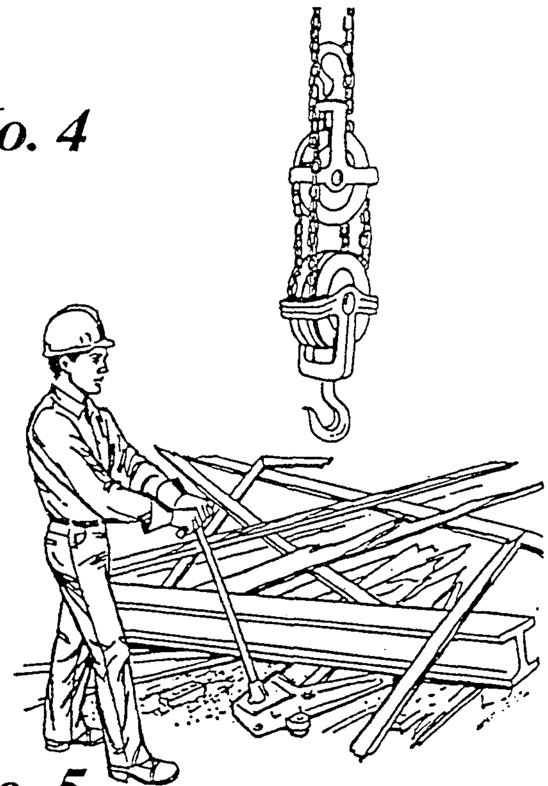
A block and tackle is a rope device that permits a rescuer to lift heavy weights. The more sheaves to the block, the greater the mechanical advantage. They look like this.



A good practice is to tie a piece of cord across the jaws of a hook to prevent a rope or sling from jumping out when the weight is temporarily supported. This is called **mousing**.

Some blocks can be opened from the side to allow easier threading of the rope. They are known as **snatch blocks**. Used properly, block and tackle can help your rescue team lift almost any obstacle, or to raise or lower injured people.





Rescue Skill No. 4

Chain Hoist

Winches, chain hoists and gear-lifting tackle are found in most garages, and a garage owner is a fine addition to your rescue team. Chain hoists are useful but are hard to work at night. They are not practical for horizontal pulls.

Floor Jack

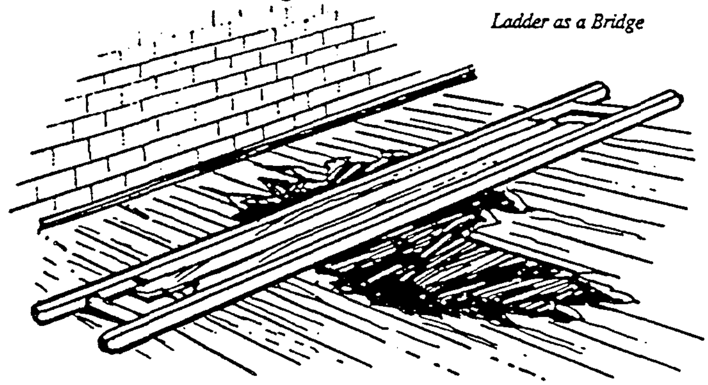
A hydraulic service jack (floor jack) has the advantage of no loose chain to get in the way. It takes little space and can be set up quickly.

Rescue Skill No. 5

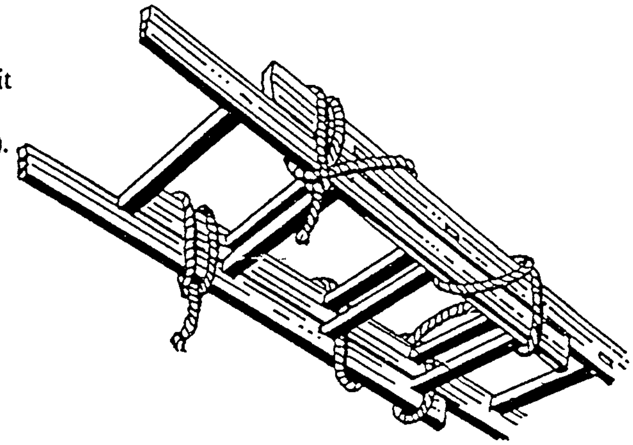
Ladders

Ladders are valuable pieces of rescue equipment. They can be used for bridges, derricks, stretchers, etc. When using a ladder as a bridge, make sure you've left plenty of overlap at each end (a minimum of three rungs). Place boards over the rungs to improve the footing.

Ladder as a Bridge



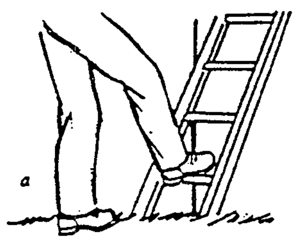
Two short ladders may be lashed together to make a longer one. Do it this way. Never tie the rope to the rungs. Always use the beams (sides). Keep the knots on the under side.

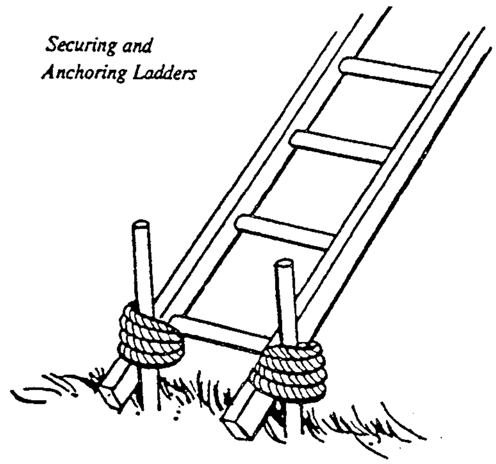


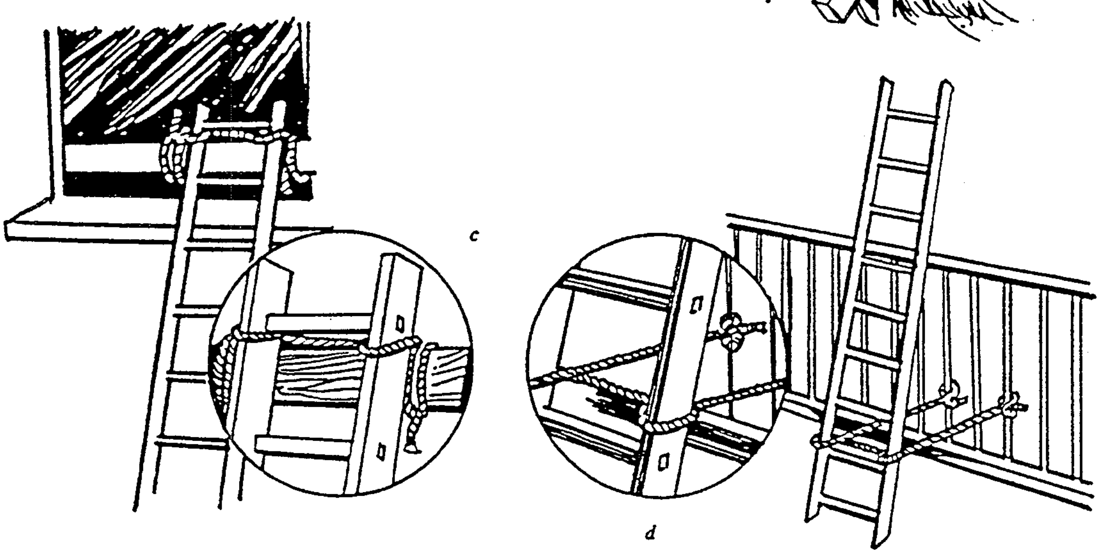
Lashing Ladders for Additional Length

To erect a ladder, have one person "foot" it to prevent slipping. Another option is to lash the bottom of the ladder to some secure object.

Securing and Anchoring Ladders

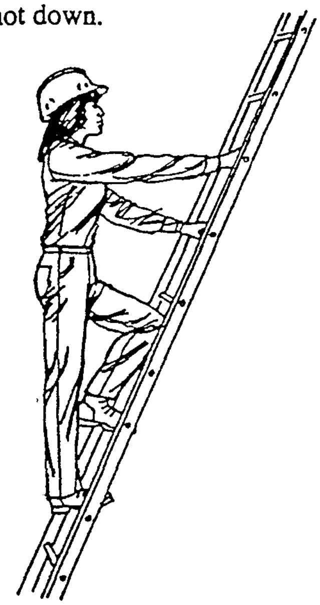




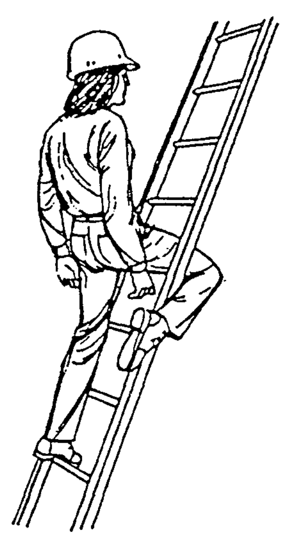


To Climb a Ladder

Hold on to the rung, not the beam, unless you're carrying something. Stand on the centre of the rungs. Look up, not down.

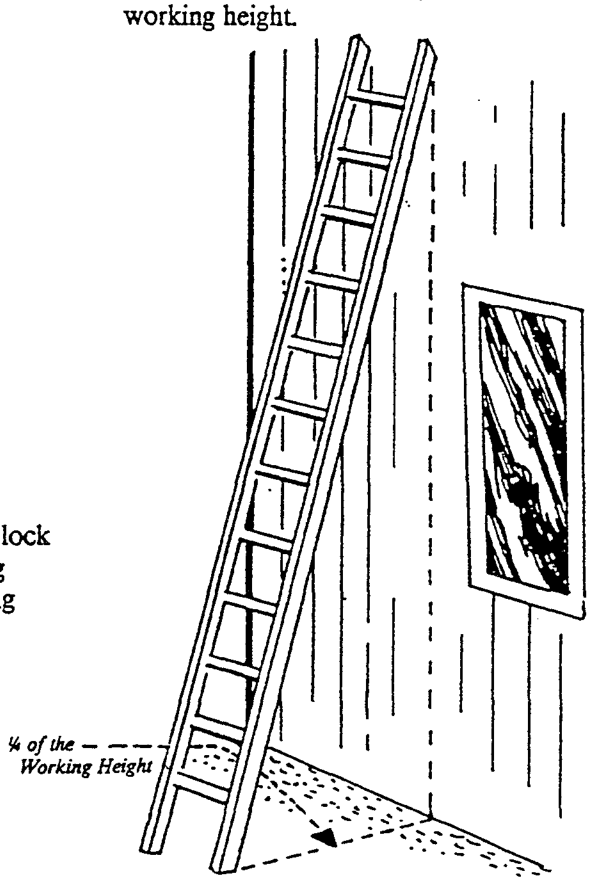


If you must stand still on a ladder, lock yourself in place by passing one leg through the rungs, gripping the rung with the knee.



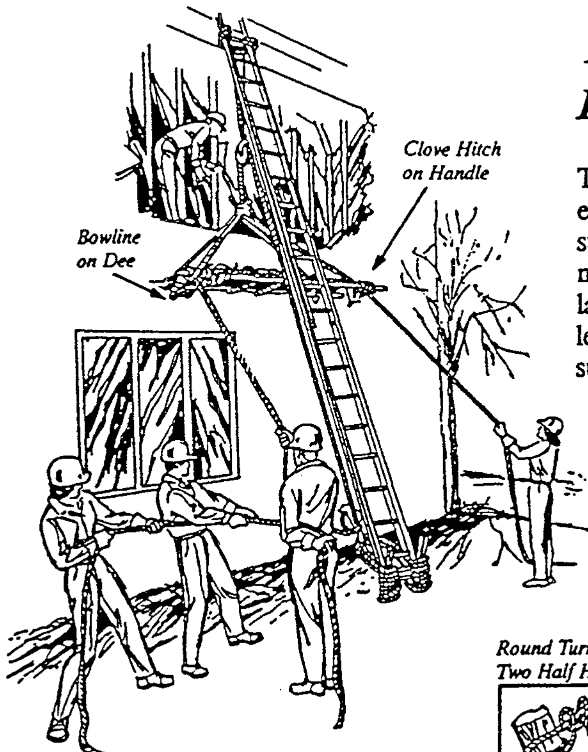
Setting It Safely

To determine how far the base of the ladder should be placed from the wall, divide the working height by four. For added safety, when working from a height such as a rooftop, ensure that at least three rungs extend beyond the working height.



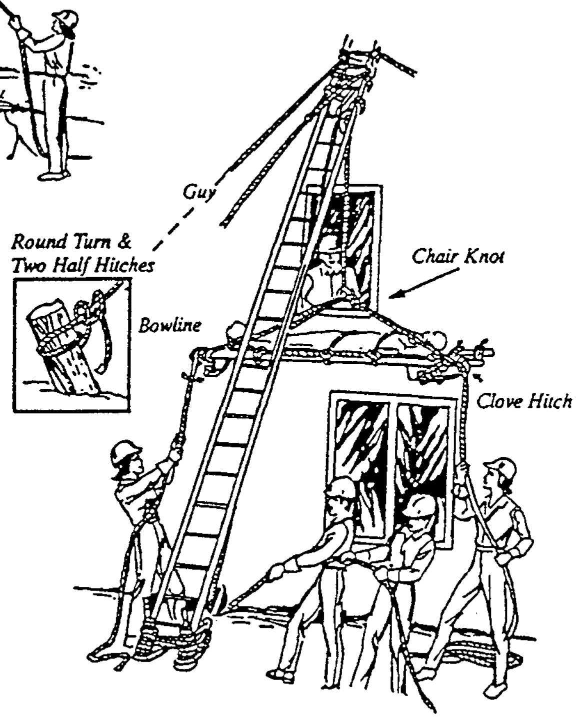
Leaning Ladder Rescue Method

This method may be used for moving a large number of casualties from the same location with maximum speed and minimum effort, provided the wall is solid enough to support the weight of the ladder and casualty.



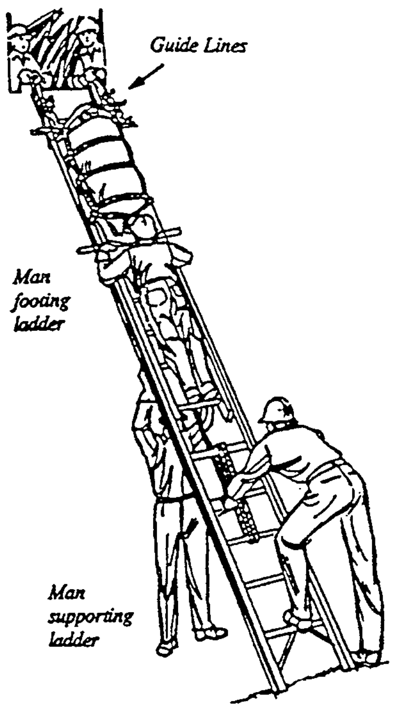
Ladder as a Derrick Rescue Method

This method is used where the wall is either too low or not strong enough to support the pressure of the ladder. The method is the same as the leaning ladder technique except that instead of leaning the ladder against the wall, it is supported by guy ropes.



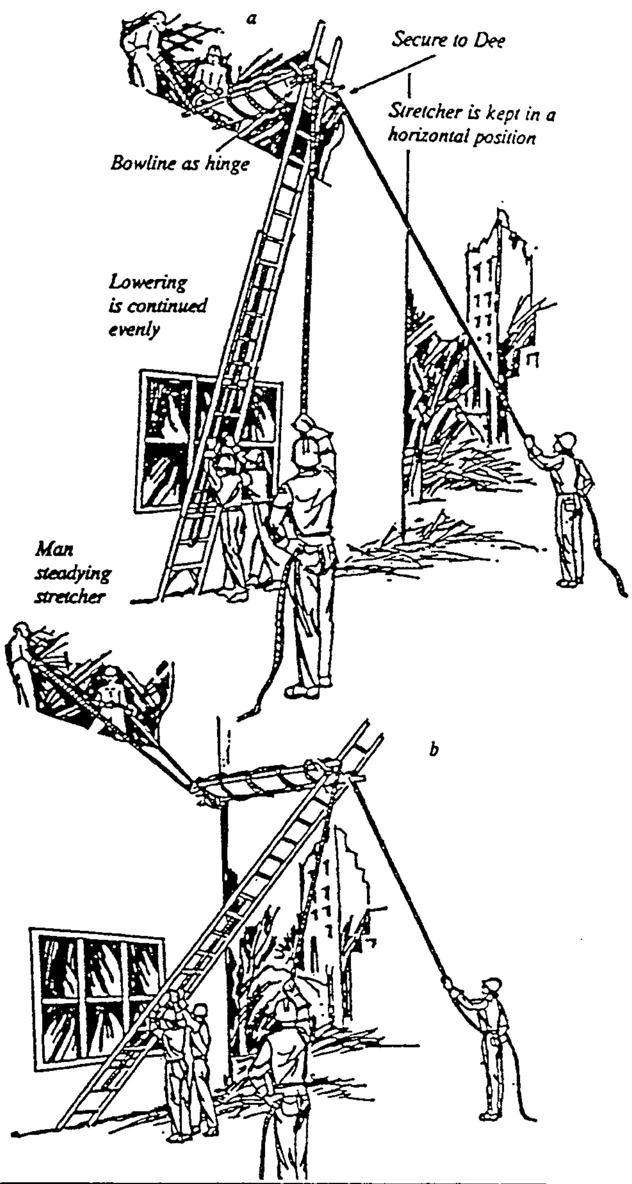
Ladder as a Slide Rescue Method

This method is suitable for heavy casualties who do not have to be kept in a horizontal position. It puts less strain on the rescue workers than lowering by ropes and therefore might also be used for moving several casualties from the same location.



Ladder Hinge Rescue Method

This is one method that is used when the casualty must be kept in a horizontal position and the height from which he or she is to be lowered does not exceed that of the ladder.



Rescue Skill No. 6

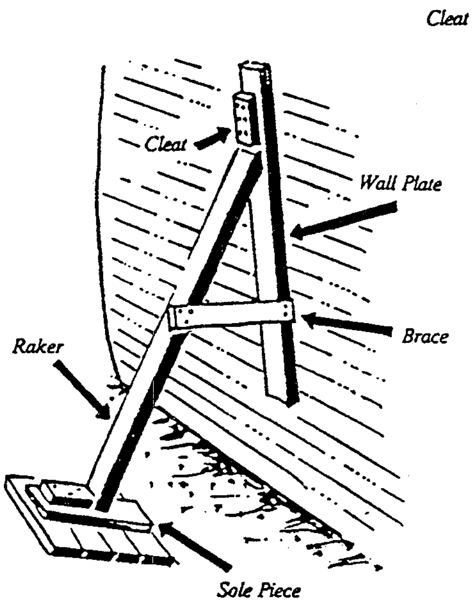
Strutting and Shoring

Once you've cleared fallen debris — or if a structure is liable to collapse further — you should shore it up with timbers. Strutting is the same process applied to doors and windows.

There are three main types of shoring — raking, flying and dead shore. Don't overdo things with shoring. The idea is support, not reconstruction.

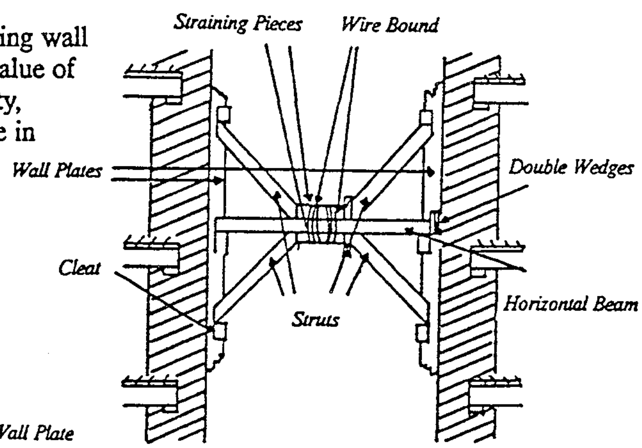
The Raking Shore

This is intended to hold a bulging wall from further collapse. As the value of this shore depends on its rigidity, common sense is the best guide in putting it in a firm place.



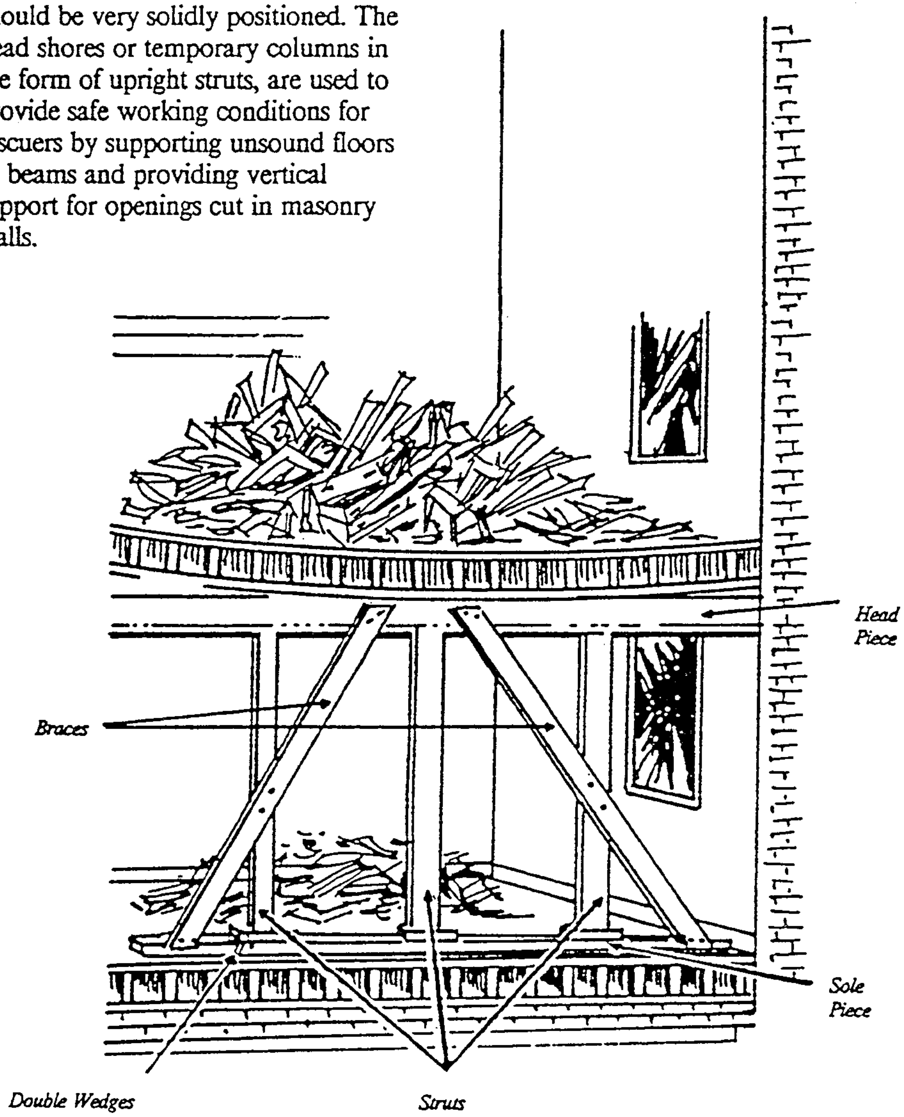
The Flying Shore

This shore uses a sound wall to support a sagging wall. It can be used for walls up to 7.62 m (25 ft.) apart. You'll see from the diagram that it is really only a series of four raking shores, each based on the horizontal beam holding the wall plates in position. A raking shore can do almost anything a flying shore can do, and with a lot less fuss.



The Dead Shore

This type of shore bears a lot of weight. Therefore the sole piece and head piece should be very solidly positioned. The dead shores or temporary columns in the form of upright struts, are used to provide safe working conditions for rescuers by supporting unsound floors or beams and providing vertical support for openings cut in masonry walls.



Rescue Skill No. 7

Emergency Handling of Casualties

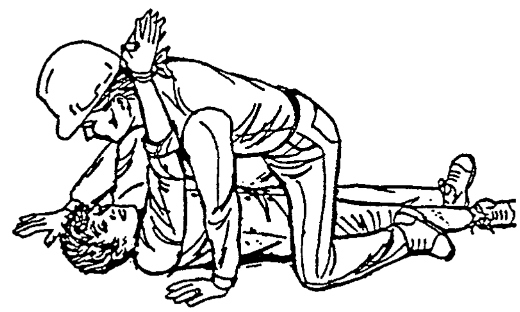
The prime purpose of all rescue work is to get the injured out of danger and into medical care as soon as possible. However, if there is no immediate danger from falling debris or further building collapse, you should always check the casualty for any life-threatening conditions: stopped breathing, severe bleeding and unconsciousness. Give first aid for these conditions before moving the casualty.

Give artificial respiration if necessary. Apply direct pressure, elevate an injured limb, and ensure the casualty remains still to stop bleeding. Ensure that an unconscious person does not stop breathing. Keep the patient warm to reduce shock. Clear dust and dirt from the mouth and nose and protect the victim from falling debris. If clothing is caught by debris, cut it free. Don't move the debris as you may cause further collapse.

Never move the casualty any further than you have to. If you can't obtain a stretcher and you're alone and must move the casualty quickly, try one of these rescue carries.

Fireman's Crawl

Use a triangular bandage, a torn shirt, etc., to tie the casualty's hands together. This way you can move a person much heavier than yourself.



Human Crutch

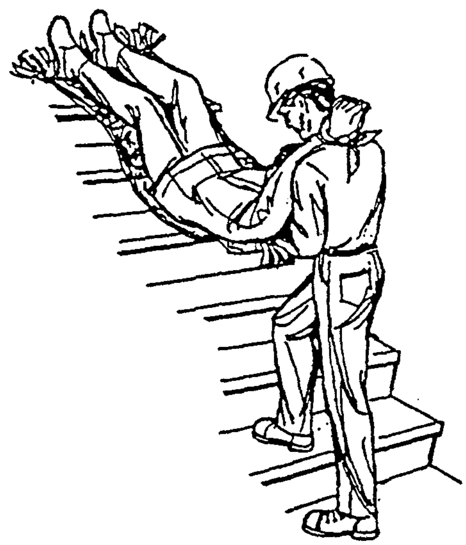
This method is only for casualties who can help themselves. This is the ordinary way to move the lightly hurt.

Pick-a-Back

Simply lift the casualty onto your back. Don't try it if the casualty is unconscious.

Removal Down Stairs (Drag Carry)

Don't try this if the victim has broken limbs. Use a mattress or rug under the casualty if one is available. Neck and back injuries may be aggravated by the drag carry if the spine is allowed to twist or flex.



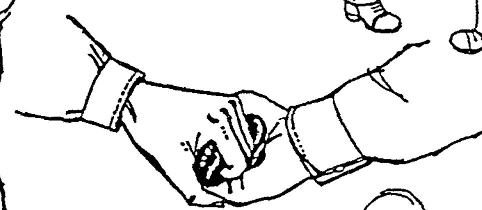
If there are two of you to do the carrying, try one of these emergency methods:

The Fore and Aft Method

This is a useful method if the casualty does not have a spinal injury. An unconscious person can be carried this way, but a broken leg means you'll have to tie the limbs together and carry them under one arm.

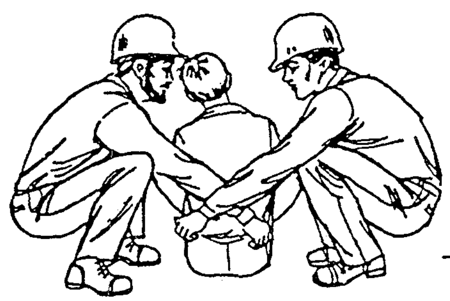
Two-Handed Seat Carry

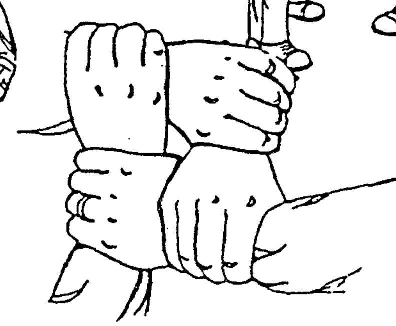
This is another good way to carry an unconscious casualty. Always use the hook grip and pad your fingers with a handkerchief to prevent cutting your partner's fingers with your nails.



Four-Handed Seat Carry

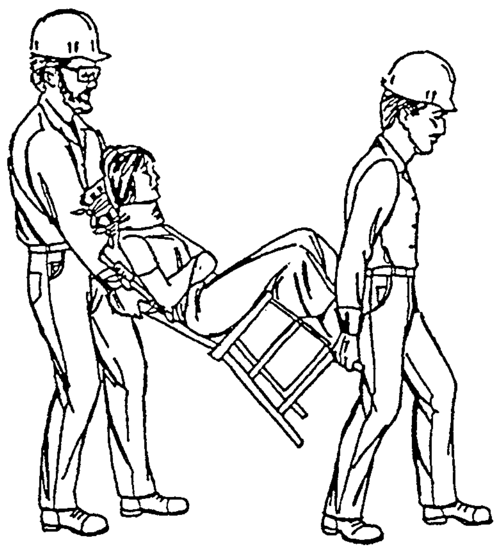
This is a good carry for a conscious casualty.





Chair Lift

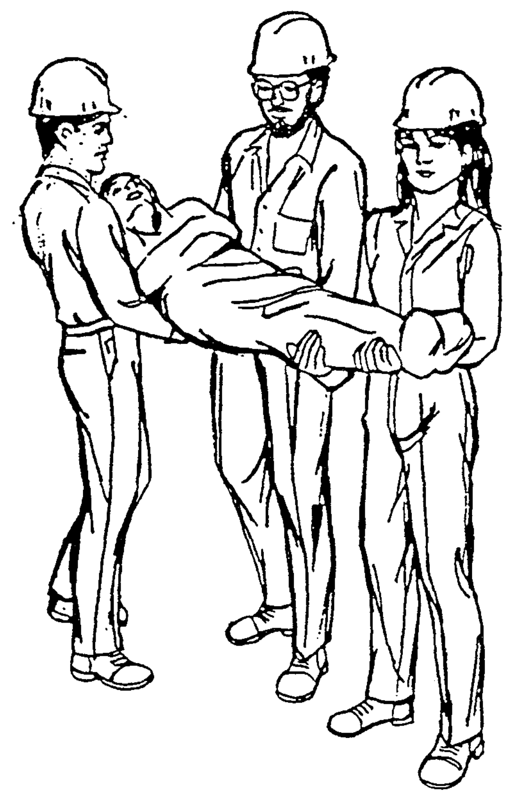
Make sure the chair is strong enough to bear the weight. Secure the casualty's hands across his or her chest. If there is a possible neck injury, use a spinal board and cervical collar to immobilize the head, neck and spine before placing the casualty in the chair.



If there are more than two of you to do the job, there are a number of different methods that can be used to carry casualties.

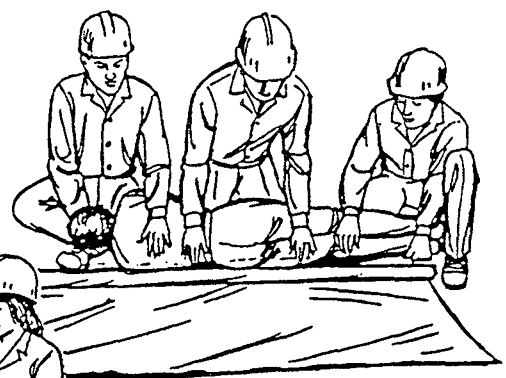
Three-Man Lift and Carry

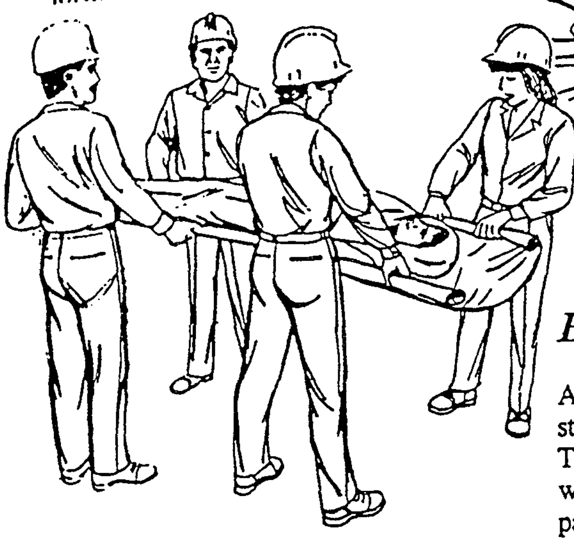
This is an excellent way of lifting a badly hurt person without complicating any injuries. The casualty can be carried forward, sideways or lowered onto a stretcher. This method is recommended for getting a badly hurt person out of a confined space and down difficult stairways. Be especially careful of casualties with possible neck and back injuries. Do not allow the back to flex (sag) or the head to roll from side to side.



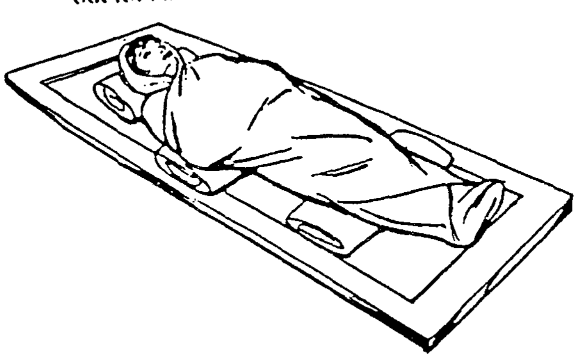
Improvisation

When you can't employ a stretcher, a blanket can be used providing the casualty has no neck or back injuries. Don't jar casualties any more than you can help when you roll them onto the blanket. Roll the edges of the blanket to form a handhold.





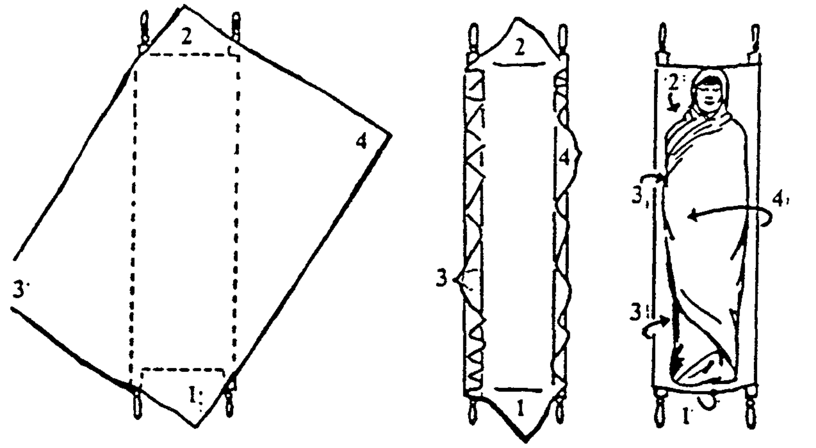
Doors, short ladders, sheets of galvanized metal, etc., can all be used to improvise stretchers. Make sure that it will clear all passageways and that it is strong enough to hold the casualty. The good rescue worker always has an eye out for suitable materials.



Blanketing Stretchers

A casualty can be wrapped on a stretcher using one or two blankets. These two methods provide maximum warmth with minimum weight on the patient. They also permit easy access to the casualty's wounds.

To wrap a casualty with the **one-blanket method**, place the blanket diagonally on the length of the stretcher and fold the overhanging edges to either side of the stretcher bed to keep them off the ground. After the casualty has been centred on the stretcher, bring the bottom corner of the blanket (1 in the figure) over the feet and tuck in between the ankles. The corner at the head (2) is brought around the head and neck to the chest.



Preparing a Stretcher with One Blanket.

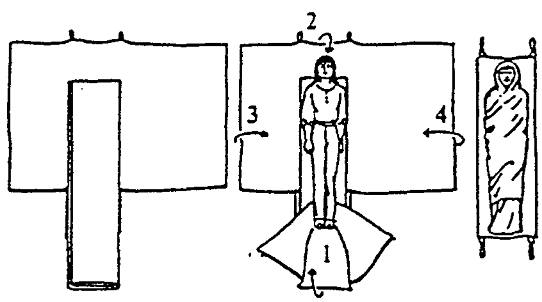
Unfold one side of the blanket (3), covering the casualty and tucking the end on the opposite side. The other side (4) is then unfolded and wrapped around the casualty to finish the procedure.

To prepare a stretcher using the **two-blanket method**, spread the first blanket open and position it at right angles to the stretcher, off centre, with the upper edge high enough to make a good cover for the casualty's head. That is usually half to three-quarters of the length of the stretcher handles.

The second blanket is folded in thirds along its length and positioned on the stretcher low enough to provide good cover for the casualty's feet. Open out the folds of the blanket at the foot of the stretcher to a length of about 60 cm (24 in.).

Fold the overhanging edges of the first blanket (3 and 4 in figure) to the edges of the stretcher bed, ready to receive the casualty. When the casualty has been positioned on the stretcher, cover the feet, using the opened-out folds (1), and tuck some of the blanket between the ankles.

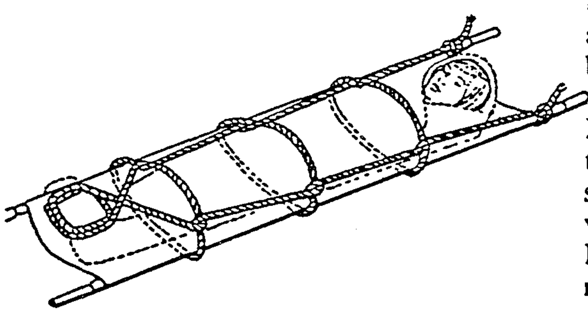
Bring the upper edge of the first blanket (2) around the casualty's head and shoulders. Carry the shorter end (3) over the body and upper legs, tucking it in against the body. Bring the long end of the blanket (4) over the body and tuck it in to complete the procedure.



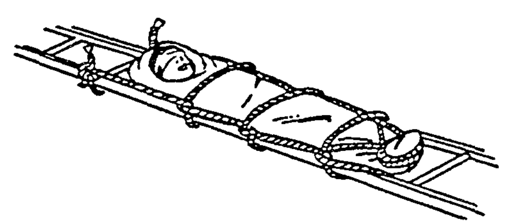
Preparing a Stretcher with Two Blankets

Lashing Casualty to Stretcher

Whenever casualties have to be carried over uneven ground or debris, they should be lashed to the stretcher. Clove hitches are used. Lashing should be applied to a stretcher this way.



Sometimes a ladder must be used as an emergency stretcher. Lash a casualty to a ladder this way. Start above the head.



Doors, iron railings, tin roofing sheets or even planks can be used as stretchers, but none of these are suitable for vertical rescue as no suitable lashing can be done.

Remember, your casualties will be hurt and in pain. Treat them accordingly.

Passing Stretchers over Obstacles

Normally four people are needed to carry a stretcher, although two are sufficient when the ground is level. When taking a patient over rubble or piles of debris, six or eight bearers may be needed. If only four are available, and a rough passage or obstacle has to be negotiated, do it this way.

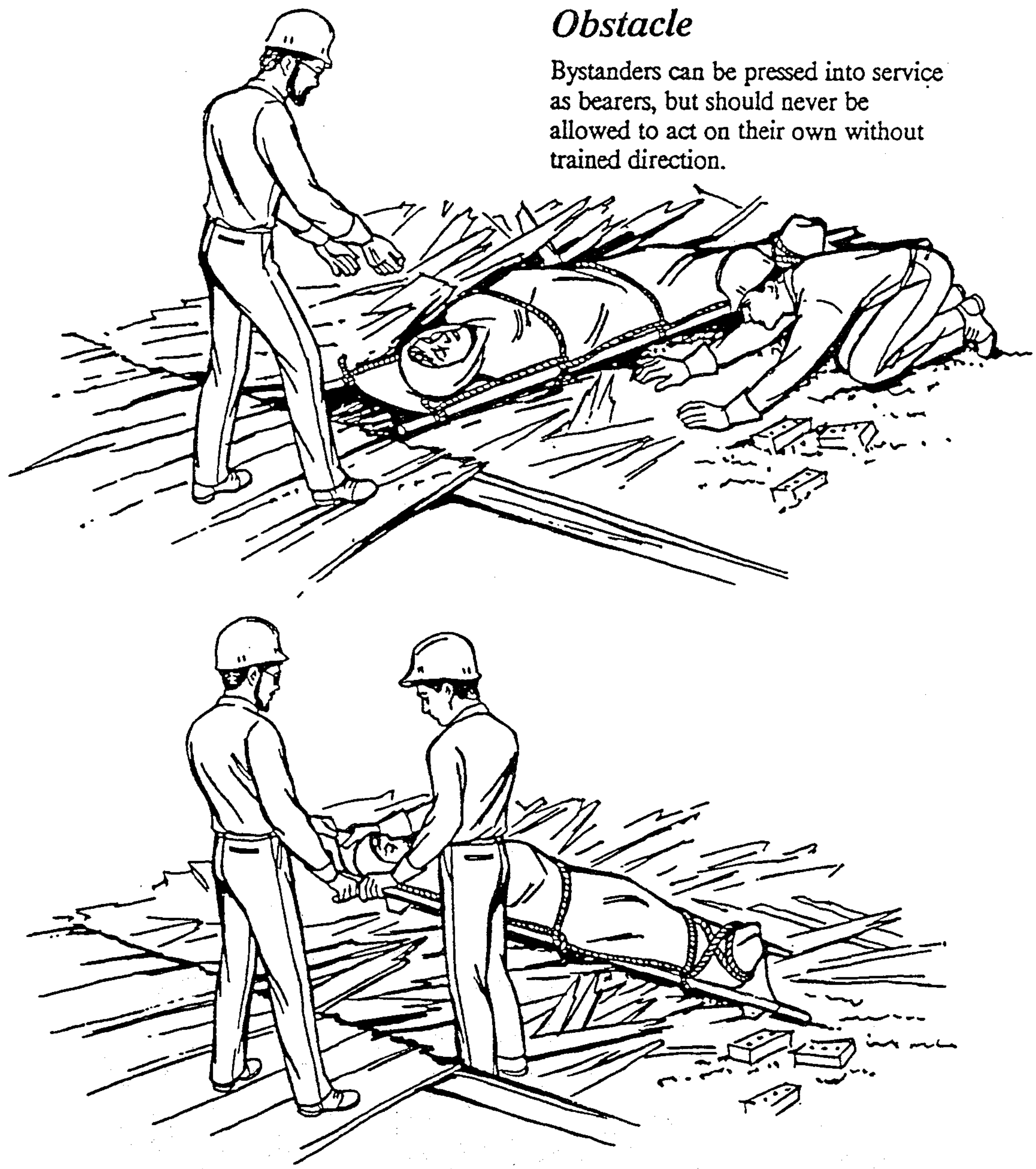
Place one bearer at the front, one at the back and one at each side. The side bearers should take the weight while the front bearer gets firmly set. Repeat this routine as often as necessary.

If only two bearers are available, place the stretcher on the ground on its supports. Make sure the canvas bed clears any rubble. The bearer at the front takes a firm stance and the rear bearer raises the front end as close to

horizontal as possible. Then the rear bearer returns to the rear end and raises the stretcher. Each obstacle should be negotiated in this manner.

Obstacle

Bystanders can be pressed into service as bearers, but should never be allowed to act on their own without trained direction.



Five Stages of Rescue

No hard and fast rules can be laid down for rescue work but, generally speaking, five stages of rescue are followed by trained rescue parties.

Stage 1 — Reconnaissance and Dealing with Surface Casualties
Examine the site. Deal with surface casualties. Gather all possible information about other occupants of the building.

Stage 2 — Location and Removal of Lightly Trapped Casualties
Search fringes of the damage area for casualties. Maintain contact with casualties inside who can be seen or heard but who cannot be moved immediately.

Stage 3 — Exploration of Likely Survival Points
Search the ruins and rescue all persons who can be seen or heard. This may include a calling and listening period.

Stage 4 — Further Exploration and Selected Debris Removal
Search farther into the ruins where the chances of trapped people remaining alive seem remote. This may include removing debris from the more likely places where casualties may be located.

Stage 5 — Systematic Debris Removal
Strip selected areas of debris until all supposed casualties are accounted for. This includes removal of the dead and parts of bodies. Identify buildings that have already been searched by using spray paint or signs. This method can also be used to mark buildings that may contain bodies.

Visual Training Aids

Check with your provincial emergency measures organization for availability of the following training aids:

- Rescue Party
- Five Stages of Rescue
- Rescue Reconnaissance

Improvisation

You don't need a lot of expensive equipment to practise rescue work. Ropes, levers, jacks and ladders are available for the asking from many sources. Mock-ups of wrecked houses can be created using discarded crates, boxes, sacks, etc. Learn the tricks now. When you're faced with the real thing, you'll have to improvise.

Do It in the Dark

To be a good rescue worker you should master all the skills we've outlined in this booklet. You should be able to do them in the dark. Practise tying knots blindfolded and in cramped quarters.

In most places you can find a casualty simulation group who'll provide realistic-looking casualties. Take advantage of their services.

Practise whenever you can. The skills you learn today, could help you save lives tomorrow.

Some Do's and Don'ts

DO

- Make a reconnaissance before you start work. The time will not be wasted.
- Examine a casualty before removal and give first aid for all life-threatening conditions, such as stopped breathing, bleeding and unconsciousness.
- Free the nose and mouth of a casualty from dust and grit to ease breathing.
- Protect a casualty from falling debris and dust by using blankets, tarpaulins, corrugated iron sheets, etc.
- Be careful how you move debris from the vicinity of a casualty.
- Keep a casualty warm to slow the progress of shock.
- Make sure that the stretcher is properly blanketed so that the casualty has the maximum amount of warmth and comfort.
- Remember the right way to carry a stretcher over debris and obstacles.
- Remember to keep a list of all casualties handled.
- Keep off wreckage as much as possible and leave it undisturbed or the neutral voids may be destroyed by further collapse.
- Be careful how you remove debris and obstacles, especially from voids, to prevent further collapse.
- Remember it is often necessary to put a simple prop or strut to strengthen a floor loaded with debris before passing over or working underneath it.
- Use gloves when removing debris by hand.
- Remember to exercise great care when using sharp tools in debris.
- Walk as close as possible to the wall when on damaged stairs and upper floors.

DON'T

- Move an injured person without rendering first aid unless the casualty is in immediate danger.
- Smoke or strike matches in case there is a gas leak.
- Crawl over debris or disturb parts of the damaged structure unless you are compelled to by circumstances.
- Pull timber out of the wreckage indiscriminately or you may cause further collapse.
- Enter dangerous places without informing the other members of your party, or if possible, without a companion to help in case of accident.
- Touch loose electrical wiring.
- Throw debris aimlessly on one side — you may have to move it again.

Appendix D

Conference Information

Program
Sponsors
Conference Speakers
Hospitality
Conference Critique

School Sites: Becoming Prepared for Earthquakes

Commemorating the Third Anniversary
of the Loma Prieta Earthquake

October 6, 1992
San Jose State University College of Engineering

Co-sponsors:
Bay Area Regional Earthquake Preparedness Project, City of San Jose, National Center for Earthquake Engineering Research, San Jose State University College of Engineering

8:30 am	Registration
9:00 am	Welcome and Introductions Dr. Jay Pinson, Dean, SJSU College of Engineering Dr. Frances Winslow, Director, San Jose Office of Emergency Services
9:10 am	**"The Earthquake Threat to Schools in the Bay Area"** Richard Eisner, BAREPP
9:50 am	**"How School Buildings Perform in Earthquakes"** H.P. Campbell & Dennis Bellet, Office of State Architect
10:40 am	Break: Poster Session on Earthquake Education by 4th Grade Students, Curriculum Display in Lobby, Vendor Fair in Outdoor Arcade
11:15 am	**"Non-Structural Hazard Mitigation for Schools"** Dr. Guna Selvaduray, SJSU College of Engineering
NOON	Lunch: Poster Session and Vendor Fair
1:15 pm	Afternoon Workshops * **"Search and Rescue Teams for Schools: Train the Trainer"** UCLA Extension * **"Earthquake Educations Materials: Making The Curriculum Quake Safe"** Sarah Nathe, BAREPP; Andrea Dargush, NCEER; Joyce Blueford, Ph.D., Math Science Nucleus; Jason Tarsish, Union School District, San Jose. * **"Triage and Medical Planning at School Sites"** Sally Snyder,R.N., Head Nurse, Irvine Unified School District; Julie Rose,R.N., Santa Clara Valley Chapter American Red Cross; Rex Painter, Santa Clara Valley Chapter American Red Cross. * **"Key Issues In School Site Planning: Making a Plan"** Frances Winslow, Ph.D. and Diane Zarate, City of San Jose; Pat Jocius, City of Cupertino; Raelene Wong, City of Sunnyvale.
4:00 pm	Dismissal

This conference is made possible by a grant from the National Center for Earthquake Engineering Research

Sponsors of
School Sites: Becoming Prepared for Earthquakes

City of San Jose - Office of Emergency Services

Since 1988 OES has been working with San Jose's seventeen public school districts, and its private schools, to achieve emergency preparedness at the school site level. Projects include a conference for superintendents and district coordinators in 1988; a conference on school site supplies in 1992; and a consultation with superintendents on emergency communication alternatives.

National Center for Earthquake Engineering Research

NCEER was established at the State University of New York at Buffalo in September 1986 with a $25 million grant from the National Science Foundation. Matching funding is provided by New York State and other sources. The Center focuses on minimizing earthquake hazards through a system of research, implementation of findings, public education and technology transfer. Its education program is geared toward enhancing earthquake science curricula and earthquake preparedness in grades K-12 nationwide.

Bay Area Regional Earthquake Preparedness Project

BAREPP is a program of the California Office of Emergency Services. Established in 1984 to promote earthquake preparedness and hazard reduction in the heavily populated counties of the Bay Area, BAREPP provides planning and technical assistance to public, private and volunteer organizations interested in earthquake education, preparedness planning, emergency response, and damage mitigation. It publishes a wide selection of information booklets and guides, slide sets, and video programs for use by governments, businesses, educators and other community groups.

San Jose State University College of Engineering

The College is a leading engineering education center in the Bay Area, with facilities for specialties such as materials engineering and packaging engineering. Earthquake related research is a focus of many faculty members, including structural and non-structural issues.

Conference Speakers

Richard Eisner
The Earthquake Program of the California Governor's Office of Emergency Services
Metro Center
101 Eighth Street, Suite 152
Oakland, CA 94607

Dennis Bellet
Office of the State Architect
400 P Street, 5th Floor
Sacramento, CA 95814

H.P. Campbell
Office of the State Architect
400 P Street, 5th Floor
Sacramento, CA 95814

Professor Guna Selvaduray, Ph.D.
San Jose State University
College of Engineering
One Washington Square
San Jose, CA 95192-0080

Carol Goldberg
William M. Cody, M.A.
John Moede
UCLA Extension
0995 Le Conte Avenue
Los Angeles, CA 90024-2883

Sarah Nathe
The Earthquake Program of the California Governor's Office of Emergency Services
Metro Center
101 Eighth Street, Suite 152
Oakland, CA 94607

Andrea Dargush
NCEER
SUNY at Buffalo
Red Jacket Quadrangle
Buffalo, NY 14261

Joyce Blueford, Ph.D.
Math/Science Nucleus
3710 Yale Way
Fremont, CA 94538

Jason Tarshis
325 Union Avenue, #210F
Campbell, CA 95008

Julie Rose, R.N.
Santa Clara Valley American Red Cross
333 McKendrie Street
San Jose, CA 95110

Sally Snyder, R.N.
Irvine Unified School District
5050 Barranca Parkway
Irvine, CA 92714

Pat Jocius
City of Cupertino
10300 Torre Avenue
Cupertino, CA 95104

Frances E. Winslow, Ph.D.
City of San Jose
Office of Emergency Services
855 N. San Pedro Street #404
San Jose, CA 95110

Raelene Wong
City of Sunnyvale
PO Box 3707
Sunnyvale, CA 94086-3707

Diane Zarate
City of San Jose
OES
855 N. San Pedro Street
San Jose, CA 95110

Hospitality Provided Courtesy of the Vendors

California Safety and Supply Co.
306 Mathew St.
Santa Clara, CA 95050
408-727-8530

Parkin-Taylor, Inc.
1072 S. Saratoga/Sunnyvale Rd. #396
San Jose, CA 95129
408-255-4564

Sands Associates
Distributors of CEPP Products
521 Mill Pond Drive
San Jose, CA 95125
408-288-5700

Sears Industrial Sales
6382 Galletta Drive
Newark, CA 94560-3709
415-794-0523

Simpler Life Emergency Provisions
PO Box 700704
San Jose, CA 95170
408-973-1222

Sunmaster
4237 South Market Court, Suite A
Sacramento, CA 95834
916-568-0005

School Sites: Becoming Prepared For Earthquakes Conference Critique

Please rate the sessions that you attended. A rating of 5 means that you strongly agree with the statement, and rate the presentation highly. A rating of 1 means that you strongly disagree with the statement, and rate the presentation as poor.

	Poor				Excellent
Keynote Address: "The Earthquake Threat to Schools in the Bay Area"					
1. The information from the session helped me to better understand the earthquake threat schools in the Bay Area. (n=49)*	1	2	3	4	5
			12%	51%	37%
2. I will be able to use this information in planning for earthquake response at my school site. (n=49)	1	2	3	4	5
	2%		20%	51%	27%
"How School Buildings Perform in Earthquakes"					
3. The information in this session helped me to better understand how school buildings perform in earthquakes. (n=48)	1	2	3	4	5
	2%	2%	15%	48%	33%
4. I will be able to use this information for planning at my school site. (n=47)	1	2	3	4	5
	2%	6%	28%	30%	34%
5. The guide book provided by the State Architect's Office will assist us in making occupancy decisions in an earthquake. (n=46)	1	2	3	4	5
			17%	35%	48%

* n= number of responses to this question.

"Non-Structural Hazard Mitigation for Schools"

	1	2	3	4	5
6. This session helped me to better understand how non-structural components can be a danger in an earthquake, and how these items can be restrained. (n=48)			17%	33%	50%
7. The information on restraining non-structural hazards in the school environment is useful to me in planning budget and activities for earthquake preparedness. (n=45)		9%	22%	36%	33%

PLEASE RATE ONLY THE WORKSHOP THAT YOU ATTENDED IN ITS ENTIRETY. DO NOT RATE SESSIONS THAT YOU ATTENDED BRIEFLY. IF YOU MOVED AMONG SEVERAL SESSIONS, PLEASE DO NOT RATE ANY.

"Search and Rescue Teams for Schools" (n=28)

	NR	1	2	3	4	5
8. This session taught me how to do light search and rescue in a school environment.			3%	11%	29%	57%
9. After this session I would feel able to organize a search and rescue team at my school.	3%		7%	14%	40%	36%
10. The written materials provided to me will enable me to share search and rescue information with other school staff members so that they can join a school site search and rescue team.	5%		7%	14%	42%	32%

"Triage and Medical Planning at School Sites" (n=11)

	1	2	3	4	5
11. After this session I feel able to organize a medical response team at my school site.	8%		27%	46%	18%
12. The written materials provided to me will enable me to share medical care information with other school staff members so that they can join a school site search and rescue team.	8%		18%	36%	36%

"Earthquake Education Materials:Making the Curriculum Quake Safe" (n=3)

	NR	1	2	3	4	5
13. As a result of this session I have more ideas about where to get curriculum materials to integrate earthquake education into classroom instruction.	33%					66%
14. As a result of this session I have a better understanding of the need to include more earthquake preparedness and response information in classroom instruction.					33.5%	66.5%
15. As a result of this session I have some new ideas for integrating earthquake preparedness information with other aspects of teaching, such as integrating with creative writing assignments.	66.5%			33.5%		

"Key Issues in School Site Planning" (n=11)

please circle the name of your instructor:

Pat Jocius=3 Diane Zarate/Raelene Wong=6

	NR	1	2	3	4	5
16. As a result of this workshop I will be able to write or revise my school site earthquake preparedness and response plan.	9%			18%	27%	46%
17. As a result of this workshop I have a better understanding of the components of a complete school site earthquake plan.	28%			8%	18%	46%
18. Sharing ideas with other educators was an important part of this workshop.	38%			8%	18%	36%
19. The written planning guidance provided to me will help me to write or revise my school site earthquake plan.				8%	36%	56%

Comments on the Overall Workshop

	1	2	3	4	4-5	5
20. The day was well organized. (n=50)		14%	24%		2%	60%

	1	2	3	4	5
21. The topics were current and important to me in my school site planning. (n-49)				31%	69%

Comments:

- thank you for a good day.

- in relation to Red Cross presentation about shelters- more detail presented than I found to be useful.

- the county should develop a core of triage instructors that would go from school to school throughout Santa Clara County: I believe this is vital!

- medical aspect was not realistic, or there needs to be a city-wide coordinated effort to supply schools with emergency equipment and containers.

- volume on mike not high enough; difficult to hear from back.

- search and rescue and triage especially critical, do it again!

- excellent

- triage session was "too medical" for me - I am just an ordinary high school administrator. Perhaps it could be divided into 2 groups: nurses and others charged with this responsibility. Our school does not have a nurse.

- the search and rescue workshop was the most informative workshop I've ever attended.

- a very good workshop; the vendors were very helpful also.

- these types of workshops are always important and a valuable source of information

- would like less presentation up front and more opportunity to get to the workshops

- I really enjoyed the seminar

- the session was well done, however most everything was information that I already knew or was aware of

- this was a good start on helping us with this overwhelming project

- breakout session was beneficial

- outstanding workshop

- I thought it was an excellent conference

- the materials and concepts were good

- the vendors who exhibited were wonderful; they had knowledge and handouts

- the LA search and rescue presentation were worth the whole day; their humor and hands-on approach are my style of teaching. I felt they were excellent.

- I found the triage and search and rescue excellent and would have loved to have more workshops like that available

- excellent

- the speakers were well prepared and the content was good; I appreciate the resource materials that were distributed; good job!

- it was one of the best conferences on school site planning I've ever attended. I used some of the information in a seminar that I gave ...later that week.

NATIONAL CENTER FOR EARTHQUAKE ENGINEERING RESEARCH
LIST OF TECHNICAL REPORTS

The National Center for Earthquake Engineering Research (NCEER) publishes technical reports on a variety of subjects related to earthquake engineering written by authors funded through NCEER. These reports are available from both NCEER's Publications Department and the National Technical Information Service (NTIS). Requests for reports should be directed to the Publications Department, National Center for Earthquake Engineering Research, State University of New York at Buffalo, Red Jacket Quadrangle, Buffalo, New York 14261. Reports can also be requested through NTIS, 5285 Port Royal Road, Springfield, Virginia 22161. NTIS accession numbers are shown in parenthesis, if available.

NCEER-87-0001 "First-Year Program in Research, Education and Technology Transfer," 3/5/87, (PB88-134275).

NCEER-87-0002 "Experimental Evaluation of Instantaneous Optimal Algorithms for Structural Control," by R.C. Lin, T.T. Soong and A.M. Reinhorn, 4/20/87, (PB88-134341).

NCEER-87-0003 "Experimentation Using the Earthquake Simulation Facilities at University at Buffalo," by A.M. Reinhorn and R.L. Ketter, to be published.

NCEER-87-0004 "The System Characteristics and Performance of a Shaking Table," by J.S. Hwang, K.C. Chang and G.C. Lee, 6/1/87, (PB88-134259). This report is available only through NTIS (see address given above).

NCEER-87-0005 "A Finite Element Formulation for Nonlinear Viscoplastic Material Using a Q Model," by O. Gyebi and G. Dasgupta, 11/2/87, (PB88-213764).

NCEER-87-0006 "Symbolic Manipulation Program (SMP) - Algebraic Codes for Two and Three Dimensional Finite Element Formulations," by X. Lee and G. Dasgupta, 11/9/87, (PB88-218522).

NCEER-87-0007 "Instantaneous Optimal Control Laws for Tall Buildings Under Seismic Excitations," by J.N. Yang, A. Akbarpour and P. Ghaemmaghami, 6/10/87, (PB88-134333). This report is only available through NTIS (see address given above).

NCEER-87-0008 "IDARC: Inelastic Damage Analysis of Reinforced Concrete Frame - Shear-Wall Structures," by Y.J. Park, A.M. Reinhorn and S.K. Kunnath, 7/20/87, (PB88-134325).

NCEER-87-0009 "Liquefaction Potential for New York State: A Preliminary Report on Sites in Manhattan and Buffalo," by M. Budhu, V. Vijayakumar, R.F. Giese and L. Baumgras, 8/31/87, (PB88-163704). This report is available only through NTIS (see address given above).

NCEER-87-0010 "Vertical and Torsional Vibration of Foundations in Inhomogeneous Media," by A.S. Veletsos and K.W. Dotson, 6/1/87, (PB88-134291).

NCEER-87-0011 "Seismic Probabilistic Risk Assessment and Seismic Margins Studies for Nuclear Power Plants," by Howard H.M. Hwang, 6/15/87, (PB88-134267).

NCEER-87-0012 "Parametric Studies of Frequency Response of Secondary Systems Under Ground-Acceleration Excitations," by Y. Yong and Y.K. Lin, 6/10/87, (PB88-134309).

NCEER-87-0013 "Frequency Response of Secondary Systems Under Seismic Excitation," by J.A. HoLung, J. Cai and Y.K. Lin, 7/31/87, (PB88-134317).

NCEER-87-0014 "Modelling Earthquake Ground Motions in Seismically Active Regions Using Parametric Time Series Methods," by G.W. Ellis and A.S. Cakmak, 8/25/87, (PB88-134283).

NCEER-87-0015 "Detection and Assessment of Seismic Structural Damage," by E. DiPasquale and A.S. Cakmak, 8/25/87, (PB88-163712).

NCEER-87-0016 "Pipeline Experiment at Parkfield, California," by J. Isenberg and E. Richardson, 9/15/87, (PB88-163720). This report is available only through NTIS (see address given above).

NCEER-87-0017 "Digital Simulation of Seismic Ground Motion," by M. Shinozuka, G. Deodatis and T. Harada, 8/31/87, (PB88-155197). This report is available only through NTIS (see address given above).

NCEER-87-0018 "Practical Considerations for Structural Control: System Uncertainty, System Time Delay and Truncation of Small Control Forces," J.N. Yang and A. Akbarpour, 8/10/87, (PB88-163738).

NCEER-87-0019 "Modal Analysis of Nonclassically Damped Structural Systems Using Canonical Transformation," by J.N. Yang, S. Sarkani and F.X. Long, 9/27/87, (PB88-187851).

NCEER-87-0020 "A Nonstationary Solution in Random Vibration Theory," by J.R. Red-Horse and P.D. Spanos, 11/3/87, (PB88-163746).

NCEER-87-0021 "Horizontal Impedances for Radially Inhomogeneous Viscoelastic Soil Layers," by A.S. Veletsos and K.W. Dotson, 10/15/87, (PB88-150859).

NCEER-87-0022 "Seismic Damage Assessment of Reinforced Concrete Members," by Y.S. Chung, C. Meyer and M. Shinozuka, 10/9/87, (PB88-150867). This report is available only through NTIS (see address given above).

NCEER-87-0023 "Active Structural Control in Civil Engineering," by T.T. Soong, 11/11/87, (PB88-187778).

NCEER-87-0024 "Vertical and Torsional Impedances for Radially Inhomogeneous Viscoelastic Soil Layers," by K.W. Dotson and A.S. Veletsos, 12/87, (PB88-187786).

NCEER-87-0025 "Proceedings from the Symposium on Seismic Hazards, Ground Motions, Soil-Liquefaction and Engineering Practice in Eastern North America," October 20-22, 1987, edited by K.H. Jacob, 12/87, (PB88-188115).

NCEER-87-0026 "Report on the Whittier-Narrows, California, Earthquake of October 1, 1987," by J. Pantelic and A. Reinhorn, 11/87, (PB88-187752). This report is available only through NTIS (see address given above).

NCEER-87-0027 "Design of a Modular Program for Transient Nonlinear Analysis of Large 3-D Building Structures," by S. Srivastav and J.F. Abel, 12/30/87, (PB88-187950).

NCEER-87-0028 "Second-Year Program in Research, Education and Technology Transfer," 3/8/88, (PB88-219480).

NCEER-88-0001 "Workshop on Seismic Computer Analysis and Design of Buildings With Interactive Graphics," by W. McGuire, J.F. Abel and C.H. Conley, 1/18/88, (PB88-187760).

NCEER-88-0002 "Optimal Control of Nonlinear Flexible Structures," by J.N. Yang, F.X. Long and D. Wong, 1/22/88, (PB88-213772).

NCEER-88-0003 "Substructuring Techniques in the Time Domain for Primary-Secondary Structural Systems," by G.D. Manolis and G. Juhn, 2/10/88, (PB88-213780).

NCEER-88-0004 "Iterative Seismic Analysis of Primary-Secondary Systems," by A. Singhal, L.D. Lutes and P.D. Spanos, 2/23/88, (PB88-213798).

NCEER-88-0005 "Stochastic Finite Element Expansion for Random Media," by P.D. Spanos and R. Ghanem, 3/14/88, (PB88-213806).

NCEER-88-0006 "Combining Structural Optimization and Structural Control," by F.Y. Cheng and C.P. Pantelides, 1/10/88, (PB88-213814).

NCEER-88-0007 "Seismic Performance Assessment of Code-Designed Structures," by H.H-M. Hwang, J-W. Jaw and H-J. Shau, 3/20/88, (PB88-219423).

NCEER-88-0008 "Reliability Analysis of Code-Designed Structures Under Natural Hazards," by H.H-M. Hwang, H. Ushiba and M. Shinozuka, 2/29/88, (PB88-229471).

NCEER-88-0009 "Seismic Fragility Analysis of Shear Wall Structures," by J-W Jaw and H.H-M. Hwang, 4/30/88, (PB89-102867).

NCEER-88-0010 "Base Isolation of a Multi-Story Building Under a Harmonic Ground Motion - A Comparison of Performances of Various Systems," by F-G Fan, G. Ahmadi and I.G. Tadjbakhsh, 5/18/88, (PB89-122238).

NCEER-88-0011 "Seismic Floor Response Spectra for a Combined System by Green's Functions," by F.M. Lavelle, L.A. Bergman and P.D. Spanos, 5/1/88, (PB89-102875).

NCEER-88-0012 "A New Solution Technique for Randomly Excited Hysteretic Structures," by G.Q. Cai and Y.K. Lin, 5/16/88, (PB89-102883).

NCEER-88-0013 "A Study of Radiation Damping and Soil-Structure Interaction Effects in the Centrifuge," by K. Weissman, supervised by J.H. Prevost, 5/24/88, (PB89-144703).

NCEER-88-0014 "Parameter Identification and Implementation of a Kinematic Plasticity Model for Frictional Soils," by J.H. Prevost and D.V. Griffiths, to be published.

NCEER-88-0015 "Two- and Three- Dimensional Dynamic Finite Element Analyses of the Long Valley Dam," by D.V. Griffiths and J.H. Prevost, 6/17/88, (PB89-144711).

NCEER-88-0016 "Damage Assessment of Reinforced Concrete Structures in Eastern United States," by A.M. Reinhorn, M.J. Seidel, S.K. Kunnath and Y.J. Park, 6/15/88, (PB89-122220).

NCEER-88-0017 "Dynamic Compliance of Vertically Loaded Strip Foundations in Multilayered Viscoelastic Soils," by S. Ahmad and A.S.M. Israil, 6/17/88, (PB89-102891).

NCEER-88-0018 "An Experimental Study of Seismic Structural Response With Added Viscoelastic Dampers," by R.C. Lin, Z. Liang, T.T. Soong and R.H. Zhang, 6/30/88, (PB89-122212). This report is available only through NTIS (see address given above).

NCEER-88-0019 "Experimental Investigation of Primary - Secondary System Interaction," by G.D. Manolis, G. Juhn and A.M. Reinhorn, 5/27/88, (PB89-122204).

NCEER-88-0020 "A Response Spectrum Approach For Analysis of Nonclassically Damped Structures," by J.N. Yang, S. Sarkani and F.X. Long, 4/22/88, (PB89-102909).

NCEER-88-0021 "Seismic Interaction of Structures and Soils: Stochastic Approach," by A.S. Veletsos and A.M. Prasad, 7/21/88, (PB89-122196).

NCEER-88-0022 "Identification of the Serviceability Limit State and Detection of Seismic Structural Damage," by E. DiPasquale and A.S. Cakmak, 6/15/88, (PB89-122188). This report is available only through NTIS (see address given above).

NCEER-88-0023 "Multi-Hazard Risk Analysis: Case of a Simple Offshore Structure," by B.K. Bhartia and E.H. Vanmarcke, 7/21/88, (PB89-145213).

NCEER-88-0024 "Automated Seismic Design of Reinforced Concrete Buildings," by Y.S. Chung, C. Meyer and M. Shinozuka, 7/5/88, (PB89-122170). This report is available only through NTIS (see address given above).

NCEER-88-0025 "Experimental Study of Active Control of MDOF Structures Under Seismic Excitations," by L.L. Chung, R.C. Lin, T.T. Soong and A.M. Reinhorn, 7/10/88, (PB89-122600).

NCEER-88-0026 "Earthquake Simulation Tests of a Low-Rise Metal Structure," by J.S. Hwang, K.C. Chang, G.C. Lee and R.L. Ketter, 8/1/88, (PB89-102917).

NCEER-88-0027 "Systems Study of Urban Response and Reconstruction Due to Catastrophic Earthquakes," by F. Kozin and H.K. Zhou, 9/22/88, (PB90-162348).

NCEER-88-0028 "Seismic Fragility Analysis of Plane Frame Structures," by H.H-M. Hwang and Y.K. Low, 7/31/88, (PB89-131445).

NCEER-88-0029 "Response Analysis of Stochastic Structures," by A. Kardara, C. Bucher and M. Shinozuka, 9/22/88, (PB89-174429).

NCEER-88-0030 "Nonnormal Accelerations Due to Yielding in a Primary Structure," by D.C.K. Chen and L.D. Lutes, 9/19/88, (PB89-131437).

NCEER-88-0031 "Design Approaches for Soil-Structure Interaction," by A.S. Veletsos, A.M. Prasad and Y. Tang, 12/30/88, (PB89-174437). This report is available only through NTIS (see address given above).

NCEER-88-0032 "A Re-evaluation of Design Spectra for Seismic Damage Control," by C.J. Turkstra and A.G. Tallin, 11/7/88, (PB89-145221).

NCEER-88-0033 "The Behavior and Design of Noncontact Lap Splices Subjected to Repeated Inelastic Tensile Loading," by V.E. Sagan, P. Gergely and R.N. White, 12/8/88, (PB89-163737).

NCEER-88-0034 "Seismic Response of Pile Foundations," by S.M. Mamoon, P.K. Banerjee and S. Ahmad, 11/1/88, (PB89-145239).

NCEER-88-0035 "Modeling of R/C Building Structures With Flexible Floor Diaphragms (IDARC2)," by A.M. Reinhorn, S.K. Kunnath and N. Panahshahi, 9/7/88, (PB89-207153).

NCEER-88-0036 "Solution of the Dam-Reservoir Interaction Problem Using a Combination of FEM, BEM with Particular Integrals, Modal Analysis, and Substructuring," by C-S. Tsai, G.C. Lee and R.L. Ketter, 12/31/88, (PB89-207146).

NCEER-88-0037 "Optimal Placement of Actuators for Structural Control," by F.Y. Cheng and C.P. Pantelides, 8/15/88, (PB89-162846).

NCEER-88-0038 "Teflon Bearings in Aseismic Base Isolation: Experimental Studies and Mathematical Modeling," by A. Mokha, M.C. Constantinou and A.M. Reinhorn, 12/5/88, (PB89-218457). This report is available only through NTIS (see address given above).

NCEER-88-0039 "Seismic Behavior of Flat Slab High-Rise Buildings in the New York City Area," by P. Weidlinger and M. Ettouney, 10/15/88, (PB90-145681).

NCEER-88-0040 "Evaluation of the Earthquake Resistance of Existing Buildings in New York City," by P. Weidlinger and M. Ettouney, 10/15/88, to be published.

NCEER-88-0041 "Small-Scale Modeling Techniques for Reinforced Concrete Structures Subjected to Seismic Loads," by W. Kim, A. El-Attar and R.N. White, 11/22/88, (PB89-189625).

NCEER-88-0042 "Modeling Strong Ground Motion from Multiple Event Earthquakes," by G.W. Ellis and A.S. Cakmak, 10/15/88, (PB89-174445).

NCEER-88-0043 "Nonstationary Models of Seismic Ground Acceleration," by M. Grigoriu, S.E. Ruiz and E. Rosenblueth, 7/15/88, (PB89-189617).

NCEER-88-0044 "SARCF User's Guide: Seismic Analysis of Reinforced Concrete Frames," by Y.S. Chung, C. Meyer and M. Shinozuka, 11/9/88, (PB89-174452).

NCEER-88-0045 "First Expert Panel Meeting on Disaster Research and Planning," edited by J. Pantelic and J. Stoyle, 9/15/88, (PB89-174460).

NCEER-88-0046 "Preliminary Studies of the Effect of Degrading Infill Walls on the Nonlinear Seismic Response of Steel Frames," by C.Z. Chrysostomou, P. Gergely and J.F. Abel, 12/19/88, (PB89-208383).

NCEER-88-0047 "Reinforced Concrete Frame Component Testing Facility - Design, Construction, Instrumentation and Operation," by S.P. Pessiki, C. Conley, T. Bond, P. Gergely and R.N. White, 12/16/88, (PB89-174478).

NCEER-89-0001 "Effects of Protective Cushion and Soil Compliancy on the Response of Equipment Within a Seismically Excited Building," by J.A. HoLung, 2/16/89, (PB89-207179).

NCEER-89-0002 "Statistical Evaluation of Response Modification Factors for Reinforced Concrete Structures," by H.H-M. Hwang and J-W. Jaw, 2/17/89, (PB89-207187).

NCEER-89-0003 "Hysteretic Columns Under Random Excitation," by G-Q. Cai and Y.K. Lin, 1/9/89, (PB89-196513).

NCEER-89-0004 "Experimental Study of 'Elephant Foot Bulge' Instability of Thin-Walled Metal Tanks," by Z-H. Jia and R.L. Ketter, 2/22/89, (PB89-207195).

NCEER-89-0005 "Experiment on Performance of Buried Pipelines Across San Andreas Fault," by J. Isenberg, E. Richardson and T.D. O'Rourke, 3/10/89, (PB89-218440). This report is available only through NTIS (see address given above).

NCEER-89-0006 "A Knowledge-Based Approach to Structural Design of Earthquake-Resistant Buildings," by M. Subramani, P. Gergely, C.H. Conley, J.F. Abel and A.H. Zaghw, 1/15/89, (PB89-218465).

NCEER-89-0007 "Liquefaction Hazards and Their Effects on Buried Pipelines," by T.D. O'Rourke and P.A. Lane, 2/1/89, (PB89-218481).

NCEER-89-0008 "Fundamentals of System Identification in Structural Dynamics," by H. Imai, C-B. Yun, O. Maruyama and M. Shinozuka, 1/26/89, (PB89-207211).

NCEER-89-0009 "Effects of the 1985 Michoacan Earthquake on Water Systems and Other Buried Lifelines in Mexico," by A.G. Ayala and M.J. O'Rourke, 3/8/89, (PB89-207229).

NCEER-89-R010 "NCEER Bibliography of Earthquake Education Materials," by K.E.K. Ross, Second Revision, 9/1/89, (PB90-125352).

NCEER-89-0011 "Inelastic Three-Dimensional Response Analysis of Reinforced Concrete Building Structures (IDARC-3D), Part I - Modeling," by S.K. Kunnath and A.M. Reinhorn, 4/17/89, (PB90-114612).

NCEER-89-0012 "Recommended Modifications to ATC-14," by C.D. Poland and J.O. Malley, 4/12/89, (PB90-108648).

NCEER-89-0013 "Repair and Strengthening of Beam-to-Column Connections Subjected to Earthquake Loading," by M. Corazao and A.J. Durrani, 2/28/89, (PB90-109885).

NCEER-89-0014 "Program EXKAL2 for Identification of Structural Dynamic Systems," by O. Maruyama, C-B. Yun, M. Hoshiya and M. Shinozuka, 5/19/89, (PB90-109877).

NCEER-89-0015 "Response of Frames With Bolted Semi-Rigid Connections, Part I - Experimental Study and Analytical Predictions," by P.J. DiCorso, A.M. Reinhorn, J.R. Dickerson, J.B. Radziminski and W.L. Harper, 6/1/89, to be published.

NCEER-89-0016 "ARMA Monte Carlo Simulation in Probabilistic Structural Analysis," by P.D. Spanos and M.P. Mignolet, 7/10/89, (PB90-109893).

NCEER-89-P017 "Preliminary Proceedings from the Conference on Disaster Preparedness - The Place of Earthquake Education in Our Schools," Edited by K.E.K. Ross, 6/23/89, (PB90-108606).

NCEER-89-0017 "Proceedings from the Conference on Disaster Preparedness - The Place of Earthquake Education in Our Schools," Edited by K.E.K. Ross, 12/31/89, (PB90-207895). This report is available only through NTIS (see address given above).

NCEER-89-0018 "Multidimensional Models of Hysteretic Material Behavior for Vibration Analysis of Shape Memory Energy Absorbing Devices, by E.J. Graesser and F.A. Cozzarelli, 6/7/89, (PB90-164146).

NCEER-89-0019 "Nonlinear Dynamic Analysis of Three-Dimensional Base Isolated Structures (3D-BASIS)," by S. Nagarajaiah, A.M. Reinhorn and M.C. Constantinou, 8/3/89, (PB90-161936). This report is available only through NTIS (see address given above).

NCEER-89-0020 "Structural Control Considering Time-Rate of Control Forces and Control Rate Constraints," by F.Y. Cheng and C.P. Pantelides, 8/3/89, (PB90-120445).

NCEER-89-0021 "Subsurface Conditions of Memphis and Shelby County," by K.W. Ng, T-S. Chang and H-H.M. Hwang, 7/26/89, (PB90-120437).

NCEER-89-0022 "Seismic Wave Propagation Effects on Straight Jointed Buried Pipelines," by K. Elhmadi and M.J. O'Rourke, 8/24/89, (PB90-162322).

NCEER-89-0023 "Workshop on Serviceability Analysis of Water Delivery Systems," edited by M. Grigoriu, 3/6/89, (PB90-127424).

NCEER-89-0024 "Shaking Table Study of a 1/5 Scale Steel Frame Composed of Tapered Members," by K.C. Chang, J.S. Hwang and G.C. Lee, 9/18/89, (PB90-160169).

NCEER-89-0025 "DYNA1D: A Computer Program for Nonlinear Seismic Site Response Analysis - Technical Documentation," by Jean H. Prevost, 9/14/89, (PB90-161944). This report is available only through NTIS (see address given above).

NCEER-89-0026 "1:4 Scale Model Studies of Active Tendon Systems and Active Mass Dampers for Aseismic Protection," by A.M. Reinhorn, T.T. Soong, R.C. Lin, Y.P. Yang, Y. Fukao, H. Abe and M. Nakai, 9/15/89, (PB90-173246).

NCEER-89-0027 "Scattering of Waves by Inclusions in a Nonhomogeneous Elastic Half Space Solved by Boundary Element Methods," by P.K. Hadley, A. Askar and A.S. Cakmak, 6/15/89, (PB90-145699).

NCEER-89-0028 "Statistical Evaluation of Deflection Amplification Factors for Reinforced Concrete Structures," by H.H.M. Hwang, J-W. Jaw and A.L. Ch'ng, 8/31/89, (PB90-164633).

NCEER-89-0029 "Bedrock Accelerations in Memphis Area Due to Large New Madrid Earthquakes," by H.H.M. Hwang, C.H.S. Chen and G. Yu, 11/7/89, (PB90-162330).

NCEER-89-0030 "Seismic Behavior and Response Sensitivity of Secondary Structural Systems," by Y.Q. Chen and T.T. Soong, 10/23/89, (PB90-164658).

NCEER-89-0031 "Random Vibration and Reliability Analysis of Primary-Secondary Structural Systems," by Y. Ibrahim, M. Grigoriu and T.T. Soong, 11/10/89, (PB90-161951).

NCEER-89-0032 "Proceedings from the Second U.S. - Japan Workshop on Liquefaction, Large Ground Deformation and Their Effects on Lifelines, September 26-29, 1989," Edited by T.D. O'Rourke and M. Hamada, 12/1/89, (PB90-209388).

NCEER-89-0033 "Deterministic Model for Seismic Damage Evaluation of Reinforced Concrete Structures," by J.M. Bracci, A.M. Reinhorn, J.B. Mander and S.K. Kunnath, 9/27/89.

NCEER-89-0034 "On the Relation Between Local and Global Damage Indices," by E. DiPasquale and A.S. Cakmak, 8/15/89, (PB90-173865).

NCEER-89-0035 "Cyclic Undrained Behavior of Nonplastic and Low Plasticity Silts," by A.J. Walker and H.E. Stewart, 7/26/89, (PB90-183518).

NCEER-89-0036 "Liquefaction Potential of Surficial Deposits in the City of Buffalo, New York," by M. Budhu, R. Giese and L. Baumgrass, 1/17/89, (PB90-208455).

NCEER-89-0037 "A Deterministic Assessment of Effects of Ground Motion Incoherence," by A.S. Veletsos and Y. Tang, 7/15/89, (PB90-164294).

NCEER-89-0038 "Workshop on Ground Motion Parameters for Seismic Hazard Mapping," July 17-18, 1989, edited by R.V. Whitman, 12/1/89, (PB90-173923).

NCEER-89-0039 "Seismic Effects on Elevated Transit Lines of the New York City Transit Authority," by C.J. Costantino, C.A. Miller and E. Heymsfield, 12/26/89, (PB90-207887).

NCEER-89-0040 "Centrifugal Modeling of Dynamic Soil-Structure Interaction," by K. Weissman, Supervised by J.H. Prevost, 5/10/89, (PB90-207879).

NCEER-89-0041 "Linearized Identification of Buildings With Cores for Seismic Vulnerability Assessment," by I-K. Ho and A.E. Aktan, 11/1/89, (PB90-251943).

NCEER-90-0001 "Geotechnical and Lifeline Aspects of the October 17, 1989 Loma Prieta Earthquake in San Francisco," by T.D. O'Rourke, H.E. Stewart, F.T. Blackburn and T.S. Dickerman, 1/90, (PB90-208596).

NCEER-90-0002 "Nonnormal Secondary Response Due to Yielding in a Primary Structure," by D.C.K. Chen and L.D. Lutes, 2/28/90, (PB90-251976).

NCEER-90-0003 "Earthquake Education Materials for Grades K-12," by K.E.K. Ross, 4/16/90, (PB91-251984).

NCEER-90-0004 "Catalog of Strong Motion Stations in Eastern North America," by R.W. Busby, 4/3/90, (PB90-251984).

NCEER-90-0005 "NCEER Strong-Motion Data Base: A User Manual for the GeoBase Release (Version 1.0 for the Sun3)," by P. Friberg and K. Jacob, 3/31/90 (PB90-258062).

NCEER-90-0006 "Seismic Hazard Along a Crude Oil Pipeline in the Event of an 1811-1812 Type New Madrid Earthquake," by H.H.M. Hwang and C-H.S. Chen, 4/16/90(PB90-258054).

NCEER-90-0007 "Site-Specific Response Spectra for Memphis Sheahan Pumping Station," by H.H.M. Hwang and C.S. Lee, 5/15/90, (PB91-108811).

NCEER-90-0008 "Pilot Study on Seismic Vulnerability of Crude Oil Transmission Systems," by T. Ariman, R. Dobry, M. Grigoriu, F. Kozin, M. O'Rourke, T. O'Rourke and M. Shinozuka, 5/25/90, (PB91-108837).

NCEER-90-0009 "A Program to Generate Site Dependent Time Histories: EQGEN," by G.W. Ellis, M. Srinivasan and A.S. Cakmak, 1/30/90, (PB91-108829).

NCEER-90-0010 "Active Isolation for Seismic Protection of Operating Rooms," by M.E. Talbott, Supervised by M. Shinozuka, 6/8/9, (PB91-110205).

NCEER-90-0011 "Program LINEARID for Identification of Linear Structural Dynamic Systems," by C-B. Yun and M. Shinozuka, 6/25/90, (PB91-110312).

NCEER-90-0012 "Two-Dimensional Two-Phase Elasto-Plastic Seismic Response of Earth Dams," by A.N. Yiagos, Supervised by J.H. Prevost, 6/20/90, (PB91-110197).

NCEER-90-0013 "Secondary Systems in Base-Isolated Structures: Experimental Investigation, Stochastic Response and Stochastic Sensitivity," by G.D. Manolis, G. Juhn, M.C. Constantinou and A.M. Reinhorn, 7/1/90, (PB91-110320).

NCEER-90-0014 "Seismic Behavior of Lightly-Reinforced Concrete Column and Beam-Column Joint Details," by S.P. Pessiki, C.H. Conley, P. Gergely and R.N. White, 8/22/90, (PB91-108795).

NCEER-90-0015 "Two Hybrid Control Systems for Building Structures Under Strong Earthquakes," by J.N. Yang and A. Danielians, 6/29/90, (PB91-125393).

NCEER-90-0016 "Instantaneous Optimal Control with Acceleration and Velocity Feedback," by J.N. Yang and Z. Li, 6/29/90, (PB91-125401).

NCEER-90-0017 "Reconnaissance Report on the Northern Iran Earthquake of June 21, 1990," by M. Mehrain, 10/4/90, (PB91-125377).

NCEER-90-0018 "Evaluation of Liquefaction Potential in Memphis and Shelby County," by T.S. Chang, P.S. Tang, C.S. Lee and H. Hwang, 8/10/90, (PB91-125427).

NCEER-90-0019 "Experimental and Analytical Study of a Combined Sliding Disc Bearing and Helical Steel Spring Isolation System," by M.C. Constantinou, A.S. Mokha and A.M. Reinhorn, 10/4/90, (PB91-125385).

NCEER-90-0020 "Experimental Study and Analytical Prediction of Earthquake Response of a Sliding Isolation System with a Spherical Surface," by A.S. Mokha, M.C. Constantinou and A.M. Reinhorn, 10/11/90, (PB91-125419).

NCEER-90-0021 "Dynamic Interaction Factors for Floating Pile Groups," by G. Gazetas, K. Fan, A. Kaynia and E. Kausel, 9/10/90, (PB91-170381).

NCEER-90-0022 "Evaluation of Seismic Damage Indices for Reinforced Concrete Structures," by S. Rodriguez-Gomez and A.S. Cakmak, 9/30/90, PB91-171322).

NCEER-90-0023 "Study of Site Response at a Selected Memphis Site," by H. Desai, S. Ahmad, E.S. Gazetas and M.R. Oh, 10/11/90, (PB91-196857).

NCEER-90-0024 "A User's Guide to Strongmo: Version 1.0 of NCEER's Strong-Motion Data Access Tool for PCs and Terminals," by P.A. Friberg and C.A.T. Susch, 11/15/90, (PB91-171272).

NCEER-90-0025 "A Three-Dimensional Analytical Study of Spatial Variability of Seismic Ground Motions," by L-L. Hong and A.H.-S. Ang, 10/30/90, (PB91-170399).

NCEER-90-0026 "MUMOID User's Guide - A Program for the Identification of Modal Parameters," by S. Rodriguez-Gomez and E. DiPasquale, 9/30/90, (PB91-171298).

NCEER-90-0027 "SARCF-II User's Guide - Seismic Analysis of Reinforced Concrete Frames," by S. Rodriguez-Gomez, Y.S. Chung and C. Meyer, 9/30/90, (PB91-171280).

NCEER-90-0028 "Viscous Dampers: Testing, Modeling and Application in Vibration and Seismic Isolation," by N. Makris and M.C. Constantinou, 12/20/90 (PB91-190561).

NCEER-90-0029 "Soil Effects on Earthquake Ground Motions in the Memphis Area," by H. Hwang, C.S. Lee, K.W. Ng and T.S. Chang, 8/2/90, (PB91-190751).

NCEER-91-0001 "Proceedings from the Third Japan-U.S. Workshop on Earthquake Resistant Design of Lifeline Facilities and Countermeasures for Soil Liquefaction, December 17-19, 1990," edited by T.D. O'Rourke and M. Hamada, 2/1/91, (PB91-179259).

NCEER-91-0002 "Physical Space Solutions of Non-Proportionally Damped Systems," by M. Tong, Z. Liang and G.C. Lee, 1/15/91, (PB91-179242).

NCEER-91-0003 "Seismic Response of Single Piles and Pile Groups," by K. Fan and G. Gazetas, 1/10/91, (PB92-174994).

NCEER-91-0004 "Damping of Structures: Part 1 - Theory of Complex Damping," by Z. Liang and G. Lee, 10/10/91, (PB92-197235).

NCEER-91-0005 "3D-BASIS - Nonlinear Dynamic Analysis of Three Dimensional Base Isolated Structures: Part II," by S. Nagarajaiah, A.M. Reinhorn and M.C. Constantinou, 2/28/91, (PB91-190553).

NCEER-91-0006 "A Multidimensional Hysteretic Model for Plasticity Deforming Metals in Energy Absorbing Devices," by E.J. Graesser and F.A. Cozzarelli, 4/9/91, (PB92-108364).

NCEER-91-0007 "A Framework for Customizable Knowledge-Based Expert Systems with an Application to a KBES for Evaluating the Seismic Resistance of Existing Buildings," by E.G. Ibarra-Anaya and S.J. Fenves, 4/9/91, (PB91-210930).

NCEER-91-0008 "Nonlinear Analysis of Steel Frames with Semi-Rigid Connections Using the Capacity Spectrum Method," by G.G. Deierlein, S-H. Hsieh, Y-J. Shen and J.F. Abel, 7/2/91, (PB92-113828).

NCEER-91-0009 "Earthquake Education Materials for Grades K-12," by K.E.K. Ross, 4/30/91, (PB91-212142).

NCEER-91-0010 "Phase Wave Velocities and Displacement Phase Differences in a Harmonically Oscillating Pile," by N. Makris and G. Gazetas, 7/8/91, (PB92-108356).

NCEER-91-0011 "Dynamic Characteristics of a Full-Size Five-Story Steel Structure and a 2/5 Scale Model," by K.C. Chang, G.C. Yao, G.C. Lee, D.S. Hao and Y.C. Yeh," 7/2/91, (PB93-116648).

NCEER-91-0012 "Seismic Response of a 2/5 Scale Steel Structure with Added Viscoelastic Dampers," by K.C. Chang, T.T. Soong, S-T. Oh and M.L. Lai, 5/17/91, (PB92-110816).

NCEER-91-0013 "Earthquake Response of Retaining Walls; Full-Scale Testing and Computational Modeling," by S. Alampalli and A-W.M. Elgamal, 6/20/91, to be published.

NCEER-91-0014 "3D-BASIS-M: Nonlinear Dynamic Analysis of Multiple Building Base Isolated Structures," by P.C. Tsopelas, S. Nagarajaiah, M.C. Constantinou and A.M. Reinhorn, 5/28/91, (PB92-113885).

NCEER-91-0015 "Evaluation of SEAOC Design Requirements for Sliding Isolated Structures," by D. Theodossiou and M.C. Constantinou, 6/10/91, (PB92-114602).

NCEER-91-0016 "Closed-Loop Modal Testing of a 27-Story Reinforced Concrete Flat Plate-Core Building," by H.R. Somaprasad, T. Toksoy, H. Yoshiyuki and A.E. Aktan, 7/15/91, (PB92-129980).

NCEER-91-0017 "Shake Table Test of a 1/6 Scale Two-Story Lightly Reinforced Concrete Building," by A.G. El-Attar, R.N. White and P. Gergely, 2/28/91, (PB92-222447).

NCEER-91-0018 "Shake Table Test of a 1/8 Scale Three-Story Lightly Reinforced Concrete Building," by A.G. El-Attar, R.N. White and P. Gergely, 2/28/91, (PB93-116630).

NCEER-91-0019 "Transfer Functions for Rigid Rectangular Foundations," by A.S. Veletsos, A.M. Prasad and W.H. Wu, 7/31/91.

NCEER-91-0020 "Hybrid Control of Seismic-Excited Nonlinear and Inelastic Structural Systems," by J.N. Yang, Z. Li and A. Danielians, 8/1/91, (PB92-143171).

NCEER-91-0021 "The NCEER-91 Earthquake Catalog: Improved Intensity-Based Magnitudes and Recurrence Relations for U.S. Earthquakes East of New Madrid," by L. Seeber and J.G. Armbruster, 8/28/91, (PB92-176742).

NCEER-91-0022 "Proceedings from the Implementation of Earthquake Planning and Education in Schools: The Need for Change - The Roles of the Changemakers," by K.E.K. Ross and F. Winslow, 7/23/91, (PB92-129998).

NCEER-91-0023 "A Study of Reliability-Based Criteria for Seismic Design of Reinforced Concrete Frame Buildings," by H.H.M. Hwang and H-M. Hsu, 8/10/91, (PB92-140235).

NCEER-91-0024 "Experimental Verification of a Number of Structural System Identification Algorithms," by R.G. Ghanem, H. Gavin and M. Shinozuka, 9/18/91, (PB92-176577).

NCEER-91-0025 "Probabilistic Evaluation of Liquefaction Potential," by H.H.M. Hwang and C.S. Lee," 11/25/91, (PB92-143429).

NCEER-91-0026 "Instantaneous Optimal Control for Linear, Nonlinear and Hysteretic Structures - Stable Controllers," by J.N. Yang and Z. Li, 11/15/91, (PB92-163807).

NCEER-91-0027 "Experimental and Theoretical Study of a Sliding Isolation System for Bridges," by M.C. Constantinou, A. Kartoum, A.M. Reinhorn and P. Bradford, 11/15/91, (PB92-176973).

NCEER-92-0001 "Case Studies of Liquefaction and Lifeline Performance During Past Earthquakes, Volume 1: Japanese Case Studies," Edited by M. Hamada and T. O'Rourke, 2/17/92, (PB92-197243).

NCEER-92-0002 "Case Studies of Liquefaction and Lifeline Performance During Past Earthquakes, Volume 2: United States Case Studies," Edited by T. O'Rourke and M. Hamada, 2/17/92, (PB92-197250).

NCEER-92-0003 "Issues in Earthquake Education," Edited by K. Ross, 2/3/92, (PB92-222389).

NCEER-92-0004 "Proceedings from the First U.S. - Japan Workshop on Earthquake Protective Systems for Bridges," Edited by I.G. Buckle, 2/4/92.

NCEER-92-0005 "Seismic Ground Motion from a Haskell-Type Source in a Multiple-Layered Half-Space," A.P. Theoharis, G. Deodatis and M. Shinozuka, 1/2/92, to be published.

NCEER-92-0006 "Proceedings from the Site Effects Workshop," Edited by R. Whitman, 2/29/92, (PB92-197201).

NCEER-92-0007 "Engineering Evaluation of Permanent Ground Deformations Due to Seismically-Induced Liquefaction," by M.H. Baziar, R. Dobry and A-W.M. Elgamal, 3/24/92, (PB92-222421).

NCEER-92-0008 "A Procedure for the Seismic Evaluation of Buildings in the Central and Eastern United States," by C.D. Poland and J.O. Malley, 4/2/92, (PB92-222439).

NCEER-92-0009 "Experimental and Analytical Study of a Hybrid Isolation System Using Friction Controllable Sliding Bearings," by M.Q. Feng, S. Fujii and M. Shinozuka, 5/15/92, (PB93-150282).

NCEER-92-0010 "Seismic Resistance of Slab-Column Connections in Existing Non-Ductile Flat-Plate Buildings," by A.J. Durrani and Y. Du, 5/18/92.

NCEER-92-0011 "The Hysteretic and Dynamic Behavior of Brick Masonry Walls Upgraded by Ferrocement Coatings Under Cyclic Loading and Strong Simulated Ground Motion," by H. Lee and S.P. Prawel, 5/11/92, to be published.

NCEER-92-0012 "Study of Wire Rope Systems for Seismic Protection of Equipment in Buildings," by G.F. Demetriades, M.C. Constantinou and A.M. Reinhorn, 5/20/92.

NCEER-92-0013 "Shape Memory Structural Dampers: Material Properties, Design and Seismic Testing," by P.R. Witting and F.A. Cozzarelli, 5/26/92.

NCEER-92-0014 "Longitudinal Permanent Ground Deformation Effects on Buried Continuous Pipelines," by M.J. O'Rourke, and C. Nordberg, 6/15/92.

NCEER-92-0015 "A Simulation Method for Stationary Gaussian Random Functions Based on the Sampling Theorem," by M. Grigoriu and S. Balopoulou, 6/11/92, (PB93-127496).

NCEER-92-0016 "Gravity-Load-Designed Reinforced Concrete Buildings: Seismic Evaluation of Existing Construction and Detailing Strategies for Improved Seismic Resistance," by G.W. Hoffmann, S.K. Kunnath, A.M. Reinhorn and J.B. Mander, 7/15/92.

NCEER-92-0017 "Observations on Water System and Pipeline Performance in the Limón Area of Costa Rica Due to the April 22, 1991 Earthquake," by M. O'Rourke and D. Ballantyne, 6/30/92, (PB93-126811).

NCEER-92-0018 "Fourth Edition of Earthquake Education Materials for Grades K-12," Edited by K.E.K. Ross, 8/10/92.

NCEER-92-0019 "Proceedings from the Fourth Japan-U.S. Workshop on Earthquake Resistant Design of Lifeline Facilities and Countermeasures for Soil Liquefaction," Edited by M. Hamada and T.D. O'Rourke, 8/12/92, (PB93-163939).

NCEER-92-0020 "Active Bracing System: A Full Scale Implementation of Active Control," by A.M. Reinhorn, T.T. Soong, R.C. Lin, M.A. Riley, Y.P. Wang, S. Aizawa and M. Higashino, 8/14/92, (PB93-127512).

NCEER-92-0021 "Empirical Analysis of Horizontal Ground Displacement Generated by Liquefaction-Induced Lateral Spreads," by S.F. Bartlett and T.L. Youd, 8/17/92, (PB93-188241).

NCEER-92-0022 "IDARC Version 3.0: Inelastic Damage Analysis of Reinforced Concrete Structures," by S.K. Kunnath, A.M. Reinhorn and R.F. Lobo, 8/31/92, (PB93-227502, A07, MF-A02).

NCEER-92-0023 "A Semi-Empirical Analysis of Strong-Motion Peaks in Terms of Seismic Source, Propagation Path and Local Site Conditions, by M. Kamiyama, M.J. O'Rourke and R. Flores-Berrones, 9/9/92, (PB93-150266).

NCEER-92-0024 "Seismic Behavior of Reinforced Concrete Frame Structures with Nonductile Details, Part I: Summary of Experimental Findings of Full Scale Beam-Column Joint Tests," by A. Beres, R.N. White and P. Gergely, 9/30/92, (PB93-227783, A05, MF-A01).

NCEER-92-0025 "Experimental Results of Repaired and Retrofitted Beam-Column Joint Tests in Lightly Reinforced Concrete Frame Buildings," by A. Beres, S. El-Borgi, R.N. White and P. Gergely, 10/29/92, (PB93-227791, A05, MF-A01).

NCEER-92-0026 "A Generalization of Optimal Control Theory: Linear and Nonlinear Structures," by J.N. Yang, Z. Li and S. Vongchavalitkul, 11/2/92, (PB93-188621).

NCEER-92-0027 "Seismic Resistance of Reinforced Concrete Frame Structures Designed Only for Gravity Loads: Part I - Design and Properties of a One-Third Scale Model Structure," by J.M. Bracci, A.M. Reinhorn and J.B. Mander, 12/1/92, (PB94-104502, A08, MF-A02).

NCEER-92-0028 "Seismic Resistance of Reinforced Concrete Frame Structures Designed Only for Gravity Loads: Part II - Experimental Performance of Subassemblages," by L.E. Aycardi, J.B. Mander and A.M. Reinhorn, 12/1/92, (PB94-104510, A08, MF-A02).

NCEER-92-0029 "Seismic Resistance of Reinforced Concrete Frame Structures Designed Only for Gravity Loads: Part III - Experimental Performance and Analytical Study of a Structural Model," by J.M. Bracci, A.M. Reinhorn and J.B. Mander, 12/1/92, (PB93-227528, A09, MF-A01).

NCEER-92-0030 "Evaluation of Seismic Retrofit of Reinforced Concrete Frame Structures: Part I - Experimental Performance of Retrofitted Subassemblages," by D. Choudhuri, J.B. Mander and A.M. Reinhorn, 12/8/92, (PB93-198307, A07, MF-A02).

NCEER-92-0031 "Evaluation of Seismic Retrofit of Reinforced Concrete Frame Structures: Part II - Experimental Performance and Analytical Study of a Retrofitted Structural Model," by J.M. Bracci, A.M. Reinhorn and J.B. Mander, 12/8/92, (PB93-198315, A09, MF-A03).

NCEER-92-0032 "Experimental and Analytical Investigation of Seismic Response of Structures with Supplemental Fluid Viscous Dampers," by M.C. Constantinou and M.D. Symans, 12/21/92, (PB93-191435).

NCEER-92-0033 "Reconnaissance Report on the Cairo, Egypt Earthquake of October 12, 1992," by M. Khater, 12/23/92, (PB93-188621).

NCEER-92-0034 "Low-Level Dynamic Characteristics of Four Tall Flat-Plate Buildings in New York City," by H. Gavin, S. Yuan, J. Grossman, E. Pekelis and K. Jacob, 12/28/92, (PB93-188217).

NCEER-93-0001 "An Experimental Study on the Seismic Performance of Brick-Infilled Steel Frames With and Without Retrofit," by J.B. Mander, B. Nair, K. Wojtkowski and J. Ma, 1/29/93, (PB93-227510, A07, MF-A02).

NCEER-93-0002 "Social Accounting for Disaster Preparedness and Recovery Planning," by S. Cole, E. Pantoja and V. Razak, 2/22/93, to be published.

NCEER-93-0003 "Assessment of 1991 NEHRP Provisions for Nonstructural Components and Recommended Revisions," by T.T. Soong, G. Chen, Z. Wu, R-H. Zhang and M. Grigoriu, 3/1/93, (PB93-188639).

NCEER-93-0004 "Evaluation of Static and Response Spectrum Analysis Procedures of SEAOC/UBC for Seismic Isolated Structures," by C.W. Winters and M.C. Constantinou, 3/23/93, (PB93-198299).

NCEER-93-0005 "Earthquakes in the Northeast - Are We Ignoring the Hazard? A Workshop on Earthquake Science and Safety for Educators," edited by K.E.K. Ross, 4/2/93, (PB94-103066, A09, MF-A02).

NCEER-93-0006 "Inelastic Response of Reinforced Concrete Structures with Viscoelastic Braces," by R.F. Lobo, J.M. Bracci, K.L. Shen, A.M. Reinhorn and T.T. Soong, 4/5/93, (PB93-227486, A05, MF-A02).

NCEER-93-0007 "Seismic Testing of Installation Methods for Computers and Data Processing Equipment," by K. Kosar, T.T. Soong, K.L. Shen, J.A. HoLung and Y.K. Lin, 4/12/93, (PB93-198299).

NCEER-93-0008 "Retrofit of Reinforced Concrete Frames Using Added Dampers," by A. Reinhorn, M. Constantinou and C. Li, to be published.

NCEER-93-0009 "Seismic Behavior and Design Guidelines for Steel Frame Structures with Added Viscoelastic Dampers," by K.C. Chang, M.L. Lai, T.T. Soong, D.S. Hao and Y.C. Yeh, 5/1/93.

NCEER-93-0010 "Seismic Performance of Shear-Critical Reinforced Concrete Bridge Piers," by J.B. Mander, S.M. Waheed, M.T.A. Chaudhary and S.S. Chen, 5/12/93, (PB93-227494, A08, MF-A02).

NCEER-93-0011 "3D-BASIS-TABS: Computer Program for Nonlinear Dynamic Analysis of Three Dimensional Base Isolated Structures," by S. Nagarajaiah, C. Li, A.M. Reinhorn and M.C. Constantinou, 8/2/93.

NCEER-93-0012 "Effects of Hydrocarbon Spills from an Oil Pipeline Break on Ground Water," by O.J. Helweg and H.H.M. Hwang, 8/3/93.

NCEER-93-0013 "Simplified Procedures for Seismic Design of Nonstructural Components and Assessment of Current Code Provisions," by M.P. Singh, L.E. Suarez, E.E. Matheu and G.O. Maldonado, 8/4/93.

NCEER-93-0014 "An Energy Approach to Seismic Analysis and Design of Secondary Systems," by G. Chen and T.T. Soong, 8/6/93.

NCEER-93-0015 "Proceedings from School Sites: Becoming Prepared for Earthquakes - Commemorating the Third Anniversary of the Loma Prieta Earthquake," Edited by F.E. Winslow and K.E.K. Ross, 8/16/93.

B15
9