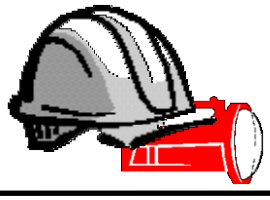


UNIT 4: SAFETY ASSESSMENT & LIGHT SEARCH AND RESCUE OPERATIONS

In this unit you will learn about:

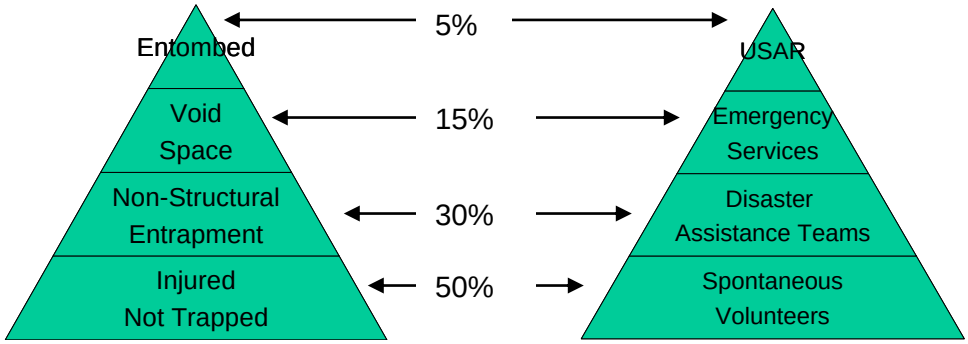
- **Suggested Supplies and Equipment**
- **Conducting Building and Situation Size up:** How to size up the situation in which the teams will operate – including structural damage
- **Search Techniques:** How to search systematically for disaster victims
- **Rescue Operation Procedures:** Safe techniques for debris removal, lifting, leveraging, cribbing, forcible entry and victim removal
- **Creating Action Plans**

UNIT 4: LIGHT SEARCH AND RESCUE OPERATIONS

INTRODUCTION AND UNIT OVERVIEW

Experience from previous disasters has shown that immediately after almost every disaster, the first response to trapped victims is by spontaneous, untrained, and well-intentioned persons who rush to the site of a collapse in an attempt to free the victims. More often than not, these spontaneous rescue efforts result in serious injuries and compounded problems.

CERTS CAN DO A LOT



Search and Rescue involves three separate operations:

- Size up involves assessing the situation and determining a safe Action Plan.
- Search involves locating victims and documenting their location.
- Rescue involves the procedures and methods required to extricate the victims.

Key components of these operations include:

- Effective Communications
- Pre-Event Planning

Rescue efforts should be planned and practiced in advance to produce the most successful outcome…everyone stays safe!

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Hard Hat
- Vest & Proper identification
- Protective Clothing
- Knee Pads
- Mask (N95)
- Leather gloves and Medical Gloves
- Flashlight, extra batteries, extra bulb, Headlamp
- Personal First Aid Kit
- Whistle

SEARCH & RESCUE TEAM EQUIPMENT & SUPPLIES

- Food & Water
- Communications Equipment – FRS Radios, Whistles, Runners
- Tools – Hand Tools, Utility Knife, Utility Shutoff Tools, Carpentry Tools, Pry Bars, Sledge Hammer, Shovel, Axe
- Medical – Gloves, First Aid Kit, Triage Tape or other markers, Stretcher, Blanket
- Maps and Forms
- Door marking crayons or tape, Duct Tape
- Fire Extinguisher
- Rope, Strap, Ladder
- Cribbing material

Handout #4-1 Team Equipment & Supplies

Notes:

SIZE UP / GATHER FACTS

A continuous fact gathering process that will dictate the appropriate action. Size up begins the moment an event occurs…

Like every other CERT operation, search and rescue require size up at the beginning of the operation and continually as long as the operation continues. **The more facts you can gather in your neighborhood or Reporting Location before an event, the faster you can conduct size up because you will already know what to expect and whether you can manage it.**

Step 1: Gather Facts
The facts of the situation must guide your search and rescue efforts.
When gathering facts, you need to consider:

- The time of the event and day of the week. At night, more people will be in their homes, so the greatest need for search and rescue will be in residential settings. Conversely, during the day, people will be at work, so the need will be in commercial buildings.
  Some emergency services are not available—or not available in the same numbers—during the evenings or on weekends. Search and rescue operations may also be affected by where people are located in their homes and the amount of daylight available.
- The type of structure. The purpose for which the structure was designed may indicate the likely number of victims, and their location.
- Construction type. Some types of construction are more susceptible to damage than others.
- Weather. Severe weather will have an effect on victims and rescuers alike and will certainly hamper rescue efforts. Forecasts of severe weather should be considered as a limiting factor on the time period during which search and rescue can occur.
- Hazards. Knowledge of other potential hazards in the general and immediate areas is important to search and rescue efforts. Time lost trying to locate and shut off utilities, for example, can have a big impact in terms of loss of life.

Step 2: Assess Your Situation/Resources

Size up is a building process, with each step building upon the previous steps until the decision is made to act. Draw on everything you've learned to assess your situation to determine:

- Whether the situation is safe enough to continue.
- The risks that rescuers will face if they continue.
- What resources will be needed to conduct the operation safely – equipment and personnel - (and what resources are available)

ASSESSING RESOURCES IS EXTREMELY IMPORTANT TO SEARCH AND RESCUE OPERATIONS.

Resource Planning Questions

Resource	Planning Questions
Personnel	▪ Who lives and/or works in the area? ▪ During which hours are these people most likely to be available? ▪ What skills or hobbies do they have that might be useful in search and rescue operations? ▪ What might be the most effective means of mobilizing their efforts?
Equipment	▪ What equipment is available locally that might be useful for search and rescue? ▪ Where is it located? ▪ How can it be accessed? ▪ On which structures (or types of structures) might it be most effective?
Tools	▪ What tools are available that might be useful for lifting, moving, or cutting disaster debris? **Handout #4-2 & 4-3 NEIGHBORHOOD SURVEY FORMS**
Considerations	**Planning Questions**
Special Needs	▪ Are there special tools/equipment/knowledge needed to assist those with special needs?
Occupancies	▪ Are there multi-unit buildings or businesses that may hamper or assist your efforts?
Hazards	▪ Types of chemicals in the area? ▪ Large old trees, power lines, gas lines? ▪ Building parapets?

TYPES OF CONSTRUCTION

- **Wood Frame – Commonly used for residential housing. Withstands a high degree of ground shaking.**
- **Steel – Used in commercial structures. Requires specific engineering to withstand ground shaking.**
- **Tilt Up – Used in commercial structures. Cement walls are held together by the roof. Susceptible to collapse.**
- **Unreinforced Masonry – Old brick buildings with no reinforcement. Can be identified by deep inset windows & brittle mortar. State requirements for retrofit.**

LIQUEFACTION & AFFECTS OF SOIL TYPES ON GROUND SHAKING

Soil composition affects structural damage.

Liquefaction is one type of ground reaction that can cause damage. Liquefaction is caused by water seeping up through sandy soil and turning into a slurry.

A soft loose soil will shake more intensely than hard rock at the same distance from the same earthquake.

The longer the shaking, greater the resulting damage.

Cities have maps showing different types of soil. The Association of Bay Area Governments www.abag.org has online shaking maps for Bay Area cities. Click on "Earthquakes".

Notes:

STRUCTURAL DAMAGE GENERAL HAZARDS

Structural collapse operations cover a wide range of incident scenarios. These incidents can be as relatively minor as a deck or porch collapse resulting in easily accessible victims, or as heavily taxing as a multistory concrete building collapse that entombs hundreds of victims. Regardless of the damage scenario encountered, CERT members must be familiar with a variety of hazards and associated risks. Effective rescue operations at a damaged structure will only be possible if rescuers are fully aware of the hazards involved and the methods necessary to mitigate those hazards.

In order for rescuers to perform at an optimum level of safety, they must be familiar with:

- Categories of hazards; building construction types and characteristics
- Types of collapse voids and likely areas of survivability
- Safety equipment
- Safety procedures
- Safety considerations

Understanding and properly applying these factors is essential if rescuers are to perform rescue operations safely in a structural collapse.

STRUCTURAL INSTABILITY

The aftermath of an earthquake will cause a variety of structural instability hazards for rescuers. These may include weakened walls, floors, columns, or beams that are incapable of supporting the remains of the structure. Secondary collapse of structural elements will be a major concern to rescuers working in areas supported by these weakened building parts.

Freestanding walls and damaged or loose chimneys can easily fall because of earthquake aftershocks, a lack of support or wind load. In earthquake-prone areas, damage resulting from quakes will be highly vulnerable to further damage/collapse because of aftershocks.

Normal settlement and shifting debris, vibrations, and aftershocks can cause secondary collapse. Previously accessible voids can become inaccessible, or the void can be eliminated altogether. Secondary collapse may cause currently undamaged attached or exposed structures, in close proximity, to fail.

Very often, structural stability is difficult to evaluate and requires the services of a structural engineer. Responders are encouraged to *stay out of buildings with questionable structural damage and contact structural engineers in their response areas to determine their availability if needed. Always do a 360 degree check of the building before entering.*

OVERHEAD HAZARDS

Rescuers performing operations at a damage site must evaluate the scene for overhead hazards that have the potential to fall and strike rescuers. Overhead hazards may include loose debris and building components suspended overhead, or dislodged bricks precariously perched on a broken wall assembly. Unsecured building contents such as file cabinets, bathtubs, refrigerators, and other furnishings can also create overhead hazards should they fall out of the structure.

Damaged electrical wires hanging low or heavily tensioned and ready to fail may pose an electrocution danger, choking, and entanglement hazard.

Scaffolding and stacked building supplies, such as piles of drywall perched on an upper floor of a building under construction, are overhead hazards common to construction site collapses. Rescuers must take the necessary time to evaluate their surroundings and to identify these potential hazards before committing resources to a dangerous area.

SURFACE HAZARDS

The environment within which rescuers must operate may be full of sharp debris that can cause injury. This debris will differ depending on the building's construction and contents. Generally, rescuers will be faced with broken glass, nails, wood splinters, jagged metal, and rough masonry. Difficult footing will be common due to spilled fluids and pools of water and sewage. Ground fissures, depressions and uneven or unsecured walking surfaces around the collapse site will add to difficult footing which can potentially result in injuries to responding personnel.

Water and other liquids on the ground will obscure the view of the walking surface and reduce friction, potential electrocution if contacting an energized power source and drowning if the water is deep enough to cover the rescuer's face. Liquids will also cause hypothermia problems for rescuers and victims, add additional weight to structural elements and debris and softens the ground supporting structural elements and debris. DO NOT ENTER BUILDINGS WITH STANDING WATER.

Rescuers must be aware of the potential for downed or exposed live electrical wires. All wires and conduits must be considered live until confirmed otherwise.

Additional potential surface hazards include open manholes resulting from flooding, or ground-level openings created by the force of the collapse. Fallen trees and utility poles blocking roadways may cause access problems for responding apparatus and personnel.

BELOW-GRADE HAZARDS

These hazards will occur in areas such as basements, underground parking garages, or low lying void spaces. The potential exists in these areas for the accumulation of atmospheric hazards due to ruptured natural gas lines or spilled chemicals. Contaminated atmospheres can be flammable, toxic, or oxygen deficient. Flooding from broken water or sewer lines may also cause difficulties for rescuers.

UTILITY HAZARDS

The most common utility types include natural gas, propane, electrical, steam, water, and sewage. When these utilities are disrupted, they will cause serious safety hazards. These will include electrocution and fire hazards from broken electrical wiring, and explosion hazards from broken natural gas and/or heating fuel lines. Disrupted steam lines can cause burns to rescuers exposed to them. Sewage from broken sewer lines can release toxic gases such as hydrogen sulfide or methane, and can expose rescuers to bacteria.

HAZARDOUS MATERIALS

Hazmat poses a significant present or potential hazard to human health or safety, or to the environment if released. Common examples are flammables such as gasoline, corrosives such as hydrochloric acid and toxics such as pesticides.

The type of building affected and its normal contents will help to identify potential hazardous materials that may be released during a collapse. Rescuers must be cognizant of this potential at residential dwellings as well commercial establishments.

OTHER HAZARDS

Rescuers may face additional incident hazards that do not fall into any previously listed categories. Some of these hazards are related to the cause of the damage, and others are actually created by rescuer actions. Fire, smoke, or explosions force responders to wear a higher level of personal protective gear than normal search operations.

It is important for rescue workers to realize that a damaged structure will be much more susceptible to fire after the earthquake and much harder to extinguish. This is due to the disruption of any built-in suppression systems, disrupted utilities, and the larger surface-to-mass ratio of the splintered flammable building materials and deep difficult to access debris piles.

Particulate matter such as smoke, concrete dust and asbestos must be recognized and appropriate personal protective equipment (PPE) must be worn to prevent this material from entering a rescuer's respiratory system. Exposure to particulate matter can cause immediate and long-term problems if not appropriately mitigated. The type of N95 masks, used in CERT, are not designed for long term exposure to particulate matter.

Rescuers will be faced with several hazards created by their own actions such as operating internal combustion engines and power tools within confined areas and contaminating the atmosphere.

Vibrations from various sources are a safety concern to rescuers, because these can cause a collapse of unstable building parts. Vibration sources can include:

- Rail traffic, such as trains and subways
- Vehicular traffic on nearby roadways
- Air traffic or helicopters over the site
- Heavy construction equipment, generators and power tools
- Responding fire and rescue apparatus

Equipment noise can drown out communication, victims' calls for help and other sounds that could warn rescuers of changing conditions inside a structure.

Operators with an obstructed view while backing or turning could run into damaged structures and over rescuers. *A secondary collapse can be caused by lifting, pulling or removing structural components with heavy equipment, such as a vehicle,*

CERT Standard Operating Procedure
Safety Assessment
When an earthquake occurs, organized neighborhoods are asked to place a "white flag" (any large white cloth) in their front yard if everything is OK, then go to their Command Post to check in. Safety Assessment teams, making an initial pass through the neighborhoods, should note which addresses have white flags and which do not. They will also note visible hazards that would impact response teams.

When that information is reported to the Command Post, it will be marked on the map and compared to the check in list. Search and rescue team leaders will assist the Incident Commander with prioritizing the response to homes who have not checked in.

All CERT members should place a "white flag" outside their home to indicate that everything is "OK" prior to reporting to their designated Reporting Location.

HANDOUT #4-4 SAFETY ASSESSMENT FORM

CERT Mission by Structural Damage Category	
If Structural Damage Is . . .	**Then The CERT Mission Is . . .**
Light: **Superficial damage, broken windows, fallen or small cracks in plaster, minor damage to contents**	To locate, triage, and prioritize removal of victims to designated treatment areas by the medical operation teams.
Moderate: **Visible signs of damage to decorative architecture** **Many visible cracks in plaster** **Major damage to contents** **Controllable gas leaks** **Still attached to foundation**	To locate, triage, and immediately **evacuate** victims to a safe area while minimizing the number of rescuers inside the building.
Heavy: **Partial or total collapse** **Tilting** **Obvious structural instability** **Heavy smoke or fire** **Uncontrollable gas leaks** **Rising or moving water** **Moved off foundation** **Change in horizontal and vertical lines** **Paint lines** **Large cracks from corners of windows at 45 degree angle** **Large cracks around front door, garage door** **Large cracks about 1' above the sidewalk at foundation level**	To secure the building perimeter and warn others about the danger of entering the building. DO NOT ENTER UNDER ANY CIRCUMSTANCES.

Step 3: Assess and Communicate Damage (Occupancies)

Look at a building from all sides by doing a "lap around."

Communicate your findings to the CERT command post or responding agencies.

There are general guidelines for assessing damage. When in doubt about the condition of a building, always use the more restrictive assessment. For example, if you are unsure about whether a building is moderately or heavily damaged, assume heavy damage. The CERT mission changes depending on the amount of structural damage.

GROUP Exercise: Search and Rescue Safety Assessment

Purpose: This exercise is an interactive activity to give you an opportunity to practice some of the thinking processes involved in planning and search and rescue size up. The brainstorming required will help you to begin to assess your neighborhood or workplace in terms of building structures, hazardous materials, safety precautions that need to be taken, etc. The exercise will be based on several different types of buildings that have gone through an earthquake.

Instructions: Use the following steps to complete this exercise:

1. Given the disaster and the specific building on the screen, answer the following questions:

   - What are the pertinent facts that must be gathered?
   - What kind of prediction can you make regarding damage, based on the incident and the building construction?
   - What probable search and rescue problems can you identify?
   - What specific safety considerations can you identify?

Notes:

Step 4: Consider Probabilities

Because the CERTs will be working in such close proximity to the dangerous situation, considering what will probably happen and what could happen are of critical importance. Identify potentially life-threatening hazards with an eye toward:

- How stable the situation really is. Even within a structure that appears from the outside to have only minimal or moderate damage, nonstructural damage or instability inside the structure can pose real danger to the rescue team. CERT members should think about what they already know about the structure that's been damaged. Are lawn chemicals, paints, or other potentially hazardous materials stored within the structure? How are they stored? Where are they? It won't take CERT members much time to answer these types of questions, but the answers could make a huge difference in how they approach the search. *Bystanders could be helpful in gathering information.*

- What else could go wrong. Based on the information gathered during steps 1 and 2 of the size up, CERT members should take a few moments to play "What if?" to try to identify additional risks that they may face. What if the electricity fails during the search? What if a wall that appears stable shifts and collapses? Applying "Murphy's Law" to the situation could save the CERT team's lives.

- What it all means for the search and rescue. Based on the probabilities, CERTs should think about what they can do to reduce the risks associated with the probabilities they have identified. Is a spotter necessary to look for movement that could indicate a possible collapse and warn the rescue team? Is some remedial action required to stabilize nonstructural hazards before beginning the search? ***CERT search and rescue teams must remember that their own safety is the first priority.***

Step 5: Establish Priorities

After evaluating the situation, the next step is to determine:

- What should be done. . .

- In what order.

The safety of CERT members is always the first priority and will dictate some of your other priorities. For example, removing or mitigating known hazards must be completed before teams begin to search. Think through the situation logically to determine how you should approach the operation.

Step 6: Make Decisions

Now you will make decisions about where to deploy your resources to do the most good, while maintaining an adequate margin of safety. Many of your decisions will be based on the priorities established during step 5. Those priorities are based on (in order):

1. The safety of CERT members. *Rescuer safety is #1.*
2. Life safety for victims and others.
3. Protection of the environment.
4. Protection of property.

Step 7: Develop an Action Plan

Step 7 is where all of the information you have about the situation comes together. During step 7, the team leader will decide specifically how the team will conduct its operation, considering the highest priority tasks first.

Action plans do not need to be written, but, when search and rescue operations are required, the situation is probably complex enough that a written plan of some type should be developed. Even a simple written plan will:

- Help focus the operation on established priorities and decisions.
- Provide documentation to be given to responding agencies when they arrive.
- Provide documentation that can be used, if necessary, after the incident.
- ***Search & Rescue Action Plans must have a communication plan!***

Safety Considerations

Regardless of the severity of structural damage, rescuer safety must be the primary concern.

The two most frequent causes of rescuer deaths are:

- Disorientation.
- Secondary collapse.

Follow these guidelines during all search and rescue operations:

- Your safety is #1
- Follow the Action Plan
- Use a buddy system. Always work in pairs, with a third person acting as a runner.
- Be alert for hazards (e.g., power lines, natural gas leaks, hazardous materials, sharp objects, etc.).

  You should never attempt to search an area where water is present.
- Use safety equipment. Wearing gloves and a helmet will protect a rescuer's hands and head. Also, the primary cause of rescuer problems after working in a structural collapse is breathing dust, so a dust mask is essential. (However, a dust mask will not filter out harmful materials.)
- Communicate. Don't assume anything!
- Have backup teams available to allow rotating of teams, prevent fatigue, and ensure help if a team gets into trouble. Have teams drink fluids and eat to keep themselves fresh.
- Know your limitations. Many volunteers have been injured or killed during rescue operations because they did not pay attention to their own physical and mental limitations. CERT rescuers should take the time to eat, drink fluids, rest, and relax so that they can return with a clear mind and improved energy.
- Follow safety procedures. CERT members should always use the proper safety equipment required for the situation and follow established procedures, including:
  - Working in pairs.
  - Never entering an unstable structure.
  - Lifting by bending the knees, keeping the back straight, and pushing up with the legs.
  - Carrying the load close to the body.
  - Lifting and carrying no more than is reasonable.

Successful search and rescue depends on teamwork.

Step 8: Take Action and Step 9: Evaluate Progress

The plan developed during step 7 is put into action during step 8 during both the Search and Rescue process.

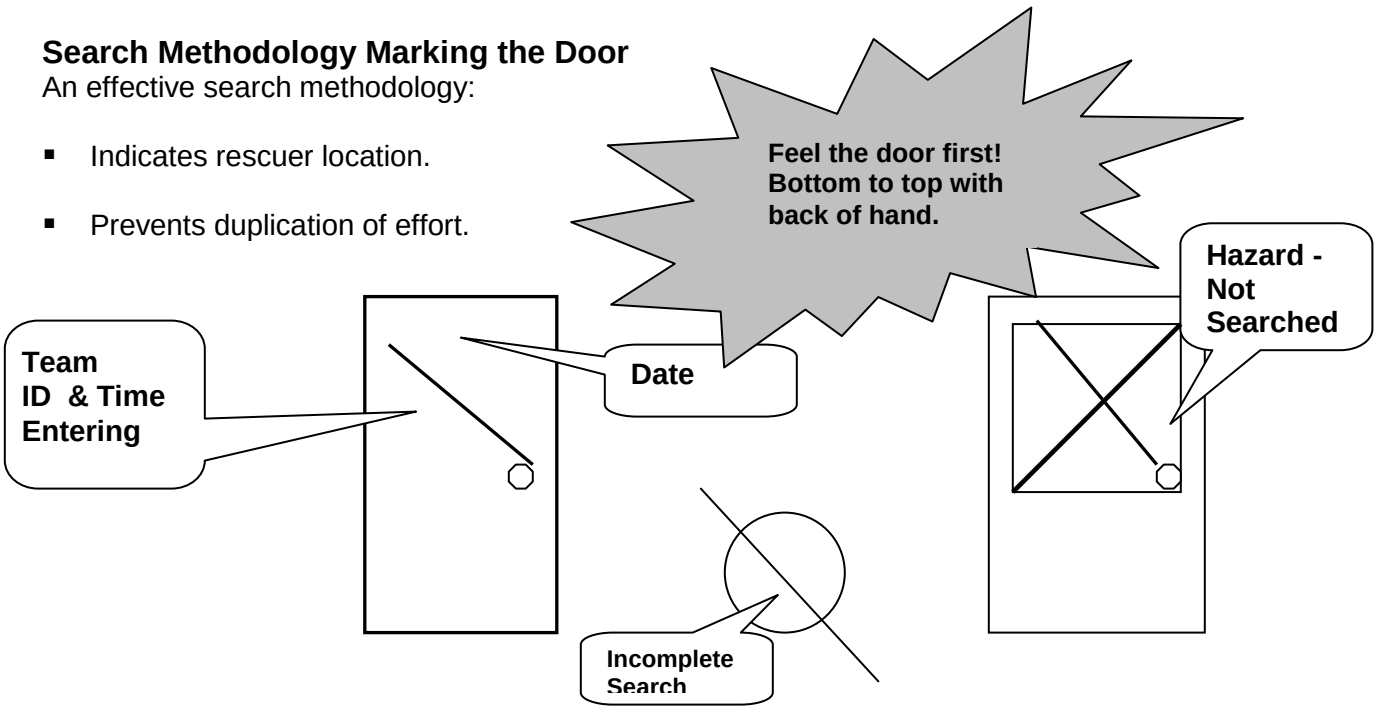
Step 9, Evaluate Progress, is the most critical, not only in terms of evaluating whether the plan works, but also from a safety standpoint.

Size up is ongoing. Information gained during step 9 needs to be fed back into the decisionmaking process for possible revision of priorities and updated action planning.

Notes:

Search Methodology Marking the Door
An effective search methodology:

- Indicates rescuer location.
- Prevents duplication of effort.



Door Markings

Search markings must be easy to make, easy to read and easy to understand. To be easily seen the search mark must be large and of a contrasting color to the background surface.

Entrance Markings

When entering a building, make a diagonal slash, on or near the entrance, beginning at the upper left to lower right.

1. The search team identifier and time that the structure was entered are marked to the left of the mid-pint of the slash and the date entered is marked near the top of the slash on the opposite side.

2. When the search is complete and the search team exits, a second large slash is made, in the opposite direction, forming an "X".

Additional information summarizing the entire search of the structure is placed in the three quadrants of the "X".

3. The left quadrant will already contain the search team identifier and time when the search team first entered the structure.

4. In the top quadrant, enter the time the search team exited the structure under the date. Change the date if different from the date the structure was entered.

5. The right quadrant is for any significant hazards located inside the structure.

6. The bottom quadrant is for the number of victims found. I – Immediate, D – Delayed, ~~"V"~~ for deceased with a corresponding number. Place a small "X" if no victims were found.

7. If the search of the entire structure is incomplete, make a circle in the middle of the single slash. At the top end of the slash, enter the time the search team exited the structure under the date. On the right side, mid-point of the slash, list any significant hazards located inside the structure. The bottom end of the slash is for the number of victims still inside. Place a small "X" if no victims were found.

Interior Door Markings

When victims are found inside, mark on the wall with a "V" or put some other signal to point rescuers to the location.

As you enter each new door inside the structure, make a diagonal slash, as you did on the entrance (no need for Team ID, Date, Time). When you exit, make the second diagonal slash, making an "X". Mark any hazards or victims in the appropriate quadrants. The top and left quadrant should be blank.

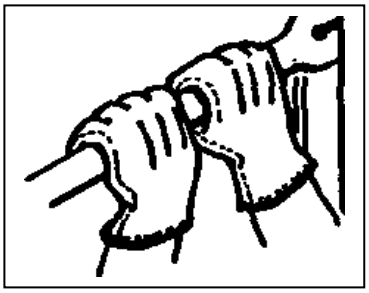
Notes:

FORCIBLE ENTRY

Forcible entry may be necessary as a result of the building shifting after a significant earthquake. To avoid injuries, don't use fire axes to open doors or remove glass. The following methods are less dramatic but are safer and quicker. These techniques will also work for evacuation.

Always look for the easiest way in.
Always wear leather gloves and eye protection.

DOORS



- Try before you pry
- Place pry bar in between door and door jam gap, slide the pry bar toward the jam until it sticks, then apply leverage
- Remove hinge pins from door if prying is not possible
- If still unable to enter, attempt to break through wall beside door

WINDOWS

- Try before you pry
- Cover entire window with duct tape over-taping frame. Failure to do so will create a dangerous hazard (note illustration)
- Stand to the side of the window when breaking (handle of tool up)
- Break window along edge of frame at top (stay upwind)
- **After** breaking **all four sides** of the window, peel tape back and remove the entire window.
- Cover window sill with a tarp or heavy blanket when crawling through.

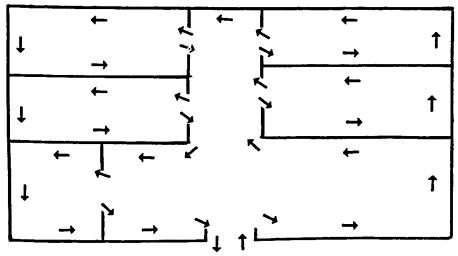
Notes:

Experienced search and rescue personnel have found these search methods to be effective:

1. Begin the search by calling out to victims. Shout something like, "If anyone can hear my voice, come here." If any victims respond, give them further directions such as "Stay here" or "Wait outside" (depending on the condition of the building). Ask victims who respond for any information that they may have about the building or others who may be trapped.

2. Use a systematic search pattern. Ensure that all areas of the building are covered. Examples of systematic search patterns to use include:

   - Bottom-up/top-down.
   - Right wall/left wall.

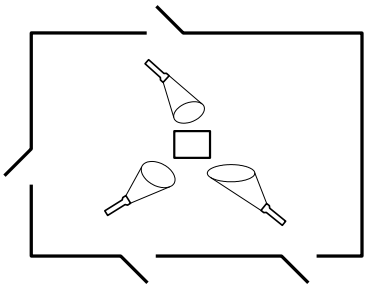


Sample Systematic Room Search

Systematic Room-Search Pattern, bottom-up/top-down or right wall/left wall to ensure that the entire building is searched.

3. Stop frequently to listen. Listen for tapping, movement, or voices.

4. Triangulate. Triangulation enables rescuers to view a single location from several perspectives. Three rescuers, guided by victim sounds, form a triangle around the area and direct flashlights into the area. The light shining from different directions will eliminate shadows that could otherwise hide victims.



Triangulation

Triangulation: Three rescuers guided by victim sounds form a triangle around the area and direct flashlights into the areas. The light will help eliminate shadows.

5. Mark searched areas to document results. Complete the “X” on or near the door when search and rescue efforts have been completed. Document findings/actions in the appropriate section of the “X”. The "X" signals to other potential searchers that the area has already been searched.

6. Report results. Keep complete records both of removed victims and of victims who remain trapped or are dead. Report this information to emergency services personnel when they reach the scene.

When the decision is made to initiate search operations, CERT members must inspect the area assigned by the CERT Area Team Leader.

The search operation involves two processes:

1. Employing search techniques based on the size up

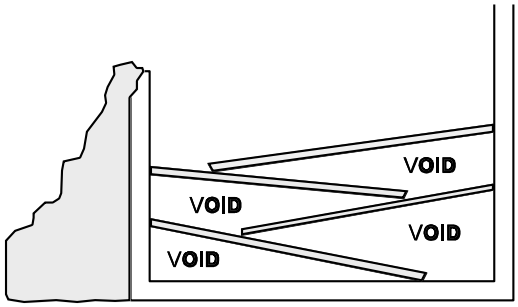
2. Locating potential victims

By using these processes, search operations will be more efficient, thorough, and safe. They will also facilitate later rescue operations.

Locating Potential Victims

The first step in locating potential victims is to conduct a size up of the situation inside the structure to gather more precise information about damage and to develop priorities and plans.

The data gathered will provide more information about areas of entrapment—or voids. There are several types of voids:

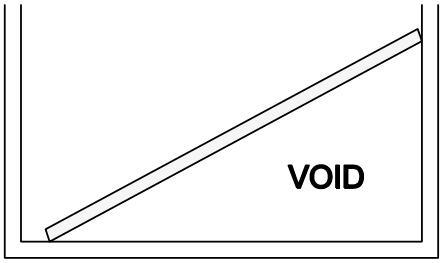


Pancake Void

Pancake Void, in which floors collapse diagonally onto each other, creating voids in the areas where the floors remain attached to the walls.

Pancake voids are most common in buildings that were constructed before 1933. They are created by weakening or destruction of load-bearing walls, which allows the floors to collapse into each other. Pancake voids are the most difficult and time-consuming to search.

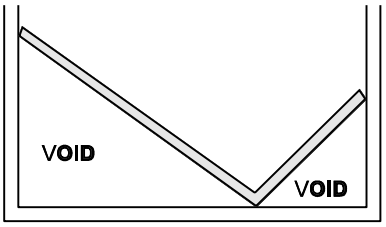
Remember the dangers of unreinforced masonry structures. **If CERT members see pancake voids, this is considered heavy damage, and they should get out immediately.**



Lean-to-Void
Lean-To Void, in which a collapsed wall or floor leans against an outside wall, creating a void where the floor remains attached to the wall.

Lean-to voids are created when a collapsed wall or floor is resting against an outside wall. A victim trapped in a lean-to void has the greatest chance of being alive.

Lean-to voids also indicate structural instability. **If CERT members see lean-to voids, they should note the location for professional responders but leave the building immediately!**



"V" Void
"V" void, in which the floor or wall collapses at or near the center, creating voids on either end next to the walls.

"V" voids are created by a "V" collapse of a floor or wall (the middle collapses and the ends lean against an outside wall). Remind the group that a "V" void creates two lean-to voids, one on either side of the collapse, in which victims can be trapped—but the sloping floor caused by the "V" collapse presents a severe potential hazard to the rescue team.

If CERT members encounter "V" voids, they should leave the building immediately.
Individual voids are spaces into which the victim may have crawled for protection. Examples of individual voids include bathtubs and the space underneath desks. Children may seek shelter in smaller spaces like cabinets.

CONDUCTING SEARCH OPERATIONS

Handout #4-5 Search & Rescue Checklist

After identifying the possible areas of entrapment, CERT members must:

- Determine the potential number of victims.
- Identify the most probable areas of entrapment.

Some of this information may be known through planning, but CERT members may need to get some information by talking to bystanders or those who are familiar with the structure. CERT members should ask questions when talking with these individuals, including:

- How many people live (or work) in the building?
- Where would they be at this time?
- What is the building layout?
- What have you seen or heard?
- Has anyone come out?
- What are the normal exit routes from the building?

Bystanders may be confused by the event. They may tend to exaggerate potential numbers or may not even remember the event accurately. Gather as much information as you can, though, because it will be useful for planning search priorities and implementing the search.

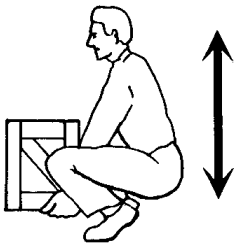
Creating a Safe Environment

There are three goals for all rescue operations:

- To maintain rescuer safety
- To triage in lightly and moderately damaged buildings
- To evacuate victims as quickly as possible from moderately damaged buildings while minimizing additional injury

None of these goals can be achieved without creating as safe an environment as possible before attempting rescue. There are, therefore, certain precautions that rescuers must take to minimize risk.

REMOVING VICTIMS - LIFTS AND CARRIES



Proper Body Position for Lifting

ONLY MOVE A PERSON IF…

THE ENVIRONMENT IS HAZARDOUS

YOU HAVE TO GET TO ANOTHER PERSON

YOU WILL DO NO MORE HARM

Proper Body Position for Lifting showing the back straight and lifting with the knees.

If safety and time permit, you should not use lifts and drags to remove victims when closed-head or spinal injury is suspected. In such cases, the spine must be stabilized using a backboard. Doors, tables, and similar materials can be used as improvised backboards. The backboard must be able to carry the person, and proper lifting techniques must be used. When moving victims, rescuers must use teamwork and communication, and keep the victim's spine in a straight line. Remember, rescuer safety and the condition of the building will dictate the approach.

Always try to let the victim move themselves.

There are a variety of carries that can be used – depending on your abilities and the resources around you. Here are a few suggestions:

Human Crutch: Let the victim lean against you so they can keep their weight off an injured foot/ankle.

Two Person Carry: 1) One person at the head (reaches under victim's arms and grabs opposite wrists. One at the feet (faces toward or away from victim, standing between the legs and cradles legs inside each arm. 2) Stand on either side of victim. Lock arms across the victim's back and other arms under the victim's knees.

Chair Carry: Sit the victim in a chair and strap them in. Lift the chair, or wheel across the floor.

Blanket Stretcher: Fold blanket lengthwise. Place under victim by turning victim onto his side and sliding the blanket underneath (scrunching up ½ the width under the victim). Return the victim to his back and pull the scrunched up portion of the blanket out to the other side. Roll up the length of the blanket to make handles. (Can also put broom handles in the roll for more support). Have one person at the head and at least three on each side (for an adult) to support the weight. Raise and lower on the count of "3". Person at the head directs the movement.

Blanket Drag: Place blanket under victim, as with blanket stretcher. Grasp a handful of blanket on either side of the victim's neck. Drag the victim keeping the head and neck in line.

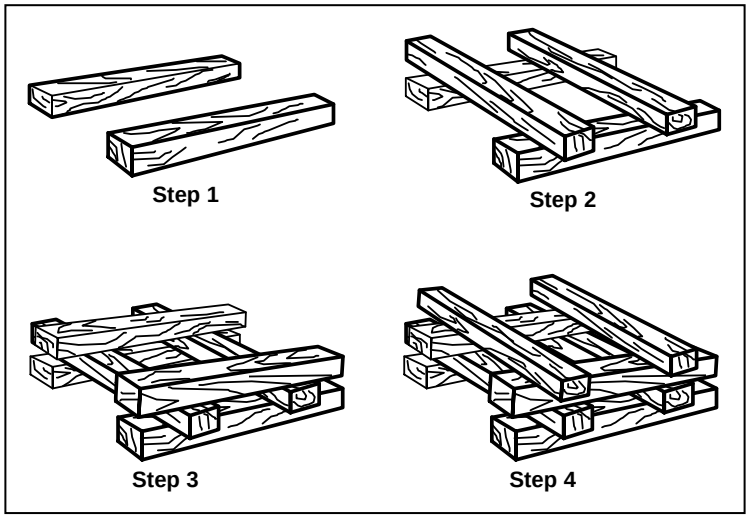
Head First Drag: With victim lying on his back, grasp a handful of clothing on either side of the neck. Drag the victim keeping the head and neck in line.

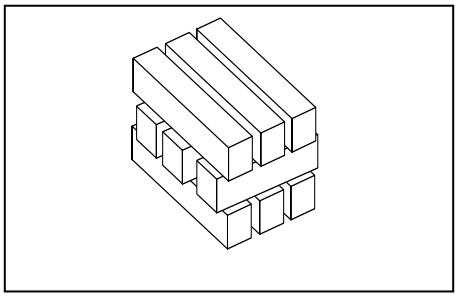
REMOVING VICTIMS - LEVERAGING AND CRIBBING

You may encounter situations in which debris needs to be moved to free victims. In these situations, CERT rescuers should consider leveraging and cribbing to move and stabilize the debris until the rescue is complete.

- Leveraging is accomplished by wedging a lever under the object that needs to be moved, with a stationary object underneath it to act as a fulcrum. When the lever is forced down over the fulcrum, the far end of the lever will lift the object.

- A crib is a wooden framework used for support or strengthening. Box cribbing means arranging pairs of wood pieces alternately to form a stable rectangle.





4"x4"x18"
2 across holds 10,000 lbs
3 across holds 20,000 lbs

Ask your lumber yard for free "Mill ends" They can cut for you - including wedges (cut on the *long* diagonal).

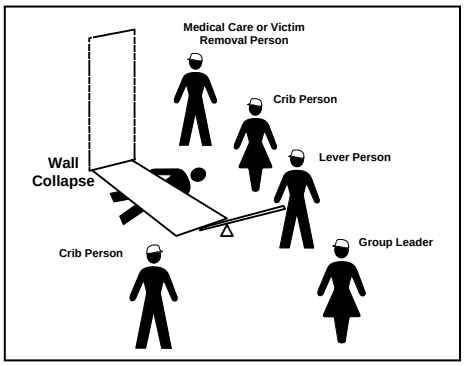
Leveraging and cribbing are used together by alternately lifting the object and placing cribbing materials underneath the lifted edge to stabilize it. Safety is number 1: "Lift an inch; crib an inch."

Leveraging and cribbing should be gradual—both for stability and to make the job easier. It may also be necessary to use leveraging and cribbing at more than one location (e.g., front and back) to ensure stability.

Notes:

When you are able to achieve sufficient lift, remove the victim and reverse the leveraging and cribbing procedure to lower the object.

Remove the more severely trapped people last.



CRIBBING TEAM MEMBERS

Group Leader – Directs the operation
Safety – Observes the operation and notes hazards
Medical – Monitors the victim
Cribbers – Sets up box cribbing
Suppliers – Hands wood to Cribbers
Lifters – Lift object with pry bars

Exercise: Removing Victims

Purpose: This exercise will provide you with an opportunity to practice the removal of victims from a collapse situation, using leveraging/cribbing and drags and carries. You will be assigned into groups and assigned to do a room search, locate victims, and remove the victims.

Instructions: Use the following steps to complete this exercise:

1. Enter your assigned "collapse site" room, do a room search, locate the victims and use leveraging and cribbing procedures to free them, and use appropriate lifts and drags to remove the victims from the room (and, if possible, from the building).

2. Rotate roles so that there are two new victims. Repeat the exercise until everyone has had an opportunity to practice being a rescuer.

Remember!

- Never put fingers or hands under the object
- Never lift object more than the height of one piece of cribbing.
- Use wedges to *temporarily* hold a small space.
- Before you start, build cribbing up to the height of the object on all sides.
- Watch for shifting!

Unit Summary

Search and rescue consists of three different activities that must be planned carefully and practiced in advance. The decision to attempt a rescue should be based on:

- The risks involved.
- Achievement of the overall goal of doing the greatest good for the greatest number.

The objectives of search and rescue are to:

- Maintain rescuer safety at all times.
- Rescue the greatest number of people in the shortest amount of time.
- Rescue the lightly trapped victims first.

CERTs are restricted to light search and rescue. Their mission when dealing with heavily damaged structures or situations that are clearly unsafe (e.g., rising or swiftly-moving water) is to warn others.

Search and rescue size up follows the same process as does size up for other CERT operations. Size up continues throughout search and rescue efforts and provides information about how to proceed. Should size up indicate that evacuation is necessary, the CERT mission is to ensure safety and organization during the evacuation.
When the decision to begin search operations is made, CERT searchers must:

- Employ appropriate search techniques.
- Locate potential victims.

Locating victims means completing a size up of the building interior to identify areas of entrapment, then conducting a search that:

- Is systematic and thorough.
- Avoids unnecessary duplication of effort.
- Documents results.

Rescue involves three main functions:

- Creating a safe environment
- Triaging or stabilizing victims
- Removing victims based on the size up

Rescue operations hinge on maintaining rescuer safety, which requires CERT members to recognize their own limitations. CERT members should *never* attempt anything that exceeds their limitations *at that point in time.*

Leveraging and cribbing may be used to remove debris and give access to trapped victims.

Victims can be removed in a number of ways, depending on:

- Their condition.
- The number of rescuers available.
- The strength and ability of the rescuers.
- The stability of the environment.

If the building's condition allows, victims with suspected head or spine injury should be stabilized on some type of backboard before being removed. If possible, these removals should be deferred to trained EMS personnel.

Homework Assignment

Read and become familiar with Unit 5: Terrorism, Disaster Psychology and CERT Organization before the next session.

Be sure you have proper safety equipment for CERT graduation. See direction sheet for additional information
Leather Gloves
Goggles
Sturdy close-toed shoes
Cotton clothing – long pants