

**SEARCH AND RESCUE**  
by  
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Always search with a buddy (**never alone**) and if possible, have a backup team standing by. If not, at least have one safety person standing by in case you get into trouble.

- Set up a way to communicate with the outside person either via radio or whistle
- One person has to be in charge
- Make a plan on how you will conduct the search
- Put on your safety equipment, hard hat, gloves, eye protection, kneepads, etc.
- Bring in a small pry bar, hand lights, and material for cribbing if needed
- Make a 360 degree circle of the building to check for any hazards.

**SIGNS OF POSSIBLE STRUCTURAL DAMAGE**

Most buildings that have suffered structural damage will show very distinctive outward signs. Before entering any building thoroughly check for signs of possible structural damage.

Buildings are built with straight horizontal and vertical lines. When it has suffered structural damage these straight lines can become distorted. This is a strong indication that the building's structural stability has been compromised. The following is a list of some of the tell-tail signs of structural damage:

**HORIZONTAL LINES: use a pen to hold over window**

- Uneven window lines
  - Draw an imaginary line across the tops of the windows
  - Is that line level?
- Foundation not level
  - Ground around foundation is fractured and uneven

**VERTICAL LINES: use a pen to hold against corners**

- Any leaning
  - Look at all sides of the building, hold a pencil up to corner and check.
  - Compare to the building next door.
- Garage doors and entry way
  - Are these doors out of plumb?

### **LARGE CRACKS IN THE EXTERIOR OF THE BUILDING:**

- Especially around garage doors and entryway
- Foundation cracks

### **SEPARATION BETWEEN THE BUILDINGS:**

- Is it even?
- Was it there before?
- Are other buildings on the block similar?

### **LIQUEFACTION:**

- Around the foundation area
- coming out of openings on ground floor

Wood frame buildings, such as homes and apartment buildings, perform very well during an earthquake. They are built to withstand the lateral force of the quake if properly prepared with foundation bolts and cripple walls. Garage doors of these buildings have large openings and can be a weak point in a quake since there is no lateral support. The area around the garage door and foundation should be examined carefully in your structural damage assessment.

### **SEARCH and RESCUE STRATEGIES and TACTICS:**

As mentioned before, the primary concern in any search operation is the safety of the searchers. If a searcher is injured, the entire operation stops until that person is brought to a safe location. At no point should the personal safety of the searcher be put in jeopardy.

Once the outward signs of structural damage are examined, buildings should be classified according to the amount of damage sustained. There are three classifications of structural damage:

- Light Damage
- Moderate Damage.
- Heavy Damage.

Only buildings that are classified as "Light or Moderate Damage" should be entered. ***DO NOT ENTER BUILDINGS THAT ARE HEAVILY DAMAGED***

### **LIGHT DAMAGE:**

The damage to the structure of these buildings is superficial such as broken windows and fallen or cracked plaster. The major damage in these types of buildings is to the interior contents.

The PRIMARY MISSION of the Search Team is to search for, locate, triage, and prioritize the removal of victims to a designated treatment area established by the medical group. Utilities should be shut off if necessary. All actions should be recorded.

### **MODERATE DAMAGE:**

The damage to the building is more extensive. Decorative work on the exterior of the building is either damaged or has fallen off, there is a large amount of cracking visible but the building is not leaning, it is still attached to its foundation, and there are no other outward signs of structural damage. There may be major damage to the interior contents.

The PRIMARY MISSION is to try to get as much information as possible on the location of potential victims from the people in the street before entering. Locate, stabilize, and immediately evacuate the victims to a safe area outside the building. Do not treat the injured inside, except to open an airway and stop major bleeding. An aftershock may make this type of building structurally unsound so spend as little time in them as possible. Document the location of heavily trapped victims and communicate the information to professional rescue team. Shut off the utilities as needed. Record all actions taken

### **FORCIBLE ENTRY:**

Forcible entry is the technique used to get into a building when normal means of entry are either locked or blocked. It should be accomplished quickly and with a minimal amount of damage. The method used will depend on the construction, operating design and the locking mechanism of the door or window being forced. Always try to gain entry the easiest way possible!

Doors and windows are the obvious places to use forcible entry to gain access. But if you are trapped in a room, you can breach a sheet rock or plaster wall between the wall studs and create a hole to climb through.

### **FORCIBLE ENTRY TOOLS:**

- Prying and spreading tools
  - Axe, crowbar, and pry bar, wrecking bar, car jacks.
- Cutting and boring tools
  - Axe, hand saw, power saws, bolt cutters.
- Striking and battering tools
  - Axe, battering ram, hammer, sledge hammer

### **POINTS OF ENTRY:**

- Front door
  - Is it open?
  - Does someone in front have the keys? .
- Any window or glass door.
- Tradesmen entrance.
- Garage door
- Back yard access
- Roof door via fire escape or back stairs

### **FORCING DOORS:**

- Swinging doors
  - Feel door for heat before attempting to force any door, then try knob
  - Break glass panel in door or next to it and reach in and unlock door
  - If there is no glass around the door force door with a sledge hammer by pounding directly on the lock
- Sliding glass doors
  - Break glass from top down. Stand to one side, cover glass with sticking shelf paper
  - Pry door at the lock
  - Lift door to disengage lock
- Garage doors
  - Break glass panel out reach in and unlock door
  - If no glass, knock wooden panel out, climb through and open door
  - Cut hole in door for entry if a solid door

### **FORCING WINDOWS:**

- Sliding, swinging, and pivoting windows
  - Try to open window first
  - Open lock with thin tool or knife
  - Break glass
- Security windows (windows with bars)
  - Only try to gain access if absolutely necessary -
  - Use jack to spread bars apart
  - Strike attachment points with heavy sledge until free
  - Attach tow chain to car and pull off

### **BREAKING GLASS:**

- Use long handled tool such as an axe
- Stand to the side of the window
- Tilt tool so hands are above part of tool used to break the glass -
- this is so glass does not slide down tool and cut rescuer
- Strike glass sharply with the flat part of the axe

- Strike glass as high on the window as possible
- Start at the top of the window and clean out all remaining glass.  
Unlock window and open before entering
- The same breaking procedure is used on fixed windows, and on glass panels in entry and garage doors Note: you can place sticky shelf paper on glass

## **GET INTO THE BUILDING THE EASIEST WAY POSSIBLE**

### **SEARCH PROCEDURES:**

Two teams of at least two people each are needed to search a building. The first team stays on the outside of the building. From this vantage point they can see if the search party is in any danger from exterior sources such as fire. They control the scene outside the building making sure that well-meaning, untrained volunteers do not disrupt the search. They can also send a runner to the Fire Department to notify them if the situation requires. The second team searches the interior of the building. **ALWAYS STAY TOGETHER WHEN SEARCHING THE BUILDING.** If there are many buildings to search, the teams should switch duties with each building to prevent fatigue.

Every search must be pre-planned. The first step is to organize your team All team members should be fully equipped but not overburdened. Each team member should have on heavy clothing, boots, gloves, helmet, vest, goggles, and carry a flashlight. In addition, the search team should carry marking pens and each member should carry a different forcible entry tool. Both the outside team and search team should have utility shutoff tools. The outside team should have a note pad and pens to document all actions taken.

### **COMMUNICATION:**

Decide on a pre-arranged signal to warn the search team of danger and to leave the building,

- Three (3) blasts of a horn or whistle to warn search team that they have to leave
- Three (3) blasts from search team would mean that they need help
- One (one) blast would tell the search team that 10 minutes have gone by
- Two (2) blasts would tell them that 20 minutes have gone by and they need to exit the building
- The search team would acknowledge by one (1) blast

The next step is to examine the exterior of the building to see if it has been structurally damaged and to classify the building as "Light, Moderate, or Heavy Damage". **IF THE BUILDING IS CLASSIFIED AS HEAVY DAMAGE, DO NOT ENTER.** If the building appears sound, answer the following questions before entering.

- Has anyone been reported missing in the building? .
- Where are the potential hazards?
- Are there any unique characteristics of this building?
- What will be the point of entry?
- Where are the fire escapes if any?
- Back stairs? .
- How tall is the building?
- How deep?
- How many units are in the buildings (check the mail boxes)

Answering these questions will give you an idea of the hazards that you will face, the amount of time the search will take, and, most importantly, alternative exits from the building.

### **THE SEARCH:**

Once it has been decided that it is safe to enter the building and the search team is fully equipped, mark the outside of the building before entering with half of an "X" or "/". Feel the upper part of the door with the back of your hand before you attempt to open it. Once inside the door, stop for a second. Do you smell gas or smoke? If so, shut off the gas and electricity if safe to do so and leave the building. Complete the marking, and go on to the next building. **Place a large light in the doorway.**

If you do not smell anything, call out "Is anyone in here?" and listen for an answer. If no answer you should start the search. Place one hand on the nearest wall; this will dictate your search pattern. All turns will either be right hand or left hand turns depending on which hand is on the wall. This will allow your search to be thorough and systematic. If you have to get out of the building just reverse direction, place your other hand on the wall and make all the opposite turns until you are on the outside. Periodically, while searching, call out and listen for a response.

Shuffle your feet along the floor moving slowly. Make sure there is solid flooring under your lead foot before you put your weight on it. Always be aware of the closest ways out of the building.

Search the building from the top down. If you look at the floor plan going up you will be more familiar with the building when you actually start the search at the top floor. Each door entered should be marked with an "X". If conditions permit, search under debris piles. Do not use elevators, but they must be searched for people trapped in them.

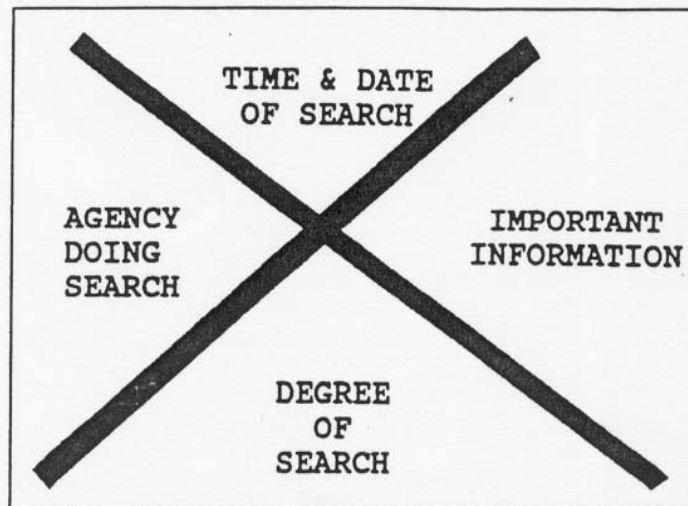
Complete the "X" immediately after leaving the building and fill in all the needed information.

When searching the building, it is important to keep several things in mind. First be alert for aftershocks, fire, gas leaks, or other possible hazards. **ALWAYS STAY ALERT.** If unable to enter a door, knock, shout, identify yourself as the search party, and listen for an answer. Listen for tapping on structural members, pipes or other metal in the building, as this sound carries much further than the human voice in enclosed spaces. One other thing that must be considered is the limitations of the searchers. Searching dark, unfamiliar buildings can be both mentally and physically fatiguing. Each person must know their own limitations and not push past them. This is when accidents and injuries happen.

***IF EVER IN DOUBT ABOUT PERSONAL SAFETY GET OUT!!!***

## **BUILDING MARKING**

The "X" is put next to or above the main entrance.



## **BUILDING MARKINGS:**

The markings are put next to or above the main entrance. Fill in all the following information in the appropriate quadrant as soon as you exit the building.

### **TOP QUADRANT:**

- Date and time of the search
- Important if any aftershocks
- After you complete your search, mark time completed

**LEFT QUADRANT:**

- Initials of person in charge of search

**BOTTOM QUADRANT:**

- Degree of search
- Building fully searched or partially searched
- Number of victims still in building and their location. Also, are they dead or alive

**RIGHT QUADRANT:**

- Important information
  - Any hazards such as structural damage
  - Utilities not shut off
  - Any other hazards

**SEARCH TEAM CHECK LIST:**

**PRE-PLAN SEARCH:**

- Organize team
  - \_\_\_ Two teams of at least two people each
  - \_\_\_ Have proper safety equipment
  - \_\_\_ Decide on duties and tools decide on signals
- Examine the exterior of the building
  - \_\_\_ Has anyone been reported missing?
  - \_\_\_ Signs of structural damage?
  - \_\_\_ Potential hazards?
  - \_\_\_ Point of entry?
  - \_\_\_ Points of exit?
  - \_\_\_ Occupancy load?
  - \_\_\_ Are the utility shutoffs apparent?
  - \_\_\_ Unique characteristics of the building?
- Classify the building
  - \_\_\_ Light Damage
  - \_\_\_ Moderate Damage
  - \_\_\_ Heavy Damage

**SEARCH:**

- Enter building
  - \_\_\_ Shutoff utilities if needed
  - \_\_\_ Mark half of "X" near entry
  - \_\_\_ Use forcible entry if necessary
  - \_\_\_ Smell of natural gas, get out and shut it off

\_\_\_ Call out "Is anyone in here?" and listen

- Start search pattern
  - \_\_\_ Stay together and along walls; search from top down
  - \_\_\_ Right hand or left hand search pattern
  - \_\_\_ Continually call out and listen
  - \_\_\_ Move slowly and test each step
  - \_\_\_ Mark each individual unit
  - \_\_\_ Complete "X" immediately after leaving the building and fill in the information
  
- Things to consider while searching
  - \_\_\_ Be alert for aftershocks, fire, or other hazards
  - \_\_\_ Always know the closest way out
  - \_\_\_ If unable to enter any door knock, shout and ID yourself, and listen for response
  - \_\_\_ Search under debris if possible
  - \_\_\_ Check elevators

## **RESCUE:**

Once the search team has located a victim, the operation enters the rescue phase. The rescue can be as simple as lifting a bookcase off an uninjured victim and helping them out of the building. It could also be a very complicated operation that could include using ladders to get into the building, assessing the medical condition of the victim, using levers and cribbing to remove heavy objects that are trapping the victim, and using rescue carries to get the person to safety. Move slowly in all operations, and take the time to assess the hazards around you before you start and continually throughout the operation.

There are some very basic rescue considerations that should be kept in mind at all times:

- Know your physical and mental limitations and don't push past them **(DON'T BECOME A VICIM)**
- Handle the hazards first. If possible, eliminate the things that will injure the rescuers before attempts are made to get the victim out.
- Always do things the easiest way possible. Don't make an easy job into a complicated one.
- In a hostile environment, remove the victim as quickly and safely as possible. The injuries to the victim may not be as serious as the situation that they are in. If a person may die unless you can get them away from danger immediately, there is no time to assess the medical condition. Just get them out.

If you discover someone who is trapped or pinned by something you must first evaluate the hazards around you then assess the victim's medical condition. If injured, decide whether it is safe to treat them there or take them to a treatment area

If the victim is trapped, decide if you can quickly complete the rescue with minimal risk. If you can't complete the rescue, don't start; send a runner to the Fire Department. If you can complete the rescue, do it systematically. Remove debris slowly, protect the victim from debris, and do not injure the victim further by your rescue method.

### **LIFTING HEAVY OBJECTS:**

People are sometimes trapped by fallen debris that has to be moved before they can be removed from the building. It is important that you, the rescuer, use proper lifting techniques so that neither you nor the trapped person is injured

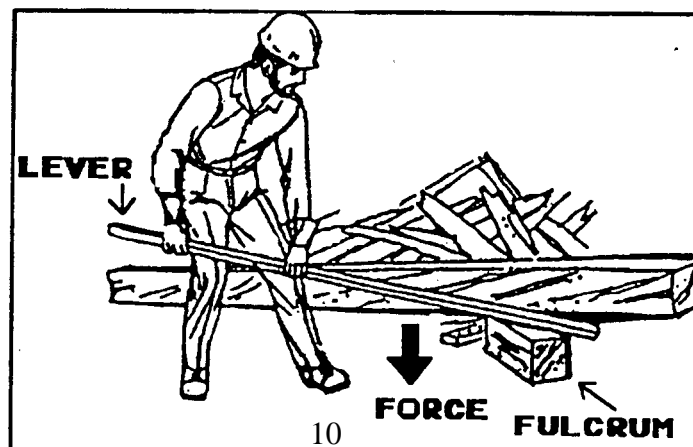
#### **LIFTING BY HAND:**

- Have secure footing and balance
- Keep back straight and lift with legs
- Look up while lifting
- More people makes lifting easier
  - One person must be in charge of lifting operations
- Use cribbing to support object being lifted

#### **LIFTING WITH TOOLS:**

- Levers - pry bar, wrecking bar, pipe, or piece of wood
- Jacks - car tire jack, lifting jack

A lever is a rigid piece of material, straight or bent, that is free to move about a fixed point called a fulcrum. A lever uses mechanical advantage to transfer a force from one place to another while changing the direction of the force. Levers are extremely important in rescue operations to remove debris that is trapping people in buildings and in the street. A lever transfers a downward pushing force into an upward lifting force.



**CRIBBING:**

Whenever a load is lifted, whether by hand or with levers, a method for temporary support is needed to insure the safety of the rescuers and the trapped person. Cribbing is used for this purpose. It is a stabilization tool used to make an object resistant to a sudden change of position or shift in weight. Cribbing will prevent the load from falling.

Cribbing is a stable platform that is able to support the weight that is being lifted. Cribbing can be made from any material; wood blocks, furniture books, concrete blocks, and even tire rims will all work as cribbing materials.

**REQUIREMENTS FOR CRIBBING MATERIALS:**

- It must be stable
- It must be able to support weight that is lifted

**CRIBBING PROCEDURES:**

- Have all lifting and cribbing materials ready at the site
- Make sure all helpers are aware of lifting plan
- Support the object with cribbing before the lifting starts so it will not fall and further injure the victim or rescuers
- Lift object and place cribbing under it
- Only lift high enough to place one layer of cribbing under it
- Lower object onto cribbing
- Repeat procedure until victim can be removed
- Move slowly

**RESCUE CARRIES:**

The purpose of search and rescue is to locate people who cannot for whatever reason exit a building and to remove them from potential danger. If the person is not hurt this is a simple task, but if the victim has sustained injuries, their medical condition must be assessed before any rescue attempt is made. The victim will also need some type of assistance to get out of the building.

**FIREMAN'S CRAWL:**

- It can be a very useful carry if you are alone and have to move someone away from hazardous surroundings
- Loosely tie the persons hands together so you have something to push against
- This carry should only be used to move a person a short distance

## HUMAN CRUTCH:



- Only use this carry with people that can help themselves
- To be used with victims with minor injuries
- Victims can be transported longer distances without fatiguing the rescuer

## TWO-PERSON CARRY:

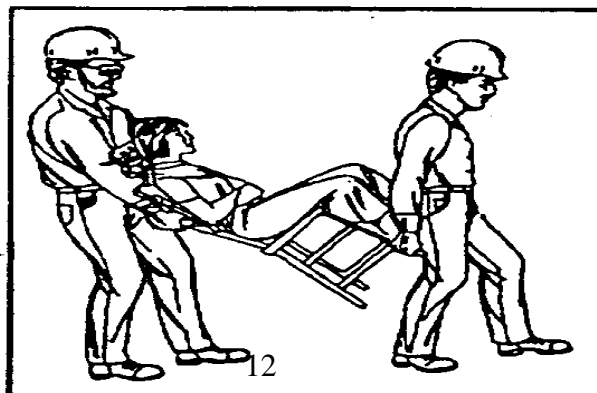
- It is usually easier to use some kind of support when carrying a victim rather than lifting the unsupported person
- It is difficult to carry a victim very far with this carry
- But where no support is available, this can be an effective carry

## IMPROVISE:

- A stretcher is a great way to support and transport a victim
- If no stretcher is available use a blanket door, table top, chair, ironing board, or anything that will support the weight of the victim

## CHAIR LIFT:

- The chair has to be strong enough to bear weight.
- Immobilize limbs
- This carry is much easier on the rescuers, and the victim can be carried much greater distances than if the victim were unsupported



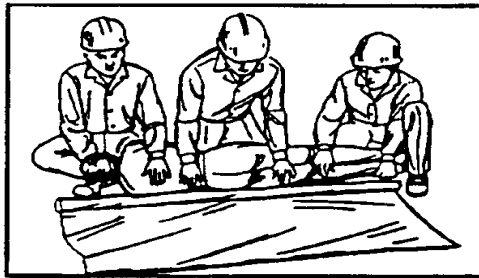
### THREE-PERSON CARRY:



- If you have three rescuers you can use this method
- Any time you move a victim by hand it is more difficult and requires more effort than if some means of support is used.

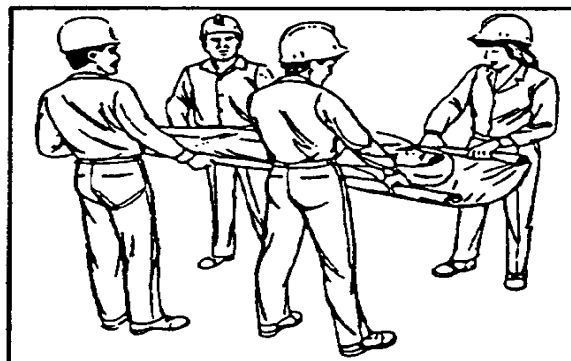
### MOVING A VICTIM LOG ROLL:

- To get the victim onto blanket or stretcher, roll them as one unit



### STRETCHER CARRY:

- Three or four people is good but six is even better
- The more people you have, the easier it is to carry a victim and less energy the rescuers will expend



## **LADDERS:**

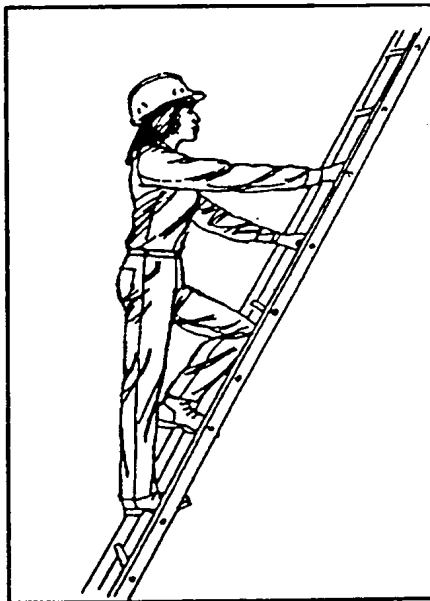
Ladders are valuable rescue equipment; they can allow search teams to enter and exit a building through top floor windows or roof access. Certain safety precautions should always be followed when using ladders.

### **ELECTRICAL WIRES:**

- Be aware of overhead wires
- Metal ladders in contact with energized wires will cause electrocution
- Have a least a 10-foot clearance between wires and the ladder so **that** there is no possibility of contact when climbing

### **SECURE LADDER:**

- Secure the base of the ladder to prevent slipping
- One person should always stabilize the ladder at the base. Secure the ladder at the top if possible
- Tie it to the fire escape



### **LADDER SAFETY:**

- Place the ladder at a safe climbing angle
- Place your feet at the base of the ladder and extend arms until palms touch the ladder, as shown in the picture
- This places the ladder at approximately a 70 degree angle to the building, the recommended climbing angle
- Place the ladder 1 rung above window sill, and 3 rungs over roof top to make it easier to get on and off the ladder

- Climb the ladder safely by starting out with either right hand or left hand on rung in front of your shoulder and the opposite foot on bottom rung
  - Keep climbing using opposite hand and leg to keep the ladder in balance
  - Hold on to the rungs, not the beam, stand on the center of the rungs, look up, not down, climb vertically up the ladder
  - Have someone foot the ladder for you by standing between the ladder and the building and holding the beams of the ladder and pulling towards the building