

# **“Light Search and Rescue”**

## **PART ONE**

Search and rescue are two separate activities: **SEARCH:** To look through (a place, an area, etc.) carefully in order to find something missing or lost. **RESCUE:** To free or deliver from confinement.

**Objectives:** The objectives of search and rescue are to:

- (1.) Acknowledge that the most important person in a rescue attempt is the rescuer.
- (2.) Rescue the greatest number of people in the shortest amount of time.
- (3.) Rescue lightly trapped victims first.

As a volunteer worker, you will confine your efforts to light search and rescue; that is, the relatively uncomplicated extrication of victims from situations that pose minimal risk to the rescuer.

### **The Need for Planning:**

Experience has shown that immediately after almost every major disaster, the first response to trapped and injured victims is by spontaneous, untrained, and well-intentioned persons paying little or no regard to personal safety. More often than not, spontaneous rescue efforts usually result in serious injuries and compounded problems.

To avoid the problems associated with spontaneous actions, rescue efforts should be planned and practiced in advance. The decision to attempt a rescue should be based on following two factors:

- (1.) The risks involved.
- (2.) The overall goal of doing the greatest good for the greatest number of people.

**Search And Rescue Resources:** Search and rescue operations require three components:

- (1.) Rescuers: Include trained personnel and volunteers.
- (2.) Tools: These depend on their availability and the needs of the situation. For example, storm or earthquake damage may require tools for lifting debris whereas flood damage may require boats, ropes, and life preservers.
- (3.) Time: This may be very limited for some victims. The first 24 hours after a disaster has been called the "Golden Day" that period during which the injured and trapped victims have only an 80 percent chance of survival if rescued.

In the aftermath of a disaster, each of these components may be very limited. Search and rescue teams can make their efforts more effective in the time available through:

- (1.) Planning and developing rescue action plans based on probable search and rescue situations, and practicing implementing those plans.
- (2.) Realistic size-up of the situation.
- (3.) Careful attention to rescuer safety.

**Planning:** Planning involves assessing probable needs, risks, and resources before disaster strikes and developing an action plan that takes these

factors into account. Action plans should be implemented under simulated disaster conditions to identify their strengths and weaknesses and ways to improve their implementation.

### **Assessing Needs and Risks:**

Needs and risks are determined to some extent by the types of occupancies in the local area. Type of occupancies in this case does not just refer to houses. It also refers to any place where people might be during a disaster, including:

- (1.) Apartments, condominiums, and mobile homes.
- (2.) Industrial, commercial, or office space.
- (3.) Schools.
- (4.) Places of worship.
- (5.) Hospitals and nursing homes.
- (6.) Airports.

“Don’t be part of the problem....Be part of the solution.”

**Part of search and rescue planning involves identifying the different types of occupancies in the local area and asking:**

- (1.) What does this mean in terms of population.
- (2.) What does it mean for the kinds of rescue efforts that may be required?

(3.) What are the implications for rescuer safety?

Careful examination of the types of occupancies that may be involved in a disaster will provide valuable information about the human and physical resources that may be required and the amount of time that may be available for search and rescue operations.

## **Assessing Resources:**

The very first step in search and rescue operations is to identify local resources before a disaster even occurs. Search and rescue resources may include personnel, equipment, and tools. Planners should use the following questions in the table below to guide their resource planning efforts.

### **Personnel**

(1.) Who lives and/or works in the area?

(2.) During which hours are these people most likely to be available?

(3.) What skills or hobbies do they have that might be useful in search and rescue operations?

(4.) What might be the most effective means of mobilizing their efforts?

### **Equipment**

(1.) What equipment is available locally that might be useful for search and rescue?

(2.) Where is it located?

(3.) How can it be accessed?

(4.) On which structures (or types of structures) might it be most effective?

## **Tools**

(5.) What tools are available that might be useful for lifting,?

Considering each of these questions will greatly facilitate search and rescue operations under disaster conditions.

## **Search and Rescue Size-Up:**

What Is Search And Rescue Size-Up? Rescues must be planned and carefully executed to ensure the success of the rescue and the safety of the rescuer. Like size-up for other disaster operations, search and rescue size-up continues throughout the disaster response. It includes the following seven steps: Step 1: Gather facts. Step 2: Assess damage to the building. Step 3: Identify your resources. Step 4: Establish the rescue priorities. Step 5: Develop a rescue plan. Step 6: Conduct the rescue. Step 7: Evaluate your progress.

Each of the size-up steps will provide information that may be critical to search and rescue efforts. Next week we will be doing part two of light search and rescue and we'll start off by looking at each of the seven size-up individually.

# “Light Search and Rescue”

## PART TWO

### Step 1: Gather Facts.

Let the facts of the situation guide your search and rescue efforts. Consider the types of structure and construction, location, and severity of damage, as well as environmental conditions and hazards, the probable number of victims, and their conditions. Because the search and rescue situation continually changes, gather facts about the situation on a continual basis and revise plans as needed. Some of the questions that search and rescue personnel must answer during fact-gathering are included in the table below. The answers to these questions will enable you to complete size-up.

#### Planning Factor Questions

#### Time of Day/Week

- (1.) How does the time of day/week affect numbers of people possibly trapped in the area?
- (2.) Where are the victims likely to be (home, work, in bed, on the road)?
- (3.) How much daylight is available for search and rescue efforts or, if none:

(4.) How long will it be until sunrise?

(5.) Is artificial lighting available and practical?

## Occupancy Type

(1.) Where are potential victims likely to be in the structure?

(2.) How many potential victims are likely?

## Construction Type

(1.) What types of construction have been affected?

(2.) What are the implications for search and rescue?

(3.) Is the age of construction significant?

## Weather

(1.) What is the current and forecast weather?

(2.) How will the weather affect rescue efforts?

(3.) How will it affect victims?

(4.) How will it affect rescuers?

## Hazards

(1.) What and where are the general hazards in the area (utilities, natural hazards, hazardous materials)?

(2.) What steps are necessary to mitigate these hazards?

(3.) How long will mitigation efforts take?

(4.) What effect might the delay have on the victims?

## **Step 2: Assess Damage to the Building.**

There are no hard and fast rules for assessing damage. However, the damage categories in the table below will serve as a reference point for defining your primary search and rescue mission.

If Structural Damage Is . . .

Then The Rescue Mission Is . . .

**Light:** Superficial or cosmetic damage, broken windows, fallen plaster; primary damage to contents of structure . . .

To locate, triage, and prioritize removal of victims to designated treatment areas by the medical operation teams.

**Moderate:** Questionable structural stability; fractures, tilting, foundation movement or displacement . . .

To locate, stabilize, and immediately evacuate victims to a safe area while minimizing the number of rescuers inside the building.

**Heavy:** Obvious structural instability; partial or total wall collapse, ceiling failures . . .

To secure the building perimeter and control access into the structure by untrained but well-intentioned volunteers.

After or in conjunction with the damage assessment, search and rescue personnel must consider probable amounts of damage and rescue requirements based on the type and age of construction.

Assess the damage from all sides by “taking a walk” around the building.

Experienced search and rescue personnel can anticipate probable amounts of damage following a disaster event based on the severity of the event and the types of structures involved.

### **Step 3: Identify Your Resources.**

In this step, the rescue team identifies all of the resources, such as personnel, equipment, and tools that are available to assist in rescuing victims.

### **Step 4: Establish the Rescue Priorities.**

Once resources have been identified, the rescuers must determine what the priorities are for the situation at hand. For example, in a certain building there may be water rising, with victims trapped inside. In that case, the priority becomes getting out those victims who can be easily reached and removed without putting any rescuers at risk.

### **Step 5: Develop a Rescue Plan.**

Next, the rescuers decide specifically how they are going to complete the tasks that they have determined are the highest priorities.

### **Step 6: Conduct the Rescue.**

Once the plan has been developed, the rescue team puts it into action and begins the rescue.

## **Step 7: Evaluate Your Progress.**

This is the most important step from a safety standpoint. The rescuers must continually monitor the situation to prevent any harm to the rescuers. Also, they determine if their plan is working, and if not, how it can be changed to make it work.

### **Safety Considerations:**

In assessing your own situation and making decisions about search and rescue strategies, rescuer safety must be the primary concern. The two most frequent causes of rescuer deaths are disorientation and secondary collapse.

The following are guidelines for safe search and rescue: Buddy System. Always work in pairs, with a third person acting as a runner.

**Hazards:** Be alert for hazards, such as sharp objects, dust, hazardous materials, power lines, leaking natural gas, high water, fire hazards, and unstable structures. If water is present, check the depth before entering. Never enter rising water.

**Safety Equipment:** Wear safety equipment and clothing appropriate to the task. In search and rescue operations, the equipment will include:

- (1.) Helmet or hard hat.
- (2.) Goggles.
- (3.) Dust mask.
- (4.) Whistle (Clog rescue whistle) for signaling other rescue workers.

(5.) Leather work gloves.

(6.) Clothing appropriate for the weather (protection from cold or rain).

(7.) Sturdy shoes (preferably steel-toed).

**Rotate Teams:** Have back-up teams available. Monitor the length of exposure of active teams. Be alert to signs of fatigue. Establish regular search and rescue shifts or rotate personnel (as a team) as needed. Have teams drink fluids and eat to maintain themselves.

## **Evacuation**

Evacuation is the organized withdrawal from an area for purposes of protecting the safety of the area's inhabitants. In the event that evacuation becomes necessary, use the following steps as guidelines to ensure safety and organization.

Step

Action

(1.) Determine the need

Determine whether there is a need for total or partial evacuation.

(2.) Identify a relocation area

Select an area that is free of hazards and easily accessible.

(3.) Communicate

Communicate to everyone involved the need to evacuate and the locations of shelters.

(4.) Predesignate routes

Designate routes from the area to be evacuated to the area of relocation.  
Consider alternatives.

(5.) Report the evacuation

Be sure to inform emergency management personnel about the evacuation to avoid unnecessary duplication of effort and risk.

The #1 rescuer problem while working in a structural collapse is from breathing dust.

Always wear a dust mask/safety equipment.

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## **PART THREE**

Conducting Search Operations: Once the decision is made to initiate search operations within a specific structure or area, rescue members must systematically inspect the area for victims, as assigned by the Area Team Leader. This involves two processes:

(1.) Locating potential victims.

(2.) Employing search techniques appropriate to the operation.

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

Locating Potential Victims: The first step in locating potential victims is to

gather any additional information required for the specific structure or area. This requires searchers to conduct a “mini-size-up” to gain more precise damage information and develop priorities and plans. Detailed information about a structure, together with information about the type of construction, will provide information about areas of entrapment. Inspecting a structure by taking a walk around it will also provide useful information.

**Areas of Entrapment:** Locating victims in and around a damaged structure generally means finding the areas of entrapment or voids in which they are concealed. There are several types of voids to look for.

**Pancake Voids:** Pancake voids are most common in pre-1933 buildings and there are small voids throughout a structure that are created by weakening or destruction of load-bearing walls and the resulting collapse of floors onto each other. Pancake voids are the most difficult and time-consuming to search.

See examples of Voids

**Individual Voids:** Individual voids are spaces into which the victim may have crawled for protection. For example, victims might be found under desks or in bathtubs.

After identifying the possible areas of entrapment, the next step is to determine the potential number of victims and identify the most probable areas of entrapment. Some of this information may be known through preplanning, but some may need to be obtained by other means, such as by talking with bystanders. When talking with bystanders, get as much information as possible. For example, how many people live or work here? Where would they be at this time? What do you know about the building layout? What have you seen or heard? Has anyone come out? Realize that bystanders may be traumatized by the event, however, and may tend to

exaggerate potential numbers or may not remember events or even building floor plans accurately. Finally, determine the normal exit routes from the building. Some victims may have become trapped while trying to escape.

After gathering all of the additional information they can, rescue members will be able to plan search priorities and implement the search.

Experienced search and rescue personnel have found the search procedures listed below to be effective:

(1.) Call Out. Begin the search by shouting 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,” these orders all depend on the condition of the building. Be sure to ask victims for any information they may have about building damage or about others trapped in the building.

(2.) Be Systematic: Use a systematic search pattern to ensure that all areas of the building are covered. For example: (A.) Bottom-Up/Top-Down. Searching from the bottom of the building up and/or from the top down is well suited to multi-story buildings. (B.) Right Wall/Left Wall. Moving systematically from one side to the other is well suited to single-floor structures and avoids repetition. The wall is the rescuer’s lifeline. If you or your partner becomes disoriented, reverse your steps, staying close to the wall until you get back to the doorway. Throughout your search, maintain voice contact with your partner so you do not get separated.

(3.) Listen Carefully: Stop frequently and just listen for tapping sounds, 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 a designated area and direct flashlights into the area. The light shining from different directions will eliminate shadows that could otherwise hide victims.

(5.) Use the Buddy System: Working together, two rescuers can search a structure more effectively and provide an additional measure of safety to each other. Buddies should also use a web belt to connect one another, especially in dark or smoke-filled areas.

(6.) Mark Searched Areas: Marking searched areas prevents duplication of efforts and identifies where rescuers are and have been. Make a single diagonal slash on or next to the door just before entering. Make an opposite slash (creating an “X”) when all occupants have been removed and the search of that area is finished. The four quadrants of the “X” can be used to indicate the initials of the searcher (left quadrant), the time/date of the search (top quadrant), personal hazards (right quadrant), and number of victims still inside (bottom quadrant). Use a zero if no victims are found. Put a box around the “X” if it is not safe to conduct search and rescue efforts in the room or building

(7.) Document Results: Keep complete records both of removed victims and of victims who remain trapped or dead, then report this information to emergency agencies when they reach your operations center.

## Conducting Rescue Operations

### **Rescues involve three primary functions:**

(1.) Creating a safe rescue environment. Creating a safe rescue environment may involve lifting objects out of the way, using tools to move objects, shoring up walls, and removing debris.

(2.) Triage or stabilizing victims.

(3.) Victim removal. Search and rescue teams will remove victims immediately from moderately damaged buildings to a safe zone. Medical teams will remove victims from lightly damaged buildings, after head-to-toe assessment and treatment.

## Creating A Safe Rescue Environment

### **The goals of victim rescue operations are to:**

(1.) Maintain rescuer safety.

(2.) Triage in lightly damaged buildings.

(3.) Stabilize (airway, bleeding, and shock) and evacuate as quickly as possible from moderately damaged buildings, while minimizing additional injury.

None of these goals can be achieved without first creating as safe an environment as possible prior to beginning extrication. There are, therefore, certain precautions that rescuers must take to minimize the risk involved in rescue efforts.

### **Know Your Limitations:**

Many well-intentioned volunteers have been injured or killed during rescue operations simply because they did not pay attention to their own physical and mental limitations. As a rescuer, you must know your limits and monitor your condition. Take time to eat, drink fluids, rest, and recuperate so you can return with a clear mind and refreshed energy. Remember:

Fatigue leads to injury.

## **Follow Safety Procedures:**

Always protect yourself by wearing and/or using the safety equipment required for the situation and following established procedures, including:

- (1.) Working in pairs.
- (2.) Never entering an unstable structure.
- (3.) Following recommended procedures for lifting and carrying.
- (4.) Never put your own safety in jeopardy. You can only be valuable as a rescuer if you remain healthy and uninjured.

## **Identifying Tool and Equipment Requirements:**

Rescue tools may be anything that can be used to find and reach victims or to move large objects out of the way. Tool and equipment requirements will vary somewhat depending on the type of disaster and rescue requirements. Identify probable tool and equipment requirements during planning so that appropriate tools and equipment will be more readily available when needed.

## **Leveraging and Cribbing:**

When a large object such as a collapsed wall or heavy debris needs to be moved in order to free victims, leverage and cribbing may be used.

Leverage is obtained by wedging a lever (pole or other long object) 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, greater

force is obtained to lift the object.

A crib is a framework of wooden or metal bars used for support or strengthening. Box cribbing means arranging pairs of wood pieces alternately to form a stable rectangle. In a disaster situation, debris may be available to use for cribbing.

Leveraging and cribbing are used together by alternately lifting the object a little and placing cribbing materials underneath the lifted edge to stabilize it. The process should be gradual: “Lift an inch crib an inch.” When leveraging and cribbing one end of an object, make sure that you are not creating an unstable condition at the other. You may have to leverage and crib both ends.

When sufficient lift is achieved, remove the victim, reverse the procedure, and lower the object. Never leave an unsafe condition.

### **Removing Debris:**

When you must remove debris in order to locate or extricate victims, a “human chain” may be used. Have volunteers line up so that they can hand debris from one person to the next, away from the rescue site. The chain should be located so as not to impede victim removal or restrict any path of travel. Wear leather gloves to protect your hands. Your hands are your most important rescue tool.

### **“Light Search and Rescue”**

## **PART FOUR**

### **Removing Victims:**

Basically, there are two main methods of removal that rescuers can employ

to get victims out of a structure. They are:

(1.) Self-removal or assist.

(2.) Lifts and drags.

### **Self-Removal or Assist:**

Ambulatory victims may be able to get out, with or without assistance, once obstacles are removed. Even when a victim is capable of self-removal, provide assistance and support as the victim vacates the area to avoid the possibility of additional injury.

**Lifts and Drags:** If a victim cannot get out on his or her own, size up the situation to determine the most appropriate means of removal. The extrication method selected depends on the number of rescuers available, the strength and ability of the rescuers, the condition of the victim, and the general stability of the immediate environment.

**One-Person Arm Carry:** If you are physically strong, you may be able to lift and carry a victim by yourself. Reach around the victim's back and under the knees, and lift. The victim may be able to assist by placing an arm around your shoulder.

**One-Person Pack-Strap Carry:** To accomplish this carry:

(1.) Stand with your back to the victim.

(2.) Place the victim's arms over your shoulders and grab the hands in front of your chest.

(3.) Hoist the victim onto your back by bending forward slightly, so his or her feet just clear the floor.

**Two-Person Lift:** The two-person lift is also called the "Georgia Street Carry."

(1.) Rescuer 1:

Squat at the victim's head and grasp the victim from behind around the midsection. Reach under the arms and grasp the victim's forearms.

(2.) Rescuer 2: Squat between the victim's knees, facing either toward or away from the victim. Grasp the outside of the victim's legs at the knees.

(3.) Using safe lifting procedures, rise to a standing position, lifting the victim. The victim can then be walked to safety.

**Chair Carry:** This technique requires two rescuers:

(1.) Place the victim in a straight-back chair (a wooden kitchen chair).

(2.) Rescuer 1: Facing the back of the chair, grasp the back uprights.

(3.) Rescuer 2: With your back to the victim's knees, reach back and grasp the two front legs of the chair.

(4.) Tilt the chair back, lift, and walk out.

**Blanket Carry:** The blanket carry requires at least six rescuers to provide stability to the victim, with one person designated as the lead person.

(1.) Lay a blanket next to the victim.

(2.) Tuck the blanket under the victim, and roll the victim into the center of the blanket.

(3.) Roll up the blanket edges toward the victim, to form tube-like handles on each side of the victim.

(4.) With three rescuers squatting on each side and grasping the “handle,” the lead person checks the team for even weight distribution and correct lifting position. (5.) The lead person calls out, “Ready to lift on the count of three: one, two, three, lift.”

(6.) The team lifts and stands in unison, keeping the victim level, and carries the victim feet first.

(7.) To lower the victim, the lead person calls out, “Ready to lower on the count of three: one, two, three, lower.”

**Improvised Stretchers:** A variety of materials can be used as improvised stretchers, which can be carried by two rescuers. For example, your instructors will demonstrate how to make a stretcher from poles and jackets.

**Drag:** Drag the victim out of the confined area by grasping either under the arms or by the feet and pulling across the floor. Remember to use safe lifting procedures. Both dragging techniques are shown in the figure below. One rescuer can also use the blanket drag by wrapping the victim in a blanket, squatting down and grasping an edge of the blanket, and dragging the victim across the floor. By carefully assessing the situation and the victim’s physical condition, then using correct removal techniques, rescue members can remove entrapped victims safely.

See Carries and Drags

**Summary:**

Search and rescue are two different activities that should be planned carefully and practiced in advance. The decision to attempt a rescue should be based on:

- (1.) The risks involved.
- (2.) Achievement of the overall goal of doing the greatest good for the greatest number.

The objectives of search and rescue are to:

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

**The mission of Light Search and Rescue when dealing with heavily damaged structures is to:**

- (1.) Isolate the area.
- (2.) Warn others.
- (3.) Search and Rescue Resources

**The three main resources required for search and rescue operations are:**

- (1.) Rescuers.
- (2.) Tools.

### (3.) Time.

Each of these resources may be very limited. Planning, accurate size-up, and careful attention to rescuer safety will be critical.

## **Conducting Search and Rescue Size-Up:**

As in other emergency operations, size-up is a critical first step. Search and rescue size-up follows the same basic process as for fire-suppression or medical operations. Size-up continues throughout response efforts and provides valuable information about how search and rescue efforts should proceed.

Should size-up indicate that total or partial evacuation is necessary; the emergency mission is to ensure safety and organization during the evacuation.

## **Conducting Search Operations:**

Once the decision to begin search operations is made, search and rescue team members must systematically:

- (1.) Locate potential victims.
- (2.) Employ appropriate search techniques.

Locating potential victims requires search and rescue team members to conduct a “mini-size-up” of areas of entrapment and potential number of victims. After locating potential victims, team members will implement a search methodology that:

- (1.) Is systematic and thorough.

- (2.) Avoids unnecessary duplication of effort.
- (3.) Provides documentation of results.
- (4.) Conducting Rescue Operations

### **Rescues involve three functions:**

- (1.) Creating a safe environment.
- (2.) Triaging or stabilizing victims.
- (3.) Removing victims.

The goals of creating a safe environment are to maintain rescuer safety and to remove victims as quickly as possible while minimizing additional injury. A large part of maintaining rescuer safety is for every team member to recognize his or her personal limitations and follow prescribed safety procedures.

Once the environment is stabilized, victims can be removed in a number of ways, depending on their condition, the number of rescuers available, the strength and abilities of the rescuers, and the stability of the immediate environment. Sometimes, a victim may be able to get out once obstacles are removed. Leveraging and cribbing may be used for debris removal. When victim removal is required, light search and rescue team members must assess the situation and select the extrication method that is best suited for the situation. Victims with head or spine injuries must be stabilized to avoid additional injury. In these cases, EMS personnel should be called in if possible.