INTERREG-IPA CROSS-BORDER COOPERATION PROGRAMME
ROMANIA-SERBIA

5.2. SEARCH & RESCUE IN EARTHQUAKES

7 Septembrie 2023

SEARCH

- Involves carrying out all necessary actions to identify and locate individuals at risk due to hazardous factors, with the aim of rescuing them.
- Must be executed in an organized and meticulous manner, based on the following principles:
  - Prioritizing the safety of the search team members, avoiding unnecessary overlap and duplication of efforts and resources. Integrating methods, techniques, and search procedures tailored to the field situation.
  - Responding swiftly to identify and locate victims.
  - Maintaining a constant exchange of information with the team leader and rescue team members.
  - Striking a balance between requirements and the available resources.

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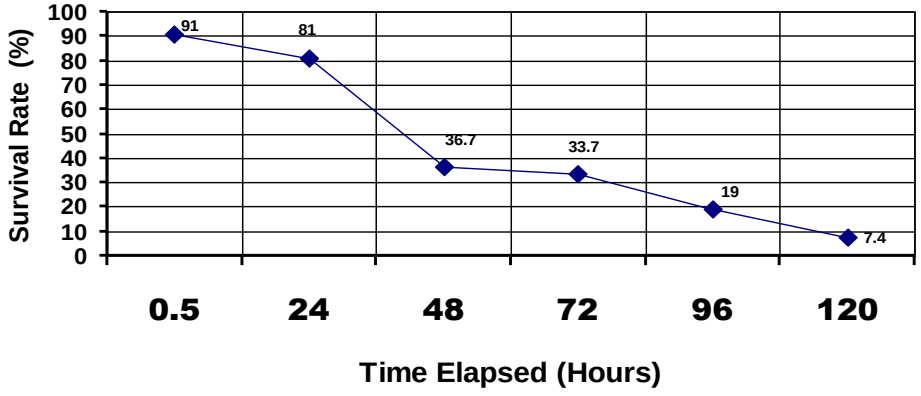
Survival Rate



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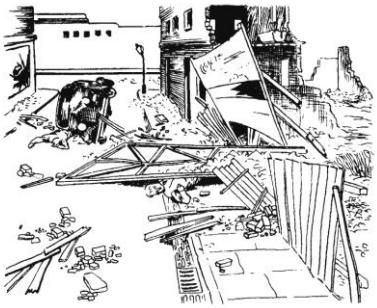
50% victims are found at or near the surface



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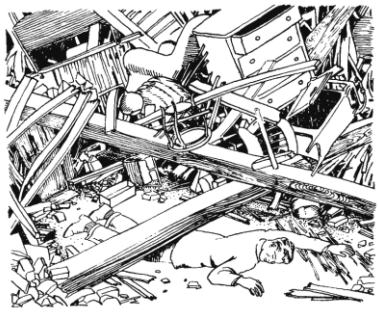
35% victims lightly trapped



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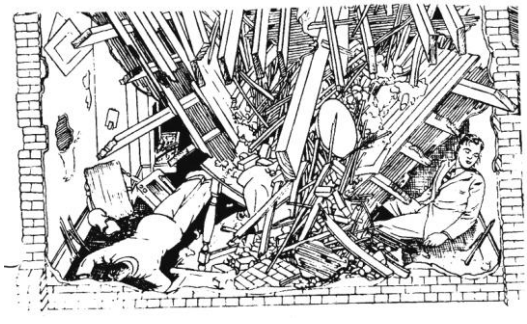
15% victims trapped in void spaces



Possible Location of Void Spaces

Structurally resistant areas:

- Basements
- Bathrooms
- Inside hallways
- Concrete walls
- Stairwells
- Elevator shafts
- Kitchens

TECHNIQUES AND PROCEDURES

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SEARCH

1. Based on the information gathered during the reconnaissance operation, the leader of the search and rescue team will coordinate the search operation for the victims, conveying the following:

- General characteristics of the affected area (surface, access routes, etc.).
- A concise assessment of the disaster's consequences.
- The allocated area of operation for the team, along with the sector where they will intervene.
- The type and number of affected buildings.
- The accessibility of the damaged structures.
- The objectives and priorities of the search operation.

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SEARCH

2. The initial step in identifying potential victims involves gathering additional information beyond what was acquired during the reconnaissance operation, pertaining to the structure or affected area.
3. The details provided about the condition of the deteriorated building will furnish crucial insights into the possible locations of victims.
4. To approximately estimate the number of individuals who might be trapped under debris, the following details are of utmost importance:

- The typical usage of the building.
- The usual number of individuals found inside it.
- The timing of the disaster occurrence.

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SEARCH

- In situations marked by complex events, the search process primarily involves identifying areas where victims might be located. This action can be executed based on available resources, through:
- Attentively listening and observing the work area to detect any sounds that could originate from victims.
- Utilizing devices for sound detection, reception, and amplification.
- Involving a canine search component.

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SEARCH

- During the search process, the following aspects are established:
- The presence of individuals in danger, as well as potential routes and methods of rescue for them.
- The layout of rooms in the basement, the structure of wells/technological channels, and their purposes.
- The diameter, nature (e.g., stone, tube, etc.), depth, and presence of water in the well/pit.
- Identification of various installations, investigation of sections traversed by channels, pipelines, etc.
- Detection of the presence of smoke and toxic gases.

SEARCH

- During the search process, the following aspects are established:
- Evaluation of the condition of utility installations (electricity, water, gas).
- Identification of access routes in the area and possibilities for intervention to rescue individuals.
- Analysis of the feasibility of using access stairs in rescue operations.
- Assessment of the potential use of means for smoke and toxic gas evacuation.
- Evaluation of the need for demolishing or disassembling construction elements or creating openings in them for rescue operations.
- Implementation of protective measures for intervention teams against smoke, toxic gases, and collapses during operations.

Victims

- After locating the victim, it is advisable for a rescuer to stay beside them and carry out the following actions:
- Provide the victim with water or conditions to breathe comfortably.
- Administer first aid.
- Maintain communication with the victim to keep them coherent and encourage them.
- Gather information from the victim regarding the presence of other individuals nearby, their location prior to the disaster, etc.
- Search and rescue teams will be accompanied at all times by medical/paramedical personnel capable of providing qualified medical assistance/first aid to the victims

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Victims

- If multiple victims requiring rescue and urgent first aid are discovered simultaneously (a situation likely to occur only in the initial phase of intervention), a prioritized assessment will be conducted. This assessment will establish the sequence in which they will be rescued and receive specialized first aid, as follows:
- Priority I: The victim is exposed to life-threatening risks, with an immediate threat to their life.
- Priority II: The victim is exposed to risks, but there is no immediate threat to their life.
- Priority III: The present risks do not endanger the individual's life.

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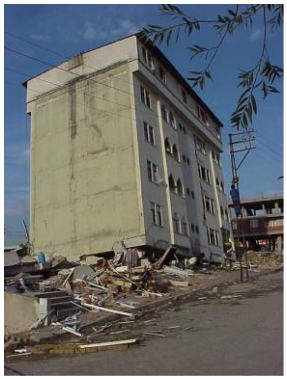
Search methods

- In a scenario where the building has completely collapsed, the initial search takes place on the surface and is conducted by a team consisting of at least three individuals, who operate as follows:
- They move in a line parallel to the affected area, maintaining a distance of no more than 6 meters between team members and ensuring continuous visual contact among themselves.
- They vocally inquire, "Is anyone here?", in search of potential responses. They remain attentive to detect sounds of distress calls or other signals emitted by victims (sounds of hitting walls, pipes, or moans, among others).
- They gather information from survivors regarding potential victims trapped under the debris and their probable position. They demarcate the search area to mark and organize it effectively.

Search methods

- In the event of a partial building collapse, a systematic search plan will be implemented, as follows:
- Initially, the search will commence by conducting a perimeter tour of the building.
- Subsequently, the building will be divided into sectors both horizontally and vertically, using the following approach:



Search methods

- The interior of the structure will be subdivided into quadrants, each quadrant receiving an alphabetical designation in a clockwise order, starting from the corner formed by side "1" and side "2";
- Quadrant E designates the space of the main hallway, staircases, and elevators, and is represented in diagrams of multi-story buildings;
- The building's front side will be labeled as "1"; The other sides will be numbered in a clockwise direction, starting from side "1";
- For multi-story buildings, separate diagrams will be created for each level;
- Each diagram will be appropriately named and numbered according to the reality perceived from the outside.
- Numbering will commence with the ground floor, followed by the 1st floor, and so forth. Numbering for the floors situated below ground level will begin from the basement and proceed upwards to the highest floor.

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RESCUE

- Rescue encompasses all operations carried out to extract victims from the area affected by hazardous conditions.
- Rescue actions need to be promptly initiated after the occurrence of the emergency situation, as experience shows that the majority of victims are recovered within the first hours following the event. With the passage of time, the chances of finding survivors diminish.
- Individuals trapped under debris can survive due to instances where beams, portions of floors, or other structural components collapse in a way that offers protection against the main weight of the debris.
- Rescue activities continue by providing urgent medical assistance.

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Rescue operation

- Upon discovering an immobilized victim under debris, the search team will notify the rescue team commander, who will proceed to the incident site to assess the situation. Based on the available information, the leader of the rescue team will orchestrate the victim's rescue operation and relay the following information to the intervention team:
- The precise location of the victim.
- The stability of the structure they are in.
- Access routes to the location.

Rescue operation

- The necessity of employing equipment, accessories, and materials to support the structure.
- The known condition of the victim (if known).
- The method to reach and extract the victim.
- Potential hazards for rescuers (toxic substances, damaged water pipes, etc.).
- Any other pertinent details essential for the efficient execution of the rescue operation. The intervention is planned so that debris removal is conducted simultaneously from multiple points by creating openings, and subsequently expanding the liberation process to the sides or starting from the edges of the debris towards its center, covering a broad area.

Rescue operation

- Based on the available information and data, the rescue operation involves the following actions, depending on the context:
- Identifying the necessary materials and conducting consolidation, securing, and temporary support work for damaged structures.
- Removing debris and other obstructions/construction elements to enable the extraction of victims.
- Creating pathways for rescuers to reach victims.
- Safely entering the intervention area.

Rescue operation

- Providing a minimum survival condition by administering, if necessary, oxygen, fluids, heated air, medications, or other materials to safeguard the victim until the rescue team arrives.
- Establishing contact with and/or identifying the victim.
- Assessing the victim's physical and mental condition.
- Implementing immobilization/anchoring measures for the victim according to the situation's specifics.
- Providing on-site first aid.
- Extracting victims from the environment in which they are trapped, using appropriate techniques and procedures.
- Safely exiting the hazardous environment for the rescuer.
- Evacuating victims from the intervention area.

Rescue operation

- Within the context of rescue operations, the following stages hold crucial significance:
- Victim stabilization (utilizing the cervical collar, KED extraction device, rescue stretcher).
- The liberation of victims by dislodging them from entrapment points.
- Provision of first aid.
- Lifting the victim.
- Victim transportation, using one of the following methods:
  - Transport conducted by a single rescuer using a strap.
  - Transportation executed by two rescuers (Georgia Street method).
  - Transportation facilitated by a chair carried by rescuers.
  - Transportation using a blanket.
  - Utilizing existing or improvised rescue stretchers.
  - Dragging the victim if deemed necessary.

Rescue techniques

- While carrying out rescue actions for individuals, the following aspects should be taken into consideration:
- Preventing victim asphyxiation by employing the Self-Contained Oxygen Supply System (SADAC) or an oxygen hose for breathing.
- Ensuring access to the victim.
- Debris should be cleared starting from the top down manually, with heavy equipment reserved for removing large construction elements.
- In cases of rescues from wells, pits, technological channels, or other confined spaces situated below ground level, where rescuers' access is challenging using traditional methods (manual ladders, ropes, etc.), or when the depth at which the victim is located exceeds the technical capabilities of equipment, a gradual climbable structure ("ramps/embankments") will be constructed to reach the level where the affected person is situated.

Rescue techniques

- When the entrances to basements are blocked by a substantial amount of debris, access is achieved through pits dug parallel to the walls or via tunnels with a triangular or trapezoidal cross-section, lined on the exterior with wooden panels. The course of these pathways will be planned to avoid gas pipes, water installations, and electrical cables.
- Cutting, breaking, and demolishing actions carried out on walls will only be conducted after the construction elements have been reinforced, and the openings created will have a "V" shape with the apex pointing downward.
- In cases where the soil becomes sandy or where the vibrations generated by machinery could endanger the victim, excavation activities will be halted, and manual digging will be pursued.

Rescue techniques

- To minimize the risk of collapse, temporary stabilization work will be performed, using both standard equipment and improvised means such as wooden stakes, beams, boards, etc.
- Throughout the intervention, individuals working below ground level will be equipped with ropes or cords to facilitate their rescue in case of a collapse.
- Openings will be made either manually or with the assistance of machinery, depending on the soil's stability, to ensure access to victims.
- During the intervention, efforts will be made to avoid generating further collapses as much as possible by steering clear of and supporting construction elements that exhibit instability.

Victim extraction

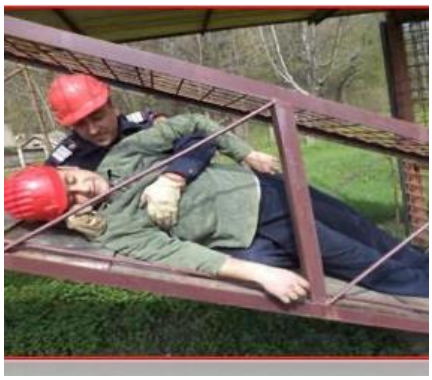
- The rescue personnel can remove the injured individual from the hazardous area using one or more of the following methods:

a) Dragging to the side.

b) Dragging the injured person from behind.

c) Dragging on the tent sheet or another textile support.

d) Dragging the victim from very narrow spaces.



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Victims' transport




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Thank you!