

Lamorinda
Community Emergency Response Team




Light Search & Rescue


Released: 20 January 2023

Lamorinda CERT

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Community Emergency Response Team


 Personal safety is ALWAYS the number one priority


 Show up prepared


➤ Wear appropriate clothing and footwear, have WATER


➤ Wear PPE – your personal protective equipment ...gloves, helmet, goggles, mask, boots, etc.

➤ Have at least one communications device: cell, radio, etc.

 Work as a team

 Size-up - maintain situational awareness

 The CERT goal is to do the
Greatest Good for the Greatest Number

 *Hope for the best but plan for the worst!*

Visual SAR.1


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Unit Objectives




Identify size-up requirements for potential search and rescue situations



Describe the most common techniques for searching a structure



Use safe techniques for debris removal and victim extrication using a lever and cribbing




Visual SAR.2

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Earthquake Possibilities



The USGS has estimated a 72 percent chance of a magnitude 6.7 or larger earthquake in the Bay Area by 2043

San Francisco region				
Magnitude (greater than or equal to)	Average repeat time (years)		30-year likelihood of one or more events	Readiness
5	1.3	(0.7)	100% (1.0)	1.0
6	8.9	(1.0)	98% (1.0)	1.0
6.7	29	(1.1)	72% (1.1)	1.1
7	48	(0.9)	51% (1.3)	1.1
7.5	124	(0.7)	20% (1.6)	0.9
8	825	(0.7)	4% (1.9)	1.0

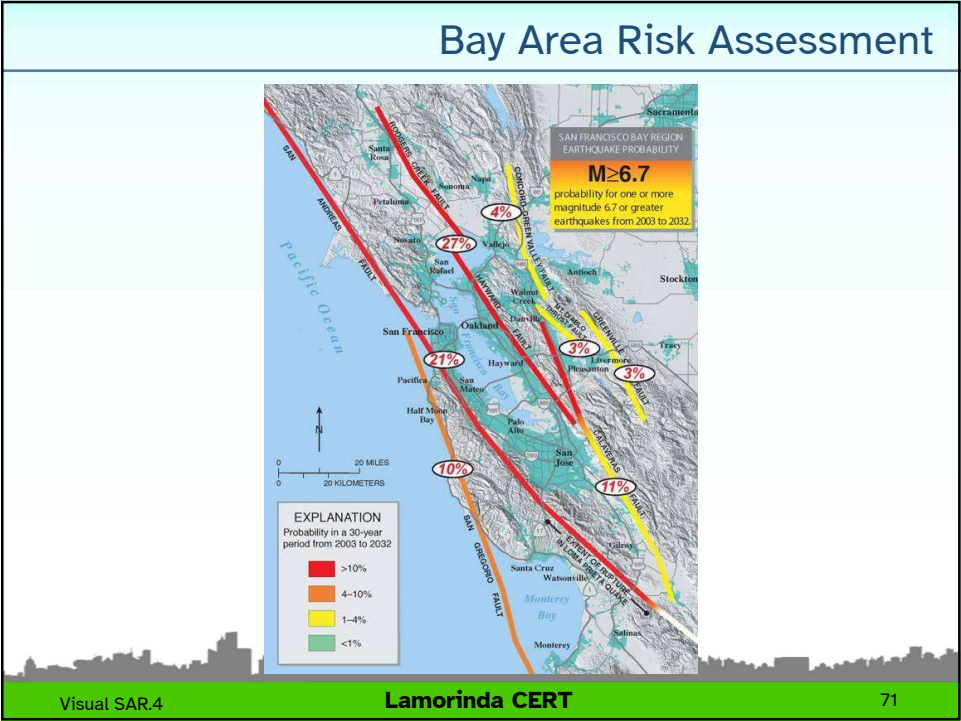
<https://pubs.usgs.gov/fs/2015/3009/pdf/fs2015-3009.pdf>

Visual SAR.3

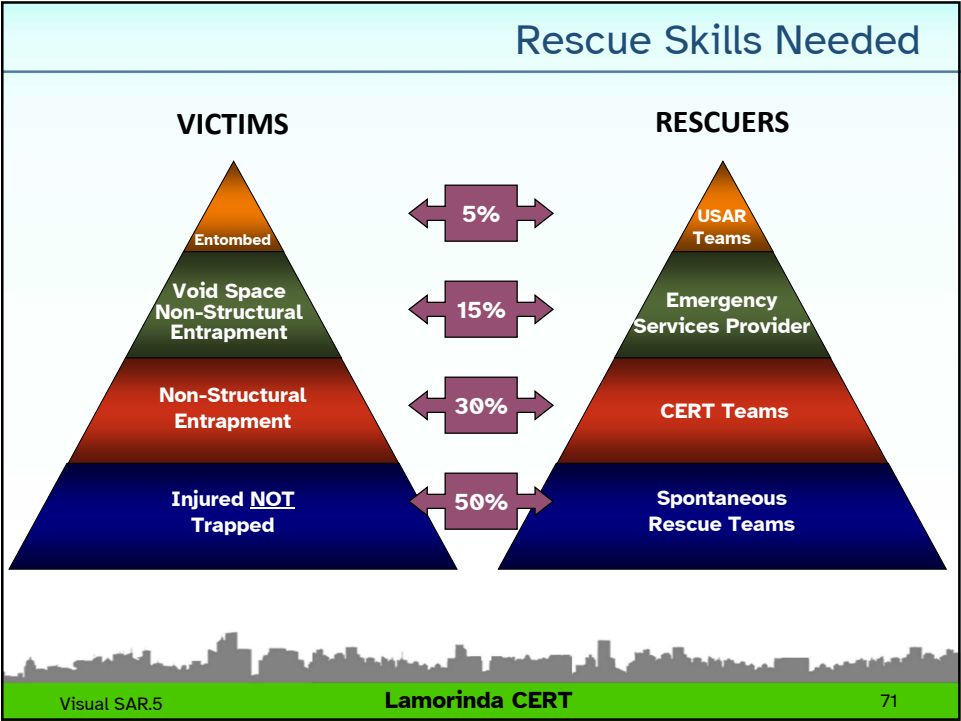
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The Golden Day

 Entrapped Victim Survival Rate

Time Until Rescue

Survival Rate

30 Minutes	99.3%
1 Day	81.0%
2 Days	36.7%
3 Days	33.7%
4 Days	19.0%
5 Days	7.4%



Buck Helm's Car
Cypress Structure
Loma Prieta Earthquake
Photo Courtesy of Ben Ho

Visual SAR.6

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The Rule of 3's

 You can survive:

➤ 3 minutes without AIR

➤ 3 hours without SHELTER from extreme weather

➤ 3 days without WATER

➤ 3 weeks without FOOD

Visual SAR.7

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Goals of Light Search and Rescue

 Keep rescuers safe

 Rescue the greatest number in the shortest amount of time

 Get “walking wounded” out first

 Rescue lightly trapped victims next




Visual SAR.8

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Light Search and Rescue Operations


 **Size-up**

➤ Evaluate everything that is going on

 **Search**

➤ Locate victims

➤ Document location

 **Rescue**

➤ Involve procedures and methods to extricate victims


Visual SAR.9


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Search and Rescue Safety

 Always have a whistle!

 The following “Emergency Alerting System” is to be used in the event of problems at the site:

➤ Evacuate – 3 short blasts (1 second each) 3 times

▪ Out – Out – Out (*short – short – short*)

▪ Drop everything and get out now!

➤ Cease Operations – 1 long blast (3 seconds duration)

▪ Quiet (*long*)

▪ Stop what you’re doing and wait for instructions

➤ Resume Operations – 1 long and 1 short blast

▪ Oooh – Kay (*long – short*)

This is the FEMA US&R Standard


Visual SAR.10

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Search and Rescue Safety

 Earthquake aftershocks

➤ Severe after shocks following a major earthquake are common and can create additional injuries and fatalities

➤ Unstable structures including bridges, overpasses, high rises, homes and water towers may suffer further collapse as a result of after shocks

➤ First responders must be constantly aware that they may be affected by such events and take necessary precautions while conducting their operations.

➤ Many injuries and deaths of first responders could be prevented if more precautions against additional shock waves were taken

Visual SAR.11


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Search and Rescue Safety




With the constant threat of terrorist attacks, it is essential that response teams pay special attention to a very new and potentially deadly threat




Everyone has to heighten their awareness of their surroundings



Secondary explosions are becoming common techniques used to cause serious injury and possibly mass death for response teams



There are no second chances when explosions are used for this purpose



After an explosion it is safe to assume that a secondary device is involved, unless proven otherwise

Visual SAR.12

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Before You Start

STOP

Stop

Think

Organize

Plan


Visual SAR.13

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Effective Search and Rescue

 Effective Size-up

 Rescuer safety

 Work in teams

 Victim safety



Visual SAR.14

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CERT Search and Rescue Size-up

1. Gather Facts

2. Assess Damage and Communicate

3. Consider Probabilities

4. Assess Your Situation

5. Establish Priorities

6. Make Decisions

7. Develop Plan of Action

8. Take Action

9. Evaluate Progress



REMEMBER:
ALL CERT
SIZE-UP IS A
CONTINUAL
PROCESS

Visual SAR.15


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Size-up Step 1: Gather Facts

 Consider:

- Time of event and day of week
- Type of structure and construction type
- Weather
- Hazards
- Occupancy

 Gather facts accurately!


Visual SAR.16


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Size-up Step 2: Assess Damage

 360° (overview and assessment)


 Identify entry and egress routes

 Identify hazards

 Is it safe to enter?

 Potential for occupants

- Interview neighbors
- Voice ‘call out’



Seattle, WA, March 10, 2001 -- Chimney bricks crumbled during the earthquake.
Photo by John Shee/FEMA News Photo

Visual SAR.17

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Assess Damage




CERT mission changes if:

➤ Damage is light

➤ Damage is moderate

➤ Damage is heavy



Consider structure type and age



Never enter a structure with heavy damage!

Visual SAR.18

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Assess Damage

Light Damage



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

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

Visual SAR.19


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Assess Damage

Moderate Damage



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

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

Visual SAR.20


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Assess Damage

Heavy Damage



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

Secure the building perimeter and control access into the structure by untrained but well-intentioned volunteers


Visual SAR.21

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Assess Damage



Loma Prieta earthquake damage in San Francisco. The soft first story is due to construction of garages in the first story and resultant reduction in shear strength. Photo from: <http://earthquake.usgs.gov/bytopic/photos.html>

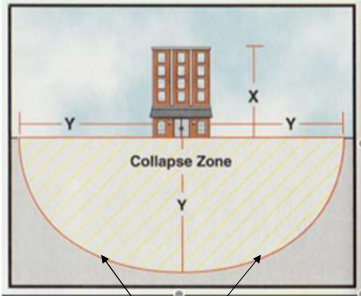
Visual SAR.22

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Collapse Zone: Stay Out of this Area




Danger tape goes here



The Collapse Zone is 1.5 times the height of the building (X) in all directions (Y)

- Example: 40' tall building, collapse zone is 60' out from building



The additional one-half is to protect you from falling debris that may be projected out during the collapse.
Remember: Bricks can weigh 4 to 6 lbs.

Visual SAR.23

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Light Frame House Collapse

House is supported on cripple walls

Earthquake moves the foundation

House shakes hard, cripple walls give way

House falls, multiple failures occur

Visual SAR.24

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Light Frame House Collapse


Visual SAR.25


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Above Ground Hazards

 Fallen fixtures

 Loose ceiling structure

 Glass

 Unsecured furniture




Visual SAR.26


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Ground Level Hazards


 Unstable buildings


 Falling debris


 Energized wires


 Loose footing


 Hazmat

 Emotionally unstable survivors

 Fire

 Glass

 Animals



Visual SAR.27

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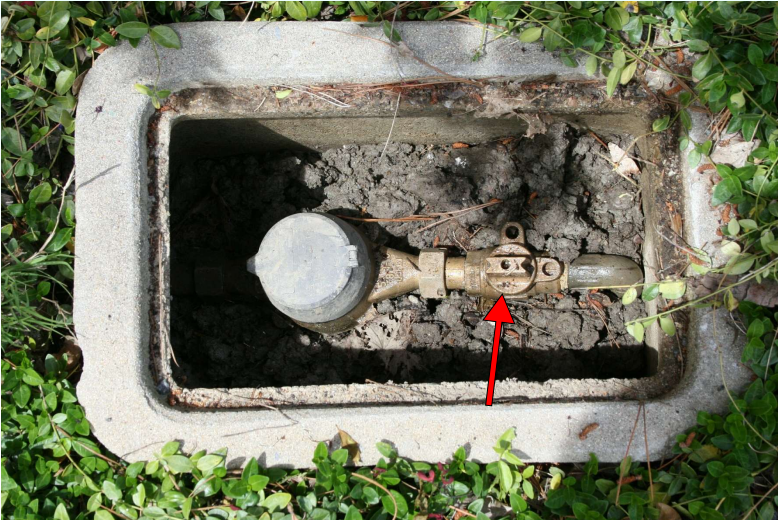
Natural Gas: Locate the Shutoff



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Water: Locate the Shutoff



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Below Ground Hazards




Visual SAR.30Lamorinda CERT71

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Size-up Step 3: Consider Probabilities

Consider what probably will happen and what could happen:

- How stable is the situation?
- What else could go wrong?
- What does it all mean for the Search and Rescue?





Visual SAR.31Lamorinda CERT71


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Size-up Step 4: Assess Your Situation

Assess:

 Whether the situation is safe enough to continue

 The risks that rescuers will face if they continue


 What resources you will need to conduct the operation safely

 What resources are available

➤ Personnel

➤ Equipment


➤ Tools



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Know Your Limitations



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Take A Break



Yoni Brook/for The Washington Post

BE BACK IN 10 MINUTES

Visual SAR.34

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CERT Search and Rescue Size-up

1. Gather Facts

2. Assess Damage and Communicate

3. Consider Probabilities

4. Assess Your Situation

5. Establish Priorities

6. Make Decisions

7. Develop Plan of Action

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9. Evaluate Progress



REMEMBER:
ALL CERT
SIZE-UP IS A
CONTINUAL
PROCESS


Visual SAR.35


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Size-up Step 5: Establish Priorities

 What should be done?

 In what order?

 How to safely rescue the greatest number in the shortest amount of time?

Visual SAR.36


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Size-up Step 6: Make Decisions

Keep in mind:

 Safety of CERT members

 Life safety of victims and others

 Protection of the environment

 Protection of property


Visual SAR.37


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Size-up Step 7: Develop Plan of Action

 Focus operation on established priorities and decisions

 Provide for documentation to give to responding agencies or the EOC

 Provide for documentation to become part of CERT records


Visual SAR.38


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Safety Considerations


 Make rescuer safety your primary concern

 Use a buddy system

 Be alert for hazards

 Use safety equipment

 Rotate teams



Teamwork = Success


Visual SAR.39

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Search Methodology



An effective search methodology:

- Is systematic and thorough
- Avoids unnecessary duplication of effort
- Provides for documentation of search results

Visual SAR.40

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Search Methods

- Call out to victims
- Stop frequently to listen
 - Victims may not be able to call out or make much noise
 - Be very quiet after calling so you can hear a response
- Use systematic search pattern
- Mark searched areas to document what you found
- Report what you found


Visual SAR.41


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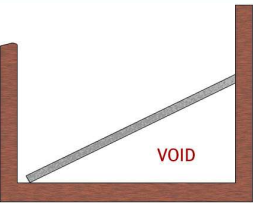
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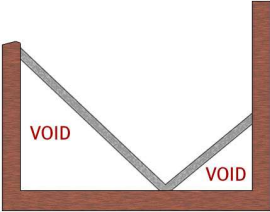
Search Operations

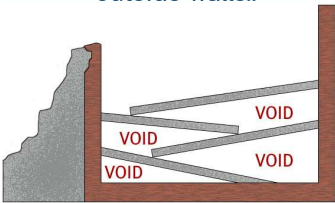
**Pancake Voids:** Pancake voids (most common in pre-1933 buildings) are small voids throughout a structure that are created by weakening or destruction of load-bearing walls and the resulting collapse of floors onto each other.

**Lean-To Voids:** Lean-to voids are created when a collapsed wall or floor is resting against an outside wall, creating a pocket of space.



**“V” Voids:** These voids are created by a “V” collapse of a floor or wall: the middle collapses and the ends lean against the outside walls..






Visual SAR.42


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Search Operations

**Individual Voids:** Individual voids are spaces large enough for an individual, frequently a child, to crawl into for cover.



Visual SAR.43

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Search Operations

 Be thorough in your search!




Visual SAR.44

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Decision to Attempt Rescue

 Enough rescuers to form teams of 2 or 3?

- One team in, one team out for safety

 Risk to the rescuers?

 Greatest good for the greatest number



Visual SAR.45

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Size-up Step 8: Take Action

Start the Search:

- 👮 Identify alternate exits
- 👮 Stay together & along the walls
- 👮 Start search from top down
- 👮 Right or left handed pattern
- 👮 Continue to call out and listen
- 👮 Move slowly, testing the floor
- 👮 Mark each individual unit
- 👮 Complete “X” after leaving

Visual SAR.46

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While Searching

- 👮 Always know the closest way out
- 👮 Knock, shout and listen
 - Call out to victims
 - “If anyone can hear my voice, come here or call out”
 - Ask any found victims for information about the building and others who might be trapped
- 👮 Search under and around debris
- 👮 Check elevators
- 👮 Victims might be in shock or confused

Always be alert for aftershocks,
fires and the smell of gas

Visual SAR.47

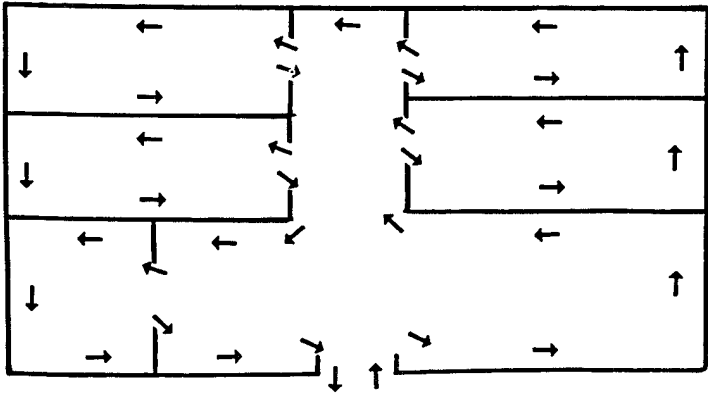
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Conducting Search Operations

Be Systematic



Visual SAR.48

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Conducting Search Operations

Be Systematic



Visual SAR.49

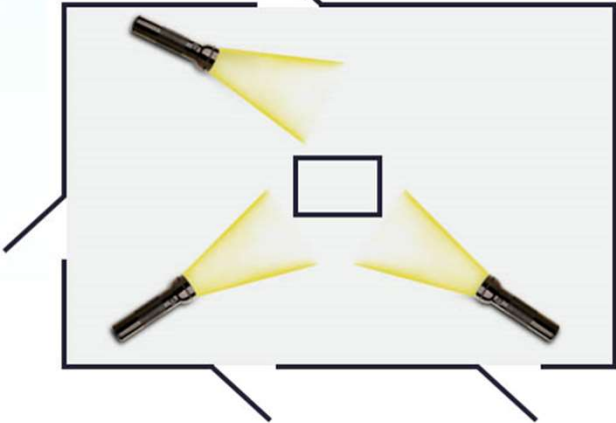
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Conducting Search Operations


Triangulate





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Search Marking System


 Indicates rescuer location

 Prevents duplication of effort

 Search Marking is a **Perishable Skill** and must be practiced regularly


SEARCH MARKINGS

WHEN YOU ENTER



SINGLE SLASH
STRUCTURE OR ROOM

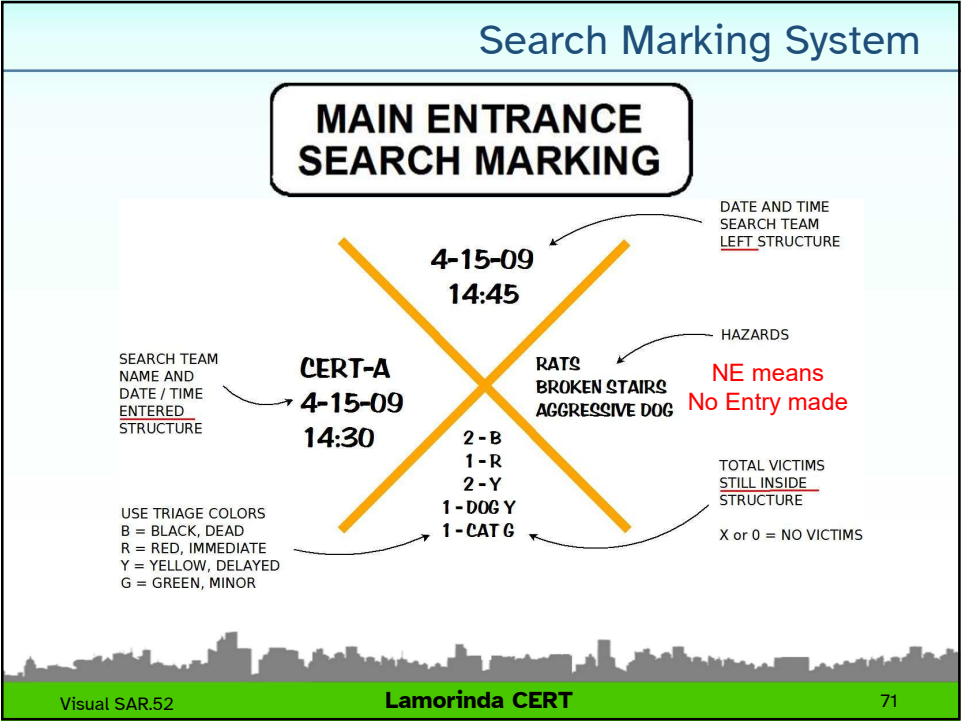
WHEN YOU EXIT



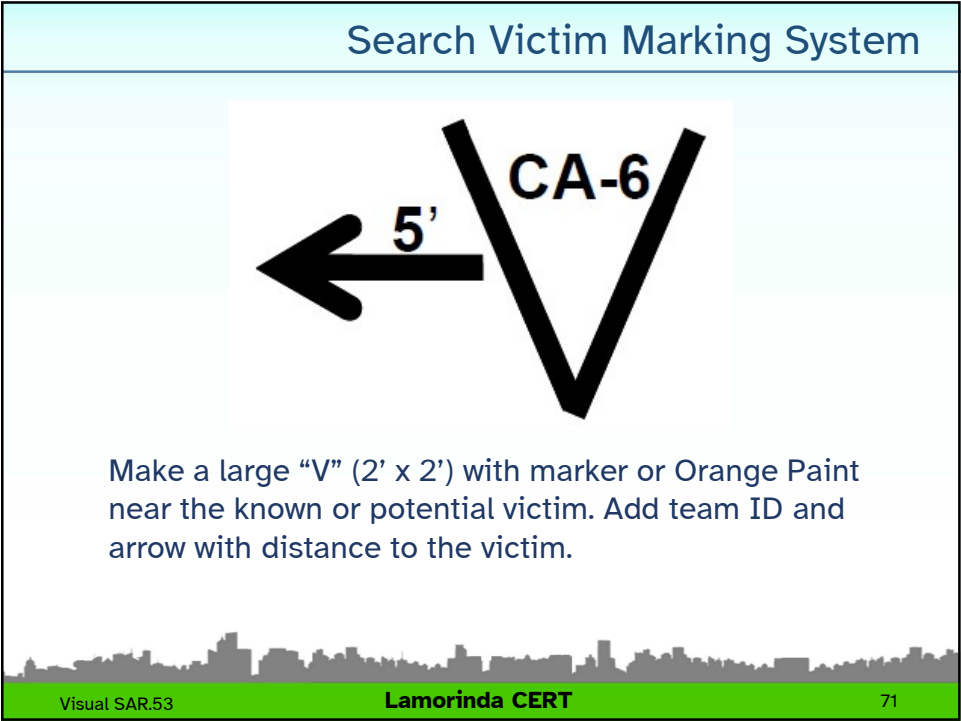
SECOND SLASH
STRUCTURE OR ROOM
(Identify Victims & Hazards)

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Search Victim Marking System



Make a circle around the “V” when a potential victim has been **confirmed to be alive**. If more than one confirmed live victim, mark total number under the “V”.

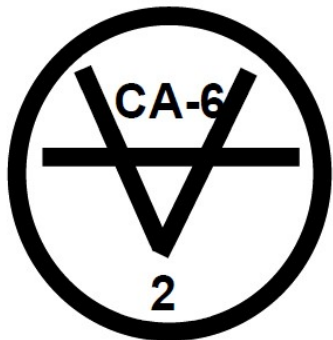
Visual SAR.54

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Search Victim Marking System



Make a horizontal line through the “V” when a potential victim has been **confirmed to be dead**.
If a combination of live and deceased victims are found, make two “V”s.


Visual SAR.55

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Search Victim Marking System



When all victims have been removed, make an “X” over the symbol.

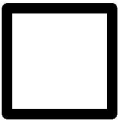
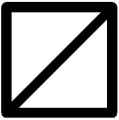
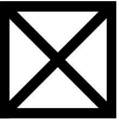
Visual SAR.56

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Building Marking System

	<p><u>Low Risk</u> for US&R Operations, with low probability of further collapse. Victims could be trapped by contents, or building could be completely pancaked or soft 1st story</p>
	<p><u>Moderate Risk</u> for US&R Ops, and structure is significantly damaged. May need shoring, bracing, removal, and/or monitoring of hazards. The structure may be partly collapsed.</p>
	<p><u>High Risk</u> for US&R Ops, and may be subject to sudden collapse. Remote search operations may proceed at significant risk. If rescue operations are undertaken, significant and time-consuming mitigation should be done.</p>

Buildings are marked by Structural Engineers only!

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Search Marking Examples



Visual SAR.58

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Building Marking Example



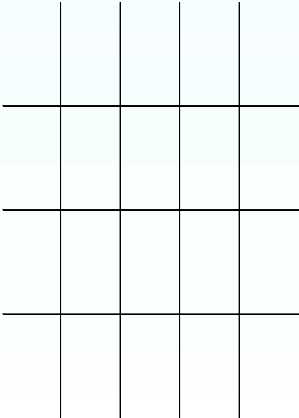
Visual SAR.59

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Exterior Search



- Set up a grid search
- Set distance between searchers according to visibility and debris
- Overlap patterns for full coverage
- Search in as straight a line as possible
- Mark areas that have been searched

Visual SAR.60

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Conducting Rescue Operations




Visual SAR.61


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Conducting Rescue Operations


 Maintain rescuer safety

 Create a safe rescue environment

➤ Move debris and objects out of the way

➤ Use tools, **not your back**, to move objects

 Triage and stabilize victims in lightly and moderately damaged structures

 Evacuate victims quickly but safely


Visual SAR.62


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Proper Lifting Method



 Back straight

 Knees bent

 Keep load close to body

 Push up with legs

Visual SAR.63


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Extrication Method


Depends upon:

 General stability of immediate environment

 Number of rescuers available

 Tools and equipment available

 Strength and ability of rescuers

 Condition of victim

Visual SAR.64


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Removing Victims

Types of victim removal include:

 Self-removal or assist

 Lifts and drags

**Allow victims to
extricate
themselves when
possible**



Visual SAR.65

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Single Rescuer Carries

 If safety and time permit, you should **not** use carries and drags to remove victims when closed-head or spinal injury is suspected



One-Person Pack-Strap Carry

Not Good




One-Person Arm Carry

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Two Rescuer Carries

 If safety and time permit, you should **not** use carries and drags to remove victims when closed-head or spinal injury is suspected



Two-Person Carry

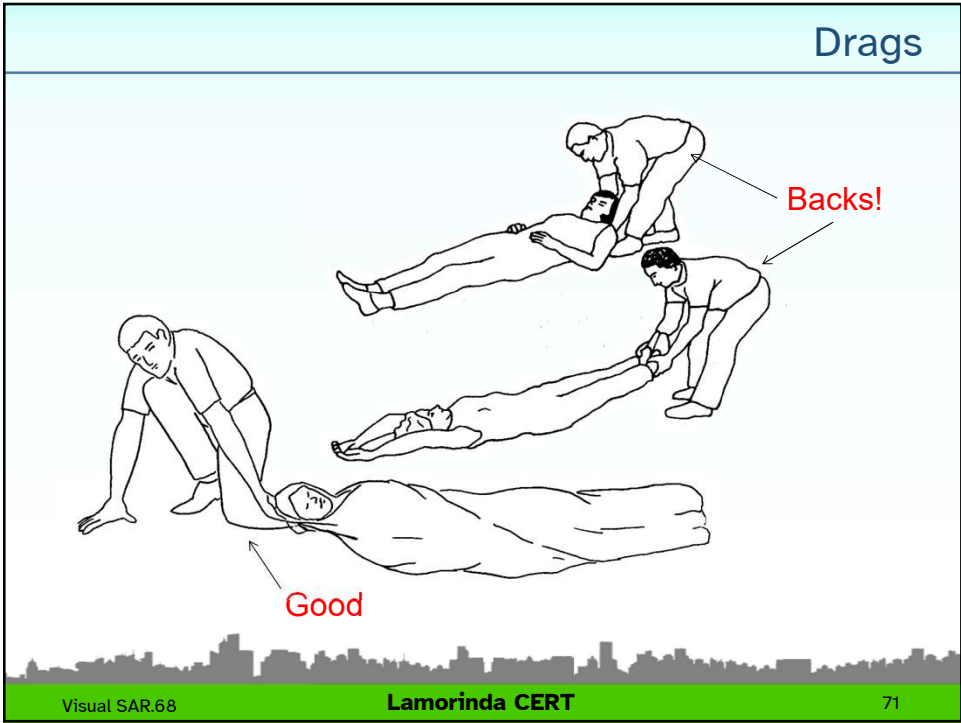
Better



Chair Carry

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Size-up Step 9: Evaluate Progress

Most critical step

Monitor plan's effectiveness and safety

REMEMBER:
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Unit Summary

CERT size-up for potential search and rescue situations

Search techniques

Lifts and drags



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