

## Chapter 10A—Search and Rescue

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## *Chapter 10A*

### *Search & Rescue*

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## INTRODUCTION

Search and Rescue is the search for and provision of aid to people who are in distress or imminent danger. The general field of search and rescue includes many specialty sub fields, mostly based upon terrain considerations. These include ground wilderness search and rescue, including the use of search and rescue canines; urban search and rescue in the city or urban environment; and air-sea rescue over the water.

**Ground Search and Rescue** is the search for persons who are lost or in distress on land or inland waterways. Traditionally associated with wilderness zones, ground search and rescue services are increasingly required in urban and suburban areas to locate persons with Alzheimer's disease, autism, dementia, or other conditions that lead to wandering behavior.

**Urban Search and Rescue** is the location and rescue of person's from collapsed buildings or other urban and industrial entrapments. Due to the specialized nature of the work, most teams are multi-disciplinary and include personnel from fire, law enforcement and emergency medical services. These teams also have specialty components such as canine teams, structural engineers, and heavy rigging specialists. They specialize in technical rescue operations in both wide area disasters and single building collapse incidents.

**Air–Sea Rescue** refers to the combined use of aircraft and surface vessels to search for and recover survivors of aircraft downed at sea as well as sailors and passengers of sea vessels in distress.

The organizational module of the FOG is designed to provide an overview of the essential Search and Rescue functions at incidents where technical rescue expertise and equipment are required for safe and effective rescue operations. These incidents can be caused by a variety of natural events (i.e., earthquakes, floods, tornados, or hurricanes) that cause wide spread damage to a variety of structures, mass transportation accidents with multiple victims, or single site events such as excavation collapse or confined space rescue operations involving only a few victims. US&R operations are unique in that specialized training and equipment are required to mitigate the incident in the safest and most efficient manner possible.

The Florida Urban Search and Rescue (US&R) Response System provides for the coordination, development, and maintenance of the States effort with resources to locate, extricate, and provide immediate medical treatment to victims trapped in collapsed structures; and to conduct other lifesaving operations.

The US&R Response System methods of operation, organization, capabilities, and procedures in mobilization, on-site operations, and demobilization are described in this document.

Two general considerations are used to deploy search resources:

- a. Area to be Searched–This involves the division of the designated area into manageable sections. Depending upon the size of the damaged area and the search

resources available, an area may be sectorized by city block, or other easily definable criteria (i.e., USNG 1000, 10000, or 100000 meter square). The available search resources will be divided and apportioned to each sector for search operations.

- b. **Priorities**—The search area is evaluated for priorities in terms of the type of occupancies affected, amount of damage, pre-evacuation, etc. Areas with the highest likelihood of survivability (in terms of type of construction) and the number of potential victims (in terms of the type of occupancy of the building) will receive attention first. Occupancies such as schools, hospitals, nursing homes, high-rise and multi-residential buildings, office buildings, etc., would be high priorities.

### ***Operations Site Set-up***

- Once an area is identified with an active rescue, control of the area immediately surrounding the site will be established before rescue operations commence.
- An Operational Work Area is established to control access to the rescue work site except for assigned Task Force (TF) members and other local rescue personnel involved in an operation, and to provide safe and secure work areas for the personnel supporting the rescue operations.
- A Collapse/Hazard Zone is established to control access to the immediate area that could be affected or impacted by further building collapse, falling debris, or other hazardous situations (i.e., aftershocks). The only individuals that will be allowed within this area are the primary TF personnel directly involved in the search for or extrication of victims. All other TF personnel must be located outside the hot zone until assigned or rotated.

- When establishing the perimeter of the operational work area, the needs of the following areas will be properly identified:
  - Access/Entry Routes (Personnel Accountability Location)
  - Emergency Assembly Area

**Figure 21 – Agency Responsibilities**

AGENCY	RESPONSIBILITY
Florida Fire Chiefs' Association	Will deploy a logistics officer to the SEOC on request to work with the State Fire Marshal to assist in responding to requests for search and rescue assistance utilizing the <i>Statewide Emergency Response Plan</i>
Florida Wing of the Civil Air Patrol	Provide aircraft use and assistance for search and rescue
The Florida Fish and Wildlife Conservation Commission	Provide aircraft, terrain vehicles, and other specialized personnel and equipment for search and rescue efforts

Florida Forest Service	Provides support in Category 3 and above hurricane incidents. This includes sending one of the Florida Interagency Incident Management Teams which are Type 1 IMT's.
Florida Association of Search and Rescue	Assist with the coordination of search and rescue resources available through volunteer and local governmental organizations

### ***Incident Command System***

When the IC or UC is designated, the Search and Rescue function will be placed under the umbrella of the NIMS organizational structure, typically as the SAR Branch Director or SAR Group Supervisor in the Operations Section.

### ***Determine Search Areas***

In most cases, the search area will be determined before you are deployed. In some cases, it will not and you will be responsible for creating a master map, segmenting it, and identifying your priorities.

### ***Master Map***

When building a master map, you will need several different kinds of maps for information purposes. When intel and information comes

in, you will plot the information on a main map so you have a clear understanding of how to move forward.

### ***Search Segmentation***

Search areas must be appropriately sized to achieve goals. Smaller segments that can be completed are better than larger segments that cannot be completed.

The population density must be considered – some search segments are going to be very small if many people live in it. Segmentation assures complete coverage if segments are well defined with clear boundaries, because findings can be easily mapped and targets can be easily located in the field.

### ***Search Priorities***

Highest priorities should be assigned where the greatest good can be achieved. Every segment should have a priority attached to it starting at the top priority and ending with the lowest.

### ***Ground***

Ground search and rescue is the search for persons who are lost or in distress on land or inland waterways. Traditionally associated with wilderness zones, ground search and rescue services are increasingly required in urban and suburban areas to locate persons with Alzheimer's disease, autism, dementia, or other conditions that lead to wandering behavior.

## ***Actions on Arrival at SAR Incident***

SAR responders may arrive on scene during the initial response or at a developing search after some initial actions are in progress or have already taken place. SAR responders should have in the pre-plan actions to take when arriving to minimize response time. Items to consider include:

- Upon arrival at a developing search, leaders should check in with the current IC for briefing on actions taken so far, by whom, and what actions are currently being taken;
- Assign a staging area manager and set up staging area;
- Analyze mission and prioritize tasks; and
- Immediately after a SAR incident begins, plan for personnel relief (failure to relieve fatigued personnel could lead to critical errors in search operations and planning).

## ***Initial Search Actions***

The Incident Commander will need to plan and conduct a Rapid (Reflex/Hasty) Search, which may include trackers, canines, and sound teams, as well as tasks such as perimeter patrols and trail checks as indicated by the situation and missing person profile developed.

- For searches where the Last Known Position/Place Last Seen (LKP/PLS) is a residence or structure, once personnel have been assigned to cover hazards, perform a thorough check of all buildings in the vicinity of the LKP/PLS to include attics, rafters, lofts, and basements of all structures, as well as tall grass areas, scrub, and wood lines around the perimeter of the property;

Establish confinement: Perimeter road patrols, if used, should strive for visual checks of roads/ditches in the area covered by Rapid Search at least once every 30 minutes;

- Perform trail checks or trail-running and have searchers scan the trails and environment/terrain to either side of trails;
- Keep one of several people available to follow up on intelligence sources or leads as they become available (Law enforcement personnel may be a good choice for this task);
- Send law enforcement personnel (if available) to check nearby businesses such as taverns or stores for the subject, and to gather additional intelligence, as well as check nearby homes;
- Consider sound searches;
- Tracking and sign cutting are important tasks during initial response and Rapid (Reflex/Hasty) Search Phase. As people walk, they will leave signs of their passage. Skilled tracker can acquire, age and follow signs. Trackers can work with canine teams without the two teams interfering with each other; and
- Canine resources may provide significant clues for the search.

### ***During the Rapid Search Phase:***

- Brief all field teams;
- Maintain confinement;
- Perform Rapid Search actions as called for by the mission profile;
- Debrief all returning teams;
- Record all efforts (for example, this may be accomplished using the ICS 214); and

- Analyze mission profile to prioritize Rapid (Reflex/Hasty) Search tasks.

After all Rapid (Reflex/Hasty) Search resources have deployed to the field, the focus of activity in the command post should shift to the Communications and Situation functions, who will handle radio traffic, position and status reports from the field. While the Rapid Search is taking place, General Staff should begin planning for the next operational period.

### ***Air-Sea***

Air-Sea rescue refers to the combined use of aircraft and surface vessels to search for and recover survivors of aircraft downed on land or at sea as well as sailors and passengers of sea vessels in distress.

An aircraft on an Instrument Flight Rules (IFR) flight plan is considered overdue when neither communication nor radar contact can be established and 30 minutes have passed since its Expected Time of Arrival (ETA) over a specified or compulsory reporting point or at a clearance limit

An aircraft on a Visual Flight Rules (VFR) flight plan is considered overdue when it fails to arrive 30 minutes after its ETA and communications or location cannot be established

An aircraft not on a filed flight plan is considered overdue at the actual time a reliable source reports it to be at least one hour late at its destination.

The county emergency management office and the State EOC should be contacted in the event of any missing aircraft to help coordinate multiple agencies and jurisdictions. The lead State Agency for locating downed aircraft is the Civil Air Patrol (CAP).

Civil Air Patrol flies more than 85 percent of all search-and-rescue missions directed by the Air Force Rescue Coordination Center at Tyndall Air Force Base, Florida. Outside the continental United States, CAP supports the Joint Rescue Coordination Centers in Alaska, Hawaii and Puerto Rico.

Searching for missing aircraft is decidedly different than missing person searches. Planning an air search for an overdue or missing aircraft initially involves estimating the most probable location of a distress incident or of the incident's survivors.

One of the initial challenges in searching for a missing aircraft is determining the size of the search area large enough to ensure that the aircraft is somewhere in the area, yet small enough to be able to search with the available SAR resources. Second, search planners must choose SAR resources for the search and the search patterns to be employed to effectively cover the area.

Some aircraft searches are relatively simple if enough evidence such as eyewitness reports, distress beacon coordinates, or radar data points provide the location of the downed aircraft. The position of a distress incident can be determined within fairly narrow limits if the following data is available:

- Location where the aircraft disappeared off radar
- Bearing or fix provided by radar, ground station or emergency radio aid

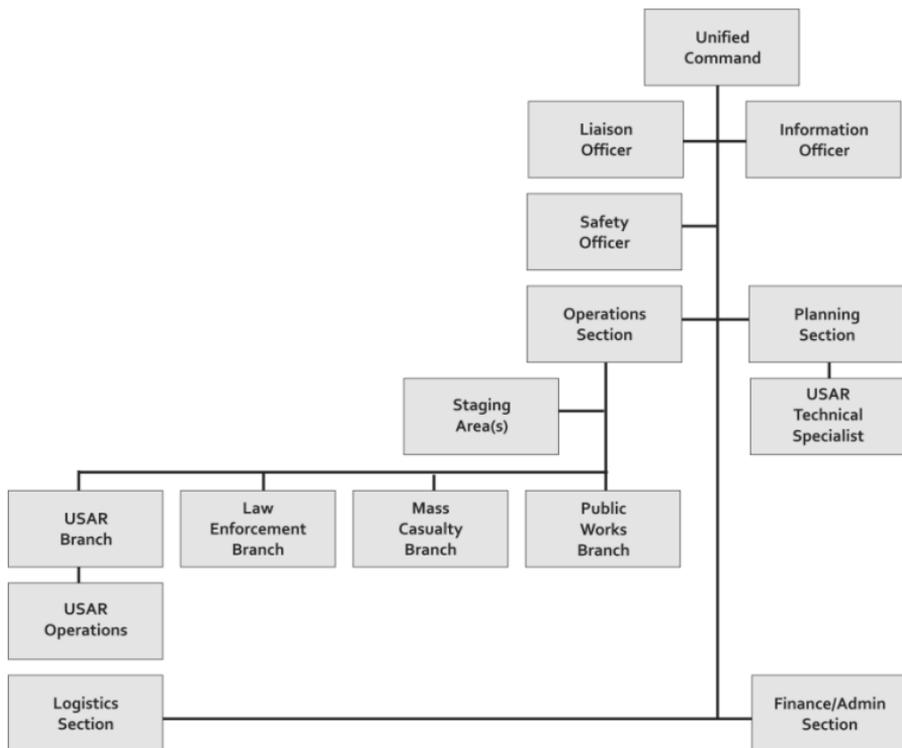
- Dead reckoning position based on time of LKP (Last Known Position) / PLS (Place Last Seen)
- Reports of sightings

Radar data is probably the most important piece of information to help narrow down the search area. Rescue Coordination Centers are the primary agency to assist in gathering radar data from the FAA as well as other information. (Tyndall Air Force Base, Panama City Florida [afrc.console@tyndall.af.mil](mailto:afrc.console@tyndall.af.mil) or 1-800-851-3051

### ***US&R Incident Command System Integration***

- a. It is a planning assumption that an ICS system will be in place before the arrival of US&R elements,
- b. The first arriving US&R command officer will coordinate the command of US&R resources with the Incident commander.

Figure 22 – Unified Command



**Figure 23 – Florida Urban Search & Rescue Resources Types**

Resource		USAR Teams		Technical Rescue Teams	
Florida Type	Type I	Type II	Type III	Type I	Type II
<b>NIMS Equivalent</b>	Type I US&R Task Force	Type II US&R Task Force	Type I Collapse Search & Rescue Team	Type II Collapse Search & Rescue Team	Type IV Collapse Search & Rescue Team
<b>Florida Designation</b>	FULL TASK FORCE (HEAVY)	INTER-MEDIATE TASK FORCE	LIGHT TASK FORCE	HEAVY TRT	LIGHT TRT
<b>Incident Type</b>	Structural collapse, collapse situations including light frame, heavy wall, heavy floor and pre-cast concrete construction	Structural collapse, collapse situations including light frame, heavy wall, heavy floor and pre-cast concrete construction	Structural collapse, collapse situations including light frame, heavy wall, heavy floor and pre-cast concrete construction	Heavy, Industrial, Vehicle Extrication, Life safety rope rescue, confined space, trench/excavation	Heavy, Industrial, Vehicle Extrication, Life safety rope rescue, confined space, trench/excavation
<b>Minimum Staffing</b>	70	32	22	8	6
<b>Max Time to Wheels Turning</b>	< 6 hrs	< 6 hrs	< 3 hrs	Immediate	Immediate
<b>Operational Period</b>	24-hour operations; Self-sufficient for first 72 hours	12-24 hour operations; Self-sufficient for first 72 hours	Capable of sustained heavy operations for 18-24 hours	Medium operations for 4-8 hours; Typically require assistance from additional team for sustained operations	Basic operations for 3-6 hours; Typically require assistance for sustained operations
<b>Response Type</b>	Federal State Regional	Federal State Regional	Local Regional State	Local or Regional	Local
<b>Training</b>	NFPA 1670 Technician: Structural Collapse, Rope Rescue, Confined Space, Vehicle and Machinery, Trench and Excavation; NFPA 1670 Operations: Water, Wilderness SAR	NFPA 1670 Technician: Structural Collapse, Rope Rescue, Confined Space, Vehicle and Machinery, Trench and Excavation; NFPA 1670 Operations: Water, Wilderness SAR	NFPA 1670 Technician: Structural Collapse, Rope Rescue, Confined Space, Vehicle and Machinery, Trench and Excavation; NFPA 1670 Operations: Water, Wilderness SAR	NFPA 1670 Technician: Structural Collapse, Rope Rescue, Confined Space, Vehicle and Machinery, Trench and Excavation	NFPA 1670 Operations: Structural Collapse, Rope Rescue, Confined Space, Vehicle and Machinery, Trench and Excavation

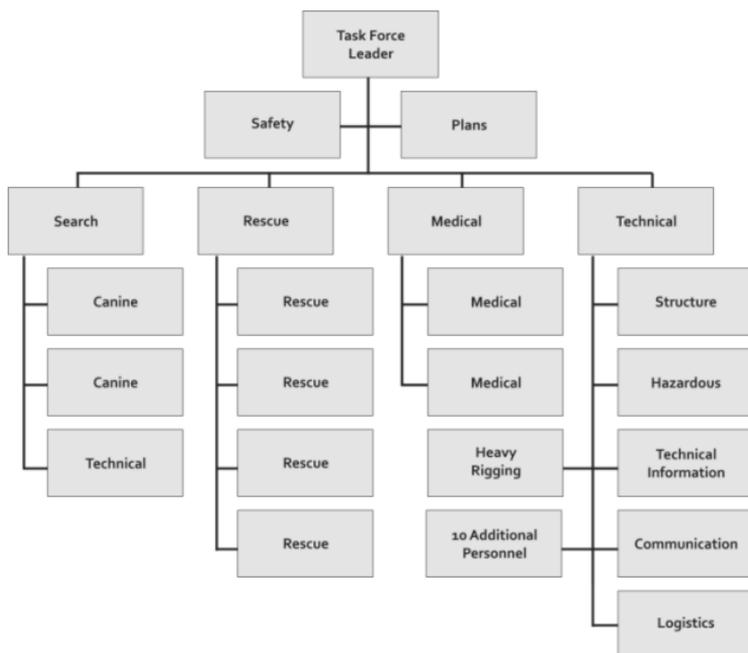
### System Organization

The State of Florida US&R response system is based upon providing a coordinated response to disasters in urbanized environments. Special emphasis is placed on the capability to locate and extricate victims trapped in collapsed buildings, from light residential construction to heavy reinforced concrete structures. The system is based on a tiered response that will assure the proper response of the closest appropriate resources for the incident.

### Type I Full USAR Task Force

This is a State of Florida or Federal asset capable of twenty-four operations for a minimum of seventy-two hours without the need for outside resources and will consist of 70 personnel. The staffing for each twelve-hour shift of personnel is a minimum of 31 personnel.

Figure 24 – Type I Full USAR Task Force



**Figure 25 – Florida Type 1 Teams**

Task Force 1 Miami Dade	Federal and State Deployable
Task Force 2 South Florida	Federal and State Deployable
Task Force 3 Tampa Bay	State Deployable

### ***Type II Intermediate USAR Task Force***

This is a State of Florida or Federal asset made up of local responders with the personnel, equipment, and training equivalent to half of a Type I Task Force. This unit is capable of twelve-hour operations for a minimum of seventy-two hours without the need for outside resources. This resource will provide a scaled down version of a full Task Force and will be able to handle some collapse incidents without the need for additional assistance.

Type II consists of a minimum of 32 personnel capable of working for twelve hours. Intermediate teams will typically require relief by a full task force or another intermediate team for twenty-four hour operations.

**Figure 26 – Florida Type 2 Teams**

Task Force 4 Central Florida	State Deployable
Task Force 5 North Florida	State Deployable
Task Force 6 South Florida	State Deployable

### ***Type III Light USAR Task Force***

A Type III Light US&R Team will consist of a minimum of 22 personnel capable of working for up to twelve hours. A Type III response requires relief by an intermediate or full task force for prolonged or twenty-four hour operations.

## ***Search Strategy***

### **Structure/Hazards Markings**

A standardized marking system is used to assure rescuer safety and to avoid needless duplication of search efforts. In order to be easily seen, the search mark must be large and of a contrasting color to the background surface. Orange spray paint is the most easily seen color on most backgrounds. Line marking or downward spray cans apply the best paint marks. A lumber marking device may be used to write additional information inside the search mark itself when it would be difficult to write the additional information with spray paint.

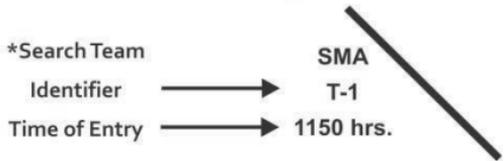
A "Main Entrance" search marking will be completed in two steps:

- First, a large (approximately 2') single slash shall be made near the main entrance at the start of the search with the search team identifier, date and time that they entered marked to the left of the mid-point of the slash.
- After the search of the entire structure has been completed, a second large slash shall be drawn in the opposite direction forming an "X". Additional information will be placed in the remaining three quadrants of the Main Entrance "X" summarizing the entire search of the structure.
- The left quadrant will already contain the search team identifier, date and time when the team first entered the structure.
- The top quadrant is for the date and time the search team left the structure.
- The right quadrant is for any significant hazards located inside the structure.

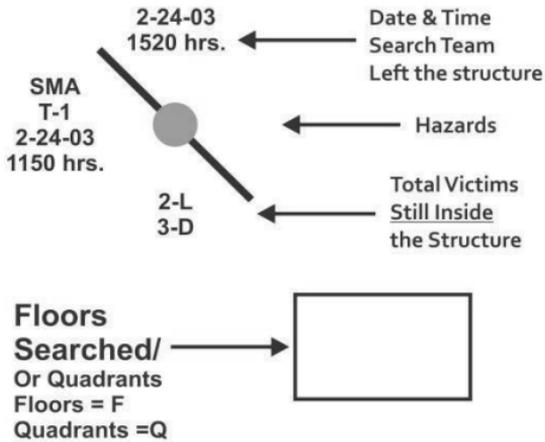
- The bottom quadrant is for the number of "LIVE" or "DEAD" victims still inside the structure this will be indicated with "L" or "D".
- Use a small "x" in the bottom quadrant if no victims are inside the structure.
- During the search function while inside the structure a large single slash shall be made upon entry of each room or area.
- After the search of the room or area has been completed a second large slash shall be drawn in the opposite direction forming an "X".
- The only additional information placed in any of the "X" quadrants while inside the structure shall be that pertaining to any significant hazards or the number of "LIVE" or "DEAD" victims.
- If multiple floors are searched a box under the X will show how many floors/quadrants have been searched in the positive. Indicate "F" for floors and "O" for quadrants.

Figure 27 – Search Markings

Main Entrance Search Marking - WHEN YOU ENTER

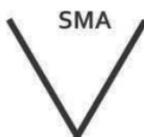


Main Entrance Search Marking - WHEN YOU EXIT - INCOMPLETE SEARCH

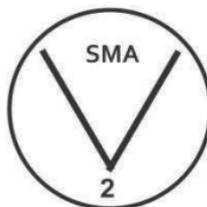


**Figure 28 – US&R Victim Marking System**

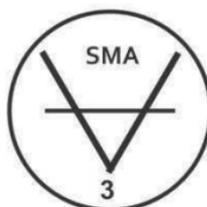
Make a large (2'x 2') V with orange spay paint near the location of a potential victim. Mark the name of the search team or crew identifier in the top part of the "V" with paint or a lumber marker type device.



Paint a circle around the "V" when a potential victim is confirmed to be alive either visually, vocally, or hearing specific sounds that would indicate a high probability of a live victim. If more than one confirmed live victim mark the total number of victims under the "V".



Paint a horizontal line through the middle of the "V" when a confirmed victim is determined to be deceased. If more than one confirmed deceased victim, mark the total number of victims under the "V". Use both the live and deceased victim marking symbols when a combination of live and deceased victims are determined to be in the same location.



Paint an "X" through the confirmed victim symbol after the all victim(s) have been removed from the specific location identified by the marking.



An arrow may need to be painted next to the "V" pointing towards the victim when the victim's location is not immediately near where the "V" is painted. Show distance on arrow.

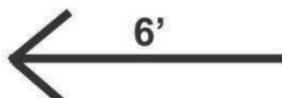
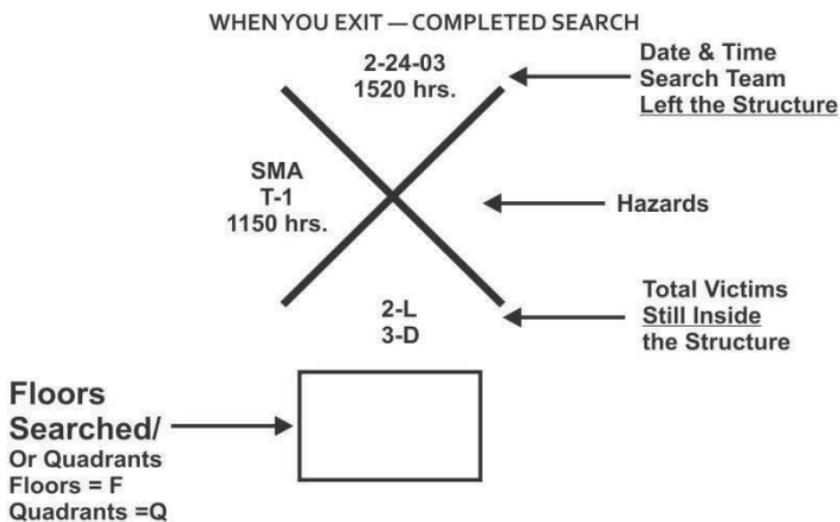


Figure 29 – Main Entrance Search Markings



Interior Search Markings - EACH ROOM OR AREA

WHEN YOU ENTER



WHEN YOU EXIT

