

### 3.5.3.5 Rope Rescue



YOUR ORGANIZATION  
STANDARD OPERATING PROCEDURES/GUIDELINES

**TITLE:** Rope Rescue

**SECTION/TOPIC:** Special Rescue Operations

**NUMBER:** 3.5.3.5

**ISSUE DATE:**

**REVISED DATE:**

**PREPARED BY:**

**APPROVED BY:**

X

Preparer

X

Approver

These SOPs/SOGs are based on FEMA guidelines FA-197

#### 1.0 POLICY REFERENCE

CFR	
NFPA	
NIMS	

#### 2.0 PURPOSE

This standard operating procedure/guideline addresses response to and operations during a rope, vertical, or high-angle rescue situation; may include information on equipment use and maintenance.

The purpose of this procedure is to establish guidelines for conducting high angle/rope rescues. Because of the infinite number of potential sites and situations that could be encountered, this procedure will not define a specific evolution to use, but will give guidelines to follow for conducting safe and effective operations.

#### 3.0 SCOPE

This SOP/SOG pertains to all personnel in this organization.

During the past several years, there has been a constant increase in the number of mountain/rope rescue related incidents. Because of the easy access to some of the city's mountain presence parks, a growing number of citizens and tourists use the parks for recreational activity. For a wide variety of reasons, victims become stranded in the mountain preserves and the Fire Department is called to assist in getting these victims to safety. Sometimes it involves a

simple walk-down and, at times, it involves a very long and complex technical high angle/rope rescue. This procedure will apply to all Fire Department personnel operating in a training or rescue incident.

#### 4.0 DEFINITIONS

These definitions are pertinent to this SOP/SOG.

##### Rope Rescue:

Rope rescue is defined as any rescue attempt that requires rope and related equipment to safely gain access to, and remove patients from, hazardous geographic areas with limited access such as mountains, high rise buildings, above or below grade structures, by means of rope system. Mountain/rope rescues are divided into two general categories; non-technical and technical.

Non-technical evacuation are those of less than 40° inclination. Technical evacuations are considered those from 40° to 90°. Technical evacuations require the dispatch of the Technical Rescue Team (TRT). Technical rescues will be dispatched as HI (High Angle incident). A HI response will consist of at least two TRT units, the Special Operations duty officer, as well as the first due company and a BC.

#### 5.0 PROCEDURES/GUIDELINES & INFORMATION

##### 5.1 Response to and Operations during a Rope, Vertical, or High-Angle Rescue Situation:

###### TACTICAL CONSIDERATIONS

###### **PHASE I Arrive On-Scene. Take Command. Size-Up.**

- A. First Arrival. The first arriving company officer should assume Command after arriving on the scene.
- B. Secure Responsible Party or Witness. Command should secure a witness as soon as possible after arriving on scene. This will help in identifying the problem and locating the victim.
- C. Locate the Victim. In most cases, Command will have to send a recon team to the area of the victim to determine the exact location of victim and nature of injuries. Command may wish to designate this as **Recon Sector**. **Recon Sector** should have EMS equipment to begin to administer the first aid to the victim. If the terrain is greater than 60o inclination, Command may decide to wait until the TRT arrives with the proper equipment to reach the victim. Command may also choose to use a helicopter for aerial recon.
- D. Assess the Need for Additional Resources. **Recon Sector** should provide Command with enough information, or recommend the need for additional resources. Information that will be helpful in determining the need for additional resources would be: number of victims, location and condition of victims, estimated angle of terrain, distance to victim, and estimated time of extraction.

Command should put in an early call for additional resources. If additional resources are not needed after a call has been put in, Command can return those units to service.

- E. Assess the Hazards. Command may wish to designate a **Safety Sector** to identify all potential hazards to rescuers. **Safety Sector** will be responsible for securing those hazards or making all members aware of those hazards. **Safety Sector** shall also be responsible for assuring that all safety procedures are adhered to.
- F. Decide on Rescue or Recovery. **Recon Sector** should advise Command whether the operation will be conducted in the rescue or recovery mode. In the rescue mode personnel assigned to Recon Sector will be reassigned to Treatment Sector and Recon Sector will be terminated. If the operation is to be conducted in the recovery mode, Command may wish to leave the victim and any related equipment in place for investigative purposes.
- G. Decide on an Action Plan. With the recommendation from **Treatment Sector**, Command will have to decide on an action plan. **Extrication Sector** and **Safety Sector** shall be made aware of the specific action plan.

Deployment of the TRT personnel in the Action Plan needs to be monitored by Command to ensure trained TRT members are available to staff critical functions. Dependent on the incident, these would be in the following areas:

- A. Rescue Team involving Rope rescue, helicopter rappel, and any climb requiring technical skills and/or training. TRT should include a Paramedic when possible.
- B. Support requires one trained TRT member at Support 12 to obtain any additional equipment or support items for the rescue team. This member could also be used in the Helicopter LZ if victim and/or TRT member was suspended below the helicopter after an extraction, depending on the location of the Landing Zone and Support 12.
- C. Liaison will provide technical capability to Command, especially when operation involves other agencies. This function can usually be filled by the Special Operations Officer responding to the call.

## **PHASE II Pre-Rescue Operations**

- A. Make the General Area Safe. Command or his/her designee should begin to make the general area safe. This may include securing the area and not allowing civilian personnel into the area.
- B. Make the Rescue Area Safe. Command or his/her designee should make the immediate rescue area safe. This may include removing all civilian personnel and all non-essential rescue personnel from the area. If it is not possible to secure all the hazards in the immediate rescue area, all personnel operating in that area shall be made aware of those hazards.
- C. Pre-Rescue/Recovery. Depending on the action plan established, Command may want to establish an **Extrication Sector**. **Extrication Sector** will be responsible for gathering all equipment and personnel necessary to operate according to the action plan. **Extrication Sector** will assign rescue personnel to conduct the rescue, and support personnel to support the rescuers, during the actual

rescue phase. **Extrication Sector** should have an alternative action plan should the first choice plan fail. This alternate plan should be communicated to all personnel operating in the rescue area.

### **PHASE III Rescue Operations**

After pre-rescue operations are complete, **Extrication Sector** shall put forth the action plan removal of the victim(s). Rescue operations should be conducted with from low risk to high risk. Rescues should be conducted with the least amount of risk to rescuers necessary to rescue the victim. Low risk operations are not always possible but should be considered first. If the rescue of the victim(s) is only possible by means of a high risk operation, **Extrication Sector** shall communicate with Command the risk/benefit of the operation.

The order of rescue from low risk to high risk would be:

Talk the victim into self rescue. If the victim is not exposed to a life threatening situation, it may be possible to talk the victim into self-extrication. If the victim is exposed to a life threatening situation, it may be best to advise the victim to stay in place until a rope rescue system can be set up.

For terrain less than 40o inclination, (non-technical) most first responders have the equipment and training to assist the victim down. If the victim is ambulatory, he/she can walk down with the assistance of rescuers. If the victim is injured or unable to assist in their own rescue, he/she should be packaged properly in a stokes basket and carried to safety.

The stokes extrication should be conducted with a minimum of 4 litter bearers. Bearers should face the direction of travel during the extrication. If appropriate, a tag line should be attached to the litter for assistance through unstable areas.

For terrain of greater than 40o inclination, the TRT shall be called in to assist with the extrication. If the victim is ambulatory, he/she may be assisted down by rescuers with the use of a belay/tag line. If appropriate, rescuers should set up an anchor system for the belay. A body belay may also be used by rescuers, if appropriate.

If the victim is not ambulatory, rescuers shall build an anchor system and prepare for a steep angle evacuation. The patient shall be packaged properly in a litter and prepared for the extrication. There shall be at least 3 litter attendants assisting with the litter evacuation. Attendants should face the anchor during the evacuation and be clipped into the litter. A separate raising/lowering line and belay line shall be set up for raising or lowering during steep angle evacuations.

For evacuations greater than 60o, the TRT shall conduct the evacuation. Evacuations greater than 60o are considered high angle operations. The **Extrication Sector** officer, in conjunction with the **Safety Sector**, should decide the most appropriate method to extricate the victim. This may include putting the victim(s) in a harness and raising or lowering them, or packaging them in a litter for the raising and/or lowering.

In any case, a 15:1 safety factor shall be maintained and a double rope technique shall be used if at all possible. If possible, a separate anchor should be used for the working line and the belay line. Proper care shall be taken to assure that the victim will not come out of the harness or litter used to extricate him/her. Which ever method of extrication is used, the **Extrication Sector** officer shall ensure the overall safety of the raising/lowering system. **Extrication Sector** shall designate the tasks of individual rescuers during the operation.

Helicopter operations are considered high risk operations. Several factors must be considered before deciding on the use of a helo for extrications. Some of these factors are: time of day, condition of victim, difficult access to the victim, and the qualifications of pilot and rescuers. If Command, in conjunction with the TRT company officers, decide to use a helicopter for extrication, a landing zone (L.Z.) shall be set up and a **L.Z. Sector** shall be established. **L.Z. Sector** should have communication directly with the pilot as well as Command.

Prior to conducting the operation, Command should ensure that the pilot is qualified and completely understands the task about to be performed. Command, or his/her designee, should ensure that a load calculation form is filled out prior to commencement of the operation. Command will have the final say as to the use of the helicopter. The pilot will have the final say on how that helicopter will be used.

#### **Phase IV Termination**

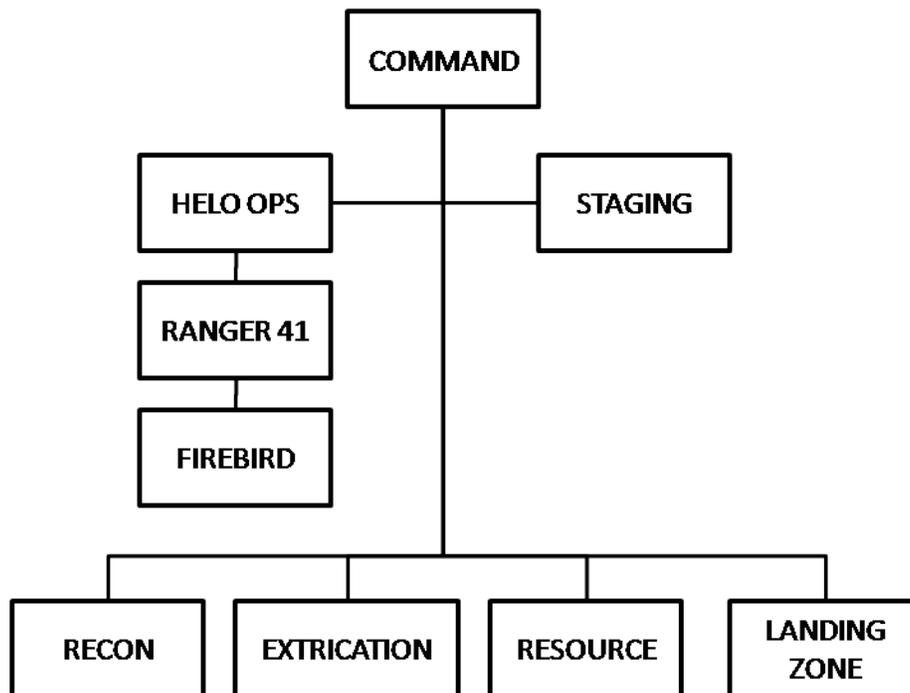
##### **I. PREPARE FOR TERMINATION**

- A. Personnel Accountability.
- B. Equipment accountability. If there has been a fatality, **Extrication Sector** may consider leaving equipment in place for investigative purposes.
- C. Re-stock vehicles.
- D. Consider debriefing
- E. Secure the scene. Return to service.

#### **Additional Considerations**

- A. HEAT. Consider rotation of crews.
- B. COLD. Consider effects of hypothermia on victim and rescuers.
- C. RAIN/SNOW. Consider the effects of rain on the hazard profile.
- D. TIME OF DAY. Is there sufficient lighting for operations extending into the night.
- E. Consider the effect on family and friends; keep family informed.
- F. Consider news media; assign a P.I.O.

#### **ORGANIZATIONAL CHART**



## **5.2 Use of Equipment during a Rope, Vertical, or High-Angle Rescue Situation:**

### **ROPE RESCUE EQUIPMENT GUIDELINES**

The purpose of this procedure is to establish a guideline for the use, care, maintenance, and storage of rope and related rope rescue equipment.

#### **ROPE**

Uses--Rappel line, lowering line, safety belay, litter tag line, or in mechanical advantage pulley systems. It is not intended to be used as a tow rope, utility line, etc. This is to be considered a life safety line only. The rescuer's life as well as the victim's may depend on it.

Construction--Nylon, low-stretch kernmantle

1. Has an inner core and an outer sheath
2. Outer sheath protects core
3. 75%-85% of the ropes strength comes from the core, depending on manufacturer

Specifications

1. Diameter: 1/2" (12.7mm)
2. Strength: 9,000 pounds (loses approximately 15% when wet)
3. Lengths: 100' for most companies; up to 600' lengths on Support-12 and EP-8

### Maintenance

1. Inspect, visually after each use, for damage to sheath, dirt or mildew, and feel for soft spots in rope core, by "running" or pulling the rope between thumb and index finger. Wash when dirty.

### Core

1. Wash with mild nonchlorine-based detergent and water. Hang loosely and allow to air dry out of direct sunlight.
2. Once rope is dry, it is stuffed, not coiled, in rope bag and stored in a dry, dust-free place, where not exposed to chemical (petroleums, alkalies) and direct sunlight.

### Cautions

1. NEVER walk or stand on the rope.
2. Don't drop rope from great heights when it can be carried down.
3. Don't drag rope across ground or apparatus bays.
4. Pad all edges.
5. Avoid nylon passing on nylon; i.e., rope passing over itself, another rope or webbing.
6. Keep all rope and webbing material out of petroleum and alkaline products, and if forced to use in applications where contamination will occur (around wheels, axles, etc.), retire after use.

## WEBBING

Uses. Anchor slings, gear slings, harness, and lashing.

Construction. Nylon, spiral weave, tubular.

Specifications. One inch wide; Strength of 4,000 pounds.

Maintenance. Same as rope.

Care. Same as rope.

Cautions. Same as rope.

## ACCESSORY CORD

Uses. Loops of 8 mm accessory cord (AC) can be attached to a host rope by a prusik hitch to form attachment points for pulleys. Long loops of 6 mm AC can be tied to allow their use as "soft" ascenders to climb a host rope.

Construction. Nylon, low stretch, kernmantle. Specifications. Rope diameter may vary from 6 mm to 9 mm, depending on application.

Maintenance. Same as rope.

Care. Same as rope.

Cautions. Same as rope.

### CARABINERS

Uses. To link various pieces of gear together, or to add friction to a system.

Construction. Locking, steel, pin type, not lock sleeve dependent. Locking, aluminum, pin type, not lock sleeve dependent.

Specifications. Steel: 9,000 pounds breaking strength. Aluminum: 5,500 pounds breaking strength.

#### Cautions.

1. Keep clean.
2. Don't drop or throw.
3. Load only in the long axis, no side loading.
4. Don't forget to lock the gate.
5. Inspect for cracks, worn spots, and smooth operation.

### PULLEYS

#### Uses

1. Reduce friction.
2. Change direction.
3. To gain mechanical advantage.

Construction--Sealed ball bearing, anodized aluminum sides.  
Specifications--2" and 4" size. 6,000-8,000 pound breaking strength.

#### Cautions

1. Keep clean.
2. Don't drop or throw.
3. Inspect for smooth operation, elongated holes.

### GENERAL CAUTIONS

1. Make sure all knots are tied and dressed correctly.
2. Maintain at least 15:1 safety margin when not belayed.
3. Belay loads when safety margin is less than 15:1
4. Rescuers shall not operate with less than a 10:1 safety margin.
5. Rescuers shall not approach an edge without being tied in and communicating with rescuers

below.

6. Rescuers shall place victims in harness during rope borne rescues.

7. Rescuers shall wear appropriate clothing:

A. for helicopter borne operations

1. Fire resistive jumpsuit
2. Seat and chest harness
3. Flight helmet
4. Eye protection
5. Approved footwear
6. Self-rescue gear
7. Safe cutting device

B. for steep or high angle rescue

1. Seat and chest harness
2. Helmet
3. Approved hiking shoes or boots
4. Self-rescue gear
5. Safe cutting device
6. Eye protection
7. Gloves

**5.3 Maintenance of Equipment used during a Rope, Vertical, or High-Angle Rescue Situation:**