



**ARCADIA FIRE DEPARTMENT
STANDARD OPERATING GUIDELINE**

**DEBRIS FLOW/
LANDSLIDE RESPONSE**

Number: 139
Revision Date: 12/05/2012
File Name: Debris Flow

Review Date: 03/25/2017

Approved: _____
Michael E. Lang, Fire Chief

PURPOSE

The purpose of this procedure is to provide a guideline for conducting safe and efficient rescue/recovery operations in the aftermath of a debris flow/landslide.

PROCEDURE

The Primary Assessment

- Attempt to secure a reporting party or witness to the accident to determine exactly what happened.
- An immediate assessment of the hazards present to rescuers should be performed.
- An assessment of potential victims should be performed.
- Determine how many victims have been affected.
- Determine how long the victims have been down and the survivability profile of the victim(s).

Secondary Assessment

- What known hazards are present; natural gas, electrical, etc?
- Location and number of victims affected.
- Hazardous material size-up.

Personnel and Equipment

- Determine if there are an adequate number of personnel on scene to manage the rescue/recovery.
- Request additional resources i.e. Fire, Law, Public Works, Building and Code Division, Sheriff, Cal Trans., Urban Search and Rescue Teams and Fire Camp Hand Crews may be of value when known victims are entrapped.
- Consider the effect of temperature extremes on personnel, and consider early rotation of personnel operating on scene, approximately every 15 to 20 minutes, 30 minutes maximum.
- Consider if the proper equipment is on-scene to complete the operation:
 - a. Thermal imaging cameras **may or may not** be of value in locating victims or hot engine parts depending on the depth of the soil. Metal detectors used by Public Works to locate below grade pipes may be useful in locating metal vehicles under the soil.

- b. Heavy equipment (back hoes, front loaders, dump trucks, etc. can be ordered from Public Works for immediate use during actual rescue operations. Heavy equipment needed for clearing road access with no rescue concern can be ordered from Cal Trans.
- c. Consider assigning heavy equipment to work the perimeter of a landslide area to provide access to rescuers, and to dig out spaces to place removed soil during rescue operations.
- d. Consider utilizing Emergency Trench Rescue and Structure Shoring techniques to prevent soil movement during search and rescue operations.
- e. Consider Fire Camp Hand Crews for deploying sand bags to divert debris flow.
- f. Landslide search and rescue operations can often take many hours to several days to complete, order flood lights, sanitation facilities and rest and rehab resources if the incident will take multiple operational periods.

Incident Command System

- Establish a remote incident command post and staging area(s). Different resources i.e. Fire, Law, Heavy Equipment, Ambulance, etc. may require separate staging areas due to function and size of equipment.
- Form a Unified Command with other emergency response Supervisors i.e. Fire, Law, Public Works, Cal Trans. Develop an Incident Action Plan (IAP) with agreed upon operational objectives.

Isolate and Deny Entry

- Establish a perimeter
- Stop all unnecessary traffic in the area
- Evacuation
 - a. Make the decision to evacuate only after evaluating the threat

Make the Area Safe

- Assign an Incident Safety Officer.
- Determine exactly what hazards and products are within the debris flow/landslide perimeter.
- If a landslide has occurred, a secondary landslide is often possible.
- Utilities, including electrical, gas and water should be shut off. If it is not possible to shut off the utilities, post a guard to assure the utilities are not turned on during the operation.
- If there is a potential for structure collapse, appropriate measures must be taken to assure the structural stability of the structure during rescue operations.
- Heavy equipment should be used with caution where known or potential victims may be located due to the possibility of victim injury, secondary collapse, noise and vibration.
- Assign observer(s) with radio communications and evacuation signaling capability to monitor the slide area to give responders advanced warning of secondary landslides or falling debris. Safety Officers and observers have found binoculars useful during landslide search and rescue operations.

- Consider marking, painting and measuring surface cracks to monitor for additional movement.
- Use standardized emergency signals:
 - a. Evacuate – Repeated short blasts of the air horn for approximately 10 seconds, followed by 10 seconds of silence. This sequence of air horn blasts for 10 seconds followed by a 10-second period of silence will be done 3 times; total air horn evacuation signal
 - b. All Stop – 1 long blast
 - c. Resume Operations – 1 long & 1 short blast

Victims

- Upon reaching the victim(s), personnel should do an immediate primary survey of the victim. If appropriate, treatment should be started immediately.
- A quick but thorough secondary assessment of the victim should be done. If time permits, personnel should attempt to treat serious injuries prior to removal.
- If indicated, complete C-spine precautions should be administered. NOTE: Because of the difficulty removing the victim from the space, optimum C-spine precautions may not be possible.
- Remember that “crush injury syndrome” and “compartment spacing” of body fluids is a real medical concern for patients who have been trapped under heavy weights such as soil for extended periods (2 – 4 hours) of time. Review of these medical conditions and proper treatment protocols is crucial for successful patient recovery and survival.

Preparation for Termination

- Conduct personnel accountability.
- Remove tools and equipment used for rescue/recovery. If there has been a fatality, consider leaving tools and equipment in place for investigative purposes.
- Secure the scene.
- Evaluate personnel, CISM if the situation dictates it.
- Consider debriefing.

Considerations

- Notifications:
 - a. Fire Chief
 - b. Deputy Fire Chief
 - c. Battalion Chief to cover the City
- Weather:
 - a. Cold. Consider effects of hypothermia on victim and rescuers.
 - b. Rain. Consider the effects of rain on the hazard profile.
- Time of Day. Is there sufficient lighting for operations extending into the night.
- Consider the effect on family and friends; keep family informed.
- Assign a P.I.O., consider news media.