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## Ames Fire Department Standard Operating Guidelines

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Book: 3 – Emergency Operations

Section: VII – Rescue Operations

Chapter: 3 – **Trench Rescue**

Date Approved: 07-19-2010 Revision No.: New Approved by: 

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### **PURPOSE:**

The purpose of this policy is to provide members of the Ames Fire Department with guidance in operational procedures when encountering a trench collapse scenario.

### **POLICY:**

A thorough knowledge and understanding of the roles, responsibilities, and challenges of performing trench rescue is essential. The Ames Fire Department may assume command and control of trench rescue incidents at facilities within the City limits or within the jurisdiction of Iowa State University.

### **PROCEDURE:**

#### **Dispatch and Arrival**

- In the event the Ames Fire Department is dispatched to a trench rescue situation, an initial apparatus response dispatch should include:
  - Rescue 1 with trench rescue trailer in tow (non-emergent).
  - Engine 1. ○ Haz-Mat.
  - Truck 3. ○ Car 1.
  - Rescue 2.
- First arriving apparatus should shut down engines to reduce vibrations, set up command, and prepare to establish:
  - A safety officer.
  - Accountability.
  - Staging.
    - First arriving units should be staged away from the trench.
    - Staging recommendations are approximately 100 feet or more for initial apparatus and 300 feet or more for secondary apparatus.
  - A location close enough for the trench trailer to be parked and easily accessed.
- Place COA Public Works Utility Maintenance on “stand by” through Ames Dispatch.
- Confirm the dispatch of an advanced life support ambulance.
- If it is determined that additional personnel are required, command should notify Ames Dispatch to contact Public Works Utility Maintenance for a trench rescue response (i.e., backhoe with operator, boom truck with operator and expandable trench box, and vacuum truck with operator).
- Public Works units and personnel will:

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---

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- Respond non-emergent and report directly to the incident commander or his/her designee.
- Operate under the Fire Department's incident command system.

### Initial Considerations

Incident command size-up should include the following:

- Determine situation complexity.
  - If possible, secure a responsible party (e.g., job foreman, or reliable witness to the accident).
  - Assess potential hazards (e.g., toxic atmosphere, electrical, ect.).
  - Determine the number and best approximate location of victim(s).
  - Ascertain the amount of time victim(s) have been missing.
- Based on the information gathered, make an early and conscious decision to proceed in either:
  - Rescue mode - used if the victim(s) can be seen and is obviously alive or if the victim's location is known and downtime is known to be minimal.
  - Recovery mode - used when the victim has been completely buried and their exact location is unknown.

### Secondary Considerations

Incident command should consider completing the following operations:

- Establish collapse work zones; the following are recommended distances:
    - Hot zone approximately 50 - 100 feet from trench.
      - Personnel operating in the hot zone should be equipped with steel-toed boots, helmet, eye protection, and gloves.
    - Warm zone approximately 100 - 150 feet from trench.
    - Cold zone approximately 150 - 300 feet from trench.
  - Control traffic movement by utilizing Ames Police to shut down roadway if needed.
    - Re-route all non-essential traffic away from the scene.
    - Shut down all heavy equipment operating within the collapse work zone.
  - Control bystanders by:
    - Removing all non-essential *civilian* personnel from any collapse work zones.
    - Removing all non-essential *rescue* personnel from the collapse hot zone.
- Consider the following:
- The effects of weather conditions (e.g., rain, snow, extreme temperatures) on the hazard profile.
  - If there is sufficient lighting for operations extending into the night.

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---

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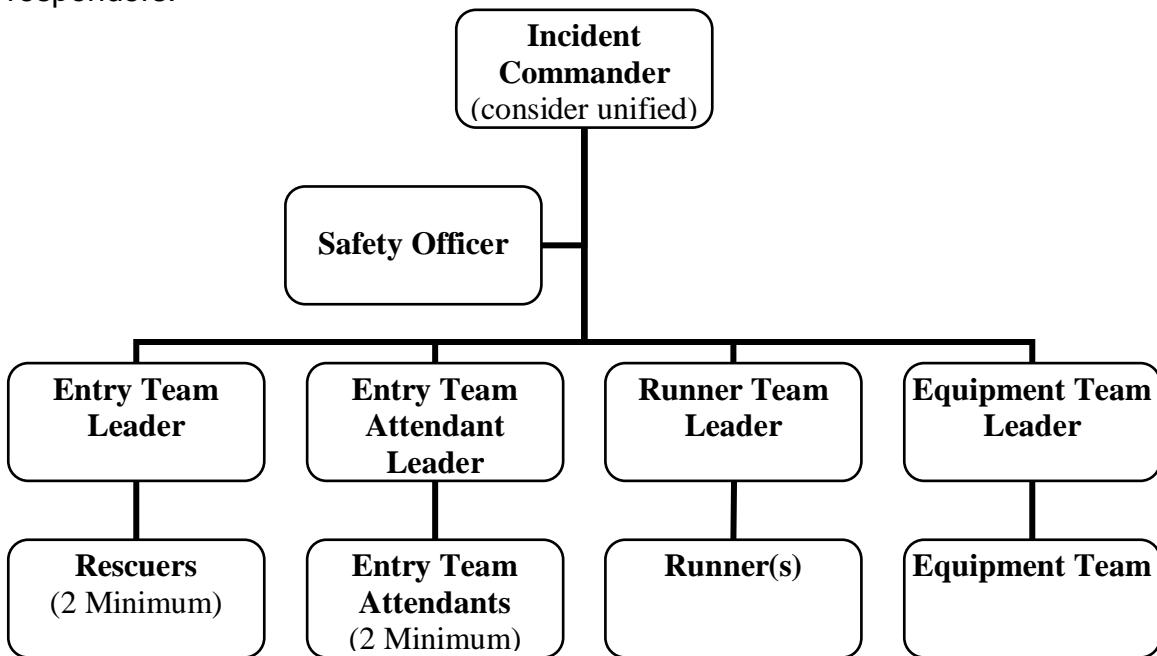
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- Keeping family and friends informed of the rescue/recovery progress
- Assigning a P.I.O. to address the news media

### Organizational Chart

An effective trench collapse response can call for a coordinated and organized response from a number of different agencies. The following organizational chart is based on the Incident Management System model for command, control, and coordination, and helps standardize the hierarchy, titles, and duties of trench rescue responders.



### Trench Rescue Personnel Assignment

- Entry Team Leader.
  - Responsible for operations in the trench.
  - Works with and oversees the “rescuer(s)” in the trench.
- Entry Team Attendant Leader.
  - Responsible for air monitoring and ventilation.
  - Trench lip safety and security.
  - Egress ladder placement.
  - Topside eyes and ears for trench integrity.
  - Backup and support Entry Team.
  - Works with and oversees the “Entry Team Attendant(s).”
- Runner Team Leader.

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---

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- Transfers equipment between trench and equipment prep/cutting area.
  - Assist with shoring placement.
  - Assist with patient removal.
- Equipment Team Leader.
  - Oversees equipment offloading and loading.
  - Responsible for equipment preparation and timber cutting.

### Preparations for Entry

Should an entry need to be made into the trench to facilitate rescue, the following preparatory items should be considered:

- Control hazards in the area (e.g., utilities, electric, gas, water).
- De-water the trench, if necessary.
- Monitor the atmospheric conditions of the trench for crews and victim(s); ventilate if necessary.
- Identify soil type and condition.
- Make the trench lip safe.
  - Approach the trench from the ends if possible.
  - Provide level area for ground pads.
  - Place ground pads around lip of trench.
- Look for unidentified hazards (e.g., fissures, unstable spoil pile).
- Assess spoil pile for improper angle of repose and general unraveling.
- Remove any tripping hazards (e.g., shovels, shores, tree roots).

### Entry

In the event that entry into the trench will be required, an Entry Team should be assigned. The Entry Team, in coordination with the Attendants, should consider:

- Placing ingress and egress ladders in the trench. There should be at least two ladders placed in the trench, spaced no more than 50 feet apart.
- Determining shoring system to be used (i.e., pneumatic, hydraulic, timber, or trench box).
- Utilizing approved shoring system to create a safe zone in the un-collapsed portion of the trench (preferably from both ends, if additional personnel and equipment are available).
- Securing loose utilities, pipe, or other obstructions in the trench.
- Removing dirt and debris from the collapsed zone. Rescuer should remain in the safe zone while removing dirt and debris from the collapsed zone.

### Victim Removal

If a victim(s) is located, consider the following list of guidelines:

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---

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- Create a safe zone around the victim(s).
- Begin dirt removal, operating from a safe zone (buckets, small shovels, by hand, by vacuum).
- Remove objects trapping the victim(s) (i.e., pipes, lumber, machinery)
- Continue extending safe zone into collapse zone.
- Uncover victim to below the diaphragm.
- Begin patient assessment, if possible (ABC's).
- Begin ventilation, if needed.
- Completely uncover the victim.
- Package the patient for removal.
- Remove the victim(s) from the trench (consider using a vertical or horizontal haul).
- Assist ALS unit with packaging and loading the patient(s) for transport.

### Incident Termination

- Remove all personnel, tools, and equipment from the trench and ensure personnel accountability, leaving shoring in place.
- If there has been a fatality or serious injury:
  - Notify Story County Medical Examiner and consider leaving tools and equipment in place for investigative purposes.
  - Request an Iowa OSHA representative to the scene using either [www.iowaworkforce.org](http://www.iowaworkforce.org) or 1-800-321-OSHA (6742).
  - Photograph the scene.
- If possible and appropriate, remove trench shoring system (last-in/first-out)
- Prepare equipment, personnel, and apparatus to return to duty.
- Secure the scene (this may include leaving the shoring system in place or covering the trench).
- Consider debriefing.
- Terminate Command.

### Mutual Aid

In the event that mutual aid is requested for a trench rescue incident, the appropriate response includes:

- Rescue 1 with trench rescue trailer (should include a minimum of four personnel).
  - When pulling the trailer, Rescue 1 should maintain a non-emergent response.
- Car 1.
  - Car 1 should respond emergent to the scene to verify what resources are required.

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- Car 1 maintains the ability to down grade response if additional information or conditions dictate that a non-emergent response is more appropriate.
- As soon as feasible, notify someone in Fire Administration that mutual aid has been requested and/or provided.

**DEFINITIONS:**

*Fissure:* A crack or narrow opening in the soil within or on top of a trench.

*Horizontal Haul:* The hoisting of a load out of a trench using an inclined plane and a mechanical advantage haul system.

*Safe Zone:* A zone created within the trench that is protected from further collapse by shoring.

*Spoil Pile:* A pile of soil, rocks, or other material removed from a trench.

*Trench:* A trench is a narrow excavation made below the surface of the ground where the depth is greater than the width.

*Trench Box:* An enclosed box created by interconnected shores.

*Trench Lip:* The area at the top of both sides of a trench.

*Vertical Haul:* The upward hoisting of a load out of a trench using a mechanical advantage haul system.

**REFERENCES**

Training for Hazardous Materials Response: Confined Space Rescue, International Association of Fire Fighters (1998).