Appendix A: Sample Trench Rescue Standard Operating Procedure

Courtesy of Ron Zawlocki

Purpose

To address operations that involve the location, disentanglement, and removal of victims from underground collapses in trenches and excavations.

Scope

This policy is designed to provide guidelines to all fire and EMS units when presented with an incident involving the collapse of a trench or excavation where a victim(s) is(are) trapped or buried. This includes "protected" trenches where a victim(s) is(are) trapped or pinned by heavy equipment, pipe, or items other than soil.

Definition

As defined by the OSHA regulation 29 CFR Part 1926:

Trench: A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Excavation: A man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

General Guidelines

I. Any incident that involves a trench or excavation shall be the responsibility of the special operations/technical rescue team.

II. Any incident in which a victim is trapped, buried, or experiencing a medical emergency in a trench or excavation will require the response of the technical rescue team.

III. No fire fighter or EMS person shall enter an unprotected trench to render victim care or perform disentanglement operations. All trenches shall be "safe and protected" using approved methods before entry by any emergency personnel.

IV. All emergency vehicles shall park at least 100 feet from the collapse site. The only exception to this shall be the technical rescue team vehicle, which may park no closer than 50 feet.

V. All traffic within 300 feet of the collapse zone shall be stopped or detoured.

VI. A hazard zone shall be established to control at least 75 feet around the perimeter of the collapse zone. This should be done with fire line tape.

Operational Phases: First-Due Units

I. **Assessment**
   - A. First-due units should attempt to gather the following information:
     1. What is the nature of the problem: collapse, medical, etc.?
     2. How many victims are there?
     3. What is their location?
     4. What are the width, length, and depth of the trench?
     5. Are there any on-scene hazards?
        - a. Disrupted utilities
        - b. Flowing water
        - c. Secondary collapse potential
        - d. Mechanical hazards/heavy equipment
        - e. Exposed but nondisrupted utilities
        - f. Hazardous materials/explosives
   - B. After these items are evaluated, the following should be completed:
     1. Determine whether the incident involves a rescue or a recovery.
     2. Ensure technical rescue team response and full assignment.
     3. Ensure hazardous materials team response.
     4. Establish visible command and control access to collapse area.

II. **Making the Site Safe**
   - A. General area safety
     1. Protect the general area around the collapse zone for at least 300 feet in all directions. This includes:
        - a. Traffic control
        - b. Access control
        - c. General hazard identification
        - d. Shutting down all heavy equipment

Copyright © 2017 by Jones & Bartlett Learning, LLC, an Ascend Learning Company

B. Rescue area safety
   1. "Perform" or "conduct" the initial steps needed to make the actual collapse zone around and in the trench as safe as possible using basic techniques. Sheeting and shoring operations, entry, and disentanglement operations are operational skills that should be carried out under the direction of the technical rescue team.
      a. Ground pad the trench site lip.
      b. Ventilate the trench with positive pressure ventilation if needed.
      c. Support any unbroken utilities.
      d. If medical conditions permit, provide a helmet and goggles for the victim (preferably not a fire service helmet).
      e. Locate, mark, and monitor fissures.
      f. Begin air monitoring.
      g. Move the spoil pile back 2 feet from the trench lip.
      h. Mark the location of the victim with chalk or paint at the lip and at the victim (in case of secondary collapse).
      i. Take pictures of what you see, preferably digital so that the teams can see what the situation looked like when you got to it and before further collapse.
      j. Supply a rope to the victim (preferably tied to him or her) to lead you back to him or her in case of a secondary collapse.
      k. Supply oxygen or SABA to the victim as appropriate; however, never enter an unprotected trench.
      l. Supply at least two ground ladders into the trench. This serves as a means of self-rescue/escape for the victim or if someone falls in.
      m. Obtain GPS location for AirEvac unit.
      n. Have utilities re-marked. Locations may have changed because of the collapse.
      o. Do not allow any personnel into an unprotected trench.
      p. Do not touch or lean on any heavy equipment until you have ensured it is not in contact with electrical utilities!

Stop: Await the arrival of technical rescue team personnel and equipment.

Technical Rescue Operations Phase

I. **Operational Responsibility**
   A. All personnel shall report to and work through the incident command post.
   B. It may be necessary to establish group officers associated with the trench or excavation collapse. These shall be in accordance with the incident command policy.
   C. In some cases, the following group officers shall be established:
      1. Operations: Responsible for coordination of the actual collapse site and the groups associated with all activity in the rescue area.
      2. Extrication: Responsible for directing the actual sheeting and shoring, disentanglement, and removal operations associated with the trench or excavation. Operations personnel report directly to the operations officer.

II. **Collapse Zone Operations**
   A. Different collapse scenarios will obviously require different sheeting and shoring techniques as the situation demands. Each scenario should be evaluated using the same evaluation mechanism and adaptations made to the current operation as required by the configuration of the trench or excavation.
   B. The following are potential forms of collapse that may be encountered. They should be handled in accordance with accepted techniques previously taught.
      1. Single wall collapse
      2. Single or double wall slough
      3. Sheer wall
      4. Spoil pile slide
      5. Intersecting trench collapse
      6. Collapses in protected trenches
         a. Rabbit box slide or above level collapse
         b. Industrial shoring collapse
         c. Inadequate protection systems in place
   C. The following are potential forms of victim entrapment scenarios that may be encountered:
      1. Victim(s) buried to waist
      2. Victim(s) buried to chest
      3. Victim(s) not buried but injured or experiencing a medical problem in the trench environment
      4. Victim(s) trapped or pinned by heavy equipment or pipe
      5. Victim(s) trapped in running sand or material
      6. Victim(s) completely buried
      7. Victim(s) buried in the end of a large-diameter pipe

III. **Operational Guidelines**
   A. Rescue Area Considerations
      1. Ensure ventilation continues when needed, and monitor the atmosphere.
      2. Ensure that dewatering systems are operational.
      3. Ensure that utilities are controlled and identified.
      4. Limit personnel at the lip and collapse zone.
      5. Ensure communications with logistics area via department radio system or landline.
      6. Ensure that the safety officer is in control of access and personnel.
      7. Ensure that the media staging area is located away from the collapse zone.

   B. General Considerations
      1. Brief all personnel on plan of action and confer with appropriate groups.
      2. Provide constant updates to incident command.

Copyright © 2017 by Jones & Bartlett Learning, LLC, an Ascend Learning Company

3. Plan at least two steps ahead of the operation and have a secondary plan ready in the event that the initial tactical plan proves unworkable.
4. Rotate personnel regularly.
5. Ensure that personnel involved in disentanglement and digging operations are rotated at least every 30 minutes.

C. Victim Considerations
1. Above all, treat the victim for crush syndrome in accordance with local protocols.
2. Consider and treat for hypothermia as necessary.
3. Never dig out a victim with heavy equipment.
4. Once you are close to the victim, dig by hand.
5. Consider the use of helicopter transport to a trauma center.
6. Ensure that technical rescue team paramedics coordinate and direct victim packaging operations.
7. Plan movement mechanism well ahead of time for the removal of the victim after disentanglement.

D. Community Resources
1. In the event that public utility resources are needed, advise the following:
   a. Determine exactly what is needed.
      i. Manpower
      ii. Heavy equipment (what type)
      iii. Pumps (what type)
      iv. Vacuum truck
   b. Ensure that all identified utilities have a representative present. Do not attempt to control utilities unless you are qualified.
   c. Ensure a staging area for all incoming community resources requested.

Special Situations

I. **Running sand or material**
   A. In these cases, it may be necessary to encase the victim(s) in interlocking drums used as an isolation tunnel. Remember that in all cases these drums should be used in the vertical position only. Using them horizontally may cause them to fail and crush under the weight of material.

II. **Other items that may be used for isolation tunnels in either the vertical or horizontal configurations are:**
   A. Concrete or steel pipe
   B. Corrugated pipe

III. **Pier holes or caissons**
   A. These are bell-shaped excavations, which are used mainly as footers to pour support columns for concrete buildings. They represent extreme danger because of the difficulty in sheeting and shoring their bell-shaped bottoms. Extreme caution should be exercised when involved in these types of operations.

IV. **Trench and tunnel operations**
   A. In certain cases, it may be necessary to dig a parallel trench or excavation to create a parallel shaft. If this becomes necessary, consider the following:
      1. Any trench cut for a rescue operation should be properly protected by either conventional or industrial means.
      2. Ensure that all utilities are identified before cutting the trench. This can be done by requesting the utility company(s) on an emergency basis.
      3. Ensure adequate shaft material for construction of your parallel shaft.
      4. If possible, request and retain a certified engineer to assist in the planning and implementation.
      5. Trench and tunneling operations should be used only as a last option.

Termination

I. Rehab all personnel before termination and removal operations.

II. Brief all personnel on the operation and its intended outcome.

III. Perform removal operations in the reverse order.

IV. Beware of secondary collapse zones. No equipment is worth risking an injury.

V. Stage, clean, and inventory all equipment. Report any lost or damaged equipment.

VI. Any parallel shaft construction, tunnels, or isolation tunnels should be left in place. Removing them may cause a collapse.

VII. Consider CISM/CISD.

VIII. Conduct a post-incident critique.

Copyright © 2017 by Jones & Bartlett Learning, LLC, an Ascend Learning Company