

Tempe Fire Department Policies and Procedures
Trench Rescue
208.02
Rev 5-24-89

Associated laws from Arizona Department of Occupational Safety and Health (ADOSH) are as follows:

NOTE: Although these laws are for ADOSH, they can be of help in inspecting trench sites in your district.

1926.651

- . Excavated material must be stored 2' from edge of excavation.
- . Shoring systems shall be planned and designed by a qualified person when excavation is in excess of 20' in depth.

1926.652

- . Trenches more than 5' in depth shall be shored, sheeted, or laid back to the stable angle.

NOTE: Stable angle is the same as in the spoil pile. No steeper than 1' rise to each 1/2' horizontal. For example see Figure 1.

- . Bracing or shoring of trenches shall be carried along with the excavation.
- . Cross braces or trench jacks shall be placed in a true horizontal position, be spaced vertically (4' maximum) and secured.

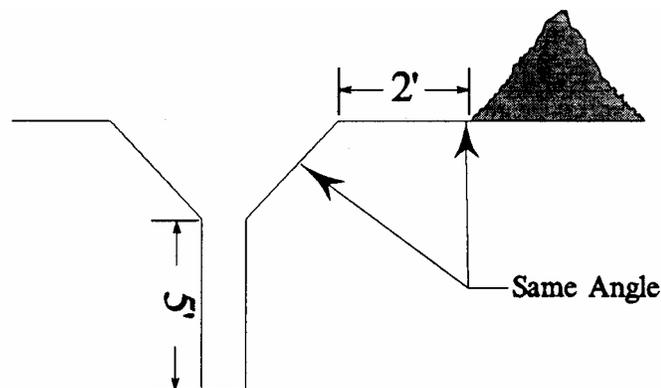


Figure 1

Trench rescue operations are always a critical danger to fire department personnel. They involve a complex operation of shoring, digging, and special resources. Safe and efficient management of these operations require special considerations in evaluating and implementing rescue efforts. It may be necessary to forestall excavation of a victim who clearly has no chance for survival in the interest of firefighter safety.

A collapse or cave-in usually occurs because of unstable soil and inadequate shoring. Potential secondary collapse must always be considered as a constant hazard. Stability may be disturbed by digging, vibration, weight added near edge of trench, rain, or for no apparent reason, just time.

A 2-1 medical assignment will be dispatched to any reported cave-in incident. Support-73 will respond with Fire Station #73 equipment (see policy on shoring equipment Support-73). The Phoenix Fire Department trench rescue equipment will also be dispatched.

Initial assignments should include an Extrication and Safety Sector Officer. The Safety Sector Officer must constantly look for signs of further collapse (i.e., cracks in surface near wall, bent shores, falling dirt, subsidence, etc. [see Figure 2]). In addition, he is insuring that safety procedures are followed by all personnel. The Extrication Officer will supervise shoring and digging efforts.

The Extrication Officer must be constantly aware of position, function, and progress of all personnel directly involved in the rescue effort. Exposure of a minimum amount of men in the trench to do the job effectively is of top priority. Safety equipment for personnel working in trench will include: SCBA, helmets, and possibly a safety line.

A hazard zone should be set up for 50' around the incident using Lobby Control. Due to added weight, vibration, etc., only working personnel are allowed in the hazard zone.

All traffic and staging will be 300' from excavation to minimize vibration. Working apparatus should be at least 100' from excavation. Soil conditions plus need for equipment will dictate any closer distance.

Ladders to provide access in and out of trench will be placed on both sides of the operation not more than 6' distant.

Relief of personnel from Resource Sector will be rotated at signs of fatigue. This may be a consideration for additional alarms.

Small hand held digging tools are to be used in uncovering buried victims. Never will power earth-moving equipment be used directly over victim (Example: backhoe).

Survival of victims must be evaluated in relation to safety of rescue personnel. Suffocation is only one element to consider. Earth moved in a cave-in may weigh several tons and can produce extensive pressure and trauma to the chest. When the head of a victim is uncovered the chest must follow quickly (even with the airway clear) to allow air to enter the victim's lungs.

The policy on shoring equipment should be reviewed with this policy and procedure.

FACTORS

- . Find out who is in charge and what happened.
- . How many victims are there?
- . Where are the victims located?
- . What kind of material is covering the victims? (Dirt, sand, concrete, pipe.)
- . Are there any hazards? (Gas, electric, water lines.)
- . Is rescue possible or is this a body recovery?
- . If rescue is possible, what equipment is needed and manpower to use it?
- . Ventilate any confined spaces mechanically and use SCBAs.
- . Use airbags and cribbing to move large objects that are trapping victim. In a tight spot, airbags may be used as shoring.
- . Use ladders for egress and bridging.
- . Be as careful in removing the shoring after the rescue as you were in installing it. The potential for further collapse is as high after the incident as it was when you arrived.
- . Plywood or sheeting should be laid along the edge of the trench for better distribution of weight for personnel who have to work there.

NOTE: Tempe Fire Department's shoring equipment is designed for protection of our personnel in a fast rescue attempt. It by no means is "safe" for every situation. Ideally, this equipment can be used in trenches up to 8' in depth and 6' in width. For larger trenches and major operations involving large collapses, the specialized equipment carried by the trench rescue team must be incorporated. Additional hydraulic shores and materials are also available from the Papago Water Treatment Plant. (Resource list on BC-7.)

Remember that collapses can still happen with shores in place. Normal dirt weighs 3800 lbs. per cubic yard. Shoring must be strong enough to hold weak walls. Two-feet of soil on a victim may be 1000 lbs. of crushing weight on his body.

SUPPLEMENTARY NOTE ON POSSIBLE USE OF BACKHOE IN RESCUE

There may be certain conditions where a backhoe may be used safely and greatly reduce the time required to recover a buried victim.

In a collapse where one wall of the trench is left intact, the buried victim's body cannot extend past that standing wall. If a backhoe and experienced operator are at the site, a parallel trench can be dug safely approximately 6" from the standing wall without danger of striking the victim. Periodically the backhoe is stopped and dirt shoveled by hand from the area covering the victim into the trench freshly dug. This dirt is then removed by the backhoe and the parallel trench deepened. This process is repeated until the victim is uncovered. (See Figure 2.)

The advantage is that the dirt on the victim is removed rapidly by shoveling downward. Pressure on the victim is relieved rapidly by the dirt falling in the parallel trench. Virtually all of the dirt is removed by the backhoe versus buckets, etc.

Factors:

- . Shore any areas that may endanger rescue personnel.
- . The area of collapse may not need to be shored if the collapsed wall is at a stable angle with no further danger of collapse. The standing wall will be cut back by the width of the parallel trench and laid back if necessary by the backhoe to prevent further collapse.
- . Rescue personnel should use helmets, SCBAs, and lifelines.

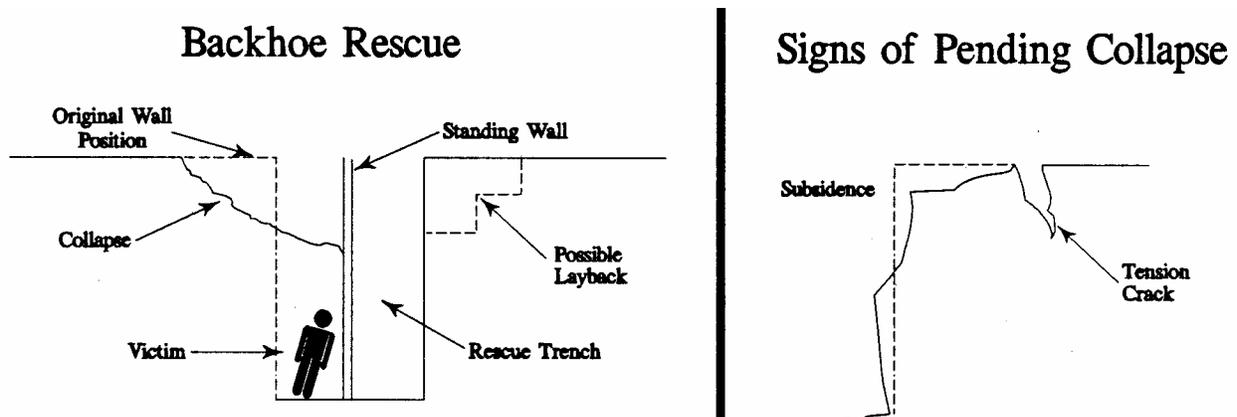


Figure 2