National Operational Guidance

Hazard

Unstable or collapsed excavations

NFCC National Fire Chiefs Council

Developed and maintained by the NFCC

Contents

Hazard - Unstable or collapsed excavations

Hazard Knowledge

Excavations may become unstable or collapse; some may be defined as, or become, confined spaces. Excavations may include trenches, pits and tunnels.

Excavations should be adequately supported, or be sloped or battered back to a safe angle. Excavation support systems (also referred to as shoring systems) are designed to stop the collapse of an excavation wall. The type and strength of the support system will be influenced by factors such as the type of material being excavated and the height and angle of the excavated face.

Support systems used for excavations need to meet and maintain various standards, as defined in guidance and regulations such as:

- The Construction (Design and Management) Regulations
- The Construction (Design and Management) Regulations (Northern Ireland)
- The Health and Safety Executive – Health and Safety in Construction
- The Health and Safety Executive - Structural stability during excavations
- The Health and Safety Executive for Northern Ireland - Construction

Excavations may become unstable or collapse due to:

- Vibration from vehicles or machinery
- Weather conditions and surface water
- Severe impact including explosions
- Loads, such as vehicles, machinery or building materials, being positioned close to an edge
- Failure of supports

Signs of collapse may include distortion or deflection of supports, tension cracks or soil movement.

The incident may involve:

- Collapse of the sides or roof
- People or objects falling into the excavation
- Materials falling onto people working in the excavation
- The undermining of nearby structures
- Damage to utilities
- Water ingress

An unstable or collapsed excavation may involve many tonnes of material, such as soil, leading to risks including entrapment under the material, or physical injuries.

Control measure - Safe system of work: Unstable or collapsed excavations

Control measure knowledge

An incident involving an unstable or collapsed excavation may require:

- Shoring
- Removal of fallen or collapsed materials
- Isolation of machinery or vehicles
- Relocation of loads, such as vehicles, machinery or building materials
- Reducing movement in the hazard area
- Appropriate location of fire and rescue service vehicles, equipment and personnel

An unstable or collapsed excavation should be assessed at the earliest opportunity. Although the initial assessment can be carried out by first responders, it may be necessary to seek specialist advice.

Specialist advice may be available from a competent person, structural engineer or tactical adviser and should be sought prior to committing personnel to the hazard area.

If personnel need to enter an unstable or collapsed excavation where the excavation support system has been compromised, it will be essential to consult with the responsible person or competent person to determine a safe system of work. This could be the contractor or a civil engineer.

The minimum number of personnel should be committed to the hazard area, especially if the assessment or monitoring indicates the potential for further collapse. There should also be emergency procedures in place, which can be initiated if required.

Where it is necessary to work around an unstable excavation, trench or other unstable surface or natural or built environment appropriate working at height procedures should be adopted. Any additional load placed in the area should be risk assessed and where possible pressure should be reduced by spreading the load, for example by using trench sheets or plywood. For more information see Unguarded edges and Spread the load.

Strategic actions

Fire and rescue services should:

- Establish arrangements with appropriate agencies to provide specialist advice, assessment and monitoring of excavations
- Ensure personnel are aware of local or national arrangements and the specialist advice available for excavations

Tactical actions

Incident commanders should:

- Avoid applying additional loads to the excavation, such as fire and rescue service vehicles, equipment and personnel
- Consider requesting specialist advice regarding unstable or collapsed natural or built environments
- Identify the type of material being excavated and the height and angle of the excavated face
- Have emergency arrangements in place for unstable or collapsed structures
- Ensure that the minimum numbers of personnel work in the hazard area for an unstable or collapsed natural or built environment

- Assess and continuously monitor the hazard area for signs of further collapse of an unstable or collapsed natural or built environment
- Seek advice or assistance for shoring from the responsible person or competent person
- Consider spreading the load of equipment or personnel to reduce the pressure on the opening

Control measure - Shoring

Control measure knowledge

Shoring can be described as temporary support to elements of a structure using metal or timber shoring systems and can be provided by urban search and rescue (USAR) teams.

Shoring provides:

- Temporary stability of structures, objects or debris
- Protection from falling debris, secondary collapse to enable search or rescue operations to proceed
- Support to vertical, horizontal or sloping surfaces

Any shoring operation should be carried out by competent personnel with the appropriate level of knowledge and training, using suitable equipment. The shoring should be continually assessed and monitored throughout the incident.

It may be necessary to use temporary shoring to save life or prevent an incident escalating. However, the equipment immediately available to fire and rescue services, or to urban search and rescue (USAR) teams, may not be of sufficient strength to substitute for excavation support systems.

On-site machinery, vehicles or equipment, such as excavation support systems or materials suitable for use as trench or pit supports, may be available. However, the available equipment may have already failed, requiring a detailed risk assessment prior to further use.

If an excavation support system has been compromised, personnel should seek the advice or assistance of the responsible person or competent person, such as the contractor or a civil

engineer.

Strategic actions

Fire and rescue services should:

- Consider providing shoring equipment and materials

Tactical actions

Incident commanders should:

- Consider requesting specialist advice and resources for shoring
- Ensure the competent person for shoring continually assesses and monitors its effectiveness
- Seek advice or assistance for shoring from the responsible person or competent person

Control measure - Cordon controls: Unstable or collapsed excavations

Control measure knowledge

To prevent collapse or further collapse of an unstable surface, trench excavation or other natural or built environment, access to the area surrounding it should be carefully controlled.

Equipment entering the area should be limited to essential items only.

An area should be identified a suitable distance away from the hazard area for personnel, equipment, machinery and any items being removed including debris. Material removed from a trench should not be placed above the area where excavation is taking place but moved a safe distance away to prevent slippage or collapse.

Where possible vehicles, machines or equipment creating vibration should be isolated or moved to

a safe distance. The movement of redistribution of weight should be risk assessed considering the risk of further collapse.

Strategic actions

Fire and rescue services should:

- Ensure personnel have access to appropriate specialist advice and equipment to assess unstable or collapsed natural or built environments
- Consider providing local equipment or access to specialist resources to enable personnel to work safely in the area around unstable or collapsed natural or built environments

Tactical actions

Incident commanders should:

- Assess the structural stability of the working environment and establish cordon controls at an appropriate distance from the hazard area
- Identify an appropriate area to locate equipment, personnel and debris to prevent further collapse of an unstable natural or built environment
- Risk assess the movement of any machinery, equipment, or vehicles prior to moving them or requesting they are moved
- Request that machines, equipment and vehicles are kept isolated or moved to a safe distance away from a natural or built environment