

The Delivery Hub health, safety and environment

Raising the bar 13

Excavations protection, access and egress

Version 1 - June 2013

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Objective

This raising the bar document is intended to address trends in areas for improvement relating to the management of excavations, particularly relating to edge protection, shoring, access/egress, inspection and training. Implementation of the guidance provided is intended to improve the safety for personnel on site and where there is a public interface, the safety of the public. Service avoidance is outside the scope of this document, however, this is addressed in another raising the bar document.

Background

Excavations pose a risk to those at ground level, in addition to those accessing, working within and exiting the excavation. This document considers the protection of people, access and egress, inspection and training.

All of this document shall be considered a minimum requirement in raising the bar.

Inadequate management of excavations has led to several fatalities in the industry:

Father-of-three Kevin West died while working in a 2.6 metre deep trench at a housing development in Windmill Road, Hamilton, in November 2004. He was asphyxiated when he became trapped under falling earth as one side of the trench gave way. Workers on the site and emergency services tried to dig him free but he did not survive.

George Wimpey (North East) Ltd was fined £300,000 after an incident in which a site worker employed by a sub-contractor was crushed to death. Neil Dunstan, 41, died when a nine foot trench he was working in collapsed on him. A second worker, Karl Buck, 28, was badly hurt in the accident at a building site near Skelton on 8 March 2004.

MCLLOUD – Family members of Keith Haddox, 44, and Justin Johnson, 32, were told shortly after they arrived at a construction accident scene that both men were dead. But relatives waited late into the night until the bodies of their loved ones were recovered, a fire chaplain said “the men were digging a 20 foot deep hole for a septic tank when it caved in on them.”

It is the intention of this document to collate best practice and through implementation ensure that nobody working in or around an excavation is placed at risk or suffers any loss.

Hierarchy of control

Prior to commencing any excavation the activity must be planned to consider alternative options, for example, directional drilling instead of open cut excavations. Alternative methods may introduce different hazards (eg service strikes) therefore a holistic review of the whole process is required.

Protection of people

All practicable steps shall be taken to prevent danger to any person to ensure that:

- Any excavation or part of an excavation does not collapse
- No material from a side or roof of, or adjacent to, any excavation is dislodged or falls; and
- No person is buried or trapped in an excavation by material which is dislodged or falls
- No person (public or site personnel) falls from height into an excavation. In order to achieve this edge protection must be ready for use as soon as the excavation is created.

To achieve this, suitable and sufficient steps must be taken to:

- Prevent any person, work equipment, or any accumulation of material from falling into any excavation
- Prevent any part of an excavation or ground adjacent to it from being overloaded by work equipment or material

Sheet piles

When correctly installed, sheet piles can provide good protection from material that may be liable to collapse and if they are of sufficient length, they can also provide edge protection for those at ground level. This should be covered in design approval and covered by company temporary works procedures.

The excavation shown in Fig 1 had sheet piles that were forming edge protection, however, they were removed and therefore further planning was required to provide edge protection once the sheet piles were removed. In Fig 2 sheet piles have not been installed appropriately and are a hazard to personnel and the pipeline. Fig 3 shows the correct method with edge protection fitted to the sheet piles as they are not high enough to provide adequate protection for personnel at ground level.

Fig 1



Fig 2



Fig 3



Trench boxes

In the planning of operations ensure that nobody is required to kneel below ground level in an unsupported trench.

Fig 4

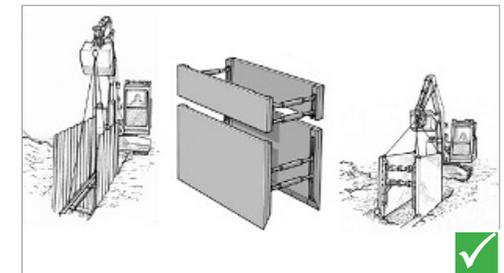


Trench boxes can be a good method of supporting an excavation, subject to design approval if there is not space for benching or sloping the sides. There are many types available and as above some have edge protection that fits to the top to avoid the need for additional scaffold handrails or barriers as shown in Fig 5.

Fig 5



Fig 6



Temporary barriers

In smaller excavations there may not be a need for sheet piles or trench boxes as benching or sloping may be adequate; however precautions still need to be taken to ensure the excavation is safe to enter if required and that personnel at ground level are protected from falls from height.

The access around the excavation as well as into it has to be considered. In Fig 7 edge protection is required around the excavation and adequate access is required to prevent site personnel falling from height (ground level) into the excavation.

Options to achieve this are shown in Fig 8, Fig 9, Fig 10 and Fig 11 providing edge protection whilst maintaining vehicle or pedestrian routes around the work area. This should be of sufficient strength to stop a stumbling person. Fig 12 shows rawbolts used to anchor the feet of the crowd barrier directly into the concrete base (fixed under permit to dig/break ground) so that it provides robust edge protection.

Edge protection must protect site personnel as well as the public and any openings in edge protection, for example to allow access for plant should be kept as small as practical and operatives should not be within two metres of an open edge.

Fig 7

Poor performance



Fig 8

Plastic barriers



Fig 9

Plastic barriers



Fig 11

Plastic barriers



Fig 10

Scaffold solution



Fig 12

Fixed crowd barriers



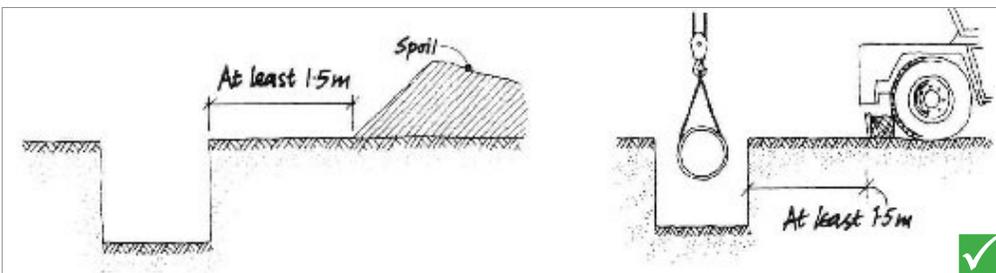
Protection of excavations and adjacent structures

When excavating provision needs to be made for spoil to ensure it is not stored against adjacent structures (eg scaffold Fig 13). Excavations should also be an adequate distance from adjacent structures to prevent undermining foundations. Spoil or plant should be 1.5m away from the edge of an excavation as show in Fig 14.

Fig 13

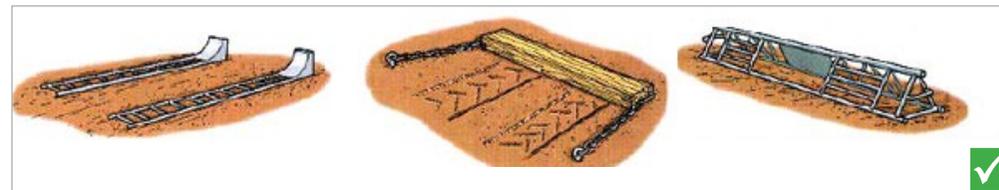


Fig 14



When planning deliveries ensure that the edge of excavations are protected to prevent plant or delivery vehicles overshooting the edge of the excavation or driving too close and endangering the integrity of the excavation. Possible solutions are shown in Fig 15 utilising tracks or wooden or metal blocks to prevent vehicles moving too close to the edge of the excavation. Plant edge protection should be at least half the height of the wheel of a vehicle that may be approaching.

Fig 15

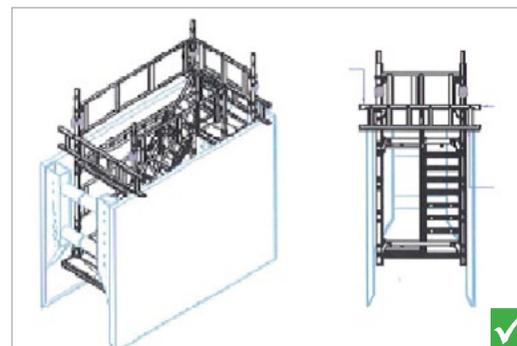


Access/egress

Where possible, entry should be eliminated through use of remote control equipment or other control measures. Where entry is necessary, all excavations must have a dedicated means of access that is secured. In shallow excavations this may be a ramp with handrail or steps. In deeper excavations it is likely to be a ladder or stairway.

Access into deep excavations for the installation of large and medium diameter drainage pipes has traditionally been via a set of ladders. An alternative to be considered is to use a system scaffold staircase (Fig 16) hung from two scaffold ladder beams that rest on the top of the trench box and can be lifted and moved from one box to the next as the drainage run continues.

Fig 16



Inspection

Before work commences, the excavation and any work equipment and materials which affect its safety, must have been inspected and recorded by a competent person:

- at the start of the shift in which the work is to be carried out
- after any event likely to have affected the strength or stability of the excavation and
- after any material unintentionally falls or is dislodged.

Where remedial actions are identified, work shall not be carried out in the excavation until the matters have been satisfactorily remedied.

Excavation tags (similar to Scaff Tags), should be considered to provide a visual check that the excavation is safe to enter and provides a record of the last inspection at the workfront.

A proforma for checking the management of excavations is provided in [Appendix 1](#).

Training

Excavation inspectors must be competent in the following areas:

- Legal obligations covering the provision and use of excavation supports
- The ability to identify excavation supporting components and know the reasons for their use
- Knowledge of standard battering back/Stepping and where and when the requirements for calculations and design are triggered
- Understanding why excavations fail, including typical warning signs and typical structural defects.
- Techniques of inspection and the completion and recording of excavation inspection reports
- Foundations
- Access and egress

In assessing competence contractors should consider providing internal excavation inspection courses to increase awareness amongst excavation inspectors.

Appointed excavation inspectors can be detailed in the construction phase health and safety plan.

When providing training it can be useful to relate quantities of material to everyday life, eg the material highlighted in [Fig 17](#) that in different circumstances may fall onto someone in an excavation is an equivalent weight to a small car ([Fig18](#)).

Fig 17



Fig 18



Guidance

HSG47 Avoiding danger from underground services.

Health and Safety Executive case studies:

<http://www.hse.gov.uk/electricity/excavations/index.htm>

Appendix 1

Excavation inspection checklist

Location	Date
Audit	Auditor

		Yes/ No	Action required
1	Has the excavation been created using the methods stated in the risk assessment/method statement and have all operatives read and signed them		
2	Is the whole area around the excavation securely fenced off to prevent access to unauthorised people at the end of each shift		
3	Is there adequate entry provision into the excavation complete with properly secured and suitable ladders and/or handrails		
4	Is there any documented evidence that that the excavation has been inspected on a daily and weekly basis		
5	Is there adequate edge protection completely enclosing the excavation and preventing accidental falls of people and plant		
6	Are de-watering measures in place and do they provide adequate facility to remove all water to an agreed location		
7	Is the spoil/top soil properly stored and sufficiently remote from the excavation to allow sufficient access and prevent uncontrolled collapse		
8	Are all working areas within the excavation clean, tidy and free from debris		
9	Are there any signs of water ingress, trench collapse, undermining of walls or any other signs of cave-in		

Action/follow-up plan

Signed

Date

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