Workplan: Excavation and Trenching

An excavation is any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal. Trench is a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width.

10 Step Workplan for Excavation and Trenching

Cave-ins are the greatest risk to workers in an excavation or trench. Other hazards include falling loads, moving equipment, falls, confined space hazards, and hazardous atmospheric conditions.

Use this workplan as a guide for managing and maintaining safe excavation work.

1. Regulatory Requirements

All employers must provide a workplace free of recognized hazards that may cause serious injury or death. As a supervisor you must understand and follow regulatory requirements for trenching and excavation work. This includes using protective systems to protect workers from cave-ins. A written plan is also required and must outline excavation safe work practices, definitions of key terms, instructions for testing soil, and inspection guidelines.

2. Designate Competent Person/Persons

A competent person is someone designated by the employer, who can identify existing and predictable hazards or working conditions which are hazardous or dangerous, and who is authorized to take prompt corrective measures to eliminate them.

The competent person(s) on site is responsible for assessing specific hazards and hazardous conditions including:

- Equipment and vehicle traffic

- Location and condition of structures near the dig site, such as underground and overhead utilities.
- Soil classification and type
- Water sources – surface water and groundwater; water table location
- Overhead and underground utilities
- Weather

3. Determine Soil Type

Excavation work is dangerous, and a hazard assessment must be done before any excavation or trenching work is started. This assessment begins by determining the type of soil. A competent person must determine the soil type using visual and manual tests.

Visual Tests

The entire excavation site, including soil adjacent to the site, will be checked for tension cracks, indications of layered geologic structuring on the open side of the excavation, signs of bulging, boiling, or sloughing, as well as signs of surface water seeping from the side of the excavation or from the water table.

Manual Tests

1. Thumb penetration test
2. Dry strength test
3. Plasticity or wet thread test
4. Soil compression strength test

Soil Types

The type of soil determines the strength and stability of trench walls. In most Canadian provinces, soil types fall into four categories:

- Type 1
- Type 2
- Type 3
- Type 4

In the U.S. there are also four types of soil, but the naming

convention is different.

- Stable Rock
- Type A
- Type B
- Type C

Moisture content also affects soil strength. Once opened, the moisture content of the soil begins to change almost immediately. This can affect the strength of the walls. The longer an excavation is left open the greater the risk is for cave-in.

4. Identify and Remove Sources of Vibration

Vibrations from nearby equipment, machines, vehicle traffic, and operations such as earth moving, compactions, pile driving, and blasting can all affect the stability of the excavation and contribute to the collapse of excavation and trench walls.

Place barricades to keep unnecessary equipment out of the excavation area. If possible, divert traffic away from the site. Don’t allow workers to be in an excavation when blasting or other similar operations are taking place.

5. Location of Spoil Piles

Excavated soil, equipment and other material located next to an excavation puts pressure on the excavation’s walls and can lead to cave-in. It can also lead to equipment or soil falling into the excavation and onto workers.

Keep soil and equipment at least 1 meter (2 feet in the US) away from excavation and trench edges.

6. Access and Egress

Whether protected by sloping, boxes, or shoring, trenches must be provided with ladders so that workers can enter and exit safely. Ladders must:

- Be placed within the area protected by the shoring or trench box.
- Be securely tied off at the top.

- Extend above the shoring or box by at least 1 meter (3 feet).
- Be inspected regularly for damage.

7. Protective Systems

Designing a protective system requires consideration of many factors, including: soil classification, depth of cut, water content of soil, weather and climate, and other operations in the vicinity. Choose the most practical design that will provide the necessary protections. The most common protective systems are:

- Sloping and benching the sides of the excavation;
- Supporting the sides of the excavation; or
- Placing a shield between the side of the excavation and the work area.

8. Preplanning

Waiting until after the work starts to correct mistakes in shoring or sloping slows down the operation, adds to the cost of the project, and makes a cave-in or other excavation failure more likely.

Before preparing a bid, you should know as much as possible about the jobsite and materials needed to perform work safely and in compliance with safety standards. Factors to consider:

- Traffic
- Proximity and physical condition of nearby structures
- Soil classification
- Surface and ground water
- Location of the water table
- Overhead and underground utilities
- Weather
- Quantity of shoring or protective systems that may be required
- Fall protection needs
- Number of ladders that may be needed
- Other equipment needs

You can gather the information through jobsite studies,

observations, test borings for soil type or conditions, and consultations with local officials and utility companies. This information will help determine the amount, kind, and cost of safety equipment needed to perform the work safely.

9. Inspections

A competent person must inspect excavations, adjacent areas, and protective systems daily for possible cave-ins, indications of failures in protective systems and equipment, hazardous atmospheres, and other hazardous conditions.

Inspections must be done prior to the start of work and as needed throughout the shift and are required after natural events, such as rainstorms, or other hazard-increasing occurrences, such as blasting work.

If unsafe conditions are found during an inspection, workers must be moved away from the hazardous area until the necessary safety precautions have been taken.

10. Training

Any worker who has a part in any excavation work must be trained on the procedures and responsibilities they have for working safely in excavations and trenches. This includes the competent person, supervisors, equipment operators, and the workers down in the excavations. Training must cover hazards, protective measures and PPE required, how to identify potential and existing hazards and report dangerous conditions.

Bottom Line

There are few activities as risky as excavation and trench work. Don’t make your workers choose between putting their lives at risk and doing their job. Train and protect them.