EXCAVATION SAFETY

DEFINITION,OBJECTIVES & AIM OF EXCAVATION

- The act or process of digging, especially when something specific is being removed from the ground is known as **EXCAVATION.**
- Excavations can be classified, from the point of view of their purpose, as planned, rescue, or accidental. Most important excavations are the result of a prepared plan—that is to say, their purpose is to locate buried evidence about an archaeological site.

TYPE OF EXCAVATION

1) Trench Excavation.
2) Basement Excavation.
3) Cut and Fill Excavation.
4) Slope Excavation.
5) Dredging.
6) Footing Excavation.
7) Pit Excavation.
8) Rock Excavation.
9) Channel Excavation.
10) Trenchless Excavation.
11) Underwater Excavation.

HAZARDS IN EXCAVATION SITE

1. Cave-ins and collapses
2. Falling objects
3. Hazardous atmospheres
4. Underground utilities
5. Equipment accidents
6. Material Handling and Storage
7. Noise and Vibration
8. Confined Spaces
9. Fire and Explosions

TRENCH EXCAVATION

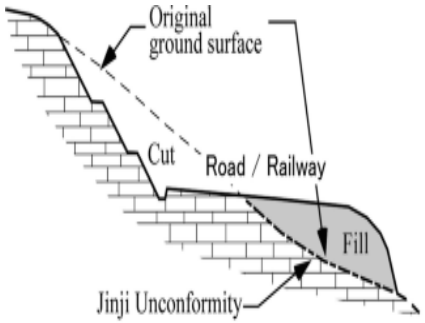
A trench is defined as a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth of a trench is greater than its width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m).

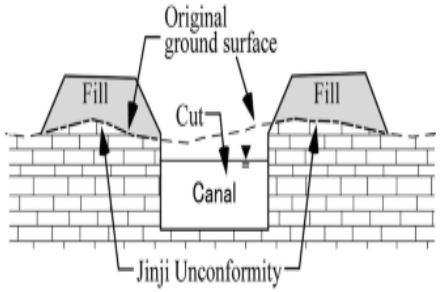
BASEMENT EXCAVATION.

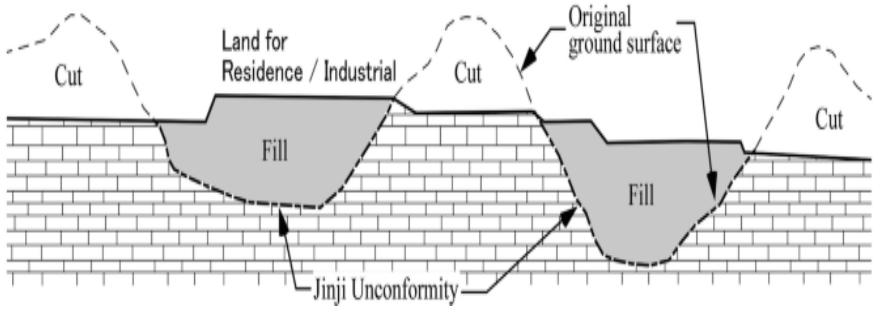
Basement excavation is the process of removing dirt, rock, and other debris to create space for a basement. Typically it is the first step in building work, as excavated material gets displaced, leaving a hole in the ground where a home's basement will be built.

CUT AND FILL EXCAVATION

Cut and fill excavation, also known as excavation and embankment is the process where excavators move and place volumes of material to create optimal terrain for a road, railway or canal.







SLOPE EXCAVATION

Slope excavation is one of the most crucial steps in the construction of a hydraulic project. Excavation project quality assessment and excavated volume calculation are critical in construction management. The positioning of excavation projects using traditional instruments is inefficient and may cause error.

DREDGING

Dredging means removing contaminated sediment from a water body, either while it is submerged (dredging) or after water has been diverted or drained (excavation). Both methods typically necessitate transporting the sediment to a location for treatment and/or disposal.

FOOTING EXCAVATION

Footings are foundations structures used to support buildings, bridges, and other structures by spreading the load so that the heavy structure above doesn't sink or collapse. Footing excavation occurs after a building site has been properly graded, at which point excavation can begin.

PIT EXCAVATION

Pit excavation is performed to create large, deep holes in the ground for various purposes, such as mining, quarrying, or archaeological digs. Heavy machinery like cranes, drills, and explosives are utilised in pit excavation. Safety equipment, lifting devices, and blasting materials are crucial for the safety and efficiency of pit excavation.

ROCK EXCAVATION

Rock excavation shall be defined as the excavation of all hard, compacted or cemented materials that require blasting or the use of ripping and excavating equipment larger than defined for common excavation.

CHANNEL EXCAVATION

Channel excavation consists of removing materials from channels, drainage ditches, and so on for one of several purposes, but often to change the flow of water or increase capacity. This could help to alleviate flooding or alternately, stagnation and sediment build-up.

TRENCHLESS EXCAVATION

Trenchless technology is a type of subsurface construction work that requires few trenches or no continuous trenches. It is a rapidly growing sector of the construction and civil engineering industry.

UNDERWATER EXCAVATION

Underwater excavation is conducted in submerged or partially submerged areas to facilitate construction projects like bridge piers, offshore structures, or underwater pipelines. Techniques such as dredging, hydraulic excavation, and remote-operated vehicles (ROVs) are employed in underwater excavation.

MEASURE HAZARDS IN EXCAVATION

- **Cave-ins and Collapses :-** Among the most concerning risks are cave-ins, where soil or rock unexpectedly falls, trapping workers. Understanding soil stability and employing proper shoring techniques are essential.

Control Measures for Cave-ins :-

- Conduct thorough geotechnical assessments before starting excavation work to determine the stability of the soil or rock.
- Implement proper shoring, sloping, or benching techniques to prevent the collapse of excavation walls.
- Provide protective systems such as trench boxes or shields to ensure the safety of workers inside the trench.

Falling objects :-

Objects such as tools, equipment, or materials can fall into the excavation, posing a risk to workers below. These falling objects can cause serious head injuries or other physical harm.

Control Measures for Falling Objects :-

- Secure tools and equipment using lanyards or tethering systems.
- Use barricades or signage to prevent unauthorized access to the excavation area.
- Ensure proper storage of materials away from the edges of the excavation.

- **Hazardous Atmospheres :-** Excavation areas might contain hazardous gases or low oxygen levels, leading to respiratory issues or suffocation. Continuous monitoring and proper ventilation are crucial.

Control Measures for Hazardous Atmospheres :-

- Test the air quality in the excavation using gas detectors or monitors.
- Provide proper ventilation or use respiratory protective equipment if necessary.
- Follow confined space entry procedures when working in excavations with potentially hazardous atmospheres.

Underground utilities :-

Excavation work may involve the presence of underground utilities such as electrical cables, gas pipelines, or water lines. Accidental contact with these utilities can lead to electric shocks, explosions, or water-related accidents.

Control Measures for Underground Utilities :-

- Conduct thorough utility surveys before excavation to identify and mark the location of underground services.
- Use non-destructive excavation techniques to expose utilities safely.
- Follow proper isolation and lockout/tag out procedures when working near live utilities.

Equipment accidents :-

The use of heavy machinery and equipment in excavation work can pose risks if not operated and maintained properly. Accidents involving equipment can result in severe injuries or fatalities.

Control Measures for Equipment Accidents :-

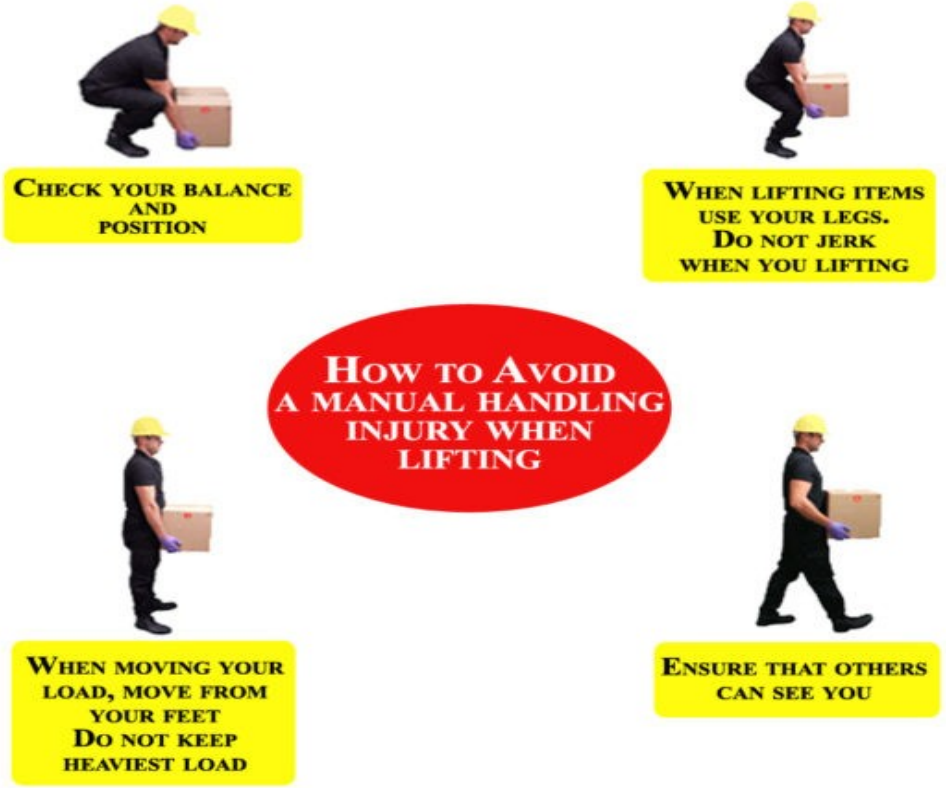
- Ensure that operators are trained and competent in using the equipment.
- Conduct regular maintenance and inspections to ensure equipment safety.
- Provide personal protective equipment (PPE) such as hard hats, gloves, and high-visibility clothing.

Material Handling and Storage :-

Improper handling and storage of materials in and around excavations can lead to accidents such as falling objects or collapsing stockpiles. Workers can be struck by materials or trapped underneath them.

Control Measures for Material Handling and Storage :-

- Train workers on proper material handling techniques.
- Store materials in designated areas away from the excavation edges.
- Use mechanical lifting aids or equipment when handling heavy or bulky items.



Noise and Vibration :-

Excavation work often involves the use of equipment that generates high levels of noise and vibration. Prolonged exposure to these workplace_ hazards can lead to hearing loss, musculoskeletal disorders, or other health issues.

- **Control Measures for Noise and Vibration**
- Provide workers with hearing protection devices such as earplugs or earmuffs.
- Schedule regular breaks to minimize the duration of exposure to noise and vibration.
- Maintain equipment in good condition to reduce noise and vibration levels.

Control Measures for Confined Spaces :-

- Follow confined space entry procedures, including proper permits and atmospheric testing.
- Provide adequate ventilation or use appropriate respiratory protection in confined spaces.
- Train workers on the hazards and safe work practices specific to confined spaces.

Confined Spaces :-

Excavations can sometimes create confined spaces that pose additional risks to workers. Confined spaces have limited entry and exit points, poor ventilation, and the potential for hazardous atmospheres.

Fire and Explosions:-

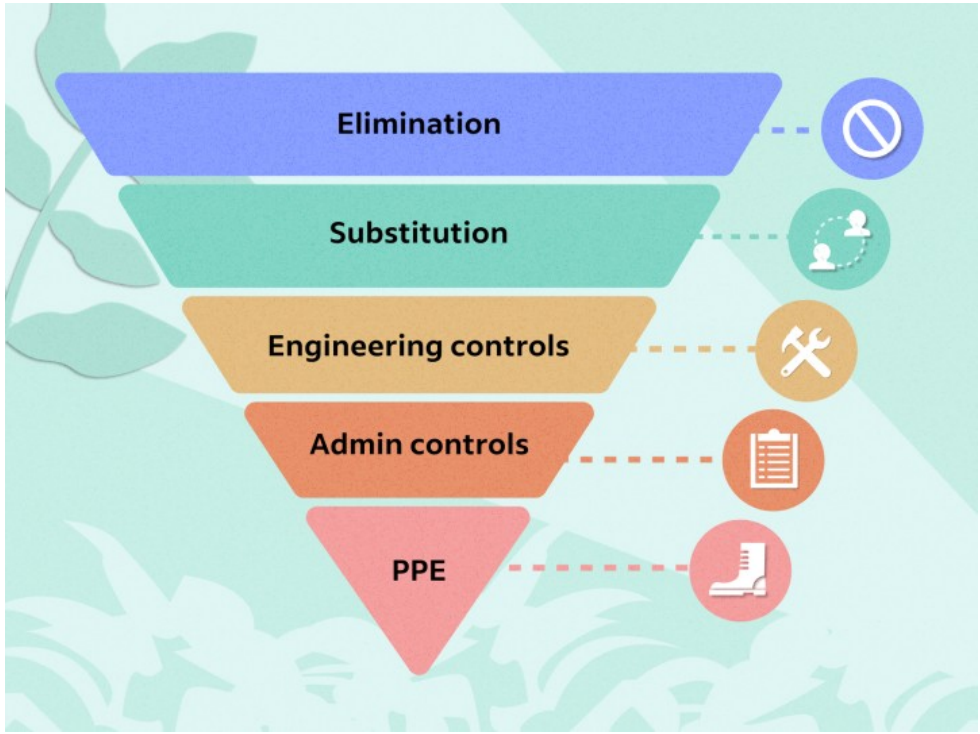
Certain excavation activities, such as welding or working near flammable substances, can create fire and explosion hazards. Ignition sources in excavations can lead to catastrophic incidents.

RISK ASSESSMENT FOR EXCAVATION

The area must be scanned for underground services and a permit is required to excavate before the work commences. For the security of excavation and the safety of the general public, the excavation area must have 2-meter-high fencing, situated at a safe distance from the work.

STAGES OF SAFETY CONTROL

- **Elimination :** – Physically remove the hazard.
- **Substitution :** – Replace the hazard.
- **Engineering controls :** – Isolate people from the hazard.
- **Administrative controls :** – Change the way people work.
- **Personal protective equipment :** – Protect the worker with PPE.



SUMMARY

Excavation Safety is a standardized set of safety precautions for trenching and excavation to eliminate hazards and control risks in compliance with regulations. It is also referred to as Trenching and Excavation Safety as often cited by the U.S. Occupational Safety and Health Administration (OSHA).