

Hazard Awareness - Permit Required Confined Spaces (PRCS)

VARIOUS TYPES OF CONFINED SPACES

Marine Vessels	Silos
Barges	Hoppers
Stationary Tanks	Elevators
Mobile Tanks	Kilns
Railcars	Manholes
Tunneling	Basins
Blenders	Sewer Lines
Pits	Pipes
Machines	Lift Stations
	Diked Areas

MARITIME

<u>Enclosed Spaces</u>	<u>Confined Spaces</u>
Cargo holds	Double bottom tank
Tanks	Wing tank
Quarters	Cofferdam
Machinery	
Boiler Spaces	

EXAMPLES OF POTENTIAL HAZARDS

- Atmospheric Hazard**
- Electrocution
- Unexpected energy/ startup
- Struck by/against
- Caught by/under/ against
- Falling from above to surface
- Falling loads or debris

ACCEPTABLE ATMOSPHERIC CONDITIONS

<i>Gas</i>	<i>Ideal</i>	<i>PEL</i>
Oxygen	20.9%	19.5% to 23.5% - GI & Constr.
Oxygen	20.9%	19.5% to 22.0% - Maritime
LEL	0.0%	Less than 10%
H2S	0.0ppm	Less than 10ppm
CO	0.0ppm	Less than 35ppm-50ppm*

AUTHORIZED ENTRANT DUTIES

- Know Hazards and what can go wrong
- Properly use equipment: testing, PPE, communication, ventilation
- Communicate with attendant as needed by voice, radio, hand signals, air horn, and rope method (OATH), etc...
- Alert attendant if permit conditions change
- Exit as quickly as possible in an emergency or upon being ordered to do so

ATTENDANT DUTIES

- Knows hazards and what can go wrong
- Aware of behavioral effects/ know signs to look for
- Knows how many people are in confined space at all times
- Never enters confined space
- Maintains communication at all times
- Monitors all activity inside and outside of the confined space and is able to identify prohibited conditions
- Summons rescue personnel if necessary
- Warns and notifies others or unauthorized entrants
- Performs non entry rescue when necessary
- Performs no duties other than attendant/hole watch, and never leave position while people are in the confined space or unless relieved

SUPERVISOR DUTIES

- Know Hazards and what can go wrong
- Verifies entries on the permit
Air Quality/ Atmospheric testing
Corrosives, Oxygen, LEL, Toxins
- Terminates permit upon completion or any unauthorized changes in or around PRCS
- Verifies rescue services are available
- Removes unauthorized people from PRCS
- Determines when responsibilities are transferred such as shift change, new permits, cease work

RESCUE & EMERGENCY SERVICES SELECTION

- Evaluate prospective rescuer's ability to rescue as summoned in a timely manner
- Evaluate prospective rescuer's proficiency
- Select rescue team from those evaluated
- Informed each rescue team or service of hazards they may confront
- Provide access to rescue personnel to all areas where rescue may take place so that evaluations and plans may be made
- Provide PPE to rescue team
- Train affected employees in rescue operations
- Train affected employees in basic first aid/CPR
- Ensure rescue personnel practice rescues at once every 12 months

CONFINED SPACE (must be all three below) :

- Large enough for an employee to enter fully & perform assigned work;
- Not designed for continuous occupancy by the employee; and
- Has a limited or restricted means of entry or exit.

EMERGENCY any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

PERMIT-REQUIRED CONFINED SPACE has one or more of these characteristics:

- Contains or has the potential to contain a hazardous atmosphere;
- Contains a material with the potential to engulf someone who enters the space;
- Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; and/or
- Contains any other recognized serious safety or health hazards.

OSHA Relative Standards: 29 CFR 1910.146 and 29 CFR 1926.1200

EHS911© COMPETENT PERSON EXCAVATION QUICKCARD

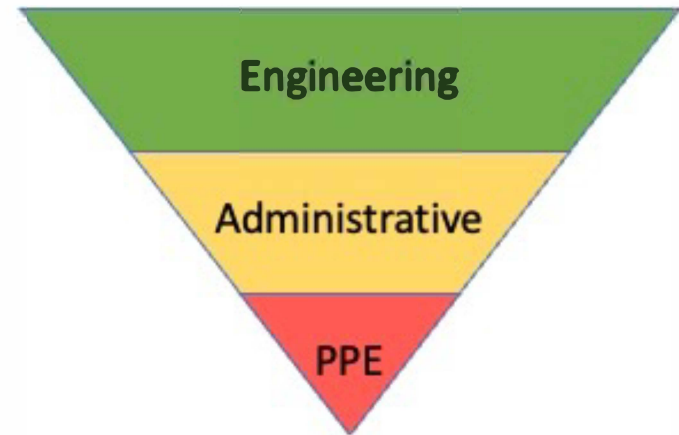
COMPETENT PERSON RESPONSIBILITIES

R- Recognize Existing and Predictable Hazards
E - Evaluate hazards and standards that apply
C – Control or eliminate hazards

COMPETENT PERSON

1) Person capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and

2) Has authorization to take prompt corrective measures to eliminate them" [29 CFR 1926.32(f)].



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ATMOSPHERIC TESTING

All tunnels and base holes will be atmospherically tested in order to complete the initial JSA in order to assure safe oxygen, LEL, CO & H₂S levels.

All other excavations greater than 4 feet in depth will also be atmospherically tested in order to complete the initial JSA in order to assure safe oxygen, LEL, CO & H₂S levels

ACCEPTABLE ATMOSPHERIC CONDITIONS

<i>Gas</i>	<i>Ideal</i>	<i>PEL</i>
Oxygen	20.8%	19.5% to 23.5%
LEL	0.0%	Less than 10%
H ₂ S	0.0ppm	Less than 10ppm
CO	0.0ppm	Less than 35ppm

ppm - Parts Per Million

% - Percentage

PEL - OSHA Permissible Exposure Limit

PROTECTIVE SYSTEMS

Benching steps or stairs made of the dirt and no more than 4 feet high per step.

Cannot bench Type C soil since it can crumble.

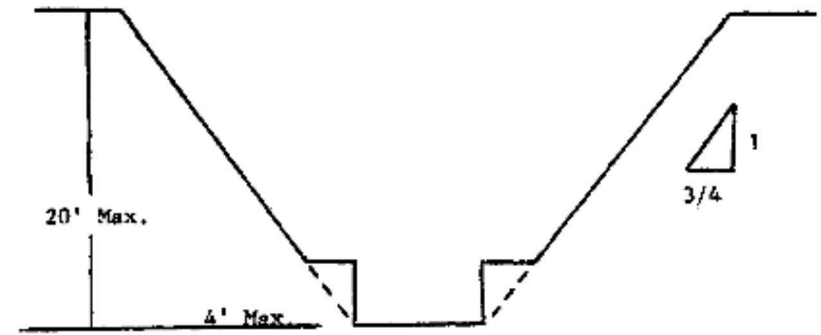
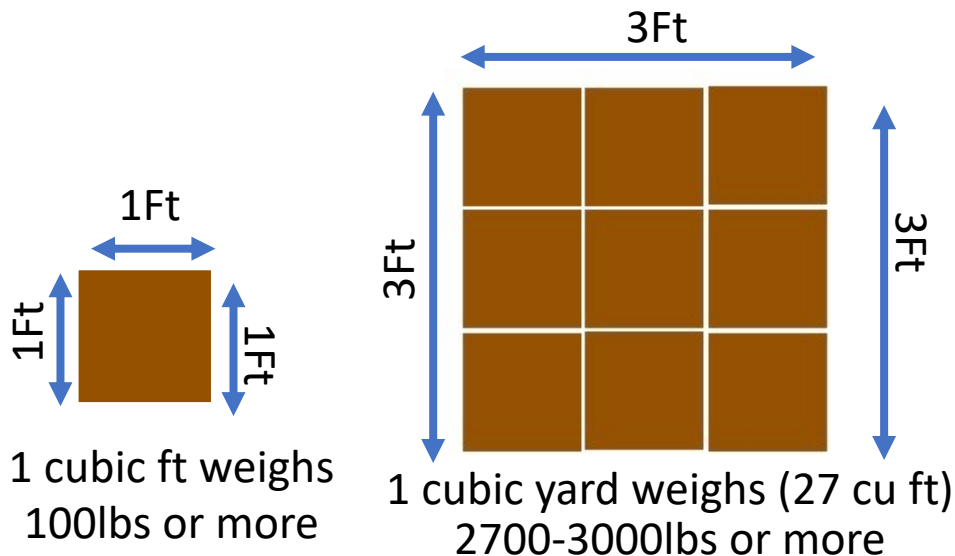
Sloping cutting back the trench wall at an angle inclined away from the excavation.

Shoring aluminum hydraulic or other types of supports to prevent soil movement and cave-ins and holding the walls up to prevent collapsing. Also, installing sheathing and driving it down with the excavator.

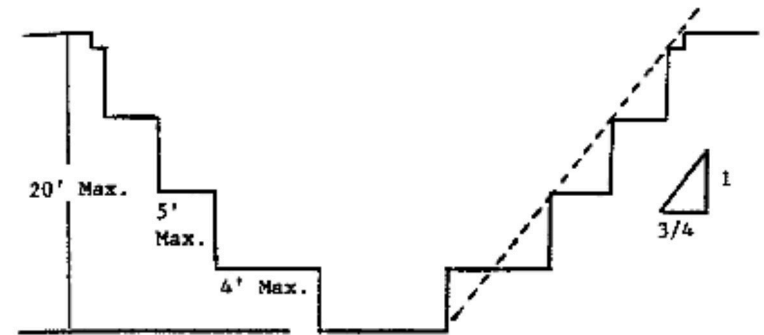
Shielding trench boxes to stop collapsing soil from engulfing the excavation occupants.

SOIL WEIGHT

Depending On The Density And Water Content on average dirt weighs:



SIMPLE BENCH



MULTIPLE BENCH

Shoring



Trench Box Shielding



SOIL TYPES

SOLID ROCK

TYPE A: 1.5 TSF and greater	Cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam
TYPE B: .5 TSF to 1.5 TSF	Angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam
TYPE C: .5 TSF and less	Granular soils including gravel, sand, and loamy sand

Industry recognizes Type C Soil in both C-60 and C-80. C-80 weighs more due to more moisture content. You cannot use aluminum shoring on C-80. OHSA only Rock, A, B, C.

In environments where the excavation is greater than 5 feet deep or if walls are at risk of caving in depths. Less than 5 feet, any sloping and/or shoring will be conducted for Type C soil classification. Any exceptions to this policy must be approved by the corporate office at which time additional documentation will be completed in order to assure accurate soil classification and the selection of the protective system

Soil		Slope Rule	Slope Calculator	
Rock		n/a	n/a	
Type A	53°	1 : 3/4	1 to .75	
Type B	45°	1 : 1	1 to 1	
Type C	34°	1 : 1-1/2	1 to 1.5	
Type A Short Term Exception		1 : 1/2	1 to .5	24 hour or less open AND 12 feet deep or less

TRENCH SAFETY MEASURES

- Call 811 before you dig. 2-3 business days for utilities to mark.
- 2 Ft. Spoil piles and encumbrances away from excavation
- 4 Ft. Provide egress like ladder, stairs or ramp
- 4 Ft. Monitor atmosphere if chemical presence suspected
- 5 Ft. Protective system like sloping/benching, shoring, shielding designed by Qualified Person by supervised & inspected by Competent Person
- 20 Ft or deeper need RPE to sign off on protective system
RPE= Registered Professional Engineer licensed in that state

COMPETENT PERSON

- Required for excavation supervision, protective system implementation, pre-shift inspections, and after any weather event
- trenches daily and as conditions change to ensure elimination of excavation hazards.
- Will determine soil type by using at least a visual observation and a physical test like thumb test, pencil, ribbon test, penetrometer or shear vein

ACCESS AND EGRESS

- Keep heavy equipment away from trench edges.
- Identify other sources that might affect trench stability.
- Keep excavated soil (spoils) and other materials at least 2 feet from trench edges.
- Know where underground utilities are located before digging

EXCAVATION VS TRENCH

OSHA defines an excavation as any man-made cut, cavity, trench, or depression in the Earth.

A Trench is an excavation that is deeper than it is wide and the bottom width is no wider than 15ft

HAZARDS INCLUDE

Trenching and excavation work presents serious hazards to all workers involved. Cave-ins pose the greatest risk and are more likely than some other excavation-related incidents to result in worker fatalities. One cubic yard of soil can weigh as much as a car. An unprotected trench can be an early grave. Employers must ensure that workers enter trenches only after adequate protections are in place to address cave-in hazards. Other potential hazards associated with trenching work include falling loads, hazardous atmospheres, and hazards from mobile equipment.

- Test for atmospheric hazards such as low oxygen, hazardous fumes and toxic gases when 4 feet deep or deeper
- Inspect trenches at the start of each shift
- Inspect trenches following a rainstorm or other water intrusion
- Do not work under suspended or raised loads & materials
- Inspect trenches after any occurrence that could have changed conditions in the trench
- Ensure that personnel wear high visibility or other suitable clothing when exposed to vehicular traffic

CONDITIONS THAT CAN LEAD TO TRENCH FAILURE

- Previously excavated soil that's been disturbed, making it unstable
- Trench intersections where large sections of earth may break away, crack or fissure
- Narrow right-of-way areas where heavy equipment operates too close to the trench edge
- Vibrations from construction machinery, passing traffic or trains
- Increased groundwater saturation, making the soil unstable and prone to collapse
- Drying of exposed trench walls, leading to moisture loss and weakening soil cohesion
- Inclined soil layers sloping into the trench, causing different soil types to shift and trigger wall collapse

CONDITIONS THAT COULD LEAD TO AN EXCAVATION OR TRENCH COLLAPSE

- ❑ Inadequate Shoring or Shielding – Lack of trench boxes, shoring, or other protective systems.
- ❑ Poor Soil Conditions – Loose, sandy, or water-saturated soil increases the risk of collapse.
- ❑ Excessive Vibration – Nearby equipment, traffic, or blasting can cause trench walls to fail.
- ❑ Water Accumulation – Rain, groundwater, or leaks can weaken trench stability.
- ❑ Improper Sloping or Benching – Failure to use the correct angle based on soil type.
- ❑ Heavy Loads Near the Edge – Spoil piles, machinery, or materials too close to the trench can cause cave-ins.
- ❑ Previous Disturbance of Soil – Excavations in backfilled or previously disturbed areas are more prone to collapse.
- ❑ Failure to Conduct Soil Analysis – Not identifying soil type to determine the correct protective system.
- ❑ Lack of Daily Inspections – Trenches not inspected before each shift or after weather changes.
- ❑ Sudden Changes in Weather – Heavy rain, freezing, or extreme temperatures affecting soil stability.

KEY EXCAVATION SAFETY GUIDELINES TO REMEMBER

- ❑ Obtain Approval – Never enter an excavation without approval from a competent person on-site.
- ❑ Daily Inspections – Check the excavation daily for environmental changes such as rain, frost, or vibrations from heavy equipment.
- ❑ Permit Compliance – Ensure the excavation is inspected and any required permits are obtained before entry.
- ❑ Wear Proper PPE – Use hard hats, safety glasses, work boots, gloves, and respirators if necessary.
- ❑ High-Visibility Clothing – Wear reflective or highly visible material or vests when exposed to vehicle traffic.
- ❑ Avoid Water Accumulation – Exit the trench immediately if water starts collecting.
- ❑ Stay Clear of Suspended Loads – Do not walk under loads being handled by power shovels, derricks, or hoists.
- ❑ Keep a Safe Distance – Stay clear of vehicles that are actively being loaded.
- ❑ Be Alert – Continuously watch and listen for potential hazards.
- ❑ Avoid Overlapping Work Zones – Do not work above or below another worker on sloped or benched excavation walls.
- ❑ Secure the Excavation – Use barricades to prevent unauthorized access by pedestrians and vehicles.
- ❑ Verify Permit Needs – Check with a supervisor to determine if excavation permits are required before entry.
- ❑ Exit Accessibility – Ensure ladders or ramps are placed every 25 feet in trenches deeper than 4 feet.
- ❑ Monitor Trench Stability – Have someone stationed above to observe the trench walls when workers enter.

READY TO START DIGGING?



What is 811?

811 is the national call-before-you-dig phone number. Anyone who plans to dig should call 811 or go to their **state 811 center's website** before digging to request that the approximate location of buried utilities be marked with paint or flags so that you don't unintentionally dig into an underground utility line.



When do I call 811?

You should call 811 or use your **state 811 center's website** a few business days before you begin any digging, including common projects like planting trees and shrubs or installing fences and mailboxes. The specific amount of advance notice that you are required to provide varies by state.



What info do I need before calling 811?

You will need to know the address of where you plan to dig, including the county and nearest cross street, as well as the type of project you're completing and the exact area on the property where you're planning to dig. Whether you call 811 or make your request online, you'll need the same info.



After I call 811, what do I do?

You need to wait a few days to allow utilities to respond to your request and ensure that all utilities have indeed responded to your request before breaking ground. Once all utilities have marked their buried lines, you should dig carefully around any utility marks and consider relocating projects that are close to buried utilities.



All 50 States & US Territories follow the same standardized underground utility color code



White

Proposed Excavation



Pink

Temporary Survey Markings



Blue

Potable Water



Green

Sewer and Drain Lines



Purple

Irrigation and Slurry Lines,
Reclaimed Water



Red

Electrical Power Lines, Cables,
Conduit and Lighting Cables



Yellow

Gas, Oil, Steam, Petroleum or
Gaseous Materials



Orange

Communications, Alarm or
Signal Lines, Cables or Conduit