



1-800-UR-RENTS

TRENCH/EXCAVATION COMPETENT PERSON VISOR GUIDE

DEFINITIONS

Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Intent: In order to be a "competent person" for the purpose of this standard one must have had specific training in, and be knowledgeable about, soils analysis, the use of protective systems, and the requirements of this standard and must be designated by the employer.

Inspections: Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rain storm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

GENERAL REQUIREMENTS

- ▶ Protecting **SURFACE ENCUMBRANCES** that may create a hazard to employees.
- ▶ Locating **UNDERGROUND INSTALLATIONS** prior to opening an excavation.
- ▶ Providing appropriate **ACCESS AND EGRESS**. ≥ 4 feet.
- ▶ Reducing employees **EXPOSURE TO VEHICULAR TRAFFIC** with the use of warning vests.
- ▶ Employee **EXPOSURE TO FALLING LOADS** shall be eliminated.
- ▶ Providing a **WARNING SYSTEM FOR MOBILE EQUIPMENT** operating adjacent to or near an excavation.
- ▶ Testing the air in excavations to identify potentially **HAZARDOUS ATMOSPHERES**. ≥ 4 feet.
- ▶ **PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION.**
- ▶ Ensuring the **STABILITY OF ADJACENT STRUCTURES.**
- ▶ Adequate **PROTECTION OF EMPLOYEES FROM LOOSE ROCK OR SOIL** that may fall or roll into an excavation.
- ▶ Daily **INSPECTIONS** by a competent person (see above definition)
- ▶ Appropriate **FALL PROTECTION** near excavations. ≥ 6 feet.

REQUIREMENTS FOR PROTECTIVE SYSTEMS

Each employee in an excavation shall be protected from cave-ins by an adequate protective system except when excavations are less than 5 feet (4 feet, WA) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

Disclaimer: For use by the trained and knowledgeable "competent person" only. Refer to appropriate requirements of your local city, county, state, federal regulations or manufacturer's tabulated engineering for further clarification.

SOIL CLASSIFICATION

Type A-25 Soil:

Cohesive soils with an unconfined, comprehensive strength of 1.5 ton per square foot (tsf) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A.

However, no soil is Type A if:

- (1) The soil is fissured; or
- (2) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- (3) The soil has been previously disturbed; or
- (4) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- (5) The material is subject to other factors that would require it to be classified as a less stable material.

Type B-45 Soil:

- (1) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf; or
- (2) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- (3) Previously disturbed soils except those which would otherwise be classed as Type C soil.
- (4) Soil that meets the unconfined compressive strength or cementation requirements for Type A but is fissured or subject to variation; or
- (5) Dry rock that is not stable; or
- (6) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C-60 Soil:

- (1) Moist cohesive soil or a moist dense granular soil which does not fit into Type A or Type B classification, and is not flowing or submerged.
- (2) This material can be cut with near vertical sidewalls and will stand unsupported long enough to allow shoring and shielding to be properly installed.
- (3) The *competent person* must monitor the excavation for signs of deterioration of the soil as indicated by, but not limited to, freely seeping water or flowing soil entering the excavation around or below the sheeting.
- (4) An alternate design for less stable Type C soil will be required where there is evidence of deterioration.

Type C-80 Soil:

- (1) Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; or
- (2) Granular soils including gravel, sand, and loamy sand; or
- (3) Submerged soil or soil from which water is freely seeping; or
- (4) Submerged rock that is not stable; or
- (5) Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

SOIL TESTING

(Minimum: One visual and one manual test are required.)

Visual Tests: Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

- Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material.
- Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.
- Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.
- Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.
- Observe the opened side of the excavation to identify if layers slope toward the excavation. Estimate the degree of slope of the layers.
- Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or location of the level of the water table.
- Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

Manual Tests: Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

- Plasticity.** Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.
- Thumb penetration.** The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure.
- Dry strength.** If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

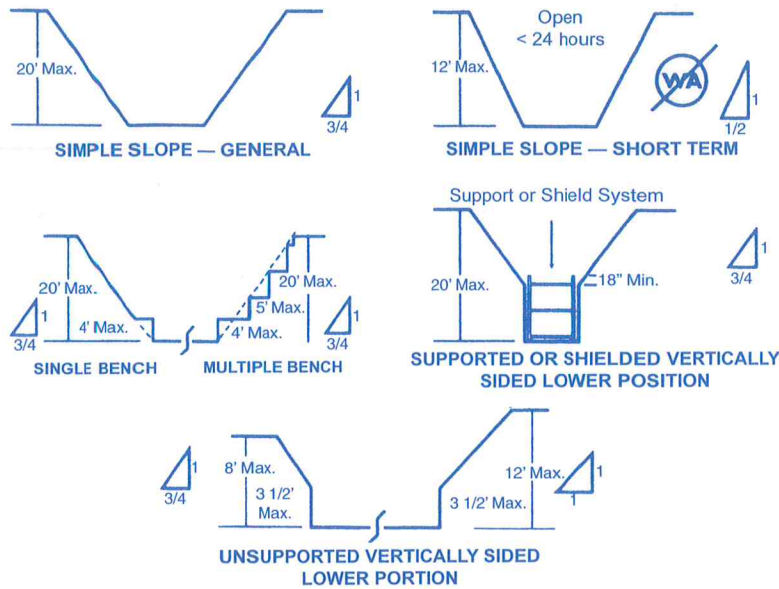
Other available options using SOIL REPORTS

Blows Per Foot	Cohesive Soil	Granular Soil
0-4	C - Soft	C - Very Loose
4-8	B - Medium	C - Loose
8-15	B or A - Stiff	C - Medium Loose
15-30	A - Very Stiff	C - Medium
>30	A - Hard	* B - Dense

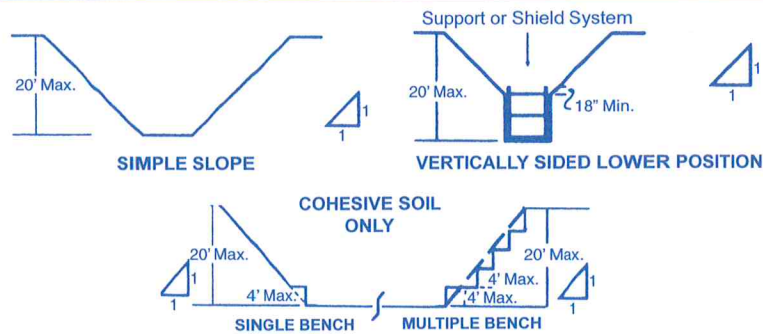
* Could be Type A if hardpan or cementation exists

SLOPING & BENCHING

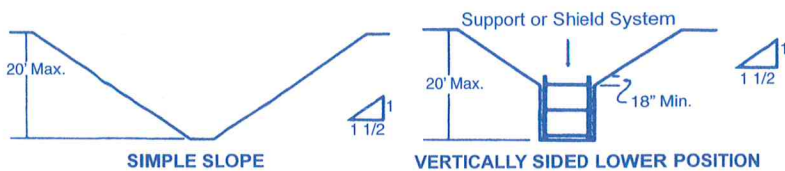
TYPE "A-25" SOIL



TYPE "B-45" SOIL



TYPE "C-80" SOIL



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SPEED SHORE ALUMINUM HYDRAULIC SHORING

Table VS-1 Type "A-25" Soil

SPEED SHORE

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 3)
	Maximum Horizontal Spacing (FEET)	Maximum Vertical Spacing (Note 6) (FEET)	Width of Excavation FEET			
			0 to 8	8 to 12	12 to 15	
0 to 15	8	4	2" dia.	2" dia.	2" dia. (1)	(Note 2)
0 to 25	8	4	2" dia.	2" dia. (1)	2" dia. (1)	(Note 2)

Table VS-2 Type "B-45" Soil

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 3)
	Maximum Horizontal Spacing (FEET)	Maximum Vertical Spacing (Note 6) (FEET)	Width of Excavation FEET			
			0 to 8	8 to 12	12 to 15	
0 to 10	8	4	2" dia.	2" dia.	2" dia. (1)	(Note 2)
0 to 20	6	4	2" dia.	2" dia. (1)	2" dia. (1)	(Note 2)
0 to 25	5	4	2" dia.	2" dia. (1)	2" dia. (1)	(Note 7)

Table VS-3 Type "C-60" Soil

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 4)
	Maximum Horizontal Spacing (FEET)	Maximum Vertical Spacing (Note 6) (FEET)	Width of Excavation FEET			
			0 to 8	8 to 12	12 to 15	
0 to 10	6 (Note 5)	4	2" dia.	2" dia.	2" dia. (1)	(Note 2)
0 to 20	4	4	2" dia.	2" dia. (1)	2" dia. (1)	(Note 7)
0 to 25	4	4	2" dia.	2" dia. (1)	N/A	(Note 7)

Notes to Tables VS-1, VS-2, VS-3

- Two inch diameter cylinders shall have a structural steel tube oversleeve 3.5 x 3.5 x 0.1875 inches extension (installed over the aluminum oversleeve extension) or a steel tube oversleeve 3 x 3 x 0.1875 inch extension (installed without the aluminum oversleeve) that extends the full retracted length of the cylinder.
- The bottom of the sheeting shall extend within 2 feet of the bottom of the excavation. If there is an indication of a possible loss of soil from behind the support system, sheeting must extend to the bottom of the excavation.
- Four feet wide sheeting is required at each Vertical Shore if raveling or sloughing of the excavation face appears likely to occur.
- Four feet wide sheeting shall be used.
- When 4 feet horizontal spacing is exceeded, the open spaces between the sheeting must be monitored for sloughing and raveling of the excavation face.
- The bottom hydraulic cylinder shall be a maximum of 4 feet above the bottom of the excavation.
- Sheeting shall extend to the bottom of the excavation.

Manufacturer's Tabulated Data, Engineering, Shoring, Shielding and Competent Person Training are available locally from United Rentals, Inc.

TRENCH SHIELD

GENERAL

- Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.
- Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.
- Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
- Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

ADDITIONAL REQUIREMENT FOR SHIELD SYSTEMS USED IN TRENCH EXCAVATIONS

Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

HAZARDOUS ATMOSPHERE

Atmospheric Oxygen Percentage and Symptoms

23.5% Max – 20.9% Normal – 19.5% Min - 16.0% Symptomatic
10% Unconscious - <8% fatal

Explosive /Flammable/Combustible Atmosphere

- Concentrations greater than 10% of the Lower Flammability (LFL) or Lower Explosive Limit (LEL) is a hazardous atmosphere.
- Concentrations within the LFL/LEL and UFL/UEL are explosive
- Airborne combustible dust concentrations that obscure visibility to 5ft or less are meeting or exceeding their LFL/LEL.

Toxic Atmosphere Symptoms

Hydrogen Sulfide (H₂S) 10ppm 8hr OSHA PEL

- .01-10ppm rotten egg smell
- 10-100ppm loss of smell
- 200-300ppm respiratory irritation
- 1000-2000ppm fatal

Carbon Monoxide (CO) 50ppm 8hr OSHA PEL

- 35ppm NIOSH 8hr TWA
- 200ppm-frontal lobe headache
- 400ppm headache, nausea
- 3,200 unconsciousness, death in 30mins
- 12,000ppm death in 1-3mins