GLOSSARY OF TERMS

ACCEPTED ENGINEERING PRACTICES are procedures compatible with the standards of practice required of a registered professional engineer.

ACGIH means the American Conference of Governmental Industrial Hygienists.

ACTUAL SLOPE means the slope to which an excavation face is excavated.

ADJACENT STRUCTURE STABILITY refers to the stability of the foundation(s) of adjacent structures whose location may create surcharges, changes in soil conditions, or other disruptions that have the potential to extend into the failure zone of the excavation or trench.

ALUMINUM HYDRAULIC SHORING means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

AS-BUILT PLANS are approved drawings showing the exact location of surface and subsurface community water or sewer lines, storm drainage systems, bike paths, sidewalks or streets, etc. As-Built Plans are kept on file by local municipalities.

BELL-BOTTOM PIER HOLE means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

BENCHING (Benching system) means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

CAVE-IN means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or other wise injure and immobilize a person.

CEILING means the maximum concentration for short period (usually between 5 and 30 minutes); this exposure is usually only allowed four (4) such times per day and average exposures must still be within OSHA's established PEL-TWA.

CEMENTED SOIL means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

COHESIVE SOIL means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical side slopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

COMPETENT PERSON is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

CONFINED SPACE is a space that, by design and/or configuration, has limited openings for entry and exit, unfavorable natural ventilation, may contain or produce hazardous substances, and is not intended for continuous employee occupancy.

CROSS BRACES mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

DISTRESS means that the soil is in condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and raveling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

DRY SOIL means soil that does not exhibit visible signs of moisture content.

EXCAVATION means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

FACES or **SIDES** means the vertical or inclined earth surfaces formed as a result of excavation work.

FAILURE means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

FISSURED means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

GRANULAR SOIL means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular

soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

HAZARDOUS ATMOSPHERE means an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

INGRESS AND EGRESS mean "entry" and "exit," respectively. In trenching and excavation operations, they refer to the provision of safe means for employees to enter or exit an excavation or trench.

IDLH means Immediately Dangerous to Life and Health.

kPa means Kilopascal; A unit of pressure. 1 kPa is approximately the pressure exerted by a 10-g mass resting on a 1-cm^2 area. 101.3 kPa = 1 atm. There are 1000 pascals in 1 kilopascal.

KICKOUT means the accidental release or failure of a cross brace.

LAYERED SYSTEM means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

LOWER EXPLOSIVE LIMIT (LEL) or **LOWER FLAMMABLE LIMIT (LFL)** of a combustible gas is the smallest amount of the gas that will support a self-propagating flame when mixed with air (or oxygen) and ignited.

MAXIMUM ALLOWABLE SLOPE means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

MOIST SOIL means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

NIOSH means the National Institute for Occupational Safety and Health.

PERMISSIBLE EXPOSURE LIMIT (PEL) means the maximum amount or concentration of a contaminant that a worker may be exposed, based on a time-weighted average of 8-hours. OSHA has defined PELs as values not to be exceeded.

PENETROMETER refers to the pocket penetrometer that directly reads the unconfined compressive strength of a soil in tons per square foot.

PLASTIC means a property of a soil that allows the soil to be deformed or molded without cracking, or appreciable volume change.

PROTECTIVE SYSTEM means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, and from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

QUALITATIVE SOIL ANALYSIS means relating to or involving comparisons of soil based on qualities; such as particle size, tendency to clump together, tension cracks and fissures, existing nearby utilities, layered geography, sources of water and vibration.

QUANTITATIVE SOIL ANALYSIS refers to tests that can be performed to soil that yield a measurable outcome. For example, measuring the diameter of a rolled thread of soil, or reading the values off a pocket penetrometer.

RAMP means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

REGISTERED PROFESSIONAL ENGINEER is a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer who is registered in any state is deemed to be a "registered professional engineer" within the meaning of Subpart P when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

REL means Recommended Exposure Limit.

SATURATED SOIL means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

SHEETING means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

SHIELD (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

SHORING (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

SHORT TERM EXPOSURE means a period of time less than or equal to 24 hours that an excavation is open.

SIDES. See **FACES**.

SLOPING (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

SOIL CLASSIFICATION SYSTEM means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

STABLE ROCK means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

STRUCTURAL RAMP means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock is not considered a structural ramp.

SUBMERGED SOIL means soil which is underwater or is free seeping.

SUPPORT SYSTEM refers to structures such as underpinning, bracing, and shoring that provide support to an adjacent structure or underground installation or to the sides of an excavation or trench.

SURCHARGE means an excessive vertical load or weight caused by spoil, overburden, vehicles, equipment, or activities that may affect trench stability.

SURFACE ENCOMBRANCE is anything that creates a hazardous surcharge load on the sides of an open cut trench or excavation and could cause it to cave-in or a protective system to fail.

TABULATED DATA are tables and charts approved by a registered professional engineer and used to design and construct a protective system.

TRENCH (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure

to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

TRENCH BOX. See **SHIELD**.

TRENCH SHIELD. See **SHIELD**.

tsf means tons per square foot.

TWA means time weighted average; the cumulative average concentration over an 8 hr/day, 40 hr/wk.

TYPE A SOIL means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty 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:

(i) The soil is fissured; or

(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

(iii) The soil has been previously disturbed; or

(iv) 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

(v) The material is subject to other factors that would require it to be classified as a less stable material.

TYPE B SOIL means:

(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

(ii) 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.

(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.

(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or

(v) Dry rock that is not stable; or

(vi) 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 SOIL means:

(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

(ii) Granular soils including gravel, sand, and loamy sand; or

(iii) Submerged soil or soil from which water is freely seeping; or

(iv) Submerged rock that is not stable, or

(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

TYPE C-60 SOIL means:

(i) Soil that shows signs of cohesiveness but does not fit into Type A or Type B classification and is not flowing or submerged.

(ii) Material can be cut with near vertical sidewalls and will stand unsupported long enough to allow vertical shores to be properly installed.

(iii) There is no indication of deterioration of the soil or freely seeping water or flowing soil entering the excavation around or below the sheeting.

UPRIGHTS means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

UNCONFINED COMPRESSIVE STRENGTH is the load per unit area at which soil will fail in compression. This measure can be determined by laboratory testing, or it can be estimated in the field using a pocket penetrometer, by thumb penetration tests, or by other methods.

UNDERGROUND INSTALLATIONS include, but are not limited to, utilities (sewer, telephone, fuel, electric, water, and other product lines), tunnels, shafts, vaults, foundations, and other underground fixtures or equipment that may be encountered during excavation or trenching work.

WET SOIL means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow

when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.