

# I. Excavations, Trenching, and Shoring

1. All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.
2. The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined before opening an excavation by contacting local utility companies and Facility Services, to establish the location of the utility underground installations.
3. An excavation permit shall be obtained from Facility Services prior to beginning the excavation on campus.
4. When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means, such as probing and hand digging.
5. While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.
6. Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.
7. Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.
8. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet of lateral travel for employees.
9. Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.
10. When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.
11. Where employees enter excavations greater than 4 feet in depth, and where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, the atmospheres in the excavation shall be tested before entry. A hazardous atmosphere is one with greater than 20% LEL or airborne exposure above OSHA PELs
12. Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres, such as a

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- concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.
13. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.
  14. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. Such equipment shall be attended while the work is in progress.
  15. Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.
  16. Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline. If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.
  17. If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person.
  18. Where the stability of adjoining sidewalks, poles, buildings, walls, footings or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees. An engineer shall determine if the condition is safe where building footings or foundations are concerned.
  19. Adequate protection shall be provided to protect employees from loose soil that could pose a hazard by falling or rolling from an excavation face or from the surface above. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material, and by placing and keeping such materials or equipment at least 2 feet from the edge of excavations and / or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations.
  20. 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,

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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 rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

21. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be immediately removed from the hazardous area until the necessary precautions have been taken to ensure their safety.
22. Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails shall be provided where walkways are 6 feet or more above lower levels.
23. Adequate barrier physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered.
24. Where excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in, there are no additional steps necessary to prevent cave-ins.
25. Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless one of the other options provided for in the OSHA standard is used under the direction of the competent person or registered professional engineer, as applicable.
26. Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system. Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation. Backfilling shall progress together with the removal of support systems from excavations.
27. No more than two feet may be excavated below the bottom of the support system, and this may occur only when the competent person/engineer has evaluated the conditions and given approval.
28. If design of the excavation is performed by a professional engineer, at least one copy of the design shall be maintained at the jobsite during construction of the protective system.