

Appendix H

Specific Excavation Requirements

This section applies to all open excavations made in the earth's surface. **Excavations** are defined to include trenches.

Surface encumbrances

All surface encumbrances that are located so as to create a hazard to employees must be removed or supported, as necessary, to safeguard employees.

Underground installations

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, must be determined prior to opening an excavation.

In addition to notifying EH&S, Facilities Management must contact utility companies or owners, within established or customary local response times, advise them of the proposed work, and ask them to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, UC Irvine may proceed with caution and provide detection equipment or other acceptable means to locate utility installations.

When excavation operations approach the estimated location of underground installations, the exact location of the installations must be determined by safe and acceptable means.

While the excavation is open, underground installations must be protected, supported or removed as necessary to safeguard all employees.

Access and egress

Structural ramps that are used solely by UC Irvine employees, as a means of access or egress from excavations, must be designed by a UC Irvine designated Competent Person. Structural ramps used for access or egress of equipment must be designed by a Competent Person qualified in structural design, and must be constructed in accordance with the design.

Ramps and runways constructed of two or more structural members must have the structural members connected together to prevent displacement.

Structural members used for ramps and runways must be of uniform thickness.

Cleats or other appropriate means used to connect runway structural members must be attached to the bottom of the runway or must be attached in a manner to prevent tripping.

Structural ramps used in lieu of steps must be provided with cleats or other surface treatments on the top surface to prevent slipping.

A means of egress from trench excavations must be provided. A stairway, ladder, ramp or other safe means of egress must 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 (7.62 m) of lateral travel for employees.

Exposure to vehicular traffic

Employees exposed to public vehicular traffic must be provided with, and must wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

Exposure to falling loads

No UC Irvine employee must be permitted underneath loads handled by lifting or digging equipment. Employees must be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with 8 CCR 1591(e), to provide adequate protection for the operator during loading and unloading operations.

Warning system for mobile equipment

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 must be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

Hazardous atmospheres

Testing and controls

In addition to the requirements set forth in the Construction Safety Orders, relating to any construction activities on campus, and General Industry Safety Orders to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements also apply:

- Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation must be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.
- Adequate precautions must be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation.
- Adequate precaution, such as providing ventilation, must be taken to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.
- When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing must be conducted as often as necessary to ensure that the atmosphere remains safe.

Emergency rescue equipment

Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, must be provided by Facilities Management and be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment must be attended when in use.

Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, must wear a harness with a lifeline securely attached to it. The lifeline must be separate from any line used to handle materials, and must be individually attended at all times while the employee wearing the lifeline is in the excavation.

Protection from hazards associated with water accumulation

UC Irvine employees must not work in excavations in which there is accumulated water, or in excavations 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. The designated Competent Persons have the authority to ensure that UC Irvine employees do not work in excavations in which there is accumulated water.

If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations must be monitored by a competent person to ensure proper operation.

If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means must 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 and compliance with the above two paragraphs.

Stability of adjacent structures

Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning must be provided to ensure the stability of such structures for the protection of employees.

Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees must not be permitted except when:

- (a) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
- (b) The excavation is in stable rock; or
- (c) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

Sidewalks, pavements and appurtenant structure must not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

Protection of employees from loose rock or soil

Adequate protection must be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection must consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

Employees must be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection must be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Inspections

Daily inspections of excavations, the adjacent areas, and protective systems must 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 must be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections must also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

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 must be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Fall protection

Walkways or bridges must be provided with standard guardrails where employees or equipment are required or permitted to cross over excavations over 6 feet and wider than 30 inches.

Adequate barrier physical protection must be provided at all remotely located excavations. All wells, pits, shafts, etc., must be barricaded or covered. Upon completion of exploration and other similar operations, temporary wells, pits, shafts, etc., must be backfilled.