

LESSONS LEARNED:

CONSTRUCTION ENGINEERING SERVICES

OBSERVATIONS AND LESSONS FROM THE SCHOOL OF EXPERIENCE

TRENCH SAFETY

Excavation and trenching are among the most hazardous construction operations. Cave-ins pose the greatest risk and are more likely than other excavation related accidents to result in worker fatality. According to the Occupational Safety and Health Administration (OSHA), two workers are killed every month in trench collapses. The U.S. Bureau of Labor Statistics (BLS) data show that 488 and 271 workers died in trenching or excavation cave-ins between 1992 and 2000 and 2000 and 2006, respectfully. Hundreds of additional injuries occur every year.

This **Lessons Learned** is intended to provide a brief overview of some of the issues involved with trench safety, but is not intended to be all inclusive or authoritative. Applicable standards should be consulted for regulatory requirements.

Hazards associated with trench work and excavations are recognizable and generally preventable. It is the responsibility of employers to provide a workplace free of recognized hazards that may cause serious injury or death. Employers must comply with OSHA's trenching and excavation requirements set forth in 29 CFR 1926.651 and 1926.652 and/or comparable OSHA-approved state plan requirements. A number of the provisions require protective systems designed by a licensed professional engineer.

OSHA requires safe access and egress to all excavations, via ladders, steps, ramps, or other safe means of exit for trenches four feet or deeper. Trench access equipment must be accessible and be located within 25 feet of workers in the trench. Some of the protective systems for trenches include:

- Sloped sidewalls
- Creating stepped benched grades (OSHA Type A or B soil only)
- Support systems made with materials such as posts, beams, shores or planking, and prefabricated trench boxes.

The design of protective systems can be complex and consider factors such as: soil classification, depth of cut, water content of soil, seepage into the trench, changes caused by weather, and surcharge loads (e.g., spoils, other materials to be used in the trench) and other operations within the vicinity.

Other key elements of OSHA's excavation standards include:

- Developing, implementing, and enforcing a comprehensive written safety program for workers that includes training in hazard recognition and avoidance of unsafe conditions
- Designating a competent person to conduct daily checks of excavations, adjacent areas, and protective systems, and taking appropriate measures necessary to protect workers
- Verifying that spoil piles and heavy equipment are kept away from the edge of the trench or excavation if workers must be present in the trench

Before excavating, the following hazards should be considered:

- Above Ground and Underground Utilities – Overhead and underground power lines, sewer, telephone, fuel, water, natural gas lines, etc. State-mandated utility clearing programs and utility companies must be contacted.
- Undermining Nearby Structures – Loss of support to nearby building foundations, walls, sidewalks, pavements, or other structures affected by the excavation.
- Materials and Equipment – Materials and equipment used for protective systems must be free of defects and maintained in accordance with the manufacturer's recommendations.
- Installation and Removal of Support Systems – Systems must be installed and removed in such a way that protects workers from cave-ins, structural collapses, or being struck by components of the support system.
- Shield Systems – Designed to restrict lateral or other hazardous movement, and resist soil and surcharge loads.
- Seepage and Water Accumulation – Can cause destabilization of trenches. Water removal equipment must be monitored by a competent person, as defined by OSHA.
- Hazardous Atmospheres and Confined Spaces – Workers must not work in hazardous and/or toxic atmospheres as defined by OSHA with concentrations that exceed the Threshold Limit Values for Airborne Contaminants established by the American Conference of Governmental Industrial Hygienists (ACGIH).

For additional information, please visit OSHA's Safety and Health Topics webpage on trenching and excavation at www.osha.gov/SLTC/trenchingexcavation/index.html, or contact your nearby ECS office. We hope this **Lessons Learned** has increased your understanding of the considerations and requirements associated with trench safety.

Respectfully,

ECS Corporate Services, LLC

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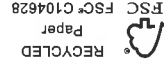
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LESSONS LEARNED

Practical Observations, Comments and Lessons of General Interest to

- Owners
- Developers
- Contractors
- Property Managers
- Facility Managers
- Architects
- Engineers
- Planners
- Investors



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