



**PDHonline Course C225 (2 PDH)**

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# **Excavation Hazard Recognition- OSHA Standards**

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# Aurora OSHA Construction News

## Trenching Still A Concern

Why do knowledgeable people choose not to use cave-in protection? Lately, the answer from employers is that cave-in protection would have been "inconvenient" to use.

While some of you know that is not what you want to tell an OSHA Compliance Officer, one employer actually said: "If the box (trench box) would have fit--we would have used it".

We are finding more and more trenching contractors not in compliance with the trenching standards. In fact, lack of cave-in protection was the #2 cited violation this past year.

A protective system must be used if an excavation is 5 feet or greater in depth. The three most commonly used kinds of protective systems are: **shoring, shielding, and sloping.**

Each of these protective systems are acceptable to OSHA; it is up to the competent person to determine which method will be most effective for the job. (See page 5 for more on protective systems).

It is not acceptable (or legal) to not use cave-in



Luckily, this worker made it out of the trench alive.

protection because of convenience.

Due to the serious hazards involved, and the fact that most contractors we inspect are not in compliance, most of this newsletter will be devoted to trenching hazards and corrective methods.

## Construction Partnership Signed

A partnership to reduce injuries, illnesses and deaths in the hazardous residential construction industry was signed by the Occupational Safety and Health Administration (OSHA), the On-Site Safety and Health Consultation Program of Illinois (DCCA), the Residential Construction Employers Council (RCEC) and the North-east Illinois District Council of Carpenters

Apprenticeship and Training Program.

The partnership will provide members with information and guidance that will help enhance employee safety programs, including ways to minimize hazards from falls. Members will work together to develop training on safety and health issues specifically aimed at residential construction.

Members of the RCEC will be encouraged to participate in programs such as Consultation's Safety and Health Achievement Recognition Program (SHARP) and the Voluntary Protection Program (VPP).

A team of representatives from the agencies will meet regularly to set goals and objectives and track progress.

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## Combined Rescue Drill a Success

The technical rescue teams of Aurora, North Aurora and Batavia Fire Departments came together this October in front of the Home Depot on Orchard Road for what appeared to be a construction accident. Fortunately, it was a preplanned trench rescue drill to test the skills and abilities of the three fire departments technical rescue teams.

According to Lt. Mark Lockwood, coordinator of Aurora's rescue team, the three departments' train together on a quarterly basis on different technical rescue disciplines. "The joint training allows us to be well prepared in the event of an actual incident," Lockwood says.

Crews simulated that a construction crew was digging a hole when part of the earth wall collapsed on a victim. The technical rescue teams used specialized equipment that was placed in the hole to prevent more dirt from falling on the victim. Rescue workers then entered the protected area, treated the victim, and removed the victim using rope rescue equipment. "Sixty-five percent of all would be



rescuers become victims because proper safety procedures are not followed" Lockwood says. "It seems like it takes a long time, but we must follow the safety procedures to protect the rescuers and the victim from further injury."

The team practiced several different scenarios from 8 a.m. to noon. The Home Depot site was chosen because of their extensive help in developing a disaster and recovery plan with the technical rescue team.

The joint rescue team was established 2 years ago to address the

needs of special rescues in the area. According to Assistant Chief Mark Bozik, the combined team is capable of handling such incidents as trench rescues, building collapses, confined space rescues, elevated or rope rescues, and mass casualty incidents.

"The combined team is 1 of only 14 teams that is recognized by the State for technical rescue" Bozik says. "The team could be called anywhere in the State in the event of a major incident. Residents should be proud that this highly trained team is in their community."



## Did You Know?

### STEEL ERECTION E-TOOL



Despite being covered since 1971 under the original steel erection standard, America's 56,000 steel erectors continued to suffer 35

fatal accidents per year, a rate of one death per 1,600 workers. OSHA estimates that 30 of those deaths, as well as nearly 1,150 annual lost-workday injuries, will be eliminated by compliance with provisions of the new standard, developed with industry and labor through negotiated rulemaking. This eTool has been created to educate employers and workers about the revised standard.

### U.S. v WALTER MARBLE

Federal District Court issued its sentencing order in this criminal prosecution of the owner of a construction company who made false statements to OSHA inspectors and furnished false documents to cover up the fact that he in fact employed a worker who was killed at a jobsite. Following a plea agreement entered last August, the court sentenced Walter Marble to **five months confinement with the Bureau of Prisons** to be followed by five months home confinement and two years of supervised release. Marble was also fined \$3,000 and assessed costs of \$100. Mr. Marble plead guilty to one count of corruptly obstructing the due administration of the law in an OSHA investigation by causing a false contract, a false invoice, and a letter containing false statements to be submitted to OSHA for the purpose of corruptly influencing OSHA's determination of whether

an individual killed in a trench collapse on November 4, 1999 was working as an independent contractor or was an employee.

### LE MYERS CO. INDICTED IN DEATHS OF TWO WORKERS

This December an electrical contracting firm and its parent company were indicted in connection with the deaths of two employees working on high-voltage lines three years ago. The misdemeanor charges allege the L.E. Myers Co. and its parent, MYR Group Inc., both based in Rolling Meadows, willfully failed to properly train and supervise the workers, who were killed in separate incidents in suburban Chicago.

The companies were charged with two counts each—one for each death—of allegedly violating Occupational Safety and Health Administration regulations. If convicted, the two companies face fines of up to \$2 million and a maximum of 5 years of probation.

## Fatalities and Injuries in Illinois

The following is a synopsis of some of the accidents we investigated during the past few months:

- Three employees were in the process of dismantling a Morgan scaffold at a Rockford, Illinois jobsite. Initially all 3 employees were working from the platform that was positioned approximately 7 feet above grade. Two of the employees vacated the platform to return to the ground. One of the employees who was considered the competent person left to remove the ladder that was leaning against the platform. The second worker who was not being monitored began to remove the last set of cross-braces at grade level. These crossbraces were the last guarantee of stability for the scaffold system and should not have been removed until the worker on the platform reconnected the cross-braces at platform level. When the unaccounted for worker at ground level had removed one of the connection points for the crossbraces the scaffold platform collapsed throwing the lone worker on the platform to the ground where he suffered a compound fracture of the right forearm. (Rockford)
- A crew was installing 48" water main in a trench approximately 10' deep. There was a 8' trench box in the trench for cave-in protection, but the North end of the trench box was not closed off. An employee working towards the north end of the trench, while still in the confinement of the box, was struck by dirt and rocks when there was a cave-in at the north end of the trench. Loose dirt and rock came into the box through the north end opening. The 33 year old construction laborer had the wind knocked out of him, and was taken to the hospital for examination. He did not sustain any serious injuries. (West Chicago)
- A 35 year old self-employed worker was tuckpointing while working on a two point suspension scaffold 15 feet from ground level. The left side of the scaffold broke from off from the parapet on the roof. The worker fell and hit his head and died from the fall. (Chicago)
- A worker was trapped by a 16 horsepower track-mounted walk-behind cable plow, while attempting to off load this machine from a Chevy Astro Van. The employee was trapped between the machine's handlebars and the roof of the van at the rear cargo doors. The machine engine was started, and the clutch and transmission engaged in anticipation of backing the 850 lb machine down the ramp. The employee was discovered by a co-worker. The engine of the cable plow was running at half throttle and the rubber tracks were slipping on the truck bed. Initial attempts to free the decedent failed. (Waukegan)
- A 21 year-old construction laborer was killed while working on a second story addition to a residence. The walls had been erected and the roof was being framed. Two sheets of plywood had been temporarily nailed down on top of the joists. The deceased walked onto the unsupported portion of temporary plywood deck and fell to the ground when the plywood broke. (Elmwood Park)
- A 39 year old construction laborer working for a masonry company was working in a room where a tubular frame scaffold had been erected. A scaffold leg was placed on top of an extension cord. The extension cord was being used to power a industrial fan on the opposite side of the room. The weight of the scaffold cut through the extension cord, energizing the scaffold. As the worker attempted to re-enter the room, he passed through the door frame and the scaffold and was electrocuted. (Palos Heights)
- A 36 year-old construction worker died after falling 12-13 feet from a sling. A 14 foot long synthetic web sling was attached to the guardrail of aerial lift. The lift was raised vertically to remove the slack in the sling. The worker, standing on top of the 31 foot tall steel silo, stepped into the bottom loop of the sling. The employee was lifted up on the sling and then lowered through a 20" x 20" opening in the top of the silo. The employee was lowered approximately 9 feet into the silo, when two employee, standing outside the silo, heard the employee inside the silo yelling, "get me out of here." The employees on ground level motioned for the lift operator to raise the employee out of the silo. As the lift operator began raising the lift, the employees on the ground heard a thump inside the silo. The employee inside the silo had fallen 12 - 13 feet off the sling to the bottom of the silo. (Orion)
- Employees were preparing to perform abrasive blasting work. The employees were instructed by the site foreman to don their type CE abrasive blast respirators. Upon the foreman's return to the area, he found the workers unconscious. The supplied air line for the respirators had been connected to a plant air line labeled "compressed air". After investigating, it was found that the line was 99.99% nitrogen. Both employees were hospitalized. (Bartonville)
- Roofers were unloading shingles from a boom onto the roof of a residential house under construction. The victim was apparently trying to step from the roof to a scaffold pick located on the front of the house when he fell approximately twenty-two feet to the ground below. The victim was taken to the hospital with fatal injuries. (Metamora)

## Most Frequently Found Hazards ~ Illinois

The “top ten” cited violations for construction are listed for the state of Illinois during this past fiscal year (October 2001-September 2002).

Lack of cave-in protection landed at number 2 on the list, with over \$350,000 in penalties issued. This was, by far, the most penalized standard last year. 16% of the violations were cited as “Repeat”. This means that the company inspected had been cited for the exact same violation (or hazard) during the past three years.

Another area consistently cited was fall protection—whether from scaffolds, roofing or residential construction sites.

We will continue our emphasis in these areas next year.

Rank	Standard	Hazard
1	1926.451(g)(1)	Lack of fall protection on scaffold—over 10’
2	1926.652(a)(1)	Trenches—lack of cave-in protection
3	1926.20(b)(1)	Accident prevention programs
4	1926.501(b)(1)	Lack of fall protection—working over 6’
5	1926.100(a)	Hard hats not provided and/or worn
6	1926.21(b)(2)	The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment
7	1926.451(e)(1)	Access to scaffolds
8	Section 5(a)(1)	General Duty Clause
9	1926.451(b)(1)	Scaffolds—not fully planked
10	1916.501(b)(10)	Roofing work on low-slope roofs—no fall protection when over 6 feet.

## Top Ten Reasons for Noncompliance

After a citation is issued, employers frequently have an informal conference with the area director to discuss the violations. Some of the “reasons” for noncompliance are quite interesting—and sad. Listed here are the “top ten” reasons for noncompliance.

**T**he job was only going to take a minute.

**G**uardrails were ordered and on the way to the job site—we just decided to start work without them.

**W**e have guardrails on the other site.

**W**e have been doing this work for 20 years and would not expose ourselves to hazards. (the employee was

in a 10-foot deep trench without cave-in protection).

**T**he soil was good.

*The employer is responsible for frequently and regular inspections of the job site. Any recognized hazards must be taken care of.*

**W**e never used that equipment (photos show employees using the equipment during the inspection).

**I** left my personal protective equipment in the other truck.

**O**ur foreman has a lot of experience and is an OSHA competent person (then why did he tell us that it

was OK to work on a 15-foot high scaffold without guardrails).

**T**hat wasn’t our employee.

And the **number 1** reason:

**O**SHA made us nervous.



*This is not a trench you would want to be in—even with a ladder.*

## Protective Systems for Trenches

Soil is heavy. A cubic foot can weigh as much as 114 pounds, and a cubic yard can weigh over 3,000 lbs.—a little more than a Volkswagen Beetle. Most workers don't realize the force that will hit them when a cave-in occurs. A person buried under only a few feet of soil can experience enough pressure in the chest area to prevent the lungs from expanding. Suffocation can take place in as little as three minutes. Heavier soils can crush the body in a matter of seconds.

Protective systems are methods of protecting workers from cave-ins of material that can fall or roll into an excavation, or from the collapse of nearby structures. If an excavation is less than 5 feet deep, OSHA does not require a protective system **unless the competent person sees signs of a potential cave-in**. (It is important to remember that a wall collapse in a trench four and 1/2 feet deep can still have serious results!)

For trenches between 5 feet and 20 feet deep, **shoring and sheeting, shielding, sloping and benching** are all acceptable protective measures. It is up to the planners of the construction project and the competent person on site to determine which systems will work best. If an excavation is greater than 20 feet deep, a **registered professional engineer** must design the protective system.

Shoring systems are structures of timber, mechanical, or hydraulic systems that support the sides of an excavation and which are designed to **prevent** cave-ins. **Sheeting** is a type of shoring system that keeps the earth in position. It can be driven into the ground or work in conjunction with a shoring system. Driven sheeting is most frequently used for excavations open for long periods of time. Another type of sheeting, in which plates or shoring grade plywood (sometimes called Finland form) is used in conjunction with strutted systems such as hydraulic or

timber shoring. These strutted systems are also referred to as **active systems**. The most frequently used strutted system involves **aluminum hydraulic shores** which are lightweight, re-usable and installed and removed completely from above ground.

A **shield**, also known as a trench box, is another common protective system used by contractors. Trench boxes are not designed to prevent cave-ins, but rather serve to "shield" workers within the structure should a cave-in occur. This is an excellent choice when placing continuous installations, as in pipe laying. The box is placed in the trench and dragged along with the progress of the work. A few important points about shields:

- Personnel should be out of the box and above ground when the shield is being moved. You could be caught between the moving box and fixed object(s);
- The top of the shield should extend at least eighteen (18) inches above the level of any materials that could cave or roll into the trench;
- Some shields are designed to be stacked, one on top of another. **Never** stack shields that are not designed for that purpose, and do not stack shields from different manufacturers, as they may not be compatible.
- The forces of a cave-in can literally push a box sideways, causing a crushing hazard. After a



A trench box is being used—but what is wrong with this picture? Hint—what would happen if the soil on top collapsed?



A shoring system could have been used in this trench to protect the workers.

box is positioned for the work, the voids between the box and the trench wall should be filled with excavated material to prevent displacement caused by a cave-in.

- Shielding should always be used according to manufacturer's tabulated data.

With both shoring and shielding, workers are only protected as **long as they stay within the confines of the system**.

**Sloping and benching** are another means of protecting workers from cave-in hazards. Sloping is a method of cutting back the trench walls at such an angle that there is little chance of collapse. This is referred to as an "angle of repose", and must be suitable to the type of soil.

There are very few applications where sloping and/or benching can be used. Why? The lack of available space. Many excavations are dug in right-of-ways where the presence of other utilities and traffic become major considerations. If the location to be excavated has been previously disturbed, as it frequently is along a right-of-way, the soil type will very likely be classified as "C". With Type C soil, the excavation walls must be sloped back on each side of the excavation one and one-half feet for every foot of depth.

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This newsletter provides a generic, non-exhaustive overview of OSHA standards-related topics. This newsletter does not itself alter or determine compliance responsibilities, which are set forth in OSHA standards themselves and the Occupational Safety and Health Act of 1970.

Additional safety measures may be required by your facility under certain conditions or circumstances. Professional advice should be sought for specific situations.

## Trenching and the Competent Person

Pre-job planning is vital to accident-free trenching. Safety cannot be improvised as work progresses.

Regardless of the depth of the excavation, OSHA requires a **competent person to inspect conditions at the site on a daily basis. Inspections must be made as frequently as necessary during the progress of work, to assure that the hazards associated with excavations are eliminated, before workers are allowed to enter the trench.**

The following concerns must be addressed by a competent person:

- ◇ Evaluate soil conditions and select appropriate protective systems.
- ◇ Construct protective systems in accordance with the standard requirements.
- ◇ Preplan; contact utilities (gas, electric) to locate un-

- derground lines, plan for traffic control if necessary, determine proximity to structures that could affect choice of protective systems
- ◇ Test for low oxygen, hazardous fumes and toxic gases, especially when gasoline engine-driven equipment is running, or the dirt has been contaminated by leaking



Yes—this is a violation. The excavation is undercutting the street and the front end loader only adds to the problem.

lines or storage tanks. Insure adequate ventilation or respiratory equipment if necessary.

- ◇ Provide safe access into and out of the excavation.
- ◇ Provide appropriate protections if water accumulation is a problem.
- ◇ Inspect the site daily at the start of each shift, following a rain-storm, or after any other hazard-increasing event.
- ◇ Keep excavations open the minimum amount of time needed to complete operations.

Should a third-party be required to stop work, or the designated competent person does not halt unsafe acts and conditions, this individual is not acting "**competently**" within the meaning of the standard.