

Course Learning Outcomes for Unit IV

Upon completion of this unit, students should be able to:

- 3. Examine technology useful for improving safety outcomes.
 - 3.1 Associate the issues surrounding construction site excavations, trenches, and confined spaces to hazard recognition and mitigation.
 - 3.2 Discuss current and future safety management systems as they relate to excavations, trenches, and confined spaces.
- 4. Recommend controls for addressing hazards at construction sites.
 - 4.1 Evaluate safety control systems used in preventing cave-in and engulfment hazards.
 - 4.2 Appraise methods for assessing and mitigating hazards related to excavations, trenches, and confined spaces at construction sites.

Course/Unit	Learning Activity
Learning Outcomes	
3.1	Unit Lesson Chapter 6 Chapter 10 Article: "Stop-Work Authority: Empowering Workers to Halt Unsafe Situations" Article: "Everything You Should Know About Claustrophobia" Unit IV PowerPoint Presentation
3.2	 Chapter 6 Chapter 10 Article: "Foreman Convicted After Trench Collapse Kills 22 Year Old Construction Worker" Webpage: Confined Spaces in Construction—Frequently Asked Questions Webpage: Safety and Health Regulations for Construction: Excavations: Scope, Application, and Definitions Applicable to This Subpart Webpage: Safety and Health Regulations for Construction: General Safety and Health Provisions: Definitions Unit IV PowerPoint Presentation
4.1	Chapter 6 Chapter 10 Document: OSHA Instruction: National Emphasis Program on Trenching and Excavation (Directive No. CPL-02-00-161) Unit IV PowerPoint Presentation
4.2	Unit Lesson Chapter 6 Chapter 10 Document: OSHA Instruction: National Emphasis Program on Trenching and Excavation (Directive No. CPL-02-00-161) Unit IV PowerPoint Presentation

Required Unit Resources

Chapter 6: OSHA Compliance

Chapter 10: Subparts P through U and Related Safety Practices

In order to access the following resources, click the links below.

- Bush, J. (2018, July 26). <u>Stop-work authority</u>: Empowering workers to halt unsafe situations. *Safety+Health.* https://www.safetyandhealthmagazine.com/articles/17242-stop-work-authority
- Hedmond, S. (2016, November 9). Foreman convicted after trench collapse kills 22 year old construction worker. *Construction Junkie*. https://www.constructionjunkie.com/blog/2016/11/6/foreman-convicted-after-trench-collapse-kills-22-year-old-construction-worker
- Occupational Safety and Health Administration. (2016, June 1). <u>Confined spaces in construction</u>—Frequently asked questions. https://www.osha.gov/confinedspaces/faq.html
- Occupational Safety and Health Administration. (1970b). Safety and health regulations for construction: <u>General safety and health provisions: definitions</u>. https://www.osha.gov/lawsregs/regulations/standardnumber/1926/1926.32
- Occupational Safety and Health Administration. (1970a). Safety and health regulations for construction: <u>Excavations: Scope, application, and definitions applicable to this subpart</u>. https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.650
- Scaccia, A. (2016, November 29). *Everything you should know about claustrophobia*. Healthline. https://www.healthline.com/health/claustrophobia

Pages 3–7 are the required reading of the following document. The first couple of pages are extra resources for you.

Occupational Safety and Health Administration. (2018, October 1). <u>OSHA instruction: National Emphasis</u> <u>Program on trenching and excavation</u> (Directive No. CPL-02-00-161). https://www.osha.gov/sites/default/files/enforcement/directives/CPL-02-00-161_0.pdf

Unit Lesson

Overview

There are serious safety issues for excavations, trenches, and confined spaces on construction sites. Few work tasks evoke such high anxiety for all involved than working below the surface of the ground or in areas where people are not naturally supposed to be. The fear of confined spaces, *claustrophobia*, is a medical diagnosis (Scaccia, 2016). The fear of being trapped or consumed by cave-in is something about which many people, workers included, are concerned. Yet on construction sites, this fear must be overcome so that the job can be accomplished. Almost every day there is a news story somewhere in the United States about an individual who loses their life or limb because of the cave-in of an excavation or trench (Sparkman, 2018). Add to that number the individuals who succumb to the confined space hazard, and one can see why it is a special topic in construction safety.

Excavations

An *excavation* is a hole in the ground that is wider than it is deep. The Occupational Safety and Health Administration (OSHA) defines excavations as "any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal" (OSHA, 1970a, para. 10). A new home foundation hole on a residential construction site is one example of an excavation. You can also see excavations at commercial construction sites where there are multiple excavators working to dig out the dirt and make a hole in the ground. The sole duty of those huge machines moving around the construction site is to remove earth from the ground to make a hole so that the next trade group can come in and build a foundation. Huge dump trucks and earth moving equipment do nothing but move dirt and other items around the jobsite. The open-pit mines for coal or gold would be an extreme example of an excavation. Some of those dump trucks can haul 40 tons of material at one time. Excavating tools can vary largely in size. Huge electric shovels are used in excavation and can, with a single bucketful of product, fill a 20-ton truck. Conversely, the two-handled shovels children play with at the

playground are also used to excavate. It is not the size of the tool or hole that defines an excavation. An excavation is simply a hole, cavity, or trench that is wider than it is deep.



This is a trench for laying pipe under trees in a park. (Karayuschij, n.d.)

Trenches

A trench is something different altogether. Deeper than it is wide, a trench can cause all kinds of phobias in the work force (OSHA, 1970a). It can be quite unsettling when one stands in a trench that is deeper than the person is tall, especially because there is little room to move side to side because the trench is only 2 or 3 feet wide. An ideal example of this would be a grave, which is usually 3 feet wide but at least 6 feet deep. Horror movies are built around this kind of scenario, such as the 1984 movie *Body Double*. In this movie, the main character is a budding young actor. He accepts a role to play a vampire but has a horrible reaction to being placed in a coffin for the necessary scene. You can see how these types of spaces might cause issues for construction workers as well.

Depending on the area of the country, some of these trenches can be quite deep. On a recent construction site, one trench was 30 feet deep and only 5 feet wide. It was a rather uncomfortable feeling to be standing at the bottom and be unable to see out of the trench. Of course, the issue here is a cave-in of the sides of the trench and having the employee engulfed by the walls falling in on him or her. A cubic yard of material can weigh a little more than a ton. A cubic yard of material, considering, but when it starts to cave in on the employee, it can be disastrous. Depending on the speed of the cave-in, the material can snap bones and crush cavities in the body. The real issue for cave-ins that are not complete, meaning the person is not completely engulfed and buried, is the person's inability to expand his or her lungs and get a deep

breath after being engulfed. The dirt weighs so much that when it is up to the employee's chest level, the employee cannot breathe. He or she will suffocate even though their mouths and noses are clear. It is a truly horrible way to die.

Confined Spaces

Confined spaces are any enclosures where human occupancy is not expected or designed for occupancy. OSHA defines, "a confined space has limited means of entry and/or exit, is large enough for a worker to enter, and is not intended for regular/continuous occupancy" (OSHA, 2016, para. 2). The trunk of one's automobile could be considered a confined space.

When a fatality occurs in a confined space, it is usually not just one person. That is what makes this issue a special topic in construction safety. Utility work generally happens underground in vaults built with concrete. Those vaults are lowered into the excavation, and pipes and conduit are then attached. The vaults, when covered, need an opening in the top to allow access for the employee to enter. That is called the *manhole cover*. With a vault, the area is below ground level, covered with dirt and other material, has one way in and out, and generally does not have an adequate oxygen supply or air flow. The potential for harmful atmospheres is significant.

Of course, there are different types of confined spaces. Most required a permit. These confined spaces have several factors that must be met in order to meet standards for a permit (OSHA, 2016). Permit required confined spaces could have the potential for hazardous atmosphere, the potential of being engulfed, or anything that might inhibit the employee's ability to exit the area without assistance (Work Safe Texas, n.d.).

There are also non-permit required confined spaces. Strangely enough, some confined spaces do not meet either the definition of a permit-required space or a non-permit required space. It is up to a competent person at the worksite to designate whether a space should be considered confined, permit required, or non-permit required. According to OSHA (1970b):

1926.32(f): A "competent person" means someone who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

The concern for all the above issues is the danger of the employee being engulfed and unable to selfextricate from the area in question.

Tragic Decision-Making for Confined Spaces

People are killed every year in confined spaces. In excavations and trenches, it is generally one or two people who are involved. They might be in the hole checking a pipe or doing some other manual labor after the heavy equipment has removed the bulk of material. In confined spaces, it is usually two people in the hole who get in trouble and then the attendant sees their fellow employees in trouble and decides to enter to perform the rescue—putting themselves in danger as well. People seem to have that superhero moment thinking they can perform the rescue against all odds. The attendant is likely to be injured or killed in the rescue attempt.

Emotions run high when something like this happens. Decisions are made in the heat of the moment that might not otherwise be made. People die in excavations, trenches, and confined spaces because the system was not set up and tested to make sure it is safe to enter or remain in the area once the employee enters. Recently there was a situation in Florida where a team of workers were working around a manhole and entry had to be made for the work. One person went in without performing or viewing a proper risk assessment matrix (RAM). That worker became incapacitated by toxic gases, and when noticed by the other workers, a second worker entered to perform the rescue. The second worker entered the vault and soon succumbed to the gases. The third worker then entered to try and help the other two workers who had already succumbed to the hazardous atmosphere in the vault. The third worker then died, as had the first two. A volunteer firefighter noticed this situation unfolding, called for help, then proceeded to try the rescue. That firefighter entered the vault without the proper personal protective equipment (PPE) and became another victim. In this case, the three workers died, and the firefighter was hospitalized for quite some time. There was no RAM created to help recognize the hazard, and precautions were not taken to prevent this true tragedy (Rabin & Goodhue, 2017).

Baltimore Fatality

In Baltimore there was a case of a young employee, not yet 20 years old, who on his first day on the job was asked to enter an excavation and check a pipe—15 feet below ground level with no safety measures in place. The hole caved in and trapped him. He died in the hole (Wenger & Bogel-Burroughs, 2018). The safety features necessary and required by OSHA were not in place. There was no shoring, sloping, or benching of the walls of the excavation. There was no oxygen monitoring. There was no form of egress for the doomed employee. There was no competent person evaluating the excavation to make sure it was safe. A young life was taken because the standards were not followed by the people in charge of the construction site. The hazards were not recognized and, therefore, not mitigated before the employee was placed into harm's way.

Liability Issues

Another point to be considered with this unit lesson and the other special topics for construction safety is that the people in charge of the construction site have a duty to provide the employees with a hazard-free workplace as stated in the OSH Act of 1970 General Duty Clause. When this duty is not fulfilled and something happens, it can become a legal matter, not only civil but also a criminal issue. Over the past several years, many foremen and superintendents have been arrested and imprisoned because of their failure to follow the standards and protect their employees (Hedmond, 2016). Case law has demonstrated that the person in charge of the situation is ultimately responsible for the safety of their work force. The competent

person, as designated by the site manager or person in charge for that company, has the authority to correct any issue they determine to be a problem.

Conclusion

There are many ways to mitigate the issues surrounding these hazards for excavations, trenches, and confined spaces. The new technology that is available can help the competent person in establishing whether the task to be performed can be done safely with the necessary safety components in place. These tasks can be and are generally done safely throughout the construction sites scattered across North America. There should be no reason why an employee is placed into harm's way when it comes to excavations, trenches, and confined spaces. Every employee is granted stop-work authority for their own safety provided by the OSH Act that states all employees have the right to stop work should the work involve some form of danger that cannot be removed (Bush, 2018). Statistically, more than a thousand employees die each year in construction because they do not invoke the stop-work authority. The workers listed above each had stop-work authority yet succumbed to their injuries sustained in these truly horrible incidents. As a group of construction professionals, we should all agree and adhere to the idea that no one dies in excavations, trenches, and confined spaces.

References

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