



# The United Rentals Guide to Trench Safety

Prevent injuries and fatalities with knowledge and action



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# A Matter of Life and Death

Eric Giguere will never forget the terror he felt when a trench cave-in buried him 6½ feet underground.

“It was pitch black. I couldn’t see, I couldn’t move. I was completely helpless. Every time I would exhale, the dirt would get tighter and tighter. It crushed my chest; I couldn’t breathe. I was suffocating,” he recalled. “I knew I was going to die right then because we didn’t follow safety procedures.”

“

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”

Giguere understood that his company should have installed a trench box or sloped the sides of the trench when the excavation went deeper than 5 feet. But he didn’t raise any objections that day because his company didn’t typically bother with such safety precautions. That lapse, and his company’s neglect, nearly cost Giguere his life.

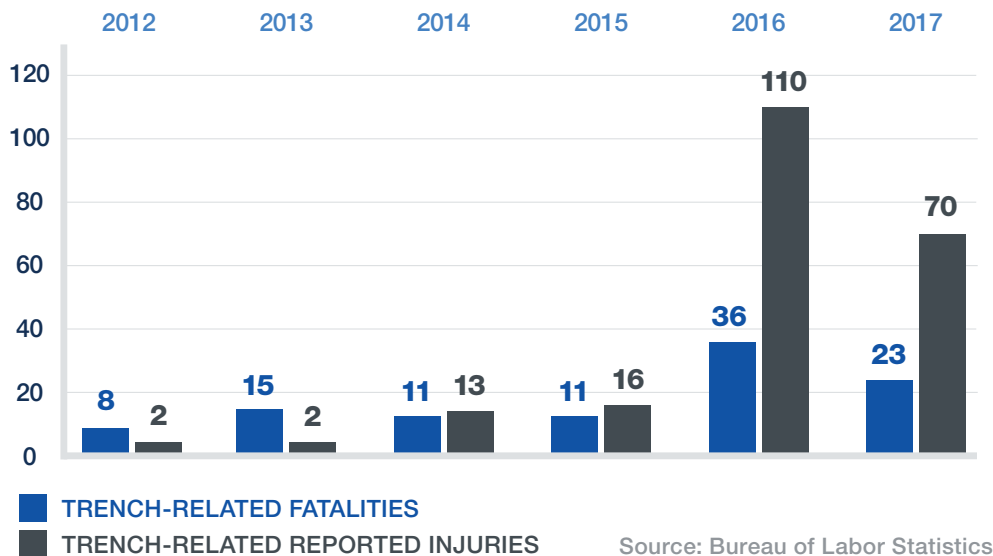
But he got lucky: His coworkers were able to dig him out, perform CPR and get him to a hospital quickly. He spent 36 hours on life support before beginning his difficult 2½-year recovery. He still has nightmares about the earth caving in.

**Giguere was lucky to survive a trench collapse. Many others don’t. Sometimes not even immediate rescue can save the victim.**

Working in trenches and other excavations is one of construction's most dangerous activities. According to OSHA, the fatality rate for excavation work is 112 percent higher than the rate for general construction.

**Trench collapses are rarely survivable, since one cubic yard of soil can weigh as much as a small car.**

## Trenching Injuries & Deaths



Trench cave-in fatalities reached a high in **2016** when **36 workers died** — more than double the average for the previous five years. The next year, 23 workers died.

There's no excuse for these fatalities. Most trench accidents are preventable by following proper safety precautions and regulations.

### A trench doesn't have to be deep to be dangerous.

According to OSHA, 72 percent of trench fatalities occur in trenches less than 9 feet deep. Cave-ins are typically fatal even if the worker is not completely buried.

## The cost of negligence

# 76%

of trench fatalities occurred when no protective system was used.

Source: OSHA

“I’ve personally seen too many trenches that are not made safe, and too often, safety procedures, inspections and proper protective systems are disregarded for ‘production’ motives,” said Blake Smith, sales and marketing director for [United Rentals Trench Safety](#).

Some contractors skip the installation of a [trench protective system](#) because of time or cost pressures. But that decision can backfire. If a cave-in occurs, the project timeline will stretch because an investigation will shut the site down. Costs will also increase — just consider the OSHA fines and the increased insurance expenses, not to mention any lawsuits. A trench collapse could also ruin a company’s reputation and lose it business.

## The cost of noncompliance

OSHA has proposed some big fines in recent years against companies accused of violating excavating and trenching rules.

PROPOSED PENALTIES	VIOLATION	DATE
\$1,475, 813	Boston contractor — two workers killed in a trench collapse	10/2016
\$714,142	Missouri plumbing contractor — worker killed in trench collapse and did not make necessary improvements in operation	12/2016
\$454,750	North Dakota excavation contractor — exposing employees to trench hazards while installing water metering pits and lines	4/2018
\$271,606	Florida utilities contractor – worker injured when water accumulated in trench; company did not provide adequate trenching protections	8/2017



# The Role of the Competent Person

“The single most important measure for preventing cave-ins when working in trenches is designating a competent person and making sure that person is adequately trained,” said Joe Wise, regional customer training manager, Trench Safety, at United Rentals.

OSHA regulations require every excavation to have a competent person in charge of overseeing all aspects of the excavation.

## What is a competent person?

OSHA defines a competent person as “one 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 responsibilities of the competent person include:

- Determining the best type of protective system for the excavation, accounting for factors such as depth, soil type and adjacent structures and surface encumbrances.
- Inspecting the excavation and protective systems daily and after weather events, such as rains or high winds.
- Identifying existing and predictable hazards and taking prompt actions to eliminate these hazards.

## Sample trench inspection checklist items



- Is there appropriate means of access and egress?
- Are ladders properly placed?
- Does the protective system comply with OSHA requirements?
- Has the atmosphere been tested?
- Are workers wearing the appropriate PPE?
- Is appropriate fall protection in place?
- Are workers protected from falling items, suspended loads and loose gravel?
- Is spoilage more than 2 feet from the edge?
- Have the conditions changed since the last inspection?
- Is water present that needs to be controlled through dewatering operations?



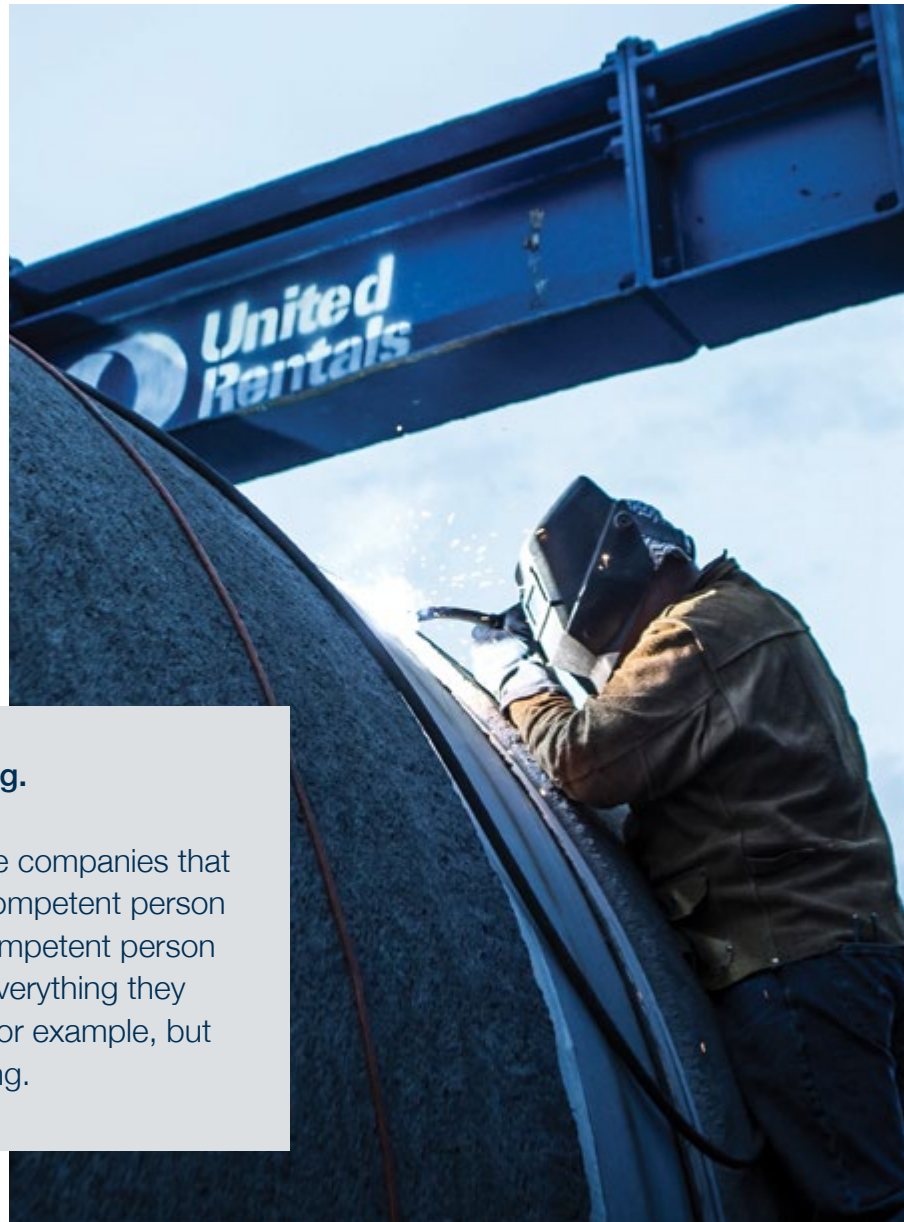
## Experience and training both count

When an employer designates someone a competent person, they are putting great trust in them and expecting them to shoulder a serious responsibility. Choosing the right person is essential. Years of experience with different trench situations is helpful, and appropriate training is critical.

OSHA doesn't spell out specific training requirements, only the type of knowledge the person needs. For example, for trenches, the competent person must be knowledgeable about soil analysis, the use of protective systems and the requirements of the 1926 subpart P standard.

Training should be ongoing. Protective solutions have seen significant advancements, and the competent person may not be up to speed if training has not been kept current.

If the competent person finds himself in a situation in which he's unsure of the best protective system for the job, it's important to seek advice. United Rentals Trench Safety can offer guidance by phone or during a jobsite visit.



### No one is competent at everything.

There's a misunderstanding at some companies that an individual who is designated a competent person for one activity is automatically a competent person for another. A person might know everything they need to know about trench safety, for example, but not be qualified to inspect scaffolding.

**United Rentals** is the largest provider of trench safety training programs, with courses including [Excavation Safety Training for Competent Persons](#).





# Choosing the Right Trench Protective System

OSHA regulations for excavation and trenching operations, covered in Standard 1926 Subpart P, require contractors to use a protective system any time a trench is 5 feet deep or greater.

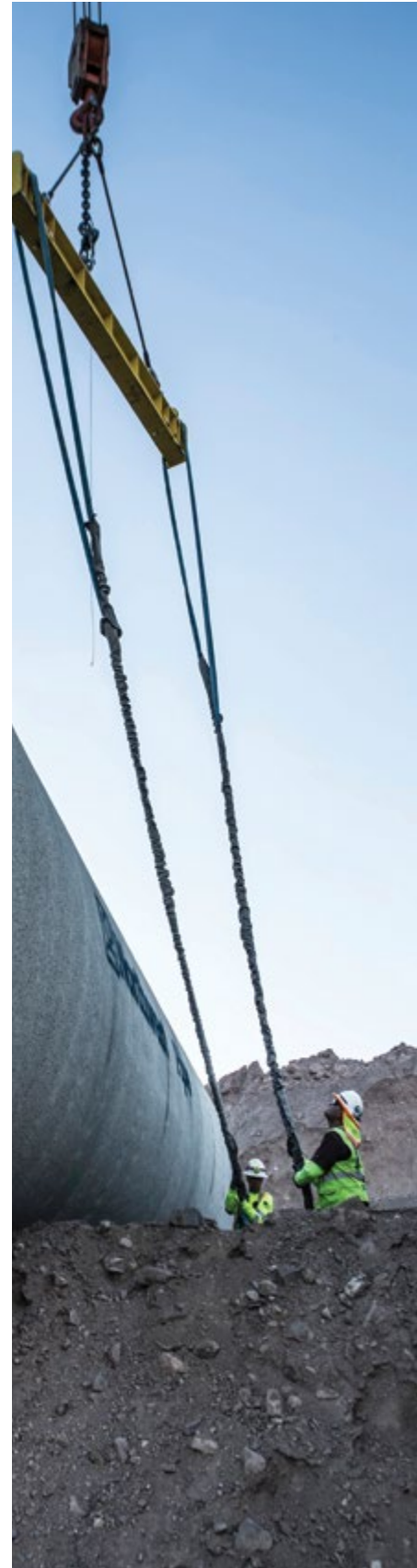
There are several types of protective systems:

- Benching – excavating trench sides to form horizontal levels or steps
- Sloping – excavating sides to angle away from the excavation
- Shoring – installing supports, such as a hydraulic strut system
- Shielding – installing a trench box or similar structure

Any protective system used must adhere to the OSHA charts (found in Appendices B, C & D of OSHA's 1926 Subpart P) or the manufacturer's tabulated data or be designed by an RPE. The competent person must review the OSHA charts or tabulated data or consult with a RPE to ensure that the desired system will satisfy all requirements.

To determine the right type of protective system for a particular job, contractors should consider these five factors:

- 1. The type of soil in the excavation area.** OSHA uses these classifications:
  - Stable rock
  - Type A – cohesive, undisturbed (i.e. clay and clay blends) – high compressive strength
  - Type B – cohesive, but disturbed, or with cracks – medium compressive strength
  - Type C – least stable, granular (i.e. sand or gravel), and/or any soil that has water seeping into it.
- 2. The purpose of the excavation.** While cross-braces might work when you're installing a long, linear run of water main, they will be in the way if you're excavating in order to drop in a large, pre-cast structure.
- 3. The width, depth and length of the excavation.** Shoring and shielding is available in a wide variety of sizes and configurations to fit the dimensions of any excavation or trench.
- 4. Other site issues.** Are there adjacent structures? Surface encumbrances? Groundwater problems? Overhead obstructions?
- 5. The area you have to work in.** Since sloping and benching systems require a mass excavation of dirt, they're not usually good choices for a downtown location crowded with roads and buildings.





# When Do You Need a Professional Engineer?

Some excavations are relatively straightforward and simply involve choosing the right protective systems. The OSHA charts allow for sloping, benching, timber and aluminum hydraulic protective system configurations up to a maximum depth of 20 feet.

But any deviation from the OSHA charts requires written approval by a registered professional engineer (RPE). Deviations may include excavations deeper than 20 feet, and, for sloping, any design steeper than what's allowed.

## Using tabulated data

Manufacturer's tabulated data are the tables and charts, approved by an RPE, that are used to design and construct a protective system. They also provide guidelines and usage limitations to the manufacturer's equipment.





Some manufactured protective systems are rated for working in depths of over 20 feet as indicated by its tabulated data, so an RPE is not required. However, even if working at depths of less than 20 feet, an RPE may need to get involved if the design parameters of the protective system will be exceeded.

When the tab data is not followed, at any depth, for any reason, an RPE must allow approval. Examples of this may include end loading and extraordinary surcharges.

## No tab data? You need an RPE

When the materials to be used for a protective system have no tabulated data, OSHA allows a design from an RPE. These materials include cantilevered steel sheeting and sheeting with welded bracing. The engineer is required to evaluate the soil, choose the section and length of sheet, choose the location and section of beam and provide the welding detail. Engineering for this form of protective system is required at any depth.

## Tab data cautions

**Caution 1:** Don't assume tab data are interchangeable just because two pieces of equipment are similar in shape and size. Each manufacturer has a set of tab data specific to each type and model of protective equipment. Some equipment, like steel shields, has specific tab data tied to it by a serial number. Other equipment, like aluminum hydraulic shores, is addressed by a more generalized document that covers a variety of sizes of the same kind of equipment.

**Caution 2:** If the tab data don't address a particular situation, don't assume that any solution you devise is acceptable. 1926.652. (c)(2)(ii) states that deviations from the tab data will be allowed only if the contractor has written permission from the manufacturer or an RPE.



5.

# Myths about Protective Systems

Don't be fooled by any of these common misconceptions about trench protective systems.

## Myth:

Only one type of protective system can be used for a particular job.

## Fact:

OSHA doesn't require the use of a particular system in a given situation. The competent person can choose the system that makes the most sense.

## Myth:

Trench boxes can prevent cave-ins.

## Fact:

**Trench boxes** aren't designed to shore an excavation's walls. They're designed to protect workers from the pressure and weight of soil in the event of a cave-in.

### Myth:

You have to use plywood, steel or other sheeting behind aluminum hydraulic shores.

### Fact:

If you don't have sloughing or raveling of the soil, you may be able to pressurize the [hydraulic shores](#) right against the dirt walls. You'd typically use this on a short-term excavation and with more stable soil types. Follow the manufacturer's guidelines.

### Myth:

You can use just one aluminum hydraulic shore for a protective system.

### Fact:

You can never use just one shore. In hydraulic shoring applications, manufacturer's tabulated data requires a minimum of three consecutive shores. For excavations that are too short to place three or four shores at the required spacing, two shores can be used, as long as they are placed at the required spacing and are within 2 feet of each end of the excavation.





**Myth:**

You'll always be compliant if you use the depth ratings and spacing numbers on the tabulated data.

**Fact:**

The tabulated data “assists” the competent person, but he or she may need to consider other factors that could require adjustments to those numbers, such as heavy surcharges or water conditions that impact soil conditions and increase hydrostatic pressure.

**Myth:**

If the competent person feels that something will work as a protective system, we can use it.

**Fact:**

The competent person has to adhere to OSHA standard 29 CFR Part 1926, Subpart P. The burden is on the competent person to prove that any protective system will function according to the requirements of the standard.





# When Is a Trench a Confined Space?

Open trenches and excavations such as building foundations are regulated under OSHA's excavation standard, 29 CFR Part 1926, Subpart P. But there are times when underground excavation projects require workers to enter a structure such as a precast pipe, manhole or vault. These structures are subject to OSHA's confined space rules because they are large enough for a person to enter but limit or restrict means of entry or exit and are not designed for continuous occupancy by a worker.

Confined spaces in construction are regulated by OSHA 1926 Subpart AA. The standard requires the jobsite to have a competent person who can identify confined and permit required spaces and can evaluate those spaces, including identifying physical hazards that must be eliminated or controlled and performing atmospheric testing if necessary.

If an actual or potential physical or atmospheric hazard exists that can't be eliminated or controlled, the space is considered a permit required confined space.

The [OSHA standard for confined spaces in construction](#) is very detailed. The agency has provided these resources to help contractors understand them:

- [Frequently Asked Questions](#)
- [Protecting Construction Workers in Confined Spaces: Small Entity Compliance Guide](#)
- [Confined Spaces in Construction: Sewer Systems](#)
- [Confined Spaces in Construction: Pits](#)

# Creating a Trench and Excavation Safety Culture



No company wants to experience an incident resulting from a trench or excavation collapse. Fortunately, these incidents are entirely preventable. The best way to prevent a trench collapse or cave-in is by clearly defining and executing a trench safety program as part of a strong safety culture.

A world-class safety culture features:

**A written company safety policy.**

A good policy thoroughly outlines responsibilities and practices to be followed.

**Effective, ongoing safety training.**

One-time training is not enough. Reinforce safety messages during safety meetings, toolbox talks, etc., and send workers for formal training whenever necessary. Trench safety solutions and protective equipment evolve, so make sure your training keeps up.

**A demonstrated commitment to safety from management.** From CEO to field supervisors, managers should show by their words and actions that they value the safety of the workers on the jobsite above everything else.

**Accountability.** If a worker is injured in a trench or there's a close call, management must take responsibility and make changes. Employees at every level must understand — and believe — that there will be consequences if they don't comply with safety requirements.



**Reminder: Provide training in a language and vocabulary the worker understands.**

**Worker involvement.** “Involving workers in the creation and implementation of a company’s safety program goes a long way toward getting them to buy into the value of the safety practices,” said James A. Dorris, vice president of health, safety and environment for United Rentals.

**Stop-work authority.** Give workers not only the authority but the responsibility to stop work if a task or situation presents a danger to themselves or others.

### The Pre-Job Briefing

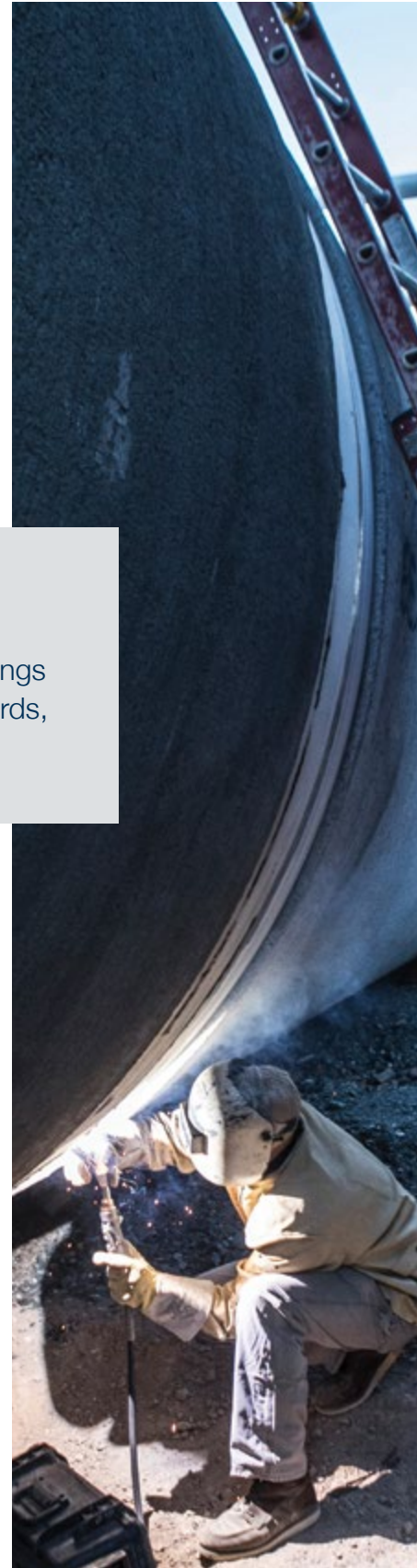
Develop a pre-job briefing checklist for trench work. Hold these briefings daily before work begins, and use them as a chance to discuss hazards, hazard mitigation, PPE needs and more.

## Working with subcontractors

When you’re working with subcontractors (and their subs), their unsafe behaviors in trenches and other excavations could affect the safety of all the workers. What’s more, if your employees see that subs aren’t following the rules, they’re less likely to believe that you take those rules seriously.

To help ensure that your subs are on board with trench and excavation safety:

- Make sure every subcontractor on your jobsite understands and complies with relevant safety rules and regulations.
- Prequalify subs by researching their experience modification rate and their OSHA 300 and 300A records.
- Check references, and ask specifically about safety.
- Ask them to outline their safety policies, the safety procedures they follow for trenching and excavation work and the methods they use to ensure that workers comply.



## Make the investment in worker safety

No construction worker enters a jobsite excavation thinking that this will be the day the earth caves in.

“Too often, workers doing this type of underground work think an accident won’t happen to them,” said Blake Smith. And it shouldn’t. Despite the alarming rise in trench fatalities, most trench accidents are preventable.

When an accident does happen, the impact is rarely minor.

“In circumstances where a worker encounters a life-changing injury or fatality, the cost goes beyond citations, fines and court settlements,” said Smith. “Families are left with the burden to move forward with their loss to cope beyond their loved one’s injury or death.”

Every company faces pressure to complete increasingly complex jobs within increasingly challenging timelines. But when shortcuts backfire, they cost time, money, and sometimes, lives.

Trench work is inherently dangerous. But if you take the necessary precautions to make it less so, and train your workers to do the same, projects will get done more efficiently, and your employees can live to work another day.





With more than 90 trench safety branches and the largest fleet of shoring and underground excavation rental equipment in North America, United Rentals can help you find the right solution for your excavation needs.

United Rentals is also the largest provider of trench safety training programs. Training is available online, onsite or at one of our store locations.