

**WORKPLACE**  
Material Handling & Safety

# Safety in Construction eBook



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# Best Built Plans Ergonomics Training Program Focuses on Preventing Soft Tissue Injuries in Construction Workers

By: **Grace Barlet**, CPWR, and **Eileen Betit**, CPWR, Contributors

Soft tissue injuries, or musculoskeletal disorders, are one of the leading causes of disabling injuries in the construction industry<sup>1</sup>. To help prevent these injuries, CPWR–The Center for Construction Research and Training (CPWR) developed a free program called Best Built Plans ([www.bestbuiltplans.org](http://www.bestbuiltplans.org)), which was introduced in the previous version of this eBook, *Keeping Your Workers Safe in Construction*. This program includes tools and resources for contractors and workers to support planning for safer manual materials handling at every stage of a construction project, while also staying productive and profitable.

Building on these resources, CPWR, in collaboration with researchers from Washington University in St. Louis, the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry, and the Mechanical Contractors Association of America, released the first module in its two-part Best Built Plans—Comprehensive Ergonomics Training Program. This training program incorporates the

resources from the Best Built Plans program and makes the important connection between how preventing injuries and pain can also reduce the need for pain medication and the risk of developing an opioid use disorder.

The first module in this program is designed to provide instructors with the information needed to raise construction workers’ awareness of soft tissue injuries and ways to prevent them, including safe lifting practices and proper body mechanics. It includes both classroom and hands-on components and materials to use with each. The second module in this program, which will be available soon, includes information on the hazards and solutions, as well as information to help contractors integrate ergonomics into their company’s safety program.

### The Worker-Focused Module

The worker-focused training module consists of four parts to provide instructors with the flexibility to tailor the program for the time, space, and resources available:

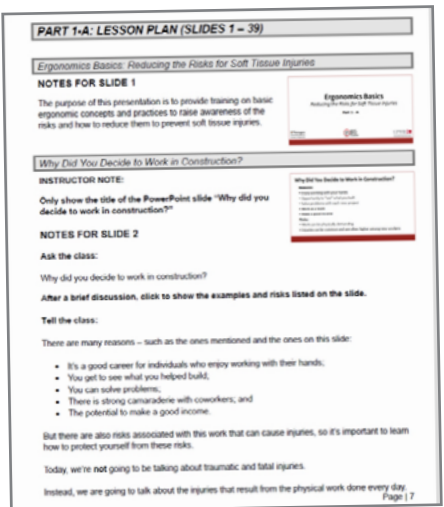
- **Part 1** is divided into two presentations, Parts 1-A and 1-B. Part 1-A introduces workers to the causes of soft tissue injuries and proper lifting practices to use to reduce the risk of injuries from handling materials on the job site. Part 1-B addresses the value of selected stretching exercises; provides basic information about the connection between soft tissue injuries and the risk for opioid dependence; and reviews the Best Built Plans resources, which are designed to reinforce what was learned.
- **Part 2** includes a series of five short, hands-on exercises designed to reinforce and apply lessons learned in Part 1-A about safe lifting practices and proper body mechanics.

- **Part 3** covers the Best Built Plans interactive training resources (available for use on a PC or as an app for a tablet or smartphone) and the smartphone games. These resources can be used to introduce trainees to, or reinforce the importance of, planning for how materials will be lifted and moved and using safe lifting practices (including equipment and team lifts).
- **Part 4** is intended to be used with a more advanced class or as a refresher for workers who have already received the basic ergonomics training.

The instructor guide includes notes for each slide in the PowerPoint presentations, instructions and signage for hands-on exercises, suggested handouts, and materials needed to conduct each part of the program. The PowerPoint slides also contain the notes that go with each slide. Users can substitute trade-specific photos for the ones used in the presentations and in the materials used in the hands-on exercises.

*The Best Built Plans—Comprehensive Ergonomics Training Program for Workers* is available online for free at: <https://www.cpwr.com/research/research-practice-library/construction-ergonomic-research-solutions>. The contractor-focused module will also be available soon on this website.

For more information about the Best Built Plans—Comprehensive Ergonomics Training Program, please contact Eileen Betit, Director of Research to Practice, or Grace Barlet, Research Assistant at CPWR–The Center for Construction Research and Training ([ebetit@cpwr.com](mailto:ebetit@cpwr.com) or [gbarlet@cpwr.com](mailto:gbarlet@cpwr.com)).



<sup>1</sup> 2019 Liberty Mutual Workplace Safety Index.



# Gorbel and Fall Protection



Every year since 2012, fall protection violations have earned the top spot on OSHA’s Top 10 list of most cited violations. In 2017, there were 6,887 total violations cited by OSHA, highlighting the need for warehouse companies to improve their fall protection measures. Failure to make fall protection a top priority can result in harsh penalties and fines for your construction company. Even more important, inadequate

fall protection can put your business at a higher risk for employee injury and death.

The path to effective fall protection begins with a top-notch safety training program. When properly organized, safety training will effectively engage employees and prime them for safe and productive employment. With OSHA citing falls as one of the most

common causes of work injuries and deaths, it is paramount that employees receive in-depth training on fall protection strategies. Employees should have a strong working knowledge of the most common causes of falls and the specific measures they can take to avoid high-risk situations.

Establishing a culture of safety starts with the active participation of senior management and stakeholders. Senior managers must then secure the buy-in of supervisors, who must secure a commitment to safety from front-line employees.

Once you have established a culture of safety and identified the high-risk areas in your construction site, it is time to focus on your fall protection equipment. By investing in robust, dependable fall protection systems, you can reduce the risk of injury on site.

Not all manufacturers are created equal, so it is important to carefully evaluate equipment providers to ensure that the systems you purchase are both reliable and cost-effective. Fortunately, Gorbel offers a host of ergonomic fall protection systems that are ideal for use on construction sites. Here are a few of the products that can help you optimize fall protection:

- **Overhead fall arrest system:** Gorbel’s Tether Track™ Rigid Rail Fall Arrest System offers workers mobility and flexibility while helping to prevent them from falling to lower levels. Most systems are made to accommodate multiple workers who weigh up to 310 pounds with their tools.
- **Free standing systems:** Gorbel’s free standing monorail fall protection systems are ideal for facilities with workers who maintain, inspect, and unload flatbed trucks and tankers. You can choose from heights up to 26 feet to provide adequate protection for workers.
- **Mobile or portable fall protection systems:** Mobile or portable systems are ideal for busy warehouse environments where workers are highly mobile. A Mobile Fall Arrest System is an active means of protecting workers from injury due to falls. A complete personal fall arrest system includes an anchor, a body harness and a connector- such as a shock-absorbing fall arrest lanyard or self-retracting lanyard (SRL). Gorbel’s Ranger Mobile Fall Protection anchor is Fall Protection on-the – go. Gorbel offers 5 day quick shipping on most of their mobile systems.

There are many ways for construction sites to safeguard against falls. However, the single best way to protect against falls is to contact an expert in the fall protection industry. With over 40 years of experience protecting the lives of employees, Gorbel has established itself as an international leader in the fall protection arena. The fall protection specialists with Gorbel are eager to assist you in your mission to protect your employees and look forward to assisting you.

Learn more at <https://hubs.ly/H0nZcFc0>.





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# A Hot Topic: Heat Stress

By: **Joan Mantini**, Chief Editor

Outdoor workers exposed to hot and humid conditions can be at risk of heat-related illness. The risk becomes greater as the weather gets hotter and more humid. The combination of both air temperature and humidity affect how hot outdoor workers feel in hot-weather conditions.

Although OSHA does not have a specific standard that covers working in hot environments, under the OSHA Act, employers have a duty to protect workers from recognized, serious hazards in the workplace, including heat-related hazards.

Employers need to take into consideration the “heat index,” which is a single value that takes both temperature and humidity into account. The higher the heat index, the hotter the weather feels. The heat index is considered a better measure than air temperature alone for estimating the risk to workers from environmental heat sources.

NOAA issues extreme-heat advisories to indicate when excessive, extended heat will occur. The advisories are based mainly on predicted heat index values:

- **Excessive Heat Outlook:** issued when the potential exists for extended excessive heat (heat index of 105-110°F) over the next 3-7 days. This is a good time to check on supplies, such as extra water coolers, and refresh worker training.
- **Excessive Heat Watch:** issued when excessive heat could occur within the next 24-72 hours, but the timing is uncertain.

- **Excessive Heat Warning:** issued when the heat index will be high enough to be life-threatening in the next 24 hours. This warning indicates that the excessive heat is imminent or has a very high probability of occurring.
- **Excessive Heat Advisory:** similar to an Excessive Heat Warning but less serious. This is issued when the heat index could be uncomfortable or inconvenient but is not life-threatening, if precautions are taken.

## TAKING PRECAUTIONS

Extra measures, including implementing precautions at the appropriate risk level, are necessary for reducing the risk of heat stress for employees working outdoors in extreme heat. The employer’s response at the four risk levels is the subject of the remainder of OSHA’s guidelines. The steps employers should take in response to an elevated heat index are the same type of steps that they would follow to address other hazards in the workplace:

- Develop an illness-prevention plan for outdoor work, based on the heat index.
- Train your workers on how to recognize and prevent heat-related illness. Train workers about safe work practices before heat index levels go up.

Workers should be prepared to recognize the signs and symptoms of heat-related illness; how to prevent it; and what to do if someone is demonstrating symptoms.



The CDC suggests a buddy system be set up, to check on workers routinely to make sure they are making use of readily available water and shade, and that they do not have heat-related symptoms. (© Blanscape - stock.adobe.com)

- Track the worksite heat index daily; communicate it and the required precautions to workers. Knowing how hot it will be during scheduled work activities can help to determine which preventive measures should be taken in preparation.

- Implement your plan; review and revise it throughout the summer.

It is suggested that workers are trained before hot outdoor work begins. Training can be more effective if it is matched to job tasks and conditions and is reviewed and reinforced throughout hot weather conditions. The following OSHA-suggested training topics might be addressed in one session or in a series of shorter sessions:

- Risk factors for heat-related illness
- Different types of heat-related illness, including how to recognize common signs and symptoms
- Heat-related illness prevention procedures
- Importance of drinking small quantities of water often
- Importance of acclimatization; how it is developed; and how your worksite procedures address it
- Importance of immediately reporting signs or symptoms of heat-related illness to the supervisor
- Procedures for responding to possible heat-related illness
- Procedures to follow when contacting emergency medical services
- Procedures to ensure that clear and precise directions to the worksite will be provided to emergency medical services

DAY 1	DAY 2	DAY 3	DAY 4
50% EXPOSURE	60% EXPOSURE	80% EXPOSURE	100% EXPOSURE

## GRADUAL EXPOSURE

By developing an acclimatization plan, employers can protect their workers from heat stress. According to the Center for Disease Control and Prevention (CDC), “Acclimatization is the result of beneficial physiological adaptations (e.g., increased sweating efficiency and stabilization of the circulation) that occur after gradual increased exposure to a hot environment.” The CDC gives three tips to assist with this plan:

1. Gradually increase the time spent in hot environmental conditions over a 7-14 day period.
2. For new workers, the schedule should be no more than 20% exposure to heat on day one and an increase of no more than 20% exposure on each additional day.
3. For worker who have had previous experience with the job, the acclimatization should be no more than:

The CDC also suggests a buddy system be set up to check on workers routinely—to make sure they are making use of readily available water and shade, and that they do not have heat-related symptoms. Workers should also be encouraged to wear clothing that is breathable, light-colored and loose-fitting, and although in some working environments personal protective equipment is necessary, it is also important to be aware that it may increase the risk of heat stress.

## STAY HYDRATED

Workers should be encouraged to drink hydrating fluids, such as water, throughout the day. The CDC recommends that, during moderate activity in moderately hot conditions, workers should drink about 1 cup every 15-20 minutes. However, staying hydrated before work is equally important. Being hydrated when you start your workday makes it easier to keep hydrated, and replenishing after work is equally



The CDC recommends drinking 1 cup of water every 15-20 minutes in moderately hot conditions. Starting a workday hydrated also helps. (© guruXOX - stock.adobe.com)

important. According to the CDC, “Hydrating after work is even more important, if you work in the heat on a regular basis. Chronic dehydration increases the risk for a number of medical conditions, such as kidney stones.”

Indeed, water will almost always maintain hydration levels, when consumed properly, while working in a hot and/or humid environment. Other electrolyte-enhanced beverages may also prove to be beneficial; however, if proper nutrition through a well-balanced diet is maintained, these types of drinks are not necessary.

## HEAT INDEX

*Using the Heat Index: A Guide for Employers* was created to help employers and worksite supervisors prepare and implement hot weather plans. Employers and employees can determine when extra precautions are needed at a worksite, with the goal to protect workers from environmental contributions to heat-related illness. You can find more about information about heat stress at *Using the Heat Index: A Guide for Employers* ([https://www.osha.gov/SLTC/heatillness/heat\\_index/pdfs/all\\_in\\_one.pdf](https://www.osha.gov/SLTC/heatillness/heat_index/pdfs/all_in_one.pdf)). **WMHS**





# Are You Wearing the Right Gloves?

When you work in construction, ensuring you're safe at work can be a real challenge. Whether you're hammering nails, cutting up plywood, or using power tools – you'll need specialized protection to ensure you can do your job and keep your hands safe.

No one wants to be on a job site without the proper protection, but sometimes protection makes it difficult to actually do your job. From too much bulk to wearing heavy materials in sweltering heat – staying safe in construction can sometimes be an uncomfortable experience.

At Superior Glove, we recognize that personal protective equipment (PPE) is only effective if you're wearing it, and you'll only be wearing it if it's comfortable and allows you to perform your job.

That's why we design our innovative safety gloves with safety and comfort in mind. We offer comfortable, dexterous work gloves with a variety of safety features including all three levels of impact protection under the new impact standard ANSI/ISEA 138.

## Leveraging Technology for Better Protection and Comfort

Known for our innovation in glove design, we leverage technology to equip our safety gloves with the protection you'll need in a glove you'll want to wear.

### Get a (Good) Grip

One of the top reasons injured workers give for not wearing gloves is that they had to take their gloves off to actually do their job. Doing your job should never come at the expense of protecting your hands. That's why Superior Glove uses science to engineer yarns to build gloves that make it feel like you're not wearing any gloves at all.

For a sure grip in oily conditions, try our S18TAFGFN – one of our best-selling gloves of all time. Made from our exclusive TenActiv™ fiber, it's easy to see why these fly off the shelves once you get your hand in one – these gloves fit so well it's like you're not wearing gloves at all. Not only are these gloves perfect for fine-detail tasks, but also have a foam nitrile palm coating to help maintain grip even in oily or wet conditions.

Another great choice for those working in dry conditions is our very popular STAGBPU. Featuring polyurethane palms, these form-fitting gloves will keep your grip strong and sure, no matter the task.

### Bad Vibrations

Don't let the Beach Boys fool you – there's no such thing as good vibrations. In fact, if you regularly use vibrating power tools while performing your job, you're putting your hands at risk of developing HAVS (Hand-Arm Vibration Syndrome) – a serious and debilitating disease. People afflicted with HAVS are at risk of losing all sensation and dexterity in their fingers and its effects are generally irreversible; however, the devastating effects of HAVS can be prevented with proper hand protection.

Slip into a comfortable pair of Superior's S10VIB anti-vibration gloves before operating power tools to protect the future of your hands today.

### Fingertip Protection

Did you know that your fingertips are one of the most sensitive parts of your body? Makes sense, right? You rely on your fingertips for the vast majority of your tactile sensory experiences, but all this heightened sensitivity means it'll hurt that much more when you get injured. Fear not, our PinchGuard technology

was designed specifically to protect you from painful fingertip injuries.

Hidden comfortably in the fingertips of your gloves, PinchGuard technology is barely noticeable but there when you need it to protect against devastating crush and pinch injuries.

The best part? These comfortable gloves are jam-packed with other essential protections for work in construction including impact protection and Oilbloc™ treatment.

For great all-purpose gloves, try our classic style 378GOBFC made from high quality leather. For additional protection from impact hazards, choose our 378GOBBFC.

### Get Your Hands in a Superior Glove

Designed with you in mind, Superior Gloves are rugged enough for the demands of the construction industry yet comfortable enough for all-day wear.

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1.800.265.7617

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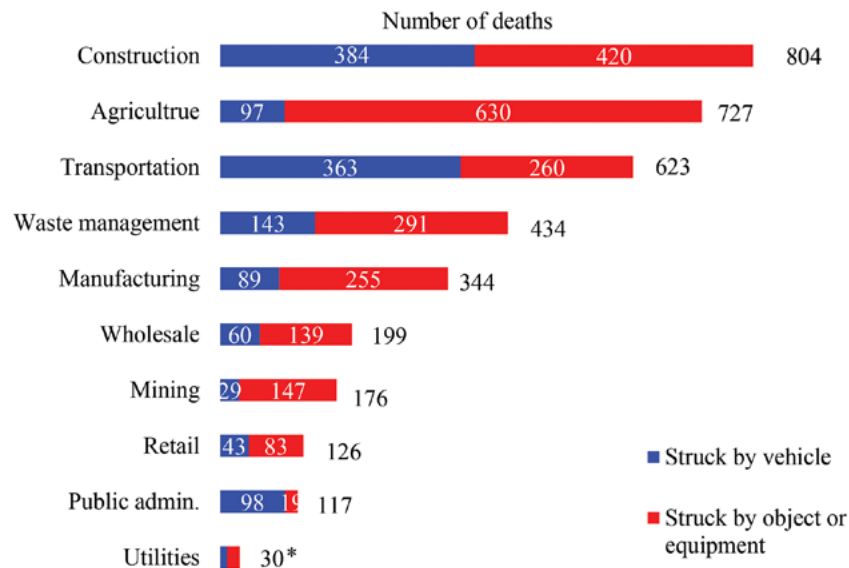


# Raising Awareness, Identifying Solutions to Prevent Struck-By Incidents

By: **Eileen Betit**, CPWR, and **Chris Le**, CPWR, Contributors

According to OSHA, the most common struck-by hazards are flying, falling, swinging or rolling objects.<sup>1</sup> Struck-by injuries are a leading cause of construction deaths and have been designated by the Occupational Safety and Health Administration (OSHA) as one of the top four construction hazards. From 2011-2015, for example, 804 construction workers died from struck-by injuries; 48% were the result of being struck by a vehicle, and 52% were struck by an object (Figure 1). During this period, there were also roughly 81,000 struck-by injuries resulting in days away from work.<sup>2</sup>

**Figure 1** Number of fatal struck-by injuries, by major industry, sum of 2011-2015 (All employment)



Source: CPWR Quarterly Data Report, Struck-by Injuries and Prevention in the Construction Industry, 2nd Quarter 2017.

## Preventing Struck-By Injuries and Fatalities



**Figure 2**

Example of an infographic developed by the NORA Work Group that can be blown up and posted on job sites, or used in articles, presentations, and social media.

Health's (NIOSH) NORA Construction Sector Council Work Group on Preventing Struck-by Injuries, CPWR established a Work Zone Safety online resource ([www.cpwr.com/research/work-zone-safety](http://www.cpwr.com/research/work-zone-safety)) to help stakeholders readily find: training resources; information to include in an internal traffic control plan; and the latest research and materials from OSHA and NIOSH. This site also contains information to help stakeholders prepare for and participate in the first National Stand-Down to Prevent Struck-by Incidents, held virtually on April 20, 2020 during National Work Zone Awareness Week.



The good news is that struck-by injuries and deaths are preventable, and CPWR-The Center for Construction Research and Training (CPWR) has resources that employers can use to train their employees on the hazards and use of appropriate engineering controls, personal protective equipment (PPE), and safety protocols. (Figure 2)

As part of its work with the National Institute for Occupational Safety and

<sup>1</sup> OSHA Training Institute Construction Focus Four: Struck-By Hazards INSTRUCTOR GUIDE. Accessed March 2020

<sup>2</sup> "Struck-by Injuries and Prevention in the Construction Industry." CPWR-The Center for Construction Research and Training Quarterly Data Report, Second Quarter 2017.



construction solutions

Construction hazards with suggested options for making work safer

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**Garage Spring Winding Wrench**  
A garage spring winding wrench is an engineering control that reduce injuries from residential or commercial garage door torsion spring wi...

**Lead Encapsulating Compounds**  
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**Fume Extraction MIG Welding Gun**  
Fume extraction MIG welding guns remove welding fumes at the point of generation.

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CPWR Construction Solutions Homepage

Figure 3

In addition, CPWR's Construction Solutions Database provides quick access to solutions for a wide variety of construction hazards, including, for example, struck-by hazards caused by blind spots and low visibility during night work. Launched in 2008, this Database can be searched by type of work or solutions for specific topics. (Figure 3)

For more information about the National Stand-Down to Prevent Struck-by Incidents and CPWR online resources on Work Zone Safety, contact Eileen Betit, Director of Research to Practice ([ebetit@cpwr.com](mailto:ebetit@cpwr.com)). For information on the Construction Solutions Database contact Chris Le, Construction Solutions Program Manager ([chrisle@cpwr.com](mailto:chrisle@cpwr.com)).

## CONSTRUCTION SOLUTIONS – EXAMPLES OF STRUCK-BY INTERVENTIONS

Solution	Type	Description
<a href="#">Automated Flagging Assistant Devices (AFAD)</a>	Substitution	AFADs are remote-controlled equipment designed to be operated by a flagger positioned outside of the travel lanes in a work zone. This device minimizes flaggers' direct exposure to traffic by allowing them to control the flagging device from an area away from traffic.
<a href="#">Work Zone Lighting</a>	Engineering Control	Work zone lighting increases the visibility of workers on foot to equipment operators, motorists and other workers during night work.
<a href="#">Temporary Longitudinal Barriers</a>	Engineering Control	Barriers delineating the separation between the work zone and public traffic, which divert and deflect vehicles from work zones.
<a href="#">Movable Longitudinal Barriers</a>	Engineering Control	Movable longitudinal barriers are mobile, rigid wall trailers (hauled by a truck) that can extend up to 102ft and provide a barrier between the work zone and public transportation.
<a href="#">Object Detection and Camera System for Heavy Equipment</a>	Engineering Control	This system consists of a monitor display that provides operators with a real-time, overhead view of their surroundings.
<a href="#">Real-time Monitoring Through A Connected Jobsite Platform</a>	Engineering Control	A mesh network system for monitoring worker location, equipment utilization and safety incidents.
<a href="#">High-Visibility Safety Apparel</a>	Personal Protective Equipment	High-visibility safety clothing to increase workers' visibility during roadway construction and maintenance.
<a href="#">Illumination Ring for Hard Hats</a>	Personal Protective Equipment	An illumination ring that attaches to a standard hard hat to help increase worker visibility.

# See the Importance of Eye Protection

By: **Heather Perl**, *Improv Learning*

Each day, across the U.S., almost 2,000 workers suffer eye injuries that require medical treatment. Along with the potential personal devastation that comes with an eye injury, OSHA estimates that these types of accidents cost businesses over \$300 million per year. Sadly, experts believe that, in as many as 90% of these cases, eye damage could have been lessened or completely avoided—if workers had been wearing personal eye protection.



According to the National Institute for Occupational Safety and Health, small objects, such as wood chips, metal slivers, sparks or dust, cause the majority of workplace eye injuries. Larger objects, such as nails, staples and screws, and some tools, also pose a significant threat to the unprotected eye. While less frequent, burns from chemicals and even cleaning products may be just as serious.

## HOW TO FIND THE OPTIMAL PROTECTIVE EYEWEAR

For the most part, protective eyewear comes in two types: safety glasses and safety goggles. Finding the best protection for any given situation requires an evaluation of the workplace environment and its potential hazards.

Typical safety concerns fall into at least one of four different categories: mechanical, temperature, chemical or radiation. Mechanical hazards consist mainly of flying particles generated by tools or machines. Metal splashes, hot liquids and intense heat radiation fall into the temperature category. Laser light or UV radiation are two examples of radiation dangers. Chemical hazards include cleaning fluids, gasses, chemical splashes and, at times, even dust.

In general, safety glasses work fine in preventing most mechanical and radiation injuries. Environments where chemical or temperature hazards come into play usually require the more comprehensive coverage that goggles provide.

Lens material also plays an important part in choosing the proper personal eye protection. Acrylic, polycarbonate, NXT polyurethane and optical glass are the four most common materials used in protective lenses. Each has its own set of pros and cons.

Polycarbonate lenses provide excellent impact and scratch resistance; are light in weight; and offer good UV protection. However, their optical clarity falls below that of NXT polyurethane or optical glass. Also lightweight and scratch-resistant, NXT Polyurethane (Trivex) offers excellent optical clarity.

Acrylic lenses protect best against solvents, but tend to scratch easily and don't hold up as well as the others. Heavier optical glass lenses provide excellent scratch resistance and distortion-free vision, but have poor impact resistance. Optical glass and polyurethane lenses typically cost more than their acrylic and polycarbonate counterparts.

To provide sufficient coverage, protective eyewear should be either adjustable or fitted to each worker. Along with the proper level of protection, comfort also matters when choosing proper workplace eyewear. Safety glasses sitting on the shelf or in the shirt pocket serve no purpose. Some comfort-enhancing features found on today's safety eyewear include:

- ▶ Cushioned brows
- ▶ Adjustable lenses
- ▶ Anti-fog lenses
- ▶ An interchangeable head strap
- ▶ Padded or gel nose bridges
- ▶ Vented frames
- ▶ Flexible temples

Looks are also a factor to consider when it comes to protective eyewear and worker compliance. Features such as mirrored lenses, wraparound frames and sport styling encourage workers to put their glasses on and keep them on—especially on outdoor job-sites.



## ANOTHER GOOD REASON TO PROVIDE PROPER EYE PROTECTION

Aside from the personal devastation that eye injuries cause, companies that don't provide proper safety gear and enforce safety protocols may find themselves financially liable, as well.

In one recent settlement, a construction worker received \$2.65 million for permanent damage incurred when a nail ricocheted backward and struck his left eye. The worker claimed that he had requested protective eyewear, but was instructed to work without it. Another case highlights the importance of enforcing safety rules. In this case, a 20-year-old electrician was standing on a ladder and working on a ceiling and not wearing eye protection, when another employee grabbed his leg as a prank. Startled, the man pulled his wire cutters into his right eye.

Although the injured man wasn't wearing the required eye protection, a jury found both the construction company and their employee 80% at fault, and they awarded \$1.6 million dollars. Although the company provided the injured party with safety glasses, and he chose not to wear them, a jury still found him only 10% liable for the incident.

Considering that safety eyewear for most applications costs less than \$5 per pair, employers have no excuse not to provide workers with the proper protection. Providing the correct safety gear and enforcing safety protocols protects workers from personal injury; saves money; creates a professional workplace atmosphere; and, most of all, is the right the thing to do. **WMHS**





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# Industry Survey Provides Insights into Trench Safety

By: **Eileen Betit**, CPWR, and **Grace Barlet**, CPWR, Contributors

Each year, construction workers are injured or die when, for example, the walls of the trench they are working in collapse, they are struck by falling loads, or they're exposed to hazardous atmospheres. In 2018, the Occupational Safety and Health Administration (OSHA) made reducing trenching and excavation hazards a priority because of the “continuing incidence of trench/excavation collapses and accompanying loss of life.”<sup>1</sup>

According to the Bureau of Labor Statistics' Census of Fatal Occupational Injuries data, between 2011-2018, 137 construction workers lost their life while performing trenching and excavation work. In 2018 alone, 14 construction workers were killed in trench collapses and 130 reported injuries.<sup>2</sup> To put the risk in perspective, one cubic yard of dirt can weigh 3,000 lbs or more. As a result, a trench collapse can result in a fatality in a matter of minutes.<sup>3</sup>

In 2019, in partnership with OSHA, NIOSH, and United Rentals, CPWR-The Center for Construction Research and Training (CPWR) developed and fielded a survey to identify factors that contribute to trench incidents and fatalities and ways to prevent them.

## Participants' Experience

A total of 637 industry stakeholders participated in the survey. Based on the types of positions they held within their organization, they were grouped into three categories: roughly 61% fell into the “industry group,” which included positions likely to be involved in day-to-day, trench-related activities on a job site; 35% fell into a “safety and health” group, which included positions that provide training or guidance for this type of work; and the remaining 4% fell into an “other” category.

Participants were primarily from companies with more than 20 employees (80%), and roughly three out of four had more than 10 years of experience in the construction industry. They performed work related to trenching on all types of projects, with commercial projects noted most frequently.

Overall, roughly three out of four (71%) of the participants rated their understanding of the OSHA trench standard as “good” to “excellent.” And, the majority said they were qualified as a competent person for trench work.

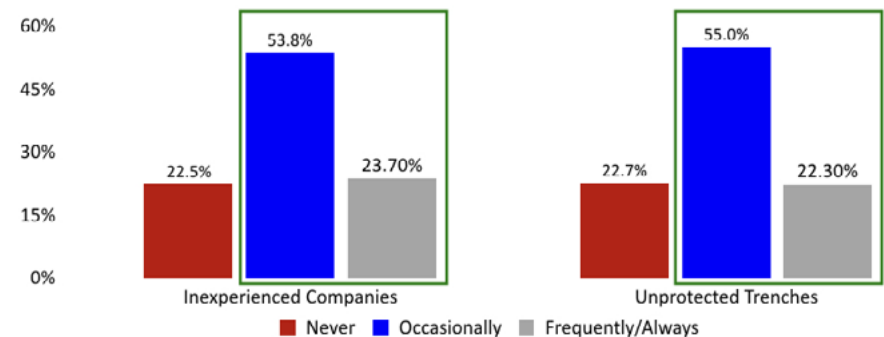
## Job Site Conditions

Participants' responses to a series of questions about conditions they encounter on job sites highlighted several that can negatively impact trench safety, including:

- **A lack of planning for the trench work to be performed.** Only about a fourth of participants said there is “always” enough planning.
- **Inexperienced companies performing trench work.** As shown in Figure 1, participants said it is relatively common to see trench incidents involving companies that are inexperienced or new to trench work and to see unprotected trenches.

How frequently do you see incidents where companies are inexperienced and new to trenching, and unprotected trenches?

Figure 1



- **Absence of a competent person on the job site.** Only 39% of participants said there is “always” a competent person trained in trenching on the job site, even though OSHA requires “that trenches and protective systems be inspected daily and as conditions change by a competent person before work begins.”<sup>4</sup> Given that response, it was not surprising that roughly three out of four of the survey participants said they “occasionally” or “more frequently” encounter trench incidents where new workers are exposed to trench work without proper supervision by a competent person (Figure 2).

1 OSHA National Emphasis Program on Trenching and Excavation. Effective 10/1/18. Accessed March 2020 [https://www.osha.gov/sites/default/files/enforcement/directives/CPL-02-00-161\\_0.pdf](https://www.osha.gov/sites/default/files/enforcement/directives/CPL-02-00-161_0.pdf).

2 U.S. Bureau of Labor Statistics. Census of Fatal Occupational Injuries (CFOI) - Current and Revised Data. <https://www.bls.gov/iif/oshcfoi1.htm>. Accessed March 11, 2020.

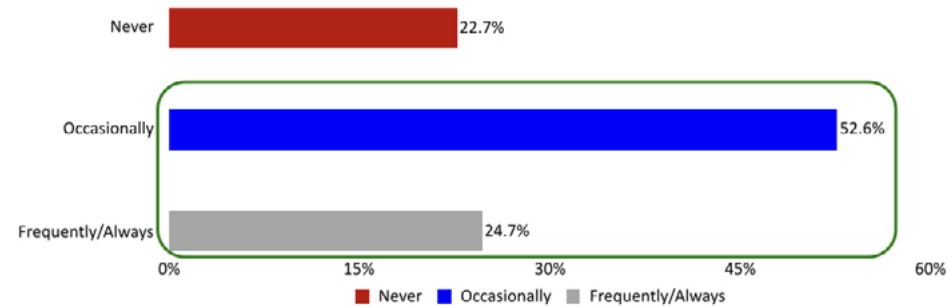
The data is for the private sector construction industry.

3 National Institute for Occupational Safety and Health [NIOSH], 2011. Preventing Worker Deaths from Trench Cave-ins. <https://www.cdc.gov/niosh/docs/wp-solutions/2011-208/pdfs/2011-208.pdf>.

4 OSHA Fact Sheet Trenching and Excavation Safety. [https://www.osha.gov/Publications/trench\\_excavation\\_fs.html](https://www.osha.gov/Publications/trench_excavation_fs.html). Accessed March 2020.

Do you see incidents where new workers are exposed to trench/ excavation work without proper competent person supervision?

Figure 2



In addition to identifying conditions that could undermine trench safety, participants were given a list of possible contributors to trench incidents and collapses and asked which they believe is the biggest contributor. Lack of training on trench safety and the OSHA requirements, schedule and production pressures, and indifference (a belief “it won’t happen on my watch”) were the responses cited most often.

### Key Findings and Resources

To reduce trench incidents and fatalities, the survey identified a need for more preplanning before trench work is undertaken, greater adherence to the OSHA requirement for a competent person, and training to ensure all involved understand the risks and OSHA requirements.

To help meet these needs, in addition to its revised National Emphasis Program for Trenching, OSHA offers assistance to contractors through its Onsite Consultation Program, Area Outreach Programs, and training and outreach materials available through its [Trenching and Excavation](#) topic page.

NIOSH has also developed a [topic page](#) to house its research and related materials on trench safety, including, for example, a recent Science Blog on [Preventing Trenching Fatalities](#). CPWR has also created materials that contractors can use on their jobs to raise awareness of the hazards and preventive measures, including a Toolbox Talk, Hazard Alert Card, video, and infographic (Figure 3) in English and Spanish. You can find the CPWR resources and gain quick access to OSHA and NIOSH resources at [www.cpwr.com/trench-safety](http://www.cpwr.com/trench-safety).

For more information about the survey or trenching resources, contact Eileen Betit, Director of Research to Practice at CPWR—The Center for Construction Research and Training ([ebetit@cpwr.com](mailto:ebetit@cpwr.com)).

**Practice Trench Safety. It Saves Lives.**

**Trench collapses cause fatalities and injuries.**  
It only takes a second for a trench to collapse. Take the following precautions to protect workers in trenches.

- Keep rocks, soil, materials and equipment **away** from the edge of the trench.
- Check with the competent person **before entering a trench**:
  - With standing or accumulating water.
  - Where there may be a lack of oxygen or hazardous fumes or vapors.
- Never enter a trench that has not been properly inspected. A **competent person** must inspect the trench and fix problems before work begins.
- Only work in trenches that have **shoring or trench box** protection. Trenches should be shielded/boxed, shored or sloped. Wear your hard hat.
- Make sure there is a safe way to enter and exit the trench, such as a ladder, ramp or steps.
- A trench doesn't have to be very deep to be dangerous. A **cubic yard of dirt** equals the weight of a mid-sized car -- **it will crush you!**

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# Big Data: Transforming Construction, One ERP at a Time

By: **Mike Vidas**, Contributor

Big data has changed the way companies operate across almost every sector, and the construction industry is no exception. As anyone in the field knows, construction is a time-consuming and costly process that involves complex projects and thin profit margins. With so many variables to account for—employees, suppliers, subcontractors and logistics—accurately

budgeting, organizing and managing a construction project to scope can be nearly impossible. However, big data and enterprise resource planning (ERP) are transforming the way many companies in the construction industry operate by enabling them to improve capacity and efficiency like never before.

## IMPACT OF BIG DATA ON CONSTRUCTION INDUSTRY

Left untouched and in its purest form, big data isn't worth all that much—but when paired with a data analytics solution, big data can be used to create opportunities for construction companies to improve productivity and profitability. An ERP can use that data to offer improved scheduling capabilities; more accurate forecasting; real-time information delivery; better quality assurance; and, last but certainly not least, greater job site safety.

### PRE-CONSTRUCTION ANALYSIS

Data and data management have always been vital to the construction industry. With the advent of the computer, construction companies were able to take advantage of programs such as Excel to manage data in an unstructured database. Then came the introduction of business software, such as Building Information Modeling, which enabled companies to store and track data in a structured environment for reporting and analysis.

Today, we once again find ourselves in the midst of a shift in the way data is managed and utilized. With big data and ERP systems, companies now have the ability to make use of their data in a more streamlined and efficient manner, which enables them to make predictions based on qualified information and identify trends early on in the construction process.

### REAL-TIME MANAGEMENT: SCHEDULES, RESOURCES, BUDGETS

Big data enables construction companies to view their projects in real time. Without this ability, project managers wouldn't get the full scope of a job and would

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lack insight into its current status. Thanks to big data, technological advances and new capabilities for mobile devices, construction companies can gain full, real time visibility into all aspects of a project, which reduces the time delay for site reports to update job costs and progress tracking.

The ability to see projects in real time enables companies to identify the causes for project overruns and delays or other factors that might affect a job, and to then capture that information in a structured system. By analyzing project overrun data and other business intelligence, construction companies can recognize inefficiencies and trends, which enables them to improve operations and strategies with concrete data and analytics.

### **CONSTRUCTION EQUIPMENT & ASSET TRACKING**

Construction companies have a tremendous amount of assets that need to be mobilized, tracked and moved from one location to another. Moving these assets can be a costly and time-consuming endeavor. Big data can help schedulers and supervisors see exactly where assets are at any given point in time, whether that is at a manufacturer's facility, in a warehouse, on the road or at a job site. By using big data analytics to view assets onsite or in-transit, mobilization supervisors can make better decisions on what equipment to move and when, where and how to move it. In short, with the ability to view assets in real time, construction companies can make more effective decisions about how to utilize them.

### **COLLABORATION**

Big data can give suppliers, builders and managers greater insight into the requirements of a project, giving them the ability to make more informed

and accurate predictions and budgets. Big data also allows for visualizations and simulations, which facilitate communications between architects, engineers and workers. This cross-channel collaboration and communication reduces the back-and-forth that might occur over minor changes and revisions by giving all involved parties insight into the impact of a change. It also enables crews to efficiently manage multiple clients and projects at any given point in time.

### **JOB SITE SAFETY**

Construction is notorious for being one of the most dangerous industries to work in, which is why construction companies must perform their due diligence to ensure the safety of their crews. With an ERP system, construction companies can identify and reduce potential risks; keep projects on track; find the right subcontractor for the job; and empower onsite workers to report hazards from their mobile devices.

### **HARNESSING THE POWER OF BIG DATA**

In order to harness the full power that big data offers and consequently improve profits and productivity, construction companies need a structure database that is able to run reporting and analysis in near-real time.

Many companies are looking to ERP solutions that are able to integrate with other key systems such as CRMs and business intelligence. So-called "point solutions," once the go-to tool in the construction industry, lost favor following the financial crisis in 2008. After the economic crash, companies added services and expanded their markets up and down the supply chain. Although this strategy reduced exposure to future market downturns, it also made it clear that point solutions were not the way forward.

ERP software not only provides real time analysis and reporting, but also delivers the features and functionalities general contractors and specialty contractors need. ERP systems give construction companies the ability to diversify their options, expand their portfolios and gain a competitive advantage, without having to purchase niche solutions for each industry or vertical in which they work. Building new technology into your existing operation offers incredible opportunities to transform your business and turn your valuable data into dollars. **WMHS**

*Mike Vidas is National Sales Director, Business Analytics, for Hitachi Solutions Canada.*

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# Tingley Picks: Our Top 10 for Construction

# TINGLEY

## Safety, quality, & comfort

The three main approaches in all Tingley gear and our construction picks are no different. We keep people safe so that they can go home at the end of the day (or night, depending on the job). Our quality products are long lasting, so you don't have to worry about them falling apart on you before the end of their lifespan. Anyone who has been on their feet in a grueling 8-12 hour shift knows the importance of comfort in the products they wear. With safety, quality, and comfort in mind, here's the list of our 10 Top Picks for Construction. Check it out...

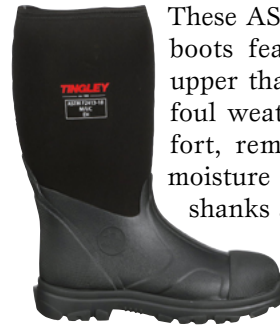
### 1. [Pilot Safety Toe PR Knee Boot](#)



A full safety boot with several unique features... Tingley's Calf Relief Expansion (CRE)<sup>™</sup>, a steel toe that meets ASTM F2413-18 M/I/C for toe impact and compression (and the boot is electric hazard (EH) rated), 100% waterproof, cleated outsole for good traction, but most importantly, this boot contains a flexible, steel puncture resistant midsole that spans the entire footbed and meets ASTM F2413-18 PR requirements to reduce risks

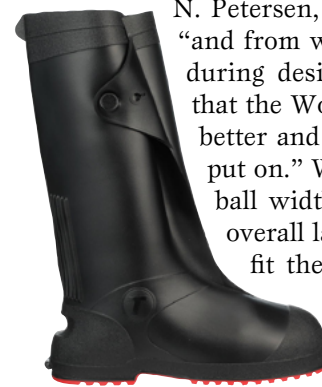
from sharp objects under foot. All puncture injuries are extremely dangerous and cause inherently dirty wounds that can lead to infection or tetanus. "An ounce of prevention is worth a pound of cure and if you're working in areas where there's a risk of foot punctures, it makes sense to protect yourself," said JB McCollum, Tingley's Project Specialist.

### 2. [Badger Boots Steel Toe](#)



These ASTM F2413-18 M/I/C steel toe boots feature a breathable neoprene upper that will protect your legs from foul weather without causing discomfort, removable insoles help to wick moisture and absorb shock, while steel shanks are ideal for all day arch support especially when climbing ladders or digging with shovels. "Badger Boots are 100% liquid proof for rain, snow, mud, and whatever else you might step in. No matter what the conditions, the Badger Boot works as hard as you to get the job done," said Robert N. Petersen, Tingley's Senior Product Manager.

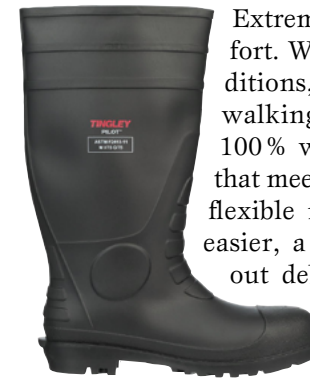
### 3. [Workbrutes G2 17 inch Overboot](#)



An upgrade to the original Workbrutes PVC overshoe line. Improvements were made to the fit, functionality, and styling. "Our customers let us know that our original Workbrutes<sup>®</sup> needed improvements," said Robert N. Petersen, Senior Product Manager, "and from working closely with them during design and testing we know that the Workbrutes G2 will fit much better and will be incredibly easy to put on." Workbrutes G2 have wider ball widths, higher toe boxes, and overall larger proportions to better fit the larger types of footwear that are worn by construction workers. Additional improvements include

refinements in styling, innovative expansion pleats and unique grips to help making donning easier.

### 4. [Pilot Steel Toe Knee Boot](#)



Extremely affordable all day comfort. Working in wet, muddy conditions, these boots provide easy walking and all day protection. 100% waterproof, with a steel toe that meets ASTM F2413 M/I/C and flexible material to make walking easier, a cleated outsole that spits out debris as you walk, and removable cushion insole to help keep feet dry and comfortable.

### 5. [Work Rubber Overshoe](#)

The original industry standard of overshoes. With its reinforced heel and toe, these work overshoes are designed to stand up to tough daily wear. These stretch easily to fit over the bulkiest of work shoes and boots, are 100% waterproof, and have excellent tensile strength that won't crack or stiffen in the cold weather, with an ease of stretch and tear resistance for more durability.





## 6. [Icon](#)

The Icon is a premium, ANSI 107 Type R Class 3 compliant jacket that is waterproof, breathable, and comfortable. Made with polyurethane on 300 denier polyester, it's engineered to provide superior comfort and safety in the toughest work environments. Available in both fluorescent yellow-green and fluorescent orange-red, the Icon is the star of our versatile SYNC System jacket combinations. Connect any SYNC System liner with the Icon jacket for the ultimate weather, work and play versatility. "Rather than the classic approach to a 3-in-1 style, our SYNC System allows the wearer to select the liner option that best fits their application, creating their own custom insulated Icon jacket," said Meg Bowser, Tingley's Product Manager.



## 7. [Job Sight Premium T-Shirt](#)



Cool, calm, and protected. This ANSI 107 Type R Class 2 t-shirt is super lightweight and breathable, with advanced polyester material engineered to resist snags and pulls. Our partially segmented Sawtooth™ reflective tape allows for additional breathability, flexibility and reduced heat stress, with a black front panel to conceal dirt and increase longevity.

## 8. [Bomber II](#)

Our most popular winter wear jacket, the Bomber II is a highly visible insulated winter wear jacket designed to provide warmth, comfort and safety at an affordable price. An ANSI/ISEA 107 Type R Class 3 compliant, 100% waterproof jacket with a quilted polyester insulated lining that provides warmth and comfort. A 210 denier polyester shell, the Bomber II comes in both fluorescent yellow-green and fluorescent orange-red as well as regular and tall sizes (in yellow-green only). Don't just take our word for it, check out one of the many five star reviews: "I have a closet full of very expensive jackets that do not come close to the wind, rain protection and comfort this jacket provides, it is GREAT!!! I am a commercial cargo pilot with a major cargo company. Being on the ramp at night, cold, wet and blowing rain it exceeded my expectations. I was completely dry and comfortable, no wetness at all. -Mike S."



## 9. [Job Sight Surveyor Vest](#)

With big visibility in all sizes, the Type R Class 2 Two-Tone Surveyor Vest offers sizing big to small with 4X/5X all the way down to XXS/XS (yellow-green only), fitting just about any and everyone. Available in both our fluorescent yellow-green and fluorescent orange-red with the contrasting two-tone reflective tape. 100% polyester solid in the front, breathable mesh in the back, this vest also features 5 exterior pockets; 3 interior pockets and a zipper front closure.



## 10. [X-Back Hoodie](#)

Our newest hoodie and SYNC System liner addition features ANSI 107 Type R Class 3 and CSA Z96 Class 2 Level 1 for dual compliance in both the USA and Canada with its X-pattern reflective tape design on the back. Constructed of a comfortable, high density polyester material and lined sleeves, this is our only sweatshirt with a detachable hood and contrasting two-toned tape. Zip this bad boy into any of our SYNC shells to add in waterproof capabilities.



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