

Safety Management in the Construction Industry 2021



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Safety Management in the Construction Industry 2021

SmartMarket Report

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About Dodge Data & Analytics

Dodge Data & Analytics is North America's leading provider of commercial construction project data, market forecasting & analytics services and workflow integration solutions for the construction industry. Building product manufacturers, architects, engineers, contractors, and service providers leverage Dodge to identify and pursue unseen growth opportunities that help them grow their business. On a local, regional or national level, Dodge empowers its customers to better understand their markets, uncover key relationships, seize growth opportunities, and pursue specific sales opportunities with success. The company's construction project information is the most comprehensive and verified in the industry.

As of April 15, 2021, Dodge Data & Analytics and The Blue Book—the largest, most active network in the US commercial construction industry—combined their businesses in a merger. The Blue Book Network delivers three unparalleled databases of companies, projects, and people.

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Introduction

Since 2020, health and safety measures on construction sites have taken on a new meaning. The construction industry has always put a high value on safety as a central tenet of project performance. Now, COVID-19 has led to new ways to consider and help protect the health and safety of workers.

However, addressing the pandemic has not changed contractors' focus on good safety management practices. The findings in this study show that contractors are as deeply engaged in safety practices and training as they were in the previous studies conducted in 2012, 2015, 2017 and 2019. This holds true despite the fact that contractors have also instituted new practices—like increased handwashing stations and more flexible policies for sick workers—that many plan to continue using after the pandemic subsides.

Strong safety management is again demonstrated to be a good business investment in the current study, with the majority of contractors reporting that they can negotiate better insurance terms (78%), improve their ability to bring in new work (66%), see improved performance from trade partners (66%) and increase worker retention (61%) due to their investments in safety.

Some contractors are also taking a more holistic approach to health and safety by offering health and wellness programs like alcohol and substance abuse programs, mental health services and stress management to workers. However, on average, fewer than half offer most of these programs. Construction is a physically and mentally demanding occupation, and wider offerings of these types of programs would substantially benefit the construction workforce.

Safety training is also a critical part of safety management, and the findings show that contractors are committed to offering training to their workers.

- The two types of training deemed to be most important by contractors are offered by nearly all of them: training on personal protective equipment (PPE), offered by 91%, and fall protection, offered by 88%.

- The frequency with which training is offered, though, varies widely, revealing that there is little standardization across the industry about how training is delivered.
- The study also reveals that the type and frequency of the safety training offered to workers is most influenced by the specific jobsite conditions, even more so than by the need to meet OSHA standards. This also aligns with the most common safety practices in use among contractors, which are also focused on specific jobsite needs.

One of the key findings of the study is that large companies (those with 100 or more employees) consistently use more practices, offer more types of training and with greater frequency, and more often experience benefits from their safety programs than do small companies (fewer than 20 employees). Given the large number of small companies in the US construction industry, this is a critical gap that needs to be addressed by the industry as a whole. It is imperative to improve the well-being of all workers to address the challenges of skilled worker shortages and an aging workforce.

The study also looks at how technology may contribute to the future of construction safety management. Its findings demonstrate that the industry is in the early stages of having a truly data-driven safety approach but with a positive outlook for the future.

- Only a few currently recognize the use of observation data from jobsite imagery or predictive analytics as essential parts of a world-class safety program.
- Several of the technologies seen as the most likely to improve safety—such as wearable sensors, predictive analytics and visual monitoring with AI—are currently used by only a small share of contractors, but many of those users deploy them frequently and a relatively high percentage of non-users expect to adopt them in the near future.

We thank CPWR for their long-standing support of this study and Newmetrix for their participation in the current one.



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Donna Laquidara-Carr currently provides editorial direction, analysis and content to DD&A's *SmartMarket Reports*. Prior to this position, she worked for nearly 20 years with DD&A's Dodge division, where she gained detailed insight into the construction industry.

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Above: Workers at The Boldt Company review safety information during construction at the Aurora Medical Center in Grafton, WI.
Cover Photo: Southland Industries workers engage in a daily huddle on a major tech office building in the San Francisco bay area.

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Executive Summary

Safety Practices

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021

Contractors are widely deploying many project-specific and organizational safety practices, including the top six most widely used ones shown in the chart at right. However, the findings reveal that large companies are more widely deploying most of these practices than are smaller companies. This gap in the use of safety practices likely accounts for differences seen in the experience of many benefits derived from their safety programs, and it shows that the industry needs to consider how to help more small to midsize contractors increase their use of these practices without taxing their limited resources.

The top means to improve safety programs is to have a standardized process for safety across all projects, and the importance of this is particularly noted by small and midsize contractors.

Data-Driven Safety

For the first time, this study also looked at the shift in the industry toward data-driven safety by including options about using data to improve safety in a few questions. With only 19% who rank making better use of safety data already collected as a top way to improve safety programs, and only about one quarter who consider use of observation data from jobsite imagery (26%) and use of predictive analytics (21%) as essential to a world-class safety program, it is clear that the concept of data-driven safety is still emerging in the industry. It will be critical to track whether these types of practices gain in importance as more contractors become familiar with the tools that allow them to capitalize on data to improve safety.

Impacts of Safety Programs

Contractors have consistently reported experiencing a wide range of positive impacts from their safety programs since the first Safety Management study conducted by Dodge Data & Analytics in 2012. The top impacts reported in the current study are shown in the chart at lower right. While direct safety benefits such as reduced recordable injury rates are apparent, there are clearly financial incentives to invest in safety, such as the ability to negotiate better insurance terms, increased ability to bring in new work and better performance by trade partners.

However, as noted above, many of these benefits are more widely experienced by larger companies, which have greater resources to invest in their safety programs, than by smaller companies. This includes critical benefits like the ability to bring in new work and the ability to attract new workers.

Top Safety Practices Used by Contractors

Dodge Data & Analytics, 2021



Top Positive Impacts of Safety Programs (share of contractors who experienced a positive impact on each)

Dodge Data & Analytics, 2021



Executive Summary

Safety Training and Communication

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021

Safety training is clearly prioritized by contractors, with over half offering all 11 types of safety training included in the study to their workers. The top six most frequently offered types of safety training are shown in the chart at right, along with the percentage of contractors who selected that type of training as one of the top three most needed for their workers. The emphasis on fall protection and PPE shows the degree to which industry messaging and regulations influence safety training priorities among contractors.

The differences by size, though, continue to play out in the types of safety training offered, with training on hazard communication, confined spaces and emergency response/ planning commonly offered by more than 70% of large companies and by fewer than half of small ones. It is notable that the biggest gaps emerge in training that is less task-specific. This conclusion is supported by the fact that the top factor influencing the type and frequency of safety training is addressing specific jobsite conditions and needs, which ranks even higher than meeting OSHA standards.

Online Training

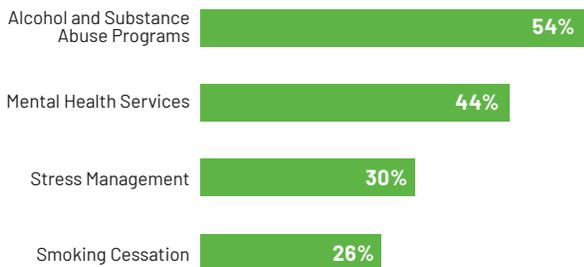
As the chart at lower right reveals, nearly two thirds of contractors use online training, with at least 35% who increased their use of it in the last year. In addition, 41% of current users expect to use online training more, and 24% of non-users expect to start using it, suggesting that this tool is becoming increasingly important for safety training in the construction industry.

Health and Wellness

For the first time, the study also examined the use of several health and wellness programs. The chart at lower left shows

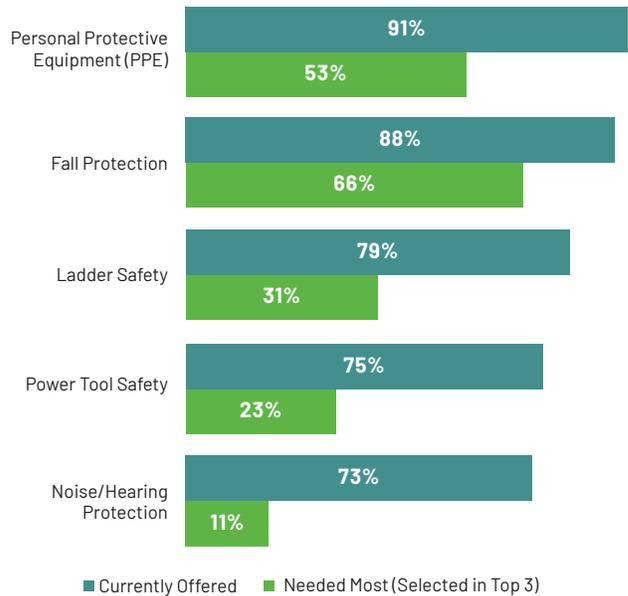
Share of Companies That Provide Health/Wellness Programs to Jobsite Workers

Dodge Data & Analytics, 2021



Safety Training Most Frequently Offered by Contractors (those offering it and those selecting it as most needed)

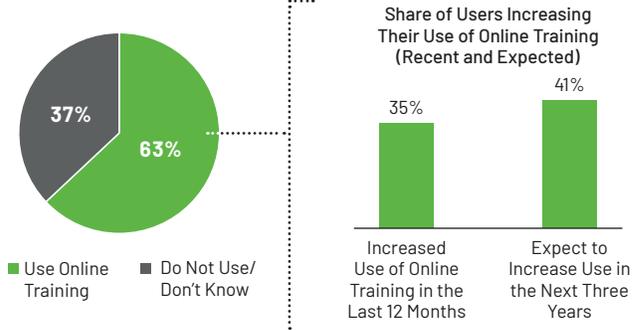
Dodge Data & Analytics, 2021



that many contractors offer their jobsite workers access to several critical programs, but that the industry as a whole needs to improve access to these critical services for workers who regularly conduct physically impactful, high-stress work on jobsites. In particular, means to provide such services to workers at small companies, where, on average, fewer than one third are providing them, should be an industry priority.

Contractors Using Online Health & Safety Training

Dodge Data & Analytics, 2021



Executive Summary

Technology for Safety

New technologies on the jobsite have the potential to help improve safety performance by providing data and insights on jobsite conditions and worker activities, by helping to keep workers out of dangerous situations and by offering new means of training workers on hazards.

The chart at upper right shows the top seven technologies currently in use on the jobsite from the ones included in the study. The blue bar shows whether they are in use at all, and the green bar shows the percentage of users who deploy them frequently/very frequently on their projects.

- The top three, well-established technologies are used by about one half to one third of contractors, and about one half to one third of those using them deploy them frequently.
- The four emerging technologies are all currently used by less than 20% of contractors, but there is a tendency for a relatively high share of those users to deploy them frequently/very frequently on projects. In fact the share of users who deploy virtual reality for training and predictive analytics and the share of users who deploy laser scanning and BIM frequently/very frequently are comparable. This demonstrates the value that users are finding in these maturing technologies and bodes well for their use in the future.

For technology to improve safety performance, though, contractors need to recognize and exploit its potential to do so. The chart at lower left reveals the top technologies that contractors believe will have a positive impact on worker health and safety. The fact that no technology was selected in the top three by more than 34% suggests that contractors are still figuring out exactly what will provide the greatest impact on safety, but certainly, the technologies listed in the chart at right are likely candidates for having a major impact on improving safety in the future as they are more widely deployed in the industry.

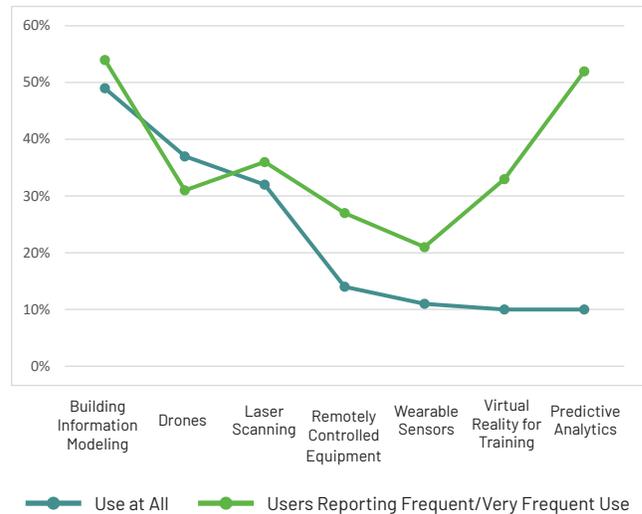
Changes Due to COVID-19

Construction, like many other industries, is still grappling with the long-term impact of changes due to COVID-19, and these clearly have ramifications for the health and safety of those in the construction industry. The study revealed a few interesting findings:

- A large share of the growth in online training was due, at least in part, to the pandemic. Among those who said that they increased their online training, 37% did so solely due to COVID-19, and 40% regarded it as influential but not the sole

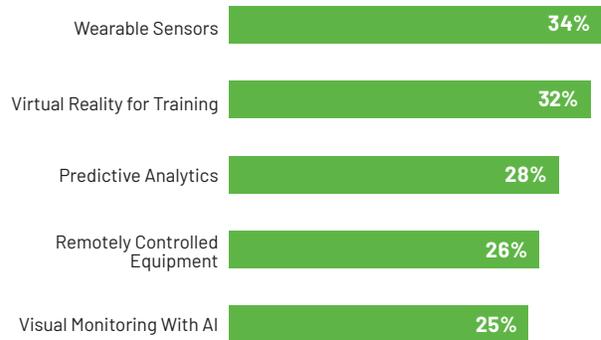
Use of Established and Maturing Technologies

Dodge Data & Analytics, 2021



Top Technologies That Contractors Believe Will Positively Impact Worker Health and Safety (selected in the top three)

Dodge Data & Analytics, 2021



factor driving the increase.

- Most companies instituted practices on their jobsites in response to the pandemic, and 61% plan to continue use of at least one practice in the future.
- However, there is no clear agreement over the practices that will be retained, with the most popular one (increased handwashing stations) only selected by 36%. The only other practices expected to be retained by 20% of contractors or more include increased use of gloves and providing more flexible/tolerant policies for absenteeism due to illness.

Data: Introduction

The current study is the fifth in a series on safety management in the construction industry that started in 2012. However, while the research includes many of the same topics covered previously, it has also been updated and improved to capture new data that reflects changes in how contractors are starting to consider safety management.

- **Practices:** Many of the practices previously asked about in earlier studies are included in the current version, with some slight changes in wording. However, this section is also used to begin a new examination of the degree to which contractors are adopting data-driven safety approaches. This is reflected in new options in the question on the essential elements of a world-class safety program and in a new question about how contractors can improve their safety programs.
- **Impacts:** Contractors were asked the same questions about the impacts on their businesses, processes and projects of their safety programs as in the previous survey, with the results again demonstrating the business value of safety investments.
- **Training and Communication:** This survey largely included new questions about safety training.
 - It provides a deep dive into specific types of training offered and those that are perceived to be most widely needed.
 - It also examines the factors that influence the types and frequency of safety training offered by contractors.
 - It examines the influence of the COVID-19 pandemic on the use of online approaches for safety training.
 - Since toolbox talks have already been well established in previous surveys as a top means for communicating about safety, it examines what industry resources contractors use for them.
 - It also continues to look at the use of the Foundations for Safety Leadership training module.
- **Technology:** Instead of focusing solely on technology used for safety as in previous studies, this one establishes the general use of technologies onsite and then examines which ones contractors believe offer the best possibility of improving safety.
- **Health and Wellness:** For the first time, this survey examines how contractors are supporting employee health and wellness. In addition, it examines what measures were adopted during the COVID-19 pandemic to keep workers healthy and which of these measures are likely to continue to be in use in the future.

Note About the Data

The findings in this report are based on an online survey of contractors conducted by Dodge Data & Analytics using the Dodge Contractor Panel and in partnership with several contractor organizations and associations.

Two analytic variables are used to examine the data.

- In many cases throughout the report, the findings are shown in total and by company size. This variable, more than any other, provides notable differences in the results. Company sizes are based on the number of employees.
 - Small: Fewer than 20 employees
 - Midsize: 20 to 99 employees
 - Large: 100 or more employees
- The written analysis in each section also mentions differences between prime contractors and trade contractors where they are statistically significant. For the sake of simplicity, prime contractors are identified as general contractors in the write-up, but while the majority (72%) of these respondents are general contractors, a small share of them are construction managers (10%), design-builders (8%) and civil/engineering contractors (10%).

For more information on the study and the respondents, see the Methodology section on page 44.

Data: Safety Practices

Safety Practices on Projects/Onsite

Practices instituted on projects and at the jobsite are perhaps the most visible and obvious tools used by contractors to manage safety. Dodge Data & Analytics has been looking at the levels of adoption for many of these practices since 2015. In the current study, contractors were asked to select all of the practices they use from a list of 10 common ones.

- Notably, nearly all (98%) of the contractors surveyed say that they use at least one of these practices. Even among small contractors, who are the least frequent users of practices overall, 93% report that they use at least one.
- While there are no significant differences since 2015, the share that report using at least one practice has grown steadily by one percentage point from 95% in 2015 to 98% now.

widely used across the industry—adopted by, on average, more than half of the contractors surveyed. It demonstrates that even the most widely adopted practices overall get much broader use by large contractors than by small ones.

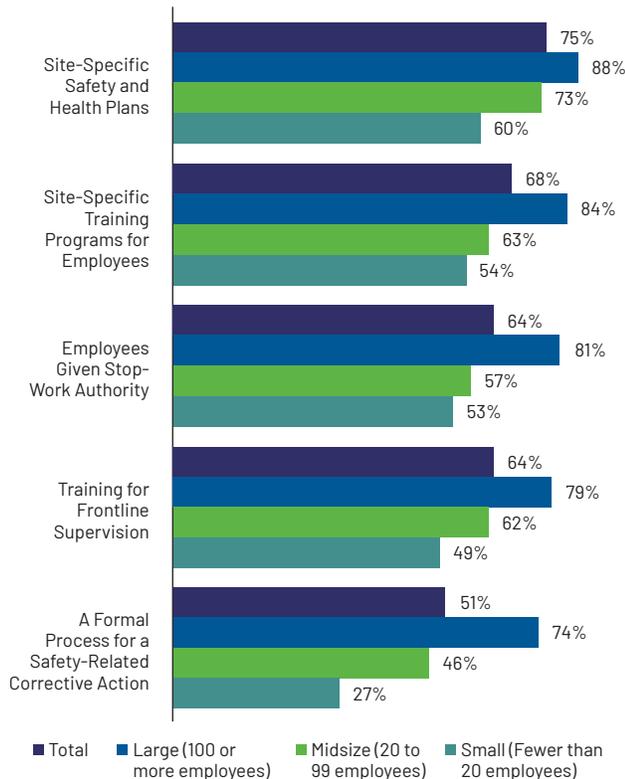
- Both small and midsize companies commonly use site-specific safety and health plans, but only 60% of small firms report doing so.
- Around three quarters or more of large companies use the remaining four practices shown. Clearly, each is a standard practice at most large companies.
- In contrast, only about two thirds of midsize companies employ site-specific training programs or training for frontline supervisors, and even fewer give workers stop-work authority or have a formal process for safety-related corrective actions. These activities are still widely used by midsize companies, but they are not as commonplace as

Top Project/Site-Related Safety Practices

The chart at lower left shows the practices that are most

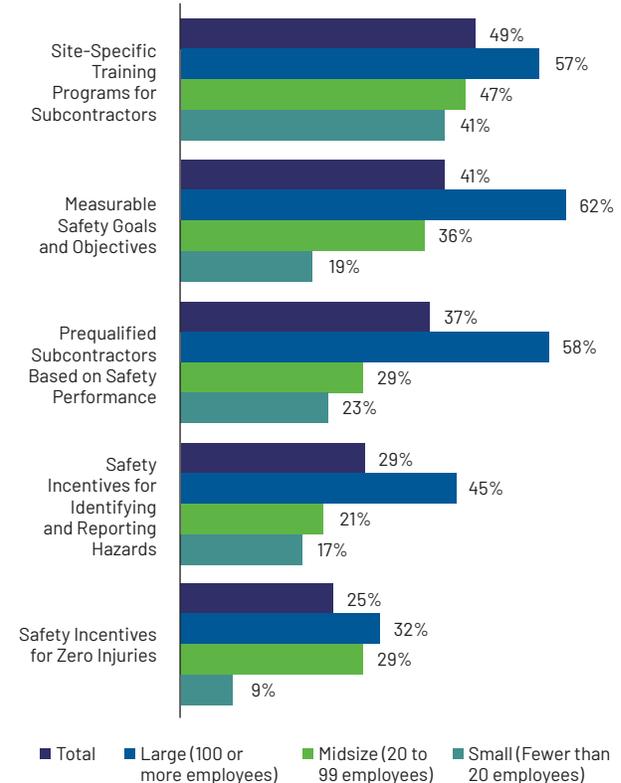
Use of Top Project/Site-Related Safety Practices (by company size)

Dodge Data & Analytics, 2021



Use of Additional Project/Site-Related Safety Practices (by company size)

Dodge Data & Analytics, 2021



Safety Practices

Safety Practices on Projects/Onsite CONTINUED

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

Use of Project/Site-Related Safety Practices Since 2017

Dodge Data & Analytics, 2021



they are among large ones.

- Small companies are close to being on a par with midsize companies in terms of their use of site-specific training programs for employees, giving employees stop-work authority or providing training for frontline supervisors. While the small companies do lag slightly in all of these behind midsize ones, the differences are not great enough to be statistically significant, and it is clear that even small firms are widely using each of these practices.
- However, small companies are significantly behind midsize companies in their use of a formal process for a safety-related corrective action, with only a small share (27%) that employ this.

Type of company, on the other hand, is not as influential on the use of these practices as is the size of company. There are no significant differences in adoption between general and specialty trade contractors for any of these practices.

Other Project/Site-Related Safety Practices

The chart on the previous page on the right shows the other five practices that are less widely used in the industry.

- For the most part, large companies still more widely use most of them, but there is one exception: the share of large contractors using site-specific training programs is not significantly larger than the share using these programs among midsize and small contractors.

- Fewer than 20% of small companies report using measurable safety goals or safety incentives. While increased use of safety incentives for identifying and reporting hazards could benefit small contractors, lower use of safety incentives for zero injuries is actually a positive finding, since incentivizing zero injuries has been shown to sometimes lead to more unsafe practices onsite.
- Clearly, though, both midsize and small companies have opportunities for much wider use of measurable safety goals and objectives, prequalifying subcontractors based on safety performance and safety incentives for identifying and reporting hazards. Industry organizations may need to consider ways to help see wider use of these practices, especially among small and midsize companies.

Use of Project/Site-Related Practices Over Time

The chart at left on this page shows the share of contractors using five specific practices that have been included in the study since 2017. There are a few important conclusions to note from this chart.

- None of the differences between the findings qualify as statistically significant, but there is a general trend for use of each of these practices currently to fall slightly below the level of use reported in 2019 and 2017.
- However, overall use of at least some practices are up by one percentage point, suggesting that there is not a general decline in use of project/site-related safety practices.
- Instead, contractors are not selecting as many options. One reason for this could be that the number of practices for them to select has grown over time, which could cause some survey fatigue. It is also possible that the need to use new practices to manage COVID-19 (see page 41) interfered slightly with contractor deployment of their standard safety practices. It will be interesting to see if larger gaps open up in two years when contractors are surveyed again, or if getting past the pandemic allows for greater normalcy on the jobsite that leads to an uptick in the use of standard safety practices.

Safety Practices

Organizational Safety Practices

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

In addition to practices adopted at the jobsite, there are several organizational practices that construction companies can implement to improve safety. Construction companies were asked whether they use 10 of these practices. Use of at least one organizational practice is even more frequent than it is for site/project practices, with 99% of respondents, regardless of size or type of company, reporting that they use at least one. This widespread use is consistent with the previous studies in 2017 and 2019.

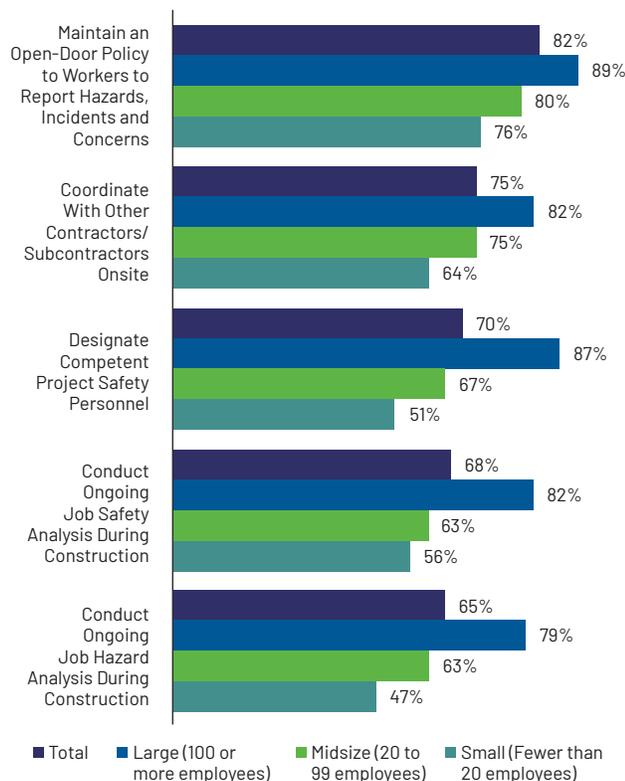
Top Organizational Safety Practices

As the chart on the left reveals, company size plays a role in the use of the majority of the most widely adopted practices.

- Not only is maintaining an open-door policy to workers to report hazards, incidents and concerns the top practice overall, it is also widely adopted by companies of all sizes, including a high percentage of small companies (78%).
- However, the differences in use for the other top practices between large companies and the rest are significant.

Use of Top Organizational Practices to Promote Safety (by company size)

Dodge Data & Analytics, 2021



This suggests the need for the industry to support wider use among small and midsize companies of even these widely adopted organizational safety practices.

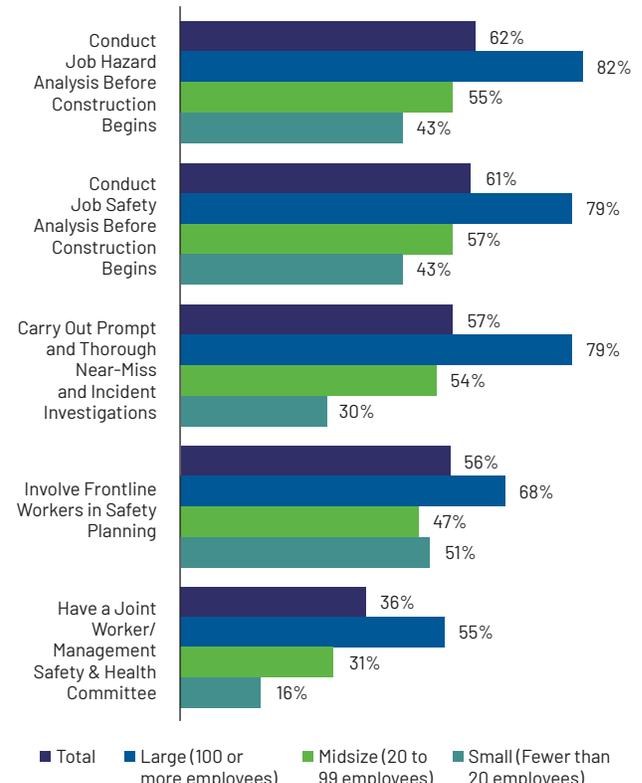
Other Organizational Safety Practices

Large firms also more frequently use most of the less widely adopted practices.

- Notably, a similar share of large companies conduct job hazard and safety analyses before construction begins as those who conduct them during construction. This is not the case for midsize or small firms, which are more likely to do these during construction than before.
- The biggest difference in use between midsize and small companies is the share that carry out prompt and thorough near-miss and incident investigations, with significant differences between small, midsize and large companies.
- There are no significant differences in current use for any of the organizational practices that were asked about in previous studies.

Use of Other Organizational Practices to Promote Safety (by company size)

Dodge Data & Analytics, 2021



Safety Practices

Ways to Improve Safety Programs

There is increasing attention in the construction industry to the need to gather data in a consistent, comparable and accurate manner across projects and analyze it in an automated fashion. This also applies to data on safety. Therefore, a new question was added to explore the degree to which contractors believe that aspects of this approach—such as making field data collection less cumbersome, using data to forecast safety risks on projects, developing a standardized safety process across projects or even just making better use of the data they already collect—would be helpful to their safety programs.

Over 90% of contractors, regardless of their size, believe that at least one of these approaches would be helpful for their safety programs. However, as the chart below demonstrates, there are some notable differences in what is considered useful by size of company.

- By far the largest share of small and midsize companies believe that having a standardized process for safety across all projects would benefit their safety programs.
- In contrast, large firms are nearly evenly split between the usefulness of a standardized process for safety, the ability to identify project elements most at risk of a safety incident in the next week and making better use of the project data they already collect.

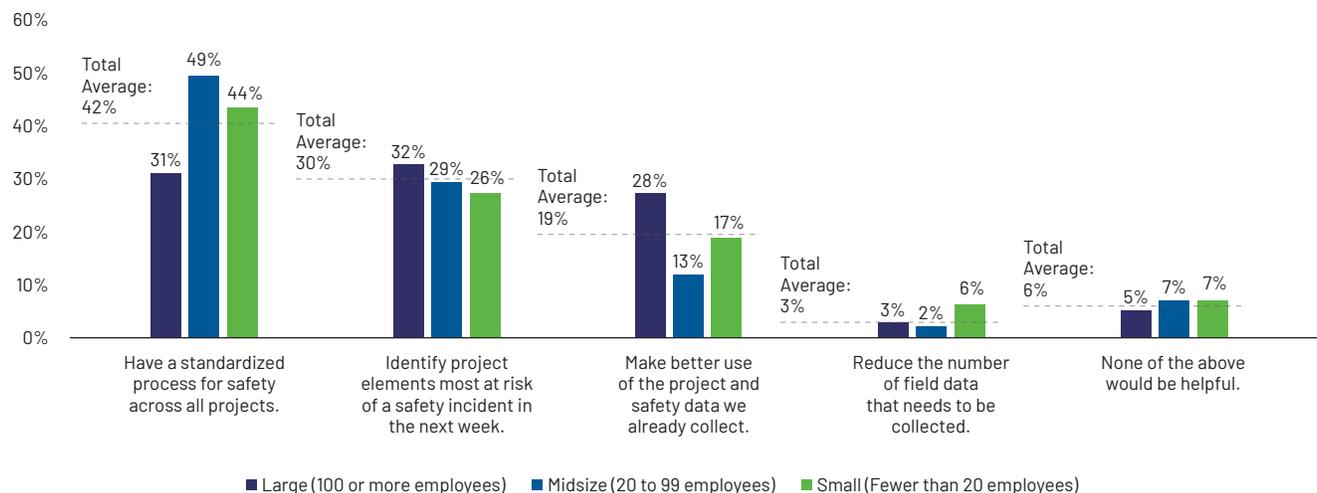
- Very few contractors find that being able to reduce the number of field data that need to be collected would improve their safety programs.
- There are no differences in the responses of general and specialty trade contractors to any of these questions.

The differences in the responses of large and small contractors may reflect the greater degree of standardization that large contractors already have in their existing safety programs. They much more frequently report formalized project/jobsite and organizational safety practices (see pages 8 and 10), and therefore may be more inclined to consider the other options offered as likely to improve their current programs.

In addition, large contractors are generally more advanced in their use of data to manage safety (see page 33) than are smaller companies, so they may be better positioned to recognize the possibility of identifying project elements most at risk of a safety incident on a week-by-week basis or realize the degree to which they still can benefit from enhanced analysis of the data that they are already collecting.

Ways to Improve Safety Programs

Dodge Data & Analytics, 2021



Safety Practices

Essential Elements of a World-Class Safety Program

Since 2012, the safety management survey has asked contractors to select what they believe are the most essential elements of a world-class safety program. Contractors were allowed to select as many options as they felt applied.

Top Essential Elements of a World-Class Safety Program

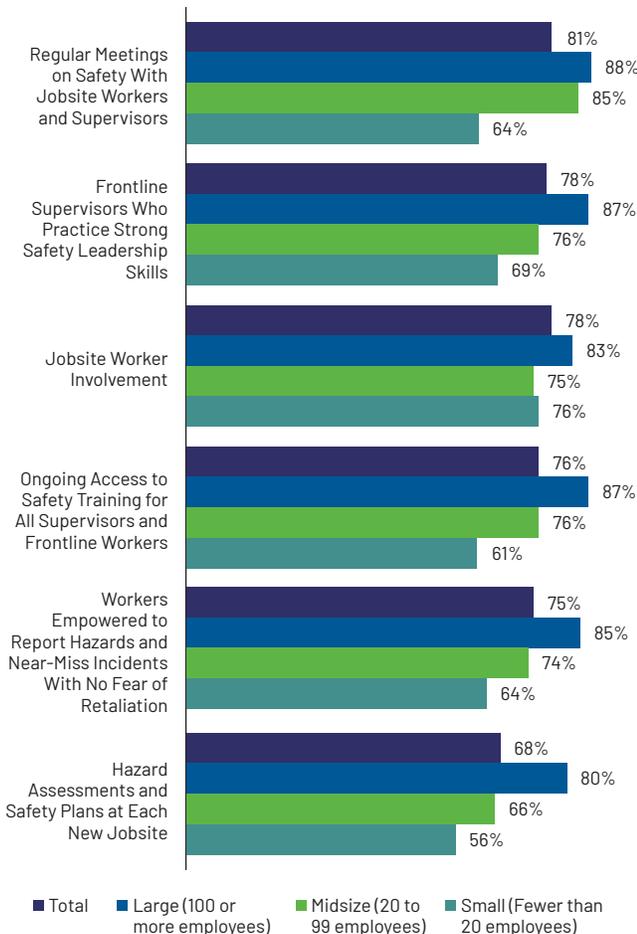
All but one of the top six most essential elements were selected by three quarters or more of the contractors participating in the survey, demonstrating widespread recognition of the value of these practices. In particular, they show the importance of supervisors and jobsite workers as the frontline of any safety program, since all the options selected involve the engagement of these workers

in meetings, their leadership skills and their training. This suggests that contractors largely regard safety efforts as people-driven rather than program-driven.

- Only jobsite worker involvement was recognized by a similar percentage of small, midsize and large companies, with no significant differences in their responses. This demonstrates the ubiquity of realizing the value of jobsite workers' contributions to safety.
- For all of the other top measures, small companies less frequently select them as essential to a world-class safety program than do midsize or large companies.
 - For the top measure—regular meetings on safety with jobsite workers and supervisors—the share of small firms that select it as essential is significantly lower

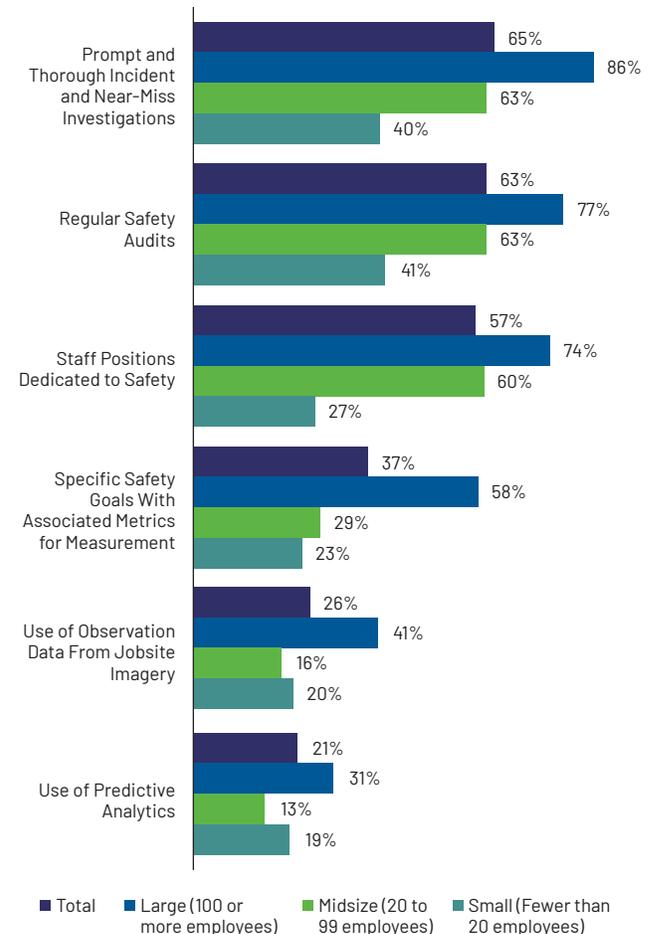
Top Essential Elements of a World-Class Safety Program (by size of company)

Dodge Data & Analytics, 2021



Other Elements Considered Essential to a World-Class Safety Program

Dodge Data & Analytics, 2021



Safety Practices

Essential Elements of a World-Class Safety Program CONTINUED

than both midsize and large firms.

- However, for the remaining four measures, the only statistically significant differences are between large and small companies, with midsize companies falling somewhere in the middle.

Other Elements of a World-Class Safety Program

Among the remaining six measures, three are still highly valued by contractors. Prompt and thorough incident and near-miss investigations, regular safety audits and staff positions dedicated to safety are still selected as essential by between half and two thirds of contractors.

- Responses vary significantly for all three by size of company, with far fewer small companies than either midsize or large ones selecting all three.
 - Incident and near-miss investigations and audits are more formal processes, and in the previous studies, small companies have often lagged in the use of formal processes compared with midsize or large ones.
 - The greatest difference, though, between small companies and the others is the smaller share that have a staff position dedicated to safety. Still, with small companies defined as those with less than 20 employees, perhaps it is not surprising that only a few reserve a staff position solely for this purpose.
- Midsize firms also significantly lag behind large firms for incident and near-miss investigations.

The last three options were added to the survey this year, and

are not as widely recognized as essential.

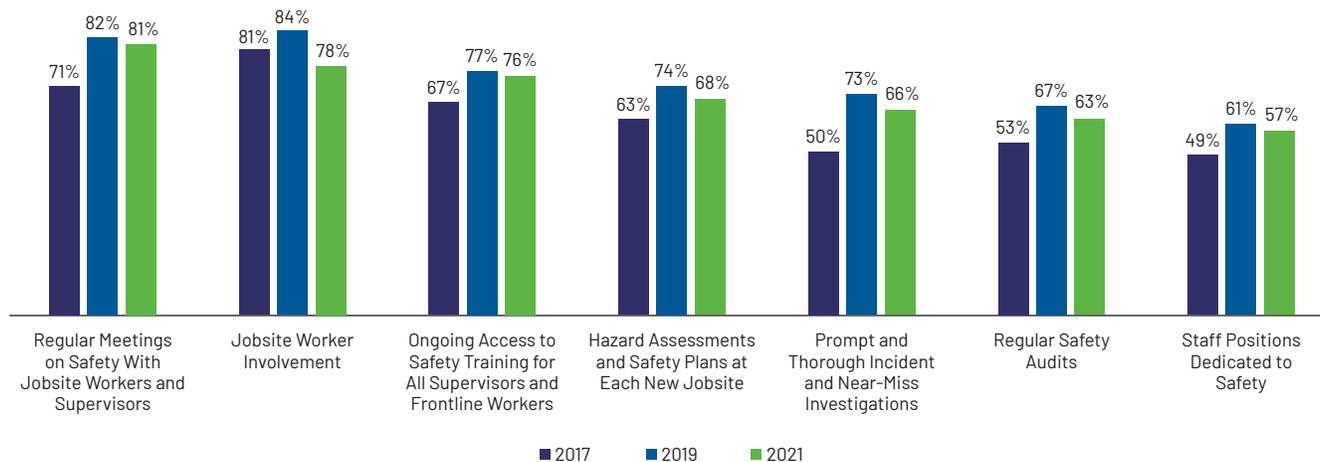
- Only 37% of contractors regard specific safety goals with associated metrics for measurement to be an essential part of a world-class safety program. Without measurable goals, it is harder to have a proactive approach to safety.
- Data-driven safety is still emerging as a practice in the industry, with fewer than 30% who regard use of observation data from jobsite imagery or use of predictive analytics as essential parts of a world-class program. This is not surprising since these are still uncommon practices, and many contractors may not be familiar enough with them to consider them essential. It will be interesting to see if these evolve over time.

Selection of Essential Elements Over Time

The chart below compares the share of contractors who selected seven elements as essential between 2017 and 2021. Overall, the chart demonstrates notable consistency in the performance of most of these elements, with the 2021 results generally falling in between the 2017 and 2019 findings.

Elements Considered Essential to a World-Class Safety Program (by year)

Dodge Data & Analytics, 2021



Data: Impact of Safety Programs

Project and Business Impacts of Safety Programs

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

While the most important benefit of safety programs is improving the safety of workers onsite, this study and the previous ones conducted by Dodge Data & Analytics have consistently demonstrated that safety programs also deliver notable project and business benefits to contractors.

Contractors were asked to rate 11 potential project and business impacts of their safety programs on a five-point scale, from highly negative to highly positive. The chart at right shows the share of those who experienced a positive/highly positive impact in green, no impact in blue and a negative impact in gray. The chart on the following page shows the benefits that are experienced by significantly different shares of small, midsize and large contractors.

The overall findings make clear that contractors are commonly experiencing a wide variety of these benefits due to their safety programs.

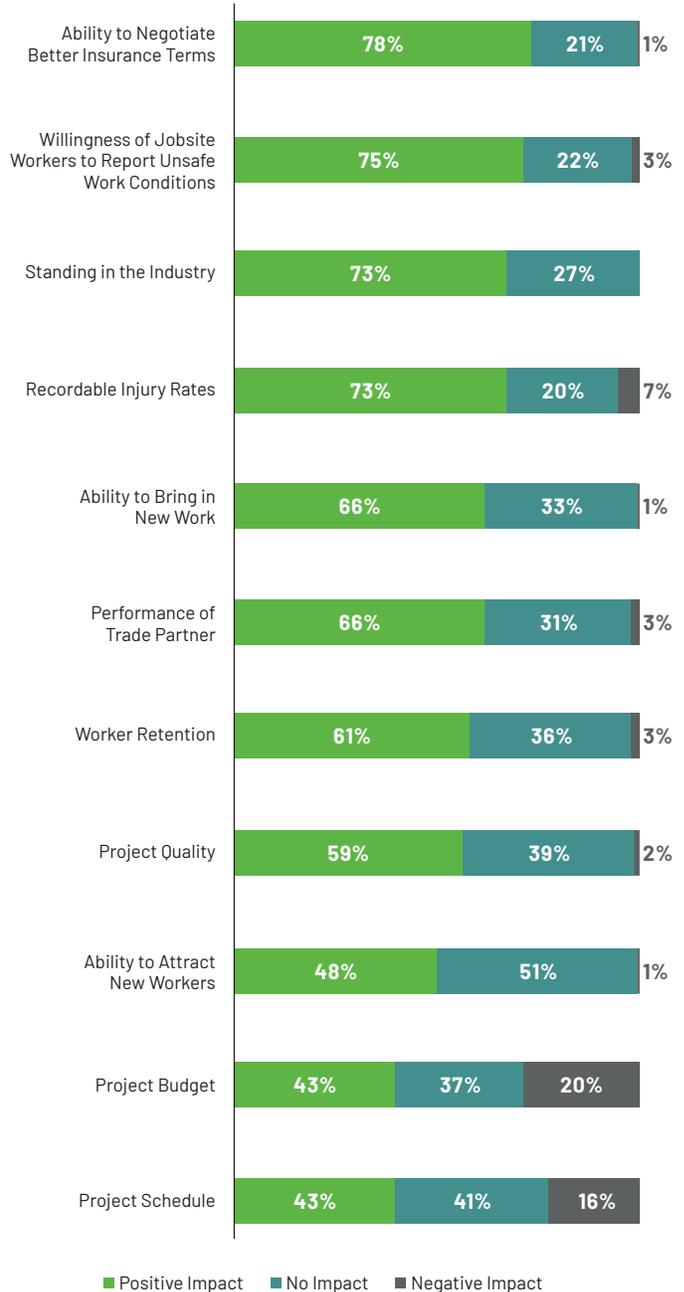
Business Benefits of Safety Programs

Several business benefits are reported by the majority of the contractors surveyed.

- The top benefit reported from safety programs is the ability to negotiate better insurance terms, reported by 78%. However, this benefit is far more widely experienced by large (90%) and midsize (79%) contractors than by small ones (60%).
- Another top benefit, reported by 73%, is an improvement in their standing in the industry. For negotiated projects or those with select bid lists, improved standing in the industry can directly impact their ability to find new work. It also may influence their ability to attract new workers. And again, large contractors (92%) far more frequently report this benefit, with both midsize (70%) and small (51%) companies lagging behind.
- Two thirds of contractors report that they are better able to bring in new work due to their safety programs. Again, this can be an important factor in negotiating work or making a short list of bidders. And again, large companies (84%) experience this as a positive benefit far more frequently than do midsize (63%) or small (44%) ones.
- A large share (61%) of contractors also experience improved worker retention due to their safety programs. This is particularly critical in these times of skilled worker shortages as companies invest in training the staff they have to meet their needs. Large companies are again the biggest beneficiaries of this, but in this case, a slightly larger share of small companies report it than do midsize ones.
- The only business benefit reported by fewer than half of the contractors is the ability to attract new workers, but there is

Impacts of Contractor Safety Programs

Dodge Data & Analytics, 2021



Impact of Safety Programs

Project and Business Impacts of Safety Programs CONTINUED

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

still a notable share (48%) experiencing it. Nearly all the other respondents are neutral. And again, large companies (63%) more frequently experience it than smaller ones.

With the business benefits universally experienced by more large than small companies, the industry needs to consider how to help smaller contractors invest more in their safety programs and also see a higher return on those investments.

Project Benefits From Safety Programs

Contractors were asked to rate six project benefits from their safety programs as well.

- Willingness of jobsite workers to report unsafe work conditions is the top project benefit reported. 87% of large companies experience it, compared with just 65% of midsize ones, with small companies falling in between at 73%.
- Reductions in recordable injury rates are also widely reported, and there are no significant differences between small, midsize and large companies for this benefit. However, it is notable that 7% report a negative impact, perhaps suggesting that there is a small share of contractors who do not agree with the safety programs their company has instituted.
- Many (59%) also experience improved project quality, and again, it is most widely reported by large companies (69%) and least by midsize companies (49%) with small companies between them at 60%.
- The 43% who report a positive impact on budget and schedule are consistent with the overall findings since 2012 for these two benefits, and continue to more than double those who believe safety programs have a negative impact on these factors.

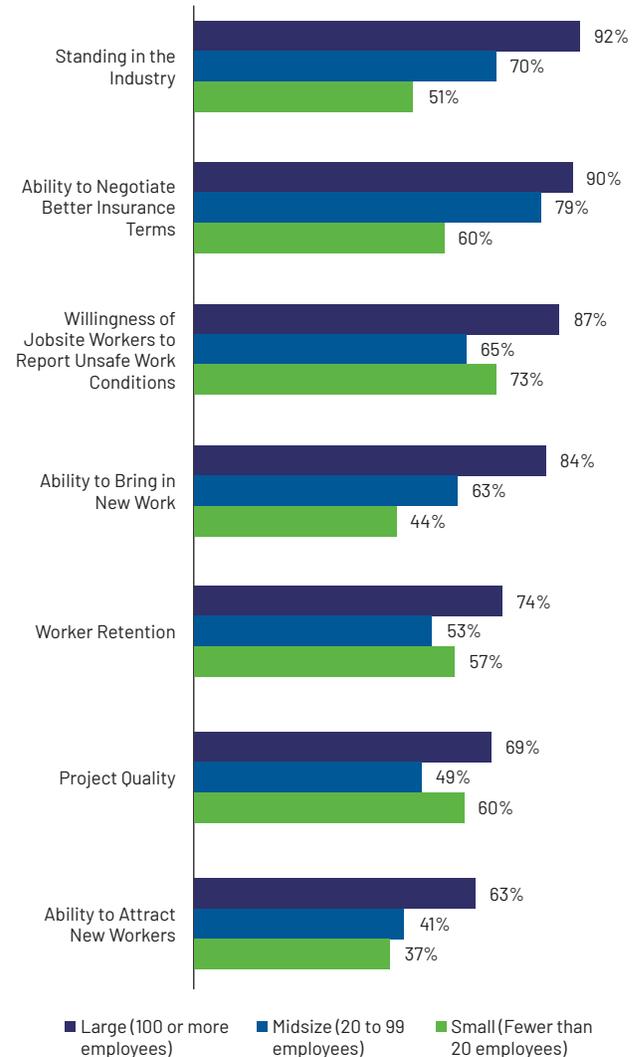
Variation Over Time

The findings on impacts are largely consistent with previous studies.

- The most notable growth compared with the average of the previous studies is in those who report greater staff retention and the ability to attract new staff, which both increased in 2021.
- The largest decline in 2021 was in the share reporting improved project quality, which averages 67% for the past four studies, but is 59% in the current study.
- There were also small declines of 3% to 4% in 2021, compared with the averages in the past for the ability to contract new work, standing in the industry and the willingness of workers to report unsafe work conditions.

Positive Impacts From Safety Practices (by company size)

Dodge Data & Analytics, 2021



Taking a Lean Approach to Safety: Tech Office Building

SAN FRANCISCO BAY AREA, CA

The construction team behind a new office building in the San Francisco Bay Area has implemented Lean construction and realized a positive impact on safety. The massive 1.8 million-sq.-ft. building had approximately 1,000 construction workers onsite at its peak. When the team recently reached the three-years-plus-180-day mark without a recordable safety incident, they celebrated with a BBQ “safety lunch.” This attests to the safety mind-set present since the project’s inception.

Whiting-Turner is the general contractor for the project. The owner was determined to develop a one-of-a-kind completely green building, which made development more complicated and required greater coordination among the trades. To achieve this, Whiting-Turner sought input from the trades from the get-go and empowered them to work as a team.

“The scheduling of a project is often pushed down the throat and doesn’t allow the trades to challenge or improve the schedule,” says Henry Nutt III, a preconstruction executive with Southland Industries who also sits on the National Board of Directors for the Lean Construction Institute (LCI), where he leads a task force designed to encourage trade partner adoption of Lean methodology and behaviors. “On this project, the general contractor asked us to share responsibility of schedule development, which had a direct impact on how we managed labor and mitigated safety risks.”

Besides encouraging safety, collaboration enabled those closest to the work to identify problems and ultimately find better, more efficient methods to complete the job. Also, it imbued a mind-set that everyone’s schedule is intertwined, and it created a layer of promises and expectations and



BBQ safety lunch celebration for achieving three years plus 180 days without a recordable safety incident.

inspired buy-in.

A Chance to Communicate

The desire for input from the trades continued into the construction phase. A brief (five to seven minutes) daily huddle begins and ends each day. At the morning huddle, the aim is getting everyone together to talk and strategize about the goals for the day. The huddle at the end of the day is for discussing how things went and what each trade will do the next day.

There were multiple daily huddles around the site; each typically included seven to ten people from the various trades involved in the work in a specific area of the building.

“The daily huddles broke down barriers, gave us a chance to discuss things that went awry, and keep the alignment going,” Nutt says. He adds, “They were a mitigating factor for safety.”

Project Facts and Figures

Project Name

Large Tech Company Office Building

Project Size

1.8M sq. ft. of developed space

Project Type

Office Building

Workers Onsite at Peak

+/- 1000

General Contractor

Whiting-Turner

Techniques Used

Daily Huddles and Gemba Walks

Days Without a Recordable Safety Incident

Three years plus 180 days and growing

Impact of the Gemba Walk

Every Friday morning, two teams took a Gemba Walk. (Gemba is a Japanese word meaning “the real place.”) A Gemba Walk involves managers and leaders observing the primary work location with the goal of gaining a clear understanding of the issues faced by those doing the work by listening to them, and ultimately determining if there are ways to improve productivity.

“The Gemba Walk is set up to be productive and proactive and enable change to be made before issues grow or even arise,” Nutt says.

The two teams conducting Gemba Walks included the field leadership. They walked around the entire site to see how things were going. They took notes and strove to take the temperature of the culture to get a sense of how workers were doing and worker morale. “One of the objectives,” Nutt says, “is to see where we are versus what people are saying and get a snapshot of where the job is in real time.”

A second walk was done by the foremen, though their walk was more granular and focused. However, it had a similar purpose.

All those who took Gemba Walks met after the walks were completed. They addressed roadblocks based on the feedback received from people in the field. The foremen were tasked with removing barriers that slow or prevent work from progressing optimally.

While Gemba Walks clearly address productivity, other issues are also reviewed. “When we go out, we look for potential safety hazards and if the workers are placing themselves at higher risk due to the existing conditions, and we seek solutions together,” Nutt says. People from all the trades are part of the Gemba Walk. “They bring a different perspective than someone who is similarly skilled, ask

why something is done a particular way, and propose atypical ideas.”

The Relationship Between Lean Construction and Safety

“Using Lean tools and methodologies while being more intentional and working together is a better approach to the risks and dangers that are part of the construction industry,” Nutt says.

He emphasizes the need for camaraderie and consideration of mental health, which also impact safety. “Lean construction forces people to say ‘I can do it alone, but I can’t do it better alone. I need the person next to me,’” Nutt says.

“We need to think how to engage with people and conflict and how it impacts mental health and how someone shows up at a job,” Nutt says. If a construction

worker is preoccupied, they are more likely to injure themselves or a colleague.

There’s great emphasis in construction on completing projects faster and for less money. But the story does not end there. Other major factors in job-related incidents are the inability to act mindfully and striving for shortcuts. Recognizing and addressing these issues help improve both safety and productivity.

Safety is a byproduct of Lean construction. A safe worksite only happens with communication. Enabling tradesmen to feel like partners, encouraging all workers to contribute, and setting clear objectives and expectations have allowed the team under Whiting-Turner to focus on safety. ■



Exposed overhead ducts on the project.

The Prevention Through Design National Initiative

NIOSH's initiative is designed to help architects, engineers, contractors and owners design hazards out of projects before construction begins.

Architects and engineers routinely design for the safety of their project's users and occupants; it's less often that they design for the safety of its builders and maintenance workers. NIOSH's Prevention Through Design National Initiative aims to change that.

Prevention through design (PtD), also known as design for construction safety or safety by design, anticipates hazards to workers, and designs them out—early, when it's most feasible. "It's much more powerful to design out a hazard than it is to retrofit, or to control a hazard in existence, or to deal with its repercussions," says Paul Schulte, director of science integration at NIOSH and program manager for the initiative.

Eliminating Hazards Before They Happen

Effective examples include the provision of anchorage points for construction and maintenance at heights, the use of prefabrication and designing in enough room for accessing task points and maneuvering in safety. "Prevention through design seeks to reduce the 'must-trust' factor," says Jonathan Bach, a safety engineer at NIOSH and the national initiative's coordinator. (Must-trust refers to the less reliable strategy of expecting individual workers to use personal protective equipment without fail.) Benefits of eliminating site hazards from the outset include fewer worker injuries and fatalities, reduced workers' compensation premiums, fewer delays from accidents and increased productivity. "Prevention

through design occurs when owners, designers and/or constructors see the high societal value, the importance to the individual workers and in many cases, the return-on-investment opportunities," says Bach.

Since the national initiative was launched in 2007, it has promoted PtD through research, education, practice and policy. It has led the development of a standardized approach—ANSI/ASSE Standard Z590.3—that provides design teams with guidance on implementing the practice. In collaboration with the U.S. Green Building Council, it has tailored a PtD credit under the Leadership in Energy and Environmental Design (LEED) certification program. It has published discipline-specific training materials, and engaged with universities to integrate the concept into architecture and engineering programs. It has supported major firms in developing in-house programs, and coordinated the presentation of industry-leading projects, corporate policies, research and recommendations at conferences.¹

Obstacles to Clear

And yet for the goal of normalizing PtD across the AEC sector, challenges remain. Concerns about liability may discourage uptake where safety considerations seem to lead to a variation from standard practice. In countries that mandate PtD, by contrast, concerns for safety and liability are aligned: in Britain, for example, where construction fatality rates are a fifth of America's, PtD has been mandatory since 1994. "Gradually, it is becoming clear that designers using

PtD-inspired safer designs are not doing safety work on the construction site, and are not involved in the contractor's means and methods of constructing," says Bach. Some construction law firms are now providing guidance on how to reduce liability exposure. And larger AEC firms are actively seeking ways to advance PtD and contribute to the development of best practices. "PtD principles will gradually be accepted as what the reasonable person in the industry would expect and do," Bach predicts.

Another challenge is the real or perceived increase in upfront costs to implement PtD measures. For projects with fixed capital budgets, longer-term savings through PtD may be out of reach. To address this, the initiative is advocating for a funding program that facilitates PtD in such cases, similar to those that facilitate priorities such as energy conservation and brownfield remediation.

Despite these obstacles, momentum around the practice is building. Bach points to an increasing number of projects underway and inquiries received, a growing body of research and new faces at conferences, and an overall uptick in interest, education, advocacy and use. Moving forward, NIOSH is developing a website of PtD examples, checklists, case studies and company policies to support resources already in the public realm; it will also make accessible hundreds of design solutions; and it will continue to collaborate with industry leaders and academia. "This is a powerful concept," says Schulte. "It's got a bright future ahead." ■

¹ For example, see presentations from a [2020 conference](#) and forthcoming presentations from a [2021 conference](#).

Data: Safety Training and Communication

Types of Safety Training

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

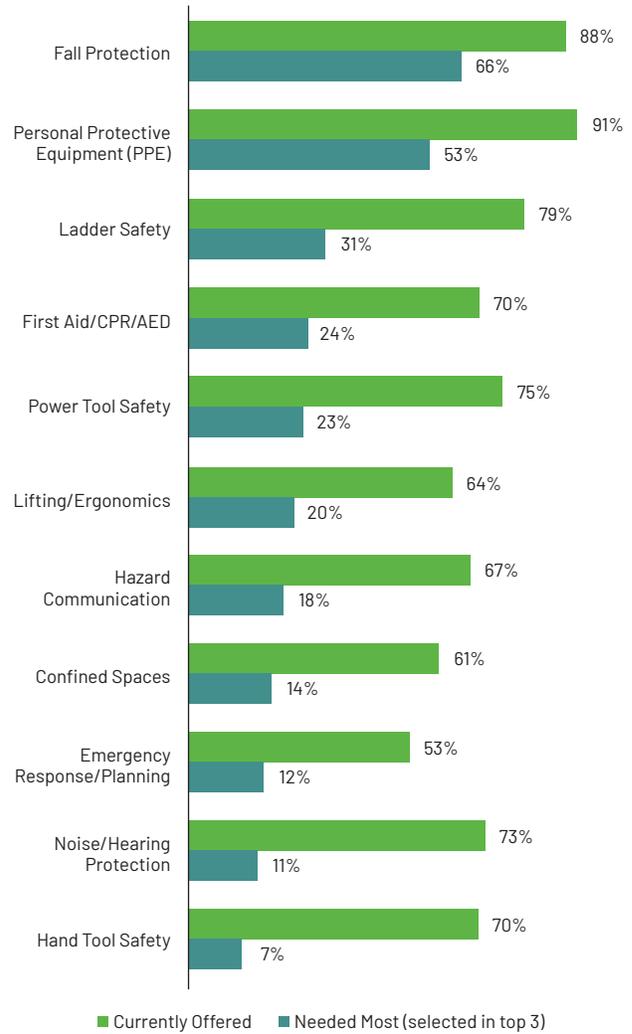
Contractors were asked two questions about common types of safety training. First, they were asked to select the types that are offered to workers at their companies from the list of 11 shown in the chart at right. Then they were asked to rank the top three most needed types from that same list of 11. The responses to both questions are captured in that chart. The chart on the opposite page shows the level of use by size of company.

Overall, the findings demonstrate a strong correlation between the frequency with which each type of training is offered in the industry and the share that consider it to be one of the top three most needed.

- For each of these types of training, significantly more large companies provide them than do small companies, and for nearly all of them, midsize companies lag notably behind large companies as well.
 - In contrast, there are no significant differences in terms of how frequently general and specialty trade contractors offer these types of training.
 - The top two types of training most frequently considered necessary are fall protection and training on PPE. Fortunately, these are also the two most widely practiced types of training in the study, with most contractors engaging in both.
 - According to OSHA, falls are the leading cause of death on construction projects, and the need for fall protection training is particularly important.
 - OSHA manuals focus on proper PPE use, so the high percentage that consider that training needed and the high share that provide it may reflect the desire to meet OSHA requirements on projects.
 - Probably due to their wide overall use, midsize companies are not significantly different from large companies in the share that conduct both of these types of training.
 - 70% or more of contractors also offer ladder safety, first aid/CPR/AED, power tool, noise/hearing protection and hand tool safety training to their workers.
 - Among these, ladder safety is generally considered the most important (selected among the top three most needed types of training by 31%) while noise/hearing protection and hand tool safety are far less frequently selected among the top types of training needed.
 - The gap in the frequency with which midsize and large companies offer power tool and hand tool safety training is less than for many other types of training.
- Over 50% offer training in lifting/ergonomics, hazard communication and confined spaces. These less commonly

Types of Training (currently offered and considered most needed)

Dodge Data & Analytics, 2021



Safety Training

and Communication

Types of Safety Training CONTINUED

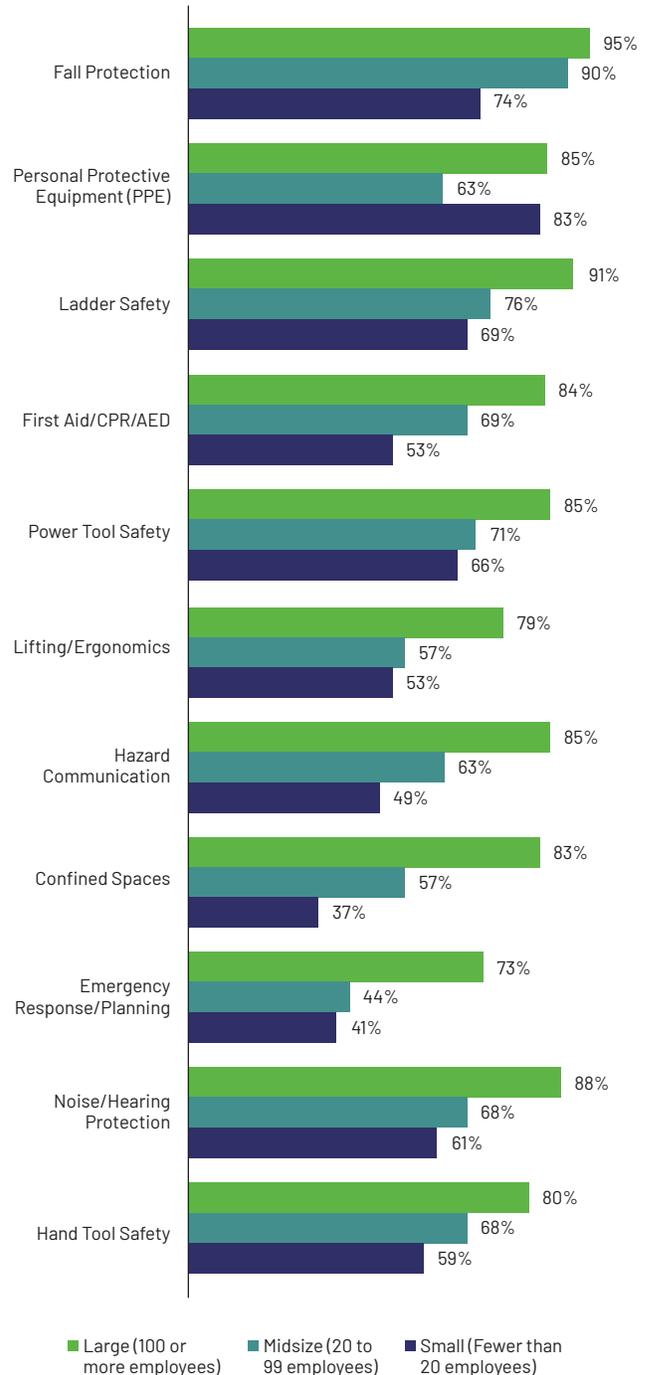
SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

offered types of training are also less frequently selected among the top three most needed by contractors.

- While there are no notable differences in the frequency of offering these types of training between general and specialty trade contractors, general contractors more frequently select training on hazard communication (23%) and confined spaces (21%) as among the top three most needed for workers than do trade contractors (14% and 7%, respectively).
- The least frequently used type of training is emergency response/planning, but even that is used by over half of the contractors who participated in the study.
- As severe weather events and other issues continue to create challenges for contractors onsite with increasing frequency, it will be interesting to see if this type of training becomes more widely used and/or grows in importance to contractors over time.

Types of Training Currently Offered (by company size)

Dodge Data & Analytics, 2021



Safety Training

and Communication

Frequency of Offering Safety Training

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

Contractors were asked to indicate how frequently they offer safety training from the list of options shown in the chart at right, which also shows the responses by size of company.

The chart also shows a relatively robust selection of the “other” option. Those who selected “other” largely fall into two groups: those who are providing training on a more frequent than quarterly basis, and those who do so when needed or when starting a new job. Here is a more detailed breakdown of those responses, which account for the majority of those selecting other.

- **More frequent:** 27% said that they provide training weekly, 12% said monthly and 2% said they provide training every day.
- **As needed/when starting a new job:** 31% said that they provide training as needed, and 12% said they do so when starting a new job.

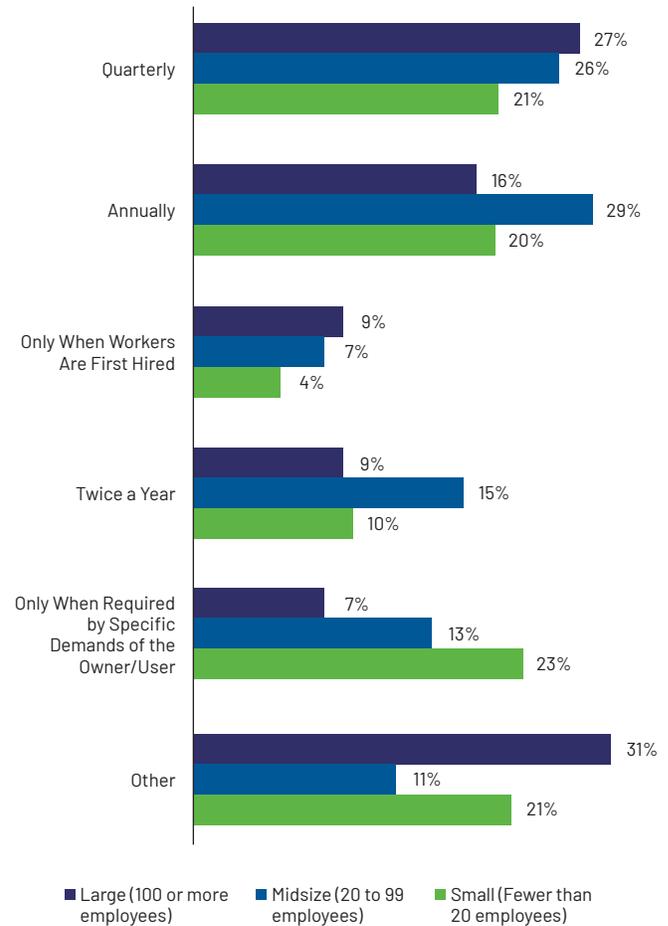
The data clearly demonstrates that there is no consistency across the industry for the frequency of offering training, with a lot of variation in responses generally and especially when factoring in the size or type of company.

- No single category was selected by one third or more of respondents, demonstrating that there is no common practice for providing training to workers.
 - The one consistent finding is that very few contractors, regardless of size or type, only train workers when they are first hired.
- Large companies report training most frequently, with 27% saying they do so quarterly, and 31% selecting the “other” option.
- Midsize companies most frequently supply training on a quarterly or annual basis.
- Small companies are the most evenly split across all the categories, showing no real pattern in the frequency of offering training.
 - Notably, though, they are more likely to only offer training when required by specific demands of the owner/user than are large companies.
- Specialty trade contractors have a slight tendency toward offering training more frequently than general contractors. The general contractors offer training on an annual basis more frequently (27% versus 17% for the trades), and the trade contractors more frequently select other than do the general contractors (29% versus 12%).

The lack of an industry standard for frequency of training can create disparities in the ability of contractors to increase safety on their sites.

Frequency of Offering Formal Safety Training

Dodge Data & Analytics, 2021



Safety Training

and Communication

Factors Influencing the Types and Frequency of Safety Training Offered by Contractors

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

Contractors were asked to select the top three factors that influence the type and frequency of safety training they offer from a list of 12 possible options, which are shown in the chart at right.

- **Specific jobsite conditions/needs** is by far the most influential, selected in the top three by 62%. This is consistent with the high use of jobsite-specific practices (see page 8), and demonstrates that for many contractors, reacting to the immediate needs of the jobsite is their top priority for safety. There are no significant differences in terms of company type or size in the influence of this factor. It is notable that this exceeds the influence of meeting regulatory requirements, suggesting a larger commitment to safety among contractors.
- **Meeting OSHA standards** also stands out as a top influencer for decisions on the types and frequency of safety training. This may account for the emphasis placed on PPE training discussed earlier (see page 19). It demonstrates that OSHA requirements are top-of-mind for many contractors in determining their safety programs.
 - Midsize companies (54%) more frequently select meeting OSHA standards in their top three than do large companies (35%), with small companies falling in the middle (43%).
- **The need to stay current on new regulations** is ranked third in influence. There are no significant differences by company type or size in the share that select this among their top three.

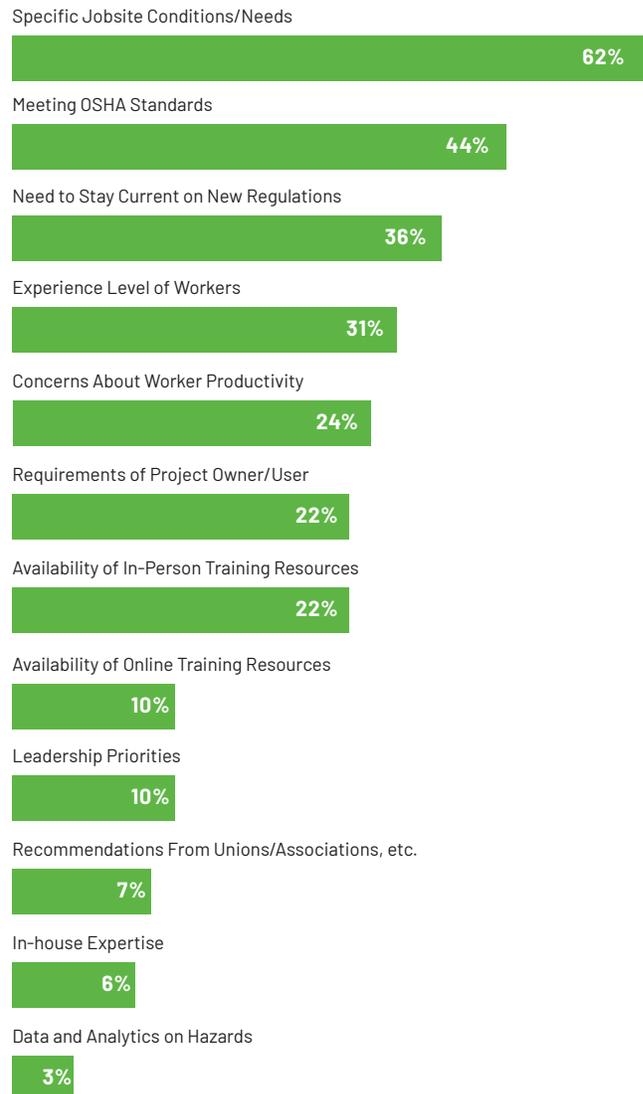
There is a cluster of four factors that are picked by roughly one quarter to one third of contractors. This suggests that the experience level of workers, concerns about productivity, owner requirements and availability of in-person training resources should all be considered moderately influential.

- Only 10% of small firms select availability of in-person training resources in their top three, compared with about one quarter of larger companies.
- 28% of specialty trade contractors select requirements of project owner/user as a top influential factor, but only 16% of general contractors do the same.

The factors that were least frequently selected suggest that the availability of online training resources, leadership, industry organizations, their own in-house expertise and data on hazards are not notably influential for most contractors in determining the types of safety training or frequency with which they are offered.

Factors With Greatest Influence on Type and Frequency of Safety Training (selected in top three)

Dodge Data & Analytics, 2021



Safety Training

and Communication

Online Health and Safety Training

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

Previous *Safety Management in the Construction Industry* studies have demonstrated that most contractors are using online training to at least a limited degree. In this study, the questions about online training were revamped to better understand how it is used and how the COVID-19 pandemic in 2020/2021 has impacted its use by contractors.

Current Use of Online Training

As the chart at upper right shows, nearly two thirds (63%) of contractors report that they use online health and safety training for their workers.

- Large companies (100 or more employees) more frequently offer online health and safety training than do smaller companies (78% versus 54%, respectively).
- However, there is no difference in the share of general and specialty trade contractors who offer this training.

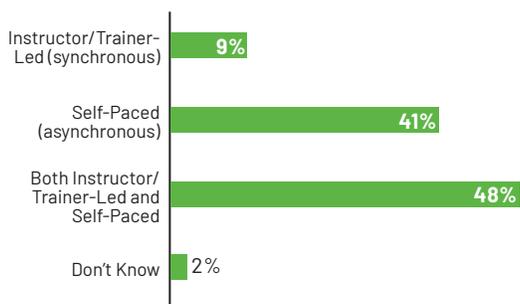
The chart at bottom left shows the types of online training currently in use. Notably, while purely instructor-led training is relatively rare, nearly half (48%) rely on a combination of asynchronous training with no instructor and instructor-led training for their online programs, suggesting that there is still a reliance on customizing and humanizing this training.

Change in Use of Online Training in Past 12 Months

The chart in the lower right reveals that about one third of the contractors who use online health and safety training currently (35%) have increased its use in the last 12 months. Again, large companies (53%) exceed smaller companies (25%) in the share that report that use of online training has increased.

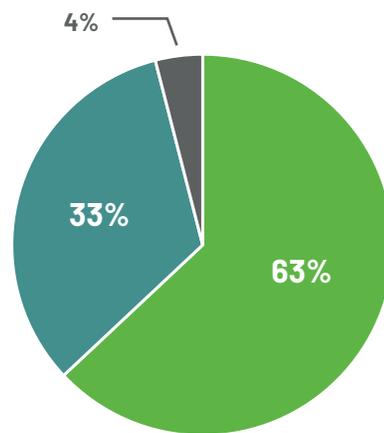
Types of Online Training (according to users)

Dodge Data & Analytics, 2021



Use of Online Health and Safety Training

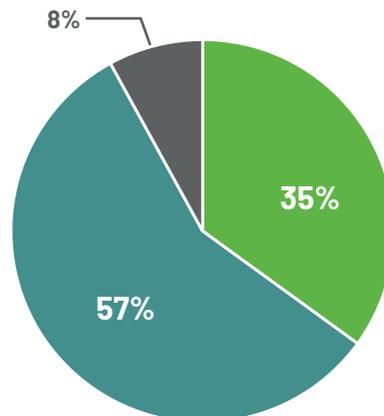
Dodge Data & Analytics, 2021



■ Use Online Training ■ Do Not Use ■ Don't Know

Increase in Online Training in Past 12 Months

Dodge Data & Analytics, 2021



■ Increased ■ Did Not Increase ■ Don't Know

Safety Training

and Communication

Online Health and Safety Training CONTINUED

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 **DATA**

The COVID-19 pandemic has influenced the use of online approaches to training for the majority of contractors using it, as the chart at upper right reveals.

- 37% report that their online training was either adopted or increased solely due to the influence of the pandemic.
- An additional 40% say it played a role in their increased use of online training, even if it was not the only factor.

It is likely that the increased exposure to online training will help many contractors better determine the degree to which they would like to use it in the future.

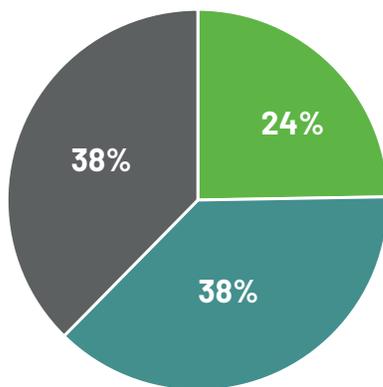
Future Use of Online Training for Health and Safety

Nearly all contractors currently using online training for health and safety plan to continue doing so at about the current level at which they offer it now (48%) or increase its use (41%). This clearly demonstrates that most contractors with experience using online training consider it a valuable tool. Notably, no users expect to stop using it.

About one quarter of the contractors who currently don't use this approach (24%) believe that they will do so in the next three years. The rest are evenly split between those who know they won't use it and those who don't know whether it will be used or not. Between the current users who expect to use it more widely and the non-users who plan to start using it, it is clear that the use of online training should continue to grow in the construction industry.

Expected Use of Online Training by Non-users in the Next Three Years

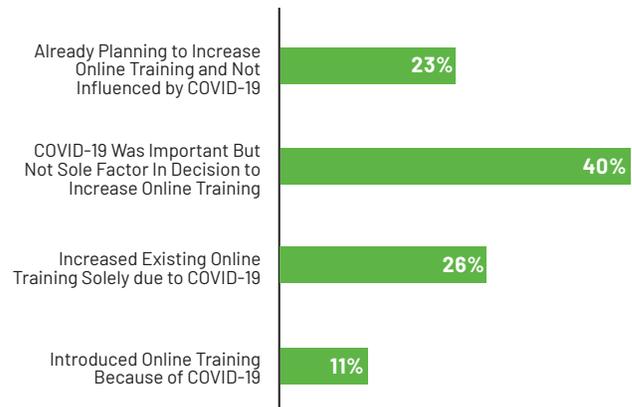
Dodge Data & Analytics, 2021



■ Will Use ■ Will Not Use ■ Don't Know

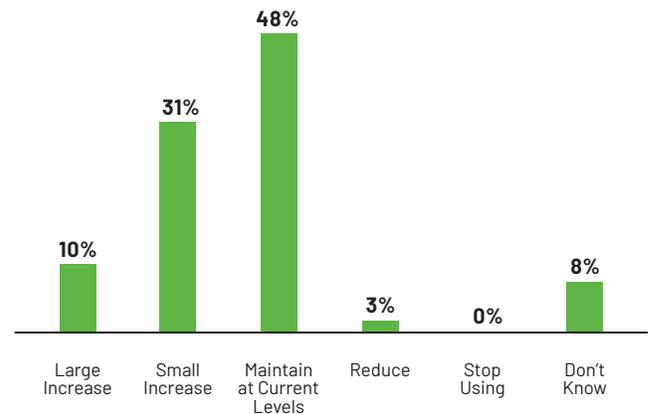
Influence of COVID-19 Pandemic (according to those increasing use of Online Training)

Dodge Data & Analytics, 2021



Expected Increase in Online Training in the Next Three Years (according to users)

Dodge Data & Analytics, 2021



Safety Training

and Communication

Enhancing Safety Training

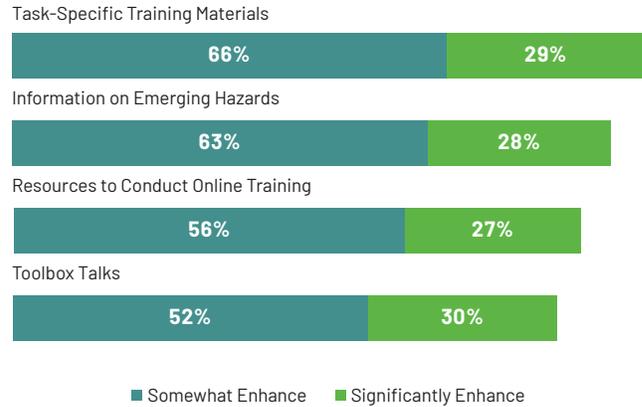
SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

Contractors were asked to rate whether four means of enhancing safety training would do so significantly, somewhat or not at all. The chart at right shows those who believe each would somewhat or significantly enhance the training.

- Roughly the same share of contractors (between 27% and 30%) believe each of these would significantly enhance safety training at their company.
- However, when looking at the combination of somewhat and significantly, task-specific training materials emerges as the top choice, followed by information on emerging hazards.
- Large companies (39%) more frequently report that information on emerging hazards would significantly enhance their safety training than do small companies (17%).
- More general contractors (36%) expect toolbox talks to enhance safety training than do specialty trade contractors (24%).

Means to Enhance Safety Training

Dodge Data & Analytics, 2021



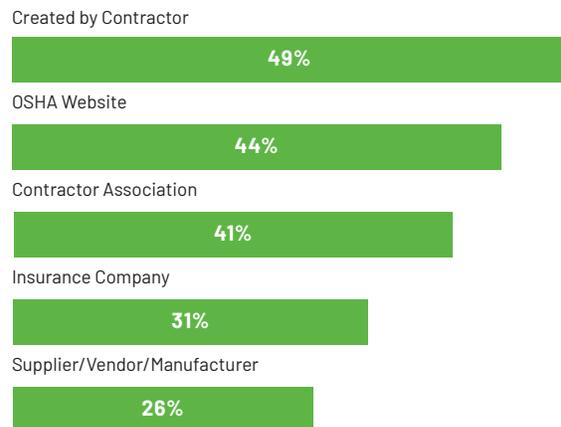
Industry Resources for Toolbox Talks

Contractors were asked to select any of the industry resources they use for their onsite toolbox talks from a list of nine options. The chart at right shows the top five most frequently selected ones.

- Perhaps the most surprising finding is that no single option is selected by more than half of contractors. This suggests that contractors do not have a main resource for these vital elements of their training toolkit.
- In addition, the highest share (49%) report that they create these resources themselves, another sign that contractors do not have a single reliable source for training. This may also be influenced by the need they report throughout the study for site-specific training and safety practices (see above and page 8).
- OSHA and contractor associations are the biggest external sources for toolbox talks, followed by insurance companies and suppliers/vendors/manufacturers.
- The only difference by size of company among all practices included is that large companies more frequently create their own toolbox talks (72%).

Top Industry Resources for Toolbox Talks

Dodge Data & Analytics, 2021



Safety Training

and Communication

Foundations for Safety Leadership Training

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

The Foundations for Safety Leadership module helps to promote a better safety climate on projects by providing information on five leadership skills that can be used to effectively communicate to and work with jobsite workers. It was added by OSHA as an elective to their construction 30-hour course in January 2017.

Dodge Data & Analytics first started tracking the use of this training by construction companies later that year. The chart at right compares the current use of the course by contractors with the reported usage in the 2017 and 2019 studies.

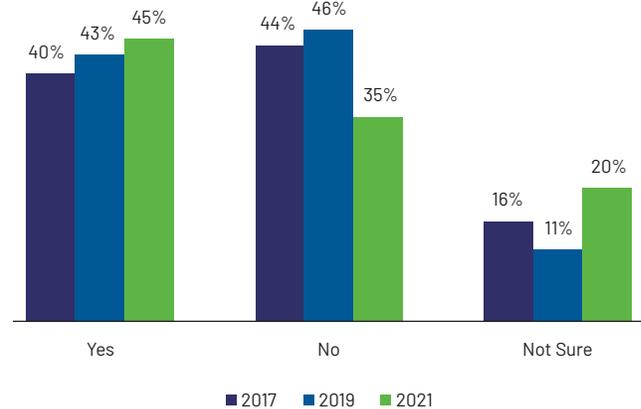
As the chart reveals, use of this training has grown slowly but steadily since its introduction.

- Half (50%) of small contractors say that they do not use this training course, compared with 31% of midsize and 28% of large companies.
- There is no significant difference in the level of use of this training between general and trade contractors.

The findings suggest that increased outreach to the industry may be necessary to get more contractors to encourage their supervisors and superintendents to take this course.

Use of Foundations for Safety Leadership Training Over Time

Dodge Data & Analytics, 2021



Trends in Safety Training

The pandemic has encouraged greater interest in e-learning and VR/AR.

When pandemic-related shutdowns started in spring 2020 and essential construction continued, safety professionals faced the daunting task of how to continue training workers effectively while adhering to COVID protocols. In some cases, employers and unions looked to leverage online tools to create distance learning opportunities.

“COVID put us in a state of disequilibrium and forced us to look at training in a different way,” says Daniel Snyder, a board member of the American Society of Safety Professionals and founder of the firm Safety Mentor. “COVID triggered the demand for applicable technology in the safety training space.”

E-Learning Trends

While there were some available e-learning options that were asynchronous—meaning instruction done by the student on their own time—the pandemic sparked greater interest in synchronous learning, where a trainer instructs students remotely and at the same time, says Jeff Dalto of Vector Solutions. However Dalto, who worked with Snyder to establish ASSP’s standards for online training, says that research has shown blended learning—which combines both asynchronous and synchronous learning—has proven successful for training.

“You use the online training primarily to deliver the prerequisite knowledge to show how a procedure is performed,” he says. “Then you reserve face-to-face time, so people can perform the skill and provide feedback while performing it. That’s an established model. It’s effective and it works.”

During the 2020 lockdowns, contractor Allan Myers adopted a

distance learning strategy that allowed for a combination of learning options, says Sandra Genter, the company’s HSE director. She says the company pushed things like First Aid and CPR training online. It also reduced occupancy for required in-person portions of training sessions, such as rigging.

Instead of bringing large groups of workers together, the company would have an instructor teach a course virtually to smaller groups of employees in various locations. Each local session is proctored by an in-person health and safety professional.

“For our previous rigging classes, we’d load them up with 15 or 20 people,” she says. “With these satellite sessions and smaller groups around the regions, we could still conduct that training with minimal gathering and transportation.”

Gary Gustafson, environmental hazards training program director at CPWR—The Center for Construction Research and Training, says adoption of online options was difficult for some construction unions, which “pride themselves on in-person training.” Still, some did pursue using remote learning tools to conduct standardized training, such as OSHA 10 and OSHA 30. Trainers also received some OSHA recertification training via online options, he said.

“I think awareness-level courses and refresher-type courses can be effective (virtually),” he says. “Areas where you can tackle topics that are already known to the student population, so it’s a refresher. Or it’s an awareness training, so you’re just scratching the surface and not going in depth. Virtual learning could be a good platform for that in the future.”

With more adoption of distance learning tools, Gustafson says CPWR can begin to research how effective it is for safety training. “We’re trying to

make sure we can say that if you move to distance learning in a synchronous environment, it will be just as effective as traditional. Or, conversely, if we see a drop off at least we know at what point it drops off. It just gives you more data points for decisions.”

Virtual and Augmented Reality

Another virtual training aspect that is still emerging is the use of virtual reality and augmented reality for safety. In recent years, DPR has piloted several uses of VR and AR, including safety applications. For example, it piloted safety recognition software that utilizes headsets, offering an assessment of how much an employee knows about a jobsite and its hazards. The company also developed a boom lift simulation. “It’s literally a startup and a walk-through of the full safety training for a boom lift using VR,” says Nelson Pascoal, MEP coordinator at DPR. “You have to tie off or it will fail you immediately in the scenario.”

Unfortunately, Pascoal says those pilot efforts were put on hold due to COVID because headsets would need to be shared.

Gustafson says he could see union training centers—which already use simulators—adopting AR/VR into future safety training efforts, but the equipment is currently too expensive. “If I’ve got 22 apprentices and they want to take distance learning (sessions) from home or the jobsite trailer, can they all have the necessary equipment to experience this without it being cost prohibitive?” ■

A New Approach to Safety Training at KHS&S Contractors

ANAHEIM, CA

Nearly every construction company has a safety manual that they provide to all employees. But Michael Cabrea, director of safety and risk control at KHS&S Contractors, wondered if that is the most effective method for engaging employees in safety management. "We give people these binders, these books, these policies, and we [say], 'this is how you are going to be safe.' It is a very antiquated approach," he says.

Taking a Lean Approach

Cabrea's team wanted to help their crews understand hazards better and understand what is expected of them. Drawing upon the Lean practices that KHS&S Contractors already had in place, they decided to explore what how visual management could help to improve safety.

They created a series of icons and symbols for hazards and work conditions, rather than just relying on manuals. Not only are these icons more immediate and visual, but they help Cabrea and his team communicate better about safety with all workers, including those with language barriers.

The icons are organized in several categories, including high hazards, which are the top priority and encompass elements like confined spaces, fall protection, emergency procedures and mobile equipment. Other categories cover a broader range of issues, including hot work procedures, proper lift and material handling, equipment procures, driver safety and even workplace violence.

The icons are used to train people to understand and recognize hazards. They are widely deployed on jobsites through the use of stickers. Workers have stickers on their hard hats that specify the type of training that they have received, so that only workers trained to handle the hazards are

assigned to certain types of work onsite. In addition, Cabrea explains that on certain jobs, the stickers for hazards are also added to the plans: "A supervisor or a foreman can look into [a section on the job] and say, 'wait a second, I realize all my hot work issues are right in this section.'" The supervisor can then assign workers to that section who are trained to deal with that hazard.

In addition to stickers with icons, they have also begun deploying QR codes in different areas for equipment.

Proper placement of the stickers is itself a key part of the safety training involved in using the icons. "We are getting [our team] used to placing the icons where they belong. This becomes that hazard recognition for them to understand the icon and place it on a blueprint," says Cabrea.

He explains that use of these icons is effective because it is part of a larger process-related approach to improving safety. He states that the icon system is more than just a set of pretty images: "It has more meaning to it. It helps people train and educate. But behind the scenes, it helps employers really digest their data and capture the right elements to help improve the system behind it. If you build your system right, you can capture a lot more data, and it can be very useful for your organization."

For Cabrea, this approach is both informed by Lean methods and at the heart of what Lean is trying to achieve. He explains this by referencing a poster used as part of their Lean initiative that can be found in their offices and on any of their jobsites. "It is the Lean



How do we know [this program] is working? Because our employees tell us. They literally tell us.

house, and in the center of Lean house is safety. This is something that all our employees are taught from day one. They are taught productivity, respecting each other, being able to communicate with each other and saying that safety is the center of Lean house ... So this Lean culture really helped us establish 1) the visual management piece for our employees; and 2) the opportunity for them to communicate on a daily basis. We have these Lean huddle meetings every morning. [While engaging in stretch and flex, we are] talking safety. What are the hazards that are going to happen today? What are the constraints for today? The Lean safety culture is what has helped us move forward because the Lean culture was there, the respect, the opportunity for our employees to voice their concerns or their opinions."

Developing a Visual Management System

Once they decided on a visual management approach, the next step was creating the icons. This first involved determining what categories that they wanted, including defining what to focus on as high hazards.

Cabrea explains that they worked with the marketing team on the icons, and that they have already been through different variations of the images that they are currently using. At the beginning, playing off the name of the initiative, "the Human Element," they created a set of images that were like a periodic table. He says, "We were like, 'this is great,' and it was horrible."

A New Approach to Safety Training at KHS&S Contractors

ANAHEIM, CA

He states that the icons were not intuitive for the workers, nor was it eye-catching.

Fortunately, an important part of their process is getting feedback from the field. Much of that feedback comes with their daily Lean huddles every morning. Not only do they discuss what is occurring onsite that week, but they get feedback in those daily meetings on the safety program in general.

In addition, they do safety surveys to evaluate their safety program, which include questions about the effectiveness of the visual management approach to safety. Cabrea reports that the feedback they are getting now on the new set of icons is largely positive.

He believes that their ability to get honest feedback from their employees comes from being a Lean company, and that communication is essential to their success. He states, "There are organizations where, unfortunately, employees don't feel comfortable voicing their concerns. We encourage it. And I think that is [a big part of our success.] How do we know [this program] is working? Because our employees tell us. They literally tell us."

Ongoing Improvement of Their Visual Management Program

But that hasn't stopped Cabrea and his team from considering ways to improve the icons in the future. They are consulting with experts on the icons to help refine them further. And of course, they continue to listen to their employees. One icon he wants to redesign is the environmental one, which has the image of a plant growing out of a hand. Workers have questioned what that means, and they are trying to come up with more relevant images.

In addition, they also want to devise the next set of icons that provide more



Ways to better engage employees with safety are at the heart of KHS&S's new safety training approach.

information on what to do based on the hazards present. Cabrea explains, "I want our employees to not only recognize the hazards but also really think about what could occur with them and what they need." For example, an icon with a fall hazard would be accompanied by one demonstrating the risk of injury and the need for a harness.

Another improvement that Cabrea is implementing is wider utilization of icons with QR codes. He sees this as another way to bring the information to the worker: "We're starting to use our QR codes to have videos with those images." The videos provide another means of giving the worker immediate, useful safety information right when they need it most, and in a visual format rather than written out as a set of instructions. He explains that they are creating videos about using different types of tools and equipment like circular saws and how to utilize fall protection. As Cabrea says, "That's where we are moving next. We are 100% trying to get away from words."

Benefits

Cabrea notes that they have seen continual improvements in safety since

they launched this program: "Year after year we have a decrease in incidents and injuries." He notes as a specific example KHS&S' EMR (Experience Modification Rate) of .49 in California. An EMR recognizes the differences among qualifying employers with respect to safety and loss prevention. He asserts that .49 is one of the lowest rates in the industry, especially for a drywall company of their size.

Cabrea also regards how their employees view KHS&S as a result of their safety program as a top benefit: "We have a lot of satisfied employees in our safety program." Financial savings accrued by KHS&S due to safety, he asserts, are reinvested back into the employees through investments into more training. He says, "The big thing for us is that we are constantly training our employees."

He also finds that this approach opens up the possibility of reducing turnover by maintaining workers: "[Workers] say this about our Lean/safe culture: It's very hard for them to want to leave. They go somewhere, and they come back because they recognize what we have in place ... people recognize that they will be safe here." ■

Data: Technology and Safety

Use of Technologies

Contractors were asked three questions about their use of 14 different technologies:

- Which technologies they are using
- How frequently they are using those technologies
- Which of the technologies not currently being used they intend to begin using in the next three years

The charts on this and the following page are organized by the share of those who report that they use these technologies:

- Established technologies are used by around one third or more.
- Maturing technologies are used by 10% or more.
- Emerging technologies are used by fewer than 10%.

The charts on this page display the percentage that currently use and plan to adopt these technologies. The chart on the following page shows the percentage of those using these technologies who report doing so frequently/very frequently on their projects.

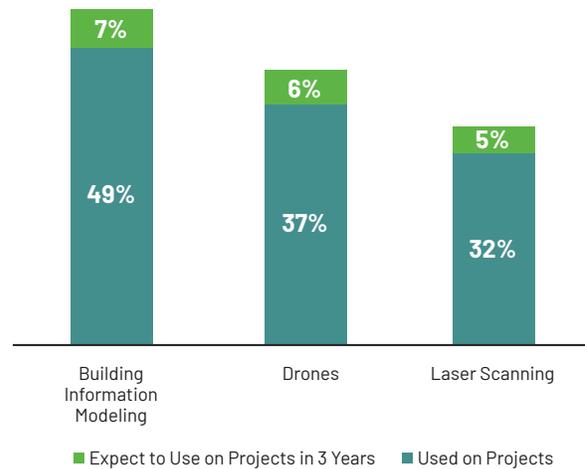
Established Technologies

Three of these technologies are used by enough contractors to be considered established in the construction industry.

- The most widely and frequently used is building information modeling (BIM). Nearly half of the contractors report using it, and more than half of those report frequent/very frequent use on their projects.
 - More large companies (66%) use BIM, compared with midsize (42%) or small (37%) companies.
 - Specialty trade contractors (57%) more often report the use of BIM on their projects than do general contractors (42%). Certain trades like mechanical contractors have embraced modeling, in part because of the role it can play in fabrication.
- Only 7% of contractors not using BIM currently plan to begin using it, suggesting a relatively shallow level of growth in the next few years.

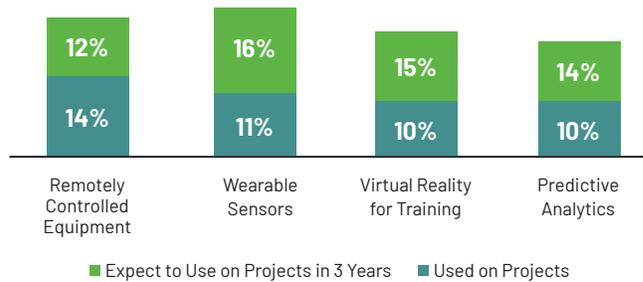
Established Technologies

Dodge Data & Analytics, 2021



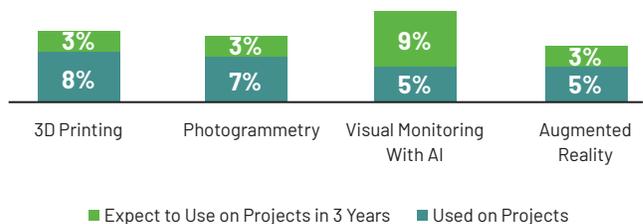
Maturing Technologies

Dodge Data & Analytics, 2021



Emerging Technologies

Dodge Data & Analytics, 2021



Technology

and Safety

Use of Technologies CONTINUED

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

- Drones are the next most widely used technology, with 37% who currently use them.
 - Like BIM, though, only a small share (6%) expect to begin using drones in the future.
 - A moderate share of users (31%) report frequent/very frequent use.
 - More general (52%) than specialty trade (22%) contractors report using them.
- Laser scanning is deployed by 32%, a larger share than in previous Dodge Data & Analytics studies on the use of technology onsite. In addition, more say that use on their projects is frequent/very frequent (36%), compared with the high frequency of drones (31%).
 - Given the investment required to use laser scanning, it is not surprising a far greater share of large companies (48%) use it than do midsize (23%) or small (21%) ones.

Maturing Technologies

Four technologies are reported in use by at least 10% of contractors, suggesting that they may be gaining a foothold in the construction industry.

- Remotely controlled equipment is currently most widely used.
- Wearable sensors has the highest percentage that expect to use it in the next three years.
- In fact, it is worth noting that the share that expect to use the maturing technologies in the near future is at least twice as high as those who expect to start using the established ones, suggesting that each is poised for growth.
- General contractors report wider use of remotely controlled equipment (21%) than do specialty trade contractors (7%), but otherwise, there is no significant difference by firm type or firm size in the current use of these maturing technologies.
- While the use of predictive analytics is relatively limited across the industry at this time, a high share (52%) of users report that they are used frequently/very frequently. A similar finding for the use of virtual reality for training suggests that those who use these technologies are seeing the advantages of using them, another positive sign for wider adoption.

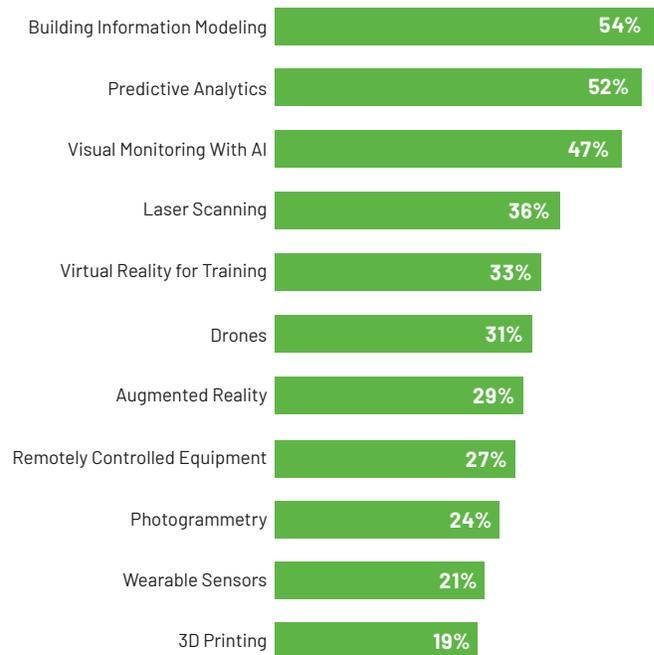
Emerging Technologies

Four of the technologies included in the study are used by fewer than 10% and more than 5% of contractors, suggesting that they are emerging into use in the industry.

- Visual monitoring with AI has a relatively high percentage expecting to use it in the near future, and it is also used frequently when in use at all. This may be the most likely emerging technology to gain wider traction in the construction industry.
- Augmented reality is more widely used among large companies (12%) than smaller ones (3%).
- Photogrammetry is more widely used by general (13%) than specialty trade (1%) contractors.

Share of Users Who Report Using Technologies Frequently/Very Frequently

Dodge Data & Analytics, 2021



Technology

and Safety

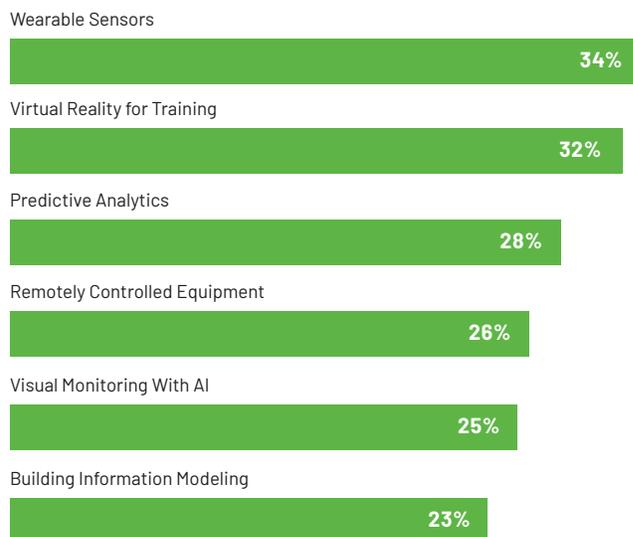
Technologies Expected to Positively Impact Worker Health and Safety

The previous section focused on the current and expected future use of technologies onsite. However, usage alone does not necessarily directly align with the the potential to have a positive impact on worker health and safety. So, regardless of their direct experience with them, contractors were asked to select the top three of the 14 technologies studied that they think will have the greatest positive impact. The ones chosen in the top three by more than 20% are shown in the chart at right.

- Wearable sensors and virtual reality for training are the most widely recognized, with about one third of contractors selecting them among the top three with a positive impact. This is despite the fact that their use is still limited to fewer than 15% of the contractors surveyed.
 - Both have a relatively high share, though, that expect to use them in the future (see page 30 for current and expected future use of each).
 - Large companies are particularly enthusiastic about wearable sensors, with 41% selecting them in their top three, compared with 34% of midsize and 23% of small companies.
 - There are no differences by size or firm type in the responses for virtual reality for training.
- The third most frequently selected technology is predictive analytics. While reported in use by very few, those who do see it used on projects report a very high frequency of use (see page 31), possibly due in part to its ability to help improve safety programs. There is also a relatively high share who expect to use it in the future, confirming its perceived value.
- About one quarter rank the remaining three options in their top three.
 - Remotely controlled equipment is particularly widely recognized by general contractors (32%) and less frequently by specialty trade contractors (19%) as having the potential to improve safety. This may be influenced by the share that specialize in civil construction.
 - Visual monitoring with AI is the only emerging technology on the list of top ones for improving safety. This may bode well for wider use of this technology in the future.
 - Building information modeling is the only established technology widely selected as improving safety. Previous studies by Dodge Data & Analytics suggest that recognition of BIM's impact on safety is often associated with more intensive use of BIM.

Top Technologies That Contractors Believe Will Positively Impact Worker Health and Safety (selected in the top three)

Dodge Data & Analytics, 2021



Technology

and Safety

Using Data to Support Safety Programs

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

Contractors were asked two questions about their use of data to support safety programs. First, they were asked about the degree to which they deploy data, with the options shown in the chart at the bottom on the page. They were also asked about their level of interest in sharing anonymized data with an insurance carrier if it would lower their premiums.

Use of Data for Safety Programs

The use of data is still emerging in the construction industry, with nearly half (49%) of contractors reporting that they don't use data at all, or that they don't use the data they gather.

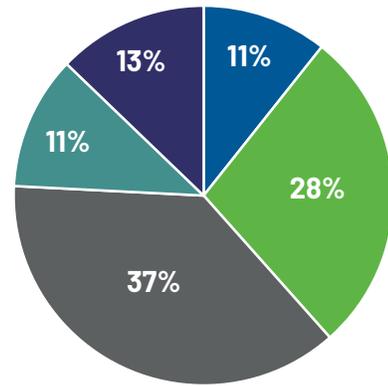
However, the use of data for safety programs is currently strongly influenced by the size of the company.

- Over 70% of small companies are not using data or don't use the data they gather.
- The majority of midsize companies are evenly split between those who gather data but don't use it and those who use data visually to represent what has already happened.
- In contrast, large companies are nearly evenly split between those who use data to represent what has already happened and those who use it proactively to determine future trends.

The engagement of large companies may provide the industry with enough expertise to help smaller companies shift along that scale to a more proactive use of data for safety.

Interest in Sharing Anonymized Safety Data With a Carrier for Lower Insurance Premiums

Dodge Data & Analytics, 2021



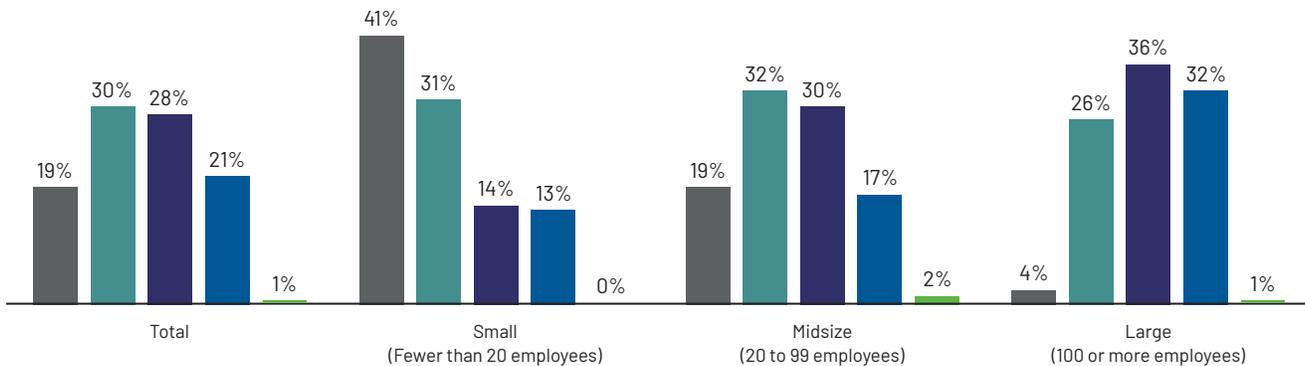
■ Extremely Interested ■ Interested ■ Not Sure ■ Probably Not ■ Would Not Share Data

Sharing Data With Carriers

The largest share of contractors remain unsure about whether they'd share data or not, and would like to know more.

Use of Data to Support Safety Program

Dodge Data & Analytics, 2021



■ Do Not Use Data in Safety Program ■ Collect Data, But Most Goes Unused ■ Use Data to Create Visual Insights to Explain What Has Already Happened ■ Conduct Analytics Using Trends of What Has Occurred to Provide Signals for What May Occur ■ Use Predictive Analytics by Training a Model Using AI to Predict What Will Happen in the Future

A Data-Driven Culture of Safety

Data from everyday actions can help improve safety outcomes.

Construction firms generate safety-related data all the time. Everyday actions, such as running an inspection checklist, conducting an assessment or holding a tailgate safety talk, generate valuable information. Shifting these processes from paper and spreadsheets to a digital platform enables construction companies to use their own data in new ways: to analyze it, to generate insights based on the aggregate and to improve. “It’s the difference between seeing individual grains of sand and seeing the beach,” says data and analytics expert Jake Freivald, a vice president at Fulcrum. “Instead of one report at a time, you’re getting the overall impact.”

Putting Data to Use

Different types of activities generate and consume different types of data. Safety inspections, for example, are compliance-oriented, based on defined requirements and capture a particular point in time, whereas risk assessments are performance-oriented, holistic and focused on continuous improvement. Data from these complementary activities makes each more effective: patterns from inspections data inform assessments; conclusions from assessments guide inspections.

Similarly, data on the delivery of tailgate talks and other types of training correlate with findings from inspection, hazard and incident reports to reveal where training is working and where more is needed. Site visits generate location-specific data that facilitate comparisons by jobsite, client or other

variables. Remediations yield valuable data regarding returns on investments.

For data to be useful, it needs to be structured according to three key criteria, Freivald says. First, obviously, it needs to be digital: compared with paper and spreadsheets, digitized information permits the use of analytics, easily incorporates multiple media formats (such as video and audio), won’t get stranded in a filing cabinet or on someone’s desktop and offers a single, common, always-current source. Beyond digitization, data needs to be pervasive: available on multiple devices and operating systems, and accessible companywide. Any employee on the jobsite should, for example, be able to take a picture of a safety hazard, submit it through an app and feel confident it will be fixed as a result of their participation. “This isn’t just for people with the word ‘safety’ in their job titles,” Freivald says. “We’re trying to create a culture of safety.” And finally, the data needs to be reliable—otherwise, people will revert haphazardly to paper.¹

8 Steps to Get Started

For companies looking to turn everyday actions into actionable data, it’s essential to begin with something small enough that the organization can manage it, yet significant enough that it will make a difference over time. “Start small, think big,” says Freivald, and he recommends eight steps to start with:

1. Digitize inspections.
2. Use the power of checklists to inject safety into more processes, and then digitize the checklists.
3. Focus on data availability: Make the data you have more available,

and then look for more procedures to capture and make available.

4. Create safety KPIs from the data, and communicate successes and opportunities for improvement.
5. Create performance metrics: How well are the safety processes themselves being carried out and how long does it take to complete them? Use data to demonstrate that safety processes are not a bottleneck.
6. Relate safety metrics to organizational performance: How are safety practices helping overall effectiveness?
7. Insert instant checks: places to simply and immediately record an observation—either as a stand-alone (such as a hazard-reporting app on everyone’s phone) or as part of a larger operational checklist.
8. Iterate and refine. “When you get to this point, you’re not done,” says Freivald. “You’re always focused on safety.”

There will be challenges, of course, and resistance to change may be top among them: When lives are at stake, safety managers may be reluctant to change what they know works. But digitization offers rigorous and replicable processes, along with the flexibility to respond to the varying needs of clients, jurisdictions and jobsites, and most significantly, insights to strengthen a company’s safety culture. ■

¹ For more on the power of checklists, Freivald recommends Gawande, Atul. [The Checklist Manifesto: How to Get Things Right](#). 1st ed., Picador, 2010.

Implementing Predictive Analytics to Improve Safety at The Boldt Company

APPLETON, WI

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA

Over the last few years, the construction industry has embraced technology and applied it throughout the construction process. This practice, combined with the inherent dangers from working on a construction site, has led many in the industry to try using technology to increase on-the-job safety.

The Boldt Company, a national construction management and general contractor company, is among those in the industry using technology to improve safety onsite. Based on the company's belief that it can make everything in its business better, including safety, Boldt has invested heavily in technology.

Entrance to Predictive Analytics

In 2012, Boldt began dabbling with predictive analytics to help improve worker safety. The company surmised that collecting data around safety, including incident information, along with predictive analytics, could help them provide crews with useful information for planning and integrating safety into their work. The company



There's a mind shift in the company that we've helped to encourage with data and reporting tools.

invested in software to help them achieve their goals.

Unfortunately, they found the software they used did not provide them with helpful information or insights. "We wanted to slice and dice more data in a meaningful way," says Scott Frazer, VP of corporate safety for Boldt. During the eight years Boldt used the software, Frazer recalls, "We were gathering safety observation data and incident information digitally so we could analyze the data in the hopes of finding and connecting dots we didn't even know were there."

Despite the disappointment with the software, Boldt remained convinced that predictive analytics, based on its usefulness in other arenas, could help with safety. "We felt it could identify risk factors, monitor changes in those factors and predict the likelihood of an

event," says Trevor Hietpas, manager, Insights and Analytics with Boldt.

A New Beginning

Following this belief, Boldt invested in new, more advanced software in early 2021 to further their use of predictive analytics for safety. The new system is better connected with Boldt's other tools, has more capture points and suggests modifications to minimize risks.

After the company began deploying the new software, they discovered they needed to educate the workforce. "There is a big misunderstanding of what predictive analysis is and how you deploy it," Frazer explains. "By name it can cause assumptions that it's a crystal ball, so we did some training to set expectations of what you can get from it."

Project Facts and Figures

Company:
The Boldt Company

Implementation of Predictive Analytics:
Companywide, all projects in all markets across the entire country

Beginning of Company Use of Predictive Analytics:
2012

Reinvigorate Use of Predictive Analytics:
2021

Workers Compensation Costs:
Reduced by 75%

Total Accident Rate:
10% reduction



Safety discussion with Salm Partners at Hager Plant.

Image Courtesy of The Boldt Company/Internal Marketing Team

Implementing Predictive Analytics to Improve Safety at The Boldt Company

APPLETON, WI

SAFETY MANAGEMENT IN THE CONSTRUCTION INDUSTRY 2021 DATA



Safety Review at Aurora Medical Center.

Despite the training, some employees remained skeptical regarding the value of predictive analytics. However, according to Frazer, “Our project teams are hungry to get a better understanding of the risks they face.”

Using Predictive Analytics in the Field

Predictive analytics takes the manual process out of safety, because employees don’t have to remember what happens when.

To that end, Boldt is striving to assemble a large dataset that spans as many aspects of each project as possible. The larger the dataset, the greater the predictive power of its analytical models. Although safety issues may vary depending on the project type, the system can identify risks that are common among them.

Consider an example of how Boldt is aiming to use predictive analytics. The team is transitioning from laying concrete to steel erection on a healthcare project that is 20% complete. The transition entails several risks, including bringing in a new crew

that has not been on the site, increasing workforce size, using a crane and engaging in overhead work. Predictive analytics has flagged this as a high-risk point.

Seeing the Benefits

By integrating its predictive risk analytics into the project schedule, Boldt will be able to flag activities that will likely create safety incidents. This information enables the project team to make adjustments to the task, or to enact mitigation controls to prevent an incident. In addition, the new software is compatible with Boldt’s existing technology, and every work group can access it. “Our various technology systems are able to talk to each other, and so we’re striving to connect them all for better predictive modeling related to both productivity and safety,” notes Hietpas.

In addition, maximizing the benefits of predictive analytics requires rethinking safety. “There’s a mind shift in the company that we’ve helped to encourage with data and reporting tools,” Hietpas reports. “In the past

people looked at safety as a series of unique events, but there are variables that influence it and they are common from incident to incident. Our recent and future investments in software are about broadening the search for those variables.” Predictive analytics determines correlations to identify those commonalities. Boldt then develops avenues to show these findings to employees and implements changes.

With the new system less than a year old, Boldt views itself as being early in its journey of using predictive analytics to help with safety. However, the company is already realizing positive results regarding safety due to predictive analytics. There has been a reduction in high-risk, high-impact incidents, which has saved the company money in insurance claims.

Construction is an inherently dangerous profession. Technology can, however, help build awareness of the dangers, encourage planning to predict and handle potential issues, and ultimately lead to a safer worksite. ■

Image Courtesy of The Boldt Company Internal Marketing Team

Interview: Thought Leaders



Peter Simon

Director of Plans, Logistics, Risk Management and Med Tech, Total Safety Consulting

Peter Simon is a Certified Safety Professional (CSP) with 20 years' experience. Throughout the course of his career, Peter has physically put construction material in place, responded to construction emergencies and evaluated buildings for public/worker safety.

What do you think are the most important recent developments that have helped improve safety on construction sites?

SIMON: Sometimes, safety folks only view themselves narrowly as safety folks, but it really is a public health mission... A lot of people want to focus on technology [as a critical recent development], and I think that is true. But even more than that, [I regard] this shift to more of a holistic public health perspective [during the COVID pandemic]—looking at safety more holistically, and general health and wellness outside the workplace and the whole person—as a really important shift recently.

[Previously], we had a lot of employers with this attitude: “Just keep [the workers] from getting killed while they are in the workspace. But beyond that, [it is] not my problem.” [But now some] have a more holistic approach to the whole thing. The European Union started with that a little earlier than here in the United States. But now it is catching on more, and you see more employers who have a holistic health and wellness approach for their employees, which is an important development. I think you are going to see more of it, but it has just started to gain momentum relatively recently.

Can you provide some examples of a holistic approach?

SIMON: Some are providing things that can potentially improve the health of their employees, such as giving them fruit onsite, trying to create a healthier work environment. Some are trying

to modify the workspace by [making ergonomic improvements] or using materials that are less toxic in the work environment. But really, it depends upon the industry. More companies roll out health and wellness programs that do analytics or have surveys ... They are getting biometrics and then giving feedback on what [their employees] could do to be healthier and then giving them credits on their health insurance based on that back and forth.

But I think generally, if you are not incentivizing your folks to do it, a lot of times, they are not going to participate. They see it as a waste of their time. If the employer provides some sort of incentive or credit, then you are more likely to get people to maybe not smoke or modify their diet ... But it is a bit of a weird dynamic because some people aren't comfortable with providing [the data needed to conduct analytics that support these programs] to their employer.

What would encourage the industry to invest more in this?

SIMON: A lot of it ties back to dollars. If you can show either an increase in production or some sort of savings, [such as] on insurance costs, or if you can show both, that really will drive it. If you look at the development of safety as a discipline, that reinforces what I just said. At first the only employers who had safety programs were people who were altruistic. But as it progressed, people started to see [the production impacts of injuries]. And as it continues to progress, not only do they see how it could impact production, but also

[insurance costs]. It's getting driven more by the bottom line.

What are the biggest challenges that contractors face in their efforts to improve safety?

SIMON: Probably the biggest challenge is integration with production. [There are a lot of companies that view] safety as an externality, a necessary evil that interferes with production. A better approach generally is some sort of integration where it can help facilitate or supplement production ... because if someone gets killed or there is a serious accident, that is going to be a huge negative for production. It is finding that delicate balance. And if you can arrive at that space, just from a starting point, it really can fundamentally change the interaction on every level.

What technologies are you interested in?

SIMON: Using an app-based system for measuring impairment ... It's not a drug test. It's an impairment test. It is a paradigm shift more toward measuring fitness of duty ... [rather than] a law enforcement approach of “got you.”

What other developments are you excited about?

SIMON: The use of visual data. Right now, it is being used mainly for design and production: They are doing real-time visual data capture and then using it to pay subs, to put on platforms and do metrics on it. That is going to spill into safety. It already has a little bit, but it will even more so sooner rather than later. And I think that's huge.

Data: Health and Wellness

Initiatives to Support Employee Health and Wellness

Increasingly, concerns about safety in the construction industry have expanded to recognize that the health and wellness of workers impacts their safety onsite. Stress, addiction and other issues can impair performance, and to truly promote safety onsite, contractors need to consider the role played by the mental and physical condition of their employees.

In order to explore this issue, contractors were asked a series of questions about the degree to which they provide four specific health and wellness programs to their office staff and to workers onsite. The charts on this and the following page summarize their responses based on the size of company. In addition, contractors were also asked whether their company has an Employee Assistance Program that helps workers with personal or work-related problems, and the responses to that question are shown by size of company in the last chart.

Size of company appears to play a role in the likelihood that these programs will be offered. However, it is notable that type of company does not, with no significant differences in the data between general and specialty trade contractors.

Access to Programs for Office Workers Versus Field Workers

The chart at upper right looks at the share of companies that offer at least one program—either dealing with alcohol and substance abuse, mental health services, stress management or smoking cessation—to their office workers versus their workers onsite. Notably, there is little difference overall with nearly the same share offering at least one of these services to both their office and field workers.

However, the pattern plays out slightly differently when examined by the size of company.

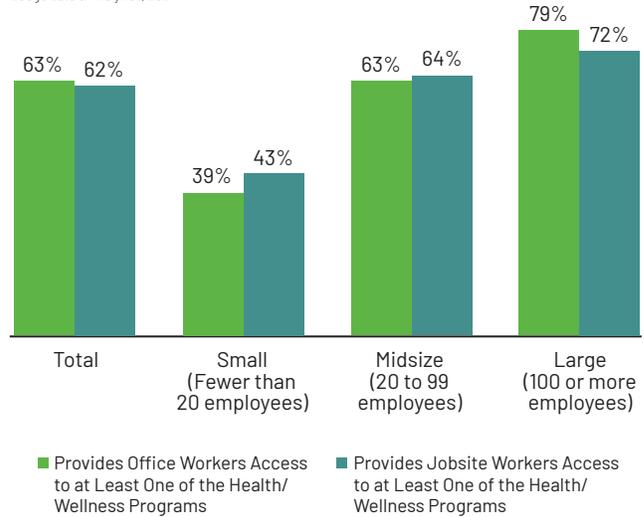
- More small companies offer at least one program to their jobsite workers (43%) than to their office workers (39%).
- For large companies, the reverse is true, with more who offer at least one of these programs to their office workers (79%) than those in the field.

In addition, the chart also clearly demonstrates that large companies more typically offer at least one program than do midsize or small companies. It is relatively common practice for these to be offered at a large company, but fewer than half of small companies report providing these same benefits to workers.

Clearly, the ability to have more resources to direct toward helping employee health and wellness is an advantage for large companies. However, with a large share of the workforce

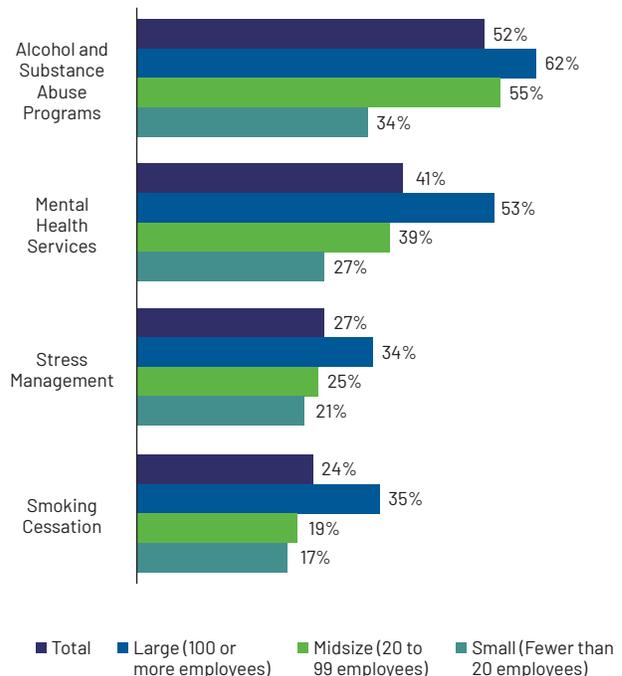
Provide Access to Health/Wellness Programs to Employees

Dodge Data & Analytics, 2021



Use of Specific Health/Wellness Programs for Jobsite Workers (by company size)

Dodge Data & Analytics, 2021



Health and Wellness

Initiatives to Support Employee Health and Wellness CONTINUED

in construction working at small companies, it is important that the industry figures out how to address this gap, possibly through industry associations, trade unions or other means, so that most workers have access to these important resources.

Use of Specific Initiatives

The charts at the bottom of the previous page and top of this one show the share of companies offering the specific services to their jobsite (previous page) and office workers (top right).

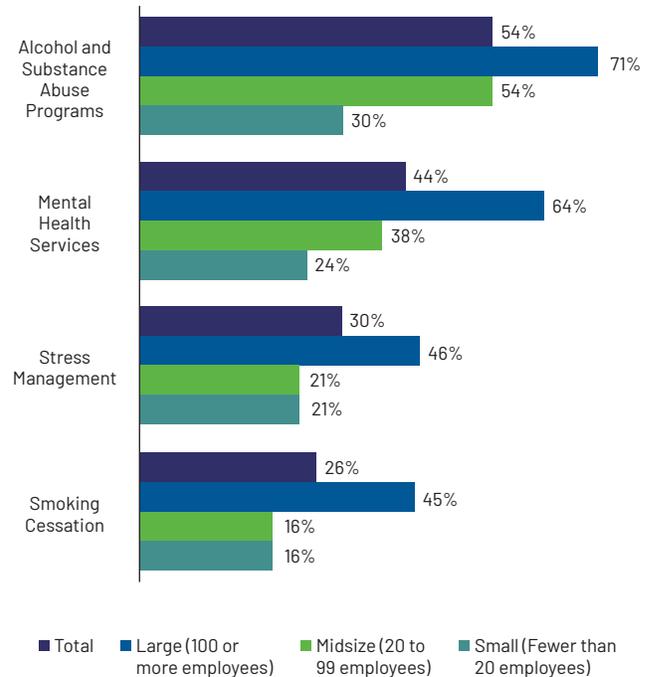
- Alcohol and substance abuse programs are the most widely offered for both, with over half of all the contractors surveyed providing these to both office and jobsite workers.
- Fewer than half of contractors, though, offer mental health services, stress management or smoking cessation programs to their workers, either in the office or onsite.
- Small companies more frequently offer alcohol and substance abuse programs and mental health services to their jobsite workers than their office workers.
- Midsize companies more frequently offer stress management and smoking cessation programs to their jobsite workers than to their office workers.
- Large companies more frequently offer all four programs to their office workers than to their jobsite workers.
- While large companies far more frequently offer all four programs than midsize or small ones, midsize companies more often provide alcohol and substance abuse programs and mental health services than do small ones. However, midsize and small companies are roughly equivalent in the share that offer stress management and smoking cessation programs.

Use an Employee Assistance Program

Over half of all the contractors surveyed have an Employee Assistance Program to help workers with personal or work-related problems, but again, as the chart at right reveals, there is a large disparity between the share of large companies with these programs, and midsize or small companies.

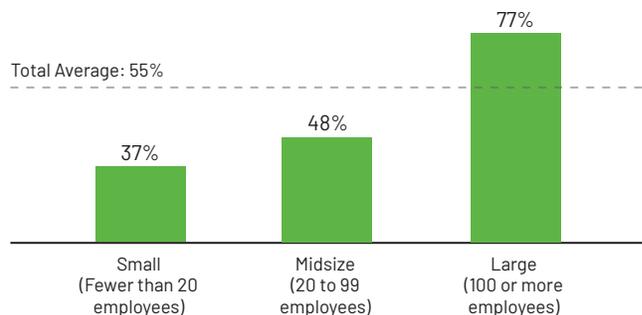
Use of Specific Health/Wellness Programs for Office Workers (by company size)

Dodge Data & Analytics, 2021



Use an Employee Assistance Program

Dodge Data & Analytics, 2021



Health and Wellness

Impact of the COVID-19 Pandemic on Employment at Contracting Companies

The COVID-19 pandemic has had an impact on many US industries, including construction. When the lockdowns due to the pandemic were first put in place, there was an uneven response from the construction industry.

- Many projects were classified as essential and continued even when almost everything else was shut down.
- There was strong regional variation in terms of the types of projects shut down and those allowed to proceed.
- Privately funded projects faced other obstacles, with their funding often put on hold during the worst of the pandemic.

In April of 2020, commercial contractors (those doing commercial and institutional construction) reported that 40% of their projects were experiencing delays, according to the *Commercial Construction Index*. By July 2020, that had decreased to 26% of projects experiencing delays. In the latest *Index* report, reflecting data from April 2021, 17% of projects were still experiencing delays, and 72% of contractors were still impacted by them.

The project delays, of course, have impacted employment levels at contractors. To better understand this, contractors were asked about the impact of the pandemic on employment.

- The good news is that, despite widespread impacts from COVID, half (50%) of contractors did not see any direct changes to their workforce.
- However, among those who did see an impact, 32% reported that they decreased the number of workers, and 27% reported that they furloughed workers.
- It is notable that there were no significant differences in their response to employing workers by type or size of company.

As workloads increase in 2021, this presents challenges for these companies. Despite the reductions in workforce, the *Commercial Construction Index* also reveals that the majority of companies still struggle with skilled worker shortages. Companies forced to reduce their workforce have likely been challenged to ramp back up as their workloads increase. This creates stress on the existing workforce to do more, which can have direct impacts on the mental health and on the physical stress on workers, impacting their safety onsite.

Impact of COVID-19 Pandemic on Employment at Contracting Companies

Dodge Data & Analytics, 2021

Decreased Number of Workers



Furloughed Workers



Reduced Worker Pay



None of the Above



Health and Wellness

Practices Put in Place to Protect Workers From COVID-19

In addition to the indirect impacts on workers (see page 40), the COVID-19 pandemic also clearly has direct implications for construction worker health and well-being. In order to better understand how the pandemic has impacted the health and safety practices of contractors and how it is likely to do so in the future, contractors were asked about:

- The measures they put in place to protect their workers.
- Which of these measures they plan to keep in place after the threat of the pandemic subsides.
- Whether they had developed a written plan to protect jobsite workers from the spread of the virus.

As the charts on this and the following page reveal, large companies more frequently instituted several measures than did smaller ones.

Practices Used to Protect Workers From COVID-19

WIDELY USED PRACTICES

Four practices are widely used by contractors to protect workers from COVID-19. While there are notable differences by size, with small companies lagging in most of these common practices, there are no significant differences between general and trade contractors.

- Increased use of cloth face coverings is the most widely adopted practice, used by most contractors (84%) with no major differences in use by company size or type. This is part of a larger focus across the US on using face coverings to control spread of the virus.
- About three quarters (74%) also enforce social distancing. This practice is significantly more widely adopted by large companies than by small ones, with midsize ones falling somewhere in between.
- Increased handwashing stations have been put in place by about two thirds (67%) of contractors. However, fewer than half of small companies (43%) use these, compared with the majority of midsize (70%) and large (82%) ones.
- 60% of contractors also require temperature checks for employees onsite, but again, this is a common practice among midsize (63%) and large (70%) companies, but less common with small ones (41%).

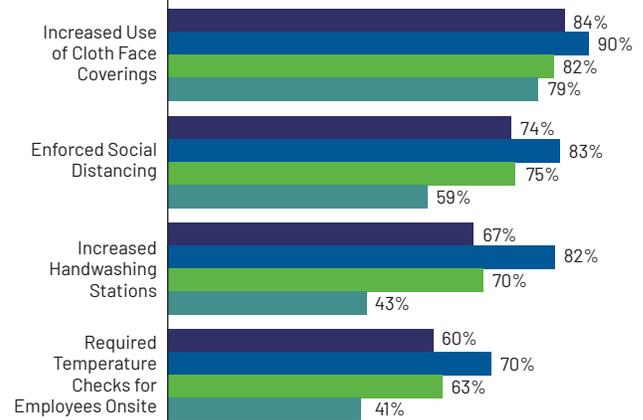
MODERATELY USED PRACTICES

Five practices are deployed by between one quarter and one half of the contractors surveyed. Again, while there are differences in use by size, there are no significant differences for any of these practices in adoption between general and specialty trade contractors.

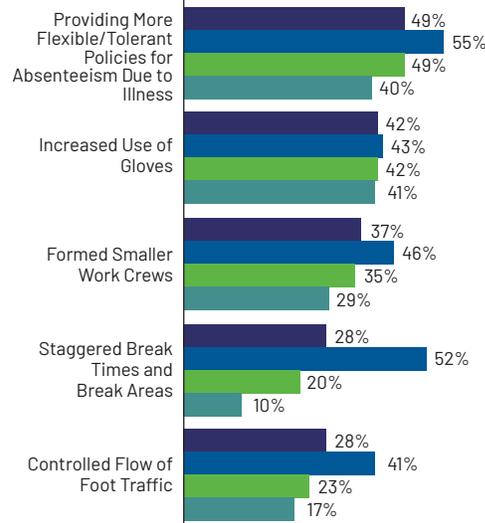
Practices Instituted on Jobsites During COVID-19 (by company size)

Dodge Data & Analytics, 2021

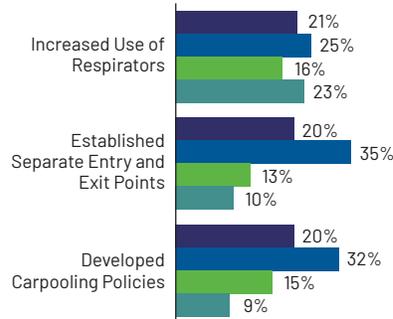
Widely Used Practices



Practices in Moderate Use



Infrequently Used Practices



■ Total ■ Large (100 or more employees) ■ Midsize (20 to 99 employees) ■ Small (Fewer than 20 employees)

Health and Wellness

Practices Put in Place to Protect Workers From COVID-19 CONTINUED

- Particularly notable is the fact that nearly half (49%) of contractors instituted more flexible/tolerant policies for absenteeism due to illness. The tight schedules in construction can lead to a focus on attendance regardless of illness that can leave other workers vulnerable to becoming sick. This is a big change to the culture of many construction sites, and an influential practice for improving the overall health of the workforce.
- One of the few practices with no meaningful differences in adoption between small, midsize or large companies is the increased use of gloves.
- Forming smaller work crews is another means to manage social distancing onsite and to avoid wide exposure of workers to a potential carrier of the virus. While a higher share of large companies have adopted this practice than have smaller ones, the difference is not statistically significant. Still, it does fit into the general pattern of large companies having a more robust response to containing the pandemic than small ones.
- Significantly more large companies have staggered break times/break areas and controlled the flow of foot traffic than have midsize or small companies. Controlling the flow of foot traffic is likely to have an added benefit of reducing the risk of injury on a busy construction site as well.

INFREQUENTLY USED PRACTICES

Fewer than one quarter of contractors have increased the use of respirators, established separate entry or exit points or developed carpooling policies in response to the pandemic.

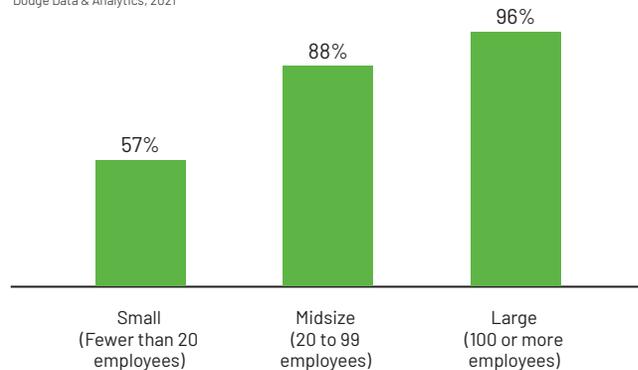
- Carpooling policies are more widely used by specialty trade contractors (26%) than by general contractors (14%). This is the only practice with a difference by type of company. Not surprisingly, it is also more widely used by large companies than by smaller ones.
- Significantly more large contractors (35%) have established separate entry and exit points than did midsize (13%) or small (10%) companies.

Creating a Formal Written Plan to Prevent the Spread of COVID-19

Most contractors (83%) report that they developed a written plan to protect jobsite workers and prevent the spread of COVID-19 during the pandemic, but as the chart at upper right shows, this is far more common among large and midsize companies than small ones.

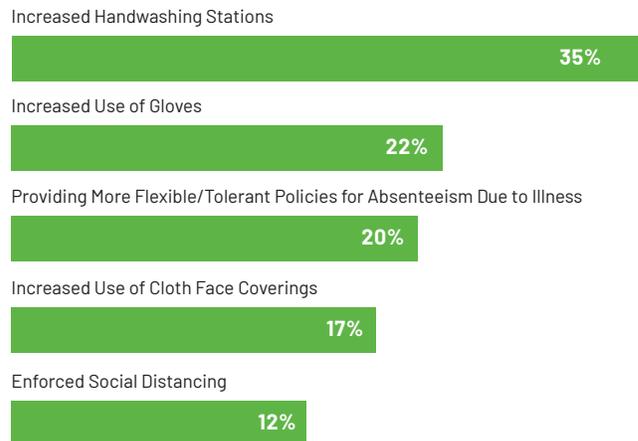
Develop a Written Plan to Protect Jobsite Workers From the Spread of COVID-19 (by size of company)

Dodge Data & Analytics, 2021



Top Practices Contractors Plan to Continue Using Post-Pandemic

Dodge Data & Analytics, 2021



Practices Contractors Will Use Post-Pandemic

Most contractors (61%) plan to continue using some of the practices they have instituted to address COVID-19. Again, there is a big difference by size, with 72% of large companies planning to do so compared with 47% of small ones. The chart above shows the top practices that will be continued and the share of contractors intending to use them. However, it is notable that even the most popular practice—increased handwashing stations—will only be retained by 35%, suggesting that contractors differ notably on which practices have the most value beyond their use for containing COVID-19.

The Psychology of Safety

Mental health must be recognized as a crucial factor in construction safety.

The mental health crisis in construction has been called a silent epidemic. Suicide rates in the industry are about three times the national average, putting construction consistently among the top three suicide-afflicted occupational groups, according to studies by the Centers for Disease Control and Prevention (CDC). And for each person who reaches the point of suicide, many more struggle with anxiety, addiction and depression.

In addition to the personal suffering these conditions can cause, mental wellness impacts construction safety. “Especially when you’re working in dangerous conditions, being in the right place mentally is important,” says Randy Krocka, safety administrator for the Sheet Metal Occupational Health Institute Trust, whose programs incorporate a significant mental health focus. “If somebody has mental health issues—and I personally deal with some depression and anxiety at times—you’re not on your game as far as what you should be thinking about when you’re working.”

Cause and Effect

Factors contributing to construction’s crisis of mental health make a long list. They include a culture in which vulnerability is stigmatized, working conditions that entail family separation and isolation, income fluctuations from cyclical employment, supervisory promotions with insufficient training, schedule- and budget-related performance pressures, disrespect and harassment in the workplace, tolerance

of alcohol and substance abuse, chronic pain and prescription opioid use. The impact of these factors on mental health results in such symptoms as fatigue, difficulty focusing, decreased productivity and problem-solving ability, increased conflict among coworkers, lateness and absenteeism, and near-misses, incidents and injuries.

In the past, workers with mental health issues—especially involving alcohol or substance abuse—often found themselves out of work. As well as devastating them personally, firing them wasted their knowledge, training and value to the industry. Nowadays, as industry organizations such as health and safety nonprofits, trade unions and leading companies work to dismantle the stigma around mental health, attitudes are changing fast. Companies are increasingly likely to offer employees the help they need to recover and return to work as valuable members of an understaffed industry. According to the findings in this report, for example, half of contractors (and two thirds of large firms) now provide confidential, short-term counseling through employee assistance programs (EAPs). The corporate leadership that such programs represent is a critical aspect of normalizing mental health issues, says Krocka: “Leadership that demonstrates that we’ll work with you if you have an issue.”

Psychological Safety

For an industry-focused set of actions to get started on improving mental health in construction firms, insurance broker and risk management company Marsh recommends three steps.¹

The first is to recognize the challenge and provide information about early signs, resources and helplines. The second is to facilitate access to such resources as an EAP, peer support groups and stress management apps. And the third is to train managers and employees in stress management, empathy and listening skills, early symptom recognition, and effective support and referral.

For companies wanting to take a methodical and comprehensive approach to creating a psychologically healthy and safe workplace, a national standard approved by the Standards Council of Canada, offers guidance.² (To date there is no comparable standard in the US.) According to the standard, four main areas of consideration make up the business case for improving workplace psychological health and safety: risk mitigation, cost effectiveness, recruitment and retention, and organizational excellence and sustainability. The standard sets out five elements of a psychological health and safety management system—a) commitment, leadership and participation; b) planning; c) implementation; d) evaluation and corrective action; and e) management review—and provides related specifics for developing and sustaining a workplace that is supportive of mental health.

“Just like any other aspect of the work, if there’s a better way, we figure it out and we do it,” says Krocka. “That’s now happening with mental health issues as well.” ■

¹ <https://www.marsh.com/us/insights/research/three-actions-to-address-mental-health-in-the-construction-industry.html>

² Standards Council of Canada. *Psychological health and safety in the workplace – Prevention, promotion, and guidance to staged implementation*. CAN/CSA-Z1003-13/BNQ 9700-803/2013, CSA Group and BNQ, January 2013; reaffirmed 2018. <https://www.csagroup.org/store-resources/documents/codes-and-standards/2421865.pdf>

Methodology:

Dodge Data & Analytics conducted the 2021 *Safety Management in the Construction Industry* survey to examine multiple topics on jobsite practices related to safety management, the impacts of safety programs, safety training and communication, and the use of technology to improve safety performance for general and specialty trade contractors. Information on the impact of the COVID-19 pandemic and how it affected health and safety on jobsites was included in this survey.

The survey is the fifth in a series of studies conducted by Dodge Data & Analytics on safety management. The previous surveys were conducted in 2012, 2015, 2017 and 2019. While many elements were updated or added in the current study, other data collected was consistent with previous safety surveys, and where relevant, presented in a longitudinal format in this report.

The research was conducted through an online survey of contractors from May 11th to June 25th, 2021 sent to the following:

- The DD&A Contractor Panel was used to reach general and specialty contractors throughout the United States. This panel contains a representative sample of construction contractors across the US.
- The survey was also sent to members of six partner associations, each of which was responsible for sending the survey to its members.
 - Associated General Contractors of America
 - Mechanical Contractors Association of America
 - National Asphalt Pavement Association
 - National Electrical Contractors Association

- Sheet Metal and Air Conditioning Contractors' National Association
- The Association of Union Contractors

In order to gain an industrywide perspective, the survey was open to all contractors (general and trade) who did work in the United States in 2021.

On average, the survey took 16 minutes to complete.

Survey Respondents

A total of 282 contractors responded to the survey.

- 141 of the respondents are general contractors, construction management companies, design-build firms and engineering contractors. These are identified as general contractors in the analysis and in the charts.
- 141 of the respondents are specialty trade contractors.

ANALYTICAL VARIABLES

In addition to the longitudinal comparisons to previous surveys conducted by Dodge Data & Analytics, two variables are used in the analysis of the data throughout this report.

- Company Size
 - Small companies with fewer than 20 employees: 25%
 - Midsize companies with 20 to 99 employees: 40%
 - Large companies with 100 or more employees: 35%
- Company Type
 - General contractors (category also includes construction management companies, design-build firms and engineering contractors): 50%
 - Specialty trade contractors: 50%

Resources

Organizations, websites and publications to help you get smarter about safety management in the construction industry.



Dodge Data & Analytics

Main Website:

www.construction.com

Dodge Construction Central:

www.construction.com/products

Market & Competitive Intelligence:

www.construction.com/products/construction-market-data

Sweets:

www.construction.com/products/sweets

SmartMarket Reports:

www.construction.com/toolkit/reports

ACKNOWLEDGEMENTS:

We would like to thank CPWR for many years of partnering with us on this research. We also thank our new partner, Newmetrix, for their support and their contributions to the research process.

We thank all of our research partners for their participation in the survey process to help make sure the industry is better informed. These include the American Road & Transportation Builders Association (ARTBA), Associated General Contractors of America (AGC), Mechanical Contractors Association of America (MCAA), National Asphalt Pavement Association (NAPA), National Electrical Contractors Association (NECA), Sheet Metal and Air Conditioning Contractors' Association (SMACNA) and the Association of Union Contractors (TAUC).

We also thank all those who shared their insights and experiences, including the thought leaders featured in this report and those who provided us with case studies or shared their insights in our feature articles.



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of America: **www.mcaa.org**

National Asphalt Pavement Association:

www.asphaltpavement.org

National Electrical Contractors

Association: **www.necanet.org**

Sheet Metal and Air Conditioning Contractors'

National Association: **www.smacna.org**

The Association of Union Constructors: **www.tauc.org**

Other Resources:

BIMForum: **bimforum.org**

buildingSMART International: **www.buildingsmart.org**

Construction Safety Council:

<https://buildsafe.org>

International Code Council: **www.iccsafe.org**

Lean Construction Institute: **<https://leanconstruction.org>**

National Institute of Building Sciences:

<https://www.nibs.org>

National Institute of Occupational Safety and Health

(NIOSH): **www.cdc.gov/niosh/index.htm**

NIOSH Total Worker Health® Program: **www.cdc.gov/niosh/twh/default.html**

Occupational Safety and Health

Administration: **www.osha.gov**

Prevention Through Design (NIOSH):

www.cdc.gov/niosh/topics/ptd/default.html

Prevention Through Design Website:

<https://designforconstructionsafety.org>

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