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THE LEADING BUSINESS MAGAZINE FOR CONTRACTORS

CONSTRUCTION BUSINESS OWNER®



STATE OF THE INDUSTRY

Inflation, labor & the new economic factors affecting today's top opportunities & challenges

IN THE OFFICE
Top 3 contractor risks & how to reduce your exposure

IN THE FIELD
5 machine-assisted technologies to improve productivity & efficiency



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FROM THE EDITOR

KATHY WELLS



The new year is upon us and brings with it an urge for revitalization. Every January, we find ourselves taking stock of the successes and failures of the past year. What have we learned? What can make us better this year? Often, these learnings can really benefit an organization; however, they're being provided only by its leadership teams. This year, I encourage you to find a way to check in with your employees about their thoughts. Consider deploying a simple "start, stop, continue" survey to gauge and engage your teams, and gain a better overall perspective of what's working within the business and what isn't. By asking, "What should we start doing? What should be stop doing? What should we continue doing?" you not only extend to employees an opportunity to participate in the success of your business, but also benefit from their candid feedback and buy-in. You may or may not be surprised by their responses. Either way, it's information worth knowing as the industry approaches a potentially challenging year.

According to FMI Corporation's latest research, " ... the recession and the eventual recovery will be uneven across engineering and construction sectors — some will post growth, while others will see their business models shift drastically." And, while it's not time to panic just yet, FMI makes the point that firms must "be clear about the opportunities and their own competencies to best position themselves for success." Turn to page 28 for our State of the Industry coverage, beginning with "The New Economy vs. the Old Economy."

Next up in State of the Industry, on page 32, "Deloitte's 2023 Engineering & Construction Outlook" offers an in-depth forecast that shares both the top five trends to watch in the new year and advice for fine-tuning your company's focus and investments. We hope this coverage offers you some helpful insights as you set your intentions for the year ahead.

Looking forward, we're happy to announce the return of CBO's Sustainability VIP honor. Back for its third year, this recognition highlights professionals who have developed or supported initiatives within their companies to champion different areas of sustainability. We invite you to visit constructionbusinessowner.com/svip2023 to submit your nomination(s) by Jan. 20, 2023. Readers can check out this year's finalists in our March 2023 issue and online at constructionbusinessowner.com.

Happy New Year,



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VOLUME 20 ISSUE 1



"My degree in OSH has made me a more well-rounded safety professional and it has definitely improved my knowledge level and confidence level."

David Combs
Master's in Occupational Safety and Health

Build Your Future in Safety

Earn Your OSH Degree in Construction Safety

At Columbia Southern University, we are dedicated to empowering our occupational safety and health students through comprehensive, relevant higher education. We are also committed to advancing the safety profession today, tomorrow and for years to come. That's why we recently launched a new bachelor's program for safety professionals who work in and around construction sites.

» **Bachelor's in Occupational Safety and Health – Construction Safety Concentration**

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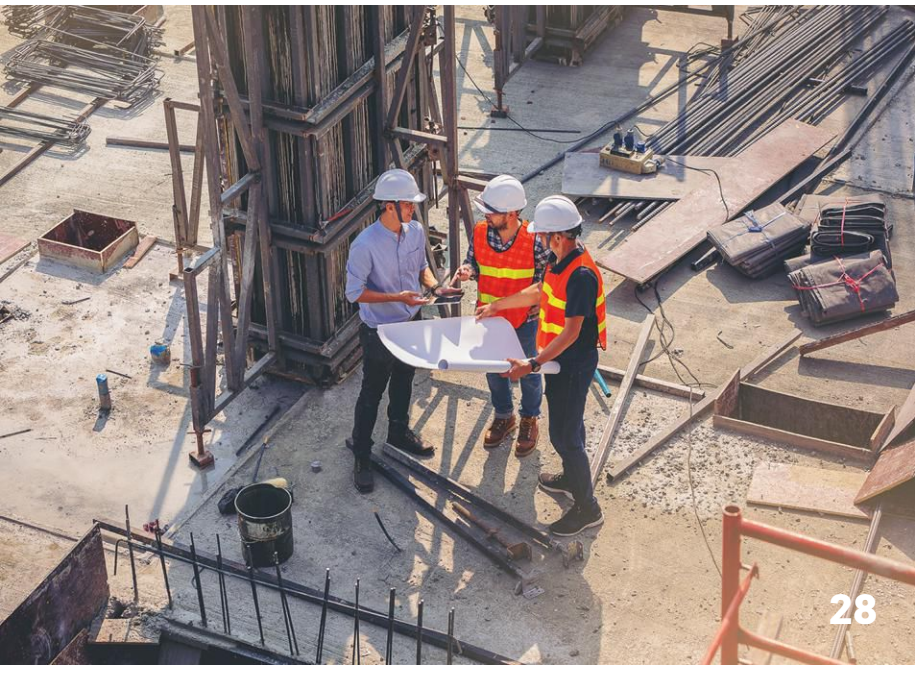
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Escalent Acquires Rhein Associates, Secures Partnership With Work Truck Solutions

Escalent, a data analytics and advisory firm with an automotive practice, announced it has acquired Rhein Associates and secured a partnership with Work Truck Solutions to create a commercial vehicle and fleet research and advisory practice. Rhein Associates provides North American commercial vehicle and off-highway powertrain forecasting data. It's best known for its main offering, the Rhein Report, which shares market intelligence and perspective to inform their business strategy. The acquisition allows Escalent to combine forecasted production (supply-side) data with its existing primary and syndicated Fleet Advisory Hub (demand-side) data. Add to that a partnership with Work Truck Solutions, which provides a one-stop commercial vehicle inventory management, operational analytics and digital marketing solution that maximizes commercial sales, customer relationships and profitability for dealers and their business buyers. This partnership gives Escalent the ability to combine Work Truck Solutions' extensive commercial vehicle inventory data set with Rhein Associates' and Escalent's data specialties. Together, Escalent will provide commercial vehicle data and advisory solutions that offer a unified, 360-degree view of the industry to help clients grow their businesses. Visit escalent.co and worktrucksolutions.com.

Nicholas R. Davis Joins International Grooving & Grinding Association

The International Grooving & Grinding Association (IGGA) — a nonprofit trade association founded in 1972 that is a technical resource in the development and marketing of optimized pavement surfaces and pavement preservation around the world — has announced the hiring of Nicholas R. Davis as its director of technical services. In the newly created position, Davis will join IGGA Executive Director John Roberts in pursuing the association's goals through the development and implementation of educational and promotional initiatives while providing technical resources and engineering guidance to contracting agencies, consultants and industry partners. IGGA created the new position in order to assure the organization's continued growth in the grooving, diamond grinding and concrete pavement preservation markets. Prior to joining IGGA, Davis gained six years of experience as assistant engineer at the New York State Department of Transportation, where he authored specifications and reports, managed a certification program for testing agencies that perform ride quality testing, and managed specification and data collection for the first performance engineered mix project in New York. Visit igga.net.

Zweig Group's ElevateHer Program Opens Applications for 2023 Cohort

Zweig Group has opened applications for the 2023 ElevateHER Cohort. ElevateHER ensures underrepresented demographics find success in the architecture, engineering and construction (AEC) industry by serving as an adviser and a hub of information and resources. The ElevateHER cohort is a special task force composed of individuals with a commitment to promote diversity as a means to combat recruiting and retention challenges in the AEC industry. The previous three cohorts worked in specific project teams, each concentrating on a particular challenge or focus area in order to provide an end product or strategy that can make a measurable impact on the AEC industry. The 2023 cohort will focus on continuing these projects as well as some new ideas and initiatives. All individuals, regardless of age, experience, gender, background or job role, were welcome and encouraged to apply. Zweig Group is a research, publishing and consulting resource for the built environment. The firm provides strategy, mergers and acquisitions, business valuation, ownership transition, marketing, business development, market research, financial management, project management, recruiting and executive search services nationwide. Visit zgelevateher.com and zweiggroup.com.

HCSS Adds Julie Spurlin as Chief Human Resources Officer



Julie Spurlin

HCSS, a provider of software that helps heavy civil businesses streamline their operations, added Julie Spurlin as chief human resources officer. Spurlin brings over 25 years of extensive experience in human resources that will help HCSS set the course for future growth. Previously, Spurlin served as senior vice president of human resources at Software AG, a German-based, global software provider. Before that she served in leadership roles within software and technology companies, including RSA and Sun Microsystems. Spurlin graduated from Virginia Tech and is close to completion of the Wharton School of Business chief human resource officer program. HCSS has helped improve operations for over 3,500 companies ranging from $1 million to billions in revenue across the U.S. and Canada. Visit hcss.com.

FMI Corporation Acquires Investment Bank Slate Partners

FMI Corporation, a provider of investment banking and consulting services to the built environment, announced the acquisition of Slate Partners LLC, a Denver-based investment bank. Co-founded by Aaron Bachik and Jason Munoz in 2014, Slate Partners provides sell-side and buy-side mergers and acquisitions (M&A) advisory services to companies in the building materials and building services industries nationwide. The firm's clients include family and entrepreneur-owned businesses as well as private equity-backed companies. The acquisition of Slate Partners brings significant complementary talent and transaction experience to the FMI

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Capital Advisors team. The addition enhances FMI's M&A capabilities and sector expertise in the building products, facilities services and contractor services segments, while strengthening its position as an advisor to private equity portfolio companies. Visit fmicorp.com.

Milo Riverso Begins Two-Year Term as Chairman of National Academy of Construction



Milo Riverso

Milo Riverso began a two-year term as chairman of the National Academy of Construction (NAC) at the conclusion of the NAC business meeting in Scottsdale, Arizona. He succeeds Maggi Walker, the previous chair, who served from 2020 to 2022. Riverso is the retired president and CEO of STV Group Inc. At STV, his responsibilities included oversight of the firm's daily activities and overall management of STV corporate, technical, financial and administrative activities. He previously served as president and CEO of the New York City School Construction Authority. Elected to the academy in 2014, he has been actively involved in NAC activities over the past eight years. He has served as the NAC first vice chair since 2020, and will now lead the academy and its executive committee. He also has served on the Membership Committee and chaired the Annual Meeting Planning Committee in 2015. Most recently, he led the nationwide search for the new academy CEO and president. Riverso also has been active in leadership roles in several industry associations, chairing both the New York chapter of the ACE Mentor Program, the Construction Management Association of America, and the New York Building Congress. Visit naocon.org.

Epiroc to Acquire Wain-Roy Business

Epiroc, a productivity partner for the mining and infrastructure industries, has agreed to acquire the business of Wain-Roy, a U.S. manufacturer of excavator attachments for the construction industry. The Wain-Roy business, with a manufacturing site in Kronenwetter, Wisconsin, is part of Oregon Tool Inc. The acquisition was expected to be completed in Q4 2022. The transaction is not subject to a disclosure obligation pursuant to the EU Market Abuse Regulation. Epiroc develops and provides innovative and safe equipment, such as drill rigs, rock excavation and construction equipment and tools for surface and underground applications. The company also offers service and other aftermarket support as well as solutions for automation, digitalization and electrification. Epiroc is based in Stockholm, Sweden. Visit epirocgroup.com.

Uwe Hirsch Named Vice President Finance at Stihl Inc.

Uwe Hirsch has been named vice president finance of Stihl Inc. Hirsch will plan, direct and control the company's overall financial plans, policies and activities, including its accounting and treasury practices. Hirsch will also provide support in the business transformation of the company and leadership of the information technology (IT) operations and system implementations. Stihl Inc. employs more than 3,000 people in the U.S., supplying the majority of Stihl products for the U.S. market as well as components and products for more than 80 markets worldwide. Hirsch joins Stihl Inc. after a career with the Bosch Group, where he most recently served as global vice president of finance, controlling and purchasing for Bosch Automotive Service Solutions in the automotive aftermarket division. Prior to that, he served as vice president of finance at Bosch Automotive Service Solutions. Stihl products are sold through a network of more than 10,000 authorized local Stihl dealers from coast to coast. Visit stihlusa.com.

Aronson Merges With Aprio

Aprio LLP, a nationally recognized business advisory and certified public accounting firm headquartered in Atlanta, announced that Aronson LLC will merge with the growing firm. Aronson's 350 team members, including 42 partners, joined Aprio effective Jan. 1, 2023. The combination of the two Top 100 firms marks both Aprio's largest transaction to date and adds a physical Aprio office in the greater District of Columbia area. Larry Davis, Aronson managing partner, will join Aprio as a partner, as will newly elected Managing Partner Lexy Kessler, who will serve as mid-Atlantic regional leader for the national firm. With a larger national presence and over $325 million in combined revenue, this merger positions Aprio to elevate its position in the market and create growth opportunities for team members. Visit aprio.com.

Rev Group Names Vice President & General Manager of Specialty Division



Wes Downing

REV Group Inc. announced the promotion of Wes Downing to vice president and general manager, specialty division. This role oversees the Capacity of Texas, LayMor and associated aftermarket parts businesses based in Longview, Texas. Downing will report to Brian Perry, president of REV commercial segment and senior vice president of operations. Downing joined REV Group in January 2018 as the warranty manager for Capacity and LayMor, and quickly advanced to director of engineering a few months later. As the engineering leader at Capacity and LayMor, Downing has been a key player in the technical development and commercialization of Capacity's battery electric and hydrogen fuel cell terminal trucks. Prior to joining REV Group, Downing served in leadership positions in the surface mining industry, include Letourneau Technologies and Joy Global. Visit revgroup.com.

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SUBMIT YOUR NOMINATION TODAY!

SUSTAINABILITY VIP 2023

Construction Business Owner (CBO) Magazine's Sustainability VIP honor recognizes the efforts and ingenuity of those building a better, more sustainable future.

Sustainability VIPs are construction industry professionals who have developed programs or launched initiatives within their companies to support any of the following areas of sustainability:

- Industry and infrastructure
- Clean energy, water and sanitation
- Recycling and responsible consumption and production
- Protection of climate, wildlife and waterways
- Sustainable cities and communities
- Green building and LEED efforts
- Humanitarian efforts (poverty, hunger, equality, health, wellness, education, employment)

Send us your nomination(s) and share the story of your coworker or colleague's sustainability expertise. Finalists will be selected and featured in CBO's March 2023 print magazine and on constructionbusinessowner.com.

Nominations close **Jan. 20, 2023.**

To learn more and nominate, visit
constructionbusinessowner.com/svip2023
or scan the code below.

CONSTRUCTION BUSINESS OWNER

Insight from industry aces & answers to construction's biggest questions

ASK THE EXPERTS

How do you prepare for a potential recession?



Gregg M. Schoppman
Partner
FMI Corporation

There are two schools of thought relative to recession preparation. First, it all comes down to preparation. Compare it to a storm targeting a specific area, like a hurricane making its way across the Atlantic. In most cases, there is a runway that allows people in the target zone to prepare themselves and their property. The same case holds true for recession-proofing a business. How strong are your collections? What does your backlog look like? How deep is your team? What does your cost structure look like? From a short-term perspective, there are hygienic elements that business leaders should be doing as ordinary course of business, and if a business wasn't doing these before the storm hit, there are probably more important concerns than a recession.

Secondly, recessions are not always catastrophic events. In fact, not all sectors are affected the same, and a well-diversified business is better positioned to play offense in a recessionary market. Talent acquisition, market share gains, business acquisition, etc. are all areas that savvy businesses see as opportunities. To do this, the business cannot be hunkered down, and it is certainly well positioned long before the market shifts. Put another way, the business isn't scrambling to be sure its balance sheet is strong because it knows it has the 'dry powder' to be a market leader in a down market.



Laurent Charpentier
CEO
Yooz

One way to future-proof your business is to consider utilizing cloud-based automation solutions for your back-office processes and operations. Digital transformation with cloud-based automation software allows accessibility from wherever you are, security and traceability for mitigating risks, and time and money savings to offset your operational costs.

Even during a recession, automated processes — like in the accounts payable and finance functions of your business — are less costly than manual processes. With highly automated and digitized back-office processes, you can eliminate manual data entry, increase accuracy while reducing errors, and save time, freeing your staff for more value-added tasks.

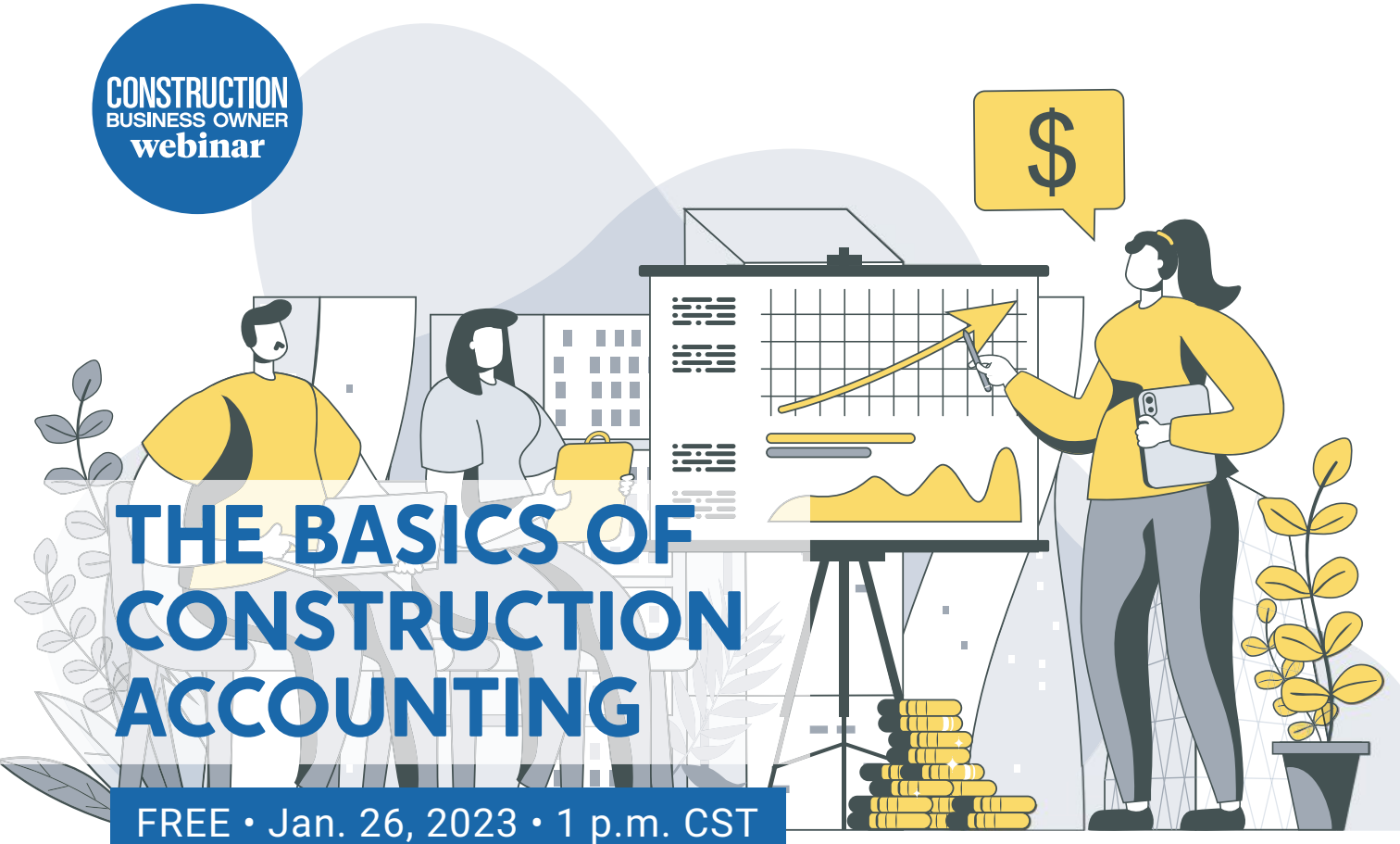
A key feature of cloud-based automation, specifically in your finance functions, is the ability to have real-time access to up-to-date and accurate data to make necessary financial decisions for your organization when you need it. Is it time to find a new vendor? Do you need to increase your prices? Make the right decision for your business backed by real statistics and analytics generated with cloud-based automation.

What's on your mind?

To submit a question for this section, email Editor Kathy Wells at kwells@cahabamedia.com.

Visit **constructionbusinessowner.com/asktheexperts** for more industry-leading insights.

CONSTRUCTION BUSINESS OWNER webinar



THE BASICS OF CONSTRUCTION ACCOUNTING

FREE • Jan. 26, 2023 • 1 p.m. CST

When a contractor has decided it's time to make the transition from standard accounting methods and tools to construction-specific accounting methods and tools, it's best to begin by reviewing the fundamentals of construction accounting and the role it will play in the contractor's business. When a contractor conceptually understands the basics of construction accounting, it accelerates their ability to build upon that knowledge effectively.

In this session, attendees will learn:

- The construction company structure and which key partners to include
- The basics of debits and credits
- The different types of accounting and revenue recognition methods
- An overview of job costing and why it should function as the center of your business
- Which key financial reports are critical to your financial success

Sponsored by Deltek ComputerEase

SPEAKER



John Meibers
Vice President & General Manager
Deltek ComputerEase

John Meibers has over 32 years of experience serving the construction industry. He has been a leader at Deltek ComputerEase since 2000 serving over 4,500 contractors nationwide. In today's rapidly changing, fast-paced world, a big part of Meibers's role is to ensure that Deltek ComputerEase equips customers with the tools they need to manage profitability, drive growth, and meet construction requirements. Prior to Deltek ComputerEase, Meibers spent 10 years working as controller for a large mechanical contractor.

Register at constructionbusinessowner.com/webinars

6 Numbers You Need to Know

How business owners can benefit from a hands-on financial approach



GEORGE HEDLEY, CSP, CPBC, is a professional construction BIZCOACH and industry speaker. He helps contractors build management teams and get their businesses to work for them. He is the bestselling author of "Get Your Construction Business To Always Make A Profit!," available on amazon.com. Email Hedley at gh@hardhatpresentations.com to sign up for his free e-newsletter, start a BIZCOACH program, attend a Wealthy Contractor BIZ-BUILDER Boot Camp or get a discount at hardhatbizschool.com online university for contractors. Visit hardhatpresentations.com for more information.

Just Ask George.

Send your questions for Hedley to Editor Kathy Wells at kwells@cahabamedia.com.

To build a profitable construction business, owners must be focused on key performance indicators (KPIs) and bottom-line numbers. These KPIs are centered on sales revenue, overhead, profit markup, labor costs per unit of work, and your updated job cost labor for every project. You can't expect anyone to care about your finances as much as you do. Someone else can pay your bills, send out the invoices, prepare financial reports and do the accounting, but the owner must be responsible for knowing and monitoring the numbers every day, week and month.

Profit is your return for business ownership, taking risk and investing capital in your business. Profit is the net amount remaining and available at the end of the year or month to provide a dividend or distribution to the company owners — or leave in the company for next year's growth. Net profit is the best indicator of the success of your company's strategic plan, leadership effectiveness, project managers, supervisors, and both your written systems and financial tracking systems.

Profit-focused leaders are competitive. They need targets and scoreboards to keep track of the score. You can't reach your business goals by trying to work as hard or as fast as possible without knowing how well you're doing financially. What aim do you take for your company's financial, profit, job cost, labor and equipment targets? You must set these targets with your management team and formalize your annual financial plan every year. Determine your annual projected overhead expenses, the average overhead and profit markup you can make in your market, and how much gross and net profit you want to make.

Consider the following six financial numbers every owner needs to know, track and review regularly.

1. Financials, Profit/Loss & Income Statement

Based on my survey of over 2,500 construction companies, only 25% of company owners know or regularly track their annual sales volume, overhead or profit goals. Do you? Are you hitting your sales and profit goals, or do you even know your targets for the year?

You must know the volume of total sales you need (at an attainable markup rate) to achieve your net profit goal. Track your sales and gross profit numbers monthly to make sure you are on target to hit your annual sales, overhead and net profit goals. Contractors who keep track are able to make necessary adjustments to their estimating and bidding strategy, customer and project bid selections, project management and field production as the need arises. To make a return on investment, you must know how much

The average contractor should make a net profit of at least 50% return on overhead. For example, $1,000,000 annual overhead should deliver a minimum net profit of $500,000.

money you need to make to cover your indirect fixed cost of doing business or overhead. Calculate your annual overhead expenses you anticipate spending to operate your company. Then track it every month to make sure your actual expenses do not exceed your budget. The average contractor should make a net profit of at least 50% return on overhead. For example, $1,000,000 annual overhead should deliver a minimum net profit of $500,000.

Every year, meet with your management team and decide how much gross and net profit you want to make in actual dollars, not percentages. To determine the specific profit number you want to hit, and look at your projected overhead for the year. Then look at the risk you take to operate your business and decide how much net profit you want to make based on the return you want to make.

2. Job Costs

Before you can bid projects, you have to know exactly what it will cost to build. In addition, not knowing accurate labor and equipment costs creates inaccurate bids or estimates for the most important part of any job: labor. Most contractors don't really know what their equipment costs annually or how much they should charge per hour when it is used on the job. For example, some contractors think their pickup truck costs around $750 per month to operate, but it actually costs over $2,900 per month.

Meet with your accounting manager to get an accurate actual cost for every employee and piece of equipment you own. For labor, include all taxes, insurance, workers' compensation, vacation, union dues, overtime, small tools, training, pension, profit sharing and other benefits. The total employee labor burden rate can vary from 35% to as high as 90%, depending on where your company is located and which benefits you provide. For equipment, include the purchase cost, depreciation, finance and interest, payments, insurance, maintenance, tires, gas, GPS and repairs.

You must utilize an integrated accounting system and software to track your actual job costs weekly, either by cost code or task. You must create accurate weekly scorecard reports of each job's labor and equipment costs versus the budget based on work completed. This will allow you to monitor the score and keep projects on budget every week. From these actual production results, you can verify the labor and equipment hours required to complete work on jobs you are estimating. If you don't know what it truly costs to build a project, it's next to impossible to make money pricing projects with guesstimates not based on actual production costs of completed projects.

3. Contract

Top construction business owners know their construction contract numbers, including completed and current jobs in progress. Tracking reports will show how well you're doing on current jobs and how you did on past jobs. Complete a work-in-progress (WIP) schedule every month listing out all current and completed projects and their costs.

4. Accounts Receivable

You can't make money unless you collect what you're owed. I know calling customers and asking for money isn't your favorite job. Stay focused on collecting what's owed by getting a weekly accounts receivable aging report to review all your outstanding invoices and due dates.

5. Liability

To keep your eye on the ball, you have to know your outstanding liabilities and debt. Create a report listing all your debts, liabilities and balloon or one-time payments due in the future. Make sure to include line of credit, line of credit drawn, other credit loans, equipment loans, future tax payments, real estate loans, total liabilities and bonding capacity.

6. Cash

Cash is king and the lifeblood of your business. To make better decisions, review a report of your cash position every week and include the following: cash in bank (checking, payroll account and savings), weekly payroll cost, weekly equipment cost, weekly overhead costs, investments, annual revenue per employee, annual gross profit per employee, and annual net profit per employee.

Aim at Nothing & Hit It Every Time

I've said it before, but most companies shoot at moving targets by attempting to make "as much money as possible" or "more than they are currently making." But those are not clear targets. Do you have specific financial targets to shoot for, and do you track your progress monthly? Take at least one hour per week to review these financial figures with your key management team and accounting manager. This small investment of time will give you a valuable return. ▲



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Happy New Year?

Business planning in a year of uncertainty



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Business planning for 2023 might feel similar to an idyllic island getaway — complete with tiki huts, white sand beaches and a slight breeze blowing across the shoreline.

However, just on the horizon, there are dark clouds billowing and the local weather forecaster doesn't seem to have an accurate projection on the storm's trajectory. Will the storm hit, or will it just float on by? Do we board up the tiki bar, or keep the patrons fully served?

Similarly, the construction world is coming off another round of high-performing years. There were certainly headwinds in the form of material shortages, fuel price increases and the ever-present labor woes, but the contracting world persevered. The only cause for pause was the continual threat of recession or economic pullback. Inflation drove costs up, interest rates rose, and, in some cases, there was the expected "cooling off" relative to construction starts.

So, where does this leave a construction business owner developing an effective strategy for the year(s) to come? Is it time to batten down the hatches and expect the worst, or is it time to play offense?

Preparation Begins Well Before the Storm

If a storm were raging on that picturesque island, would the islanders say to themselves, "Maybe we should slap up some plywood … " or would they have prepared themselves well in advance, shoring up their village and ensuring they had emergency provisions? It is intriguing to think of how many contractors thought to look at their balance sheet, collections, etc., at the beginning of the pandemic — as if in the middle of a wholesale business stoppage the world had never seen before, the balance sheet would mystically add zeros to weather an extended weak economic cycle.

The same concept holds true for this economic cycle: Even if the market continues to falter, preparations should have been made well before. Put another way, don't be caught in a raging typhoon, hanging boards on the wall of a house while the wind is whipping the ladder out from underneath you. Preparation should begin today — not tomorrow, not another month, but immediately to be acted upon.

Contrarian Logic

Winston Churchill said, "Never waste a good crisis." And there is something to be said for capitalizing on a down market. Too often, businesses hunker down amid a storm and try to ride out a weak economy. Assuming the preparations were done, and the business is situated properly, this might be an opportune time to play offense. Are there new markets or geographies that will be ripe after the



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storm? Are there acquisition targets that would be excellent complements to your business?

Hunkering down can also be dangerous. It presents imagery of business leaders taking a defensive posture when quite possibly it would be better to be seen actively in the marketplace. Furthermore, there is also a concern that the business loses sight of initiatives, such as internal communication and its own people, that could be detrimental to long-term health.

Additionally, even in the worst economic conditions, there will always be winning sectors. Harkening back to the Great Recession, while many sectors that were decimated, there were also shining stars that stabilized many businesses. Put another way, a business does not have to parallel the economic plight of the country, and it can chart its own path — assuming it has thought ahead. Diversification takes great forethought and strategy.

Taking Inventory

No, this isn't about liquidating stores of inventory in the warehouse. This is about reflecting on the business and asking the tough questions relative to the current situation. The most important piece of advice is to avoid complacency. It is a word that makes most business leaders cringe, but complacency is also bred through comfort. If a business has been profitable, it is easy to think that these great times will never go away. Great business leaders should use this recession inventory checklist to reflect on the position of the business and ensure it is adequately developing an action plan now to attack weak points before the tempest strikes:

Business Development

- Do you have strong business development activity, or are you simply answering the phone?
- Do you have active relationships in the business community, or are you the last firm people turn to?
- Have you actively examined your distribution of work across niches/customers? What is the percentage or distribution? What are the margins among those niches/customers? Are you surprised by who is your best customer?
- Do you chase projects or customers?
- Do you ever find yourself saying, "There is no way that other firm can do it for that price …" only to see the competition around year after year?

Project Execution

- Are you executing flawlessly, or have you developed some bad habits?
- Are you really strategizing your work, or are you checking boxes?
- Are you good at collecting receivables, or have you gotten sloppy?
- Are you good at optimizing resources like equipment and materials, or do your jobsites look like auction sites?
- Do you see margin erosion and not really know why the fade is there, but you are at least still making money?

Talent Development

- Have you been routinely developing your people, or have you been "too busy"?
- What is the temperature (morale) of your team in a good economic climate?
- Do you blame flight issues solely on compensation?
- Have you been actively working on succession issues and filling gaps as people have retired?
- If there were an economic crisis, how would you prioritize your team members?
- Lastly, if you didn't have the time to develop the team when you were busy, how will you develop the team when there is no work?

Innovation

- What was the last new thing you rolled out within the firm?
- How have you encouraged your team to experiment and try new things when times were good?
- Have you invested in the organization?
- Do you think of these innovation items as simply technological achievements?

Answering any of these questions incorrectly is not cause for a flogging. In fact, most businesses have had their fair share of challenges. After the pandemic, it was hardly blue skies and rainbows. Business leaders were adjusting to an entirely new way of doing business as the world morphed, all while an exponential number of both positive and negative stimuli were influencing the industry. However, this a call to action for all business leaders to not just prepare a cut-and-paste business plan, but, rather, challenge the entire strategic direction of the firm for the long term. Hopefully, after the storm passes, we can all sip fruity drinks on that white sand beach. ▲



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What's in Store for Construction in 2023?

How economic, labor & supply chain issues factor into the new year



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Looking ahead to the state of the construction industry in 2023 and beyond, it's impossible to disregard the impact of the macroeconomic issues we are used to hearing about. On the positive side, we have a strong dollar boosting the purchasing power of domestic companies issuing purchase orders overseas. However, this may be offset by stubborn inflationary trends (and the Federal Reserve's aggressive interest rate hikes in response), ongoing strains on the supply chain, and the struggle of attracting and maintaining a qualified workforce.

Rising Interest Rates

On the private side of the industry, there's less money on the table when it comes to lending. Cash flow is getting crimped as lenders have responded to rising rates by tightening their grip on liquidity. Interest rates are affecting margins, too, so financing deals that looked like a sure thing only a few months ago aren't closing now. Construction firms with private portfolios are feeling that pinch. In turn, many are looking at projects on the public side of the industry moving forward and saying, "We can do that work, too." These new faces are entering bids on public work, with broad ripple effects.

These firms know they aren't competing on experience, so they are happy to compete on price. The result is downward pressure on public bid pricing. Still, experience matters, and that's true both on- and off-site. Private companies are playing a whole new ballgame when it comes to pursuing public work projects. Construction firms with a history of completing projects awarded by government offices and other public entities have a real advantage when it comes to securing bonding and delivering the financial reports this type of work requires.

When Federal Reserve Chair Jerome Powell spoke at a symposium in Jackson Hole, Wyoming, in August, he made it clear that interest rates would continue to climb until "we are confident that inflation is moving down." The October 2022 inflation report returned better-than-expected results, but based on Powell's comments, it'll take more compelling evidence of falling inflation before rising interest rates level off. It remains to be seen what else is in store for the industry as rates look likely to continue their climb.

Supply Chain

COVID-19 introduced a host of issues that revealed vulnerabilities in the just-in-time supply chain. The construction industry has responded with ingenuity, building out capabilities designed to prevent the kind of disruption we saw in 2020. Many are over-purchasing the supplies they struggled to source a few years ago. That may prove smart should any unexpected shutdowns throw a wrench in the global recovery, but they are also added expenses. In addition to warehousing fees, the cost of trucking doubled as goods head first to the warehouse, then to the jobsite. Meanwhile, some construction



companies are striking up partnerships with former competitors. Joint ventures are increasingly common as companies addressing labor and supply constrictions band together to prove the old adage that two are better than one. Some best-in-class firms appear happy to pay for equipment and supplies long before they're needed; others have created partnerships born of necessity.

Solutions like these are a hedge — and could prove strategically significant, smart and profitable — but they are not without risks of their own. It is safe to say, though, that negotiation and sourcing are highly coveted skills within the construction space.

Labor

On the labor front there may be some good news. A recent analysis of labor statistics suggests that job hopping may be slowing. Where economic conditions had made switching employers fairly high-reward and low-risk, a cooling economy is upsetting that equation. According to a recently released Bureau of Labor Statistics report, fewer construction industry employees walked away in 2022. But the industry's unemployment rate has been hovering around 3.5%, with recent data reporting 36,000 new job openings. Considering the country is still at or near maximum employment, getting the right people in place to complete projects remains a serious concern. If these conditions continue, we may see the trend in employee defections reverse. Wise employers won't wait to check in with their teams to make sure employees feel rewarded. That means creating the work environment and pay structure that will serve retention efforts.

The Waiting Game

When the Build Back Better (BBB) plan was passed, it looked like a boon for the construction industry. Now that the industry is in rougher shape (at least on the private side), it could be a lifeline for some firms.

Unfortunately, what was anticipated to be a swift rollout has not yet materialized. Still, with a lot of funding allocated toward major construction initiatives, construction firms are looking forward to a huge influx of utility, infrastructure and environmental work.

In the meantime, construction firms can take some preliminary steps to stand out as BBB-funded projects begin going out to bid.

First, tighten up that balance sheet. To compete for public work, it's essential that a contractor has working capital and equity. Next, start making smart moves to maximize your bonding capacity. The higher value the project, the more you'll rely on your bonding partners to qualify to get the work.

Return to Normal

After a few years of upheaval, we're overjoyed to see that our working world looks a lot more familiar. We're seeing great turnout at in-person industry summits, conventions and committee meetings. If we learned anything through the pandemic, it's the value of interpersonal contact and close community. That lesson is being carried out with a high level of camaraderie throughout the industry. Not only is it great to see people eager to work together, but it will serve the industry well as we prepare to face an economic environment that is full of potential challenges. That said, I do believe the future is ours to design and look forward to building it together. ▲

11 Ways to Submit the Best Quality Bid

How contractors can use tech to build bids & secure business

BY DAVID REDD

An accurate bid for construction work takes time; it's not something that can be thrown together in 15 minutes. It takes knowledge of the client, an understanding of the plan, and much skill to estimate labor, materials and equipment costs accurately. The key to submitting the best quality bid is having the most accurate and up-to-date current costs as possible in your estimated costs — the more accurate the bid, the more profits for your business.

Estimators are specialists in the field and know how to create the best bid with the most accurate pricing and time frames. Estimators must consider everything from building materials to equipment to labor. A good construction cost estimator is not only knowledgeable about the construction field and the project but is also able to create accurate estimates, often for multiple jobs simultaneously.

Technology helps with construction estimates and bid creation by eliminating manual processes. Technology also lets the estimating firm share project documents and collaborate on prices with subs and material providers. With bidding software, you can pre-populate the quote system with items you carry in every estimate, saving time.

The bids that emerge from bidding and estimating software outline all the deliverables, pricing, time frames and tasks for accomplishing the project. Digitized bids often present better to customers than paper-based bids or Excel spreadsheets, because they can contain graphics and images to illustrate the project work. You want to ensure your bid appears as professional as possible, and bid software can help you do that. Contractors that use technology will stand out from the competition when creating and submitting bids.

Here are 11 tips for creating the best quality bid:

1. Match the project with your business goals.

You want to make a profit, right? So bid on work you are more likely to win than work you have no chance of winning or making a profit on. It's better to only bid on a project if your company has the proper skill set, equipment or experience. To do otherwise could lead to cost overruns, fines and unhappy customers, damaging your firm's reputation.

2. Make sure you understand the work to be performed in detail.

Know the existing site conditions to reduce problems. Are there specific site conditions that challenge the work, such as soil conditions that cause excess runoff? Is there limited accessibility to the site? Are there proper utilities at the site, or do you need to factor in those costs? Be aware of all these conditions, and determine if additional costs need to be added to the bid to ensure you make a profit.

3. Attend pre-bid meetings.

Give your project team the ability to ask questions and gain clarification on any items that could affect the bid. Pre-bid meetings help those submitting bids better understand the scope of work and any special requirements needed to complete the job. Some pre-bid meetings are mandatory, so you must attend the meetings to submit a bid. Pre-bid meetings often include a site visit.

4. Use accurate and pertinent information.

Ensure you have all the pertinent information you need to complete the bid and that the information is accurate. Review the plans and specs thoroughly, including securing the correct bonds to complete the job.

For example, suppose the bid requires a woman-owned business to submit materials. In that case, you must be a woman-owned business. Can you substitute certain materials? Get clarification from business representatives and owners by the cutoff dates. Refrain from assuming anything; get exact clarification of every aspect of the work.

Make sure you use accurate measurements in your bid. Only accurate measurements can lead to the right amount of building materials and labor used in the bid. Make sure you use the correct units of measure, too. If you submit a bid with square feet as the measurement and you should have used the metric scale or square yards, your estimated costs will be wrong, and you could lose money on the job.

5. Import bid items.

Import bid items from Department of Transportation (DOT) websites to speed data entry and eliminate the double entry of information using software. Activities and bid items can be built on

the fly, copied from a previous estimate or pulled from a list of standardized work activities. Import external takeoff program data and quantities into your bid to produce a cost estimate accurately.

6. Produce the bid in the format the owner wants.

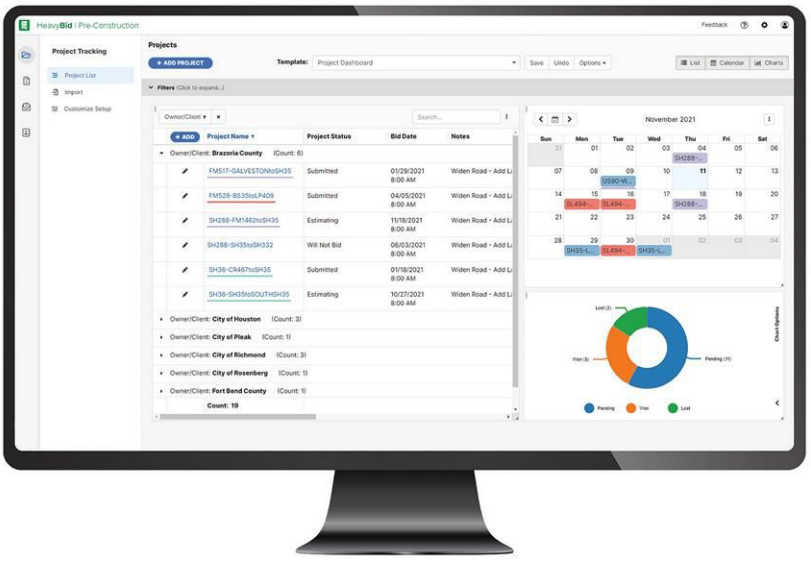
If the owner wants the bid on paper, submit the bid on paper. However, more and more bids today are submitted electronically, as paper-based bids can be time-consuming and prone to error. When you use bidding software, you can compare previous quotes and prices in seconds, compared to manually sorting through masses of paperwork from previous bids. Also, some bidding software includes templates to make it easier to create a proposal.

7. Include the cost of machine usage in your bid.

If you rent equipment, you must incorporate those costs into your bid. If you already own the heavy equipment you will need for the job, you will need to add the costs of using the equipment. To calculate equipment operation costs, you should use fixed and variable costs. Fixed costs include the purchase price of the equipment plus annual depreciation. Variable costs include the maintenance costs and the cost to operate the equipment, including labor and fuel.

8. Verify subcontractor capabilities and pricing.

When including subcontractors in your bid, make sure these subcontractors can perform the work you need at a reasonable price. You can verify the subs' capabilities by contacting contractors where the subs have worked and asking about the quality of the work performed. Ensure you clearly define the scope of work you need from the subcontractors and that they fully understand the work requirements.



9. Always double-check your math and work rules.

When creating your bid, does the project owner allow for overtime? If not, then you will need to use a five-day calendar as your time frame. Or does the project owner want you working four 10-hour days? Make sure you know this and submit it accordingly.

Avoid math errors by double-checking your numbers. If you make a math error, it can throw the whole bid amount off as each piece of the project is built upon the other. Let multiple people review your math to avoid errors you might have missed.

10. Estimating labor costs can be tricky.

You can look at previous projects similar to the new project to estimate labor, but know that no two projects are exactly alike — you can't just input existing numbers. To determine your labor costs, factor in hourly wage times the number of man-hours required for each specific task. It would be best if you also considered whether the task requires specialized talent, and in that case, you may have to pay more for that talent. You also need to consider the productivity and experience of each worker, as more experienced workers may be able to complete a task twice as fast as an inexperienced one.

11. Incorporate material cost changes.

Materials can quickly change, and the prices of the same materials may differ across the country. Make sure you understand the exact specifications of the materials and ask whether you may use substitutes. There can be a considerable price difference in the types of lumber, so make sure you know what materials you will need to bid.

Achieving an accurate bid requires dedication and examination of all estimating systems and processes. Take a deep dive into all the data to verify the most accurate, detailed information required for the job. If you follow these 11 tips, you will submit the best quality bid. If you use bidding and estimating software, you can improve the bid's accuracy while saving time. ▲

David Redd is the content manager at HCSS. HCSS HeavyBid is used by over 50,000 estimators in the industry. With HeavyBid, contractors can win more projects in less time, as HeavyBid is a fast and accurate estimating software for civil construction. Visit hcss.com.



Top 3 Contractor Risks & How to Reduce Your Exposure

Your guide to navigating today's construction environment

BY LAURA PENHALE & TOM POSTOL

Notwithstanding COVID-19's onset in 2020, construction activity has been, and continues to be, robust. New home construction and multifamily increased, and with few exceptions, commercial building shows no signs of slowing down either. The public and federal construction market is also picking up steam, with the federal government making a multi-year $550 billion infrastructure investment through the Infrastructure Investment and Jobs Act.

Still, there is reason to be cautious. Because some construction projects can take months or even years to complete, the construction industry has likely not yet felt the full impact of the pandemic and its attendant economic challenges.

Contractors are adjusting to the scarcity of key construction inputs like labor and material. Companies that are effectively managing this disruption still may be experiencing impacts to their profit margins as costs increase. Aside from project margins, lack of material and/or labor also has the potential of impacting project schedules and creating additional overhead expense.

Despite today's difficulties, the good news is that contractors have some level of control in how they manage these variables. We'll share ways contractors can adjust to the new reality and still maintain profitability.



Construction Risk Has Never Been Greater

With the U.S. economy in flux, it can be hard to identify the right way forward when it comes to the tight labor market, supply chain, material cost inflation and new and emerging contract risks. Make sure the management of these risks is the key to success — not the mark of failure.

1. Labor Shortage

There are currently two open jobs for every unemployed American, according to the U.S. Bureau of Labor Statistics. With construction activity remaining strong and the well-documented industry labor shortage, it's no surprise that contractor businesses are focused on attracting and retaining employees.

This can be a challenge if your business is growing, as you have more projects than usual or you are moving into a new area for work.

Here are a few ways your firm can navigate labor issues:

- *Partnering with other contractors.* If you need subcontractors on a semi-regular basis, it may help to pool resources with other contractors. Share subcontractors or refer work to contractors you know and trust when you're over capacity. Develop a pool of contractors to work with regularly and refer to.

- *Start building the talent pipeline "yesterday."* With the labor shortage growing, it's more important than ever to attract younger workers into the business. Consider visiting high schools to discuss the construction industry, your career progression and what a job in the construction industry means to you. Partner with local trade schools and hire interns to learn directly from you. Recruit younger than you have in the past.
- *Support your employees.* Beyond offering a fair salary, it's the little things that create engagement and a sense of belonging to an organization. Offer benefits to make sure they can take care of their health and wellbeing, and that of their families. Increase gas mileage reimbursement or offer special bonuses such as weekly gas cards to make it easier to get to a jobsite.
- *Create a culture of workplace safety by providing safety training to all employees.* Encourage teamwork and mentorship programs, which can encourage cooperation rather than blame when mistakes occur.
- *Encourage community outreach.* Not only do community projects make everyone feel good, but many employees feel loyalty to companies that give back to their community.

2. Supply Chain & Materials Cost Inflation

The price of lumber and steel have fluctuated wildly since the beginning of the pandemic. At different periods in the last year, and likely in the near future, some building materials may not be available at all.

Runaway prices are a major concern for contractors accustomed to just-in-time delivery. Materials that are stored on-site can be prone to theft, but just-in-time delivery has contractors relying more on trucking companies and other logistics organizations and may lead to delays down the road.

Contractors must figure out how long they can guarantee a price — or how they will try and pass on rising costs to their customers.

Because material costs have and continue to show volatility, contractor risk is magnified, and pricing is difficult. Contractors must figure out how long they can guarantee a price — or how they will try and pass on rising costs to their customers.



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Your firm can reduce the impact of rising material costs and supply chain fluctuations in the following ways:

- When possible, include a cost escalation clause in your contract. You can't control whether prices will change, and in today's environment, a lot can change from when a bid estimate is put together and when a contractor can mobilize and execute the work. An escalation clause can result in the project owner sharing at least part of the financial burden when a significantly different and unforeseen circumstance occurs.
- Value or reengineering of a project. When you face a shortage of material, labor or other inputs, consider a discussion with the owner or owner's representative and discuss ways to modify the project while still meeting the owner's building needs.
- Seek alternate suppliers or materials. Contractors and customers have to be more flexible. When materials aren't available, it may be necessary to shift suppliers or materials to complete the project. New materials may provide their own challenges — whether it's a change in sizing or use — but adaptability enables success.
- Document all changes. Keep track of any changes, from product pricing to additional supply chain costs. This can help prevent legal issues and conflicts with the project owner. Contractor losses are often caused by insufficient record keeping. To prevent losses, you should document every aspect of a job, including site conditions, scheduling issues, change orders and material price escalations. To avoid being held responsible for additional project costs beyond a contractor's control, as well as to recover any additional costs that are incurred above and beyond the contractual responsibilities, thorough documentation is key.
- Secure your site. Construction site accidents, theft and mishaps can be cause for significant financial loss. Make sure appropriate work site safety protocols are in place and there is a process for reporting work-related injuries. Jobsite theft may be more likely since material costs have increased. Materials can also be damaged by nature, potentially causing a major loss. Automated monitoring devices like water or theft alarms are relatively inexpensive and can be moved from site to site as needed. Be sure everything is fenced off and/or under surveillance to protect your investment.



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- Maintain the right insurance coverage. Appropriate coverage goes hand in hand. If the project is bonded, a surety company will also want to know that the contractor has procured the contractual limits of coverage from a financially strong insurer.

3. Transfer of Contractual Risk

Risk transfer can be challenging. With all parties trying to minimize their own exposure, it can be challenging to transfer risk sufficiently — and to ensure all the risk is administered proportionately based on the stakeholder's obligations.

The construction contract's terms with the project owner can have an impact on a contractor's ability to secure surety or insurance support. Be aware of this and screen your contracts carefully. The owner, mortgagees, contractors and subcontractors are additional named insureds under a builder's risk policy, meaning there are very limited, if any, options to transfer risk for the project to other parties. Sureties will also be looking at these risk elements and many others, like liquidated damage and dispute resolution clauses, as they evaluate project support.

Here are a couple of ways your firm can reduce contractual risk:

- Understand the contract. Don't sign anything until there is a full understanding of the risks. Make sure the contract specifies ample time and includes a process to resolve conflicts on-site, including the ability to work with the owner to resolve the conflict.
- Consult with an attorney. It's a good idea to develop a relationship with an attorney who specializes in construction law and have them review your contracts before signing. If concerns remain, consider having your surety company engage their legal team. Having good communication with your surety agent and surety company and, where needed, providing the contract language for their review will not only provide valuable insights, but help to establish trust between you and the surety. ▲



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How to Manage Generational Gaps in the Field

Improving communications between age-diverse teams

BY BRIAN POAGE

As one of the oldest and most established trades, the construction industry employs a large and diverse workforce. You can find contractors from nearly any age group on the jobsite.

While construction companies greatly benefit from the different skills and experiences a multigenerational staff brings to the table, it can be difficult to effectively meet their unique needs and expectations. As Forbes Business Council member and CEO Carl Hung writes, "One of the toughest forms of diversity to manage within a company, and one that is often neglected, is age diversity."

Despite the challenges, there are several strategies that can help companies better serve employees in the field at any stage of their careers. These tips and techniques improve communications between age-diverse teams and promote employee retention.

Standardize Field Communications

In the field, good communications are critical. But while not every employee in a certain age group will have the same preferences, there are often commonalities in the ways they share and consume information that differ from the next generation.

Accurate, timely jobsite data is crucial to keeping projects on track, and companies need to provide tools that help employees with different communication styles collect and share progress updates efficiently. For communication-heavy processes like daily reporting, consider investing in technology that prioritizes simplicity and ease-of-use.

For example, pen-and-paper reporting is still widely used in the construction industry. But because they are time-consuming and lead to frequent communication errors, handwritten reports frustrate younger workers. Many of them use technology to effortlessly exchange information with friends and family on a daily basis, and they don't want to waste work hours on pen-and-paper reporting.

Likewise, some daily reporting software is incredibly detailed and complex, requiring significant training. The learning curve to utilize it may be too steep for the members of older generations who do not use technology as frequently as younger workers in their personal lives. They may be reluctant to try this kind of software, or they may not take full advantage of it.

Look for technology that is designed for easy adoption, more efficient than pen and paper, and not overly complex. Ideally, any communication-enhancing software you implement should have the following features:

- *Intuitive interface* — The best software is intuitively designed. It should have a clean, clear interface with easy access to its most important functionalities. Field crews should be able to pick up software and instinctively understand how to use it with minimal training.
- *Standardized formats* — Good daily reporting software will offer templates and checklists that take the guesswork out of what information to collect and how to present it. Field crews can capture information in a standardized format that is universal.
- *Automated data sharing* — Your reporting system should allow field crews to automatically share information with the rest of their team without needing to turn in a physical report or manually attach it to a message or email. Software that utilizes cloud storage takes the burden of communications off your multigenerational staff by making reports available to access as soon as they are submitted with automatic notifications.
- *Photo and video capture* — Visual data like photos and videos clearly communicate what's happening on the jobsite with little room for misinterpretation.

By standardizing field communications and giving teams a way to consistently share information, you'll remove a major roadblock for your multigenerational workforce.

Encourage Mentorship

Employees of different age groups who work together will often exchange ideas and experiences. Encourage this behavior by assembling age-diverse crews and establishing a formal mentorship program.

- *Assembling age-diverse crews* — You may be tempted to divide employees by age when creating work schedules, hoping to avoid conflict. However, if younger and older employees rarely interact on the job, everyone — including the company — loses out on major opportunities for growth. Age-diverse crews are more



balanced with their blend of skills and experience levels. When there are generational gaps in the field, employees will naturally learn from each other and diversify their skill sets. This informal mentorship makes crews stronger and helps them apply a wide variety of knowledge to their work.

- *Establishing a formal program* — A formal mentorship program provides structure and helps employees feel comfortable adding time for teaching and learning into their work schedules. Managers can define how many hours should be spent mentoring each week and provide subject matter guidelines or criteria for program completion. Remember that mentorship goes both ways: Younger employees can be taught new skills by older workers and vice versa. Offer incentives for employees of all ages to share their skills with their coworkers. Not only will employees grow professionally through mentorship, but they'll also gain new perspectives that promote good working relationships.

Provide Training Opportunities

Providing formal diversity training will help your age-diverse workforce better relate to their coworkers. Many educational programs are available online or in person.

Training teaches employees skills to evaluate their own behavior and appropriately resolve any conflicts that arise from age-related differences.

Team-Building Exercises

Hosting team-building exercises is a great way to increase camaraderie and help employees of different generations get to know each other better. Hiring professionals at Indeed suggest quick, simple team-building activities that can be conducted on-site.

Or, if budgets and schedules allow, you can schedule an off-site activity like paintball, miniature golf or volunteering. The best team-building exercises allow your employees to work together on a common goal outside of their normal job responsibilities. The point of team building is to give your crews an opportunity to interact in new ways. Getting out of work mode helps them see things from a different perspective.

Conduct Employee Surveys

The best method to improve the way you manage field employees is to ask them for feedback. Conduct surveys, collect questionnaires or provide a suggestion box that encourages them to freely express their opinions on various workplace issues.

Seek feedback on communication styles, channels and frequency. Ask about pain points and gather opinions on your company processes. Some feedback may surprise you.

You should thoroughly review all feedback and apply it when possible. Even when suggestions aren't feasible, address them and explain why.

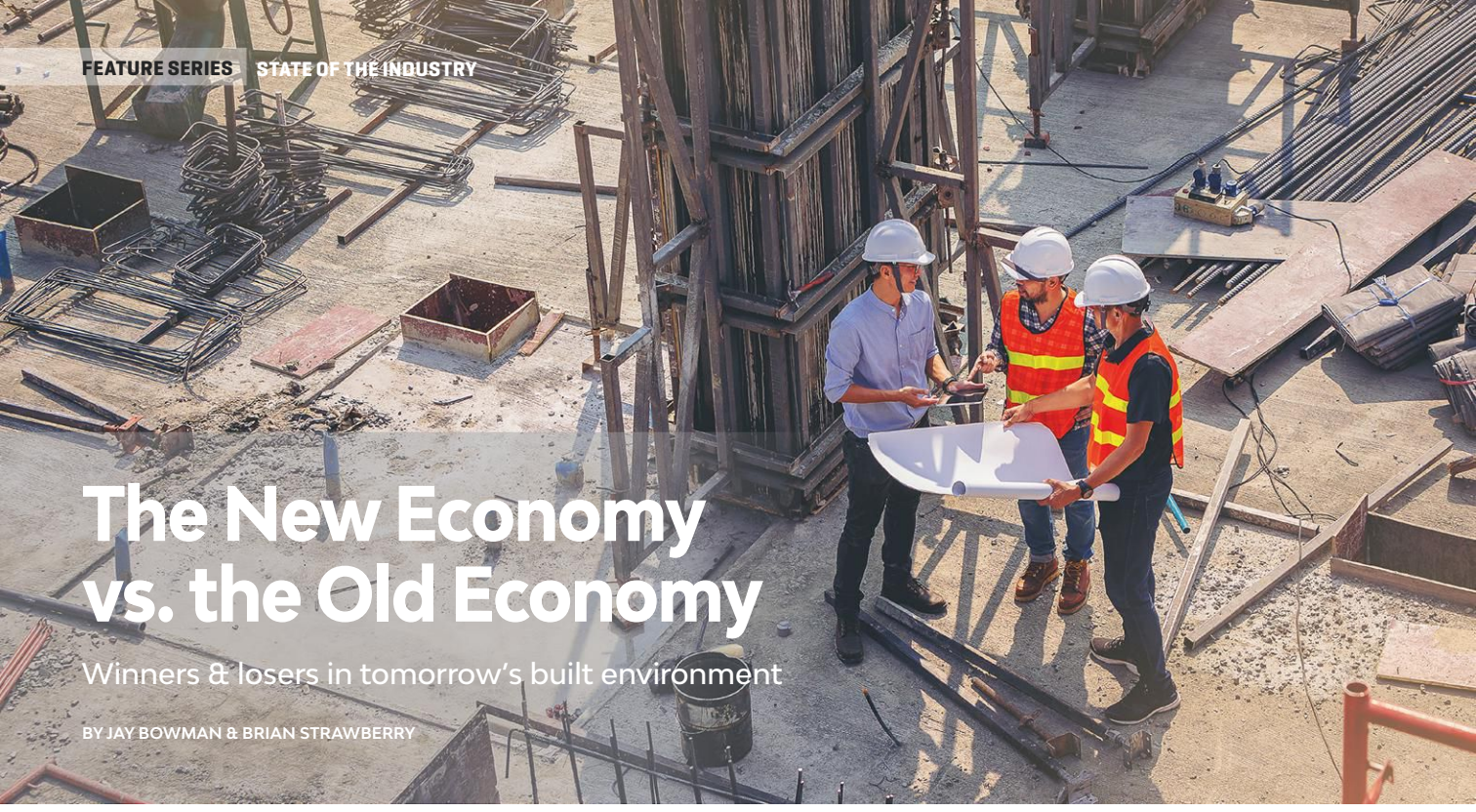
Knowing that they were heard, and the company cared to provide a transparent explanation why their requests were denied goes a long way in making employees feel valued.

If, through surveys and other feedback-gathering methods, you find that your field employees have vastly different expectations for management, you may need to consider taking different approaches with employees from various age groups.

For example, if you find Generation Z wants in-person meetings to discuss company strategy while millennials would prefer similar announcements to be sent via email, you may wish to use both methods. ▲

Brian Poage, a former Raken customer, was so impressed with the easy-to-use construction management app, he joined the company full-time. His background as a superintendent and project manager helps him connect meaningfully with customers and identify ways they can benefit from Raken's real-time production insights. Visit rakenapp.com.





The New Economy vs. the Old Economy

Winners & losers in tomorrow's built environment

BY JAY BOWMAN & BRIAN STRAWBERRY

Trying to interpret which way the economy will go is confusing and uncertain, even for those whose primary responsibility is doing so. There are many competing views on whether we're in a recession and how long it will last. One thing we are confident in is that 2023 looks quite challenging.

After FMI Corporation analyzed the economic impacts for the engineering and construction (E&C) industry in its first paper, "How Bumpy Is It Going to Get? Mapping Recession Scenarios," we argue now that the question isn't whether the economy is in recession, but what the end of the downturn might look like, how policymakers will respond, and how long a recession might last. In that paper, we presented three potential recession scenarios:

- *Base case — A correction lasting 12 to 18 months.* In our most likely scenario, we outline the potential for tightening of monetary policy that will reinforce economic contraction as well as a large hit to the job market and asset prices resulting in 12 to 18 months of recession.
- *Better case — A balanced correction lasting six to 12 months.* In this case, inflation is expected to peak in 2022, followed by a decrease to below the five-year average toward the end of the year and into 2023, aided by a drop in oil prices. This allows real wages, savings and disposable incomes to rise.
- *Worse case — Severe overcorrection lasting two to three years.* Economic events as outlined in the base case become severe enough to create stimulative policy and other conditions for prolonged and higher inflation.

Using these three paths as a framework, we can better understand the underpinnings of this turbulent transition for the E&C industry. Also, given certain expectations and knowledge, it becomes possible to examine exposure to different scenarios, strategize for an era of repricing, and prepare to pivot and take advantage of shifts in the marketplace.

Yet, the recession and the eventual recovery will be uneven across E&C sectors, and we're beginning to see that some will post growth, while others will see their business models shift drastically.

Adjusting for today's inflation of about 8.5% (8.3% in August), real construction demand will seem like an almost 20% decline by 2026, despite the rise in total construction put in place spending. In 2012 dollars, construction spending remains below the 2005 peak and is almost 50% less than the current dollar forecast in five years.

Given the current pressures, it's not surprising that industry sentiment is declining across numerous sectors. FMI's Nonresidential Construction Index (NRCI) and Heavy Civil Construction Index both declined 16% in the third quarter from the previous quarter. Both are showing that the industry expects contraction. The Construction Industry Round Table (CIRT) Sentiment Index dropped 20% quarter over quarter and 35% from the prior year's third quarter.

While macro prognostications provide vital context, you need to zoom in to understand the dynamics of market sectors, which are often moving in different directions. So which areas will fare better through a recession, and which will contract?

Those sectors that have different demand drivers, that are larger than current economic activity, have increased developer interest and a time frame that's longer than 12 months,

or what we're calling the new economy, will likely experience growth. Examples of this include data centers, life sciences, semiconductor fabrication and distributed power.

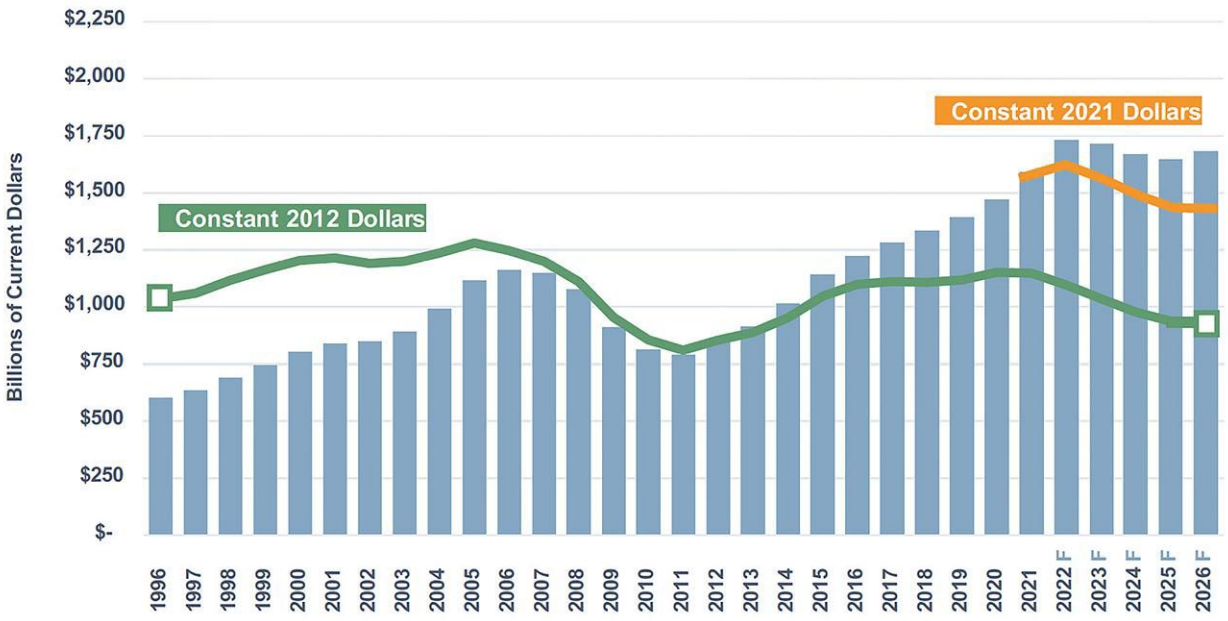
Places that encourage larger gatherings, like shopping malls, movie theaters, office space, sports facilities and amusement parks, are likely to experience a decline. Many of these places have taken a hit from the COVID-19 pandemic, combined with shifts in how people work and consume entertainment, and it is unlikely investment will return at the same levels.

Forecasting the exact behavior of spending across various segments or markets is tricky, but we can understand the possible impacts some of these larger trends will have in shaping the new economy in the coming years.

Some Bigger Trends to Focus On

- *Urbanization* — Eighty percent of the U.S. population lives in an urban area, which is shifting how people shop, eat and get around. For example, those consumers do most of their shopping online, driving demand for logistics, cold storage and last-mile delivery facilities. They're farther away from food sources, and now 70% of U.S. daily caloric intake is processed foods, up from less than 50% in 2000. With nearly half of groceries purchased online, the need for distribution facilities and drivers continues to grow. And as car ownership becomes a larger expense, many are shifting to mass transportation options, driving demand for new ways to efficiently get around.
- *Declining health* — With 60% of U.S. adults on a daily prescription, the demand for life sciences and health care facilities continues to increase. Yet, our forecast of 2% growth in the next five years is tempered by the lack of staff for hospitals and other clinics despite the increase in demand.
- *Growing data* — The number of connected devices tripled in the past five years, adding to the growing need to store, process and analyze data, indicated by the more than 932 billion computer chips manufactured in 2020. Combine the increase in technology adoption with the shifting nature of work, with 50% of people working at home compared with only 5% pre-pandemic, and a 50% increase in data center spending in the next five years becomes clear.
- *Power distribution* — Extreme weather events have revealed weaknesses in U.S. energy infrastructure: Record outages in 2020 led to residents managing an average of 60 hours without power, and outages continue to impact communities across the nation. As the U.S. invests in power grid resiliency and renewables, green energy providers will be busy, especially when considering the likely forthcoming energy incentives found within the Inflation Reduction Act of 2022. Firms that retrofit and perform energy audits on old infrastructure will also find work in otherwise lagging sectors.

Construction spending is expected to mirror these key trends over the next five years. For example, data centers, which



Source: FMI Q3 2022 Forecast, CBO long-term economic projections

* Current dollars converted using CPI

Figure 1. Total Construction Spending Put in Place (U.S.)

represent 20% of the office segment, are expected to increase by more than 50% in the next five years. Warehouses made up more than 50% of the commercial space in 2021, and spending here increased by 35% from 2019 to 2021, despite overall declines in commercial construction spending.

Additionally, no matter the current economic climate, long-running demographic trends and migration patterns highlight that Southern and Southeastern states will continue to offer favorable conditions for engineering and construction services. Those same patterns will allow newer and high-growth industries to flourish due to an inflow of labor, backed by local and state governments aggressively supporting business investments and relocations.

Conversely, however, these shifts impose considerable stress on other contracting markets (i.e., Western and Northeastern states), and challenges become amplified when the broader economy is in recession. Thinking of the economic climate as an accelerant for change imposes considerable risk on those states as their local economies evolve to become less diversified, more concentrated and increasingly dependent on their remaining employers. In those contracting states, labor is further constrained, which becomes a significant limiting factor for future economic growth.

Where you are in the next five years matters.

Top 3 Takeaways

1. Certain segments will continue to grow. Beware the changing risks on both sides.
2. Understand the long-term demographics to position long-term opportunities.
3. Project complexities and labor needs have been expanding. Is this trend sustainable?

What Can E&C Firms Expect?

Given these trends, construction is getting bigger, faster and more complex. Projects are shifting from the small and ordinary to large megaprojects, with construction put in place for these expected to increase almost 500% over the next five years to $300 billion.

In 10 years, the U.S. megaprojects market is expected to reach $350 billion, according to FMI's 2019 analysis.

With more than $3.5 trillion in megaprojects currently in design or planning phases through 2050 across North America, understanding the trends and market conditions where you operate will be critical to winning business, no matter the size of

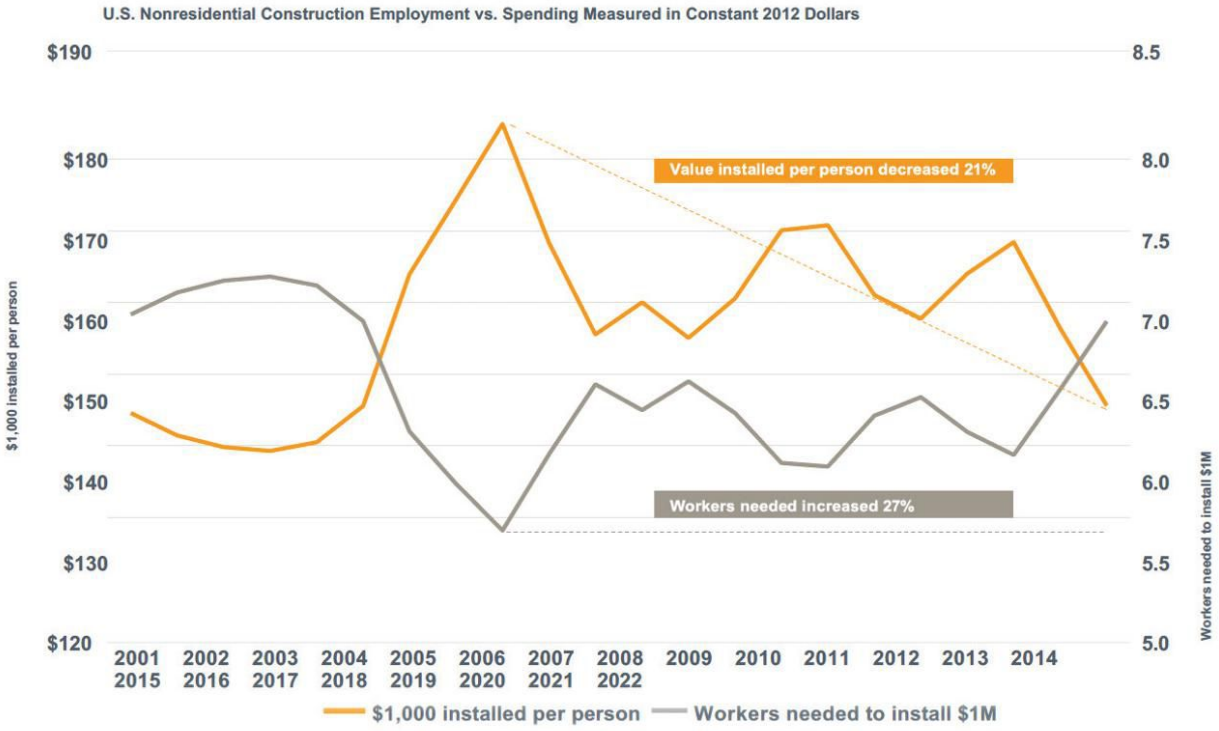
Figure 2. Nonresidential and Heavy Civil Construction Index (NRCI & HCCI) Q3 2017 to Q3 2022



These indexes are presented as a sampling of construction industry executives voluntarily serving as panelists for this FMI survey. Responses are based on their experience and opinions, and the analysis is based on FMI's interpretation of the aggregated results.

Source: FMI Nonresidential Construction Index and Heavy Civil Construction Index

Figure 3. Increasing Nonresidential Project Complexities Demand More Labor



Source: BLS, FMI

* Current dollars converted using CPI

the contract. Increasing project complexity and size will require E&C firms to invest strategically to manage and deliver these large projects.

That investment will also need to include labor and productivity initiatives. Since 2009, the value of nonresidential construction installed per person has decreased 21%, while the workers needed to install $1 million of product has climbed 27% (Figure 3).

And projects aren't just getting bigger. Their timelines are also condensing. For nonresidential projects valued at more than $25 million, the average schedule has shortened by more than a year during the past decade. That puts a strain on already challenged labor conditions as people are expected to do more in less time.

Understanding the broader economy and how that will impact your local business is critical for developing a strategy that will enable you to execute on projects in the new economy. Other ways to better position your company include:

- Understanding the customer.
- Recruiting the people currently in your organization.
- Leveraging your strengths to overcome obstacles.
- Developing scenarios based on sustained 10% to 15% increase in costs.
- Identifying opportunities to create competitive advantages.
- Building your network.
- Remembering what will be the same in the next five to 10 years.

While it's not a time to panic, firms must be clear about the opportunities and their own competencies to best position themselves for success. Those that are unable to shift to work in the new economy risk being left behind. ▲



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Deloitte's 2023 Engineering & Construction Outlook

5 trends to watch & where to focus your aim

BY MICHELLE MEISELS, KATE HARDIN, PAUL WELLENER, AIJAZ HUSSAIN & ANURADHA JOSHI



The U.S. engineering and construction (E&C) industry began 2022 on a bright note after achieving strong growth of 8% in construction spending in 2021. While the value added reached $1 trillion in second quarter (Q2) 2022, gross output stood at $2 trillion in Q2 2022 compared to $1.9 trillion in Q2 2021. But a closer look at current market dynamics suggests that 2023 will likely experience differentiated growth rates across different industry segments.

On the one hand, the nonresidential segment is likely to be buoyed by funds entering the market from the Infrastructure Investment and Jobs Act (IIJA) and the CHIPS and Science Act of 2022. The CHIPS and Science Act provides $52.7 billion for American semiconductor research, development, manufacturing and workforce development and is expected to drive construction in 2023 and beyond.

On the other hand, residential construction companies are relatively more pessimistic about the industry outlook for the next year compared to other segments. The residential segment may witness sluggish growth due to weakening consumer demand. So, while some segments may be more bullish than others, there are headwinds, such as inflation and supply chain issues, which may continue to affect the industry overall in the coming year.

The construction industry is expected to continue feeling the effects of increased prices — from the rising prices of steel, lumber and fuel to the increased cost of skilled labor. As a consequence, the industry could experience project completion delays, increased construction costs and reduced profit margins.

1. Market Dynamics

Industry segments experience different growth trajectories & increased competition

2023 could be a different year for the industry, with heightened uncertainty due to high inflation, rising interest rates and bifurcation across various industry segments. Companies are keeping an eye on how their backlogs will play out in 2023, especially during the second half of the year.

While many companies have substantial backlogs, specifically in energy-related construction (e.g., liquefied natural gas [LNG] facilities) and data centers, as they get through the back half



of 2023, they may see a potential impact of economic slowdown on their deliveries. Construction activity has broadly started declining due to rising interest rates and deteriorating fundamentals for commercial real estate. An uptick in interest rates raises project costs as input prices increase. Also, an increase in material and compensation costs reduces contractors' profit margins.

These dynamics will affect some sectors more than others (Figure 1). For example, homebuilders, infrastructure contractors and industrial plant developers will have different growth trajectories. For instance, the Dodge Momentum Index (DMI), a monthly measure of the initial report for nonresidential building projects issued by Dodge Construction, fell 1.2% in August 2022 to 171.9. While the commercial component of the index increased by 1%, the institutional component decreased by 5.6%.

Housing construction in the U.S. slowed down in August primarily due to high interest rates, supply chain constraints and decreased housing affordability. According to the U.S. Census Bureau, building permits fell by 10% to 1.5 million in August 2022 from the previous month. With the Federal Reserve further tightening interest rates to combat inflation, housing construction and permits will likely remain volatile. Additionally, mortgage rates remain high. The average rate on a 30-year fixed-rate mortgage was 6.3% in mid-September 2022, the highest since late 2008. Homebuilders will likely experience sluggish demand as real consumer spending is forecast to fall in 2023 amid an uncertain economic environment.

By contrast, companies building infrastructure projects are likely to remain relatively insulated from the economic slowdown, driven by strong infrastructure buildouts, and the substantial project backlogs developers and contractors have in their pipeline.

In addition, the next round of $1 trillion in IIJA funding enters the market starting October 2022 for several projects. However, labor shortages, wage inflation and ongoing supply chain constraints may slow this growth.

Moreover, developments in the global E&C market, such as how companies deliver projects and what regulations and standards they use (e.g., building information modeling, or BIM, standards), are likely to impact the U.S. market.

Since the International Organization for Standardization (ISO) published its first global BIM standards in 2019, several countries have made the use of certain BIM standards mandatory. As standards, such as ISO 19650 (an international standard for managing information over the whole life cycle of a built asset using BIM), become more consolidated and widely adopted, they are expected to drive growth in the U.S. market when U.S. companies adopt those standards from regions such as Europe, Australia and Canada.

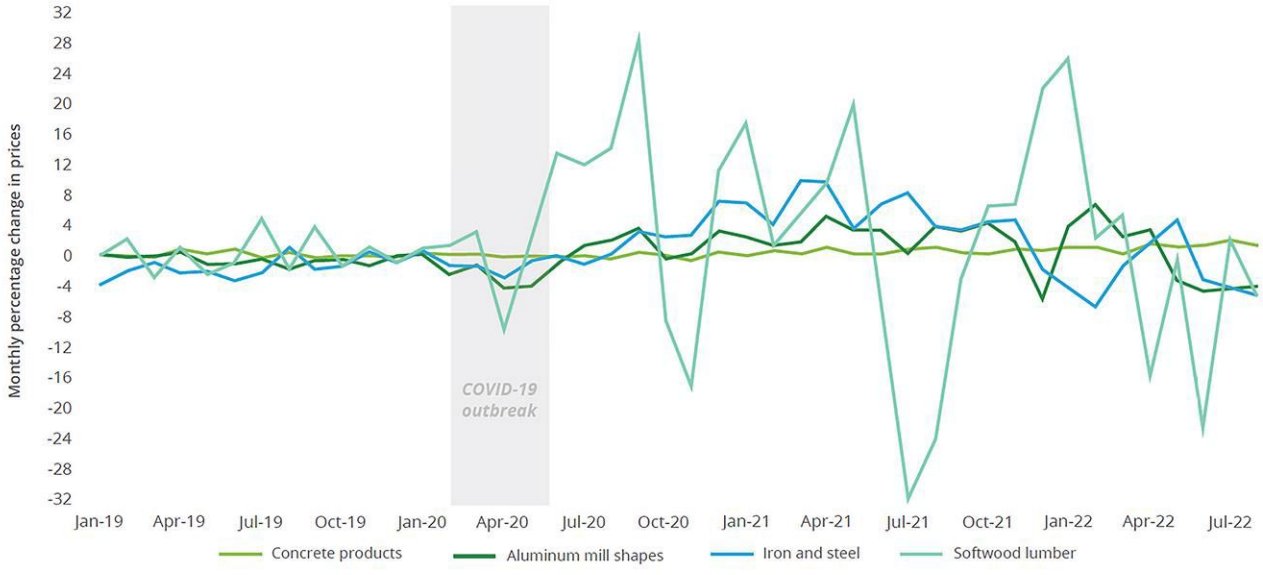
There is also an ongoing shift in mergers and acquisitions (M&A) with increased activity by private equity (PE) investors to buy subcontractors and form synergies and economies of scale. M&A activity by PE investors in construction registered a deal value of $11.8 billion in 55 acquisitions between January and August 2022.

The number of deals increased by around 6% compared to the same period in 2021, while the deal value soared by 297%. The industry could experience mergers and acquisitions of material suppliers and allied service providers to build local capacity and promote supply assurance.



Source: Deloitte analysis.

Figure 1. Changing market dynamics to affect industry segments differently



Source: Deloitte analysis of BLS data.

Figure 2. Volatility in material prices continue

2. Supply Chain

Increased lead times & volatile material costs pressure margins

Over the past two years, the COVID-19 pandemic, transport bottlenecks and geopolitical uncertainties have exposed vulnerabilities in the E&C supply chain. These disruptions have raised material costs, confined production and restricted freight movement. Four in five survey respondents cited supply chain disruptions as one of their company's top three challenges in the next year.

The industry continues to observe input price fluctuations, and the volatility in material costs is driving up the overall cost of construction (Figure 2). Prices of construction inputs increased 40.5% between February 2020 and August 2022. Persistent inflation could hurt contractors who have not bought large quantities of their materials at normalized prices or included appropriate price escalation clauses in their contracts.

The ongoing disruptions are expected to drive the E&C industry toward new business models, supported by new ecosystems that bring innovative products and services to serve the unique needs of different end markets.

- *Technology* — For example, a construction technology company has leveraged 3D, virtual modeling and robotics for a new off-site homebuilding approach that addresses labor shortages and controls carbon emissions. To address the supply challenges and rising material costs, developers and contractors will likely leverage advanced technologies to assess strategic inventory strategy for materials and inputs.
- *Ecosystem approach* — An ecosystem approach can improve E&C companies' ability to respond to disruptions and enable interoperability throughout the supply chain. Firms investing and participating in ecosystems are more likely to reap higher strategic benefits. By forming an ecosystem with Industry 4.0 providers and material suppliers, E&C companies can use data-sharing platforms to exchange real-time information with material suppliers in case of a disruption or shortage of supply.
- *Heightened focus on supply chain management* — E&C companies are expected to increasingly stand up supply chain management functions and build more local capacity, driving competition across the industry. Companies will likely expand capacity for the supply of materials in the U.S., get closer to customers to address supply chain constraints and be less dependent on foreign suppliers.

3. Future of Work

Talent pressures and shifting talent models lead the industry to rethink workforce strategies

The E&C industry remains significantly short of skilled workers, further exacerbated by a tight labor market. More than 82% of survey respondents mentioned a tight labor market and an exiting workforce as one of their company's top challenges in the next year. Even though the construction industry has a strong pipeline of projects and spending, especially the infrastructure buildouts, may be challenged to meet the demand due to a persistent shortage of workers and high turnover.

Labor availability in construction continues to decline (Figure 3), driven by declining interest in the industry, an aging population, and talent pressures in "competing" industries such as technology and trucking. Many workers, especially from the younger generation, are preferring less physically demanding jobs. The number of construction workers between the ages of 25 and 54 decreased by 8% in the past 10 years, while the share

of older workers leaving the industry increased.

To retain top talent, companies should consider a workforce strategy based on two pillars: a purpose-driven organization and a personalized career path. Moreover, technology adoption and innovation could help attract employees with new skills and roles such as data scientists and retain workers by encouraging them to work with cutting-edge tools. In addition, an increased focus on diversity, equity and inclusion (DEI) in hiring could yield additional talent for the industry. In 2021, only 11% of all construction workers were women, 6.3% were Black, and 2.1% were Asian. According to a Deloitte study, DEI hiring can help raise productivity, enhance organizational management, improve financial performance and increase innovation.

Addressing the tight labor market and exiting workforce amid shifting talent models will likely remain a priority for most E&C companies in 2023. According to Deloitte's survey, 91% of respondents agree that offering a flexible and agile workforce structure can help E&C companies to attract and retain talent.

4. Emerging Technologies

Developers and contractors further invest in emerging technologies to drive efficiencies

While the E&C sector has been historically slow in integrating and adopting digital technologies, industry players are now increasingly paying attention to and leveraging emerging technologies. Most E&C companies are utilizing digital technologies to expand business opportunities and boost profits by reducing costs in the long run and enhancing project execution. Further, with increased global supply chain disruptions, increased competition, worker shortages and skyrocketing material prices, the need for digital transformation in construction has become much stronger.

Construction companies are under pressure to safely deliver high-quality projects on time and within budget despite these challenges. While external factors remain outside companies' control, implementing new technologies can help increase visibility and tackle process inefficiencies. For instance, construction companies will likely adopt digital technologies through two IIJA initiatives: advanced digital construction management systems (ADCMS) and the Technology and Innovation Deployment Program (TIDP) related to the transportation sector managed by the Federal Highway Administration.

These initiatives will provide a total of $550 million to promote the use of digital technologies on government-funded projects. TIDP comprises research and development (R&D) and other efforts related to highways and transportation, while ADCMS is part of the TIDP and was created to advance technologies such as BIM, 2D and 3D modeling, and others. Similar programs will likely be explored across other industrial sectors such as energy and mining and metals. More than half of the Deloitte survey respondents agreed they would likely invest in digital technologies such as artificial intelligence (AI), digital twins and BIM in the next year.

Moreover, developers and contractors are likely to further invest in combined digital and physical technologies such as



Source: Deloitte analysis of BLS data.

Figure 3. Job openings in construction continue to remain high



Source: Deloitte analysis.

Figure 4. Top priorities of E&C companies to drive sustainability

visual intelligence, sensors and Internet of Things (IoT) devices, robotics, immersive collaboration and drones to increase efficiency. Around 44% of survey respondents have shown interest in investing in advanced technologies.

For example, an industrial technology company recently released an all-in-one cloud-hosted software that enables end-to-end workflow estimation for general and specialty contractors. It provides a structure for consistent and standardized estimating procedures that allows companies to leverage leading practices to boost accuracy and productivity. It also offers collaboration software that connects users with data on any device to enable efficient project collaboration.

Generative design methods produce unique optioneering options (design alternatives) and enable faster collaboration between E&C companies and their customers. These innovative methods help improve project execution, resulting in better managed costs and schedules.

The generative design approach allows companies to leverage modern optimization algorithms and cloud computing power, combined with codified rules, engineering parameters and constraints for early design considerations.

Prefabrication and modular construction will likely continue to be a key new way of working and delivering projects. These modern construction methods enable more standardization across the building process and allow construction firms to actively address the severe productivity problems affecting construction projects' quality and pace of delivery.

According to Deloitte's survey, 46% of respondents will likely invest in prefabrication and modular construction capabilities next year. 2023 will likely experience increased adoption rates for the same as more developers and contractors look to capitalize on building in controlled environments to drive operational efficiencies while also solving for changing customer demands and addressing margin erosion.

Leading E&C companies have adopted a structured approach to innovation and exploring emerging technologies. They seek to mitigate the following risks:

- Overlapping funding requests that can lead to confused project approvers and other inefficiencies.
- Creating a burden on talent through siloed R&D, lack of defined impact measures and lack of technology readiness frameworks.
- Prioritizing investments incorrectly due to lack of a disciplined program approach.

Assuming these risks can be minimized, both established providers and startups are expected to continue bringing innovative solutions of different maturity and readiness levels. A focus on practical value and return on investment could further expedite these efforts and potentially achieve significant gains for organizations. In 2023, companies will likely increase the adoption of structured approaches to emerging technologies across the E&C industry.

5. ESG & Sustainability

Industry evaluates new practices to deliver positive societal impacts

Many customers are becoming more sustainability conscious and placing greater pressure on developers to lower the carbon footprint of new construction. The increasing global focus on climate change could incentivize construction companies to factor sustainability into their projects, construction processes and designs (Figure 4).

The 2021 World Green Building Trends report showed that commitments to boost green building efforts remain strong. Thirty-four percent of surveyed companies in the U.S. were focused on green building, and 46% reported that they would do so in the next three years. According to a survey by the Associated General Contractors of America (AGC) in June 2022, 78% of respondents reported having policies to promote

recycling, 48% for materials reuse, and 26% for environmentally friendly or sustainable purchasing. However, only 14% currently report greenhouse gas (GHG) emissions on one or more projects.

However, the construction industry is fragmented and project-based, which makes it more challenging to adopt sustainable technologies. One of the biggest challenges construction companies face when implementing sustainable practices is a lack of integrated visibility in their processes and with subcontractors.

As a result, the sector is likely to focus on technology because digitalization plays a key role in enabling energy efficiency and demand flexibility in facilities and buildings. For instance, technologies such as big data and AI/machine learning can help companies track their overall carbon footprint. Smart buildings and infrastructure, which integrate IoT sensors, can increase data availability to track and monitor energy efficiency and enable more efficient operations and maintenance.

ESG will continue to be an increasingly important part of requirements from the operating owners, and it will likely be reflected accordingly in the flow-down requirements.

Additional opportunities in 2023 will likely include considerations for green construction materials (e.g., recycled plastic bricks), renewable energy sources (e.g., hydrogen/solar), and a wide range of supply chain topics, including transparency, traceability, resiliency and circularity.

E&C companies are also factoring in social and governance issues such as ethical organizational practices, community impact and involvement, quality of governing body, and risk and opportunity oversight because these are increasingly important to stakeholders.

To remain competitive, construction companies should prioritize and innovate how they identify, plan and deliver on ESG strategies that comply with regulatory requirements and investor demands, as well as benefit the communities in which they operate. They should remain aware of changing regulatory requirements and reporting procedures.

For instance, in March 2022, the Securities and Exchange Commission (SEC) proposed a new rule that would require public companies to disclose annually certain climate-related financial statement metrics, information related to climate-related risks, and GHG emissions in public disclosure filings. If these rules are finalized and effective during this calendar year, they could begin to be phased in for 2023.

Preparedness Could Be Crucial to Navigate Volatility

2022 got off to a strong start for the E&C industry but was met with several strong headwinds, including rising costs and labor shortages. This created both opportunities and challenges for the industry. E&C companies should prepare for the rapidly changing operating environment characterized by supply chain challenges, high inflation, rising interest rates, increasing material costs and persistent labor shortages. As developers and contractors compete intensely for materials and talent, business continuity, along with buying strategies such as centralized buying/demand planning across projects, should remain a key priority in 2023.

The construction industry is expected to continue feeling the effects of increased prices — from the rising prices of steel, lumber and fuel to the increased cost of skilled labor. As a consequence, the industry could experience project completion delays, increased construction costs and reduced profit margins.

In the coming year, E&C companies will be attuned to the different business environments in each of their customer markets and should therefore focus on the following:

- Having better control over leverage and credit, and creating a buffer through additional cost savings
- Paying attention to changing workforce and workplace expectations and skills levels to more effectively retain talent in a competitive market
- Increasing the use of digital technologies to improve visibility and efficiency, providing resilience amid ongoing disruption
- Capitalizing on additional funds and projects arising from the IIJA and Inflation Reduction Act that could provide additional opportunities in the infrastructure segment

Where companies invest, how they approach project delivery, and how they differentiate themselves in the market is important as the industry becomes more competitive in 2023. ▲

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5 Machine-Assisted Technologies for Crawler Excavators

Discover how these solutions can help improve productivity & jobsite efficiency

BY JOEL ESCALANTE

Today's next-generation crawler excavators use a variety of smart technologies, such as electrohydraulic control systems, to help operators achieve better levels of productivity, safety, accuracy and jobsite efficiency.

Fully electronically controlled excavators combine electronic intelligence with the flexibility of highly efficient hydraulic components. Unlike standard excavators, which have pilot hoses sending the signal for a specific function to control the machine's bucket, boom or arm, the electrohydraulic system is fully electrical. A computer tells the pilot system and the main control valve what to do the moment the operator starts using the joystick.

Let's take a closer look at these machine-assisted technologies found on electrohydraulic excavators.

Grade Assist Offers More Precision

You've likely heard of grade control systems, which prevent excavators from digging too deeply and enable precise measurements by using satellite systems, GPS and laser technology. However, some of today's electrohydraulic excavators are equipped with a grade-assist mode for accurate grading and quicker cycles.

An electrohydraulic control system can include the following features:

- Programmable joystick switches for ease of operation
- Fully electronic joystick
- Swinging sensor
- Equipment sensors on the boom, arm, bucket and upper body, including a laser catcher

When excavator operators activate the grading system, a touch-screen setting enables them to set the assist mode, allowing the computer to help the operator through audio and visual displays. All the operator has to do is pull the arm function, and the machine



Machine guidance and control for accurate earthmoving work

controls the bucket and boom automatically to maintain the desired grade or slope. The touch-screen monitor can give operators better control over the intended direction of travel as well as more precision when setting the bucket-tooth depth, height and slope in earthmoving and grading applications.

It also enables advanced machine guidance and machine control systems, including 2D and 3D grading systems. The 2D systems let operators work off a single plane, such as straight-line trenches, point A to point B.

The 3D systems allow variable distances, like a curved trench or line, for more complex projects. For instance, if operators are trenching to install a sewer system with the 3D system, they can set the slope and maintain the slope by looking at the touch screen. As operators get close to the determined depth, the system will change colors and an alert will go off to notify them on how close they are getting to slope and depth.

In addition, many excavators are equipped with laser receivers, so operators don't need to reset the depth each time the machine is moved to another location. The receiver will display an icon on the touch screen so the operators know they can continue to dig at the same parameters.

At the end of the day, grade assist results in game-changing improvements in productivity and efficiency for even the most novice operators.

Fine Swing Function Leads to Faster Cycle Times

Most excavator operators have experienced shaking at the beginning or end of the swing movement when lifting an object. Activating the fine swing function gives operators greater control when lifting an object and better accuracy when placing it. It also increases the safety of operators in certain lifting applications, like pipe laying, and can prevent damage from the object falling from the excavator. Fine swing can be engaged and disengaged manually, giving operators more control. When the function activates, the overrun disappears, allowing the excavator to smoothly reach maximum swing speed while removing the shock from the turn. Operators can turn off the rotation, or slew, and brake to prevent material loss from the bucket.



Virtual wall setting allows operators to set workable range for safety

Virtual Wall Setting Improves Productivity

New precision technology features, such as a virtual wall setting, help operators improve their safety and productivity when working in confined spaces. For instance, if there is an obstacle on one or both sides of the machine, the operator can set limits, so the machine won't swing past that. They can also control the settings for arm out as well as set ceiling and floor limits. The function can be overridden at any time.

Onboard Weighing System Accurately Measures Material

Instead of guessing how much material they are loading into a truck, an operator can work more confidently with an onboard weighing system.

This technology accurately measures and displays the material in the excavator bucket via a touch-screen display, which provides important notifications for operator performance.

Lift-Assist Mode Improves Safety

Excavators regularly lift or crane objects on jobsites, so using lift assist allows operators to remove the guesswork when lifting objects. This function measures and displays the current weight of the bucket as materials are being loaded, as well as the tipping load, and alerts the operator when the total loading weight is exceeded.

The sensors are accurate to within 3%. This function can reduce concerns about tipping the machine if the object is too heavy.

Many equipment manufacturers are introducing next-generation excavators with advanced electronic technologies to deliver smart performance, and the trend isn't slowing down anytime soon. These technologies are designed to help make operators work smarter — not harder — on the jobsite. ▲

Joel Escalante is a senior product specialist, excavators, at Doosan Infracore North America. He has over 30 years of experience with construction equipment, with 28 of those years in manufacturing, which have contributed to his strong background and in-field experience. Joel is a professional engineer. He holds a mechanical engineering degree from the Michigan Technical University. Doosan Infracore North America, headquartered in Suwanee, Georgia, markets and supports the Doosan brand of products that includes dozers, crawler excavators, wheel excavators, mini excavators, wheel loaders, articulated dump trucks, material handlers, log loaders and attachments. Visit na.doosanequipment.com.





Safeguarding Data for Fleets in Construction

How to build a cybersecurity program to keep your equipment covered

BY ROBERT NAWY

Data security is of paramount importance to fleets — even the smallest data breach could lead to a company's loss in revenue and customers, as well as a potential hit on its reputation. As the fleet industry continues to focus on digital transformation initiatives, management has become more concerned with data security because many companies still have outdated information technology (IT) infrastructure that lacks modern tech safeguards. In regard to construction fleets, employees accessing company information through various networks — along with vendors and subcontractors accessing certain systems and data — create many susceptible points of infiltration for cybercriminals.

The increased adoption of telematics devices has also transformed fleets into mobile data factories. While it is vital that fleet operations have the ability for information to flow freely, there must also be stability when balancing openness and the protection of sensitive data. Newer vehicles utilize some of the most complex and connected technology — making them vulnerable to hackers. Some hackers can control nearly every function of a vehicle, including engine performance, braking systems, airbag deployment, power steering, windshield wiper functionality and security features.

New forms of tech provide numerous benefits to fleets and are becoming more of the standard, as the tech can reduce accidents while allowing fleet managers to prioritize operations and fulfillment. While many features improve safety, efficiency and convenience, the evolution of digitized technology in fleet vehicles essentially makes them a moving target for cyberattacks if not properly secured. Fleet companies can minimize threats by implementing a robust cybersecurity infrastructure that will protect all their confidential data and avoid exposing even the most minor vulnerability.

Construction Fleet Cybersecurity

Compared with other sectors that are late to the adoption of tech solutions, construction is under a greater threat, with lower historic investment in security infrastructure and a workforce that needs upskilling in using tools effectively and safely.

Construction is also vulnerable because of the way the industry has historically worked. Many contractors still rely on paper documents and drawings for their everyday tasks when managing different projects. By adopting tech solutions such as data analytics, companies can reduce their direct labor costs and avoid unexpected claims and other costs.

Through the adoption of technology, the sector has become richer with data along with organizations seeking to educate themselves on what can be done to protect themselves.

The team charged with building a construction cybersecurity program will identify first the laws that apply to the organization and IT standards it wishes to follow, along with other guiding principles.

With robust cyber protection, managed cybersecurity solutions reduce costs while enhancing the ability to maintain security policies. From the initial stages of implementing a cybersecurity service, the tech can accept software source code in a secure lab for analysis during a company's software development cycle. It resolves security issues through the design of safety systems and information, rather than executing fixes after product releases.

Additionally, while keeping a company informed of its system's defensive stance, it is also deployed on-site to ensure the protection of a company's systems and information.

Managers can safeguard their fleets by arming them with the necessary protections to eliminate vulnerabilities for the foreseeable future. Through the implementation of a third-party managed cybersecurity service, managers can ensure all the cyber doors are locked and gain second-by-second monitoring capabilities. The tech supports IT personnel, essentially giving them eyes on any potential vulnerabilities so they can address them long before they are discovered or penetrated by cyberattackers. The tech also provides any necessary training and education that can help team members avoid the risk of displaying valuable data, as well as ensure they are adapting to companywide best practices.

Navigating Future Risks

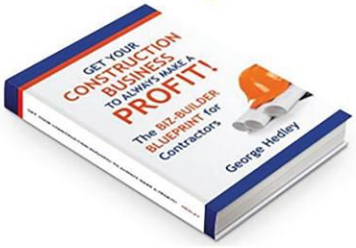
Unfortunately, organizations in almost every industry are navigating cyber threats, and the construction industry is no exception.

There are, however, a number of risk mitigation strategies — the first step is to find experienced advisers to help navigate this complex legal and technical terrain. ▲

Robert Nawy is CEO of IPKeys Cyber Partners, a provider of an industry-leading, secure operational technology (OT) and information technology (IT) intelligence platform that addresses the complex cybersecurity, data and critical infrastructure protection challenges faced by operators of mission-critical networks for customers in the energy, government and public safety communications, and industrial markets. The company's suite of solutions encompasses cybersecurity, cyber compliance, and operational network monitoring for a range of dynamic OT and IT environments. The company is headquartered in New Jersey and has offices in California, Louisiana and Texas. Visit ipkeyscyberpartners.com.



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Why Field Data Matters

Exploring the unexpected reason why projects & budgets run over

BY DAVID BRIAN WARD

It's not uncommon for a construction project to fall behind due to supply issues, staffing, last-minute client requests or weather. When this happens, the project manager makes adjustments to the plan and resets client expectations. What they may not realize is just how much each change nips at the bottom line. While a certain percentage of every bid factors in delays, there's an often-overlooked data set that could minimize the impact of changes: field data.

Field data contains a lot of critical information about the skills of workers and status of projects, yet it's not always factored into the larger project plan. When you bridge the gap between what's happening on the jobsite and the best-laid plans mapped out in the construction business owner's office, you can spot trends and get ahead of potential issues before they erode a project's profitability.

Why Jobsite Data Is Overlooked

Jobsites are where the construction business owner makes — or loses — money. But the processes that many contractors use to manage projects and people make it nearly impossible to see where a project is going awry until something happens. This is because the majority of business processes on construction jobsites are still done with paper and pen.

Think about it: Workers sign in each day by scribbling their name and time of arrival on a sheet of paper. The daily log is largely based on memory and is subject to human error, especially after a long day when the supervisor is eager to get home.

In addition to the aforementioned challenges, many important conversations and activities are not documented. For example, workers may talk about completing their latest training certifications or their specific experience in the trades, but that information may not be recorded. Knowing who is on a jobsite and what they bring to it helps project managers be more effective in planning the work. It also protects the business owner if there's an incident or investigation. For these reasons, digital tools are springing up on construction jobsites. It's all part of the construction industry's larger shift to digital transformation.

Digital transformation is the use of technology to modernize processes. Yet it's more than just the use of technology on a construction jobsite: Digital transformation is also about the company's culture and transforming the way the business is managed to ensure that digital technology is seamlessly woven into every process. Moving to digital transformation is on the radar for most construction companies.

A recent survey conducted by the National Association of Women in Construction (NAWIC) and Safe Site Check In showed that 71% of companies consider digital transformation a priority. However, data from Dodge Construction Network indicates that only 15% have implemented a digital transformation strategy.

According to Jon Broyles, corporate safety officer at AMG & Associates Inc., "Once our digital tools were in place, it made our work environments safer, allowing individuals to sign in, answer safety questions and verify manpower. We use these technologies to always know who is on site, their location, project they're working on and supervisor. We can easily reach them and have private, digital records that are useful for other departments, including safety (meeting Occupational Safety and Health Administration standards), payroll, project management and even the CEO."

Using Jobsite Data to Make Business Decisions

The shift to digital transformation is iterative — it's not like constructing, building and moving on to the next project — and doesn't need to be overwhelming. Most construction companies start small, using an app on a smartphone or tablet to automate, streamline and better document what's happening on a jobsite. The familiarity of apps in our everyday lives makes it easier for workers to adopt a new tech process on the jobsite. Daily check-in apps are the easiest point of entry to digital transformation.

To get even more value from jobsite data, contractors are integrating it into project management platforms like Procore and CMiC. The field data, with its insights on worker attendance, skills and productivity adds additional insight into the performance of each project and the company. The information can also inform the construction business owner's bids and operational decisions.

Zach Hoffman, director of field operations at Prevost Construction, integrates jobsite check-in data with Procore. "We rely on [data and software] to manage every aspect of a construction project," Hoffman said. "The integration was easy, saving us hours every day spent rekeying field data into the project management platform. We can improve jobsite productivity without compromising safety or quality."

As construction budgets and the labor market get even tighter, construction business owners are investing in digital technologies to identify hidden pockets of cost savings and productivity boosters. One of the fastest paths to a solid return on investment through this strategy is automating paper processes on jobsites and integrating that data with their existing investments in project management platforms.

Since what happens on a jobsite can make or break a contractor, it only makes sense to capture and analyze data from the field to consistently track and measure profitability and continue to use that data to make decisions that are in the best interest of clients and the contractor's business. ▲

David Brian Ward is the CEO and founder of Safe Site Check In. He has more than 30 years of experience as a technology entrepreneur and investor. Ward's experience has centered around the business of technology management for organizations ranging in size from Fortune 500 companies to startups in their infancy stages. Prior to Safe Site Check In, Ward was the founder of Telegraph Hill Software, an enterprise technology consulting firm providing leadership and technical expertise in development, engineering, operations and program management. Visit safesitecheckin.com.





New Products to Watch

Selected by the editors of Construction Business Owner, these new-to-the-market products are just a few of our favorites recently released to the construction community. Stay tuned in every issue to find out what you need to know about the latest gear, solutions & industry-leading innovations.

BOBCAT ▶

RP22.40 reversible plate compactor

Released: 10/13/22

Availability: North American market

What's new? Ideal for compacting granular material such as sand, gravel and asphalt. This walk-behind machine is nimble and durable. It enables operators to experience quick directional changes with minimal effort in tight spaces. This is Bobcat's smallest reversible vibratory plate compactor.

Specs: The RP22.40 reversible plate compactor comes with 4.8-horsepower Honda engine. Includes an operator handle designed for minimal hand-arm vibration.

Check 200 on index.





◀ MECALAC

136MRail excavator

Released: 10/13/22

Availability: North American market

What's new? This crawler-based excavator with factory integrated hi-rail combines all the functions of an excavator with exceptional lifting, towing and loading capabilities. With its rail gear raised, the 136MRail can be operated as an excavator on regular terrain, offering operators maximum versatility with a single machine. At 13 tons with a 75-horsepower engine, it is ideal for light to medium service and maintenance jobs. The 136MRail's patented boom makes it ideal for use in confined areas, such as subway tunnels. The boom incorporates an offset feature for applications, such as ditch-cleaning alongside the tracks.

Specs: Attachments such as grapple buckets, tie-removers, power brooms and trenching buckets allow users to accomplish a wide variety of tasks around rail systems. The 136MRail provides heightened versatility by offering all these functions both on and off the rail. Equipped with an optional pneumatic brake system, the 136MRail can tow up to 14-ton trailers. Travel speed on rail is 12.4 mph, and off rail is 5.6 mph. The machine can move on and off the rail with ease, allowing efficient access to jobsites anywhere along the track. The 136MRail also drives productivity for its users through a 1-cubic-yard skid loader bucket that provides 72% more capacity compared to other machines of its size. The 136MRail can scoop and load ballast or unload and spread ballast on the track.

Check 201 on index.

KOMATSU ▶

PC490LCi-11 excavator with intelligent Machine Control 2.0 (iMC 2.0)

Released: 10/19/22

Availability: North American market

What's new? Designed to lessen the skills gap between new and experienced operators — while helping improve the bottom line for contractors — the 359-horsepower PC490LCi-11 is Komatsu's largest intelligent excavator. An excellent match for excavation, trenching, slope work or fine grading, the PC490LCi-11 helps minimize over-excavation to empower operators to dig straight to grade quickly and accurately.

Specs: A new 10.4-inch iMC monitor features increased memory capacity, processing speed and pinch-to-zoom functionality in a smaller lightweight package for improved performance and ease of use. The new bucket angle hold control helps operators reach finish grade quickly and accurately. It automatically holds the bucket angle to the design surface during arm operation, enabling operators to perform finish grading using only arm input.

Check 202 on index.





▲ LEICA GEOSYSTEMS

iCON gps 160 smart antenna

Released: 3/31/23

Availability: U.S., Canadian & European markets

What's new? Can be used as a base station, a rover or for machine guidance. It is a smaller, more compact GNSS antenna with additional features and a larger display for ease of use.

Specs: Particularly suited to complex construction environments with different GNSS requirements — the ability to switch between the different applications is at users' fingertips. Besides checking grade, cut and fill, stakeout points and lines, users can also use this solution for basic-level GNSS machine guidance. The iCON gps 160 comes with an integrated color display, a user-friendly interface, smart setup wizards and an intuitive construction-specific workflow.

Check 203 on index.



▲ READING TRUCK

Contractor Body

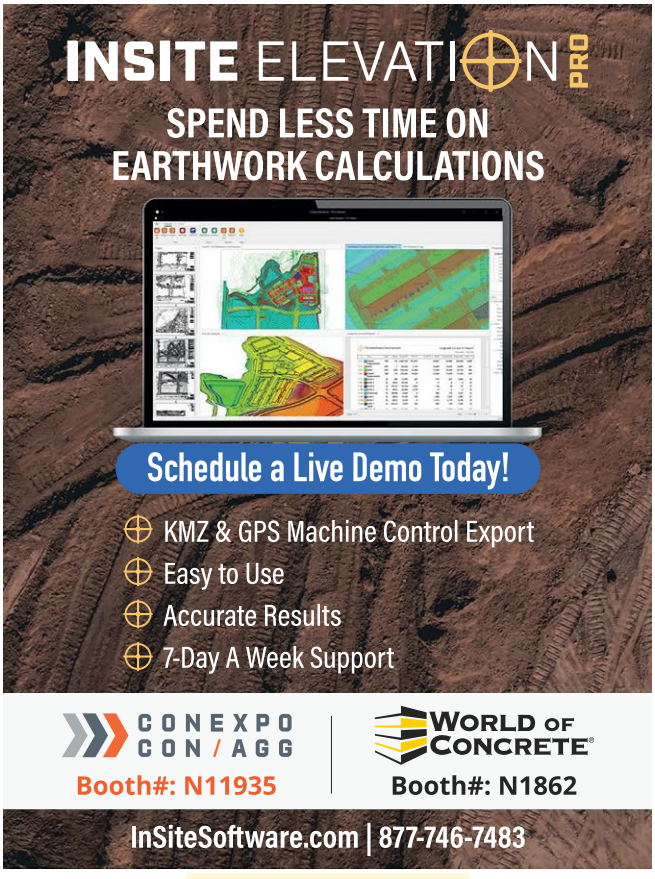
Released: 11/15/22

Availability: U.S. market

What's new? Designed with today's contractors in mind, the Contractor Body comes equipped with features including A60 galvannealed steel construction, e-coat primer and powder coat finish. The Contractor Body also addresses the safety of operators with enhanced LED lighting and an interchangeable tapered bulkhead available to improve visibility from the cab. Many options are also available for this body, including a top-opening Spacemaker and shovel box for long storage.

Specs: Available in 10-foot and 12-foot lengths, the Contractor Body is built upon Reading's heavy-duty platform body and includes standard features like a fork truck loadable material rack, 12-gauge hot-rolled deck plate, movable tailboard for different space configurations with 17-inch fold-down rails, and toolboxes.

Check 204 on index.



Check 111 on index.



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▲ **JOHN DEERE**
470 P-tier excavator
Released: 10/20/22
Availability: North American market
What's new? Offers enhanced visibility features, making it an ideal solution for operators looking to increase productivity on the job. It comes equipped with grade management solutions engineered to minimize rework and boost productivity. Strategic visibility enhancements have been added to the P-tier lineup. The 470 P-tier model features standard Right, Rear and Left Camera Systems with added LED surround lighting, all integrated into the main monitor of the machine. The LED-surround lighting and standard camera systems provide the operator with a 270-degree view of the area around the machine, improving safety and visibility on the job.
Specs: The 470 P-tier model offers SmartGrade technology as a factory option. Choose from 2D guidance, 2D SmartGrade Ready Control and SmartGrade 3D Control. These grade management options allow customers to choose a level of technology that's right for them with the ability to upgrade as their business needs grow. Included with SmartGrade, Overdig protect technology limits the bucket's cutting edge from going below the target design surface while in-cab real-time distance to target measurements help promote operator accuracy. Optional on the 470 P-tier, the new hydraulic coupler-ready option provides factory-installed hydraulic plumbing all the way to the end of the arm. Coupler controls are also factory integrated into a switch in the cab. Compatible with multiple aftermarket coupler manufacturers, this feature allows operators to efficiently switch attachments and adds more productive working hours each day.
Check 205 on index.



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(Check Only One)

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❑ 10 Construction – Special Trade Contractors
❑ 03 Highway and Street Construction
❑ 04 Water, Sewer and Utility Construction
❑ 05 Heavy Construction
❑ 06 Concrete Work
❑ 07 Excavation Work
❑ 08 Wrecking and Demolition Work
❑ 13 Architecture, Engineering and Construction Management Services
❑ 11 Consulting Contractor
❑ 99 Other (please specify)

_____

2. Your primary job title is: *(Check Only One)*

❑ 10 Owner, Partner, President, CEO, CFO, COO, Vice President, Director
❑ 11 General Manager, Manager, Foreman, Superintendent, Purchasing Agent, Controller, Accountant
❑ 12 Engineer, Architect
❑ 06 Consultant
❑ 99 Other (please specify)

_____

3. Approximate annual contract sales volume:

(Check Only One)

❑ 01 Less than $500,000
❑ 02 $500,001 – $1,000,000
❑ 03 $1,000,001 – $2,500,000
❑ 04 $2,500,001 – $5,000,000
❑ 05 $5,000,001 – $10,000,000
❑ 06 $10,000,001 – $20,000,000
❑ 07 $20,000,001 – $50,000,000
❑ 08 More than $50,000,000

4. Which of the following products/services are you planning to buy during the next 12 months?

(Check All That Apply)

❑ 01 Earthmoving Equipment
❑ 02 Trucks, Trailers and Accessories
❑ 03 Compact Equipment
❑ 04 Lifting and Hoisting Equipment
❑ 05 Safety Equipment and Apparel
❑ 06 Attachments
❑ 07 Concrete and Paving Equipment
❑ 08 Survey and Site Prep
❑ 09 Compressors, Generators and Pumps
❑ 10 Financing and Accounting Services
❑ 11 Software and Technology
❑ 12 Insurance and Bonding
❑ 13 Training and Education
❑ 14 Telecommunications
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❑ 19 Rental Equipment
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Annual Value of Construction Put in Place

October 2020/2021/2022 Annual Rate Comparison

This chart compares the two previous years' total value of construction put in place to an annual forecast based on October 2022 figures. (Millions of dollars. Totals may not add up perfectly due to rounding.)

	2020	2021	2022
Total Private Construction	**1,093,730**	**1,244,971**	**1,420,380**
Residential	637,138	774,688	887,224
Nonresidential	456,592	470,283	533,156
Total Public Construction	**344,785**	**353,049**	**374,569**
Residential	8,971	9,163	9,281
Nonresidential	335,814	343,886	365,289
TOTAL Construction	**1,438,515**	**1,598,020**	**1,794,949**

**Seasonally Adjusted Annual Rates. Source: U.S. Census Bureau*

$1,794,949

OCTOBER 2022 TOTAL ANNUAL VALUE OF CONSTRUCTION PUT IN PLACE

"Economic headwinds have been steadily mounting, and finally led to weakening demand for new projects," said AIA Chief Economist Kermit Baker, Hon. AIA, Ph.D. "Firm backlogs are healthy and will hopefully provide healthy levels of design activity against fewer new projects entering the pipeline should this weakness persist."

AIA Architectural Billings Index (ABI)

National			*Regional - Billings				*Sectors - Billings			
Month	Billings	Inquiries	Northeast	Midwest	South	West	Multifamily Residential	Commercial/ Industrial	Institutional	Mixed
May-22	53.5	63.9	51.4	56.8	52.3	59.3	54.5	57.7	51.7	56.2
Jun-22	53.2	58.2	48.7	54.8	51.5	57.8	52.6	52.5	53.5	52.8
Jul-22	51.0	56.1	48.4	52.2	53.6	51.7	52.8	52.2	49.6	52.1
Aug-22	53.3	57.9	49.8	51.4	52.9	50.2	52.0	51.2	52.0	51.2
Sep-22	51.7	53.6	54.6	52.1	51.7	51.6	47.9	49.6	58.9	50.3
Oct-22	47.7	52.3	50.3	50.8	50.6	49.6	46.1	45.9	54.3	50.8

For more information on the index or to subscribe to the complete historical data going back to 1995 for your internal analysis, **please contact economics@aia.org.** The ABI presents monthly construction billings data, using a base score of 50. A score of more than 50 indicates a growth from the previous month, and a score of less than 50 indicates a contraction from the previous month. A score of 50 indicates no change. Source: The American Institute of Architects (AIA), Architecture Billings Index (ABI).

*Regional and Sectoral indexes are three-month moving averages, due to small sample size. All data is seasonally adjusted.
**Every January, the AIA research department updates the seasonal factors used to calculate the ABI, resulting in a revision of recent ABI values.

Considering a Digital Onsite Construction Management Plan?

- Avoid costly mistakes and budget overruns with automated task lists
- Increase critical colaboration
- Improve overall reporting
- Eliminate paper documents
- Keep team members aligned with a common database
- Stay aligned from the back office with job site activities
- Automate and streamline workflow and processes
- Improve productivity with interactive project visualizations



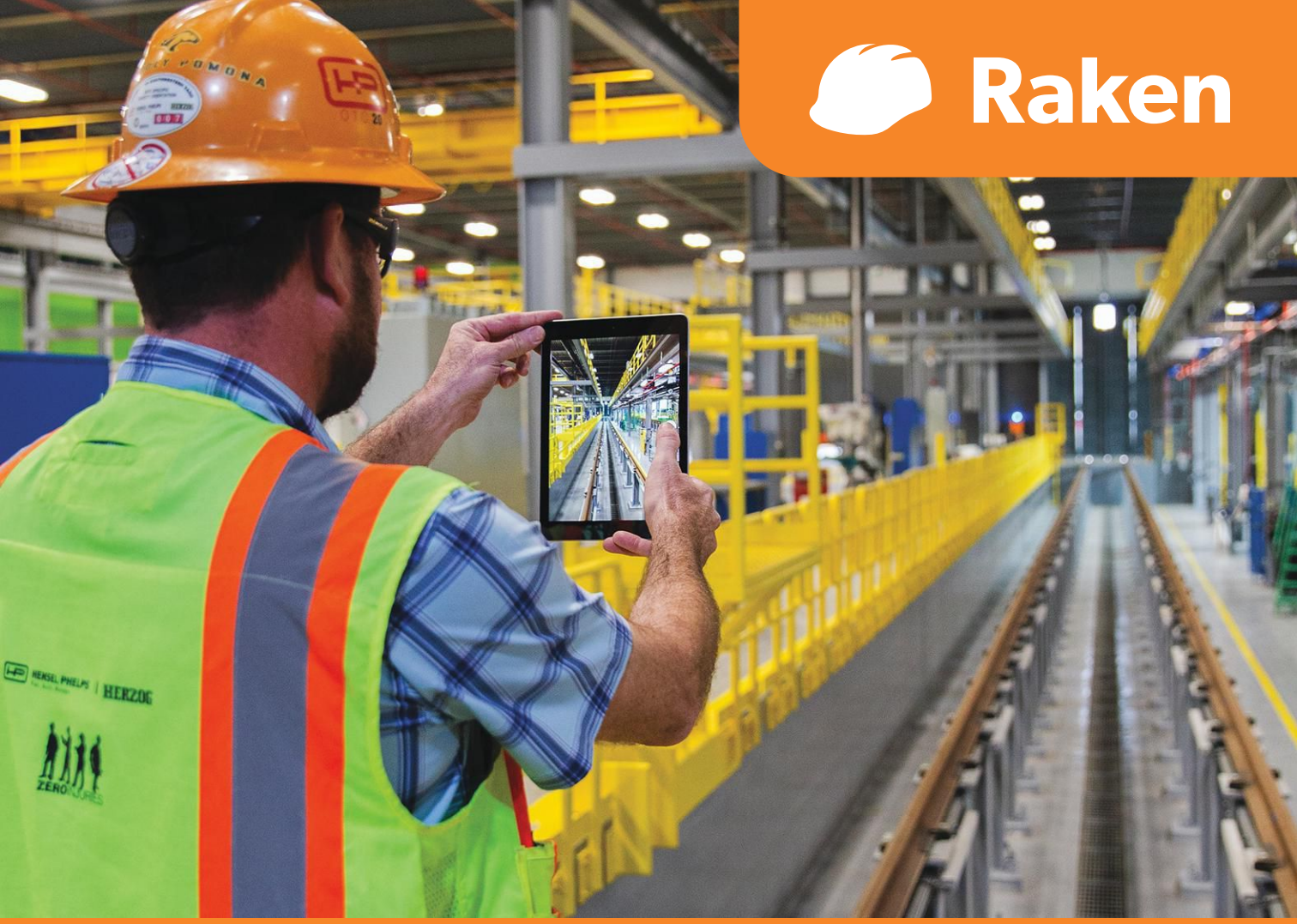
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