2023

The State of Healthcare Construction

ROBINS & MORTON

Building With Purpose®

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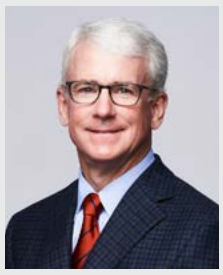
FROM THE CHAIRMAN & CEO



This year marks the third edition of our State of Healthcare Construction Report. Our previous two editions captured trends within the healthcare construction industry and how building and design team partners have responded to growing challenges. We took a different approach this year, and the following pages contain a data- and experience-based glimpse into the future of healthcare construction.

In the 2023 State of Healthcare Construction Report, we once again draw upon the latest perspectives of healthcare providers and construction and design team members to share key learnings. We hope you find the information useful. Thank you for taking the time to read and share this issue.

Bill Morton
Chairman & CEO

Introduction

Welcome to the third edition of The State of Healthcare Construction Report.

In this year's report, we changed our focus from reporting on current trends to forecasting pivotal industry shifts.

To objectively assess how these shifts will alter healthcare construction in the coming decade, we interviewed healthcare leaders, architects, engineers, construction managers, consultants, technology specialists, and industry academics. The conversations revealed challenges ahead, but they also expressed a collective optimism about the future of project delivery, digital innovation, and environmental stewardship. The opportunity to achieve a healthier and more empathy-based human experience is a theme that echoed in each conversation and across every sector.

The report is divided into three sections. First, we delve into the effects of recent economic volatility, projecting the long-term impacts on healthcare construction and potential changes to patient care delivery. Second, we analyze prefabrication and its relationship to technology, providing predictions for advanced integrations in the future. In the final section, we report on the growing correlation between positive human experience and positive business outcomes.

We hope you enjoy reading the report and encourage you to share it with your colleagues. We also invite your comments and ideas. Click or scan the QR code below to provide your thoughts in the Robins & Morton-developed PlusDelta app, which is also available for your personal use at plusdelta.app.

02

Complexity and Cost Challenges Shift the Formative Stage of Projects

KEY POINTS

- Long-term economic challenges and patient care delivery changes will impact how project teams plan, design, and build together in the coming decade.

- Responding to the challenges, building teams will achieve new levels of efficiency, productivity, and risk mitigation through an integrated team model from programming through occupancy.

- For many healthcare clients, moving away from a traditional model — often referred to as design, bid, build — is a difficult transition. Learning about the benefits and net gains experienced by others can be a turning point in investigating an alternative delivery method.

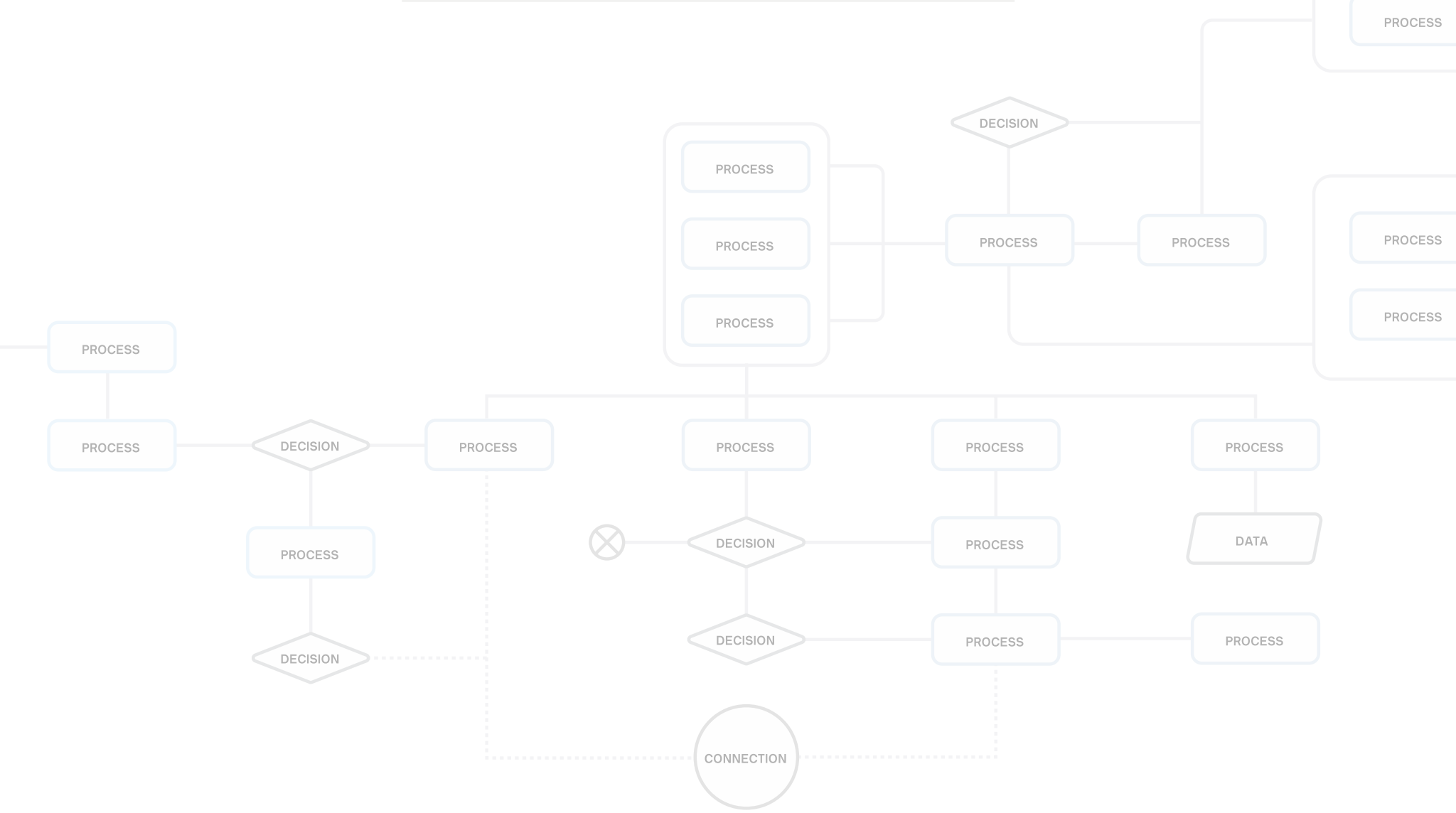
Discussions with healthcare construction experts — clients, designers, construction managers, trade contractors, consultants, and others — reveal a clear consensus. Substantial changes will be needed to meet the evolving economic and programmatic forces now in play for those engaged in healthcare construction projects.

These forces, accelerating and amplifying during three years of revolutionary change, present an inflection point for new approaches. As we head into the midpoint of a decade filled with global health and economic transformation, client priorities and industry challenges will reshape and inform the building process. These include:

- **Increased price competition, patient choices for care, and the projected cost for continuous investments in new technology**
- **Increasing need by health system clients for a more efficient, predictable, and shorter construction experience**
- **Continuing decentralization of patient care, with many services shifting from acute care hospital visits to ambulatory outpatient treatment, home-based care, and urgent care options**
- **Ongoing workforce shortages that impact labor cost and project schedules, a challenge that will continue as Boomer retirements spike in the next five years**
- **Historic cost increases in materials, combined with rising interest rates, that will compel clients and their construction teams to create offsetting innovations**

The long-term impact of these urgent economic and care delivery changes will create demand for new types of health facilities and alter how project teams plan, design, and build together. The changes will also present opportunities to reimagine and improve efficiency options, raising important considerations for the future, including the structuring of project delivery to benefit from new data, prefabrication methods, and technology.

The collective ideal, contributors agree, is a future where the team accelerates the pace and efficiency of project delivery and creates value-based methods that make design and construction a more predictable, enjoyable experience. Can we get there?



DEVELOPING RESPONSIVE COST CONTAINMENT STRATEGIES

Bill Hercules, president and CEO of global consultancy WJH Health, knows the healthcare sector from multiple perspectives. As an architect, he planned and executed capital projects totaling more than 26 million square feet and led the healthcare design practices for firms HKS and Perkins & Will. He also served as a Foundation board member for AdventHealth for Children. In his current role, Hercules is the founder and lead strategist for WJH Health, a healthcare facility strategy and planning practice.

“The question for healthcare teams is, how can we develop new, more efficient ways of delivering a hospital and recast the entire process without the constraint of past conventions and assumptions,” he said. “How can you reimagine [healthcare construction] within a predictable cost containment model?”

Hercules referenced the architectural phrase “form follows function,” coined by the famous architect Louis H. Sullivan in 1896. Hercules suggested that healthcare teams today need to also apply the idea of “form follows finance,” a premise introduced by author Carol Willis in her 1995 book of the same name.

“Building trends are significantly influenced by the financial impacts and opportunities that present in every era of rapid change,” Hercules said. “Looking ahead, we can see that changes in delivering design and healthcare construction services in this era will be shaped by evolving macroeconomic forces.”

Fiscal pressures on clients include recovering from the revenue declines many endured in 2022, and the traditionally low reimbursement models for many Medicare and private insurance payments. Looking ahead, future inflation pressure, post-pandemic wage increases, and unpredictable energy costs are likely to make it harder to stay within prescribed budget and revenue plans.

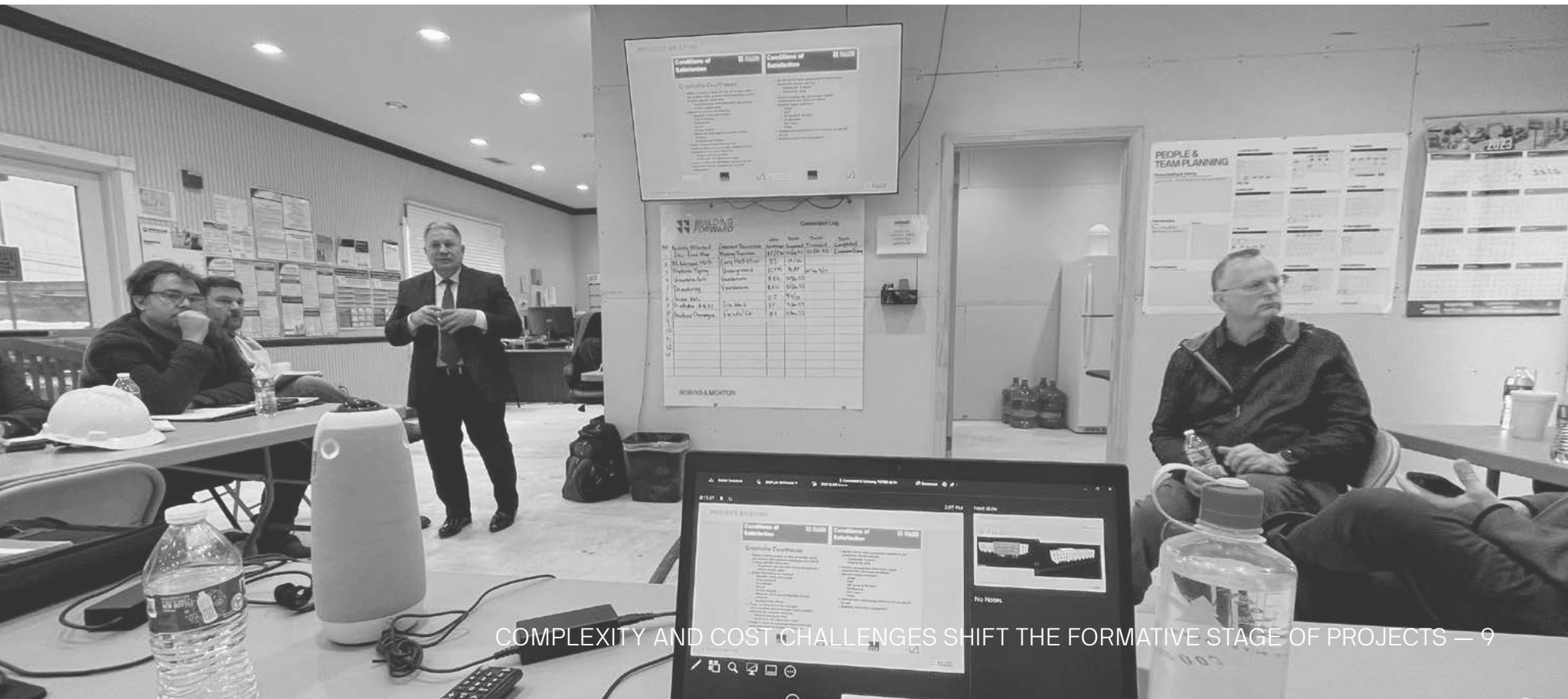
SHAPING A FUTURE THROUGH PARTNERSHIP

To help clients achieve sustained cost efficiency in the future, construction teams are working to help ease the future financial burden on health systems with a more holistic and evidence-based planning process — before big decisions are made.

One of the realities of healthcare construction is that most clients don't build often enough to become experts in construction planning, strategy, and program development. Each time a project is conceived, the process of planning, programing, budgeting, and timing can quickly become a cumbersome predicament that slows progress. Early engagement and integration of construction partners can provide significant value in both the project planning and construction process.

"Clients are looking to us to help them with their programing and strategy for capital projects in their building and infrastructure," said Mike Dare, Robins & Morton project director and Raleigh-Durham office leader. "In the past, we were asked to provide preconstruction support, cost projections and logistics support. As we head to a future that will demand ever-increasing efficiency, we see more owners needing us to help validate their program assumptions and cost.

In a volatile marketplace, we can take a high-level look at their program goals and see if their budget makes sense early, before commitments are made."



INTEGRATED MODELS GUIDE PROJECT FULFILLMENT

“Project success with complex building programs such as hospitals comes down to early planning and, ideally, a deep collaboration among the design teams, the construction manager or general contractor, the trade partners, the owner’s representatives, and the facility team,” said Jay Snyder, principal and president of Big Blue Innovations (BBI). “Integrated teams, joining together as early as project programming and early budgeting, continue to create the value owners need today and in the future.”

Whether integration is achieved contractually through integrated project delivery (IPD) or through a less formal configuration, the value is created when a cross-disciplinary team can share experiences and distinct knowledge to explore ideas and make decisions jointly.

When clients execute a fully collaborative model, shared goals across the team shape a culture that takes on problem solving and innovation together.

“With intentional integration early on, I’ve seen a welcome cultural and behavioral departure from the conventional design, bid, build model,” said Linden Urquieta, vice president with HKS in Dallas. “Having the key people involved from the get-go and collaborating together allows design and construction pros to take on more research and develop evidence-based solutions, then credibly present these suggestions to the clients.”

Urquieta, Snyder, and other contributors emphasized the importance of working in integrated teams to navigate the strategic and tactical choices of prefabrication, offsite manufacturing, and project logistics. With all participants in the construction process seeking creative ways to achieve speed to market, early integration as a best practice will continue to gain traction and universal support.

Patrick Duke, managing director at CBRE, shared his view that clients will be ready for, and more enthused about, adopting IPD models in the future. “Health system clients want a more collaborative delivery model because they saw the power of collaboration during the pandemic,” he said.

“But when they say they want to move toward a collaborative model and do something different, the question becomes, do they have the organizational discipline and courage to move from point A to point B? Because when your board and others prefer to do things in a certain way, change is difficult, as we all know. But the clients are getting better about being more open to the net gains they see others receive.”

CASE STUDY
PIEDMONT MEDICAL CENTER — FORT MILL

Integrated team approach reaches client cost and occupancy goals

Efficiency, speed to market, and future flexibility goals led Tenet Healthcare Corporation to choose an integrated, design-assist approach for a new 200,000-square-foot hospital project.

With a Certificate of Need (CON) deadline looming and program parameters in flux, Tenet Healthcare needed to move quickly through design and preconstruction to build the new Piedmont Medical Center — Fort Mill in York County, South Carolina.

The project faced substantial challenges. Since the original project budget was established years earlier, it was significantly below what a comparable 200,000-square-foot healthcare facility would cost to build. A second issue was time. Tenet Healthcare's goal was to open as early as feasible to meet community health needs in the fast-growing York County region, and to also meet the fixed CON deadline.

Tenet Healthcare chose an integrated design-assist team led by Robins & Morton and Nashville-based architect ESa to meet its budget and schedule goals. The team's first step was to work with Tenet Healthcare on the program elements and employ cross-discipline collaboration to resolve the cost challenges and identify efficiencies.

"With every project, you need to spend time with the designers, trade contractors, and the client to explore a range of options before making design and scope decisions," said Operations Manager Steve Wiley of Robins & Morton. "Because the entire team was together early and understood the urgent goals we all shared, we developed multiple conceptual estimates to help Tenet Healthcare validate its desired program and determine how it would be built within the set budget."

That collaboration became even more critical after a six-month pause while Tenet Healthcare assessed the economic impact of COVID-19 on their future needs at Fort Mill.

The team created a cost-efficient, operationally practical design and construction program by applying Lean planning and target value delivery that included prototypical building elements and efficient standardization of interior spaces.

The 100-bed community hospital opened on time in 2022. It features six operating rooms, an emergency department, labor and delivery rooms, imaging and diagnostic services, and medical/surgical spaces. The campus includes a three-story, 60,000-square-foot medical office building.

"Agreeing on what the budget is and knowing the client needs early in the process allows us to create a more predictable cost containment experience for all parties," said Robins & Morton Senior Preconstruction Manager Bill Michael.

03

Prefabrication Strategy Creates Tech-Enabled Efficiency

A new era of possibility and promise

Prefabrication work being performed offsite

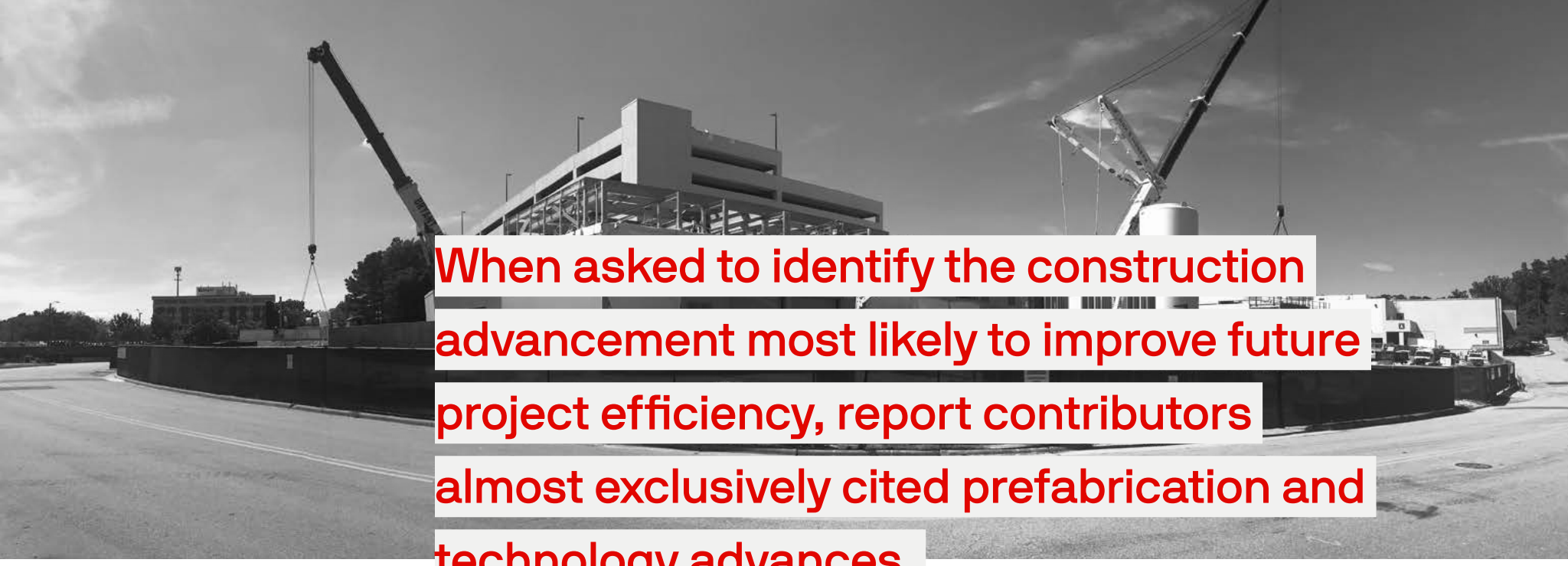
KEY POINTS

- Digital and data-enabled construction strategies, including prefabrication, project analytics, and digital twin models, will provide measurable gains in efficiency, safety, and quality outcomes.

- Robust investments in prefabrication research, application, and support technology will allow a high percentage of future hospital construction to be performed offsite while creating new cost and schedule advantages for clients.

- The greatest opportunity to impact efficiency, speed, and value through prefabrication is at the early stage of programing and planning the project.

- Identifying and objectively vetting prefabrication's benefits and constraints on a project-specific basis will determine project success.



When asked to identify the construction advancement most likely to improve future project efficiency, report contributors almost exclusively cited prefabrication and technology advances.

The promise of expanded offsite construction and prefabrication in the future will be supported by new levels of data analytics and evidence-based decision making.

“Modular and prefabrication solutions as we know them today could never happen without a sophisticated technology structure behind them,” said Robins & Morton Director of Corporate and Operational Technology David Pratt. “Sharing project benchmarking, based on reliable database information from previous projects, is essential to making the right decisions on modular investment. It’s an underappreciated advantage and a big part of what we do and learn.”

For example, efficient offsite construction cannot take place without considering how the prefabricated element will fit into an existing space or tie into planned systems. Technology such as building information modeling (BIM) makes offsite construction viable by ensuring that when the elements arrive onsite, they can be installed seamlessly. The current interconnectedness of prefabrication and technology make offsite construction a digital-enabled practice.

Industry optimism is based largely on project improvements already happening, demonstrated by breakthroughs that achieve measurable efficiency, safety, and quality gains. “Modular and offsite construction will continue to further integrate with technology, advancing the practice to a new level of precision and speed, supported by data gathering and integration,” said Pratt.

“Whether we measure efficiency through more precise schedules, a more productive workforce, leaner budgets, or quality control advances, the benefits for our clients will be tangible and welcomed.”

PREDICTIVE, EVIDENCE-BASED PREFABRICATION STRATEGIES

Carlos Moreno, an associate principal with Perkins Eastman in Austin, Texas, is enthusiastic about the current applications of prefabrication and the possibilities ahead. "Supply chain issues, labor shortages, and cost escalation powerfully impacted design and construction teams in recent years. That increased attention gave new urgency to the value of prefabrication as a long-term option for meeting those challenges," he said.

"In the next evolution of construction, prefabrication opportunities will continue to develop. We are using prefabrication as much as we can, especially to avoid a lot of labor-intensive work being done on the project site. In addition to efficiency benefits, it contributes to safety at the site by shifting work such as welding and cutting activities away from the jobsite to a safer environment. When you're inside, or adjacent to, an existing hospital, each added safety measure is important."

Bob Sullivan, Vice President of Facilities Project Management and Construction
Boston Children's Hospital

"Exploring all options for a prefabrication plan is what we see happening within most healthcare building programs now and in the future."

Robins & Morton SmartFab® Director Matt Hardy also provided insight on prefabrication and offsite construction's performance in healthcare, as well as a forecast for how it will evolve in the coming decade. Hardy leads the company's prefabrication and modular planning efforts and applies his decade-plus of experience in prefabrication, healthcare building, and engineering to the role.

"An early indication of what's ahead is the apparent enthusiasm from our larger clients that frequently plan and build. Each time an opportunity arises, they expand their prefabrication and offsite strategy to include more components," Hardy said. "One client recently set a goal of assigning 60% of each project's total labor hours to offsite construction and modular components on future projects. They are closely tracking this work as they go. They believe this is how every healthcare project will proceed in the years ahead."

EVALUATING AND VETTING PROJECT OPTIONS EARLY

While prefabrication and modular solutions are widely used in other building types, Hardy believes that it is actually easier to plan and integrate modular solutions into healthcare projects.

“Many of the spaces are similar in layout and suited to standardization. The challenge with hospital projects is the need for early identification and objective vetting of each specific project’s opportunities. The largest opportunity to impact efficiency, speed, and value is during the very early stages. Because of the complexity of a hospital building and the need to find the right scale and value of a preconstruction initiative, it is imperative that we start early with these decisions,” he said.

Another challenge stressed by Hardy and others is the importance of finding the right balance when standardizing spaces such as patient rooms, emergency rooms, surgical suites, and exam rooms built as modular units. “Standardization in the design of these spaces will change the process of making late-stage changes,” he said. “It will take some getting used to, but the cost and schedule benefits of avoiding late changes will help change past practices.”

Carlos Moreno described the long-term value proposition. “Modular systems, whether component prefabrication or an outright modular building, allow additional quality control to come back to the design and construction arena,” he said. “Is it a cheaper process at first? Not necessarily. Sometimes, it is more expensive at the onset of a project. But when you look at the compressed timeline of bringing a facility from concept to completion, a modular design-build strategy is not only more predictable, but it also allows for all the replicable elements that make up a project to occur methodically and quickly, translating to cost savings.”

Also offsetting the early-stage investment in a prefabrication strategy is creating long-term labor savings that align with the need for better solutions to the current marketplace shortage.

“The industry’s labor issues underpin many, if not most, of the challenges construction faces because of continued schedule compression and expectations, unavailable and overscheduled skilled trades, and even overcommitted field supervision,” said Jay Snyder of BBI.

“Contractors and the industry can mitigate this by evolving their business strategy and operational practices with new ways of thinking about how they use resources in a manufacturing setting.

For example, where appropriate and where risk can be managed, contractors should consider training a worker to be able to take on multiple roles, or even work across adjacent trades. It’s not that farfetched to consider training painters to also be certified to do waterproofing, or to train someone in both joint sealing and fire caulking, as simple examples. Initially, senior folks in these specialties will balk, but we should ask ourselves if the underlying training and applications have enough similarities that we can extend skillsets to similar production assemblies. The military is addressing their shortage of personnel through this approach as well, with positive early results.”

FUTURE PATHWAYS IN PLACE TO BENEFIT ALL TEAM MEMBERS

The long-awaited maturity and universal stakeholder adoption of digital-enabled technology in construction is expected to introduce new options for clients and their building partners. For each, the promise behind tech maturity is to save time and cost on every project — in other words, a more replicable and highly efficient planning, design, and building experience for all.

Project leaders say that for these objectives to reach their full potential, it won't be enough to usher in new and improved updates of tech tools, apps, and analytics software. The essential breakthroughs will happen only when the traditional silos break down further and the industry taps into the long-term benefits of more open-source data sharing and benchmarking. Thanks to the gains of integrated teams and the lessons of transparent collaboration, progress towards a digital-enabled revolution is underway.

A timely example of this progress towards tech integration and sharing is apparent with the success of the prefabrication advances on projects such as Novant Health's new Ballantyne hospital. The reason for fast growth and the accompanying excitement is how analytics and digital modeling create tangible value and erode the old silos.

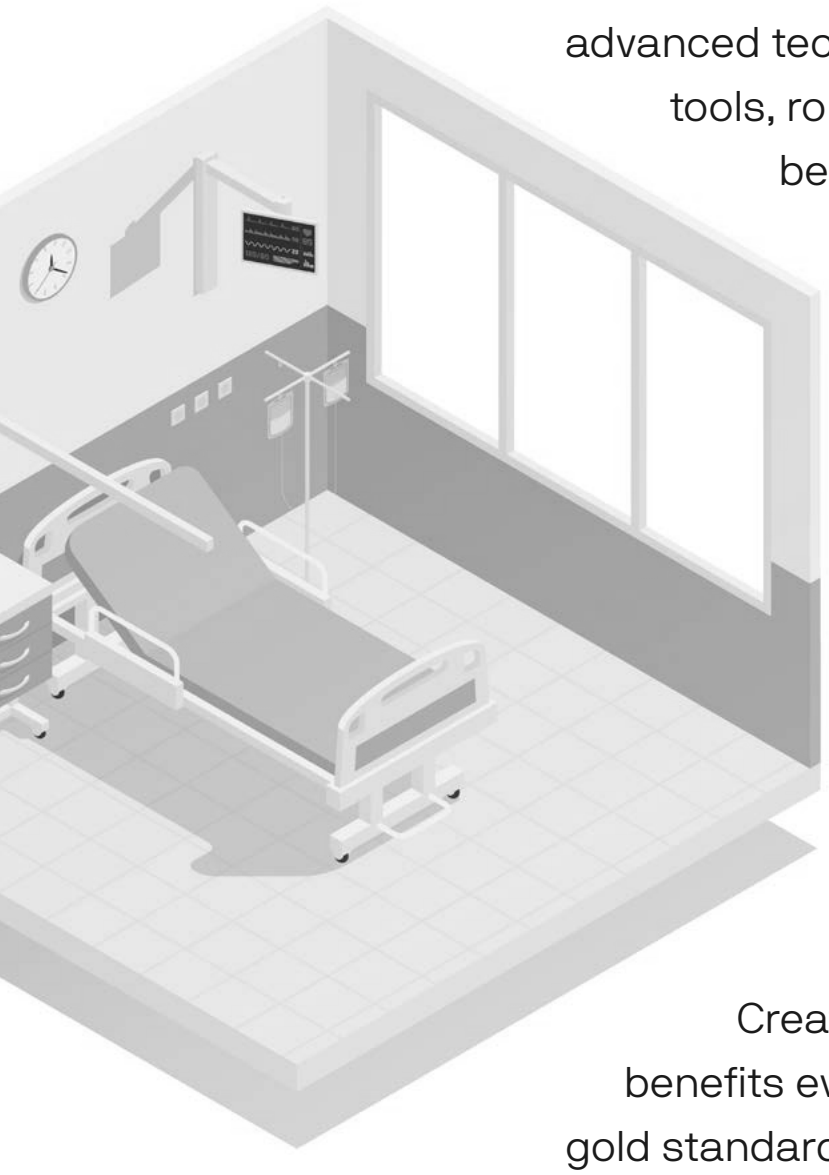
DIGITAL TWINS INFORM FUTURE DEVELOPMENT

Many healthcare clients see the importance of investing in modern analytics and digital data. "They are looking at our technology capabilities and the advancements in business analytics," Pratt reported. "There is an evolving understanding of how these tools can advance their facility operations, maintenance, and life cycle savings by utilizing predictive data to gain efficiencies."

"A client recently invited us to their facility to help them build a technology-enabled BIM model of their existing building assets. The deliverable will be a 3D digital twin, a real-time and reliable model of what they own and operate."

Pratt said that the benefits of digital twin analytic models are hard to overstate. Once a client has asset tracking data built into the model of the building's equipment and infrastructure, facility managers can monitor performance and anticipate maintenance needs ahead of problems and surprises. When the time comes to plan and design a renovation or a compatible new building, the information needed by the design and building team is available without the expense of detailed front-end investigation and documentation.

This opportunity to manage the entire life cycle of a building also benefits clients by integrating more efficient, futuristic use of advanced technologies, including virtual reality and augmented reality tools, robotics applications, and predictive AI analytics that will be used long after the construction team leaves.



Can the construction industry meet the challenge of integrating these digital tools to create an information-sharing culture? Patrick Duke of CBRE offers an optimistic perspective. "Despite the construction industry lagging a lot in real estate and the adoption of technology, this is changing. I see people having more open minds. Reluctance about tech and innovation adoption is being replaced by an openness to expand the gains of Lean methodologies and the opportunity to do things faster. I like that attitude I see from our industry."

Creating a smart and seamless digital integration that benefits everyone throughout the entire facility life cycle is the gold standard. Channeling tomorrow's beneficial tools — artificial intelligence (AI), virtual reality (VR), and autonomous robotics, for example — will require a concerted, collaborative effort to create reliable, comprehensive data interaction across every platform and tool set.

Robotics in Construction

Q+A with Christina Till

Is there a more talked-about construction tech story than robots on the jobsite?

To gain a frontline view of robots today and in the future, we talked with Christina Till, technology implementation coordinator with Robins & Morton.

Christina is a Villanova University graduate who majored in mechanical engineering with a minor in mechatronics. She is currently pursuing her master's degree in electrical engineering.

What should people know about using robots today on a hospital construction site?

Using robots for highly repeatable tasks allows skilled workers to focus on more complex work. It also contributes to site safety by allowing us to separate people from events that could become dangerous.

What kind of tasks are robots typically doing?

We are using Spot®, a Boston Dynamics robot, to take daily progress photos that upload into a digital database. The robot, which we call Morty, can also perform laser scanning and document existing conditions within a building. This can help us avoid sending humans into areas such as crawlspaces, a significant safety benefit.

Our team is testing another robot for layout at a project in Doral, Florida. This robot stencils a building's layout onto the foundation, reducing the time and workforce it typically takes to complete this task. Additionally, one of our healthcare projects in North Carolina is beta testing Honda's autonomous work vehicle (AWV) as a way to reduce the labor and costs involved in moving materials across the site.

Are there any other factors that determine the best applications?

The greatest barrier to adoption is that the machines can be expensive. As with the price of other technologies in the early stages, the price of robots will come down in the future. Right now, people get to see how robots work and learn which tasks they can do to help our teams be safer and more efficient.

How might robotics evolve in the future?

As new digital technology emerges to automate how we use construction data, robots will provide more capability for progress tracking and reporting. We will be using more dashboard applications to share digital information and analytics. Robots will help with capturing and uploading real-time information to a database and will translate that information into a dashboard tool designed to track, analyze, and report on project key performance indicators.

Robots have great tracking applications. For example, robots can autonomously monitor and report conditions. By monitoring specific areas on a jobsite, for example, they can detect when material is delivered or how many vehicles are going to and from the site.

Robots can detect a range of items, such as security, use smart systems, and send condition reports to initiate necessary changes.

CASE STUDY
NOVANT HEALTH BALLANTYNE

Modular Construction Maximizes Patient Care Space at Novant Health

The strategic case for expanding prefabrication applications grew stronger in response to supply chain disruption, volatile pricing, and labor shortages in the past three years. Recent projects provide evidence that offsite manufacturing and prefabrication will play a lead role in healthcare construction's future success.

A recent project for Novant Health illustrates the value of identifying the right applications for a smart, evidence-based prefabrication strategy.

When Novant Health received approval to build a new hospital campus in Charlotte's rapidly growing Ballantyne, North Carolina, community, the client wanted to devote as much of its permitted 216,000 square feet as possible to providing and supporting patient care.

To meet that objective, Charlotte Engineers specified a rooftop penthouse to move equipment out of the building's occupied patient care floors.

Preserving Floorspace Translates to 10,000 Square Feet of Additional Patient Care Space

“Since the prefabricated modules are considered equipment — and not part of the building’s structure — the 10,000-square-foot mechanical penthouse does not reduce the amount of allowable space on the building floors,” said Robins & Morton Division Manager Mike Bumgardner.

While determining sizing and the ideal location for the mechanical penthouse, the team studied the options for manufacturing all or part of it offsite. Through investigation and collaborative analysis, the team determined that the hospital was a perfect candidate for Robins & Morton’s SmartFab® approach.

Objective Vetting of Prefabrication Ideas

By definition, SmartFab® is a systematic review process to identify and implement a customized, project-specific pre-assembly, modular, and prefabrication plan. This multidisciplinary objective review considers benchmark performance data from other projects and a real-time projection of risks, benefits, and costs. The goal is to eliminate waste, accomplish the client’s fiscal plans, and achieve outcomes that produce added value in project quality, safety, and efficiency.

Robins & Morton, Charlotte Engineers, and project architect HDR worked through design enhancements that placed the boilers, chillers, and first-floor air-handling units in the basement.

Air handlers serving the second and third floor, hot water distribution, cold water return pumps, and medical gas distribution were designated for offsite prefabrication as a penthouse module.

Offsite Penthouse Manufacturing Selected

When the design was complete, and with the support of project mechanical contractor TMI, the Novant Health team selected Systecon, a global leader in modular utility products, to manufacture and deliver the unit.

The team used precise BIM and VDC digital modeling to align the complex mechanical piping and distribution lines with the onsite infrastructure. Robins & Morton provided 3D scans of the structure that were used by Systecon to overlay its 3D model. This step ensured

accurate positioning of all ducts, piping, and electric connections, and coordinated the structure to align with dozens of concrete pedestals and embed plates. Every installation step was planned in advance via team visits to the Ohio manufacturing plant and continuous communications between Robins & Morton and Systecon.

Tangible Gains for Earlier Completion

The penthouse installation — including all connections — was completed in three weeks. Each module consisted of floor, interior and exterior walls, roof, and all equipment, with connections between the units and the structure.

"You're building the penthouse shell and installing the equipment in a single step," said Robins & Morton Superintendent Jamie Atkins. "With conventional construction, this would have taken three months instead of three weeks."

Future Expansion Flexibility

The hospital is built to support a future fourth-floor vertical expansion. The modular penthouse is configured to be easily disassembled, then lifted onto the future fourth floor for quick reassembly. An extra chiller in the basement and added capacity in the adjacent central energy plant help further futureproof Novant Health's $154 million investment.

The onsite team coordinated the logistics for the delivery and installation of 19 pieces of the unit, some weighing as much as 38,000 pounds and transported on specially designed trailers.

04 The Human Experience Informs Future Success

KEY POINTS

- Prioritizing the human experience, including the well-being of caregivers, patients, construction team members, and community stakeholders, is sparking actions to create healthier and more empathetic approaches to the construction process.

- Establishing a positive, motivating experience for all stakeholders is now becoming as important as achieving traditional project success metrics.

- Sustainability, social responsibility, transparency, and community philanthropic initiatives are increasingly expected behaviors — earning the loyalty and support of employees, community members, and influencers.

- Organizations that excel in taking action on the human side will benefit in tangible, and often unexpected, outcomes. Addressing labor shortages, empowering staff innovation, and generating community support and goodwill are advantages described by those leading the way.

Healthcare design and construction teams succeed by meeting established performance criteria. Was the schedule met? Did the project finish within budget? Do the design and function of the new facility meet client and occupant expectations?

While these performance criteria remain as important as ever, additional priorities emerge as the very nature of healthcare — and building for healthcare — evolves toward the future.

Increasingly, a wide-ranging set of human-side success metrics challenges every organization working in the healthcare sector. Improved performance and everyday leadership on workforce, sustainability, wellness, and community needs will underpin project performance.

While hardly new, this emphasis on better human outcomes will be more critical than ever as leaders strive to inventively respond to labor shortages, economic headwinds, and social equity.

“Across the entire team, including designers, trade contractors, and clients, the path to success with a building project needs to include engaging at a deeper level with each other, with our team members, and with the larger community. That input provides the foundation for creating better outcomes,” said Robin Savage, president and COO of Robins & Morton. “In the years to come, developing a healthier and more empathetic human experience together will help alleviate many obstacles.”

Healthcare Clients: Well-being and Workplace Priorities

In a survey researching the top issues confronting healthcare CEOs in 2022, workforce challenges ranked first among the top concerns. The annual survey, conducted by the American College of Healthcare Executives (ACHE) and released in February, asked respondents to rank 11 issues affecting their hospitals. This is the second year in a row the surveyed CEOs cited workforce and personnel challenges as the top issue, citing staff burnout and overall well-being as priorities.

To address frontline clinical staff's health and wellness needs, hospitals are upgrading the workplace experience. "In today's healthcare planning and design, staff wellness in the workplace is an important conversation during the input phase of each project," said architect Derek Veilleux, senior principal and director of the Health & Wellness Practice at SMRT in Portland, Maine. "Natural light throughout workspaces, views to outside nature, outdoor gardens and patios for respite and reflection, and private break spaces to decompress or make a phone call in quiet are amenities that make a difference."

Jackie Mustakas, senior sustainability manager for Robins & Morton, concurs.

"Wellness is such a hot topic right now with our clients. The labor shortage caused a lot of employers, not only those in healthcare, to consider everything that allows more successful recruitment and retention of employees. Clearly, the need to support the physical and mental health of hospital staff will be a continuing priority for our clients."

Mustakas recalls how wellness trends in the workplace, and the fast-growing WELL and Fitwell certification programs, were natural extensions of sustainability initiatives. "Following the onset of the

pandemic, people occupying workplaces became aware of things like measuring air quality and using negative airflow in hospital settings. We all prefer working in a building that feels better and improves our health and productivity."

Looking forward, healthcare construction experts see rising interest in applying the evidence-based WELL certification and Fitwell certification to foster wellness in the workplace.

Healthcare Patients: Evolving the Hospital Experience

Ongoing changes in healthcare financial and reimbursement models combined with the vital role of telehealth, home care, and ambulatory care present opportunities to rethink the patient experience.

In a recent interview with Becker's Hospital Review, Gerard Brogan, senior vice president and chief revenue officer of Northwell Health in New Hyde Park, New York, described a shift towards more patient choice and flexibility.

"Operationally, hospitals and health systems will be more designed around the patient experience rather than the patient accommodating to the hospital design and operations. Specifically, it will be more geared toward patient choice, shopping for services, and price competition for out-of-pocket expenses."

Bryan Emde, executive director of the Office of Design and Construction for AdventHealth, shared a few ideas. "As we move into an ever-changing future, we have an opportunity to make things easier for people who come in for care," he said.

The World Economic Forum estimates the number of adults 65 and older will double by 2050.

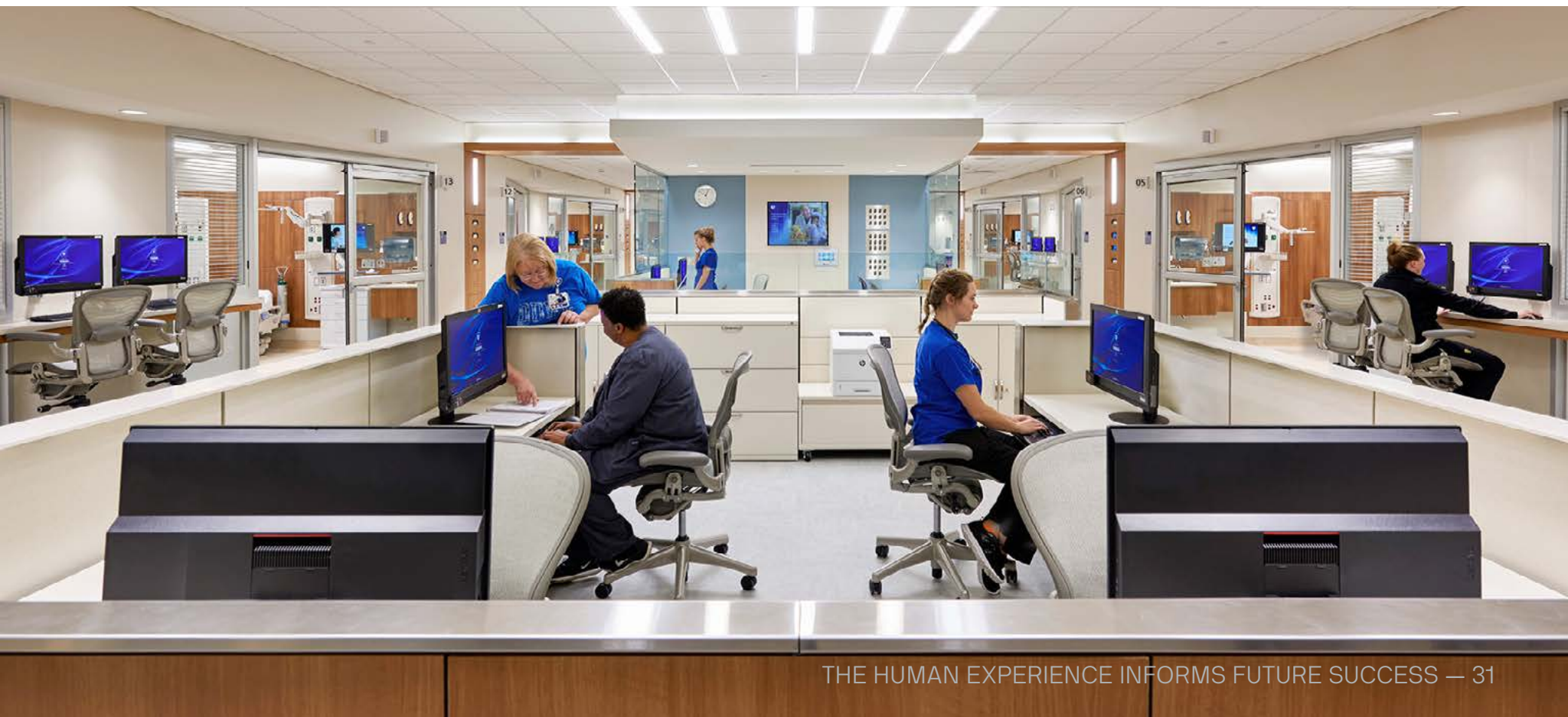
“For seniors, hospital visits can be a scary time. If we make it simpler and more enjoyable, it helps them and the hospital. We want to make their experience easy, not stressful or complicated.”

Bryan Emde
AdventHealth

“What if a patient is coming in to see an orthopedic doctor? In the future, we want to create a healthcare environment where patients can park their car, come in, be welcomed with a cup of coffee, have childcare available if needed, and make the visit as simple to manage as possible. They will encounter an easy-to-navigate space where, using their phone app, they can get an x-ray done, go to the pharmacy to fill a prescription, or stop for blood work in the lab. What if the patient also receives a single, easy-to-understand bill for services via the same phone app?”

Integrating hospitality experiences in healthcare is an intriguing idea that may serve as a differentiator in a future scenario when mega players such as Walmart and Amazon enter the industry as competitors.

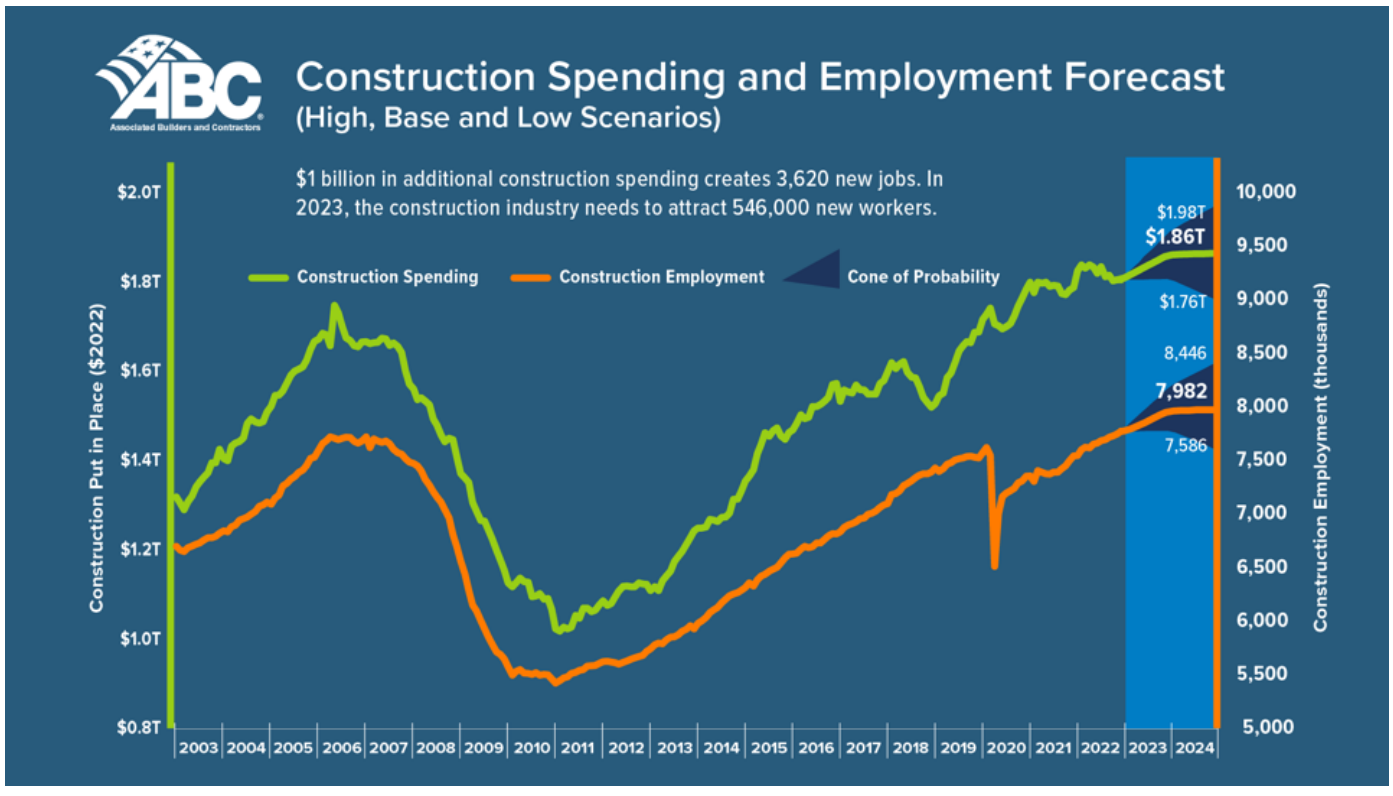
“If somebody wants to call themselves a healthcare visionary, all they have to do is be a good student of the hospitality industry because much of what the hospitality industry is doing will be happening in a few years in healthcare,” said Dr. Wayne Ruga, president and founder of The CARITAS Project.



The Building Team:
Improving Engagement, Health, Retention

The challenge of recruiting adequate staff for new healthcare facilities is immediately preceded by the challenge of maintaining a workforce during the facility's construction.

According to the Associated Builders and Contractors (ABC), the construction industry will need to attract an estimated 546,000 additional workers beyond the normal pace of hiring in 2023 to meet the demand for U.S. building projects. ABC reports that the construction industry averaged more than 390,000 job openings per month in 2022, the highest level on record. The industry's national unemployment rate of 4.6% in 2022 was the second lowest on record.



Unfortunately, data reveals that long-term labor shortages will continue to challenge the industry. In response to the challenge, construction companies continue to invest in creative initiatives to introduce the advantages of construction employment and develop a future pipeline of employees. Programs geared towards high school students to generate awareness and interest in construction careers are helping develop a future workforce. More success stories like these will be needed to close the gap.

Robins & Morton's Building Forward® Lean Practice Leader Jennifer Lacy shared her insights on long-term thinking and actions to improve retention, recruitment, and employee engagement.

"The focus for the industry was always on managing the project tools and day-to-day processes, and for team leaders, measuring the tangible outcomes accomplished," she said. "To be successful today and in the future, an emphasis on team health and the well-being of our team members is essential too.

When we connect with people on a basic human level and take care of the human side inside and outside of work, we increase their engagement, trust level, and motivation to succeed. These results will raise the bar for all future project goals and expectations."

"A strategic and ongoing emphasis on the human factors in attracting and retaining people is well matched to the emerging workforce in the industry," Lacy said. "For the younger generations coming into the industry, it can't just be, here's the structure; you need to work within it. They want to take on a meaningful role and know they are having an impact. 'Here are the things that we know can help define success, but what defines success for you?' And we need to make sure we're aligned on that idea."

Architect and consultant Bill Hercules of WJH Health referenced the need to address the social, emotional, and mental health needs of individual employees. "The public discussions around mental health, and the fact that almost everybody has some direct concern about their own mental health or the well-being of someone close to them, offer a wider awareness and urgency," he said. "These are major issues, and the support infrastructure simply hasn't matured enough to address the need. We know how to respond to cardiac health symptoms, but helping employees with mental health needs is more complex and more individually based."

The Community:
Building and Sustaining Cohesive Partnerships

Planning and building healthcare facilities is a community endeavor. The positive impacts, during and after construction, are experienced across an entire region. Healthcare construction, done in partnership with residents, local businesses, project staff, client staff, and local nonprofits, is about building a healthier future while helping sustain a community's social fabric.

Organizational and community improvements through environmental, social, and governance (ESG) actions will provide opportunities to make the building process more efficient and create a new generation of sustainable, environmentally sound hospitals. "We are having much deeper conversations with clients about sustainability. For a long time, the focus was LEED checklists and energy efficiency," Mustakas said. "Now, the conversation has shifted to more strategic and operational issues, including embodied carbon, future electrification, and community reporting on environmental initiatives and performance data."

CASE STUDY
BAPTIST HEALTH SOUTH FLORIDA

Dual Goal of LEED and WELL Certifications Informs Carbon Reduction Analysis

In Boca Raton, Florida, Robins & Morton is building a seven-story, 417,000-square-foot patient tower for Baptist Health South Florida. The project offers a glimpse into the future of healthcare construction — one that is strongly influenced by community health and sustainability.

When complete in 2025, the new Gloria Drummond Patient Tower will be among the first hospital facilities to earn WELL and LEED certification. WELL is a performance-based global standard for defining and certifying health and well-being standards for occupants, and LEED is a globally recognized standard and rating system for the design, construction, and operation of high-performance green buildings.

Boca Raton Regional Hospital project partners Robins & Morton, HKS, and TLC Engineering Solutions co-presented an education session, “Fire to Electrons: Decarbonization at BHSF Boca Raton Regional Hospital,” at ASHE’s March 2023 PDC Summit on Health Facility Planning, Design & Construction[1]. The session provided a present and future look at the team’s collaboration to reduce carbon emissions and implement long-term materials, energy, and wellness strategies to reduce operating costs and deliver a healthy, future-ready facility for the Boca Raton community.

Materials Supply Chain

Traditionally, LEED and sustainability performance in healthcare have been measured by the building's projected energy use, water consumption, and use of sustainable materials. However, these metrics overlooked the urgency of carbon emissions. Most of these emissions are released before the doors of the facility open to the public. While some carbon emissions come from the construction process, up to 90% of the total environmental impact comes from the material supply chain.

The cradle-to-grave carbon impact of specified products, finish materials, concrete, wood, HVAC equipment, and hundreds of other items begins at the manufacturing plant. It continues for decades until reaching the end-of-use, demolition, and disposal end game.

Life Cycle Assessment (LCA)

The Boca Raton Regional Hospital team used benchmark data to conduct reviews and modeling to estimate environmental impacts throughout the expected life cycle of materials and products. As additional data and modeling tools become available in the years ahead, LCA initiatives will evolve from a comparative task to a more precise process, offering further cost management and operations and maintenance benefits. As clients commit to more aggressive sustainability goals in the future, LCAs for materials and carbon impact will play a larger role in preconstruction discussions and decisions.

Envelope Matched to Local Climate

The building envelope integrates passive shading strategies that dramatically reduce the amount of heat entering the spaces. Lightweight sun shading devices and trellises help combat the morning sun, while recessed precast panels mitigate the heat gain from the mid-day and afternoon sun.

The hospital's modern enclosure design includes locally sourced precast concrete panels that are prefabricated in South Florida.

Low Carbon Concrete Studies

Concrete is one of the largest sources of embodied carbon in construction. The Boca Raton Regional Hospital team worked to identify options to lower carbon impacts, analyzing the cost and tradeoffs of new concrete production methods and products. These included supplementary cementitious materials (SCM) such as fly ash, a byproduct of coal combustion, and recycled aggregates, including one that recycles CO2 captured from industrial emissions and injects it into the concrete to prevent the atmospheric release of carbon.

The team discovered that factors such as alternative concrete availability, transport cost, regulatory and structural code requirements, and achievable net carbon reduction data ruled out multiple options.

Another limiting factor was the project's South Florida location. "The hospital is five miles from the Atlantic Ocean and needs to withstand a Category 5 hurricane," said Anik Patel, senior MEP manager with Robins & Morton. "The high wind load alone presents a big challenge when we consider any option that reduces the building structure's density and resilience."

Future Evolution for Materials and Decarbonization

Among the present-day lessons of the Boca Raton Regional Hospital project team is that the expected evolution of benchmark data, forecasting, cost analysis tools, and alternate materials will provide a powerful boost for teams such as theirs, working to fulfill the sustainability mission of their client. Harnessing these new resources will become an increasingly important part of the early preconstruction and design decisions made by integrated, cross-discipline teams.

That prospect is already seen as a more near-term development. Robins & Morton's concrete self-perform work teams report that concrete suppliers are investing capital in the decarbonization process in response to marketplace demand.

"Emphasis on community responsibility, carbon reduction, and life cycle forecasting aligns with our clients' present and future needs," said Jackie Mustakas, senior sustainability manager for Robins & Morton. "The conversations center on their most strategic issues, including environmental stewardship, cost reduction, and responsive actions to provide places that meet the needs of their staff, patients, and local community members."

[1] ASHE PDC Summit presenters were Sammy Shans of HKS, Anik Patel of Robins & Morton, and Anthony Scaccia of TLC Engineering Solutions

05 Contributors

BRYAN EMDE, AIA
Executive Director | Office of Design and Construction
AdventHealth | Central Florida Division

Bryan Emde, AIA, is the Executive Director of the Office of Design and Construction for AdventHealth. His department manages design and construction activities for the organization in the Central Florida area. Bryan is a registered architect who worked on the design side for over 20 years before joining AdventHealth in 2015. In his spare time, Bryan enjoys geocaching, traveling, and working on puzzles with his family.

JAY SNYDER
President & Principal
Big Blue Innovations

Jay Snyder is the President of BBI - Big Blue Innovations, which consults contractors through digital transformation, assists technology startups on launch and growth, and provides M&A planning. Jay has been in the engineering and construction industry for 23 years with experience that includes executing $1 billion of construction as a project manager and executive, hospital director of real estate and construction, construction tech startup founder, and as a leading consultant at industry titans Capgemini and FMI.

DEREK J. VEILLEUX AIA, EDAC, NCARB
Senior Principal, Director of Health & Wellness Practice
SMRT Architects and Engineers

Derek Veilleux, AIA, is a senior principal leading the Health and Wellness practice at SMRT Architects and Engineers. In 26 years of practice, he has developed a deep understanding of the challenges facing healthcare providers. Derek strives to collaboratively deliver evidence-based designs with operationally efficient, compliant, and sustainable environments supporting the physical and emotional needs of patients, their families, and staff. His recent work includes acute and ambulatory care, medical office, and mental health facilities.

DR. WAYNE RUGA
Founder and President
The CARITAS Project

Serial innovator Dr. Wayne Ruga has been pioneering a breakthrough approach to cultivating more caring healthcare experiences through the work of The CARITAS Project since 1999. Called 'generative space', this innovation has improved healthcare delivery around the globe. Previously, in addition to receiving patents, teaching in universities, and conducting research, he founded a highly successful design practice, and then founded and developed two leading healthcare innovations — the Symposium (HFSE) and The Center for Health Design (CHD).

CARLOS N. MORENO, AIA, NCARB
Associate Principal
Perkins Eastman

Carlos Moreno, AIA, is an architect dedicated to the continued exploration of trends and services in the healthcare industry. As such, he recognizes that the delivery of healthcare is not a linear process but rather one that needs to be responsive to speed to market in addition to economics. His attention to technical issues and knowledge of regulations in acute care bring a high level of expertise and value to the delivery of services to Perkins Eastman's clients.

PAUL HOLLEY
Professor, McWhorter School of Building Science
Auburn University College of Architecture, Design and Construction

Paul Holley, Ph.D., spent 14 years working in commercial construction prior to 2002 when he joined the faculty of Auburn University, where he teaches undergraduate and graduate students at the McWhorter School of Building Science. Dr. Holley serves as director of the Center for Construction Innovation & Collaboration, has held two endowed professorships, received multiple national teaching awards, and was recently recognized with Auburn's Leischuck Presidential Award for Excellence in Teaching.

ROBERT SULLIVAN
Vice President, Project Management and Construction
Boston Children's Hospital

Bob Sullivan is Vice President, Project Management and Construction, at Boston Children's Hospital, where he is responsible for all renovation and new construction. He is a life-long construction professional with an extensive background in project management and senior operations. His career spans over 42 years and has been shaped by extensive education in construction management and administration techniques as well as hands-on experience gained in completing a multitude of complex building assignments.

LINDEN B. URQUIETA, AIA, NCARB, LSSYB
Vice President, Project Manager
HKS Inc.

Linden Urquieta is a Vice President and Project Manager with HKS, an international architecture firm. Her passion for architecture stems from the opportunity to create spaces for people that will leave a lasting impression in their memory. She collaborates with families, clients, consultants, and the project team to deliver a comforting and healing environment that is a haven, and sometimes a home away from home. Linden's involvement in projects from start to finish is what she enjoys most, watching a concept morph into a physical building.

PATRICK DUKE
Managing Director
CBRE

Patrick Duke is CBRE's Americas Healthcare Project Advisory Solutions leader. Patrick has served as a key spokesperson on topics ranging from gender equity in the design and construction industry to collaborative project delivery models. He serves as a Counselor of Real Estate (CRE) and is a Board Member of World Pediatric Project (WPP) and Young Caribbean Professional Network (YCPN). Patrick also serves on the Diversity and Inclusion Committee at Auburn University's Samuel Ginn College of Engineering.

DAVID PRATT
Director of Corporate and Operational Technology
Robins & Morton

Director of Corporate and Operational Technology David Pratt is responsible for managing Robins & Morton's Corporate IT department, BIM/VDC department and Jobsite Engagement Team (JET). David has been in the construction industry for more than 25 years, with most of his experience focused on various areas of technology. He holds degrees in computer science and career technical education from multiple Florida state colleges, the most recent being from the University of Central Florida. David is also a proud United States Air Force veteran.

MATT HARDY
SmartFab® Director
Robins & Morton

SmartFab® Director Matt Hardy, a 25-year construction veteran, leads Robins & Morton's SmartFab® systematic review process to identify and implement customized, project-specific logistics, pre-assembly, modular and prefabrication plans for every project. Matt also conducts outreach to vendors and trade contractors to learn from them, ensuring that Robins & Morton is up to date on the prefabrication and modular options available. Prior to working at Robins & Morton, Matt worked with electrical trade contractors and most recently held the title of Director of Healthcare Construction and Prefabrication Services for Tri-City Electrical Contractors.

JACKIE MUSTAKAS
Senior Sustainability Manager
Robins & Morton

As Robins & Morton's Senior Sustainability Manager, Jackie Mustakas leads the company's sustainability-focused initiatives. She also heads the company's Sustainability Council, analyzes sustainable initiatives and assists clients as part of Robins & Morton's Green Building services. Her certifications include LEED AP, Green Globes Professional, ParkSmart Advisor and WELL AP. She holds a Bachelor of Science in Building Construction and master's in Sustainable Design and Construction, both from the University of Florida.

JENNIFER LACY
Building Forward® Lean Practice Leader
Robins & Morton

Robins & Morton's Building Forward® Lean Practice Leader Jennifer Lacy has been with the company for 19 years and is responsible for the continued advancement of the company's Building Forward® approach, based on Lean philosophies. She is a published author, hosts a weekly YouTube livestream, and is a frequent speaker at national conferences such as Lean Congress, Associated General Contractors' Annual Conference, Healthcare Facilities Symposium and more. Jennifer holds a Bachelor of Science in Operational Management from Texas A&M University-Commerce.

BILL HERCULES, FAIA, FACHA, FACHE
President/CEO
WJH Health

Bill Hercules inspires healthcare leadership teams by shaping their future places of care. Having planned and/or executed healthcare projects totaling more than 26.3 million square feet and $10.3 billion, Bill's cross-disciplinary and bold ideation accelerates mission alignment by creating frameworks that attract the future through focused inquiry within organizations, and by innovative approaches outside of healthcare's historical channels. Bill founded WJH Health, a global consultancy that resolves the place of care at the nexus of mission, performance, and experience. He is the only practicing global triple-Fellow in the American Institute of Architects (AIA), the American College of Healthcare Architects (ACHA), and the American College of Healthcare Executives (ACHE).

CHRISTINA TILL
Technology Implementation Specialist
Robins & Morton

Christina Till is Robins & Morton's Technology Implementation Specialist. Her role includes testing and overseeing technology used on jobsites throughout the Southeast. Although her field of study was mechanical engineering, she was intrigued by the potential of using robotics to transform construction processes. After interning at Robins & Morton in 2021, she decided to shift her career path to focus on technology use in construction.

Christina holds a degree in mechanical engineering with a minor in mechatronics from Villanova University. She is currently pursuing her master's degree in electrical engineering.

MIKE DARE
Raleigh-Durham Office Leader at
Robins & Morton

Mike Dare is a Project Director and Robins & Morton's Raleigh-Durham office leader. Mike has been with Robins & Morton 14 years and has directly contributed to the success of more than 90 projects totaling more than $400 million. Mike is a graduate of Sam Houston State University's construction management program. In his free time, he volunteers with the American Heart Association, Leukemia and Lymphoma Society, the Ronald McDonald House, Apex United Methodist Church, and ABC.

ROBIN SAVAGE
President/COO
Robins & Morton

Robins & Morton President and Chief Operating Officer Robin Savage is responsible for the overall operations of the Birmingham office, preconstruction services and all divisions of the company.

Robin received his Bachelor of Science in Building Construction from Auburn University in 1982 and received the Outstanding Senior Award in Building Science Construction. In 2012, Auburn presented him with the school's prestigious Lifetime Achievement Award for his service, leadership and commitment to his alma mater and company. Robin is a longtime member of the Auburn Building Science Industry Advisory Council, previously served as a member of the Construction Industry Fund Board, and is a former president and current board member of the Alabama Chapter of Associated Builders and Contractors. He also supports a variety of civic organizations, including serving as a member of board of directors for the Greater Birmingham Humane Society and Glenwood, Inc.

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