

Meet the new members of your jobsite safety team – robots

■ A pilot program using AI and autonomous robots provided detailed monitoring and scoring of everything from lighting conditions and fall hazards to PPE and fire safety, giving instant feedback to both management and crew.

By **STEWART GERMAIN**
AND **GARRETT METZ**
Skanska USA

When we think about jobsite safety, we think personal protective equipment (PPE), proper signage, clear instructions, fire extinguishers, barriers, proper lighting, using the right equipment for each task, and regular inspections, among other things. But robots are probably not on anyone's checklist.



Germain

At Kaye, the residential tower Skanska is both developing and building in Belltown, we have two robots that are integral members of our jobsite safety team. We call them our Didge Field Safety Technicians.



Metz

Didge is the name Boston-based Nextera Robotics gave to the AI and autonomous robots that we are piloting at Kaye, and in the first few weeks they've been a game-changer in several ways.

WHAT CAN THE ROBOTS DO?

The short version is they collect and analyze large quantities of data. At Kaye, they're precision photographers for unparalleled image capture. The robots roam the jobsite capturing images of work in progress – inside, outside, every floor, every room... they even climb stairs. They take pictures from the same locations week after week, even in low light and outside of typical jobsite hours. These are not hand-held phone images that need to be stitched together or grainy low-res videos, but rather full, high-def, 360-degree images that give our project executives a clear look at exactly what's happening on the jobsite.

This level of photographic detail, when connected to the project's BIM model and Nextera's construction project management and safety monitoring platform, allows for AI progress tracking, accurate percentage-in-place reporting and helps the project stay on schedule.

What does that have to do with safety? Everything.

WEEKLY AUTOMATED JOBSITE SAFETY REPORTS

Each week the Didge takes photos throughout the site – every room, every floor, every angle – to analyze safety issues. After the robots have captured thousands of images, the AI and safety monitoring platform generates a weekly automated safety report that gives us an unbiased assessment of overall safety on the jobsite. It provides detailed monitoring and scoring of everything from lighting conditions and fall hazards to PPE and fire safety, giving instant feedback to both management and crew. It is an invaluable source of shared ground truth for project executives, project managers, the Safe-

ty Team, and insurance company. The reports provide easy to read quick-scan highlights that are color coded green, yellow, orange and red to indicate risk factors from positive findings and observations to high-risk activities requiring immediate attention.

We're able to drill down floor by floor and see heat maps showing precisely where issues like clutter or improper lighting need to be addressed. We can then schedule teams to go deal with the issues and even give them a map and a picture showing exactly what to look for.

COACHING PROPER PPE USE WHILE PROTECTING PRIVACY

Because the AI is trained to recognize safety equipment like helmets, vests, glasses and gloves, it can analyze photos taken throughout the daily scan to detect scenarios like, "100% of workers on floors 4, 5 and 6 were wearing all PPE."

Likewise, the AI-powered robots can identify images where a team member is not wearing proper PPE and flag those images – notably blurring all team member faces for privacy except when sharing with the environmental health and safety (EHS) leader – so that direct one-on-one coaching conversations can occur. This may help prevent future incidents.

DRIVING SAFETY STANDARDS TO A NEW LEVEL

Over time, the constant feedback loop from the robots to the EHS leader and the crew can significantly enhance the safety culture on site.

Spotting safe behaviors and conditions is equally crucial as identifying unsafe ones. Maintaining a comprehensive safety record can facilitate smoother, fact-based discussions between insurers and builders regarding claims or future construction project insurance.

REDUCING WORKER BACK AND KNEE STRAIN

Much like how drones helped remove the element of risk of human workers needing to climb exceptionally high on ladders to get top view photos, these robots are helping reduce physical strain on workers.

To capture their images, the Didge robots are often maneuvering themselves into stances that can be uncomfortable for humans to get into. While easy for the size and shape of the robots, these positions (think constant crouching or odd angles for humans) would be harder on our backs and knees, especially having to repeat them room after room, floor after floor, week after week, walking the entirety of a soon-to-be 31-story building like Kaye each week. Kaye is not the first project where Skanska has utilized robots. We've piloted different types of robotics with varying capabilities and in each instance, we've found our work to be more efficient and safer. We see notable lost time incidents saved, along with significant schedule compression and less rework.

What better way to celebrate



Skanska is using two Nextera Didge robots at its Kaye jobsite in Belltown.

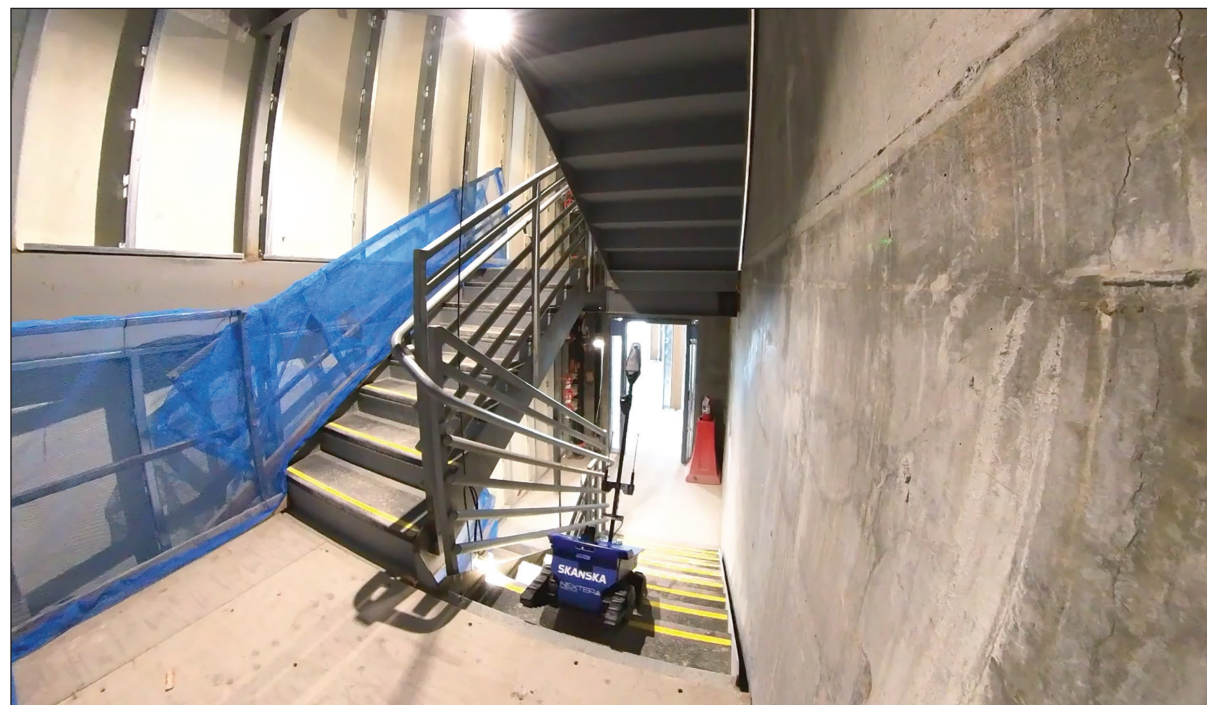
Photos courtesy of Skanska USA

Skanska's core value of Care for Life than by utilizing new technologies that put their health, safety and wellbeing first?

Every project manager has a long list of things to do. Throw in meetings, getting pulled aside by coworkers to tackle other topics, and myriad other To Dos that our people contend with, and the value of having a dedicated AI-powered Didge Field Safety Technician on site becomes easy to see.

While the Didge robots have only been on site a few weeks, as we continue to progress towards our expected topping out at Kaye this summer, all of us at Skanska look forward to the added data and combined project management and safety benefits the robots will continue to provide.

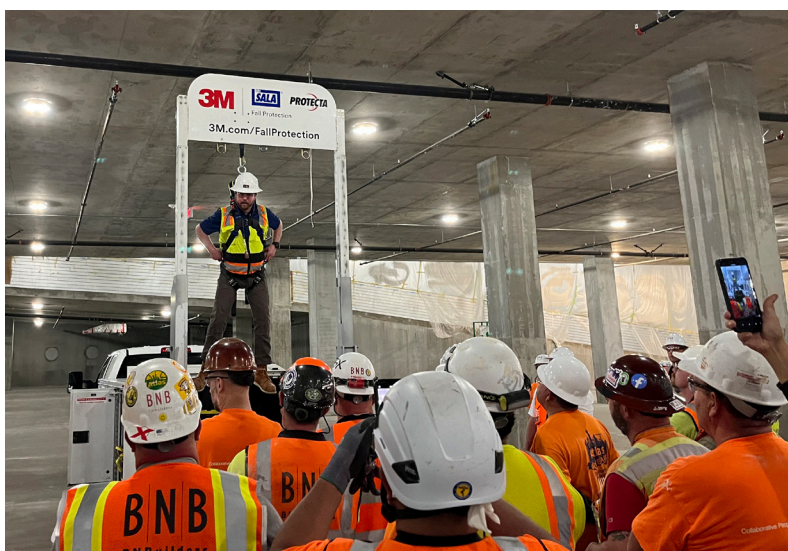
Stewart Germain is director of innovation, and Garrett Metz is senior project engineer at Skanska USA.



The Didge Safety Field Technician climbs the stairs at Kaye on its way to photographing another floor.

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Cranes, trains and automobiles: navigating complex site conditions

■ Safely delivering affordable housing in the bustling heart of Capitol Hill required early communication, careful planning and proactive coordination with local agencies.

By JJ POWELL AND ANTHONY SHERMAN
Walsh Construction

It is no secret that there is a shortage of affordable housing in Seattle these days. Fortunately, there is growing public support, and mission-driven developers working to address this issue.

A frequently stated goal in the development of affordable housing is for buildings to be in amenity-rich neighborhoods with access to public transit. This reduces the need to build expensive parking stalls and gives residents access to jobs, stores, restaurants, services, schools, and transit.

Two projects that meet this goal are the recently opened Pride Place and upcoming Broadway Youth Center projects located in the heart of the Capitol Hill neighborhood at Broadway and Pine. Both projects were developed by Community Roots Housing in partnership with GenPride and YouthCare, two organizations who provide access to housing and services for Seattle's older LGBTQIA+ and young adult populations, respectively.



Powell



Sherman

These two projects are ideally located for the residents of these buildings. They are, however, not ideally located for managing construction logistics and safety planning. It takes commitment to careful planning and safety practices necessary to deliver these much-needed projects safely with minimal impacts to project schedules and budgets.

Walsh Construction Co. is a northwest-based general contractor with 40 years of experience delivering mixed-use wood-frame projects in central Seattle neighborhoods. For the Pride Place project, Walsh's project team was able to deliver the 118-unit building to Community Roots Housing in late 2023 with zero safety incidents.

Delivering a project at this dense, transit-rich location involved working around an active streetcar line, installation of complex utilities in the public right of way, and maintaining safe pedestrian access and use within a heavy-use multi-modal commuting corridor. Successfully ensuring safe movement of people, streetcars and vehicles along Broadway involved early and frequent coordination with various public agencies including SDOT, King County Metro, SPU, SCL, and SDCI. Walsh was then responsible for implementing and upholding safety regulations with its own labor team and nearly 100 subcontractor partners.

Keys to success for safety at the corner of Broadway & Pine include:

- Pre-task Planning – Walsh has implemented a company-wide pre-task planning effort, which focuses crews and site supervisors on critical tasks, workflows, and identifies potential hazards

and safety concerns before the work begins.

- Community outreach – Starting well before construction, the team sent out newsletters, emails, posted signage, and walked door-to-door to inform neighborhood residents and businesses of upcoming activities and street impacts. Walsh partnered with GenPride and the Capitol Hill blog to utilize their communication networks.

- Agency coordination – Working in dense Seattle neighborhoods requires coordination with entities like SDOT's Hub Coordination Team, which reviews all projects in the Capitol Hill Hub Zone with a goal of maintaining safe, consistent practices across multiple projects. Walsh maintained frequent, proactive coordination with SDOT to ensure that our approach for right of way management along Broadway was implemented in the most timely and responsive way possible.

Two scopes of work that illustrate the extensive safety coordination that is required at these types of sites are the connections to underground utilities and the erection and dismantling of the tower crane. Implementing the approaches above allowed the project team to interrupt the flow of traffic while prioritizing pedestrian and bike commuter safety. Walsh's project team maintained safe access to local businesses and was able to complete each activity safely and efficiently, ahead of schedule, which allowed the street to be reopened to the public sooner than anticipated.

Installation of water, sewer and storm utilities required two safety-critical activities: coordination and operation of a 24" boring machine to tunnel under the active streetcar and trenching in the center of the street. This required extensive communication and pre-task planning, using two- and five-week look ahead schedules, and daily task and safety planning with crews and flagging staff. The project team was able to install the water, sewer and storm connections safely and successfully, while maintaining bus and streetcar routes along Broadway, sometimes as frequently as every 3 minutes during peak commute times.

Preparation for the tower crane erection began over a year prior to actual installation. Communication with SDOT, King County Metro, and local residents and businesses along Broadway was crucial to the success and safety of this effort. The activity itself required a critical hoist over Broadway, above and adjacent to high-voltage power lines.

The Walsh project team developed a plan with project partners Northwest Tower Crane, Barnhart Cranes, Leavitt Tower Cranes, Yes We Can Flagging, and our own Safety team. Installing and dismantling the crane required a full shutdown of Broadway between Pike and Pine and utilized dozens of focused personnel to safely manage each day. During this phase, due to the extreme overhead hazards and potential danger to pedestrians and commuters, all traffic was rerouted around this section of Broadway.

Seattle and communities like Capitol Hill desperately need more affordable apartments. Successful delivery of these



While the Walsh team installed and dismantled the tower crane at the Pride Place jobsite, all traffic was rerouted around that section of Broadway. Dozens of focused personnel were on site to safely manage each day. Photo by NW Skyview Imagery



Walsh's project team was able to deliver the 118-unit Pride Place project to Community Roots Housing in late 2023 with zero safety incidents. Photo by NW Skyview Imagery

homes efficiently and safely requires a top-to-bottom investment in safety culture and day-to-day practice. Implementing practices such as community outreach, agency collaboration and pre-task planning benefits project teams as well as the public at large.

Walsh looks forward to continuing our commitment to safety for the Capitol Hill community at the upcoming Broadway Center for Youth, which is due to start this summer directly across Broadway from the Pride Place project.

Community Roots Housing and YouthCare will continue the revitalization of this bustling intersection with the development of 84 additional affordable homes and the new YouthCare Constellation Center. Hop on a bus, bike

or streetcar to come check it out!

JJ is a senior project manager at Walsh Construction, providing strategic project leadership to affordable housing projects throughout Seattle. Anthony

Sherman is a superintendent at Walsh Construction focused on proactive planning and partnership with trades to safely deliver mixed-use projects across the Pacific Northwest.



The project team was able to install water, sewer and storm connections safely and successfully, while maintaining bus and streetcar routes along Broadway, sometimes as frequently as every 3 minutes during peak commute times. Photo by Walsh Construction

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BNBuilders' "Why I Work Safe" campaign includes a bulletin board at every jobsite where workers can put pictures of their families, pets and any other reason they have for staying safe. Photos by Maria Lamb

Preventing serious injuries & fatalities: advancing safety in construction

By adopting a forward-thinking approach that prioritizes collaboration, continuous improvement, and proactive risk management, the industry can mitigate the occurrence of serious incidents and ensure the well-being of frontline workers.

By MICHAEL CHURCH & TJ ROGGY
BNBuilders

Despite advancements in safety management and technology, the construction sector still faces a troubling trend: it has the highest volume of workplace fatalities across the country. Serious injuries and fatalities (SIF) are a grim reality for the industry, with many employers left grappling for solutions. Preventing SIF incidents is now a major focus for general contractors hoping to reduce risk and keep their employees safe while on the job.

MODERNIZING SAFETY STANDARDS

Herbert William Heinrich's Theory of Accident Causation is most well-known for the 300-

29-1 ratio pyramid theory. He states that for every 300 near miss incidents, there are 29 incidents with minor injuries, and 1 catastrophic or fatal incident. While he was undoubtedly the most influential pioneer for the safety industry, his conclusions have steered companies and safety professionals astray in the ongoing search for improvement.

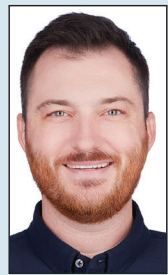
For instance, in his book "Industrial Accident Prevention: A Scientific Approach," he states that 88% of workplace accidents are caused by unsafe acts of workers. However, assigning blame solely to workers doesn't pave the way for substantial safety improvements. Real systemic change and progress in addressing the SIF issue necessitates a proactive stance on safety, involving ongoing, collaborative efforts to enhance systems.

By adopting a forward-thinking approach that prioritizes collaboration, continuous improve-

See PREVENTION — page



Church



Roggy



An on-site Safety Stand-down taught by BNBuilders' assistant safety director Steve Leigh.

Building a secure culture of safety in health and science construction

Healthcare facility sites can present significant logistical and safety challenges, requiring innovative approaches, consistency in protocols and clear communication.

By MATT PERHATCH
Aldrich

Every contractor says safety is their top priority, and it should be. But what does that really look like? Some safety factors are universal no matter the project type, such as proper PPE, appropriate use of equipment, fencing and signage around an active site, etc. Some complex project environments require additional and specialized measures that impact a contractor's overall work approach, especially occupied facilities with sensitive operations.



Perhatch

Aldrich + Associates focuses on health and science facility renovations and new construction, where working safely means working differently, particularly for construction in occupied facilities where active care never stops.

Safe construction in health and science environments looks like being creative in our approaches, consistent in our adherence to protocols and processes, and collaborative at all levels of our company to ensure the safety of our team, care providers and patients. There's room for continuous improvement, which looks like Aldrich team members making safety a personal imperative and feeling empowered and secure in speaking up with their experiences and suggestions.

INNOVATIVE APPROACHES PROMOTE SAFE WORK

Healthcare facilities are everywhere in our community, which means we must be prepared to work on all kinds of project sites, some of which present significant logistical and safety challenges. Such sites require innovative approaches to accomplish our work safely and effectively. Our work on Northwest Kidney Centers' (NKC) new flagship Seattle campus is one such project. Located in a busy and congested area next to Harborview Medical Center, the campus is currently under construction, with field operations overseen by Superintendent Brett Price. Brett is an industry veteran with 33 years of experience in the field, 27 of which have been with Aldrich, and a track record of success on multiple NKC projects.

The site sits at a 45-degree angle adjacent to Harborview's heli-



Superintendent Brett Price designed an interlocking ramp system to stabilize large trucks and cranes on the sloped site of the Northwest Kidney Centers' new flagship Seattle campus. Photo courtesy of Aldrich



The NKC project required a 25-foot-tall shoring for a 14-inch concrete deck above. Instead of putting the forms together in place, the team preassembled the shoring poles in sections and craned each one precisely into place. Photo courtesy of Aldrich

pad. These physical constraints required looking through a different lens than is typical for a healthcare project with this footprint. Our teams and construction partners have been in constant communication to identify

and implement innovative solutions to safety. Through collaboration, we have developed three ingenious solutions to improve access and safety on this complex site: custom-engineered ramps for a sloped project site, preassembled shoring poles, and a life pole fall protection system.

RAMPS BUILT FOR SLOPED PROJECT SITES

To safely work on the site's steep grade, Brett pioneered designs for a new interlocking ramp system to stabilize large trucks and cranes. The substantial 5-foot-tall blocks with 3-foot ramps leveled and supported pump trucks during concrete pours, worked perfectly for boom lifts, and are still being used as construction progresses.

The portable blocks were built with picking eyes so they can be moved with the tower crane or forklift to any location on the jobsite. This creative solution has been essential to safely executing this job on schedule.

PREASSEMBLED SHORING POLES

The project required a 25-foot-tall shoring for a 14-inch concrete deck above. We discussed options with our shoring preform supplier and determined that instead of putting the forms together in place, we could rent the parts, build the sections to our specifications, and fly them in with our crane to improve safety.

Field teams, led by long-time Aldrich Superintendent Andrew Murphy, preassembled the shoring poles into sections and each pre-assembly was lowered into place with surgical precision. This innovative approach provided a

See CULTURE — page

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Prevention

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ment, and proactive risk management, the industry can mitigate the occurrence of serious incidents and ensure the well-being of its frontline workers.

UNDERSTANDING

ROOT CAUSES

At BNBuilders, preventing SIF incidents begins with thorough analysis. We conduct ‘Deep Dive’ reviews with senior leadership for high-potential incidents, sharing findings with the entire company weekly. Supervisors then relay lessons learned to our teams in Monday toolbox talks.

Near-miss reports also inform our prevention efforts, triggering Deep Dive analyses for incidents related to the construction Fatal Four (falls, electrical, caught-between and struck-by.)

BUILDING A STRONG SAFETY CULTURE

Safety culture also plays a big role in making sure employees and subcontractors make good choices while on the job. Generating buy-in leads to stronger participation in safety meetings, more thorough safety planning and better incident reporting. Engaging safety campaigns have allowed us to improve our safety culture and demonstrate to our employees that we care about their health and safety. These include:

- Why I Work Safe – a bulletin on every jobsite where workers can put pictures of their families, pets, and any other reason they have for staying safe.

- Value Every Voice – a theme that encourages everyone to feel confident and empowered to speak up when they see potential safety hazards.

- Find It, Mark It, Miss It – a protocol for utility avoidance; teams scan for utilities using a Ground-Penetrating Radar, mark the utilities physically on site and in a live utility map, and then create a plan to avoid hitting the utility.

By engaging our employees and recognizing them as individuals, we create a culture of trust, which in turn empowers them to take an active part in our safety protocols.

ASSESSING RISK & PLANNING ACCORDINGLY

Focusing on SIF potential for each task during the planning process is crucial to preventing incidents. Instead of only focusing on traditional lagging indicators like Total Recordable Incident Rate (TRIR) and lost-time,

companies should also look ahead by identifying high-risk activities. These include tasks that require fall protection, electrical work, ladder use and cranes. We ask each team to communicate upcoming high-risk activities to the safety department so we can help them plan to do the work safely.

INVESTING IN TECHNOLOGY

While much of our safety program relies on planning and communication, technology continues to be a vital resource in understanding and preventing risk. Safety applications assist us in conducting and documenting inspections to pinpoint and remove hazards at the worksite. Looking ahead, we anticipate a significant advancement with the integration of generative AI and machine learning, enabling us to analyze the data we collect and forecast the likelihood of future incidents.

TRAINING & COMMUNICATING WITH YOUR WORKFORCE

Finally, training and communicating with our employees is the most important step in reducing SIF incidents. We do regular monthly safety trainings with management staff at all levels as part of our BNB University program. Our annual Safety Town Halls give our front-line supervisors the opportunity to share their thoughts and ideas with the safety team and senior leadership. We prioritize follow-up to demonstrate our commitment to listening to and acting on employee feedback.

PIONEERING SAFETY EXCELLENCE

The construction industry’s ongoing battle with workplace fatalities highlights the urgent need for proactive measures and innovative approaches to safety. Despite progress in safety management and technology, SIF remains a major concern.

By involving our workforce and fostering a strong safety culture, we’ve achieved remarkable success, illustrated by our strong safety record and multiple national safety awards from the AGC. Through teamwork, open communication and constant improvement, we’re setting a safety standard that keeps our workers safe and paves the way for others in the industry.

Michael Church is the regional safety manager, and TJ Roggy is health and industrial hygiene manager for BNBuilders.

Culture

Continued from page 4

safe and stable environment for workers, created efficiency, and saved time.

LIFE POLES FALL PROTECTION SYSTEM

The deck heights required specialized fall protection measures. The traditional “Raptor” mobile fall protection system presented risks of getting strung out and tangled with other obstructions on this site, so I devised an effective alternative using custom fabricated safety posts that were attached to the structural column bolts. This provided a cable system for crews to hook onto with a retractable safety line that moved with them to safeguard against tripping hazards and falls.

CLEAR COMMUNICATION AND PROTOCOLS

Construction in an occupied facility of any kind is challenging and requires detailed planning, coordination, and communication. The challenges — and imperative for safety — are heightened in health and science facilities because of the sensitive nature of ongoing operations, occupants and equipment.

For example, we recently replaced an older PET/CT with a top-of-the-line digital platform PET/CT scanner for Seattle Radiology, located on the ninth floor of the Nordstrom Medical Tower. This challenging project required significant coordination, communication, and adherence to a detailed plan in order to execute successfully.

We worked collaboratively with our crane partner Omega Morgan, the building manager CBRE, and the city of Seattle to develop, document, and perform a complex procedure to remove the existing PET/CT and bring in the new one through the side

of the building. Key to success was making sure the crane’s fly zone was clear, which required permits to close city streets and coordination and communication within stakeholders in and around the building to close or limit access to the parking garage, stairwells and sidewalks.

We held multiple meetings with building management and security to plan two events (one to remove the old equipment and one to bring in the new one), which were carried out on Saturdays to limit disruption during the work week. We proactively communicated with those affected by the closure and limited access to keep the area clear.

While this process is relatively standard for maneuvering large, multi-thousand-pound imaging equipment, this example was made particularly challenging by the ninth floor location. Our team’s proactive planning and consistency of execution enabled both scenarios to be successfully accomplished.

LEVERAGING COLLECTIVE EXPERIENCE

Another effective way that Aldrich promotes continuous safety improvement is through regular opportunities for our team to learn from each other. A push to get to the end of any one project can create complacency, but our teams prioritize opportunities to take a step back, discuss the issues, and keep safety top of mind at all times.

Our superintendents meet weekly for a Thursday morning huddle, the purpose of which is to support each other and all our projects by sharing knowledge and experiences, and problem-solving together as a team. This is particularly valuable and effective because many of our team members have spent decades in the industry and with

Aldrich, making them a treasure trove of knowledge and know-how.

With a sense of security in bringing a challenge to the group, it’s understood there is no judgement, no ridicule, and no reprimands for bringing forward any situation or ideas. This foundation of open, honest discussion supports collaborative development of executable solutions. This is the kind of trust, cooperation, and teamwork that promotes our secure culture of safety at Aldrich.

CONSTRUCTION SAFETY FOR HEALTHY COMMUNITIES

Aldrich’s culture centers on the premise that authentic, personal attention to both clients and employees is fundamental. Best safety practices are part of that. We’re intentional in our efforts to empower our team members to speak openly about safety concerns as well as ideas for improvement, and we’re grateful that our team members take personal responsibility for working safely at all times. Our ongoing efforts pay off — we continue to reduce our EMR every year.

As a health and science contractor, we’re in the business of improving the health of our community, and safety is at the heart of our ability to do so. The construction industry’s focus on safety is ultimately about resilience — when everyone goes home each day feeling safe and secure in their work, we can keep moving forward in building communities that support people in leading healthy, fulfilling lives. We’ll keep doing our part.

Matt Perhatch is Aldrich’s general superintendent and safety officer, and was named AGC Build Washington’s Superintendent of the Year for excellence in construction safety in 2022.