

Seattle Daily Journal of Commerce

# HEALTH CARE

## DESIGN & CONSTRUCTION



February 27, 2020

The current design for Lake Chelan Community Hospital is 59,000 square feet — scaled back from the original plan for 125,000 square feet.



IMAGE PROVIDED BY COLLINSWOERMAN

# HOSPITAL PROJECTS IN RURAL AREAS FACE EXTRA OBSTACLES

After four bond votes and numerous design revisions, Lake Chelan will finally get a new hospital. Its tortuous path from conception to construction wasn't unusual.

Critical access hospitals are vital to rural America.

They provide much-needed health care services to remote communities that would otherwise be underserved. Nevertheless, in the current health care climate many critical access hospitals are closing as they struggle to find the right combination of sustainable services, staff and facilities.



BY JAMEY BARLET COLLINSWOERMAN

In addition to these tangible factors, money is an influential component of the success or underperformance of critical access hospitals. Unfortunately, capital is often scarce in many of these rural communities.

Collinswoerman has spent over a decade working with a small hospital within Chelan County facing similar hurdles, exploring various options and solutions with the community. As the project gets closer to the design finish line, the facility Collinswoerman is designing bears little resemblance to the one drawn many years before as a result of ever-evolving project and community components.

More than 10 years ago, Collinswoerman began meeting with the Chelan Public Hospital District to discuss a replacement for the aging Lake Chelan

Community Hospital (LCCH). The hospital served a large though sparsely populated area in north Chelan County. The next-closest facility was in Wenatchee, a minimum 45-minute drive for many Chelan residents.

The number of year-round Chelan residents was subnormal, perhaps 7,000 or so, with permanent resident growth projections for the city of Chelan and surrounding area being very little. However, a key driver for the facility was the vacation and recreational community, with the resident count growing to over 30,000 from Memorial Day to Labor Day.

The seasonal census for the recreational community demanded an upgrade to the current facilities, which had been built in the early 1960s.

As one might imagine, the seasonal community had specific needs, including easy accessibility to emergency and urgent care services, while the permanent residents may require services associated with chronic care and disease management. The different health care needs for each population had to be taken into consideration when best approaching critical access hospital design for this diverse-needs community.

## Stops and starts

Prior to Collinswoerman being asked to assist the community in this project, the organization

already had plans to expand their aging facilities. The design was put to the test by a community bond vote, but failed by less than 100 ballots.

Collinswoerman was selected to move forward with new leadership to develop a new design. The firm brought ample experience in the design of rural critical access hospitals and quickly sized up the issues of the existing site and potential expansion.

Collinswoerman recommended that instead of expanding the existing facility, they build on a new site for partially expanded and enhanced services and enabling facilities. This would ensure the design would not be compromised by the existing site constraints.

Over two years into the discussions and preliminary planning work, the hospital district purchased a 12-acre property that was relatively flat, ideal for a future replacement hospital, outpatient clinic and medical office building.

The proposed relocation of the hospital was the first major construction project to be undertaken by the hospital district in nearly 45 years. Being a public district with hospital finances, a bond needed to be passed in order address project funding.

There was tremendous community interest in the prospect of new medical facilities. However, several things arose that stalled project progress: two failed bond initiatives that fell just short of what was needed, in one case

by 15 votes, as well as several leadership changes resulting in a shift in leadership's vision for the project.

The project began with an ambitious young CEO who had been hired to build the new facility. While critical access hospitals are, by definition, 25 beds, LCCH was licensed for 34.

The original design ideas included space for all 34 beds as well as other community amenities and totaled 125,000 square feet. The community voted on this proposal and found it over-scaled; the proposal was defeated.

The next leadership had more modest expectations. While the existing facility was less than 40,000 square feet, Collinswoerman essentially set off to design a code-compliant replacement that was 75,000 square feet. This solution barely lost in a bond vote and the project was temporarily tabled.

## Cost-conscious design

It is not unusual for a rural project to stall as this one did. Despite obstacles, Collinswoerman continued to believe this was a much-needed project for the permanent community as well as for the seasonal visitors to Lake Chelan.

The firm remained a resource through the leadership changes offering to bring project clarity to the community and helping prepare leadership and board for

each bond attempt. Collinswoerman offered creative solutions that fell within the hospital district's budget while presenting design ideas that both would fit into the community's needs and not seem overly ambitious and costly.

On the fourth attempt, the hospital bond issue was passed.

Obstacles of health care reform challenged the community to provide services in a more cost-effective manner, an issue many rural communities often experience. Collinswoerman continues to work with the hospital's leadership to focus on reimbursable care delivery models, being cost conscious while providing improved care.

Many rural hospitals such as LCCH have up to 85% of their reimbursement tied to government payers. Collinswoerman has tested the design and changes with a corresponding reimbursement review.

Utilizing some of the current trends identified in the health care industry — such as universal room size, modular construction, patient-centered care and lean design — is helping to minimize size and costs for a client working within a tight, fixed budget. The current design is 59,000 square feet with a future medical office building master planned for the site.

*Jamey Barlet is an associate principal and market leader for Collinswoerman.*

# HERE'S WHAT'S IN STORE FOR HEALTH CARE IN THE NORTHWEST

Complex patient needs are pushing health care systems to update infrastructure, replace aging facilities, and construct new clinics, outpatient centers and hospital wings.



BY JOHN WILLIAMSON & MARK HOWELL  
SKANSKA USA BUILDING

## Trends in play

For more than a decade, the steadily accelerating pace of health care-related construction starts has continued. Early on, some Pacific Northwest industry watchers pegged this growth to the slight increases in hospital margins due to Oregon's and Washington's status as Medicaid expansion states under the Patient Protection and Affordable Care Act, passed by Congress in 2010.

Overall, expanded dollar-for-dollar Medicaid reimbursement dollars helped reduce rates of uncompensated care. This positively impacted the financial margins of regional hospitals, medical centers, federally qualified health centers, clinics and providers.

Additionally, Medicaid and Medicare reimbursements grew for care in prevention and outpatient settings. And the parallel growth in commercial health insurance coverage rates also contributed to more investment in the modernization and construction of health facilities.

Fast forward to a decade later, building pace remains unabated

There's one thing we know about the future of construction in health care, which is not exclusive to the Northwest: The U.S. population is aging and demand for acute care is increasing.

With it, the nature of health care is evolving, so planning, development and building health facilities must likewise change. As we forecast the future of health care design and building, we know three principles must drive health care's built environment: Build for patients, build for efficiency and build for outcomes.

Those are tall orders, but our owner-partners expect this of us.



At Oregon Health & Science University, a new wing of the Casey Eye Institute is being constructed to expand space for clinical and applied research.

IMAGE BY NBBJ

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## ON THE COVER

A 60,000-square-foot wing for the Casey Eye Institute is under construction at the Oregon Health & Science University in Portland. See the article on this page to read about other projects underway in the Northwest. IMAGE BY NBBJ

## DJC TEAM

SECTION EDITOR: SAM BENNETT • SECTION DESIGN: JEFFREY MILLER  
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here in the Northwest. Oregon and Southwest Washington have experienced a very active health care construction market with a new maternity/obstetric wing to a new hospital in Vancouver, substantial expansion of more than five large buildings on a new medical campus at Portland's South Waterfront, two brand new critical access hospitals in Oregon's northern coastal communities, a new mental health inpatient facility in Portland, extensive expansion of new acute inpatient space in Central Oregon and more.

Since 2010, the Washington market has seen a number of new acute towers started, completed and others in design and planning phases to support the growing population, as well as fulfilling commitments made during health care systems' mergers and acquisitions.

In the past several years, many of those projects included space to support the need for more inpatient beds. Many of the Puget Sound region's health care systems continue to update diagnostic and radiology treatment areas to support newer, more advanced technology and growing demands.

Outpatient medical office and ambulatory surgery centers continue to expand rapidly to serve the growing outpatient service lines. In addition, a number of new behavioral health facilities

were constructed and several larger inpatient facilities are on the drawing boards to meet the market demand.

And active planning is underway in the Northwest for more long-established health care systems to get much needed infrastructure updates, new clinics and outpatient facilities, new hospital wings, aging facilities and even full replacements to manage the ever-increasing complexity of care needed by patients.

Other previously predicted trends are still in play. One is the drive to make care more geographically accessible. Clinics and micro-hospitals, funded by larger health care systems, continue to increase in number and spread, under the notion of bringing health care to the person/community, instead of assuming the person will be able to locate a larger centralized care location.

These trends are clearly seen in the Pacific Northwest. We are seeing the focus on wellness and preventive care in outpatient/clinic facilities in many communities as the vehicle to take health care to the people, yet still relying on some centralized inpatient facilities for higher-acuity patients.

## Emerging examples

Health care strategic planners now can virtually walk in the path of the patient to examine

service/care delivery and flow. The concept of the "neighborhoods of care" at the St. Charles Medical Center's new patient tower and ICU in Bend, Oregon, was first planned as a "card-board city."

In an off-site warehouse, care providers and hospital employees modeled how reconfiguring patient rooms could simultaneously accommodate overlapping care providers, visiting family members, lifting equipment and multiple bio-monitor units. In the "neighborhood," several micro-stations exist throughout the unit for charting, professional consultation, medication dispensing and remote patient monitoring.

The initial structure of the nursing station in the inpatient behavioral health unit at the PeaceHealth Sacred Heart Hospital in Eugene, Oregon, was reconfigured early in the planning process because the centralized station didn't afford a full visual spectrum of patients in their rooms. Providers found when they can make eye contact with patients, better and more timely assessments can happen and safety is improved.

At Oregon Health & Science University, a new wing of the Casey Eye Institute is being constructed to expand space for clinical and applied research, so the research can done in

# A LOOK INSIDE THE CURE FACTORY, SEATTLE CHILDREN'S NEW CELL THERAPY LAB

The 12th-floor facility, located inside the new Building Cure downtown research tower, was built under a stringent process that keeps spaces free from contaminants.

When I used to think about health care facilities, what came to mind were sterile corridors fitted with crash rails, surgery suites filled with equipment and pharmacies lined with drugs. Today, I can't help but acknowledge that a major disruptor to patient treatment is coming — and it brings new types of health care spaces with new challenges to owners,



BY CORIANN PRESSER  
LEASE CRUTCHER LEWIS

designers and construction professionals.

Cell therapy — reprogramming a patient's living blood cells to fight disease — is showing incredible promise in treating several devastating diseases.

Clinical trials have dramatically improved outcomes for patients with life-threatening conditions like leukemia and sickle cell anemia by using reprogrammed versions of each patient's own blood cells.

The Cure Factory is Seattle's newest cell therapy facility, recently opened by Seattle Children's Research Institute at Building Cure. Building Cure is the Northwest's first high-rise cell therapy building — a vertically-integrated system to cure

The Cure Factory prepares cell therapy treatments for patients at Seattle Children's and partner hospitals in the U.S. and Canada.



childhood diseases, from development of new cures to programming the cells of patients.

Once a cell therapy applica-

tion is proven, scientists at the Cure Factory on the 12th floor prepare cell therapy treatments for patients at Seattle Children's

and partner hospitals in the U.S. and Canada. These therapies modify a patient's immune cells (T-cells) from blood samples to attack the harmful or diseased cells and teach the rest of the T-cells in a patient's body to do the same.

The facility requirements for production of cell therapies are tightly controlled and vigorously monitored to meet the highest standards for drug production. The treated cells are fragile drugs that are regulated by the FDA, which requires certified Good Manufacturing Practice (cGMP) standards: clean-build protocols, validated monitoring systems, materials that can stand up to rigorous daily cleaning, and clear and independent maintenance access to equipment, lights and diffusers to ensure zero disruption to or contamination of the cell therapies.

## Clean protocol

To guarantee cGMP integrity in the Cure Factory, we needed to ensure stringent clean-build protocols. This was an unusual challenge on a 600,000-square-

foot high-rise project with over 700 skilled tradespeople cycling through during the various phases — far more than a typical cGMP jobsite in Seattle.

Two "levels" of clean-build protocol were adopted to protect the facility from potential contaminants during construction.

Level 1 protocol was a stringent baseline for the whole floor, including restricting access to those who had work on the floor and had received the training, a ban on food or drink other than water, keeping tools and equipment in good repair to prevent other material contamination and keeping ducts and pipes sealed from manufacture and transport to the point of installation.

The Level 2 protocol was an even higher standard within the cGMP space. Some aspects included limited access locations, sign in/out requirements, differential air pressures, "wipe-down zones" for material and tools, limitations on dust-generating equipment, protective covers over footwear, and the careful tracking of material custody from manufacture to installation.

The lab requires dedicated mechanical and electrical services that can meet the needs of an ultraclean space and provide redundancy in case of a loss of power or natural gas service.



The mechanical floor directly above the Cure Factory allows building engineers to perform maintenance and servicing without disrupting the science below.



Successful education, implementation and compliance in restricted work areas was critical, and especially challenging given the large number of craft workers. A dedicated team carefully laid out the training program, created clear and easily understandable signage and space for logistics and material flow and tightly controlled the work sequencing.

They also partnered with Seattle Children's to focus on worker understanding and buy-in, so each trade partner would be committed to the protocols. Seattle Children's researchers and doctors periodically joined our safety meetings to bring the "why" message home to everyone — that what would take place inside these walls once we walked away would make a

difference.

### Systems and access

Building a vertically integrated research and production facility brings significant challenges to mechanical, electrical and plumbing systems and their installation sequences.

The Cure Factory requires dedicated mechanical and electrical services that can meet the operating requirements of an ultraclean space and redundancy requirements to ensure that the treatments will remain viable during a significant loss of power or natural gas service. Other research spaces in the building rely on vacuum systems, lab gases and controlled waste streams that must get to and from the laboratory across this

same vertical stack of space.

To support this heavy infrastructure, the team created multiple mechanical floors the size of the entire building footprint, including one directly above the Cure Factory.

To thread the MEP infrastructure inside the Cure Factory, a double-height space was constructed with 20-foot floor-to-ceiling heights and walkable interstitial spaces installed under the concrete decks. The interstitial spaces allow Seattle Children's building engineers to perform maintenance and servicing without disrupting the science below.

The interstitial space was organized with Seattle Children's building engineers and maintenance team to ensure that each key system that needed maintaining was clearly organized and accessible within 5 feet of the catwalk.

It was important that we focused first on function and access and then finalized the remainder of the routing. By sorting out these details well in advance, we were able to prefabricate and install 20-foot-long multi-trade racks that included ductwork, piping, electrical panels and pathway for low voltage.

This planning allowed us to make sure every system fit perfectly and ensured future access to needed elements. Prefabrication allowed us to accelerate the complex installation.

### Rallied by the mission

The success of the Cure Factory and Building Cure was due to a great team who rallied around

patient treatments sooner.

This was embodied by our shared mantra: "Every dollar not spent constructing this building can be reallocated to curing childhood diseases. Every day not needed for construction means an extra day of research. A facility that performs precisely as designed means no disruption or delay to groundbreaking research."

The design and construction team included Aedas, Flad, AEI, KPFF, McKinstry, Prime Electric and Andrew Clapham & Associates along with Lease Crutcher Lewis.

Here's a greater success: The Cure Factory will allow Seattle Children's to treat 10 times more patients than before, with up to 1,000 children a year receiving life-saving cell therapy every year.

As research advances and more clinical trials take place, cell therapy will only grow in prominence. Seattle Children's alone is looking into applications for at least 80 more diseases!

With new advances and treatments will come new opportunities for design and construction professionals to make such facilities possible. We're excited to see what's next for patient care and how it could change the very makeup of health care facilities.

*Coriann Presser is a project executive at Lease Crutcher Lewis.*

Seattle Children's opened the Building Cure research high-rise in 2019.



Facility requirements for the production of cell therapies are tightly controlled and vigorously monitored.



# HOW WELCOMING DESIGN CAN IMPROVE OUTCOMES FOR PATIENTS — AND STAFF

In behavioral health settings, more therapeutic environments have been linked with reduced aggression in patients. Staff also benefit.

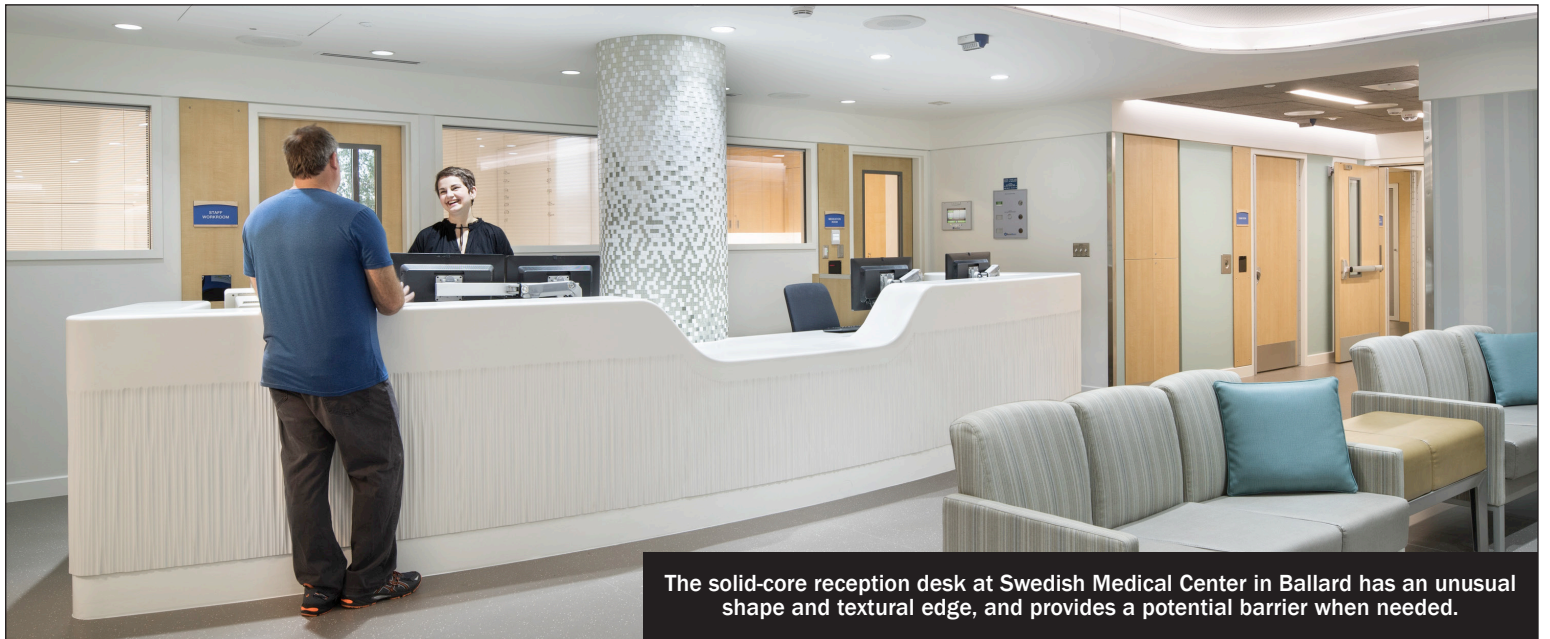
In the past decade alone, the health care design community has made tremendous strides toward bringing design parity to behavioral health, an important step in destigmatizing mental illness.

From the moment patients and their families arrive in a behavioral health environment, the care and attention paid to its design should signal that they are welcome, and that the help they seek is no different than any other health care need. This represents a significant departure from the days when these facilities embodied the marginalization and stigma of mental illness. Many looked like jails — and some still do.



BY KARI THORSEN  
ZGF

With today's behavioral health



The solid-core reception desk at Swedish Medical Center in Ballard has an unusual shape and textural edge, and provides a potential barrier when needed.

PHOTOS BY BENJAMIN BENSCHNEIDER

units, in particular, designers and planners have a responsibility to advocate for bringing beauty, respite and healing to the spaces while still keeping patients from self-harm.

Progress starts with creating an interior environment that is familiar to those seeking care.

For instance, materials and finishes that connect to the natural world through texture and color. Fixtures that resemble what we might encounter in our everyday lives including door handles, coat hooks, toilets and faucets. Giving patients choices about

their environment. Furnishing common areas with comfortable furniture that draws people out of their rooms to seek connections with providers and fellow patients. And providing daylight and views, as well as restorative garden landscapes outside.

Yet as we continue to reset patient and family expectations, it's critical to prioritize the experi-



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Comfortable furniture encourages patients to leave their rooms and spend more time with others.

ence of staff as well. Across the region, the health care industry is grappling with a workforce shortage. The problem is especially acute in the behavioral health setting, something that's far from unique to our corner of the country. In addition to the challenges of recruiting new staff, retaining existing workers and providing

an environment that's conducive to health has proven to be elusive. Research has shown that more than half of mental health workers suffer from symptoms of burnout. In addition to the negative effects on their own health, employee burnout is also linked — not surprisingly — to in-unit care that results in worse outcomes for patients.

### Support for staff

While a growing body of research has shown that the physical environment has great potential to impact patient outcomes, there is also evidence to suggest that investing in well-designed spaces can benefit the health and performance of

care teams. A 2015 study in the *Journal of Nursing Management*, for instance, found that well-designed areas of respite can lead to greater job satisfaction, performance and retention, while having a positive impact on nurses' health.

Opportunities include small respite rooms, daylight lounges and massage chairs.

Providing staff with a variety of work settings — onstage and off — can also support the many dimensions of their jobs. Off-stage, quiet nooks for heads-down work can be supplemented with open-plan work zones with partitions, offering added opportunities for communication and consultation with fellow team members.

Within the behavioral health unit itself, incorporating casual touchdown spaces throughout can promote interactions and relationship-building with patients. Also within the behavioral health unit, elements like open nursing stations can also change the staff-patient dynamic for the better while enhancing transparency. Research has shown that open stations are also preferred by nurses.

During the design of the recently completed 22-bed behavioral health unit at Swedish Medical Center in Ballard, we implemented a custom-milled reception desk at the main staff work-

space area. Built from Corian, its unique shape and textural edges emulate an art feature.

The desk also doubles as a potential barrier between patients and staff, when needed. This presents a welcome departure from the more familiar depictions in movies, where nurses are seated behind a wire-glass enclosure. We sought to strike a balance between size and durability needs with a desire to project a warm, welcoming, and comforting environment.

### Incorporating nature

More than three decades have passed since a landmark study from health care design researcher Roger Ulrich affirmed the idea that views to nature can support hospital patients in their journeys to healing. It's become clear that light-infused, nature-inspired spaces can help patients feel at ease, no matter how serious or momentous the reason for their visit, and no matter the length of their stays.

To shape the patient and provider experience, we take an interdisciplinary approach, recognizing that people experience buildings well before they cross the threshold. We often partner with our urban design team to

WELCOMING DESIGN — PAGE 11



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# CHP SYSTEMS: A POWERFUL ENERGY-SAVING TOOL FOR HOSPITALS

When health care facilities generate their own heat and power on site, they can achieve much greater energy efficiency than with a traditional grid-and-boiler system.



BY RON FUES & NICK EDNEY  
MCKINSTRY

In an era of tight budgets, intense competition and high costs, health care facilities across the country are understandably challenged by the time-old directive to do more with less. Where, exactly, should hospitals and clinics be looking for efficiency?

The usual suspects — doctors, nurses, hospital staff, medicine and equipment — draw most of the attention, but nearly every health care facility has an often-overlooked area for improvement: building systems. Hospitals and clinics too often neglect the opportunity to surround their skilled medical staff with facilities that match their excellence.

Beyond just installing low-flow toilets or changing light bulbs, revamped building systems can provide more reliable energy, bolster a facility's emergency preparedness, cut costs and help meet sustainability goals.

In particular, combined heat and power (CHP) systems allow health care facilities to generate their own power on site that is drastically more reliable, cost efficient and energy efficient — all while lightening their carbon footprint.

So, what exactly are CHP systems, and why do they present such a promising opportunity for health care facilities?

## The ABCs of CHP

As the U.S. Department of Energy explains, CHP is “the concurrent production of electricity and useful thermal energy (heating and/or cooling) from a single source of energy.”

With CHP, thermal and electrical power are both generated at the point of consumption, as opposed to relying on a far-away power plant.

In Washington, our traditional grid electricity almost entirely comes from dams or gas-fired power plants and — as noted by



Good Samaritan's new 2-gigawatt CHP system in Puyallup is expected to cut combined energy and maintenance costs by 25% and reduce greenhouse gas emissions by 17%.

PHOTO BY RUSS CARMACK/COURTESY MULTICARE

the U.S. Environmental Protection Agency (EPA) — roughly two-thirds of that power is lost (and thus wasted) between the dam/power plant and the end consumer. In addition, power plants largely waste all the excess heat they produce. With a CHP system's on-site generation, that distribution loss is eliminated and the excess heat is no longer wasted — it's captured and used for heating and/or cooling.

Taking all those factors into account, the EPA observes that CHP systems can achieve energy efficiencies of more than 80%, compared with 50% for a traditional system (i.e., grid electricity and a boiler). As such, it's no surprise that more than 200 hospitals in over 30 states now use CHP systems.

## Off-grid power

In addition to the energy-efficiency benefits, CHP systems have added value for critical facilities like hospitals. Losing grid power for a little while is an inconvenience for most residences and buildings, but it can be a disaster for health care

facilities.

Hospitals are legally required to maintain off-grid emergency generators for this exact reason, but generators only provide electricity, rely on a finite/stored fuel supply, are often only sized for life-safety and critical functions, and are normally off — which can lead to unreliability even if they are tested regularly.

In contrast, CHP systems are also off-grid, provide both electricity and thermal energy, are always on (and are thus more reliable), and run on fuel that isn't finite (thus are usually unaffected by disasters).

For a real-life example of the power and resiliency of CHP systems during a natural disaster, look no further than New York City's Montefiore Medical Center. In this case study, the EPA details how Montefiore remained fully operational during two catastrophic grid outages thanks to its CHP system, “allowing it to accommodate patients who were evacuated from nearby hospitals due to a loss of electricity at those facilities.”

It's not just the EPA that's recognizing the powerful potential

of CHP systems, either. Puget Sound Energy (PSE), a major provider in our region, offers significant incentives specifically for implementation of CHP systems, as do many other utilities.

As PSE notes, CHP systems are “a great opportunity to save money and increase your system reliability.” The utility also adds that CHP systems make sense for “businesses that have high annual hours and a continuous thermal load... examples include hotels, hospitals, nursing homes, pools, and health facilities.”

At the national level, a 2016 U.S. Department of Energy (DOE) report singled out hospitals and health care facilities as “good fits” for CHP systems due to their coincident power and consistent thermal loads. The report estimates that U.S. health care facilities alone represent nearly 10 gigawatts of technical potential for CHP systems, with only a small fraction of that potential being taken up by existing CHP capacity.

## Results at Good Sam

MultiCare Good Samaritan Hospital in Puyallup has often

been at the vanguard of sustainability. It's why they pushed to be the first inpatient hospital facility in Washington state to receive LEED Gold certification in 2012, and it's the reason why the MultiCare team didn't stop there.

At McKinstry, our mission is to make every building we touch more efficient, and we've been working towards that goal since we first partnered with MultiCare in 2013. Since then, we've developed more than 30 projects with MultiCare across the Puget Sound region.

At Good Samaritan, McKinstry partnered with MultiCare on a new 2-megawatt CHP system, which came online in late 2019 and was fully implemented in early 2020. The system will cut combined energy and maintenance costs by 25%, while reducing greenhouse gas emissions by 17%, compared with connecting to the standard power grid.

To maximize efficiency, the excess heat generated by Good Samaritan's CHP system is also captured and used to create steam to heat water for space



# HOSPITALS GIVING WAY TO OTHER CARE OPTIONS AS PROVIDERS LOOK TO CUT COSTS

More patients are getting routine care through networks of retail clinics, urgent care centers, and ambulatory surgery and specialty facilities.

The health care sector is growing rapidly, with the Bureau of Labor and Statistics predicting a 14% increase in health care employment by 2028.

While this is an exciting time for the field, growth presents both challenges and opportunities for health care systems. In a 2018 survey conducted by M.A. Mortenson Co., two-thirds of industry leaders expected to increase their investment in medical facilities to remain competitive.



BY BRYAN MAGGIO  
M.A. MORTENSON  
CO.

However, of those polled, 35% reported insufficient capital resources as their biggest challenge.

In this environment, health care systems are innovating to meet the demands of the market and the needs of patients by embracing more cost-efficient and time-sensitive approaches to delivering their real estate needs.

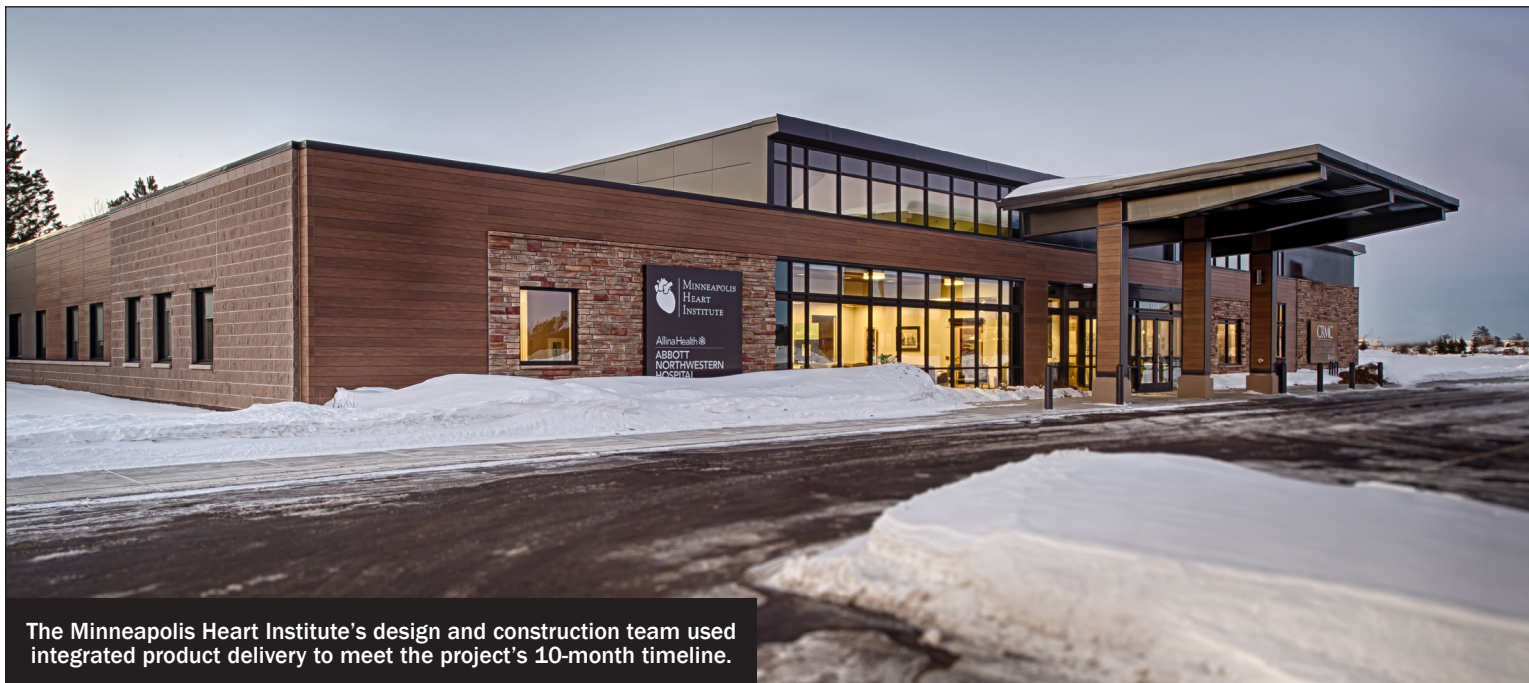
On a foundational level, health care systems are evolving to meet the market demands of a changing demographic and transition to a value-based care model brought on by the Affordable Care Act.

Hospitals, traditionally viewed as the primary patient care facility, are giving way to the rise of networks of retail clinics, free-standing urgent care centers, and ambulatory surgery and specialty facilities as part of a hub-and-spoke real estate strategy. These sorts of facilities are more cost effective to construct and operate and can be delivered on a shorter timeline.

## Improving access

In the hub-and-spoke model, the hospitals at the center treat only the most acute cases, with the primary focus on keeping patients out of the hospital through early intervention in the form of primary and ambulatory care. This approach ultimately keeps people healthier and in turn reduces a health system's operating expenses, allowing it to be most efficient with its valuable capital.

From a patient perspective, this trend translates into more access to preventive and rou-



The Minneapolis Heart Institute's design and construction team used integrated product delivery to meet the project's 10-month timeline.

PHOTO COURTESY OF SCOTT AMUNDSON PHOTOGRAPHY

tine care in convenient locations through networks of surrounding facilities. Freed from some of the complex regulatory requirements of hospitals, these facilities are often able to integrate retail-like amenities to create a more comfortable, welcoming environment.

Behavioral health treatment facilities are at the forefront of this trend as one of the most significant growth areas in the health care sector. In the past, mental health care was often associated with a strong cultural stigma and largely inaccessible to patients who were not able or willing to seek care in a hospital environment. This system has led to a scarcity of available beds for patients in crisis. In fact, Washington ranks second to last in the nation in terms of the availability of beds at inpatient facilities, according to a recent report from the Seattle Times, leaving nearly a quarter of adults in our state unable to get the care they need.

To address these limitations, the governor's office has spearheaded investment into behavioral health care facilities, which many expect to reach \$1 billion in the coming years. As part of a paradigm shift, these resources are not solely directed toward large state-run hospital facilities but also fund smaller community hospitals and clinics dedicated to mental health care. An example is the 115-bed Smokey Point Behavioral Hospital in Marysville constructed by Mortenson

in 2017.

For health care systems in Washington, this investment presents an opportunity to expand their operations, reach and impact through new facilities. With that expansion comes a need for more physicians, nurses and social workers to care for this population.

The University of Washington Medical Center's future Behavioral Health Teaching Facility on the Northwest Hospital campus is an example of this trend in action. With funding from the state of Washington, the facility is expected to add to Washington's bed capacity and provide a training environment for the next generation of caregivers.

## Design-build and IPD

With the growing need to expand quickly to meet patient needs and stay ahead of competition, many health care systems are shifting the way they deliver new facilities.

When asked in a 2018 survey conducted by M.A. Mortenson what project delivery method their organization would most prefer to utilize, 54% of industry leaders responded with either design-build or integrated project delivery (IPD). This represents a dramatic transformation in a market sector that for decades has leaned towards more traditional delivery methods like design-bid-build and CM-at-risk.

Embracing more new-age approaches like design-build

and IPD allow for greater collaboration, shorter timelines and a more nimble design and construction process. IPD is a flexible model that adapts to each individual project but generally begins with the selection of teams and the finalization of a value-based fee structure.

Instead of working separately, everyone from architects to trade partners and fabricators are often co-located to foster increased collaboration. Most teams work from a single model, providing real-time cost and constructability feedback, allowing for the most efficient use of resources, and eliminating the need for costly and time-intensive design iterations.

Both the University of Washington and Kaiser Permanente are recognized as national leaders in IPD. Currently, Mortenson and design partner HOK are leveraging the IPD method to target-value design a new 150,000-square-foot ambulatory facility as part of the expansion of Kaiser Permanente's Everett Medical Center. In addition to design consultants, key trade partners and suppliers are actively engaged in the process at this early stage, ensuring the ideas and perspectives of those who are eventually responsible for building the project are heard during design. These interdisciplinary teams are combining their expertise to explore design solutions that support prefabrication and modularization and shorten the overall construction

duration.

The Allina & Cuyuna Regional Medical Center in Minnesota provides an example of IPD's potential. Allina's Minneapolis Heart Institute had short-term lease that was set to expire, making the need for a new facility urgent.

Mortenson helped foster a new partnership with Cuyuna Regional Medical Center that brought together stakeholders from two separate organizations. The project embraced an integrated delivery model designed to achieve the level of collaboration and speed that the complex project required, completing the new health care center in 10 months.

From delivery models to design features and patient experience, health care facilities are evolving to meet regulatory changes and patient needs in a highly competitive market.

As one of the most rapidly growing sectors in our state and nationally, health care will continue to challenge the design and construction field to innovate solutions that deliver shorter timelines and a more efficient use of resources. With these challenges comes the opportunity to increase access, overcome limitations, and build facilities that will serve communities for many years to come.

*Bryan Maggio is a health care market executive for M.A. Mortenson Co.*

# INTEGRATED PROJECT DELIVERY OFFERS RISKS AND REWARDS FOR TEAM MEMBERS

Degenkolb Engineers shares a few lessons learned after 10 years of working on IPD teams.



BY KENDA SALISBURY & JAY LOVE  
DEGENKOLB ENGINEERS

After more than 10 years working on integrated project delivery (IPD) teams, Degenkolb Engineers has learned many lessons. As IPD becomes more prevalent and accepted by owners as a viable project delivery process, it's helpful to understand the strengths of the process.

The Lean Construction Institute defines IPD as “a project delivery approach that integrates people, systems, business structures, and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimize efficiency through all phases of the project, from early design through project handover.”

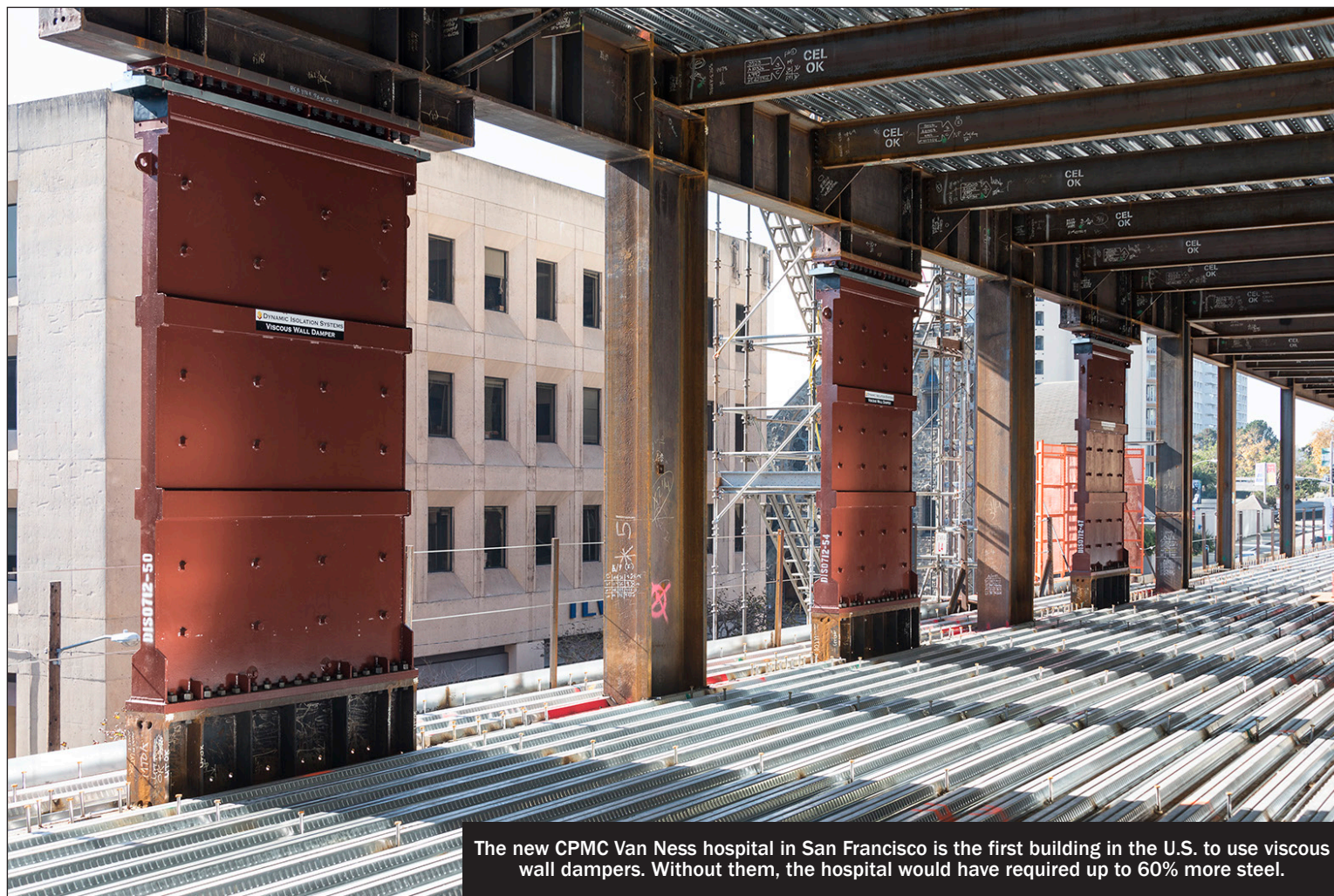
IPD requires a change in thinking of the entire design and construction team. By bringing the entire team together from the beginning stages of the project, they can consider all aspects in every conversation.

Degenkolb Engineers has provided structural engineering services for more than \$4 billion in IPD and lean-driven health care and education projects. This experience includes:

- Sutter Health's California Pacific Medical Center, Van Ness Campus (CPMC Van Ness): 13-story, 1 million-square-foot acute care hospital with 247 patient beds, diagnostic and treatment centers, and subterranean parking.

- Sutter Health's California Pacific Medical Center, Mission Bernal Campus (CPMC Mission Bernal): Seven-story, 215,000-square-foot acute care hospital with 120 patient beds, operating suites, expanded maternity ward and emergency room, and acute geriatric unit.

- Sutter Health's Alta Bates Summit Medical Center Merritt Tower: 11-story, 250,000-square-foot acute care hospital with 238 patient beds and inpatient acute rehabilitation treatment center.



The new CPMC Van Ness hospital in San Francisco is the first building in the U.S. to use viscous wall dampers. Without them, the hospital would have required up to 60% more steel.

PHOTO BY BRETT DRURY

- University of California, San Francisco (UCSF) Joan and Sanford I. Weill Institute for Neurosciences: 274,000-square-foot research facility for psychiatry, neurology, neurosurgery, and basic neuroscience with desktop research, clinical research and clinical care space.

- University of California, San Francisco (UCSF) Research and Academic Building at Zuckerberg San Francisco General Hospital and Trauma Center: Five-story, 175,000-square-foot laboratory research and academic facility.

## Team culture

A strong IPD requires active facilitation and participation. A significant investment of time is needed to build the individual relationships and culture of the team as a whole.

Strong relationships and trust create psychological safety and collaboration, allowing the team to take risks. The environment created must allow all ideas to come to the table.

A common theme heard

amongst our IPD project teams is staffing continuity.

“Teams must have a process for onboarding and offboarding team members. There must be a commitment to maintaining continuity of project knowledge and team culture,” said Ray Pugliese, Degenkolb senior principal and project manager for the UCSF Weill Institute. “Including design and preconstruction personnel needs to be supplemented by construction superintendents and foremen who will be out on the project site. Field staff are best equipped to tell you if your design is feasible for construction.”

IPD is an intentional process and requires agreement from all parties. There are differing opinions on whether IPD can be executed with traditional contracting methods or if an Integrated Form of Agreement (IFOA) is needed.

IFOA is a tri-party agreement between the owner, contractor and architect. The IPD IFOA shares the project risks and rewards proportionate to team member's financial and techni-

cal involvement. To date, our experience centers around IFOA-based IPD projects.

## Pulling together

The CPMC Mission Bernal project team encountered a difficult situation late in construction.

“All of our target costs started creeping up and our contingency started to disappear,” explained Carrie Mitchell, Degenkolb principal and project manager for structural design.

The team pulled together and created a new plan and schedule for the entire project to stabilize key project indicators.

“I don't think the team would have pulled together without the IFOA,” she said. “The IFOA encouraged the team to pull together, without pointing fingers, saving approximately 85% of the project's profit. It's imperative to keep project goals top of mind for the entire team every week.”

Wayne Low, Degenkolb senior principal and project manager for structural design for Sutter's

Alta Bates Summit Merritt Tower, participated in an IPD research study at UC Berkeley.

“In our research we found that it only takes one partner to send the whole project awry,” Low said.

Not all parties of the design and construction team participated in the IFOA for one project. One team member didn't participate and had a large scope of construction responsibilities and fell behind on delivery. This team member was unresponsive to the team, causing constraints for the project as a whole.

“People always put their own interests first if they're not financially tied together,” Low said.

IPD encourages team members to bring all possible design and construction solutions to the table and to keep all of these options open until the team makes final design decisions.

For Sutter Health, the ability of their facilities to function after a large earthquake is key. At CPMC Van Ness, the team explored tra-

## WHAT'S IN STORE

CONTINUED FROM PAGE 3

partnership with direct patient care, connecting leading edge treatments seamlessly in time and space to the ophthalmology patients who need them.

For many health systems, community-based care is a strategic focus, bringing health care to the people. Patients are getting more engaged and empowered in this age of information and rise of consumerism.

Patients are expecting more choice and more access to data to inform their decision making. With services such as telehealth, patients can meet with their doctors via an internet connection at their own kitchen counter instead of an exam room.

And the broad-based information technology adoption by health care providers, such as practice management and electronic medical record systems, are driving facilities to implement extensive data connection requirements. These factors are driving the design more than ever of new hospitals, clinics and health facilities.

The original patient floors at the MultiCare Good Samaritan Hospital in Puyallup were configured with centralized nursing stations. When they elected to build out the remaining two floors, they utilized cardboard and virtual mock-ups so that the care teams were able to confirm improved patient visibility by the nursing staff through decentralized nursing stations. This approach brought the staff closer to the patients and increased one-on-one time with the patients by reducing time between charting, nutrition, medication and the patient's bedside.

The health care ecosystem continues to expand its reach into the communities through urgent care clinics and free-standing medical office buildings. Kaiser Permanente also is growing rapidly as they continue to expand their services in the Northwest.

We continue to see clinics moving to an "onstage and backstage" program. This approach groups the providers in "back-

stage," open-environment teaming areas to create more collaboration between doctors and nursing staff.

Double-sided exam pods then allow patients and their families access from the public corridors and the care providers to enter from the backstage, creating more efficient flow and less travel time between the nursing areas and exam rooms.

### Focusing on outcomes

Building for outcomes is perhaps the most critical function for which we plan and prepare. In the array of potential acute, outpatient and ambulatory settings, we work with our clients to create flexible environments that anticipate changing needs of patients.

We work to customize and align the design goals to create the desired outcomes and to facilitate the environment of safety and healing. The best project outcomes occur when the design and construction team work collaboratively with the providers and users.

Sustainability is also an important element in health care construction not only to be environmentally responsible but also to reduce operating costs, including building for environmental resiliency. Similarly, creating sustainable structures can lead to the efficient use of resources since health care facilities require large amounts of energy and resources to run multiple systems. Reducing operating costs can be a significant positive impact to the financial health of a hospital.

To build for efficiency, Samaritan North Lincoln Hospital in Lincoln City, Oregon, made smart use of tall windows to maximize light and reduce electricity needs, and implemented efficient mechanical systems designed to save operating costs. Samaritan North Lincoln also sought to build for the future by creating a hospital that would grow with the community, anticipating future health needs such as expanded birthing and obstetric triage rooms, larger

and better-configured emergency and trauma care services, and modernized acute patient care space.

After completing the first LEED Gold hospital in Washington in 2010, we continue to see increased interest in carbon reduction, and more sustainable solutions on health care projects.

It only makes sense that more emphasis is taken to reduce new hospitals' Energy Use Intensity (EUI), as they are 24/7 facilities and large consumers of energy.

Several years ago, Target 100 challenged new hospitals to achieve an EUI of 100 or less. Many of the newer facilities are getting close through utilization of daylighting, lighting controls, heat recovery, more efficient equipment, advanced system monitoring and automation controls, and improved building envelopes.

In addition, there is more emphasis on right-sizing patient rooms, exam rooms and procedural spaces to ensure patient care and procedures are performed efficiently while minimizing wasted space. More focus is placed on standardization and streamlining patient care to increase efficiencies and reduce errors. These efforts can improve patient outcomes. More health care organizations are embracing lean principles like Virginia Mason Hospital and Seattle Medical Center has done for years to improve procedural outcomes, improve predictability and reduce cost.

Today's hospitals, clinics and health care spaces must be built with the focus on evolving and increasingly complex patient care. This well illustrates the ongoing and strong interest in redesigning facilities with flexibility, cost efficiencies and provider engagement in mind.

*John Williamson is manager of Central Oregon, and Mark Howell is senior vice president and account manager in Seattle for Skanska USA Building.*

## PROJECT DELIVERY

CONTINUED FROM PAGE 10

ditional code-based structural design and looked at developing technologies and practices.

Structural engineers proposed a hybrid steel moment-frame design incorporating viscous wall dampers. Developed in Japan over the past 30 years, viscous wall dampers absorb strong movement and reduce overall stress on the building.

CPMC Van Ness is the first

building in the United States to use viscous wall dampers. The wall dampers absorb about 90% of the energy from an earthquake and have the added benefit of augmenting the strength of the building. Without the wall dampers, the hospital would have required up to 60% more steel. Factoring in the cost of the wall dampers with structural steel, the design saved 25% of

the total cost of the building's structural steel.

While IPD is still relatively new to design and construction, it is imperative to understand the process as a whole, the time and commitment needed by each team member, and the importance of shared risk and reward.

*Kenda Salisbury and Jay Love are Degenkolb engineers.*

## WELCOMING DESIGN

CONTINUED FROM PAGE 7

ensure that our buildings are designed from the outside in, so that visual cues from the outdoors are legible from inside and keep us connected to the natural world.

Landscaped healing gardens in particular have been shown to confer benefits to hospital staff by reducing stress and improving emotional health.

For behavioral health patients, they not only have the potential to extend the therapeutic benefits of treatment, but to provide a verdant backdrop for walking paths and exercise space. Movement is foundational to wellness, and routines established within the in-unit environment can be maintained long after patients are discharged. And while these gardens aren't common in our state's behavioral health facilities, there's no reason why such a space can't be designed to be safe and secure, and to include distinct zones for care providers to enjoy.

### Reducing stress

Many of the ideas outlined so far carry dual benefits. Research has linked more therapeutic environments with reduced aggression in patients. That means lessening the need for medication and restraints and in turn, lowering the overall stress of the providers who look after them.

In some cases, incorporating these ideas isn't feasible because of the challenges inherent to a particular project. Despite these obstacles, it's possible to design an environment that breaks convention and raises the bar for care.

Inside the recently completed behavioral health unit at Swedish Medical Center in Ballard, we incorporated a color-tunable LED lighting system in the unit's common areas. The unit was built within two floors of the existing hospital, which receive little daylight. The aim was to imbue the space with changing light to mimic the color and intensity

of daylight throughout the day, thereby synchronizing patients' natural sleep-wake rhythms, marking the passage of time, instilling routine, and providing a sense of calm as the day winds down. Not only does this support healthy circadian rhythms for patients, but it benefits staff who spend considerable time each week within the same spaces.

To enhance the unit's physical environment, existing structural columns were transformed with glass and ceramic tile that feature colors and textures evoking the natural environment of the Pacific Northwest. This attention to detail and aesthetic beauty contrasts with the design of older behavioral units, where durability considerations were prioritized and where columns were often wrapped in concrete and painted, leaving grooves, steel housings, and fixtures exposed.

A year after it opened, we surveyed 18 providers working within the unit as part of a post-occupancy evaluation. They reported that the circadian lighting had a calming effect on patients, and that patients perceived the colors and textures in the communal spaces as soothing.

When design elements in the behavioral health setting start to look like the kind we'd encounter in other health care environments, or even in our homes, the more likely it is that people who need help will feel comfortable seeking it. And the more likely that their care providers will feel supported and empowered while on the job.

With one of the nation's highest incidences of mental illness and a pronounced workforce shortage, the need in Washington state has never been more urgent. We have a responsibility — and an opportunity — to help design the path forward.

*ZGF principal Kari Thorsen leads the planning and interior design of many of ZGF's largest health care projects locally and nationwide.*

## CHP SYSTEMS

CONTINUED FROM PAGE 8

heating, humidification, sterilization and domestic hot water used by patients, staff and families throughout the hospital.

"Sustainability efforts like this new CHP system at Good Samaritan are essential to MultiCare delivering on our mission of partnering for healing and a healthy future," said Tammy Buyok, MultiCare's vice president of facilities management and operation support. "Sustainability also means delivering on our values: To deliver community benefit and reduce risk. Saving energy not

only reduces costs, it reduces our impact on the communities we serve and ensures we can provide for a robust future."

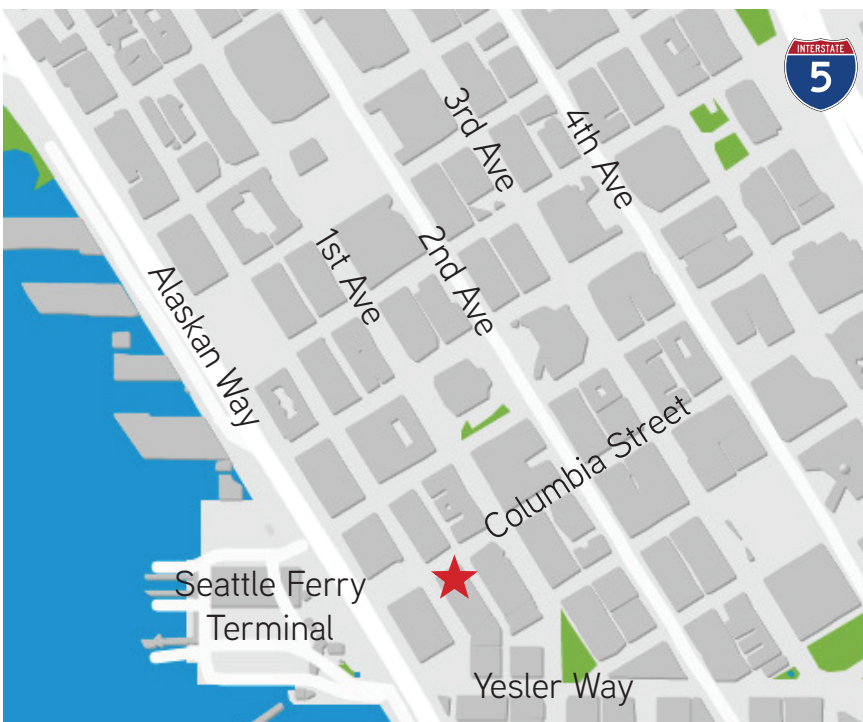
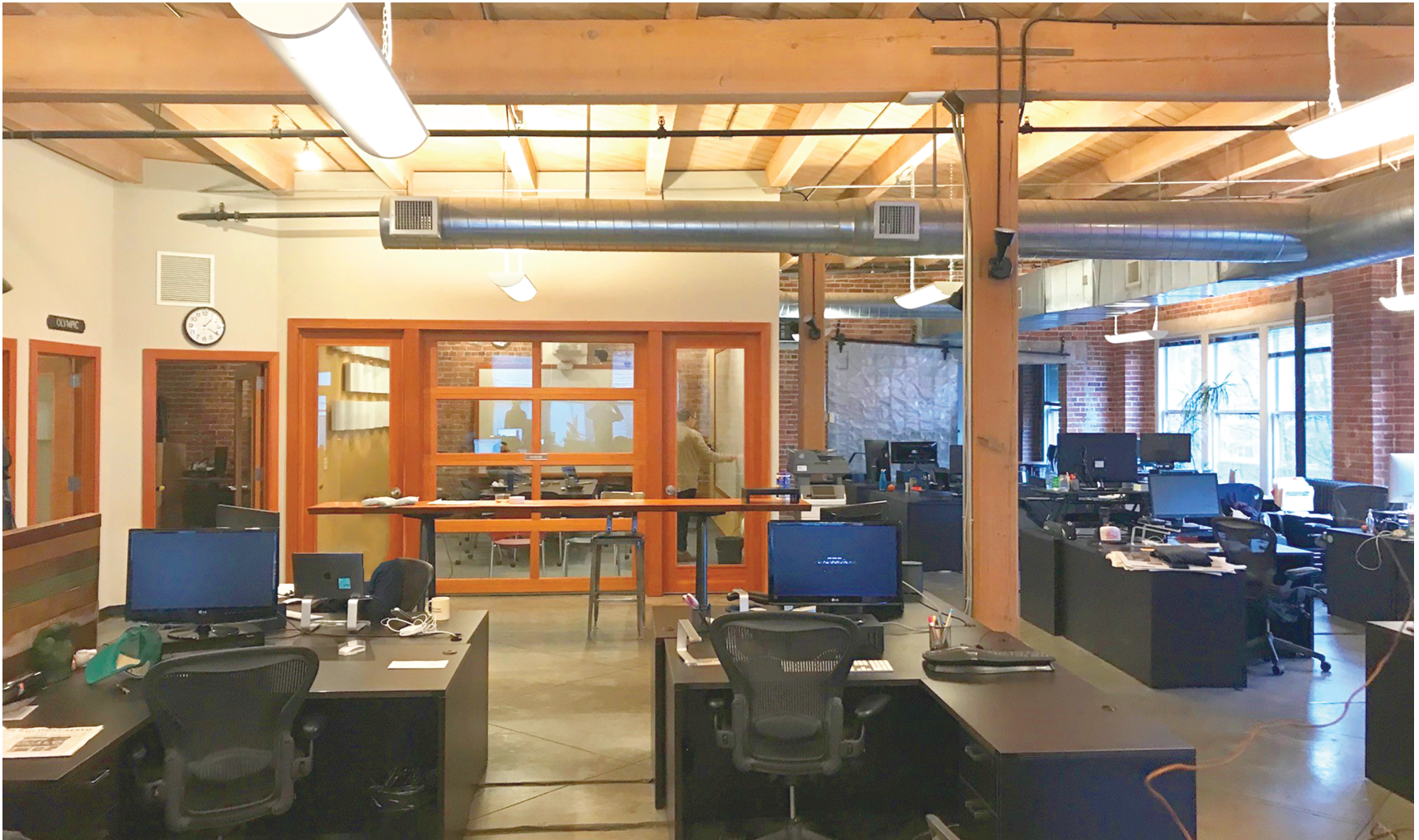
At Good Samaritan and nationwide, CHP systems are a powerful tool for health care facilities to achieve much-needed cost reduction, energy efficiency and reliability — all of which improve the patient experience and help ensure a healthy future.

*Ron Fues is a project director and Nick Edney is a senior electrical engineer at McKinstry.*

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# HEALTH CARE COULD LOOK A LOT DIFFERENT IN 2040, SO GET READY

Whatever happens, clients will still need help making informed decisions on how to best invest in their facilities.



BY BRAD HINTHORNE & MARIE HENSON  
PERKINS AND WILL

Health care is one of the most rapidly changing and increasingly complex industries, and it's on the cusp of a transformation that will affect all consumers, providers, payers and families.

According to a Deloitte Insights report on the future of health care, incumbent players can either lead this transformation as innovative and well-connected market leaders, or they can

attempt to resist this inevitable change.

The report goes on to say that in the future of health, incumbents and industry disruptors will share a common purpose. While disease will never be completely eliminated, through science, data, and technology, we will be able to hopefully prevent it, identify it earlier, intervene proactively, and understand its progression to help consumers effectively and actively sustain their well-being.

## Changes ahead

Within the next 20 years a number of developments will transform the health care landscape: advances in medicine and technology, intensifying competition to engage the patient/consumer, the explosion and increasing interoperability of all



The Lytle Center for Pregnancy & Newborns at Swedish Medical Center on First Hill has a living room with a fireplace and 20-foot-tall windows.

PHOTO PROVIDED BY PERKINS AND WILL

2040 — PAGE 19



Seattle Children's Hospital Hybrid OR/Cath Lab, Seattle, WA

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# BUILDING OUT THIS NEW HYBRID O.R. WAS NO SIMPLE OPERATION

The highly technical surgical suite at Harborview is one of only a handful of such facilities nationwide.

Rapidly evolving health care technology requires sophisticated facilities and infrastructure. Likewise, the rigorous demands of these specialized designs require high-performance collaboration teams.



BY TODD PARKE  
PCS STRUCTURAL  
SOLUTIONS

So when University of Washington Medicine needed to upgrade a critical operating room, they partnered with a capable design-build team to design and construct a highly technical hybrid bi-plane operating room, one of only a handful of such facilities nationwide.

## Hybrid operating rooms

Hybrid bi-plane operating rooms are surgical suites that provide real-time patient imaging data — in this case a C-shaped biplanar imaging system that generates images on two separate planes — and allow a quick shift from diagnosis to surgical treatment in the same room. Hybrid operating rooms are sized and configured to exacting specifications. The rooms must support cardio- and neuro-medical teams, among others, and roughly 15,000 pounds of equipment.

At Harborview Medical Center, the new systems were integrated into an existing operating room. Every wall, ceiling and floor of a medical facility is jam-packed with programming — ductwork, conduit, lighting, medical gases, monitors, booms, storage, and structure. How to add more programming to an existing room is a highly complex orchestration that requires the design-build team to find truly unique solutions on a tight schedule and with minimal impact to hospital operations.

## Team vision

We knew that designing a hybrid operating room required robust teamwork. Solid design solutions would develop from effective communication and coordination of large amounts of information.

Because PCS goes all in on medical projects, from billion-dollar patient towers to cutting-

## HARBORVIEW TEAM

**Owner:**  
University of Washington  
Medicine

**Architect:**  
Ankrom Moisan  
Architecture

**Design-build contractor:**  
Aldrich + Associates

**Structural engineer:**  
PCS Structural Solutions

**Electrical engineer:**  
Stantec

**Mechanical engineer:**  
Notkin Mechanical  
Engineers

edge operating room replacements, the Harborview project was a natural fit. Preparing for project pursuit, the design-build team held meetings to cement the cohesiveness and camaraderie the project would need throughout design and construction.

Even before work began, we invested the time we needed to build authentic connection and to develop a team vision for the project. Each team member selected an image they felt best fit their role and desires for the project. For example, PCS saw our role as an iceberg — even though the structural engineering would be hidden inside the walls, it needed to have a huge impact.

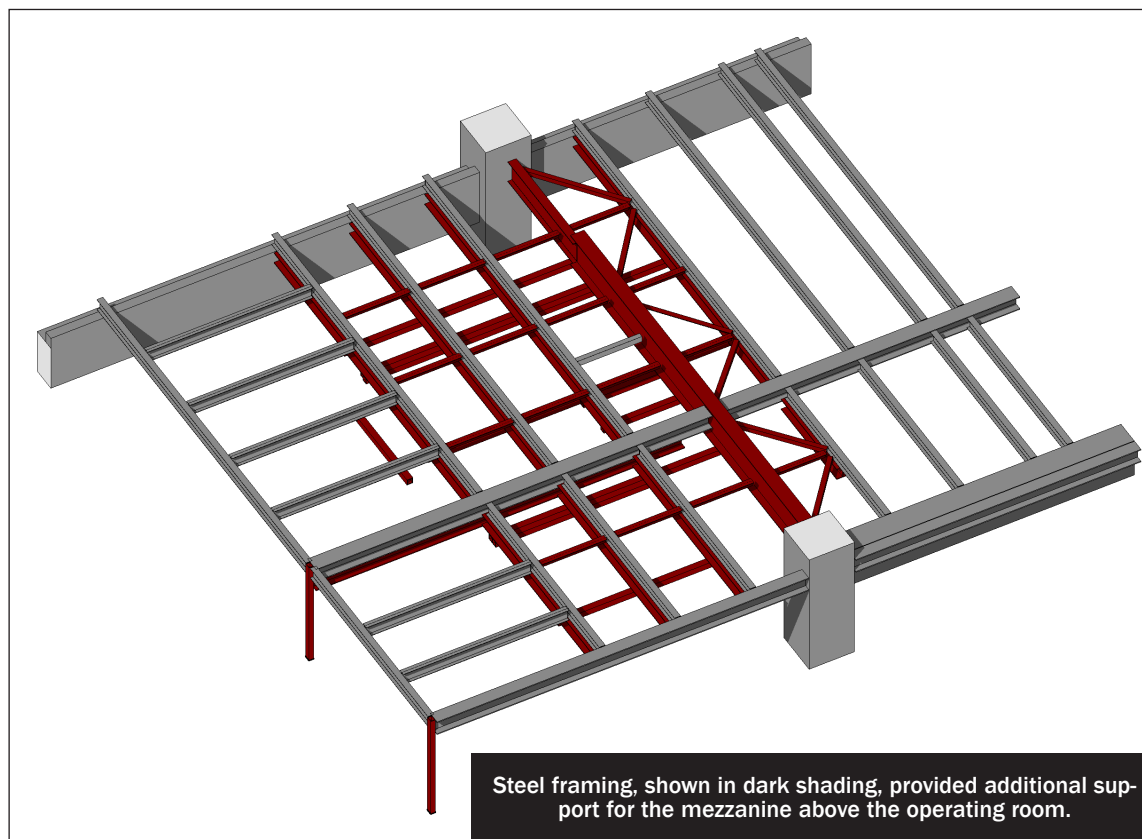
## Design-build

Design-build delivery provided the project with an essential framework: early collaboration, teamwork, efficiency and speed. It was critical that the project go seamlessly from design to build and limit impact to a busy operating floor. Open and free communication between contractor, architect and structural engineer early in the design process was crucial.

The design team and the subcontractors who were engaged early in the process worked together to help interview and



Physician teams at Harborview communicated precisely what operating room functionality needed to look like and why.



Steel framing, shown in dark shading, provided additional support for the mezzanine above the operating room.

IMAGES COURTESY OF ANKROM MOISAN ARCHITECTS

select several specialty subcontractors, including the integrated ceiling specialist, which was pivotal to the success of the team.

End-user participation brought the real-life operating room experience

and informed fundamental decisions. The design team created hand-adjustable models of the operating room.

Moving the pieces, the physician teams communicated

precisely what operating room functionality needed to look like and why. The surgeons and hospital staff helped establish the

# GOOD DESIGN TAKES SOME STRESS OUT OF VISITING THE HOSPITAL

Attention to details such as thoughtful wayfinding helps people feel more comfortable and connected to their environment.

As health care facilities grow in complexity and scale, design firms place an increasing importance on approaching design solutions from the visitor's perspective.

In the Northwest, where world-class medical facilities play a critical role in the economy and health of our region, it is essential to foster solutions that meet client needs while also addressing the user experience.



BY MARILEE HANKS  
KNOT

At Knot, the emphasis is on early collaboration with design firms to discover design methods that will enhance the experience that patients, families and friends have when visiting facilities such as Providence Regional Medical Center in Everett and the OHSU Center for Health and Healing in Portland.

Knot's role in these designs includes placemaking, wayfinding and donor recognition solutions.

Wayfinding, or directional signage, at large facilities such as Oregon Health and Science University's Peter O. Kohler Pavilion, is a critical component to making large-scale health care facilities run smoothly — as thousands of patients, visitors and medical staff navigate this 16-floor building located on Portland's Marquam Hill each day.

Knot designers place a significant spotlight on putting themselves in the visitors' shoes. We assume that visitors are coming to facilities such as the Kohler Pavilion or Providence Regional Medical Center for the first time, and the measure of good design should be our ability to make people feel comfortable and connected to these environments.

It's safe to assume that many visitors to these medical facilities already have a certain amount of stress, so we approach our design solutions with a great amount of delicacy, in terms of the visitor experience.

Making that a reality involved the use of large-scale graphics to provide memorable cues at key entry points at Kohler Pavilion. Our design at Kohler employed panels with greatly magnified nature images printed to film. In the parking garage, Mount Hood, which is visible from Kohler Pavil-

The Providence Regional Medical Center in Everett has a wayfinding program with brightly colored graphics.



PHOTOS COURTESY OF KNOT

ion, is a key icon represented in parking graphics for each color-coded floor of the underground lot.

A similar bold-colored graphics strategy was part of Knot's design for the Providence Regional Medical Center in Everett. Knot's designers created the exterior campus-wide wayfinding program, as well as the interior sign program that gives staff and visitors a coherent yet artfully executed system to navigate the center's 12-story tower and garage.

## Donor recognition

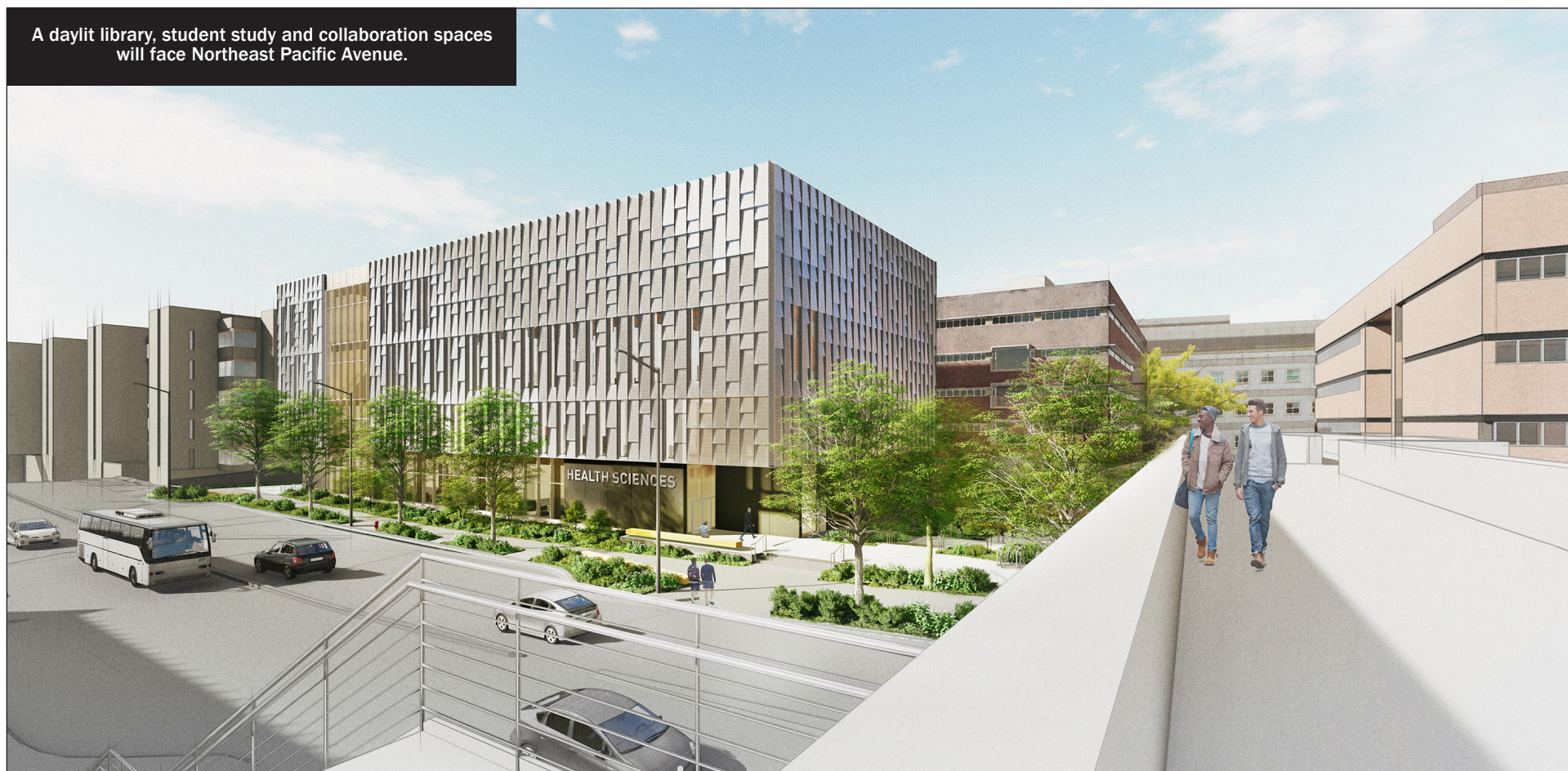
For many medical facilities, such as the Fairbanks Memorial Hospital Surgery Center, a donor recognition wall plays a key role in the overall design. The Fairbanks hospital's donor wall features color, lighting and forms inspired by the aurora borealis, while highlighting important milestones and people who have

A donor recognition wall at the Fairbanks Memorial Hospital Surgery Center in Alaska was inspired by the aurora borealis.



GOOD DESIGN — PAGE 19

A daylit library, student study and collaboration spaces will face Northeast Pacific Avenue.



RENDERINGS COURTESY OF THE MILLER HULL PARTNERSHIP

# UW'S NEW HEALTH SCIENCES BUILDING WILL BE A HUB FOR 21ST-CENTURY CARE

Its spaces have been designed to spark innovation, creativity and collaboration.

Providing more care  
to more kids.

Seattle Children's Building Care | 2021

COUGHLIN  
PORTER  
LUNDEEN

Following the groundbreaking development of the Hans Rosling Center for Population Health, the University of Washington has embarked on a second new building that will impact thousands of students across the schools of Dentistry, Medicine, Nursing, Pharmacy, Public Health and Social Work. The Health Sciences Education Building (HSEB) will foster interaction, collaboration and creativity and set a new tone for the existing medical campus. It will be a centrally located hub for the health science schools to train future health professionals in support of affordable, accessible and high-quality, 21st-century health care.

BY RUTH BALEIKO,  
CHRIS HELLSTERN  
AND ELIZABETH  
MOGGIO

THE MILLER HULL  
PARTNERSHIP

The project is led by our design-build team of Miller Hull, The S/L/A/M Collaborative and Lease Crutcher Lewis.

## Improving care culture

To inspire generations of future

health care professionals, a culture of care is embedded in all aspects of the HSEB's design. Our team's attention to landscape, architectural materials, legibility of wayfinding and visibility of interior activity is intended to set a new example of warmth and invitation to south campus.

The program was carefully crafted to include spaces that spark innovation and creativity with a diversity of environments that encourage collaboration where health science school students learn from each other how to be part of high-performing, healthy delivery teams.

A daylit library, student study and collaboration spaces line the north side of the building facing Northeast Pacific Avenue, while classrooms, skills and anatomy labs are positioned to the south. An interprofessional commons space perches above an outdoor south facing plaza.

By making indoor and outdoor spaces feel more humane, inviting and comfortable, our team hopes that the student experience will feel immersed in those characteristics — and be passed on to future professionals.

## High-performing teams

The HSEB project's commitment to high-performing teams is a driving force in the highly collaborative interdisciplinary design and construction process developed by the design-build team and the UW.

Following on the success of this progressive design-build process in creating the Hans Rosling Center for Population Health, our team embraces a culture of trust and respect as we explore and test solutions that simultaneously consider design, construction, fabrication and sequencing realities. This strategy has enabled our team to work creatively and efficiently, while incorporating extensive owner involvement and long-distance experts, such as S/L/A/M.

Designing a unique HSEB for a world-recognized university on an urban campus provides opportunity to think not just about the successes inside the building, but the potential to impact campus, local and regional success as well.

**Stormwater treatment:** One of these opportunities comes to



our project by way of stormwater treatment.

During site analysis, our team discovered an abandoned concrete flume from the Harris Hydraulics Lab located alongside the basin's outfall to Portage Bay. Instead of treating only the stormwater from the HSEB, our team designed a regional stormwater treatment facility for the university's San Juan drainage basin. This system provides greater impact by treating 34 acres of stormwater using a natural process of amended soils and plants.

Working closely with UW, students will be directly involved in studying this stormwater system. A grant provided by the UW Campus Sustainability Fund ensures that students will work to create various soil mediums and test different plant species to find optimal treatment paths.

In addition to the educational benefits, this regional stormwater treatment system will provide a single point for maintenance and operations, greatly reducing the number of stormwater points that both the UW and Seattle Public Utilities must engage with. Predictive models show that this system will significantly increase the amount of treatment that can be provided to this quantity of water and much more quickly than previous long-range plans.

**Mass timber:** Continuing the theme of larger impact, the UW understands the benefits that building with mass timber can provide for their ever-expanding campus as well as the regional economy.

Utilizing mass timber can bring a significant embodied carbon benefit to the huge global warming footprints associated with new buildings and provide a significantly reduced amount of carbon. Although wood was the material of choice for many buildings several decades ago, it has fallen out of favor for other methods.

To help this resurrection, the UW and the design-build team successfully pursued two federal grants to support the integration of CLT panels as floor and roof structure. One grant provides funding to study the unique vibration characteristics of a mass timber structural system and the impact on building tenants. The other provides support for integrating mass timber in higher education buildings.

**Strategic daylighting:** With new construction on the UW campus, there is a great opportunity and responsibility to reduce building energy. One of

Electrochromic glass, which uses an electronic signal to tint the glass, may be installed on the building's south face to help reduce solar heat gain.



the primary ways to do this is by designing buildings to respond appropriately to their climate.

A newer technology called electrochromic glass can help reduce solar heat gain while maintaining the daylight and visual connection that we all need when inside our buildings. Electrochromic glass uses an electronic signal to tint the glass and block unwanted solar gain. This signal darkens the coating on the glass as lithium ions and electrons transfer from one electrochromic layer to another, allowing for varied levels of tint depending on the voltage used.

Once again partnering with the UW Campus Sustainability Fund, a research proposal that supports the use of electrochromic glass is currently under advisement. If accepted, the goal is to incorporate it into the HSEB so that it can provide targeted areas of electrochromic glass on the south facade, which is most impacted by solar heat gain. Students will then have direct access to the electrochromic system to test the effectiveness and learn its benefits.

Additionally, students from the UW's Integrated Design Lab will work directly with the design-build team to run various analyses on the use of this glazing and determine the impacts it

has to occupants. By using electrochromic glass, this project provides another rewarding way for our team to engage with students and create additional

learning opportunities on their own campus.

Ruth Baleiko is a partner at the Miller Hull Partnership, Chris

Hellstern is the Living Building Challenge services director, and Elizabeth Moggio is a senior associate.

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# FIRE DAMPERS: ONE MORE WAY HOSPITALS CAN SAVE LIVES

The International Building and Fire Code requires damper inspections, but crews need a plan to work around staff and patients, and minimize disruptions.

**F**ire dampers save lives. This is particularly true for facilities catering to vulnerable populations, including hospitals where many patients are non-ambulatory.

Statistics show that approximately 70% of all building fire-related deaths are associated with smoke inhalation and that most victims are not located in the same room as an active fire.

The International Building and Fire Code requires inspections of fire dampers,



BY JAY DANNER  
HERMANSON CO.

smoke dampers and combination fire/smoke dampers to be made one year after installation at any facility type, and again every six years in hospitals (every four years for other building types). Studies show that on average 55% of all inspected dampers fail within the first 10 years due to building settling, tenant improvement work that alters surrounding areas, or expansion and contraction of the damper's metal components.

Inspections require a licensed contractor to:

- Locate and operate (actuate) all fire and smoke dampers in the facility.
- Remove and reset the fusible link (where possible) to verify the damper fully closes.
- Manually activate electric smoke dampers and pneumatic smoke dampers to ensure actuator operates and fully closes.
- Provide a detailed report of each damper's operational status.

## MultiCare Tacoma General

As the city's largest hospital, MultiCare Tacoma General Hospital is a Level II trauma center with 437 beds and the second-largest obstetrical care center in the state. During routine fire/life safety testing, it was determined that 841 of the hospital's 2,139 fire, smoke or fire/smoke dampers needed to be either inspected, repaired or possibly replaced in order to meet National Fire Protection Association (NFPA) requirements.

After receiving the inspection report, MultiCare chose Hermanson Co. to perform the necessary corrective action to bring deficient dampers into compliance and to resubmit evidence of corrective actions taken.

Hermanson has more than 20 years of experience working in

occupied hospitals. Additionally, it's one of the few mechanical contractors in the Puget Sound area that employs the required accredited technicians (under the American National Standards Institute ISO/IEC 17024) to do damper corrections.

Knowing the hospital's desire to limit potential operational interruptions by constricting the project timeline to a three-month period, coordination of Hermanson staff began within relevant business units.

By utilizing the expertise of four specialized groups within the company, including TCC Group (Tab, Control, CX), Construction Support Group, Critical Environments (CEG) management, and a Special Projects workforce, Hermanson felt confident in its ability to meet the project deadline.

In the field, five crews were assembled to meet the project's requirements and heightened time and operational sensitivity. The crews were composed of:

- Sheet metal workers (qualified to make corrective actions).
- ANSI/ICB-licensed fire/smoke damper technicians (able to certify corrective actions).
- Material handlers (used as spotters to assist in patient sensitive areas and tasked with stocking project carts).

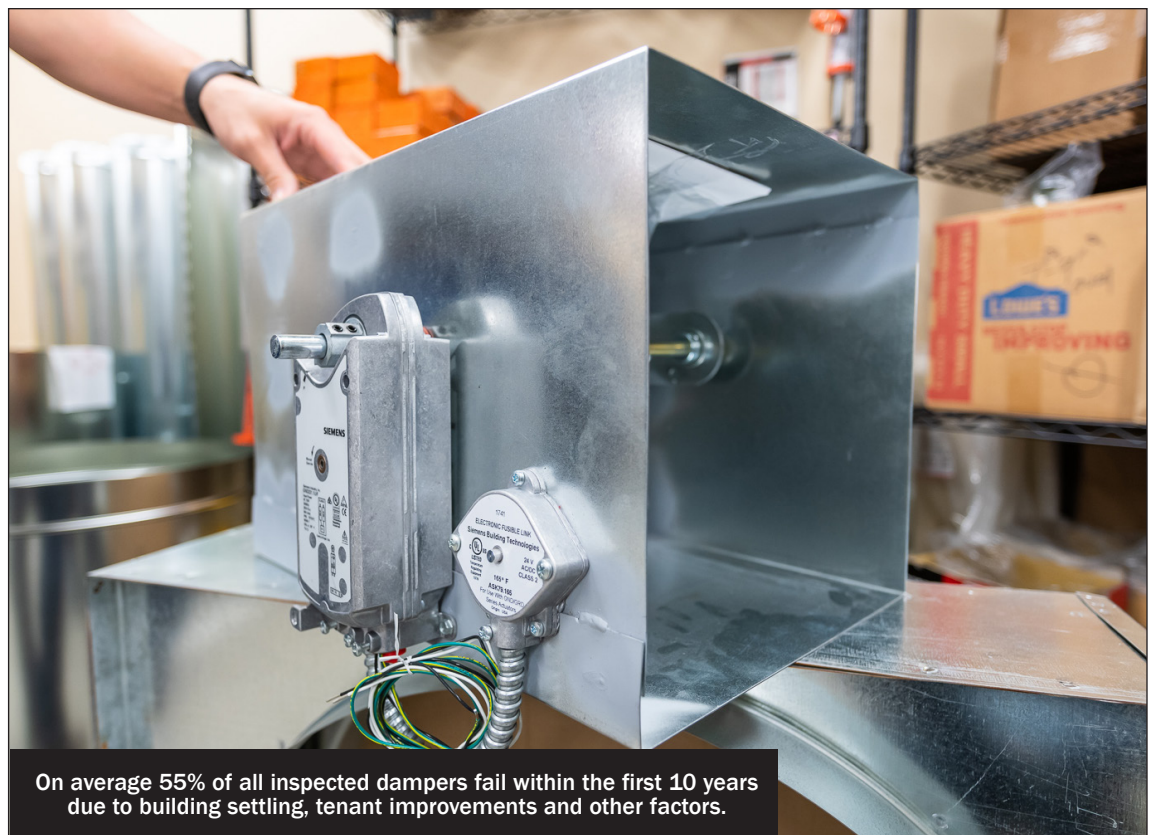
Additionally, MultiCare supplied David Dowling, a dedicated HVAC technician from its facilities department, to work as a liaison between hospital staff and damper correction crews.

"Working within a fully operational hospital with staff and patients needing access to areas where damper inspections may occur, having David Dowling's assistance was instrumental in the project's overall success," noted Brad Sharp, a Hermanson supervisor and project consultant. "He provided the coordination necessary to allow the five crews to work on a continuous rotating basis with minimal downtime."

## Documentation process

Crews began the process of documenting repairs or replacements of each of the dampers called out in the initial inspection with photographic evidence of dampers in fully operational open and closed positions. Working across seven buildings on the hospital campus, meticulous record keeping was necessary to provide accurate documentation for final project reporting.

The initial inspection report, conducted by a third party, cited many dampers as "unable to inspect" (including 350 of



On average 55% of all inspected dampers fail within the first 10 years due to building settling, tenant improvements and other factors.



A vacuum-sealed Hepacart controls potential dust and particulates released during inspections.

the 374 dampers in one building alone) due to accessibility issues. These damper corrections required the additional step of gaining access before determining if any corrective work needed to be performed.

Hiring an accredited inspector can save both time and expense by allowing corrections to be

completed at the time of inspection.

Patient safety, privacy and comfort were the primary project concerns, and achieved by scheduling work during early morning, late evening and week-ends hours. Additionally, the use of Hepacarts ensured containment of dust and particulates

that could have been introduced into the hospital during damper work. A spotter was stationed outside of the cart to assist with the safe passage of hospital staff and patients.

At the end of the three-month period, the required correc-

PHOTOS BY JASON HERITAGE

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## 2040

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health-related data, a changing regulatory landscape, and new entrants who bring both advanced technologies and an understanding of consumers.

Organizations investing in consumer engagement technologies, virtual health, and care coordination are well-positioned for the future whether or not reimbursement shifts toward value-based payment models.

If this vision for the future of health is realized, we will see both healthier populations and dramatic decreases in health care spending. If we're right, by 2040 we might not recognize the industry at all.

Who doesn't want to be part of a new 21st-century health care model centered on technology coupled with patient empowerment? A wide range of companies — from inside and outside of the health care sector — are already making strategic investments that could form the foundation for a future of health that is defined by radically interoperable data, open and secure platforms, and consumer-driven care.

## Meeting tomorrow's needs

Seattle sits at the nexus of innovation, technology and health care and is well positioned to lead this transformation of a new model in health care. However, one of the many challenges in this dynamic industry is how to plan and design a facility today that will meet the strategic and operational needs of an institution five to 10 years from now.

Nearly all nine of the major hospitals within the Seattle city limits have large-scale expansions planned or under construction. All of them rightfully devote significant time and energy to ensure there's a valid

business case in an industry where reimbursement is fluid, land is scarce, construction costs are at an all-time high and rapid advancements in medicine, science and technology all inhibit certainty.

Nobody can say with absolute certainty how many beds or operating rooms or widgets may be needed a decade from now, which is generally how long it takes for a complex institution to plan, fund, design and deliver a complex project.

As architects and planners, our role in this complex analysis is to apply our expertise and experience in design, land use planning, entitlements, health care planning and programming, construction, etc., to help our clients make informed decisions and be good stewards of their limited resources.

We are able to translate operational and strategic objectives into space requirements, compare those requirements against industry benchmarks, consider the complex implications of new construction vs. renovation, analyze various parcels to determine their ability to efficiently accommodate various near- and long-term program needs, study alternative development scenarios and strategies within the rules established by land use and building codes, understand the operational and cost implications of different phasing scenarios, and provide guidance on strategies for long term adaptability and flexibility.

As architects, it's also important that we talk with patients, families, physicians, nurses, administrators and neighbors, who look at buildings through different lenses.

This analysis, combined with the owners' ongoing analyses of other competing demands within their respective institu-

tions, cultures and businesses is critical to the long-term financial success of institutions and campuses, because building too much or too little can have equally devastating results.

Health care facilities will be enhanced by high-tech devices, artificial intelligence, augmented and virtual reality, and broad data availability projected on large screens and mobile devices.

Rooms will accommodate families and technology seamlessly. For instance, hospital room TVs will be flat screens for entertainment and patient education. But they will also let the care team call up images and data to explain the patient's health issues to both the family and patient.

Mobile devices, like tablets, will be in the hands of providers as well as patients so they can feel more engaged in their care by documenting their pain, noting other symptoms, or contacting the nursing station when necessary.

The next 10 to 20 years will reveal new innovations in health care that we cannot even predict today. In Seattle, where all nine hospitals are located within existing neighborhoods that have grown more dense over time, real estate is a precious commodity.

Regardless of what the future of health care holds, the need for our clients to make informed and accurate decisions on how to best invest in legacy or new facilities will remain, and the design and construction industry will continue to play a vital role in making these important decisions.

*Brad Hinthorne is a managing principal at Perkins and Will and Marie Henson is an associate principal at Perkins and Will.*

## HYBRID O.R.

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control-room and viewing window locations and bed orientations.

Operating room nursing staff knew where in-room storage had to be situated and what could be located outside the room. The anesthesiology crew also needed operating room real estate.

Having the contractor as a partner from day one allowed the entire design team to take what we learned from each end-user meeting, walk directly over to the space and coordinate design solutions. It was because of this thorough coordination that the project achieved no structural comments under a stringent review from the city of Seattle. With the tight schedule and need for early input, design-build delivery greatly minimized both schedule and budget risk.

## Structural design

Well-orchestrated pull planning was critical to getting all the pieces in the right place at the right time — coordinating timely installation of steel in preparation for the prefabricated integrated ceiling, for example.

The team had to decide whether to replace or strengthen the mezzanine floor above the operating room to support the new integrated ceiling booms and imaging arm. Through close coordination with the general contractor, Aldrich + Associates, the decision was made to strengthen and stiffen the existing steel mezzanine, first to minimize demolition and also for ease of moving steel framing material through an active hospital.

When suspending multiple booms, ceiling lights and an imaging arm, seismic bracing and stability were paramount. Rather than using traditional

braces which would create more obstructions in the busy mezzanine space above, the PCS team created a horizontal truss out of the existing mezzanine.

With the simple addition of small steel shapes, the ceiling and equipment were braced leaving enough space for the placement of ducts and piping, etc., by the mechanical and electrical teams.

Columns were eliminated and moved to free the operating room of obstructions, yet structural depths were precise to allow the operating room to be built within a 13-foot-6-inch floor-to-floor space. Because 30-foot steel beams couldn't be carried up the elevator, they were brought up in pieces, connected and lifted into place like a ship in a bottle.

Construction is currently wrapping up, completed in just over six months, in one of the busiest operating room spaces at Harborview Medical Center. With little downtime to adjacent operating space, minimal field issues, attention to budget and an expedited schedule, the owner is being delivered a high standard of care.

The new hybrid bi-plane operating room will help physician teams provide leading-edge health care to patients in the region and stand ready to embrace emerging VR and AI technologies. It is poised to attract health care talent to the area who will continue to innovate health care practices.

The Harborview hybrid bi-plane success demonstrates how early collaboration can meet the needs of a project with breathtaking complexity and rigorous requirements.

*Todd Parke is an associate principal at PCS Structural Solutions.*

## GOOD DESIGN

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been critical to the hospital's success.

Such donor recognition walls are an important way to recognize a large and diverse group of people who have made contributions and also a gesture by the institution to show its gratitude. Various color schemes and typefaces are part of the design puzzle, and often these elements tie in to our larger way-finding program for each facility.

At the OHSU Rood Family Pavilion in Portland, Knot designers used the exterior perforated and folded-metal pattern as inspiration for donor signage

and donor recognition program highlights the key role played by donors to the facility such as the Ronald McDonald House Charities of Oregon and Southwest Washington.

For successful programs such as these, design teams need a sensitivity to user experiences. Knot designers have a passion for understanding spatial relationships and creating programs that deliver on the promise of increased efficiency for medical staff and visitors alike. Additionally, advances in new signage materials make this an exciting time to be involved in signage

and donor recognition health care projects.

Understanding a client's needs and close communication with architectural firms early on result in design solutions that are both complex and delicate — all of which make the user feel at ease with every visit.

*Marilee Hanks, owner and principal at the Portland landscape architecture/experiential graphic design firm Knot, is passionate about shaping the human experience of place and reinforcing the natural systems that sustain us.*

## FIRE DAMPERS

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tive action evidence report was submitted to keep the hospital in compliance for another six years. The experience and practical knowledge gained at MultiCare Tacoma General will be replicated on upcoming fire/life safety damper inspection and/or correction projects.

Sharp said, "While it has always been critically important, the professional execution of fire damper inspection and compliance certification is about to become even more top of mind for our clients."

State lawmakers are currently working on HB 2701, which will set penalties for non-compliance and strengthen inspection and correction accreditation require-

ments.

"This puts teeth into the current NFPA requirement for quick corrective action. It's the right thing to do to help secure safe facilities for vulnerable populations," Sharp said.

It is expertise, pre-planning, commitment to patient concerns and the right resources that ensure satisfied health care clients and the continued safety of their patients and staff.

*Jay Danner has worked for Her-manson Co. as a project manager in the critical environments group for more than eight years and specializes in health care projects.*



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