

BUILDING BETTER SCHOOLS

Challenges & Opportunities for the Design and Operation of Educational Facilities

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CHALLENGES & OPPORTUNITIES FOR THE DESIGN AND OPERATION OF EDUCATIONAL FACILITIES

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Introduction

The quality of a school’s physical environment plays a crucial role in fostering a positive and effective learning experience. When we focus on building and operating schools with design interventions that result in improved safety and security, indoor air quality, lighting and sustainability in mind, for example, we not only create a better educational setting but also positively impact the health and well-being of students and staff.

That’s why we’ve assembled this eHandbook on the challenges and opportunities in designing and operating educational facilities, whether they be for K-12 or higher education. In this digital resource, you’ll find valuable and practical information from experts on how to create schools that are safer for students and staff alike; how educational facilities can be designed with decarbonization strategies to make them more efficient and with a smaller environmental footprint; improving key elements like indoor air quality for occupant health and more effective lighting strategies for improved learning; how universities can tailor housing for their student populations; as well as how schools can be designed with inclusivity in mind. We’ve also highlighted several new products that can help schools look and perform better.

We hope you find this eHandbook an invaluable resource as you work to design and operate educational facilities that better serve students and staff.

Jeanie Fitzgerald, Managing Editor, *Architectural Products*

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5 Experts Discuss School Safety and Security

Here's how to keep eyes wide open and students protected with the best in safeguarding strategies for the education market, K-12 to Higher Ed.

by AnnMarie Martin

A point often overlooked in the discussion of school safety is that we should also be identifying ways to keep schools better connected to the community invested in making sure the children attending are given the chance to lead long, happy, productive lives. Our sources on these two pages are offering up their best advice on achieving just that, as well as how to properly arm schools with the best in design safeguards that support the latest in security procedures and technologies.

“The design of schools must strike a balance between openness and

privacy—they should feel welcoming to the communities they serve.

More than any bulletproof glass, a meaningful and caring relationship between a school and the world outside its walls is essential to keeping our children and educators safe. Contrary to the inclination to protect our children by creating schools that are closed fortresses with few openings or windows to the street, schools must offer transparency and opportunities for access. Views out are critical to maximize “eyes on the street.” Views in (not everywhere, but strategically) offer visitors, families, and neighbors the

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opportunity to feel connected to their schools and the children they serve.

Certain spaces, such as the visitor entrance and lobby, are key potential moments of engagement and opportunity. A bright, open, inviting space of entry establishes a relationship with the public without placing students in a fishbowl. Security can easily be incorporated into such a gateway space, with exterior and interior glazing maximizing visual connectivity, and a potential additional layer of separation between the entrance and core learning spaces.”

—Elizabeth Stoel, Director of Architecture, [Cooper Robertson](#)



Elizabeth Stoel, Director of Architecture, Cooper Robertson

“Engage a security designer early in the building design process to incorporate Crime Prevention Through Environmental Design (CPTED). The goal of CPTED is to deter criminal behavior through multi-disciplinary design strategies, applying the principles of natural surveillance, natural controlled access, and territorial reinforcement. The design should maximize the ability for people to observe the space around them, see and be seen. It should use physical features to guide pedestrians, both inside and outside, while cre-

ating perception of risk to potential offenders.

Training is also critical for educational institutions to understand the nuances of lockdown or lockout protocols. Without it, lockdown and lockout protocols are sometimes misunderstood by building users and safety officials. A full lockdown may put occupants in harm’s way, leaving them trapped in corridors or common areas and exposed to threat. In a crisis, operators can remotely initiate a lockdown, including perimeters and interior shelter rooms. Panic duress buttons are often distributed in large spaces, such as classrooms, and can initiate building lockdown. Alternatively, once an emergency message is broadcast, designated shelter in place rooms can utilize a local lockdown button or door mechanism, allowing faculty members the ability to monitor their local area, shelter those in the vicinity, and secure interior doors once appropriate.”

—Scott Ondik, Senior Security and Telecommunications Designer, [SmithGroup](#)



Scott Ondik, Senior Security and Telecommunications Designer, SmithGroup

“In the case of student housing, we often suggest positioning units one story up, and incorporating security elements like card readers to gain access to the living quarters. Common spaces organized on the ground floor can engage with the surrounding student population as well as create a public interface. Though more subtle in nature, various design elements can be incorporated to further foster a sense of safety—like a glazed facade, or an open-plan interior program to help create transparency.

An often forgotten element of designing for safety, we suggest programming for enhanced visibility and sightlines for semi-public areas such as laundry rooms, study areas, conferencing spaces, and other gathering areas, even when they may not always be fully occupied. Bringing additional open-plan spaces to a given area relies on effective strategic planning and thoughtful design. This holds true not only for indoor spaces but also for outdoor areas. Many campuses offer public green spaces as safe places for the whole community to enjoy. To enhance safety, universities might consider adding resources like ‘Blue Light Security Phones,’ or utilizing strategic lighting design to evenly illuminate all spaces and pathways.” —Erik Sueberkrop, Founding Principal, [STUDIOS Architecture](#)

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Image courtesy of Cooper Robertson

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Designing for Safety in Higher Education Facilities

Architects and designers are urged to prioritize safety measures alongside structural design and aesthetics for higher education campuses.

By Lauren Brant

Architects and designers focus on the structural design, floorplan layout and aesthetic of buildings to best meet the needs of the users. But when it comes to the design of educational facilities, are you accounting for the safety of the design early enough in the process?

EXTERIOR CAMPUS SAFETY STRATEGIES

Campus safety should not be an afterthought, argued Alex Halliday, Genetec's Regional Director for the consultant group of Canada. Utilization of security consultants early in the design and building processes can ensure safety remains at the forefront of design and can even reduce the security budget later, Halliday says.

"If security and operational security are involved in the conversation, then you can take advantage of the resources in different ways to incorporate into the architectural design to reduce the security budget," he said. "Instead of having security pay for a fence, you've got landscaping paying for a hedge and making everything look proper and work together."

Colleges and universities should be designed with clear lines of sight and controlled access points, which does not stop at the design of buildings.

Paul Timm, director of education safety for Allegion who has assessed over 2,000 schools, said [Crime Prevention Through Environmental Design's \(CPTED\)](#) principles were designed to reduce crime, which can be accomplished through intentionally well-designed, maintained, and friendly natural environments that foster a culture of safety.

"It all comes from what was called the [Broken Windows Theory](#)—if you have a building and you come in on Monday and you find out a window was

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broken and you put in a ticket and replace it a week from now, you're going to have more broken windows," Timm said. "But if you replace it immediately and return it to situation normal, you're far less likely to get more broken windows."

Updates to lighting, controlled access points and increased security can enhance campus security. LED lights are most popular because of their efficiency and brightness but may require community sessions to address concerns.

"Occasionally we'll get people who say, 'My neighbors are complaining about lighting, so I can't run that lighting,'" Timm said. "It's safest for the community to run that lighting at night because the band concert gets out late and we don't want kids walking through a dark parking lot—we don't want anyone walking through a dark parking lot and police want to clearly see as they drive by."

Cones can be placed on exterior lights to direct illumination down, reducing impacts to neighbors, if necessary. However, higher-education campuses can educate the community about how lights enhance safety not only on campus but also on the adjacent properties. Layered lighting is a technique used to ensure the type of light is conducive to the needs of the space. Halliday said certain light is better for the eye, but not good for video surveillance, so an evaluation for interior and exterior spaces will inform which lighting type to use.

The presence of good lighting and vegetation is crucial in parking lots, along walkways and at entries. Timm noted CPTED guidance states no shrubs should be taller than three feet and all tree limbs should be cleared 8 feet high in those areas. Timm recommends architects involved in landscape design around those three areas should plant something with the word miniature in the name to maintain that line of sight. Recent landscape trends are incorporating decorative grasses like prairie grasses or tiger grasses. While the natural aesthetics are pleasing, the grasses are tall and obstruct views.

The outdoor campus environment also needs security measures in place to keep everyone safe during their time on campus. Open spaces for soccer fields, concerts or even pathways around campus can benefit from shrubbery and hedges that maintain visibility, but funnel access. Planting waist-high hedges and trees with no low-hanging branches as well as placing planters in front of buildings that have reinforced steel in the center can make a campus aesthetically pleasing while incorporating natural security features.

In areas with fall hazards, use anti-slip tape and signage to alert people of those risks. Install video cameras to capture traffic for the institution's protection against legal action. It's also important to consider properties

and businesses adjacent to the campus property and how people enter and leave those spaces. That can inform the layouts of campus buildings. Future campus growth should also be discussed as part of campus safety strategies to ensure the current project's infrastructure flows into future expansion and renovation plans.

TIPS TO SECURE CLASSROOMS

Classrooms should also have a good line of sight, so faculty and students can see the entire room, and if someone threatening enters, people have time to react.

Effective security implementation requires communication between the builders and campus leadership to identify the risk and security tolerances.

"You can have a secure campus that has every door locked, no windows, walls and gates that essentially look like a correctional institution, but that's not a very good learning environment," Halliday said. "On the other end of the spectrum, you have this open field and easy buildings and tents with no security. So, how do the architects have good communication with the end user to understand what their security and risk tolerances are to make it balance?"

With tolerances identified, architects can also develop evacuation routes and shelter-in-place locations to meet each campus' needs. Primary and secondary evacuation routes should be marked within classrooms and hallways, along with appropriate exit signage. A higher-education campus in Florida may need shelter in place for a weather-related concern not found on campuses in landlocked areas. Other instances may be for a security incident, so campuses need to be able to secure doors and windows.

Strategies that campuses, especially open campuses, can implement to deter and prevent unauthorized access to buildings include visible security personnel and security points, intercom systems, and video surveillance to control access remotely. Designs for higher-education student residential halls that feature secured vestibules and limit access by floor add layers of security to those buildings.

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Improving School Security with Integrated Technologies

The unfortunate reality is that educational institutions are prone to unexpected events. Tragedies, including active shooter situations, continue to reinforce the message that stringent security measures need to be in place to keep students, faculty, and visitors safe.

There are several measures that schools can take to improve their building security. Chief among them is the recognition that a singular approach in school security is not the answer and that one system alone is not enough to provide complete protection.

These measures should include deploying a combination of security technologies, such as door entry, access control systems, and intercoms, along with clear policies around visitors and building access. Also, the security plan should include a multi-layered approach to ensure a secure campus environment that protects the front door, hallways, and classrooms.



LIMIT BUILDING ENTRY POINTS

While a school building will naturally have multiple entrance and exit points, school administrators should restrict access to one main entrance for students and the public to access. This means that the majority of doors in the building should remain locked from the outside and not accessible unless they need to be accessed in an emergency situation.

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Back entrance doors that can be used by staff should include an entry control system that requires an individual to use an access control credential, such as an access control badge or key pin to gain access. This will also create an access control log that can prove useful in the future.



PROVIDING COMMUNICATION AND SECURITY TOOLS IN CLASSROOMS AND THE FRONT OFFICE

In the classroom, it is equally important to ensure that teaching staff have access to security tools and can easily communicate with the front office in the event of an emergency. An intercom system installed in each classroom enables a teacher to reach the front office quickly.

The direct line of communication with the front office ensures that school personnel can respond quickly if a fight breaks out during class, or if a student or teacher experiences a medical emergency.

Meanwhile, the front office can screen visitors before permitting them to enter by using a variety of security and communication tools, including an IP video intercom system and locked entrance way. In many schools today, a visitor can enter a small lobby, but

cannot get full access into the building until that visitor is vetted by the front office.

To assist with this process, schools have installed intercom systems that enable the front office staff to speak with and visually verify the identity of a visitor before unlocking a door to allow that person to enter. These tools, especially being able to use video to verify a person's identity, can also help to see if a visitor is carrying any weapons or if a person is agitated in any way, enabling staff to contact security if there is a safety concern.

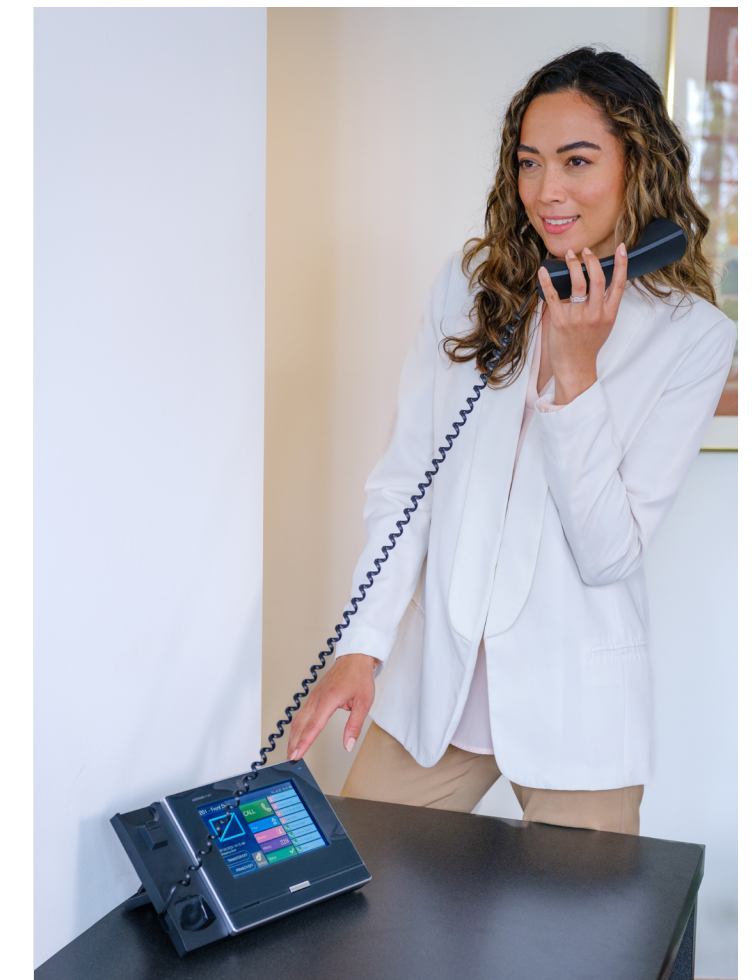
INVEST IN AN ACCESS CONTROL SYSTEM

A key and lock are no longer enough to keep a school building secure or to manage building access. This is why it's important for schools to invest in a system that can safely manage entrances and generate access control reports. With an access control system in place, school security can easily manage when a staff member has access to a building, such as limiting access during the hours of 1am to 5am, or revoke access privileges when an employee no longer works for that particular school. An access control system can also generate an alert and send a notification to the school resource officer when a door does not close properly, since an open door can pose a threat to keeping the building and the occupants inside safe and secure.

In addition, schools can leverage the visitor management functionalities often found within access control systems and

support the ability to create temporary visitor credentials that can restrict a visitor's access to certain areas of a building, when used in conjunction with a door entry control system. The visitor credentials can also be set to send a notification to front desk staff if the visitor doesn't return to the main entrance by a certain time to log out.

It's clear that one solution alone isn't going to solve the problem of school security. However, school districts can incorporate a multi-layered approach that integrates multiple technologies to provide complete campus coverage and to improve security facility-wide.



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Decarbonizing Campuses

Schools and universities have taken many strides on the path to carbon neutrality, but there still is a long way to go.

by Mike Kennedy

The latest grim warning about climate change came in March when a report from the United Nations Intergovernmental Panel on Climate Change declared that the world is likely to pass a dangerous temperature threshold within the next 10 years unless nations immediately transition away from fossil fuels.

Previous pronouncements about the harmful effect of greenhouse gas emissions have not persuaded enough people to take the urgent actions needed to reverse global warming, but the message has been taken seriously at many U.S. colleges and universities. Through initiatives

like the American College and University Presidents' Climate Commitment, hundreds of higher education institutions have pledged to decarbonize—reduce the carbon footprint generated by buildings and operations on their campuses—and have taken concrete steps to make the pledges a reality.

Several schools have attained carbon neutral status or have made significant progress.

“It used to be, ‘How are we going to do this? This is so hard. No one is listening to me. No one’s funding this. What are we going to do?’” says

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Decarbonizing campuses

Martha Larson, director of sustainability for RMF Engineering, which works with colleges and universities on campus decarbonization. “Now the conversations all say, ‘Here’s a project that’s done. Here’s a campus that reduced carbon emissions by 70% or 80%...People have demonstrated practical solutions and really remarkable results.’”

BEYOND A BUZZWORD

It has six syllables and might be considered what people used to call a ten-dollar word. But decarbonization has become a familiar term among those pursuing sustainability efforts on education campuses. The meaning is straightforward— getting rid of carbon emissions.



University of Massachusetts Amherst North Chiller Plant

“The movement toward using the word ‘decarbonization’ is really an indication of the mainstreaming of concerns about climate change,” Larson says. “That term has really developed in the last three to five years. The understanding of that phrase and exactly what it means is still evolving. What we usually mean is how to introduce lower-carbon ways to make energy...We’ve already reduced the amount of energy we’re using, but how do we make whatever we need in a way that is less intense from a carbon and energy perspective?”

In her work helping campuses develop their sustainability plans and reduce their carbon footprint, Larson says her approach consists of three pillars:

- Understanding the energy base
 “A lot of the work we do is to simply take existing data, both at the campus level and at the building level, and put that into digestible formats with really clear data visualization so that we assess and evaluate and make decisions that are informed by how the campus is performing,” Larson says.
- Reducing demand
 “Campuses are good at this,” Larson says. “They’re getting pretty good at

justifying and completing projects based on an energy savings payback.”

- Future-forward solutions
 “This is where we get into more of the innovative solutions that we call campus decarbonization,” Larson says.

Many college campuses are good candidates for successful decarbonization because they have district energy systems where a central plant generates energy for many facilities—anywhere from 50% to 90% of the buildings on a campus.

“That’s a good opportunity because a lot of that really hard work and heavy lifting of how to decarbonize energy generation can happen in one place, the central plant,” Larson says. “When everything is centralized, we can combine using our cooling loads, where we’re trying to reject waste heat, and we can funnel that waste heat directly into our heating loads. Through technologies that are rapidly evolving—usually it’s a heat pump technology—it’s a great way to recover heat and move heat around before we have to make new heat.”



A thermal storage energy tank on the Centennial Campus of North Carolina State University in Raleigh.

A LONG GAME

Schools should understand that carrying out a decarbonization plan will take time.

“This is always going to be a phased approach,” Larson says. “All that money, all that construction, all those building transformations—they can’t happen all at one time. The idea of it being overwhelming, too expensive, never able to do it—when you think of it on a 20- to 30-year timeline, it becomes a lot better fit.

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Tzu Chen

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How Technology Can Help Higher Education Transition Post-Pandemic

Technology will play an important role for colleges and universities in the post-COVID period. Here's why.

By Kevin Grauman

With the recent FDA approvals for [COVID-19](#) vaccines, and plans to swiftly distribute the doses, many people are looking positively towards the future, envisioning what life will look like post-pandemic. With stay-at-home and social distancing orders changing how we lived in 2020, the new year is offering hope for a safe return to normal.

One benefit to the pandemic that has been largely discussed, however, is innovation. From creating remote work environments to building a vaccine in a matter of months, the innovation that the pandemic necessitated is something that will hopefully continue after we've returned to normal.

For higher education institutions, there have been some excellent innovations implemented to help with remote access to learning and student services. And as the vaccine distribution begins, schools have to decide how to continue. Although in-person learning helps schools financially by ensuring higher enrollment rates, improving remote learning can help encourage international students to enroll.

Higher education institutions need to understand that the way they approach education and customer service will forever be altered.

HOW HIGHER EDUCATION HAS CHANGED DURING COVID

Over the past year, students and staff have become accustomed to virtual classes. Even after the pandemic, there will likely be growing interest in alternative options for education. Virtual classes reduce commute times and allow students to live further away from their colleges, saving them

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money on transportation and housing.

Much like how remote work is taking off around the world, post-COVID education may see an increased demand in remote learning options. Many schools currently host online classes, but post-pandemic, they may need to increase the number of classes and courses that are offered online, including offering virtual final exams.

In the same way, professors may see the benefits to both teaching or hosting office hours online. Virtual video conferencing queues can be implemented to help facilitate office hours and meetings with professors. During busier times, such as exam season, students who are looking for help can join a virtual queue. They'll receive updates on their place in line and, when their professor is available to help them, they'll be able to join a video conference to get the information and help they desire—all from a distance.

Another aspect to consider is how to effectively serve students. From academic advising to financial services, higher education is full of moments where students are forced to line up or wait in crowded lobbies to get served. Post-pandemic, students may be hesitant to wait in crowded spaces, even when social distancing guidelines are dropped. In the long term, this will require reimagining physical spaces, but in the short term, schools can turn to technology solutions.

By implementing a virtual line management system, students can join the waiting line virtually from an app on their phone, allowing them to wait in their car, dorm or anywhere that allows them to remain safe and socially distant. The app will inform them of their place in line, approximate wait time and when someone is available to serve them.

This eliminates crowded waiting rooms, which can help ease anxiety and improve the health of staff and students. Line management solutions also help to provide a better customer service experience

by allowing students the freedom to attend classes or grab a coffee instead of wasting time waiting in lines.

[\[Related: The Role of Technology in Post-COVID Spaces\]](#)

ONLINE SOLUTIONS FOR HIGHER ED

Virtual appointments and call centers can even be implemented to move the entire student services experience online, taking the place of queue management systems. Although many schools utilized these systems throughout the pandemic, reimagining them for the long term means that schools need to consider the call center customer experience.

Call center queues can be improved in a similar way as in-person queues by implementing customer service technology. This technology can allow students to enter “call-back queues” to get served instead of having to wait on hold. After entering the call-back queue, they'll receive text updates about their place in line and the wait time.

During periods of increased uncertainty—near fall and winter enrollment dates, student loan due dates or bursary deadlines—call center requests will increase. Call center technology is pivotal during these times, as it helps staff serve students more efficiently.

An unforeseen benefit to the pandemic is that industries have been forced to challenge the status quo. In higher education, there was an extremely limited timeline to adapt to the pandemic. This forced colleges to experiment with new technological solutions. In many cases, these technologies proved to be extremely beneficial, creating a better customer experience and allowing for more options to meet students' needs.

Although the post-pandemic future remains uncertain, there is no doubt that technology will be pivotal for universities looking to take the next step—and for helping them transition to new expectations.

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Rubber Flooring: The Smart Choice for Schools.



The best place to start when educating yourself on a topic is knowing the right questions to ask.

In this case, what is the best flooring for educational environments? The answer is simple: rubber flooring. But the simplicity of the answer belies the complexity as to why rubber flooring is the best solution in education spaces.

Rubber flooring is versatile, allowing specifiers to incorporate both practical and

aesthetic solutions into their designs to support learning, inspire creativity and boost student success outcomes.

Its versatility also addresses the varied needs of all education applications, from daycare playrooms through university lecture halls, and everything in between. While the specific needs vary in each setting, rubber flooring can enhance any learning environment in a plethora of ways that promote engagement in the learning process.

Multifunctionality is a must.

Everyone had a favorite subject in school, but rubber flooring doesn't play favorites. It offers flexibility and adaptability to support all subjects—from chemistry to art to P.E., and more. And it meets the needs of diverse student populations and teaching styles.

This multiuse functionality aligns with the evolution of schools and the increase of collaborative spaces for active learning and

engagement. There are now fewer scenarios where students sit in perfect rows of desks with a teacher hovering at the board. There's more movement, more thinking outside the proverbial box, more opportunities for experiential learning. And rubber flooring is the best foundation to successfully support this paradigm shift because it can stand up to this type of use and look good doing it.



Durability and Longevity
Holds up to heavy traffic, delivering high performance and maintaining appearance. Also offers excellent life cycle value.



Quiet and Comfortable
Sound-absorption helps concentration by reducing noise caused by footfall, moving equipment, chairs scraping, etc. Shock-absorption provides a comfortable surface, easing joint stress and reducing fatigue.



Enhanced Safety
Slip resistance minimizes accident risk, especially in areas prone to spills or where water is present, such as vestibules. Absorbs impact, reducing the likelihood of injuries if a fall occurs.



Low Maintenance
Hygienic and easy to clean, even during the school year. Scratch, scuff, chemical and stain resistant. No waxes or finishes needed, saving labor time/cost and promoting healthier IAQ.



Sustainability
Environmentally responsible and highly sustainable. Uses fewer resources to produce and is recyclable. Long lifespan lessens replacement timeframe, reducing environmental impact.

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Innovative flooring leads the way to inspiration—for designers and students.

Educational spaces are being reimagined, reconsidered, reworked to be more agile, collaborative, inspiring, all in service to creating more conducive learning environments. And flooring is one of the key foundations upon which to forge this path.

Flexco passes with flying colors when it comes to providing



flooring solutions for education. Their FlexTones rubber palette features 68 solid colors and provides a wide variety of neutral, bright and deep, saturated hues, as well as profiles and textures, that support the varied needs of education environments.

Custom-cut Designs

Flexco offers visually impactful custom-cut designs, including logos, to support school colors and branding. Also useful for wayfinding.



Color does more than meet the eye.

It's an established fact that color impacts mindset and behavior. And in schools, color is used in design to achieve aesthetic goals that set a tone, as well as aid in functionality, especially as the desire for less structured spaces becomes more prevalent.

All the feelings.

Flexco colors can span the range of work and play that happens in schools to support serious studying and serious socializing. Depending on the area and goal, Flexco colors can stimulate the senses or create calm and focus. They can affect attitudes and foster creativity. They can inspire, soothe, motivate and evoke emotions. They can create a mood.

All the function.

More practically, the use of Flexco colors in flooring can help define spaces, serving as the visual cue that creates sub-spaces within classrooms or larger areas, seamlessly influencing behavior patterns. Color can also be used in all types of education facilities to establish points of focus and in a wayfinding capacity to denote traffic patterns and support directional guidance.

For rubber flooring that will bring your vision to life and enhance any learning environment, Flexco has it.

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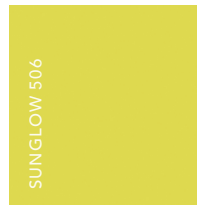
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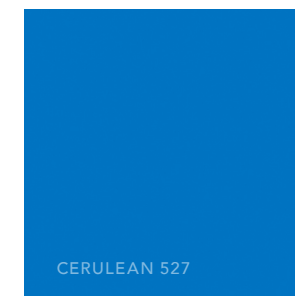
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Evaluating IAQ Solutions for Higher Education (and Beyond)

Efficacy, efficiency and application-specific solutions must all be balanced in the final safety equation.

By Paul de la Port

As we continue to manage life alongside COVID-19, there comes a time to brave crowded indoor spaces again. For designers and facility executives in higher education, this societal re-entry to the great indoors requires [careful attention to air quality](#).

With aging HVAC, inefficient ventilation and even some well-meaning but illperforming short-term fixes widely marketed to address indoor air quality (IAQ), it seems hurdles are everywhere in the face of an airborne pathogen. Infection rates soar in closed indoor areas with insufficient ventilation, and as the virus mutates and becomes more infectious, design and facility professionals are clamoring for better solutions.

One extreme—if common—solution deployed in higher education settings is the replacement of HVAC systems for more modern infrastructure with better air filtration. This wholesale approach to improving IAQ can be time- and resourceintensive, driving some specifiers to seek smaller scale, portable air filters to save time,

resources and space. However, not all portable filtration systems are created equal, and significant variability in IAQ can be a huge safety challenge in the age of COVID-19.

According to [a survey](#) of 500 higher education workers in the U.S., no less than 78% of schools upgraded their HVAC systems to improve filtration. However, only 40% deployed portable HEPA filters, despite these being vastly less expensive and significantly more efficient air purifiers. Perhaps most regrettably, 14% of respondents implemented ionization solutions that are under increased scrutiny from researchers for not being effective.

Though we now have accurate knowledge of how SARS-CoV-2 is transmitted— and the tools to defend against it—many universities are still struggling to determine the best course of action regarding IAQ. What is most effective, what makes the most sense for a specific space and what can be deployed efficiently must all be balanced in the final safety equation.

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IDENTIFYING RELEVANT SPECIFICATIONS

Effectiveness can be difficult to ascertain if you focus too much on marketing terms commonly deployed within the air quality product sphere. It is all too commonplace to see terms like CFM, HEPA and 99.99% in isolation, but understanding what these specifications mean in context is the key to selecting the right product for the job.

The air purification industry on the whole does not make this calculation easy. Dr. Jeffrey Siegel, an engineering professor at the University of Toronto, [estimates these products to be 50 to 75% illegitimate](#). “You’re dealing with an industry that doesn’t want consumers to understand these devices and how they work,” Siegel warned.

Take HEPA specifications, for example. It’s tempting to base a buying decision on the efficiency of the filter. However, the efficiency of the entire system will determine how well the equipment performs. To evaluate efficiency, pay attention to Clean Air Delivery Rate (CADR), which reflects the airflow measured in cubic feet per minute (CFM) multiplied by the efficiency of the entire system.

What use is there to have an efficient HEPA filter specification and high CFM if a significant percentage of the airflow is not running through the filter? If the CADR is not within 1% of the CFM on a product’s specification, take caution. The solution will not deliver the expected air changes per hour (ACH).

[\[Related: Breaking Down IEQ and How to Improve It\]](#)

Approaching IAQ in a space-specific manner also requires savvy design and facility professionals to be wary of new technology that makes bold claims about safety yet has very little real-world evidence to back these claims up. Always prioritize solutions that have been proven to be efficient in operational conditions that mimic the exact

environments in which they will be used (an office floor, a classroom, a training center, etc.).

Another key consideration is the efficiency of the solution for your bottom line: the cost of ownership of these devices, which includes filter costs. The annual consumable replacement costs can be 50% of the upfront machine cost. Many consumer-grade filters get clogged every few months and need to be replaced multiple times per year. This is not only costly, but a significant maintenance headache.

Driven by COVID-19, industrial specification HEPA solutions that are designed for professional workplaces are now available. These systems are 99.99% efficient and require filter changes only every one to two years.

Buyer beware: without considering effectiveness, your space needs and cost efficiency together—it’s easy to make a high-profile mistake. The disappointing [recent purchase of HEPA units by NYC Schools](#) cost at least \$43 million, yielding devices that ultimately were “definitely underpowered,” in the words of Dr. Siegel. According to a Chalkbeat article, the purifiers purchased were inefficient, ranking ninth out of a dozen units independently tested by the Illinois Institute of Technology.

BOTTOM LINE

Universities that have been sitting stagnant for over a year due to COVID-19 are starting to bustle again with activity. It’s more important than ever to keep students, staff and the larger community healthy by improving IAQ in the buildings they use every day.

Portable, professional-grade air cleaning systems are a powerful tool to help us achieve this, but we need to educate ourselves and better understand whether or not these devices are truly working. Cutting through the misinformation will deliver cleaner and safer air, helping everyone breathe more easily.



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Guiding Lights

3 lessons in lighting for school districts

By Rahul Shira

School districts are saddled with several competing challenges. On the one hand, they are expected to maintain an engaging learning environment and support student and staff comfort. On the other hand, they face a tight budget with limited resources. As if balancing these conflicting demands wasn't enough, school infrastructure upgrades have long been overlooked in favor of more pressing priorities.

The average U.S. public school is more than 50 years old. Districts cannot wait any longer to begin modernizing their facilities. One place to begin those upgrades is lighting.

LIGHTING THE PATH FORWARD

The aging infrastructure of the typical school facility means that most are still using conventional light sources with a traditional on/off switch. But modern technology enables education facilities to integrate smart sensors into their lighting systems and connect them to cloud-based software. This will unlock greater control and value for a district beyond that basic illumination.

By leveraging the Internet of Things (IoT), schools can enrich their learning environments and support their bottom line.

Here are three beneficial lessons a district can learn from upgrading its lighting system:

LESSON 1: CULTIVATING A COMFORTABLE LEARNING ENVIRONMENT IS PARAMOUNT TO A SCHOOL'S SUCCESS.

Ask educational professionals what's most important at their school, and the answer would be unanimous: the students. The lighting in a classroom is a simple yet effective way to help stimulate students' learning.

For example, teachers can use connected lighting to tailor light scenes or settings in their individual classrooms through a scene switch on the wall. A study done at the University Hospital in Hamburg-Eppendorf on

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school children in classroom environments found that dynamic lighting like this can increase their reading speed by 35% and decrease their frequency of errors by 45%.

The lighting can even be synced with the time of day to support students' and teachers' natural day-night or circadian rhythms, which dictate our biological clocks and energy levels. Teachers can set a scene with a crisp, bright tone of white light to inspire concentration and focus for a lesson or presentation. Then, they can scale down the lighting to warmer tones during quiet times or breaks so that students can relax and recharge.

LESSON 2: FREEING UP OPERATIONAL COSTS CAN HAVE A SIGNIFICANT IMPACT ON YOUR BOTTOM LINE.

Each year, K-12 schools collectively spend around \$8 billion on energy. Lighting accounts for around 9% of that expenditure. But unlike a conventional light source, which expends more energy to achieve the same light output, a connected LED lighting system can increase energy savings by up to 90% and help reduce operational costs.

A noteworthy example of this is in school hallways, where the lights are often left on at full power all day. With a connected lighting system, facility managers could create zones

in their buildings and adjust the lighting accordingly. They could power off every few lights or dim them to save energy while the space is unoccupied, but still leaving some illumination for security.

If a student or faculty member enters a darkened hallway, occupancy-sensing technology instantly activates the right light levels. This is especially useful in larger areas, like cafeterias, libraries and gymnasiums, or other spots where foot traffic may be inconsistent, like bathrooms or recreational spaces.

To pick up additional energy savings, the lights can even be scheduled in accordance with classes ending – or automatically dimmed to compensate for extra daylight seeping in through windows. Together, these functions enable schools to use energy only when and where it is needed – maximizing operational efficiency, so limited funds can be spent on other areas like curriculum or supplies.

LESSON 3: USING DATA-BASED INSIGHTS IS KEY TO IMPROVING YOUR FACILITIES FOR STUDENTS AND STAFF.

Students, teachers and administrators can all benefit from better facilities management, but accomplishing that goal may be complicated. It entails much more than just

fixing broken equipment.

With a connected lighting system, facility managers can get a richer picture of their school buildings to help them make more informed decisions about day-to-day operations. For example, in a dashboard, administrators can track energy usage across an entire district, building or even an individual room for more granular insights. This information can be used to help a district gain access to certain utility-driven rebate programs that may provide additional funds to reinvest back into classrooms and students.

Additionally, from these reports, facility managers will be able to identify how often each room is used and where reduction opportunities lie. For instance, historical data can be leveraged to streamline heating and cooling functions; districts will no longer be allocated their limited dollars to heating or cooling unoccupied spaces.

A BRIGHTER FUTURE

Schools are now preparing their buildings for the coming year, and lighting is one area where improvements may be overdue. Connected lighting provides a platform for a district to transform its schools into smarter learning environments.

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Chicago Faucets Gets a Plus for Continuous Innovation

by Greg Hunt, Commercial Product Manager for Chicago Faucets

Chicago Faucets has a long-established reputation for durability and reliability as the company’s founder invented the Quatern® cartridge. The manufacturer is well regarded in [schools](#) because its faucets can withstand heavy use at the middle school level and above where high abuse and high demand come to play. Chicago Faucets is also the preferred brand at athletic stadiums where thousands of people funnel through the restrooms. Most recently both the Lincoln Financial Field and CFG Bank Arena installed Chicago Faucets.

CF CONNECT APP LAUNCHED FOR EFFICIENT WATER MANAGEMENT

In addition to feature-laden faucets, the company has developed the [CF Connect app](#), a new tool for touchless faucet management that monitors water usage, flushing and creating a documented audit trail, all with little manual intervention — saving time and money. The CF Connect app includes hygiene and pipe flushing modes for regular maintenance and restarting a building after closure.



Northpointe Christian Schools in Grand Rapids, Michigan wanted an upscale look for their new restroom renovation. They selected the E-Tronic 80 touchless faucet and soap dispenser in matte black because it is both easy to maintain, as well as stylish for a modern look. The E-Tronic 80 has easy to access above-deck electronics, integrated ASSE 1070 certified scald protection, optional user adjustable temperature control and is easy to adjust and monitor with the CF Connect app. It is the ultimate in restroom hygiene, convenience, and reliability.

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At this time it is available for the [HyTronic® Series](#), [E-Tronic® 80 Series](#), and the [E-Tronic® 40 Series](#). The company will continue to roll out the CF Connect app to other touchless faucet families.



The new Grandville Middle School in Grandville, Michigan, selected the 420 Series manual faucet for all its restrooms. Initially, it was a breeze to install with built-in ASSE 1070 certified scald protection for code compliance. With its vandal resistant, durable cast brass construction and low maintenance, it was an easy choice for the school maintenance personnel.

EASE OF INSTALLATION, DURABILITY, AND SUSTAINABILITY TOO!

Engineers specify them because they can exceed their clients' expectations. They are designed with extra attention to the details and provide value added benefits. Many faucets have integrated ASSE 1070 certified thermostatic mixers for scald protection, long lasting batteries, and install quickly. Plus there are many lower flow options available that meet USGBC LEED and the EPA's WaterSense standards. The company has recently created an AEC Daily CE Class on [Sustainability](#) to educate specifiers.

Chicago Faucets offers a wide variety of hygienic touchless, metering (low touch) and manual faucets along with stocking parts for decades

old fittings. The saying goes the faucet lasts longer than the building. Contractors and plumbers install Chicago Faucets because they know that Chicago Faucets is a trusted brand with reliable products that save time in installation. They also know that Chicago Faucets manufactures most of the fittings in their Milwaukee, Wisconsin plant.

Building owners and facility managers prefer them because they are easy install and parts are readily available from most plumbing wholesalers. At the end of the day, it doesn't matter how good a product is if it's not readily available. All of the popular Chicago Faucets products are part of the *CFNow!* Quick ship program.

From preschools to universities, the manufacturer covers all the bases for fittings in the education market. With continuous research and development, Chicago Faucets innovations offer water management efficiency and time savings in bustling buildings of learning and assembly.



Tri-County Schools in Howard City, Michigan wanted a quality faucet with uniformity, clean look and low maintenance. Tri County preferred the 3500 Series metering faucet. The 3500 Series offers a metered cycle with a timed automatic shut-off, adjustable anytime between two to 25 seconds after turning on to conserve water.

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Multistudio Introduces Flexible Learning to the Underserved

The Michelle Obama School is building up not just its students but also the community thanks to the San Francisco firm's inclusive design and development approach.

by AnnMarie Martin

In just a few short years, Richmond, Calif.'s Michelle Obama School has become the beating heart of this community since its ribbon cutting in 2020, with facilities to enrich the lives of not just the students but their parents, families and neighbors as well. Students grades K-6 began to occupy its spaces in the fall of 2022.

[Multistudio](#) banded together with the school district and this historically underserved community to develop programming and a design vision that would provide what they dubbed a "whole child, whole community," approach that includes three project-based learning suites and spaces such as the Parent Room and the Multipurpose Room & Dining Commons that provide constant connections back to the neighborhood's children and continuing education opportunities that strengthen the family unit (and by extension a student's mind and confidence.)

The suites support learner variability which is a core tenet of Universal Design for Learning (UDL). The range of spaces let students engage with each other and the material in whatever way is most conducive to their abilities and lived experiences. Each suite consists of a commons area for homeroom and breakout learning; a maker lab; teachers' conference room and collaboration space; several collaboration zones supported



Image by Kyle Jeffers

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Multistudio Introduces Flexible Learning to the Underserved

by a mobile library; dedicated restroom; access to outdoor learning space; fullheight floor-to-ceiling whiteboards and tackable boards that encourage expression. There are also operable partitions that can be used to meet certain public health regulations that might arise, preventing the class from going hybrid.



Image by Kyle Jeffers

All indoor learning spaces are directly connected to climatically tuned outdoor gardens, yards, balconies, and courts that encourage multimodal teaching and learning through experiment, observation, play and discovery.

To support families as well as their children, the school offers a program called “Parent University” that includes ESL classes, tax filing assistance and parenting workshops, hosted in the community room and library that has movable partitions to accommodate both small and larger workshops. It also features storefront doors that open up to a small plaza for afterhours events and can host up to 40 people. But the true powerhouse is the 4000-sq.-ft. Multipurpose Room & Dining Commons—a mass timber structure that has 20 ft. ceilings and two operable glass garage doors that open to an outdoor dining plaza. The MPR hosts breakfast, lunch, and dinner daily for the students. It can host up to 560 people for events and is equipped with a warming kitchen and community kitchen.



Image by Kyle Jeffers

The Multipurpose Room & Dining Commons has two east-facing operable garage doors and hosts breakfast, lunch and dinner daily for students.

Predominantly Latinx, 64% of the residents speak English as their second language and 51% of households qualify as low-income. Before the school redesign, the district had no public amenities, outdoor space or a library. So making use of the available shared spaces within for more than just school function was vital to the health of the community.



Image by Kyle Jeffers

The MPR is contiguous to shaded outdoor dining areas that provided a safe and comfortable dining environment during the pandemic.

While the design team is still developing a Post Occupancy Evaluation process to glean lessons from the design and apply them to future projects, the message from the Michelle Obama School was clear: it’s the local pride and joy, helping students and all residents alike to soar.

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How Universities Can Tailor Housing to Student Populations

Dorms create a sense of belonging, but many legacy buildings don't match the realities or needs of today's students. See how Aurora University and Fisk University created on-campus housing for diverse student bodies.

by Jennie Morton

Dorms create a sense of belonging, but many legacy buildings don't match the realities or needs of today's students. New residence halls are a unique opportunity to redefine college living. See how two institutions—Aurora University and Fisk University—created on-campus housing that welcomes a diverse student body.

NEURODIVERGENT DESIGN

Neurodivergent individuals have heightened sensitivity to environmental cues. Design can either help or hinder their ability to process stimuli. Particularly for



The Mesirov Learning Lab, which features a sensory art installation, is a gathering point inside Tucker Hall. It helps foster connection and study skills for students under the Pathways program, which supports individuals on the autism spectrum.



Courtesy of Aurora University

autistic students, sensory regulation is integral to their learning process. An attuned living space can alleviate anxiety, sustain concentration and promote peer interaction. This is exemplified by the students under the Pathways program, which supports individuals on the autism spectrum.

“We started down this path to serve individuals on the spectrum over a decade ago,” explained Jen Buckley, senior vice president for student success. “We noticed that college-bound neurodivergent individuals experience a tremendous service cliff after high school. This population has the academic ability to be successful, but they need additional support for social pragmatics and executive functioning. A sensory-sensitive resident hall is a vital piece of their educational experience.”

The five-story dorm, which is open to juniors and seniors of any background, has many hallmarks of a traditional residence hall. Where it differs is in the sensory experience. It demonstrates how it only takes a handful of thoughtful design choices to be welcoming to a wider range of students. These include:

- Muted, cool colors
- Seamless drywall
- Dimmable and tunable lighting

Courtesy of Aurora University

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How Universities Can Tailor Housing to Student Populations

- Showerheads with adjustable water pressure
- Acoustic absorption with ceiling panels, vinyl flooring and carpet
- Adjustable and movable furniture in common areas

“Environment matters. The more anxiety someone has, the more their learning is impeded,” Buckley emphasized. “We employed universal design principles to Tucker Hall that give students control and flexibility.”

The hall includes the Mesirov Learning Lab, which is a focal gathering point. The multipurpose space hosts a variety of activities from art and game nights to community programming. A sensory artwork installation adds a colorful and touchable flourish on a feature wall.

“Tucker Hall is an inclusive space that celebrates everyone in our student population,” stated Buckley. “It increases awareness about the unique gifts and strengths individuals on the spectrum bring to our campus.”



Courtesy of Ford Photographs

Fisk University used shipping containers to address a housing shortage on campus. Each container has one efficiency apartment for two students.

SHIPPING CONTAINERS TO STYLISH STUDIOS

Nashville has experienced rapid growth in recent years and is one of the fastest expanding metros. The downside is soaring real estate costs and lack of housing stock. Whereas it was once attractive and affordable to live off campus, students are now in a rental crunch. Fisk University, a historically black college, is stepping in with two new residence options on campus.

“Upcoming cities like Nashville have seen real estate values increase to where it’s no longer practical for college entry. That’s placing pressure back on universities to provide housing,” explained Jared Bradley, president of The Bradley Projects, an architectural firm. “The challenge is that a majority of institutions already have waiting lists. They have not been constructing dorms to keep pace with enrollment, much less an unexpected rental shortage.”

Fisk University tackled the problem from two angles. The first is a new multistory dorm, which is the first dorm on campus in 60 years. With a timeline for 2024, this 150-room project will have a capacity of nearly 290 students. The short-term solution, however, came in the form of shipping containers.

Apartment-style dorms remain a hot commodity for students. Shipping containers are easy to convert into efficiency units, plus they offer an accelerated construction schedule. At 40 feet long, the open footprint accommodates a kitchenette, study area and sleeping quarters, plus a full bath. The Fisk complex has 13 “buildings,” two containers on the ground level and two stacked above with outside stair access. The apartments are now home to almost 100 students.

“Living in a shipping container has an inherent cool factor. It’s an out-of-the-box idea, even though it’s a literal box. Painted in the school’s yellow and blue colors, they are fresh, cool and artistic—all vibes that fit Fisk’s brand,” Bradley said. “The shipping containers are not just a solution to a housing problem—they’re a point of pride to live there.”

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NXT MOV

Created for comfort and durability, NXT MOV was born from a collaboration between design and engineering. This collection of furniture for education began with seating designed by Q Design in conjunction with Artcobell engineers and now includes coordinated mobile desking options.

NXT MOV is a direct response to studies that show how activity-permissive learning spaces help prevent student fatigue and promote engagement. The collection includes five chairs, four desks and four tables with selections for different types of educational spaces and learning styles: four-leg chairs, swivel designs, two stools, mobile desks and tables that facilitate group work.

www.artcobell.com



WATERCOLORS

EF Contract's latest carpet tile, WaterColors, is a study in color. Near solid color for each tile spans from neutrals to bold, chromatic colorways. Set against patterned flooring, WaterColors brings out patterns; it's ideal for delineating spaces and wayfinding. Install it over the whole floor or use it as a border.

The rich texture is achieved by EF Contract's Encore SD Ultima nylon fiber and constructed using a proprietary yarn styling that creates a unique, warm texture. Encore SD maximizes appearance retention with high color performance and sustainability. Tiles come in two formats: 24 by 24 inches or 18 by 36 inches. Choose from 20 colorways. Ideal for workplace, retail and education.

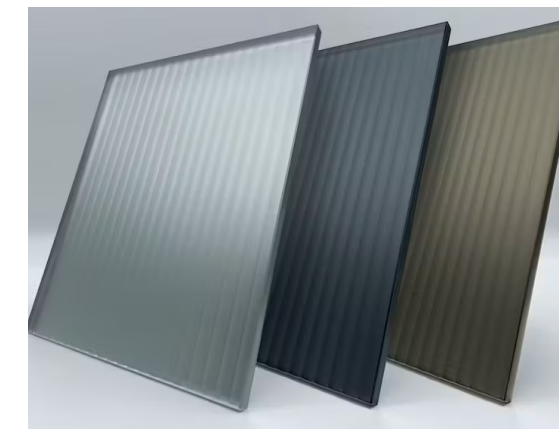
www.efcontractflooring.com



AGREE

The Agree tables from Steelcase are easy to reconfigure for any learning mode and foster connection and engagement in active learning spaces. Keystone and chevron table shapes form a soft arc with clear sightlines between students when arranged in lecture mode, while trapezoid tables can be combined and reconfigured for interesting zones and versatile layouts that support the flow of active learning. ADA-compliant, the large personal table (24 in. x 40 in.) is an accessible option for all learners. Legs can be equipped with hard nylon glides but can also come in soft felt glides or soft-locking casters. Legs are also available in low gloss black or platinum gray. Choose from a curated collection of Steelcase laminates with color-matched edge band and an optional side dock with storage hook and center dock available in sterling dark solid.

www.steelcase.com



EVOLUTION

The Evolution Collection from Bendheim offers softened lines of fluted texture in its Titanium etched finish. The durable, maintenance-friendly material and its three-dimensional nature make Evolution ideal for a wide array of interior design roles. Its fingerprint-resistant surface is suited for wall cladding applications in high traffic areas, while its gentle glow enhances the cleanest design. The fluted etched mirror maximizes light and reduces glare through diffused reflections. Available in silver, gray and bronze metallics as well as in custom colors.

www.bendheim.com

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KASTA

KASTA from the Magnuson Group was designed in collaboration with Gensler who served as product design consultant. These freestanding waste and recycling receptacles are available in four sizes (22, 30, 35 and 45-gallon) and multiple finishes, all crafted from cold-rolled powder-coated steel with 86% recycled content. They can be used independently or ganged to create just the right combo of disposal streams that include mixed recycling; glass; metal; plastic; paper; food waste/compost; landfill. Available in two top options featuring clean and informative label graphics that include both text and icons. There are also six body colors and nine top colors.

www.magnusongroup.com



TAKE-OUT

Take-Out is a modern and more versatile offering in the popular connected seating table category. Light enough to be picked up, arranged and rearranged, Take-Out opens up new ways for people to connect in outdoor spaces—face-to-face or abreast, an intimate chat or a large group gathering. Five different silhouettes—a single, double, triple, left triple and right triple—can either stand alone or work together in myriad arrangements. Available sizes: single 37.5 x 30.25 x 30 in.; double 37.5 x 52.5 x 30 in.; triple 37.5 x 71.5 x 30 in.; left or right triple 37.5 x 71.5 x 30 in.

www.landscapeforms.com



FREESTYLE ECOLOCK

Made with bio-based polymers and natural materials, EcoLock is a sustainable, modular resilient floor tile with a patented vertical interlocking seam technology. It employs a three-layer system; the top features a no-wax urethane finish, the second has a commercial wear layer and the third has a decorative print film layer. This system makes it possible for the stylish floor to absorb wear and tear and not need heavy duty maintenance.

Can be installed over existing flooring with minimal subfloor preparation and no messy adhesives. The non-porous surface resists stains and infectious organisms, while the built-in underlayment delivers underfoot comfort and sound reduction. Made from 80% rapidly renewable content and contains no PVC, ortho phthalates, chlorine, formaldehyde or halogens.

www.selectech.com



MASS CHAIR

The Mass Chair from Leland is all about community—the engagement it fosters and the joy it brings. From a distance, this stacking chair seems simple and straightforward. But look closer and you'll discover subtle nuances that make it different from other chairs of its kind—including the gentle curves that make separate parts feel like one. Designed by Javier Cuñado at ITEMdesignworks, the Mass Chair does the same for teams, making different people feel an integral part of the whole whether in corporate, education, hospitality or auditorium environments. Lightweight and effortless, strong and space-efficient, Mass is a fitting place to share, create, communicate, and become a part of something bigger.

www.lelandfurniture.com

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OUTDOOR CHARGING STATIONS WITH USB-C

Legrand's Outdoor Charging Stations offer an ideal charging experience for employees, students and guests in any outdoor setting. Each station is equipped with a combination of standard GFCI power outlets, GFCI and USB-C combo power outlets and four-port USB-A outlets to ensure compatibility with all devices.

Some models incorporate LED lighting, allowing users to charge devices effortlessly even after sunset. Each station is designed to support A/V or communication connectivity, providing the flexibility required for any outdoor activities.

www.legrand.us



DYSON HEPA BIG+QUIET FORMALDEHYDE

The Dyson HEPA Big+Quiet Formaldehyde air purifier addresses air quality issues in shared spaces to take indoor air purification further. It features more than double the airflow of previous Dyson purifiers at up to 90 liters of airflow per second of purified air. A carbon dioxide sensor reports CO₂ in real time, indicating to people in shared spaces when to ventilate.

A re-engineered motor bucket ensures quiet operation, measuring just 55.6 decibels of noise on maximum airflow speed. The three-phase filtration system captures up to 99.97% of fine particles, removing odors and gases like NO₂, benzene and VOCs and permanently destroying formaldehyde.

www.dyson.com



IMAGINASIUM COLLECTION

Young students learn best when they're on the move. Imaginasium Blocks and Blips allow them to imagine, create, build, climb, nestle and learn by easily adapting to a wide range of interactive learning and teaching methods, from experiential to experimental, play-based, floor-based, tiered seating, cocooning and more. Made of lightweight foam, this soft seating is easy to maneuver and is specifically scaled for young learners. It can be used alone or in combination to create agile, adaptable environments.

When it's not in use, Blocks and Blips store easily and efficiently; Blocks can be stacked as a cuboid and Blips stack ten-high onto a caddy. Features no wood or other hard parts to bump or bruise. Designed to stand up to wear and tear with reinforced seams and stitching and industrial-grade zippers.

www.ki.com



ABPURE INFINITY COLLECTION

The ABPURE Infinity Collection is a line of carbon-neutral rubber sheet flooring—the first flooring collection produced with renewable natural gas from organic waste, which helps to reduce greenhouse gas emissions at the source.

The 3mm flooring features an elegant tone-on-tone chip visual, and its palette includes foundational base colors running from light to dark within hue families to create harmonious tonal combinations. The line has a large selection of neutral grays and beiges, environmental blues and greens, and uplifting accent colors. Nfuse technology penetrates and seals the flooring, making it an occupancy-ready collection that never needs to be waxed.

www.american-biltrite.com

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GETTING TO NET ZERO: CARBON SOLUTIONS FOR TODAY'S CLIMATE CHALLENGES

This eHandbook on decarbonization offers building and design practitioners with practical and valuable content to help them meet their sustainability goals. Inside, you'll find information on how to calculate the carbon footprint of your interior renovations, as well as how to reduce that impact through smart product specification. It also offers several cost-effective strategies to help you achieve your sustainability target, as well as present a regenerative framework for tackling the climate crisis.

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HEALTH BY DESIGN: A PRESCRIPTION FOR CREATING HEALTHIER ENVIRONMENTS FOR OCCUPANTS

Nowhere is the trend toward healthy commercial buildings more important than in healthcare environments. This eHandbook showcases the importance of designing spaces that take into account the ways a building can support health and wellness, from specifying the right materials for the rigorous cleaning demands of healthcare facilities to re-evaluating products and materials, and to the importance of implementing

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Indoor air quality has always been of vital importance, but never has it demanded more attention from architects, designers, building owners and facility managers than it does today in the wake of a global pandemic. This eHandbook offers the most up-to-date information available on the subject.

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Variable refrigerant flow (VRF) zoning systems solve many of the challenges associated with commercial construction and facility management. It's time to ask yourself: is VRF right for my facility? This eHandbook explores that question.

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Every design choice impacts acoustic quality, and noise levels in a room can impact health, concentration and productivity—just ask anyone who's worked in an

open office before. This eHandbook will help you better understand the fundamentals of how acoustics work in buildings, identify ways to improve acoustics and make the connection between acoustics and wellness clearer.

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In this eHandbook, we look at the evolution of hotels into streamlined, touchless experiences with stringent cleaning practices. We also explore how meeting and event spaces have changed during the pandemic, repurposing guest rooms as temporary office space, and the "staycation" trend that may be here to stay.

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While we understand more about COVID-19 today than at the outset of the pandemic, it will continue to reshape the way medical facilities are designed and operated. We assembled this eHandbook: to offer guidance from trusted sources to help hospital staff and designers alike with the decisions they need to make today—and tomorrow.

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