

# building OPERATING management



David Rainer, North Carolina State, takes a holistic approach to security

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# MASTER PLANNING

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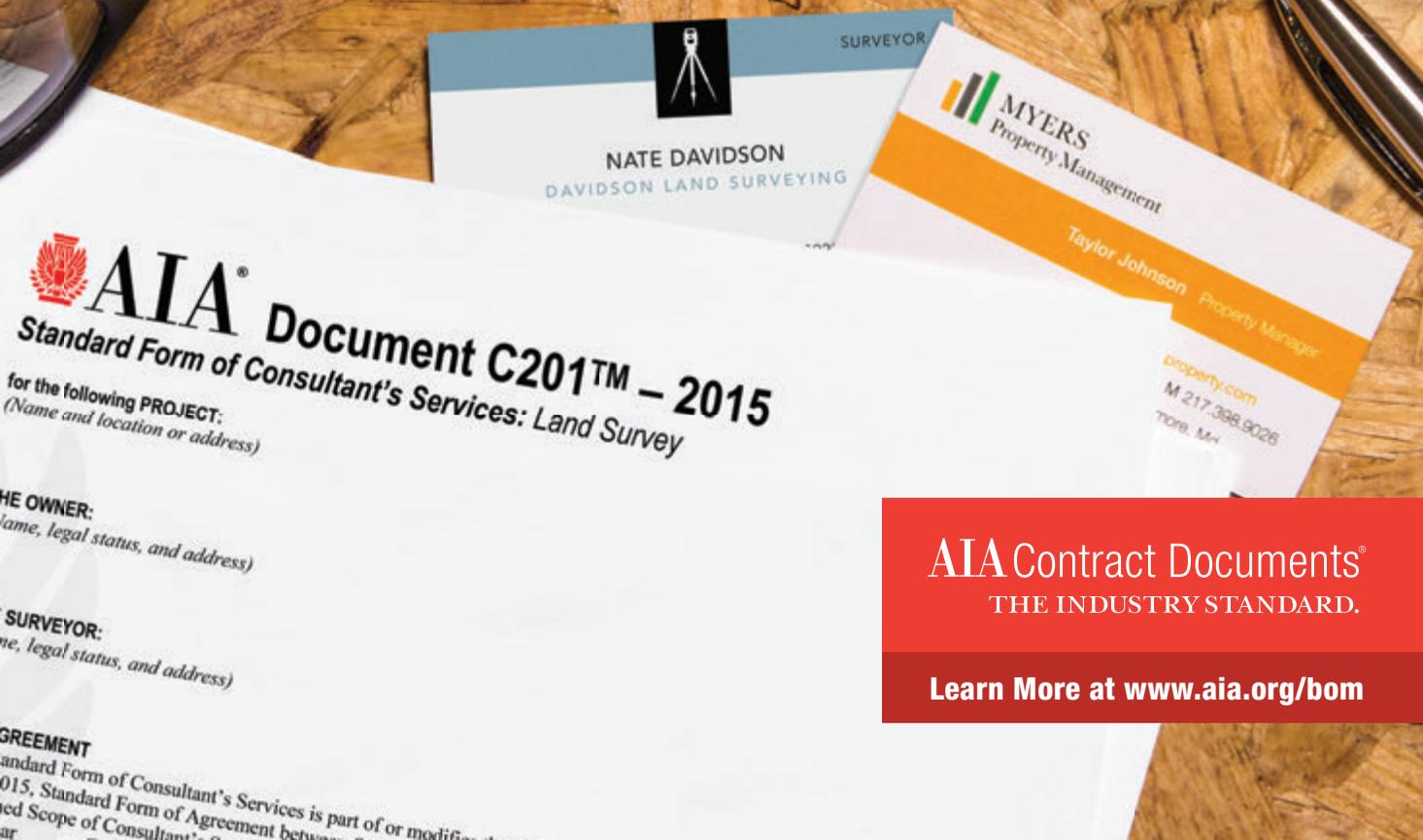


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[ online exclusive ]



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## EDITORIAL

# One Remedy For Lack of Respect

I recently saw a rerun of the old television show *Columbo*. Columbo, you may remember, was a rumpled detective who just kept asking questions. He got no respect from each episode's criminal, usually a person in a position of power. But week after week, Columbo's low-key persistence paid off with an arrest.

Let's see — no respect from people in positions of authority. Hmm. I don't want to carry the analogy too far, but there might be a few facility managers who can identify with Columbo. If you're one of them, consider emulating his strategy of using patience and logic to build your case.

Start by asking yourself questions. What would happen if we lost cooling on a hot summer day? How can facilities support the organization's sustainability goals? Should we be concerned about all the empty cubicles? What would we do if power went out for an extended period? What do we know about our energy use?

In many cases, you won't be able to answer the questions yourself. So do what Columbo did. Go to department heads, business unit managers, HR, and IT with your questions. They probably won't have answers either. Tell them what you think — why you're concerned or why you think there might be an opportunity to improve. See what questions they have.

Your goal isn't to scare anyone. Unlike Columbo, you're not trying to make an arrest. The idea is to start a conversation about ways facilities can add value.

Don't expect immediate results. Losing cooling might be a disaster, but it could be there's no money to replace that decrepit chiller. Be persistent. Figure out how you'll keep people working if the chiller fails, then do what you can to get a new chiller into the capital plan.

As soft spoken as he was, Columbo wasn't shy. He didn't hesitate to ask provocative questions — another quality facility managers might want to emulate.



Edward Sullivan

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## PRODUCT GALLERY

**UPS** incorporates SiC (silicon carbide) semiconductors that allow higher switching frequencies, lower switching losses, and higher thermal conductivity than traditional insulated gate bi-polar transistors. SUMMIT Series is a three-phase, on-line double-conversion system offered in 500 kVA with efficiencies greater than 98 percent at 50 percent load. **MITSUBISHI ELECTRIC**



### FACILITY MANAGEMENT SOFTWARE

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data associated with any floor plan, location map, or building image. SpaceRunner is a cloud-based application that helps keep track of information like warranties, maintenance performed, part numbers, and serial numbers. **XYICON**

### MOBILE PARALLELING ACCESSORY

allows users to combine different sized generators with different fuel types.

Mobile Paralleling Box, designed for use with

Kohler's gaseous and diesel mobile generator line, can be used to parallel as many as eight generators. The Kohler Decision-Maker 3500 digital controller provides the paralleling intelligence and network communications for remote monitoring. **KOHLER**

### WALL SYSTEM FAMILY

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## School Solves IAQ Issues with Targeted Air Purification

Nothing gets a principal's attention quite like a health-related concern tied to air quality. After a teacher and a parent voiced concerns about air quality issues in separate classrooms, Mike Vilendrer, director of operations at Community Consolidated School District 181, found himself in search of a solution.

The Hinsdale Middle School school building in Hinsdale, Ill., is in excellent condition and Vilendrer and his team strictly adhere to the state's green cleaning codes. However, architectural changes at the school over the years caused some areas to have indoor air quality (IAQ) issues, such as undesirable odors.

The issues involved a student with allergies who had persistent health problems because of suspected IAQ issues in a science room where the student spent several hours of each day. The child's parent asked that a HEPA filter purification system be installed in the room to remove allergens.

In addition, in the art room, art supplies were sending lots of dust and other particles into the air, which created an uncomfortable environment and could cause symptoms that affect concentration and focus. And lastly, a teacher reached out to the principal about consistent problems with the air quality in her classroom.

The HVAC system for the 108,000-square-foot school — no matter how well designed — was not equipped to handle the IAQ problems. The solution was found with four AeraMax Professional commercial-grade air purifiers — three for the main problem locations, and one in the band room. This allowed the school to make indoor air quality a top priority where it was needed most.

The AeraMax Professional was selected as the best targeted air purification approach for Hinsdale Middle School because the units are designed to turn on and off on their own, and they remain quiet and don't disrupt teaching.

Eight months after installing the AeraMax Professional units — almost the entire school year — the difference was clear and the issues were resolved.

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### ELEVATOR CONTROL PANEL



can restrict floor access based on various user credentials, including fingerprint or proximity card. The EC10 Elevator Control Panel can control up to 10 individual relays and support up to three expansion boards. Each expansion board controls up to 16 relays, so a single EC10 can control access for up to 58 total floors.

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**DEAD BOLT** can be used as a primary lock on restrooms, locker room doors, and storage closets. The



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Grade 1 requirements. **DORMA**

### MONITORING SYSTEM

offers four sensor inputs, allowing for the deployment of multiple temperature and humidity sensor configurations along with eight digital inputs, which can be used to track: open/closed doors, motion and airflow sensors, fire alarms, gas and leak detectors, and summary alarms from critical equipment. The Environmental Monitoring System 200 is a wired stand-alone sensor network manager, but can integrate with BMS, NMS, or DCIM.

**UPSITE**



### SURVEILLANCE CAMERA

is an indoor/outdoor dome camera offering full HD 1920 x 1080 resolution, integrated infrared illumination for



seeing in complete darkness, and a rugged housing that is rated for both weather and vandal resistance. The Vigi-

lance Full HD Outdoor Dome Network Camera (DCS-4602EV) features 3D noise filtering for enhanced low light performance and Power over Ethernet. **D-LINK**

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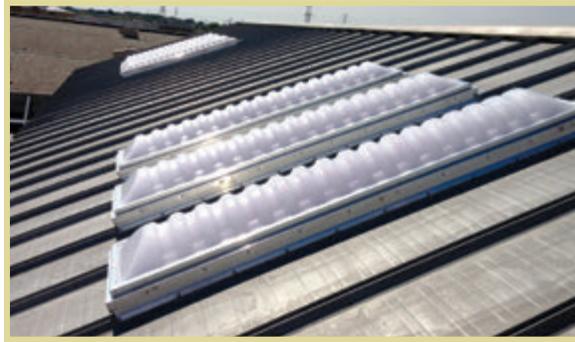


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## Roofing



» **BUTLER** The Retro-Lite daylighting system, designed to replace the Lite Panel panel system, is available for retrofit applications on an MR-24 or CMR-24 roof system. The system provides 100 percent diffused light without glare or hot spots, even in overcast conditions, and testing shows the self-curling system is

effective at preventing water penetration, according to the company. Acrylic dome design has a visible light transmittance value of 0.68.

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» **DURO-LAST** Duro-Guard Soprapap'r, a vapor retarder and air barrier membrane, is composed of a self-adhesive SBS modified bitumen with a polyethylene facer on the top surface and a silicone release film on bottom. When correctly engineered into a roof assembly, product will contribute to long-lasting thermal and waterproofing performance in all climate zones and for all colors, the company says. Product can also be used as a temporary roof in new construction or roof tear-offs, and can be installed on steel, plywood, gypsum, concrete board, asphalt panel, or concrete deck.



» **GAF** Ever-Guard Extreme is the company's premium TPO product, formulated with proprietary stabilizers and UV absorbers that are intended to improve weathering protection against heat aging and UV degradation. The

company claims strong results in areas of seam strength, elongation, dimensional stability, and breaking strength. Guarantees are available up to 35 years.



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» **GARLAND** OptiMax is a thermoset polyurethane-modified membrane. It combines asphalt and polyurethane to create a membrane that becomes increasingly resilient as it ages because, with time, polyurethane molecules are chemically linked with one another, the company says. Performance is further improved, it adds, by the fact that minerals are more strongly attracted to the polyurethane in the membrane, creating better adhesion and UV protection.



» **FIRESTONE** RubberGard EPDM SA and UltraPly TPO SA with Secure Bond Technology provide a high degree of adhesion in temperatures as low as 20 and as high as 120 degrees Fahrenheit, thus giving contractors more flexibility, according to the company. Secure Bond Technology ensures adhesion coverage across the entire roofing membrane, with self-bonding membrane speeding installation, the company says. The products have no volatile organic compounds (VOC) and are odorless during and after installation. Primer not needed.

*Varco Pruden's Innovative Daylighting Solution*

## PRISMAX SL™ SKYLIGHTS



PrisMAX SL uses prismatic lens technology to provide optimal daylight performance. These highly efficient skylights were developed in conjunction with Sunoptics™, a leader in daylighting technology. When used as part of a sensor-controlled lighting package PrisMAX SL will reduce the need for electrical lighting.

Designed to work on Varco Pruden's SSR™ or HWR™ roof systems, PrisMAX SL's unique "self-curving" structure uses a patented water-diverter and seam-mounted aluminum framing to create a long term, weathertight seal for years of maintenance-free performance.

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- ✦ Diffused lighting without hot spots
- ✦ An innovative solution for existing buildings or new construction
- ✦ Environmentally friendly, low maintenance performance

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BEFORE PRISMAX



AFTER PRISMAX

Replaced regular skylights with PrisMAX SL. The electric lights are off in both photos.



### » CERTAINTEED

SmartFlash EZ Patch is designed to speed emergency repairs of low-slope roofing. The

single-component, self-terminating cold liquid-applied membrane patches leaks and cracks on flat and sloping surfaces. The product, made of one part urethane, is UV-stable and self-adhering. Each package contains latex gloves and a pre-saturated fleece patch, measuring about 16 inches by 10½ inches, which can be used on bitumen, single-ply membranes, concrete, wood, and metal roofing surfaces. Roof is rainproof in an hour and completely cured in 48 hours.

For more information about PrisMAX SL, visit [www.VP.com/ad/BOMM](http://www.VP.com/ad/BOMM).

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» **MULEHIDE** New Silicone Roof Coating System is intended to extend the life of aging roofs by restoring and repairing asphalt, modified bitumen, metal, concrete, TPO, PVC, and EPDM roofing systems. System includes a cleaner to prepare the substrate for priming; two primers to improve top-coat adhesion; a multi-purpose sealant for use with Tietex reinforcement roofing fabric; three top coats; and a cleaning solvent to wash tools and equipment.

Silicone's low water absorption resists ponding water and a quick cure time makes same-day recoating possible, according to the company.



» **BILCO** A thermally broken aluminum roof hatch uses frame and cover design to minimize heat transfer and condensation effects and to improve energy efficiency, the company says. An element of low conductivity is integrated between interior and exterior surfaces of the cover and frame to reduce temperature transfer. Product has 3 inches of polyisocyanurate insulation with an R-value of 18 in both the cover and curb and a special cover gasket to minimize air leakage. Includes counter-balanced lift assistance for easier one-hand operation and an automatic hold-open arm.

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*John R. Burt*



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» **TREMCO** The TremLock T-138 Shingle Recover System is designed to re-cover a damaged but still functional shingled commercial roof. Standing seam metal panels install directly over existing shingles without tear-off or underlayment. Shingle recover clips are long enough to sit on two shingles simultaneously, aligning each clip with roof plane and holding the panel three-quarters of an inch above the existing roof. This helps create an air space that allows continuous airflow between the existing shingled and new metal roof, reducing heat transfer significantly, according to the company.



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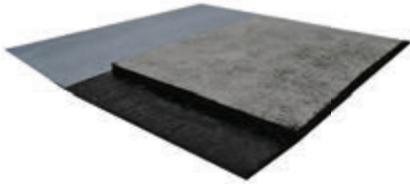
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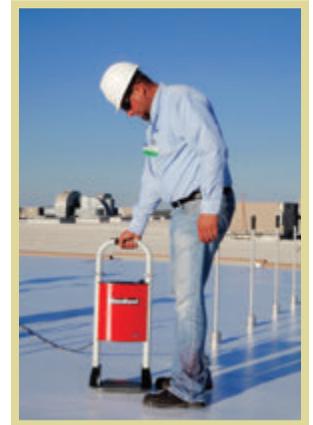
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» **SOPREMA** SOPRASMART Laminated Boards combine company's SOPRALENE SBS-modified bitumen membrane and cover board into one installation layer, resulting in application consistency and complete adhesion. Membrane overlaps are made with technology that seals the overlap and protects assembly from open flame intrusion when torch welding. Product comes in a variety

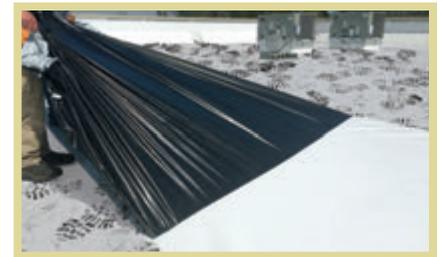
of cover board options including SOPRABOARD, high-density polyisocyanurate foam board, gypsum panels, and high-density rock wool options.



### » OMG

RhinoBond System offers a non-penetrating mechanical

fastening solution that provides improved wind performance while virtually eliminating flutter, the company says. It secures insulation and membrane to a roof using fewer fasteners and plates and without penetrating roofing material, thus avoiding leak points. An electromagnetic induction welder bonds underside of membrane to specially coated plates that hold the insulation and membrane in place. System does not require perimeter half-sheets, allowing fewer seams. Product carries an FM 1-210 wind uplift rating and resists over 500 pounds of force in static testing.



### » CARLISLE SYNTEC SYSTEMS

Sure-Weld TPO with APEEL Protective Film is designed to guard the surface of the company's TPO membrane from scuffs and dirt accumulation during installation, eliminating the need to clean the roof upon project completion. The film is durable, easy to remove, and can withstand intense heat and UV exposure for up to 90 days without deteriorating, the company says. Its cool gray color is designed to reduce glare on sunny days, and it enables any accumulated moisture to dry more quickly. The company's removal assurance says the film will not splinter during removal for 90 days after installation.



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## CLOSE-UP: OUTSOURCING

# Four Steps For FM Contract Transition Management

by teena shouse

Some senior real estate executives have reported that outsourcing will continue to increase at a steady rate. In a 2015 *Building Operating Management* survey of almost 2,000 facility managers, 20 percent reported that they expect outsourcing to increase this year, which follows 17 percent reporting an increase in the last year. The continuing growth in outsourcing — which will increase the number of facility management service-provider changes and transactions — will make it even more important to have sound business transition processes in place. With a large percentage of a facility management budget locked into a service contract, or multiple service contracts, it is critical to get the contracts running properly from the start, which depends on a smooth transition. And a smooth transition depends on having a good transition plan.

A good transition plan involves employing facility management contract transition management (CTM). CTM is the plan for transitioning from one model of facility management service delivery to another.

Having a transition plan is important because changing from one service provider to another, or transitioning from internally provided services to an outsourced contract, can be overwhelming due to the number of details, the expense, and the sometimes emotional process. Unfortunately, many transitions fail. That can leave the owner and facility manager in an undesirable relationship for years, while a service provider can discover it has committed to a contract that could damage it financially and possibly harm its professional reputation.

In addition, the risks of not adopting a successful CTM plan include a repetition of past mistakes, failure to ensure a strong win/win contract for both the provider and facility manager, productivity issues for the facility manager's customers on the affected sites, and damage to the equipment due to lack of maintenance.

A comprehensive CTM plan should address infrastructure and technology (e.g., CMMS/IWMS), processes (e.g., evaluation and monitoring), communication, collaboration, and people, which

involves change management, clarification of roles, and responsibilities. Successful CTM requires careful forethought, planning, and a systematic approach to managing the transition, the risks, and the change. Paying attention to four key areas can help ensure a successful transition.

“ It is important to keep in mind that while change may have a clear starting point, the end point is often vague and gradual. ”

## 1. Pre-Contract Stage

The management of the transition project should begin well in advance of the request-for-proposal (RFP) process and continue through the solicitation process, contract development, and the actual transition period, and then for 60 to 90 days after the new services have begun. This will ensure that the plan is on target and commitments are being met. It offers a chance for course correction before any real damage occurs.

Beginning with the end in mind during the pre-RFP release contract development stage, the transition requirements should be created and clearly delineated in the RFP language. The transition language starts with under-

# 20%

In a survey of nearly 2,000 facility managers in 2015, 20 percent expect outsourcing to increase this year.

Source: BOM survey

# A LEADER IS BORN.

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standing the customer's needs, translating those needs into requirements, and then developing specifications aligned with the requirements to be included in the RFP. Sufficient information about the facilities needs to be provided in the RFP to allow bidders to make consistent and accurate assumptions about the types, condition, and quantity of asset items to be covered by the service contract. This also allows a more direct comparison of bids and helps ensure that the equipment conditions are accurately allowed for and represented.

At this stage of the game, it is also imperative that the client declare expectations regarding service levels. Additionally, this is the time when both management metrics and key performance indicators (KPIs) should be determined to allow the bidders to fully understand how their performance will be measured. In the actual transition stage, the KPIs will help in developing an effective operational plan. Some examples of typical KPIs include: operating budget to actual performance variance, preventive maintenance (PM) compliance, response time compliance, and preventive-to-corrective maintenance ratio. Often a balanced scorecard of management metrics and KPIs linked to the organization's strategy leads to successful long-term performance.

The pre-transition strategy should include verification and sharing of the accuracy of the facilities data, asset inventory, and physical condition of the assets by both the existing and new service provider. Much of this data should reside in the computerized maintenance management system (CMMS) or integrated workplace management system (IWMS). It is best to conduct these quality assurance verifications far enough in advance of the existing service provider's contract expiration that corrections may be made, but not so far in advance that the observed conditions change due to subsequent service activity. This information will also benefit both the new service provider in better understanding his projected investments of labor requirements and financial exposure. The statement of work should be sufficient to ensure that the prospective bidders have all they need to create a complete and realistic proposal.

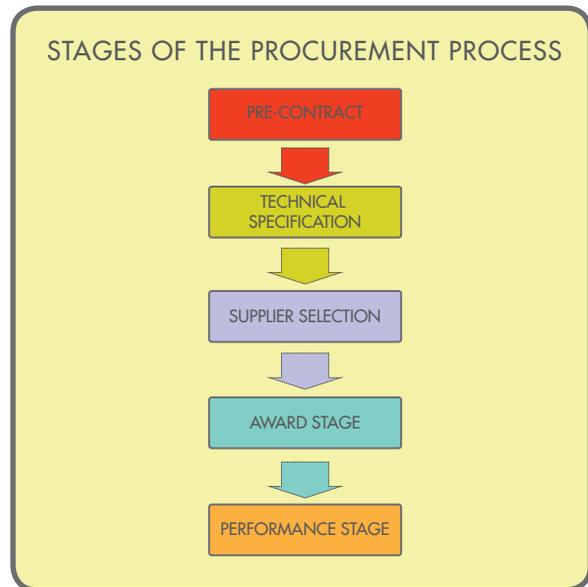
## 2: The Facility Manager's Role

The facility manager should drive the CTM process and therefore lead the CTM team, working in concert with the procurement group. The facility manager may be required to explain some things to the procurement group, including the fact that facility service contracts are very different than purchasing contracts and therefore the purchasing techniques will be different. Another point to be explained might be that techniques such as reverse auctions and such other types of purchasing practices are poor contracting processes for facility management services, as the group is not buying widgets.

A CTM team goal should be to create a strong partnership with all team members. This contracted service could have very expensive impacts on the company's greatest two assets: its people and properties.

The facility manager should be sure to create a phase-out plan listing all the required activities, who is responsible for the activities, and an associated schedule with activity dates. As well, a risk management plan should be created.

The facility manager should also conduct an initial contract phase-out coordination meeting six months before



During each stage of the procurement process, FMs should also keep contract transition management in mind.

the end of the current contract and have subsequent status meetings on a bimonthly or monthly basis.

A communications plan should include required notifications and coordination. For example, occupants (customers) will need to be notified about the change in service providers and the fact that they may see an increase in service provider activity during the transition. Another example is security. If the organization requires security badges, and perhaps background checks before those badges can be issued, coordinating with the security department with respect to the oncoming new contractor is critical and should be part of the communications plan.

## 3: Structuring the Transition

Transition approaches vary as much as the companies that procure and provide them. There are no national or international norms when it comes to this process. There are, however, current ISO facility management guidance standards under development that will address common global approaches to strategic sourcing and facility management agreements.

Facility managers should take the best of the current practices and create a model that could be most effective. To build on a base of process, let's review a short synopsis of a government example. The process can be transferred to the private sector as well.

**Contract Transition Planning** — Address the plan for transitioning from an existing service provider to a new service provider or contract type and the plan for ensuring that government-furnished items, property, or information are accounted for. (The existing service provider is responsible for reconciling discrepancies.) Include transition strategies, schedules, and identification of the individuals responsible for facilitating a smooth transition.

**Method for Monitoring Objectives** — Describe the methods for monitoring and evaluating the performance-based

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objectives. The quality assurance surveillance plan addresses the methods for monitoring performance against the contract. This section should address service provider oversight (field inspections, monthly assessment of project status, contract administration, deliverable reports, budgetary data, physical inspections, etc.). Also, identify the roles and responsibilities of the individuals involved in monitoring and evaluating the performance-based objectives.

**Inspection and Acceptance Process** — Discuss the strategy for ensuring contract requirements conform to quality assurance provisions and address roles and responsibilities of individuals involved in this process. Also, reference contract sections that address inspection and acceptance.

**Invoice Review** — Discuss the plan or process (instructions, certifications, documentation, etc.) for reviewing and approving invoices; reference the invoice requirements in the contract. Also, discuss the roles and responsibilities of individuals directly involved in the process.

**Agreements with State, Community, or Other Entities, Including Sub-service Providers** — This section should address any partnering agreements (Resource Conservation and Recovery Act permit, Clean Air Act operating permit, State Environmental Policy Act, etc.) with the state, community, or other entities the service provider must comply with in meeting the requirements of the contract. This section should also identify the parties responsible for fostering these agreements, and include full disclosure of any sub-contracts that will also need to transition under the new agreement. Communication with them as to the expectations of the clients will be imperative and is the responsibility of the lead project manager of the main contract.

While the government can have very specific requirements, its basic approach is very solid. Other items to be sure to include are: sample of deliverable matrix, detailed transition plan, and a risk mitigation plan. Complete and accurate data from a CMMS or IWMS program is extremely helpful, almost imperative, when transitioning from one provider to the next. If the facility manager knows

exactly what equipment exists and its condition, this will affect the pricing proposed by the service provider and give the latter a great foundation for its O&M plan. It is important to discuss the ownership of data, data standards, system configuration to enable data analytics and KPI dashboards, and access to either owner-provided or service-provider-provided systems.

#### 4: People Management

The transition period between service providers can be a period of great disruption, which can create financial risk for all parties. The goal should be a commitment by the existing service provider to transfer well-maintained equipment and operational data to the new service provider while eliminating operational impact to the facility occupants. Third-party consultants, aligned with the CTM team, can sometimes support all involved parties and may minimize the disruption and risk.

The most vulnerable aspect of the transition is the “people” aspect. Lack of understanding, poor follow-through, resistance to change, lack of buy-in, and insufficient training can derail even the most comprehensive set of processes. A carefully thought-out and implemented change management engagement process can mitigate potential service interruptions related to the transition.

Successful transitions intentionally incorporate the “people” process (or change management engagement process) into overall contract transition management. Intentional incorporation means the various stakeholders (procurement, HR, C-suite, facility management team, and possibly others) are effectively engaged through agreed-upon communication processes and mechanisms for internal discussion, debate, and feedback; and receive the support they need to roll out the CTM plan to staff, clients, and others.

It is important to remember that while change may have a clear starting point, the end point is often vague and gradual. Thus it is important that managers retain access to needed supports even after the contract change has been implemented.

The more transparent the process, the better. Procurement, HR, the C-suite, and facility management should

work with total transparency in the process and legal requirements to protect the company procuring services. The desired outcomes must be clearly understood by all. It is essential to have effective change management and great communication to affected employees who work in affected properties. This is especially true if service levels will change and cause a cultural shift, which should be monitored and well-communicated at all levels of the organization.

The transition plan should also include how future communication will take place, including: frequency, media, and breadth of distribution. As an example, will communication be via internal versus external party reviews? Will you use full quarterly business reviews? Dashboard reporting through a CMMS program?

This is also a good time to set down the first-year milestones based on the new contract, including specific projects, metrics reporting, and promised deliverables, perhaps in the form of a balanced scorecard. Discuss conformity to the contract specs and agreed service levels, and further define and clarify roles and responsibilities.

Bottom line, there is no magic potion. Both facility manager and service provider need to work together. As in any good relationship, this involves setting realistic, well-defined goals, creating a strong communication plan, seeing diligent follow-through by all parties, following the process steps, and committing to making it work from the beginning. ■

*Teena Shouse is vice president of corporate services at Facility Engineering Associates. She has over 26 years of experience in service-related fields, mainly facility management. She can be reached at [teena.shouse@feapc.com](mailto:teena.shouse@feapc.com).*

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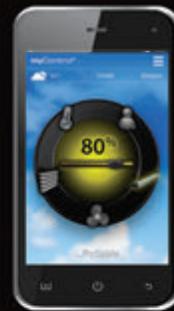
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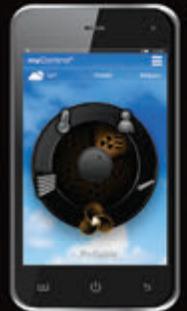
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## CLOSE-UP: SECURITY

# For Colleges and Universities, Campus Security Is a Multifaceted Challenge

by maryellen lo bosco

The tragedy that left 10 people dead at Umpqua Community College in Roseburg, Ore., adds one more incident to the list of shootings on college campuses. The statistics are sobering. Based on a study done of mass shootings around the world between 1966 and 2012, the United States has five times as many mass shootings as the next highest country, the Philippines, according to a recent report in the *Wall Street Journal*. While the U.S. has about 5 percent of the global population, it had 31 percent of the mass shooters in that period. According to CNN, reporting on a study in the journal *PLOS ONE*, mass shootings — defined as four or more deaths — occur on average about once every two weeks in the U.S., and school shootings occur about once a month.

But shootings represent only one security concern for colleges and universities. Ensuring the well-being of people who work and study at colleges and universities has become more complex in recent years, and the technology used to address risks has become more sophisticated.



"Theft and burglary have gone down because of better security measures within buildings."

*Christopher M. Kopach,  
University of Arizona*

## Active Shooters

Many lessons have been learned in the decade and a half since the shootings at Columbine. One is that, because law enforcement or backup is usually three to five minutes away, it's important to train people in what to do before help arrives.

"Universities and other educational institutions are training people to run away, hide, and as a last response to take the shooter out," says Robert Lang, retired assistant vice president of strategic security and safety and chief security officer for Kennesaw State University in Georgia.

Scott Merlo, chief of the department of public safety at Western Michigan University, says security people on campus can no longer wait for backup if a serious incident occurs. "If you are by yourself, you have to go in and address the threats," he says. "We train for active-shooter scenarios, and we train with surrounding agencies, such as the sheriff's department and the city police department." Western Michigan has the

benefit of its own police department, with 28 officers who are responsible for patrol and security enforcement on campus.

Kennesaw State trains crisis coordinators, individuals who are assigned to each building on campus and to each floor. The program has trained 250 people from all areas of the university, including people in facilities and security, along with academics and professional staff.

While people were reluctant to get involved at first, they were convinced "when we started showing them the benefit of knowing what to do, especially in an active-shooter situation when they were on their own," Lang says.

Kennesaw State also created a crisis intervention program, to make people aware of aberrant behavior and to report it where they see it. Lang notes that, in



Kennesaw State created a crisis intervention program to make people aware of aberrant behavior and report it.

*Robert Lang  
Kennesaw State (retired)*

# 3-5 minutes

Average time it takes law enforcement to arrive in active-shooter incident



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# Advance



"We did a quantitative security risk assessment and developed a security master plan."

*David Rainer,*  
North Carolina State University

retrospect, authorities learned that some of the shooters who made the national news had been seeing mental health practitioners, and some were on medications they had stopped taking. "We wanted to create a red-flag program where you could report anyone to a website, and a psychologist could interview them and decide if there is a problem, so that they could get help," he says. The program was not conceived as something punitive, but rather as a way to get people help if they needed it.

According to Scott Merlo, public safety chief at Western Michigan University, because of the number of shooting incidents in malls, schools, theaters, and elsewhere, the topic is always "at the forefront of our mind." His university uses threat assessment teams that look for signs of possible threats from or erratic behavior on the part of students, staff, or faculty. "We are constantly reviewing social media websites looking for threats, parties, and incidents that we might not be aware of," he explains. "We can gather good intelligence from some of the social media websites. Twitter, Snapchat, and so forth — when you look at them it is amazing what you can find," he says.

Active shooters have increased sensitivity to campus safety, but they are not necessarily driving the changes in campus security over the past five years. "The driver is community expectations, and in order to meet those expectations, it is important to have compre-

hensive goals and plans," says David Rainer, associate vice chancellor of environmental health and public safety at North Carolina State University.

"We look at campus safety holistically and have consolidated all of our emergency planning response, police, environmental health and safety, risk management, and security into one organization. We've tried to be very strategic in how we go about managing safety and security," he says.

As North Carolina State's public urban campus has grown, security issues have become more complex. "We did a quantitative security risk assessment and developed a security master plan, beginning about three years ago," Rainer says. The risk assessment involved interviewing multiple stakeholders, from students to university leaders; analyzing local and campus crime statistics, as well as operational issues and existing security policies and procedures; and conducting a detailed site survey and analysis of 60 major facilities on campus.

The master plan has led the school properly allocate resources for security programs and systems, Rainer says. The school has changed the way it uses technology. For example, electronic door access points have gone from 25 in 2009 to 1,500 now, and 50 cameras have increased to 1,800 cameras. The university also has its own police force and an extraterritorial jurisdiction agreement with the city of Raleigh, with responsibility for residential facilities where students live off campus. The police force goes through the same training as all police officers in North Carolina.

Some campuses have certified police departments. For example, the university system of Georgia requires that all of its schools have certified police officers who carry guns, says Lang.

Rockefeller University in New York City uses 35 licensed security officers instead of certified police officers. According to Michael J. Murphy, assistant director of security, Rockefeller's security staff receives continuous training in areas such as professionalism, customer service, crime scene preservation, grand larceny, verbal judo, and, of course, active-shooter scenarios. The campus community gets training as well, via the university website as well as in-person orientation for new students, online training through the Federal

Emergency Management Agency, and in-person training from the NYPD.

## Adopting Technology

Increasing technology surveillance allows a campus security force to better address typical campus criminal activity. Security cameras and card readers have become a staple of the industry, says Murphy. Technology helps his school address many of its security issues, "including missing property, vehicle accidents in parking lots, and suspicious people on campus," he says. "The cameras help us prove and disprove a lot of claims."

Crimes of opportunity are common on college campuses, including larceny and breaking and entering in living areas, Merlo says. Students most often lose expensive computers or cell phones because they are not paying attention and leave property unattended. "There are criminals that target college kids," he says. They look for unlocked cars, or enter the library or other buildings where people might plug a phone in and walk away. Merlo's staff train students in commonsense crime prevention, but technology is also helping. Computers are registered at the university, and security can track them down. "Sometimes criminals are from the outside and will walk into dorm rooms and grab something, but this is changing because of less access to dorm rooms. We have card swipes and can look back at who is accessing buildings." Merlo's university now has over 800 surveillance cameras.

Technology helps keep people informed about emergency situations, and offers a way for the university community to communicate with security or campus police about potential threats. For example, a new University of Arizona program allows people to text and send pictures directly to dispatch about an incident in progress. The program also gives the community access to the university's emergency plans — "what to do in the event of an active shooter, biological spill, or an earthquake, for example," says Brian Seastone, the school's chief of police.

Alert notices that are sent to people's phones have been in place for about seven years, according to Christopher M. Kopach, assistant vice president of facilities management at the University of Arizona. In the last decade, the use of cameras has increased as well. "Theft



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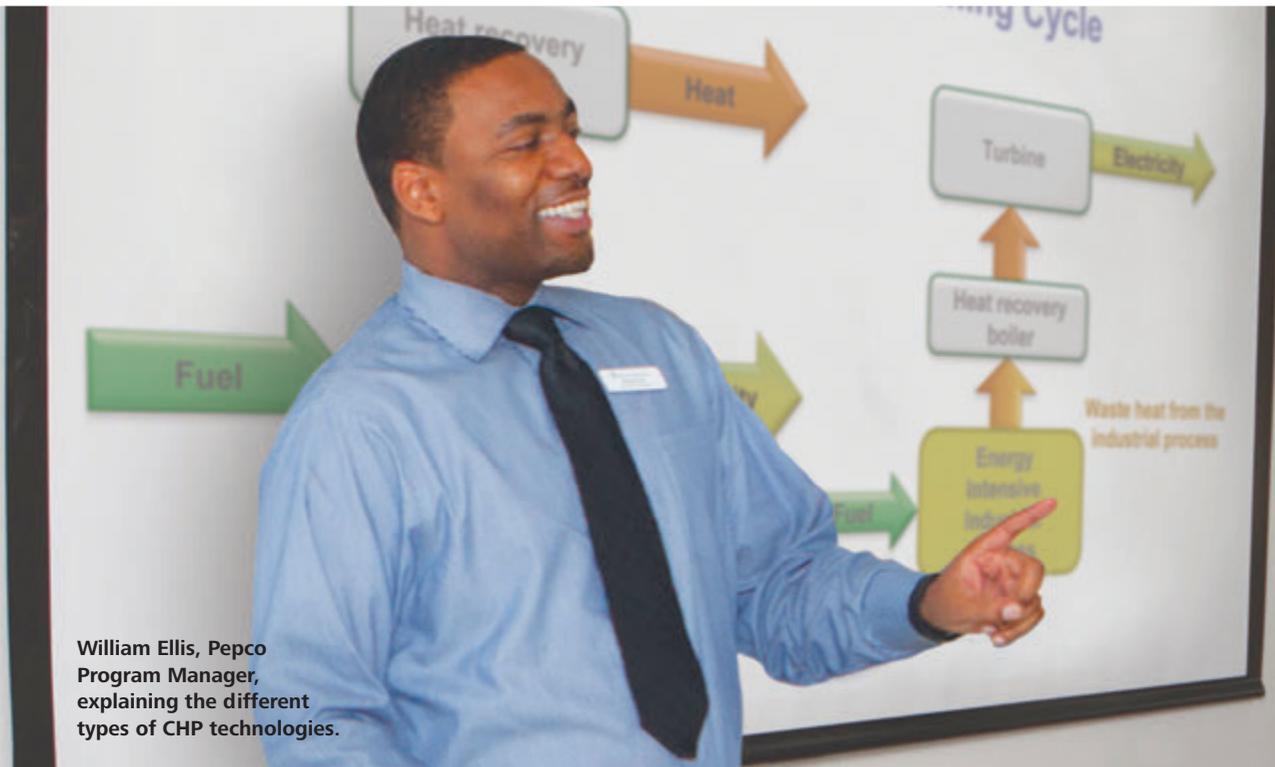
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and burglary have gone down because of better security measures within buildings, with keyless locks that use a card system," Kopach says. Arizona has instituted a 12-phase project of putting exterior entrances on keyless access. A card system also makes it easier to lock down a building in the event of an emergency. Some 237 core classrooms

have been recently upgraded and outfitted with digital display clocks that begin scrolling messages in the event of a crisis, Seastone says.

### Clery Act Requirements

Another area where security is evolving is sexual assault and harassment. The Crime Awareness and

Campus Security Act (known as the Clery Act) requires all colleges and universities receiving federal funds to keep and disclose statistics about crimes on campus.

"Clery is a working document," says Merlo, "which leads to a lot of transparency. People have a right to know, and that makes the campus safer, the quicker information is given to the community." Typically, a compliance officer within a police department is responsible for Clery crime statistics, Lang adds. If someone requests information, it must be provided within 24 hours.

New Clery obligations continue to be added. Requirements added in 2011 prohibit student-on-student sexual harassment and sexual violence and mandate that the institution investigate and address sexual violence. The reauthorized Violence Against Women Act requires colleges and universities to report domestic violence, dating violence, and stalking; notify victims of their rights; and adopt policies that prevent sexual violence.

A recent survey by the Association of American Universities found that a quarter of undergraduate women had experienced unwanted sexual contact sometime during their college years. Researchers say the results can be biased slightly upward, since students who ignored the survey are less likely to have been victimized. Meanwhile, reports of sexual violence are increasing because of more student education and access to help. "Universities talk more about (sexual assault), and students are aware of resources on campus and are more comfortable reporting incidents within the last year or two," Merlo says.

Seastone also notes that in the last two years his school has seen an increase in sexual assault reports. "We are convinced that there are not more assaults occurring, but rather that people are comfortable reporting these crimes, and we encourage them to report," he says. ■

*Maryellen Lo Bosco, a freelance writer covering facility management and technology, is a contributing editor for Building Operating Management.*

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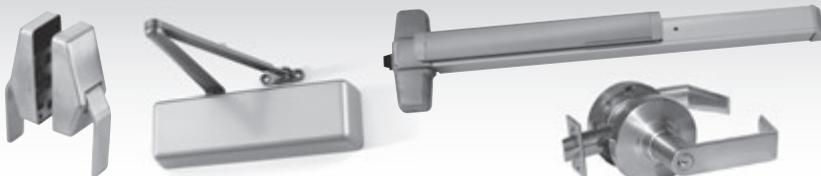
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# MASTER PLANNING

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FMs explain how to set the  
stage for successful projects

by desiree hanford

Taking a trip without any planning in advance is rarely a good idea. It can lead to wasted time, wasted money, and frustration. A plan, even one that doesn't take into account every moment of every day, often results in less stress and a more enjoyable trip for all involved.

The same can be said for master plans for facilities. Without them, facility managers may go from one crisis to another, reacting instead of having an idea of what equipment is due to be replaced or what floor needs to be updated.

"We always have a master plan," says Tim Cooper, director of engineering for Four Seasons Los Angeles at Beverly Hills. "Our master plan is a plan for growth in an ever-changing world, one that includes renovation, new industry standards, and government regulations. We want to stay ahead of everyone else."

Master planning is a valuable tool for any facility manager. Master planning can help facility managers meet organizational needs, win funding, prepare for a range of scenarios, and avoid surprises. But, just as each organization is unique, so too each master planning approach takes a distinctive shape based on the needs, priorities, and challenges of the specific organization.

## Range of Plans

Master planning doesn't necessarily mean just one plan. The Four Seasons has a three-year plan that focuses on technology, with the short timeframe allowing it to update and utilize new technology quickly. It also has a five-year master plan and a 10-year plan, the latter for replacement of large, expensive equipment such as chillers and air handling units, Cooper says.

It's the five-year plan, however, that is the Four Season's main plan because the hotel essentially renovates every six years so that it stays current. Cooper assembled an asset list when he arrived, a list that includes the life expectancy of equipment — the year built and the year installed — which feeds into the five-year plan because it allows him to plan and budget for replacement.

The payoff for the plan includes fewer breakdowns and more efficient maintenance because the plan keeps everything, including equipment, up to date. A five-year plan isn't a very long time to look ahead in the hospitality industry, Cooper notes, so by the time one project is finished, it's time to start another one.

Even with a plan, flexibility is essential, Cooper says. The hotel needs to adapt to changes in societies, cultures, and the market. This year, the Four Seasons Los Angeles at Beverly Hills is seeing an influx of visitors from China, so it changed its plan to incorporate Chinese amenities, such as a Chinese wishing tree for the Chinese New Year. Next year, the plan calls for reviewing and replacing televisions and the television infrastructure, so when interviewing potential

suppliers, Cooper has been inquiring about the availability of Chinese and Arabic channels.

"Even though it's a five-year plan, you have to visit it a lot," he says. "You always have to tweak the plan."

Different kinds of facility plans serve different, though often interlocking, purposes. (See "FMs Should Understand Role of Strategic Plans" on page 31). McLennan Community College in Waco, Texas, has three different types of master plans: a campus master plan, a master facilities plan, and a facilities master plan, says Sydney Ross, director of facilities, planning, and construction. The campus master plan, done about every 15 years, uses an outside service that provides master planning.

The college's master facilities plan is generated with campus personnel and reviews every building, parking area, and street and gives each a grade, looking to see what needs repairs. The plan is updated every five years.

The facilities master plan lists projects ranging from preventive maintenance to Americans with Disabilities Act

compliance, projects that extend beyond five years. In addition to being tied to a capital improvement fund, the facilities master plan includes a construction section and a planned-infrastructure section. It also has a section for contingency items, such as a water leak in a building or large fan in a science building breaking. Although it's a five-year plan, the facilities master plan is reviewed each year.

"We want to provide goals and strategies for facilities for current and future growth to ensure we have proper facilities and roads and streets and parking if we do have growth," Ross says. "Fortunately, our board and administration have put a focus on maintenance and facilities. So the campus looks very nice, and they have committed the resources that we need to maintain it."

Between 2007 and 2012, the school updated and renovated with a 50-year horizon. With a \$75 million bond, it upgraded infrastructure, renovated space, and added buildings, Ross says.

By one important measure — positive student feedback — the facilities master plan has been an overwhelming success for McLennan. On its student evaluation survey, the school's facilities received an 85 percent approval rating from students.

"That's big," Ross says. "It's important for our students to have good facilities, and our board and administration also embrace that."

## Feedback Mechanism

While an organization's strategic priorities shape a facility master plan, that plan can also help the facility department provide important feedback to upper management.

Consider Denison University in Granville, Ohio. Arthur Chonko, director of facilities services, says small schools like

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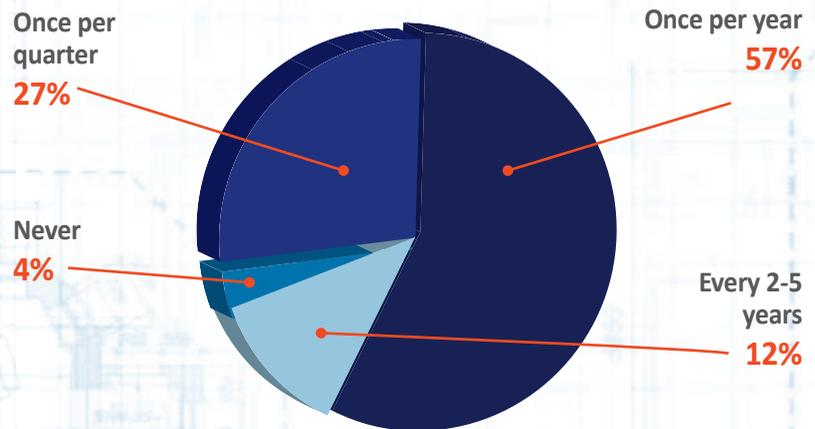
Master planning  
can help facility  
managers meet  
organizational  
needs, win funding,  
prepare for a range  
of scenarios, and  
avoid surprises.

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## ABOUT THE SURVEY

The survey was emailed to 8,000 facility managers. A total of 372 responses were received. Of those, 302 facility managers indicated that their organizations have plans for facilities that include specific buildings and/or pieces of equipment and that look forward at least two years (e.g., master plan, strategic plan, capital plan, capital renewal, energy management plan, real estate plan, etc.). All data for charts is based on responses from facility managers who reported having such plans.

## HOW OFTEN IS PLAN REVIEWED?



R=276

## WHAT ARE TOP MASTER PLANNING CHALLENGES?



Percentage of respondents who ranked challenge a 4 or 5 on a 1-5 scale where 5 is a very significant challenge. Multiple responses allowed. R=255

Denison that aren't looking to grow their student bodies need to do a good job of managing their square foot per student. Denison is "pretty heavily loaded" from a facilities standpoint for the number of students it has, Chonko says. A previous master plan included an audit that reported on how various spaces were used.

"It costs 'X' number of dollars to maintain that space and you have to consider what is the burden you put on the student in terms of finance," he says. "It's easy to get funding for new building, but maintenance is just as important." Ideally, he says, a master plan will look not only at where a lack of space is limiting programs, but also at underused spaces to see if they can be renovated to meet other space needs or removed from inventory.

Denison University's master plan, which covers about 10 years and is revised every five to eight years, looks at where the school is at as an institution and where it wants to go, and then ties facility management into that direction, with the latter supporting the former, Chonko says.

Denison is still trying to figure out how to best tackle the challenge of having enough space but not too much space, Chonko says. The facility management team has done a good job of raising awareness so that the university's board and administration are aware of the issues of continuing to add more space, he says. The school is working on its fine arts space, the last of the larger projects on its master plan. As part of the fine arts space, Chonko says the school

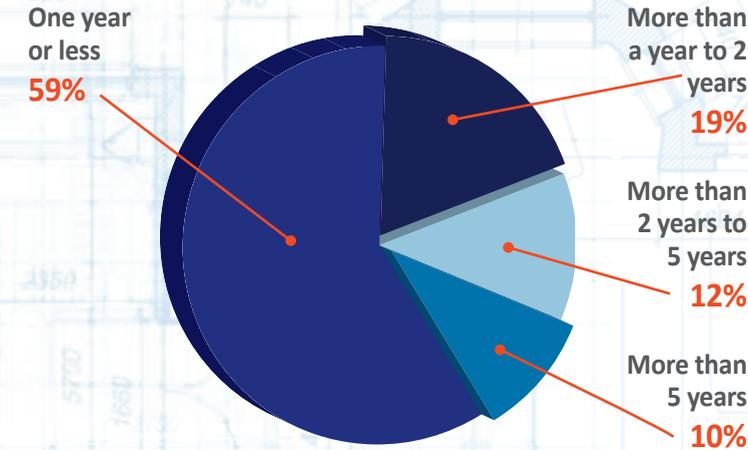
will renovate some existing space and tear down at least one building.

## Dollars and Cents

A master plan can also help facility organizations address funding challenges.

The Elko County School District in Elko, Nev., is the fourth-largest county by size in the contiguous 48 states, covering more than 17,000 square miles. It has 22 school sites, ranging from single classrooms to Elko High School with 1,300 students. What's more, with Elko County largely dependent on mining and ranching, the student population rises and falls with the price of gold, says Steve Bowers, building operations and construction manager for the district. According to the 2010 census, the county population was just shy of 49,000 people.

## HOW LONG SINCE PLAN WAS CREATED/UPDATED?



R=276

# 87%

**of survey respondents  
with plans believe their  
plans are effective.**

The district created its first master plan in September 1999 and updated it in 2001-2002. The plan contains triggers to indicate the need for a new school building. For example, modular classrooms are used to accommodate students when an existing facility is full. The master plan says that, when the total percentage of modular classrooms hits 30 percent, it's time to start the process of building a new school.

Although it's somewhat outdated, the plan still serves as a blueprint for the construction of new facilities, says Bowers.

The master plan is now under review to see if the district's program is adequate, Bowers says. That's

because a new elementary school is being constructed and several items have come up that weren't included in the master plan. The district now has all-day kindergarten and pre-kindergarten and needs to make sure it's complying with state accreditation standards, such as square foot per student, Bowers says. Also, in recent projects, schools have requested gyms and multipurpose rooms, the latter also acting as a cafeteria so that the gym doesn't need to fill that role, Bowers says.

The master plan provides a blueprint for designing new schools, providing guidance on how many classrooms and specialty classrooms are needed for a given size

## FMs Should Understand Role of Strategic Plans



ERIC LONG

The Smithsonian's facility strategic plan is one key to ensuring a successful visitor experience at venues like the National Air and Space Museum.

It's important to recognize the difference between a facilities master plan and a facilities strategic plan, says Stormy Friday, president of The Friday Group. "The facilities master plan should focus on the real estate portfolio. In a strategic plan, you need to focus on long-term goals for things like service delivery, skills assessment, succession planning. Those are strategic business goals and objectives. You can marry the two, but they take a different approach, and they each take a different set of goals and objectives."

The Smithsonian Institution has both a master plan and a facilities strategic plan. Judie Cooper, facility management analyst with the Office of Facilities Management and Reliability (OFMR) at the Smithsonian, calls the latter a "guiding document" that is developed with OFMR's team members. It determines OFMR's priorities, establishes and fosters relationships with stakeholders, provides professional development of staff, and ensures that OFMR is best positioned to provide maximum support to the Smithsonian's mission. The Smithsonian welcomes tens of millions of visitors every year. "Facilities are a large part of their successful experience," Cooper says.

"This plan (provides) a framework for our staff, stakeholders, (and) customers that clearly demonstrates where our priorities are, how our decisions are made, what is important to us, how we conduct ourselves, [and] how critical we are to the success of the Smithsonian Institution," says Cooper in an email. "Our plan leads us toward excellence in everything we do that supports the Smithsonian."

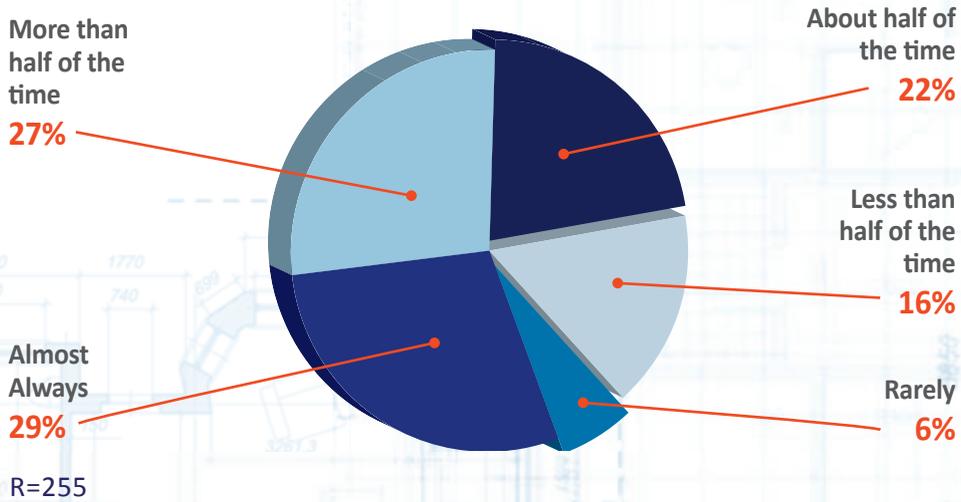
One tangible measure of success: "We have been successful in receiving funding during these highly constrained fiscal times," Cooper says.

Cooper notes that the staff works hard to ensure that as many people as possible are heard and participate in the strategic planning process. "We are very conscious of the importance of the full engagement and participation of our staff in every aspect of our work," she says.

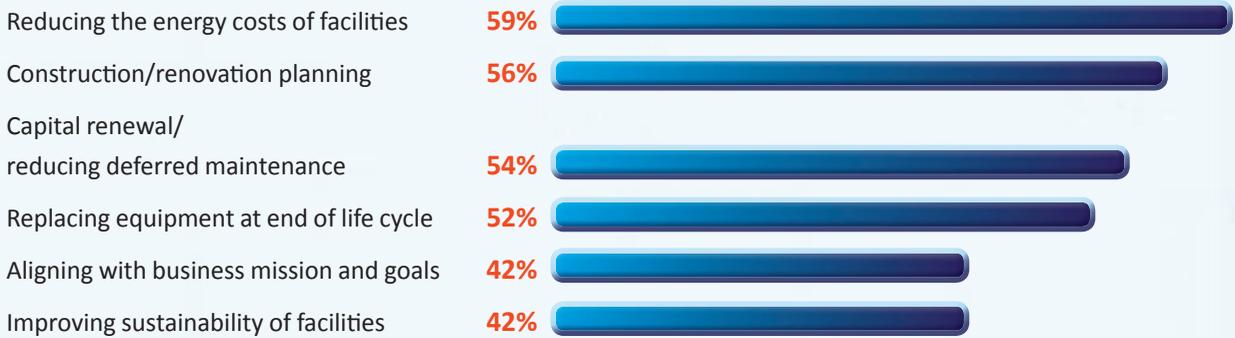
The facilities strategic plan will last through 2018. Work on the next five-year plan will begin in the final 18 months of the current plan.

— Desiree J. Hanford

### HOW OFTEN ARE PROJECTS FUNDED IN YEAR SCHEDULED?

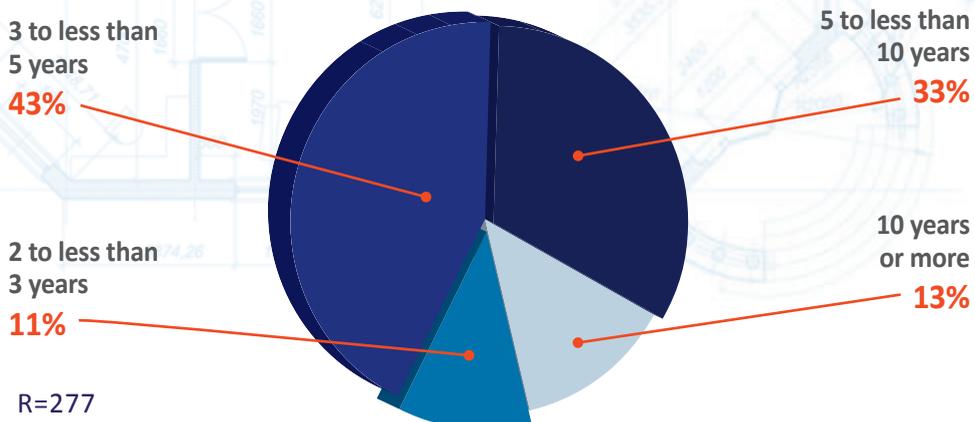


### WHAT ARE HIGHEST PLAN PRIORITIES?



Responses add to more than 100 percent because multiple answers were allowed. R=277

### HOW MANY YEARS DOES PLAN COVER?



school. Because the school district is a pay-as-you-go system — paying for everything as the costs are incurred and not accumulating debt — the master plan means it can get accurate estimates on the costs of new schools and explain to taxpayers how their money is being spent. With the district's revenues at about \$12 million a year and a new elementary school costing between \$30 million and \$35 million to build, it takes a few years for the district to accumulate the necessary funds, Bowers says.

The master plan was critical to gaining public support, according to Smyer. Communities in the far-flung district see local schools as essential to their identities and want to know that the district is considering the facility-related needs of those schools. "Without a master plan, the community would have unanswered questions about schools and,

in my opinion, would not support a tax increase to allow for the construction of facilities," Smyer says in an email.

### Implementation Challenges

While the master plan sets the agenda, facility managers know they have to translate that plan into individual projects, a step that can raise a whole new

**83%**

**of survey respondents report that other departments are involved in developing the facility plan.**



Funding was also challenging for the Cassia School District in Cassia County, Idaho, a district that is geographically larger than the state of Delaware and has 17 schools. The state is one of the few that requires a supermajority for bond approval, and Superintendent Gaylen Smyer says that after taxpayers approved a 20-year bond in 1996, it took until March of this year to get another one approved because taxpayers didn't want to OK another bond until the 1996 bond was close to being paid off. The bond will help pay for new schools, additions, and renovations, all of which are needed because the student population has increased, Smyer says.

"The challenge was getting it all passed and getting people informed about the matter," he says. "It was getting the information out there, getting people to understand the need, and getting them to support it."

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A facilities master plan helped McClennan Community College in Waco, Texas, manage a major campus construction and renovation program that included building a 96,000-square-foot classroom facility.



set of planning challenges. At the Four Seasons Los Angeles at Beverly Hills, for example, work has to be done while the hotel is running 24 hours a day, 365 days a year, and not inconvenience guests enjoying their stay, Cooper says. That's true at any hotel, but at an upscale property the expectations are even greater. Cooper and his staff must plan extensively — considering all scenarios — and then communicate and work with other departments so it's all seamless to guests.

"So you have to include the 'what if's,'" he says. "What if the project should take two days but the valve breaks? Can you get it in 24 or 48 hours? Should you get the valve in advance in case it breaks? What if you blow another gasket because of the pressure?"

Cooper keeps his supervisors informed, telling them how long a project will take and how much it will cost, but also what it means in terms of time, cost, and possible guest inconvenience if something goes wrong. "If you're closing 20 rooms at \$1,500 a night, that's a lot of money," he says.

Guests pose another challenge for Cooper. If a guest who has been coming for 15 years and stays in the same room every visit will be arriving at a time when the room needs to be empty for three days, Cooper may put planned work on hold or give the guest a complimentary upgrade or free dinner.

"It's a challenge," he says. "You don't want any part of the business down for any length of time because it's expensive."

The solution is solid planning and keeping all departments in the loop, Cooper says. He starts at the top of every department and makes sure everyone who may be involved or affected by the work knows the plan. Cooper recently was working on a plan to knock out half the hotel's restaurant, and he had meetings with general managers, the director of rooms, hotel owners, and others.

"If you start from the top, you can get the word out," he says. "Make sure everyone understands why you're doing it, the benefits of doing it, and how it enhances the guest experience because then they are on board and then they help." ■

*Desiree J. Hanford, a contributing editor for Building Operating Management, is a freelance writer who spent 10 years as a reporter for Dow Jones.*

*Email comments and questions to [edward.sullivan@tradepress.com](mailto:edward.sullivan@tradepress.com).*

## FMs Share Tips on Master Planning

*Building Operating Management* asked facility managers to share lessons they've learned about master planning. Here are some of their comments, taken from a master planning survey.

### MONEY

- "It takes more money and more FTEs than expected."
- "Include cost escalation and contingency."
- "Find ways to tie plan to financial aspects and consequences of inaction."

### FLEXIBILITY

- "Adjustments (training and physical) always need to be made long after systems are switched out/upgraded."
- "Expect that initial timetables may not be achievable due to multiple factors."
- "It's a living document that is constantly changing with projects completed, new requests, and the ever-present emergency."
- "Maintain flexibility to adjust plan to respond to changing urgent priorities."

### GETTING BUY-IN

- "Insure key stakeholders are identified and have bought in to the plan at the very beginning of the planning process."
- "It won't work if you don't have buy-in from the top."
- "Some projects have many critics; it's our job to make sure the critics are involved on the front end (planning stage)."
- "It is important to keep the involved parties informed as to successes as well as 'potential trip hazards.'"

### MAKING THE PLAN WORK:

- "Do not overextend what you can do in one year. Do not ask for too much funding in one year."
- "Don't use outside 'experts' until you have done your research and have set your own criteria."
- "Revise costing estimates often and maintain accurate files, inputting data as we get it."
- "If you do not maintain it, it takes a long time to update it."

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## GREEN RETAIL

# The Green Store

A mixed-use facility in Washington, D.C., includes a 62,400-square-foot Safeway store and a five-story, 285,000-square-foot residential development. The project achieved LEED Gold certification for the residential space and LEED for Commercial Interiors Gold for the store.



TORTI GALLAS & PARTNERS, INC.

Retailers are using LEED and other resources to prioritize sustainability  
by julia raish

Much ink has been spilled over the battle between e-commerce and brick and mortar stores, but the fact is that physical retail locations are not going the way of the fax machine anytime soon: Retail and mall space (which includes everything from big box stores to quick-serve restaurants) still encompass 20 percent of the buildings in the U.S.

In this highly competitive market, where margins are often thin and consumers enjoy a wealth of choices, an increasing number of retail owners are turning to sustainability to differentiate themselves while improving their operational efficiencies. According to “LEED in Motion: Retail,” a study published in 2014 by the U.S. Green Building Council (USGBC), the number of retail owners highly involved in green building (where more than half of their new

buildings are green) more than doubled between 2011 and 2013 from 18 to 38 percent and is expected to grow to more than 50 percent by 2016.

Seeking a LEED certification for a retail space, however, is still not without its challenges: The wide variety of store types and uses makes it hard to determine a one-size-fits-all solution, and the relationship between what the retail tenant controls versus the landlord in a shopping mall setting means that parties with different interests may need to collaborate for success.

## Highly Involved Owners

What are these “highly involved” owners profiled in the USGBC study doing differently to successfully implement LEED strategies into their stores and reap the benefits of a better performing real estate portfolio? The



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following are a few smart and sensible methods to ensure success.

By understanding the company's underlying values and goals first, those values can then be translated to guide implementation and align delivery of LEED strategies. For example, one company may be more driven to achieve operational efficiency of the building, whereas another may be more invested in ensuring employee health, comfort, and productivity.

This cohesion between the larger company mission and LEED criteria guides actions to support sustainability throughout the company's operations. These values can manifest themselves in a corporate sustainability plan or other written mission statement that directs how responsible actions are to be executed in retail space, including daily operations, the leasing process, and top-level executive decision-making.

And the results can be found at the retailer and developer scales. For

It is critical to communicate the message of a building's sustainability features through targeted outreach. Inform the community about a project's sustainable features to provide a better understanding of the company's values.

example, Target's corporate responsibility plan includes a specific commitment to sustainability. Beyond just offering green products, Target aligns values to action, by choosing to develop its properties in efficient locations, including leasing in previously constructed sites and choosing locations near urban sites. The company further reduces the environ-

mental impact of new development through stormwater management efforts, energy efficiency, and the sourcing of power from renewable sources like on-site solar atop its buildings. Roughly a quarter of Target stores are located in previously developed spaces, while the newly built San Rafael, Calif., store is LEED Gold certified.

Retail developers are also demonstrating their core values through tangible and visible development features. For example, certain retail developers may include site and landscape features to distinguish a development from its neighbors and provide the visitor with a unique experience. Similarly, many retail developers recognize the operational benefits (financial and maintenance) they achieve by updating to LED lighting, including sophisticated lighting controls and programmed sequences.

To ensure that the impact of these sustainable upgrades and practices are fully leveraged and don't simply end at the core and shell development phase, many developers are choosing to engage in new types of partnerships with their tenants.

#### Landlord-Tenant Partnerships

Breaking the mold of the landlord-tenant relationship through innovative leasing and tenant guidelines creates a new step in ensuring that LEED criteria is infused in leased retail space. The Federal Realty Investment Trust (FRIT) is exemplary in its relationships with tenants because it provides tenant fit-out options that give lessees the

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opportunity to operate in space that aligns with their company values. Fريت has attracted high-end clientele and created long-lasting relationships by establishing itself as a realty company that offers retailers space that is both up to operational standards and aligned with sustainable principles that are increasingly important to the retail industry.

This partnership creates a win-win situation for both parties. Landlords have the chance to demonstrate the alignment of their values with tenants, while tenants are given access to a new kind of leasing structure that goes beyond dollars per square foot. Another option for tenant-landlord innovation with REITs is to focus on sustainability in the delivery of tenant shells. This way, when a retailer chooses to lease a space within one of these developments, the tenant is provided with a healthy and sustainable base feature set. And if that tenant is interested in going further when fitting out its own space, the

developer can provide tenants with additional guidance.

### Consider Community Needs

Developers are also shifting their goals to align development objectives with the needs of the local community, including paying a premium for spaces that have specific value sets incorporated into the location. This strategy focuses on self-selecting development sites that fit into community values — sustainability, access to the outdoors, transit-oriented development (TOD) neighborhoods, walkability, and community events like farmers markets.

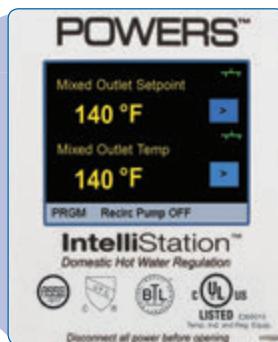
An especially effective strategy is leveraging existing TOD sites, characterized by a mix of building uses, including retail and residential, and close proximity to public transit to create a dense, easily accessible neighborhood. By locating a retail site in urban areas, increased walkability and proximity to public transportation improves community connectiv-

ity and foot traffic to the site, while earning LEED points.

A recent project that demonstrated the consideration of community needs during development is the Petworth Safeway and luxury residential development in the Petworth neighborhood of Washington, D.C. The project developer, Duball, LLC, redeveloped a 60-year old Safeway store into urban infill mixed-use development, just two blocks from the Georgia Avenue-Petworth metro station. The building was revitalized to include a modern 62,400-square-foot Safeway store along with a five-story, 285,000-square-foot residential building. Though targeting LEED Silver, the project team achieved LEED Gold for the residential space and LEED Commercial Interiors Retail Gold for the Safeway store. Its proximity to public transportation and residential living provides the community with a new hub of connectivity while simultaneously boosting economic growth to the area.



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Finally, it is critical to communicate the message of a building's sustainability features through targeted outreach. External communications should inform the community about a project's sustainable features in order to provide a better understanding of a company's values. This creates environmentally conscious retail advocates for your business, resulting in more consumers and increased sales.

Communication is vital not only to external audiences, but internally as well. Adequately educating facility staff and tenants about a building's sustainability features will set sustainability programs up for future success, as informed users will efficiently use the building and its green features at their optimum and intended purpose. Informed tenants also become some of the best advocates for sustainability efforts.

Whole Foods is a great example of successfully communicating values-driven decision-making in the choice of retail space and operations to both its customers and stakeholders. The natural foods supermarket uses signage that guides customers through sustainable purchasing decisions, promotes the use of green features in its spaces (i.e., compost, recycling), and implements marketing campaigns focused on how sustainability is incorporated in operations as a whole. Through successful communications, Whole Foods' image as a leading sustainable brand has attracted a following of loyal customers that not only understand but also feel aligned to its values.

An example of an available tool that can be used to boost transparent communication of sustainable retail space is the International Council of Shopping Centers (ICSC) Property Efficiency Scorecard. The scorecard is the only available benchmarking system that creates a specific standard for retail developers and owners to use as they work toward responsible operations that result in more efficient practices. Developers and owners are able to benchmark and measure their portfolio against industry peers, which helps communicate the value of these measures to a wider audience. The scorecard also provides reporting to clearly explain

performance data to stakeholders, internal-decision makers, and tenants, providing customizable data that is most relevant to the intended audience. This transparent data can be distributed through a variety of promotional materials and communication efforts, providing new insights into portfolio performance and reinforcing the retail brand as being environmentally responsible.

Align Values With LEED

These strategies allow retail owners to successfully increase margins by putting emphasis on the market-driven trends of place-making and customer experience by leveraging sustainable development in their retail spaces. Each space can be adapted to fit the specific characteristics of the local market, whether the owners decide to establish a weekly farmers market as a community engagement practice, or be highly selective in the tenant mix to create a space that serves the needs and values of the surrounding area. Or at another level of influence, an owner might use an innovative, non-traditional relationship between landlord and tenant by offering a higher level of service that breaks down the split incentive barriers of previous leasing contracts.

Retail owners and developers can accomplish much by understanding and aligning their values to LEED credit strategies, creating shared goals among both tenants and landlord, incorporating the needs of the community, and offering transparent, effective communications. They will be able to differentiate their brand from the competition and earn consumers' loyalty, while simultaneously improving operational efficiencies and shifting toward a model that is incentivized to be financially and environmentally sound. ■

*Julia Raish is a manager with Paladino and Company, a sustainability consulting firm. She leads Paladino's retail and mixed-use sector, and works to optimize the performance of the entire portfolio with a variety of retail clients who are constructing multiple buildings at the same time.*

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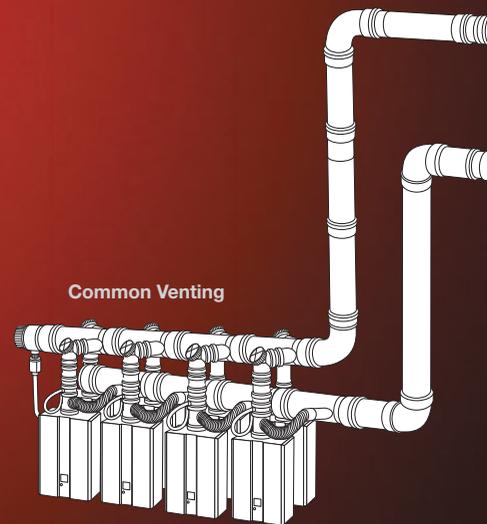
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## Rethinking Healthcare Data Centers

A piecemeal approach to data centers may be cheaper, but the benefits of a new data center may justify the costs

by stephen szycher

**STORING INFORMATION** is one of the most important challenges organizations face. Many turn to data centers to ensure that their stored data is organized, available, and secure. One of the hardest parts of this process is that the data not only consists of the existing records that companies acquire over time, but also the continuous stream of new, incoming information. As methods of retaining and storing information have changed, the actual asset, the data center, has not. Fundamentally, we are now able to translate old information archives into digital data to be stored with the new. But the actual physical location of this data is another evolving issue to contend with.

### CHANGING LANDSCAPE

In the case of healthcare institutions, federal law now

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requires patient data to be stored electronically. While practical and effective, it is a method many institutions were not using, and have had to put into practice. One of the biggest unknowns with healthcare providers, who retain and receive large amounts of patient data, has always been the volume of data. How much space, both

virtual and physical, that data will take up is also unknown.

Throughout the process of acquiring and storing digital data, institutions have gone from requiring hard drives and servers to needing buildings full of them. The biggest problem here is that most organizations don't know that, when they begin storing data electronically, they might have to build 20,000 square feet of clean, fully redundant, server storage space specifically for this purpose. This leaves organizations in one of three positions:



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1. A patchwork of spaces in different buildings across the corporate campus, which houses a multitude of data centers.

2. The data centers are consolidated into an existing building that is not suited for data center programs, primarily the white space and necessary infrastructure backup. The space might not be efficiently laid out or structurally robust, or it might be located in a high-risk location.

3. The most desirable position is when the institution has invested in the construction of a new building that is specifically designed and located to be its new data center.

Healthcare institutions are businesses, and while the construction of a new data center does not generate new revenue for healthcare institutions like a new medical facility does, data centers can cost as much as a new medical facility. That's the reason most hospitals find themselves with a patchwork of data center spaces or a data center in an existing building not really suited to the purpose. However, the data center needs to be viewed as being just as much a part of a healthcare provider's overall revenue stream as the medical facilities themselves. Data should be treated as generated revenue in this regard; if the data stops, so too does a large part of the medical machine.

It's possible the cost of storing an organization's data in an inappropriate facility or spread out in high-risk buildings can, over time, outweigh the cost of building a new data center. It comes down to being proactive, not reactive. The one-time capital expenditure for a new data center, which offers the efficiency of new technology, should provide returns on investment that justifies the costs, not to

mention improvement in risk mitigation and marketability.

#### MAKING THE DECISION

Take away the intangibles, and the whole scenario can be summed up in a financial model used to evaluate a business decision.

A case in point is a large educational institution, with multiple buildings across an urban campus, including a hospital. In this case, the institution had a handful of data centers, with the major hub in the basement of one of its larger facilities. The goal of the institution in this case had been to find space wherever available, potentially based on the least valuable real estate — the basement. Based on current models, this choice would raise a red flag, but at the time, it was the right business decision for the institution.

Later, this basement, which houses the data center's major hub, flooded. The institution rapidly deployed a backup plan using its other storage locations. Because the data centers were not built as backups but more as parallel storage, the transition was not seamless. But, with a stopgap in place, the institution could now think forward. Should it rebuild in place? Or find other available space to just replace the flooded square footage? Should the institution consolidate its data centers in an existing building extensively renovated to serve as a data center — a “new but existing building” — or begin development of an entirely new facility?

The best answer for the institution in this case was to consolidate its data centers into a new but existing building. This meant finding the appropriate real estate and upgrading it architecturally, structurally, and from an MEP (mechanical, electrical and plumbing) perspective. The

location had flaws from the perspective of each discipline, but none fatal.

Architecturally, the new hub was located four stories up to mitigate any flood concerns. However, this presented challenges with deliveries and the transport of equipment to rooms that were not at level with a loading dock. From a security perspective, an elevated data center is more secure, but the existing building had windows and soft spots in the façade that needed to be blocked up and enhanced. Also to be considered were the thermal characteristics of the system.

Structurally, the new location was not built for the capacities to support data center programs, and reinforcing was required. The existing floor system was a cast-in-place, ribbed concrete slab system that framed to steel beams and columns. To increase the capacity, additional steel beams were introduced to shorten the concrete spans and reduce the force demand. The floor-to-floor height was limited, so the depth of the beams had to be minimal. A uniform increase in floor capacity was provided to allow for some flexibility within the spaces. The corridor also had to be reinforced for equipment rigging paths.

The MEP infrastructure was upgraded to meet the electrical and mechanical needs of a data center. However, the central plant for the institution, as well as the backup generators, was located buildings away. This led to costly conduit routing and infrastructure distribution.

All the necessary design parameters were incorporated, and the facility is a functioning data center. The decision to build this data center in the way it was and the location it is in was not a knee-jerk reaction.

**Costs of storing data in an inappropriate facility or in multiple high risk buildings can, over time, outweigh the cost of building a new data center.**

The institution took its time and evaluated its options. Clearly, the capital costs associated with the approach finally taken were less than what it would have cost to construct a new built-to-suit data center. However, building new at the very beginning — when the institution began creating data centers and the decision was made to put the hub data center in the basement — would likely have been the most cost-effective strategy, given the costs of each piecemeal data center constructed, the costs to run them, the loss associated with the flooded basement, the costs of the current solution, and the potential costs associated with new space needed in the future. ■

*Stephen Szycher, PE, LEED AP BD+C, is a principal with Thornton Tomasetti. He leads the mission critical market sector, overseeing project delivery for confidential data and telecommunications centers throughout North America.*

*Email comments to edward.sullivan@tradejournal.com.*



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# critical facilities

## 12 Ways to Save Energy In Data Centers

These proven strategies offer best practices that can be applied in many data centers

by steve ryan and robert huang

**ACCOUNTING FOR** 2 percent of the nation's electricity use, data centers' enormous energy consumption has gained national attention the last few years. Through the U.S. Environmental Protection Agency's Energy Star Buildings program, more than 60 large enterprise data centers, run by the most prominent companies in the world (e.g., AOL, Kaiser Permanente, Target, NetApp, BNY Mellon, JP Morgan, MasterCard, Aflac, and 3M), have been certified as energy-efficient. The program allows data center facility managers to compare their data centers' efficiency to hundreds of other data centers around the country, estimate their carbon footprint, and track their improvement. Certified data centers benefit from EPA recognition and satisfy LEED requirements.

Unlike larger data centers, mid-tier and small data centers (under 20,000 square feet of white space) often do not prioritize energy efficiency, but devote their limited resources to data center uptime and security. Numbering in the millions and located in almost every commer-

cial building, these ubiquitous smaller data centers actually account for most of the data center power draw in the U.S.

To help close the energy efficiency knowledge gap in smaller data centers, Energy Star has identified 12 common data center efficiency opportunities. Often implemented at Energy Star-certified data centers, these opportunities include airflow management, HVAC, and IT measures.

The best practices include:



**1. Hot aisle/cold aisle:** Server racks should be oriented so that the fronts of the servers (where the cool air is drawn into the server) always face each other. This orientation creates alternating "hot aisle/cold aisle" rows of server racks, thus separating the cool air from the hot air and allowing air conditioning units to work more efficiently.



**2. Containment:** Various physical barriers should be installed to further eliminate hot and cold air mixing. Even with a hot aisle/cold aisle configuration, hot and cold air can still

mix. Mixing can be minimized by using flexible strip curtains, similar to plastic supermarket refrigeration covers. Two Energy Star-certified data centers — BNY Mellon and RagingWire — employed hot aisle containment during their efficiency upgrades that led to higher chilled water temperatures and energy savings.



**3. Variable speed fan drives (VSDs):** Computer room air conditioners (CRACs) with VSDs can vary their fan speed with the data center server load. Because fan power varies roughly with the cube of fan speed, one half the fan speed will lead to one-eighth the fan power draw. Four Energy Star-certified data centers — BNY Mellon, Kaiser Permanente, RagingWire, and Target — employed VSDs to save hundreds of thousands of dollars annually, with paybacks ranging from 0.54 to 1.7 years.



**4. Other airflow management devices** are also worth considering. Blanking panels are thin plastic panels installed



Darrin Cary (left)  
Chief of Operations  
Wilbert Precast Concrete

Carlos Limón (right)  
Commercial Industrial Engineer  
Avista

# Concrete evidence of energy savings.

**S**uccessfully running a precast concrete business is hard enough without having to deal with energy-related issues. It's why Wilbert Precast has cemented a long-term working relationship with Avista for expert energy assistance.

Wilbert Precast began in Spokane in 1906, primarily manufacturing concrete burial vaults. During the more than a century that has since followed, its product lines have greatly expanded and so did the company, adding two more manufacturing facilities in Lewiston, Idaho, and Yakima, Washington. Now a top regional supplier, Wilbert Precast pours everything from septic tanks and retaining walls to buildings and

bridges. It has even poured nuclear storage containers for the Hanford Site in the Tri-Cities. If it's made of concrete, it's probably on the company's list of custom products.

"If you need a concrete pterodactyl, give us a call," jokes Darrin Cary, Chief of Operations at Wilbert. "Our state-of-the-art facilities let us do just about anything."

According to Cary, Wilbert Precast products are known for consistency and reliability, much of which is owed to close monitoring of desired moisture during the curing process once the concrete is poured. That's when strength and durability are developed. Temperature is key. So when ceiling insulation at the Spokane plant began to fall on workers' heads, it caused quite a headache.

"The vapor barrier failed," explained Cary. "Industries like ours put a lot of moisture in the air. If we pour 60 yards of concrete, hydration as the concretes

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in unused rack space so that hot air does not flow directly from the hot aisle to the cold aisle. Staff at Kaiser Permanente used boat covers, underfloor baffles, and blanking panels to eliminate nearly 70,000 cubic feet per minute of bypass air.

Structured cabling systems can eliminate disorderly cables that might constrain exhaust airflow from rack-mounted equipment.

Floor grommets improve cooling efficiency by sealing open areas where cables enter and exit plenums (such as a raised floor). QTS' enormous 990,000-square-foot Atlanta Metro data center installed vented tiles and grommets and sealed gaps around its raised floor to save over \$30,000 per month.



### 5. Server inlet temperatures and humidity adjustment:

ASHRAE has expanded the recommended server inlet temperature to range from 65 to 80 degrees F and expanded recommended humidity ranges to include 42 to 59 degrees F dew point. Many data centers continue to set their thermostats at temperatures that are too low or their allowable humidity ranges too tight. BNY Mellon raised the temperature of its supply air from 72 to 78 degrees F, which allowed it to increase its chilled water temperature from 44 to 47 degrees F, thus lowering cooling costs.



**6. Air-side economizer:** Because data centers must be cooled 24 hours a day, 365 days per year,

cooler evening or winter air can be used to cool a data center even in warmer climates through an air-side economizer. NetApp's global dynamic laboratory, the first data center to earn the Energy Star certification, owes much of its savings to air-side economizers. Using outside air allows that data center to operate without a chilled water plant for more than 75 percent of the year.



**7. Water-side economizer:** For data centers with chilled water plants, a water-side economizer uses the evaporative cooling capacity of a cooling tower (instead of the chiller) to cool the data center. This measure is best suited for a large expansion or new construction, as water-side economizer retrofits may have long paybacks.



**8. Comatose server retirement:** Surveys indicate that 8 to 10 percent of servers are actually not doing anything. Sun Microsystems cut 8 to 10 percent of IT equipment load and 11 to 14 percent of total load by retiring or decommissioning unused servers.



**9. Server consolidation:** Data center managers can reduce the total number of servers by putting more applications on fewer machines. For example, two or three lightly used file servers can be consolidated onto one machine.



**10. Server virtualization:** A type of server consolidation, server virtualization allows multiple virtual servers to work simultaneously on one physical host server. Server virtualization has revolutionized data center management — improving scalability, reducing downtime, and enabling faster deployments — and is commonplace in large data centers but much less common in smaller data centers. Southwestern Illinois College performed a detailed three-year total cost of ownership analysis of placing 35 virtual servers on four physical host servers; it showed \$280,000 in total savings in direct and indirect costs.



**11. Data storage best practices:** Automated storage provisioning (right-sizing, re-allocating unused storage, and improving use of existing storage), data compression, deduplication (removing duplicate copies), and tiered storage lead to less storage use and hence, less energy consumption.



**12. More efficient IT equipment:** Energy Star-certified servers, storage equipment, and uninterruptible power supplies (UPS) consume power more efficiently. Tests conducted jointly by EPA, Hewlett-Packard, and Microsoft demonstrated that a new Energy Star server at low loads consumed 54 percent

**Four Energy Star-certified data centers employed VSDs to save hundreds of thousands of dollars annually, with paybacks ranging from 0.54 to 1.7 years.**

less power than older, non-certified server models.

These 12 energy efficiency measures are not cutting-edge technologies that only giant tech companies with high margins can afford. (For example, Google cools one of its data centers with seawater, and Facebook uses direct, not alternating, current to power its custom-built servers.) Rather, these solutions provide a facility manager at a commercial building a viable starting point to begin examining data center efficiency and implementing cost-effective strategies to cut energy savings and associated costs. ■

*Steve Ryan is program manager for Energy Star labeled office equipment, roofing, water heaters, pool pumps, and HVAC products. He also manages a national initiative called The Low Carbon IT Campaign that includes data center efficiency strategies.*

*Robert Huang, a senior associate at Cadmus, manages the Low Carbon IT campaign.*

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## ADVERTISEMENT

cures puts about 300 gallons of water into the air. When all that condensation rose to the ceiling, it was wicked up by the insulation. It wasn't long before everything started falling out piece by piece."

The problem stemmed from the way the plant's earlier insulation was installed. Wilbert elected to apply sag-and-bag insulation, typically used in metal



Improved lighting throughout the facility has boosted worker safety and morale.

buildings; however, local building codes required an insulation layer that was too thick to be screwed in, and so it had to be strapped to the ceiling. Seams were taped along the roof's main frames and purlins to keep the insulation dry, but the strap-and-tape system wasn't designed to endure the high moisture of concrete production.

"When soggy bats of insulation started falling, it became a major safety concern," affirmed Cary, "so management decided to just remove the rest of it."

Their decision, however, led to other problems that consumed valuable production time. In summer the lack of insulation created higher indoor temperatures that would make the poured concrete release moisture too rapidly. Workers had to employ extra measures to slow down the curing process.

In winter the building would get colder and so curing blankets had to be placed over the concrete to maintain proper curing temperatures. Worse, production condensation would accumulate on the bottom of the cold metal ceiling and start dripping, forcing workers to cover and protect the newly painted finishes on precast buildings.

The company had to continue enduring production hassles because fixing the problem was prohibitively costly. They found the cost of installing new insulation was about \$150,000, as it would require adding another layer of sheet metal to the roof to avoid the same problem later. Wilbert seemed caught between a rock and a hard place, at least until Avista stepped in.

As part of a program to better manage the region's growing energy needs, Avista provides rebates and incentives to help its large customers make energy-efficiency upgrades. Upon learning of the problem, Avista sent its engineers to inspect the plant and research options. They came back to Wilbert with a recommendation to use a new advanced closed-cell insulation technology better at blocking moisture. Avista also offered \$25,790 in incentives to complete the project. For Wilbert, it was an easy decision.



Ending the condensation problem saved time formerly spent protecting product finishes.

"All the problems ended when we sprayed in the new rigid insulation," said Cary. "The raining stopped, and now it's nice and comfortable for everyone out there. We also saved quite a bit on

natural gas over the last year [7,369 therms]."

Along with replacing the insulation, Wilbert chose to install new lighting at the plant as well. Taking advantage of an additional \$21,983 in Avista rebates, the company replaced 36 halides with double that number of T-5 fluorescents throughout the manufacturing floor and mechanic shop. It also swapped T-12s with T-8s in the company office, and replaced exterior lights with LEDs. Despite adding a greater number of lights, the plant is now saving 141,249 kWh of electricity annually.

"It's way brighter than the halides, which always yellowed with age," said Cary. "Now we have more usable light, even around our large crane hooks where the lights are 36 feet off the floor. It's also better for safety and employee morale."

Cary expressed that he is pretty happy with all of the changes. Avista is happy, too. Because helping its customers save energy is always a solid undertaking.

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## SHOWCASE: LIGHTING

# From Cost to Quality, LEDs Continue to Make Gains

by melanie taylor

The lighting industry has gone through many changes throughout its history, including the advent of halogen, compact fluorescent, and corrected-color high-intensity discharge (HID) light sources. While those legacy lighting sources are still in use, none has had the transformational impact that LED light sources are having on the industry and on facility managers today.

Semiconductor devices that produce visible light when an electrical current is passed through them, LEDs are fundamentally changing the way light is produced. In turn, they are changing the way lighting designers and electrical engineers, as well as facility managers, think of lamp life, serviceability, and replacement of light fixtures.

LEDs can substantially reduce lighting energy use while maintaining quality lighting, enabling lighting designers to realistically consider providing — and facility managers to

gain the benefits of — net-zero energy commercial buildings.

The evaluation and implementation of LED light sources in a rush-to-market environment are tricky issues. Following is a guide to evaluating LED light sources across many different parameters — from color quality to life-cycle cost — with a focus on high-quality design that provides good value to the facility manager.

**50,000-hour lamp life is a game-changer.** Without the filaments that literally burn out in incandescent lamps or the phosphor that degrades over time in fluorescent, mercury vapor, and metal halide lamps, LED light sources have a lamp life of approximately 50,000 hours — up to 10 times that of a halogen incandescent lamp and up to double that of a linear fluorescent lamp. As a result, the frequency of lamp replacement and associated maintenance time and costs are significantly reduced.

## Efficacy outshines legacy systems.

In terms of their efficacy or light output measured as lumens per watt, LEDs (100-120 lumens per watt) outshine incandescents (40 lumens per watt) and fluorescents (60 to 80 lumens per watt). As a result, LEDs provide substantial energy savings on lighting, which typically consumes 25 percent of the electricity in a commercial office building. The lighting industry anticipates that LED efficacy will continue to improve, with a huge impact on energy use in commercial, industrial, institutional, and residential buildings.

**White light provides accurate color rendering.** The color appearance of objects under artificial lighting is an important characteristic of light sources. The Color Rendering Index (CRI) is an internationally accepted assessment that compares the appearance of a colored object under an artificial light source to its appearance under a reference light source. A CRI of 100 is consid-



» **a. USHIO** Uphoria 2 LED PAR lamps are available in PAR20, PAR30, PAR30LN, and PAR38 models, in 2700K and 3000K. The wet-location rated Uphoria 2 LED PAR lamps use tightly-binned, high (90+) color rendering LEDs, and multi-faceted reflectors for beam control and reduced glare. The thermal design allows air to flow around the inside and outside of the lamp and over the heat sink.

» **b. EATON** The Metalux Encounter LED Series is available with an optional integrated sensor control system to meet energy codes for occupancy sensing and daylight harvesting. The luminaires feature contemporary styling with proprietary WaveStream LED technology, delivering soft, natural light uniformity, according to the company. Performance efficacy up to 112 lumens per watt, in four CCT options at 85 CRI.

» **c. EYE LIGHTING** Aphos Mini 39W LED luminaire delivers 3,000 lumens in Type II, IIA, III, and V configurations. It has IP65 rated optics, and an IP67 rated driver for protection against water, insects and dirt. Available in 4000K or 5000K color temperatures, with 70 CRI, in five different powder coat color finishes. Aphos Minis are ETL listed and many models are DLC qualified.

» **d. SUPER BRIGHT LEDS** Even-Glow LED panel lights consume as little as 6 watts of power in the 6-inch-square task light model. Available in a variety of shapes, sizes, wattages, and color temperatures. Rectangular panels offer 120- or 160-degree beam angles and a diffused PMMA optical lens.

### More Info

For more information on these products, visit [www.facilitiesnet.com/16259BOM](http://www.facilitiesnet.com/16259BOM)



»e. **CREE** LR22 Troffer incorporates a recessed, fully luminous, highly diffuse flat panel design that seamlessly blends into any ceiling. Offered in both neutral and cool color temperatures of 3500K and 4000K with a 90 CRI, in a 2-by-2-foot configuration with efficacy of 100 lumens per watt. Features on-board 0-10V dimming capabilities.

»f. **MAXLITE** LED Lensed Retrofit Kit (LRK) is edge lit and installs into existing troffers without the need to enter the ceiling spaces. With a profile measuring less than three inches in depth, the LRK is designed to fit standard 2-by-2 and 2-by-4-foot troffers. Offered in 25- and 35-watt outputs, in 3500K, 4100K and 5000K.

»g. **LEDTRONICS** High-Power LED T5 Appliance Bulbs have a compact design for tight spaces and consume 3.4 watts, replacing incandescent and halogen bulbs up to 30 watts. The LED20T5 tube-style bulbs come in 3000K and 6000K, with a 360-degree no-shadow beam pattern, and an 80+ CRI. Available in standard bases.

»h. **TERRALUX** The SL Fixture linear stairwell and garage fixture line is available in one, two, and four foot lengths. All have options for an integrated occupancy sensor and battery backup. Outputs range from 1,500 lumens to 4,000 lumens, and efficacy is greater than 100 lumens/watt.

»i. **LUNERA LIGHTING** The Helen Lamp GX23 is a plug-and-play replacement for 13W CFL and supports both ballast-driven and line-voltage-driven configurations. The product, which operates at 5 watts, was designed using thermally conductive plastic instead of aluminum for the heat sink to reduce weight and cost. Delivers up to 535 lumens, in color temperatures from 2700K to 4000K with a CRI of 82.



»j. **HESS AMERICA** The Riva is an LED pole-mounted luminaire available in 3000K and 4000K. The matte acrylic cylindrical lens diffuses light uniformly. The inverted taper steel pole is available in heights of 8 or 10 feet, and is corrosion resistant. Universal high power factor electronic driver accepts 120V through 277V input at 50/60Hz while providing 700 mA drive current to the LEDs. Power consumption is 56 watts. HID and CFL models also available.

»k. **JESCO** The INFINA Hardwired LED system operates directly from standard 120 line voltage, with a single electric line powering a continuous run of 150 feet or more. LEDs are embedded in a flexible, clear thermoplastic. They produce output of 550 lumens from 4.95-watts per foot, and have an efficacy of 112 lumens per watt, with a CRI of 80+. Available in 2700K, 3000K and 4000K.

**LITHONIA LIGHTING** The Breez Series LED luminaire (BZL) has a gull-wing reflector design and highly-reflective optical coating to create a fully-indirect optical system, with no lens, diffuser, or refractor. The BZL comes standard with a 0-10V digital eldoLED driver that provides flicker-free dimming to one percent. Optional nLight technology allows it to communicate with Acuity Brands control devices.

**CAST LIGHTING** LED Impressionist Wall Wash Light (CIWL6) provides light level control at the fixture, through a dimming circuit accessed through a plug at the base of the light. Dimmable in five percent increments. The fully sealed light can be used in any orientation (upward or downward facing). Multiple mounting kits available.

**TCP** GU24 base LED lamps are available in an A-lamp shape. TCP LED bulbs with a GU24 base have low heat generation and excellent color consistency, according to the company. They are fully dimmable, with no warm-up time.



## LED Lighting Delivers Practicality and Punch For Online Retailer

LED lighting provided the ideal solution for a global online retailer seeking highly-designed, high-performance spaces for its multi-million-square-foot headquarters in Seattle with standards that can be internationally replicated across all of its office spaces.

The lighting design team ran many modeling studies to determine the optimal lighting layout with spacing that was appropriate both directly above workstations and in private offices. The design provided for subsequent build-outs of additional private offices in open office space that could be achieved without the need to change the lighting design. Pendant-mount linear direct/indirect LED fixtures were used to provide even light levels on the ceiling and at workstations, and to provide a cohesive appearance for the space.

The reduced wattage of the LED fixtures provides an energy-efficient lighting system with an average lighting power density of 0.8 Watts per square foot. Each fixture is addressable, enabling the building operations staff to change the control zones of fixtures as necessary by reprogramming the controls rather than rewiring. The LED fixtures' rated lamp life of 50,000 hours means that they should not need to be replaced for up to 10 years, reducing maintenance costs.

To give the space the high-tech punch that is appropriate for this innovative online retailer, smaller LED modules and fixtures were employed to achieve creative visual effects, such as thin lines and patterns.

— Melanie Taylor

ered to be the best CRI rating.

Today's high-quality LEDs have the white light characteristic that meets user norms and expectations for color rendering in this regard. A CRI of 80 or above is appropriate for most applications, except for art, retail, and healthcare applications, where a CRI of up to 95 may be required. The higher the CRI, however, the less efficient the lamp, so the costs and benefits must be weighed to design a cost-effective lighting solution.

For example, LED lamps with a CRI of 80 might be used throughout a commercial installation, except where a higher CRI is required, such as lobby retail spaces and tenant reception areas where art is displayed.

**Color temperature meets norms from warm to cool.** Today's LED technology also meets users' color temperature norms based on their experience with legacy light sources. As measured in degrees Kelvin, LED light sources range from "warm" (2500-3000K) to "cool," "blue," or "natural daylight"

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»a. **PIXI LIGHTING** Troffer-replacement luminaire is just over a half-inch thick and uses edge-lit LED technology. The built-in driver can be surface-mounted, suspended like a pendant, put into T-grids, or flushed into drywall. Available in beveled and straight-edged bezels, in 2700K, 3000K, or 4000K CCT in a variety of sizes, providing a minimum 85 lumens per watt.

»b. **COLUMBIA LIGHTING** LCAT LED Contemporary Architectural Troffer's high efficiency acrylic center lens features linear prisms for high performance without pixelation. Available in 2-by-4, 2-by-2, 1-by-4 models, in four color temperatures. Rated as having 80 percent lumen maintenance at 60,000 hours. Lumen packages of 2,200 to 9,250 at up to 132 lumens per watt. Integral battery pack optional on most models.

»c. **INTERMATIC** Intermatic electronic photo controls for LED fixtures are available in dusk-to-dawn ON/OFF, twist lock, and fix mount options. The company says it offers products with electronic ballast inrush current ratings and extended life designs that match the current lighting technology being deployed. Testing per NEMA 410 to ensure compatibility with today's array of electronic ballasts and LED drivers.

»d. **HUBBELL LIGHTING** HBL LED Highbay for large indoor spaces has a 5000K color temperature and a CRI of 68. Measuring 18 inches in diameter by 6 inches in height, the fixture is available in aisle, narrow, and wide distributions. Rated L70 at 100,000 hours. Lumen packages of 11,000 to 17,000 at up to 101 lumens per watt (45 degrees C).

»e. **EARTHTRONICS** The 12-watt LED Plug In Lamp for EarthTronics provides 33 percent more energy savings and longer performance life than 18-watt G24q-2 base compact fluorescent lamps, according to the company. The LED Plug In produces 1,100 lumens and works directly on existing instant start electronic ballasts. Available in 3000K, 4000K, and 5000K, with a CRI greater than 80.

**DURABRITE LIGHTING SOLUTIONS** SLM Series LED fixtures are aimable, low-watt, outdoor-only luminaires. Available in 5400K with an output up to 50,000 lumens, with an efficiency of 125 lumens per watt. Each fixture has protective heat vents, is UL wet-listed and DesignLights Consortium certified. Ambient light sensor switch optional.



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a

»a. **RAB LIGHTING** MASI is a semi-recessed LED fuel-station-canopy fixture with DLC premium qualification. Available in two sizes (16-in. and 20-in.), five power packages (52, 80, 100, 160 and 200W) with equivalencies up to 400-watt metal halide, and in cool, neutral or warm color temperatures. MASI delivers an efficacy rating up to 144 lumens per watt.



b

»b. **LUTRON** The Lutron Stairwell LED Fixture works with a remote mountable wireless sensor that can be best positioned to ensure timely illumination. This also allows individual fixtures to be grouped so that, for example, the floor level above and below are lit at the same time. The fixtures deliver 100 lumens per watt. Available in 4-foot 40W and 20W options, as well as 2-foot 30W and 15W options.

c



»c. **OSRAM SYLVANIA** SubstiTUBE IPS T8 LED lamps from OSRAM SYLVANIA operate on existing instant start and select programmed rapid start (parallel-wiring) electronic T8 ballasts providing up to 35 percent energy savings over T8 fluorescents. They contain no mercury, provide instant and uniform light distribution, and come in 3000K, 3500K, 4100K, and 5000K. Available in 2, 3 and 4 feet.

(5000K and above). For example, a color temperature of 2300K provides the very warm light that is appropriate for residential, retail, or hospitality projects, while 3500K provides the very cool white light that is appropriate for commercial office spaces.

Unlike fluorescent light sources, which never adequately matched the warm color of incandescents, LEDs are also an energy-efficient alternative to incandescents where warm light is desirable.

**Light distribution achieves diffuse objective.** As a point-source light, LEDs were used in the past to create directional downlighting, accent lighting, and spot lighting. Today, there are a wide range of LED light fixtures that use reflectors and lenses to diffuse light, enabling LEDs to be used for ambient lighting that is appropriate in many commercial applications, including offices. The task-ambient lighting designs for these environments may combine task lighting at the desks with pendant-indirect or recessed 2-by-4-foot fixtures providing indirect ambient light.

**Appearance goes sophisticated, high-tech.** Until recently, the majority of LED fixtures were designed to replicate legacy fixtures, such as 2-by-4-foot recessed light fixtures that fit into ceiling tiles. It has been a challenge to use highly designed, decorative light fixtures in commercial applications, including hospitality and high-tech spaces, because they required incandescent light sources. The new, smaller LED modules and fixtures are an energy-efficient alternative.

For example, LED technology was used for creative, high-tech lighting designs for the tenant interiors of a Seattle-based global online retailer. (See "LED Lighting Delivers Practicality and Punch for Online Retailer" on page 52.)

**Serviceability, replacement require new management approach.** Unlike legacy light sources, LED light sources do not flicker or suddenly "burn out." As an LED light source approaches the end of its life-cycle, it will gradually provide less light. To maintain optimal lighting, facility managers should implement a long-term management process, including a record of LED module/fixture serial numbers and installation dates and a replacement schedule based on projected lamp life.

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Similarly, facility managers should change their replacement process. Unlike halogen lamps or compact fluorescent light (CFL) bulbs, commercial LED modules are typically hard-wired into the fixture. The higher quality LED fixtures use a quick-connect component to connect the module to the fixture for ease of replacement, while others are more difficult to replace. Facility managers, lighting designers, and other specifiers should keep this issue in mind when selecting LED products.

In either case, the facility manager should contact the LED manufacturer and provide the serial number of the old LED module or fixture to obtain an appropriate replacement with the same lumen output as the module that was originally specified. The old LED module/fixture is typically returned to the manufacturer for recycling of the components.

That said, the industry is manufacturing relatively inexpensive utilitarian fixtures, such as garage light fixtures, that are meant to be thrown away and replaced at the end of their useful lives. Some larger facilities are beginning to use these to lower maintenance costs.

In some cases, a facility manager may be ready to renovate the entire space or upgrade its lighting system to the next generation of LED lighting at 50,000 hours.

**Initial and life-cycle costs are attractive.** Until recently, the initial cost of an LED lighting system for a commercial application was high in comparison with the legacy lighting systems, such as fluorescent office lighting, but they are now comparable. In addition, the newer LEDs can be dimmed without the need to purchase a special dimming ballast, which typically added \$80 to \$100 to the cost of each fluorescent fixture.

Over their life-cycle, LED systems offer significant operations and maintenance savings. For example, over the course of 34 million hours of operation for one manufacturer's family of outdoor streetlight fixtures, 29 fixtures failed out of 5,400 fixtures during that time. With a robust lighting system like this, a municipality no longer needs to have a crew regularly replacing lamps in streetlight fixtures. This substantially reduces maintenance costs.

To ensure that an LED lighting system will deliver the consistent performance of which it is capable in all parameters from lamp life to life-cycle cost, facility managers should rely on lighting designers with proven experience and expertise in comparable types of projects and on major manufacturers with proven track records for quality and reliability. Energy Star ([www.energystar.gov](http://www.energystar.gov)) and the Design-Lights Consortium ([www.designlights.org](http://www.designlights.org)) are sources of information on products that meet performance standards. For large-scale projects, mock-ups offer facility managers a chance to experience a space with the actual lighting.

LED lighting technology is revolutionizing the lighting industry and lighting systems for commercial environments. The evolution of a light source that is both versatile and energy efficient provides unprecedented aesthetic and economic opportunities. ■

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*Email comments to [edward.sullivan@tradepress.com](mailto:edward.sullivan@tradepress.com).*



»d. **GE LIGHTING** Lumina-tion TS Series LED Accent Lights' lens gives the look of a traditional halogen lamp without the "dots" of light common to many LED lamps. Available in flood (25 and 35 degree beams) and spot versions, in 2700K, 3000K, or 3500K color temperatures, with an 80 or 90 CRI. Global track adapters standard.



»e. **LUMENOPTIX** Specification Downlight Retrofit (SDR) converts any existing aimable recessed round downlight to LED. The SDR uses chip on board technology, and provides a typical CRI of 82. Features numerous dimming and reflector options. Made from 16GA galvanized steel with flange. Three tool-less adjustable clips assure proper seating to any ceiling thickness.

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