MANTIS INNOVATION

Reaching new heights in higher education

Optimizing campus facilities and energy management for next-gen success

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About Mantis

At Mantis Innovation, unlocking efficiencies is our driving force. We specialize in energy efficiency, energy procurement, and facilities management solutions. Our tailored strategies help you optimize operations, minimize costs, streamline processes, and elevate performance. Our expertise allows us to thoroughly assess your facility operations, identify areas for improvement, and craft long-term strategies for sustainable success. By enhancing energy management and implementing effective practices, we help you navigate budgetary risks and improve operational planning. Together, we ensure your organization operates at its peak potential while setting new standards of excellence in your industry.

mantisinnovation.com

CHAPTER 1

From lecture halls to living spaces: Five forces reshaping every corner of campus

Once defined by ivy-covered halls and tenured traditions, higher education is now actively reimagining what a campus can be. In 2025, institutions face rising expectations and fresh momentum — with climate goals accelerating, hybrid learning here to stay, and long-delayed reinvestment beginning to take hold.

Leaders are stepping up to deliver more — more flexibility, more sustainability, more value — while working within tighter financial and operational constraints.

All this puts facilities and energy strategy at the heart of institutional decision-making. From the layout of learning environments to the performance of legacy infrastructure, the campus plays a starring role in advancing student outcomes, controlling long-term costs, and wielding assets to drive mission and resilience.

These five trends are writing the syllabus for what's next.

Spending is up, but maintenance backlogs are still growing.

01

Institutions are finally directing more dollars toward their aging buildings. In fact, campus spending on existing facilities rose 26% in 2023 compared to the year prior — and more than one-third over 2021 levels.

But that boost is quickly being absorbed by rising costs. Inflation in construction services and materials continues to erode the purchasing power of campus budgets, meaning even increased investment isn't enough to close the growing maintenance gap. For many schools, the result is a frustrating bind: spending more but still struggling to keep up.

Facilities teams are shrinking — and feeling the strain.

02

While faculty and executive professional (administration roles have grown steadily, the share of facilities and maintenance staff has been on the decline. Since 2017, the full-time non-exempt staff workforce has shrunk by 9 percent, with part-time roles down 8 percent — and steeper declines began in 2020.

Today, turnover is still high, especially among operations teams, creating added strain as building systems age and expectations for comfort and service keep climbing. Many campuses are working hard to meet evolving needs with leaner teams and tighter margins — but the pressure is on.

Aging infrastructure is driving massive reinvestment needs.

03

The average campus building is around 50 years old, and deferred maintenance has snowballed into a massive backlog. According to APPA research, US higher ed institutions spend roughly $37 billion annually on facilities operations and maintenance, plus $28 billion annually on new construction and renovations.

But these investments fall short of the estimated $112 billion still needed for urgent repairs and upgrades. Without decisive reinvestment, campuses risk escalating failures that disrupt learning and strain budgets.

Ambitious climate goals still need follow-through.

04

More than 800 US colleges and universities have set climate neutrality targets, signaling clear momentum toward a net-zero future. Yet only ~15 have reached this goal so far.

Turning ambitious targets into measurable outcomes calls for deeper investment in facilities performance, emissions tracking, and long-term planning. As expectations for sustainable campuses rise — from students, staff, alumni, and local communities — visible progress is becoming just as important as the targets themselves.

Student (and helicopter parent) expectations are reshaping the campus experience.

05

After years of enrollment declines, student numbers are tentatively rebounding. But today's students — 87% of whom receive financial aid — are more discerning about value and experience than ever.

At the same time, families are increasingly involved, raising the stakes for campuses to deliver experiences that balance academics with comfort, convenience, and community. Meanwhile, as virtual learning options continue to gain traction, traditional campuses have a unique opportunity to shape the dynamic, irreplaceable environments that screens simply can't replicate.

How higher ed is meeting the moment: Facilities as a strategic driver

Campus facilities have become a bellwether for how institutions are adapting to today's pressures, from mounting costs and deferred maintenance to evolving student expectations and climate commitments. Facilities teams now play a central role in helping campuses compete.

Recognizing this, forward-looking institutions are finding creative ways to rise to the occasion — modernizing campus facilities while managing cost and complexity.

- **Flexible student housing, workforce housing, and mixed-use** developments that combine labs, retail, and residential uses are transforming campuses into community anchors. These spaces help drive enrollment, boost retention, and support revenue goals.
- **Tech-enabled, "anywhere learning" environments** have opened the door for campuses to repurpose physical space for maker labs, group work, and student life — reflecting both enrollment realities and belonging goals.
- **Systemness and portfolio-level planning** are enabling institutions to stretch capital dollars further by sharing infrastructure and aligning investments across campuses.
- **Sustainability is emerging as a strategic asset**. Since 2011, energy efficiency improvements have saved US campuses more than $370 million. More than 400 institutions now have formal emissions goals — and for prospective students, sustainability matters: 61% say it influences where they apply.

Together, these shifts are putting facilities and energy front and center in the race to higher ed's next era: where smart investments can advance academic mission, climate goals, and financial resilience all at once.

Achieving facility and operational excellence for all institution types

PRIVATE UNIVERSITIES

Aligning high-performance design with brand-driven aesthetics, and integrating long-term asset planning and donor-supported capital upgrades.

PUBLIC UNIVERSITIES

Stretching capital and operational budgets with scalable systems, lifecycle-focused planning, and energy strategies that meet compliance and cost goals.

LIBERAL ARTS COLLEGES

Designing flexible, multipurpose spaces that support collaboration and belonging — while making the most of limited square footage and staff capacity.

COMMUNITY COLLEGES

Prioritizing modular design, durable materials, and adaptable systems that deliver cost-effective performance and expand access across diverse student populations.

SPECIALTY COLLEGES

Tailoring infrastructure to program-specific needs — from enhanced ventilation and precision lighting for technical programs to envelope design that inspires those in creative disciplines.

MANTIS PARTNER SPOTLIGHT

University of Hartford slashes energy costs while upgrading campus experience

CHALLENGE

The University of Hartford needed a campus-wide efficiency upgrade to cut energy and maintenance costs, reduce emissions, and modernize building systems — all without disrupting learning environments or daily campus operations.

OPPORTUNITY

Mantis delivered full-campus LED upgrades, occupancy and daylight sensors, and rooftop HVAC optimization, helping the university reduce energy use and secure utility incentives to offset nearly half the project's total cost.

OUTCOME

The upgrades cut lighting and maintenance costs by nearly $1 million annually, improved comfort in classrooms and common areas, and delivered a full return on investment in just three years.

$955,000	$2,700,000	5,400,000	3 Years
TOTAL ANNUAL SAVINGS	TOTAL INCENTIVE	TOTAL ANNUAL kWh SAVED	PROJECT PAYBACK

CHAPTER 2

Facilities strategy with a higher purpose

With budgets under pressure and expectations rising, institutions are asking more from facilities, energy, and operations teams. From balancing costs to elevating the student experience to advancing sustainability goals, these teams are being tasked with solving on multiple fronts at once.

These are the four big goals facilities leaders are working toward, often simultaneously and with limited room for error.

Making the most of precious budgets

01

College and university funding is a complex mix of tuition, endowments, government support, alumni giving, and grants — all of which face growing constraints. At the same time, institutions are expected to deliver a campus experience that reflects the price tag.

Facilities operations and maintenance is one of the largest expenses on most higher ed budgets — second only to salaries. Managing costs across aging infrastructure and diverse building portfolios adds to the workload. But with limited budgets and lean staffing, many institutions face gaps in coverage, especially when it comes to large-scale projects.

To get the most of every dollar, institutions are turning to smarter tools. Technologies like digital twins, integrated work order systems, and predictive analytics are helping teams target maintenance efforts, stretch asset life, and plan capital improvements with greater confidence and efficiency.

Optimizing energy costs

02

Energy is one of the largest controllable costs on campus — and the potential for savings is significant. Across 5 billion square feet of space, US colleges and universities spend more than $6 billion a year on energy.

But energy use varies widely depending on the type of space. A research lab typically requires intensive ventilation and equipment loads, while dorms, classrooms, and humanities buildings often have more predictable and moderate energy demands. For example, one study found that research buildings averaged 216 kWh/m^2/year, while academic offices used just 137 kWh/m^2/year.

With this level of variation, real-time insight is a must. So campuses are investing in submeters, building automation systems, and energy management platforms to monitor usage at a granular level. These tools help teams spot waste, improve performance, and prioritize upgrades where they'll deliver the greatest return. They also lay the groundwork for tracking emissions and supporting longer-term decarbonization goals.

Elevating the campus experience

03

From a vibrant dining hall to a sophisticated science building, facilities shape how students, faculty, and families experience campus life. Today's students increasingly see themselves as "customers," and 71% of administrators say that mindset influences how students engage with their institutions. Comfort, safety, and design all contribute to the sense of value — and the campus environment plays a big part in delivering it.

Tech-forward campuses hold strong appeal for today's students. According to an EDUCAUSE survey, students at institutions perceived as tech leaders are more likely to feel confident in the value of their education and prepared for their careers. That perception extends to facilities, where leaders are beginning to explore AI for operational support, another part of the higher ed culture to be leading edge.

Importantly, these efforts must be carried out in ways that support campus life, not disrupt it. Phased upgrades, thoughtful scheduling, and transparent communication are key to ensuring improvement doesn't come at the cost of experience.

Meeting sustainability goals

04

Sustainability has become a core part of institutional identity, influencing everything from capital projects to student recruitment. Over the past decade, there's been dramatic growth in the number of colleges committing to practices like LEED-certified construction, local food sourcing, fossil-fuel divestment, and clean energy procurement.

And they're tracking progress, too, with participation in AASHE's STARS Index — a self-reporting framework for colleges and universities to measure sustainability performance — now spanning nearly every US state and Washington, DC.

But beyond public commitments, campus communities increasingly expect to see climate action reflected in the built environment. Visible efforts — like solar canopies over residence hall parking lots, rooftop panels on student unions, real-time energy dashboards in dining halls, or low-carbon renovations of classroom buildings — help demonstrate progress and build trust.

These efforts matter not only to students, faculty, and alumni, but also to rankings organizations and prospective funders. For many institutions, they offer a green edge: showing that the campus is backing up its goals with tangible, credible action.

Different spaces bring different considerations

SPACE TYPE	KEY CONSIDERATIONS
Residential dorms	Prioritize safety, comfort, and rapid response to maintenance issues — from HVAC concerns to plumbing fixes that can impact student life around the clock.
Dining halls	Focus on hygiene, energy efficiency, and flexible seating arrangements that support both daily service and campus events.
Administrative offices and libraries	Design for quiet, adaptable spaces with strong connectivity, comfortable lighting, and easily adjustable layouts as staffing and use needs evolve.
Teaching spaces	Support flexible configurations, consistent thermal comfort, and reliable in-room technology for both in-person and hybrid instruction.
R&D and engineering labs	Require precise temperature and ventilation controls, strong safety protocols, and infrastructure that supports high energy loads and sensitive equipment.
Athletic and recreation facilities	Emphasize durability, ventilation, and safety — from resilient flooring in gyms to secure access control and locker room systems.

MANTIS PARTNER SPOTLIGHT

Temple University strengthens long-term roof performance across campus

CHALLENGE

Temple needed a proactive, cost-effective approach to roofing and envelope management — supporting building performance across decades without major disruptions to its growing urban campus.

OPPORTUNITY

Since 2018, Mantis has supported more than two dozen Temple facilities through roof assessments, design services, and construction oversight. Where possible, restoration is prioritized over replacement, with green roof options integrated to boost efficiency.

OUTCOME

The ongoing roof asset management program is helping Temple reduce capital spend, lower operating costs, and extend roof life. In one key project, Barrack Hall, Mantis delivered major upgrades on time and under budget.

29	387,385 sq ft	$318,000	10,525 sq ft
FACILITIES COVERED UNDER PROGRAM	TOTAL ROOF AREA MANAGED	BARRACK HALL CONSTRUCTION COST	BARRACK HALL ROOF UPGRADE

CHAPTER 3

Smarter campuses, stronger balance sheets

The institutional goals are clear, from maximizing limited budgets and improving the student experience to meeting climate commitments and staying competitive. Delivering on those goals demands a fresh, more proactive approach to facility and energy strategy.

Campus leaders are zeroing in on three areas where modernization efforts can unlock the greatest value: 1) managing core assets, 2) reducing energy costs and emissions, and 3) building smarter, more connected systems.

Each area brings its own set of challenges — and a range of practical strategies already helping campuses stretch resources, avoid disruptions, and future-proof investments.

01. Cutting costs and carbon with smarter energy management

Campus energy use is a major line item as well as a major opportunity. With the right mix of efficiency upgrades, connected systems, and strategic procurement, institutions can lower utility costs, support sustainability goals, and reduce operational risk.

That opportunity comes to life through a range of high-impact practices:

- **Efficiency upgrades deliver fast wins.** Projects like HVAC optimization, LED retrofits, demand response programs, and mechanical system tuning can deliver rapid payback and reduce strain on staff and infrastructure. Teams can fine-tune ventilation rates and air changes per hour (ACH) based on space type — running labs at spec while scaling back in low-use classrooms or admin spaces.

- **Connected systems enable real-time control.** Smart meters, building automation systems (BAS), and occupancy sensors give facilities leaders more precise control over how and when energy is used. Real-time insights help teams improve comfort, reduce waste, and respond faster — especially in high-use buildings like student centers, research labs, and residence halls.

- **Strategic procurement cuts cost volatility.** Colleges are increasingly turning to forward-looking energy strategies — such as renewable energy certificates (RECs), clean power contracts, and green tariffs — to stabilize utility costs and support decarbonization goals. As of October 2024, EPA's Top 30 College & University Partners collectively used nearly 4.3 billion kWh of green power — equivalent to the annual electricity use of more than 395,000 US homes. For every strategy, market intelligence is the foundational key to keeping institutions ahead in a volatile energy market.

- **Clean infrastructure improves long-term resilience.** Institutions are investing in solar arrays, geothermal systems, and electrified heating and cooling — helping modernize aging systems, reduce lifecycle costs, and future-proof campus operations. Many institutions are leveraging available incentives and rebates to improve ROI on these upgrades.

02. Keeping campus assets in shape without budget whiplash

Campus infrastructure is deeply tied to both financial performance and the student experience. And yet, many institutions still find themselves reacting to failures rather than planning around them.

Strategic asset management flips that script, helping facilities teams preserve capital, reduce disruptions, and prioritize limited resources across every building type — from dorms and labs to athletic complexes and performance spaces.

Here's how effective asset management supports fiscal and operational goals alike:

- **Longer-lasting assets mean lower long-term costs.** Proactive upkeep of systems like HVAC, boilers, roofs, and building envelopes helps extend the life of those investments — and avoid expensive emergency repairs. Preventive maintenance stretches every dollar and keeps past capital spending working harder, for longer.
- **Predictive planning smooths capital planning.** By using building condition assessments and data-driven planning tools, facilities leaders can identify the right work to do and schedule it at the optimal time. Data-driven planning also helps them make purchases more effectively, including taking advantage of contractor economies of scale and seasonal labor costs trends. All this helps flatten the capital budget curve and gives leadership a clearer view of near- and long-term needs.
- **Fewer disruptions protect the student experience.** Proactive planning can prevent an HVAC failure during finals week, a flood in a recital hall the night of a performance, or a lab shutdown in the middle of a key research cycle. These are the moments that can impact morale, retention — and yes, spark calls from concerned families.
- **Data helps make the case for reinvestment.** Asset-level visibility gives facilities teams the data to back up funding requests, sequence projects by urgency, and collaborate more effectively with finance and campus planning stakeholders.

03. Smart systems for better control, visibility, and planning

As teams stay lean and expectations keep rising, smart building strategies offer a way to do more with less. By turning buildings into data sources, connected systems help campus teams respond faster, align more easily with leadership goals, and streamline day-to-day operations.

Here's how leading campuses are using smart systems to reduce friction and boost performance:

- **Automated building controls reduce workload and waste.** These technologies automatically adjust temperature, lighting, and ventilation based on occupancy patterns — keeping comfort high and energy waste low in lecture halls, dorms, and research spaces.
- **Utility data supports smarter decisions.** Consolidated energy management platforms make it easier to track usage trends, surface anomalies, and simplify utility billing — all without relying on spreadsheets or time-consuming audits. That clarity helps teams prioritize upgrades and communicate results to leadership.
- **Advanced management systems support both comfort and operational efficiency.** Analytics and diagnostics that draw on data from building controls and condition assessments can trigger maintenance work orders and support capital planning, taking your program to the next level. Adding CO_2, humidity, and motion sensors helps maintain indoor air quality in line with ASHRAE 62.1 standards — whether in busy student centers or sensitive lab environments.
- **Smart systems are a launchpad for future priorities.** Smart systems are a launchpad for what's next. Connected infrastructure enables future-ready planning — from EV charging stations and emissions tracking dashboards to flexible systems that can support new accreditation standards or student technology expectations down the line.

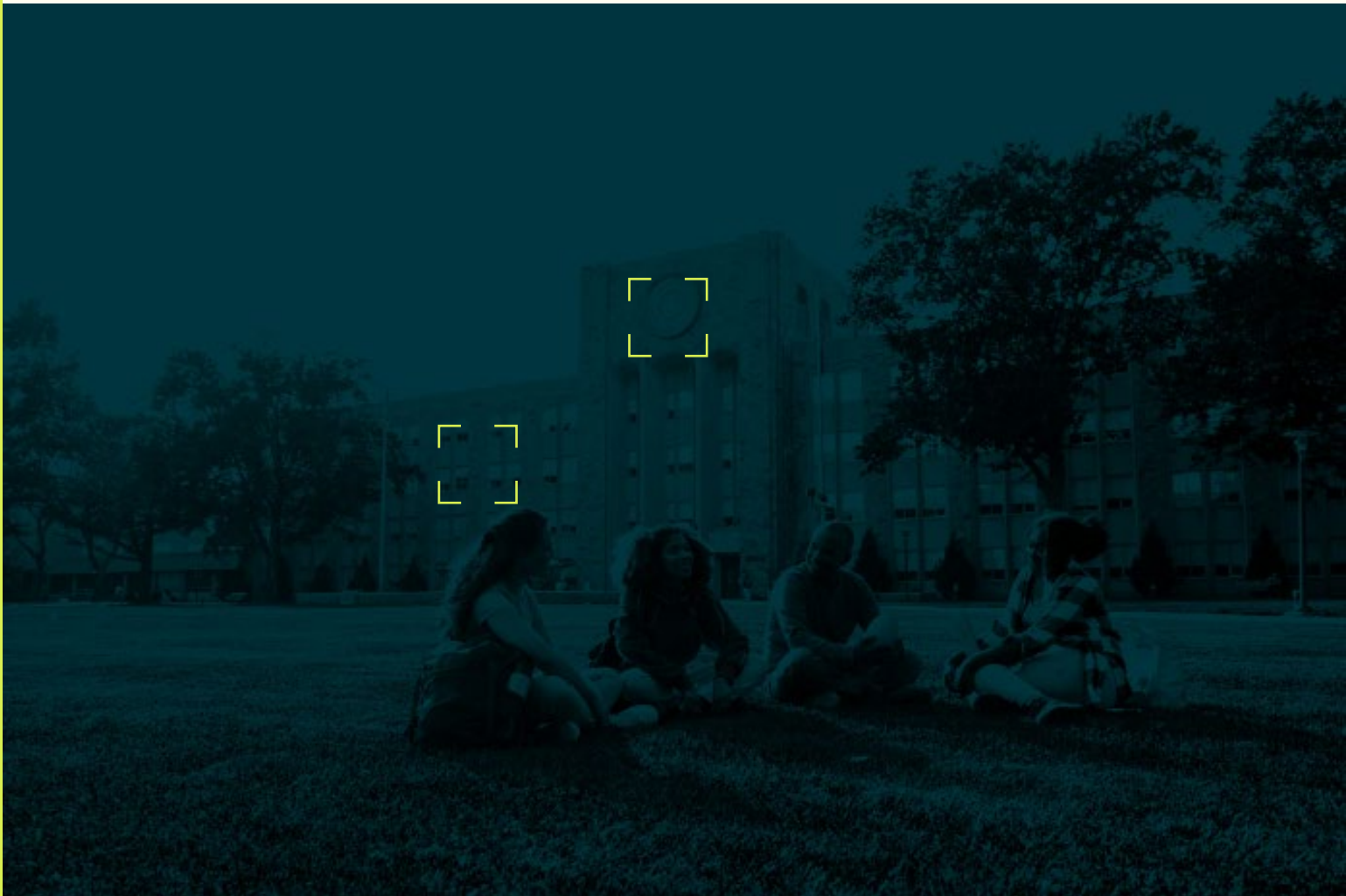
Mastering capital planning

Stretching limited funds begins with a clear, comprehensive view of your campus infrastructure. Facilities teams that understand the condition and performance of building systems across dorms, labs, academic buildings, and more can prioritize the right projects — balancing quick wins that improve day-to-day operations with major upgrades that extend asset life and boost sustainability.

The key: align capital improvements with institutional performance goals. By establishing a reliable asset baseline and leveraging data-driven assessments, campuses can sequence investments to:

- prevent costly emergency repairs
- smooth budget cycles
- maximize return on every dollar spent.

This strategic approach not only safeguards financial health but also enhances the student experience by minimizing disruptions and ensuring campus spaces are safe, comfortable, and mission-ready.



MANTIS PARTNER SPOTLIGHT

Smart building systems spark efficiency and sustainability on historic campus

CHALLENGE

A New England school sought energy upgrades across its 19th-century campus, aiming to reduce costs and improve sustainability while working around classroom schedules.

OPPORTUNITY

Mantis designed custom HVAC, lighting, and building management systems tailored to the school's unique mix of facilities. Occupancy-based lighting and smart controls help reduce energy use while maintaining a comfortable learning environment.

OUTCOME

The project delivered six-figure annual savings, avoided hundreds of metric tons of emissions, and achieved a full return in under three years — all while enhancing long-term performance across academic and administrative spaces.

$115,500	$52,000	630,000	2.4 years
TOTAL ANNUAL SAVINGS	TOTAL INCENTIVE	BARRACK HALL CONSTRUCTION COST	PROJECT PAYBACK

CHAPTER 4

The syllabus for high-ROI campus optimization

01 START WITH THE DATA

02 PLAN UPGRADES THAT ALIGN WITH PERFORMANCE AND BUDGET GOALS

03 TIME IT RIGHT — THE ACADEMIC CALENDAR IS YOUR ALLY

04 EXECUTE AND TRACK WITH BANDWIDTH IN MIND

05 TELL THE STORY

Every campus is different — but the path to smarter, more resilient buildings starts the same way: with a solid data baseline and a thoughtful, phased approach to improvement. From quick operational wins to long-range capital planning, here's how facilities leaders can turn big goals into real-world results.

01. Start with the data

Before committing to any project, ground your strategy in a clear, asset-level view of your campus portfolio. Are you optimizing a single high-use facility — or ready to tackle a quad of aging buildings with shared infrastructure? Which buildings are driving energy costs or generating student complaints?

Operational data, maintenance logs, and condition assessments lay the foundation for both near-term wins and long-term investment strategies.

02. Plan upgrades that align with performance and budget goals

Once you've got the full picture, prioritize improvements that align with your top institutional goals — whether that's cutting emissions, reducing OpEx, or improving student comfort. A campus-ready playbook might include:

- Sealing building envelopes and improving insulation in older residence halls
- Retrofitting lighting and lighting controls in high-occupancy spaces
- Upgrading HVAC systems and tuning airflow based on use and space type
- Reassessing energy procurement strategies and layering in renewables
- Connecting and calibrating automation systems to enable better control

03. Time it right — the academic calendar is your ally

Construction and system shutdowns are inevitable, but disruption doesn't have to be. Use academic breaks, summer sessions, and low-occupancy periods to phase upgrades strategically. Major residence hall overhauls? Target summer. HVAC work in lecture halls? Steer clear of finals week. Thoughtful timing protects the student experience — and the institution's credibility.

04. Tell the story

Facilities work is easy to overlook — unless you make it visible. Highlight progress on sustainability in student recruitment materials. Collaborate with alumni relations to showcase carbon goals. Reinforce to faculty and staff that behind-the-scenes upgrades are creating better places to teach, learn, and live.

When you share the story, stakeholders across campus see — and trust — the value you're delivering.

MANTIS PARTNER SPOTLIGHT

Connecticut liberal arts college cuts costs and emissions with efficiency upgrades

CHALLENGE

Mitchell College, a liberal arts school in New London, Connecticut, faced rising energy and maintenance costs from outdated lighting and HVAC systems. The inefficiencies were straining budgets while also contributing to higher carbon emissions.

OPPORTUNITY

Working with Mantis Innovation's Efficiency Solutions team, the college launched a campus-wide upgrade. Careful scheduling minimized disruption, while utility incentives covered 60% of costs for new lighting, controls, and high-efficiency boilers.

OUTCOME

The project delivered a short payback period and strong return on investment while cutting emissions. Today, Mitchell College enjoys lower operating costs, improved comfort for the entire campus community, and more reliable infrastructure.

$187,000	$643,000	845,500	2.3 years
TOTAL ANNUAL SAVINGS	TOTAL INCENTIVE	TOTAL ANNUAL KWH SAVED	PROJECT PAYBACK

MANTIS PARTNER SPOTLIGHT

Texas medical university builds long-term strategy for roof performance

CHALLENGE

With more than 75 buildings across four campuses, a major Texas medical university needed a scalable, preventive approach to roof management that would reduce emergency costs and support long-term capital planning.

OPPORTUNITY

Mantis assessed more than 1.7 million square feet of roof area and developed a phased strategy prioritizing repairs over replacements — helping stabilize aging roofs and minimize disruption to healthcare and research operations.

OUTCOME

The program has significantly reduced leaks, cut reactive repair costs, and paved the way for a proactive roof asset plan that supports both budget control and long-term performance.

75+	1.7M sq ft	4	5+ years
FACILITIES COVERED UNDER PROGRAM	TOTAL ROOF AREA ASSESSED	CAMPUSES SERVED ACROSS TEXAS	PROJECT DURATION (2020-PRESENT)

CHAPTER 5

Campus optimization: Let us commence

While no two institutions are exactly alike, many are facing familiar pressures: aging infrastructure, volatile energy costs, evolving student needs, and rising climate commitments.

Historic colleges may be balancing preservation with performance, upgrading legacy buildings without losing their character. STEM-driven campuses are racing to modernize labs and support high-tech learning environments — while ensuring the systems behind the scenes can keep up.

Facilities decisions now carry outsized weight, shaping not just operational efficiency, but institutional identity. When building performance aligns with academic priorities, optimization becomes a powerful asset: one that can strengthen reputation, support enrollment, and elevate the campus experience.

The future of your campus starts now.

Learn more about how to drive optimization across your campus by contacting a Mantis Innovation expert today.

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