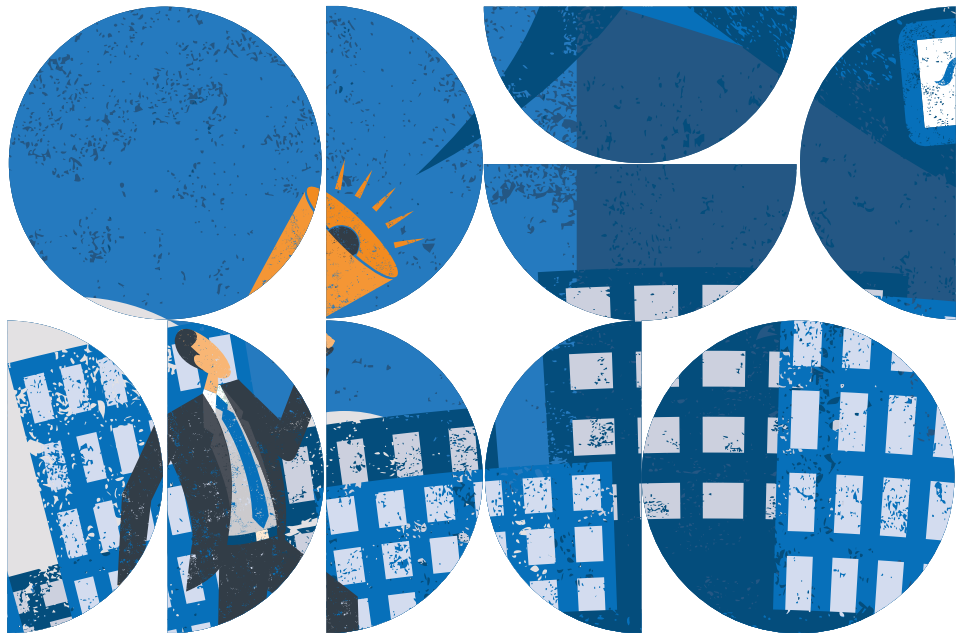
EAB

Addressing Increasingly Complex **Deferred Maintenance** Decisions

Six Lessons to Improve Planning, Prioritization, and Executive Communication

Facilities Forum



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Project Director

Ann Forman

Contributing Consultants

Lauren Burakowski, PhD
Michael Fischer
Rachael Kauss
Kimberly Rose

Design Consultant

Kelsey Stoneham

Executive Director

John Workman, PhD

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Supporting Members in Facilities Maintenance

Resources Available with Your Membership

This publication represents only one of our many resources to support members in their efforts to address deferred maintenance challenges on campus. Details about additional resources are provided below.

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Shifting the Balance from Reactive to Preventive Maintenance

- Creating greater preventive maintenance capacity by streamlining inefficient processes and eliminating common timesinks
- Stretching the operating budget to create dedicated preventive maintenance roles or teams
- Exploring the future of predictive technologies and impact on maintenance

Capital Renewal Funding Playbook

- Details 100 creative capital renewal funding strategies and their potential impact on maintenance funding and prevalence along with implementation guidance and case studies of successful implementation for each tactic.
- Offers 10 executive-level lessons to help Facilities leaders choose 10-12 successful capital renewal funding strategies for their institution

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Register for upcoming sessions to hear our latest findings or access archives of past presentations. Many members convene campus leaders and task forces to attend and share ideas on practices and implementation.

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Executive Summary

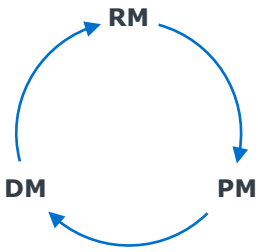
Higher Education Facing Critical and Multifaceted Maintenance Challenge

While colleges and universities have faced maintenance challenges for decades, recent trends have elevated maintenance to a strategic imperative for senior leaders. Beyond tighter budgets and widening funding gaps, most institutions face the dual challenge of replacing or renovating aging buildings while maintaining newer "smart" buildings that require more frequent and complex upgrades.

Most significantly, the relationship between deferred, reactive, and preventive maintenance creates a complex, multifaceted problem. As deferred maintenance backlogs grow and systems begin to fail, Facilities must divert resources to reactive maintenance activities, which in turn leaves fewer resources for preventive maintenance. Given the interdependence between the three types of maintenance, Facilities leaders must address this challenge on multiple fronts.

Relationship Between Deferred, Reactive, and Preventive Maintenance

As the **deferred maintenance** backlog grows, the risk of system failure increases



As systems fail, Facilities must dedicate resources to **reactive maintenance,** leaving fewer resources for preventive maintenance

Dedicating fewer resources to **preventive maintenance** increases the amount of deferred maintenance

Adopting a Methodical Approach to Tackle Deferred Maintenance

A huge and growing deferred maintenance backlog is arguably one of the most daunting challenges facing most campuses. While a select few institutions have managed to eliminate (or nearly eliminate) deferred maintenance over time, the majority of these institutions possess unique, hard-to-replicate circumstances that have contributed to their success. Realistically, most institutions must adopt a methodical, slow-and-steady approach to smartly chip away at their backlog over time.

Six Executive Lessons to Address Increasingly Complex Deferred Maintenance Decisions

To help Facilities leaders address increasingly complex deferred maintenance decisions, this publication offers a three-part strategy for improving planning, prioritization, and executive communication. The first executive lesson focuses on securing senior leader support for capital renewal. The next three lessons focus on strategies for collecting condition data, choosing the right condition metrics, and weighing projects against institutional goals. Finally, the last two lessons provide guidance for creating more flexible renewal plans and making principled divestments.

1	2	3
Communication	**Data, Assessment, and Prioritization**	**Planning**
Strategies to communicate capital renewal in a compelling way to secure senior leaders' trust and obtain resources	Strategies to choose meaningful metrics, collect condition data efficiently, and weigh projects against institutional goals	Strategies to create adaptable capital renewal plans for short- and long-term needs and win buy-in to take the worse spaces offline

Higher Education's Deferred Maintenance Imperative

INTRODUCTION

Stewardship Impacts Everyone

Facilities Maintenance Challenges Have Ripple Effects Across Campus

Deferred maintenance has been a top priority for facilities leaders for decades. Yet as institutions face aging buildings and growing maintenance backlogs, tackling the challenge of deferred maintenance has increasingly become an area of focus of other institutional leaders, including boards, presidents, and chief business officers. The growing attention on deferred maintenance in higher education is not surprising given that maintenance issues affect nearly all areas of campus. Four examples of Facilities maintenance challenges and their impact on other institutional leaders are described below.

Representative Facilities Maintenance Challenges		Implication for Other Institutional Leaders
Facilities forced to make budget tradeoffs between routine maintenance and landscaping/grounds	→	**VP of Enrollment Management** worries about recruiting students due to diminishing curb appeal of campus
Facilities must sink research renewal dollars into unexpected HVAC failure in same building	→	**Provost** unable to recruit star faculty with current research labs
Facilities deprioritizes classroom upgrades in favor of infrastructure investments	→	**Deans** forced to invest their own budget into upgrading classrooms and lecture halls
Facilities executive told to refresh teaching labs, expands work to address critical overdue renewal	→	**CBO** becomes frustrated when a series of modernization and renewal projects go over budget

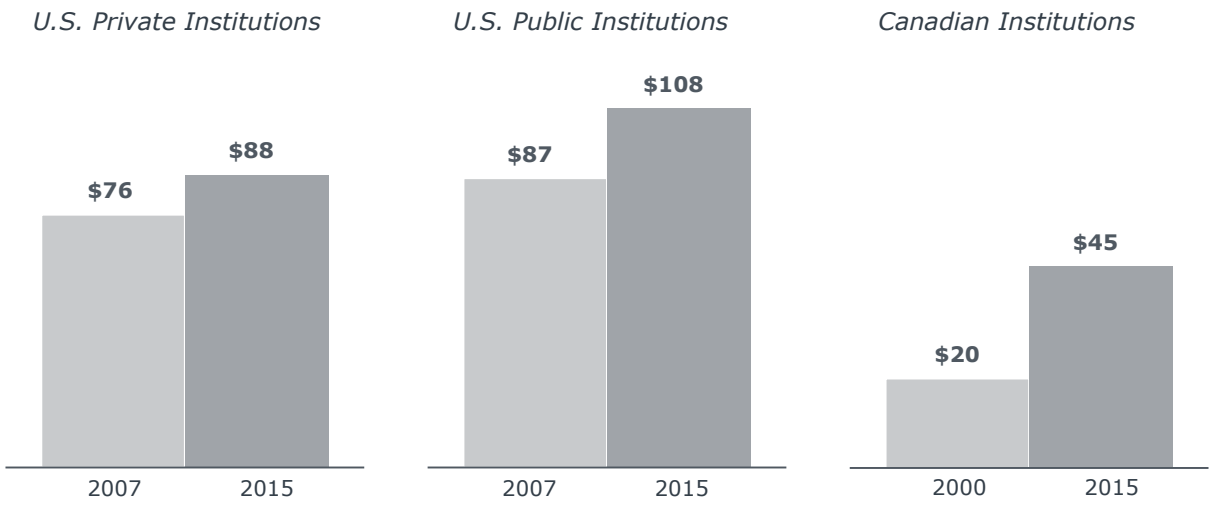
Source: Facilities Forum interviews and analysis.

Moving in the Wrong Direction

Deferred Maintenance per Square Foot Increasing Across North America

Unfortunately, while senior leader focus on deferred maintenance grows, so do the backlogs on most campuses. According to Sightlines data, the deferred maintenance backlog per square foot increased 16% at U.S. private institutions and 24% at U.S. publics between 2007 and 2015, and 56% at Canadian institutions between 2000 and 2015.

Deferred Maintenance Backlog per Square Foot



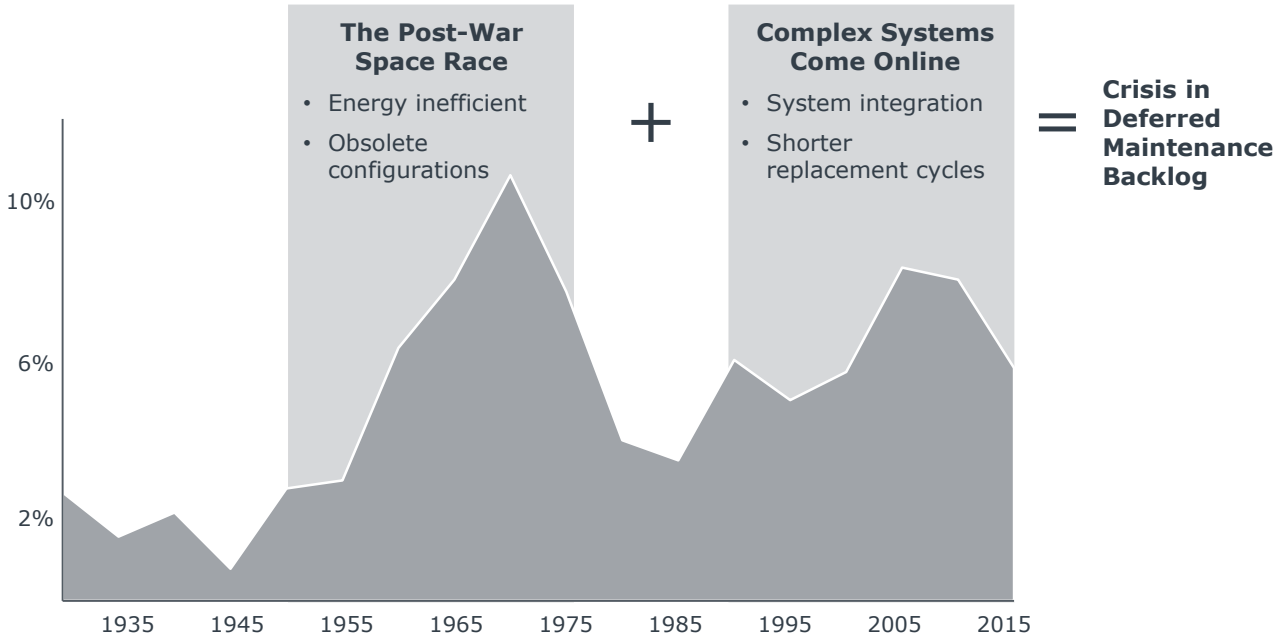
Source: : CAUBO, "A Point of No Return: The Urgent Need for Infrastructure Renewal at Canadian Universities," 2000, http://www.caubo.ca/knowledge-centre/surveysreports/caubo_point_of_no_return/; CAUBO and Sightlines, "Deferred Maintenance at Canadian Universities: An Update," May 2014, http://www.caubo.ca/knowledge-centre/surveysreports/caubo_deferred_maintenance_2014/; Sightlines, "State of Facilities in Higher Education: 2015 Benchmarks, Best Practices & Trends," 2015, http://www.sightlines.com/insight/state-of-facilities-2015/; Facilities Forum interviews and analysis.

The Perfect Storm

Post-WW2 Building Boom, New "Smart" Buildings Driving Growth in Backlogs

Facilities leaders in higher education face four unique maintenance challenges, detailed across the following pages. The first challenge facing Facilities leaders is a perfect storm of renewal needs. As illustrated below, most institutions face the dual challenge of replacing or renovating antiquated buildings while maintaining newer "smart" buildings that require more frequent and complex upgrades.

Percentage of Total Higher Ed Space by Year of Construction



In the United States, 35% of current space was built in the post-war construction boom between 1960 and 1975—and many of these buildings now require significant renovations. Simultaneously, institutions must fund renewal costs for newer, more advanced buildings constructed in the last two decades, which comprise 31% of facilities on campuses nationally. While Facilities leaders agree that campuses should invest between 2% and 3% of total asset value into campus facilities, most institutions fall well short of that benchmark.

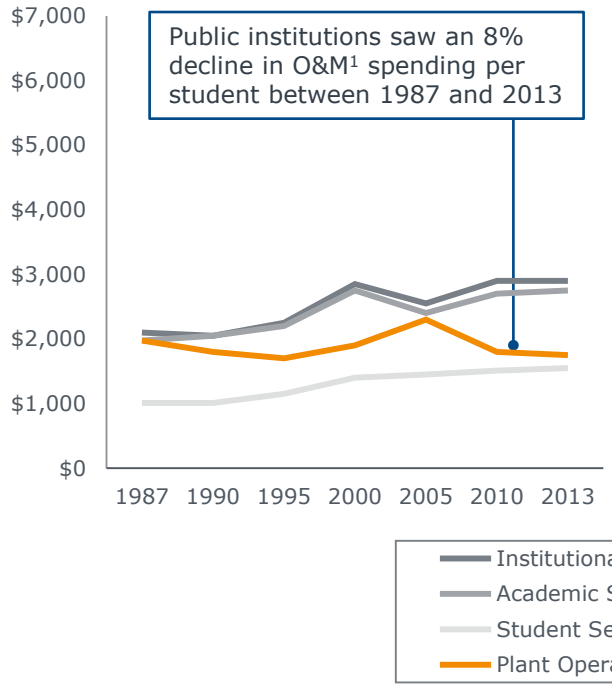
Source: Sightlines, "State of Facilities in Higher Education: 2015 Benchmarks, Best Practices & Trends," http://www.sightlines.com/insight/state-of-facilities-2015/; Facilities Forum interviews and analysis.

O&M Spending Far Outpaced by Other Investments

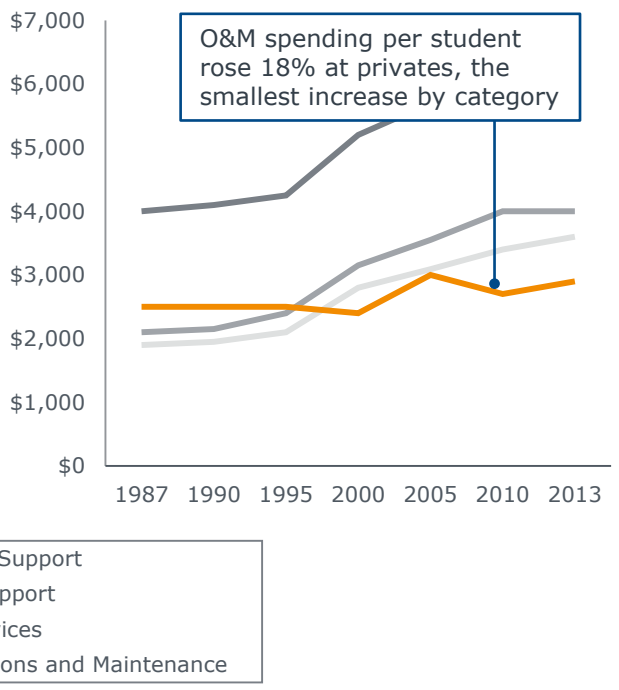
Tighter Budgets Lead to Painful Trade-Offs

The second challenge for Facilities leaders is tighter budgets. Nearly all institutions face declining revenues due to changes in enrollment, public support, research funding, and debt capacity. Unfortunately, tightening budgets across higher education have disproportionately impacted Facilities units. The graphs below depict spending per student in inflation-adjusted 2013 dollars across four spending categories at public and private institutions between 1987 and 2013.

Spending per Student by Public Institutions (2013 Dollars)



Spending per Student by Private Institutions (2013 Dollars)



At public institutions, every spending category has risen back above pre-recession level except plant operations and & maintenance (O&M) spending, which has dropped 8% since 1987. At private institutions, plant O&M has grown the least over the past 20 years compared to the other categories, growing less than 1% each year.

Source: Hinrichs PL, "Trends in Expenditures by US Colleges and Universities, 1987-2013," Federal Reserve Bank of Cleveland, September 2016, https://www.clevelandfed.org/en/newsroom-and-events/publications/economic-commentary/2016-economic-commentaries/ec-201610-trends-in-expenditures-by-us-colleges-and-universities.aspx; Facilities Forum interviews and analysis.

1) Operations and maintenance.

Even If You Had $300 Million…

Simultaneously Executing That Many Capital Projects Logistically Impossible

The third challenge is that even with adequate funding, most campuses cannot simultaneously execute a significant number of capital projects at one time. The table below compares the theoretical impact of $8 million worth of capital projects to campus, versus $300 million. On the left, $8 million worth of capital projects would minimally impact campus operations, resulting in mostly localized and manageable interruptions.

Theoretical Impact of Capital Renewal Funds at Example Institution

	$8M Provided for Capital Renewal	$300M Provided for Capital Renewal
Planning Resources Required	Number of projects funded small enough to be managed by institutional team	Huge amounts of time and financial resources needed to develop details, execute projects at once
Number of Units Affected	Fraction of total units impacted at one time	Most units affected simultaneously, creating impossible swing space needs
Staging Area Required	Localized projects share small, nearby preparation space	Projects across campus require multiple worksites, redundant tools
Ripple Effects on Campus	Students and staff able to adjust to minor disruptions to campus	Majority of buildings and throughways inaccessible at once

> "It's a whole lot better to get $10 million a year for 10 years than to get nothing for nine years and then have $100 million dumped on you all at once."
>
> *Dennis Bailey, Senior Associate VP, Facilities*
> *Florida State University*

By comparison, $300 million worth of capital projects would massively disrupt an entire campus. First, most campuses lack sufficient swing space to absorb the units displaced by construction. Second, institutions would likely need to repurpose fields and parking lots as project staging areas, which would drastically impact underground infrastructure and traffic patterns. Lastly, most institutions simply lack enough staff to support planning, scheduling, and executing more than a few capital projects at once.

Source: Facilities Forum interviews and analysis.

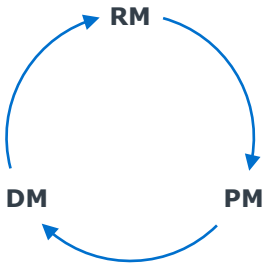
A Messy and Multifaceted Problem

Deferred Maintenance Language Is Misleading and Obscures Complexity

The last maintenance challenge facing Facilities leaders is that deferred maintenance is a complex and multifaceted problem. The graphic below illustrates the interdependence between deferred, reactive, and preventive maintenance. A growing deferred maintenance backlog results in an increased risk of system failure. As systems begin to fail, Facilities must divert resources to reactive maintenance activities. However, this leaves fewer resources for preventive maintenance, ultimately increasing the deferred maintenance backlog.

Relationship Between Deferred, Reactive, and Preventive Maintenance

As the **deferred maintenance** backlog grows, the risk of system failure increases



As systems fail, Facilities must dedicate resources to **reactive maintenance,** leaving fewer resources for preventive maintenance

Dedicating fewer resources to **preventive maintenance** increases the amount of deferred maintenance

Given this interdependence, Facilities leaders must adopt a two-pronged strategy to address these maintenance challenges on multiple fronts. The first strategy is to develop a strong preventive maintenance program by eliminating common timesinks and reprioritizing critical preventive maintenance tasks. For best practices on transitioning from reactive to preventive maintenance, please download our publication *Shifting the Balance from Reactive to Preventive Maintenance,* available on eab.com.

The second strategy is to adopt a methodical approach to smartly chip away at the deferred maintenance backlog over time. The remainder of this publication details executive lessons to address increasingly complex deferred maintenance decisions.

Source: Facilities Forum interviews and analysis.

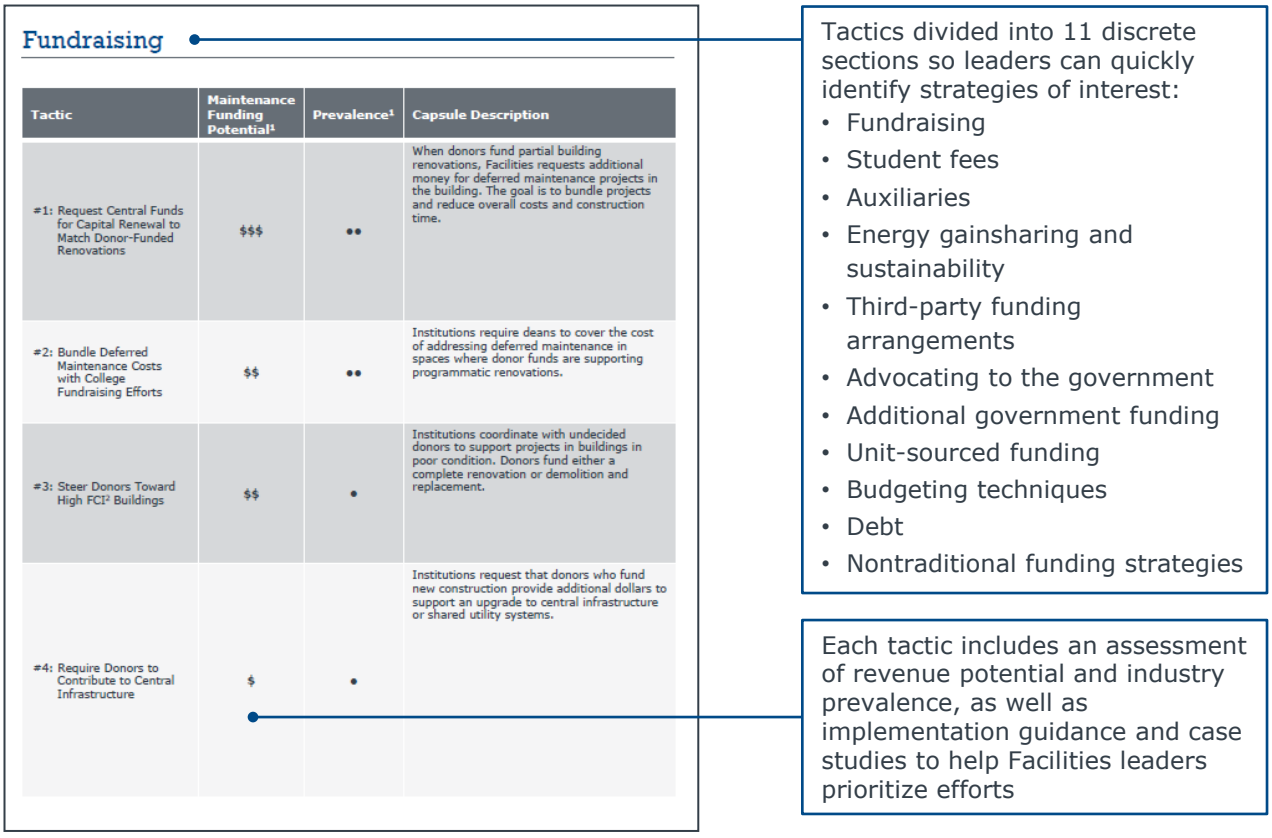
Securing Capital Renewal Funding

Facilities Leaders Pursue Diverse and Creative Funding Strategies

Of course, securing adequate funding is a core component of addressing the deferred maintenance backlog. As traditional sources of revenue decline, Facilities leaders must pursue diverse funding strategies. To assist Facilities leaders in this endeavor, the Facilities Forum offers a dedicated publication, the *Capital Renewal Funding Playbook*. This publication contains detailed descriptions of 100 different tactics institutions have used to fund capital renewal. Each tactic in the playbook includes detailed implementation guidance, case studies, and an assessment of potential revenue to help Facilities leaders prioritize efforts. Using this playbook, leaders can identify the 10 to 12 funding tactics most applicable to their institution to meaningfully increase funding for capital renewal.

To access the full *Capital Renewal Funding Playbook*, please visit **eab.com/ff/fundingplaybook.**

Snapshot of Capital Renewal Funding Playbook



Fundraising

Tactic	Maintenance Funding Potential[1]	Prevalence[1]	Capsule Description
#1: Request Central Funds for Capital Renewal to Match Donor-Funded Renovations	$$$	••	When donors fund partial building renovations, Facilities requests additional money for deferred maintenance projects in the building. The goal is to bundle projects and reduce overall costs and construction time.
#2: Bundle Deferred Maintenance Costs with College Fundraising Efforts	$$	••	Institutions require deans to cover the cost of addressing deferred maintenance in spaces where donor funds are supporting programmatic renovations.
#3: Steer Donors Toward High FCI[2] Buildings	$$	•	Institutions coordinate with undecided donors to support projects in buildings in poor condition. Donors fund either a complete renovation or demolition and replacement.
#4: Require Donors to Contribute to Central Infrastructure	$	•	Institutions request that donors who fund new construction provide additional dollars to support an upgrade to central infrastructure or shared utility systems.

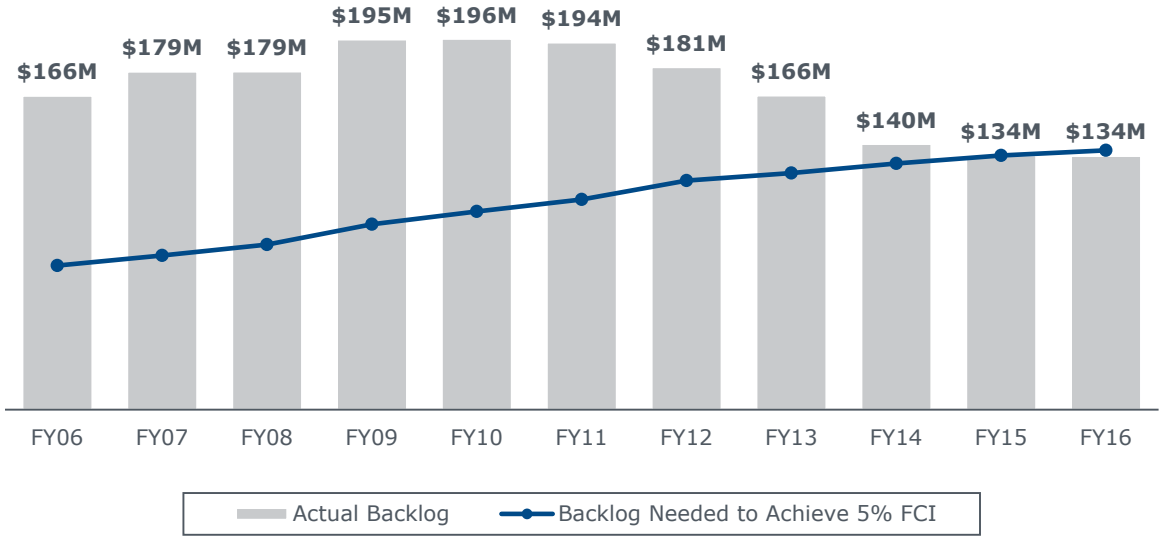
Source: Facilities Forum interviews and analysis.

Turning the Tanker

UVA Demonstrates Replicable Success with Slow and Steady Approach

A select few institutions have managed to eliminate (or nearly eliminate) deferred maintenance over time. However, these institutions possess unique, hard-to-replicate circumstances that have contributed to their success. More realistically, most institutions should adopt a "turning-the-tanker" approach to addressing deferred maintenance. As shown below, the University of Virginia has been strategically chipping away at their backlog since 2005, when deferred maintenance became a high-level priority. By deploying effective prioritization and planning strategies, UVA achieved their goal of 5% FCI[1] in 2015.

Deferred Maintenance Backlog at the University of Virginia



1) Facility Condition Index, measured as the amount of deferred maintenance divided by total asset value.

Source: University of Virginia, Charlottesville, VA; Facilities Forum interviews and analysis.

Six Executive Lessons for Addressing Increasingly Complex Deferred Maintenance Decisions

To help Facilities leaders "turn the tanker" and address increasingly complex deferred maintenance decisions, this publication offers six executive lessons to improve planning, prioritization, and executive communication. The lessons are organized into the three broad categories below. The first lesson focuses on winning senior leader buy-in and support for capital renewal. The following three lessons focus on strategies for collecting condition data, choosing meaningful metrics and weighing projects against institutional goals. Finally, the last two lessons provide guidance for creating more flexible renewal plans and making principled divestments.

1 Communication	**Lesson 1** Communicate capital renewal in a compelling way to build trust and obtain resources
2 Data, Assessment, and Prioritization	**Lesson 2** Choose metrics that support higher-order analyses for capital renewal decisions **Lesson 3** Evaluate benefits of completing condition assessment with consultants vs. in-house team **Lesson 4** Weigh impact of individual capital projects on strategic goals
3 Planning	**Lesson 5** Create adaptable capital renewal plans for short-, mid-, and long-term needs **Lesson 6** Get buy-in to take the worst spaces offline

Source: Facilities Forum interviews and analysis.

Communication

SECTION 1

Lesson 1: Communicate capital renewal in a compelling way to build trust and obtain resources

Lesson 1: Communicate Capital Renewal in a Compelling Way to Build Trust and Obtain Resources

Lesson in Brief

Facilities leaders win senior leader trust and secure capital renewal funding through effective communication strategies, such as using visual aids, breaking down the deferred maintenance backlog into smaller portions, and connecting capital renewal investments to top institutional priorities.

Rationale

While Facilities leaders fully grasp the scope and scale of the deferred maintenance backlog, other leaders may not recognize the signs of neglect that are often hidden behind walls or underground. As a result, they do not understand the magnitude of the problem, leading them to devote limited institutional resources to other priorities rather than maintenance. By making the problem real and linking it to other strategic priorities, Facilities leaders can increase executive understanding of the deferred maintenance challenge and generate buy-in for additional funding.

Implementation Components

Component 1: Make the Problem Real

Facilities leaders employ visual aids such as photos and campus tours to showcase capital renewal needs to board members, state legislators, and private donors.

Component 2: Reframe the Backlog

Facilities leaders break down the deferred maintenance backlog total into smaller portions to make the problem more approachable for senior leaders.

Component 3: Connect Deferred Maintenance to Priorities

Facilities leaders gain support and funding to address deferred maintenance by connecting capital renewal projects to strategic priorities important to other campus leaders.

Source: Facilities Forum interviews and analysis.

Struggling to Gain Traction

Three Solutions to Capital Renewal Communication Challenges

The first executive lesson to address deferred maintenance is to communicate capital renewal in a compelling way to build trust and obtain resources. The graphic below shows the three common challenges of communicating capital renewal needs to senior leaders, along with three targeted solutions. The first challenge is that renewal needs are often hidden behind walls, on roofs, or underground. To address this, Facilities leaders must make the problem real by using visual aids that illustrate renewal needs in a tangible way.

Typical Approach to Communicating Capital Renewal Needs

Facilities Leader's Message:		
"There is a large deferred maintenance backlog that is negatively impacting the institution."	"In fact, capital renewal is a one billion dollar problem for our campus."	"I need your support to better fund capital renewal so we can get a handle on our deferred maintenance."
Senior Leader's Response:		
"Really? I don't see anything wrong on campus."	"That's a huge number! We'll never have that much money. Why even bother?"	"That is a big ask. How is capital renewal going to benefit me?"
Solution:		
Make the Problem Real	**Reframe the Backlog**	**Connect Deferred Maintenance to Priorities**

The second challenge is the magnitude of capital renewal funding needs is often overwhelmingly large. This can cause senior leaders to tune out and simply ignore the problem. The solution is to reframe the backlog as a more approachable number.

The final challenge is that senior leaders may not understand the broader institutional benefits of addressing capital renewal needs. To address this, Facilities leaders must better connect deferred maintenance to the broader strategic priorities. This lesson highlights how institutions have successfully deployed these communication strategies.

Source: Facilities Forum interviews and analysis.

Show, Don't Tell

UMD Publishes Picture-Heavy Reports to Spotlight DM Needs

Component 1: Make the Problem Real

The first component to improve deferred maintenance communication is to make the problem real through visual aids. The University of Maryland, College Park (UMD) developed an effective two-pronged communication strategy to illustrate capital renewal needs to senior leaders and the broader campus community. First, the Facilities department developed two reports, previewed below, that showcase the university's deferred maintenance backlog.

Building a More Effective Report

Provides context for current capital renewal needs, comparing against peer institutions and past renewal projects

Employs a pictoral style with clear photos, easy-to-understand graphs, and limited text on each page

Includes specific asks and strategies connected to other institutional priorities that senior leaders can implement

> "*Restore the Core* and *Invisible Crisis* were game changers. Without them, the capital renewal conversation on campus would not have happened."
>
> *Jack Baker, Executive Director of Operations & Maintenance, UMD*

The first publication, *Invisible Crisis,* focuses on issues behind walls and below ground invisible to the naked eye. The second publication, *Restore the Core,* emphasizes the need for maintenance work around the historic heart of campus. These text-light reports illustrate the problem by focusing on photos and graphics that truly illustrate capital renewal needs. UMD's executive director credits these reports for starting broader renewal conversations on campus.

For further guidance on leveraging reports to showcase capital renewal needs, please see the "Guide to Effectively Communicating Facilities Information Through Reports" on page 68 of this publication. For a full version of UMD's *Restore the Core,* please see page 75.

Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; Cosner D, "Failing Infrastructure Creates Invisible Crisis at University of Maryland," June 1, 2012, https://www.facilities.umd.edu/documents/Invisible%20Crisis.pdf; University of Maryland, College Park, MD; Facilities Forum interviews and analysis.

From Boardroom to Boiler Room

UMD Uses Tours to Highlight the Impact of Funds—And Lack Thereof

The second prong of the University of Maryland's strategy is maintenance-focused campus tours. Three key elements of the tour are outlined below. First, the Facilities leader begins the tour with physical objects, offering tangible evidence of aging infrastructure and outdated equipment for individuals to observe firsthand. Second, UMD targets key stakeholders, including board members, legislators, and donors. In addition to aging infrastructure, the Facilities leader also showcases recent accomplishments such as a new high-efficiency HVAC unit to demonstrate the positive impact of facilities investments.

Three Key Ingredients of UMD's Campus Facilities Tours

1

Start Tour with Physical Objects

Tangible pieces of equipment highlight behind-the-scenes failures and needs

2

Select Tour's Target Audience

Most impactful for new board members, state legislators, and private donors

3

Incorporate Tour Into Onboarding Processes

Recently elected board members and legislators automatically scheduled for tour

Impact of Communication Efforts at College Park

$10M

Annual deferred maintenance funding stream obtained for 12 years

$100M

Funding for new physical science building after touring legislators through outdated science building

Finally, UMD incorporated these campus tours into the formal onboarding process for board members and legislators, ensuring that all new senior stakeholders understand the urgency of addressing deferred maintenance. Impressively, UMD was able to secure $10 million in annual deferred maintenance funding for 12 years and $100 million to replace an old science building. While the reports and campus tours were part of a broader deferred maintenance strategy, leaders at UMD point to these communication efforts as critical to their success.

Source: University of Maryland, College Park, MD; Facilities Forum interviews and analysis.

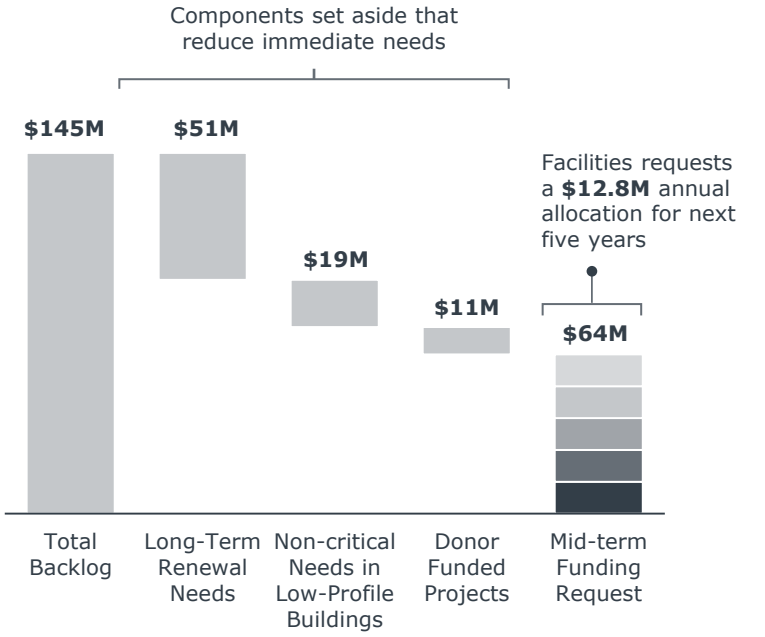
Focus the Board on a Manageable Number

University of Denver Breaks Down the Backlog Into More Realistic Asks

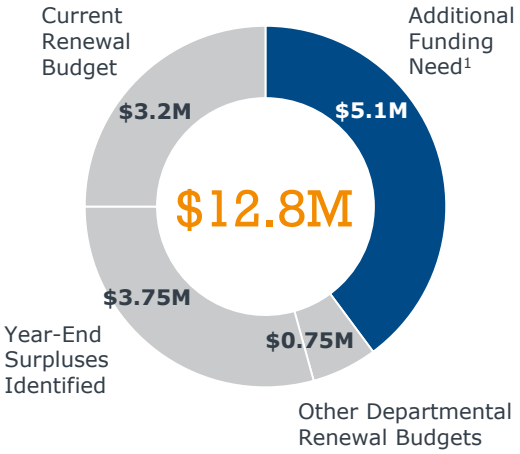
Component 2: Reframe the Backlog

The second component is to reframe the backlog to make the problem more approachable. As shown below, Facilities leaders at the University of Denver took steps to break down their $145 million backlog into a more manageable annual request. First, Facilities set aside three pieces of the backlog that did not need to be addressed in the short term: long-term renewal needs, non-critical work in low-priority buildings, and donor-funded projects. This reduced the unfunded need to $64 million, or a more reasonable annual request of $12.8 million for five years.

Breakdown of the University of Denver's Backlog, 2007



University of Denver's Funding Plan, 2007



These efforts alone reduced the backlog from $145 million total to just $12.8 million annually for the next five years. Denver further subdivided the annual request into the specific funding sources shown on the right. Facilities identified and proposed repurposing funds from year-end surpluses and auxiliary unit renewal budgets, leaving an additional request of only $5 million a year from the board. As a result of this exercise, the board agreed to fund the request, enabling Denver to reduce their backlog to nearly zero by 2016.

1) Additional funding obtained through departmental gain-sharing, gifts, donations, reserves, and other resources.

Source: University of Denver, Denver, CO; Facilities Forum interviews and analysis.

Additional Strategies to Reframe the Backlog

While Denver reframed the backlog by focusing on funding sources, there are a number of ways to make deferred maintenance needs more approachable. Two additional strategies are listed below. Western University categorizes projects by infrastructure need like plumbing or electrical, which allows leaders to prioritize and allocate funds across categories. Similarly, the University of Arizona sorts renewal projects into campus portfolios such as academic or administrative buildings, enabling leaders to identify broad areas to invest in rather than individual projects.

Western

Bucket Capital Renewal Needs by Category

Facilities leader buckets renewal needs by infrastructure portfolio (e.g., roofs, plumbing, electrical) and then allocates across categories based on priority need

THE UNIVERSITY OF ARIZONA.

Work with Senior Leaders to Create Portfolios

Facilities leader presents senior leaders with capital renewal needs sorted by campus portfolio (e.g., academic, administrative, etc.); conversation centers around which portfolios to invest in first before deciding which individual projects to fund

The key ingredient of all three strategies is breaking the large deferred maintenance backlog into smaller, more digestible portions to make the problem more approachable for senior leaders.

Source: University of Arizona, Tucson, AZ; Western University, London, ON; Facilities Forum interviews and analysis.

Translating Renewal into Senior Leaders' Language

Component 3: Connect Deferred Maintenance to Priorities

The final component of better maintenance communication is to connect deferred maintenance to institutional strategic priorities. As each institution has different strategic goals and deferred maintenance needs, Facilities leaders must customize their capital renewal messaging to fit campus-specific priorities. To help inform these efforts, the table below details four success stories of Facilities leaders linking renewal needs to institutional priorities.

Examples of How Facilities Leaders Can Make Funding Requests a More Compelling Investment

Institution	Strategic Priority	Case Study
University of Hartford	Enrollment	Institution would not invest in irrigation project; Facilities leader came back next day and pitched investment as opportunity to increase curb appeal and enrollment and received funds the next day
Western University	Sustainability	AVP minimizing carbon emissions in capital renewal building designs and new construction to make more appealing to sustainability-focused provincial government and to minimize the impact from the introduction of Cap & Trade[1]
McGill University	Student Success	Facilities obtained board funding by demonstrating capital renewal projects' impact on student success metrics and potential risk to reputation due to equipment or system failure
University of New Brunswick	Supporting Local Economy	Facilities executive linked capital renewal to economic benefits for the region, including construction jobs, long-term research investment, and higher-skilled workers

1) Canadian cap and trade program to reduce greenhouse gas emissions beginning in 2017.

Source: Cap and Trade in Ontario, https://www.ontario.ca/page/cap-and-trade-ontario; McGill University, Montreal, QC; University of Hartford, Hartford, CT; University of New Brunswick, Fredericton, NB; Western University, London, ON; Facilities Forum interviews and analysis.

Data, Assessment, and Prioritization

SECTION 2

- Lesson 2: Choose metrics that support higher-order analyses for capital renewal decisions
- Lesson 3: Evaluate benefits of completing condition assessment with consultants vs. in-house team
- Lesson 4: Weigh impact of individual capital projects on strategic goals

Struggling to Get a Reliable Picture of Condition

Facilities Leaders' Three Main Concerns

A crucial step in addressing deferred maintenance is gaining an accurate picture of asset condition to guide project prioritization and capital investment decisions. However, Facilities leaders face three common challenges in obtaining detailed and accurate information on campus condition, shown below. The first challenge is getting the right data. While condition data play a major role in project prioritization, Facilities leaders often wonder which metrics and analyses provide the most accurate picture.

1	2	3
Am I getting the right data?	**Is my data collection process efficient?**	**How do I weigh condition against strategic importance?**
"I use UNIFORMAT II[1] to determine what information to collect on each system, but I'm not sure if that's enough to make the best decisions based on system condition and need."	"I'm not sure where to start the assessment process. How do I get the information I need and keep it current without deploying an army of people?"	"My prioritized list of projects only reflects condition. I know projects have to align with institutional priorities, but I'm not sure how to achieve strategic alignment."
Lesson 2: Choose metrics that support higher-order analyses for capital renewal decisions	**Lesson 3: Evaluate benefits of completing condition assessment with consultants vs. in-house team**	**Lesson 4: Weigh impact of individual capital projects on strategic goals**

The second challenge is ensuring efficiency of the data collection process. While facility condition assessments (FCAs) gather a great deal of data, Facilities leaders increasingly wonder if they are performing these evaluations as efficiently as possible. The third challenge is weighing condition data against strategic importance. While Facilities leaders know how to prioritize projects based on condition, weighing the impact of individual capital projects on broader strategic goals is more challenging.

This section details three lessons that address each of these challenges.

1) UNIFORMAT II defines a standard classification for building elements and related site work: http://www.uniformat.com/index.php/background.

Source: Facilities Forum interviews and analysis.

Lesson 2: Choose Metrics That Support Higher-Order Analyses for Capital Renewal Decisions

Lesson in Brief

Facilities leaders select strategically aligned condition metrics by weighing the difficulty of measurement against the value of information provided to their campus. After choosing metrics and gathering data, Facilities leaders conduct high-value analyses to produce actionable information on asset condition.

Rationale

As condition data play a major role in project prioritization conversations, it is critical for Facilities leaders to gather metrics that accurately assess campus condition. Yet many Facilities leaders wonder if they are tracking the "right" metrics. No single list of metrics is right answer for all Facilities units, so institutions must determine which metrics will translate into the most meaningful information for their particular campus.

Implementation Components

Component 1: Decide Which Metrics to Incorporate in Facility Condition Assessment

Facilities leaders choose metrics that will translate into the most meaningful information for their particular campus by balancing ease of measurement and industry prevalence, or how commonly a metric is used across higher education.

Component 2: Select Which Analyses to Run on Condition Metrics

To translate condition data into actionable information, Facilities leaders select the data analyses—such as facility condition index or facility quality index—that offers the most value to their campus.

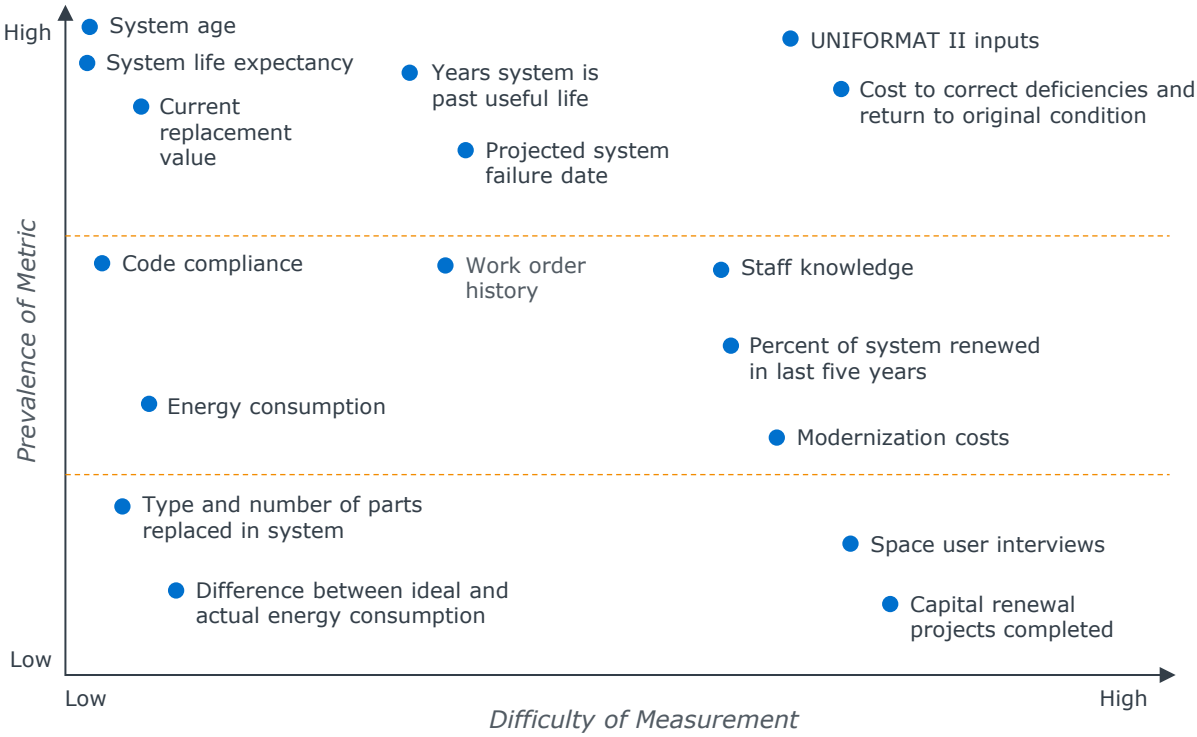
Source: Facilities Forum interviews and analysis.

Metric Options for Clearer Picture of Condition

Component 1: Decide Which Metrics to Incorporate in Facility Condition Assessment

Gathering data on current campus condition at the building and system level is critical to inform investment decisions, yet many Facilities leaders wonder if they are tracking the "right" metrics. Unfortunately, no single list of metrics is right answer for every institution. Instead, Facilities leaders must determine which metrics will lead to the most meaningful information for their particular campus.

Potential Metric Options by Difficulty of Measurement and Prevalence of Metric



The graph above offers a framework to assist Facilities leaders in selecting the most impactful metrics. It plots 17 metrics by difficulty of measurement and prevalence, meaning how commonly other Facilities units across higher education track and utilize a given metric. For example, many institutions track UNIFORMAT II inputs even though these metrics are difficult to track. On the other hand, type and number of parts replaced in system is not commonly tracked, even though it is relatively easy to pull from the CMMS.[1]

1) Computerized maintenance management system

Source: Facilities Forum interviews and analysis.

Does Your Assessment Help Answer These Questions?

Assessments Provide Data, Not Necessarily Information or Guidance

When choosing metrics to track, Facilities leaders must consider the important questions below to determine if the data collected will translate into actionable information vital to creating a deferred maintenance plan.

Due Diligence Questions Assessments Should Answer

- ☑ Do I have a clear understanding of the overall condition of my campus?
- ☑ Can I articulate the 10 most pressing projects for each broad category of systems (e.g., roofs)?
- ☑ Do I have a systematic way to update facilities assessments?
- ☑ Can I forecast out the capital renewal needs of my campus for 10 years?
- ☑ Do I have the information I need to communicate the condition of campus to senior leaders and the board?

Tips from Your CIO to Maximize Data Quality

- ✓ **Assign ownership.** Facilities leaders must assign someone within the department responsibility over the data parameters and the software used to manage them to ensure the collection of data occurs regularly through reliable processes.
- ✓ **Lock in variables.** Consistency in the collection and measurement of terms from year-to-year allows for better tracking and analysis over time.
- ✓ **Focus on groups of assets, not individual units.** While experienced Facilities leaders might see particular pieces of equipment as unique, data analysis requires categorizing equipment by similarities to have groups from which to extract data. Such labels can include location, function, type, criticality, and age.
- ✓ **Refrain from reinventing the wheel.** Many modern CMMS platforms come with performance trending modules built into the software, with training resources available from the company's website or representatives. Additionally, some institutions' IT units have experience implementing similar data structures and may have the capacity to provide advisory or developmental support to Facilities leaders.

Moreover, data quality is crucial to the reliability of analyses. To that end, the table above includes insights and lessons from chief information officers (CIOs) about maximizing data quality through proper data hygiene and governance.

Source: IT Forum interviews and analysis; Facilities Forum interviews and analysis.

Transforming Data into Valuable Information

Component 2: Select Which Analyses to Run on Condition Metrics

After determining which metrics to track, the next step is to conduct analyses to convert data into valuable information. The table below details five high-value analyses along with their relative advantages. While nearly all institutions use the facility condition index (FCI) to prioritize capital projects, many institutions have benefited from the additional analyses provided below. For example, the facility quality index builds off FCI by incorporating modernization costs, resulting in a more comprehensive measurement of cost to renovate. Another example is financial risk of failure, less common due to its high complexity. However, institutions that conduct this analysis derive vale from understanding the costs of inaction, as it offers an alternative way to think about prioritization.

Though other options exist for assessing condition, Facilities Forum recommends the five analyses below as a starting point.

Five Analyses to Maximize Utility of Data

Analysis	Description	Advantages
Facility Condition Index	Evaluation of overall building condition; measures cost to correct condition deficiencies and return to original condition, divided by the current replacement value	Widely accepted description of building condition; single metric easily explained to senior leaders
Facility Quality Index	Evaluation of both overall building condition and how well it meets programmatic needs; measures cost to correct condition deficiencies and return to original condition plus the cost of functionality improvements, divided by the current replacement value	More comprehensive measurement for the cost to renovate space to today's standards (not just replacing in-kind); modernization element makes metric less common
Lifecycle Modeling	Statistical method that forecast capital renewal needs at least 10 years out	No boots on the ground, so typically costs about 20% of a full FCA; useful for planning campus-wide capital renewal expenditures
Financial Risk of Failure	Financial consequences based on probability of failure	Allows decision makers to understand financial consequences of inaction
Institutional Risk of Failure	Risk to institutional or academic mission based on probability of failure	Allows decision makers to understand the damage to institution, mission, or reputation

Source: Facilities Forum interviews and analysis.

Lesson 3: Evaluate Benefits of Completing Condition Assessment with Consultants vs. In-House Team

Lesson in Brief

Institutions have three options to complete facility condition assessments (FCAs): contracting with a consultant, engaging consultants to train staff on the assessment process, and completing assessments in-house. Ultimately, Facilities leaders should choose the option most suitable to their campuses resources and assessment needs.

Rationale

The vast majority of institutions conduct facility condition assessments, which provide detailed information on condition at the sub-system, building, and campus level. While FCAs provide a substantial amount of data, the challenge is performing these evaluations efficiently. To maximize the efficiency of the data collection process, Facilities leaders must weigh the benefits of each data collection method against campus resources and staff expertise.

Implementation Options

Option 1: Contract with a Consultant

Institutions use a consultant to complete condition assessments. While third-party expertise carries more weight with senior leaders, using consultants to complete campus assessments is the most costly option, ranging from five to twenty cents per square foot.

Option 2: Consultant Trains Staff on Assessment Process

Institutions engage consultants to train in-house staff on completing campus assessments. Though this approach has higher upfront costs, it represents a transitional step to in-house assessments, yielding long-term cost savings.

Option 3: Complete Assessments In-House

Institutions complete campus assessments with in-house staff. Institutions can either establish a team of specialists (i.e., engineers, architects) or maintain a smaller team of generalists who leverage local staff expertise for short periods of time to support the assessment. At less than two cents per square foot, in-house assessments are the least costly option, but require significant staff time.

Source: Facilities Forum interviews and analysis.

Three Main Options for Condition Assessments

Engaging Consultants to Train Staff Is a Transitional Model

The third lesson for addressing deferred maintenance is to evaluate the benefits of completing condition assessments with consultants versus in-house teams. The vast majority of institutions conduct facility condition assessments (FCAs), which provide detailed information on condition at the sub-system, building, and campus level. While FCAs provide a substantial amount of data, the challenge is performing these evaluations cost-effectively. The table below describes three options for conducting facility condition assessments, including the advantages, disadvantages, and approximate frequency of each approach across institutions.

	Option 1: Contract with a Consultant	Option 2: Consultant Trains Staff	Option 3: Complete In-House
Description	Institution engages consultant to complete campus assessment	Consultants train staff on assessment; may partially assess facilities with staff	Dedicated in-house team constantly assesses facilities
Typical Timing	Every three to five years; consultants increasingly contract to assess 20% to 25% of campus each year	Consultant comes to campus as many times as necessary to train staff; future assessments completed in house	Occurs continuously through dedicated staff
Advantages	Assessments completed quickly; third-party perspective holds weight with senior leaders	Staff receive expert training, increasing in-house expertise while maintaining flexibility of internal team	Enables institutions to build customized assessment model; cost is much less, about $0.013 per GSF
Disadvantages	Less customizable; expensive, cost varies from $0.05-0.20 per GSF	Upfront training has higher cost, pulling operating dollars from other areas; cost is approximately $0.025 per GSF	Requires resources and dedicated FTEs to ensure assessments prioritized
Approximate Frequency			

The majority (60%) of campuses continue to use a consultant to complete the condition assessment. Their third-party expertise carries the most weight with senior leaders; however, at five to twenty cents per square foot, they are the most costly option. Only 5% of institutions use consultants to train in-house staff on completing the assessment. Though this approach has high upfront costs, it represents a transitional step to in-house assessments, yielding savings in the long-run. Finally, approximately 35% of institutions complete the assessment with in-house staff. At less than two cents per square foot, in-house assessments are the least costly option (though it requires significant staff time).

This lesson provides more detailed information and guidance on the three options for completing facility condition assessments.

Source: Facilities Forum interviews and analysis.

Considerations for Choosing a Vendor

Vendors Offer Different Types of Expertise, Services, Deliverables

Option 1: Contract with a Consultant

The first and most prevalent option for conducting facility condition assessments is to contract with a consultant. The primary decision involved with this approach is choosing a vendor, as facility assessment vendors offer different services, deliverables, and types of expertise. Facilities leaders should consider the questions below as they vet different vendor offerings against their campus goals and needs.

High-Level Vendor Considerations

- How often does the vendor work with higher education institutions?
- What is the vendor's definition of deferred maintenance?
- Are sub-system-level, project-level, or high-level details more important to you?
- What methods does the vendor use to collect condition data and prioritize projects?
- Does the vendor present assessment results to senior leaders on campus?
- How much Facilities staff time will the vendor require when assessing campus?
- Do you plan to complete facility condition assessments in-house in the near future?

Vendor Services and Deliverables

- What types of services does the vendor offer? (i.e., various assessment options, capital planning, life-cycle modeling, board meeting presentations)
- Does the vendor offer peer benchmarking?
- What deliverables does the vendor produce? (i.e., reports, recommended list of projects)
- Does the vendor offer assessment software or tools?
- Where is the assessment data stored: on campus or in the cloud?
- Can clients integrate assessment data with their current CMMS or asset management system?
- Does the vendor provide hands-on, on-campus staff training?

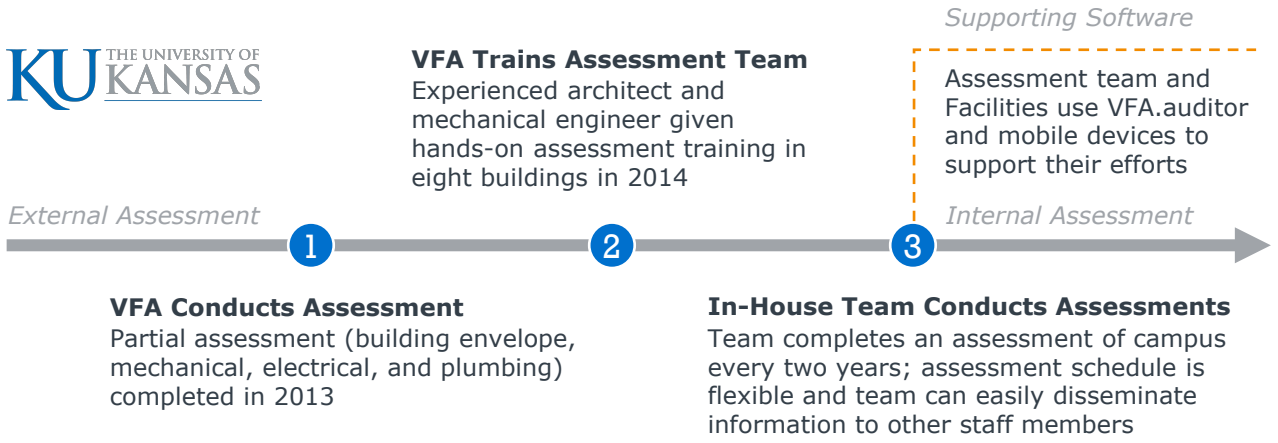
Source: Facilities Forum interviews and analysis.

Making the Transition

University of Kansas Hired Consultant to Train Staff in the Art of Assessment

Option 2: Consultant Trains Staff on Assessment Process

The second option for completing condition assessments is engaging a consultant to train internal staff. The timeline below shows the major milestones of the University of Kansas's (KU) engagement with VFA, a facilities assessment services firm. VFA offers staff training when institutions purchase VFA.auditor, their internal assessment software.



Results of VFA Training

$0.025
Cost per gross square foot of first year of assessment program, including training

40 hours
Of training provided by VFA across one week, with 16 hours of post-training support

$150K
Savings per year by moving to in-house assessment process

First, VFA conducted a partial assessment of the campus in 2013. The following year, VFA trained an architect and mechanical engineer across eight buildings, providing them with valuable hands-on experience. With the assistance of VFA's software, the team now completes all assessments independently.

Ultimately, KU estimates that moving to an in-house assessment team will save them $150,000 per year.

Source: University of Kansas, Lawrence, KS; Facilities Forum interviews and analysis.

In-House Team Conducts Continuous Assessment

UNC-Chapel Hill Completes Full Campus Assessment Every Three Years

Option 3: Complete Assessments In-House

The third option is to complete campus condition assessments in-house. The University of North Carolina at Chapel Hill takes this approach. Chapel Hill's dedicated assessment team consists of an architect, mechanical engineer, and electrical engineer. While their primary responsibility is to complete condition assessments on a three-year cycle, the team also developed and regularly updates a condition database to expedite future assessments. By leveraging historic data and automated processes, the team can produce detailed building-specific reports within one to two weeks of an assessment.

University of North Carolina at Chapel Hill's Assessment Program

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

UNC's Dedicated Assessment Team

- Architect
- Mechanical Engineer
- Electrical Engineer

Program Structure

- Complete campus assessments done on three-year cycles
- Full-time staff report to Director of Engineering Information Services
- Building-specific reports produced within one to two weeks of assessment
- Assessments built on previous versions to expedite process
- Data managed with VFA.facility software and mobile devices
- Provides historic cost data to estimate future system, parts, and replacement costs

Source: University of North Carolina at Chapel Hill, Chapel Hill, NC; Facilities Forum interviews and analysis.

Leveraging Existing Staff Expertise

University of North Carolina at Charlotte Taps Internal Specialists as Needed

While an in-house assessment team requires dedicated staffing, it does not need to consist exclusively of specialists. The University of North Carolina at Charlotte's in-house team consists of two generalist employees: a facility condition assessment program manager and an administrative specialist to manage logistics. The manager leverages internal experts such as building managers or zone engineers to support the assessment process as needed. To minimize disruption, the annual assessment schedule is published one year in advance to allow impacted staff to plan accordingly.

Components of UNC Charlotte's Facilities Condition Assessment Program

UNC CHARLOTTE

Two Dedicated Employees
Full-time manager and administrative specialist are only two employees dedicated to continuously assessing campus condition

Internal Experts Tapped as Needed
Manager taps internal staff to support more technical system and building assessments

Assessment Plan Published One Year Out
Annual assessment plan published at the beginning of the year, detailing schedule by building and system

Plan Minimizes Staffing Impact
Publishing the schedule in advance helps staff plan around assessment, minimizing the impact on day-to-day operations

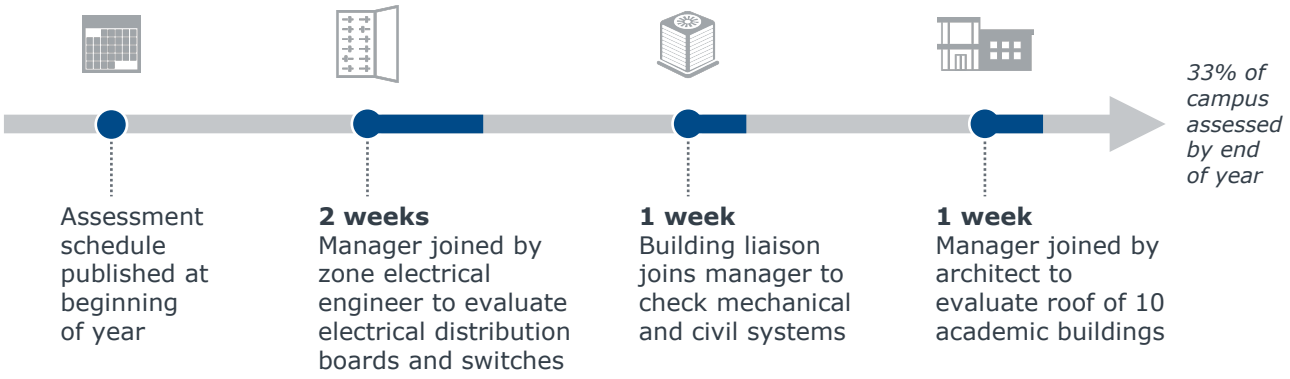
Source: University of North Carolina at Charlotte, Charlotte, NC; Facilities Forum interviews and analysis.

Representative Annual Assessment Schedule

Zone Staff and Building Liaisons Alerted Before Their Support Needed

The graphic below depicts a representative annual assessment schedule at UNC Charlotte. The program manager engages experts for varying lengths of time, depending on the scope of the work involved. For example, the manager taps the zone electrical engineer for two weeks, but only needs support from the building liaison for one week. Ultimately, this approach allows UNC Charlotte to complete assessments for approximately one-third of campus each year.

Representative Annual Assessment Schedule at the University of North Carolina at Charlotte



The most important factor when deciding between a specialist- or generalist-centric assessment team is the availability of specialized staff. Institutions in labor markets where engineers and architects are difficult to recruit may opt to go the generalist route. However, it is still critical for leaders to consider how short-term assessment work may impact their day-to-day duties and the ability for the department to achieve its broader priorities.

Source: University of North Carolina at Charlotte, Charlotte, NC; Facilities Forum interviews and analysis.

Lesson 4: Weigh Impact of Individual Capital Projects on Strategic Goals

Lesson in Brief

Facilities leaders weigh building condition data against other strategic factors such as project impact on student success or campus curb appeal to ensure the final capital renewal project list incorporates broad institutional priorities and maximized limited resources.

Rationale

When prioritizing projects, building condition is typically the most accessible information. However, renewal needs do not always align with institutional strategic priorities, and comparing quantitative condition data (such as FCI) against qualitative factors (such as impact on student success) can be challenging. By weighing the impact of individual projects on strategic goals, Facilities leaders can develop final projects lists that balance maintenance needs with broader institutional priorities.

Implementation Options

Option 1: Elevate a Single Institutional Priority

Facilities leaders prioritize capital renewal projects around a single institutional priority, such as student success or campus curb appeal.

Option 2: Gather Feedback from Academic Leaders Through Multistep Process

Facilities leaders incorporate feedback from academic leaders into the capital renewal prioritization. To avoid political tension, Facilities leaders can use an inclusive, multi-step process that solicits input from various campus stakeholders.

Option 3: Quantify Other Strategic Considerations to Facilitate Comparison

Institutions develop a ranking system that incorporates both condition-based and strategic factors into the capital renewal project prioritization process.

Source: Facilities Forum interviews and analysis.

Condition Information Only One Piece of the Puzzle

Institutions Must Consider Strategic Goals When Prioritizing Projects

The fourth lesson for addressing deferred maintenance is to quantify the impact of individual capital projects on strategic goals. Unfortunately, maintenance priorities and institutional strategic goals do not always align.

Sample List of Buildings Ranked by FCI

Building	FCI
Science Lab Building	66%
Administration Building	64%
Upper-class Res Hall	51%
Academic Office Building	48%
Student Center	40%
Classroom Building	33%
Dining Hall	28%
Undergraduate Gym	28%
Lecture Hall	25%
Freshman Res Hall	23%

Sample List of Buildings Ranked by Impact on Strategic Priorities

Building	FCI	
Science Lab Building	66%	Poor condition impeding undergraduate learning
Classroom Building	33%	Central to academic mission; historic value
Freshman Res Hall	23%	Important for first-to-second year retention
Academic Office Building	48%	
Student Center	40%	
Upper-class Res Hall	51%	
Dining Hall	28%	
Undergraduate Gym	28%	
Lecture Hall	25%	
Administration Building	64%	Repairs not crucial to achieve strategic goals

This challenge is illustrated in the example above. The list on the left shows capital projects at a representative institution ranked by facility condition index (FCI). The list on the right represents the finalized list after the president, provost, and other senior leaders weigh each project's impact on other important strategic goals. Apart from the science lab building, the two lists reflect significantly different priorities. For example, the freshmen residence hall is least in need of attention based solely on condition, but the building's inclusion in the prospective student tour and importance for first-to-second-year retention makes it a top institutional priority.

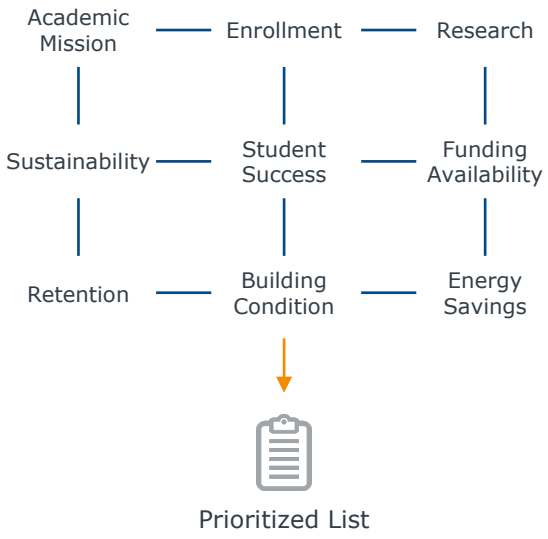
Source: Facilities Forum interviews and analysis.

Competing Goals Complicate Prioritization Process

Facilities Leaders Seek a Better Way to Evaluate Investment Trade-Offs

In theory, a number of factors beyond building condition should be reflected in the prioritized list of projects. A handful of factors are shown below. However, weighing condition against other strategic factors is challenging for two reasons. First, unlike quantitative metrics like FCI, qualitative factors such as impact on student success are difficult to measure. Second, Facilities leaders must make prioritization decisions while navigating complicated campus politics. The next several pages provide examples of institutions that have successfully managed this tricky balancing act.

Many Strategic Inputs Necessary for Capital Renewal Prioritization



Struggling to Assess Importance

Strategic goals and institutional mission are more challenging to quantify than FCI, making it difficult for campus leaders to compare the relative priority of different maintenance projects.

Trickle-Down Prioritization

"The importance of a roof depends on who it's leaking on."

Academic Leader
Private Research University

Source: Facilities Forum interviews and analysis.

What's Most Important to You?

Prioritization Is Simplified When One Factor Takes Center Stage

Option 1: Elevate a Single Institutional Priority

The first approach to capital renewal prioritization is to elevate a single institutional priority above all others. The two institutions below prioritize capital renewal projects around one strategic goal. First, Elon University focuses primarily on campus curb appeal to drive enrollment growth. Given the large number of competing institutions in the surrounding area, leaders at Elon have consistently prioritized projects that enhance students' first impression of campus. Elon's focus on curb appeal has contributed to it's consistently high university ranking. In 2017, *U.S. News & World Report* ranked Elon first among master's-level universities in the South for the fourth straight year.

Example Institutions Prioritizing Projects Around Single Goal

ELON UNIVERSITY

Curb Appeal

Elon prioritizes projects that maintain and enhance curb appeal, aiming to attract prospective students with a beautiful campus from the moment they arrive.

UNIVERSITY of West Georgia

Student Success

UWG moving to a system where they prioritize renovations of buildings that provide highest number of student contact hours, leveraging academic and space utilization data to identify spaces with high academic impact.

Second, the University of West Georgia is beginning to prioritize projects that have the greatest impact on student success. Leveraging space utilization data, leaders at West Georgia will prioritize renovations in buildings with the highest number of student contact hours.

While this approach would clearly simplify project prioritization, it is not universally applicable. Many institutions would struggle to choose a single priority to elevate above all others. However, Facilities leaders may be able to apply a similar approach centered around a handful of priorities, which would still help streamline the prioritization process.

Source: "Elon Ranks #1 For Teaching, Innovation And Academic Excellence in U.S. News & World Report's 2017 'America's Best Colleges'", http://www.elon.edu/E-Net/Article/137243; Elon University, Elon, NC; University of West Georgia, Carrollton, GA; Facilities Forum interviews and analysis.

Straight from the Source

Partnering with the Academy to Understand Academic Priorities

Option 2: Gather Feedback from Academic Leaders Through Multistep Process

The second approach to capital renewal prioritization is to integrate academic priorities into the decision-making process. While mapping academic information onto Facilities projects can be challenging, some campuses have overcome this by outsourcing the prioritization exercise directly to academic leaders. For example, the provost at Whitefall University[1] confidentially prioritized academic departments by expected growth, which Facilities leaders used to develop a mutually prioritized project list. While productive, most academic leaders will be unwilling to undertake such a formal prioritization exercise due to high political risk.

Partnering with the Academy to Understand Academic Priorities

Whitefall University[1] Scores Academic Departments

1. Facilities develops a condition-based project list, categorized by building subsystem
2. Subsystems ranked using 250-point algorithm evaluating age and current condition
3. Facilities executive asks assistant provost to confidentially prioritize departments by program growth
4. Facilities cross-checks project list and department rankings to develop mutually prioritized list of renewal investments

> "Many academic leaders think it's academic political suicide to prioritize certain buildings over others, especially if it's enshrined in a paper trail."
>
> *Facilities Leader*
> *Public Flagship University*

UC-Irvine's Academic Prioritization Process

- Facilities creates project list based on condition, knowledge of buildings, and risk of failure
- Facilities executive meets with 50 academic building facility managers to adjust the list based on academic input
- Facilities sends list to assistant deans for review and approval
- Oversight Committee (25 senior-level members) meets to review list; committee does not have approval authority, but meeting provides opportunity for members to give input into prioritization process

Project priority list finalized

The University of California, Irvine's process on the right is a safer approach to incorporating academic input into capital project prioritization. After creating a project list based on building condition, the Facilities leader at UC Irvine solicited feedback from building managers and assistant deans. Ultimately, a senior committee with cross-campus representation reviewed and finalized the list of projects. This inclusive, multi-step process allows various stakeholders to provide input and avoids creating political tension.

1) Pseudonym.

Source: University of California, Irvine, Irvine, CA; Facilities Forum interviews and analysis.

Quantifying Considerations to Facilitate Comparison

WIU's Matrix Evaluates Projects on a Consistent Scale

Option 3: Quantify Other Strategic Considerations to Facilitate Comparison

The last approach to capital renewal prioritization is to develop ranking systems that incorporate both condition-based and strategic factors into the decision-making process. One tool that clearly articulates inputs and simplifies the prioritization process is Western Illinois University's (WIU) Strategic Building Renovation Matrix, shown below. WIU's ranking system, specifically focused on simplifying building renovation decisions across campus, includes ten metrics such as utilization, staff and student needs, and maintenance needs.

Western Illinois University's Strategic Building-Wide Renovation Matrix

	Building		Waggoner Hall	Simpkins Hall
	Building Type		Academic	Academic
STRATEGIC RENOVATION CRITERION	Utilization	2.0	5	4
		WT	10	8
	Life Safety and ADA	3.0	3	3
		WT	9	9
	Fundable	1.0	1	1
		WT	1	1
	Master Plan Factor	2.0	4	2
		WT	8	4
	Staff and Student Needs	3.0	3	2
		WT	9	6
	Visibility	2.0	4	2
		WT	8	4
	Building Exterior Needs	2.0	2	3
		WT	4	6
	Deferred Maintenance	3.0	5	2
		WT	15	6
	FCA Factor**	2.0	2.75	2.7
		WT	5.5	5.4
	Other	2.0	4	3
		WT	8	6
	Comments			
	Strategic Renovation Factor out of 110 possible points		77.5	55.4

Members of the Master Plan Implementation Team fill out matrix for each building their department occupies

Each score (from 1 to 5) weighted 1, 2, or 3 to reflect metric's relative strategic importance

Matrix assigns score up to 110, a scale sensitive enough to yield sufficiently different outcomes and facilitate comparison

WESTERN ILLINOIS UNIVERSITY

Each metric is weighted to reflect its relative strategic importance. Facilities fills out the condition metrics, while deans fill out the other metrics for buildings their departments occupy. Each metric is evaluated on a five-point scale, resulting in a final score up to 110 points. While some campuses take a similar approach to rank renovation projects, most institutions use a less sensitive scale (e.g., projects are ranked on a scale up to 30 points), resulting in less differentiated outcomes. By comparison, WIU's matrix yields a wide range of final scores, which enables leaders to easily compare and prioritize renovation projects.

The complete version of Western Illinois University's Building Renovation Matrix is available on page 44 of this publication.

Source: Western Illinois University, Macomb, IL; Facilities Forum interviews and analysis.

Western Illinois University's Strategic Building-Wide Renovation Matrix

	Building		Sample Hall	
	Building Type		Academic	
	Gross SQFT		120,000	
	Year Occuiped		1972	
STRATEGIC RENOVATION CRITERION	Utilization by Students and Faculty	2.0	5	
		WT	10	
	Life Safety and ADA Compliance Needs	3.0	3	
		WT	9	
	Fundable (State Funding or Corporate Partnerships)	1.0	1	
		WT	1	
	Master Plan Factor	2.0	4	
		WT	8	
	Faculty, Staff and Student Needs	3.0	3	
		WT	9	
	Visibility to Campus, Community, and Perspective Students	2.0	4	
		WT	8	
	Building Exterior needs (Roof, Brick, Curtain wall, glazing etc)	2.0	2	
		WT	4	
	Deferred Maintenance Needs (MEP, HVAC)	3.0	5	
		WT	15	
	Facilities Condition Assessment Factor	2.0	2.75	
		WT	5.5	
	Other	2.0	4	
		WT	8	
	Comments			
	Strategic Renovation Factor out of 110 possible points		77.5	

Source: Western Illinois University, Macomb, IL.

Western Illinois University's Strategic Building-Wide Renovation Matrix Definitions

Each criterion category is given an importance value of 1-5, which is then multiplied by the multiplier weight to determine the final category value. Category values are summed to determine strategic renovation factor (out of 110).

Utilization by Students and Faculty: The higher the building utilization by students and faculty, the higher the number. The higher the utilization number, the higher the number is on the matrix, and vice versa. This can be quantified by the Space and Utilization study. (Multiplier 2.0)

Life Safety and ADA Compliance Needs: The greater the need for life safety and ADA upgrades, the higher this number is on the matrix. (Multiplier 3.0)

Fundable (State Funding or Corporate Partnerships): If funding is available for a renovation specifically allocated for a particular building, the greater the number is on the renovation matrix. (Multiplier 1.0)

Master Plan Factor: If the Master Plan recommends renovation, in whole or in part, within a given time frame (within five years, ten years, or fifteen years), the higher the number is on the matrix. A recommended renovation within five years would have a higher value on the matrix than a recommendation within fifteen years. (Multiplier 2.0)

Faculty, Staff and Student Needs: The higher the Faculty, Staff and Student needs in this space, the higher number on the renovation matrix is. (Multiplier 3.0)

Visibility to Campus, Community, and Prospective Students: The more visible the building is, the higher the number on the matrix. (Multiplier 2.0)

Building Exterior Needs (Roof, Brick, Curtain wall, Glazing, etc.): The more exterior work the building needs, the higher the number is on the matrix. (Multiplier 2.0)

Deferred Maintenance Needs (MEP, HVAC): The more heating, ventilating, air conditioning, plumbing, etc. building needs, the higher the number is on the matrix. (Multiplier 3.0)

Facilities Condition Assessment Factor: The Facilities Condition Assessment, updated 2014, outlines the deferred maintenance needs, criticality of work needing to be done, and associated renovations estimates. The greater the need for facilities repair/replacement, the higher the number on the matrix. The matrix factor is inversely proportional to the FCA value, as the FCA's scale 1 as buildings in the worst condition. (Multiplier 2.0)

Other: Here input other contributing factors which are not otherwise easily categorized. (Multiplier 2.0)

Source: Western Illinois University, Macomb, IL.

Planning

SECTION 3

- Lesson 5: Create adaptable capital renewal plans for short-, mid-, and long-term needs
- Lesson 6: Get buy-in to take the worst spaces offline

Lesson 5: Create Adaptable Capital Renewal Plans for Short-, Mid-, and Long-Term Needs

Lesson in Brief

Facilities leaders establish flexible short-, mid-, and long-term capital renewal plans that can adapt to changing conditions while continuously chipping away at the deferred maintenance backlog.

Rationale

Since the challenges and goals of capital renewal planning vary across different time frames, Facilities leaders must leverage different strategies to create adaptable renewal plans for short-, mid-, and long-term maintenance needs. Especially in an erratic funding environment, creating capital renewal plans that clearly articulate short- and long-term project priorities ensures Facilities optimizes limited capital allocations.

Implementation Components

Component 1: Short-Range Planning

Facilities units maintain a list of three- to six-month "shovel-ready" projects to ensure unexpected funds are spent strategically and demonstrate preparedness to senior leaders, leading to greater trust and funds in the future.

Component 2: Mid-Range Planning

Facilities units develop robust yet flexible capital renewal plans that map out year-to-year investments, bundle projects to reduce cost and speed of execution, and align projects with specific funding sources to stretch limited dollars.

Component 3: Long-Range Planning

Facilities leaders estimate long-term funding needs to proactively identify future challenges and work closely with senior leaders to secure reliable revenue streams.

Source: Facilities Forum interviews and analysis.

Hitting a Moving Target

Effective Planning Means Committing to Priorities While Maintaining Flexibility

The fifth lesson is to create adaptable capital renewal plans for short-, mid-, and long-term needs. The graphic below illustrates that the challenges and goals of capital renewal plans vary across different time frames.

In the short term, Facilities units are sometimes caught unprepared to quickly execute projects when funding unexpectedly arises, resulting in lost opportunities and distrust from senior leaders. To ensure last-minute funds are spent strategically, Facilities units should maintain a list of "shovel-ready" projects to execute on short notice.

Capital Renewal Planning Time Frames, Challenges, and Goals

Next, the challenge of mid-term planning is matching projects with revenue streams given an uncertain funding environment. Despite unpredictable conditions, Facilities leaders should develop precise project plans to ensure they are constantly chipping away at the deferred maintenance backlog.

Finally, the major challenge of long-term planning is the unpredictability of funding availability. Facilities leaders should estimate future funding needs and work closely with senior leaders to secure reliable revenue streams.

The remainder of this lesson will cover strategies for creating robust yet adaptable short-, mid-, and long-term capital renewal plans.

Source: Facilities Forum interviews and analysis.

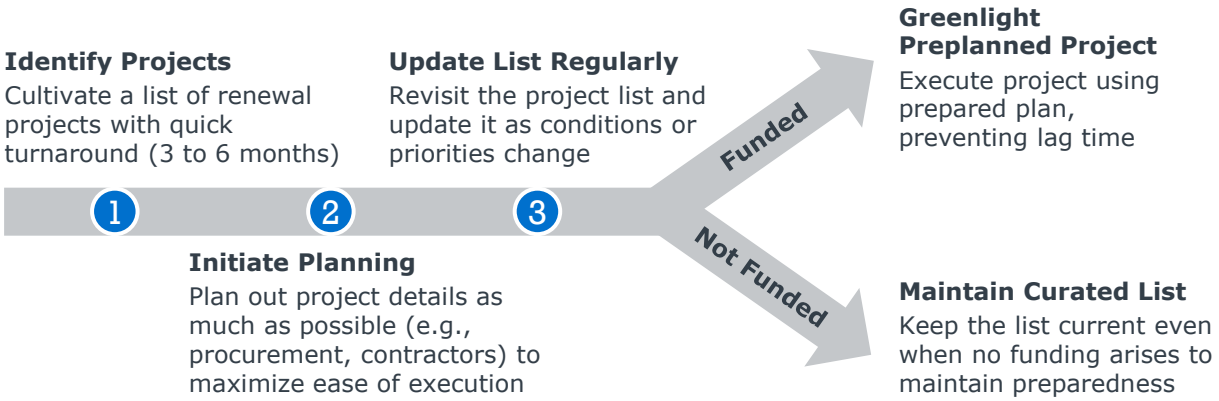
Curating a List of Shovel-Ready Projects

List Ensures Facilities Can Spend Money as Soon as It Becomes Available

Component 1: Short-Range Planning

The first type of capital renewal planning focuses on short-term (less than one year) needs. Given the complexity and length of most capital renewal projects, Facilities leaders sometimes underemphasize short-term planning. However, preparing for short-range projects is crucial for two reasons. First, some institutions operate under restrictive carry-forward policies that require all unspent funds to return to the state or system. This often leads to unproductive year-end spending. More importantly, short-term planning is critical for building senior leader trust. The execution of valuable projects on short notice demonstrates Facilities' efficiency and preparedness, leading to greater trust and funds in the future.

Process to Develop and Execute Shovel-Ready Project List



The Perils of Unpreparedness

"The worst thing that can happen is that you're constantly begging for more funding—but then you're not able to spend it when money becomes available."

Facilities Leader
Private Liberal Arts College

The graphic above provides a high-level framework for developing and executing a list of shovel-ready projects. First, Facilities identifies potential projects with a three- to six-month turnaround. Second, Facilities thoroughly plans all project details—such as drafting contracts and emails—to prevent unnecessary delays. Next, Facilities updates the list regularly to reflect changing conditions or priorities. Finally, Facilities either receives funds and executes pre-planned projects, or continues to maintain and update the list until funding becomes available. Ultimately, short-term planning ensures Facilities maximizes all funding opportunities.

Source: Facilities Forum interviews and analysis.

Staking a Claim on Year-End Funds

Saffron University[1] Secures Dollars for Projects with Quick Turnaround Time

Moving beyond preparedness, some institutions have begun proactively identifying and securing funds for short-term projects. Like many public institutions, Saffron University must return all unspent E&G[2] funds which historically led to wasteful year-end spending. In 2013, Facilities proactively requested year-end funds for a pre-planned utilities infrastructure project. Though the project had been rejected during the annual budget process earlier in the year, senior leaders immediately funded the project with unspent year-end dollars. Four key insights from Saffron University's experience are listed below.

Lessons Learned from Saffron University

Target Available Leftover Funding

Seek out end-of-year, alternative sources of funding that have less competition than initial budget dollars

Focus on Critically Important but "Unsexy" Needs

Select valuable projects otherwise challenging to fund due to small size or hidden location (e.g., infrastructure)

Select Projects with Two- to Six-Month Time Frames

Prioritize projects with short time frames to ensure available funds can be spent quickly (particularly on campuses with strict carry forward rules)

Reduce Thought Burden on Senior Leaders

Compile as much information as possible to simplify the decision-making process for senior leaders

1) Pseudonym.
2) Education and general.

Source: Facilities Forum interviews and analysis.

UTSA Maps Out Ten-Year Renewal Needs

Plan Creates Detailed Replacement Cost Estimates for Systems and Buildings

Component 2: Mid-Range Planning

The next type of capital renewal planning is for mid-range projects between one and ten years out. The table below shows an excerpt of the University of Texas San Antonio's robust capital renewal plan for the next decade. The plan includes detailed costs of replacement for each sub-system across an 11-year period, along with the total cost of replacement.

Snapshot of the University of Texas at San Antonio's Capital Renewal Plan, in Thousands of Dollars

Building/ Project Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total
Biosciences, Elevators	$0	$0	$0	$0	$0	$0	$262	$0	$0	$0	$0	$262
Biosciences, HVAC	$128	$1,677	$2,440	$0	$0	$0	$0	$0	$0	$0	$0	$4,245
Biosciences, Fire Detection	$0	$262	$0	$0	$0	$0	$0	$1,130	$0	$0	$0	$1,392
Biosciences, Specialties	$0	$0	$0	$0	$0	$0	$3,145	$0	$0	$0	$0	$3,145
Biosciences, Total Building	$128	$1,939	$2,440	$0	$0	$0	$3,407	$0	$0	$0	$0	$7,915
John Peace Lib, Total Building	$1,216	$5,269	$6,283	$1,631	$355	$1,824	$0	$405	$0	$3,445	$6,203	$20,428
Energy Plant, Total Building	$4,345	$1,587	$2,035	$392	$0	$1,587	$0	$0	$23	$0	$0	$9,971

This approach has two primary benefits. First, estimating total costs upfront enables more effective prioritization decisions. As shown on the table, this exercise allows leaders to map out investments across sub-systems each year. Second, this planning process allows leaders to easily re-evaluate and reprioritize projects over time as building condition, funding levels, and priorities change.

Source: University of Texas at San Antonio, San Antonia, TX; Facilities Forum interviews and analysis.

Linking Mid-Range Projects to Specific Funds

KU Uncovers Funding Shortfall, Prioritizes Restricted Dollars

In addition to project cost estimates, the University of Kansas's (KU) capital renewal plan aligns projects with specific funding sources, such as student fees, state funds, or capital renewal dollars. One advantage of this approach is that Facilities can proactively identify funding gaps. Moreover, this approach allows Facilities to better match projects with the appropriate type of funding. For example, KU can ensure that high-priority projects align with the most reliable funding streams and that restricted funds, such as gifts or tax credits, are used appropriately.

For a full version of the KU's Capital Renewal Plan, please see page 56 of this publication.

University of Kansas's Capital Renewal Plan Mapped by Funding Source

KU THE UNIVERSITY OF KANSAS

Location	Description	Cost	Category	Funding Source
Lindley Hall	Fire alarm system	$414,951	Academic	State funding
Potter Lake	Dredging and repairs	$500,000	Grounds	Infrastructure renewal fees
Haworth Hall	Membrane Repairs	$17,886	Academic (Biology)	State funding
15th Street	Traffic flow improvements	$250,000	Infrastructure	Fund 180
Chancellor's Residence	Exterior Rehabilitation	$500,000	Administration	Sale of historic tax credits
Watson Library	Roofing Renewal	$2,433	Libraries and Museums	*Funds currently not identified*

Connects most important projects (e.g., safety) to most reliable funds

Highlights possible collaboration with other departments

Aligns projects with funds to identify gaps

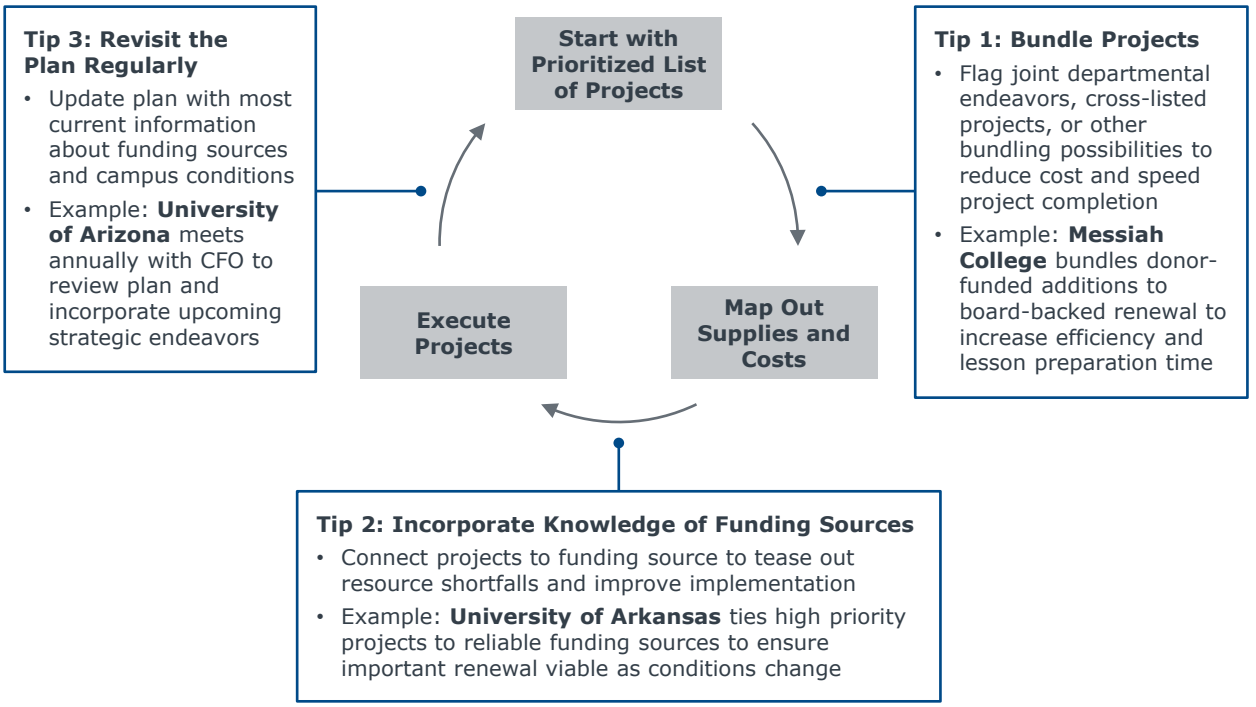
Source: University of Kansas, Lawrence, KS; Facilities Forum interviews and analysis.

Lessons Learned from Keeping the Plan Current

Proven Tips for Bundling Projects and Matching to Funding Sources

While many institutions have mastered the basics of mid-term planning, most can benefit from targeted process improvements. The framework below depicts a high-level summary of mid-term capital renewal planning, as well as tips to improve the process. The first tip is to bundle projects together to reduce cost and speed of execution. For example, Messiah College was able to fund a much-needed roof renewal as part of a donor-funded project to renovate their gymnasium.

Capital Renewal Planning Cycle



The second tip is to connect projects with specific funding sources to proactively identify funding gaps. To guarantee the execution of important projects in an unpredictable funding environment, the University of Arkansas links high-priority projects to reliable funding streams. The final tip is to regularly update the mid-term plan to reflect changing conditions and priorities. At the University of Arizona, Facilities leaders meet annually with the CFO to review the capital renewal plan and ensure projects reflect strategic goals.

Source: Messiah College, Mechanicsburg, PA; University of Arizona, Tucson, AZ; University of Arkansas, Fayetteville, AR; Facilities Forum interviews and analysis.

Gazing into the Future

The Citadel Prepares 40-Year Capital Renewal Plan to Gauge Long-Term Needs

Component 3: Long-Range Planning

The last and most challenging type of capital renewal planning is long-range planning, which typically looks beyond the next 10 years. Given the unpredictability of maintenance needs and funding availability, creating reliable long-term renewal plans can be challenging. Nonetheless, this exercise enables Facilities leaders to identify potential long-term challenges and make the case that greater stewardship now will reduce future expenses. The Citadel, The Military College of South Carolina. has taken a promising first step toward building a long-term plan. Their process for building a 40-year capital renewal plan is outlined below.

Long-Term Planning Process at The Citadel, The Military College of South Carolina

Challenge of Split Time Perspectives	Bringing the Future to the Present	Making the Financial Case
The Citadel builds long-term plan after realizing that while Facilities often thinks in terms of decades, board members and state legislators are focused on year-to-year decisions	40-year plan forgoes showing large backlog number, instead providing detailed estimates of changing building condition and funding sources, allowing senior leaders to foresee potential long-term opportunities and challenges	Plan showcases unavoidable costs the Citadel will eventually face, linking manageable stewardship commitment now to a reduction in future expenses

Source: The Citadel, The Military College of South Carolina, Charleston, SC; Facilities Forum interviews and analysis.

DRAFT FY2017 Deferred Maintenance Priority List

August 31, 2015

Methodology: Ran KU VFA.facility "budget scenario" prioritization report for centrally-funded buildings on Lawrence and Overland Park campuses. Omitted Entomology Research Lab (candidate for razing) and Oldfather Studios (likely to be divested). Filtered for critical systems (building envelope, MEP) and systems with "currently critical" priority due to age and observed conditions. Estimated costs include 25% increase for soft costs. Filtered out items to be addressed in a current or upcoming planned project, or through regular maintenance, or through discretionary projects, or by IT. Also filtered out items most effectively maintained until failure (e.g., a stairwell heater) or until a whole-building or whole-system renovation (e.g., electrical distribution wiring). Adjusted priority of some items (exterior walls, exterior windows) based on new information about the relative urgency of like needs. This list omits streets, sidewalks, watermains, and other site and utility needs outside of buildings since currently those items are aggregated in the database in a manner that does not facilitate prioritization of discrete needs.

Note: Below this list are two more lists of items that are ineligible for state R&R funding and/or which do not show up in the VFA.facility report.

= recommended for FY2017 R&R funding based on the longstanding practice of distributing among various system types. Some additional projects appear on the recommended R&R funding allocations document.

Calculated Rank	Calculated Score	Asset Name	Requirement Name	Estimated Cost (USD)	Asset FCI	Requirement Prime System	Requirement Category	Asset KU Mission Critical	Asset Use for Budget Module
1	92.53	Lindley Hall	Fire Alarm System Renewal	$ 414,951	0.31	D5037-Fire Alarm Systems	Beyond Useful Life	Yes	Academic
2	91.48	Haworth Hall	Central AHU - Const Volume - Central Wing Renewal	$ 536,179	0.34	D3040-Distribution Systems	Beyond Useful Life	Yes	Academic
3	91.13	Haworth Hall	Single-Ply EPDM Membrane - Fully-Adhered - 1985 Renewal [plus some PVC membrane]	$ 17,886	0.34	B30-Roofing	Beyond Useful Life	Yes	Academic
4	91.13	Haworth Hall	Elastomeric Coating - 1985 Renewal	$ 51,747	0.34	B30-Roofing	Beyond Useful Life	Yes	Academic
5	91.13	Chalmers Hall	Skylights - Dome Types - 1977 Renewal	$ 113,053	0.22	B3021-Glazed Roof Openings	Beyond Useful Life	Yes	Academic
6	91.13	Chalmers Hall	Modified Bitumen - 1977 Renewal	$ 315,438	0.22	B30-Roofing	Beyond Useful Life	Yes	Academic
7	89.22	Watson Library	Asphalt Shingled Roofing Renewal	$ 2,433	0.26	B30-Roofing	Beyond Useful Life	Yes	Library and Museums
8	88.71	Higuchi Building	Fire Alarm Systems - Smoke & Pulls Renewal	$ 225,018	0.30	D5037-Fire Alarm Systems	Beyond Useful Life	Yes	Research
9	88.56	Watson Library	~Wood Windows Renewal	$ 17,045	0.26	B2020-Exterior Windows	Beyond Useful Life	Yes	Library and Museums
10	88.56	Watson Library	Aluminum Windows Renewal	$ 69,120	0.26	B2020-Exterior Windows	Beyond Useful Life	Yes	Library and Museums
11	87.66	McCollum Laboratory	DX Condensing Unit - 60 Tons Renewal	$ 81,019	0.38	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Research
12	87.66	Life Sciences Building A	Chiller - Reciprocating - Air-Cooled Renewal	$ 236,540	0.30	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Research
13	87.31	Malott Hall	Single-Ply PVC Membrane - Fully Adhered - Cooling Tower & Loading Dock Renewal	$ 20,495	0.24	B30-Roofing	Beyond Useful Life	Yes	Research
14	87.31	Higuchi Building	Modified Bitumen Renewal	$ 89,812	0.30	B30-Roofing	Beyond Useful Life	Yes	Research
15	86.65	McCollum Laboratory	Exterior Wood Trim Renewal	$ 1,668	0.38	B2010-Exterior Walls	Beyond Useful Life	Yes	Research
16	86.65	McCollum Laboratory	Steel Windows Renewal	$ 88,748	0.38	B2020-Exterior Windows	Beyond Useful Life	Yes	Research
17	86.65	Malott Hall	Aluminum Windows w/ Spandrel Panels Renewal	$ 529,006	0.24	B2020-Exterior Windows	Beyond Useful Life	Yes	Research
18	85.63	Smith Hall	DX Condensing Unit - Trane - Rooftop Renewal	$ 18,375	0.11	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Academic
19	85.63	Smith Hall	DX Condensing Unit - Trane Renewal	$ 23,013	0.11	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Academic
20	85.63	Blake Hall	Chiller - Carrier - 1988 Renewal	$ 59,698	0.15	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Academic
21	85.28	Dole Human Development Center	Single-Ply EPDM Membrane - Concrete Paver Ballast Renewal	$ 377,531	0.15	B30-Roofing	Beyond Useful Life	Yes	Academic
22	84.62	Marvin Studios	CMU Block Walls - Plain - 6" Renewal	$ 1,231	0.16	B2010-Exterior Walls	Beyond Useful Life	Yes	Academic
23	84.04	Watson Library	Traction Geared Passenger Elev - 22A Renewal	$ 242,275	0.26	D1010-Elevators and Lifts	Beyond Useful Life	Yes	Library and Museums
24	83.76	Life Sciences Buildings B & C	DX Condensing Unit - 2.5 Tons - Bldg B Renewal	$ 4,603	0.42	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Research
25	83.76	Regnier Hall	Heat Generating Systems - Unreliable Boilers Renewal	$ 91,102	0.05	D3020-Heat Generating Systems	Reliability	Yes	Academic
26	83.76	Life Sciences Buildings B & C	Chiller - Reciprocating - Air-Cooled - Bldg B Renewal	$ 168,872	0.42	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Research
27	83.76	Life Sciences Buildings B & C	Chiller - Reciprocating - Air-Cooled - New Renewal	$ 177,316	0.42	D3030-Cooling Generating Systems	Beyond Useful Life	Yes	Research
28	83.41	Stauffer-Flint Hall	Gutters and Downspouts Renewal	$ 29,123	0.11	B30-Roofing	Beyond Useful Life	Yes	Academic
29	83.41	Foley Hall	BUR (Built-Up Roofing) Renewal	$ 47,025	0.52	B30-Roofing	Beyond Useful Life	Yes	Research
30	83.41	Regnier Hall	Modified Bitumen Renewal	$ 365,034	0.05	B30-Roofing	Beyond Useful Life	Yes	Academic
31	82.13	McCollum Laboratory	Elevator Controls - Motor Controller - New Renewal	$ 4,451	0.38	D1010-Elevators and Lifts	Beyond Useful Life	Yes	Research
32	82.13	McCollum Laboratory	Traction Geared Sidewalk Lift Renewal	$ 26,809	0.38	D1010-Elevators and Lifts	Beyond Useful Life	Yes	Research
33	80.80	Nichols Hall	Aluminum Windows Renewal	$ 462,137	0.21	B2020-Exterior Windows	Beyond Useful Life	Yes	Research
34	80.65	Strong Hall	Modified Bitumen - 1995 Renewal	$ 27,526	0.24	B30-Roofing	Beyond Useful Life	Yes	Administration
35	79.99	Strong Hall	Steel Windows Renewal	$ 35,464	0.24	B2020-Exterior Windows	Beyond Useful Life	Yes	Administration
36	79.99	Strong Hall	Wood Windows Renewal	$ 101,715	0.24	B2020-Exterior Windows	Beyond Useful Life	Yes	Administration
37	78.31	Malott Hall	Walls and Handrails - Roof Guards Lacking	$ 2,940	0.24	B2015-Balcony Walls and Handrails	Building Code	Yes	Research
38	78.23	Stauffer-Flint Hall	Hydraulic Passenger Elev Renewal	$ 103,565	0.11	D1010-Elevators and Lifts	Beyond Useful Life	Yes	Academic
39	77.57	Robinson Health & PE Center	Aluminum Windows - 1980 - Natatorium Renewal	$ 84,964	0.21	B2020-Exterior Windows	Beyond Useful Life	Yes	Athletics and Recreation
40	75.78	Power Plant	Modified Bitumen Renewal	$ 95,289	0.47	B30-Roofing	Beyond Useful Life	Yes	Operations
41	75.12	Power Plant	Solid Brick Walls Renewal [plus stone veneer walls and limestone copings]	$ 86,608	0.47	B2010-Exterior Walls	Beyond Useful Life	Yes	Operations
42	75.12	Power Plant	Steel Windows Renewal	$ 206,390	0.47	B2020-Exterior Windows	Beyond Useful Life	Yes	Operations
43	71.96	Chiller Building #1	Single-Ply Membrane - Fully Adhered Renewal	$ 19,706	0.02	B30-Roofing	Beyond Useful Life	Yes	Operations
44	51.55	Military Science Building	Steel Windows Renewal	$ 239,379	0.30	B2020-Exterior Windows	Beyond Useful Life	No	Academic
45	50.30	Lippincott Hall	Modified Bitumen - 1954 Renewal	$ 7,865	0.23	B30-Roofing	Beyond Useful Life	No	Library and Museums
46	49.79	Hangar #1 Airport	Fire Alarm System - Light Density Renewal	$ 63,649	0.27	D5037-Fire Alarm Systems	Beyond Useful Life	No	Research
47	46.36	Max Kade Center	Single-Ply EPDM Membrane - Fully-Adhered Renewal	$ 1,480	0.15	B30-Roofing	Beyond Useful Life	No	Academic
48	46.36	Max Kade Center	Gutters and Downspouts Renewal	$ 2,139	0.15	B30-Roofing	Beyond Useful Life	No	Academic
49	45.12	Lippincott Hall	Traction Geared Passenger Elev - Lippencott Addition Renewal	$ 234,101	0.23	D1010-Elevators and Lifts	Beyond Useful Life	No	Library and Museums
50	44.49	Botany Greenhouse	Asphalt Shingled Roofing Renewal	$ 5,353	0.71	B30-Roofing	Beyond Useful Life	No	Research
51	43.83	Lied Center	Steel Windows Renewal	$ 5,277	0.08	B2020-Exterior Windows	Beyond Useful Life	No	Academic
52	43.83	Botany Greenhouse	Wood Windows Renewal	$ 6,973	0.71	B2020-Exterior Windows	Beyond Useful Life	No	Research
53	43.13	Nunemaker Center	Fire Alarm System - Ave. Density + Mass Communication Renewal	$ 66,713	0.28	D5037-Fire Alarm Systems	Beyond Useful Life	No	Administration
54	42.58	Campanile	BUR (Built-Up Roofing) Renewal	$ 2,446	0.04	B30-Roofing	Beyond Useful Life	No	Library and Museums
55	40.76	EHS Annex	Asphalt Shingled Roofing Renewal	$ 8,395	0.32	B30-Roofing	Beyond Useful Life	No	Operations
56	40.10	EHS Annex	Wood Siding Renewal	$ 856	0.32	B2010-Exterior Walls	Beyond Useful Life	No	Operations
			Total	6,317,546					

Source: University of Kansas, Lawrence, KS.

University of Kansas's Capital Renewal Plan (cont.)

Suggested Priorities for Infrastructure Renewal Fees Funding

Methodology: Listed previously identified unfunded campus priorities that are not eligible for R&R funding or Tax Credits funding.

Suggested Rank	Building or Location	Description	Estimated Cost	Comments
1	Potter Lake	Dredging and Repairs	$ 500,000	Need funding ASAP to commence design and bid in time for fall 2016 completion.
2	Iowa & 19th Pedestrian Tunnel	Programming & Schematic Design	$ 100,000	This is a master plan objective. This planning would be preparation for a major grant proposal.
3	Fambrough Gateway & Street Realignment	Programming & Schematic Design	$ 100,000	This is a master plan objective. This planning would position for potential fundraising.
4	Malott Gateway	Install Flagpoles	$ 60,000	A long overdue initiative at one of the main front doors to campus.
5	Military Science Building	Disconnect Roof Drains from Sanitary Sewer, Connect to Storm Sewer	$ 20,000	This would generate sanitary sewer capacity credits needed for Central District project.
6	Power Plant	Disconnect Roof & Yard Drains from Sanitary Sewer, Connect to Storm Sewer	$ 20,000	This would generate sanitary sewer capacity credits needed for Central District project.
7	Watson Library to Naismith Drive	Install Section of Jayhawk Trail	$ 2,000,000	Students have requested a sidewalk from Facilities Administration Building to Malott Hall.
8	11th Street	Install Sidewalk on South Side from West Campus Road to Missouri Street	$ 100,000	We've requested the City install this as they own that stretch of road.
9	Chiller Plant #3	Zone Chiller Plant to Serve Chalmers Hall, Lindley Hall, Marvin Hall, Possibly Others	$ 4,000,000	This is a master plan objective that would improve energy efficiency and firm capacity.
10	Spencer Museum of Art	Relocate Cooling Towers from Roof to Ground-Level Enclosure	$ 2,000,000	This would reduce risks of water damage to high-value art collections and position for future expansion.
11	Entomology Research Lab	Raze Building	$ 200,000	Is in unacceptable condition, nonconforming to the master plan, and may be a safety concern.
12	Parking Lots 38 & 61	Remediate & Retrofit Underground Fuel Storage Tanks for Stormwater Retention	$ 500,000	This would improve sustainability and reduce stormwater fees to the City.
13	Campuswide	Educational Signs for Champion Trees & Outstanding Trees	$ 100,000	This would complement other efforts to preserve and maintain these treasures.
		Total	$ 9,700,000	

Suggested Priorities for Historic Rehabilitation Tax Credits Funding

Methodology: Listed perviously identified unfunded campus priorities that are eligible for tax credits funding by virtue of being listed or contributing buildings in historic districts.

Suggested Rank	Building or Zone	Description	Estimated Cost	Comments
1	Chancellor's Residence	Exterior Rehabilitation	$ 500,000	Total estimate is $700,000. $195,000 was allocated in 2015.
2	Dyche Hall	Roof & Exterior Rehabilitation	$ 3,500,000	Based on Treanor Architects assessment report in 2015. This work is urgently needed.
3	Bailey Hall	Modernization (Whole Building Renovation)	$ 14,000,000	Some cost would be recouped in energy savings and tax credits, and whole building reno is more cost effective than piecemeal improvements.
		Total	$ 18,000,000	

Source: University of Kansas, Lawrence, KS.

Lesson 6: Get Buy-In to Take the Worst Spaces Offline

Lesson in Brief

Facilities leaders use data and space planning to win support for taking buildings in the worst condition offline.

Rationale

While Facilities leaders recognize the value of principled divestments to their broader deferred maintenance strategy, decommissioning space on campus is nearly always an unpopular and politically tenuous decision. Even when senior leaders understand the value of this strategy, they may be unwilling to publically support building demolition or decommissioning for political reasons. By leveraging data and other buy-in strategies, Facilities leaders can win senior leader support for decommissioning space and ultimately reduce the backlog by taking the worst spaces offline.

Implementation Opportunities

Opportunity 1: Focus on Non-Strategically Critical Buildings to Begin Divestment Efforts

Facilities assesses the strategic impact of all buildings on campus through a rigorous planning and evaluation process that guides investment and divestment decisions.

Opportunity 2: Leverage Cost-Benefit Analysis to Win Support of Senior Leaders

Facilities uses data like annual operations savings and deferred maintenance backlog reduction that immediate building divestment would achieve to win buy-in from institutional leaders.

Opportunity 3: Pair Building Demolition with New Construction

Facilities pairs all demolition with new construction to win support of stakeholders impacted by building demolition.

Opportunity 4: Offset Demolition Costs with Sales Through Architectural Salvage

Facilities offsets demolition costs by selling repurposable components of demolished buildings.

Source: Facilities Forum interviews and analysis.

Taking Space Offline a Herculean Task

Few Institutions Have Successfully Demolished Buildings

Rather than capital investment, the sixth lesson for addressing deferred maintenance centers on taking the worst spaces offline. All Facilities leaders recognize the value of principled divestments to the broader deferred maintenance strategy. However, decommissioning space on campus is nearly always an unpopular and politically tenuous decision. Even when senior leaders understand the value, they may be unwilling to publically support building demolition or decommissioning for political reasons.

This final lesson provides strategies to help Facilities leaders win buy-in for taking the worst spaces offline.

Two Down, Dozens to Go

"I've been at this institution for ten years and the only things I've torn down were a parking structure and a gatehouse."

Facilities Leader
Regional Public University

Something to Remember Me By

"No President, even if they agree with you, wants to be remembered as the one who shrunk campus. It's not the legacy they want."

Facilities Leader
Regional Public University

Importantly, institutions considering decommissioning space must establish short- and long-term plans to accommodate displaced units. The Facilities Forum's recent publication *Working with Academic Leaders to Improve Space Utilization* offers proven strategies to improve space management and free up swing space to accommodate units impacted by building demolition.

Study in Brief: Working with Academic Leaders to Improve Space Utilization

- Study explores nine best practices to correct current space misuses and incentivize academic leaders to redeploy underutilized space
- Includes strategies for improving space governance efficacy, recalibrating allocation and size of faculty offices, increasing share of centrally scheduled classrooms, and improving research lab productivity
- Full study available now at eab.com

Source: Facilities Forum interviews and analysis.

Responsive and Responsible Planning

BGSU Responds to External Pressures by Reevaluating Campus Footprint

Opportunity 1: Focus on Non-Strategically Critical Buildings to Begin Divestment Efforts

One institution that has successfully taken space offline is Bowling Green State University. In light of changing student needs and aging campus infrastructure, Bowling Green's Building Investment Committee launched a new campus master plan with the three guiding principles, outlined below. The plan aimed to preserve the institution's most historic structures and improve the quality and distribution of academic space. Most importantly, the plan called for evaluating the strategic impact of every building on campus to guide investment and divestment decisions. Ultimately, this evaluation process resulted in the demolition of four buildings with low long-term strategic value.

Bowling Green State University's Planning Timeline

BGSU

1. BGSU launches new campus plan to address changing student body composition and aging physical campus
2. Newly assembled Building Investment Committee establishes actionable planning milestones
3. Committee translated three planning principles into series of questions to evaluate campus facilities
4. Questions (listed below) guide decisions of what to invest in, decommission, and demolish

Three Principles and Questions to Evaluate Campus Facilities

Maximize use of Traditions buildings, the oldest and most historic facilities	What should we do with our **Traditions buildings?**
Improve the quality and distribution of academic space	How can we selectively invest to get buildings into **better condition?**
Determine which buildings have the most strategic long-term use	Which spaces truly help advance the **academic mission?**

Source: Bowling Green State University, Bowling Green, OH; Facilities Forum interviews and analysis.

Making Decommissioning a Campus Reality

Bowling Green's rigorous planning and evaluation process led to the impressive results shown below. By 2018, BGSU will have decreased the number of classrooms on campus by 23% and demolished 380,000 square feet of space across four buildings. Ultimately, strategic building demolition will reduce BGSU's deferred maintenance backlog by 18%, allowing Facilities to better focus renewal dollars on more critical buildings.

To learn more about Bowling Green State University's plan, download our research brief *Taking Space Offline*, available at eab.com.

Bowling Green Decommissioning Results

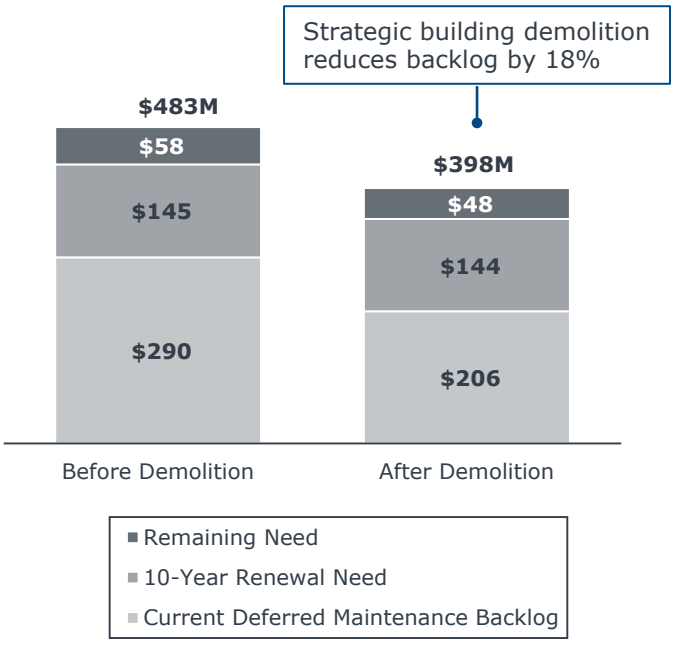
23%

Decrease in the number of classrooms from 2012

380K

Square feet **demolished** across four buildings by early 2018

Capital Renewal Needs[1]



Study in Brief: Taking Space Offline

- Our research brief profiles Bowling Green State University's blueprint to strategically decommission underutilized classrooms to advance academic goals and better appeal to a changing student profile
- Provides tactics to generate executive buy-in and identify the right spaces for investment and decommissioning
- Full research brief available now at eab.com

1) Data comes from ROPA+ modeling on behalf of Bowling Green.

Source: Bowling Green State University, Bowling Green, OH; Facilities Forum interviews and analysis.

Crunching the Numbers

Caltech's Facilities Leader Creates Cost-Benefit Analysis of Demolition

Opportunity 2: Leverage Cost-Benefit Analysis to Win Support of Senior Leaders
Another institution that has successfully divested from buildings in the worst condition is California Institute of Technology (Caltech). Caltech's Facilities executive presented the following table to the provost, outlining the annual savings and deferred maintenance reduction that targeted demolition would achieve. For each building, Facilities calculated demolition costs and the immediate annual savings earned through the elimination of utilities and operations and maintenance costs. Next, they calculated the payback time frame, based exclusively on savings. Finally, Facilities calculated the amount of deferred maintenance eliminated through demolition. By leveraging a straightforward cost--benefit analysis, Facilities gained the provost's support to demolish these five buildings with an average facility condition index (FCI) of 0.84.

Table of Demolition and Payback Options, April 2011

Caltech

Building	Size (Gross SF)	Demo Cost based on $15/SF	Reduction in Annual Utility & Operations Cost Based on $10/SF	Payback in Years	DM Eliminated
Sloan Annex	8,650	$200,000	$86,500[1]	2.3	$900K
Ticket House	1,450	$21,750	$14,500	1.5	$180K
DCAA House	790	$11,850	$0[2]	--	$90K
Public events building	2,180	$32,700	$21,800	1.5	$250K
Two Y buildings	4,055	$60,825	$15,550[2]	4	$210K

> "Once my provost understood the total cost of ownership, he wanted to tear down more buildings than I did."
>
> *Jim Cowell*
> *Associate Vice President for Facilities Planning and Management*
> *California Institute of Technology*

1) Loss of ICR reimbursement offsets some savings to general fund.
2) Savings reduced since units will move to a space that is now mothballed.

Source: California Institute of Technology, Pasadena, CA; Facilities Forum interviews and analysis.

Taking Buildings Down Is a Win-Win

Caltech Eliminates Deferred Maintenance and Reduces Annual O&M Costs

As shown below, Caltech's building demolition significantly improved overall campus condition and reduced annual expenses. Since 2012, the institution has demolished 25,000 square feet of space and eliminated $4.7 million from their deferred maintenance backlog. Due in part to these demolitions, Caltech has been able to maintain a FCI of approximately 0.24.

By the Numbers

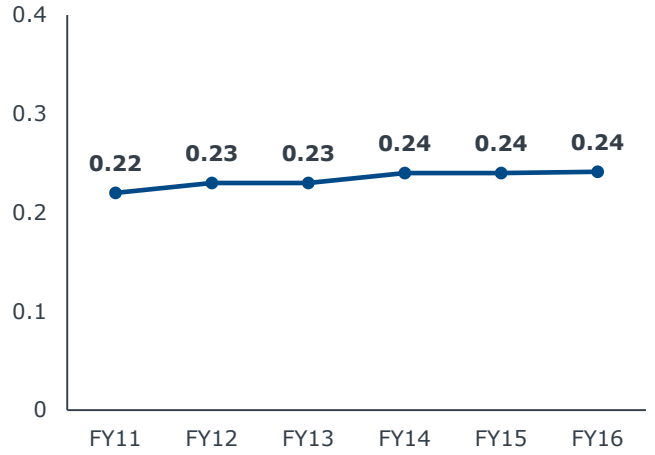
25K Square feet demolished since 2012

0.84 Average FCI of demolished facilities

$4.7M DM of demolished facilities

$250K Savings in avoided annual O&M expenses

Facility Condition Index at Caltech



Source: California Institute of Technology, Pasadena, CA; Facilities Forum interviews and analysis.

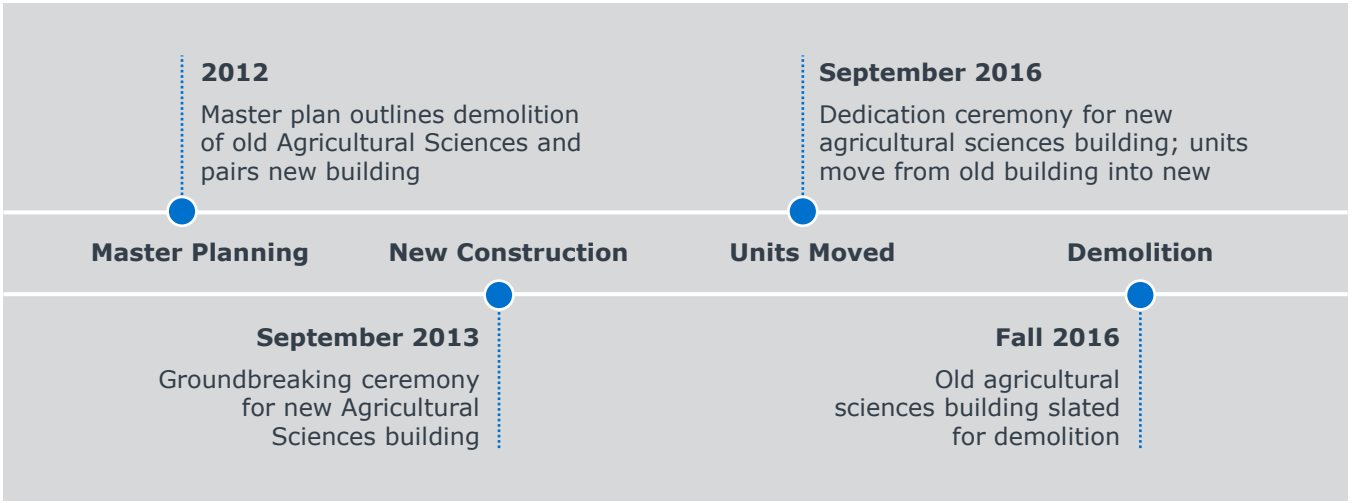
You've Got to Give a Little to Get a Little

WVU Pairs New Construction with Demolition

Opportunity 3: Pair Building Demolition with New Construction

The third consideration is to pair building demolition with new construction. Many Facilities leaders have found that impacted stakeholders are more likely to support demolition if offered brand new space. One institution that pairs all demolition with new construction is West Virginia University (WVU). The example below outlines the timeline for their Agricultural Sciences building.

Timeline of Events Leading to Building Demolition at West Virginia University (WVU)



WVU eliminates 344K SF and $66M in its DM backlog in past decade—a 16.5% decrease

First, WVU announced the demolition of the old building in the 2012 master plan. The following year, they broke ground on the new building. The new building's dedication ceremony was held in September of 2016. Shortly after, the old Agricultural Sciences building was slated for demolition. Since first introducing this approach, WVU has eliminated a total of 344,000 square feet and reduced the deferred maintenance backlog by 16.5%.

Source: West Virginia University, Morgantown, WV; Facilities Forum interviews and analysis.

Offsetting Demolition Costs with Sales

Minnesota State University Generates $35K from Architectural Salvage

Opportunity 4: Offset Demolition Costs with Sales Through Architectural Salvage
The final consideration is to offset demolition costs with sales through architectural salvage. Minnesota State University (MSU) engaged the architecture firm FEH Design to demolish a 1960s residence hall through controlled implosion. Beyond the implosion, Minnesota State specifically chose FEH Design for their architectural salvage service, whereby the firm sells every repurposable component of a demolished building for a portion of the revenue. For example, FEH Design sold dining furniture to summer camps, auctioned mail boxes to former residents, and even converted building rubble into gravel used to build a new parking lot on campus.

Implosion of Gage Residence Hall Complex

YOUTUBE.

- Gage Residence Hall Complex constructed in 1965; in 2004, complete renovation estimated to cost MSU $28.8 million
- MSU issued RFP for demolition, ultimately selecting FEH Design's $1.3 million bid[1]
- Beyond implosion, FEH offered architectural salvage to clear excess inventory and divert garbage from landfill; achieved 95% diversion rate

Architectural Salvage

- Sold dining furniture to three summer camps
- Set aside building stones and bricks to sell to alums
- Coordinated with Advancement to sell old mailboxes
- Converted building rubble into gravel; saved $250K in using gravel to build parking lot

$35,200

Revenue from pre-demolition and salvage sales

As a result, Minnesota State received $35,000 in revenue through their revenue-sharing arrangement with FEH Design. They also saved $250,000 in parking lot construction costs by reusing the building rubble. Importantly, institutions considering decommissioning space must establish short- and long-term plans to accommodate displaced units.

1) FEH and MSU created revenue-sharing agreement to split revenue from architectural salvage.

Source: FEH Design and Minnesota State University, "Sustainable Demolition & Deconstruction," MAPPA 2016 Annual Conference; Facilities Forum interviews and analysis.

Appendix

Supplemental Materials

Guide to Effectively Communicating Facilities Information Through Reports

Whether informing campus constituents about current condition of facilities or convincing senior leaders that specific projects or asks should be a funding priority, Facilities leaders must frequently communicate technical information and space data to different stakeholders. One of the most common formats for communicating this information is through reports. However, Facilities leaders must balance providing the right amount of context without overwhelming the recipient with information. This guide outlines key components of effective communication through a report format.

Considerations for Content to Include in Facilities Reports

1 **Tailor the report to the intended audience** by including details relevant to their role and goals. Potential audiences include institutional senior leaders, deans, the board, or legislators. Knowing the intended audience enables Facilities leaders craft a customized message and more effectively advance the goal of the report. The table below provides examples of tailoring reports to different audiences.

Audience	Goals	Information to Include
Deans	Reports created for deans will provide updates on ongoing construction projects and future plans for the buildings deans occupy and potentially solicit buy-in for the Facilities capital renewal plan.	• Current projects that impact the buildings deans inhabit, including updates on project impacts (e.g., noise, building accessibility, parking), timelines, and completion dates • Functional changes to layout and style of space with accompanying photos and/or renderings • How each project improves life on campus, including brief case studies if applicable (e.g., how HVAC updates have improved classroom conditions, how more reliable infrastructure safeguards and supports ongoing research) • General overview of the Facilities capital renewal plan to preview future work and solicit feedback from academic leaders
CBO	Reports targeted at the chief business officer may aim to generate support for and interest in funding specific projects or a broad renewal plan, and provide updates on previously funded projects.	• Current projects with timelines and completion dates • Business cases for proposed projects, including potential return on investment • Connections between proposed projects and broader strategic goals for the institution
Legislators	Reports produced for legislators will likely focus on securing funding for a broad renewal plan.	• Capital projects successfully completed in the past to demonstrate responsible stewardship of resources • Proposed projects including business cases • How capital renewal plan and specific projects will positively impact campus reputation, program offerings, and the surrounding community • Connections between renewal plan and broader strategic goals for the institution
Broader Campus Community	Reports designed for the broader campus community will serve to update and inform the campus about current and future projects.	• General overview of the Facilities capital renewal plan to preview future work • Successfully completed capital projects • How capital renewal plan and specific projects will positively impact campus reputation, program offerings, and the surrounding community • How each project improves the campus experience, including brief case studies (e.g., how HVAC updates have improved classroom conditions, how work on campus roads has improved traffic flow)

Even if the report is written specifically for one audience, it can be distributed to multiple stakeholders. Choose how widely the report will be disseminated based on the goals of the report. For instance, a board-level report can be circulated among senior campus leaders. However, it is possible circulating with the broader campus could do more harm than good if the report lacks sufficient context or explanation.

Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; Facilities Forum interviews and analysis.

Guide to Effectively Communicating Facilities Information Through Reports (cont.)

2 **Showcase big wins** through examples of recent projects completed for, in collaboration with, or with funding from the target audience. These projects demonstrate that Facilities is making investments in assets that both advance institutional goals and support the priorities of the intended audience. Depending on the recipient of the report, it can also be a step towards showcasing that Facilities is a good steward of scarce institutional resources.

Current Program for the Core Buildings

Funded by University of Maryland

H. J. Patterson Wing 2 3rd Floor: Internally funded renovation (FY 2010) at a cost of $4.7 million

Journalism Building: Internally funded renovation (FY 2009/2010) at a cost of $7.1 million

Shoemaker Hall: Internally funded (FY 2008-2010) at a cost of $9.02 million

Included in Governor's FY 2011-2015 CIP

University Teaching Center: Including renovation of Holzapfel Hall (FY 2012-2015) at a cost of $60.2 million

Chemistry Wings 1 and 2: Renovation (FY 2013-2015 and beyond) at a cost of $74.4 million

3 **Make targeted funding requests.** If one goal of the report is to request funding, limit requests to projects that are most urgent and/or are of interest to the target audience. The goal is to communicate the magnitude of the problems facing campus and create urgency without overwhelming the audience with too many asks.

4 **Describe why each project is important to the success of the institution,** highlighting how the projects (and any funding requests) in the report specifically benefit the intended audience. Facilities must link projects to a specific strategic goal (e.g., supporting research and student success, boosting recruitment). By clearly showing the audience how projects support the mission and strategic goals of the institution, Facilities leaders improve their chances of achieving their goal, whether it is generating interest or securing funding. For example, the University of Hartford's Facilities leader was told that the institution would not invest in irrigation project. The Facilities leader reframed the project as an opportunity to increase curb appeal and enrollment and received funds immediately.

Another example comes from the University of Maryland at College Park's (UMD) 2010 *Restore the Core* report:

These conditions cost the campus scarce operating funds each time an emergency repair is needed, waste utilities, and result in cancelled classes, interrupted research, and down time for students, faculty, researchers and staff.

The following pages look at just some of the buildings that make up the university. While words tell the story, a picture is worth a thousand words. Better yet, a tour during or immediately following an emergency response is sobering.

The University must obtain the capital funding needed to *Restore The Core* so our facilities can support our world-class university.

Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; University of Hartford, Hartford, CT; Facilities Forum interviews and analysis.

Guide to Effectively Communicating Facilities Information Through Reports (cont.)

Considerations for Formatting Facilities Reports

5 Begin the report with an **executive summary** to highlight important takeaways upfront. The goal of an executive summary is for the reader to understand the focus and purpose of the report and entice the reader to continue reading. UMD began its 2010 report Restore the Core by summarizing the problem in compelling and urgent language.

Restore the Core!

The Need to Renew the Oldest Buildings on Campus and the Heart of the University

The core of the university is housed in buildings that were constructed before 1950 and no longer meet the university's needs. While the stately columns and Georgian architecture look nice from afar, we must look behind the walls to learn the real story.

Heating and cooling systems waste significant amounts of energy and cannot provide year-round temperature and humidity control. Radiators cannot meet the needs of a research university.

The electrical systems are over subscribed, do not meet current safety codes, and are supported by fuses and other components that are no longer manufactured. The electric systems can not meet the needs of today's technology.

Building foundation drains have long since failed, causing major flooding of many buildings during every major and most modest rain events. The floods destroy research, create mold problems, and interrupt the mission of the university.

The buildings are served by an invisible underground system of pipes, wires, drains, etc., which fail regularly resulting in additional flooding, loss of heating, cooling, humidity control, and disruption to academic and administrative activities, costing hundreds of thousands dollars each year.

Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; Facilities Forum interviews and analysis.

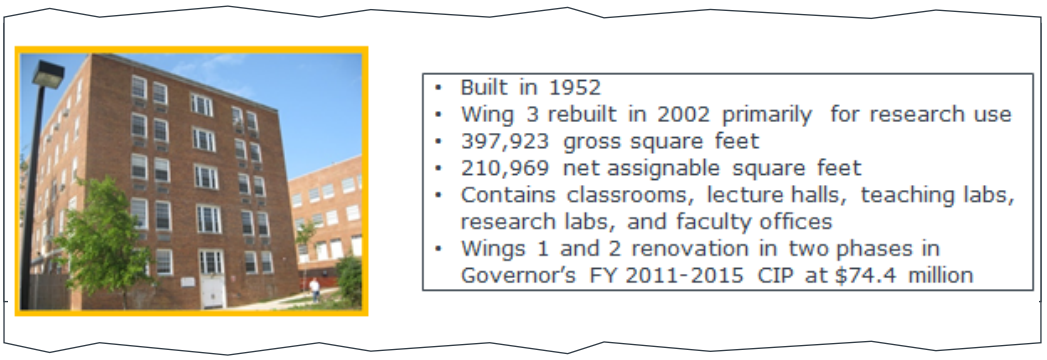
Guide to Effectively Communicating Facilities Information Through Reports (cont.)

6 **Communicate one project, building, system, or space per page.** Maintaining a narrowly scoped focus minimizes clutter and improves readability. It also speeds time to report creation by standardizing the information that should be included on each page. Most importantly, this ensures the report is consumable regardless of whether the reader starts at the beginning or opens to a random page. Organize projects within the report based on the report's goals.

Example Page from UMD's *Restore the Core* Report

7 **Bullet out important background information** to provide sufficient context for the project/building/system/space. Background information includes:

- Name and location of project, including building(s) and stakeholders impacted
- Target completion date
- Brief summary of work completed (i.e., what was constructed, renovated, or maintained) and by whom (e.g., Facilities, external contractor)
- Contact information within Facilities department



Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; Facilities Forum interviews and analysis.

Guide to Effectively Communicating Facilities Information Through Reports (cont.)

8 Use **pictures and simple graphs** to communicate visual information. Pictures should be clearly labeled with contents and location (if applicable). Call out specific takeaways for each picture, such as infrastructure failures or unique features of renderings of future spaces.

- For a completed project, include before and after pictures
- For an update on an ongoing project, include pictures showing progress
- For funding requests, include pictures of failing systems and components (and detail why the systems are failing)

All graphs should be accompanied by a brief description of key takeaways. This will enable readers to quickly scan and extract the important information.

- Use bright colors and big numbers to call out important data points
- Make graphs as accessible as possible by including titles, axis labels, and legends; color-coding the graph is helpful, but keep colors to a limited number to avoid overwhelming the reader.

Pictures of Corroded Pipes at UMD

Older installed sprinkler pipes become corroded over time and reduce the capacity of the pipe to deliver critically needed water when activated.

Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; Cosner Sr. D, "Failing Infrastructure Creates Invisible Crisis at University of Maryland," June 1, 2012, https://www.facilities.umd.edu/documents/Invisible%20Crisis.pdf; Facilities Forum interviews and analysis.

Guide to Effectively Communicating Facilities Information Through Reports (cont.)

9 **Use short, simple sentences and concise language**. Aim to be as non-technical as possible with report language. Target the writing style for laypeople by excluding jargon and unfamiliar terms. The goal is to make the report as easy to read as possible so the reader can focus on processing the request.

When it is necessary to include Facilities-specific terms in the report, define them within the report or in a glossary of terms to the reader can understand[1]. Some terms that merit definitions may include:

- Facilities Condition Index (FCI): Ratio that measures the cost to correct condition deficiencies and return an asset to its original condition, divided by the current replacement value of that asset.
- Building or room utilization rate: Space utilization metric defined as the number of hours a building or classroom is occupied across the academic week (e.g., from 8 a.m. to 5 p.m., Monday through Friday).
- Building Automation System/Building Management System (BAS/BMS): Centralized, remote, automatic control of multiple systems within a single building (or serving multiple buildings), particularly mechanical and electrical systems such as HVAC, lighting, and fire systems. For example, the BAS shuts down a room's HVAC on evenings and weekends even if the occupant has left the air conditioning on.

An Explanation of an Infrastructure Problem at UMD

A hole no bigger than the end of a finger eight feet below the surface...

...means a substantial and costly repair.

1) A good starting point for definitions is the APPA Glossary. This glossary of terms is publically accessible and does not require an APPA membership. Access the glossary at: http://www.appa.org/research/glossary.cfm.

Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; Cosner Sr. D, "Failing Infrastructure Creates Invisible Crisis at University of Maryland," June 1, 2012, https://www.facilities.umd.edu/documents/Invisible%20Crisis.pdf; Facilities Forum interviews and analysis.

Guide to Effectively Communicating Facilities Information Through Reports (cont.)

10 **Use consistent fonts and colors, as well as ample white space.** Align the font and color choices with either the institutional brand or the Facilities brand (if established). Check with the departmental or central communications office for a report template (e.g., PowerPoint or Word templates with institution's approved colors and layouts).

If there are no standardized fonts or color schemes, consider implementing them within the Facilities department. Using consistent fonts and a limited color scheme across documents and media increases the perception of professionalism and signals to readers that the communication is from Facilities, which can draw attention on a campus overflowing with information. Use bolding, underlining, and italics selectively, only to call out titles or important information.

Beyond limiting the number of colors, balance graphics and text with white space. Incorporating white space into a document creates more "hooks" for the reader's eye and reduces the effort required to digest the information. Increasing line spacing and margins (of both text and graphics) allows for more white space in a document.

Lecture hall with obstructed view

Small, cramped classrooms heated with steam radiators

Antiquated facilities used by thousands of visitors annually

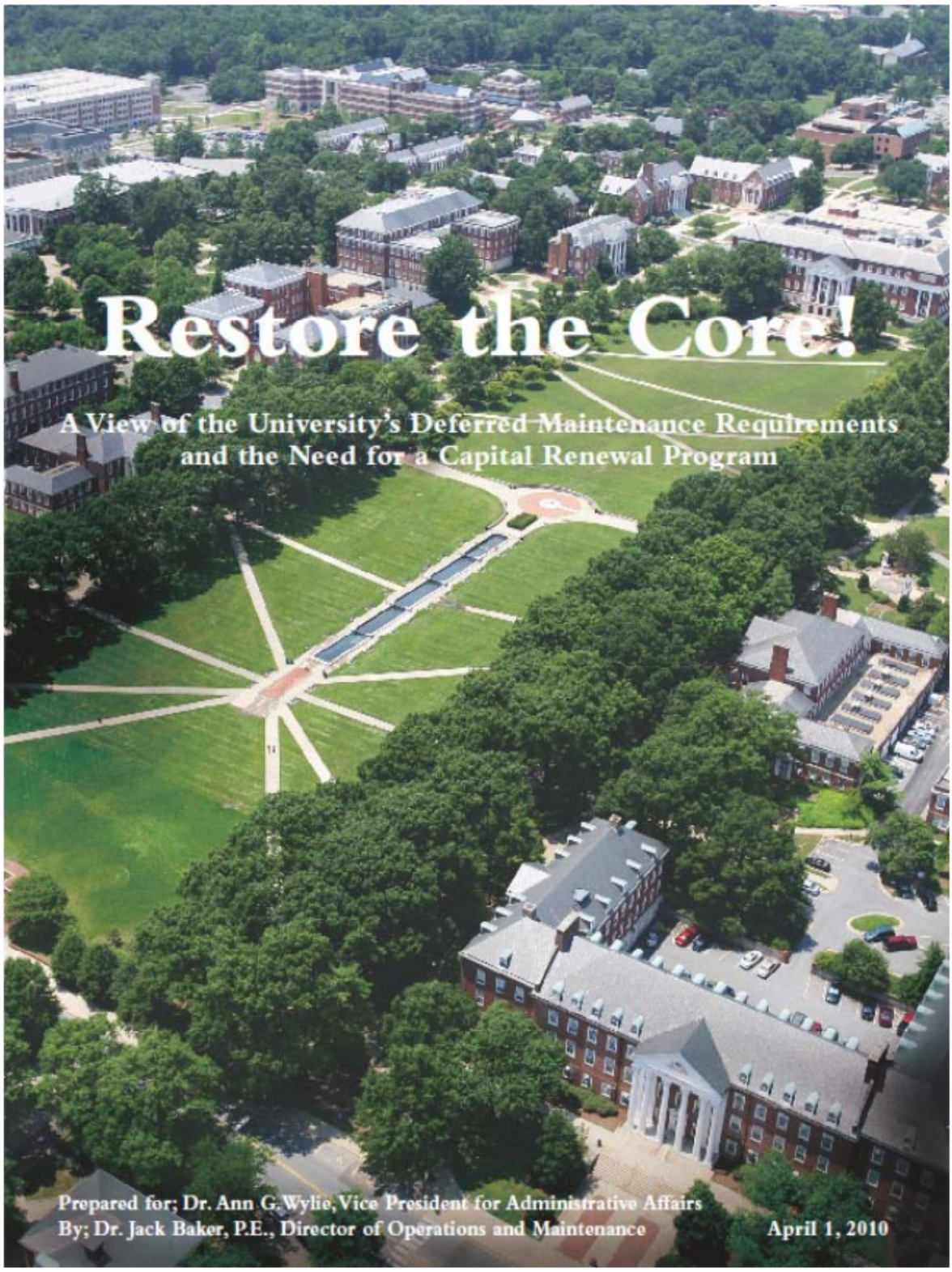
Serious brick joint failures

11 **Check the report carefully for grammatical errors and overall comprehension**. Ask someone not involved in report creation to proofread the report to check for errors and possible issues with clarity. Determine what target stakeholders need to know about the project and remove words that do not provide essential information. This will improve comprehension and readability.

12 **Produce electronic versions for display on kiosks or screens**, which is a sustainable solution for campuses moving away from or eliminating printed documents. Electronic versions can also be emailed to legislators or posted on Facilities' or the institution's website for wider distribution.

Source: Baker J, "Restore the Core," April 1, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf; Facilities Forum interviews and analysis.

University of Maryland's Restore the Core Report



Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core!

Table of Contents

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core!

Table of Contents (Continued)

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UMD's Restore the Core Report (cont.)

Restore the Core!

The Need to Renew the Oldest Buildings on Campus and the Heart of the University

The core of the University is housed in buildings that were constructed before 1962 and no longer meet the University's needs. Unfortunately very few of these buildings have been renovated and thus most of their building systems are antiquated, heavily deteriorated and energy inefficient. Some examples:

•Heating and cooling systems waste significant amounts of energy, can not provide year round temperature and humidity control , and are nearly impossible to maintain due to their advanced deteriorated condition.

•The electrical systems are over subscribed, do not meet current safety codes, are supported by fuses and other components no longer manufactured. The electric systems can not meet the needs of today's technology.

•Building foundation drains have long since failed causing major flooding of many buildings during every major and most modest rain events. The floods destroy research, create mold problems, and interrupt the mission of the university.

•The buildings are served by an invisible underground system of pipes, wires, drains, etc. which fail regularly resulting in additional flooding, loss of heating, cooling, humidity control and disruption to academic and administrative activities, and cost hundreds of thousands dollars each year.

These conditions cost the campus scarce operating funds each time an emergency repair is needed, waste utilities, and result in cancelled classes, interrupted research, and down time for students, faculty, researchers and staff.

The University must obtain the Capital funding needed to *Restore The Core* so our facilities can support our world class university

1

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core!

Overview of the University of Maryland Campus

The flagship of the University System of Maryland, the University of Maryland began in March 1856 as the Maryland Agricultural College and graduated it's first students in July 1862. Situated on 1,250 acres, the campus facilities include 264 buildings encompassing 13,122,241 gross square feet of interior building space.

When age is adjusted, where applicable, to the date of major renovation, 30% of the state-supported space in buildings is over 40 years of age and 18% is over 50 years of age (fall 2008 data). In fact, 63% of all USM state-supported space older than 50 years belongs to UM (fall 2008 data, age not adjusted to the date of major renovation). The infrastructure, in many cases, is 50 to 70 years old. Due to the vast size and advanced age of UM's facilities and historic underfunding of facilities renewal, there is a deferred maintenance backlog of well over $0.6 billion.

This document, which describes a $264 million campaign to restore 17 key buildings and hardscape, addresses only a portion of UM's facilities renewal needs. UM has also proposed a $119 million plan to address the "Invisible Crisis" of our failing infrastructure. Many other facilities also need funding to address renewal needs.

Facilities renewal and our deferred maintenance requirements continue to have a major impact on our ability to meet our teaching and research mission and achieve our goals. Meeting the Board of Regents goal of expending 2 percent of replacement value annually on facilities renewal will help avoid increasing the over $0.6 billion backlog, but will not reduce it. Our growing backlog can only be addressed by large special allocations of capital funding totaling in the hundreds of millions of dollars.

The buildings included in the Restore the Core plan were chosen based on a number of criteria. All except one are located in or adjacent to UM's historic core area around McKeldin Mall. These are among the oldest buildings on campus and, in general, don't contain laboratory or high-tech space that requires urgent facilities renewal attention. Consequently, the building foundation, electrical, mechanical and HVAC systems are antiquated, deteriorating and often not compliant with current code, with parts no longer available when repairs must be made.

2

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core!

Quick Overview of Restore The Core Buildings

Building	Date of Construction or Renovation	Condition Description	Estimated Renovation Cost*
Rossborough Inn	1798	Historic building, oldest on campus, built in 1798. Insufficient electrical and HVAC systems. Plaster delaminating. Foundation leaks.	$ 4,300,000.00
Morrill Hall	1898/1944	Second oldest building on campus, built in 1898, survived the Great Fire of 1912. Insufficient electrical and HVAC systems. Building envelope failing. Foundation leaks.	$ 7,700,000.00
Taliaferro Hall	1908/2003	Building over one hundred years old. Foundation leaks, lacks modern HVAC, plumbing infrastructure failing, does not support modern teaching technology.	$ 9,100,000.00
Turner Hall	1923/2008	Exterior wood and windows require replacement. HVAC system insufficient resulting in indoor air quality issues. The building houses the Dairy restaurant.	$ 5,200,000.00
Francis Scott Key Hall	1932/2001	Foundation leaks. HVAC system insufficient. Electrical distribution system antiquated and can not support modern teaching technology.	$ 8,300,000.00
Holzapfel Hall	1932	Extensive interior and exterior wood replacement required. HVAC system insufficient and not sustainable. Electric distribution system insufficient.	$ 3,500,000.00
H.J. Patterson	1937/1967	Frequent roof leaks. HVAC system insufficient and not sustainable. Antiquated electrical distribution system is unreliable and can not sustain current research requirements.	$ 52,800,000.00
Marie Mount Hall	1940/1980	Foundation leaks. Frequent roof leaks. HVAC system insufficient and not sustainable. Antiquated electrical distribution system is unreliable.	$ 3,600,000.00
Symons Hall	1940/1951/2007	Foundation leaks. HVAC system inadequate and inefficient. Electrical distribution system do not conform to current code and limits use of building.	$ 13,200,000.00
Main Administration	1940	Electrical distribution system requires replacement. HVAC system in need of replacement. Indoor air quality an issue. Antiquated building visited by donors.	$ 9,700,000.00
Reckord Armory	1944	Lacks modern HVAC and electric distribution systems. Indoor air quality an issue. Classrooms and lecture halls insufficient.	$ 20,000,000.00
Woods Hall	1948	Severe foundation leaks. HVAC system inefficient and not sustainable. Electric distribution system antiquated and does not meet current code, parts no longer available.	$ 7,900,000.00
Chemistry Building	1952/2002	Lacks modern HVAC and electric distribution systems. Indoor air quality an issue. Systems can not support research needs.	$ 74,000,000.00
Memorial Chapel	1953	Very high profile building. Serious foundation leaks, floods high voltage equipmenHVAC system inefficient and not sustainable.	$ 6,700,000.00

3

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core!

Quick Overview of Restore The Core Buildings

Tydings Hall	1961	Lacks modern HVAC and electric distribution systems. Indoor air quality an issue. Some of the most heavily used classrooms and lecture halls insufficient.	$ 4,300,000.00
Jimenez Hall	1962	Slate roof failing. Serious foundation leaks, floods high voltage equipment. HVAC and electric systems inefficient and not sustainable.	$ 17,600,000.00
Lee Building	1969	Lacks modern HVAC and electric distribution systems. Indoor air quality an issue. Interior plumbing failing regularly and requires immediate replacement.	$ 4,600,000.00
Hardscape		Acres of patios, walks, porticos, fountains, walls, etc. in serious need of repair. Some brick structures are in excess of fifty years of age.	$ 12,000,000.00
Total Need			$ 264,500,000.00

* Estimates Provided in 2010 Dollars

4

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Rossborough Inn

Home to the Offices of Marketing Communications and Undergraduate Admissions

- Built in 1798
- Recent Paint and Carpet Upgrades
- 11,558 GSF
- 7,272 NASF
- Historic Landmark, Oldest Building on Campus
- Historic Building Used to Host Prospective Students and Their Parents
- $4.3 Million for Total Renovation

- **HVAC system in need of replacement, temperature and humidity control not possible**
- **Electrical system can not support higher technology demands of current use**
- **Interior finishes in need of restoration**
- **Foundation leaks, brick falling off structure**

Insufficient Electrical Infrastructure for Current Use

Plaster Delaminating

Interior Finishes in Disrepair, lead based paint

Foundation Leaks results in Mold Formation

Electrical Systems Do Not Conform to Code

Exterior Brick In Very Bad Condition

5

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Morrill Hall

Home to Economics, Center for International Development and Conflict Management

- Built in 1898
- Partial Renovation 1994
- 16,277 GSF
- 10,934 NASF
- The Keystone to Morrill Quadrangle
- Survived the Great Fire of 1912
- $6 Million in Deferred Maintenance
- $7.7 Million for Total Renovation

- **HVAC system does not meet the most current design standards and not energy efficient**
- **Slate roof failing**
- **Foundation drain problems**
- **Electrical system limits use to low impact offices**

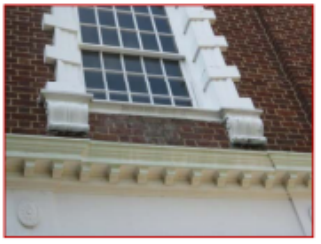
Foundation Drain Failure Contributes to Erosion and Problems with Flooding Other Buildings on the Mall

Slate Roof Failing, Expensive to Maintain

Original Wood Floors and Steps Potentially Dangerous

Building Envelope Failing, 111 Year Old Building Requires Continuous Costly Maintenance

Exterior Walks and Concrete In Need of Replacement



As With All Older Buildings, Exterior Wood Costly to Repair and Maintain

6

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Tallaferro Hall

Home to College of Arts and Humanities and History Department

- Built in 1908
- Partial Renovation 2003
- 47,870 GSF
- 29,327 NASF
- Classrooms Lack Modern Technology
- Steam Radiator Heat
- Utility Systems Require Replacement
- $7.1 Million of Deferred Maintenance
- $9.1 Million for Total Renovation

- **Foundation drains have failed, flood basement floors 3-4 times each year**
- **Exterior wood In need of replacement**
- **Roof replacement necessary**
- **Antiquated facilities used to host all visiting Chinese delegations**

Recently Renewed Finishes supported by failing pipes and is...

...adjacent to un-renovated area.

An Unacceptable Solution to Failed Foundation Drains, Basement Offices Flood from below (drains) and above (failing pipes).

Columns rotting away, emergency patch cost $15,000 and replacement in excess of $100,000

7

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Turner Hall

Home to the Offices of University Marketing, Dining Services, Visitor and Conference Center

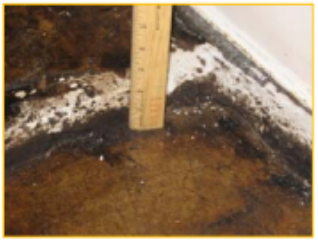
- Built in 1923
- Renovation to Second Floor 2008
- 25,666 GSF
- 13,663 NASF
- Every Potential Student and their Parents Visit the Facility
- $4.1 Million in Deferred Maintenance
- $5.2 Million for Total Renovation

- **Exterior wood requires repairs**
- **Windows in need of replacement**
- **HVAC system insufficient, requires replacement, indoor air quality a problem**

Visitor's Center Seen by Thousands of Students, Parents and Visitors Annually. This is their First Impression of the University

Single Pane Windows Require Replacement

Recently Uncovered Floor Pad Failure



HVAC System kept Operational With Duct Tape

Mold Formation due to Insufficient HVAC

8

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Francis Scott Key Hall

Home to College of Arts and Humanities and History Department

- Built in 1932
- Top Two Floors Partially Renovated 2001
- 52,548 GSF
- 29,327 NASF
- 33% of Space Dedicated to Classrooms
- Classrooms Lack Modern Technology
- Steam Radiator Heat
- $6.6 MM of Deferred Maintenance
- $8.3 Million for Total Renovation

- **Foundation drains have failed, wet ground and basement floors**
- **Electric and HVAC systems can not meet teaching needs**
- **Classrooms do not support high technology teaching requirements**

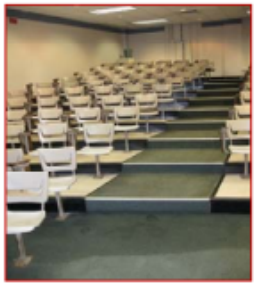
Low Tech Classrooms, Still using overhead projectors

Energy Inefficient Windows, single pane, rotting wood.

Failed Foundation Drains, Piped to Surface increases Runoff

ADA Accessibility Elevator does not Reach all Floors

Antiquated Electric Panels, Replacement parts not available



Lecture Hall Floods From Roof Leak Virtually Every Hard Rain

9

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Holzapfel Hall

Home to Offices of International Programs, Jewish Studies, American Studies, Classrooms

- Built in 1932
- No Overall Renovation To Date
- 34,157 GSF
- 22,228 NASF
- Most of Building to Be Torn Down as Part of University Teaching Center Project
- Funds Included in Governor's FY 2011-2015 C.I.P. at $60.2 Million

- **Extensive exterior and interior wood repairs needed**
- **Slate roof failing**
- **Heating by radiators and cooling by window air conditioners not sustainable**
- **Building condition beyond renewal**

Extensive Exterior Wood Replacement Required

Inefficient and Unsustainable HVAC

Electrical Infrastructure Requires Replacement

The New University Teaching Center will Replace Holzapfel, Tear Down Shriver, and is one of the Campus' Most Critical Capital Budget Requirements

10

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! H. J. Patterson Hall

Home to Biology, Cell Biology/Genetics, Environmental Science, Plant Science and Landscape Architecture, and teaching and research labs

- Built in 1937
- Expanded 1967
- 118,972 GSF
- 78,422 NASF
- Labs can not Support Research Needs
- Wing I Renovation in USM FY 2011-2020 CIP at $30.6 Million with initial funding in FY 2011
- Wing 2 Renovation in USM FY 2011-2021 CIP at $22.2 Million with initial funding in FY 2018

- **Roof systems and roof drains have failed**
- **Electric and steam radiator heating systems can not meet teaching needs**
- **Building is a drain on operating budget, daily loss of services to teaching and research activities**
- **Building requires capital renovation**

Steam radiators and Window Air Conditioners provide Heating and Cooling

Exposed 13,600 Volt Transformer terminals

Failed Roof Structure Required Shutting Down and Relocation of Active Research lab

Mechanical Spaces Cooled by Fans Year Round

Teaching and Research supported by Fused Electric Circuits

Antiquated and Non-Code Compliant Electrical Infrastructure Requires Simple Maintenance to be Performed in Protective Gear

11

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

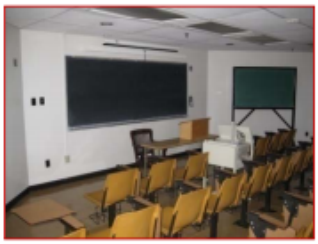
UMD's Restore the Core Report (cont.)

Restore the Core! Marie Mount Hall

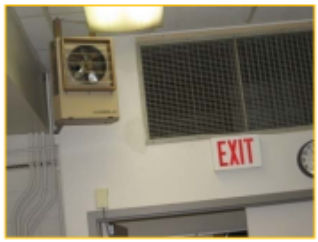
Home to Family Science, Linguistics, Nutrition and Food Science, University Senate, Classrooms and Lecture Halls

- Built in 1940
- Partial Renovation 1980
- 114,757 GSF
- 65,713 NASF
- 16% of Space Used for Teaching Labs, Classrooms and Study Areas
- $3.6 MM in Deferred Maintenance

- Slate Roof Failing
- Frequent Roof Leaks
- Foundation Drain Problems
- Electric Room Floods Often

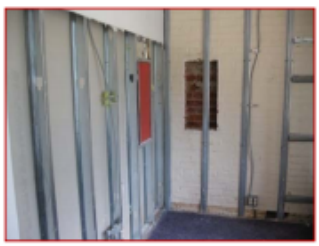


Classrooms Lack Modern Teaching Technology



Inefficient HVAC System Not Energy Efficient or Sustainable

Failed Foundation Drains



What Happens When the Roof Leaks, Walls Removed to Mitigate Mold

Old Metal Electric Bus Duct (not wires) Protected from Water by Plastic Sheet

Flooded Electric Room, Water Within one inch of Shutting Down Building and Marie Mount SCUB Serving Eight Buildings

12

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Symons Hall

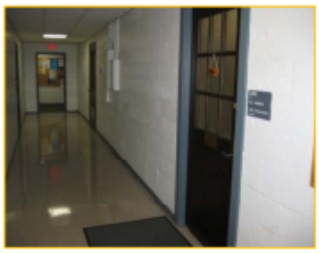
Home to the Dean of College of Agriculture and Natural Resources, Dean of College of Chemical and Life Sciences, Agricultural and Resource Economics, and the National Center for the Study of Terrorism

- Built in 1940
- Renovated 1951, South Wing Renovated 2007
- 78,248 GSF
- 48,637 NASF
- Inefficient HVAC Systems
- Windows Need Replacement
- Utility Systems Require Renovation
- Offices Reminiscent of 1950's
- $9.2 Million of Deferred Maintenance
- $13.2 Million for Total Renovation

- **Foundation drains have failed**
- **HVAC systems are inadequate, lacks central air conditioning**
- **Electrical infrastructure does not conform to code**

Energy Wasting
Window Air Conditioners

Offices from 1950's



Steam Radiator Heat

Failed Foundation Drains, floods basement several times each year

Rotting Wood Frames Inside…

…and out!

13

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Main Administration Building

Home to the Offices of the President, Provost, Vice President for Administrative Affairs, Vice President for University Relations

- Built in 1940
- No Major Renovations to Date
- 41,299 GSF
- 24,282 NASF
- Antiquated Facilities Used to Host Campus Visitors and Donors
- $7.6 Million of Deferred Maintenance
- $9.7 Million for Total Renovation

- **HVAC system in need of replacement, can not provide year round temperature and humidity control, mold a year round issue**
- **Electrical system dangerous and replacement parts no longer available**

First Floor Bathroom Supporting our University

Multiple High Energy Air Conditioning Systems, not Sustainable

Heating by Radiators

Antiquated Electrical Equipment, Replacement Parts no Longer Available

Rotting Single Pane Windows are Energy Inefficient

14

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Reckford Armory

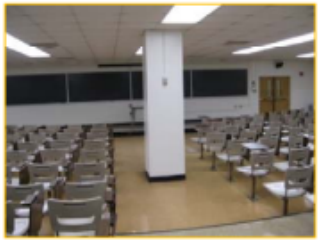
Home to Recreation Services, Office of Extended Studies, General Purpose Classrooms , and three of the Campus' Most Heavily Utilized Lecture Halls

- Built in 1944, Used as a Firing Range
- No Major Renovation to Date
- 78,615 GSF
- 56,937 NASF
- Huge "Energy Hog"
- Rooms are Hot and Humid in Summer, Cold in Winter
- Classrooms Insufficient, Lack Modern Technology
- Classrooms and Lecture Halls Used by Thousands of Students Each Year
- $15.7 Million in Deferred Maintenance
- $ 20.0 Million for Total Renovation

- **Foundation drains have failed**
- **Interior and exterior wood in need of replacement**
- **HVAC system not energy efficient**
- **Will not be used for classrooms upon completion of the undergraduate teaching facility**

Lecture Halls Lack Modern Technology and Contain Blocked Views

Classrooms Must Be Replaced with State of The Art Teaching Facilities in the University Teaching Center Program



Lecture Hall Obstructed View

Small, Cramped Classrooms heated with Steam Radiators

Antiquated Facilities Used by Thousands of Visitors Annually

Serious Brick Joint Failures

15

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Woods Hall

Home to College of Arts and Humanities, Anthropology, and Women's Studies

- Built in 1948
- No Major Renovations To Date
- 24,055 GSF
- 14,122 NASF
- Contains classrooms, research labs, and faculty offices
- $6.2 Million of Deferred Maintenance
- $7.9 Million for Total Renovation

- **Foundation drains have failed, flooded high voltage rooms**
- **Electric and HVAC systems can not meet teaching needs**
- **Classrooms do not support high technology teaching requirements**
- **Building requires major building systems and architectural renovation**

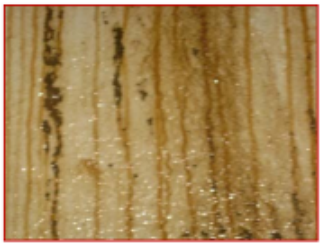
Severe Flooding from Failed Foundation Drains, so moats were constructed in electric and mechanical spaces to re-direct water

Faculty Office Cooled by Window Air Conditioning

Failed Foundation Drains, water now drains on the ground

Unacceptable solution to flooding problems, Sandbags a Permanent Fixture

High Voltage Transformers in water creates a Very Serious Problem



Water Penetrating Foundation Walls, Destroying Structural Integrity

16

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! The Chemistry Building

Home to Departments of Chemistry, Biochemistry, Chemical and Biomolecular Engineering, Geology, and Shared Analytical Instrumentation Facilities

- Built in 1952
- Wing 3 Rebuilt 2002 Primarily for Research Use
- 397,923 GSF
- 210,969 NASF
- Contains classrooms, lecture halls, teaching labs, research labs, and faculty offices
- Wing 1 and 2 Renovation In Two Phases in Governor's FY 2011-2015 C.I.P. at $74.4 Million

- **Electric and HVAC systems can not meet teaching needs**
- **Window air conditioners can not properly control temperature and humidity for high end research**
- **Classrooms do not support high technology teaching requirements**
- **Building requires major building systems and architectural renovation**

Classrooms Lack Modern Teaching Technology

Teaching Labs Circa 1950's

Potential Students Declare Their High School Labs Are In Far Better Condition

Leaking Pipes Force Installation of Temporary Water Barriers in Several Active Research Labs

17

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Memorial Chapel

One of the Most Used Ceremonial Buildings on Campus

- Built in 1953
- No Major Renovation To Date
- 26,272 GSF
- 15,793 NAS
- $6.7 Million for Total Renovation

- **Serious foundation leak issues, floods high voltage electric room and mechanical room**
- **Extensive exterior wood repairs needed**
- **HVAC system for cavernous building needs to be replaced with higher efficiency design**

Serious Foundation Leaks...

...into High Voltage Electric Room and Mechanical Room

Major Effort Needed to Repair Exterior Wood Surfaces

Single Pane Windows Not Energy Sustainable

Inefficient HVAC System in Cavernous Building

Failing Exterior Brick

18

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Tydings Hall

Home to the Department of Economics, Center for International Development and Conflict Management, the Anwar Sadat Chair for Peace and Development, Government and Politics, and College of Behavioral and Social Sciences

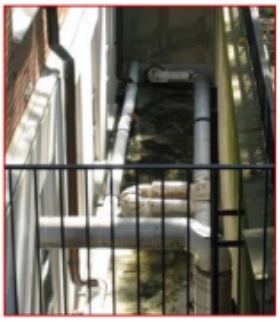
- Built in 1961
- No Major Renovation To Date
- 101,945 GSF
- 63,670 NASF
- 31% of Available Space used for Classrooms
- $4.3 MM in Deferred Maintenance

- **Some of the most heavily used Classrooms lack Modern Teaching Technology**
- **Exterior Wood Requires Replacement**
- **Severe Water Infiltration, Often Floods Lecture Hall and Electric Room**
- **HVAC System Insufficient, Requires Replacement**

Heating and Cooling System Can Not Provide Proper Temperature and Humidity Control. Classrooms are Uncomfortably Hot in Summer Months and Cold in Winter Months

Need to Modernize Classrooms

Failed Foundation Drain Required Temporary Solution



Foundation Drain Problems and Building Envelope Failures Result in the Basement Floor Electric and Mechanical Room and the Lecture Hall to Flood Several Times Each Year

Major Effort Needed to Repair Exterior Wood Surfaces

19

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Jimenez Hall

Home to the School of Language, Literature and Cultures, and Classrooms

- Built in 1962
- Partial HVAC Renovation due to Mold 1997 at a cost in excess of $1MM
- 65,321 GSF
- 39,262 NAS
- 21% of Assignable Space for Classroom Use
- $13.5 Million in Deferred Maintenance
- $17.6 Million for Total Renovation

- Serious foundation problems. water leaking into electric rooms
- Slate roof failing
- Heating by radiators and cooling by multiple systems, indoor air quality and mold issues, a Chronicle of Higher Education feature story
- Electrical infrastructure requires modernization

Not Fully ADA Compliant

Serious Foundation Leaks into Electric Room

Inefficient and Unsustainable HVAC

Electrical Infrastructure Requires Upgrades for Code and to Support Newer Technology

Classrooms Non Suitable for Current Teaching Technology

Single Pane Windows Waste Considerable Energy

20

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core! Lee Building

Home to the Bursar, offices of the Vice President for Research, Student Financial Aid, Graduate School

- Built in 1969
- No Major Renovations To Date
- 42,1852 GSF
- 28,743 NASF
- One of the Most Visited Buildings on Campus
- Building Systems Require Renovation
- $4.6 MM of Deferred Maintenance

- **Electrical Infrastructure Does Not Conform to Code**
- **Leaking Pipes a Frequent Occurrence, Disrupting Operations and Costing Tens of Thousands of Dollars of Maintenance Funds**
- **HVAC Systems are Energy Inefficient and Result in Poor Air Quality**

Heating Pipe Interior Condition, Can Not Provide Heating or Cooling

Entire Piping System In Need of Replacement

Infrastructure Problems are Out of Sight, Therefore Out of Mind Until There is a Failure

- Corroded, leaking pipes
- Each Flood Results in Replacing Carpet, Tearing Out Walls, Repairs to Pipe, Wall Replacement and the Wait Until the Next Pipe Failure
- Recent Renovation Project uncovered pipes in advanced state of deterioration that Facilities Management spent almost 2% of one year's budget to fix a fraction of one building
- Inadequate HVAC system results in poor indoor air quality costing 3 times more to operate than a system designed to current energy standards

Exposed 13,600 Volt Terminals

21

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)

Restore the Core's Hardscape!

- The Core's hardscape consists of patios, walks, porticos, fountains, sculptures, decorative walls, benches, seating areas…
- Many of the structures are over 60 years old, some over 100 years old
- Brick mortar joints failing
- Some surfaces are impermeable and add to water runoff issues
- Several million bricks around the mall
- $ 12 Million estimate d need for repairs

Skinner Bas Relief

Post at Rossborough Inn

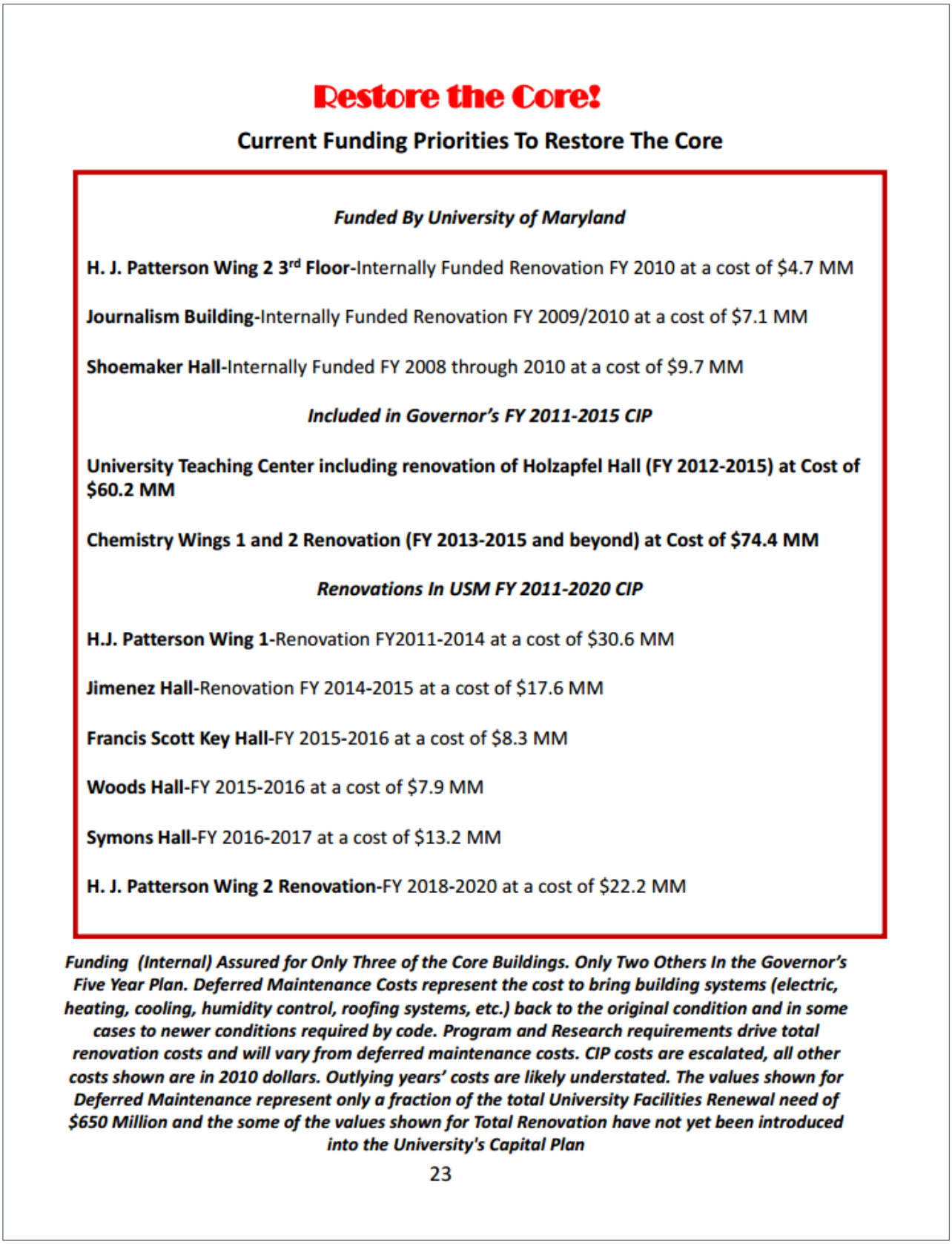
Retaining Wall at Francis Scott Key

Knee Wall at Armory

22

Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

UMD's Restore the Core Report (cont.)



Restore the Core!

Current Funding Priorities To Restore The Core

Funded By University of Maryland

H. J. Patterson Wing 2 3rd Floor-Internally Funded Renovation FY 2010 at a cost of $4.7 MM

Journalism Building-Internally Funded Renovation FY 2009/2010 at a cost of $7.1 MM

Shoemaker Hall-Internally Funded FY 2008 through 2010 at a cost of $9.7 MM

Included in Governor's FY 2011-2015 CIP

University Teaching Center including renovation of Holzapfel Hall (FY 2012-2015) at Cost of $60.2 MM

Chemistry Wings 1 and 2 Renovation (FY 2013-2015 and beyond) at Cost of $74.4 MM

Renovations In USM FY 2011-2020 CIP

H.J. Patterson Wing 1-Renovation FY2011-2014 at a cost of $30.6 MM

Jimenez Hall-Renovation FY 2014-2015 at a cost of $17.6 MM

Francis Scott Key Hall-FY 2015-2016 at a cost of $8.3 MM

Woods Hall-FY 2015-2016 at a cost of $7.9 MM

Symons Hall-FY 2016-2017 at a cost of $13.2 MM

H. J. Patterson Wing 2 Renovation-FY 2018-2020 at a cost of $22.2 MM

Funding (Internal) Assured for Only Three of the Core Buildings. Only Two Others In the Governor's Five Year Plan. Deferred Maintenance Costs represent the cost to bring building systems (electric, heating, cooling, humidity control, roofing systems, etc.) back to the original condition and in some cases to newer conditions required by code. Program and Research requirements drive total renovation costs and will vary from deferred maintenance costs. CIP costs are escalated, all other costs shown are in 2010 dollars. Outlying years' costs are likely understated. The values shown for Deferred Maintenance represent only a fraction of the total University Facilities Renewal need of $650 Million and the some of the values shown for Total Renovation have not yet been introduced into the University's Capital Plan

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Source: Baker J, "Restore the Core: A View of the University's Deferred Maintenance Requirements and the Need for a Capital Renewal Program," University of Maryland, College Park, 2010, https://www.facilities.umd.edu/documents/restore%20the%20core.pdf

Advisors to Our Work

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Arizona State University
Bruce Nevel
Associate Vice President, Facilities Development and Management

Baylor University
Don Bagby
Assistant Vice President, Facilities and Planning

Brown University
Steve Maiorisi
Vice President of Facilities Management

Lindsey Graham
Academic Vice President for Finance and Administration

California Institute of Technology
Jim Cowell
Associate Vice President for Facilities

Bill Taylor
Senior Director of Facilities Management

California State University, Channel Islands
Ysabel Trinidad
Vice President for Business and Financial Affairs

Wes Cooper
Senior Director of Facilities Services

John Gormley
Senior Director for Planning, Design, and Construction

California State University, Los Angeles
Warren Jacobs
Associate Vice President for Facilities, Planning, Design and Construction

Dana Twedell
Facilities Services Director

Carleton University
Darryl Boyce
Assistant Vice-President of Facilities Management and Planning

Chapman University
Rick Turner
Associate Vice President, Facilities Management

The Citadel, the Military College of South Carolina
Ben Wham
Former Associate Vice President for Facilities and Engineering

Clemson University
Todd Barnette
Interim Chief Facilities Officer

Kathy Dively
Director, Business Enhancement Strategies Team

Colgate University
Brian Hutzley
Vice President for Finance and Administration

Concordia University
Michel Nadeau
Associate Vice-President, Facilities Management

Dalhousie University
Jeff Lamb
Assistant Vice-President, Facilities Management

Tareq Abdullah
Assistant Director of Asset Management

Mary Jane Adams
Director of Campus Planning
Darrell Boutilier
Director of Operations

Duke University
John Noonan
Vice President for Facilities

Duquesne University
Rod Dobish
Assistant Vice President and Chief Facilities Officer

East Carolina University
Bill Bagnell
Associate Vice Chancellor for Campus Operations

East Tennessee State University
David Collins
Vice President for Finance and Administration

Bill Rasnick
Associate Vice President for Facilities Management, Planning, and Construction

Elon University
Robert Buchholz
Associate Vice President for Facilities Management and Director of Physical Plant

Gerald Whittington
Senior Vice President for Business, Finance and Technology

Emory University
Matthew Early
Vice President for Campus Services

Florida State University
Dennis Bailey
Senior Associate Vice President, Facilities

Framingham State University
Warren Fairbanks
Associate Vice President of Facilities and Capital Planning

Furman University
Jeff Redderson
Assistant Vice President, Facilities & Campus Services

George Mason University
Tom Calhoun
Vice President of Facilities

Greater Cleveland Regional Transit Authority
Michael York
Deputy General Manager, Operations

Harvey H. Kaiser Associates, Inc.
Harvey Kaiser
President and Founder

Indiana University
Tom Morrison
Vice President, Capital Planning and Facilities

Iowa State University
Dave Miller
Associate Vice President for Facilities

Johns Hopkins University
David Ashwood
Director of Plant Operations

Jones Lang LaSalle
David Houck
National Practice Leader, Higher Education

Marymount University
Upen Malani
Assistant Vice President, Campus Planning and Management

Massachusetts Institute of Technology
Don Holmes
Director, Maintenance & Utilities

McGill University
Robert Couvrette
Associate Vice-Principal, Facilities Management and Ancillary Services

McMaster University
Mohamed Attalla
Assistant Vice President & Chief Facilities Officer

Medical University of South Carolina
Greg Weigle
Chief Facilities Officer

Messiah College
Kathie Shafer
Vice President for Operations

NASA
Scott Robinson
Director, Facilities and Real Estate Division

National Park Service
Ray Todd
Director, Denver Service Center

The New School
Lia Gartner
Vice President for Buildings

Thomas Whalen
Assistant Vice President for Facilities Management

Northern Kentucky University
Zaidi Syed
Assistant Vice President for Facilities Management

The Ohio State University
Lynn Readey
Associate Vice President, Facilities Operations and Development

Brett Garrett
Special Assistant to the Associate Vice President, Facilities Operations and Development

Anne Pensyl
Director, Performance Metrics

Paul Sherwood
Assistant Vice President, Facilities Operations and Development

Ohio University
Joe Lalley
Senior Associate Vice President of Technologies & Administrative Services

Pennsylvania State System of Higher Education
Steve Dupes
Assistant Vice Chancellor for Facilities

Pennsylvania State University
Phillip Melnick
Director of Buildings and Grounds

Predictive Maintenance Center
Abdel-Moez Bayoumi
Director

Purdue University
Ted Weidner
Associate Professor of Engineering Practice of Construction Engineering and Management

Rochester Institute of Technology
John Moore
Assistant Vice President for Facilities Management Services

Rutgers University
Antonio Calcado
Executive Vice President, Strategic Planning and Operations, and COO

Joe Holtsclaw
Director, IWMS Administration

Saint Mary's College of California
Michael Flood
Interim Director of Facilities Services

Simon Fraser University
Larry Waddell
Chief Facilities Officer

Todd Gattinger
Director, Maintenance & Operations

Smith College
Peter Gagnon
Capital Construction Director

Smithsonian
Nancy Bechtol
Director, Smithsonian Facilities

Kendra Gastright
Director, Office of Facilities Management and Reliability

Rick Haas
Associate Director, Financial and Asset Management

Sheri Vucci
Director, Office of Business Operations

Southern Methodist University
Philip Jabour
Associate Vice President and University Architect for Facilities Planning and Management

Southern Oregon University
Drew Gilliland
Director of Facilities Management and Planning

Texas A&M University
Jane Schneider
Associate Vice President for Facilities and Operations

Ralph Davila
Executive Director of Facilities and Dining Administration

Texas Christian University
Chris Honkomp
Assistant Vice Chancellor for Facilities

Richard Bryan
Director of Operations

Hollis Dyer
Assistant Director of Building Maintenance

University of Alaska, Anchorage
Chris Turletes
Associate Vice Chancellor for Facilities and Campus Services

Ryan Buchholdt
Business Manager

University of Arizona
Chris Kopach
Assistant Vice President, Facilities Management

University of Arkansas
Mike Johnson
Associate Vice Chancellor for Facilities

University of British Columbia
John Metras
Managing Director, Infrastructure Development

University of Calgary
Bart Becker
Vice President, Facilities

Boris Dragicevic
Associate Vice-President, Facilities

University of California, Irvine
Marc Gomez
Associate Vice Chancellor, Facilities Management and EH&S

University of California, Los Angeles
Kelly Schmader
Assistant Vice Chancellor for Facilities Management

University of Central Florida
Lee Kernek
Associate Vice President for Administration and Finance

Frank Ballentine
Quality Assurance/ Quality Control Manager

Duane Siemen
Facilities Operations Director

Jason Wyckoff
Reliability Engineer Manager

University of Cincinnati
Joe Harrell
Associate Vice President, Facilities Management

University of Colorado Boulder
Dave Danielson
Assistant Vice Chancellor for Facilities Management

University of Dayton
Beth Keyes
Vice President for Facilities Management

University of Delaware
Paul Dickinson
Director, Maintenance and Operations

James Loughran
Director of Finance and Administration for Facilities

University of Denver
Scott Schrage
Interim Associate Vice Chancellor of Facilities Management

Jeff Bemelen
Former Director of Facilities Management

University of Hartford
Norman Young
Associate Vice President, Facilities Planning & Management

University of Idaho
Brian Johnson
Assistant Vice President, Facilities

University of Kansas
Barry Swanson
Associate Vice Provost, Campus Operations and Chief Procurement Officer

Shawn Harding
Program Manager, Campus Operations

Callie Long
Project Manager, Business Operations

University of Kentucky
Mary Vosevich
Vice President for Facilities Management

University of Maryland, College Park
Jack Baker
Executive Director, Operations & Management

Andi Crabb
Senior Engineer

University of Massachusetts Amherst
Shane Conklin
Associate Vice Chancellor for Facilities and Campus Services

Ray Jackson
Director of Physical Plant

University of Minnesota
Mike Berthelsen
Interim Vice President, University Services

University of Montana
Kevin Krebsbach
Director of Facilities Service

University of Nebraska-Lincoln
Jim Jackson
Assistant Vice Chancellor, Facilities Maintenance and Operations

University of New Brunswick
Barbara Nicholson
Associate Vice President, Capital Planning & Property Development

University of New Mexico
Chris Vallejos
Associate Vice President for Institutional Support Services

Lisa Marbury
Executive Director

University of North Carolina at Chapel Hill
Anna Wu
Associate Vice Chancellor for Facilities Services

Abbas Piran
Director of Engineering Information Services

University of North Carolina at Charlotte
Phil Jones
Associate Vice Chancellor for Facilities

James Johnson
FCAP Manager

University of North Carolina at Greensboro
Charles Maimone
Vice Chancellor for Business Affairs

University of Oklahoma
Brian Ellis
Director of Facilities Management

University of San Francisco
Mike London
Associate Vice President, Facilities Management

University of Saskatchewan
Colin Tennent
Associate Vice-President & University Architect, Facilities Management

University of South Florida
Christopher Duffy
Assistant Vice President, Facilities Management

University of Texas at Austin
Dan Clairmont
Associate Director of Facilities Operations and Maintenance

Ana Thiemer
Associate Director of the Planning Division

University of Texas at Dallas
Rick Dempsey
Associate Vice President of Facilities Management

University of Texas at San Antonio
Dave Riker
Associate Vice President for Facilities

Luis Borrero
Assistant Vice President for Facilities Maintenance and Operations

Mike Merada
Plant Engineer

University of Utah
Ken Nye
Interim Associate Vice President for Facilities Management

Cory Higgins
Executive Director, Facility and Construction Operations

Steve Hoskins
Associate Director, Facilities Data Systems

Bob Simonton
Director of Capital Projects

University of Vermont
William Ballard
Associate Vice President for Administrative and Facilities Services

University of Virginia
Don Sundgren
Associate Vice President and Chief Facilities Officer

Rick Rice
Deputy Chief Facilities Officer

Mark Webb
Director of Programs and Infomatics

University of West Georgia
Brendan Bowen
Assistant Vice President, Campus Planning and Facilities

University of Wisconsin-Madison
Margaret Tennessen
Interim Associate Vice Chancellor for Facilities Planning and Management

Bill Elvey
Former Associate Vice Chancellor for Facilities Planning and Management

West Virginia University
Randy Hudak
Associate Vice President, Facilities & Services

Dan Olthaus
Director of Maintenance

Western Illinois University
Scott Coker
Director of Facilities Management

Ted Renner
Deputy Director of Facilities Management

Western University
Lynn Logan
Associate Vice-President, Finance & Facilities

Wheaton College
Scott Okesson
Director of Facilities

Kevin Engel
Director of Development

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EAB

2445 M Street NW, Washington DC 20037
P 202.266.6400 | **F** 202.266.5700 | eab.com