EAB

Tackling the **Deferred Maintenance** Crisis

Five Things Every Institutional Leader Should Know About the Campus Threat and Strategies to Improve

Executive Briefing

Deferred Maintenance Crisis at a Tipping Point

Colleges and universities face daunting deferred maintenance backlogs. Budget shortfalls are only amplifying the issue, and maintenance needs have begun to impact the student experience, impair critical research efforts, and ultimately prevent institutions from achieving their strategic goals.

Representative Impact of Deferred Maintenance

1.5x Average growth of deferred maintenance backlog compared to inflation

66% Of buildings nationally are due for significant renovations and upgrades

Institutions increasingly forced to transfer renewal costs to students in form of new fees

Outdated facilities are difficult to adapt to needs of most advanced research

This executive briefing details five insights to keep in mind as you navigate deferred maintenance decisions:

1. Deferred maintenance is not just a Facilities problem—it affects everyone.
2. Capital renewal needs are more complicated than a single backlog number.
3. Diminishing Facilities resources have fueled growing backlogs.
4. While daunting, the backlog is surmountable.
5. EAB has a suite of resources to help you address your backlog.

1 Deferred maintenance is not just a Facilities problem—it affects everyone.

Stewardship Impacts Everyone

Deferred maintenance has been a top priority for facilities leaders for decades. As institutions face aging buildings and growing maintenance backlogs, tackling deferred maintenance has increasingly become a primary concern for boards, presidents, academic leaders, and students. The growing attention on deferred maintenance is unsurprising given that maintenance issues affect all areas of campus. Unaddressed capital needs have a direct impact on the ability of other leaders to recruit students or attract star faculty critical to research excellence.

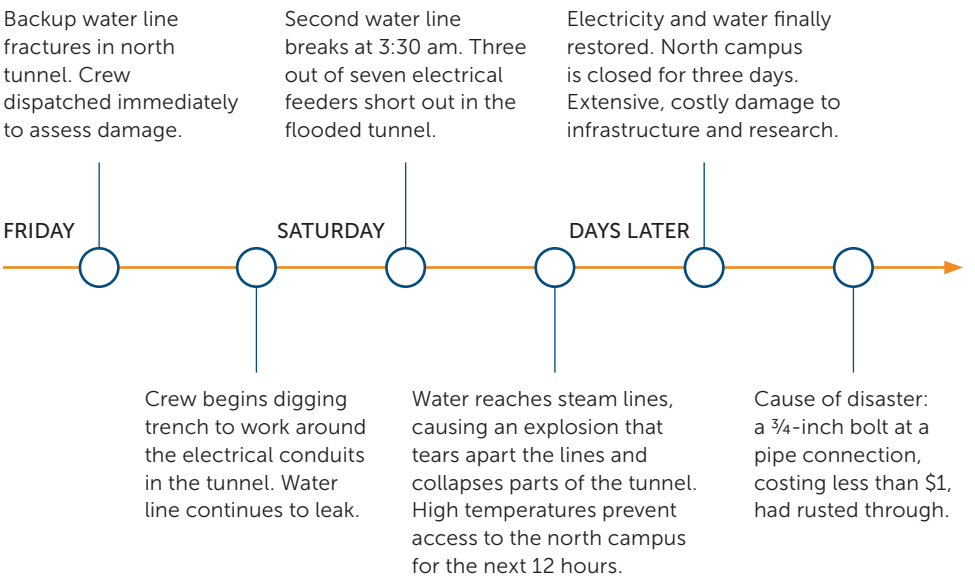
Representative Facilities Maintenance Challenges		Implications for Other Institutional Leaders
Facilities forced to make budget trade-off between planned maintenance and landscaping/grounds	→	**VP of Enrollment Management** worries about recruiting students due to diminishing curb appeal of campus
Facilities must sink research lab 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

Costly Maintenance Failures Impact Staff and Student Experience

Even small problems can have a dramatic impact on faculty, staff, and students—and require millions of dollars to address. University of New Mexico has experienced the far-ranging impact of maintenance failures firsthand. A number of years ago, New Mexico experienced a small crack in a backup waterline due to a rusty ¾-inch bolt. As Facilities began addressing the leak, a second line burst and shorted out three electrical feeders. The water continued to spread and reached nearby steam lines, causing an explosion and collapsing the tunnel. Work halted for 12 hours due to high temperatures, and the entire north campus was closed for three days.

When the leak and its ripple effects were fully resolved, the university had spent over $100,000 on the repair itself, not counting labor hours or lost productivity. All told, the institution estimates it lost over a million dollars in productive time for faculty and staff. And while the University of New Mexico suffered an unexpectedly large failure from a small leak, campuses are increasingly facing risks like this when they are forced to deprioritize routine tasks and renewal projects. Ultimately, it is impossible to predict when a failure may happen—or how much it could cost the institution.

Major Campus Failure at University of New Mexico



2 Capital renewal needs are more complicated than a single backlog number.

More Than the Sum of Its Parts

Most institutions can point to a single number that represents their deferred maintenance backlog. This figure roughly approximates all projects a campus must complete to return various infrastructure components (like roofs and foundations) and building systems (like plumbing and HVAC) to "like-new" condition.

But that backlog figure is inherently flawed. There are three main reasons why centering renewal conversations around the backlog is counterproductive:

1. The backlog, which is often in the hundreds of millions or billions of dollars, is overwhelming large. The face value **causes sticker shock**, overwhelming stakeholders with a seemingly insurmountable obstacle and prompting inaction rather than inspiration.

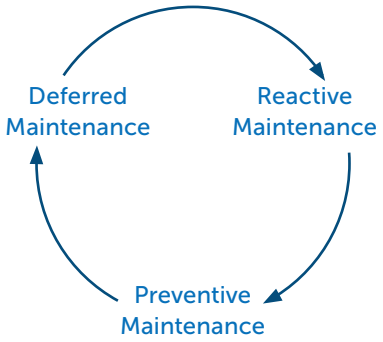
2. The backlog number obscures the fact that even if an institution had the millions (or even billions) required, **most campuses couldn't address everything at once**. The planning resources and staging requirements would be unreasonably high, and the impact on students, faculty, and staff in terms of construction, campus access, and traffic would be unduly burdensome.

> "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

3. Finally, the backlog represents more than just a list of projects to tackle. The graphic at the top of the following page illustrates that **all maintenance activities are interrelated**. 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. This leaves fewer resources for preventive maintenance, ultimately increasing the amount of deferred maintenance.

Relationship Between Different Maintenance Activities

As the deferred maintenance backlog grows, there is increased risk of system failure



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

Troublesome Terminology

Looking beyond the backlog, the term "deferred maintenance" itself is problematic. It has been in use since the 1970s. However, the term's continuous use across the past several decades when so many other factors have come into play—including the advent of more complex buildings, decreasing state support, and the most recent recession—means the term no longer accurately reflects campus reality.

In fact, calling this challenge "deferred maintenance" is counterproductive. It signals to campus leaders and others that Facilities has failed to do its job. Far from neglecting the physical plant, Facilities leaders have taken on the responsibility of stretching a shrinking operating budget farther and farther.

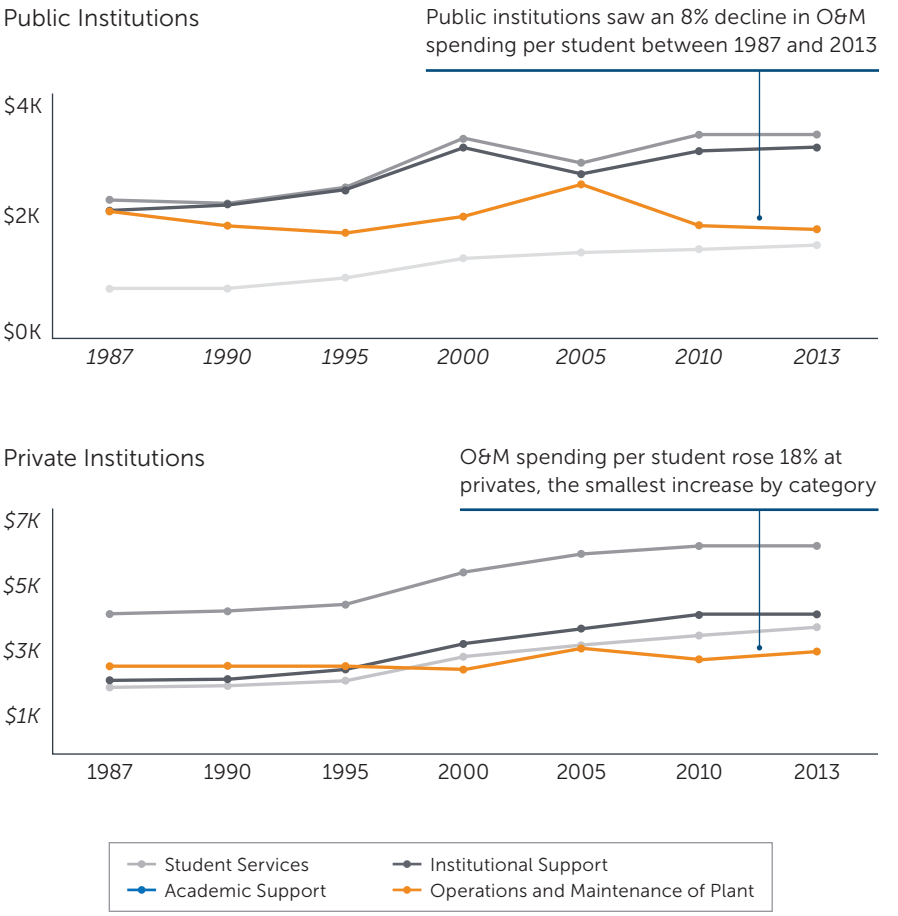
Some Facilities leaders have introduced alternative phrases, referring to the problem as "capital renewal," "deferred renewal," or simply "modernization." However, the industry has not yet reached consensus on a single alternative.

3 Diminishing Facilities resources have fueled growing backlogs.

Maintenance Spending Far Outpaced by Other Investments

Nearly all institutions face declining revenues due to changes in enrollment, public support, research funding, and debt capacity. Unfortunately, tightening budgets have negatively impacted Facilities units the most. 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. At public institutions, every spending category has risen above its 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 at less than 1% each year, the slowest pace compared to the other categories.

Spending per Student by Category Between 1987 and 2013
(Inflation-Adjusted 2013 Dollars)



Decreased Funding Contributing to Growing Backlog

This diminished funding has come at a time when maintenance needs are greater than ever. In the United States, 35% of current higher education facilities was built in the Post-WWII construction boom between 1960 and 1975, and many of these buildings now require significant renovations. Simultaneously, institutions must fund renewal costs for newer, more technologically advanced "smart" buildings constructed in the last two decades, which comprise 31% of facilities on campuses nationally.

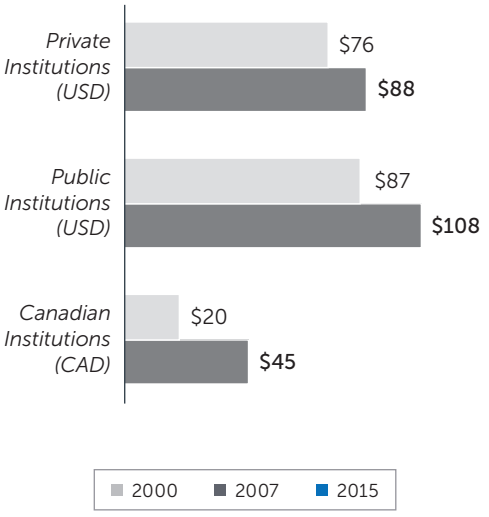
35% of current space built in Post-WWII construction boom between 1960 and 1975

31% of current space built since 1995; newer buildings are more complex and require more frequent upgrades

While engineering and architectural experts agree that campuses should invest between 2% and 3% of total asset value into campus facilities, most institutions fall far short of that benchmark.

As a result, backlogs continue to increase in both the United States and Canada.

Average Deferred Maintenance Backlog per Square Foot



Private institutions have seen a 16% increase in the DM backlog per square foot from 2007 to 2015—8.6% faster than inflation.

Public institutions have seen a 24% increase in their DM backlog per square foot from 2007 to 2015—66% faster than inflation.

Canadian institutions have seen a 56% increase in their DM backlog per square foot from 2000 to 2015—70% faster than inflation in Canada.

4 While daunting, the backlog is surmountable.

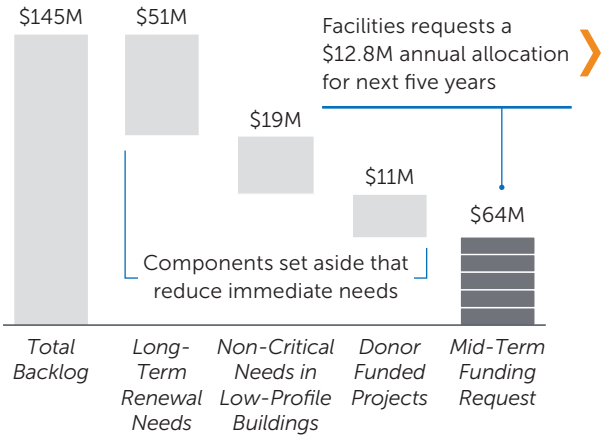
Shifting the Focus from the Total Backlog to a More Reasonable Annual Ask

Addressing a growing deferred maintenance backlog represents one of the single greatest challenges facing most campuses. However, there are a select number of institutions that have achieved zero (or close to zero) deferred maintenance. And while not every strategy will be replicable for each institution, these campuses offer pieces of a roadmap that others can pursue.

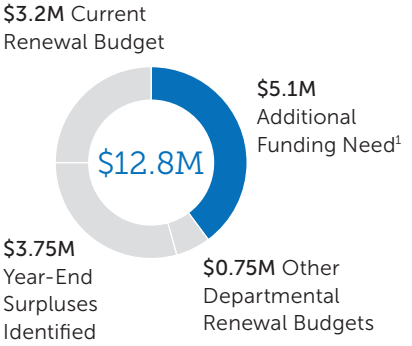
One institution that has seen great success in the past decade is the University of Denver. Their estimated backlog in 2007 was $145 million. Recognizing that figure would seem insurmountable to the board, Facilities leaders first set aside three components: $51 million in long-term needs, $19 million of non-critical work in low-priority buildings, and $11 million for projects with potential donors. Facilities leaders framed the remaining $64 million as $12.8 million a year for the next five years.

Furthermore, Facilities subdivided that request into specific funding sources. Beyond the $3.2 million in annual funding they already received, Facilities pointed to $4.5 million from year-end surpluses and auxiliary units as additional funding sources. This reduced their board request to only $5 million in additional funds per year. The board agreed, and Denver now has close to zero in its deferred maintenance backlog.

Breakdown of the University of Denver's Backlog, 2007



University of Denver's Funding Plan, 2007



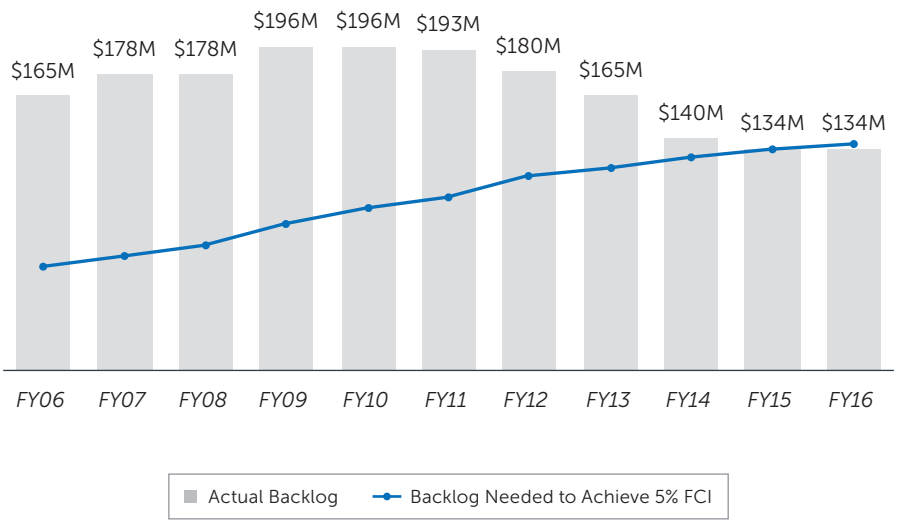
1) Additional funding obtained through departmental gain-sharing, gifts, donations, reserves, and other resources.

A Replicable 'Turning the Tanker' Approach

Another institution that offers a replicable strategy is the University of Virginia (UVA), which has been slowly chipping away at its backlog since the mid-2000s. At that time, deferred maintenance became a Board of Visitors-level priority. The university began pursuing a number of different strategies that included increased funding, better prioritization, and longer-term planning efforts. And while the specific strategies were successful, the most important piece was their commitment to "turn the tanker" and steadily reduce the backlog.

The chart below shows their success. Their backlog has decreased 19% since 2006 (and 32% since its 2009–10 high of $196 million). Most impressive is that UVA's backlog decreased sufficiently by 2015 to achieve a campus-wide FCI[1] of 5%.[2]

Deferred Maintenance Backlog at the University of Virginia



1) Facilities condition index (FCI) is an equation that measures cost to correct condition deficiencies and return a building to its original condition divided by the current replacement value of the building. APPA guidelines indicate a 5% target means the building and/or campus is serving its intended purpose and has minimal maintenance issues.

2) UVA set an average FCI across all buildings as a campus-wide goal, but also had different FCI and investment strategies for different type of buildings. This allowed UVA to invest more in strategically important buildings and less in others while still working toward its target FCI.

5 EAB has a suite of resources to help you address your backlog.

Progressive institutions offer a number of lessons on how higher education can begin to turn the tanker and address the deferred maintenance backlog. To equip institutions with the information they need, the Facilities Forum offers the three resources shown below. Each one is presented with sample case studies to provide a preview of the full resource. Members can access, download, and order hard copies of the resources at eab.com.

Addressing Increasingly Complex Deferred Maintenance Decisions

Six Lessons for Increasing Executive Understanding and Action and Optimizing Planning and Prioritization

SAMPLE STRATEGY	CASE STUDY
Create building endowments to fund renewal and/or operations and maintenance	**Furman University** in Greenville, South Carolina, fundraises 30% beyond the cost of construction for new buildings. Furman splits the 30% into two discrete building-specific endowments; 80% of the money goes to an O&M endowment, while the remaining 20% goes into a capital renewal fund. While some endowments can be used on any building on campus, most can be used to address maintenance needs only in a specific building. Furman now has endowments to support renewal and O&M costs across one-fourth of all campus buildings.
Better weigh facilities condition against strategic priorities	**Western Illinois University** (WIU) in Macomb, Illinois, uses a 10-metric matrix to weigh the strategic importance of different campus buildings. The metrics are a mix of facilities condition information (like life safety and exterior needs), which Facilities fills out, and strategic considerations (like visibility to campus, community, and perspective students), which deans provide for every building they occupy. Each metric is weighted 1, 2, or 3, depending on importance and then evaluated on a scale of 1 to 5. The matrix outputs a building importance score up to 110, giving WIU a principled guide for prioritizing full-building renovations.
Take worst spaces offline	The Facilities executive at **California Institute of Technology** (Caltech) in Pasadena, California, uses compelling savings data to convince senior leaders to take the worst buildings offline. In 2011, he shared that the utility and operational cost savings (estimated at $10 per square foot) from taking six buildings with an average FCI of 0.84 offline would offset the cost of demolition (estimated at $15 per square foot) within 1.5 to 4 years, depending on the building. All six buildings have subsequently been demolished, reducing Caltech's deferred maintenance backlog by $4.5 million and yielding $250,000 in avoided annual O&M costs.

Capital Renewal Funding Playbook

Compendium of 100 Tactics to Fund Deferred Maintenance Projects

SAMPLE STRATEGY	CASE STUDY
Participate in gainsharing with energy service provider	**California Polytechnic State University,** San Luis Obispo (Cal Poly) partnered with the Pacific Gas and Electric Company to creatively finance over $4 million in energy conservation measures including lighting retrofit projects, central plant upgrades to boiler controls and condenser water systems, and advanced wireless thermostats. Cal Poly is repaying one of the loans by paying the same monthly bills as before (though utility costs are lower). When the loan is repaid in 10–13 years, the institution will get to keep the utility savings.
Incrementally increase annual capital renewal funding	**Western University** in London, Ontario, has a board-funded Maintenance Modernization and Infrastructure fund. The fund was seeded with half a million dollars in academic year 1996–97. In each subsequent academic year, the annual transfer increases by $750,000 (excluding 2011) until it reaches its max of $15.5 million in academic year 2017–18.

Shifting the Balance from Reactive to Preventive Maintenance

Best Practices for Eliminating Common Timesinks and Reprioritizing Critical Preventive Maintenance Tasks

SAMPLE STRATEGY	CASE STUDY
Create dedicated preventive maintenance team	Ten years ago, the **University of Texas at San Antonio** (UTSA) created a dedicated preventive maintenance (PM) team to ensure they completed PM tasks more consistently. Now, the team consists of 12 employees (three mechanics, four electricians, one plumber, three general maintenance staff, and a supervisor) and is responsible for 58% of UTSA's PM across the 5.4 million gross square foot campus. The team's sole focus on PM allows them to achieve a healthy PM work order completion rate of 93%, ensuring the institution's buildings and equipment remain in like-new condition and protecting against future contributions to the backlog.
Use equipment sensors to complete the picture of asset condition and avoid costly failures	**NASA** (the government agency) is increasingly investing in sensors to improve time maintenance activities. They recently installed sensors on nearly 300 assets, giving Facilities leaders a more complete picture of equipment condition and signaling where intervention is necessary. This has led to a 750-hour reduction in annual maintenance work and $143,000 in avoided failures. Ultimately, NASA reports the sensor investment paid for itself in under a year.

Project Director
Ann Helen Forman

Contributing Consultants
Lauren Burakowski, PhD
Michael Fischer
Rachael Kauss

Managing Director
John Workman, PhD

Designer
Kate Young

Image Credit

Cover image: iStock

Sources

Page 3: Rose R, *Charting a New Course for Campus Renewal*, Alexandria, VA: APPA, 1999.

Page 5: Kaiser H, "Capital Renewal and Deferred Maintenance," Alexandria, VA: APPA, 2017.

Page 6: Hinrichs PL, "Trends in Expenditures by US Colleges and Universities, 1987–2013," Federal Reserve Bank of Cleveland, September 2016, https://www.clevelandfed.org/newsroom-and-events/publications/economic-commentary/2016-economic-commentaries/ec-201610-trends-in-expenditures-by-us-colleges-and-universities.aspx

Page 8: University of Denver, Denver, CO.

Page 9: University of Virginia, Charlottesville, VA.

Page 10: California Institute of Technology, Pasadena, CA; Furman University, Greenville, SC; Western Illinois University, Macomb, IL.

Page 11: California State University, Los Angeles, Los Angeles, CA; "Cal Poly San Luis Obispo Creative Energy Project Finance," 2015, http://www.greenbuildings.berkeley.edu/bestpractices/2015/calpolyslo-creative-energy-finance.html; NASA, Washington, DC; University of Texas at San Antonio, San Antonio, TX; Western University, London, ON; Sightlines, "State of Facilities in Higher Education: 2016 Benchmarks, Best Practices, & Trends," 2017, http://www.sightlines.com/wp-content/uploads/2016/12/2016-State-of-Facilities-in-Higher-Education.pdf.

All other research gathered from Facilities Forum interviews and analysis.

Washington DC | Richmond | Birmingham | Minneapolis

P 202.747.1000 | **F** 202.747.1010 | **eab.com**