

Brown University Department of Facilities Management: Preventive Maintenance Program Journey

Facilities leaders are charged with maintaining physical assets that serve as a cornerstone for supporting their institution's mission. Yet, despite the value of these assets, deferred maintenance often continues to grow, and preventive maintenance is pushed aside.

Brown University's Department of Facilities Management seeks to provide value to the University by not only maintaining but enhancing the quality of its physical facilities.

In 2010, the Department realized that the value it provided to the University was slowly eroding:

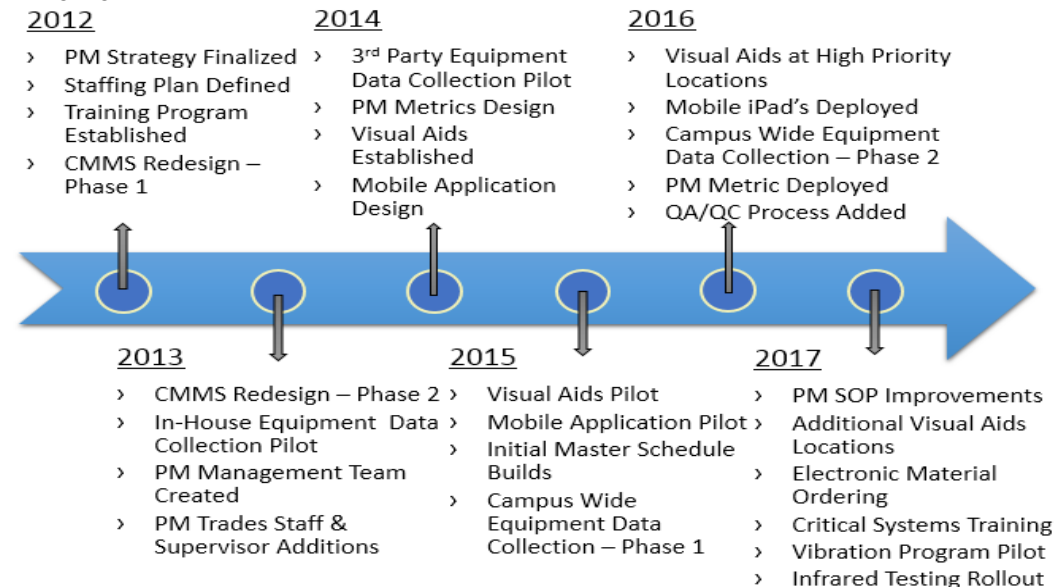
- Deferred Maintenance Needs = \$462 million and projected to grow \$48M per year
- 75% of work orders were costly unplanned(reactive) maintenance
- no staff dedicated to preventive maintenance

The Department made the decision to tackle the situation head-on. In 2011, they embarked on a 7-year journey to more effective Preventive Maintenance using an innovative approach that engaged not only their staff but also the campus customers they serve.

The four key goals developed for the program:

- Prolong the useful life of equipment
- Lower operating costs associated with equipment maintenance
- Reduce equipment water and energy use
- Reduce unplanned building system interruptions

Timeline:



Future improvements include: parts kitting, work order initiation from building automation system data, additional use of infrared testing and vibration analysis. This will allow preventive maintenance optimization with reductions in fixed schedule maintenance actions.

Brown's Preventive Maintenance Program:

**Brown University
Department of Facilities
Management:**

- 233 Buildings
- 6.2M Maintainable gross sq. ft.
- 104 Trades staff
- 20 Management Staff

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Institutional Benefits

Brown understood they needed to invest time in developing a strategic plan to guide the organization along the path required to achieve the four key goals. The strategy also details where the long-term program funding comes from through the improvements identified by the team exercises. Resources freed up through implementation of the improvements are redirected to further strengthen the Preventive Maintenance efforts.

As such, the approach to developing and implementing a Preventive Maintenance strategy was multi-pronged, starting with understanding the current situation, then defining a desired future state, and finally, generating a plan to reach it.

Brown's innovative approach, the development of the Preventive Maintenance program based on a coordinated strategy, is providing measurable benefits to the Department of Facilities Management and the Brown University community.

- **Fiscal Responsibility** - Prolonging the useful life of buildings and assets decreases long-term capital renewal needs and daily operating costs due to emergency and unplanned repairs.
- **Employee Morale** – Reducing unplanned maintenance and emergency work orders allows employees to focus on their planned daily tasks, improves productivity, and reduces stress created by too much “fire-fighting.” Working together in a collaborative way on a Preventive Maintenance strategy has helped to create a problem-solving teamwork culture, where maintenance staff, management and customers all work together to identify and tackle problems with buildings, building systems and maintenance scheduling.
- **Customer Service** - Customer satisfaction has improved through reductions in building system disruption, improvement in communication, and a focus on customer value.
- **Stewardship** – From reduced energy use to improvement in allocation of staff to the highest-priority assets, the Preventive Maintenance program is supporting better stewardship of our natural resources, people at Brown, and Brown's financial resources.

Brown Facilities Management has seen measurable effect of the preventive maintenance program through:

1. A reduction in the rate of increase in the deferred maintenance value.
2. A stabilization in the operations and maintenance budget with no increase year on year since the initial seed funding. This includes no increases due to wage inflation.
3. Higher job satisfaction levels from the front line staff who were involved with the program development and implementation.



How did Brown attack the problem?

- Large group, multi-day conference room workshops.
- Small group working sessions.
- Shop meetings.
- Job shadowing.
- Problem-solving & prioritization sessions.



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Innovation Through Management, Customer and Employee Teamwork

Brown's approach developed a Preventive Maintenance strategy holistically through:

Creative Consultant Teaming

Brown took a chance when awarding the support contract for this work. Most of the responses to their RFP focused on the technical aspects of the work; but one response recommended a facilitated collaborative approach, whereby many stakeholders in the entire system would be engaged including; building occupants, maintenance staff and facilities management leadership; to find hidden resources by looking at current work practices. Although the two firms selected had not submitted a proposal together as a team, Brown paired the preferred technical facilities consultant with the facilitator consultant and asked them to work together.

Decision-Making and Prioritization Based on Stakeholder Value

To provide focus for Preventive Maintenance (PM), Brown Facilities Management worked with over 133 campus stakeholders – building occupants, trades staff, Facilities Management staff, and academic department heads – to identify what they value from Facilities' maintenance processes. The team realized: if they can deliver what is valued by stakeholders, they will deliver improved customer satisfaction in building and asset performance and the level of Facilities Management customer service.



This Stakeholder Value was then used as a guiding compass when making decisions throughout the rest of the strategy development, from identifying 13 key building characteristics, asset types and building prioritizations, to determining needed process updates and staffing changes. This value focus allowed the diverse group to align on common ground even when making tough choices about their future.

Budgeting & Funding PM: Using Transparency to Find Hidden Resources

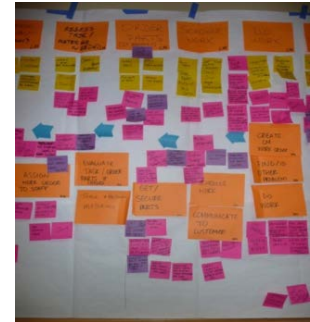
Brown developed a new PM budget based on the defined building and asset prioritization, associated desired maintenance levels, and on resulting requirements in labor and materials costs. This budgeting model, based on decisions made by stakeholders during the strategy development, has allowed Brown to openly demonstrate how resources are allocated on the priorities that matter most to their customers & stakeholders.

Brown’s new maintenance level and prioritization model for budgeting PM initially revealed a needed budget increase of \$3.8 million to fund the desired PM program. To decrease this prohibitive cost, the Facilities Management team engaged in an intense collaborative process to find hidden waste in work processes and ways to remove waste and improve their existing work processes. The consultants quidded Brown through a collaborative process using LEAN techniques and Value Stream Mapping to collectively discover areas of waste in existing processes and identify ways to eliminate this waste.

First, Brown maintenance trades staff were paired with management and consulting team members to conduct job shadowing. Each group walked through work orders as they were performed and together they discussed and documented the problems and obstacles that inhibited work performance. From waiting for materials to looking for parking to spending time finding the right piece of equipment, the shadow teams identified more than 200 problems that were costing excess time and money and causing frustration for the staff. Then, the entire team worked together to generate a Value Stream Map of the process steps, people and problems involved in fulfilling work orders, based on their newly transparent view of what happens:

A portion of the Value Stream Map for maintenance processes, generated to document what happens vs. what different people think happens, in fulfilling work orders.

- Orange – major process steps
- Yellow – sub-process steps
- Blue – flow of work
- Pink – problems or obstacles
- Purple – ideas to tackle problems & obstacles



As a result, the team identified major focus areas for improvement and estimated the amount of improvement available:

Improvement Area	Hours Gained (est)
Asset & Equipment Information	12,528
Standard Work Execution	12,161
Preventive Maintenance strategic & responsive scheduling	9,305
Tools/parts/materials/inventory management	14,568
Management & Communication	8,439

The team identified 57,000 hours of labor costs that could be recovered through improved work process efficiency.

That equates to 27 FTEs and roughly \$2.5 million of the \$3.8 million needed to fund the PM strategy.



*Job Shadowing:
What obstacles get in the way of doing work to deliver value to our customers?*



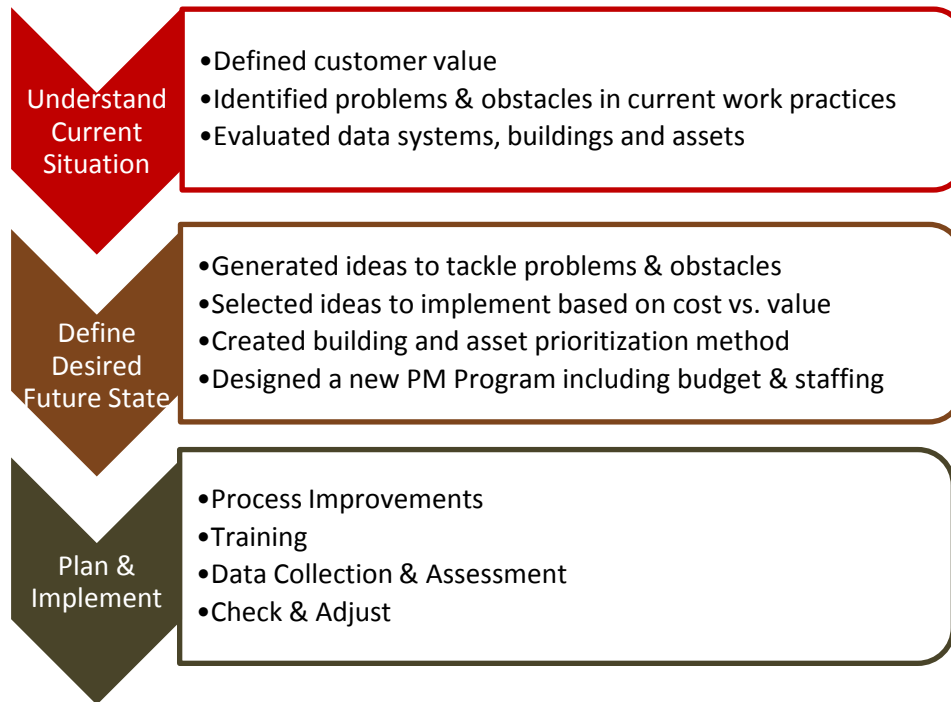
How Can Brown’s Preventive Maintenance Strategy Development be Used by Others?

Although other institutions may not have the same deferred maintenance challenges, goals or culture, the approach and framework that Brown used to develop their PM strategy and practices can be used at any campus to define the elements needed to address their specific situation.

Brown’s approach to this work involved two main tenets:

1. Focus on what’s most important to University stakeholders
2. Engage the people closest to the work to not only find hidden resources to apply to PM, but to find ways to make work better – less waste, less frustration and more fulfilling

Brown followed the following basic steps as a framework to developing a robust, sustainable PM program:

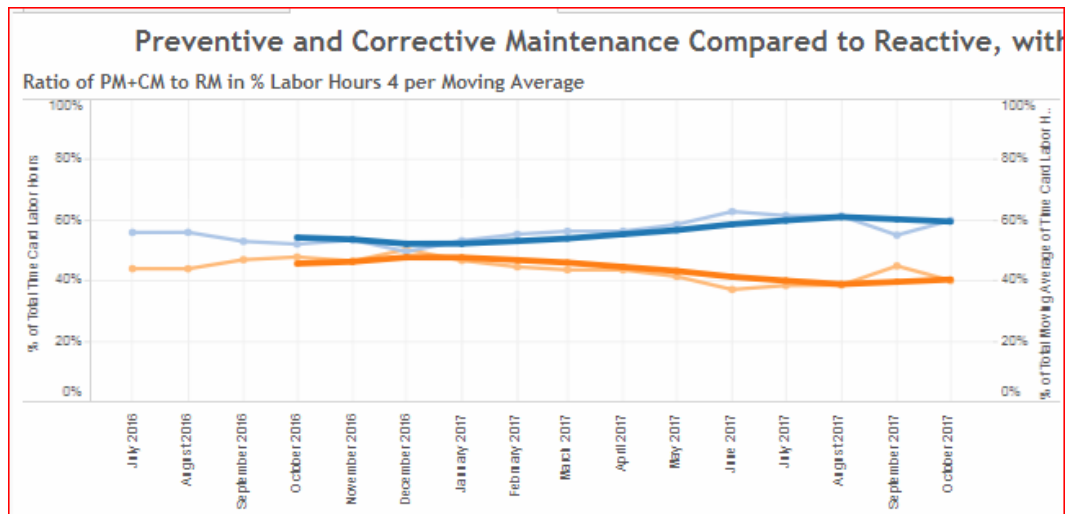


Although the deferred maintenance challenge is a complex problem with a multi-faceted solution, Brown’s philosophy of focusing on what’s important and engaging the people closest to the work can support the success of any change initiative. The specifics –people, goals, timeframe, data collection methods, etc. – might differ, but the framework of understanding the current situation to inform future goals and actions can be applied to any challenge. Brown University has used a similar approach to tackle other problems on campus, from improving their utility rebate processes to developing a sustainability strategy. Other institutions also use this approach and framework with success on many tough challenges.

Management Commitment and Employee Involvement

Brown University management committed improving the level of service provided by Facilities Management and increasing the level of stewardship towards all categories of the campus physical assets.

Commitment by the management team at Brown University was also there for development of the PM strategy and implementation plan and for seed funding to make the first changes to the organization and work process improvements. This then enabled the program to begin and develop its own benefits based funding. Program status reports and successes are reviewed each quarter with the Facilities Management leadership team. The metric developed are viewable on line and broadly available at multiple levels of the organization.



Most of the work process improvements are executed by the more than 100 front-line maintenance staff, who also continue to provide feedback regarding what is working and what does not add value.

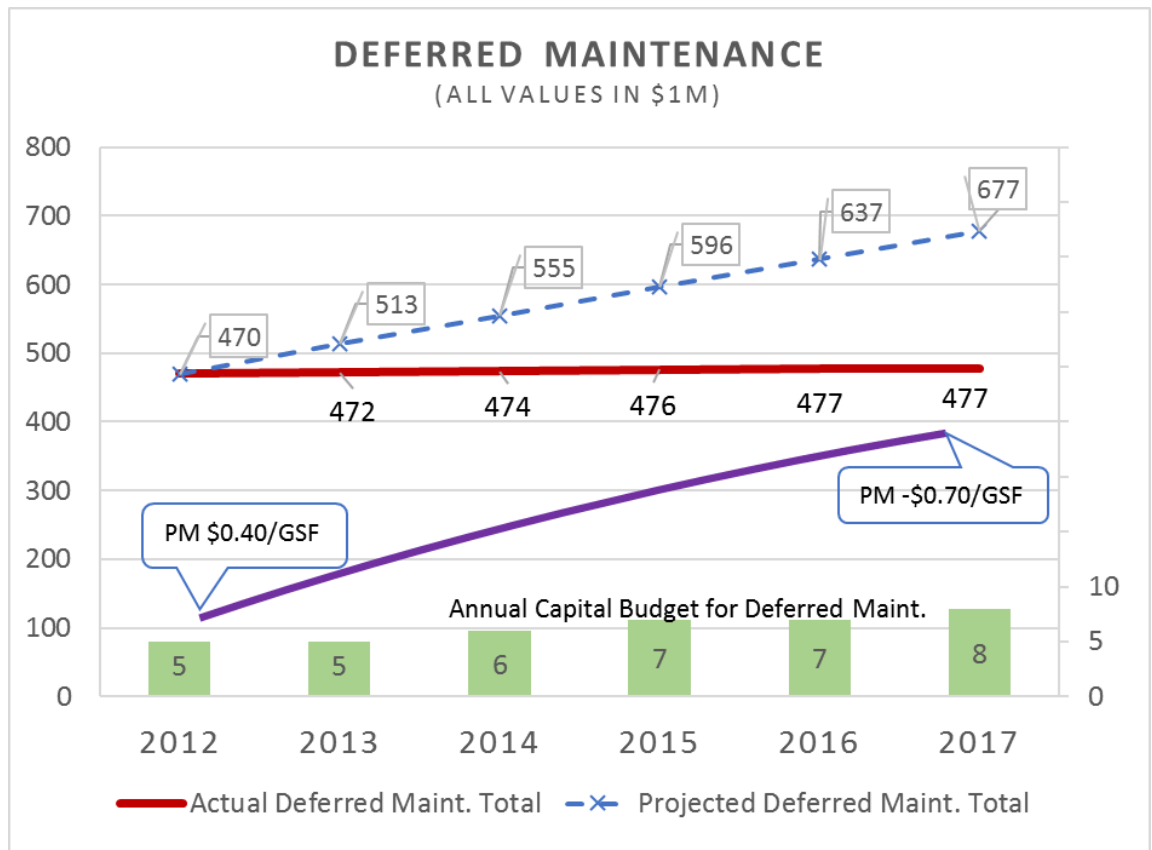
Due to the success of this program, Brown University Facilities Management is applying LEAN processes to other areas of service to the university, including the capital projects delivery processes.

Documentation, Analysis, Customer Input & Benchmarking

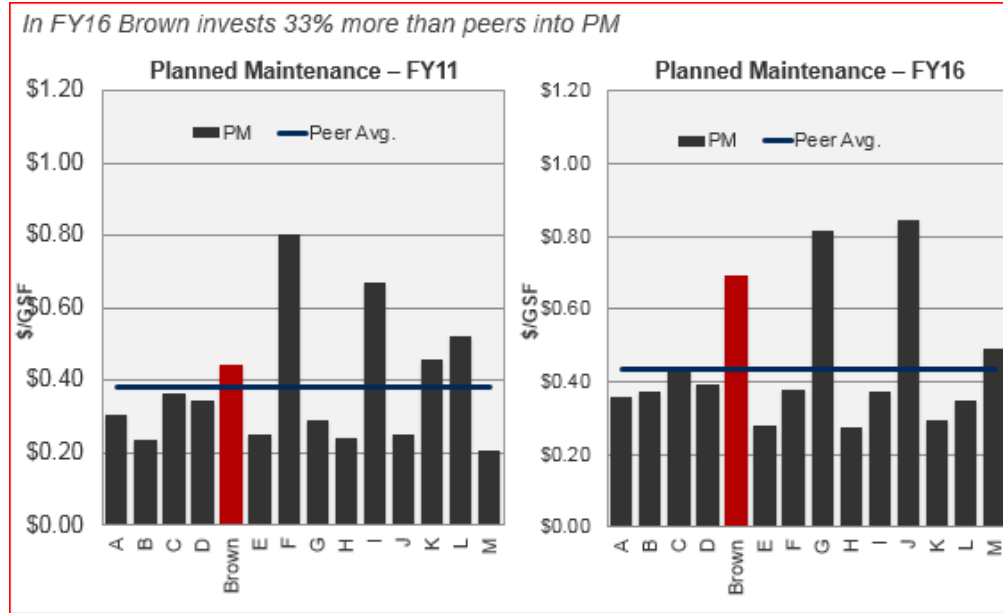
Brown's leadership, innovation and continuous improvement have yielded impressive results so far:

- A 35% decrease in reactive or unplanned maintenance work orders
- An 80% increase in equipment receiving preventive maintenance
- 30 dedicated PM staff

The expected growth in differed maintenance was almost eliminated to just 1.8% over the last five years, instead of the projected 10% per year growth to \$677M of deferred maintenance.



Brown has also increased its PM commitment to a best in class level that is 33% more than most of our peers.



“We’ve had people come in and make recommendations before, but this is the first time anyone has asked us what we think.”



“I learned that blue collar and white collar can work together to solve problems.”

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A key aspect of the strategy was to monitor its success through reporting and on-line metric monitoring. The table here shows the progress in important areas of the program. 1) know what needs to be maintained, 2) know who will be performing the work, and 3) know that we are tracking towards the > 70% planned work type.

	2011 (Pre-Strategy)	2016 (Year 3)	2019 (Target)
No. PM+CM completed	14,000	30,433	45,000
No. RM completed	38,000	26,933	20,000
% PM+CM Labor	25%	54%	≥ 70%
% RM Labor	75%	46%	≤ 30%
In-House PM+CM Labor	\$1.5M	\$4.0M	\$4.85M
Supplies PM+CM	\$580K	\$600K	1.15M
Contract Services	\$1.6M	\$1.8M	\$1.8M
Dedicated PM Staff	0	32	40
No. Of Equipment	5,000	19,983	>20,000

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