UMASS AT A CROSSROADS

PART 2: IS UMASS' EXPANSION FISCALLY SUSTAINABLE?

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Executive Summary

Over the last decade, the University of Massachusetts (UMass) has become one of the country's leading public university systems, jumping in national rankings of state universities and becoming one of the most selective public higher education options for both in-state and out-of-state students. Just ten years ago, UMass-Amherst accepted 80.7 percent of in-state applicants; by the 2015-2016 cycle, that percentage had fallen to 56.8 percent. As further evidence of UMass' rise to academic excellence, the average high school grade point average (GPA) of an incoming freshman improved from 2.82 in 1992 to 3.78 in 2014. More than anytime in state history, UMass boasts admissions statistics and a student population that are competitive with the nation's most established research universities.

In building an impressive national profile, the school has also dramatically increased enrollment, expanding its student population by more than 27 percent from 2005 to 2014. Over this same period, UMass undertook a campaign of capital expansion totaling $3.8 billion.[1] All this has not come without growing pains. The university has become increasingly dependent on rising state appropriations and expanded revenue from tuition and fees to make up for growing operating losses that stem in large part from its aggressive expansion. The unprecedented number of capital additions over the last decade has resulted in escalating debt that threatens to compromise UMass fiscal stability. From FY2005-FY2016, UMass capital spending tripled the university's outstanding debt from $946.2 million to $2.9 billion.

The $3.8 billion expansion of the five UMass campuses occurred during a period in which the university's deferred maintenance backlog grew from $2.7 billion in 2005 to $3.3 billion in 2014, as reported by the UMass Annual Indicator reports. Beyond this development, UMass FY2015-2019 Capital Plan calls for significant further expansion. As of June 17, 2015, UMass trustees have granted full project approval for 111 projects totaling $3.44 billion, and preliminary project approval of 97 additional projects totaling $3.54 billion.

While the achievements of UMass over the last decade merit praise, it is important that policymakers and the public consider the long-term financial and public policy implications of UMass' ongoing transformation. The proposals in the FY2015-2019 capital plan and allocation of resources therein set the university's course for decades to come. Elected officials in the commonwealth are familiar with the financial hardship that resulted from the MBTA's undertaking of system-wide expansion while ignoring its growing deferred maintenance backlog and growing operating deficit. Lawmakers should apply lessons learned from MBTA expansion when considering UMass' capital plan, its deferred maintenance backlog, and its growing dependency on increased levels of future state funding and out-of-state tuition revenue to support the school's expansion plans.

The $3.8 billion expansion of the five UMass campuses occurred during a period in which UMass deferred maintenance backlog grew from $2.7 billion in 2005 to $3.3 billion in 2014, as reported by the UMass Annual Indicator reports.

Introduction

As explored in our first report in this series, the past decade has been a period of tremendous growth for UMass. This growth has taken many forms, including expansion of the school's capital facilities, increased student enrollment, and a growing national profile and public mission. These developments have resulted in innumerable successes for the university, including impressive leaps in national rankings.

As our first report discussed, from 2005 to 2014, UMass increased total enrollment by 27.3 percent, far outpacing the average of other New England state universities (1.7 percent), MA private four-year universities (11.8 percent), U.S. public universities (14.4 percent), and U.S. private universities (16.4 percent). UMass' expanding programs have resulted in significant increases in operating expenses over this period, as we will explore in greater depth later in this paper.

UMass capital expansion and enrollment growth are closely linked. To attract and accommodate more students, UMass undertook a building boom on its campuses between FY2005 and FY2015 with a price tag of $3.81 billion, only $1.38 billion of which was funded by the state. The university funded the balance by itself through increased institutional borrowing, more revenue from tuition and fees, and admitting increasingly higher volumes of out-of-state students who pay more to attend.

The institution recently adopted an ambitious $6.98 billion FY2015-2019 Capital Plan that outlines significant additional expansion of the university's five campuses.

To put the scale of the $3.81 billion program into perspective, the total capital replacement value of all physical assets at the UMass campuses was estimated to be $10.0 billion in December 2014, including the new capital improvements, as stated in the UMass Capital Plan 2015-2019.[4]

This report considers the implications of the capital plan on future university and state finances. Our findings suggest that UMass' capital plan as currently proposed threatens to exacerbate the budget gap that has been created by capital and enrollment expansion and increase the university's dependence on future state capital and operating funding, tuition and fee revenue increases, along with expanded enrollment of out-of-state students to support the university's growing costs.

UMass Capital expansion

UMass' capital plan has expanded dramatically over the last decade. Figure 1 reveals the scope of this expansion, presenting capital asset additions and adjustments from FY2005-FY2015. As the table shows, the capital program at the university's five campuses resulted in an increase of $3.81 billion in net capital asset additions/retirements in plant according to UMass Annual Financial Reports 2005-2015.[3] To put the scale of the program into perspective, the total capital replacement value of all physical assets at the UMass campuses, including the new capital improvements, was estimated to be $10 billion in December 2014 according to the FY2015-2019 Capital Plan.[4]

Figure 1. UMass net capital asset additions FY2005-FY2015 (000s)

Fiscal Year	Buildings and Improvements (ending balance)	Additions/ Adjustments	Retirements/ Adjustments	Net additions
2005	$1,636,538	-	-	-
2006	$1,878,229	$251,723	-$10,032	$241,691
2007	$2,070,438	$234,042	-$41,833	$192,209
2008	$2,167,551	$97,433	-$320	$97,113
2009	$2,586,338	$421,474	-$2,704	$418,770
2010	$2,885,304	$303,716	-$4,750	$298,966
2011	$3,126,849	$242,806	-$1,261	$241,545
2012	$3,322,211	$207,543	-$12,181	$195,362
2013	$4,058,559	$754,586	-$18,238	$736,348
2014	$4,694,649	$643,091	-$7,001	$636,090
2015	$5,447,343	$762,310	-$9,616	$752,694
2006-2015	-	$3,918,724	-$107,936	$3,810,788

As previously mentioned, most of the funding (63.9 percent) for capital expansion was provided by the university itself. Between 2005 and 2015, the state legislature enacted three bond bills that provided UMass with $1.38 billion in capital funding, which represents 36.1 percent of the $3.81 billion net capital additions over this timeframe. In June of 2008, the legislature enacted the $1 billion *Life Sciences Industry Investment Act* that included $276.7 million earmarked to support facility improvements at UMass.[5] Two months later, the legislature authorized a $2.2 billion higher education bond bill,[6] including $1 billion for the five UMass campuses.[7] Chapter 237 of the Acts of 2014 amended the 2008 Higher Education Bond Bill by adding $100 million to the bottom line to fund deferred maintenance needs at UMass.

As a result of self-funding nearly two-thirds of recent capital expansions, funding the balance of its $6.98 billion 2015-19 Capital Plan has become a challenge for UMass. As revealed in an October 2014 report from The Higher Education Finance Commission, a significant chunk of this planned capital program remains unfunded:

> Even with the significant contribution the state has made to UMass through the Life Sciences and Higher Education bond bills, the lion's share of funding for the university's current capital program has come from the university itself, with UMass funding about 54% of this activity and the commonwealth funding the remaining 17%. As a result, nearly 30% or $1.6 billion of the university's 5-year plan is unfunded, which will require either additional state funds or campus borrowing to be able to continue to make important campus investments. In fact, 75% of the university's $2.7 billion in debt is related to non-auxiliary type facilities which would normally be financed by the commonwealth.[8]

The changing role of the UMass Building Authority

UMass aggressive capital expansion has been facilitated in part by the changing role of the school's building authority. According to its website, "the university of Massachusetts Building Authority's (UMBA's)...original mission was to build facilities such as student dormitories, dining facilities and parking garages on UMass campuses that could be financed from student fees and charges." UMBA explains its change in mission as follows:

> In recent years, the Authority has expanded its role and now builds academic buildings, laboratories, athletic facilities, heating plants, and other facilities, as well as providing funding for the repair and renovation of existing campus facilities. In order o construct facilities, the Authority borrows funds by issuing tax-exempt bonds. The university has pledged to pay the principal and interest on the bonds issued by the Authority over the life of the bonds. The Authority is also responsible for the construction of these facilities and hires architects, engineers and construction firms to design and build them. After the facilities are completed, they are used and maintained by the university while the Authority maintains ownership of the buildings.[9]

UMass now faces financial challenges in funding the balance of its $6.98 billion 2015-19 Capital Plan.

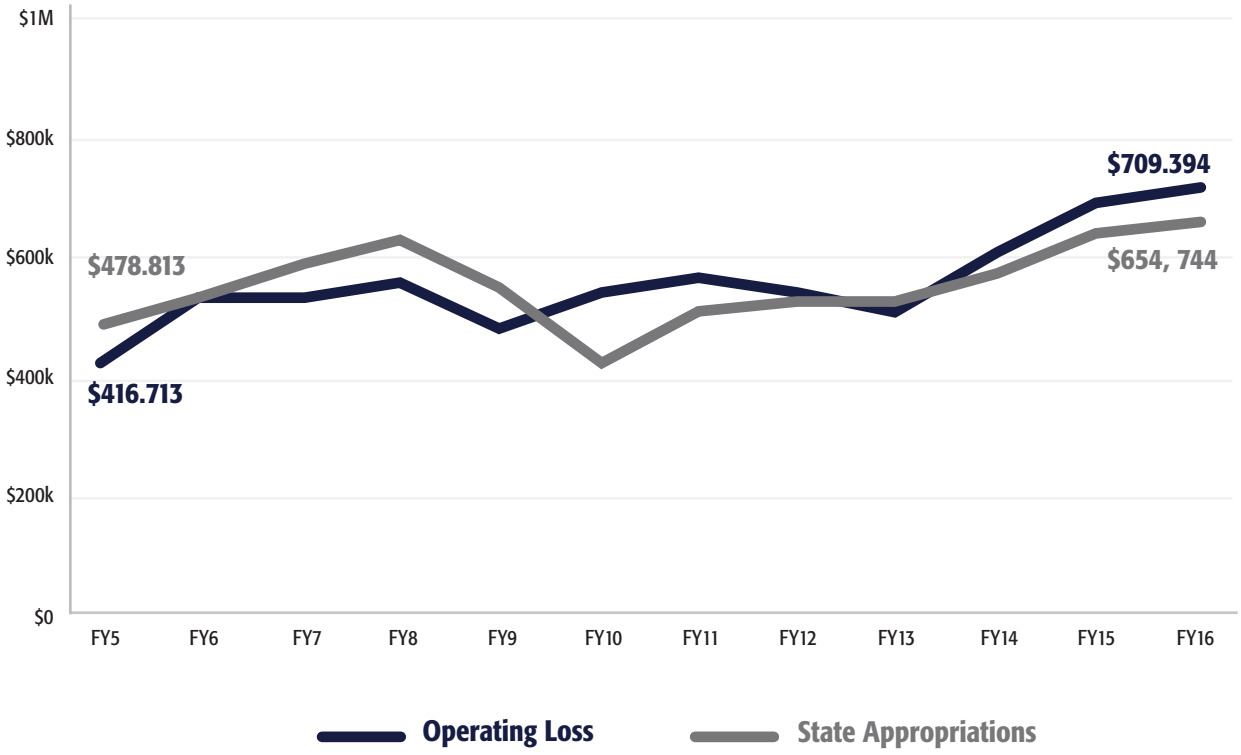
UMass operating loss increased from $416.7 million to $709.4 million from FY2005 to FY2016.

This recent change in UMBA's mission has provided UMass with a way to make capital expansion decisions without legislative approval. Before the change, UMass depended upon legislative approval and state financing to construct academic buildings, laboratories, athletic facilities, heating plants, and other facilities not funded by fees and charges.

STATE APPROPRIATIONS—FILLING THE BUDGET GAP?

Public university administrators rely upon state financial assistance as one of the principal means of offsetting operating losses, an accounting term referring to the difference between total operating expenses and income from sources such as student tuition, fees and federal grants, and not including state and federal appropriations. As figure 2 shows, UMass' operating loss increased from $416.7 million to $709.4 million from FY2005 to FY2016. State funding has closely mirrored the university's annual operating losses. State appropriations increased from $478.8 million in FY2005 to $654.8 million in FY2016, including payment of university employee health insurance and pension costs.[10(1)]

Figure 2. UMass losses and state appropriations FY2005-2016 (in millions of $)



The costs of fringe benefits, public pensions and post-retirement health insurance for UMass retirees

An important consideration for state leaders in determining future UMass funding levels is the cost of fringe benefit expenses for state-funded employees at the university. For these employees, the state pays the employer's share of fringe benefit costs including health insurance, unemployment compensation, pension contributions and workers' compensation benefits as well as post-employment pension and health insurance.[11] The fringe benefit rate is 29.18 percent in FY2016. In FY2014, UMass had 6,438 full-time equivalent state-funded employees. That year, the state incurred $141.9 million in fringe benefit expenses for active UMass employees in addition to $486.7 million in direct appropriations to the university.

The commonwealth also incurs the cost of post-employment pension payments and the employer's share of post-retirement health insurance for formerly state-funded UMass retirees. In counting total state support for UMass, this expense is sometimes overlooked, but it is considerable. The Massachusetts Office of the Comptroller's financial statements of the commonwealth for FY2015 report that the state's unfunded pension liability for all state retirees totaled $24.5 billion. An April 2015 MassLive article further explains the troubling future that lies ahead for the state when it comes to unfunded employee retirement obligations: "In fiscal year 2014, the state owed $15.6 billion in future health insurance benefits for all state retirees, which must be paid out over the next 30 years. The state has only set aside money to pay for 3.3 percent of that, leaving an unfunded liability of $15 billion, according to state financial documents."[12]

The state's total unfunded liabilities for pensions and future health insurance is approximately $40.1 billion. It is difficult to estimate what percentage of the unfunded liability is attributable to UMass retirees, but as an approximation, UMass had 6,438 full time equivalent (FTE) state-funded employees in FY2014 and the state's retirement systems had 184,723 active members in FY2015.[13] By this rough estimate, UMass employees constitute approximately 3.5 percent of the total number of active employees in the state's retirement systems. 3.5 percent of the commonwealth's $40.1 billion in unfunded pension and post-employee health insurance obligations translates to approximately $1.4 billion in unfunded liability for retired UMass employees.

50:50 Proposal

UMass' growing reliance on state funding has become a point of disagreement among Massachusetts elected officials. As the *Boston Globe* reported in early November, Senate President Rosenberg — a UMass alumnus who represents Amherst and is a long-time fervent supporter of the state university system — balked at a $10.9 million increase in appropriations to UMass based on the school's refusal to act on his prior request that the university lower its student fees, which rose this year after remaining unchanged for three years.[14]

A more recent disagreement over state funding has its roots in a policy decision made by the previous state administration. In 2014, UMass lobbied aggressively to win a commitment from the legislature and Governor Deval Patrick for a 50:50 funding arrangement. By the terms of this proposal, the commonwealth would fund 50 percent of the cost of educating resident undergraduate students, and the remaining 50 percent would be covered by students. As the *Boston Globe* reported, UMass proposal requested $519 million for the school's five campuses—a grand total that includes $100 million more relative to the funds allotted just two years prior.[15] According to the UMass budget document, the state included this increase to the university's FY2014 appropriation and went further by including an additional increase in an outside section of the FY2015 state budget:

> While the University has experienced significant enrollment growth there has also been a massive cost shift in how higher education is funded in the United States, and here in the Commonwealth, where student charges continually increase and state support per student declines. For FY2014, much work has been done to change from the traditional funding formula conversation to a proposal whereby the Commonwealth would provide 50% of the cost of educating resident undergraduate students while the student would contribute the remaining 50%. This is achieved with a phased in approach to increasing overall funding to the University over the next two years. This type of investment, estimated at $39.1 each year for the next two years, not including fringe, would allow for a freeze in tuition and mandatory curriculum fee for resident undergraduate students of the University. The State included this increase to the University's appropriation for FY2104 and went further by including an outside section of the State budget demonstrating the additional increase for FY2015.[16]

Earlier this year, however, a key state official announced that the 50:50 funding deal between UMass and the state is no longer in effect.[17] MassLive reported in early February 2016:

> The deal made by former Gov. Deval Patrick and former University of Massachusetts President Robert Caret for the state to fund 50 percent of the cost of a UMass education in exchange for a freeze on student fees and tuition is, effectively, dead."[18] The article further noted that neither Governor Charlie Baker nor university president Marty Meehan pursued that strategy this year. State Secretary of Education James Peyser said that the administration made the decision based not only on available resources, but on a policy directive that the state should not commit to funding of this level without clear and definitive agreement regarding what the total UMass budget should be. As Secretary Peyser expressed, "From a policy point of view, even if we had the resources, we would need to look at whether that was the right way to go... We're certainly open to talking about some more stable and longer term approaches to funding UMass, but at this point we can't commit to funding 50:50.[19]

Issues surrounding rising student tuition & fees

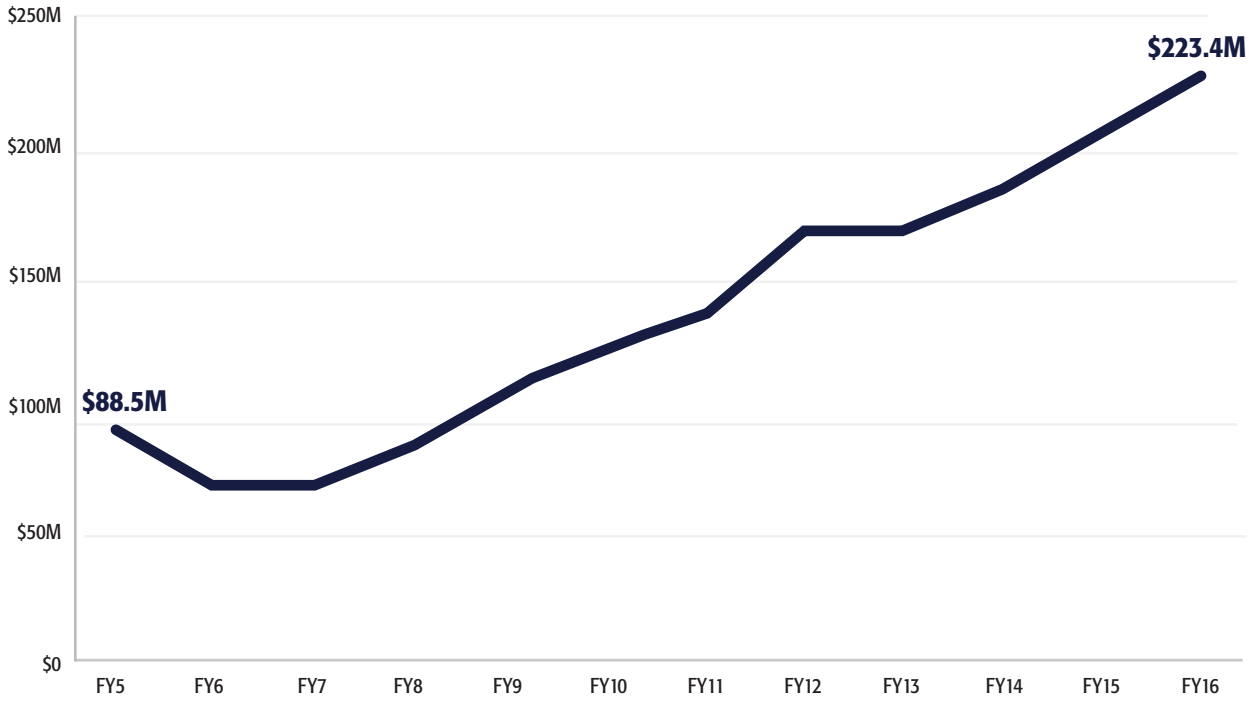
Absent an agreement between UMass and state leaders about future enrollment and capital expansion, the legislature and governor have begun to raise concerns about the effects that such expansion will have on the state budget and student tuition and fees. Annual UMass tuition and fee revenue increased from $388.4 million in FY2005 to $839.8 million in FY2016, resulting from expanded student enrollment, an increase in out-of-state students paying higher tuition and fees, and tuition and fee hikes. The university raised tuition and fees in the fall of 2015 for in-state undergraduates by between 5.98 percent and 7.76 percent at its five campuses. Tuition increased from $13,258 to $14,171 at UMass Amherst, from $11,966 to $12,682 at UMass Boston, from $11,681 to $12,588 at UMass Dartmouth, and from $12,447 to $13,427 at UMass Lowell. According to the UMass FY2016 budget, the tuition and fee hikes are expected to increase tuition income, net of scholarships, by $73.1 million, from $766.7 million to $839.8 million.

These tuition and fee increases established UMass Amherst as 13th most expensive of 172 public universities in *U.S. News and World Report*'s 2015 National Universities Rankings, which is measured by total tuition and fees paid by in-state students. UMass Amherst's tuition and fees are now more expensive than those of four public universities that rank among the best 30 in the nation according to US News and World Report: U.C.—Berkeley (ranked 20th), U.C.L.A (23rd), U. Michigan—Ann Arbor (29th), and U.N.C.—Chapel Hill (30th). A more detailed examination of rising tuition and fees will be included in the third report in our series on UMass.

Increasing Levels of Outstanding Debt

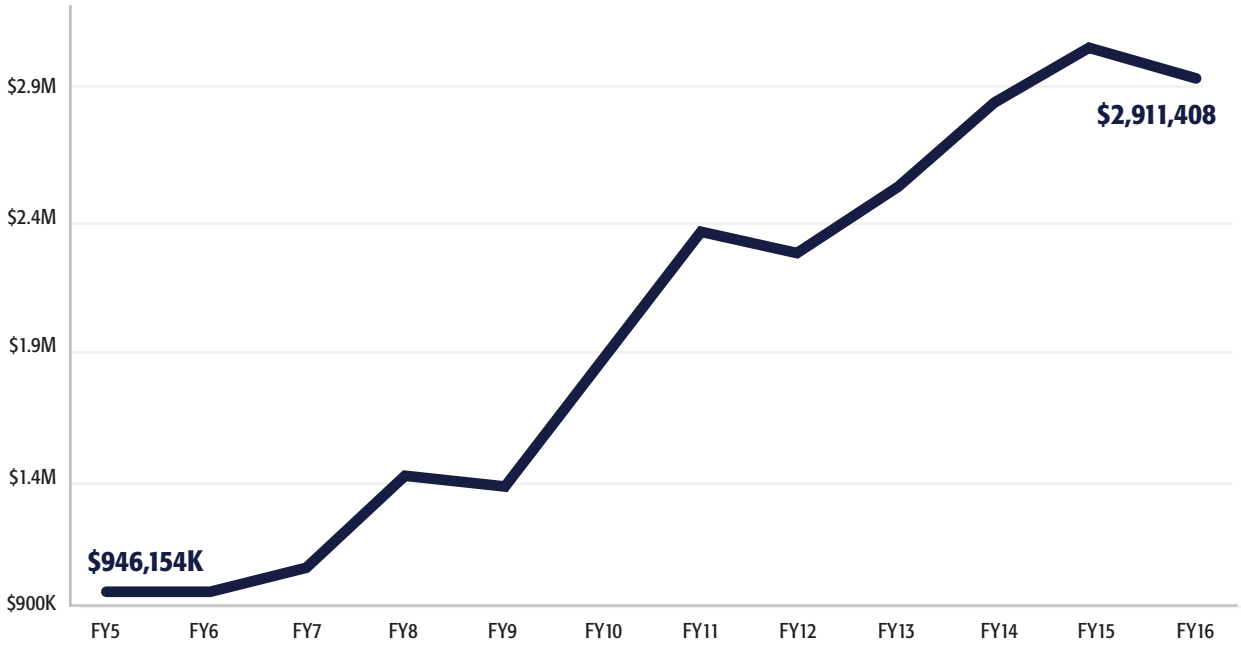
UMass also faces financial pressure due to debt service obligations related to its recent capital expansion. As revealed in Figure 4 and accompanying Table – Figure 3 in the Appendix, annual debt service payments grew from $88.5 million in FY2005 to $223.4 million in FY2016. As explained in its capital plan, UMass is subject to a maximum debt service to operating expenditures ratio of 8 percent. The FY2015-2019 Capital Plan lists FY14 debt to operating ratio as 6.3 percent, projected to rise to 7.1 percent by 2019—dangerously close to the limit.[20] Given that limit, the university will become increasingly dependent on state capital funding if it intends to carry out its capital plan as adopted. Rising debt service has triggered the concern of Moody's rating agency, which lowered the UMBA's outlook from stable to negative in 2014 but did not reduce its actual rating. Moody's reaffirmed that assessment in February 2015.

Figure 4. UMass annual debt service FY2005-FY2016



As Figure 5 and accompanying Table – Figure 3 in Appendix show, UMass capital spending program more than tripled the university's outstanding debt, which grew from $946.2 million in FY2005 to $2.9 billion in FY2016.

Figure 5. Total UMass bonds outstanding FY2005-FY2016



The interest payments UMass must make on this debt, excluding capital repayment, have also been growing precipitously. Figure 7 presents interest payments on bonds, showing UMass' increasing interest on indebtedness payments from FY2004 to FY2016. As the chart shows, interest on indebtedness rose from $30.2 million in FY2004 to $104.2 million in FY2016. In an effort to limit interest payments in the short term, the university postponed principal payments on $295 million in debt issued in February of 2015 until 2020, structuring the debt obligation so UMass would only pay interest during that period.

Figure 6. UMass Interest on indebtedness FY2004-FY2016

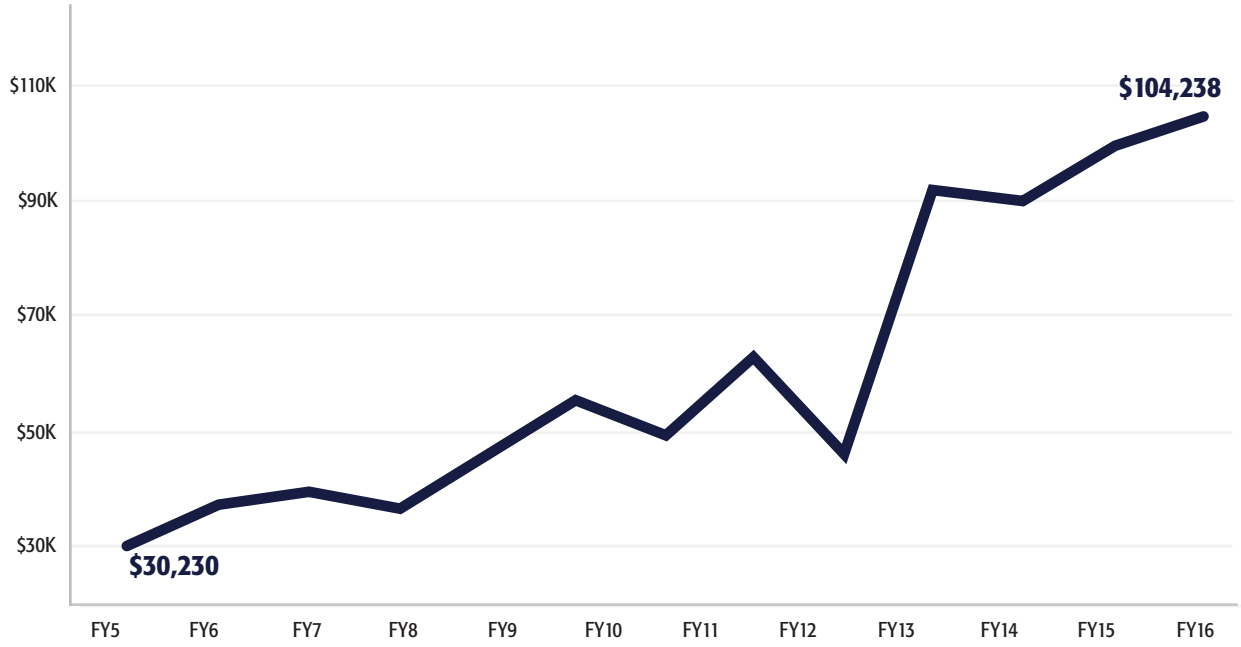


Figure 8 shows the extent to which UMass is dependent upon state appropriations to avoid operating at an annual loss, and how the line item payment of interest on indebtedness factors into UMass' bottom line.

Figure 7. UMass: Income/(Loss) Before Other Revenues, Expenses, Gains, and Losses

	FY13	FY14	FY15	FY16
Operating Income/Loss	-$511,083	-$600,621	-$687,850	-$709,394
Nonoperating Revenues/(Expenses)	-	-	-	-
Federal Appropriations	$6,774	$7,020	$7,209	$7,425
Non-Operating Federal Grants	-	-	-	-
State Appropriations (including stimulus funds in FY10-FY11)	$519,311	$570,618	$635,679	$654,744
Gifts	$30,044	$29,013	$35,875	$37,267
Investment and endowment return	$67,886	$103,327	$58,893	$56,562
Interest on Indebtedness	-$91,365	-$89,496	-$99,067	-$104,238
Other Non-operating revenues/ (expense)	$72,011	$75,325	$75,163	$77,882
Net Non-operating Revenues	**$604,662**	**$695,807**	**$713,752**	**$729,641**
Income/(Loss) Before Other Revenues, Expenses, Gains, and Losses	**$93,579**	**$95,186**	**$25,902**	**$20,247**

A March 2015 *Boston Globe* headline read, "After building boom, UMass $3 billion in debt. Tab could hinder future growth, but trustees are undaunted."[21]

UMass' accumulation of self-funded debt has drawn attention. A March 2015 *Boston Globe* headline read, "After building boom, UMass $3 billion in debt. Tab could hinder future growth, but trustees are undaunted."[21] If UMass continues to accumulate significantly higher levels of bonded indebtedness without offsetting state funding, it will either have to reduce its operating loss or increase other non-operating revenues, most of which are largely beyond the university's control.

A GROWING DEFERRED MAINTENANCE BACKLOG

Deferred maintenance refers to the postponement of maintenance of capital assets in need of replacement or renewal, including the delay of repairs on infrastructure, machinery and other forms of property. Increasingly across the U.S., state-funded higher education institutions have been inadequately addressing their capital renewal needs. A 2013 report from the consulting group, Sightlines LLC (Sightlines), points out that higher education project backlogs increased by 15 percent nationwide from 2007 to 2012.[22]

For Massachusetts' public universities, the situation is particularly troubling. An October 2014 report issued to the state legislature by the Higher Education Finance Commission stated that the 10-year deferred maintenance needs of the commonwealth's 29 higher education campuses, state universities and community colleges—including UMass—is approximately $4.2 billion.[23] In the same report, the Commission called for the governor and legislature to enact a $4.2 billion bond bill to address the shortfall.

As the largest contributor to this aggregated backlog, UMass has continued to increase its outstanding debt and as a result its future funding needs with aggressive capital expansion. The UMass FY2015-2019 Capital Plan, adopted in December 2014, notes, "Over the past five years, the collective annual spending on stewardship and asset reinvestment for the UMass

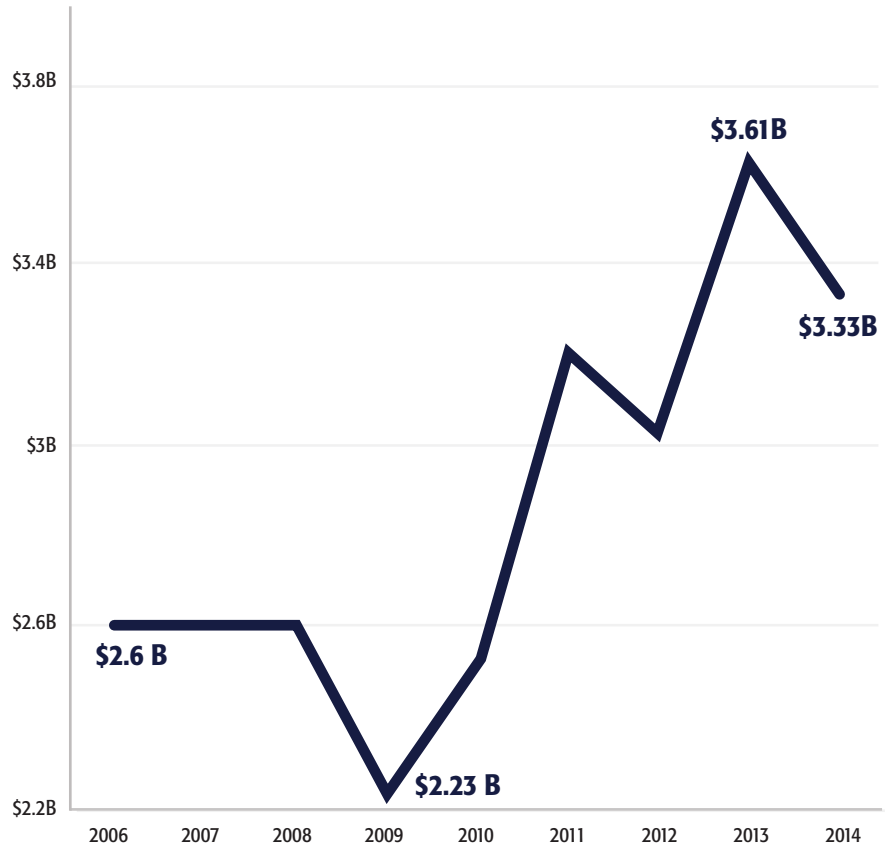
system has only been sufficient to sustain but not reduce the deferred maintenance backlog." UMass acknowledges the challenge surrounding its deferred maintenance backlog in its 2014 Annual Financial Report: "Despite these successful acquisitions, the ability to address priority capital needs and requirements for deferred maintenance, technology, repairs and adaptation, and selected new construction projects is one of the largest challenges facing the University."[24]

Underfunding of deferred maintenance has left the system with a large inventory of facilities in disrepair. In its 2007 UMass Annual Indicators report, the university reported that its five campuses were facing a deferred maintenance backlog of $120.16 per gross square foot (GSF) in FY 2006, totaling $2.6 billion.[25] In its 2015 Annual Indicators report, the university reported that it was facing a deferred maintenance backlog of $160 per GSF in FY 2014, totaling $3.33 billion. This represents an increase of approximately one-third in deferred maintenance per square foot over this period, according to the university's year-by-year reports. These large increases in capital repair needs occurred in the midst of UMass aforementioned $3.81 billion capital expansion program from 2006 to 2015.

Figure 8A shows that in 2010, the university reported its lowest system-wide deferred maintenance backlog totaling $2.23 billion. By 2013, it had grown to $3.61 billion and then declined to $3.33 billion in 2014, according to the school's 2015 Annual Indicators report.

Underfunding of deferred maintenance has left the system with a large inventory of facilities in disrepair.

Figure 8A. Growth of UMass total deferred maintenance costs 2006-2014 ($B), UMass Annual Indicator reports 2007-2015



Another metric that UMass has regularly reported since 2006 is deferred maintenance per gross square foot (GSF) on its campuses. Figures 9B and 9C present UMass' deferred maintenance per GSF on its campuses as reported by UMass in its 2007-2015 Annual Indicator reports, which share the preceding year's balance of deferred maintenance/GSF. These reports indicate that the deferred maintenance backlog increased from $120.16/GSF in 2006 to $160.00/GSF in 2014.

These reports indicate that the deferred maintenance backlog increased from $120.16/GSF in 2006 to $160.00/GSF in 2014.

To put the magnitude of UMass' $160/GSF deferred maintenance backlog (in 2014) into perspective, state leaders should compare it to industry benchmarks. A 2013 Sightlines report offers a helpful explanation of baseline performance standards for higher education building authorities that states: "Most facility experts cite the threshold of a $100/Gross Square Foot (GSF) backlog as a level where facility operations can no longer be proactive because so many building components are breaking; reactive work orders take up all of their staff time."[27] As Figures 9B-9C illustrate, UMass has maintained a deferred maintenance backlog in excess of this threshold every year since 2006.

Figure 8B. Growth of UMass deferred maintenance per gross square foot 2006-2014

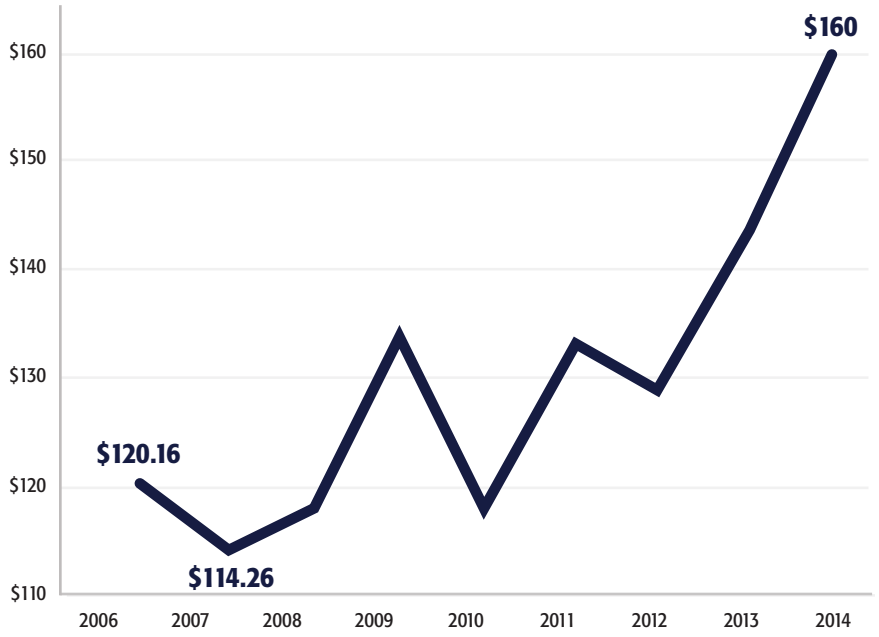
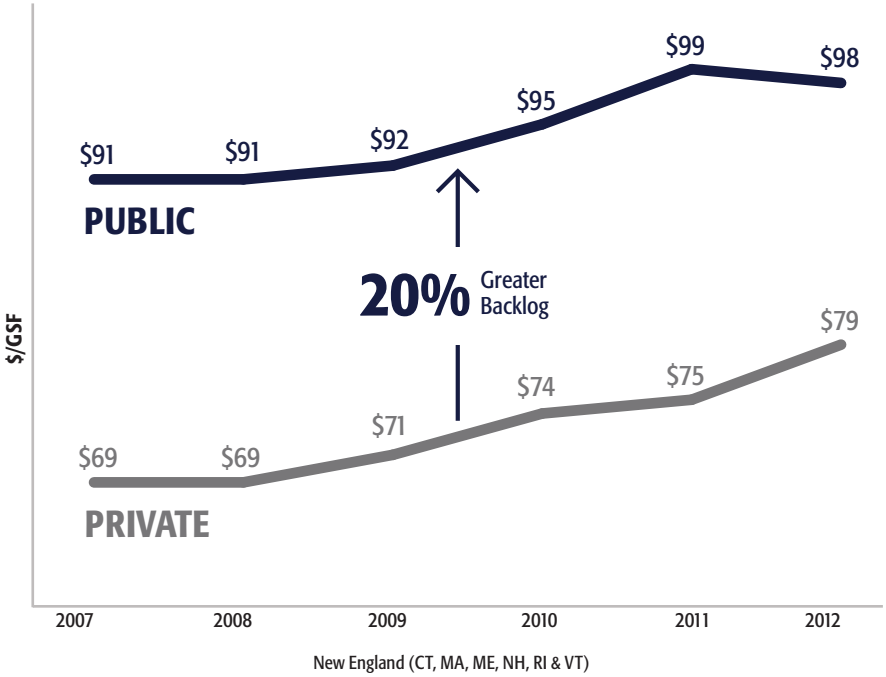


Figure 8C. Growth of UMass deferred maintenance per gross square foot 2006-2014

Deferred Maintenance per GSF								
2006	2007	2008	2009	2010	2011	2012	2013	2014
$120.16	$114.26	$118.04	$134.18	$117.90	$133.10	$128.92	$143.00	$160.00

Figure 9. Deferred maintenance backlog per GSF at New England public campuses, 2007-2012



Comparison of UMass' deferred maintenance backlog with other New England public institutions

To put UMass' deferred maintenance numbers into regional context, the *New England Journal of Higher Education* published a study by Sightlines in January 2014 reporting that public campuses in New England, including those in Massachusetts, had an average deferred maintenance backlog of $98/GSF in 2012, meaning that UMass' backlog in 2012—which UMass reported to be $165/GSF in its 2015 Annual Indicators report and $135/GSF in its 2014 Annual Indicators report—was considerably higher than that of other New England campuses in 2012.[27]

UMass officials maintain that the university's growing deferred maintenance backlog is caused by a lack of state capital funding, but they acknowledge at the same time that UMass has elected to make large capital expenditures during the period that the deferred maintenance backlog was growing. UMass Amherst, the largest of the university's five campuses, explains on its capital planning website:

> The [Amherst] campus has grown during a ten-year, billion-dollar capital improvement program that started in 2004. Since the 1993 plan, the campus has added one and a half million [gross square feet] of new buildings, while funding has been below the level necessary to maintain the existing physical plant. As a result, the university is struggling with a $2 billion backlog of deferred modernization.[28]

Discrepancies in available data

A close review of UMass' reporting about the size of its deferred maintenance backlog shows that the university has reported disparate statistics about the size of its prior year backlogs. For example, the 2015 UMass Annual Indicators report (reporting data through 2014) presents a 5-year trend chart showing that the university reduced its system-wide deferred maintenance per gross square foot from $172/GSF to $160/GSF between FY2010 and FY2014.

Figure 10. UMass Deferred Maintenance/GSF, 2015 UMass Annual Indicators report

Deferred Maintenance per GSF				
FY 2010	FY 2011	FY 2012	FY 2013	**FY 2014**
$172	$165	$168	$159	**$160**

This data is at odds with UMass' December 2014 FY2015-2019 Capital Plan, which notes, "Over the past five years, the collective annual spending on stewardship and asset reinvestment for the UMass system has only been sufficient to sustain but not reduce the deferred maintenance backlog."[29]

It is also inconsistent with UMass' 2014 Annual Indicators report, which lists 2009 deferred maintenance as $132/GSF—not $172/GSF, as the 2015 report indicates. If the deferred maintenance backlog was $132/GSF in FY2010 as reported in the 2014 Annual Indicators report, rather

than $172/GSF as reported in the 2015 report, that would mean that UMass' deferred maintenance backlog actually increased substantially (by 21.2 percent) between FY2010 and FY2014, rather than the 7 percent decrease from $172/GSF to $160/GSF indicated in its 2015 Annual Indicators Report.

Figure 11. UMass Deferred Maintenance/GSF, 2014 UMass Annual Indicators report

Deferred Maintenance per GSF				
FY 2009	FY 2010	FY 2011	FY 2012	**FY 2013**
$123	$132	$138	$135	**$143**

The variance in UMass' reporting of historic trends in the size of its deferred maintenance backlog has been problematic. Figure 13 compiles the deferred maintenance per GSF historic trends reported in the 2010-2015 UMass Annual Indicators reports. This information is supposed to provide a yearly progress report on the extent to which UMass has or has not reduced its deferred maintenance backlog. As the table shows, the historic numbers UMass has been reporting have been changing. For instance, deferred maintenance/GSF for FY2010 was reported in the 2011 Annual Indicators Report as $117.90/GSF—in the 2012 and 2013 Annual Indicators Reports, it was listed as $164.81/GSF. In the 2014 Annual Indicators Report, it was reported as $132/GSF, while in the 2015 Annual Indicators Report it was reported as $172/GSF. This represents four different figures for the same year.

Figure 12. UMass Deferred Maintenance/GSF, 2014 UMass Annual Indicators report

Source	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
2010 Annual Indicators Report	$114.26	$118.04	$134.18	-	-	-	-	-
2011 Annual Indicators Report	$114.26	$118.04	$122.80	$117.90	-	-	-	-
2012 Annual Indicators Report	$114.26	$118.04	$122.80	$164.81	$133.07	-	-	-
2013 Annual Indicators Report	-	$118.04	$122.80	$164.81	$133.07	$128.92	-	-
2014 Annual Indicators Report	-	-	$123	$132	$138	$135	$143	-
2015 Annual Indicators Report	-	-	-	$172	$165	$168	$159	$160

UMass consultant Sightlines made a presentation to the UMass Board of Trustees in December 2014 that included information about trends in the size of UMass' deferred maintenance backlog, concluding that UMass had not reduced its deferred maintenance backlog during the preceding five years. This presentation was cited in UMass' 2015-2019 Capital Plan, as follows:

> The University has engaged Sightlines to conduct deferred maintenance analysis for the University campuses in order to define future capital investment needs and campus backlogs. The Sightlines analysis has determined that a total of $130.1 M of stewardship funds would be needed in FY14 to keep up UMass system campus facilities. This is the annual investment needed to ensure buildings will perform properly and reach their useful lives. Sightlines has also identified a 10-year asset reinvestment backlog totaling $3.0 B. This is the accumulated backlog of repair and modernization needs and the definition of resource capacity to correct them. This $3.0B backlog consists of $1.9B of immediate need where the subsystem has already failed or is functioning with substantial degradation of efficiency and performing at an increased cost. The backlog also consists of $0.4B of infrastructure and modernization need and $0.7B of remaining renewal need. Over the past five years, the collective annual spending on stewardship and asset reinvestment for the UMass system has only been sufficient to sustain but not reduce the deferred maintenance backlog.[30]

The above-cited statement in the UMass 2015-2019 Capital Plan indicates that UMass had not reduced its deferred maintenance backlog during the preceding five years. This conclusion is inconsistent with what the university disclosed in its 2015 Annual Indicators report, published in July 2015, which indicates that UMass reduced its deferred maintenance backlog by 7 percent from FY2010-FY2014.

A UMass press release issued on February 16, 2016 entitled "UMass Announces Major Progress on Campus Renovations" also provides figures that are inconsistent with those published in recent UMass documents. The release includes a chart (see figure 14A below) showing that the university achieved a 31 percent reduction in deferred maintenance at its Amherst campus from FY2009-FY2015. The release further states that deferred maintenance on that campus had been reduced from $869 million to $596 million over the same period.[31] A second chart (see figure 14B below) cites a 25 percent "backlog reduction" at UMass Amherst, from $2.020 million in FY2009 to

$1.510 million in FY2015. The second chart omits corresponding university-wide information for both categories in FY2009.

Figure 13A. Deferred Maintenance Reduction, February 2016 UMass Press Release

	Amherst	University
FY09	$869	-
FY15	$596	$1,439
FY19 (Proj)	-	$902
$ Change	$(273)	$(537)
% Change	-31%	-37%

Source: Sightlines

Figure 13B. Backlog Reduction, February 2016 UMass Press Release

	Amherst	University
FY09	$2,020	-
FY15	$1,510	$3,204
FY19 (Proj)	-	$2,267
$ Change	$(510)	$(937)
% Change	-25%	-29%

The data in the press release (shown above) do not correspond with what UMass discloses in its 2015 Annual Indicators report. The press release reports that system-wide deferred maintenance is currently $1.439 billion, for instance, which is less than half of the $3.33 billion reported as deferred in the 2015 Annual Indicators report. The combined total of deferred maintenance and "backlog" reported in the press release ($4.643 billion = $1.439 billion deferred maintenance + $3.204 billion "backlog") is far more than the $3.33 billion figure reported in the 2015 Annual Indicators report.

The combined total of $4.643 billion stated in the press release is also at odds with what was reported by UMass in the FY2015-2019 Capital Plan, which states that Sightlines had identified a 10-year asset reinvestment backlog of $3 billion. Additionally, the figure used to account for deferred maintenance at UMass Amherst in FY2015—$596 million—is less than half of the deferred maintenance total UMass Amherst reported in the 2015-19 Capital Plan, which states: "The deferred maintenance backlog on the Amherst campus is estimated at approximately $1.5 billion."[32] The combined total of deferred maintenance and "backlog" reported in the press release for UMass Amherst is $2.106 billion ($596 million plus $1.520 billion), which greatly exceeds the $1.5 billion figure reported in the FY2015-2019 Capital Plan. The extreme differences in data suggest that the UMass press release employs a new and redefined set of categories that include construction projects not previously counted as deferred maintenance and is inconsistent with its recent annual reporting.

The fact that the two charts do not include a figure for system-wide deferred maintenance or "backlog" for FY2009 is an omission that should be noted. By omitting this information, UMass fails to address the central issue of whether its deferred maintenance backlog has been reduced. The source of the data in the charts, as shown, was Sightlines,[33] which according to the FY2015-2019 Capital Plan reported to the university in 2014 that no reduction in system-wide deferred maintenance backlog had been accomplished in the previous five years (2009 to 2014). The university has reported in its Annual Indicators reports that system-wide deferred maintenance was $2.6 billion in FY2009 and $3.33 billion in FY2014.

Addressing UMass' deferred maintenance backlog

As UMass and the commonwealth weigh options to address the growing deferred maintenance needs and future expansion plans at the five UMass campuses, the school's leadership would do well to study the best practices of public higher education institutions that have successfully resolved problematic maintenance backlogs. As the example below confirms, this can be achieved through prudent facilities renewal programs and initiatives that employ both comprehensive metrics for system assessments and regular, sustainable reinvestment in capital assets.

The most impressive local example is the Massachusetts State College Building Authority (MSCBA), which manages facilities on the state college system's nine campuses. Analogous in role to the UMBA, the MCSBA is in charge of financing, planning, designing and constructing all "revenue-funded facilities" in the state university system, and also provides authorization to fund and build capital projects at the commonwealth's 15 community colleges.[34]

With the introduction of a comprehensive facility renewal program in February 2003, the MSCBA has managed to eliminate the majority of the state college system's deferred maintenance needs. From 2000-2014, the Authority reduced the backlog from $61.1 million to $9 million.[35] Unlike asset management initiatives in place at other public university systems, MCSBA's renewal program employs a predictable schedule in conjunction with regular assessment of funding needs. In the system's 2014 Annual Report, the Authority breaks down its unique approach to reducing the postponed capital repair backlog:

> Typically, renewal projects include work that is performed on a regular cycle to maintain an existing building in its present configuration for its current use. The Facility Renewal Plan includes a schedule of the anticipated useful life of each major building component and system and the date and amount of the next required investment. The plan is revised annually to incorporate recently-completed work, to validate the projected schedule for future work, and to update the unit prices for each building assembly that is scheduled for future replacement.[36]

To illustrate the success of the MCSBA renewal plan, it is helpful to examine the program's progress with a specific metric widely used as an industry standard measure in higher education facilities management. The Facility Condition Index (FCI) provides a comprehensive picture of facility conditions that school officials can use to better determine an organized schedule of investment. It is the ratio of the value of deferred maintenance divided by the current replacement value (CRV)—the monetary value an institution assigns to its capital—of the facility [FCI = DM/CRV]. The schedule in figure 15 below delineates the condition tiers that correspond to ranges of the FCI that serve as performance indicators. They are the same standards UMass Amherst used when it did a facilities assessment in 1999.[37] As the chart shows, any FCI measurement in excess of 20 percent indicates a "Very Poor" condition, while anything less than 5 percent is considered "Ideal."

As the FCI calculations from 2000 to 2014 reveal in the table below, the MSCBA has made impressive strides in reducing its deferred maintenance needs in recent years—the FCI dropped from 22.3 percent ("Very Poor") in 2000 to 2.1 percent ("Ideal") in 2014.[38]

UMass has not published an FCI report that Pioneer could find. The last UMass report that used an FCI-based methodology was published in 1999.[39] The Sightlines analysis presented to the UMass trustees in December 2014 did not include this methodology of comparison among institutions. Sightlines did include in its report, however, a replacement value for facilities on each campus in addition to an assessment of a 10-year deferred maintenance backlog for educational and general (E&G) space on each campus. In the Sightlines report, the Boston, Dartmouth, and Lowell campuses are combined—although deferred maintenance backlog figures for auxiliary facilities are not provided.

Figure 14. FCI Schedule of Ratings

Condition	FCI
Ideal	< 5%
Good	5-10%
Fair	10-15%
Poor	15-20%
Very Poor	> 20%

Because E&G space represents only 15 million of UMass' total 21.3 million GSF of facility space, there is insufficient information available to make a comprehensive FCI calculation for each campus. We can nonetheless determine what the FCI percentage would be at a minimum by dividing the 10-year deferred maintenance backlog for E&G space exclusively by the total replacement value of capital, including both E&G and auxiliary space, on each campus. The results based on these figures actually understate the total FCI of UMass campuses, and reveal the troubling levels of capital in disrepair within the UMass system.

The 'Minimum FCI' column in figure 17 shows that UMass Amherst's FCI (33 percent) is considerably higher than what was reported in 1998 (25 percent).[40] UMass Boston, Dartmouth, and Lowell have a minimum combined FCI of 52 percent, due to a deferred maintenance backlog of $1.6 billion and a replacement value of $3.1 billion. The UMass system as a whole has a minimum FCI of 31 percent, which significantly exceeds the 20 percent FCI standard threshold, above which capital conditions are characterized as "Very Poor."

Figure 15. MSCBA Facility Condition Index, 2000-2014

	2000	2002	2004	2006	2008	2010	2012	2014
Deferred Maintenance ($m)	61.1	49.3	39.1	22.7	15.2	13.0	10.6	9.0
Current Replacement Value ($m)	274	293	330	374	416	464	511	642
Facility Condition Index	22.3%	16.8%	11.8%	6.1%	3.6%	2.8%	2.1%	2.1%

Figure 16. UMass FCI calculations based on E&G Space in GSF

Campus	GSF	E&G GSF	Aux GSF	Replacement Value	10-Year Backlog (E&G space only)	Minimum FCI
UMass – Amherst	10.6M	6.5M	4.0M	$3.9B	$1.3B	33%
UMass Medical	1.8M	1.8M	0	$1.2B	$0.2B	17%
UMass – B/D/L	8.9M	6.6M	2.3M	$3.1B	$1.6B	52%
Total	21.3M	15.0M	6.3M	$8.3B	$2.6B	31%

Reconsidering the FY2015-2019 Capital Plan in light of UMass' growing deferred maintenance backlog

After tripling its outstanding debt from $946 million in FY2005 to $2.9 billion in FY2016 and increasing annual debt service payments from $88.5 million in FY2005 to $223.4 million in FY2016, UMass has adopted a $6.98 billion capital plan for FY2015-2019, $3.44 billion of which has received full project approval by university trustees.[41] Funding has not been identified or approved for the balance. An important question is whether it makes sense for UMass to undertake further expansion of this scope, particularly in light of the WICHE projections of a 11.4 percent decline in Massachusetts high school graduates between 2015-16 and 2027-28 discussed in Part 1 of our series. Equally important is to review of the capital plan in light of the $3.33 billion deferred maintenance backlog at the university's five campuses discussed above.

A key policy issue facing state leaders concerns whether UMass' capital spending should be directed more towards deferred maintenance. The FY2015-2019 Capital Plan includes the following statement concerning planned spending on deferred maintenance at UMass Boston:

> There are 41 projects in the Capital Plan with activity in the FY15-FY19 period; five-year total spending on these projects is projected at $792.3M. Fifteen of these projects are ongoing from prior fiscal years, and had pre-FY15 spending totaling $195.3M. Total planned spending on these projects from inception through FY19 is thus $987.7M. Of this total, $924.5M or 93.6%, will be spent on Campus Master Plan projects. It is estimated that $167.3M, or 16.9% of total spending, will help to reduce the Deferred Maintenance backlog.[42]

As this excerpt suggests, the resources that UMass plans to dedicate to deferred maintenance needs at UMass Boston alone are dwarfed by the 41 projects slated for that individual campus. The priorities this statement reflects must be the focus of a policy discussion that involves the legislature and the governor's office. Working in partnership with UMass leadership, this group must determine whether this prioritization of continued aggressive development over addressing outstanding facilities renewal needs is in the best interest of the commonwealth.

Another key consideration is how UMass' FY2015-2019 Capital Plan will be financed. Figure 18 below shows the identified funding sources for UMass' $6.98 billion current capital plan. Of the $6.98 billion in total projects, the university has identified funding sources for $3.78 billion. Of that, $1.14 billion will come from state funding, $126.4 million from external sources, $2.07 billion from university borrowing and $450.93 million from direct university capital expenditures. The balance of the plan, $3.19 billion, is contingent on currently unidentified future funding. Of the $3.78 billion of projects with identified funding, UMass will fund $2.52 billion ($2.07 billion from borrowing and $450.93 million from expenditures) representing 66.5 percent of the total, while external funding sources including the state will fund the balance, representing 33.5 percent of total identified funding. More than $2.5 billion in additional borrowing and direct capital expenditures will exacerbate the university's already strained financial condition and increase its dependency on additional state aid and increased tuition and fee revenue in the future.

Of the $3.39 billion in approved projects[43] included in the $6.98 billion UMass FY2015-2019 Capital Plan, only 10.9 percent ($426.5 million) are dedicated to deferred maintenance and 10.8 percent ($419.5 million) to renovation of existing facilities.[44] New construction projects, with a budget of $2.26 billion, constitute 57.9 percent of the $3.39 billion approved project list. Considering that in 2015, the university reported that its deferred maintenance backlog is $3.33 billion,[45] UMass appears to have adopted a strategy of capital expansion rather than addressing its deferred maintenance backlog.

Figure 17. Funding sources for UMass $6.98 billion FY2015-2019 capital plan

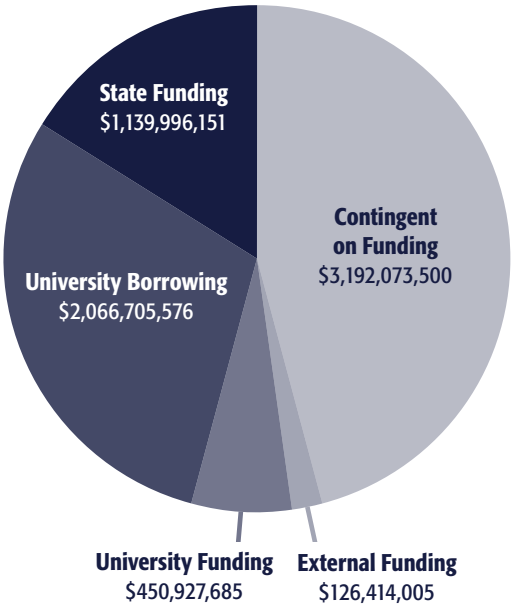
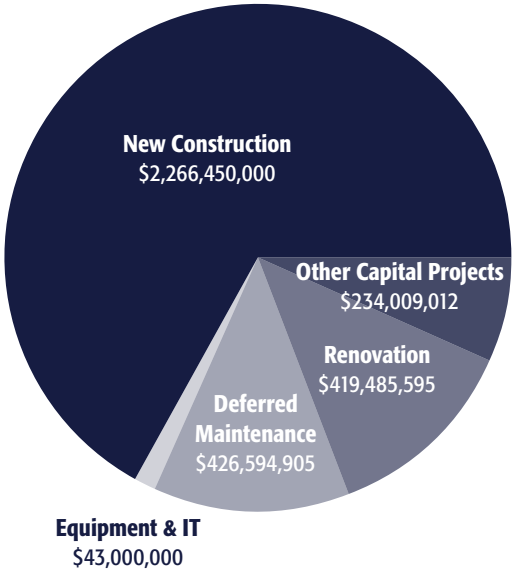


Figure 18. $2.26 billion of the $3.39 billion of approved projects included the UMass FY2015-2019 Capital Plan are for new construction



Conclusion

UMass has been one of the country's leaders in expanding student enrollment and facilities over the past decade. The fiscal demands generated by this expansion have been taxing, however, and the strategies UMass has employed to fund its rapid development have strained university finances.

The institution's rapid growth has been funded in large part by self-funded debt, with only 36.1 percent provided by the state. This has exacerbated the university's need for revenues to support that debt, as well as funding for programs to educate a student body that has grown by more than 27 percent. Decisions by UMass trustees and university leaders to continue expanding enrollment and facilities will either necessitate added revenue from tuition and fees, state assistance, other outside revenue, or from expanded out-of-state enrollment. Secretary of Education James Peyser made a prudent observation when he said the state should not commit to funding at the 50:50 level without clear and definitive agreement regarding what the total UMass budget should be.[46]

Over this period of growth, UMass has not adequately maintained its existing capital assets. The assertion by university officials that the fault lies with state leaders for not providing adequate state funding to address deferred maintenance at the university cannot be reconciled with the fact that sufficient funds were nevertheless available during the same period to finance substantial capital expansion. Since 2006, UMass' deferred maintenance deficit rose from $2.6 billion to $3.33 billion—an increase of $733 million while the university was making $3.8 billion in net capital additions to its campuses.

This narrative is similar in many respects to what happened at another essential Massachusetts institution: the Massachusetts Bay Transportation Authority (MBTA). In the report of the Governor's Special Panel to Review the MBTA, issued in April 2015, the panel determined that the T faces a $6.7 billion maintenance backlog.[47] This estimate has since been increased to $7.3 billion.[48] Under the terms of a 1991 consent decree, the MBTA was required to build a series of large expansion projects, reducing the amount it could invest in its immense deferred maintenance needs. The agency's pervasive system failures last winter made it clear that expansion goals must be tempered by the need to maintain existing infrastructure.

The MBTA's $7.3 billion maintenance backlog, combined with UMass' $3.33 billion backlog adds up to a staggering $10.6 billion in unfunded capital maintenance at two of Massachusetts's largest and most important public institutions. The commonwealth has an important stake in decisions made about UMass' expansion and the condition of its physical assets because of the university's importance to Massachusetts students and to the state economy. To the extent that decisions made by UMass will demand increased state resources, including additional operating subsidies and capital funding, or necessitate a continuing change in the university's out-of-state enrollment practices, state leaders should be made a party to future capital planning discussions.

Appendix

Table – Figure 2. UMass operating expenses, operating revenues, operating loss, state appropriations FY2005-2016

Year	Operating expenses	Operating revenues	State appropriation	Operating loss before state appropriation
2005	$1,926,740	$1,510,027	$478,813	$416,713
2006	$2,056,484	$1,526,248	$526,749	$530,236
2007	$2,178,558	$1,652,008	$582,116	$526,550
2008	$2,238,492	$1,688,820	$617,271	$549,672
2009	$2,446,653	$1,968,810	$540,187	$477,843
2010	$2,588,548	$2,053,788	$566,528	$534,760
2011	$2,788,784	$2,229,113	$543,696	$559,671
2012	$2,596,033	$2,059,154	$515,916	$536,880
2013	$2,663,700	$2,152,754	$519,311	$511,083
2014	$2,809,289	$2,209,279	$570,618	$600,621
2015	$2,849,917	$2,162,068	$635,679	$687,850
2016	$2,993,807	$2,284,414	$654,744	$709,394

Table – Figure 3. Increasing levels of outstanding debt and debt service FY2005-FY2016

	UMBA	UMASS MDFA	WCCC MDFA	Energy Bonds	Total Bonds Outstanding	Annual Debt Service
FY2005	649,291	85,790	211,073	-	946,154	88,451
FY2006	648,179	84,990	208,712	-	941,881	67,559
FY2007	629,125	84,970	330,514	-	1,044,069	67,997
FY2008	978,045	83,965	323,015	-	1,385,025	82,446
FY2009	955,028	63,041	315,941	-	1,334,010	104,412
FY2010	1,456,460	62,081	308,568	-	1,827,109	120,282
FY2011	1,947,700	61,080	300,875	1,530	2,311,185	133,800
FY2012	1,884,082	61,961	292,857	1,434	2,240,334	165,057
FY2013	2,126,542	60,672	284,350	1,338	2,472,902	164,801
FY2014	2,477,692	59,331	275,491	1,243	2,813,757	181,117
FY2015	2,689,166	58,000	266,300	1,150	3,014,616	202,689
FY2016	2,596,905	56,669	256,777	1,057	2,911,408	223,414

(Endnote)

1. The university participates in the commonwealth's Fringe Benefit programs, including active employee and post – employment health insurance, unemployment compensation, pension, and workers' compensation benefits. Health insurance and pension costs for active employees and retirees are paid through a fringe benefit rate charged to the university by the commonwealth and currently the liability is borne by the commonwealth. The accompanying financial statements for the years ended June 30, 2014 and 2013 present as tuition revenue approximately $34.3 million and $35.1 million, respectively, of in-state tuition received by the university and remitted to the State Treasurer's Office for the general fund of the Commonwealth of Massachusetts. The amount of tuition retained by the university related to out-of-state students during 2014 and 2013 was $75.8 million and $74.5 million, respectively. The recorded amount of State Appropriations received by the university has been reduced by a corresponding amount of tuition remitted as shown below (in thousands)

	2014	2013
Gross Commonwealth Appropriations	$486,656	$447,837
+ Fringe Benefits	141,881	130,005
	628,537	**577,842**
Less: Tuition Remitted	(34,325)	(35,103)
Less: Mandatory Waivers	(23,594)	(23,428)
Net Commonwealth support	**$570,618**	**$519,311**

Endnotes

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32. "Fiscal Year 2015 to 2019 Five-Year Capital Plan." Page 27.

33. Pioneer Institute made a document request of UMass for data presented by Sightlines to the Board of Trustees, but that request was denied on the basis that the information was in draft form. The university did provide a copy of the December 2014 Sightlines presentation to the UMass Board of Trustees.

34. While the MSCBA is a public entity of the Commonwealth, the Authority itself does not receive appropriations from the state—all revenues to support the MSCBA's operation come from rents and fees paid for by students.

35. "Annual Report Fiscal Year 2014." The Massachusetts State College Building Authority, 31 December 2014. Page 10. Available at: http://www.mscba.org/content/news/docs/62_newsdoc.pdf.

36. Ibid.

37. "Foundation for Excellence: A Strategic Framework for Facilities Development." A presentation by Chancellor David K. Scott, University of Massachusetts, 10 November 1999. Available at: http://www.umass.edu/pastchancellors/scott/powerpoint/facildev/facildev.pdf.

38. "Annual Report Fiscal Year 2014." The Massachusetts State College Building Authority, 31 December 2014. Page 10.

39. "Foundation for Excellence: A Strategic Framework for Facilities Development." A presentation by Chancellor David K. Scott, University of Massachusetts, 10 November 1999. Available at: http://www.umass.edu/pastchancellors/scott/powerpoint/facildev/facildev.pdf.

40. FCI = total cost of existing deficiencies/current replacement value; UMass Amherst FCI = $393 Million/$1.6 Billion = 0.25 in FY 1998.

41. "Board of Trustees Votes." The University of Massachusetts, 17 June 2015. Available at: https://www.umassp.edu/sites/umassp.edu/files/content/6-17-15%20FINAL%20Board%20Votes.pdf.

42. "Fiscal Year 2015 to 2019 Five-Year Capital Plan." Page 33.

43. As noted in the FY2015-2019 capital plan, projects approved by the UMass Board of Trustees fall into two categories. As the capital plan notes, "The first is a preliminary approval which is an estimate of the total project cost. The project is then studied to determine the full project scope and cost and comes back before the board for a second vote for a full project approval before it enters the construction phase. This offers the Board the ability to review projects twice and ensures that the

campus, the President's Office and the Building Authority have reviewed the project."

44. The $3.39 billion figure provided in the FY15-19 Capital Plan for total approved projects differs from the value of total approved projects calculated using the numbers listed in Appendix A of the Capital Plan. Appendix A lists all projects in the Capital Plan and identified funding sources for each. As noted throughout the document, the total cost of UMass Capital Plan is reported as $6.98 billion. The sum total cost of projects not yet approved listed in Appendix A is 3,033,385,500—this figure subtracted from the $6.98 billion total cost of the Capital Plan results in a value of total approved projects worth $3.94 billion, not $3.39 billion as stated elsewhere in the Capital Plan.

45. "2015 Report on Annual Indicators." The University of Massachusetts, July 2015. Available at: https://www.umassp.edu/sites/umassp.edu/files/publications/2015%20Annual%20Indicators%20Report%20F.pdf.

46. Schoenberg, Shira, "50:50 funding deal between UMass and the state 'no longer in effect'." MassLive, 1 February 2016. Available at: http://www.masslive.com/politics/index.ssf/2016/02/5050_funding_deal_between_umas.html.

47. "An Action Plan to Transform the MBTA," The Governor's Special Panel to Review the MBTA. April, 2015. Page 18. Available at: http://www.mass.gov/governor/docs/news/mbta-panel-report-04-08-2015.pdf.

48. "Report #1: Baseline Analysis and Progress sto Date." MBTA Fiscal and Management Control Board. Page 3. September, 2015. Available at: http://www.mbta.com/uploadedfiles/About_the_T/Board_Meetings/FMCB60dayReportReport1BaselineAnalysisandProgresstoDate.pdf

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