

# *Building Condition Report*

***An assessment of  
campus academic and  
general buildings***



# ***Building Condition Report***

## ***Table of Contents***

Acknowledgements	Page 2
Summary	3
Introduction	5
Findings	7
Summary Data	15

Appendix: Legacy Buildings Report

## ***Acknowledgements***

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## SUMMARY

This Building Condition Report results from a comprehensive review of campus education and general administration (E&G) buildings conducted by staff from Administration and Finance with assistance from Sightlines Facilities Asset Advisors, a consultant firm that provides integrated facilities planning services. Reviewed in the assessment is the current condition of our buildings with respect to deferred maintenance deficiencies, renewal of building systems, fire safety, and other needs.

The underlying goal of the report is to provide a comprehensive view of the needs of E&G facilities to guide the stewardship of existing physical assets over the next ten years, with an emphasis on the next one to five years. With an average age of forty-two years as depicted in Appendix A, only two small structures assessed in this report have been renovated. Not addressed by this Report are auxiliary, dining, housing, and small structures. Maintenance costs will be discussed in a separate document.

Throughout the assessment process, special attention was applied to the needs of our “legacy” buildings. The legacy buildings represent the older buildings on campus. Nearly 1 million square feet of E&G space out of an inventory of 6.5 million square feet was built before World War II. Some of these buildings have greater historical significance than others; but perhaps all of them are perceived to have particular value to the campus. A more detailed review of these buildings is provided in a separate document which is included in Appendix C of this report.

Demonstrated in the report is the need for capital expenditures of \$833 million over the next five years, including the cost of swing space, demolition, and replacement space, as summarized in Appendix B. An additional \$524 million is needed in the six- to ten-year range. A need of \$347 million is identified beyond ten years. The campus will experience positive facilities impacts with the investments, and consequences without them:

- Research. Laboratory buildings would be renovated with enhanced mechanical, electrical, and plumbing systems, including significantly upgraded wet chemistry laboratory facilities with high-efficiency chemical fume hoods, eyewash stations, safety showers, and other laboratory safety improvements. The existing condition of some wet laboratories requires that restrictions be placed on the use of hazardous materials. When it is not cost-effective to renovate existing laboratories, laboratory operations need to be relocated or protocols further restricted.

Deans with departments in the laboratory sciences, particularly the physical and biological sciences, find it increasingly difficult to get candidates to accept faculty appointments because facilities for wet chemistry are not comparable to what the competition offers.

- Instruction. With investment, classrooms would be ventilated and attractive. The technology gap would be closed in the 60% of teaching venues where the curriculum is delivered without benefit of a basic technology package. Otherwise, classroom instruction

will continue to be conducted with chalk on blackboards in unventilated rooms that look like elementary classrooms from the 1950s. Most of the classroom stock is not capable of supporting modern teaching methods.

Deans with humanities, fine arts, and social science departments find the gap in the quality of teaching space compared with the competition a detriment in attracting the best students to their majors.

- Student Life. The cost of repairing the Student Union exceeds the replacement value of the building. Its replacement needs to be funded in the next five years. The quality of student life depends on having adequate space for student activities, clubs, meetings, and assemblies.
- Safety. Buildings would be equipped with current-generation fire detection and suppression systems, and would comply with standards for accessibility. Code restrictions relating to ceiling heights, corridors, and smoke barriers would be resolved. Without funding, the administration will be faced with restricting use and limiting occupancy in a number of buildings.
- Closures. It is recommended that twenty structures be closed and demolished within ten years. Provision will be made to cover the cost of swing space, demolition, and replacement space where necessary.

These levels of investment and impacts represent a snapshot of the current problem. Deferred maintenance continues to accrue even as investments are made in buildings to retire other deferrals.

## INTRODUCTION

The Amherst campus is comprised of over 140 buildings that support the teaching, research and public service mission of the University. Many of these buildings, half of which are fully depreciated, require immediate investment to ensure that they can continue to support necessary academic and administrative functions. Many legacy buildings have reached a critical point, requiring technical and financial assessments to determine their ability to continue to support current programs, and in some cases whether they can support any modern function. Major buildings constructed in the 1960s have reached the age where basic building systems are at the end of their useful lives, can no longer be maintained, and require replacement. Several buildings designed for specific uses were converted to other uses without the appropriate investment in basic building systems. Finally, the majority of the buildings supporting the academic mission require significant investment in building code upgrades to assure continued use.

The campus has stated goals related to attracting and retaining top faculty and students and increasing research activity. Achieving these goals will require adequate facilities. All of these needs are competing for available capital in the near future. The purpose of this planning exercise is to provide the context for discussing the priorities for the next round of capital investment and to guide the decisions on how these funds are invested to support the campus mission.

### **Facility Mission:**

Provide a condition review and classification of the education and general administration buildings to lead the discussion on the total facility needs that are required to provide the appropriate stewardship of existing building assets. The review includes routine maintenance, reduction of deferred maintenance, health and safety upgrades, renewal and replacement of obsolete space and building systems, as well as alterations and additions to the physical plant required to maintain the campus position as a leading public university in New England.

### **Building Condition Assessment Goals:**

1. Document the condition summary and deficiencies of all Amherst campus buildings.
2. Categorize buildings and recommend building classification for the short and long term.
3. Recommend upgrades to ensure the health and safety of current and future occupants.
4. Recommend investment strategy to maintain new and recently constructed buildings in good condition and prevent the future accumulation of deferred maintenance.
5. Recommend corrective actions to reduce the deferred maintenance backlog and upgrade basic building systems required to maintain operations.

6. Determine highest and best use of our existing buildings and strive to preserve buildings that support the campus heritage.
7. Recommend the removal and replacement of deteriorated and obsolete space.
8. Recommend renewal for existing space and identify new space needs in instructional and research space required to accommodate academic and research activity.

## FINDINGS

This Building Condition Report summarizes the capital investments needed in E&G buildings on the University of Massachusetts Amherst campus. The Report does not include auxiliary service buildings, such as housing and dining facilities. Neither does it include dozens of structures smaller than 10,000 square feet.

Buildings are categorized according to their condition and the kinds of investments needed, including building system replacement and space renovation:

1. Keep Up
2. Catch Up and Keep Up
3. Keep and Renew
4. Defer and Do Not Reinvest
5. Secure and Protect
6. Dispose and Replace

The costs of swing space, demolition, and replacement are captured for structures not expected to be carried permanently in the building stock. A final section addresses infrastructure needs.

With respect to method, these data were compiled from a base including 6400 individual entries of deferred needs. Those entries were combined into projects and analyzed for urgency. Building summary sheets underpin the spreadsheet entries included in this report. The investments needed for some buildings are large enough to trigger further investigation: Bartlett Hall, all of the Morrill Science Buildings, Chenoweth Laboratory Addition, and Goessmann

Laboratory Addition, for example, were built without air supply systems, and will be very costly to retrofit. Thayer and the Animal Isolation facility are small, but house intense functions. The financial exposure in the Library is so great that a separate study of building systems and use has been commissioned.

Although this is a report about capital needs, not maintenance, the lack of maintenance over time gives rise to the capital need. The Physical Plant has developed a variety of measures, which will be summarized in a separate report, demonstrating the need for additional maintenance funding by comparing current expenditures with accepted industry standards and a comparison group of large, public research universities.

The aggregate capital need over the next five years to keep buildings from slipping further is just over \$833 million. An additional \$524 million is needed in the six- to ten-year range. Beyond ten years, a \$347 million need is identified. Significant expenditures for swing space, demolition, and replacement space are needed for those structures leaving the building stock. These numbers represent a snapshot of the current problem. Deferred maintenance continues to accrue even as investments are made in buildings to retire other deferrals.

## Category 1: KEEP UP

0-5 year need:       \$5.6 million  
6-10 year need:     \$11 million

A building is in the Keep Up category if currently there is little or no deferred maintenance, and no need for space or system renewal or modernization. A building in this category is capable of serving the most advanced applications of the programs or services it houses. The goal of the institution is to maintain all building components and replace them at the ends of their useful lives.

These are our best buildings, and there are precious few of them supporting instruction and research:

- Alford Hall
- Animal Care Facility
- Conte Polymer Research Center
- E-Lab II
- Engineering & Computer Science Center
- Knowles Engineering Building
- Mahar Auditorium
- 358 North Pleasant
- Mullins Center
- Research Administration Building
- Robsham Visitors Center
- Grinnell Arena

Almost 900 thousand square feet of education and general administration space, or 14% of 6.5 million square feet, fall into Category 1. Soon to come into the Category 1 inventory are:

- Skinner Hall
- Studio Arts Building
- Central Heating Plant
- Integrated Sciences Building
- Recreation Center

When these buildings are complete and in service Category 1 will include approximately 1.3 million square feet, or about 19% of 7 million square feet.

Even the best buildings require attention to keep deferred maintenance from accruing. The Conte Polymer Research Center, for example, houses the country's premier polymer researchers. Only twelve years old, the building's window gaskets leak and need to be replaced. If unaddressed, this problem will lead to the deterioration of interior finishes and a negative impact on the research protocols conducted in the affected spaces.

Category 1 buildings will need investments of \$5.6 million within the next five years, and \$11 million in the six- to ten-year range to replace worn out building systems. The amount increases to \$28 million beyond ten years. The expenditures will keep the buildings supporting the most advanced program demands.

## Category 2: CATCH UP AND KEEP UP

0-5 year need:	\$225 million
6-10 year need:	\$187 million

A building is categorized for catching up and keeping up with building system maintenance if maintenance has been deferred, but spaces and building systems are not yet in need of renewal. A building in this category is currently capable of serving the important applications of the programs and services it houses. The goal of the institution is to retire deferred maintenance on a system-by-system basis, and to maintain building components within their life cycles. Roughly 1.5 million square feet of classroom, laboratory, and academic office space, or 23% of education and general administration space, falls into this category and represents the campus's greatest asset exposure. Among the large structures in this category are:

- Arnold House
- Fine Arts Center
- Furcolo Hall
- Hasbrouck Laboratory Addition
- Herter Hall
- Holdsworth Hall
- Lederle Graduate Research Center
- Lederle Graduate Research Center Addition
- Marston Hall
- Morrill Science Center Section IV
- Stockbridge Hall
- Thompson Hall
- Tobin Hall

The campus recently has made or is making significant investments in a number of these buildings from a variety of sources. More is needed:

- Fine Arts Center. The building, 35 years old, needs new elevators, ventilating fans, and electrical panels among critical needs totaling \$40 million in the next five years, including renovations to performance spaces. The major performance spaces have not been renovated since the building was built.
- Lederle GRC. Virtually every mechanical, electrical, and plumbing system in this 35 year-old building complex, \$33 million in the next five years, needs to be replaced. Research space on the seventh floor is closed because of noxious fumes. Laboratory space on the twelfth floor is closed because it is obsolete. An organic chemistry suite on the third floor will go out of service when the ISB opens unless it is renovated to modern standards.
- Marston. Sections of the basement of Marston Hall are abandoned for lack of adequate electrical service and ventilation. This building needs \$7.7 million in investments in transformers, electrical panels, elevators, fire alarm systems, windows and other fundamental building components to return shuttered space to service and restore full function in the rest of the building.

- Morrill IV. Although the 4<sup>th</sup> floor was renovated and is excellent condition, the floors below need a \$34 million investment over the next five years to accommodate new faculty appointments. Not only is there no make-up air system to satisfy fume hoods, but also the domestic water supply system is so leaky than water service in the building is daily threatened.
- Tobin. A tall building housing the Psychology Department, this facility has research laboratories and animal facilities in addition to classrooms and offices. Over the next five years, it needs \$8.8 million in investments to replace elevators, balance fume hoods, and upgrade the electrical service.

In many respects, the ability of these assets to continue responding to program needs depends on timely investments in building system replacement and space renovations over the next five years. The campus will have to allocate \$225 million over the next five years to catch up and keep up with deferred building system component replacement as well as critical renovations to Category 2 buildings to address evolving program needs. An investment of \$68 million in swing space and moves will be required. Without this funding, these buildings may degrade within five years to the next category, and some functions will be put at risk.

### **Category 3: KEEP AND RENEW**

0-5 year need:	\$380 million
6-10 year need:	\$253 million

A building is categorized for renewal if significant maintenance has been deferred, and space or systems need significant renewal. The ability of a building in this category to serve the important applications of the programs and services it houses is compromised. The goal of the institution is to maintain building components to the extent possible, retire deferred maintenance on a system-by-system basis when feasible, and invest in renewal when possible and economically justifiable.

Many large, important buildings fall into this category. Generally they were built between 1959 (Morrill I) and 1972 (DuBois Library). The category also includes a number of legacy buildings erected early in the 20<sup>th</sup> century, and further described in the appendix to this report. Clark, French, and Fernald Halls, for example, will be limited to less intensive uses in the future. Roughly 1.0 million square feet of classroom, laboratory, and academic office space, 15% of education and general administration space, falls into this category.

Every one of these buildings is compromised. Bartlett Hall, for example, has failing facades. Mechanical systems in the Animal Isolation Laboratory and Thayer Animal Disease Laboratory are unable to maintain stable pressure differentials between rooms. Fernald and French Halls have research laboratories with fume hoods that cannot be certified for use

following modern standards. Paige Laboratory lacks infrastructure for installing fume hoods. Faculty recruitments have been impacted in the Chenoweth Addition because fume hoods are not available. Few classrooms in Machmer Hall have technology installed; all are outdated, tired, and lacking adequate ventilation. Sections of Marcus Hall have simply been closed because they are unsuitable for housing programs. Studies are underway in the DuBois Library to determine whether a portion of the building can be repurposed for other than Library uses, and in Goodell Hall to determine the best use of vacant space in the structure given code limitations. Among the structures in this category are:

- Bartlett Hall
- Animal Isolation Laboratory
- Clark Hall
- Fernald Hall
- French Hall
- Goessmann Laboratory Addition
- Isenberg School of Management
- Paige Laboratory
- Thayer Animal Disease Laboratory
- Chenoweth Laboratory Addition
- Du Bois Library
- Goessmann Laboratory
- Machmer Hall
- Marcus Hall
- Morrill Science Center Sections I, II, and III

Along with category 2, these buildings comprise the heart of our stock. UMA will have to allocate \$380 million over the next five years to catch up with deferred building

system component replacement and for renovations to renew category 3 buildings, preventing the structures from becoming unsuitable for their current use. These renovations will trigger the need for \$35 million worth of swing space, moves, and logistics. To give specific examples of impacts absent these investments:

- Goessmann Addition. Without \$20 million in renovations, all of the space vacated upon completion of the ISB will be unsuitable for laboratory functions and closed.
- Machmer Hall. At 50 years old, Machmer Hall needs \$10 million in investments in basic mechanical, electrical, and plumbing systems. A heavily used classroom building, Machmer will lose its classrooms one by one as local heating systems fail.
- Morrill I, II, and III. These 47-year old buildings were built without tempered air systems. A draft study by an engineering firm of mechanical, electrical, and plumbing systems in the Morrills supports the finding that investments of \$84 million are needed over the next five years not only in those systems, but also in renovations, to keep research laboratories in service. The report recommends downgrading Morrill III to office, classroom, and instructional laboratory use. The problem is that the Biology Department has research facilities in Morrill III.

- Engineering Shops Building
- Flint Laboratory
- Hasbrouck Laboratory

#### **Category 4: DEFER AND DO NOT REINVEST**

0-5 year need:	\$11.8 million
6-10 year need:	\$5.7 million
Contingency:	\$20 million

A building is deferred if it is not suitable for a significant financial investment. The ability of a building in this category to serve the modest applications of the programs and services it houses is compromised in the long term; however, it is usable in the near future. The goal of the institution is to keep these buildings in service for ten years or more with necessary maintenance and limited expenditures to retire deferred maintenance affecting the building envelope, utilities, and life safety systems. These buildings are on a disposal cycle, with the date of disposal undetermined.

Comprising 393 thousand square feet as a group, 6% of the education and general administration building stock, individually the buildings in this category are relatively small and obviously tired, including, for example:

- Agricultural Engineering Building Central
- Agricultural Engineering Building North
- Agricultural Engineering Building South
- Berkshire House
- Draper Hall
- Hampshire House
- Middlesex House

The Deferred Needs Assessment identifies only small investments totaling \$12 million, limited to deferred building system component replacement related to the building envelopes, utilities, and fire safety systems in category 4 buildings. In the aggregate, these investments represent a relatively low percentage of building replacement costs.

Forty buildings comprise this category and present special classification problems in that some will clearly fail within the ten year time frame, but it is not possible to know which ones. This assessment assumes that beyond the next ten years, failures will result in \$13 million in demolition and \$168 million in replacement space costs.

### **Category 5: SECURE AND PROTECT**

0-5 year need:       \$0.0 million  
6-10 year need:     \$0.0 million

A building is categorized to be closed if significant maintenance has been deferred, and both space and systems need significant renewal. A building in this category is no longer able to support a program or service, but carries significance worth protecting against the time renewal and modernization become possible. The goal of the institution is to provide the minimum maintenance to the building envelope and utilities. This is a category the institution hopes rarely to employ.

Only the Chapel currently falls into this category. The Chapel is highly significant: it is the visual icon for the campus, the most important link to the past, and a daily reminder of the inadequacies of a system that cannot afford the \$10 million renovation necessary to keep open its equivalent of Independence Hall.

Category 5 building require some maintenance and upkeep, including envelope protection, fire detection, and maintenance heat.

## Category 6: DISPOSE AND REPLACE

0-5 year need:	\$100 million
6-10 year need:	\$48 million

A building is categorized for disposal if qualitative considerations do not outweigh the impracticality of further investment in the asset. The need is to replace these structures within five years, or at minimum to identify funds to begin the replacement process within five years. The buildings in this category comprise 346 thousand square feet, more than 5% of the education and general administration building stock.

While many of the structures in category 6 are obscure and already slated for removal in connection with a building project, some warrant discussion:

- Cold Storage Building
- South College
- (Old) Chenoweth Laboratory
- Hatch Laboratory
- Hills House
- Student Union
- West Experiment Station

Cold Storage and (Old) Chenoweth Laboratory, connected as they are to the three Agricultural Engineering Buildings, occupy an important future building site and should all be demolished at the same time. Hatch Laboratory, with its many serious code deficiencies including dead-end corridors, sub-standard floor-to-ceiling heights, and inadequate ventilation, is already scheduled for decommissioning and demolition. Damage to West Experiment Station from water

intrusion is extensive and prohibitively expensive to repair at \$2 million for the roof alone, plus another \$6.5 million, or \$600 per square foot, to renovate. Unlike the Chapel, which is watertight, West will quickly deteriorate beyond repair. The Department of Facilities and Campus Planning has explored possible sources of external funding for preserving West, and has found none.

South College, Hills House, and the Student Union have major implications.

The October 27, 2006 report of John Watts, fire safety consultant, drove small, short-term steps for improving the safety of South College against the risk of fire, including reduced occupancy, restrictions in use, and improved fire detection and emergency egress systems. Any larger expenditure would trigger collateral investments estimated at \$5 million for accessibility improvements required by code, and an electrical upgrade. At more than \$160 per square foot, this is an unsupported investment as it offers no improvement in existing building conditions. A complete renovation of the 31 thousand square foot building would cost \$15.5 million. South College occupies a prominent site on the campus upon which a new structure would serve better the academic program.

Hills House offers a different set of problems. A converted dormitory almost 88 thousand square feet in size, Hills is large, riddled with code deficiencies, and clad with a crumbling façade. No investment can raise ceilings which are too low to meet the building code. The campus needs \$20 million over the next five years to begin replacing the space. Another \$20 million will be needed by year six.

With respect to the Student Union, a study is underway to determine whether the building can comply with new statutory requirements related to fire safety, for continued use of assembly spaces like the Ballroom. The study will analyze the implications of open stairwells and mezzanine space, smoke barriers between major spaces, and the coatings on building materials. The only effective way to make this building comply with contemporary code requirements is to dismantle and rebuild it. This is at least a \$61.5 million problem, as the estimate is based only on replacing a building originally built to meet the needs of a student body of 12 thousand.

In the aggregate, buildings in this category represent a continuous exposure and drain on campus resources amounting to \$100 million over the next five years, and \$48 million in the six to ten year window.

## **INFRASTRUCTURE**

0-5 year need:	\$37 million
6-10 year need:	\$37 million

Features from athletic fields, roads, paths, and parking lots, to steam, water, sewer, and electrical distribution systems, require maintenance and renewal to keep the campus safe, ensure continuity of service, and control operating costs. Investments averaging more than \$7 million per year, every year for the foreseeable future, are needed to meet these goals.