These guidelines have been prepared by the Green Building Subcommittee of the Chancellor’s Sustainability Committee, which is chaired by Ezra Small, Campus Sustainability Manager. The subcommittee took a credit by credit approach to analyzing campus infrastructure, policies and practices as they pertain to green building and LEED certification.

It is our hope that these updated guidelines will continue to help facilitate and streamline the LEED certification process for new construction and major renovations at the University of Massachusetts Amherst (UMA). In addition, by using these guidelines as a framework for green building, we hope that design teams will be able to challenge the University with creative, resourceful and innovative strategies for sustainable buildings on campus.

These guidelines are not meant to replace the official USGBC LEED manuals. The information herein, in conjunction with maps and references available through Facilities & Campus Services, is meant to support design teams in their understanding of the UMA campus through the lens of LEED. However, it is the responsibility of each design team to ensure that they fully comprehend the LEED rating system, credit requirements, and associated reference materials. Contact Facilities & Campus Services for more information.
# Acknowledgements

## Green Building Subcommittee/Chancellor’s Sustainability Committee

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<thead>
<tr>
<th>Staff</th>
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<tr>
<td>Jeff Dalzell</td>
<td>David Damery</td>
<td>Soroush Farzinmoghadam</td>
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<tr>
<td>Ray Jackson</td>
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<td>John Matthews</td>
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<td>Daniel McCarthy</td>
<td>Kathleen Lugosch</td>
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<td>Pam Monn</td>
<td>Stephen Schreiber</td>
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<td>Ludmilla Pavlova</td>
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<td>Tom Shaw</td>
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<td>Ezra Small</td>
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<td>Dennis Swinford</td>
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## Contributors

<table>
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<tr>
<td>Sandy Beauregard</td>
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<tr>
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## 2013 Revision Authors/Editors

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EXECUTIVE SUMMARY

BACKGROUND
In 2007, University of Massachusetts President Jack Wilson signed the American College and University Presidents’ Climate Commitment (ACUPCC). The same year, University of Massachusetts Amherst (UMA) Chancellor Thomas Cole established the Environmental Performance Advisory Committee (EPAC) to assess ways to reduce the environmental impacts of the campus. In 2008, Governor Deval Patrick signed Executive Order 484 which included the provision that all state buildings be certified under the LEED rating system as Silver Plus. At the same time, UMA made the commitment to achieve LEED Silver Plus or better for all new construction and major renovations. In 2010, EPAC created the Green Building Committee (GBC) to focus efforts on sustainable design and building on campus. In 2012, EPAC became part of “Sustainable UMASS” which is a broad campus wide effort to promote and implement sustainability into all aspects of campus operations and campus life. Also in 2012, the GBC became a subcommittee of the Chancellor’s Sustainability Committee (CSC).

During the summer of 2010, the GBC - a cross disciplinary group comprised of faculty, staff, and students - met biweekly to produce a document which is based on, but not limited to, the LEED-NC 2009 rating system. The committee reviewed the LEED credits and prerequisites and established priority and feasibility levels for each based on the environmental realities and mission of the University. A narrative summary of background information and campus-specific research was created for each category, credit, and prerequisite. The final report and slide presentation summarize the current knowledge and points of view from many UMA stakeholders, and are critical tools in the effort to advance sustainability through high performance buildings on campus. In 2013, the Green Building Subcommittee updated the Green Building Guidelines to reflect campus achievements since 2009 and to require achievement of Energy & Atmosphere Credit # 5 - Measurement & Verification on all UMASS Amherst LEED projects.

PURPOSE
These guidelines provide a framework for approaching new construction and major renovation projects at UMA by focusing the conversation on the aspects of green building most important to the campus. They are intended to be the beginning of a dynamic conversation between designers, UMA stakeholders, and users of new buildings. LEED points are not the end goal of these guidelines; rather, they will be a by-product of the design of high performance buildings.

The process of sustainable design extends well beyond the scope of these pages. However, they help define a common starting point for the design process. Project teams may consider the research and discussion provided here to be a baseline from which to begin their investigation.
GUIDELINES FOR INNOVATION
Over the course of writing these guidelines, certain sustainable design concepts have emerged again and again as items which are especially important to the University. Design teams are expected to carefully consider the following as they define the project’s green building goals:

• Engage users to challenge and expand the limits of the human comfort zone.
• Share project data with the campus for research and education.
• Generate opportunities for future education about sustainable living and working.
• Verify that campus sustainability and energy savings goals are being achieved.

CHALLENGE DESIGNERS TO CHALLENGE US
The Green Building Subcommittee challenges designers to challenge the University by presenting new ways of building that are increasingly sustainable and which promote the various missions of the institution. The design team’s role is to deepen UMA’s commitment to and understanding of green building techniques and technology through detailed investigation and innovative research.

PROTECT THE NATURAL ENVIRONMENT
UMA’s commitment to the natural environment has been articulated in a variety of venues including the Presidents’ Climate Commitment and the Climate Action Plan (CAP). Successful building design should address greenhouse gas emissions, fossil fuel usage, impact on the plant and animal life surrounding the UMA campus, and educating the community about proper stewardship.

OVERARCHING PRINCIPLES
Throughout the analysis of the LEED-NC rating system, the GBC returned to a few overarching principles that influenced the priority designations of each credit. Out of the 60 credits, 29 were identified as high priorities. Each of these credits relate to more than one of the overarching principles. The principles include:
**MAXIMIZE DURABILITY AND MINIMIZE MAINTENANCE COSTS**
Buildings at UMA are expected to last a very long time and serve hundreds of thousands of students, staff, and faculty throughout their lifetime.

- SS6.1: Stormwater Design - Quantity Control
- WE1: Water Efficient Landscaping
- WE3: Water Use Reduction
- EA3: Enhanced Commissioning
- EA5: Measurement and Verification
- MR7: Certified Wood
- IEQ3.1: Construction IAQ Management Plan - During Construction
- IEQ3.2 Construction IAQ Management Plan - Before Occupancy
- IEQ4.1: Low-Emitting Materials - Adhesives and Sealants
- IEQ4.2: Low-Emitting Materials - Paints and Coatings
- IEQ4.3: Low-Emitting Materials - Flooring Systems
- IEQ4.4: Low-Emitting Materials - Composite Wood and Agrifiber Products
- IEQ5: Indoor Chemical and Pollutant Source Control

**REDUCE ENERGY CONSUMPTION**
The financial costs and environmental impacts of energy use should be minimized throughout the construction and operations of UMA’s buildings.

- WE3: Water Use Reduction
- EA1: Optimize Energy Performance
- EA2: On-Site Renewable Energy
- EA3: Enhanced Commissioning
- EA5: Measurement and Verification
- MR2: Construction Waste Management
- IEQ1: Outdoor Air Delivery Monitoring
- IEQ7.1: Thermal Comfort - Design
- IEQ7.2: Thermal Comfort - Verification
- RP1.2: Regional Priority (EA2)

**SUPPORT ACADEMIC RESEARCH**
New construction should serve UMA’s various areas of research. Faculty across campus are actively engaged in fields closely tied to Green Building.

- SS6.2: Stormwater Design - Quality Control
- WE1: Water Efficient Landscaping
• EA1: Optimize Energy Performance
• EA2: On-Site Renewable Energy
• MR7: Certified Wood
• IEQ1: Outdoor Air Delivery Monitoring

PROMOTE INTERCONNECTED CAMPUS COMMUNITY
The UMA community is enhanced by densifying the core campus, promoting pedestrian and bicycle circulation, and strengthening the relationships between buildings and open space.

• SS2: Development Density + Community Connectivity
• SS4.1: Alternative Transportation - Public Transportation Access
• SS4.2: Alternative Transportation - Parking Capacity
• SS5.2: Site Development - Maximize Open Space
• IEQ3.1: Construction IAQ Management Plan - During Construction

CONTROL STORMWATER RUNOFF
The UMA stormwater utility system has reached maximum capacity and is beginning to fail. Flooding occurs across campus after major storm events and almost all surface flow is funneled to one culvert that runs underneath the southern end of Commonwealth Avenue. Future projects must meet capacity of their stormwater needs on site or add capacity to the system.

• SS5.2: Site Development - Maximize Open Space
• SS6.1: Stormwater Design - Quantity Control
• SS6.2: Stormwater Design - Quality Control
• RP1.1: Regional Priority (SS6.1)
Commonwealth of MA - Administration & Finance Bulletin # 12

Major renovation projects are defined as those projects that include a complete overhaul of a significant portion of the original structure and where the cost of the renovation is greater than 50% of the assessed value of the building.

Higher up-front cost shall not preclude construction unless costs cannot be justified with a simple payback of 10 years or less.

MA LEED Plus Standard - 2006
For projects over 20,000 GSF obtain LEED Silver Certification plus the following specific credits:

Energy performance exceeding MA Energy Code requirements by at least 20%* (EA c1)
Third party building commissioning (EA c1, c3)

At least one of the four Smart Growth criteria
SS c2 - Construct or renovate on a previous developed site or within a ½ mile of ten basic services and a residential neighborhood with average density of 10 units/acre and with pedestrian access between buildings and services
SS 3 - Construct or renovate on a brownfield site
SS 4.1 - Construct or renovate on a site with public transportation within ½ mile
MR c1.1 - Maintain 75 percent of existing building structure and envelope

Two irrigation and building water efficiency criteria
WE c1.1 - Reduce potable water consumption for irrigation by 50 percent
WE c3.1 - Incorporate strategies that will conserve 20% of building water use

* Major renovation projects that might have difficulty meeting this requirement can apply for a waiver to the Green Building Subcommittee
LEED REQUIREMENTS

PROJECTS SMALLER THAN 20,000 GSF

Adhere to MA LEED Plus described above, or
Surpass the MA Energy Code by at least 20%, or
Follow the prescriptive approach of the New Buildings Institute’s Advanced Buildings Benchmark Tool
The George N. Parks Minuteman Marching Band Building is now the single home for the Pride and Class of New England. The building includes a large indoor practice and performance space that can contain the entire 300 member marching band, and two smaller group practice spaces. Incorporating the existing Grinnell Arena gave the percussion section its own practice space. The new facility also includes additional storage rooms (for instruments, uniforms and music), and office and conference space for band staff. This building was the first UMASS Amherst Building to achieved LEED certification in early 2012. The Design and Construction Team exceeded expectations when the building achieved Gold certification.

George N. Parks was the Director of the UMASS Minuteman Marching Band from 1984 until his tragic passing in September 2010. George was the catalyst and the great motivator for this new building and while he was able to walk through the partially completed building in mid September, he did not live to see his dream come to its full fruition.
LEED PROJECTS

UNIVERSITY OF MASSACHUSETTS AMHERST POLICE STATION

585 EAST PLEASANT STREET

Design began on this 2-story facility in early 2008, with construction starting in October 2009. Completed in late 2010 early 2011, the University and the design team ensured many innovative green features were incorporated into this facility as an educational tool for students and for the environmental benefits.

Consistent with the University of Massachusetts Amherst Environmental Performance and Green Initiatives, an important goal for this project was to design and construct the new police facility to meet LEED certification standards. This project targeted LEED Gold certification as a means to ensure that energy and resources are used as efficiently as possible due to the new mission critical facility’s need to operate 24/7, 365 days a year.
By renovating the existing greenhouse and constructing more than 15,700 square feet of additional laboratory and greenhouse space, the project will provide much needed teaching and research facilities for the College of Natural Sciences. The Greenhouse is an efficient glass and steel research machine. Sophisticated automated building systems control lighting, temperature, humidity, irrigation and fertilization, adapting the interior environment in response to the sun, the wind, and the weather. The facility maximizes research capability and provides an open, flexible environment for introductory botany instruction. Project interiors have a simple, minimal character in keeping with the overall agrarian style. The project was completed in August, 2011 and received LEED Gold certification in 2012.
LEED PROJECTS

PROJECTS CURRENTLY AWAITING CERTIFICATION

Life Sciences Laboratories

Commonwealth Honors College - Birch Hall

Commonwealth Honors College - Elm Hall

Commonwealth Honors College - Linden Hall

Commonwealth Honors College - Maple Hall

Commonwealth Honors College - Oak Hall

Commonwealth Honors College - Sycamore Hall

Hampshire Dining Commons Renovations

McGuirk Stadium & Football Champions Center

Paige Laboratory Renovations

New Academic Classroom Building
### Category: Sustainable Sites

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### Points
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- Water Efficiency: 10
- Energy and Atmosphere: 35
- Materials and Resources: 14
### Category: Indoor Environmental Quality  
**Points: 15**

<table>
<thead>
<tr>
<th>Credit</th>
<th>Achieved</th>
<th>Required</th>
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<td>1.5</td>
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**Prerequisites:**
- Prereq 1: Minimum Indoor Air Quality Performance
- Prereq 2: Environmental Tobacco Smoke (ETS) Control

### Category: Innovation and Design  
**Points: 6**

<table>
<thead>
<tr>
<th>Credit</th>
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<tbody>
<tr>
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</tr>
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</tr>
<tr>
<td>1.3</td>
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<tr>
<td>1.4</td>
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**Points Achieved (Total):** 6

### Category: Regional Priority  
**Points: 4**

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<td>1</td>
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<td>1.3</td>
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**Points Achieved (Total):** 4

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<th>Water Efficiency</th>
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<table>
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</table>

**TOTAL Points: 110**

**LEED V2.2:**
- 26-32: Certified
- 33-38: Silver
- 39-51: Gold
- 52+: Platinum

**LEED V3:**
- 40-49: Certified
- 50-59: Silver
- 60-79: Gold
- 80-100: Platinum

**High Priority Credit as defined by Green Building Guidelines**

**Required High Priority Credit as defined by the Green Building Guidelines**

**Credit Achieved by Project**
<table>
<thead>
<tr>
<th></th>
<th>Marching Band Building LEED V 2.2</th>
<th>Police Station LEED V2.2</th>
<th>CNS Green Houses LEED V3</th>
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<tbody>
<tr>
<td><strong>Energy</strong></td>
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<tr>
<td>Baseline</td>
<td></td>
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<tr>
<td>ASHRAE 90.1-2004/2007</td>
<td>389,508</td>
<td>560,246</td>
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<td>Steam/Gas (MBtu/y)</td>
<td>1,920</td>
<td>172</td>
<td>1,186</td>
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<tr>
<td>Total (MBtu/y)</td>
<td>3,249</td>
<td>2,083</td>
<td>4,026</td>
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<tr>
<td>Proposed</td>
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<tr>
<td>Electrical (KWh/y)</td>
<td>273,888</td>
<td>338,366</td>
<td>751,435</td>
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<tr>
<td>Steam/Gas (MBtu/y)</td>
<td>654</td>
<td>143</td>
<td>898</td>
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<td>Total (MBtu/y)</td>
<td>1,589</td>
<td>1,297</td>
<td>3,462</td>
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<td>Actual</td>
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<tr>
<td>Electrical (KWh/y)</td>
<td>153,403</td>
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<td>Steam/Gas (MBtu/y)</td>
<td>444 (Steam)</td>
<td>115 (Gas)</td>
<td>* (Steam)</td>
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<td>Total (MBtu/y)</td>
<td>968</td>
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<td><strong>GHG CO2 Equivalent (Tons)</strong></td>
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<td>Emissions</td>
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<td>Electrical (Ton)</td>
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<td>Steam/Gas (Ton)</td>
<td>24.7</td>
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<tr>
<td>Total (Tons)</td>
<td>143.7</td>
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<td>Reduction to Baseline</td>
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<tr>
<td>Electrical (Ton)</td>
<td>184</td>
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<tr>
<td>Steam/Gas (Ton)</td>
<td>82.2</td>
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<tr>
<td>Total (Ton)</td>
<td>266.2</td>
<td>77.7</td>
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<td><strong>Water</strong></td>
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<tr>
<td>Baseline Case (Gallon/y)</td>
<td>127,062</td>
<td>430,433</td>
<td>97,300</td>
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<tr>
<td>Design Case (Gallon/y) / Water Saving</td>
<td>79,262 / 37.60 %</td>
<td>255,446 / 40.70 %</td>
<td>63,250 / 35 %</td>
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<tr>
<td>Actual Water Usage (Gallon/y)</td>
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<tr>
<td>Actual GHG , CO2 Equivalent Reduction (Ton)</td>
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<td><strong>Construction Waste</strong></td>
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<tr>
<td>Generated (Ton)</td>
<td>99.76</td>
<td>304.28</td>
<td>88.84</td>
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<tr>
<td>Diverted (Ton)/ Percentage</td>
<td>85 / 85.2 %</td>
<td>269.36 / 88.58 %</td>
<td>67.4 / 76 %</td>
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<tr>
<td>GHG , CO2 Equivalent Reduction (Ton)</td>
<td>144</td>
<td>310</td>
<td>97</td>
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<tr>
<td><strong>Heat Island Effect</strong></td>
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<td></td>
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<tr>
<td>Low-Sloped Roofing Materials, minimum SIR of 78 (Sq ft)</td>
<td>Not Attempted</td>
<td>10,142</td>
<td>Not Attempted</td>
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<tr>
<td>SRI compliant roof area/ total roof area %</td>
<td>-</td>
<td>94.2 %</td>
<td>-</td>
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<tr>
<td>Qualifying Non-Roof Hardscape Surfaces 5 (Sq ft)</td>
<td>Not Attempted</td>
<td>Not Attempted</td>
<td>13,034</td>
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<tr>
<td>Qualifying non-roof surfaces/ total non-roof surfaces %</td>
<td>-</td>
<td>-</td>
<td>71 %</td>
</tr>
</tbody>
</table>

1 Not available, (The meter Doesn’t work)
2 Not available, (Needs more actual readings from meter)
3 Not available, (No separate Meter for Irrigation)
4 "The Carbon Footprint of Water", Bevan Griffiths-Sattenspiel and Wendy Wilson, 2009
5 Area of qualifying reflective materials and plus area of open-grid pavement system (at least 50 % previous).
NOTES ON THE LEED DATABASE FROM FY2013 ACTUAL INFORMATION AND LEED DOCUMENTATION OF THREE LEED GOLD BUILDING, UMass Amherst

As a part of Green Building Committee goals to monitor UMass LEED certified buildings, and also for the educational purposes we have produced this document to compare several features of Marching Band Building, Police station, and CNS Green Houses. Information extracted from three UMass LEED Gold certified buildings has shown in four categories of Energy Usage, Water Usage, Construction Waste Diverted and Heat Island Effects base on LEED documentations and actual reads.

For the Energy section we have Baseline, Proposed (from EAc1: Optimize Energy Performance in LEED V2.2 projects, and from EAp2: Minimum Energy Performance for project under LEED V3), and Actual Energy usages from Actual Readings on FY 2013 in the term of Electricity and Gas or Steam usage. Also GHG results by each part and reductions to the baseline has prepared in this Energy section.

In Water Usage part the Baseline, Design Case, and Actual water Usage of the Building has monitored to show water saving amount and GHG reduction of this water saving in compare with the Base line Case.

Construction Waste part has tried to show amount of Diverted Waste materials during construction and calculate GHG reduction results from this part of Green Building Construction.

Another section in this database has tried to show how much UMass LEED Buildings has reduced the Heat Island Effects with the Roofing Materials and Non-Roof Surfaces.

Some notes from this LEED Database table show:

• In George N. Parks Minuteman Marching Band Building Electric, Steam and the total energy usage of the building is much lower than Baseline and the Proposed Energy Model.

• Police Station Building shows the total Electrical Energy usage of less than baseline after M&V of 2011-2012, but it is still higher than proposed Energy Model. The Gas usage is lower than proposed level in the Model.

• In Bowditch Research & Education Greenhouse actual electrical Usage is much higher than proposed and baseline, also we do not have actual Energy Usage for Steam since the meter does not work. The actual water usage for the building is not available, since there is no separate meter for irrigation in this building.
**Credit Key**

**Sustainable Sites**

**Water Efficiency**

**Energy + Atmosphere**

**Materials + Resources**

**Indoor Environmental Quality**

**Regional Priority**

**Innovation in Design**

**Priority Levels**

- **High** - Credit strategy should influence design.
- **Medium** - Credit should be pursued when it is practical for the program.
- **Low** - Credit is achieved if possible.

**Feasibility Levels**

- **Easy** - Current policy and/or existing infrastructure supports credit compliance.
- **Moderate** - Requires adjustments to the status quo.
- **Difficult** - Requires a specific approach during design/construction and/or changes to current campus practice.
SUSTAINABLE SITES FINDINGS

• The campus of 1,348 acres serves 27,000 students and 5,500 faculty/staff. The peak density is 23.7 people/acre.

• The campus has 10,000 parking spots.

• 5% of commuters currently arrive to the campus by bicycle. (CAP)

• 29% of UMA employees currently use the bus –up from 17 % in 1999. (Framework Plan)

• The campus’ underground stormwater infrastructure was built in the 1800s.

• Stormwater on the campus generally flows east to west.

• 72% of the campus is pervious and 28% is impervious.

• If the existing surface parking lots were combined in one location, the paved land area would be nearly the size of the academic core.

• The annual average precipitation at UMA is 45.57 Inches, and the wettest month of the year is May with an average rainfall of 4.11 inches.
SS CATEGORY

SUSTAINABLE SITES

With a population of 32,500 students, faculty, and staff, UMA is essentially a small city nestled in the rural hills of Western Massachusetts. The campus has an urban feel, complete with tall buildings (including the 28 story W.E.B. DU Bois Library) and a complex web of pedestrian, vehicular, and shared pathways. At the same time, it is part of the rural fabric of the area, surrounded by open farmland and upland forest.

UMA has a robust site planning process which views the campus as a network. Site selection decisions are driven by relationships to adjacent buildings, district planning, vehicular circulation and access, the quality of open space, and program. With the exception of stormwater issues, individual environmental considerations are less of a priority than the overall feel, look, and flow of the campus. However, many of the LEED credits in this category will be automatically earned by projects because of high density and existing transportation infrastructure.

The University has significant resources to assist design teams in understanding the complexities of site selection, including a series of GIS maps calling out LEED compliance for many of the Sustainable Sites credits.

POSSIBLE POINTS: 26

17 HIGH PRIORITY
5 MEDIUM PRIORITY
4 LOW PRIORITY
16 EASY FEASIBILITY
8 MODERATE FEASIBILITY
2 DIFFICULT FEASIBILITY
CONSTRUCTION ACTIVITY POLLUTION PREVENTION

SS PREREQUISITE 1

LEED CREDIT INTENT
To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

LEED CREDIT REQUIREMENTS
Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local standards and codes, whichever is more stringent. The plan must describe the measures implemented to accomplish the following objectives:

• To prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
• To prevent sedimentation of storm sewers or receiving streams.
• To prevent pollution of the air with dust and particulate matter.
• To document the installation and maintenance of these measures throughout the life of the project using inspection reports, record logs, and photographs.

UMA CREDIT DISCUSSION
The prevention of construction activity pollution is crucial on campus both for its environmental impact and because the campus is constantly in use by students, faculty and staff. Design teams are expected to include provisions for the control of erosion, sedimentation and airborne dust in their drawings and specifications.
SITE SELECTION

SS CREDIT 1
1 POINT

LEED CREDIT INTENT
To avoid the development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

LEED CREDIT REQUIREMENTS
Do not develop buildings, hard-scape, roads or parking areas on portions of sites that meet any of the following criteria:

- Prime farmland (soil classification)
- Low-lying land (previously undeveloped)
- Endangered or threatened species habitat
- Wetlands: 100 ft buffer
- Water bodies: 50 ft buffer (previously undeveloped)
- Parkland

PROJECT ACHIEVEMENT RECORD
- George N Parks Minuteman Marching Band Building, (1 point)

UMA CREDIT DISCUSSION
AT UMA, building sites are selected by design teams primarily for their proximity to similarly programmed buildings and their alignment with the campus master plan.

The preservation of farmland is a low priority for the core of campus, thus a soil classification of prime farmland by the USDA should not preclude a project team from choosing a particular site although it will eliminate the potential for earning this LEED credit. Similarly, existence of an endangered species or location of a water body should not preclude the use of a site for a future project, although the project design should respond, when possible, to the environmental features of the site and to the educational potential therein.

The feasibility of this credit is site dependant. Many of the potential building sites on campus fulfill all of the criteria of the credit because they do not meet any of the LEED definitions for inappropriate sites.
LEED CREDIT INTENT
To focus development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.

LEED CREDIT REQUIREMENTS
Construct or renovate a building on a site that meets the following criteria:

Option 1: Development Density

• Is located on a previously developed site
• In a community with a minimum density of 60,000 square feet per acre net.

Option 2: Community Connectivity

• Is located on a previously developed site
• Is within ½ mile of a residential area or neighborhood with an average density of 10 units per acre net
• Is within ½ mile of at least 10 basic services
• Has pedestrian access between the buildings and services

PROJECT ACHIEVEMENT RECORD
• George N Parks Minuteman Marching Band Building, (1 point)

UMA CREDIT DISCUSSION
The requirements for this LEED credit are consistent with many of the priorities for campus development. Pedestrian movement and open space should predominate. Placing residential areas in close proximity to basic services (including cafes, restaurants, post offices, gyms, and banks) supports the development of an urban campus, encourages bicycle and pedestrian travel and reduces the need for individual vehicle use.

Most of the core campus meets the requirements for Option 2: Community Connectivity and design teams should confirm that this is the case for potential building sites.

¹ Campus Landscape Improvement Plan (CLIP)
S.S. CREDIT 2: COMMUNITY CONNECTIVITY
At UMA, building sites are selected by design teams primarily for their proximity to similarly programmed buildings and for their alignment with the campus master plan, not because they are, or are not, contaminated. However, if a preferred project site was found to contain hazardous materials, remediation would be required.
S.S. CREDIT 3: BROWNFIELD REDEVELOPMENT
LEED CREDIT INTENT
To reduce pollution and land development impacts from automobile use by locating new construction in close proximity to existing public transportation.

LEED CREDIT REQUIREMENTS
Locate the project within ¼ mile of at least 1 stop for 2 bus lines

Projects may earn an additional point for exemplary performance by complying with both of these requirements:

- Locate the project within ¼ mile of at least 2 or more stops for 4 or more public or campus bus lines usable by building occupants.
- Demonstrate that the frequency of service is at least 200 total transit rides per day.

HASBROUK BUS STOP: 7 BUS LINES, 191 STOPS PER DAY

PROJECT ACHIEVEMENT RECORD
- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
At UMA, public transportation is a high priority. Currently, there are approximately 10,000 parking spaces on campus and 33,000 students, faculty and staff, a figure which emphasizes the need for a reduction in the use of single-occupancy vehicles. Reducing greenhouse gas emissions is also a high priority for the University, due in part to Executive Order 484. The University’s Climate Action Plan states a series of Mitigation Strategies to curb campus transportation-related emissions including implementing and enhancing public transportation. Major campus buildings that serve students should have a nearby transit stop within 500 feet of the entrance.¹ Close proximity of new projects to bus stops is both crucial to campus development and supported at the University and State levels.

All of the core campus currently meets the requirements stated above. Furthermore, for projects outside of the campus core, precedent has been set for the building of additional bus stops when they don’t yet exist.

¹ UMA Design Guidelines
S.S. CREDIT 4.1: PUBLIC TRANSPORTATION
ALTERNATIVE TRANSPORTATION -
BICYCLE STORAGE AND CHANGING ROOMS

SS CREDIT 4.2
1 POINT

LEED CREDIT INTENT
To reduce pollution and land development impacts from automobile use by encouraging bicycle commuting.

LEED CREDIT REQUIREMENTS

• Commercial
  • Provide secure bicycle racks within 200 yards of a building entrance for 5% or more of all building users
  • Provide shower and changing facilities within 200 yards of a building entrance for 0.5% of FTE occupants

• Residential
  • Provide covered bicycle storage for 15% of occupants

PROJECT ACHIEVEMENT RECORD

• George N Parks Minuteman Marching Band Building, (1 point)
• UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
The University is committed to encouraging bicycle commuting through the expansion and proliferation of racks and access to lockers/showers¹. 5% of commuters currently arrive to the campus by bicycle². An additional number of vehicle-owning students use bicycles for day-to-day travel. Increasing the number of bike racks and available showers on campus incentivizes the use of bicycles as a primary mode of transportation, promotes a healthy lifestyle, and is aligned with the master plan goal of a pedestrian core campus. It is a goal of the University to go beyond the requirements of this LEED credit.

All of the core campus is within 200 yards of bike storage, however, design teams should include bike storage as part of their project’s building and landscape design³. The inclusion of showers and changing rooms for new projects should be assessed on a case by case basis; project teams will be provided with a map of existing shower/changing facilities to use in this decision-making process.

¹ UMA Design Guidelines, ² Climate Action Plan, ³CLIP
S.S. CREDIT 4.2: BIKE STORAGE & SHOWERS

Legend

- UMA Campus Boundary
- Shower Locations
- Bike Racks
UMA CREDIT DISCUSSION

The University has been tasked with reducing greenhouse gas emissions by 25% by fiscal year 2012.¹ Offering incentives for low-emitting and fuel-efficient vehicle use can help achieve this, however, it’s likely that a greater impact on emissions will be realized through other methods.

Parking Services offers discounts to LEV/FEV users, using a list of LEED compliant vehicles. The discount of 50% for one year technically exceeds the LEED requirement of a 20% discount for two years. A Credit Interpretation Ruling will need to be sought to confirm that this discount structure will work for the credit. Coordination will need to happen between the project teams and parking services to ensure that notification of the discount is publicly posted.

¹ Executive Order 484
UMA CREDIT DISCUSSION
Parking is a huge issue for UMA, with 80% of employees and 50% of students driving to the campus in single-occupant vehicles. Existing parking lots within the core campus are common sites for new construction because they occupy some of the only flat areas. A current mandate requires the campus to replace each removed spot with a new spot on the periphery. Incentivizing carpooling is one method of encouraging alternate forms of transportation on campus.

In terms of feasibility, the Parking Services provides discounts for carpoolers – 50% off of the regular parking cost each year, for an infinite number of years. Whether or not parking is provided for less than 5% of FTEs will be project-dependant. Design teams are encouraged to fully explore parking options.

LEED CREDIT INTENT
To reduce pollution and land development impacts from automobile use.

LEED CREDIT REQUIREMENTS
Option 1: Parking capacity must not exceed minimum local zoning requirements. [Not Applicable at UMA]

Option 2: Provide parking for less than 5% of full-time equivalent building occupants:

- Provide preferred carpool parking for 5% of total parking spaces, or
- Provide parking discounts for carpoolers.

Option 3: Provide no new parking

Option 4: Provide 25% fewer parking spaces than the applicable standard listed in the 2003 ITE “Parking Generation” study.

PROJECT ACHIEVEMENT RECORD
- George N Parks Minuteman Marching Band Building, (1 point)
Pursuing this credit will require a culture shift on campus. Current emphasis is placed on presenting a welcome and polished landscape to multiple audiences characterized by mowable turf grass. Physical Plant has begun using native, hardy plants in gardens and is replacing annuals with perennials, and UMA plantings should be “simple, robust, and indigenous” and be as maintenance-free as possible.¹ However, designating 50% of the building site for native plantings is unlikely for projects on the core campus where multi-purpose outdoor spaces are a higher priority.

¹ Campus Landscape Improvement Plan (CLIP)
**SITE DEVELOPMENT - MAXIMIZE OPEN SPACE**

**SS CREDIT 5.2**

1 POINT + 1 (EXEMPLARY)

**LEED CREDIT INTENT**

To promote biodiversity by providing a high ratio of open space to development footprint.

**LEED CREDIT REQUIREMENTS**

Provide vegetated open space adjacent to the building that is equal in area to the building footprint. Vegetated open space includes:

- Lawn
- Playing field
- Pedestrian-oriented hardscapes
- Plantings
- Green Roofs

Owner must sign a form stating that the open space will remain open space for the life of the building.

Projects may earn an additional point for doubling open space requirements.

**PROJECT ACHIEVEMENT RECORD**

- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (1 point)

**UMA CREDIT DISCUSSION**

The design of outdoor spaces surrounding campus buildings should be as thorough as the design of the buildings themselves.¹ Emphasis should be placed on the development of programmed outdoor spaces, and visitors should have lingering images of a green, healthy, well-maintained landscape. Pedestrian movement and open space should predominate, where possible. This credit is achievable unless the size of the site is not twice the size of the building footprint. Project teams should take care in considering this when choosing the LEED project boundary.

¹ UMA Design Guidelines
UMA CREDIT DISCUSSION
UMA compliance for this credit will be driven primarily by Mass DEP regulations. The existing stormwater system is overburdened; managing stormwater quantities on campus is a priority. The use of retention ponds is highly limited on the core campus due to space constraints; however, UMA is beginning to experiment with on-site infiltration using rain gardens and bio-swales. Underground storage of water for reuse in cooling and wastewater systems is another strategy that should be investigated by design teams.

LEED CREDIT INTENT
To limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.

LEED CREDIT REQUIREMENTS
For sites with imperviousness less than 50%:

• The post-development peak discharge rate must not exceed pre-development rate

For sites with imperviousness greater than 50%:

• Storm water runoff must be reduced by 25% for the 2-year 24-hour (3”) design storm

SS CREDIT 6.1
1 POINT + 1 (EXEMPLARY)

HIGH PRIORITY | MODERATE FEASIBILITY

SOUTH WEST CON COURSE
REDEVELOPMENT WITH
PERVIOUS PAVEMENTS,
NATIVE PLANT, AND RAIN
GARDEN STORM WATER
RETENTION.

RAIN GARDEN, LOT 62/STUDIO ARTS BUILDING
μ

1 inch equals 450 feet

Legend

- UMA Campus (1,348 ac)
- 72% Pervious (976 ac)
- 28% Impervious (372 ac)
- UMA Core Campus (172 ac)
- 45% Pervious (78 ac)
- 55% Impervious (94 ac)

Pervious/Impervious Map
UMA CREDIT DISCUSSION
UMA compliance for this credit will be driven primarily by Mass DEP regulations. The existing stormwater system is overburdened; managing stormwater quantities on campus is a priority. The use of retention ponds is highly limited on the core campus due to space constraints; however, UMA is beginning to experiment with on-site infiltration using rain gardens and bio-swales. Underground storage of water for reuse in cooling and wastewater systems is another strategy that should be investigated by design teams.
LEED CREDIT INTENT
To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.

LEED CREDIT REQUIREMENTS
At least 50% of the site hardscape must be either shaded, or have a solar reflectance index (SRI) of at least 29.

Projects may earn an exemplary point if 100% of the site hardscape is shaded or has an SRI of at least 29 or if 100% of the on-site parking spaces have been located under cover.

UMA CREDIT DISCUSSION
At UMA, a balance is sought between having green, leafy spaces and allowing for views and a neat campus appearance. For this reason, the shading option of this credit may not be viable for many sites. However, the campus specifies the use of standard concrete - which has an SRI of 35 - for pedestrian paths and patio areas to provide a clear distinction from vehicular circulation as well as to reduce heat island effect.¹

¹ Campus Design Standards
HEAT ISLAND EFFECT - ROOF

SS CREDIT 7.2
1 POINT + 1 (EXEMPLARY)

LEED CREDIT INTENT
To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.

LEED CREDIT REQUIREMENTS
Install roofing materials that have an SRI of at least:

• Low-sloped roof = 78
• Steep-sloped roof = 29

Or

• Install a vegetated roof that covers at least 50% of the roof area.

Projects may earn an exemplary point if 100% of the roof is vegetated.

PROJECT ACHIEVEMENT RECORD
• UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
At UMA, roofing choice is highly dependent on project budget and building use. Mitigating the heat island effect on roofs is not a high priority for the campus. Additionally, the energy savings of light-colored roofs in northern climates is debatable.

UMA currently has limited interest in installing experimental roofs, including vegetated systems.

THE SOLAR REFLECTANCE INDEX (SRI) IS A MEASURE OF THE ROOF’S ABILITY TO REJECT SOLAR HEAT, AS SHOWN BY A SMALL TEMPERATURE RISE. IT IS DEFINED SO THAT A STANDARD BLACK (REFLECTANCE 0.05, EMITTANCE 0.90) IS 0 AND A STANDARD WHITE (REFLECTANCE 0.80, EMITTANCE 0.90) IS 100. FOR EXAMPLE, THE STANDARD BLACK HAS A TEMPERATURE RISE OF 90 DEG. F IN FULL SUN, AND THE STANDARD WHITE HAS A TEMPERATURE RISE OF 14.6 DEG. F.
Night lighting plays a large role in making the UMA campus more inviting, both enhancing the usability of outdoor spaces and improving safety. This LEED credit requires an adherence to a lighting power density threshold as well as provisions to prevent “sky glow”. CLIP standards call for a lighting power density (watts/sf) that does not comply with LEED. Additionally, the campus currently specifies a lighting fixture that may not comply with LEED requirements because it illuminates above 90 degrees.¹ However, depending on the project, it may be possible to comply with the requirements for this credit. Credit compliant light fixtures may be recommended as a new campus design standard.

¹ UMA Design Guidelines
WATER EFFICIENCY FINDINGS

• The campus used 222,400,000 gallons of water in FY13, enough to fill 10,000 swimming pools.

• The reduction in campus potable water use over the three year period was due to the water conservation measures installed by Johnson Controls as part of an energy saving contract initiated in 2003:
  
  FY07 = 27,391,551 cubic feet  
  FY08 = 26,055,152 cubic feet  
  FY09 = 25,379,406 cubic feet

• Potable water consumption since the Johnson Controls retrofit continues to rise with the campus population.
  
  FY10 = 26,426,605 cubic feet

  200,000 gallons of reclaimed water are used in the campus' central heating plant.
UMA is part of a temperate forest climate, characterized by four distinct seasons and a good deal of precipitation spread evenly throughout the year. However, periodic drought periods plague the Western Massachusetts region, the most recent occurring in the summer of 2010, where rainfall was 5 inches less than the average for the period. Although the price of water is relatively low in this part of Massachusetts, the University recognizes it is an increasingly precious resource, and its abundance cannot be taken for granted. Design teams are expected to emphasize water efficiency for all campus projects.

The University’s potable water comes from the Town of Amherst, sourced from several wells and reservoirs in the area. An effluent line is expected to be utilized in the near future for make-up water to cooling towers within the campus core.

Various strategies for water use and reduction should be considered for new projects, and a combination of strategies may have the biggest impact within the constraints of budget and scope. Particularly with bathroom fixture selection, water efficiency goals should to be balanced with maintenance, durability, and user experience.

Design teams are encouraged to model water use throughout the design phase to analyze consumption and conservation strategies.
UMA CREDIT DISCUSSION

At UMA, water use reduction is a high priority. The campus gets its potable water from the Town of Amherst, whose water comes from seven sources in the watershed (both wells/aquifers and reservoirs). In 1980, drought-like conditions coupled with the return of the student body and a cluster of unseasonably hot days caused a water crisis that culminated in the evacuation of the campus. This event and the potential for its reoccurrence stress the importance of water savings for the University.

Flush and flow fixtures for all University projects must meet the requirements of this LEED prerequisite, which stipulates a 20% reduction over code. Lavatory faucets with automatic controls and low-flow shower heads can be easily implemented. Toilets that meet LEED criteria, with an efficiency of 1.28 gpf, have been shown to be very effective at removing waste from the bowl. However, pipe slope and arrangement of other water-using appliances in the pipe stream can affect the conveyance of waste through the pipes.¹ It is crucial that fixture decisions be made as part of an integrative approach between architects and plumbing engineers to ensure performance optimization.

¹ Alliance for Water Efficiency

WATER USE REDUCTION

WE PREREQUISITE 1

LEED CREDIT INTENT
To increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

LEED CREDIT REQUIREMENTS
Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation).

Calculations are based on occupant usage and must include only the following fixtures and fixture fittings:

- Water Closets
- Urinals
- Lavatory Faucets
- Showers
- Kitchen Sink Faucets
- Pre-rinse Spray Valves

REQUIRED

ATKINS RESERVOIR

WATER EFFICIENCY

26
WE CREDIT 1
2-4 POINTS

LEED CREDIT INTENT
To limit or eliminate the use of potable water or other natural surface or subsurface water resources available on or near the project for site landscape irrigation.

LEED CREDIT REQUIREMENTS
Option 1: Reduce by 50% (2 points)

• Reduce potable water use for irrigation by 50% from a calculated midsummer baseline case.

Option 2: No Potable Water Use for Irrigation (4 Points)
Meet the requirements for Option 1 and,

• Path 1
  • Use only recaptured rainwater, recycled wastewater, graywater or other municipally supplied non-potable water.

• Path 2
  • Install landscaping that does not require permanent irrigation systems.
  • Temporary irrigation systems used for plant establishment are allowed only if removed within 1 year of installation.

PROJECT ACHIEVEMENT RECORD
• George N Parks Minuteman Marching Band Building, (2 point)
• UMass Amherst Police Station (2 points)

UMA CREDIT DISCUSSION
The University is situated in a temperate forest climate, characterized by four distinct seasons and a good deal of precipitation which is evenly spread throughout the year. Temperate forest climates are second only to rainforest climates for total annual rainfall. UMA landscaping is designed specifically for this climate. With a few exceptions, the campus landscape is not irrigated, and robust plantings and drought-resistant turf grass is used.¹

For the most part, project teams should always design landscaping that does not require permanent irrigation. In select cases, and usually for educational purposes, gardens might be designed which require irrigation. In these cases, use of small rainwater harvesting systems should be explored. Project teams should integrate landscape, building, and stormwater treatment design to ensure the optimization of such a system.

¹ Campus Landscape Improvement Plan (CLIP)
Most likely, a 20% reduction in water use by flush fixtures will be attained by project teams due to the requirements of the water use reduction prerequisite. However, even by implementing waterless urinals and high efficiency (1.28 gpf) toilets, the average project will achieve only a 39% savings for flush fixtures, not the 50% required by this credit.

In order to reach the LEED target of a 50% reduction for flush fixtures, even higher efficiency toilets would need to be specified. However, toilets beyond the 1.28 gpf rating may not meet the usage and maintenance needs of the University and have not yet been sufficiently tested for use on campus. Therefore, it’s likely that design teams would need to implement the use of non-potable water systems in order to earn this credit. Project teams should fully understand the implications of the collection and use of non-potable water before beginning project design.
WE CREDIT 3
1 POINT

LEED CREDIT INTENT
To increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

LEED CREDIT REQUIREMENTS
Employ strategies that in aggregate use 30, 35 or 40% less water than the water use baseline calculated for the building (not including irrigation).

Calculations are based on occupant usage and must include only the following fixtures and fixture fittings:

- Water Closets
- Urinals
- Lavatory Faucets
- Showers
- Kitchen Sink Faucets
- Pre-rinse Spray Valves

Projects can earn an additional point for achieving a 45% reduction in water use.

UMA CREDIT DISCUSSION
The LEED prerequisite requires 20% reduction in water use. Achieving greater levels of water efficiency will take creativity on the part of the design team, as well as an integrated approach between architects, plumbing engineers, and others on the project team.

The use of waterless urinals may be considered by design teams as an effective strategy for reducing water use. A 2008 study for the Massachusetts EOEEA found that facility managers and custodial staff were overall very satisfied with waterless urinals.¹ This was especially true for new construction; retrofitting with waterless urinals can be difficult due to variations in pipe height and the slope of existing drain lines. The study does not recommend the use of waterless urinals in dormitories, due to potential misuse. In addition to potential water cost savings, waterless urinals do not require water supply pipes which can result in significant savings for the project. That said, the University has yet to implement waterless urinals on this campus, so both cultural change and maintenance training will be necessary.

The use of non-potable (i.e. graywater) systems is highly dependant on project scope and design. Project teams should fully understand the implications of using non-potable water systems for flush fixtures before beginning project design.

¹ Waterless Urinals Report and Evaluation, MA Executive Office of Energy and Environmental Affairs
ENERGY + ATMOSPHERE FINDINGS

• Total electricity:
  • FY11= 122,060,047 kwh
    • Central Heating Plant (CHP) generated: 51%
    • Purchased from Western Massachusetts Electric Company (WMECO): 49%
  • FY12= 123,802,566 kwh
    • CHP generated: 66%
    • Purchased from WMECO: 34%

• 90 campus buildings are currently being metered and data is recorded hourly:
  • 41 academic and administration buildings
  • 42 dormitories
  • 7 auxiliary buildings

• A limited number of campus buildings have been commissioned, and the University is planning to create an in-house commissioning team for the ongoing commissioning of all buildings on campus.

• The CHP has reduced the campus’ greenhouse gas emissions by approximately 75%. It generates 100% of the campus’ steam and between 60-70% of its electricity.
This category is considered to be one of the most important for the University. As a state institution, UMA has a responsibility to reduce both operating costs associated with utility use and greenhouse gas emissions. Constructing energy efficient buildings has economic value and is a high priority for the campus.

**ENERGY + ATMOSPHERE**

The UMA Central Heating Plant replaced a coal-burning facility dating back to 1918. It produces steam and electricity by burning natural gas and oil. As new buildings come on line and utility prices rise, it will be increasingly important to reduce energy use.

In addition, electrical consumption continues to rise due to cultural trends (technology in the classroom, digital media, electronics in student rooms, etc), on-campus population growth, and building expansion. Design teams should investigate all factors – process loads, user habits, HVAC type and configuration, exterior envelope characteristics, etc. – and their potential for increased efficiency.

Three of the Energy and Atmosphere credits – Optimize Energy Performance, Enhanced Commissioning, and Measurement + Verification – have the greatest impact on the energy consumption of new buildings, and can be especially powerful when considered in tandem. Teams are encouraged to design for high performance and enhanced operations using these credits as a starting point.
LEED CREDIT INTENT
To verify that the project’s energy-related systems are installed, calibrated and perform according to the owner’s project requirements, basis of design, and construction documents.

LEED CREDIT REQUIREMENTS
The following commissioning process activities must be completed by the team:

- Designate commissioning authority (CxA)
- Document owner’s project requirements (OPR)
- Develop basis of design (BOD)
- Incorporate commissioning requirements into construction documents
- Implement commissioning plan
- Verify installation and performance of the systems to be commissioned
- Complete a summary commissioning report

UMA CREDIT DISCUSSION
Commissioning of energy-related systems is the first step in ensuring that a building performs as designed. Design teams are expected to earn this prerequisite, and should note that Executive Order 484 requires the use of a third party commissioning agent (i.e. not an employee of the design firm.)
LEED CREDIT INTENT
To establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.

LEED CREDIT REQUIREMENTS
Demonstrate a 10% improvement (for new buildings) or a 5% improvement for major renovations of existing buildings, compared with the baseline building performance rating.

Baseline building performance should be calculated according to ASHRAE standard 90.1 2010.

Create a computer simulation model for the whole building project or follow prescriptive guidelines for energy improvements (depending on building size and type.)

UMA CREDIT DISCUSSION
Design teams are expected to meet the requirements of Executive Order 484, which mandates a 20% improvement in energy usage over MA Energy Code. Since the MA Energy Code is based on ASHRAE 90.1 2010, doing so will also meet the requirements of this LEED prerequisite.
The Montreal Protocol called for a complete phase out of CFC refrigerants by 1995, which makes satisfying this prerequisite standard procedure. The UMA Design Guidelines specify the use of R-134a or R-123 refrigerant, both of which are compliant with this prerequisite.

**LEED Credit Intent**
To reduce stratospheric ozone depletion.

**LEED Credit Requirements**
Do not use chlorofluorocarbon (CFC)-based refrigerants in new HVAC&R systems.
Complete a comprehensive CFC phase-out conversion when reusing base building HVAC equipment.

**UMA Credit Discussion**
The Montreal Protocol called for a complete phase out of CFC refrigerants by 1995, which makes satisfying this prerequisite standard procedure. The UMA Design Guidelines specify the use of R-134a or R-123 refrigerant, both of which are compliant with this prerequisite.
The University favors the Whole Building Simulation (i.e. “energy modeling”) path for a number of reasons. First, energy modeling has the potential for optimizing building design in a way that a prescriptive path may not. Second, as an academic institution, the ability to compare predicted performance to actual performance is valued. Third, more LEED points are available to projects using this path.

Meeting the requirements of Executive Order 484 - a 20% reduction in energy costs - will earn projects 5 points under EAc1. Design teams are encouraged to go beyond the 20% reduction, although specific targets will vary by building type and function. More important than a numerical objective is the process by which project teams integrate the design and energy modeling to ensure that buildings are as energy efficient as possible within the project scope and budget. Designers and energy modelers should maintain a continuous cycle of designing and modeling that begins in the pre-design stage and has iterations through the final construction documents.

All campus projects must consider the future flexibility of building programming. The University recognizes that this requirement may at times impede attainment of the maximum energy cost reduction. However, it will help ensure that buildings have the longest lifecycle possible, one of the fundamental considerations in sustainable building and design.
All Commonwealth agencies are required to meet the target of 15% of annual electric usage procured from renewable sources by 2012¹, and the University is aligned with this goal.² New projects are ideal candidates for renewables, the most viable options being photovoltaics and solar thermal. (There is not enough wind in the region to make wind power practical for the campus.) Design teams should consider integrating pilot projects featuring renewable technologies developed by faculty researchers. Building site and design should be assessed to ensure a best fit for the chosen technology. It is also expected that teams will incorporate strategies - such as daylighting - that reduce the overall energy load so that less (solar) energy generation is required. Consider alternatives to the standard applications of renewable technologies, for example, PV panels that also function as a shading system for windows or landscape. For roof-mounted installations, teams should coordinate closely with the roofing contractor to ensure guarantee of the roof warranty.

Creativity is encouraged when it comes to potential financial structures for the funding of renewable energy generation.

¹ Executive Order 484  ² Climate Action Plan  ³ Campus Solar Radiation Study
One of the critiques of LEED for New Construction is that many buildings which earn certification are actually no more energy efficient than conventional buildings of the same type.¹ This has to do with many factors, including inappropriate building design, failure of the LEED system to properly weight energy-related credits, and a lack of synergy between building design and construction and ongoing operations and maintenance.

The commissioning of a building’s energy systems is a crucial step towards ensuring that the building will perform as designed and provide energy savings as predicted. Under MA law, all new University projects must employ an independent, third party commissioning authority², which, per LEED, may include a qualified employee of the owner. The University holds the position that its own engineers and operations and maintenance staff should fully understand the energy systems of the campus in order to take advantage of potential cost savings. As a result, the training component of the commissioning process is considered to be of utmost importance. Design teams should work closely with the campus to appoint a commissioning authority for each project who is especially skilled at training and able to work in conjunction with one or more UMA employees during the commissioning process.

¹ USGBC ² Executive Order 484
Refrigerant choice is determined by a combination of factors. These include cost (both initial and operating), efficiency, anticipated phase-out, delivery schedule, and LEED credit compliance. The priority of each of these factors varies from project to project.

Currently, UMA specifies the common refrigerants, HCFC-123 and HFC-134a. While these refrigerants have very low Ozone Depletion Potentials and moderate Global Warming Potentials, project specific calculations will be necessary to determine credit compliance. Design teams should consider the use of refrigerants with even lower Ozone Depletion Potential and Global Warming Potential while performing a life cycle cost analysis for each option.
CHANCELLOR’S SUSTAINABILITY COMMITTEE
GREEN BUILDING SUBCOMMITTEE
UNIVERSITY OF MASSACHUSETTS AMHERST
FALL 2013

UMA CREDIT DISCUSSION
UMA CREDIT DISCUSSION
M+V is very important at UMA. Design teams should work closely with the University to ensure that each project’s M+V plan will support ongoing efforts to track and understand energy data, as well as enhance operations and maintenance. For most projects, Option D is recommended. Design teams should provide a baseline energy model (ASHRAE 90.1) as well as an as-built energy model. The University’s M+V team will calibrate the as-built energy model to reflect actual weather conditions, occupancy patterns, and updated load data.

Design teams should determine meter location with help from the M+V team. Specific meter locations will vary by project, but should include, at a minimum, individual electrical panels, large mechanical equipment (chillers, etc.), and variable frequency drives (VFDs). Domestic hot water, building water, steam for heat, and steam for hot water should be metered as well. When possible, motion sensors and swipe card access doors should be monitored and recorded through the Building Automation System to measure occupancy. In order to establish campus-wide energy use benchmarks, design teams are encouraged to sub-meter the building using zones defined by program function. All metered data should feed into Metasys, the campus-wide Building Automation System (BAS).

LEED CREDIT INTENT
To provide for the ongoing accountability of building energy consumption over time.

LEED CREDIT REQUIREMENTS
Develop and implement a measurement and verification plan that covers at least 1 year of occupancy.

Plan must include a process for corrective action.

M+V Plan must be consistent with either Option D or Option B of the IPMVP.

- Option B: Energy Conservation Measure (ECM)
  - Must be able to isolate the ECM
  - Rarely approved for LEED credit

- Option D: Whole Building Calibrated Simulation
  - Large/complicated buildings, integrated ECM’s
  - Use whole building analysis + monitoring
  - Calibrate energy simulation model to as-built energy use

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PROJECT ACHIEVEMENT RECORD
- UMass Amherst Police Station (1 point)
Measurement & Verification of building performance is a critical component of confirming that our buildings are performing as promised and that we are actually meeting our reduced energy consumption goals. Accurate confirmation of savings produced from energy conservation measures is crucial to the success of our building and renovation projects.

Benefits of Measurement & Verification include:

• Compliance with LEED and/or Energy Star requirements
• Verification that we are achieving our Energy Use and Green House Gas Emission Reduction Goals.
• The energy data and analysis obtained can be used in building management decisions.
• M&V provides feedback for future design of “Green Buildings” and for educational initiatives
• The process and metering implemented under M&V will provide feedback of facility performance over the life of the building. Poor energy performance of equipment is often an indication of the need for maintenance or replacement.
• Assurance of building energy efficiency by providing accurate reporting of savings resulting from the energy strategies/conservation measures implemented.
• Verification of energy savings and performance of mechanical, electrical, and other system change outs or renovations (i.e. “if we replace all the windows in a building, how much better is the building performing?”)

Implementation of M&V will help UMASS Amherst Continuously Commission its buildings.

Measurement & Verification Process and Costs

M&V consists of collaborative work between the Divisions of Facilities & Campus Services and an M&V agent, who may be the same entity as the Independent Commissioning Agent (must not be the Designer or the Contractor/ Construction Manager)

M&V will require calibrating the energy model to as-built conditions and/or adjusting equipment performance targets to include changes made during construction and installation, testing and calibration of the required building utility meters and sub-meters

Costs for the additional meters (and some level of load separation) to facilitate M&V can add $2 to $4 per square foot to the cost of a project. The costs of the independent M&V agent must also be included in the project budget.
The total cost of M&V can represent an average of 7% of the potential cost savings over the life of the project. (Walker, et al 1999).

Developing an energy model during the full cycle of a building is critical – from conceptual design to as-built model calibration. Energy modeling costs about 20 cents per square foot for high end modeling (as the buildings get larger than 120,000 square feet, this number might be 10-15 cents per square foot)

Measurement & Verification Building Performance Requirements are coming in LEED Version 4.0.
**GREEN POWER**

**EA CREDIT 6**  
2 POINT + 1 (**EXEMPLARY**)  

**LEED CREDIT INTENT**  
To encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

**LEED CREDIT REQUIREMENTS**  
Provide at least 35% of the building’s electricity from renewable sources based on quantity of energy consumed, not cost.

Project teams may choose to purchase Renewable Energy Credits that cover 70% of the energy consumed for one year.

An extra point can be earned if projects purchase 100% of their electricity from renewable sources.

**UMA CREDIT DISCUSSION**  
UMA’s electricity provider, Western Massachusetts Electric Company, does not provide Green Power, so earning this credit must be done through the purchase of Renewable Energy Credits (RECs). Though UMA is committed to carbon emissions reduction, the purchase of RECs is not a priority at this time. Though relatively simple, this credit requires additional costs without providing direct tangible benefits to the program of the building and therefore is not encouraged.

As a strategy for funding carbon reduction projects in an increasingly constricted budget environment, UMA’s ongoing approach is to generate revenue through the sale of RECs from on-campus renewable energy. The Central Heating Plant earns RECs due to its co-generation abilities and last year, UMA generated over $1 million from the sales of these RECs. These funds will be set aside and dedicated to future energy conservation and carbon reduction projects on campus.  

1 Climate Action Plan

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**Certified Renewable Energy**

Green-e.org
FINDINGS

• The University’s physical character has evolved over 150 years and the material palette reflects this fact.

• Exterior building materials include brick, concrete, stone, steel, slate and glass.

• 2/3 of the campus was constructed during the building boom of the 1960s and 1970s.

• Buildings on campus are expected to last for 50 years or more.
The selection of materials for campus buildings is influenced by many different stakeholders. In addition to environmental considerations, user safety and health, durability and maintenance, and cost are all factors. Overall, material selection will be project dependant, but teams are expected to balance the disparate needs of the University when selecting building materials.

Although the environmental impact of materials is a chief consideration, the campus has had experiences with poor material choices which illustrate the importance of using market-tested materials over the next “green” thing.

In addition, the University has spent millions of dollars over the years for abatement of various toxic materials from building sites, including asbestos and pcbs. Design teams are expected to consider the lifetime health risks and benefits of all materials used on new campus projects.

The University has a comprehensive recycling program, where materials are taken to the campus Waste Management Transfer Station and sorted and shipped to a large plant in the region. Design teams should incorporate means for recycling in all buildings, and consider using building design to educate and involve users in recycling efforts.
MATERIALS + RESOURCES

UMA CREDIT DISCUSSION
Recycling on campus is a high priority. The Office of Waste Management has created a comprehensive recycling program which has helped the University’s overall recycling rate reach 65%. Students, faculty and staff are encouraged to sort recyclable materials into the ubiquitous color-coded bins. These recycling efforts conserve 45,000 gallons of oil and 20,000 trees and help UMA avoid $275,000 annually in disposal charges.¹

All projects should contain areas for the collection and storage of materials to be recycled.² Design teams should also coordinate with the campus to determine whether the building needs an outdoor trash/recycling corral in addition to the interior area.

¹ Office of Waste Management  ² UMA Design Guidelines

STORAGE AND COLLECTION OF RECYCLABLES

MR PREREQUISITE 1

LEED CREDIT INTENT
To facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

LEED CREDIT REQUIREMENTS
Provide an easily-accessible dedicated area for the collection and storage of materials for recycling for the entire building.

Materials must include at a minimum:

- paper
- corrugated cardboard
- glass
- plastics
- metals

BUILT-IN RECYCLING STATIONS AT THE LIFE SCIENCES BUILDING

RECYCLING ROOM, NORTH D, NORTH RESIDENTIAL AREA
MR Credit 1.1
1-3 points (+1 Regional)

**LEED Credit Intent**
To extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

**LEED Credit Requirements**
Maintain the existing building structure:

- structural walls
- structural floor
- roof decking

And envelope:

- exterior skin and framing
- excluding window assemblies & non-structural roofing material

The minimum percentage building reuse for each point is:

- 55% 1 point
- 75% 2 points
- 95% 3 points

If the project includes an addition with square footage more than 2 times the square footage of the existing building, this credit is not applicable.

**UMA Credit Discussion**
This credit is a high priority for legacy structures, or buildings considered to have historical significance for the University.

The feasibility of this credit will vary greatly by project. For major renovations of existing building, the requirements may be easily achievable.

¹ Climate Action Plan
**MATERIALS + RESOURCES**

**UMA CREDIT DISCUSSION**
For the most part, major renovations are an opportunity to replace the existing materials with newer, more durable materials. As part of UMA’s commitment to sustainability, major renovations are only scheduled for buildings that are unable to support programmatic needs and/or pass building code. The existing non-structural elements in such buildings are rarely reusable. In a case where the existing materials are reusable, it is unlikely that the University would completely discontinue occupancy. Per LEED, such a project would not be considered a major renovation, nor eligible for certification under the New Construction and Major Renovation rating system.

In situations where existing walls are maintained after a major renovation, they tend to be structural walls and therefore not applicable to this credit.

**LEED CREDIT INTENT**
To extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

**LEED CREDIT REQUIREMENTS**
Use existing interior non-structural elements in at least 50% of the completed building, including additions.

- interior walls
- doors
- floor coverings
- ceiling systems

If the project includes an addition with square footage more than 2 times the square footage of the existing building, this credit is not applicable.

**LOW PRIORITY | DIFFICULT FEASIBILITY**

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**FAILING WOOD CURTAIN WALL, BARTLETT HALL**
UMA CREDIT DISCUSSION
Recycling is a high priority on campus. However, waste produced by construction activities is not sorted on campus, rather, it is the responsibility of the contractor to properly dispose of construction and demo waste.

It is the University’s position that, due to the location of the campus and the availability of local waste contractors who can recycle and track construction waste, a minimum target of 75% should be met by all project teams.

PROJECT ACHIEVEMENT RECORD

- George N Parks Minuteman Marching Band Building, (2 point)
- UMass Amherst Police Station (2 points)
MATERIALS REUSE

MR CREDIT 3
1-2 POINTS (+1 EXEMPLARY)

LEED CREDIT INTENT
To reuse building materials and products to reduce demand for virgin materials and reduce waste, thereby lessening impacts associated with the extraction and processing of virgin resources.

LEED CREDIT REQUIREMENTS
Use salvaged, refurbished or reused materials, the sum of which constitutes at least 5% or 10% based on cost of the total value of materials on the project.

- 5% 1 point
- 10% 2 points

Projects can earn an additional point for using salvaged, refurbished or reused materials the sum of which constitutes 15% of total materials value.

UMA CREDIT DISCUSSION
The University has standardized building materials in order to simplify alterations, maintenance, and repair.¹ Although re-purposing salvaged materials can save on cost of new materials and has significant environmental benefits including reducing landfill space and the effects of harvesting and manufacturing, UMA identifies this credit as a low priority.

On some small scale projects, it may be possible to reuse building materials. Design teams should track reuse and apply for the LEED credit if the requirements are met.

¹ UMA Design Guidelines

RE-PURPOSED GRANITE USED FOR THE SOUTHWEST CONCOURSE RENOVATION
RECYCLED CONTENT

MR CREDIT 4
1-2 POINTS (+1 EXEMPLARY)

LEED CREDIT INTENT
To increase demand for building products that incorporate recycled content materials, thereby reducing the impacts resulting from extraction and processing of virgin materials.

LEED CREDIT REQUIREMENTS
Use materials with a total recycled content that constitutes at least 10% or 20%, based on cost, of the total value of the materials in the project.

- 10% 1 point
- 20% 2 points

Include only materials permanently installed in the project. Mechanical, electrical and plumbing components, and specialty items such as elevators cannot be included in this calculation.

Projects can earn an additional point by using recycled materials which total 30% of the materials budget.

UMA CREDIT DISCUSSION
For most building projects, there are many ways to incorporate the use of recycled materials into the design. Often, standard building materials contain recycled materials. Structural steel beams and columns produced in the US, for example, have an average recycled content rate of 93%.¹ Since this LEED credit is based on the overall project materials budget, design teams should assess the potential for recycled content of “big ticket items” early on. In many cases, projects may earn this credit simply by tracking recycled materials, so it is important to require the submittal of recycled materials in the specifications.

While creativity in design is encouraged, building materials should be chosen for their function and durability above all else.

¹ American Institute of Steel Construction

PROJECT ACHIEVEMENT RECORD
- George N Parks Minuteman Marching Band Building, (2 point)
- UMass Amherst Police Station (2 points)
**LEED CREDIT INTENT**
To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

**LEED CREDIT REQUIREMENTS**
Use building materials that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site.

- 10% 1 Point
- 20% 2 Points

Percent is calculated using material costs. Assemblies using multiple materials can be calculated separately.

Projects can earn an additional point by using regional materials which total 30% of the materials budget.

**PROJECT ACHIEVEMENT RECORD**
- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (2 points)

**UMA CREDIT DISCUSSION**
Although achievement of this credit will be dependent on what type of materials are used on the project, it should be a goal for most design teams. Wood, concrete, stone, and brick are all readily available within the region. Sourcing metals that are extracted within the radius may be more difficult, but many steel manufacturers provide detailed information about how their products comply with this credit.

Design teams should assess their materials budget early on to determine the “big ticket” items (concrete, steel, wood, brick, landscape materials, carpet), in order to facilitate earning this credit. In some cases, projects may earn this credit simply by tracking regional materials, so it is important to require the submittal of regional materials in the specifications.
Rapidly Renewable Materials

MR Credit 6
1 point (+1 Exemplary)

LEED Credit Intent
To reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials.

LEED Credit Requirements
Use rapidly renewable building materials and products for 2.5% of the total value of all building materials and products used on the project, based on cost.

Rapidly renewable materials and products are made from plants that are typically harvested within a 10-year or shorter cycle.

Projects can earn an Exemplary point by achieving a rapidly renewable materials content of 5% or more.

 Uma Credit Discussion
At UMA, the most important characteristic of any building material is durability. All of the University’s buildings see a high occupant usage, and we expect buildings to function for 50 years or more.¹ Therefore, it is crucial that design teams understand the correct use and installation of all materials that they include in a project.

The feasibility of this credit is highly dependant on the project, since materials will differ depending on the function and look of a building. Highly visible materials such as bamboo or cork may be appropriate, but project teams should also investigate product assemblies which may also have rapidly renewable content. For example, door cores (agrifiber), millwork (bamboo or agrifiber), monolithic resinous flooring (castor oil) and spray foam insulation (soy or castor oil) are all products that contain rapidly renewable content. Again, project teams should ascertain the durability and functionality of all materials before specifying their use.

¹ UMA Design Guidelines
CERTIFIED WOOD

MR CREDIT 7
1 POINT (+1 EXEMPLARY)

LEED CREDIT INTENT
To encourage environmentally responsible forest management.

LEED CREDIT REQUIREMENTS
Use a minimum of 50% of wood-based materials that are certified in accordance with the Forest Stewardship Council’s principles and criteria.

- structural framing
- dimensional framing
- wood flooring
- sub-flooring
- wood doors and casework
- wood finishes

Wood purchased for temporary use (construction) on the project may be included at the discretion of the team.

An additional point can be earned if 95% or more of the project’s new wood is FSC certified. Attention to scheduling is necessary since FSC materials may not be readily available from local suppliers.

The Massachusetts Woodland Cooperative (MWC) was founded with help from members of the UMA Department of Environmental Conservation. MWC promotes sustainable, local forestry and has earned Forest Stewardship Council (FSC) land management certification.

PROJECT ACHIEVEMENT RECORD
- UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
UMA is committed to sustainable forestry and building practices should reflect that commitment. The use of FSC certified wood throughout projects is a high priority. Research in the Department of Environmental Conservation is closely linked with local sustainable forestry efforts. This credit does not establish a minimum quantity of wood, and most UMA projects use very little wood. Therefore, the use of 50% FSC certified wood should be specified early in the design process.

Materials + Resources
FINDINGS

- Approximately 85% of the buildings on campus have operable windows to allow for natural ventilation.

- Smoking is prohibited on campus within 25 feet of all building entrances.

- Low VOC paints, sealants and coatings have been part of the University’s design guidelines since 2004.
UMA places a high priority on the quality of indoor environments. Ventilation, lighting, temperature, and humidity all affect the overall comfort of building occupants. Although it is difficult to quantify, the performance of students, researchers, and staff depends in part on their level of comfort.

Indoor Environmental Quality

However, and especially in this climate, indoor environmental quality often comes at the expense of energy efficiency, with air exchanges being the primary measurement of air quality. Design teams are encouraged to explore alternate means of achieving good indoor air quality, including passive solutions, innovative heat exchange, and careful attention to the quality of materials used inside the building envelope.
LEED Credit Intent
To establish minimum indoor air quality (IAQ) performance.

LEED Credit Requirements

Mechanical ventilation systems must be designed using the ventilation rate procedure or the applicable local code, whichever is more stringent.

UMA Credit Discussion
Current MA building code is based on the International Building Code 2009, which has minimum ventilation rates identical to ASHRAE 62.1. Therefore, teams will meet the requirements of this prerequisite by meeting state code.
LEED CREDIT INTENT
To prevent exposure of building occupants and indoor surfaces to environmental tobacco smoke (ETS).

LEED CREDIT REQUIREMENTS
Prohibit smoking in the building.
Prohibit on-property smoking within 25 feet of entries, outdoor air intakes, and operable windows.
Provide signage to allow smoking in designated areas.

UMA CREDIT DISCUSSION
Smoking has been prohibited in all buildings on campus (with the exception of a few designated smoking areas) since 1993. On July 1, 2013 the UMASS Amherst campus became tobacco free.
All new buildings shall be tobacco-free (including during construction) and provide signage enforcing the requirement.
The UMass Amherst Policy for a Tobacco-Free Campus
The University of Massachusetts Amherst prohibits tobacco use starting July 1, 2013. For the purpose of this policy, “tobacco” refers to any and all tobacco products, whether inhaled or ingested, as well as electronic cigarettes. The use of tobacco products is prohibited everywhere on campus, inside buildings and throughout the grounds. This policy applies to everyone and anyone on campus, including students, staff, faculty, contractors, and visitors.

1. The use of tobacco is prohibited in all buildings and vehicles owned or leased by UMASS Amherst, regardless of location.
2. The use of tobacco is also prohibited on all University grounds and in any outdoor area controlled by the University. This includes all University land, parking lots and parking ramps, athletic fields, tennis courts, and recreational areas.
3. The use of tobacco is prohibited inside any vehicle located on University grounds.
4. When any person enters the grounds of the University, any smoking material shall be extinguished and disposed of in an appropriate receptacle at the perimeter of the grounds of the University.

Exceptions for research purposes require the approval of the Provost or designee. Requests for any other exceptions as may be required by law should be submitted to the Vice Chancellor for Administration and Finance.
**OUTDOOR AIR DELIVERY MONITORING**

**IEQ CREDIT 1**

1 POINT

**LEED CREDIT INTENT**

To provide capacity for ventilation system monitoring.

**LEED CREDIT REQUIREMENTS**

Install permanent monitoring systems to ensure that ventilation systems maintain design minimum requirements.

Configure all monitoring equipment to generate an alarm when the airflow values or carbon dioxide (CO2) levels vary by 10% or more from the design value.

- Monitor CO2 concentrations within densely occupied spaces.
- Provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow

**PROJECT ACHIEVEMENT RECORD**

- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (1 point)

**UMA CREDIT DISCUSSION**

At UMA, good ventilation is important for a number of reasons, including the maintenance of an optimal learning environment. New projects are expected to monitor both outdoor airflow and CO2 concentrations using the campus Building Automation System (BAS).

Teams should explore options which can optimize both indoor air quality and energy savings, such as demand-controlled ventilation systems and economizers.
It is the University's position that the minimum ventilation rates of ASHRAE 62.1 (as mandated by the MA Building Code) are sufficient and will fully support a program of excellent indoor air quality. Design teams are not encouraged to exceed those rates, as the increase in energy costs will outweigh potential benefits.

LEED CREDIT INTENT
To provide additional outdoor air ventilation to improve indoor air quality and promote occupant comfort, well-being and productivity.

LEED CREDIT REQUIREMENTS
Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2007 as determined by IEQ p1.

PROJECT ACHIEVEMENT RECORD
• George N Parks Minuteman Marching Band Building, (1 point)

UMA CREDIT DISCUSSION
It is the University’s position that the minimum ventilation rates of ASHRAE 62.1 (as mandated by the MA Building Code) are sufficient and will fully support a program of excellent indoor air quality. Design teams are not encouraged to exceed those rates, as the increase in energy costs will outweigh potential benefits.
UMA CREDIT DISCUSSION

UMA is dedicated to employee health and safety, including that of its subcontracted construction workers. In addition, the University is committed to good indoor air quality throughout the life of its buildings, and construction activities can play a large part in achieving this goal.

Earning this credit should not add cost to the project if air handling units are not in use during construction. In situations where air handling units are used, the cost of filters and replacement filters will increase the project cost.

UMA expects contractors to maintain a clean, safe work site. Design teams must coordinate with construction staff and subcontractors to ensure that everyone complies with requirements, and to ensure the proper documentation of IAQ measures.
CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN: BEFORE OCCUPANCY

IEQ CREDIT 3.2
1 POINT

LEED CREDIT INTENT
To reduce indoor air quality problems resulting from construction or renovation.

LEED CREDIT REQUIREMENTS
Develop and implement an IAQ management plan and implement it after all finishes have been installed and the building has been completely cleaned before occupancy.

• Option 1: Flush-Out
  • 14,000 f³ outdoor air per f² with an internal temp of 60°F, 60% humidity.
• Option 2: Air Testing
  • After construction end and prior to occupancy, conduct baseline IAQ testing.
  • Conduct an additional flush-out where maximum concentration limits are exceeded and retest the area.

LEED Air Sampling Criteria:
- Formaldehyde < 50 ppb
- Carbon Monoxide < 9 ppm
- Particulates < 50 ug/M³
- Total VOC < 500 ug/M³
- 4-PCH < 6.5 ug/M³

PROJECT ACHIEVEMENT RECORD
• George N Parks Minuteman Marching Band Building, (1 point)
• UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
UMA is committed to maintaining healthy, non-toxic, indoor environments for students, faculty and staff. This credit, combined with IEQc3.1, helps verify that a new building is beginning its life-cycle with good indoor air quality.

Attaining this credit using the flush-out option may be difficult due to the tight construction and occupancy schedules of most campus projects.

More important than credit attainment is the adherence of construction teams to a written IAQ plan. Design teams should begin considering indoor air quality in the schematic design phase and incorporate the use of low-VOC paints and sealants, non-toxic materials and architectural finishes, and good work site practices throughout.
LOW-EMITTING MATERIALS – ADHESIVES AND SEALANTS

IEQ CREDIT 4.1
1 POINT

LEED CREDIT INTENT
To reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants.

LEED CREDIT REQUIREMENTS
Adhesives, Sealants and Sealant Primers must comply with South Coast Air Quality Management District (SCAQMD) Rule #1168.

Aerosol Adhesives must comply with Green Seal Standard for Commercial Adhesives GS – 36.

VOC Budget Methodology: If no appropriate LEED compliant product exists, teams may show overall VOC compliance using a VOC budget method:

\[
\text{(Volume compliant products x LEED VOC limits )} - \text{(Volume compliant products x Actual VOC levels)}
\]

Available VOC budget

PROJECT ACHIEVEMENT RECORD

• George N Parks Minuteman Marching Band Building, (1 point)
• UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
Volatile Organic Compounds react with sunlight to form ground-level ozone that can have significant detrimental effects on human health. VOCs are common in many building materials, but alternatives with low VOCs are widely available at little or no additional cost.

Functionality should be considered above all else. Design teams are expected to achieve this credit when market-tested products are available. Teams should consider using the VOC budget method to show compliance in the event that one or more products do not meet University standards for durability.
Volatile Organic Compounds react with sunlight to form ground-level ozone that can have significant detrimental effects on human health. VOCs are common in many building materials, but alternatives with low VOCs are widely available at little or no additional cost.

Design teams are expected to specify the use of low VOC paints and coatings that are LEED compliant. Paint products should be low odor, low or zero VOC coating with anti-microbial properties. Project teams should coordinate with contractors to collect documentation for LEED submittals.

1UMA Design Guidelines
INDOOR ENVIRONMENTAL QUALITY

LOW-EMITTING MATERIALS – FLOORING SYSTEMS

IEQ CREDIT 4.3

1 POINT

LEED CREDIT INTENT
To reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants.

LEED CREDIT REQUIREMENTS
All carpet and carpet cushion installed in the building interior must meet the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.

All hard surface flooring must be certified as compliant with the FloorScore standard by an independent third party.

Concrete, wood, bamboo and cork floor finishes such as sealer, stain and finish must meet the requirements of South Coast Air Quality Management District (SCAQUMD) Rule 1113.

Tile setting adhesives and grout must meet SCAQMD Rule 1168.

PROJECT ACHIEVEMENT RECORD

• George N Parks Minuteman Marching Band Building, (1 point)
• UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
Volatile Organic Compounds react with sunlight to form ground-level ozone that can have significant detrimental effects on human health. VOCs are common in many building materials, but alternatives with low VOCs are widely available at little or no additional cost.

According to the UMA Design Guidelines, “carpet shall have low indoor air pollution emissions, low overall VOC emissions, and low concentrations of toxic and irritating components.” Design teams are expected to specify the installation of low VOC flooring systems that are LEED compliant, however, durability and maintenance are the primary factors when selecting flooring systems. Materials should be chosen which have been proven effective for similar applications.
LOW-EMITTING MATERIALS — COMPOSITE WOOD AND AGRIFIBER PRODUCTS

IEQ CREDIT 4.4
1 POINT

LEED CREDIT INTENT
To reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants.

LEED CREDIT REQUIREMENTS
Composite wood and agrifiber products used on the interior of the building must contain no added urea-formaldehyde resins.

Composite wood and agrifiber products include:

- Particleboard
- Medium Density Fiberboard
- Plywood
- Wheatboard
- Strawboard
- Panel Substrates
- Door Cores

PROJECT ACHIEVEMENT RECORD

- George N Parks Minuteman Marching Band Building, (1 point)

UMA CREDIT DISCUSSION
Formaldehyde is a naturally occurring VOC found in small amounts in animals and plants, but is carcinogenic and an irritant to most people when present in high concentrations.

Design teams are expected to specify the installation of wood and agrifiber products without urea-formaldehyde, and coordinate with contractors to collect documentation for LEED submittals.
INDOOR CHEMICAL AND POLLUTANT SOURCE CONTROL

IEQ CREDIT 5
1 POINT

LEED CREDIT INTENT
To minimize building occupant exposure to potentially hazardous particulates and chemical pollutants.

LEED CREDIT REQUIREMENTS
Employ permanent entryway systems at least 10 feet long in the primary direction of travel to capture dirt and particulates entering the building.

Acceptable entryway systems include grates, grills, and slotted systems. Roll-out mats are acceptable only when maintained on a weekly basis by a contracted service organization.

Sufficiently exhaust each space where hazardous gases or chemicals may be present or used:

• Garages
• Laboratories
• Prep rooms
• Art rooms
• Shops
• Copying and printing rooms

Install new air filtration media in regularly occupied areas prior to occupancy.

UMA CREDIT DISCUSSION
At UMA, it is important that buildings support their janitorial staff in maintaining a clean and non-toxic environment. Because of the frequency with which students and faculty move through our buildings, and the prevalence of snow, sand, salt, dirt, and water, entryway systems are especially important for UMA projects.

Design teams are encouraged to incorporate the requirements of this credit early in the design process. Depending on the building type, some or all of the requirements will be applicable. Design teams should work closely to coordinate HVAC and room layout to ensure superior air quality.
IEQ CREDIT 6.1
1 POINT

LEED CREDIT INTENT
To provide a high level of lighting system control by individual occupants or groups in multi-occupant spaces and promote their productivity, comfort and well-being.

LEED CREDIT REQUIREMENTS
Provide individual lighting controls for 90% of the building occupants.

Provide lighting system controls for all shared multi-occupant spaces to enable adjustments that meet group needs and preferences.

PROJECT ACHIEVEMENT RECORD
- George N Parks Minuteman Marching Band Buildinga, (1 point)
- UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
Most buildings on campus are used by a variety of users and groups for a variety of functions. Lighting that is flexible and can respond to the different needs of occupants is important for creating the ideal learning environment.

Achieving this credit is project dependant, but when sought, individual and group lighting controls should be paired with occupancy sensors to ensure optimal energy use. Project teams are also encouraged to incorporate dimmers and daylighting controls into the lighting design, and to work closely with the University in specifying control systems that have proven long-term viability and are easily maintained.
**IEQ Credit 6.2**

1 POINT

**LEED Credit Intent**

To provide a high level of thermal system control by individual occupants or groups in multi-occupant spaces and promote their productivity, comfort and well-being.

**LEED Credit Requirements**

Provide individual comfort controls for 50% of the building occupants.

Operable windows may be used in lieu of controls for occupants located 20 feet inside and 10 feet to either side of the operable part of a window.

Provide comfort system controls for all shared multi-occupant spaces to enable adjustments that meet group needs and preferences.

**Project Achievement Record**

- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (1 point)

**UMA Credit Discussion**

The feasibility of this credit depends on the building type and design. Dormitories, individual offices, and meeting rooms are all excellent candidates for individual thermal comfort controls. Operable windows are appropriate for most campus buildings and can help meet the requirements of this credit.

User cooperation is necessary for continued successful operation. Design teams are encouraged to work closely with the University in specifying control systems that have proven long-term viability and are easily maintained.
LEED CREDIT INTENT
To provide a comfortable thermal environment that promotes occupant productivity and well being.

LEED CREDIT REQUIREMENTS
Design HVAC systems and building envelope to meet the requirements of ASHRAE Standard 55-2013, Thermal Environmental Conditions for Human Occupancy.

PROJECT ACHIEVEMENT RECORD
- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (1 point)

UMA CREDIT DISCUSSION
The University expects all design teams to meet these credit requirements, except in cases where the optimal design for temperature and humidity fall outside of the range of ASHRAE 55 (greenhouses, for example).

UMA is making a concerted effort to close the loop between design/construction and operations and maintenance. For this reason, the transfer of O&M manuals is a particularly important aspect of this credit.
Providing a feedback loop between building occupants and building operations staff is crucial for creating comfortable learning and living environments. Project teams should coordinate with UMA staff to develop a thermal comfort survey implementation plan.

In addition, teams should design systems as part of the Building Automation System (BAS), so that ongoing thermal comfort data can be studied in conjunction with energy use data.

**LEED CREDIT REQUIREMENTS**

- Provide a permanent monitoring system to ensure that building performance meets the desired comfort criteria as determined by IEQ Credit 7.1: Thermal Comfort—Design.
- Conduct a thermal comfort survey of building occupants within 6 to 18 months after occupancy.
  - Anonymous responses about thermal comfort in the buildings
  - Assessment of overall thermal performance
  - Identification of thermal comfort problems
- Develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort.

**PROJECT ACHIEVEMENT RECORD**

- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (1 point)
UMA CREDIT DISCUSSION
Whether or not to pursue this credit will depend on the building design. Fenestration should be balanced with energy use (heating/cooling) and space function. Architectural strategies including solar shading, light shelves, and building orientation should be explored to maximize the useful daylight while minimizing unwanted solar gain and glare. Effective implementation of these techniques should produce an indoor environment that improves occupant productivity and comfort.

Although not required by this credit, design teams are expected to include automatic dimming controls for electric lighting to take advantage of daylighting and energy cost savings.
INDOOR ENVIRONMENTAL QUALITY

UMA CREDIT DISCUSSION
Direct line of sight to the outdoors allows valuable connections between the academic and social life inside buildings and the vibrant pedestrian and environmental life outside, and increases occupant productivity and well being. Our location on the Western slope of the Connecticut River Valley offers unique opportunities for scenic views that include campus buildings in the foreground, farms in the middle ground, and the Berkshire mountains in the background.

While most programmed areas on campus would benefit from views to the outdoors, some spaces, like lecture halls and laboratories, may not. Additionally, building footprints that minimize the perimeter-to-area ratio will make this credit difficult to achieve. Design teams should consider views, programmatic needs, and building flexibility when placing windows and walls.

LEED CREDIT INTENT
To provide the building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

LEED CREDIT REQUIREMENTS
Achieve a direct line of sight to the outdoor environment via vision glazing between 30 inches and 90 inches above the finish floor for building occupants in 90% of all regularly occupied areas.

An exemplary point may be earned by meeting 2 of the following 4 measures:

• 90% have multiple views at least 90° apart
• 90% have views of vegetation, human activity, or objects at least 70’ away from exterior of glazing
• 90% have views located within the distance of 3x the head height of the vision glazing
• 90% have access to views with a view factor of 3 or greater.

LEQ CREDIT 8.2
1 POINT (+1 EXEMPLARY)

LOW PRIORITY | MODERATE FEASIBILITY

NORTHEAST RESIDENTIAL AREA

DAYLIGHT AND VIEWS - VIEWS
REGIONAL PRIORITY FINDINGS

• The University resides in the Pioneer Valley, a region made up of Franklin, Hampshire, and Hampden counties.

• Approximately 15,000 year ago, the pre-glacial Lake Hitchcock was formed by sediment damming the Connecticut River Valley near Middletown, CT. At its largest, this lake stretched 200 miles from Rocky Hill, CT to St. Johnsbury, VT.

• Accumulation of the fine sediments of Lake Hitchcock account for the excellent rich soils of the Pioneer Valley, which has been called the Breadbasket of New England. The rich soil was an influential factor in the sighting of Massachusetts Agricultural College, the institution that later became the University of Massachusetts.
In writing these guidelines, UMA has essentially created our own Regional Priority credits. However, the six credits on the following page have been determined by the USGBC to have additional importance specific to this region.

Design teams should refer back to the credit page to understand the priority and feasibility established by the campus for each credit.
**REGIONAL PRIORITY CREDITS**

The six credits listed here have been designated regional priority credits by the USGBC for Amherst, MA. Projects will automatically earn an additional point (up to a maximum of 4 points) for achieving the basic requirements of any of these credits. Teams should refer to the credit page within the guidelines for UMAspecific information.

1–4 Points can be earned under this category.

**Intent**

To provide an incentive for the achievement of credits that address geographically specific environmental priorities.

**Requirements**

Earn 1 of the 6 Regional Priority Credits (credits identified by the USGBC Regional Councils and Chapters as having additional regional environmental importance). A database of Regional Priority Credits and their geographic applicability is available on the USGBC Web site.

One point is awarded for each Regional Priority credit achieved. No more than 4 credits identified as Regional Priority credits may be earned. USGBC has prioritized credits for projects located in the U.S., Puerto Rico, the U.S. Virgin Islands, and Guam. All other international projects should check the database for eligible Regional Priority credits.

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**BROWNFIELD REDEVELOPMENT**

**SS Credit 3**

**Medium Priority | Moderate Feasibility**

**Intent:**

To rehabilitate damaged sites where development is complicated by environmental contamination and to reduce pressure on undeveloped land.

**OPTION 1:**

Develop on a site documented as contaminated by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local voluntary cleanup program.

OR

**OPTION 2:**

Develop on a site defined as a brownfield by a local, state, tribal or national government agency, whichever is most stringent. Projects where asbestos is found and remediated may also earn this credit. Testing should be done in accordance with EPA Reg 40CFR part 763, when applicable.
STORMWATER DESIGN - QUANTITY
SS Credit 6.1

HIGH PRIORITY | MODERATE FEASIBILITY

Intent:

To limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.

Requirements

Option 1. Design storms

Case 1. Sites with existing imperviousness 50% or less

Path 1:
Implement a stormwater management plan that prevents the postdevelopment peak discharge rate and quantity from exceeding the predevelopment peak discharge rate and quantity for the 1- and 2-year 24-hour design storms.

OR

Path 2:
Implement a stormwater management plan that protects receiving stream channels from excessive erosion. The stormwater management plan must include stream channel protection and quantity control strategies.

Case 2. Sites with existing imperviousness greater than 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the 2-year 24-hour design storm.

OR

Option 2. Percentile rainfall events

Case 1. Non-zero lot line projects

In a manner best replicating natural site hydrology processes, manage onsite the runoff from the developed site for the 95th percentile of regional or local rainfall events using Low Impact Development (LID) and green infrastructure.

Use daily rainfall data and the methodology in the United States Environmental Protection Agency’s Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act to determine the 95th percentile amount.

OR

CASE 2: zero lot line projects

For zero lot line projects located in urban areas with a minimum density of 1.5 FAR (13,800 square meters per hectare net), in a manner best replicating natural site hydrology processes, manage onsite the runoff from the developed site for the 85th percentile of regional or local rainfall events using LID and green infrastructure.
REGIONAL PRIORITY CREDITS

HEAT ISLAND - NON-ROOF

SS Credit 7.1

Medium Priority | Moderate Feasibility

Intent
To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.

Requirements

Option 1
Use any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots):

• Provide shade from the existing tree canopy or within 5 years of landscape installation. Landscaping (trees) must be in place at the time of occupancy.
• Provide shade from structures covered by solar panels that produce energy used to offset some nonrenewable resource use.
• Provide shade from architectural devices or structures that have a solar reflectance index (SRI) of at least 29.
• Use hardscape materials with an SRI of at least 29.
• Use an open-grid pavement system (at least 50% pervious).

OR

Option 2
Place a minimum of 50% of parking spaces under cover. Any roof used to shade or cover parking must have an SRI of at least 29, be a vegetated green roof or be covered by solar panels that produce energy used to offset some nonrenewable resource use.

INNOVATIVE WASTEWATER TECHNOLOGIES

WE Credit 2

Medium Priority | Difficult Feasibility

Intent
To reduce wastewater generation and potable water demand while increasing the local aquifer recharge.

Requirements

Option 1
Reduce potable water use for building sewage conveyance by 50% through the use of water-conserving fixtures (e.g., water closets, urinals) or nonpotable water (e.g., captured rainwater, recycled graywater, on-site or municipally treated wastewater).

OR

Option 2
Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.
ON-SITE RENEWABLE ENERGY

EA Credit 2

Intent

To encourage and recognize increasing levels of on-site renewable energy self-supply to reduce environmental and economic impacts associated with fossil fuel energy use.

Requirements

Use on-site renewable energy systems to offset building energy costs. Calculate project performance by expressing the energy produced by the renewable systems as a percentage of the building’s annual energy cost and use the table below to determine the number of points achieved.

Use the building annual energy cost calculated in EA Credit 1: Optimize Energy Performance or the U.S. Department of Energy’s Commercial Buildings Energy Consumption Survey database to determine the estimated electricity use.

The minimum renewable energy percentage for each point threshold is as follows:

<table>
<thead>
<tr>
<th>Percentage Renewable Energy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>1</td>
</tr>
<tr>
<td>3%</td>
<td>2</td>
</tr>
<tr>
<td>5%</td>
<td>3</td>
</tr>
<tr>
<td>7%</td>
<td>4</td>
</tr>
<tr>
<td>9%</td>
<td>5</td>
</tr>
<tr>
<td>11%</td>
<td>6</td>
</tr>
<tr>
<td>13%</td>
<td>7</td>
</tr>
</tbody>
</table>

BUILDING REUSE - WALLS, FLOOR, ROOF

MR Credit 1.1

Intent

To extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

Requirements

Maintain the existing building structure (including structural floor and roof decking) and envelope (the exterior skin and framing, excluding window assemblies and nonstructural roofing material). Hazardous materials that are remediated as a part of the project must be excluded from the calculation of the percentage maintained.

The minimum percentage building reuse for each point threshold is as follows:

<table>
<thead>
<tr>
<th>Building Reuse</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>55%</td>
<td>1</td>
</tr>
<tr>
<td>75%</td>
<td>2</td>
</tr>
<tr>
<td>95%</td>
<td>3</td>
</tr>
</tbody>
</table>
Innovation in Design Findings

- A vibrant Eco-Rep program with hundreds of students across campus is dramatically changing the awareness of sustainability initiatives.

- Researchers at the University’s Wind Energy Center study blade element momentum theory (BEM), potential flow analysis, and advanced turbulence modeling.

- Several permaculture gardens have been created adjacent to Dining commons. Its annual and perennial gardens will supply food directly to the University’s dining services.
Innovation in Design credits can come from a range of sources, including the LEED Pilot Credit Library, exemplary achievement of existing credits, and borrowed credits from other LEED rating systems. Design teams can also create their own credits for this category, an approach which UMA encourages.

On the following pages, the University has outlined some of the credits which are of particular interest, or which dovetail especially well with campus priorities and policy.

Most importantly, we want to challenge design teams to challenge us with solutions for improving the environmental impact, user experience, and building performance.
Over the course of writing these guidelines, certain sustainable design concepts have emerged again and again as items which are especially important to the University. Design teams are expected to carefully consider the following as they define the project’s green building goals and strategy for innovation credit attainment:

- Engage users to challenge and expand the limits of the human comfort zone.
- Share project data with the campus for research and education.
- Generate opportunities for future education about sustainable living and working.

The LEED rating system breaks the Innovation in Design Category into five distinct sections:

1. LEED AP Participation Credit (1 point possible)
2. Exemplary Credits (1-3 points possible)
3. Pilot Library Credits (1 point possible)
4. Created Innovation Credits (1-5 points possible)
5. Borrowed Innovation Credits (1-5 points possible)

Teams may earn a combination of credits from the above innovation categories; the total allowed is five points plus one for the LEED AP credit, or six total.

Because Innovation credits are especially dependant on project design, the University has not prioritized them in the same way as the rest of the LEED system. However, of particular importance are those credits which foster integrative design, whole systems thinking, and educational advancement. To that end, design teams are encouraged to pay particular attention to the innovative credits in the following pages which are marked with this icon:

In addition, design teams should be familiar with the other LEED rating systems (LEED for Existing Buildings, LEED for Schools, LEED for Neighborhood Development, LEED for Health Care) and consider incorporating credits from those systems into new construction for Innovation in Design points.

Above all else, design teams are asked to challenge the University by presenting new and innovative possibilities for sustainable design on campus.

**Project Achievement Record**

- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (3 point)
UMA CREDIT DISCUSSION
While incorporating a LEED AP in the design process has become industry standard and is common practice for new construction at UMA, LEED AP credentials are not a necessary part of a team committed to sustainable design.

PROJECT ACHIEVEMENT RECORD
- George N Parks Minuteman Marching Band Building, (1 point)
- UMass Amherst Police Station (1 point)

LEED CREDIT INTENT
To support and encourage the design integration required by LEED to streamline the application and certification process.

LEED CREDIT REQUIREMENTS
At least 1 principal participant of the project team shall be a LEED Accredited Professional (AP).

The USGBC awards one point if the active members of the project team include a LEED Accredited Professional.

LEED AP ACCREDITED PROFESSIONAL

[Certificate image]
EXEMPLARY CREDITS

The eight credits below have been designated high priority by UMA and can earn additional “exemplary performance” points if the following requirements are met.

SS 4.1: ALTERNATIVE TRANSPORTATION – PUBLIC TRANSPORTATION ACCESS
EXEMPLARY REQUIREMENTS
Locate project within ¼ mile of at least 2 stops for 4 or more bus lines and demonstrate frequency of service of at least 200 rides per day.

UMA CREDIT DISCUSSION
Depending on the project site, this credit may be readily attainable. Project teams should refer to the LEED GIS portal to determine whether project sites will meet these requirements.

SS 5.2: MAXIMIZE OPEN SPACE
EXEMPLARY REQUIREMENTS
Provide vegetated open space adjacent to the building that is double in area to the building footprint.

UMA DISCUSSION
This credit is dependent on the LEED Project boundary. Decisions about open space use should be made in close conversation with Campus Planners.

SS 6.2: STORMWATER QUALITY CONTROL
EXEMPLARY REQUIREMENTS
Project teams may earn an exemplary performance point by documenting a comprehensive approach to capture and treat stormwater and demonstrate performance above and beyond the credit requirements.

UMA DISCUSSION
Stormwater treatment continues to be an issue on campus and teams are encouraged to explore potential strategies for going beyond MassDEP regulations and basic LEED credit requirements.

MR 2: CONSTRUCTION WASTE MANAGEMENT
EXEMPLARY REQUIREMENTS
Recycle and/or salvage at least 95% of construction and demolition waste.

UMA DISCUSSION
Earning this additional point will depend largely on the type of project. Reaching the 95% threshold for recycled construction and demolition waste is difficult, and will take concerted effort. Project teams are encouraged to obtain references and examples of past projects from waste contractors if pursuing this.
MR 7: CERTIFIED WOOD

EXEMPLARY REQUIREMENTS
95% of all wood-based materials must be certified by the FSC.

UMA DISCUSSION
For projects designed with very little wood, this exemplary point may be readily attainable.

EA 1: OPTIMIZE ENERGY PERFORMANCE

EXEMPLARY REQUIREMENTS
Using the whole building energy simulation option, show an energy cost savings of 50% over baseline for new construction (46% for major renovations).

UMA DISCUSSION
Depending on the building type, this exemplary point may be attainable. Project teams are encouraged to employ a truly integrative design process in order to reach the highest percentage threshold possible.

EA 2: ON-SITE RENEWABLE ENERGY

EXEMPLARY REQUIREMENTS
Generate 15% of the total building energy needed using renewable sources.

UMA DISCUSSION
The use of renewable energy (especially solar) for new projects is encouraged. Before designing renewable energy into a project, teams should make every effort to create an efficient building with a low overall energy load.

EA 3: ENHANCED COMMISSIONING

EXEMPLARY REQUIREMENTS
Conduct comprehensive commissioning of the building envelope.

UMA DISCUSSION
The University considers this exemplary credit to be of the utmost importance. Design teams should prioritize envelope commissioning for all projects.
Pilot Credits

The LEED Pilot Credit Library is intended to introduce new credits to the LEED rating system which haven’t yet been through the complete drafting and balloting process. Teams are encouraged to explore the following pilot credits for potential innovation points.

Pilot Credit: Innovative Ventilation
Requirements

- Design systems that utilize innovative ventilation strategies
  - Displacement ventilation
  - Under-floor air delivery systems
  - Natural ventilation


- Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 2.8 of the CIBSE Applications Manual AM10, March 2005.

Uma Credit Discussion
This credit is a high priority because it encourages the integration of thermal comfort and energy efficiency. It is not advised for certain types of buildings such as labs – where temperature and humidity need to be closely regulated – but may be an excellent solution for dormitories, offices, and classrooms. Design teams should consider other sustainable design strategies which can compliment and support natural ventilation, including thermal mass and daylighting.

Pilot Credit: Preliminary Integrative Project Planning and Design
Requirements

- Use cross discipline design and decision making beginning in the programming and pre-design phase.

- Before schematic design, conduct a preliminary LEED meeting including a minimum of four key project team members, including the Owner or Owner’s representative. As part of the meeting, create a LEED action plan that, at a minimum, includes the following:
  - The targeted LEED award level (Certified, Silver, Gold, or Platinum);
  - The LEED credits that have been selected to meet the targeted award level; and
  - The primary responsible party selected to meet the LEED requirements for each prerequisite or credit.

- Before schematic design, conduct at least one full-day integrative design workshop with the Integrative Project Team.
UMA CREDIT DISCUSSION
Integrative planning and design is critical to the execution of truly sustainable buildings. Most of these credit requirements are common practice at UMA, and achievement of this pilot credit will help assure a successful process that involves all campus stakeholders.

PILOT CREDIT: INTEGRATIVE PROJECT PLANNING AND DESIGN

REQUIREMENTS

• Use cross discipline design and decision making for all phases of design and construction.

• Achieve Pilot Credit 5: Preliminary Integrative Project Planning & Design

• Actively involve all team members referenced above in at least three of the following phases of project design and construction process:
  • Conceptual/schematic design
  • LEED planning
  • Preliminary design
  • Energy/envelope systems analysis or design
  • Design development
  • Final design, construction documents and specifications
  • Construction Administration

• Conduct meetings with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems encountered, formulate solutions, review responsibilities, and identify next steps. In these meetings, utilize the process framework established by the ANSI Market Transformation to Sustainability Guideline Standard March 2007 revision for distribution Whole System Integration Process (WSIP).

UMA CREDIT DISCUSSION
Maintaining integrative design through construction administration challenges the status quo. Teams are encouraged to achieve this credit and to go beyond credit requirements to include diverse team members throughout all phases of project design and construction.
A tremendous thank you to Ludmilla Pavlova, Jeff Quackenbush, Jason Burbank and all of the staff of UMASS Amherst Campus Planning, Design & Construction Management, and Physical Plant. Without their patience, guidance, and knowledge these guidelines would never have achieved this level of depth and relevance.

The conversation between design teams and the University is ongoing and is as much a part of sustainable design as the LEED credits within these pages. It is our hope that these guidelines will foster a deeper understanding of environmental issues on the University of Massachusetts Amherst campus and lead to buildings which are long-lasting, sensitive, and sustainable.