UMass Amherst

Green Building Guidelines

LEED v4 2014
CERTIFICATION GUIDELINES

LEARN LIVE LEAD Sustainable UMASS

Inspiring Innovation

These guidelines have been prepared by the Green Building Subcommittee of the Chancellor's Sustainability Committee, chaired by Ted Mendoza. The subcommittee took a credit by credit approach to analyzing campus infrastructure, policies and practices as they pertain to green building and LEED certification. For this most recent iteration of the University Green Building Guidelines, each credit has been revisited and re-written to align with the most recent version of LEED, LEED version 4.

Now that project teams are accustomed to using these guidelines to frame their conversations surrounding sustainability for new buildings, the Green Building Committee has added a discussion centered around all existing building renovations and maintenance. In addition to growing the UMass campus' built environment in a sustainable manner, it is imperative that the great number of existing buildings are properly addressed in the context of sustainability as well. We hope that these guidelines will help to engage design teams with the unique challenges and needs of the UMass Amherst campus, and give them inspiration with which to challenge the University with creative, resourceful, and innovative strategies in making positive changes that go beyond buildings, to engage the infrastructure and fabric of the University. Through design, you have the power to effect real change and to bring awareness to the public about environmental issues. Your successful design solutions are proof of the feasibility of large-scale urban implementation of sustainable practices.

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 your understanding of the UMA campus through the lens of LEED. However, it is our hope that this document will inspire design teams to innovate creative solutions. We are entrusting you, the designers, to achieve full comprehension of the LEED rating system, credit requirements, and associated reference materials. Contact Facilities & Campus Services for more information.

Acknowledgments

Green Building Subcommittee / Chancellor's Sustainability Committee

Staff

Dennis Swinford
Thomas Shaw
Pam Rooney
Jeff Dalzell
John Mathews
Ted Mendoza
Ludmilla Pavlova
Ezra Small
Jason Burbank
Sandy Beauregard
Jeff Quackenbush

Faculty

Ray Mann
Ben Weil
Ajla Aksamija
Simi Hoque

Students

Soroush Farzinmoghadam
Nariman Mostafavi
Somayeh Tabatabee
Kylie Landrey
Patricia O'Flaherty

Primary Authors/Editors

Kylie Landrey
Ted Mendoza
Ludmilla Pavlova-Gillham
Soroush Farzinmoghadam
Somayeh Tabatabaee
Nariman Mostafavi
Ray Mann
Jeff Dalzell
Ajla Aksamija

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Introduction

In 2007, the University of Massachusetts President Jack Wilson signed the American College and University Presidents' Climate Commitment (ACUPCC). That same year, the University of Massachusetts Amherst Chancellor, Thomas Cole, established the Environmental Performance Advisory Committee (EPAC) to assess ways to reduce the environmental impacts of the UMass Amherst campus. In 2008, Governor Deval Patrick signed Executive Order 484, which included the provision that all newly constructed state buildings over 20,000 GSF be certified under the USGBC LEED rating system as LEED Silver or better. In 2010, EPAC created the Green Building Committee (GBC) to focus efforts on sustainable design and building on campus. During the summer of 2010, the GBC – a cross-disciplinary group comprised of faculty, staff and students – met bi-weekly to produce the original Green Building Guidelines; a document which is based on, but not limited to, the LEED-NC 2009 rating system.

This LEED v4 update to the Green Building Guidelines expands upon the original framework for approaching new construction and major renovations at UMass Amherst by correlating our viewpoints with those expressed in the most current version of LEED and including guidance for 2 other LEED certification paths – Interior Design and Construction (ID+C) and Existing Buildings Operations & Maintenance (EBOM). The updated document also goes "Beyond LEED" by providing insight from UMass Amherst campus stakeholders into how we can further promote and support the sustainability missions of the institution.

LEED Version 4, which was formally announced at the Greenbuild Conference in November 2013, supercedes LEED v2009 and will become the exclusive LEED certification path after October 31, 2016. Generally speaking, the most notable change from LEED v2009 to v4 is an expansion to include additional rating systems for specific building and renovation types (i.e. data centers, warehouses, multi-family homes, hospitality) . In addition, LEED v4 rearranges prerequisites and credits within the 5 major categories from v2009 , adds 2 new major categories (Location and Transportation, and Regional Priority), and provides more alignment with an "integrative project planning" approach that has potential to further influence the built environment

and construction activities, and promote the goals of the LEED Rating System, including:

- A “reverse contribution” to global climate change
- Enhancement of individual human health and well being
- Protection and restoration of water resources
- Protection, enhancement and restoration of biodiversity and ecosystem services
- Promotion of sustainable and regenerative material resource cycles
- Building of a greener economy, and
- Enhancement of social equity, environmental justice, and community quality of life

In acknowledgment of these goals, these Green Building Guidelines summarize the current resources, knowledge and opinions from many stakeholders within the UMass Amherst campus – focusing the conversation, topic by topic, on the aspects of green building that are highly valued by the university. By prioritizing strategies for achieving sustainability, we highlight several over-arching principals that are currently considered necessary building blocks for the development of a flourishing campus community. I hope you find these viewpoints insightful and helpful in your pursuit of a greener built environment.

Ted Mendoza
Chair, Green Building Committee (2014 - 2015)

Going Beyond LEED

The University of Massachusetts, Amherst must address sustainability from an integrative, innovative perspective. Although the LEED (Leadership in Energy and Environmental Design) rating system has been officially adopted, the required LEED Silver certification for new buildings will not be enough to help the university meet the campus carbon neutrality goal for 2050. Even energy efficient, LEED certified new buildings increase total campus energy consumption. Currently, the university is not meeting the required energy reduction measures mandated by executive order 484. If UMass truly hopes to confront climate change and our growing carbon footprint, we must take a leadership role to institutionalize an integrative design process during the earliest stages of any new project, reach for the most rigorous green building certifications, and continue to pioneer new techniques and new technologies to embrace our built environment with creative solutions for change.

In April 2012 the University adopted a Campus Master Plan (CMP) that provides the vision and framework for a long term view of the campus growth for the next 50 years. By articulating the manner in which the campus guiding principles translate into specific recommendations for campus systems development in support of future smart growth, the CMP embodied the campus approach to sustainable development throughout its discussion of system frameworks such as open space, circulation, flexible mixed use development, building heritage and community connectivity. A subsequent chapter on Master Plan Sustainability further evaluated the ability of the CMP to support the goals of the campus Climate Action Plan, particularly greenhouse gas emissions, energy, green infrastructure and transportation. Every new construction and/or major renovation project provides a unique opportunity to build out the campus vision for each system framework and for physical sustainability.

The university urges design teams and other involved state agencies to continue to evolve the campus approach to green building practices so that we can continue to build on the foundation of sustainability we have already established. This evolution will help us to achieve a regenerative campus; a campus that restores, renews, and revitalizes our own sources of energy and materials, while supporting natural

processes and creating resilient, evolving systems that integrate the needs of our campus community with the integrity of nature.

There are multiple tools, certifications, and frameworks that our campus should explore for future projects, in coordination with other state agencies and design teams, in order to help the university achieve a truly sustainable and regenerative environment. Below is a summary of several systems that aim to instill accountability in the building process by providing methods of measurement in various categories of sustainable design and building operations. They are listed here to provide an informative snapshot that demonstrates the many other endeavors in the green building movement which are already going beyond LEED, or which can provide inspiration during the design process. The UMass campus vision to achieve carbon neutrality by 2050 net zero campus will not be possible to achieve without individuals who are willing to think outside the box and pioneer new methods of building and maintaining existing buildings and grounds.

• **LEED for Existing Buildings: Operations & Maintenance (LEED EBOM):** Up until now, UMass Amherst has only pursued LEED for New Construction and Commercial Interiors. However, UMass aspires to begin building certification for operations and maintenance of existing buildings. One path for achieving this goal is to encourage teams who are designing new facilities to incorporate as many approaches outlined in LEED EBOM as possible, in order to facilitate the future certification of projects under that rating system. This may take many forms. Design teams might choose to institute measurement and verification processes that provide continuous performance tracking of building and landscape systems, they might provide educational materials outlining specific green strategies that would be continuously supported by maintenance teams and building occupants, as well as other thoughtful approaches to green building maintenance and operations.

• **Passive House Building:** For residential projects and small to mid-scale administrative buildings we believe that the Passive House Institute US (PHIUS) provides a useful framework alternative for building sustainability and resiliency. The system's reliance on building science principles that embody a pragmatic "maximize your gains, minimize your losses" approach is in concert with our commitment to reduce campus GHG emissions through a combination of energy conservation measures within existing buildings and rigorous energy performance requirements for new construction projects.

• **Net Zero Energy Building Certification℠ (NZEB):** While LEED projects have consistently attempted to

reduce energy utilization, we have yet to achieve a net zero energy facility. Given the recent successes in this area on commercial and residential projects, we believe that pursuing NZEB certification from the International Living Future Institute would provide significant benefits and distinction to the campus and would bring us closer to the goal of carbon neutrality.

• **Living Building ChallengeTM (LBC):** For rural/ periphery sites where the campus central infrastructure systems are not available and there is particular concern for maintaining the health of existing natural systems, we believe that the LBC provides a significant opportunity for going beyond LEED. The seven performance categories of the LBC, called Petals, are: Place, Water, Energy, Health & Happiness, Materials, Equity and Beauty. They underpin the development of net zero energy and water systems, the utilization of healthy building materials, the embodiment of an approach to aesthetic and social harmony that would be in concert with our University's agricultural roots, and could be appropriate for both new construction and renovation of existing/legacy buildings.

Design teams should approach projects with a broad knowledge base in the many certification guidelines that provide inspiration to help the university think creatively and to pilot new methods for achieving sustainable building solutions. The costs of meeting more stringent, yet truly innovative certifications will be paid back in the health and wellness benefits of these regenerative living, working, and learning environments, the savings in operating costs, and the recognition the university will receive as a global leader in sustainability. If we aspire to lead the movement, we have to take risks and push the envelope in design and innovation.

[1] http://www.usgbc.org/Docs/Archive/General/Docs3353.pdf
[2] http://living-future.org/lbc/about
[3] http://living-future.org/netzero
[4] http://www.phius.org/what-is-passive-building-/the-principles
[5] http://www.presidentsclimatecommitment.org/about/commitment

Purpose

Communicate environmental information (both physical and policy-driven) of the campus to outside design teams.

Help UMA staff understand and navigate the LEED rating system.

Prioritize strategies for sustainability on campus.

Facilitate efficient LEED credit achievement.

Findings

The GBC focused on **key over-arching principals** valued by UMass as the building blocks for a flourishing campus community to determine the priority designations of each credit. The principals include:

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 surface flow is funneled to culverts that runs underground to help direct water run-off on campus. Future projects must meet capacity of their stormwater needs on site or add capacity to the system.

Promote Interconnected Campus Community

The UMA community is enhanced by the densification of the core campus, promoting pedestrian and bicycle circulation, and strengthening the relationships between buildings and open space.

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.

Maximize Durability & Control 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.

Reduce Energy Consumption

The financial costs and environmental impacts of energy use should be minimized throughout the construction and operations of UMA's buildings.

Protect the Natural Landscape

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. Successful building design should address greenhouse gas emissions, fossil fuel usage, impact on the plant and animal life that surrounds the UMA campus, and educating the community about proper stewardship.

LEED v4 Categories & Rating Systems

Interior Design + Construction

Building Design + Construction

Building Operations + Maintenance

- INTEGRATIVE PROCESS
- LOCATION & TRANSPORTATION
- SUSTAINABLE SITES
- WATER EFFICIENCY
- ENERGY & ATMOSPHERE
- MATERIALS & RESOURCES
- INDOOR ENVIRONMENTAL QUALITY
- INNOVATION
- REGIONAL PRIORITY

LEED v4 Credits-at-a-Glance

Location & Transportation

LTc1: LEED for Neighborhood Development Location (16 Points)
LTc2: Sensitive Land Protection (1 Point)
LTc3: High Priority Site (2 Points)
LTc4: Surrounding Density and Diverse Areas (5 Points)
LTc5: Access to Quality Transit (5 Points)
LTc6: Bicycle Facilities (1 Point)
LTc7: Reduced Parking Footprint (1 Point)
LTc8: Green Vehicles (1 Point)

Sustainable Sites

SSc1: Site Assessment (1 Point)
SSc2: Site Development- Protect of Restore Habitat (2 Points)
SSc3: Open Space (1 Point)
SSc4: Rainwater Management (3 Points)
SSc5: Heat Island Reduction (2 Points)
SSc6: Light Pollution Reduction (1 Point)

Water Efficiency

WEp1: Outdoor Water Use Reduction
WEp2: Indoor Water Use Reduction
WEp3: Building-Level Water Metering
WEc1: Outdoor Water Use Reduction (2 Points)
WEc2: Indoor Water Use Reduction (6 Points)
WEc3: Cooling Tower Water Use (1 Point)
WEc4: Water Metering (2 Points)

Energy & Atmosphere

EAc1: Enhanced Commissioning (4-6 Points)
EAc2: Optimize Energy Performance (1-18 Points)
EAc3: Advanced Energy Metering (1 Point)
EAc4: Demand Response (2 Points)
EAc5: Renewable Energy Production (1-3 Points)
EAc6: Enhanced Refrigerant Management (1 Point)
EAc7: Green Power and Carbon Offsets (1-2 Points)

Materials & Resources

MRp1: Storage and Collection of Recyclables
MRp2: Construction and Demolition Waste Management Planning
MRc1: Building Life-Cycle Impact Reduction (5 Points)
MRc2: Building Product Disclosure and Optimization- Environmental Product Declarations (2 Points)
MRc3: Building Product Disclosure and Optimization- Sourcing of Raw Materials (2 Points)
MRc4: Building Product Disclosure and Optimization- Material Ingredients (3 Points)
MRc5: Construction and Demolition Waste Mangement (2 Points)

Indoor Environmental Quality

IEQp1: Minimum Air Quality Performance
IEQp2: Environmental Tobacco Smoke (ETS) Control
IEQc1: Enhanced Indoor Air Quality Strategies (2 Points)
IEQc2: Low-Emitting Materials (3 Points)
IEQc3: Construction Indoor Air Quality Management Plan (1 Point)
IEQc4: Indoor Air Quality Assessment (2 Points)
IEQc5: Thermal Comfort (1 Point)
IEQc6: Interior Lighting (2 Points)
IEQc7: Daylight (3 Points)
IEQc8: Quality Views (1 Point)
IEQc9: Acoustic performance (1 Point)

Innovation

INc1: Innovation
INc2: LEED Accredited Professional

Regional Priority

LTc4: Surrounding Desnity & Diverse Uses
SSc2: Site Development- Protect or Restore Habitat
WEc1: Outdoor Water Use Reduction
EAc5: Renewable Energy Production
EAc2: Optimize Energy Performance
MRc1: Building Life Cycle Impact Reduction

LEED Performance of Past Projects

Marching Band/ V2.2	Police Station/ V2.2	Life Science Lab V2.2	CNS Greenhouses/ V3	Football Training Fa V3	Hampshire DC Ren V3

Umass Certified Building LEED Checklist 2009 BD&C

Achieved						**Category:**	**Sustainable Sites**	**Points: 26**
Achieved						Prereq 1	Construction Activity Pollution Prevention	
1		1	1	1	1	Credit 1	Site Selection	1
1		1	5	5	5	Credit 2	Development Density + Community Connectivity	5
			1			Credit 3	Brownfield Redevelopment	1
1	1	1	6	6	6	Credit 4.1	Alternative Transportation—Public Transportation Access	6
1	1	1	1	1	1	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
1		1	3	3	3	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
1		1	2	2	2	Credit 4.4	Alternative Transportation—Parking Capacity	2
	1					Credit 5.1	Site Development—Protect or Restore Habitat	1
1	1	1	1			Credit 5.2	Site Development—Maximize Open Space	1
		1	1	1		Credit 6.1	Stormwater Design—Quantity Control	1
		1	1			Credit 6.2	Stormwater Design—Quality Control	1
		1	1	1		Credit 7.1	Heat Island Effect—Non-roof	1
	1	1			1	Credit 7.2	Heat Island Effect—Roof	1
						Credit 8	Light Pollution Reduction	1
						Category:	**Water Efficiency**	**Points: 10**
Achieved						Prereq 1	Water use Reduction-20%	
2	2	2	4	4		Credit 1	Water Efficient Landscaping	2 to 4
		1				Credit 2	Innovative Wastewater Technologies	2
2	2	2	3	4	4	Credit 3	Water Use Reduction	2 to 4
						Category:	**Energy and Atmosphere**	**Points: 35**
Achieved						Prereq 1	Fundamental Commissioning of Building Energy Systems	
Achieved						Prereq 2	Minimum Energy Performance	
Achieved						Prereq 3	Fundamental Refrigerant Management	
10	6	6	2	7	15	Credit 1	Optimize Energy Performance	1 to 19
						Credit 2	On-Site Renewable Energy	1 to 7
1	1	1	2	2		Credit 3	Enhanced Commissioning	2
	1	1	2			Credit 4	Enhanced Refrigerant Management	2
	1	1		3		Credit 5	Measurement and Verification	3
					2	Credit 6	Green Power	2
						Category:	**Materials and Resources**	**Points: 14**
Achieved						Prereq 1	Storage and Collection of Recyclables	
					3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors and Roof	1 to 3
					1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2	2	2	2	2	2	Credit 2	Construction Waste Management	1 to 2
						Credit 3	Materials Reuse	1 to 2
2	2	1	2	2	2	Credit 4	Recycled Content	1 to 2
2	2	2	2	2		Credit 5	Regional Materials	1 to 2
						Credit 6	Rapidly Renewable Materials	1
	1	1		1	1	Credit 7	Certified Wood	1

Marching Band/ V2.2								
Police Station/ V2.2								
Life Science Lab V2.2								
CNS Greenhouses/ V3								
Football Training Fa V3								
Hampshire DC Ren V3								

						Category:	Indoor Environmental Quality	Points: 15
Achieved						Prereq 1	Minimum Indoor Air Quality Performance	
Achieved						Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1	1	1	1	1		Credit 1	Outdoor Air Delivery Monitoring	1
1			1			Credit 2	Increased Ventilation	1
1	1	1	1	1	1	Credit 3.1	Construction IAQ Management Plan—During Construction	1
1	1	1		1		Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1	1	1	1	1	1	Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1	1	1	1	1	1	Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1	1	1	1	1	1	Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1		1	1	1	1	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		1		1		Credit 5	Indoor Chemical and Pollutant Source Control	1
1	1		1	1		Credit 6.1	Controllability of Systems—Lighting	1
1	1		1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
1	1	1	1	1	1	Credit 7.1	Thermal Comfort—Design	1
1	1			1		Credit 7.2	Thermal Comfort—Verification	1
			1			Credit 8.1	Daylight and Views—Daylight	1
		1	1		1	Credit 8.2	Daylight and Views—Views	1

						Category:	Innovation and Design	Points: 6
1	3	4	5	4	4	Credit 1	Innovation in Design	5
1	1	1	1	1	1	Credit 2	LEED Accredited Professional	1

						Category:	Regional Priority	Points: 4
			ss6.1	ss6.1		Credit 1.1	Regional Priority: SS6.1 Stormwater Design Quantity	1
						Credit 1.2	Regional Priority: EA2 On-Site Renewable Energy	1
			ss7.1	ss7.1	MR1.1	Credit 1.3	Regional Priority: SS3, SS7.1, WE3, or MR 1.1	1
			we3			Credit 1.4	Regional Priority: SS3, SS7.1, WE3, or MR 1.1	1

						Summary of Categoories	
7	5	11	23	20	20	Sustainable Sites	26
4	4	5	7	8	8	Water Efficiency	10
11	9	9	6	12	12	Energy and Atmosphere	35
6	7	6	6	7	7	Materials and Resources	14
12	10	10	12	11	11	Indoor Environmental Quality	15
2	4	5	6	5	5	Innovation and Design	6
			3	2	2	Regional Priority	4

42	39	46	63	65	65	TOTAL	Points: 110
61	57	67	57	59	59	Percent Achieved Out of Maximum Possible Points	

High Priority Credit as defined by Green Building Guidelines

Required High Priority Credit as defined by the Green Building Guidelines

Credit Achieved by Project in LEED V2.2 (26-32 Certified, 33-38 Silver, 39-51 Gold, 52-69 Platinum)

Credit Achieved by Project in LEED V3 (40-49 Certified, 50-59 Silver, 60-79 Gold, 80-110 Platinum)

LEED v4 Summary of Priority & Feasibility by Credit

Priority			Feasibility		
Low	Med	Hi	Easy	Mod	Diff

LEED V4 BD&C UMass Priority & Feasibility

Low	Med	Hi	Easy	Mod	Diff	Category:	Location & Transportation	Points: 32
16					16	Credit 1	LEED for Neighborhood Development Location	16
		1	1			Credit 2	Sensitive Land Protection	1
	2				2	Credit 3	High Priority Site	2
		5	5			Credit 4	Surrounding Density and Diverse Areas	5
		5	5			Credit 5	Access to Quality Transit	5
		1	1			Credit 6	Bicycle Facilities	1
		1		1		Credit 7	Reduced Parking Footprint	1
		1	1			Credit 8	Green Vehicles	1

						Category:	Sustainable Sites	Points: 10
Required			Required			Prereq 1	Construction Activity Pollution Prevention	
		1	1			Credit 1	Site Selection	1
		2	2			Credit 2	Site Development- Protect or Restore Habitat	2
		1		1		Credit 3	Open Space	1
	3			3		Credit 4.1	Rainwater Management	3
		2		2		Credit 4.2	Heat Island Reduction- Roof & Non-Roof	2
		1		1		Credit 4.3	Light Pollution Reduction	1

						Category:	Water Efficiency	Points: 11
Required			Required			Prereq 1	Outdoor Water Use Reduction	
Required			Required			Prereq 2	Indoor Water Use Reduction	
Required			Required			Prereq 3	Building-Level Water Metering	
		2	2			Credit 1	Outdoor Water Use Reduction	2
		6	6			Credit 2	Indoor Water Use Reduction	6
	1			1		Credit 3	Cooling Tower Water Use	1
2				2		Credit 4	Water Metering	2

						Category:	Energy and Atmosphere	Points: 33
Required			Required			Prereq 1	Fundamental Commissioning and Verification	
Required			Required			Prereq 2	Minimum Energy Performance	
Required			Required			Prereq 3	Building Level Energy Metering	
Required			Required			Prereq 4	Fundamental Refrigerant Management	
		6	6			Credit 1	Enhanced Commissioning	6
3	10	5	5	10	3	Credit 2	Optimize Energy Performance	18
		1	1			Credit 3	Advanced Energy Metering	1
		2		2		Credit 4	Demand Response	2
	3			3		Credit 5	Renewable Energy Production	3
	1		1			Credit 6	Enhanced Refrigerant Management	1
		2	2			Credit 7	Green Power and Carbon Offsets	2

Priority			Feasibility					
Low	Med	Hi	Easy	Mod	Diff			
						Category:	Materials and Resources	Points: 13
Required			Required			Prereq 1	Storage and Collection of Recyclables	
Required			Required			Prereq 2	Construction & Demolition Waste management Planning	
		5		5		Credit 1	Building Life-Cycle Impact Reduction	5
	2			2		Credit 2	Building Product Disclosure & Optimization-Environmental Product Declarations	2
		2		2		Credit 3	Building Product Disclosure & Optimization- Sourcing of Raw Materials	2
	2			2		Credit 4	Building Product Disclosure & Optimization- Material Ingredients	2
		2	2			Credit 5	Construction & Demolition Waste Management	2
						Category:	Indoor Environmental Quality	Points: 16
Required			Required			Prereq 1	Minimum Air Quality Performance	
Required			Required			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
2			2			Credit 1	Enhanced Indoor Air Quality Strategies	2
		3		3		Credit 2	Low-Emitting Materials	3
		1		1		Credit 3	Construction Indoor Air Quality Management Plan	1
		2		2		Credit 4	Indoor Air Quality Assessment	2
		1	1			Credit 5	Thermal Comfort	1
	2			2		Credit 6	Interior Lighting	2
		3		3		Credit 7	Daylight	3
1				1		Credit 8	Quality Views	1
	1			1		Credit 9	Acoustic Performance	1
						Category:	Innovation and Design	Points: 6
		5	2	3		Credit 1	Innovation in Design	5
		1	1			Credit 2	LEED Accredited Professional	1
						Category:	Regional Priority	Points: 4
		1	1			Credit 1.1	LTc 4: Surrounding Density and Diverse Uses	1
		1	1			Credit 1.2	SSc 2: Site Development - Protect or Restore Habitat	1
		1	1			Credit 1.3	WEc 1: Outdoor Water Use Reduction	1
	1			1		Credit 1.4	EAc 5: Renewable Energy Production	1
	1			1		Credit 1.5	EAc 2: Optimize Energy Performance	1
		1		1		Credit 1.6	MRc 1: Building Life-Cycle Impact Reduction	1

						Summary of Categories	
16	2	14	13	1	18	Location & Transportation	32
0	3	7	3	7	0	Sustainable Sites	10
2	1	8	8	3	0	Water Efficiency	11
3	14	16	15	15	3	Energy and Atmosphere	33
0	4	9	2	11	0	Materials and Resources	13
3	3	10	3	13	0	Indoor Environmental Quality	16
0	0	6	3	3	0	Innovation and Design	6
0	2	4	3	3	0	Regional Priority	4
24	29	74	50	56	21	TOTAL	Points: 125

High Priority Credit as defined by Green Building Guidelines

INTEGRATIVE PROCESS

IPc1: Integrative Process

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To support high performance, cost-effective project outcomes through an early analysis of the interrelationships among systems.

LEED CREDIT REQUIREMENTS

Beginning in pre-design and continuing throughout the design phases, identify opportunities to achieve synergies across disciplines and building systems described below. Use the analyses to inform the owner's project requirements (OPR), basis of design (BOD), design documents, and construction documents.
Energy-Related Systems:

- Perform energy modeling analysis before completion of schematic design and assess at least two potential strategies associated with each of the following. Document how the analysis informed design and building form decisions in OPR and BOD. Also document influence on final design.
    - Site conditions
    - Massing and orientation
    - Lighting, and renewable energy opportunities
    - Basic envelope attributes
    - Lighting levels, plug and process load needs
    - Thermal comfort ranges
    - Programmatic and operational parameters

AND
Water-Related Systems:

- Perform preliminary water budget analysis before completion of schematic design that explores how to reduce potable water loads. Assess and estimate the project's potential nonpotable water supply sources and water demand volumes, including the following, and document how the above analysis informed building and site design decisions in OPR and BOD. Demonstrate how at least one on-site nonpotable water supply source was used to reduce burden on municipal supply or wastewater treatment systems by contributing to at least two of the water demand components listed above.
    - Indoor, outdoor and process water demand
    - Supply sources
- Demonstrate how the analysis informed the design of the project, including the following, as applicable:
    - Plumbing and sewage conveyance and/or on-site treatment
    - Rainwater quantity and quality management systems;
    - Landscaping, irrigation, and site elements;
    - Roofing and/or building form and geometry; and other systems

UMASS CREDIT DISCUSSION

UMA recommends design teams work towards achieving this credit. The requirements are already included as part of the general expectations for a successful project. Renewable energy opportunities is the only requirement that may not be previously met by other credits. Design teams need to complete *feasibility studies for renewable energy to assist UMA in working towards campus energy reduction goals. By completing feasibility studies in the early phases of design, the design team and UMA can investigate optimization of available resources.

*According to USGBC, this credit is designed to encourage collaboration and seemless integration of the goals of all stakeholders during early design stages in order to ensure the best project outcome. The feasibility study is an analysis of the viability of an idea. It focuses on helping to answer essential questions about whether proposed project goals make sense for UMass. The study outcomes would determine the strengths and weaknesses of various proposed approaches.[1]

[1] "Integrative Process: Behind the Intent." USGBC. USGBC, n.d. Web. 20 Nov. 2015.

LOCATION & TRANSPORTATION

Summary

Possible Points

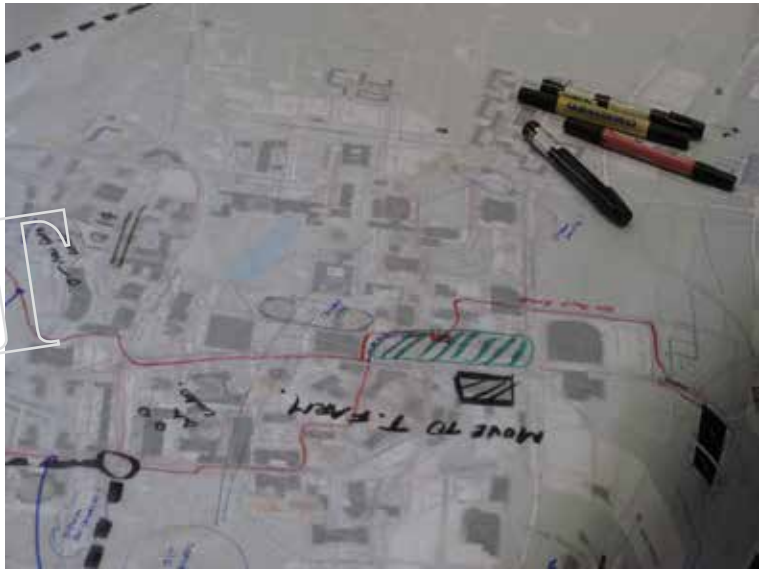
- BD+C (New Construction & Major Renovation): 32 Points
- ID+C (Commercial Interiors): 36 Points
- EBOM (Operations & Maintenance Existing Buildings): 15 Points

As outlined in the UMass Amherst Campus Master Plan of 2012 (CMP), UMA is focused on sustainable development, land use and location of sites within the campus that achieve a compact, walkable campus with a wide variety of activities and facility types that are tightly knit and fully utilized. The CMP emphasizes building density within the campus core and emphasizes human scale interventions that preserve the landscape and cultural assets. It illustrates how strong, vibrant streetscapes can be designed to support many modes of transportation and reduce related carbon emissions. The campus street system is envisioned as a multi-modal network that extends its connections to the adjacent communities and the region.

Each building project that undertakes the LEED v4 certification plays an important part in implementing the CMP vision, and therefore is encouraged to provide creative solutions that contribute to the incremental development of the campus systems, particularly for open space, pedestrian spines, bicycle and transportation networks.

Visit the Master Plan Explorer online:
http://maps.umass.edu/apps/MasterPlanExplorer/

Campus Planning Scholarworks page:
http://scholarworks.umass.edu/cp/



Campus Master Plan Workshop 2012

LOCATION & TRANSPORTATION

BD+C Summary: 32 Possible Points

6 High Priority	5 Easy Feasibility
1 Medium Priority	1 Moderate Feasibility
0 Low Priority	1 Difficult Feasibility

LOCATION & TRANSPORTATION

ID+C Summary: 36 Possible Points

Note:
Categories for ID+C are similar to BD+C, except that some credits are omitted from ID+C and achievable points differ between the two rating systems.

The LEED ID+C category, or Interior Design and Construction, applies to projects with a minimum of 250 square feet (22 square meters) of gross floor area. Projects are certified in this category if they are solely fit-outs of interior space. In addition, at least 60% of the project's gross floor area must be complete by the time of certification.

LOCATION & TRANSPORTATION

EBOM Summary: 15 Possible Points

There is only one available EBOM credit in the Location & Transportation Category:

LTc1: Alternative Transportation (1-15 possible points) 47

The LEED EBOM point category, or Existing Buildings: Operations and Maintenance, provides an opportunity to earn credit towards a project's LEED certification for programs established to monitor a building after construction is complete . In relation to L&T credits, USGBC believes that tracking building occupants' behavior is crucial to determine whether projects are achieving expected results. Being well-informed about occupants' travel patterns also helps in the development of policies and incentives that will contribute to encouraging positive future changes in transportation habits.

LOCATION & TRANSPORTATION (BD+C/ID+C)

LTc1: LEED for Neighborhood Development Location

LOW PRIORITY
LOW FEASIBILITY
POINT POTENTIAL: 16

LEED CREDIT INTENT

To avoid development on inappropriate sites. To reduce vehicle miles traveled. To enhance livability and improve human health by encouraging daily physical activity. Projects attempting this credit are not eligible to earn points under other Location & Transportation Credits.

LEED CREDIT REQUIREMENTS

- Locate project within boundary of a development certified under LEED for Neighborhood Development (Stage 2 or Stage 3 under the Pilot or 2009 rating systems, Certified Plan or Certified Project under the LEED v4 rating system)
- Projects attempting this credit are not eligible to earn points under other Location and Transportation credits and use a separate table which dictates possible points

COMMONWEALTH HONORS COLLEGE

UMASS CREDIT DISCUSSION

Currently, UMass Amherst has not registered any districts for certification under the LEED for Neighborhood Development (ND) rating system. Capital projects at the University take a long time to plan, design and construct, and are often funded (and owned) by multiple agencies, such as the Division of Capital Asset Management and Maintenances, the University of Massachusetts Building Authority and UMass Amherst. However, the LEED for ND rating system could be deployed in the future for building projects that cluster within a residential, academic or other district that includes structured site development in conjunction with facility planning, design and new construction/renovation of two or more buildings. The certification of the ND district must be complete before a building project can take advantage of the credits earned under the certification. Therefore, the decision to pursue, register and certify under LEED ND must occur at the earliest possible time in the planning process in order to gain the full benefit of the district certification. The ND rating system is applicable to projects of two or more mixed-use buildings. It also provides additional credit to future Commercial Interiors/Renovation projects.

LOCATION & TRANSPORTATION (BD+C)

LTc2: Sensitive Land Protection

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To avoid the development of environmentally sensitive lands and reduce the environmental impact from the location of a building on a site.

LEED CREDIT REQUIREMENTS

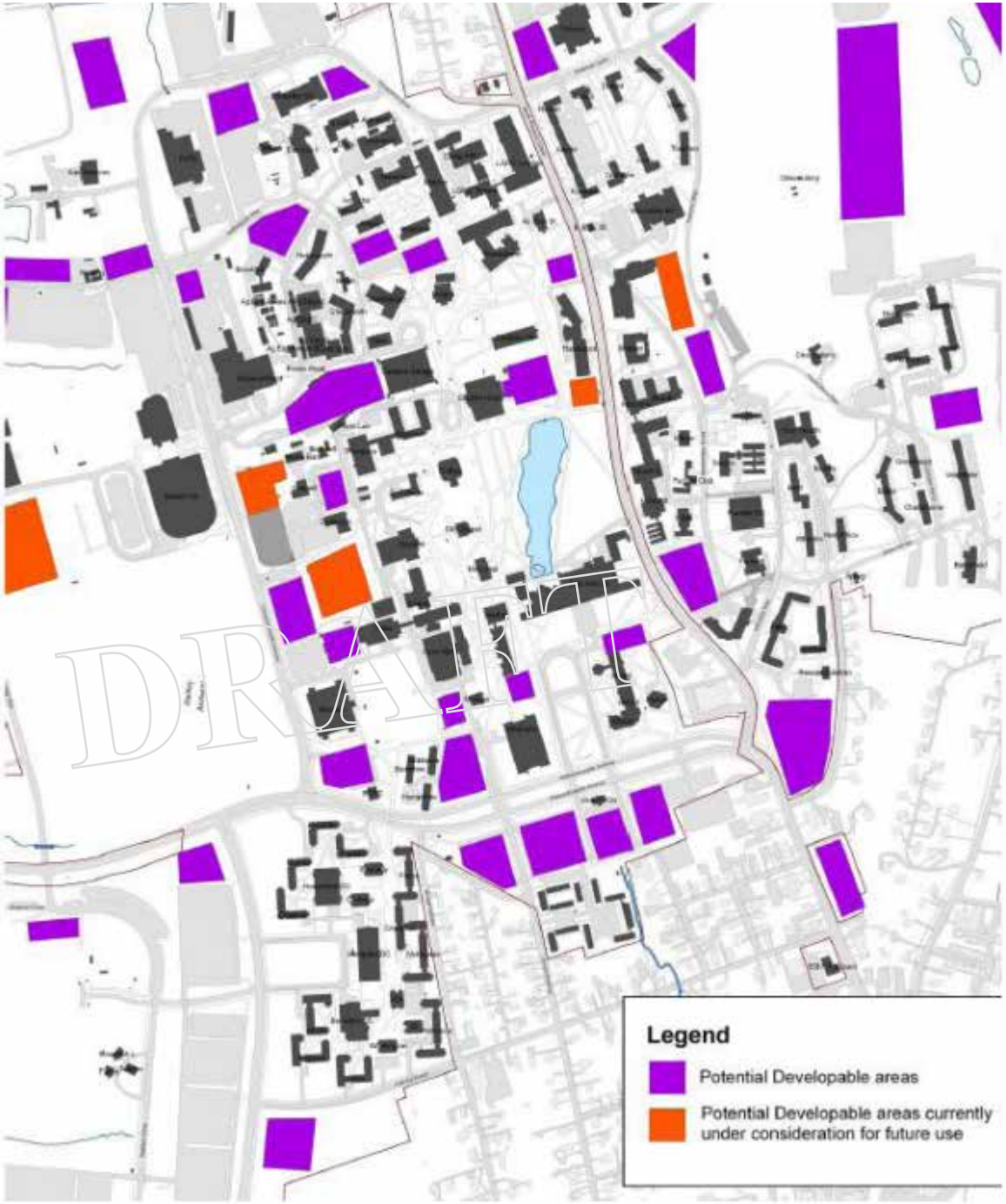
Locate the development footprint on land that has been previously developed

- If project will be built on previously undeveloped land, it must not be considered “sensitive” land:
  - Prime farmland (as defined by U.S. Code of Federal Regulations)
    - Floodplains, as legally designated by local or state jurisdiction
    - Habitat, species or ecological communities listed as threatened or endangered
    - Areas on or within 100 ft. of a water body
    - Areas on or within 50 ft. of wetlands
  - Note: Minor improvements may be made to enhance appreciation of wetland and water body buffer zones (as outlined by LEED V4 BD+C Sensitive Land Protection).

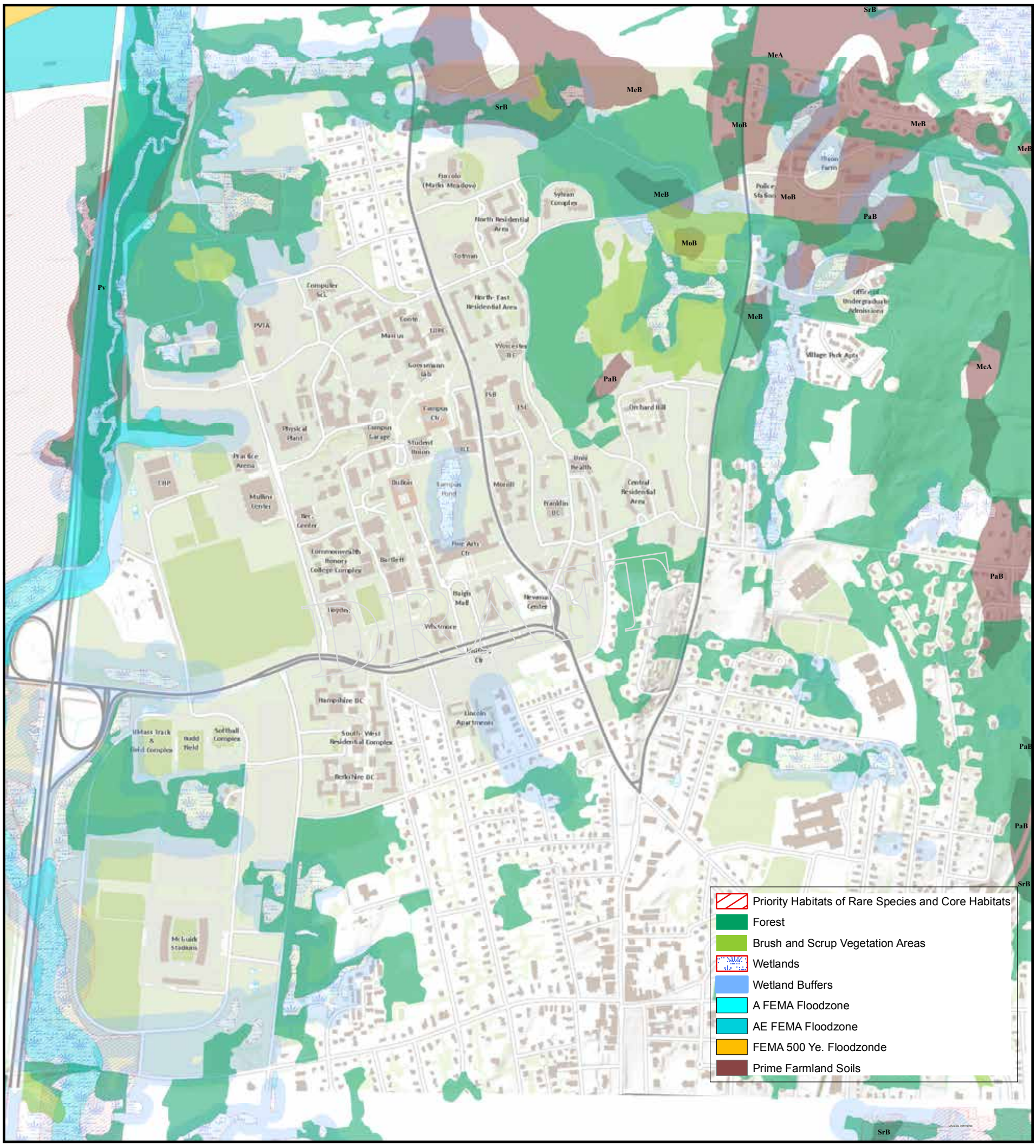
UMASS CREDIT DISCUSSION

As outlined in the Campus Master Plan[1], the majority of future sites occur on land within the campus core that has been previously developed. The Campus Pond, which qualifies as sensitive land, and Prexy’s Ridge, which is an old growth forest, have been identified as heritage landscapes and the University will continue to maintain and enhanced this areas for future generations. In the event that a future building site is located in an area that includes sensitive land, the location of the development footprint is strongly encouraged to meet the requirements of this credit by avoiding sensitive lands and mitigating impacts.

[1] UMass Amherst Campus Master Plan



2007 Campus Master Plan Update



N
W E
S

1 in = 961 ft

Environmental Constraint and Sensitive Land

S. Farzinmoghadam
Campus Planning
June 2015

LOCATION & TRANSPORTATION (BD+C)

LTc3: High Priority Site

MEDIUM PRIORITY
DIFFICULT FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To encourage project location in areas with development constraints and promote the health of the surrounding area.

LEED CREDIT REQUIREMENTS

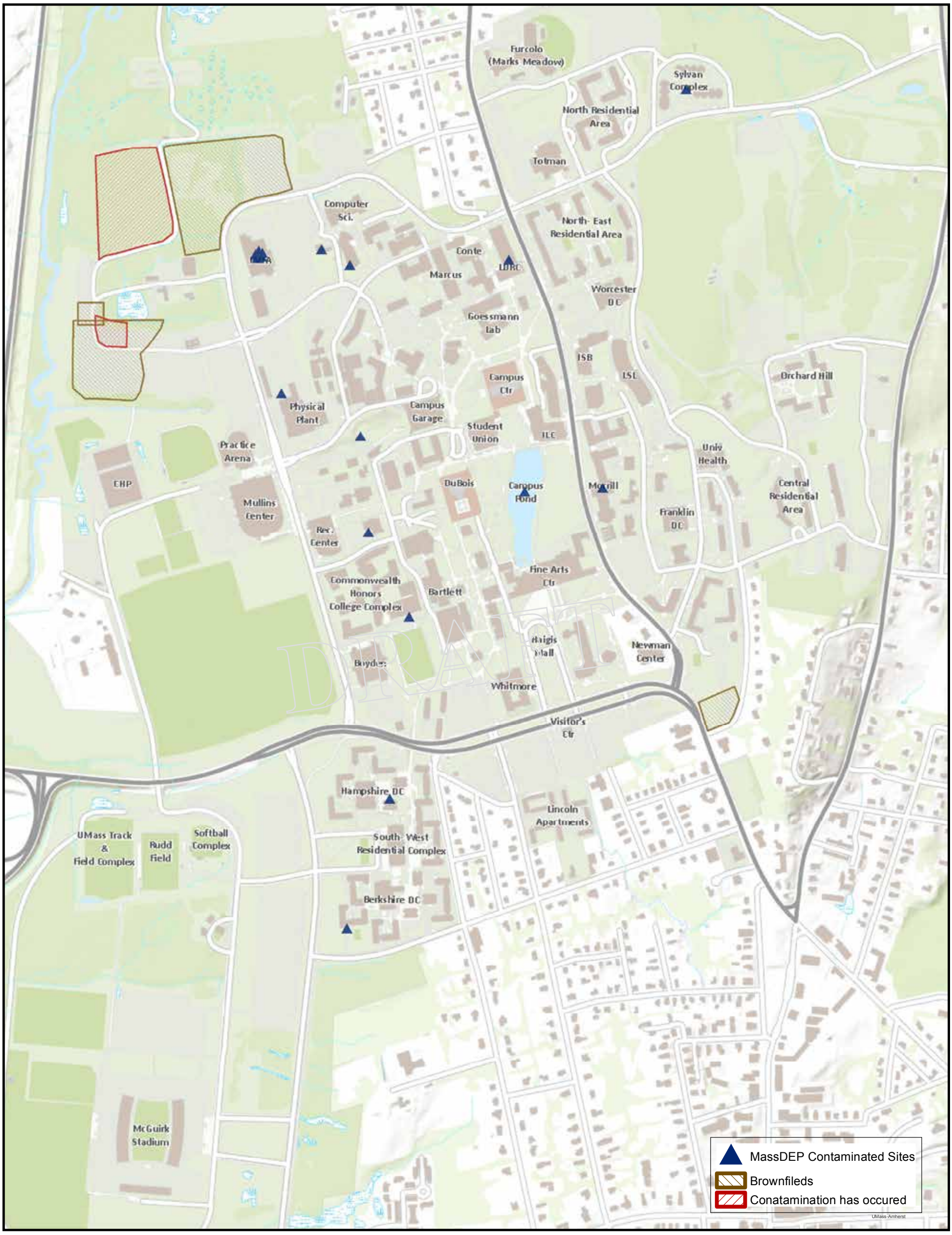
Locate project on infill site in historic district

- If historic district site is not an option, choose an otherwise constrained site:
  - A low income community
  - Difficult development area
  - Federal Empowerment Zone, Enterprise Community, or Renewal Community
  - Site listed by EPA National Priorities List
- Option 3 requires remediation of groundwater or soil contamination (Brownfield) identified on the site in accordance with presiding authority standards

Campus Pond, Chapel, and Library

UMASS CREDIT DISCUSSION

Option 1: Historic District and Option 2: Priority Designation do not currently apply to UMA, as we do not yet have designated high priority sites under the LEED v4 definitions; with the exception of the Chapel, which has been nominated to the National Register of Historic Places. A design project is currently in progress to renovate the building in a manner that is historically sensitive. In addition, the Campus Master Plan has defined 50 heritage buildings to remain on the campus into the future and has recommended that the campus pond and lawn be restored and enhanced as the campus's landmark landscape and the jewel of the campus open space system. Option 3 Brownfield Remediation may apply to projects that discover on-site soil or ground contamination; in those cases site remediation is likely to be both desired by UMA and required by regulatory agencies.



1 in = 623 ft

Contaminated Site and Brownfield Redevelopment

S. Farzinmoghadam
Campus Planning
June 2015

LOCATION & TRANSPORTATION (BD+C/ID+C)

LTc4: Surrounding Density and Diverse Uses

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 5

LEED CREDIT INTENT

To conserve land and protect farmland and wildlife habitat by encouraging development in areas with existing infrastructure. To promote walkability and transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging daily physical activity.

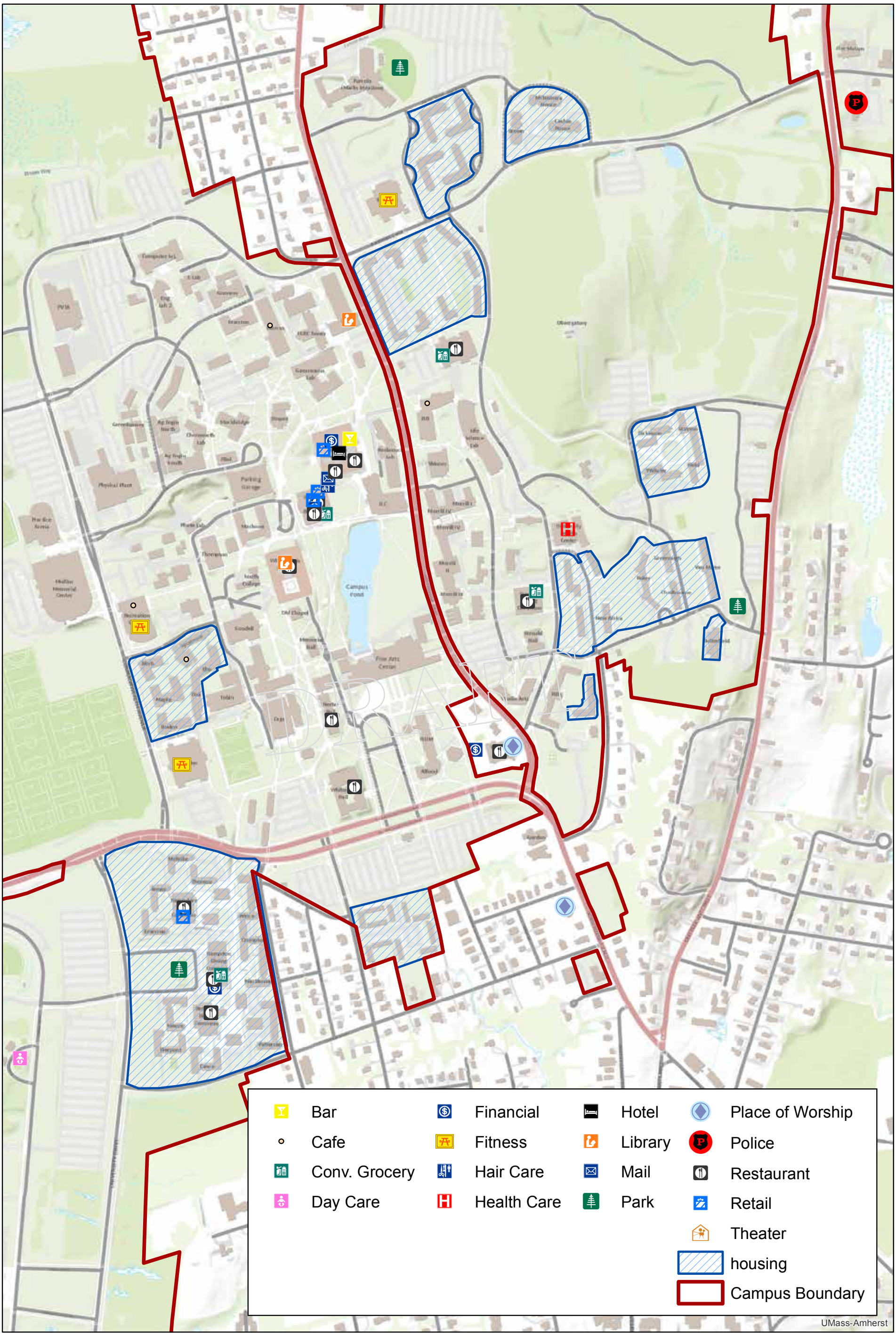
LEED CREDIT REQUIREMENTS

- Option 1: Locate on a site whose existing surrounding density within ¼ - mile radius of project boundary meets values in table:
  - For area with residential Density (DU/acre) of 7 or nonresidential density (FAR) of 0.5, 22,000 sq. ft. of buildable land per acre earn 3 points and for residential density of 12 and non-residential density of 0.8, 35,000 sq. ft. of buildable land earn 3 points.
- In addition to, or in place of option 1, this credit can also be achieved by constructing or renovating a building such that the project's main entrance is within ½ - mile of seven (1 point) to eight or more (2 points) existing buildings (with publicly available diverse uses)- see restrictions outlined in LEEDv4

UMASS CREDIT DISCUSSION

Creating a vibrant, 24/7 campus core community is a guiding principle for future campus development. Most new buildings and major renovation projects on the UMA campus are likely to achieve this credit due to the density of existing buildings with diverse uses and community functions. In addition, building projects with high occupancies (academic and residential use) are advised to consider incorporating an amenity that supports greater community use.

This credit builds upon the requirements of LEED version 3 and points are redistributed. The full value can only be earned if option 1 and 2 are met. The radius for density calculations is now specified to ¼ mile from project boundary, and proximity to diverse uses is now based on walking distance (see map). There are also additional restrictions regarding how diverse uses can be counted.



1 in = 512 ft

LT 4: SURROUNDING DENSITY AND DIVERSE USES

S. Farzinmoghadam
Campus Planning
June 2015

LOCATION & TRANSPORTATION (BD+C/ID+C)

LTc5: Access to Quality Transit

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 5

LEED CREDIT INTENT

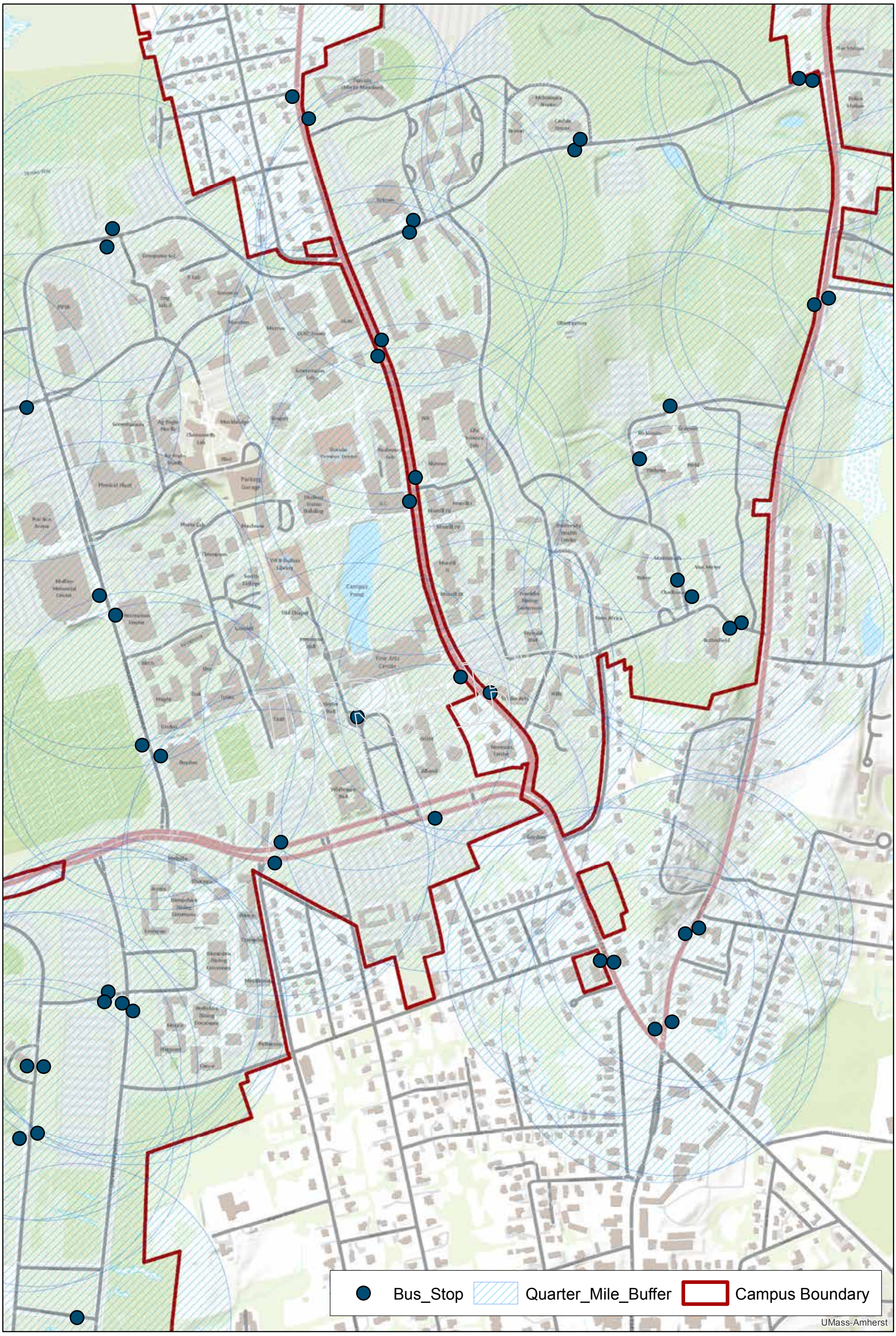
To encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other environmental and public health harms associated with motor vehicle use.

LEED CREDIT REQUIREMENTS

- Locate any functional entry within ¼ - mile walking distance of existing or planned bus, streetcar, or rideshare stops, or within ½ - mile walking distance of existing or planned bus rapid transit, rail stations, commuter rail stations, or ferry terminals
- Minimum requirements for frequency of transit service at relevant stop must be in compliance with specified LEED v4 table

UMASS CREDIT DISCUSSION

Untangling vehicular and pedestrian circulation within the campus core is a guiding principal of the Campus Master Plan and each building project provides unparalleled opportunities to enhance the pedestrian connectivity on campus. Each design project should plan for improving the pedestrian experience by careful consideration of sidewalks and the pedestrian, bicycle, vehicular and transit systems to which they connect. Most new buildings and major renovation projects on the UMA campus are likely to achieve this credit due to the excellent transit service provided by UMass and the Pioneer Valley Transit Authority (PVTA). In order to best promote walkability and transportation efficiency, UMA suggests that it is important for design teams to consider including bus pull-ins for buildings with high occupancies (academic or residential use) that are sited adjacent to major campus transit roadways with existing service (Commonwealth Drive, Massachusetts Drive and North Pleasant Street, East Pleasant, Eastman Lane, University Drive, Orchard Hill Road, Clark Hill at Butterfield, etc.). These projects should plan to create a bus pull-in shelter near the facility that can support two 60’ long articulated buses at any time.



1 in = 512 ft

LT.5: ACCESS TO QUALITY TRANSIT

S. Farzinmoghadam
Campus Planning
June 2015

LOCATION & TRANSPORTATION (BD+C/ID+C)

LTc6: Bicycle Facilities

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To promote bicycling and transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging utilitarian and recreational physical activity.

LEED CREDIT REQUIREMENTS

- Locate project with functional entry or bicycle storage within a 200-yard walking or bicycling distance from a bicycle network that connects to at least 10 diverse uses (requirements vary by building type)
- All destinations must be within a 3-mile bicycling distance of project boundary
- Bicycle storage (short-term or long-term depending on building type) must be within 100 feet of building entrance (sufficient to service occupancy of project)
- Provide at least one bicycle shower room with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter

Integrative Learning Center, Bike Parking

UMASS CREDIT DISCUSSION

Promoting bicycling and a healthy transportation mode split at UMA is a high priority, as evidenced by the campus's success in increasing bicycle commuting by 3% and reducing single occupancy vehicles on campus by 16% since 2000. The campus recently achieved "Honorable Mention" status by the League of American Bicyclists – Bicycle Friendly Universities list and hopes to achieve greater improvements in bicycle commuting through the establishment of a Bicycle Advisory Committee and improvements in the bike storage and support infrastructure. The campus is part of a regional bicycle share program; the Transportation Demand Management Program (TDM) includes carpool matching, riders have the option to participate in the NURide Program; Transit provides bike storage for 3 bikes per bus and are considering installing bike support/repair stations at each major bus shelter.

Projects are greatly encouraged to meet and/or exceed the requirements of this credit and to provide covered bicycles storage. Given the range of bicycle network support efforts on campus, projects might consider creative additions to current bicylcle storage designs and developing Innovation In Design credits to support our goals.

LOCATION & TRANSPORTATION (BD+C/ID+C)

LTc7: Reduced Parking Footprint

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To minimize the environmental harms associated with parking facilities, including automobile dependence, land consumption, and rainwater runoff.

LEED CREDIT REQUIREMENTS

- Do not exceed minimum local code requirements for parking capacity
- Calculate parking capacity base ratio using 3rd edition Transportation Planning Handbook, Tables 18-2 through 18-4

New Projects Should Incorporate Bus Pull-ins When Feasible (photo take at Integrative Learning Center)

UMASS CREDIT DISCUSSION

The UMA Campus Wide Parking Vision Plan of 2013 defines an efficient, implementable and sustainable strategy for the campus to that complements the goals and objectives of the Campus Master Plan. One guiding principle of the plan is the elimination of surface parking lots within the campus core and the implementation of transit demand strategies that support this goal, many of which are in alignment with the requirements of this credit. Given that UMass is not required to follow minimum local code requirement for parking capacity, there are no clear venues for the campus to meet this credit requirement. However, it is possible to undertake a campus-wide analysis of the existing parking capacity base ratio in order to determine if it is possible to meet the credit's requirements under an Innovation in Design credit.

PTAB needs more individuals who have a long-term vision and perspective. Reduction in parking demand may come as a result of a policy change, such as introducing a telecommuting and compressed work week policy.

The design team should work with UMA Campus Planning to analyze available options.

LOCATION & TRANSPORTATION (BD+C)

LTc8: Green Vehicles

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To reduce pollution by promoting alternatives to conventionally fueled automobiles.

LEED CREDIT REQUIREMENTS

- Designate, clearly identify, and enforce 5% of parking spaces solely for use by “green” vehicles
- Green vehicle: ACEEE minimum green score of 45
- In lieu of designated parking spaces, 20% discount for owners of green vehicles
- In addition to preferred green vehicle parking, EVSE parking spaces must comprise 2% of all project parking spaces, or liquid or gas alternative fuel facilities or battery switching station must be installed

Electric Vehicle Charging Stations, Robsham Memorial Vistior Center

UMASS CREDIT DISCUSSION

UMA has achieved this credit under LEED 2009 for past projects. The University will continue to strive for the more stringent standards of LEED v4 by requesting new projects to include an EV charging station.

Currently, UMA has a clean vehicle discount for vehicles which have received the US EPA Smartway Elite vehicle certification. The Smartway discount has allowed the University to achieve the first credit requirement (20% discount).

UMA is currently working towards a plan to move parking to the campus perimeter and as such, strongly encourages public transit and carpooling, as well as the use of green vehicles. In order to support these endeavors, the University suggests that design teams work with transit services towards improving the green transit infrastructure for new projects on campus.

LOCATION & TRANSPORTATION (EBOM)

LTc1: Alternative Transportation

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1-15

LEED CREDIT INTENT

To reduce pollution and land development effects from automobile use for transportation.

LEED CREDIT REQUIREMENTS

- Option 1 (1 Point): Conduct a survey of regular building occupants on their transportation patterns. Visitors must be surveyed as well if the typical peak or daily average of guests is greater than the number of regular building occupants.
- Option 2 (3-15 Points): Demonstrate an alternative transportation rate in accordance with Table 1. Walking, biking, public transit, telecommuting, rideshare options, compressed workweeks, carpools, and green vehicles are all viable options.
- Option 3 (2 Points): Meet the requirements of option 1 and implement an alternative transportation program to reduce conventional travel rates of building occupants. Employ at least 1 element from each of the following 3 categories: Education Strategies, Basic Support Strategies, and Direct Strategies (see EBOM reference guide for details).

UMASS CREDIT DISCUSSION

UMA does not currently conduct regular surveys of building occupants. However, studies have been completed in the past that can help to inform future decisions surrounding transport and sustainability.

The University is fortunate to be part of an extensive bus transit system and new infrastructure is always instituted with consideration for pedestrian access and bike transport.

UMA supports programs to encourage sustainable commuting options. For example, the University has partnered with NuRide to help individuals find carpool partners free of charge. Design teams should contact Parking Services to determine the best strategy for meeting this credit for a specific project.

Beyond LEED: Transit

UMASS DISCUSSION

UMass encourages design teams to think beyond LEED to consider campus goals that extend beyond any one project.

Bike storage is of particular urgency. Currently, projects that meet the LEED requirements for bike storage are not meeting the campus demand. Design teams should apply innovative solutions to incorporate bike facilities near building entrances. In the University's experience, proximity is one of the most important considerations to determine whether people will use a particular bike rack, regardless of whether it is covered or not. Bike racks farther from building entrances are less utilized, while closer ones are over capacity. This may be due in part to convenience, and also for security reasons. People want their bikes to be visible in public spaces. Currently, in-house staff is completing a project to determine existing bike rack inventory, and to document current locations and capacity. This study will prompt further discussion to address the best strategy moving forward, how many covered and uncovered bike racks should be added, and what the budgeting needs are. Currently, the annual budget for bike loops is not sufficient to support campus demand.

In addition to facilitating bicycling on campus with supporting infrastructure, the University also encourages commuters to choose public transit whenever possible and to drive energy efficient vehicles. In order to encourage commuters to adopt more energy efficient modes of transportation, UMass supports the installation of EV charging stations when feasible for a project. The University feels strongly that if the infrastructure is in place, people will use it. It is especially financially viable to include the installation of conduit in preparation for future charging stations when existing parking lots are resurfaced.

Design teams should consider transit endeavors as part of every project in the context of campus goals for energy reduction beyond LEED, and should use their architecture to contribute to the advancement of these sustainability initiatives.

SUSTAINABLE SITES

Summary

Possible Points

- BD+C (New Construction & Major Renovation): 10 Points
- EBOM (Operations & Maintenance Existing Buildings): 10 Points

Some of the UMA Sustainable Sites findings:

The campus's underground storm water infrastructure was built in the 1800s.

Storm water on the campus generally flows east to west. 72% of the campus is pervious and 28% is impervious.

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.

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 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 storm water 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.

In response to feedback from the updated campus-wide Master Plan completed in 2012, VHB pavement management completed an inventory of hardscaped areas on campus. They found that the combination of sidewalks, walkways and surface lots cover a combined 8.8 million sq. ft. and the roadways under the jurisdiction of UMass total 18.8 miles. These statistics have prompted a discussion of porous pavement as a valid alternative to hardscape on campus. Rob Hendry would like to develop a porous pavement parking pilot/ program. The Paige/ Thayer parking lot could be an alternative; John Collura's research could also support the effort. Guidelines for parking space design for storm water management, porous surfaces and other strategies. We might consider changing parking assignment policies. Campus core lots could be used as a pay-per-time lot to support limited access to the core. PTAB needs more individuals who have a long-term vision and perspective and would benefit from a presentation from MP Sustainability committee.

SUSTAINABLE SITES

BD+C Summary: 10 Possible Points

7 High Priority	3 Easy Feasibility
3 Medium Priority	7 Moderate Feasibility
0 Low Priority	0 Difficult Feasibility

SUSTAINABLE SITES

EBOM Summary: 10 Possible Points

Note:
Most credits for EBOM are different from BD+C and will be discussed further. Some credits, however, overlap, and are this page references those credits in the BD+C section. Sustainable Sites is not included in the ID+C rating system.

2 High Priority	1 Easy Feasibility
1 Medium Priority	2 Moderate Feasibility
1 Low Priority	1 Difficult Feasibility

SUSTAINABLE SITES (BD+C)

SSp1: Construction Activity Pollution Prevention

REQUIRED

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 project
- Plan must conform to erosion and sedimentation requirements of 2012 EPA Construction General Permit (or local equivalent, whichever is more stringent)

Erosion & Sedimentation Controls Protect the Campus Pond From Construction Run-Off

UMASS 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 a strategic plan for the control of erosion, sedimentation and airborne dust in their drawings and specifications.

SUSTAINABLE SITES (BD+C)

SSc1: Site Assessment

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To assess site conditions before design to evaluate sustainable options and inform related decisions about site design.

LEED CREDIT REQUIREMENTS

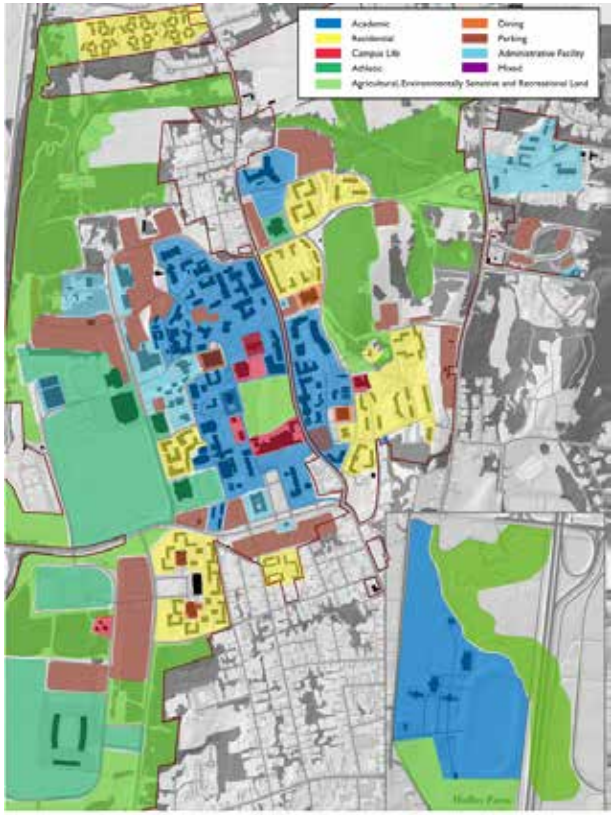
Complete and document site survey to include:

- Topography
- Hydrology
- Climate
- Vegetation
- Soils
- Human Use
- Human Health Effects

The survey or assessment should demonstrate the relationships between the site features and topics listed above and how these features influence

UMASS CREDIT DISCUSSION

The design team should work with UMA Landscape Services and Campus Planning to develop and document the site survey and assessment.



Campus Land Use Map

SUSTAINABLE SITES (BD+C/EBOM)

SSc2: Site Development- Protect or Restore Habitat

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

LEED CREDIT REQUIREMENTS

- Preserve and protect 40% of the greenfield area on the site from all development and construction activity
- Provide one of the following support systems:
  - Option 1: Using native or adapted vegetation, restore 30% of all portions of the site identified as previously disturbed (see further details for this option @ usgbc.org)
  - Option 2: Provide financial support for nationally or locally recognized land trust (Accredited by Land Trust Alliance) or conservation organization within the same EPA Level III ecoregion or the project's state

Native Plantings, Stockbridge Hall

UMASS CREDIT DISCUSSION

Option 2 is not applicable to these guidelines. UMA owns off-campus properties which can be categorized under option 1 for this credit. These properties have native and adapted vegetation in place. It is recommended that the design team coordinates with the Campus Planning GIS group for more documentation.

SUSTAINABLE SITES (BD+C)

SSc3: Open Space

HIGH PRIORITY
MEDIUM FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities.

LEED CREDIT REQUIREMENTS

- Provide outdoor space greater than or equal to 30% of the total site area
- Minimum 25% of outdoor space must be vegetated or have vegetated overhead canopy
- Outdoor space must be physically accessible to one or more of the following:
  - Pedestrian oriented paving area that encourages physical activity
  - Garden with diverse vegetation types and year-round visual interest
  - Designated community garden space or urban food production
  - Preserved or created habitat that meets SSC 2 credit requirements

UMASS CREDIT DISCUSSION

The design of outdoor spaces surrounding campus buildings should be as thorough as the design of the buildings themselves (refer to UMA Design Guidelines). Emphasis should be placed on the development of programmed outdoor spaces, and visitors should have lingering images of a robust, healthy, well-maintained landscape, coordinated with the UMA landscape services. 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.

Southwest Concourse (2011), UMass Amherst

SUSTAINABLE SITES (BD+C/EBOM)

SSc4: Rainwater Management

MEDIUM PRIORITY
MEDIUM FEASIBILITY
POINT POTENTIAL: 3

LEED CREDIT INTENT

To reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region.

LEED CREDIT REQUIREMENTS

Option 1 - Path 1. 98th Percentile of rainfall events

- Manage (on site) rainwater runoff from the developed site for 95th percentile of regional rain fall events using low-impact development standards and green infrastructure

Option 2 Natural land cover conditions

- Manage on site the annual increase in runoff volume from the natural land cover condition to the post-developed condition

For EBOM: Use low-impact development (LID) practice to capture and treat water from 25% of the impervious surfaces for the 95th percentile storm event., besides, Establish and implement an annual inspection program

Green Roof, Integrative Learning Center, UMass Amherst

Raingarden, Life Sciences Laboratories, UMass Amherst

UMASS CREDIT DISCUSSION

UMA compliance for this credit will be driven primarily by Mass DEP regulations. The existing sewage water system is overburdened and managing rain water quantities on campus is a priority. The use of retention ponds is highly limited on the core campus due to space constraints; however, UMA has been successful with on-site infiltration using rain gardens and bio-swales for some sites (LSL2, the Integrative learning Center for Roof gardens, and Studio Arts and the Southwest Concourse have integrated rain gardens). Underground storage of water for reuse in cooling and wastewater systems should be investigated by design teams.

SUSTAINABLE SITES (BD+C)

SSc5: Heat Island Reduction- Roof and Non-Roof

HIGH PRIORITY
MEDIUM FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To minimize effects on microclimates, human, and wildlife habitats by reducing heat islands.

"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.

LEED CREDIT REQUIREMENTS

Option 1. Non-Roof and Roof (2 points) : Meet the criterion specified by USGBC

- Alternatively, an SRI and SR weighted average approach may be used to calculate compliance. For non-roof measures, use any combination of the following strategies:
- Use new or existing plant material to provide shade over paving areas within 10 years of planting
- Provide shade with structures that are covered by energy generation systems
- Provide shade with architectural devices that have a 3-year SR value of at least .28
- Provide shade with vegetated structures
- Use paving materials with a 3-year SR value of at least .28
- Use an open-grid pavement system

Option 2. Parking Under Cover (1 Point):

- Place minimum 75% of parking spaces under cover, Any roof used to shade the area must (1) have a 3-year SRI of at least 32 (2) be a vegetated roof, or (3) be covered by energy generation systems

Minimum Solar Reflecance Index Value, by roof slope

	Slope	Initial SRI	3-Years Aged SRI
Low Sloped Roof	≤2:12	82	64
Steep-Sloped Roof	>2:12	39	32

UMASS CREDIT DISCUSSION

At UMA, roofing choice is highly dependent on project budget and building use. The University currently has some experience in vegetated roof systems. The design team should consult with Physical Plant for more information.

At UMA, a balance is sought between having green, leafy spaces and allowing for views and a composed campus appearance. For this reason, the shading option of this credit may not be viable for many sites. The design team is expected to provide options with a high SRI (standard concrete has an SRI of 35) that will also provide a clear distinction between pedestrian paths and vehicular circulation, and reduce the heat island effect.

Integrative Learning Center Green Roof (2014), UMass Amherst

SUSTAINABLE SITES (BD+C)

SSc6: Light Pollution Reduction

HIGH PRIORITY
MEDIUM FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.

LEED CREDIT REQUIREMENTS

Meet requirements for all exterior luminaries located inside the project boundary using the calculation method (Option 2).

- The photometric characteristics of each luminaire when mounted in same orientation and tilt as specified in project design
- Classify the project under one lighting zone using the lighting zones definitions provided in the illuminating IES/IDA Model Lighting Ordinance User Guide

The Integrative Learning Center Illuminates the Campus from Within, with Some Strategically Placed Outoor Lighting to Accent Major Walkways (2014), UMass Amherst

UMASS CREDIT DISCUSSION

Night lighting plays an important 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. UMA is currently moving towards new design standards for lighting systems on campus. Credit compliant light fixtures may be recommended as a new campus design standard.

SUSTAINABLE SITES (EBOM)

SSp1: Site Management Policy

REQUIRED

LEED CREDIT INTENT

To preserve ecological integrity and encourage environmentally sensitive site management practices that provide a clean, well-maintained, and safe building exterior.

LEED CREDIT REQUIREMENTS

Create and implement a site management policy that employs best management practices to reduce harmful chemical use, energy waste, water waste, air pollution, and/or chemical run off.

- Use of low emission maintenance equipment
- Snow and ice removal
- Cleaning of building exterior, pavement, and other impervious surfaces
- Erosion and sedimentation control
- Organic waste management
- Invasive and exotic plant species management
- Fertilizer use
- Irrigation management

UMASS CREDIT DISCUSSION

Currently UMA does not have comprehensive site management policy. For each of these requirements, UMA landscape services follow different procedures. Landscape services will work with the design team to write and adapt a comprehensive site management policy for EBOM projects.

SUSTAINABLE SITES (EBOM)

SSc3: Heat Island Reduction- Roof and Non-Roof

HIGH PRIORITY
MEDIUM FEASIBILITY
POINT POTENTIAL: 1-2

LEED CREDIT INTENT

To minimize effects on microclimates, human, and wildlife habitats by reducing heat islands.

"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.

LEED CREDIT REQUIREMENTS

May use any combination of the following options, to earn up to 2 points for this credit

- Option 1. Non-Roof : Use any combination of the following strategies for 50% of site paving:
  - Use the existing plant materials or install plants or vegetated planters
  - Provide shade with structures covered by energy generation systems
  - Provide shade with architectural devices or vegetated structures
  - Use the paving and materials with a three year aged solar reflectance (SR) value of at least 0.28.
- Option 2. Roof (1 point) : Use either roofing materials with SRI equal to or greater than the values in table for a minimum of 75% of the roof area, or vegetated roof for a minimum of 50% of the area, or both. If using both, meet the following criterion:
- Option 3. Non-Roof and Roof (2 points) : Meet the following criteria:

	Slope	Initial SRI	3-Years Aged SRI
Low Sloped Roof	≤2:12	82	64
Steep-Sloped Roof	>2:12	39	32

UMASS CREDIT DISCUSSION

At UMA, a balance is sought between having green, leafy spaces and allowing for views and a composed campus appearance. For this reason, the shading option of this credit may not be viable for many sites. The design team is expected to provide options with a high SRI (standard concrete has an SRI of 35) that will also provide a clear distinction between pedestrian paths and vehicular circulation as well as reduce heat island effect.

To achieve this credit, the design team needs to coordinate with Physical Plant landscape services in order to improve the operation and maintenance of the project.

Light Colored Walkways Have A Low SRI. Photo Taken From ILC Rooftop

SSc3 Continued: Heat Island Reduction- Roof and Non-Roof

- Option 4. Parking under Cover (1 point)
  - ESTABLISHMENT
    - Place at least 50% of parking spaces under cover. Any roof used to shade or cover parking must (1) have a three-year aged SRI of at least 32 (if three-year aged value information is not available, use materials with an initial SRI of at least 39 at installation), (2) be a vegetated roof, or (3) be covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.
  - PERFORMANCE
    - Implement a maintenance program that ensures all SRI surfaces are cleaned at least every three years to maintain good reflectance, and all vegetated roofs are maintained for plant health and good structural condition.

SUSTAINABLE SITES (EBOM)

SSc4: Light Pollution Reduction

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To minimize light trespass from the building and site, reduce sky-glow, improve nighttime visibility, and reduce impact on nocturnal environments.

LEED CREDIT REQUIREMENTS

Option 1. Fixture Shielding:

- Shield all exterior fixtures (where sum of the mean lamp lumens for that fixture exceeds 2,500) such that installed fixtures do not directly emit any light at a vertical angle more than 90 degrees from straight down.
- Provides fixture schedule showing exterior luminaire and lumen information and luminaire shielding information.

Lighting Interspersed Through Southwest Concourse Improves Campus Safety Without Contributing to Light Pollution

UMASS CREDIT DISCUSSION

Night lighting plays an important role in making the UMA campus more inviting, both enhancing the usability of outdoor spaces and improving safety. This LEED credit requires adherence to a lighting power density threshold, as well as provisions to prevent sky glow. The University is currently moving towards new design standards for lighting systems on campus. Credit compliant light fixtures may be recommended as a new campus design standard.

SUSTAINABLE SITES (EBOM)

SSc5: Site Management

LOW PRIORITY
DIFFICULT FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To preserve ecological integrity and encourage environmentally sensitive site management practices that provide a clean, well-maintained, and safe building exterior while supporting high performance building operations and integration into the surrounding landscape.

LEED CREDIT REQUIREMENTS

Option 3: reduction in emission from site management equipment :

- Show and maintain a 50% reduction in hydrocarbon (HC) and nitrogen oxide (NO2) emissions, and a 75% reduction in carbon monoxide (CO) emissions from baseline condition.

UMASS CREDIT DISCUSSION

Currently UMA does not have comprehensive site management policy. The University supports option 3 (the only one listed above) as the best option to pursue if the project hopes to achieve this credit. For each of these requirements, UMA landscape services follow different procedures. Landscape Services will work with the design team to write and adapt a comprehensive site management policy for EBOM projects.

SUSTAINABLE SITES (EBOM)

SSc6: Site Improvement

MEDIUM PRIORITY
MEDIUM FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To preserve and improve ecological integrity while supporting high-performance building operations.

LEED CREDIT REQUIREMENTS

Develop a five-year site improvement plan that includes the following:

- documentation of existing site conditions
- site improvement objectives
- performance standards to evaluate ongoing progress
- and monitoring protocols

UMASS CREDIT DISCUSSION

Currently UMA does not have a comprehensive site management policy. For each of these requirements, UMA Landscape Services follow different procedures. Landscape Services will work with the design team to write and adapt a comprehensive site management policy for the EBOM projects.

The plan must be developed in coordination with Landscape Services. A new improvement plan with no-cost and low-cost measures must be implemented every five years.

Beyond LEED: Sustainable Sites

UMASS DISCUSSION

Beyond any specific project, the University hopes to develop a campus-wide landscape management plan that will help to inform decisions related to the LEED projects on campus. Projects that are sited on green fields are further encouraged to consider designing to the NZEB and/or the LBC certification.

WATER EFFICIENCY

Summary

Possible Points

- BD+C (New Construction and Major Renovation): 16 points
- ID+C (Commercial Interiors): 17 points
- EBOM (Operations & Maintenance Existing Buildings): 17 points

UMA is located in a temperate forest climate zone, characterized by four distinct seasons and evenly distributed precipitation levels throughout the year. However, unseasonal drought periods plague the western region of Massachusetts; the most recent occurrence in summer 2010, when precipitation levels dropped to 5 inches below the seasonal average. UMA recognizes water as an invaluable resource, an abundance of which should never be taken for granted. For all campus projects, UMA expects the design teams to consider all potential options to reduce water consumption.

UMA gets its potable water from the Town of Amherst, sourced from several reservoirs and wells in the area. A diverse set of water conservation strategies should be considered for new construction and major renovation projects, and can be an effective solution for limiting waste within the budget and project scope constraints. On the micro level, a building's water conservation goals can be addressed by the selection of efficient fixtures and fittings. Specific goals to achieve efficient water use should be pursued, with simultaneous consideration for maintenance requirements and durability. Computer simulation of the projects' water use is encouraged by UMA, to be used as a decision making tool during the design phase. These goals will help the design team to realize the most effective solutions early in the project timeline.

WATER EFFICIENCY

BD+C Summary: 11 Possible Points

2 High Priority	3 Easy Feasibility
1 Medium Priority	1 Moderate Feasibility
1 Low Priority	0 Difficult Feasibility

WATER EFFICIENCY

ID+C Summary: 2 Possible Points

Note:
There are only two ID+C credits for the Water Efficiency Category, both of which are also part of BD+C: the required prerequisite and one other overlapping credit with awarded points differing based on category.

The LEED ID+C category, or Interior Design and Construction, applies to projects with a minimum of 250 square feet (22 square meters) of gross floor area. Projects are certified in this category if they are solely fit-outs of interior space. In addition, at least 60% of the project's gross floor area must be complete by the time of certification.

WATER EFFICIENCY

EBOM Summary: 12 Possible Points

The LEED EBOM, or Existing Buildings: Operations and Maintenance category, provides an opportunity to earn credit towards a project's LEED certification for programs established to monitor a building after construction is complete. The EBOM credits for the Water Efficiency category are the same as the BD+C category. However, some credits differ in number of achievable points depending on rating system (see points listed above for EBOM section).

Since UMA has not yet completed EBOM for Water Efficiency, the University encourages design teams to provide consultation for implementation of this LEED section at the UMass campus.

WATER EFFICIENCY (BD+C)

WEp1: Outdoor Water Use Reduction

REQUIRED

LEED CREDIT INTENT

To reduce outdoor water consumption.

LEED CREDIT REQUIREMENTS

Reduce outdoor water use per the following option:

- Option 1. No irrigation required
  - Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period.

Atkins Reservoir, Town of Amherst Water Supply

UMASS CREDIT DISCUSSION

At UMA, water use reduction is a high priority.

UMA receives a significant amount of rainfall over the course of the year, due to its location in a temperate forest climate zone. This climate type is second only to rain forests in terms of annual precipitation figures. UMA expects project teams to make sustainability-informed choices in vegetation/ground-cover selection. The hope is that fueling this part of the design discussion with a strong knowledge-base will eliminate the need for permanent irrigation, by taking advantage of participants well-versed in water efficiency strategies and landscaping methods, to incorporate plant materials best suited to the site in question.

WATER EFFICIENCY (BD+C/ID+C/EBOM)

WEp2: Indoor Water Use Reduction

REQUIRED

LEED CREDIT INTENT

To reduce indoor water consumption.

LEED CREDIT REQUIREMENTS

- For fixtures and fittings (water closets, urinals, lavatory faucets, showers, kitchen sink faucets, and pre-rinse spray valves), as applicable to the project scope, reduce aggregate water consumption by 20% from the baseline.
- Newly installed fixtures and fittings that are eligible for labeling must be Water Sense labeled

INTEGRATIVE LEARNING CENTER (2014) DUAL FLUSH TOILETS, UMASS AMHERST

UMASS CREDIT DISCUSSION

Potable water at UMA comes from the Town of Amherst, procured from seven different sources in the watershed (wells/aquifers and reservoirs). Drought-like conditions in 1980, coupled with the water usage by the student body and a cluster of unseasonably hot days, culminated in a campus evacuation due to water crisis. This historic event highlights the importance of water use reduction for UMA, to minimize future water shortages on campus.

All fixtures shall meet this prerequisite, which requires a 20% indoor water use reduction over the baseline. Toilets with 1.28 gpf have historically been satisfactory at clearing the bowl. UMA highly recommends that fixture decisions be made an integrative effort between the design team and plumbing engineer for optimized performance of the systems, since pipe slope and arrangement of other water-consuming appliances in the pipe network can considerably influence the conveyance of waste through the pipes. Lavatory faucets with automatic controls and low-flow shower heads are highly favorable.

WATER EFFICIENCY (BD+C/EBOM)

WEp3: Building Level Water Metering

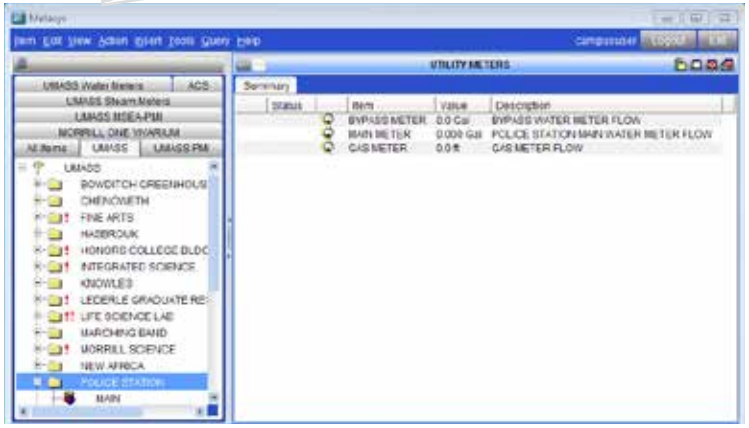
REQUIRED

LEED CREDIT INTENT

To support water management and identify opportunities for additional water savings by tracking water consumption.

LEED CREDIT REQUIREMENTS

- Keep track of the project's total potable water use (building and associated grounds)
- Provide monthly and annual summaries of meter water consumption data
- Commit to sharing the resulting whole project water consumption data with USGBC for a five-year period



UMA Metasys Interface, Police Station

UMASS CREDIT DISCUSSION

UMA has the privilege of having an in-house campus-wide building management system (Metasys) that compiles water usage data for all major buildings (over 29,000 SF) at the building level. This data is collected using pulse meters and automatically tallied through Metasys. All new construction and renovation projects will be added to this system to produce monthly and annual consumption figures (A small number of buildings are not connected to Metasys and are being manually read every month).

UMA commits to share the data with USGBC via Energy Star's Portfolio Manager.

WATER EFFICIENCY (BD+C/EBOM)

WEc1: Outdoor Water Use Reduction

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To reduce outdoor water consumption.

LEED CREDIT REQUIREMENTS

Reduce outdoor water use per the following option:

- Option 1. No irrigation required
  - Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period.

UMASS CREDIT DISCUSSION

UMA requires project teams to design landscaping that does not need permanent irrigation. Gardens with irrigation needs might be designed in select cases and also for educational purposes. In these cases, feasibility of using a storm-water harvesting system should be studied.

UMA highly encourages project teams to integrate building, landscape and storm-water collection system design to ensure optimized outdoor water usage.

WATER EFFICIENCY (BD+C/ID+C/EBOM)

WEc2: Indoor Water Use Reduction

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 6

LEED CREDIT INTENT

To reduce indoor water consumption.

LEED CREDIT REQUIREMENTS

- Further reduce fixture and fitting water use from calculated baseline in WE Prerequisite Indoor Water Use Reduction
- Additional potable water use reduction can be achieved by using alternative water sources

UMASS CREDIT DISCUSSION

An integrative approach between the design team and plumbing engineer is required to achieve this credit. Creative fixture and fitting design is necessary to achieve a greater than 20% reduction in water use (required by WEP 2).

UMA has not had a positive experience with water-less urinals. Using gray water systems is recommended for flush fixtures, though it is highly dependent on project scope and design (as long as the gray water harvesting systems are easy to manage/maintain). Gray water use must be considered during the early stages of design.

WATER EFFICIENCY (BD+C/EBOM)

WEc3: Cooling Tower Water Use

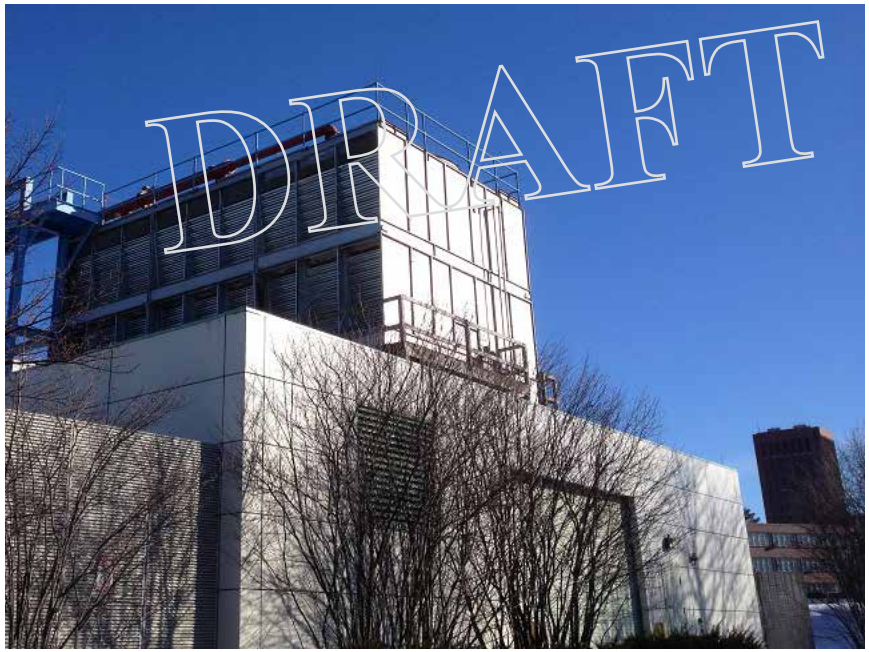
MEDIUM PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1-2

LEED CREDIT INTENT

To conserve water used for cooling tower makeup while controlling microbes, corrosion, and scale in the condenser water system.

LEED CREDIT REQUIREMENTS

- For cooling towers and evaporative condensers, conduct a one-time potable water analysis
- Achieve minimum 10 cycles by increasing level of treatment in condenser or make-up water OR achieve the number of cycles for 1 point and use a minimum 20% recycled non-potable water



Cooling Tower at UMass

UMASS CREDIT DISCUSSION

UMass has an appointed water treatment specialist in house who completes regular testing of make-up water in cooling towers. This credit is easily achievable by coordinating with our specialist to provide the required reporting of the control parameters listed in this LEED credit.

WATER EFFICIENCY (BD+C/EBOM)

WEc4: Water Metering

LOW PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To support water management and identify opportunities for additional water savings by tracking water consumption.

LEED CREDIT REQUIREMENTS

Install permanent water meters for two or more of the following water subsystems:

- Meter water use of at least 80% installed domestic hot water heating capacity
- Meter water systems serving at least 80% of indoor fixtures and fittings
- Meter reclaimed water, regardless of rate
- Irrigation: Meter water systems serving at least 80% of the irrigated landscaped area

UMASS CREDIT DISCUSSION

Two of the requirements are especially applicable to UMA project types and scope:
Metering domestic hot water use is one of the easiest options. Water use metering for irrigation should only be implemented for unique situations such as educational gardens or permaculture programs that are associated with the building.
UMA keeps track of reclaimed water and make-up town water use for the Central Heating Plant. Additional, separate reclaimed water metering also depends on the project type and scope, and the project's potential for gray water systems.
Separate metering of pools, dishwashers, clothes washers, and other subsystems that use process water should be considered whenever feasible. UMA expects design teams to include whole-building water meters as well as separate metering for hot water.

Beyond LEED: Water Efficiency

UMASS DISCUSSION

The University hopes to rework the current approach to storm water management and irrigation. With LEED regulations, each project addresses Water Efficiency requirements independently. The Landscape Management Services on campus would like to work towards a more integrated system and process across campus.

Many buildings are landscaped with native plant species and drought tolerant plants. However, irrigation is still used in most cases to maintain the many grassy lawns and to help establish new plant material.

Ideally, design teams should focus on implementing landscape materials that would truly (after being established) not need the support of an irrigation system.

ENERGY & ATMOSPHERE

Summary

Possible Points

- BD+C (New Construction and Major Renovation): 33 points
- ID+C (Commercial Interiors): 38 points
- EBOM (Operations & Maintenance Existing Buildings): 38 points

This category is one of the most important for the University. As a state institution, UMA is responsible for reducing both greenhouse gas emissions and operating costs associated with utility use. Energy efficient buildings have economic value and UMA strives to build as sustainably as possible.

The UMA Central Heating Plant (completed in 2008) replaced a coal-burning facility dating back to 1918. It produces steam and electricity by burning natural gas and oil. As new buildings come online 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 Energy and Atmosphere credits – Optimize Energy Performance, Enhanced Commissioning, and Advanced Energy Metering – 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.

ENERGY & ATMOSPHERE

BD+C Summary: 33 Possible Points

5 High Priority	5 Easy Feasibility
2 Medium Priority	2 Moderate Feasibility
0 Low Priority	0 Difficult Feasibility

ENERGY & ATMOSPHERE

ID+C Summary: 38 Possible Points

Note:
Categories for ID+C are similar to BD+C, except that some credits are omitted from ID+C and achievable points differ marginally depending on the type of construction (see ID+C points listed above).

The LEED ID+C category, or Interior Design and Construction, applies to projects with a minimum of 250 square feet (22 square meters) of gross floor area. Projects are certified in this category if they are solely fit-outs of interior space. In addition, at least 60% of the project's gross floor area must be complete by the time of certification.

6 High Priority	3 Easy Feasibility
2 Medium Priority	5 Moderate Feasibility
0 Low Priority	0 Difficult Feasibility

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAp1: Fundamental Commissioning and Verification

REQUIRED

LEED CREDIT INTENT

To support the design, construction, and eventual operation of a project that meets the owner's project Requirements for energy, water, indoor environmental quality, and durability.

LEED CREDIT REQUIREMENTS

- By the end of DD phase, engage a Commissioning Authority (CxA) with the following qualifications: experience on at least 2 building projects with similar scope of work; is not part of the design team (except for projects <20,000 SF)
- Review the OPR, BOD, and project design. Develop and implement a Cx Plan. Incorporate Cx into the project design. Develop construction checklists, system test procedures, and prepare a final Cx process report.
- Prepare and maintain a Facilities Requirements and O&M Plan.

UMASS CREDIT DISCUSSION

It is important to understand that the CxA needs to be engaged before the Design Development (DD) phase of the project is complete. Also note that elements of envelope commissioning are now incorporated in the OPR and BOD. Finally, one design review and one operations and maintenance plan are now required under LEED v4.

UMA has completed the Measurement & Verification Guidelines & Template Plan for implementation at the campus. Design teams can access the summary and complete document intent on the Sustainable UMass website.

For more information and to download the files, please follow this link to the UMass Campus Planning website Campus Development Guidelines page (resources tab):

https://www.umass.edu/cp/campus-development-guidelines

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAp2: Minimum Energy Performance

REQUIRED

LEED CREDIT INTENT

To reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.

LEED CREDIT REQUIREMENTS

Fulfill one of the following requirements:

- Demonstrate energy improvement of 5% for new construction, 3% for major renovations, or 2% for core and shell projects in proposed building performance rating compared with baseline rating
- Comply with mandatory and prescriptive provisions of ASHRAE Standard 90.1-2010, Appendix G.
- Create a computer simulation model for the whole building project or follow prescriptive guidelines for energy improvements (depending on building size and type.)

UMASS 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 (2004) by Fiscal Year 2012 and a 35% improvement in energy usage over MA Energy Code (2004) by Fiscal Year 2020. By following this prerequisite, design teams will meet and exceed Executive Order 484, since the current MA Energy Code (2012) is based on ASHRAE 90.1-2010, which has an overall energy usage improvement of 30%.

It is important to note that UMA has an Energy Modeling Guideline to share with design teams, which provides basic assumptions, parameters, and precedents for computer simulation models or alternative modeling appraoches for campus.

The computer simulation model developed for this prerequisite should be submitted to UMA in order to be implemented in future campus M&V efforts.

ENERGY & ATMOSPHERE (BD+C)

EAp3: Building Level Energy Metering

REQUIRED

LEED CREDIT INTENT

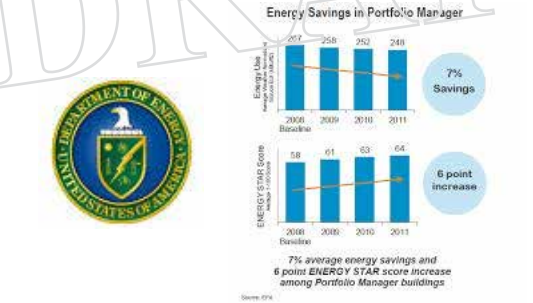
To support energy management and identify opportunities for additional energy savings by tracking building-level energy use.

LEED CREDIT REQUIREMENTS

Install or use existing building-level energy meters that can be aggregated to provide building-level data representing total building energy consumption, including:

- Electricity
- Natural gas
- Chilled water
- Steam/hot water
- Others (fuel oil, propane, biomass, etc.)

Commit to sharing resulting data with USGBC for five years after project accepts LEED certification



UMASS CREDIT DISCUSSION

Currently, UMA maintains in-house stewardship of all energy consumption data for all buildings on campus via the campus-wide building management system (Metasys). Commitment to sharing data with USGBC will be via Energy Star's Portfolio Manager.

Regarding electrical sub-metering, UMA asks design teams to accomplish a goal of providing and displaying system-level energy demand and consumption (i.e. lighting, plug loads, HVAC, etc.) for the building.

When possible, motion sensors and swipe card access doors should be monitored and recorded through the building management system to measure occupancy. All metered data should feed into this system (Metasys.)

EAp4/EAp3: Fundamental Refrigerant Management

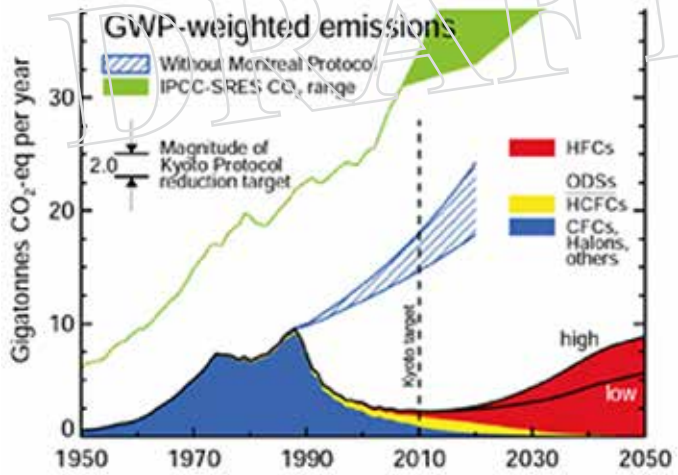
REQUIRED

LEED CREDIT INTENT

To reduce stratospheric ozone depletion.

LEED CREDIT REQUIREMENTS

- Do not use CFC-based refrigerants in new heating, ventilating, air-conditioning, and HVAC&R systems
- When re-using existing equipment, complete comprehensive CFC phase-out conversion before project completion
- Small HVAC&R units with less than 0.5 lb. of refrigerant are exempt



THE MONTREAL PROTOCOL HAS IMPLEMENTED REAL CHANGETOWARDS A HEALTHIER PLANET

UMASS 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 R123 refrigerants, both of which are compliant with this prerequisite.

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAc1: Enhanced Commissioning

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 4-6

LEED CREDIT INTENT

To further support the design, construction, and eventual operation of a project that meets the
owner's project Requirements for energy, water, indoor environmental quality, and durability.

LEED CREDIT REQUIREMENTS

- Option 1, Path 2 – Enhanced Cx with MBCx (4 pts): Complete CxP activities for mechanical, electrical, plumbing, and renewable energy systems in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC&R systems as they relate to energy, water, indoor environmental quality, and durability. In addition, develop MBCx procedures and identify points to be measured and evaluated to assess performance of energy and water consuming systems.
- Option 2 – Envelope Cx (2 pts): Complete CxP activities for the building's thermal envelope in accordance with ASHRAE Guideline 0-2005 and the NIBS Guideline 3-2012 (Exterior Enclosure Technical Requirements for the Commissioning Process), as they relate to energy, water, indoor environmental quality, and durability.

UMASS CREDIT DISCUSSION

Prior to LEED v4, UMA required the Measurement & Verification (M&V) process to be implemented on all new construction or major renovation projects. Long-term, it behooves UMA to have physical monitoring systems in place, so the facilities team can implement MBCx over the life of the building. Although building-level metering is now a prerequisite in LEED v4, UMA asks the design teams to implement system-level metering (i.e. sub-metering) for all new projects. Due to these assumptions, UMA advocates Option 1, Path 2, which includes enhanced systems Cx and MBCx, as a minimum acceptable level of quality.

UMA encourages the consideration of Option 2 when applying for this credit.

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAc2: Optimize Energy Performance

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1-18

LEED CREDIT INTENT

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.

LEED CREDIT REQUIREMENTS

Demonstrate a % improvement above EAP 2 in the proposed building performance rating compared with the baseline. Points for % improvement in energy performance follow the following range:

- For New Construction projects: 6% (for 1 point) up to 50% (for 18 points)
- For Major Renovation projects: 4% (for 1 point) up to 48% (for 18 points)
- For Core and Shell projects: 3% (for 1 point) up to 47% (for 18 points)

UMASS CREDIT DISCUSSION

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.

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAc3: Advanced Energy Metering

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To support energy management and identify opportunities for additional energy savings by tracking building-level and system-level energy use.

LEED CREDIT REQUIREMENTS

Install advanced energy metering for the following:

- All whole-building energy sources used by the building
- Individual energy uses that represent 10% + of total annual building consumption
- Meters must be permanently installed, record at minimum intervals of 1 hr., and transmit data to remote location
- Electricity meters must record both consumption and demand
- Data collection system must use local area network, or comparable network
- System must be capable of storing all meter data for minimum 36 months
- Data must be remotely accessible
- All meters must be capable of reporting hourly, daily, monthly, and annual energy use

Facilities & Campus Planning Have Smart Outlets Installed to Track Energy Consumption at the Device Level

UMASS CREDIT DISCUSSION

Currently, UMA maintains in-house stewardship of all energy consumption data for all campus buildings via the campus-wide building management system (Metasys). UMA will share resultant data with USGBC via Energy Star's Portfolio Manager.

Since all metered data should feed into this system (Metasys), UMA posits this credit as falling under easy feasibility due to the requirements outlined in prerequisite 3 (EAP3) mandating building-level metering, as well as UMA's encouragement of the inclusion of sub-metering for new construction projects.

Regarding electrical sub-metering, UMA asks design teams to establish a goal to provide and display system-level energy demand and consumption (i.e. lighting, plug loads, HVAC, etc.) for the building. As an example, Physical Plant implemented a pilot project using a system that monitors and tracks energy use at the device level, as well as the lighting loads and capacity for systems-level metering. These tracking strategies produce data that can be explored through an interactive cloud-based dashboard to help identify the greatest areas of energy loss and create a structure by which UMA can define accountability on a human level.

ENERGY & ATMOSPHERE (BD+C)

EAc4: Demand Response

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1-2

LEED CREDIT INTENT

To increase participation in demand response technologies and programs that make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions.

LEED CREDIT REQUIREMENTS

Case 1. Participate in an existing demand response program (2 points)

- Design a system with the capability for real-time, fully-automated DR based on external initiation by a DR Program Provider. Semi-automated DR may be utilized in practice.
- Enroll in a minimum one-year DR participation amount contractual commitment with a qualified DR program provider, with the intention of multiyear renewal, for at least 10% of the estimated peak electricity demand. Peak demand is determined under EA Prerequisite Minimum Energy Performance.
- Develop a comprehensive plan for meeting the contractual commitment during a Demand Response event.
- Include the DR processes in the scope of work for the commissioning authority, including participation in at least one full test of the DR plan.

Case 2: Demand Response Program not available (1 pt)

- Install interval recording meters with comm and ability for the BAS to accept an external signal.
- Develop a comprehensive plan for shedding at least 10% of building estimated peak kW. (Peak kW is determined under EAP 2.)
- Include the DR process in scope of work for the CxA, including participation in at least 1 full test of the DR plan.
- Contact local utility reps to discuss participation in future DR programs.

UMASS CREDIT DISCUSSION

UMass currently participates in a demand response program. The University can achieve this credit by completing a combination of increased electricity production, a load shed program that is triggered through Metasys, and additional manual intervention. However, none of the recent projects on campus have been added to the Metasys load shed program.

UMA advises design teams to pursue this credit, since it is valuable data for the University and would not be difficult to achieve a 10% reduction in peak demand for a building.

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAc5/EAc4: Renewable Energy Production

MEDIUM PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1-3

LEED CREDIT INTENT

To reduce the environmental and economic harms associated with fossil fuel energy by increasing
self-supply of renewable energy.

LEED CREDIT REQUIREMENTS

- Use renewable energy systems to offset the building energy costs
- Calculate percentage of renewable energy
  - % RE = Equiv. cost of usable energy produced by RE system / Total bldg annual energy cost
  - Points awarded as such:
    - 1 point for 1% RE
    - 2 points for 5% RE
    - 3 points for 10% RE
- The use of solar gardens or community renewable energy systems is allowed if both the following requirements are met:
  - Project owns system or has signed lease agreement for minimum 10 years
  - System is located within same utility service area as facility claiming use

UMASS CREDIT DISCUSSION

All Commonwealth agencies are required to meet the target of 30% of annual electric usage procured from renewable sources by 2020, and the University is aligned with this goal.

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.) 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 ensure the design of the RE system does not compromise the performance of the roofing system.

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

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAc6/EAc5: Enhanced Refrigerant Management

MEDIUM PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.

LEED CREDIT REQUIREMENTS

Option 1:

- Do not use refrigerants, or use only if ozone depletion potential (ODP) = 0 and global warming potential (GWP) < 50

Option 2:

- Select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment that comply with the following formula:

$$\frac{\sum[(LCGWP + LCODP \times 10^5) \times Q_{unit}]}{Q_{total}} \leq 100$$

Refrigerant	ODP	GWP
R-113 Trichlorotrifluoroethan	0.8	4800
R-143a Trifluoroethane	0	4300
R-11 Trichlorofluoromethane	1	4000
R-125 Pentafluoroethane	0	3400
R-404A (44% R-125, 52% R-14	0	3300
R-507 (45% R-125, 55% R-143	0	3300
R-402A (38% R-22, 60% R-125	0.02	2600
R-12 Dichlorodifluoromethan	1	2400
R-407A (20% R-32, 40% R-125	0	2000
R-22 Chlorodifluoromethane	0.05	1700
R-407C (23% R-32, 25% R-125	0	1600
R-134a Tetrafluoroethane	0	1300

Refrigerant	ODP	GWP
R-401B (61% R-22, 28% R-124	0.04	1200
R-401A (53% R-22, 34% R-124	0.37	1100
R-32 Difluoromethane	0	650
R-124 Chlorotetrafluoroethar	0.02	620
R-152a Difluoroethane	0	120
R-502 (48.8% R-22, 51.2% R-1	0.283	4.1
R-114 Dichlorotetrafluoroeth	1	3.9
R-744 Carbon Dioxide - CO2	0	1
R-123 Dichlorotrifluoroethan	0.02	0.02
R-13 B1 Bromotrifluorometha	10	0
R-245a Pentafluoropropane	0	0
R-717 Ammonia - NH3	0	0
R-718 Water - H20	0	0
R-729 Air	0	0

UMASS CREDIT DISCUSSION

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 (highlighted on chart). While these refrigerants have very low Ozone Depletion Potentials (ODPs) and moderate Global Warming Potentials (GWPs), project specific calculations will be necessary to determine credit compliance. Design teams should consider the use of refrigerants with even lower ODP and GWP while performing a life cycle cost analysis for each option.

ENERGY & ATMOSPHERE (BD+C/ID+C)

EAc7/EAc6: Green Power and Carbon Offsets

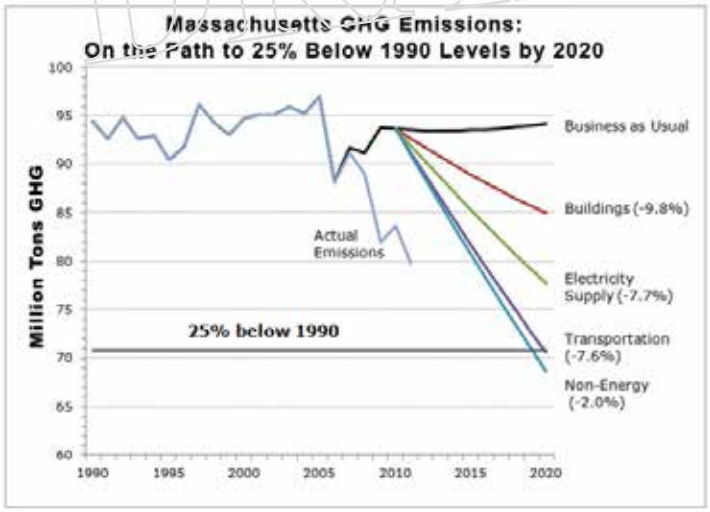
HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1-2

LEED CREDIT INTENT

To encourage the reduction of greenhouse gas emissions through the use of grid-source, renewable energy technologies and carbon mitigation projects.

LEED CREDIT REQUIREMENTS

- Engage in contract for qualified resources for minimum five years, to be delivered at least annually
- Contract must specify provision of at least 50% or 100% of project's total energy from green power, carbon offsets, or renewable energy certificates (RECs)
  - 1 point for 50% RECs; 2 points for 100% RECs
  - Green power & RECs must be Green-e Energy Certified or equivalent
  - Carbon offset may be used to mitigate Scope 1 or Scope 2 emissions (defined by EPA) on a CO_2 MT basis and must be Green-e Energy Certified or equivalent



UMASS CREDIT DISCUSSION

UMA completed the process to purchase Green Power Credits in order to help secure the LEED Gold certification for Hampshire DC. On behalf of the Design and Construction Department at the University, the project manager suggests this is a worthwhile investment in sustainability. It provides an inexpensive approach to achieving more credits for a project, and the process is straightforward. In the case of Hampshire DC, the Architects (Bergmeyer Associates, Inc.) approached UMBA with their interest to pursue Green Power Credits. Many agencies provide green credits and support a variety of carbon offset projects. If UMA continues to value this approach to achieveing LEED credits, the campus may develop a more comprehensive policy that addresses the University's approach to purchasing Green Power.

All Commonwealth agencies are required to reduce GHG emissions resulted from operation by 40% by 2020, and the University is aligned with this goal. In calculating emissions, agencies shall use FY 2002 as the baseline, and emissions reductions shall be measured on an absolute basis and not adjusted for facility expansion, load growth or weather.

ENERGY & ATMOSPHERE (EBOM)

EAp1: Energy Efficiency Best Management Practices

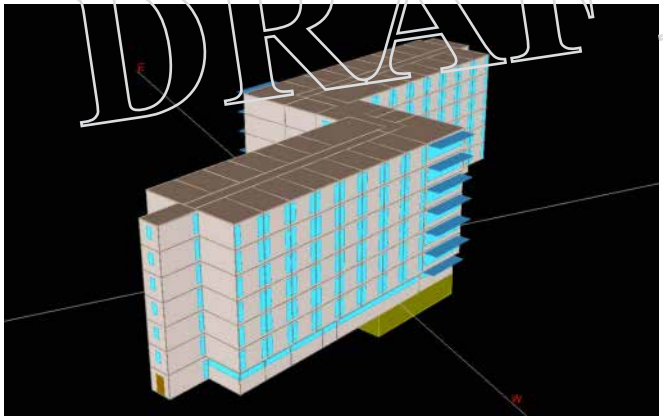
REQUIRED

LEED CREDIT INTENT

To promote continuity of information to ensure that energy-efficient operating strategies are maintained and provide a foundation for training and system analysis.

LEED CREDIT REQUIREMENTS

- Conduct an energy audit that meets both the requirements of the ASHRAE preliminary energy use analysis and an ASHRAE Level 1 walk-through assessment identified in the ASHRAE Procedures for Commercial Building Energy Audits or equivalent.
- Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently



UMass Requires Energy Modeling To Be Completed For All New Construction and Major Renovation Projects

UMASS CREDIT DISCUSSION

UMA has completed the Measurement & Verification Guidelines & Template Plan for implementation at the campus. Design teams can access the summary and complete document intent on the Sustainable UMass website.

For more information and to download the files, please follow this link to the UMass Campus Planning website Campus Development Guidelines page (resources tab):

https://www.umass.edu/cp/campus-development-guidelines

The Measurement & Verification Plan provides a system of feedback to ensure UMA is acheiving energy performance goals for all campus buildings.

UMA does not currently maintain Operations and Maintenance plans for the buildings on campus. However it would not be difficult to create one in advance of an EBOM project for a specific building, in order to complete the EBOM certification. The necessary information is generally available, but is not compiled into one manual/plan.

ENERGY & ATMOSPHERE (EBOM)

EAp2: Minimum Energy Performance

REQUIRED

LEED CREDIT INTENT

To reduce the environmental and economic harms associated with excessive energy use by establishing a minimum level of operating energy performance.

LEED CREDIT REQUIREMENTS

- Calibrate meters within the manufacturer's recommended interval if the building owner, management organization, or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.
- Meter the building's energy use for a full 12 months of continuous operation and achieve the levels of efficiency set forth in the options below.
  - Case 1. ENERGY STAR Rating
    - For buildings eligible to receive an energy performance rating using the EPA ENERGY STAR's Portfolio Manager tool, points are awarded for ENERGY STAR scores above 75
  - Case 2. Projects not eligible for ENERGY STAR Rating
    - Projects not eligible to use EPA's rating system may compare their buildings' energy performance with that of comparable buildings, using national averages or actual buildings, or with the previous performance of the project building.
    - Option 1. Benchmark against typical buildings
    - Path 1. National average data available

UMASS CREDIT DISCUSSION

As previously discussed, UMA utilizes Metasys to track all energy consumption data for campus buildings. All metered data should feed into this system.

In order to use Portfolio Manager, buildings must fall within specific use categories approved by the Energy Star rating system. Not all UMA building types are eligible to receive an Energy Star score. The University recommends eligible building types follow case 1. When that option is not feasible, case 2 path 1 is an appropriate alternative.

Eligible building types on campus:

Data Center
Hotel
Medical Office
Multifamily Housing
Office
Residence Hall/dormitory
Wastewater treatment plant
Worship facility

ENERGY & ATMOSPHERE (EBOM)

EAc1: Existing Building Commissioning- Analysis

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To use the existing building commissioning process to improve building operations, energy, and resource efficiency.

LEED CREDIT REQUIREMENTS

- Evaluate current building performance against performance specifications in the current facilities O+M plan.
- Identify systems and components to be investigated and analyzed as part of existing building or energy audit process and provide a breakdown of estimated resource use for each of these systems.
  - Option 1: Develop an existing building commissioning plan to include the following:
    - Updated current facilities requirements
    - Commissioning team members and their roles and responsibilities
    - Description of approach for identifying facility improvement opportunities
    - Process for reviewing and prioritizing opportunities with owner to develop implementation plan
    - Format and content of eventual deliverables
    - Proposed schedule
  - OR Option 2: complete an energy audit plan following the requirements of ASHRAE Level 2, Energy Survey and Analysis.

UMASS CREDIT DISCUSSION

Commissioning plans and energy audits at UMA are typically done using outside consultants. This would need to be performed in collaboration with the UMA Campus Energy Engineer.

UMA values commissioning on campus in order to accrue energy data that will help the University better understand current energy use trends on campus and evaluate the best approaches to energy use reduction in the future. This can also help the campus energy engineer to identify anomalies in energy use so that building energy performance issues can be addressed efficiently.

UMass Energy Dashboard Tracks Campus Buildings' Energy Use.

http://www.bedashboard.com/Kiosk/20

ENERGY & ATMOSPHERE (EBOM)

EAc2: Existing Building Commissioning- Implementation

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To use the existing building commissioning process to improve building operations, energy and resource efficiency.

LEED CREDIT REQUIREMENTS

- Meet requirements of EAC 1
- Apply the following requirements to all directly energy-consuming or energy-producing systems:
  - Implement no (or low) cost operational improvements and develop 5 year plan for equipment replacement and major modifications based on analysis phase.
  - Confirm training of building operations staff.
  - Develop tracking and verification program for all projects implemented as part of the existing building commissioning process.
  - Update O+M plan and current facilities requirements to incorporate newly implemented improvements.

UMASS CREDIT DISCUSSION

For prior NC LEED certification projects, training can be pulled from close-out documentation and O+M manuals.

For non-NC projects, UMA recommends new training workshops that would need to be documented.

To track and verify energy use for implemented projects, all info can be obtained through either the UMA Campus Energy Engineer or Building Maintenance Department.

ENERGY & ATMOSPHERE (EBOM)

EAc3: Ongoing Commissioning

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 3

LEED CREDIT INTENT

To use the existing building commissioning process to improve building operations, energy, and resource efficiency.

LEED CREDIT REQUIREMENTS

- Meet the requirements of EAC 1 and EAC 2
- Establish an on-going commissioning process that includes planning, point monitoring, system testing, performance verification, corrective action response, ongoing measurements, and documentation to proactively address operating problems in the systems being commissioned.
  - Frequency of analysis during 1st year (at least quarterly) and subsequent analysis cycle (at least bi-annually)
- Update the systems manual with any modifications or new settings
- Continue to update the facilities O+M plan to reflect actual conditions, and issue annual revisions of these documents.
- Only activities associated with ongoing Cx completed within 2 years of the application may be included to show progress.

UMASS CREDIT DISCUSSION

As previously discussed, UMA has completed the Measurement & Verification Guidelines & Template Plan for implementation at the campus. Design teams can access the summary and complete document intent on the Sustainable UMass website.

For more Information and to download the files, please follow this link:

https://www.umass.edu/cp/campus-development-guidelines

ENERGY & ATMOSPHERE (EBOM)

EAc4: Optimize Energy Performance

HIGH PRIORITY
MEDIUM FEASIBILITY
POINT POTENTIAL: 1-20

LEED CREDIT INTENT

To reduce environmental and economic harms associated with excessive energy use by achieving higher levels of operating energy performance.

LEED CREDIT REQUIREMENTS

Demonstrate increased energy efficiency improvement beyond EA Prerequisite Minimum Energy Performance as described below. Each building must provide a full 12 months of continuous actual metered energy data.

Case 1. ENERGY STAR Rating (3–20 points)

- For buildings eligible to receive an energy performance rating using the EPA ENERGY STAR's Portfolio Manager tool, points are awarded for ENERGY STAR scores above 75

Case 2. Projects not eligible for ENERGY STAR Rating

- Projects not eligible to use EPA's rating system may compare their buildings' energy performance with that of comparable buildings, using national averages or actual buildings, or with the previous performance of the project building.
- Option 1. Benchmark against typical buildings (1–20 points)
- Path 1. National average data available (1–20 points)
- Demonstrate energy efficiency performance that is at least 26% better than the median energy performance for typical buildings of similar type by benchmarking against national average source energy data provided in the Portfolio Manager tool.

UMASS CREDIT DISCUSSION

Currently, UMA maintains in-house stewardship of all energy consumption data for all campus buildings via the campus-wide building management system (Metasys). UMA will share resultant data with USGBC via Energy Star's Portfolio Manager.

In order to use Portfolio Manager, buildings must fall within specific use categories approved by the Energy Star rating system. Not all UMA building types are eligible to receive an Energy Star score. The University recommends eligible building types follow case 1. When that option is not feasible, case 2 path 1 is an appropriate alternative.

Eligible building types on campus:

Data Center
Hotel
Medical Office
Multifamily Housing
Office
Residence Hall/dormitory
Wastewater treatment plant
Worship facility

ENERGY & ATMOSPHERE (EBOM)

EAc5: Advanced Energy Metering

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To support energy management and identity opportunities for additional energy savings by tracking building-level and system-level energy use.

LEED CREDIT REQUIREMENTS

Install advanced energy metering for the following:

- All whole-building energy sources used by the building and major end uses that represent 20% or more of total annual consumption by the building, minus plug load use.
- Advanced energy metering must be permanently installed.
- Data collection system must use local area network or comparable communication infrastructure.
- The system must be capable of storing all meter data for at least 36 months.
- Program energy management system to set an alarm whenever energy consumption and peak demand rise above anticipated by more than 5%.
- On at least a monthly basis, report facility's utility peak demand and total consumption and compare it with data for the previous month and the same month from the previous year.

UMASS CREDIT DISCUSSION

As previously discussed, UMA utilizes Metasys to track all energy consumption data for campus buildings. All metered data should feed into this system.

UMA's encourages the inclusion of sub-metering for existing buildings. Since the building management system is already in place for the campus, easy feasibility for achievement of credit requirements is dependent on installation of building-level meters and sub-meters for UMA projects.

ENERGY & ATMOSPHERE (EBOM)

EAc6: Demand Response

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1-3

LEED CREDIT INTENT

To increase participation in demand response technologies and programs that make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions.

LEED CREDIT REQUIREMENTS

Evaluate building systems and equipment for participation in a demand response program. On-site electricity generation does not meet the intent of this credit.

- Case 1. Participate in an existing demand response (DR) program and complete the following activities (3 Points):
  - Have fully automated DR system in place, based on external initiation by a DR program provider. Semi-automated DR may be utilized in practice.
  - Enroll in min. one-year DR contractual commitment with a qualified DR program provider, with the intention of multiyear renewal, for at least 10% of annual peak electricity demand (based on electric utility bills)
  - Develop comprehensive plan to meet contractual commitment during a DR event
  - Include DR processes in current facilities requirements and O+M plan
  - Initiate at least one full test of the DR plan
- Case 3. Permanent load shifting. Implement electrical load shifting measures with the following requirements (2 Points):
  - Have system in place during performance period which permanently transfers electricity demand from peak hours to off-peak hours (defined by the local utility provider)
  - Demonstrate the facility successfully reduces peak demand by 10% during performance period as compared to peak electrical demand by:
    - Identifying all load shifting measures and their intended peak electrical load shift
    - Verifying corresponding peak electrical load reduction for each measure
    - Verifying corresponding off-peak electrical load increase for each measure
    - Include load shifting measures in current facilities requirements and O+M plan.

UMASS CREDIT DISCUSSION

This credit is also part of the BD+C section. As mentioned there, UMass does currently participate in a demand response program,. The University can achieve this credit by completing a combination of increased electricity production, a load shed program that is triggered through Metasys, and additional manual intervention. However, none of the recent projects on campus have been added to the Metasys load shed program.

For the EBOM category, Demand Response has the potential to earn up to 3 LEED points for the project. UMA advises design teams to pursue this credit, since it is valuable data for the University and would not be difficult to achieve a 10% reduction in peak demand for a building.

ENERGY & ATMOSPHERE (EBOM)

EAc7: Renewable Energy and Carbon Offsets

MEDIUM PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 5

LEED CREDIT INTENT

To encourage the reduction of greenhouse gas emissions through the use of local and grid-source renewable energy technologies and carbon mitigation projects.

LEED CREDIT REQUIREMENTS

Demonstrate one or both of the following for at least a portion of the building's total energy use:

- Total energy use is met directly with renewable energy systems
- A minimum 2-year contract is in place, with the commitment to renew on an ongoing basis, to purchase qualified resources that will be delivered at least annually. Resources must have come online after January 1, 2005.
- Meet at least some of the building's total energy use directly with renewable energy systems, or engage in a contract to purchase green power, carbon offsets, or Renewable Energy Certificates (RECs).

UMass Robsham Memorial Visitor Center, Solar Parking Lot Canopy Pilot Project

UMASS CREDIT DISCUSSION

All Commonwealth agencies are required to meet the target of 30% of annual electric usage procured from renewable sources by 2020, and the University is aligned with this goal.

UMA encourages design teams to consider renewable energy options for all campus projects. The University has identified photovoltaics and solar thermal as the most viable ones. (There is not enough wind in the region to make wind power practical for the campus.) Building site and design should be assessed to ensure a best fit for the chosen technology. Creativity is encouraged when it comes to potential financial structures for the funding of RE generation.

As an alternative to renewable energy sources, UMA has successfully purchased Green Energy Credits for LEED certified buildings in the past . Design teams are encouraged to work with project managers and the Campus Energy Engineer.

ENERGY & ATMOSPHERE (EBOM)

EAc8: Enhanced Refrigerant Management

MEDIUM PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.

LEED CREDIT REQUIREMENTS

Option 1: No refrigerants or low-impact refrigerants (1 point)

- Do not use refrigerants, or use only refrigerants (naturally occurring or synthetic) that have an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of less than 50.

Option 2: Calculation of refrigerant impact (1 point)

- Select refrigerants that are used in HVAC&R equipment to minimize of eliminate the emission of compounds that contribute to ozone depletion and climate change.

UMASS CREDIT DISCUSSION

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 (ODPs) and moderate Global Warming Potentials (GWPs), project specific calculations will be necessary to determine credit compliance. Design teams should consider the use of refrigerants with even lower ODP and GWP while performing a life cycle cost analysis for each option.

Beyond LEED: Energy

UMASS DISCUSSION

UMass encourages design teams to think beyond LEED to consider campus goals that extend beyond any one project. All of the sustainability efforts on campus support the end goal of reduced total energy expenditure.

When possible, design teams are encouraged to consider NZEB certification and/or pilot technologies that could serve future projects as more extensive solutions to overall energy reduction. The University, for example, has a great deal of roof real estate that could be utilized for solar energy production. Currently, the campus mandates that all new projects complete a feasibility study and that they are “solar ready.” As technologies continue to evolve, design teams are responsible to supply feasibility research for innovative solar solutions. Efforts like this can help move the campus towards more significant energy reduction than can be achieved through LEED certification of new buildings alone.

These efforts are important to the University because the campus can only make great progress with great investment by dedicated, creative teams, that work together to achieve a vision for sustainability.

MATERIALS & RESOURCES

Summary

Possible Points

- BD+C (New Construction and Major Renovation): 13 points
- ID+C (Commercial Interiors): 13 points
- EBOM (Operations & Maintenance Existing Buildings): 8 points

The selection of materials for campus buildings is influenced by many different stakeholders. In addition to environmental considerations, user safety & health, durability & maintenance, and cost are all factors. Overall, material selection will be project dependent, 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

BD+C Summary: 13 Possible Points

2 High Priority
3 Medium Priority
0 Low Priority

1 Easy Feasibility
4 Moderate Feasibility
0 Difficult Feasibility

MATERIALS & RESOURCES

ID+C Summary: 13 Possible Points

2 High Priority
3 Medium Priority
0 Low Priority

1 Easy Feasibility
4 Moderate Feasibility
0 Difficult Feasibility

Note:
Categories for ID+C are similar to BD+C, except for MRc1, and some differences in achievable points between the two rating systems. MRc1 will be discussed on its own page.

The LEED ID+C category, or Interior Design and Construction, applies to projects with a minimum of 250 square feet (22 square meters) of gross floor area. Projects are certified in this category if they are solely fit-outs of interior space. In addition, at least 60% of the project's gross floor area must be complete by the time of certification.

EBOM Summary: 8 Possible Points

3 High Priority	3 Easy Feasibility
2 Medium Priority	2 Moderate Feasibility
0 Low Priority	0 Difficult Feasibility

Note:
Credits for EBOM are different from BD+C and ID+C and will be discussed in the following section.

MATERIALS & RESOURCES (BD+C/ID+C)

MRp1: Storage & Collection of Recyclables

REQUIRED

LEED CREDIT INTENT

To reduce the waste that is generated by building occupants and hauled to and disposed of in landfills.

LEED CREDIT REQUIREMENTS

- Provide accessible dedicated areas for collection and storage of entire building's recyclable materials (collection and storage areas may be separate locations)
- Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals
- Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste

ELECTRONIC RECYCLING IN WASTE RECOVERY & TRANSFER FACILITY (WRTF)

UMASS 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 55%. 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.

There is a campus procedure to welcome delivers of Batteries, mercury-containing lamps, and electronic waste to the waste recovery & Transfer Facility (WRTF), and Office of Waste Management (OWM) runs special Fall and Spring dorm collections.

[1]Office of Waste Management [2] UMA Design Guidelines

MATERIALS & RESOURCES (BD+C/ID+C)

MRp2: Construction & Demolition Waste Management Planning

REQUIRED

LEED CREDIT INTENT

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

LEED CREDIT REQUIREMENTS

Develop and implement a construction and demolition waste management plan:

- Identify minimum of 5 materials targeted for waste diversion
- Articulate material diversion plan

Provide report detailing all major waste streams generated

UMASS CREDIT DISCUSSION

Recycling is a high priority on campus. Generating a Demolition Waste Management Plan will be the responsibility of the General Contractor or Construction Manager.

MATERIALS & RESOURCES (BD+C/ID+C)

MRc1/MRc2: Building Life-Cycle Impact Reduction

HIGH PRIORITY
MODERATE FEASIBILITY
2-5 POINTS

LEED CREDIT INTENT

To encourage adaptive reuse and optimize the environmental performance of products and materials.

LEED CREDIT REQUIREMENTS

Demonstrate reduced environmental effects during initial project decision-making:

- Reuse existing building resources
- Or demonstrating a reduction in materials use through life-cycle assessment

Achieve one of the following options:

- Historic building reuse
- Renovation of abandoned building
- Building and material reuse
- Conduct a whole building life-cycle assessment with minimum of 10% reduction in at least three of six impact categories.

95% of Structure and Envelope Reused[2]
Skinner Hall, UMA School of Nursing

UMASS CREDIT DISCUSSION

The UMass campus has a number of older, “legacy” buildings that are eligible for state historic building status. In 2007 UMass Amherst undertook an extensive Campus Cultural Resources Survey (CRS), including an inventory of 112 buildings and properties and the compilation of 103 Massachusetts Historical Commission Inventory Form B (Building) sheets. [1] The cultural and environmental benefit of reusing existing buildings is an important priority for UMass Amherst. Massachusetts Historical Commission (MHC) is the State Historic Preservation authority which makes the final decision on demolishing any part on a historic building in Campus.

Campus planning advocates for revitalizing legacy buildings by developing “building buddies” for them, which provide a flexible and modern addition adjacent to a legacy building that provides HVAC, accessibility, and other system support to the older structure. MHC standards for rehabilitation of legacy buildings require including a preservation professional on the project team.
Material reuse is a high priority for legacy structures, but its feasibility will vary greatly by project. For major renovations of existing building, the requirements may be easier to achieve.

For new construction projects the use of life cycle assessment analysis can be used to meet some portion of this credit through using ATHENA or relevant software for specific high quality materials.

MATERIALS & RESOURCES (BD+C/ID+C)

MRc2/MRc3: Building Product Disclosure and Optimization- Environmental Product Declarations

MEDIUM PRIORITY
MODERATE FEASIBILITY
1-2 POINTS

LEED CREDIT INTENT

To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

LEED CREDIT REQUIREMENTS

Achieve at least one of these options:

- Environmental product declaration (EPD): from at least 20 different permanently installed products sourced from at least five different manufactures.
- Multi-attribute optimization: use products that comply with this credit's criteria for 50 % by cost of permanently installed products.

UMASS CREDIT DISCUSSION

The University has some standardization of building products in order to simplify alterations, maintenance, and repair.[1]

When seeking this credit, it will be the design team specification responsibility to choose products and manufactures who can provide environmental product declarations (EPD).

[1] UMA Design Guidelines

MATERIALS & RESOURCES (BD+C/ID+C)
MRc3/MRc4: Building Disclosure and Optimization- Sourcing of Raw Materials

HIGH PRIORITY
MODERATE FEASIBILITY
2-5 POINTS

LEED CREDIT INTENT

To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

LEED CREDIT REQUIREMENTS

Option 1:

- Raw material source and Extraction Reporting: Use at least 20 different permanently installed products from at least 5 different manufactures that have Source and Extraction Reporting.

Option 2:

- Leadership Extraction Practices: Use products that meet at least one responsible extraction criteria of this credit for at least 25% by cost of the total value of permanently installed building products.

RE-PURPOSED GRANITE USED FOR THE SOUTHWEST CONCOURSE RENOVATION

UMASS CREDIT DISCUSSION

The University has some standardization of building products in order to simplify alterations, maintenance, and repair.[1]

When seeking this credit, it will be the design team specification responsibility to choose products and manufactures who can provide the appropriate Reporting.

[1] UMA Design Guidelines

MATERIALS & RESOURCES (BD+C/ID+C)

MRc4/MRc5: Building Product Disclosure and Optimization- Material Ingredients

MEDIUM PRIORITY
MODERATE FEASIBILITY
1-2 POINTS

LEED CREDIT INTENT

To encourage the use of products and materials with available life-cycle information, and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products with disclosed chemical ingredient information, and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts.

LEED CREDIT REQUIREMENTS

Achieve at least one of these options:

- Material Ingredient Reporting: Us at least 20 products from 5 different manufactures that need this option's criteria.
- Material Ingredient Optimization: Documentation of this option's criteria for at least 25 %, by cost of the total value of permanently installed products.
- Product Manufacturer Supply Chain Optimization: Use building products that meet this option's criteria for at least 25%, by cost, of the total value of permanently installed products.

UMASS CREDIT DISCUSSION

The University has some standardization of building products in order to simplify alterations, maintenance, and repair.[1]

When seeking this credit, it will be the design team specification responsibility to choose products and manufactures who can provide the appropriate documentation that meet this credit criteria.

[1] UMA Design Guidelines

MATERIALS & RESOURCES (BD+C/ID+C)

MRc5/MRc6: Construction and Demolition Waste Management

HIGH PRIORITY
EASY FEASIBILITY
1-2 POINTS

LEED CREDIT INTENT

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

LEED CREDIT REQUIREMENTS

- Recycle / Salvage nonhazardous construction and demolition materials
- Calculations can be by weight or volume
- Choose a waste diversion option or reduce total waste material (per USGBC guidelines)
  - Divert 50% and Three Material Streams (1 point), OR
  - Divert 75% and Four Material Streams (2 points), OR
  - Do not generate more than 2.5 pounds of construction waste per square foot of the building's floor area. (2 points)

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
FOOTBALL PERFORMANCE CENTER

UMASS CREDIT DISCUSSION

Since recycling is a high priority on campus, this credit should be pursued. 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.

A report from previous three certified LEED Gold buildings in UMass Campus shows following numbers and GHG reductions:

		Marching Band Building	Police Station	CNS Green Houses
Construction Waste (Ton)	Generated	99.76	304.28	88.84
	Diverted / Percentage	85 / 85.2 %	269.56 / 88.58 %	67.4 / 76 %
	GHG , CO2 Equivalent Reduction (Ton)	144	310	97

MATERIALS & RESOURCES (ID+C)

MRc1: Long-Term Commitment

MEDIUM PRIORITY
MODERATE FEASIBILITY
1POINT

LEED CREDIT INTENT

To encourage choices that will conserve resources and reduce environmental harm from materials manufacturing and transport for tenants' relocation.

LEED CREDIT REQUIREMENTS

The occupant or tenant must commit to remain in the same location for at least 10 years.

UMASS CREDIT DISCUSSION

UMass Amherst is an ongoing "tenant" of space that is built and renovated by the State for the University. So remaining in the same location is generally a given. UMass periodically renovates space for upgrades and for change of UMass users but generally not more frequently than periods of ten years.

MATERIALS & RESOURCES (EBOM)

MRp1: Ongoing Purchasing & Waste Policy

REQUIRED

LEED CREDIT INTENT

To reduce the environmental harm from materials purchased, used, and disposed of in the operations within buildings.

LEED CREDIT REQUIREMENTS

- Environmentally Preferable Purchasing: Have in place an environmentally preferable purchasing (EPP) policy for products purchased during regular operations of the building. Include at a minimum:
- (1) Ongoing Purchases, (2) Durable Goods Purchases
- The policy should address the criteria in the following credits:
  - Materials and Resources Credit: Purchasing—Ongoing
  - Materials and Resources Credit: Purchasing—Lamps
- Solid Waste Management : Have in place an environmentally preferable solid waste management policy that addresses reuse, recycling, or composting of products purchased during regular operations of the building. Include at a minimum: (1) Ongoing waste (2) Durable goods waste (3) Hazardous waste

WRTF Accepting Fridges and A/C Units

UMASS CREDIT DISCUSSION

The EPP requirements should be reviewed with Facilities Management and Purchasing leadership to further develop the “Discussion” statement for this credit.

The Office of Waste Management (OWM) provides the timely and efficient removal of any and all solid waste generated at the University through an Integrated Solid Waste Management (ISWM) approach.

The UMass Procurement Department determines procedures for the purchase, transfer and disposition of Equipment which are defined as durable items (2 years or more life) having an estimated purchase value of $100 or more, and will be listed as Surplus Equipment for Sale(SES). Surplus items not fitting the Procurement definition of equipment should be listed on the Surplus Equipment for Disposal or Transfer (SED).

For safely disposes of hazardous materials, the university complies with established regulations from the Mass Department Environmental Protection, MDEP (310cmr30), as well as regulations from the EPA (40cfr260, 40cfr262, 40cfr273). The Chemical inventory system called CEMS (chemical environmental management system) is a reuse and exchange program to reduce the amount of hazardous, universal, and non-regulated chemical waste. A universal waste-bulb crusher is used in the Waste Recovery Transfer Station, which extracts the mercury out of fluorescent bulbs.

MATERIALS & RESOURCES (EBOM)

MRp2: Facility Maintenance & Renovation

REQUIRED

LEED CREDIT INTENT

To reduce the environmental harms associated with the materials purchased, installed, and disposed of during maintenance and renovation of buildings.

LEED CREDIT REQUIREMENTS

Have in place a facility maintenance and renovation policy that includes guidelines for renovation and maintenance activities, using LEED rating system strategies, to be implemented at the discretion of building owners, operators, or tenants. The policy must address:

- Purchasing Policy: Include at a minimum Base building elements permanently or semi- permanently attached to the building (mechanical, electrical and plumbing components and specialty items such as elevators are excluded); and Furniture and furnishings
- Waste management Policy: Addressing Facility maintenance waste, and Renovation waste
- Indoor air quality Policy: Follow the recommended control measures of SMACNA, and develop a procedure of before occupancy and air quality testing

UMASS CREDIT DISCUSSION

A general UMA template policy should be developed in consultation with Facilities, Physical Plant, DCM, and Alterations.

MATERIALS & RESOURCES (EBOM)

MRc1: Purchasing- Ongoing

HIGH PRIORITY
EASY FEASIBILITY
1 POINT

LEED CREDIT INTENT

To reduce environmental harm from materials used in the operations and maintenance of buildings.

LEED CREDIT REQUIREMENTS

Purchase at least 60%, by cost, of total ongoing consumables that meet at least one of the following criteria. Include the product categories identified in the Materials and Resources prerequisite: Ongoing Purchasing and Waste Policy:

- Postconsumer recycled content, Extended use, Sustainable agriculture, Local sourcing of food and beverages, Bio-based materials, Paper and wood products
- Purchase at least 40%, by cost, electric-powered equipment that meets at least one of the following criteria:
  - EPEAT rating
  - ENERGY STAR rating

UMASS CREDIT DISCUSSION

UMass Amherst, as a state agency of the Commonwealth of Massachusetts, is required to meet the requirements of the Executive Order 515, Establishing an Environmental Purchasing Policy, which requires agencies to set initiatives that focus on Energy Efficient Products, Toxics Reduction, Recycled Content/Waste Minimization, and Purchasing Sustainable Products.

UMass Amherst has implemented the following practices in compliance with EO515:

- The Green Office Program
- The University's office supply contract thru W.B Mason identifies green and recycled cleaning and paper products that will replace non-green products so that end users have a choice when they order.
- Green Procurement Vendor Show

Design Team should confirm that the Purchasing Policies in place satisfy the requirements of this credit.

MATERIALS & RESOURCES (EBOM)

MRc2: Purchasing- Lamps

MEDIUM PRIORITY
MODERATE FEASIBILITY
1 POINT

LEED CREDIT INTENT

To establish and maintain a toxic material source reduction program to reduce the amount of mercury brought onto the building site through purchases of lamps.

LEED CREDIT REQUIREMENTS

Implement the lighting purchasing plan that specifies an overall building average of 70 picograms of mercury per lumen-hour or less for all mercury-containing lamps purchased for the building and associated grounds within the project boundary. Include lamps for both indoor and outdoor fixtures, as well as both hard-wired and portable fixtures. Lamps containing no mercury may be counted only if their energy efficiency at least equals that of their mercury-containing counterparts.

UMass Campus, LED Lighting

UMASS CREDIT DISCUSSION

The University has engaged in a number of LED conversion programs over the last three to four years. In 2011, all of the traffic lights on campus were converted to LED's and in 2013 the campus ordered over 1,000 LED's from the leading by Example Department of Energy Resources LED Replacement Bulb Project. The bulbs were free Energy Star qualified, dimmable, LED light bulbs. The list of reduced wattage, energy saver-bulbs, includes the Philips 9.7 watt, L-Prize, dimmable LED bulb, equivalent to a typical 60 – 75 watt incandescent light bulb, a number of LED equivalent BR and PAR flood lamps.

These bulbs have been installed throughout campus in auditoriums, campus center, Fine Arts Center, academic classroom building lobbies, and administration buildings.

Review current lamp purchasing policy in Physical Plant to further determine viability of this credit.

MATERIALS & RESOURCES (EBOM)

MRc3: Purchasing- Facility Maintenance & Renovation

HIGH PRIORITY
MODERATE FEASIBILITY
1-2 POINTS

LEED CREDIT INTENT

To reduce the environmental harm from materials used in building renovations.

LEED CREDIT REQUIREMENTS

Option 1. Products and Materials (1 point): Purchase at least 50%, by cost, of the total maintenance and renovation materials that meet at least one of the following criteria:

- Recycled content, Wood products, Bio-based materials , Materials reuse, Extended producer responsibility , GreenScreen v1.2 Benchmark , Cradle to Cradle Certified , International Alternative Compliance Path , Product Manufacturer Supply Chain Optimization, Low emissions of volatile organic compounds , Low emissions of formaldehyde, USGBC approved program

AND/OR Option 2. Furniture (1 point):Purchase at least 75%, by cost, of total furniture and furnishings that meet one or more of the Above criteria.
OR Option 3. No Alterations or Furniture Purchasing (1 point)

UMASS CREDIT DISCUSSION

The University of Massachusetts Amherst is committed to look for opportunities that utilize supplies that are recycled or green and to promote environmental friendly products including furniture and furnishings.

Satisfaction of this credit will require a strategy and documentation provided by the renovation design team. The plan should be reviewed by DCM and Alterations.

Option 3 is not reasonable because we need to refurnish our buildings on a regular basis.

MATERIALS & RESOURCES (EBOM)

MRc4: Solid Waste Management- Ongoing

HIGH PRIORITY
EASY FEASIBILITY
2 POINTS

LEED CREDIT INTENT

To reduce the waste that is generated by building occupants and hauled to and disposed of in landfills and incinerators.

LEED CREDIT REQUIREMENTS

Maintain a waste reduction and recycling program that reuses, recycles, or composts the following:

- at least 50% of the ongoing waste as specified in Materials and Resources Prerequisite: Ongoing Purchasing and Waste Policy (by weight or volume); and
- at least 75% of the durable goods waste as specified in Materials and Resources Prerequisite: Ongoing Purchasing and Waste Policy (by weight, volume or replacement value).

In addition, safely dispose of the following:

- all discarded batteries; and
- all mercury-containing lamps

UMA Waste Management Facility

UMASS CREDIT DISCUSSION

UMass Amherst has one of the highest recycling rates in the state of Massachusetts when compared to other communities, ranking in the top 5% with a 56% diversion rate in FY12.

UMass Amherst has the Surplus Barn that falls under the jurisdiction of the Office of Waste Management on campus. UMass offices can go to the barn and pick up furniture such as desks, chairs, tables, and filing cabinets. Offices that have furniture that they no longer want can send it to the barn so it can be reused.

All students, faculty and staff can call the office of Waste Management or go to the recycling facility to drop off and dispose of electronic waste.

All computers and electronic products on campus are barcoded and registered with the Office of Information and Technology. If the item can not be reused or refurbished the Office of Waste Management is contacted. The Office of Waste Management contracts with RMG Enterprise Inc. from New Hampshire to dispose of the electronic waste in a safe and professional way.

MATERIALS & RESOURCES (EBOM)
MRc5: Solid Waste Management- Facility Maintenance & Renovation

HIGH PRIORITY
EASY FEASIBILITY
2 POINTS

LEED CREDIT INTENT

To divert construction, renovation, and demolition debris from disposal in landfills and incinerators and recover and recycle reusable materials.

LEED CREDIT REQUIREMENTS

- Divert at least 70% of the waste (by weight or volume) generated by facility maintenance and renovation activities from disposal in landfills and incinerators. Include base building elements as specified in the Materials and Resources prerequisite: Facility Maintenance and Renovation Policy.
- Exclude furniture and furnishings that pose human health concerns (e.g., mold) as well as components not considered base building elements; mechanical, electrical, and plumbing components; and specialty items, such as elevators.

Football Performance Center
Construction Waste Management

UMASS 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. Exact numbers are not known due to the amount of construction and the amount of contractors at the university.

The small quantity of waste materials generated by the Alterations Dept. which handles minor renovations are delivered to the UMass Waste Recovery and Transfer Facility and are subject to our sorting requirements. Brick and concrete are sorted for recycling. All types of scrap wood are collected and sent for energy recovery at regional waste-to-energy plants. All metals are recycled as well.

Beyond LEED: Sustainable Materials

UMASS DISCUSSION

In order to work towards a more sustainable campus, waste reduction is an important opportunity for improvement. Currently, campus waste is not regulated or tracked with any real consistency. UMass hopes to establish a framework that will enable the University to track waste and implement more effective waste management systems from project inception through the planning for the life of the building. The University stipulates that all waste sorting must occur on site at designated areas of a construction site, with distinct bins to minimize co-mingled waste. We also strongly encourage project teams to investigate reusable materials from other campus projects. There should be an updated and ongoing inventory of available reusable materials, which should be stored by the contractor. Contractors must also post notice and submit records to campus officials.

In addition to more stringent efforts in construction site waste sorting and diligent effort on the part of the contractor to maintain an updated inventory of reusable materials, The University feels strongly that design and construction teams for campus projects should use a greater proportion of recycled materials than required by LEED, without compromising the function or durability of building components.

In order to effectively track waste volume generated over time, the University plans to provide truck scales on site. For each project the waste management plan must include a requirement to provide UMA with waste reports including billing information (in addition to the LEED submittals).

These efforts act as an extension of related LEED credit requirements outlined in the Materials and Resources category. Diligent project teams and construction management efforts can have a dramatic positive impact on waste reduction, both during construction and once the building is in use.

In addition to waste reduction efforts, sustainable, local sourcing of materials is an important investment for design teams to take into account because the University supports the directive to work with local vendors and give back to the community of Western Massachusetts.

Material content is less urgent to UMass than other issues, such as waste or transportation; however, in order to encourage the manufacture of better and more environmentally responsible products, the University as a customer, must demand transparency. The LEED stipulation to demand EPDs is the first step towards change.

INDOOR ENVIRONMENTAL QUALITY

Summary

Possible Points

- BD+C (New Construction and Major Renovation): 16 points
- ID+C (Commercial Interiors): 17 points
- EBOM (Operations & Maintenance Existing Buildings): 17 points

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, faculty, student, researcher and staff performance depend in part on their level of comfort.

However, especially in this climate, Indoor Environmental Quality often comes at the expense of energy efficiency, with the primary air quality measure in air exchanges per hour. Design teams are encouraged to explore alternative means of achieving good indoor air quality, including passive solutions, innovative heat exchange, providing daylight, and careful attention to the quality of materials that comprise the building envelope.

INDOOR ENVIRONMENTAL QUALITY

BD+C Summary: 16 Possible Points

5 High Priority	2 Easy Feasibility
2 Medium Priority	7 Moderate Feasibility
2 Low Priority	0 Difficult Feasibility

INDOOR ENVIRONMENTAL QUALITY

ID+C Summary: 17 Possible Points

5 High Priority	5 Easy Feasibility
2 Medium Priority	2 Moderate Feasibility
2 Low Priority	0 Difficult Feasibility

Note:
Categories for ID+C are the same as BD+C, except that 2 points are associated with IEQc 9 for ID+C, Acoustic Performance.

The LEED ID+C category, or Interior Design and Construction, applies to projects with a minimum of 250 square feet (22 square meters) of gross floor area. Projects are certified in this category if they are solely fit-outs of interior space. In addition, at least 60% of the project's gross floor area must be complete by the time of certification.

INDOOR ENVIRONMENTAL QUALITY

EBOM Summary: 17 Possible Points

8 High Priority	5 Easy Feasibility
2 Medium Priority	6 Moderate Feasibility
1 Low Priority	0 Difficult Feasibility

Note:
Most EBOM credits are the same as BD+C. The ones that differ include IEQp3, IEQ6, IEQ7, IEQ8, IEQ9 and IEQ10. These credits are discussed further.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C/EBOM)

IEQp1: Minimum Indoor Air Quality Performance

REQUIRED

LEED CREDIT INTENT

To contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality (IAQ).

LEED CREDIT REQUIREMENTS

- Meet the requirements for both ventilation and monitoring
- For mechanically ventilated spaces and for mixed-mode systems, determine minimum outdoor intake flow using the ventilation rate from ASHRAE 62.1-2010 For naturally ventilated spaces (and for mixed-mode systems when mechanical ventilation is inactive), determine the minimum outdoor air opening and space configuration using the natural ventilation procedure from ASHRAE Standard 62.1-2010. Confirm that natural ventilation is an effective strategy following the flow diagram in CIBSE Applications Manual AM10, March 2009, Natural Ventilation in Nondomestic Buildings, Figure 2.8 and meet the requirements of ASHRAE 62.1-2010
- Install monitoring devices that measure indoor air quality performance

UMASS 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.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C/EBOM)

IEQp2: Environmental Tobacco Smoke Control

REQUIRED

LEED CREDIT INTENT

To prevent or minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental tobacco smoke.

LEED CREDIT REQUIREMENTS

- Prohibit smoking in building
- Prohibit smoking on property within 25 feet of all entries, outdoor air intakes, and operable windows
- May provide designated smoking areas (built according to specific regulations) outside of the 25- foot non-smoking perimeter
- Provide signage within 10 feet of all building entrances indicating non-smoking policies

Tobbaco-Free UMass Signs are Posted on Campus

UMASS CREDIT DISCUSSION

Smoking has been prohibited in all buildings on campus since 1993. On July 1, 2013 UMASS Amherst's campus outlawed tobacco use everywhere on the property, including inside all buildings and throughout the grounds. All new buildings must be tobacco-free (including during construction) and provide signage enforcing the UMass Amherst Policy for a Tobacco-Free Campus. For the purposes of this policy, "tobacco" refers to any and all tobacco products, whether inhaled or ingested, as well as electronic cigarettes. This policy applies to everyone and anyone on campus, including students, staff, faculty, contractors, and visitors.

tobacco
let's clear the air
tobacco-free UMass Amherst

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C)

IEQc1: Enhanced Indoor Air Quality

LOW PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 3

LEED CREDIT INTENT

To promote occupants' comfort, well-being, and productivity by improving indoor air quality.

LEED CREDIT REQUIREMENTS

- Provide mechanically ventilated, naturally ventilated, and mixed-mode systems, as applicable
- Strategies include: entryway systems, interior cross-contamination prevention, filtration, natural ventilation design calculations, and mixed-mode design calculations

+30%

UMASS CREDIT DISCUSSION

The University has taken a position on minimum ventilation rates, supporting ASHRAE 62.1 (mandated by the MA Building Code) as sufficient to 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.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C)

IEQc2: Low Emitting Materials

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 3

LEED CREDIT INTENT

To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

LEED CREDIT REQUIREMENTS

- Select materials without VOCs or with extremely low content of VOCs. Different materials must meet different requirements to be considered complaint. Building materials are organized into seven categories, each with different thresholds of compliance. These include interior paints and coatings; interior adhesives and sealants; flooring; composite wood; ceilings, walls, thermal and acoustic insulation; furniture; and exterior applied products (for healthcare and school projects
- Composite wood must have low formaldehyde emissions
- New furniture must be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011. Furniture must comply with ANSI/BIFMA E3-2011 Furniture Sustainability Standard Sections 7.6.1 and 7.6.2. For classroom furniture, use the standard school classroom model in CDPH Standard Method v1.1

UMASS CREDIT DISCUSSION

When exposed to sunlight, Volatile Organic Compounds break down to form ground-level ozone that causes significant long-term detrimental health effects for humans. VOCs are common in many building materials, but alternatives with low VOCs are widely available at little or no additional cost. Functionality is the most important priority for material selection. However, 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. Furniture selection is part of the team's responsibility to achieve this credit. In interior spaces, furniture with low VOCs must be used.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C)

IEQc3: Construction Indoor Air Quality Management Plan

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To promote the well-being of construction workers and building occupants by minimizing indoor air quality problems associated with construction and renovation.

LEED CREDIT REQUIREMENTS

Develop and implement IAQ management plan for construction and preoccupancy phases of building to address the following:

- Meet or exceed recommended control measures specified by SMACNA IAQ Guidelines for Occupied Buildings under Construction, 2nd ed., 2007, ANSI/SMACNA 008-2008, Ch. 3
- Protect on-site and installed absorptive materials from moisture damage
- If permanently installed air handlers are used during construction, filtration media with a minimum efficiency reporting value of 8 must be used at each return air grille
- Prohibit use of tobacco products inside the building and within 25 feet of the building entrance during construction

Air Handlers Manage Air Quality During Construction

UMASS CREDIT DISCUSSION

UMA is dedicated to employee health and safety, including that of its subcontracted construction workers. In addition to a commitment to job site safety, the University is committed to good indoor air quality throughout the life of its buildings. Sound initial construction practices help UMA to achieve 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. Smoking is prohibited in all buildings on campus, as well as grounds.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C)

IEQc4: Indoor Air Quality Assessment

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To establish better quality indoor air in the building after construction and during occupancy.

LEED CREDIT REQUIREMENTS

Select one of the following two options, after construction ends:

- Perform a total building flush-out using newly installed filtration media. If occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy (until a total of 14,000 cubic feet per square foot of outdoor air has been delivered)
- Conduct baseline IAQ testing before occupancy ,but during normal occupied hours, with the building ventilation system started at the normal time and operated at the minimum outdoor airflow rate

UMASS CREDIT DISCUSSION

UMA is committed to maintaining healthy, non-toxic, indoor environments for students, faculty and staff. This credit, combined with IEQc3, 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. It is most important for construction teams to adhere to a clear written IAQ. Design teams should begin considering indoor air quality during 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 the construction process.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C/EBOM)

IEQc5: Thermal Comfort (IEQc3 for EBOM)

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

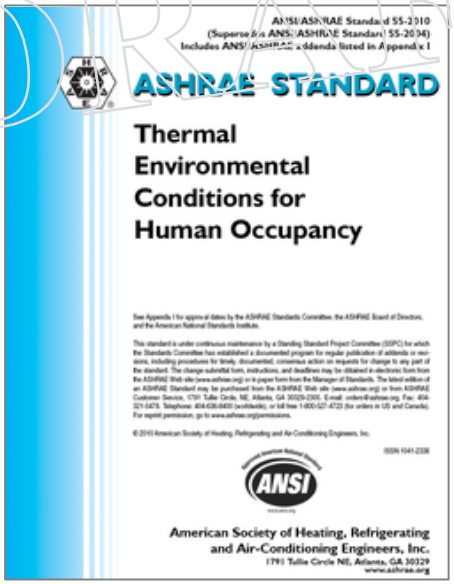
LEED CREDIT INTENT

To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.

LEED CREDIT REQUIREMENTS

Meet requirements for both thermal comfort design and thermal comfort control

- Thermal Comfort Design:
  - Design heating, ventilation, and air-conditioning (HVAC) systems that meet ASHRAE standard 55-2010 (or applicable standard)
- Thermal Comfort Control:
  - Provide individual thermal comfort controls for at least 50% of individual occupant spaces



UMASS CREDIT DISCUSSION

UMass expects all design teams to meet thermal comfort design requirements, by pursuing optimal design for temperature and humidity within the range of ASHRAE 55 (except for cases that fall outside of this designation- greenhouses, for example). The feasibility of this credit depends on building type and design. Dormitories, individual offices, and meeting rooms are excellent candidates for individual thermal comfort controls. Operable windows are appropriate for most campus buildings and can help the project to 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 operated and maintained.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C/EBOM)

IEQc6: Interior Lighting (IEQc4 for EBOM)

MEDIUM PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To promote occupants' productivity, comfort, and well-being by providing high-quality lighting.

LEED CREDIT REQUIREMENTS

Option 1:

- 90% (minimum) of individual occupant spaces must have personal lighting controls with at least 3 levels of adjustability
- All shared spaces must use multi-zone control systems

Option 2:

- Choose four of eight strategies outlined by USGBC to improve lighting quality (use lighting fixtures with luminance of less than 2,500 cd/m2; use light sources with a CRI of 80 or higher; use sources that have rated life of at least 24,000 hours for 75% of lighting load; use direct only overhead lighting for 25% or less of total lighting load; etc.)

UMASS CREDIT DISCUSSION

Most campus buildings serve a variety of functions and have a diverse group of users. Flexible lighting that can respond to the many and varied needs of occupants is critical to create a highly functional learning environment. Priority for achievement of this credit is project-dependent. However, 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 operated and maintained.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C/EBOM)

IEQc7: Daylight (IEQc5 for EBOM)

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 3

LEED CREDIT INTENT

To connect building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight into the space.

LEED CREDIT REQUIREMENTS

- Provide manual glare control devices for all regularly occupied spaces
- Three options to verify daylight access:
  - Spatial daylight autonomy verified by computer simulations
  - Demonstrate that annual sunlight exposure of no more than 10% is achieved through computer simulations
  - Calculate illuminance levels through computer simulations, and demonstrate that the levels will be between 300 and 3,000 lux for 9 AM and 3 PM, both on a clear-sky day at the equinox for the floor area.

UMASS CREDIT DISCUSSION

Providing daylight to interior spaces improves occupants' satisfaction with the interior environment, and improves productivity and well-being. Therefore, daylighting design strategies should be incorporated into all projects. Fenestration design should be optimized for optimal energy use (heating/cooling) and appropriate for space function. Architectural strategies including solar shading, light shelves, and building orientation should aim to maximize useful daylight while minimizing unwanted solar gain and glare. Effective implementation of these techniques produces a pleasant and comfortable indoor environment that improves productivity. In addition to the requirements for meeting this credit, design teams are expected to include automatic dimming controls for electric lighting to take advantage of daylighting and reduce total building energy costs.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C/EBOM)

IEQc8: Quality Views (IEQc5 for EBOM)

LOW PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To give building occupants a connection to the natural outdoor environment by providing quality views.

LEED CREDIT REQUIREMENTS

- 75% of regularly occupied floor area must achieve a direct line of site to the outdoors
- 75% of area must have at least 2 of the following kinds of views:
  - Multiple lines of site to glazing at least 90 degrees apart
  - Views that include at least 2 of the following: space of minimum 25 feet around perimeter of building, flora and fauna, and movement
  - Unobstructed views
  - View factor of 3 or greater

UMASS CREDIT DISCUSSION

UMass values direct lines of site between indoor spaces and their outdoor counterparts. These sightlines strengthen connections between the academic and social life inside buildings and the vibrant pedestrian and environmental life outside, increasing occupant productivity and well being. The University's 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.

INDOOR ENVIRONMENTAL QUALITY (BD+C/ID+C)

IEQc9: Acoustic Performance

MEDIUM PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1 for BD+C, 2 for ID+C

LEED CREDIT INTENT

To provide workspaces and classrooms that promote occupants' well-being, productivity, and communications through effective acoustic design.

LEED CREDIT REQUIREMENTS

Meet USBGC requirements in the following categories:

- Background noise levels per 2011 ASHRAE Handbook, HVAC Applications, Chapter 48, Table 1 or AHRI Standard 885-2008 (calculate or measure sound levels).
- Sound isolation using appropriate sound transmission class (STC) rating
- Reverberation time
- Sound reinforcement for large conference rooms and auditoriums seating more than 50 persons
- Masking (the design levels must not exceed 48 dBa).

UMASS CREDIT DISCUSSION

Good acoustic comfort is crucial to occupant productivity and well-being. Design teams should implement specific solutions prescribed by the different acoustic needs for each space type. Classrooms, lecture halls, auditoriums, library spaces, offices, laboratories, and residence halls, for example, all have a different set of requirements that should be thoughtfully approached during the design phase.

INDOOR ENVIRONMENTAL QUALITY (EBOM)

IEQp3: Green Cleaning Policy

REQUIRED

LEED CREDIT INTENT

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment.

LEED CREDIT REQUIREMENTS

- Green cleaning policy must be implemented, using non-toxic cleaning products and appropriate selection of disinfectants
- Second option is to earn third-party certification (either Green Seal's Gs-42 or ISSA's CIM-GB)

VISIT THE SUSTAINABLE UMASS WEBSITE TO LEARN MORE ABOUT THE CAMPUS CLEANING POLICY

UMASS CREDIT DISCUSSION

UMA has a campus-wide green cleaning policy in place that identifies the best tools, products and practices for maintaining sustainable buildings that protect human health and the environment. It can be found on the Sustainable UMass website.

GREEN CLEANING POLICY

INDOOR ENVIRONMENTAL QUALITY (EBOM)

IEQc1: Indoor Air Quality Management Program

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To maintain the well-being of occupants by preventing and correcting indoor air quality problems.

LEED CREDIT REQUIREMENTS

Establishment

- Develop and implement an indoor air quality (IAQ) management program based on the EPA Indoor Air Quality Building Education and Assessment Model (I-BEAM).Include the IAQ management program in the project's current facilities requirements and operations and maintenance plan.

Performance

- Conduct an I-BEAM audit on a regular basis (at least once every five years) and revise the IAQ management program as appropriate.

UMASS CREDIT DISCUSSION

UMA is dedicated to employee health and safety. The University is committed to good indoor air quality throughout the life of its buildings. Sound initial construction practices help UMA to achieve this goal. If design teams conducted an Indoor Air Quality Management Program during construction, then it may be more feasible to complete this credit as well, with some adjustments to the plan.

INDOOR ENVIRONMENTAL QUALITY (EBOM)

IEQc2: Enhanced Indoor Air Quality Strategies

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To promote occupants' comfort, well-being, and productivity by improving indoor air quality.

LEED CREDIT REQUIREMENTS

Option 1: Entryway Systems (1 point)

- Have in place permanent entryway systems at least 10 feet (3 meters) long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances. Acceptable entryway systems include permanently installed grates, grilles, slotted systems that allow for cleaning underneath, rollout mats, and any other materials manufactured as entryway systems with equal to or better performance. Maintain all on a weekly basis. Confirm that entryway systems have been maintained on a weekly basis.

Option 2: Additional Enhanced IAQ Strategies (1 point)

- *Comply with the requirements of at least one of the following:
  - Filtration for mechanically ventilated spaces
  - Carbon dioxide monitors
  - Outdoor air monitoring for mechanically ventilated spaces
  - Outdoor air monitoring for naturally ventilated spaces
  - Alarmed openings for naturally ventilated spaces

*If you are interested in pursuing option 2, please see further requirements for each option in the LEED EBOM credit library: www.usgbc.org/credits

UMASS CREDIT DISCUSSION

UMA encourages pursuing this credit. It should be easy to achieve since monitoring systems and ventilation are already required in new buildings for occupant health. UMass also has a designated cleaning staff, who are accustomed to regular maintenance and cleaning. The only added effort on the part of the design team would be to confirm and document regular cleaning procedures.

INDOOR ENVIRONMENTAL QUALITY (EBOM)

IEQc6: Green Cleaning- Custodial Effectiveness Assessment

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment, by implementing, managing and auditing cleaning procedures and processes.

LEED CREDIT REQUIREMENTS

- Routine inspections must be performed to identify areas of improvement in green cleaning
- Cleaning providers can use the APPA Leadership in Educational Facilities Custodial Staffing Guidelines for the audit, and the facility must score 2.5 or less

UMASS CREDIT DISCUSSION

UMA's award-winning sustainable cleaning program continues to improve with routine inspections. In 2007, five facilities received (OS1) Green Certified Cleaning Program. This premier recognition is given to organizations that refuse to use products detrimental to human health, and who are dedicated to reducing environmental harms associated with harsh chemical use and disposal.

INDOOR ENVIRONMENTAL QUALITY (EBOM)

IEQc7: Green Cleaning- Products & Materials

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To reduce the environmental impacts of cleaning products, disposable janitorial paper products and trash bags.

LEED CREDIT REQUIREMENTS

- At least 75% of purchases (based on cost) for cleaning products and materials must meet environmental standards (EPA's Design for the Environment Standard, Green Seal or Environmental Choice certifications)
- Ionized water or electrolyzed water can be used instead of chemicals
- Paper products should be certified by the Forest Stewardship Council (FSC) for fiber procurement
- Acceptable cleaning products that meet the credit can be found on ISSA's Transparency Program

UMASS CREDIT DISCUSSION

UMA developed campus-wide standards for procurement of janitorial supplies, with the primary objective to purchase green products and reduce the number of hazardous chemicals on campus. The cleaning supplies used on campus are broken into four categories: general cleaning supplies, hand soaps, plastic bags and liners, and paper products.

INDOOR ENVIRONMENTAL QUALITY (EBOM)
IEQc8: Green Cleaning-Equipment

MEDIUM PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants that adversely affect air quality, human health, building finishes, building systems and the environment, from powered cleaning equipment.

LEED CREDIT REQUIREMENTS

- 40% of green machinery must be used for cleaning
- Vacuums and carpet extractors must meet Carpet and Rug Institute's Seal of Approval
- Floor scrubbers should have on-board chemical meters or use tap water to clean
- All equipment must have ergonomic designs, bumpers to protect building surfaces and operate at 70 dB or less
- Gel batteries, absorbent glass mat and lithium-ion batteries must be used
- Non-green machinery should be phased out and replaced at the end of their life that meet the LEED criteria

UMASS CREDIT DISCUSSION

UMA's campus-wide green cleaning policy specifies the best tools and equipment for maintaining a clean, safe and sustainable environment for building occupants.

INDOOR ENVIRONMENTAL QUALITY (EBOM)

IEQc9: Integrated Pest Management

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 2

LEED CREDIT INTENT

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants that adversely affect air quality, human health, building finishes, building systems and the environment.

LEED CREDIT REQUIREMENTS

- Outdoor and indoor pest management methods
- Contractors must identify roles as part of the IPM team
- Preventive measures must be non-toxic
- If pest control is required, the least toxic application must be used
- In cases where stronger pesticide is needed, staff must personally notify sensitive occupants, and post a sign for 24 hours

UMASS CREDIT DISCUSSION

UMA's Facilities & Campus Services use an integrated pest management process, and oversee all pest control issues.

INDOOR ENVIRONMENTAL QUALITY (EBOM)

IEQc10: Occupant Comfort Survey

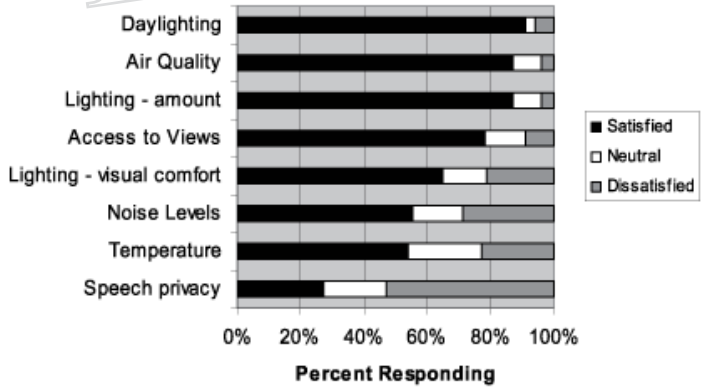
HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To provide for the assessment of building occupants' comfort as it relates to thermal comfort, acoustics, indoor air quality (IAQ), lighting levels, building cleanliness and any other comfort issues.

LEED CREDIT REQUIREMENTS

- Administer at least one occupants comfort survey to collect anonymous responses regarding at least the following: acoustics, building cleanliness, indoor air quality, lighting, and thermal comfort
- The responses must be collected from a representative sample of building occupants making up at least 30% of the total occupants, and survey results must be documented
- If the results indicate that more than 20% of occupants are dissatisfied, develop and implement corrective action plan to address comfort issues. At a minimum, perform new survey at least once every two years



UMASS CREDIT DISCUSSION

UMA has established an Indoor Air Quality Policy, Section 7.3 of the Environmental Health and Safety Policy Manual. It requires that all University employees and students be provided with acceptable indoor air quality. This policy also provides a standard IAQ survey form that can be used to assess occupants' satisfaction with their interior environment.

Beyond LEED: Occupant Health + Comfort

UMASS DISCUSSION

LEED has become the benchmark for sustainable structures. However, in order to continue to push the envelope, UMass supports design teams in their further investigation of sustainable building methods.

Occupant health and comfort are important to the institution. Students, staff and guests on campus benefit from “healthful” spaces. People are more productive and most able to achieve their educational and workplace goals when they are comfortable, healthy, and happy in their environment.

Now that LEED has paved the way, and environmentally sustainable buildings are finally being incorporated into code and becoming the norm, the focus of sustainability in the building and design industry is shifting to the people who inhabit those spaces.

As of January 2015, a new WELL Building Standard[1] provides a source of inspiration for designers to continue to expand sustainable building efforts. UMass encourages occupant comfort surveys be conducted as part of all new building procedure within the LEED certification system. However, it is important to consider many aspects of occupant health, including fitness, available food options within the building or in close proximity, and air quality among others. UMass recommends the thoughtful integration of a variety of healthful design decisions in order to continue to improve occupant experience, health and well-being.

[1] http://www.wellcertified.com/

INNOVATION

Summary

Possible Points

- BD+C (New Construction and Major Renovation): 6 points
- ID+C (Commercial Interiors): 6 points
- EBOM (Operations & Maintenance Existing Buildings): 6 points

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 also have flexibility to 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 hope 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

INNOVATION

BD+C Summary: 6 Possible Points

4 High Priority	1 Easy Feasibility
0 Medium Priority	2 Moderate Feasibility
0 Low Priority	1 Difficult Feasibility

INNOVATION

IDc1: Innovation (BD+C)

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 5

LEED CREDIT INTENT

To encourage projects to achieve exceptional or innovative performance.

LEED CREDIT REQUIREMENTS

Project teams can use any combination of Innovation, Pilot, and Exemplary Performance strategies:

- Option 1. Innovation (1 point): Achieve significant, measurable environmental performance using a strategy not addressed in the LEED green building rating system. AND/OR,
- Option 2. Pilot (1 point): Achieve one pilot credit from USGBC's LEED Pilot Credit Library. AND/OR,
- Option 3. Additional Strategies
  - Innovation (1-3 points): Defined in Option 1 above.
  - Pilot (1-3 points): Meet the requirements of Option 2.
  - Exemplary Performance (1–2 points): Achieve exemplary performance in an existing LEED v4 prerequisite or credit that allows exemplary performance.

The Design Building (Spring 2017) has an innovative structural system utilizing cross-laminated timber that will serve as a learning opportunity for students in the building as well.

UMASS CREDIT DISCUSSION

Because Innovation credits are especially dependent 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. 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.

INNOVATION

Green Building Education

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To provide public education focusing on green building strategies and solutions.

LEED CREDIT REQUIREMENTS

To take advantage of the educational value of the green building features of a project and to earn a LEED point, any approach should be ACTIVELY instructional. Two of the following three elements must be included in the educational program:

- A comprehensive signage program built into the building's spaces to educate the occupants and visitors of the benefits of green buildings. This program may include windows to view energy-saving mechanical equipment or signs to call attention to water-conserving landscape features.
- The development of a manual, guideline or case study to inform the design of other buildings based on the successes of this project. This manual will be made available to the USGBC for sharing with other projects.
- An educational outreach program or guided tour could be developed to focus on sustainable living, using the project as an example.

UMASS CREDIT DISCUSSION

For each LEED building completed at UMass, a detailed project profile and brochure of sustainable features is available on the campus sustainability website, SustainableUMass. The profile highlights how each project fits into the overall campus sustainability initiative.

In addition to providing information online, UMA conducts regular Green Building Tours for students and professionals, to present information about the LEED certified buildings on campus. The university provides learning materials about green building concepts, sustainable building features, and the LEED rating system during the tour.

The Green Building Department of Campus Planning has published a building User Manual for one of our LEED buildings, which serves as a resource for staff, faculty and students. It contains information to help familiarize occupants with the building, its operations, important contacts, standards and user responsibilities, as well as explanations about sustainable features and best practices.

Educational dashboards provide an interactive platform where visitors to our LEED certified buildings can learn about general building statistics, sustainable building features, and tips for how they can be part of the solution for a more sustainable campus.

INNOVATION

Green Cleaning

MEDIUM PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

Reduce exposure of building occupants to contaminants that adversely impact the indoor environment.

LEED CREDIT REQUIREMENTS

- Green cleaning policy must be implemented, using non-toxic cleaning products and appropriate selection of disinfectants
- Second option is to earn third-party certification (either Green Seal's Gs-42 or ISSA's CIM-GB)
- At least 75% of purchases (based on cost) for cleaning products and materials must meet environmental standards (EPA's Design for the Environment Standard, Green Seal or Environmental Choice certifications)
- Ionized water or electrolyzed water can be used instead of chemicals
- Acceptable cleaning products that meet the credit can be found on ISSA's Transparency Program

UMASS CREDIT DISCUSSION

The Custodial Services, Physical Plant at UMA is committed to implementing green cleaning programs for all new construction and major renovation projects per the UMA Green Cleaning Policy, and Training Manual. Employees working in the building are trained in the green cleaning process, and all cleaning materials used in the building are Green Seal approved.

All chemicals, equipment, and techniques used to maintain the cleanliness of Dinning Commons are particularly environmentally safe, and are currently regulated by OS1 green cleaning standards.

Read more about the UMass Green Cleaning Policy:

http://www.umass.edu/sustainability/green-campus/green-cleaning-af

INNOVATION

Composting Program

MEDIUM PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To reduce the amount of discarded food and organic waste that is sent to landfills

LEED CREDIT REQUIREMENTS

Clearly define and demonstrate scope, quantifiable environmental benefits, and comprehensive programming and requirements for ongoing application. Submittals:

- Narrative describing pre·consumer food waste composting process, associated signage, facility construction and operation, and economic and educational opportunities
- Calculations of specific tonnage of material diverted from landfill as a result of the composting facility
- Copy of project application for Outstanding School Program Award for recycling program, including food waste.
- Photographs of compost facility construction and operation

Fully compostable meal, College Day Picnic, 2014

UMASS CREDIT DISCUSSION

The Office of Waste Management at the university is committed to supporting the composting of campus food waste in Auxiliary Services Facilities and other campus operations.

The composting program keeps food and organic waste out of landfills, reducing groundwater contamination, methane production and the carbon footprint of the waste. The resulting compost provides a long-term stable organic soil product for farms. The program also serves as an educational vehicle for students, faculty, staff and visitors. A partnership between the UMass Physical Plant and the New England Small Farmers Institute (NESFI) allows UMA to convert food waste into rich compost just 9 miles away in Belchertown, MA. As a result, organic waste is now the largest stream of recycling on campus with over 1,400 tons per year.

Learn more about the UMass composting program here:

https://www.umass.edu/sustainability/green-campus/composting

INNOVATION

Pilot Credit: Innovative Ventilation

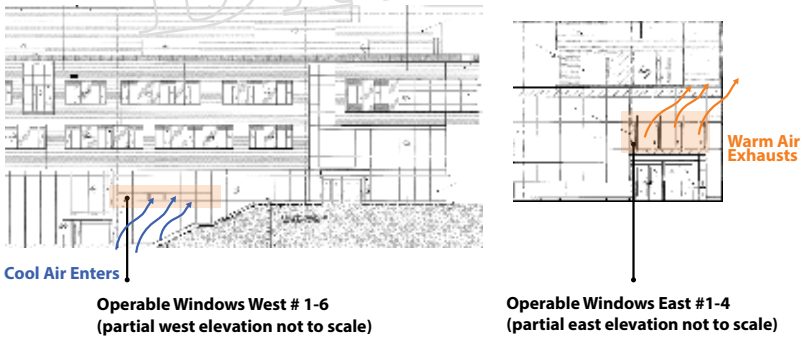
HIGH PRIORITY
DIFFICULT FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

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.

LEED CREDIT REQUIREMENTS

- Design systems that utilize innovative ventilation strategies
  - Displacement ventilation
  - Under-floor air delivery systems
  - Natural ventilation
- Design natural ventilation systems in accordance with the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10, "Natural Ventilation in Non-Domestic Buildings", March 2005.
- 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.



Natural Ventilation at the UMass Integrative Learning Center

UMASS 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.

INNOVATION

Pilot Credit: Preliminary Integrative Process Planning & Design

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

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.

LEED CREDIT 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 (Certifi ed, 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.

UMASS 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.

INNOVATION

Pilot Credit: Integrative Planning & Design

HIGH PRIORITY
MODERATE FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

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.

LEED CREDIT 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).

UMASS CREDIT DISCUSSION

Maintaining integrative design from project inception 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.

INNOVATION

IDc2: LEED Accredited Professional (BD+C)

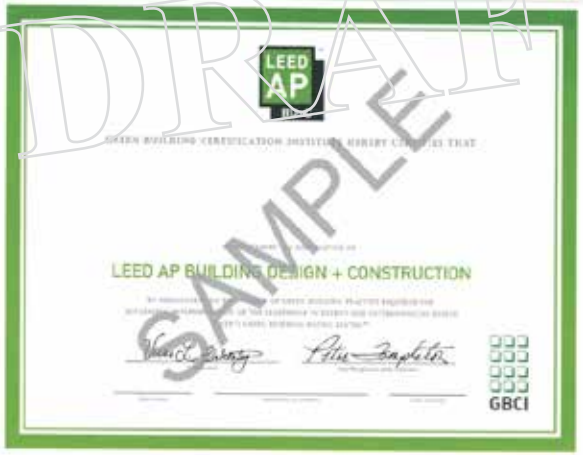
HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To encourage the team integration required by a LEED project and to streamline the application and certification process.

LEED CREDIT REQUIREMENTS

At least one principal participant of project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project



UMASS CREDIT DISCUSSION

While incorporating a LEED AP in the design process has become industry standard and is common practice for new construction at UMA. Most design teams have at least one member with LEED AP credentials, making this generally an easy credit to achieve.

REGIONAL PRIORITY

Summary

Possible Points

- BD+C (New Construction and Major Renovation): 6 points
- ID+C (Commercial Interiors): 6 points
- EBOM (Operations & Maintenance Existing Buildings): 6 points

In writing these guidelines, the University has essentially created its 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

BD+C Summary: 4 Possible Points

Refer to individual credit sections for details on requirements, priority and feasibility.

5 High Priority	4 Easy Feasibility
1 Medium Priority	2 Moderate Feasibility
0 Low Priority	0 Difficult Feasibility

REGIONAL PRIORITY

ID+C Credits: 4 Possible Points

4 High Priority
2 Medium Priority
0 Low Priority

3 Easy Feasibility
3 Moderate Feasibility
0 Difficult Feasibility

REGIONAL PRIORITY

EBOM Summary: 4 Possible Points

4 High Priority
2 Medium Priority
0 Low Priority

4 Easy Feasibility
2 Moderate Feasibility
0 Difficult Feasibility

REGIONAL PRIORITY

RPc1: Regional Priority

HIGH PRIORITY
EASY FEASIBILITY
POINT POTENTIAL: 1

LEED CREDIT INTENT

To provide an incentive for the achievement of credits that address geographically specific environmental, social equity, and public health priorities.

LEED CREDIT REQUIREMENTS

- Earn up to four of the six Regional Priority credits. These credits have been identified by the USGBC regional councils and chapters as having additional regional importance for the project's region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, http://www.usgbc.org/rpc.
- One point is awarded for each Regional Priority credit achieved, up to a maximum of four.

UMASS CREDIT DISCUSSION

The six credits listed on the following pages have been designated as Regional Priority credits by the USGBC for the University of Massachusetts, Amherst.

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 UMA specific information.

APPENDIX A. LEED V4 FOR BUILDING DESIGN & CONSTRUCTION

Summary of Changes from LEED 2009

Prerequisite	Integrative Project Planning and Design (Healthcare Only)	• Credit language clarified. • Charrette requirement adjusted from 8 hours to 4 hours.
Credit	Integrative Process	• New credit. • Encourages early analysis of energy and water systems to inform design.
LOCATION AND TRANSPORTATION		
Credit	LEED for Neighborhood Development Location	• New credit. • Encourages selection of a LEED ND certified site. • Gives project teams a streamlined path to earn LT points.
Credit	Sensitive Land Protection	• Credit title renamed from "Site Selection". • Credit language clarified. • Option for projects located on protected sites to earn credits through sensitive land best management practices.
Credit	High Priority Site	• Credit incorporates requirements from "Brownfield Remediation". • Encourages selection of sites with development constraints.
Credit	Surrounding Density and Diverse Uses	• Credit title renamed from "Development Density and Community Connectivity". • Multiple thresholds to reward different density levels and amounts of diverse uses. • Projects earn points in the density and the diverse uses options separately. • Warehouse and distribution center requirements added to encourage development near commercial or industrial sites or near transportation infrastructure.
Credit	Access to Quality Transit	• Credit title renamed from "Alternative Transportation—Public Transportation Access". • Multiple thresholds to reward varying transit service levels. • Metric of radius changed to walk distance. • Frequency of transit included in metric.
Credit	Bicycle Facilities	• Credit title renamed from "Alternative Transportation—Bicycle Storage and Changing Rooms" • Added a requirement to be located at a bicycle-accessible site or bicycle network.
Credit	Reduced Parking Footprint	• Credit title renamed from "Alternative Transportation-Parking Capacity". • Minimum parking requirements reference levels in the ITE *Transportation Planning Handbook*. • Option for No New Parking omitted.
Credit	Green Vehicles	• Credit title renamed from "Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles". • 3% of parking spaces must be reserved for green vehicles. • An additional 2% of parking spaces must have refueling stations – electric vehicle charging or liquid, gas, or battery facilities. • Revised Schools requirements for buses and on-site vehicles • Warehouse and Distribution Centers requirement added for on-site vehicles and anti-idling measures.
Credit	Alternative Transportation	• Removed this previously Retail-specific credit and distributed its former options among the analogous D&C rating systems

SUSTAINABLE SITES		
Prerequisite	Construction Activity Pollution Prevention	• Updated the EPA Construction General Permit version from 2003 to 2010.
Prerequisite	Environmental Site Assessment	• No substantive changes.
Credit	Site Assessment	• New credit. • Encourages early analysis of site conditions to inform design.
Credit	Brownfield Remediation	• Moved requirements to Location and Transportation Credit: High Priority Site. • Combined options.
Credit	Site Development - Protect or Restore Habitat	• Replaced setback requirements with preservation standards. • Added option for financial support of off-site preservation.
Credit	Open Space	• Credit renamed from "Site Development – Maximize Open Space" • Added qualification that open space must be of beneficial use to the occupants or community. • Clarified turf grass requirements and vegetated roof requirements.
Credit	Rainwater Management	• Credit is a combination of "Stormwater Design—Quality Control" and "Stormwater Design—Quantity Control". • Includes site-specific criteria for more frequent, low-intensity events. • Added option for zero lot line, urban projects.
Credit	Heat Island Reduction	• Credit is a combination of "Heat Island Effect—Nonroof" and "Heat Island Effect—Roof". • Updated the roof SRI requirements. • Changed paving materials metric to Solar Reflectance (SR). • Included 3-year aged SRI and SR values. • Included weighted SRI average calculation methodology. • Increased threshold for parking spaces under cover.
Credit	Light Pollution Reduction	• Removed the interior lighting requirements which are now addressed in the EA prerequisite. • Included the BUG rating methodology as a prescriptive way to meet the exterior lighting requirements. • Added Lighting Zone 0. • Included exterior signage requirements. • Added exemptions from exterior lighting requirements.
Credit	Site Master Plan (Schools)	• Clarified requirements for projects with no future planned development.
Credit	Tenant Design and Construction Guidelines (Core and Shell)	• Added "Storage and Collection of Recyclables" to the list of prerequisites and credits.
Credit	Places of Respite (Healthcare)	• No substantive changes. • Credit titled renamed from "Connection to the Outside World—Places of Respite".
Credit	Direct Exterior Access (Healthcare)	• No substantive changes. • Credit title renamed from "Connection to the Outside World—Direct Exterior Access for Patients".
Credit	Joint Use of Facilities (Schools)	• Removed the requirements for separate entries.

WATER EFFICIENCY		
Prerequisite	Outdoor Water Use Reduction	• New prerequisite. • Requires a reduction in landscape water use by 30% using EPA's WaterSense Water Budget Tool or no irrigation.
Prerequisite	Indoor Water Use Reduction	• Credit title renamed from "Water Use Reduction". • WaterSense label required for certain fixtures and fittings • Appliance and process water uses addressed. • Basic cooling tower requirements from ASHRAE 189 added. • Additional appliance and process water requirements for Retail, Schools, Healthcare and Hospitality only.
Prerequisite	Minimum Potable Water Use for Medical Equipment Cooling (Healthcare)	• Prerequisite removed.
Prerequisite	Building-Level Water Metering	• New prerequisite. • Requires each project to be capable of measuring whole building water use.
Credit	Outdoor Water Use Reduction	• Credit title renamed from "Water Efficient Landscaping". • Requires a reduction in landscape water use by at least 50% using EPA's WaterSense Water Budget Tool or no irrigation.
Credit	Innovative Wastewater Technologies	• Credit removed. • Will be tested in Pilot Credit Library with new nutrient recovery option.
Credit	Indoor Water Use Reduction	• Credit title renamed from "Water Use Reduction". • WaterSense label required for certain fixtures and fittings. • Added Appliance and Process Water requirements. • Added more thresholds for achievement.
Credit	Cooling Tower Water Use	• New credit. • Encourages projects to analyze water source and maximize water cycles.
Credit	Water Metering	• New credit. • Rewards projects for submetering at least two water end uses.
ENERGY AND ATMOSPHERE		
Prerequisite	Fundamental Commissioning and Verification	• Credit title renamed from "Fundamental Commissioning of Building Energy Systems". • Modified intent to ensure project meets the owner's projects requirements related to energy, water, indoor environmental quality and durability. • Added requirement for preparing an Operations and Maintenance Plan. • Added requirement to engage a Commissioning Authority by the end of the design development phase. • Clarified language for who can be the commissioning authority. • Included requirements for a design review of the enclosure.
Prerequisite	Minimum Energy Performance	• Updated referenced standard to ASHRAE 90.1-2010. • Added requirements for data centers. • Added retail-specific process load requirements • Updated Advanced Energy Design Guides prescriptive option to 50% AEDG for Office, Retail, Schools, and Healthcare. • Updated Core Performance Guide prescriptive option to meeting core requirements plus six additional strategies.

Prerequisite	Building-Level Energy Metering	• New prerequisite. • Requires each project to be capable of measuring whole building energy use.
Prerequisite	Fundamental Refrigerant Management	• No substantive changes.
Credit	Enhanced Commissioning	• Added options for monitoring based commissioning and envelope commissioning. • Added requirements to prepare the building operators for the intended operation of building systems • Clarified language for who can be the commissioning authority.
Credit	Optimize Energy Performance	• Updated referenced standard to ASHRAE 90.1-2010. • Added requirements for data centers. • Added retail-specific process load requirements • Updated Advanced Energy Design Guides prescriptive option to 50% AEDG for Office, Retail, Schools, and Healthcare. • Updated Core Performance Guide prescriptive option to meeting core requirements plus six additional strategies.
Credit	Advanced Energy Metering	• New credit. • Requires all energy end-uses that represent 10% or more of the total energy consumption of the building to be metered. • Meters must be connected to the building automation system and log data at appropriate intervals. • Core and Shell projects required to address future tenant spaces.
Credit	Demand Response	• New credit. • Encourages projects to design and install systems necessary to participate in a demand response program. • Also available to projects located in areas without demand response programs. • Added requirement to include demand response processes in the commissioning scope.
Credit	Renewable Energy Production	• Credit title renamed from "On-Site Renewable Energy". • Added provision for community-scale renewable energy systems. • Points adjusted significantly.
Credit	Enhanced Refrigerant Management	• Added retail-specific requirements.
Credit	Measurement and Verification	• Credit removed. • Installation of measurement and verification infrastructure addressed in Building-Level Energy Metering prerequisite and Advanced Metering credit.
Credit	Green Power and Carbon Offsets	• Credit title renamed from "Green Power". • Credit based on total building energy usage. • Carbon offsets allowed for scope 1 or 2 emissions • Required contract length extended from 2 years to 5 years. • Eligible resources must have come online after January 1, 2005.
MATERIALS AND RESOURCES		
Prerequisite	Storage and Collection of Recyclables	• Added requirement to address batteries, mercury containing lamps, or electronic waste. • Added retail requirement to identify top 4 waste streams to provide recycling collection and storage.
Prerequisite	Construction and Demolition Waste Management Planning	• New prerequisite. • Requires setting a project target for waste management. • Require reporting waste diversion rates.

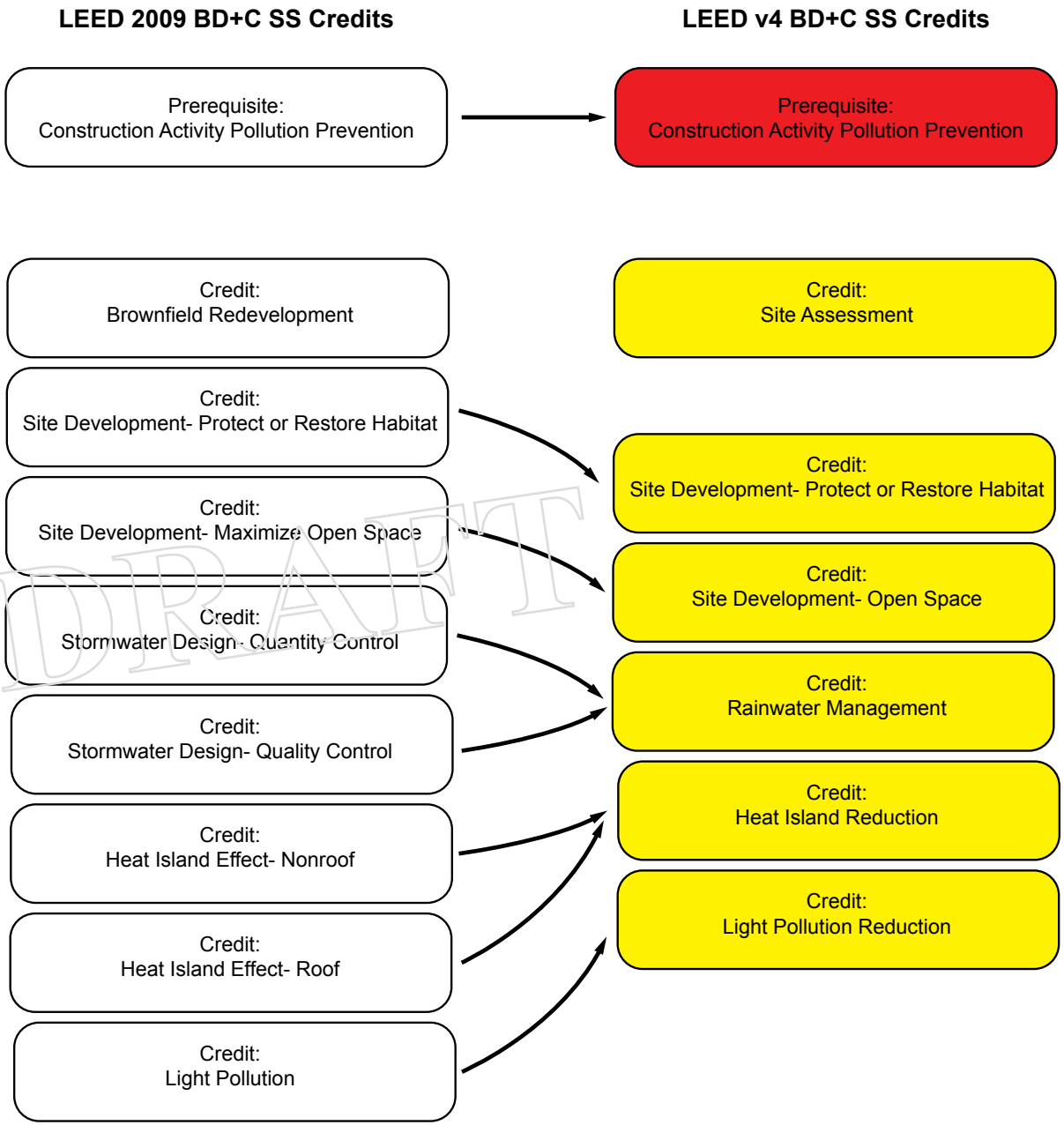
Prerequisite	PBT Source Reduction—Mercury	• No substantive changes.
Credit	Building Reuse – Maintain Existing Walls, Floors, and Roof	• Credit requirements moved to "Building Life Cycle Impact Reduction" credit.
Credit	Building Reuse – Maintain Interior Nonstructural Elements	• Credit requirements moved to "Building Life Cycle Impact Reduction" credit.
Credit	Building Life Cycle Impact Reduction	• Credit is a combination of "Building Reuse—Maintain Existing Walls, Floors, and Roof" and "Building Reuse—Maintain Interior Nonstructural Elements". • Added options for the reuse of historic and blighted buildings. • Added option for a whole building life-cycle assessment of the project's structure and enclosure.
Credit	Building Product Disclosure and Optimization—Environmental Product Declarations	• New credit. • Addresses transparency in environmental life-cycle impacts and selecting products with improved life-cycles. • Structured into disclosure and optimization options. • Rewards the use of products with Environmental Product Declarations. • Rewards products that meet the local products criteria.
Credit	Materials Reuse	• Credit requirements moved to "Building Life Cycle Impact Reduction".
Credit	Recycled Content	• Credit requirements moved to "Building Product Disclosure and Optimization—Sourcing of Raw Materials."
Credit	Regional Materials	• Credit requirements moved to the "Building Product Disclosure and Optimization" credits.
Credit	Rapidly Renewable Materials	• Credit removed. Rapidly renewable materials addressed by "Building Product Disclosure and Optimization—Sourcing of Raw Materials"
Credit	Certified Wood	• Credit requirements moved to "Building Product Disclosure and Optimization—Sourcing of Raw Materials".
Credit	Building Product Disclosure and Optimization—Sourcing of Raw Materials	• New credit. • Addresses transparency in raw material sourcing and selecting materials that have been appropriately sourced. • Restructured into disclosure and optimization sections. • Rewards products from manufacturers that have provided information on land use practices, extraction locations, labor practices, etc. • Rewards products that meet the local products criteria.
Credit	Building Product Disclosure and Optimization—Material Ingredient Reporting	• New credit. • Addresses transparency in material ingredients and selecting products with optimized ingredients. • Structured into disclosure and optimization options. • Rewards the use of products with ingredient reporting in programs like Health Product Declaration, Cradle 2 Cradle, and others. • Rewards products that meet the local products criteria. • Third option for supply chain optimization.
Credit	PBT Source Reduction-Mercury (Healthcare)	• No substantive change. • Credit title revised.
Credit	PBT Source Reduction-Lead, Cadmium, Copper (Healthcare)	• No substantive change.

Credit	Furniture and Medical Furnishings (Healthcare)	• Updated referenced standards in option 2. • Updated the criteria for option 3.
Credit	Resource Use-Design for Flexibility (Healthcare)	• Credit renamed to "Design for Flexibility". • Credit language clarified.
Credit	Construction and Demolition Waste Management	• Added an option for waste reduction strategy. • Requires waste diversion from multiple material types. • Alternative daily cover no longer counted as diverted waste.
INDOOR ENVIRONMENTAL QUALITY		
Prerequisite	Minimum Indoor Air Quality Performance	• Added requirements for outside air delivery monitoring • Added requirements for residential projects addressing combustion appliances, CO monitors, and radon.
Prerequisite	Environmental Tobacco Smoke Control	• Removed allowance for designated smoking areas inside the building for al projects but residential. • Reduced the maximum allowable leakage rate for compartmentalized residential units. • Prohibited smoking on the entire site for Schools projects.
Prerequisite	Minimum Acoustic Performance (Schools)	• Harmonized ANSI & ASHARE standards. • Added exterior noise control exceptions for projects located on quiet sites. • Added exceptions for projects with limited renovation scopes or strict historic preservation requirements.
Credit	Outdoor Air Delivery Monitoring	• Credit requirements moved to "Minimum Indoor Air Quality Performance" and "Enhanced Indoor Air Quality Strategies" credits.
Credit	Increased Ventilation	• Credit requirements moved to "Enhanced Indoor Air Quality Strategies" credit.
Credit	Enhanced Indoor Air Quality Strategies	• Credit is a combination of "Outdoor Air Delivery Monitoring", "Increased Ventilation", and "Indoor Chemical and Pollutant Source Control" credits. • Added additional options for mathematical modeling, additional sensors, and mixed mode systems.
Credit	Low-Emitting Materials	• Credit is a combination of the "Low-Emitting Materials" credits. • Requirements based on VOC emissions rather than VOC content. • Systems approach to emissions within a space. • Added requirement for TVOC disclosure. • Modified requirements for formaldehyde.
Credit	Construction Indoor Air Quality Management Plan	• Credit title renamed from "Construction Indoor Air Quality Management Plan—During Construction". • No substantive changes.
Credit	Indoor Air Quality Assessment	• Credit title renamed from "Construction Indoor Air Quality Management Plan—Before Occupancy". • Added a maximum temperature limit for flush outs. • Expanded the list of contaminants for which to test under Option 2. • Clarified that furniture must be installed.
Credit	Indoor Chemical and Pollutant Source Control	• Credit requirements moved to "Enhanced Indoor Air Quality Strategies" credit.
Credit	Controllability of Systems—Lighting	• Credit requirements moved to "Interior Lighting" credit.
Credit	Thermal Comfort	• Credit title renamed from "Thermal Comfort—Design". • Updated reference standard to ASHRAE 55-2010.

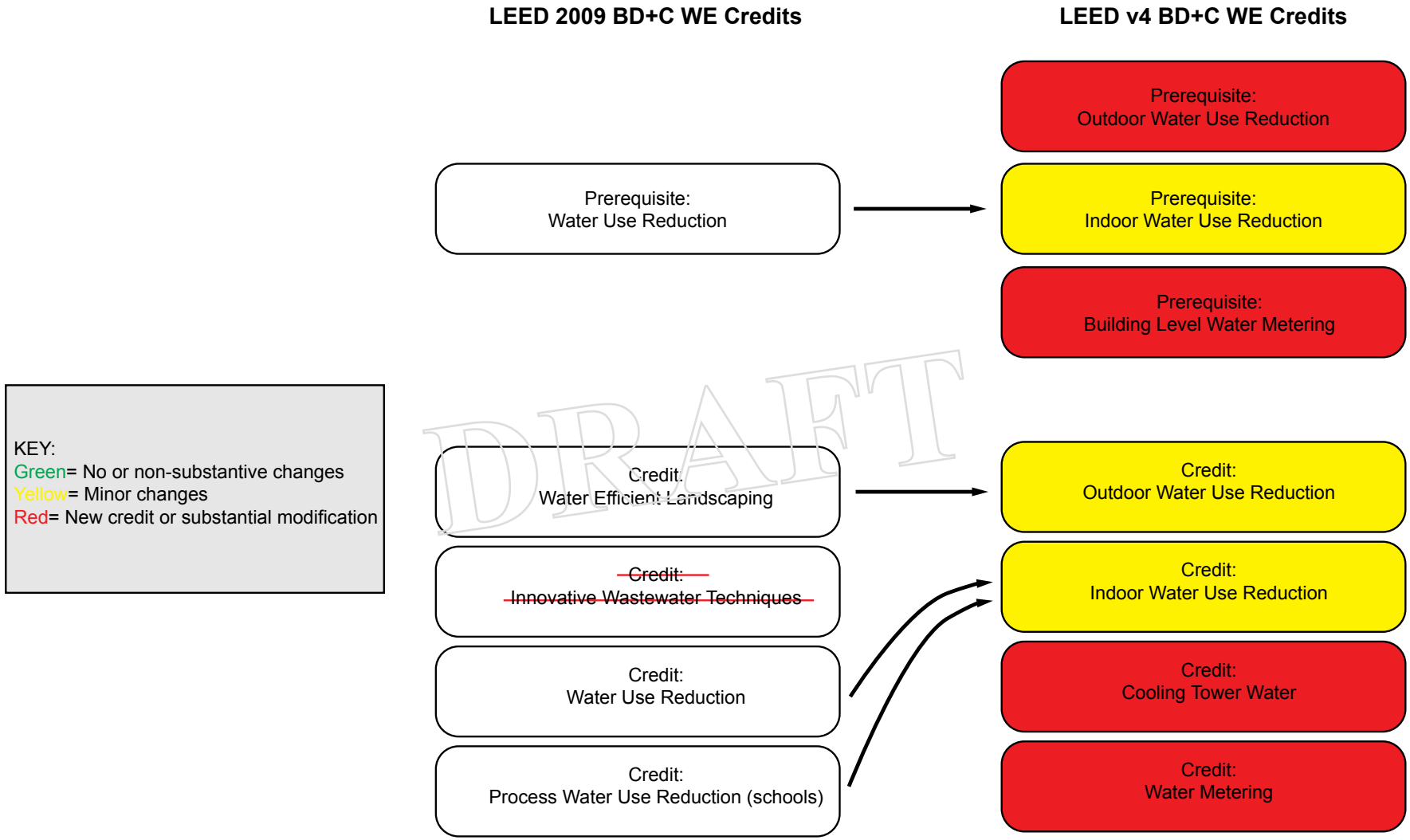
		• Credit removed from Core and Shell.
Credit	Interior Lighting	• New Credit. • Incorporates controls requirements from "Controllability of Systems—Lighting" credit. • Added an option that addresses lighting quality.
Credit	Daylight	• Credit title renamed from "Daylight and Views—Daylight". • Removed prescriptive option. • Added option for spatial daylight autonomy. • Changed units from footcandles to lux. • Added a timing requirement to measurement option.
Credit	Quality Views	• Credit title renamed from "Daylight and Views—Views". • Added requirement for quality view, defined by the LEED 2009 exemplary performance criteria. • Added provisions for interior atria.
Credit	Acoustic Performance	• New credit except in Schools and Healthcare. • Added requirements for room noise levels, speech privacy and sound isolation, reverberation time, and paging, masking, and sound reinforcement systems. • Harmonized ANSI and ASHRAE standards.
Credit	Mold Prevention (Schools)	• Credit requirements moved to "Thermal Comfort" credit.

APPENDIX B.
SS Credit Changes

KEY:
Green= No or non-substantive changes
Yellow= Minor changes
Red= New credit or substantial modification

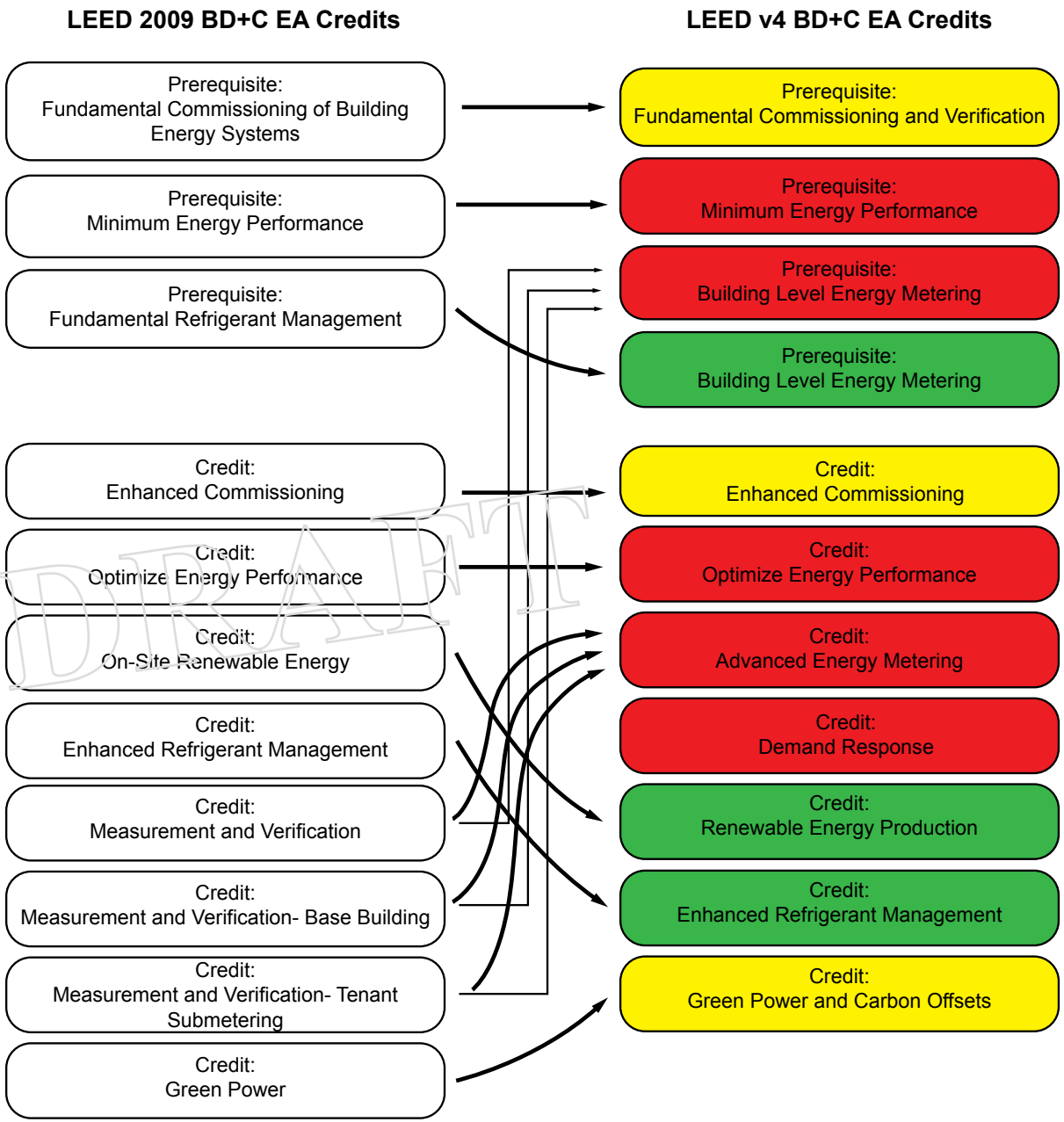


APPENDIX C.
WE Credit Changes

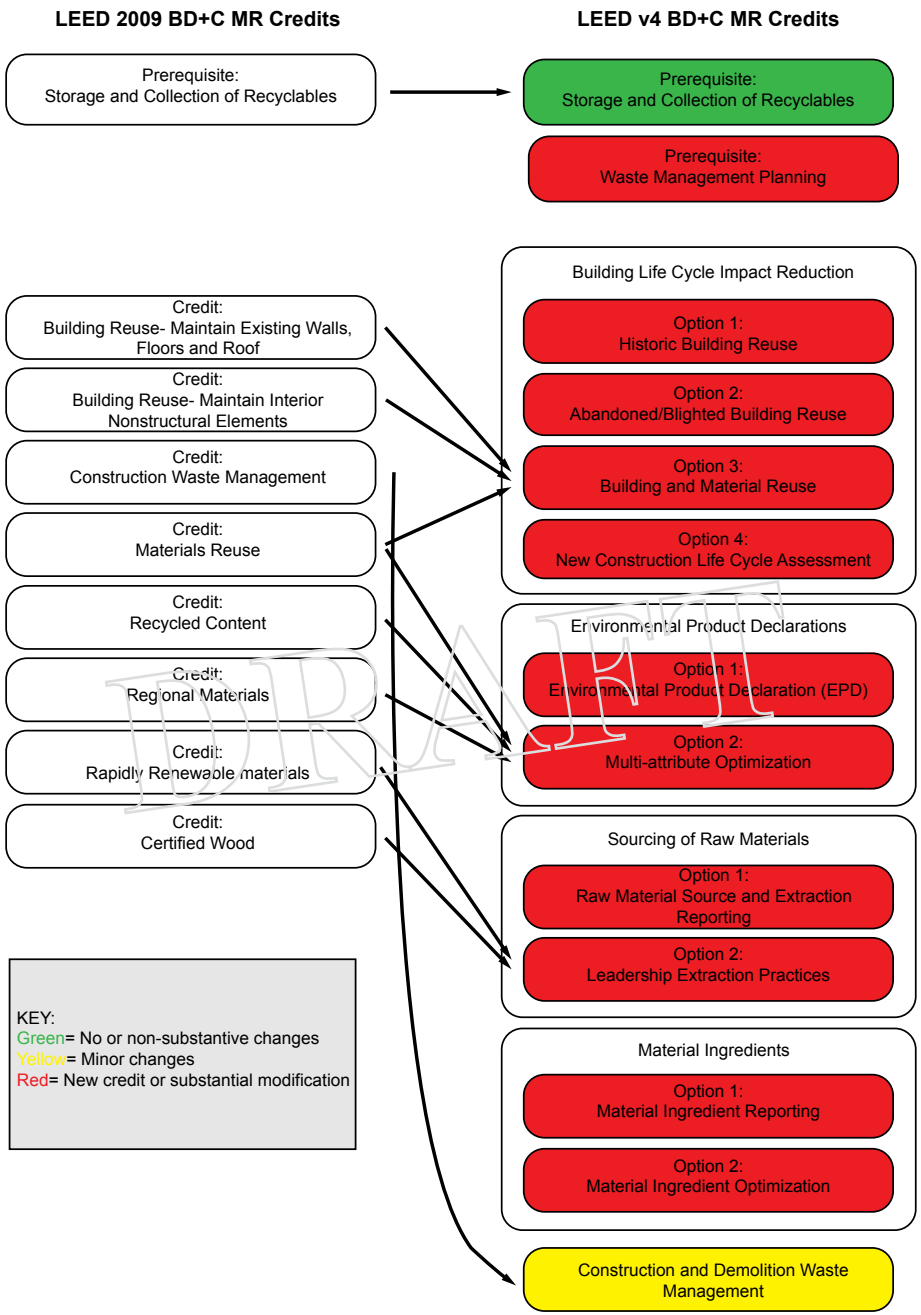


APPENDIX D.
EA Credit Changes

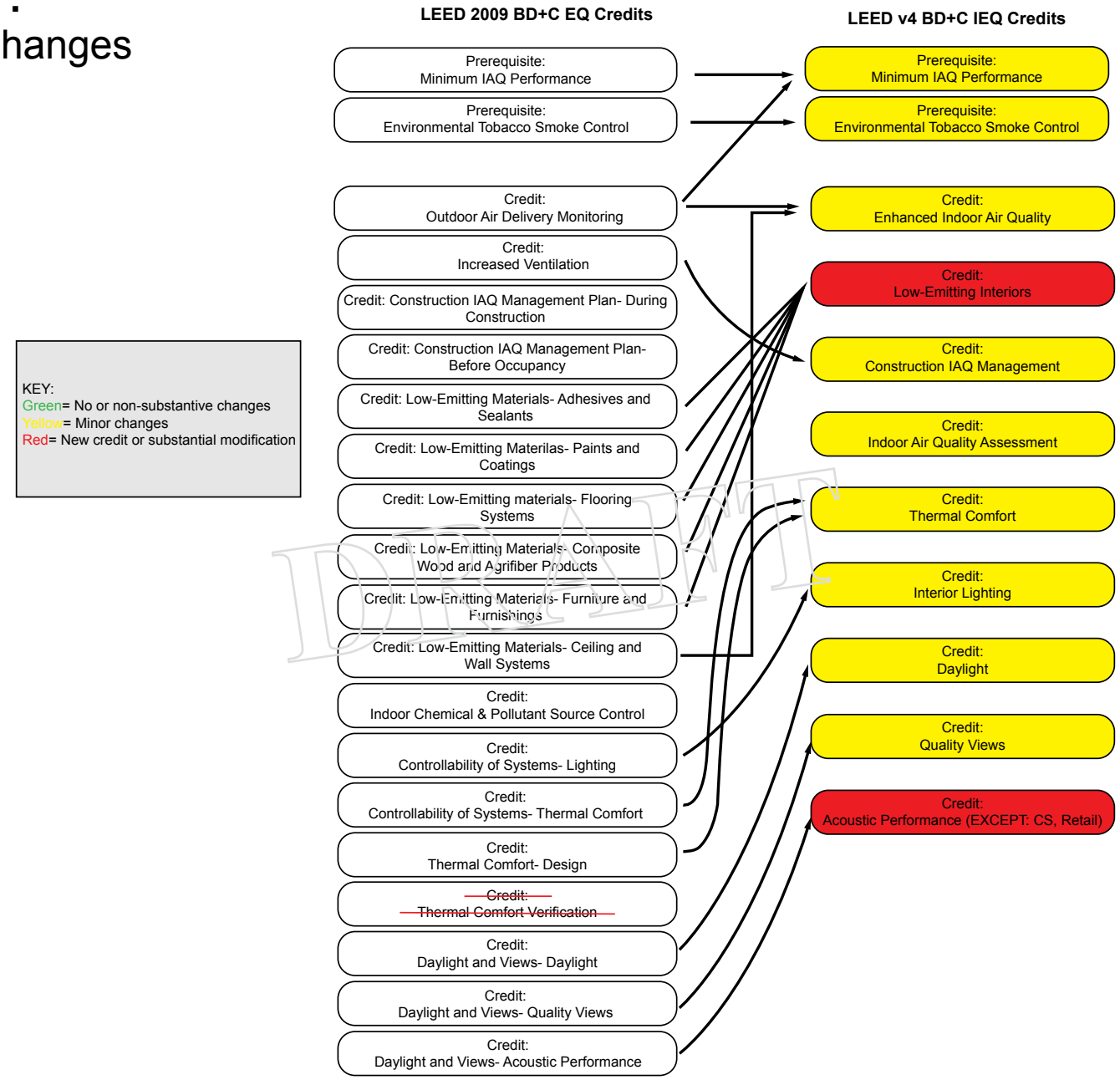
KEY:
Green= No or non-substantive changes
Yellow= Minor changes
Red= New credit or substantial modification



APPENDIX E.
MR Credit Changes



APPENDIX F.
IEQ Credit Changes



Notes: