UNIVERSITY OF MISSOURI

SUSTAINABLE DESIGN GUIDELINES

January 2012 Draft

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Introduction

THE UNIVERSITY OF MISSOURI – SUSTAINABLE BUILDING GUIDELINES

This document is intended to provide MU project teams with a consistent approach to sustainable buildings on campus. It gives clear instructions on MU's sustainable building guidelines as well as giving project teams additional support in their approach to sustainable building.

The LEED® green building certification program is the nationally accepted benchmark for the design, construction, and operation of green buildings. MU has not made it a requirement for all projects to earn LEED certification as a standard on Campus, however all Campus projects shall utilize this Sustainable Design Guideline throughout the design and construction process to assist in meeting Campus Sustainable Building Goals. For the purpose of this Guideline the term "Projects" shall be defined as "A building consisting of a minimum of 1,000 square feet of gross floor area and that has been designed for, constructed on, and operated on a permanent location on already existing land. The project may be new, ground-up design and construction, or major renovation, of at least one commercial, institutional, or high-rise residential building in its entirety. The project must serve one or more full time equivalent (FTE) occupant(s)." All projects shall comply with this Guide.

The Guide is intended to be a living document.

COMMITMENT TO SUSTAINABILITY

On March 18, 2010 after signing the American and College University Presidents' Climate Commitment, the University of Missouri officially adopted its current Sustainability Policy Statement: "The University of Missouri embraces its role in providing a healthy and safe learning environment for its students, faculty and staff. Consistent with MU's mission and values we are committed to leadership in demonstrating local and global environmental stewardship. MU recognizes the increasing need for policies and practices that reduce greenhouse gas emissions and has signed the American College and University President's Climate Commitment with the goal of making the MU campus carbon neutral.

Further, MU has undertaken an ambitious program of environmental sustainability that includes, but is not limited to, the following actions:

- Incorporating sustainability and social responsibility in the teaching curriculum;
- Researching, testing, and implementing new sustainability initiatives; and disseminating effective sustainability practices.
- Taking proactive steps to preserve, protect, and renew natural resources, both locally and globally, thereby minimizing anthropogenic harm to the environment.
- Identifying and utilizing environmentally friendly energy resources and employing a dynamic and proactive energy-conservation program.
- Minimizing waste generation, recovering recyclable materials and safely managing necessary waste disposal.
- Observing sustainable best practices in campus construction and procurement.
- Researching and promoting sustainable practices in the growth, management, and transportation of food.
- Promoting clean, efficient, and healthy transportation for all students, staff, and faculty.
- Each unit or department within the university is expected to evaluate current policies and practices on a regular basis with the goal of adopting and improving environmentally sustainable practices.

MU has been a member of U.S. Green Building Council (USGBC) since 2002 and has undertaken an aggressive sustainability plan committed to the principals set forth within the LEED green building certification program.

For more information MU's commitment to energy savings, CAP plan, and LEED goals visit the following link http://sustainability.missouri.edu/

LEED AS A FRAMEWORK

To further the Campus' Commitment to Sustainable Design, MU's Campus Facilities, in collaboration with Sasaki Associates, developed this Campus Wide Approach to Sustainable Building using LEED as a framework. Leadership in Energy and Environmental Design, otherwise known as LEED, is a green building certification system developed by the U.S. Green Building Council (USGBC). USGBC is a non-profit organization made up of more than 16,000 member companies, including MU, committed to "a prosperous and sustainable future for our nation through cost-efficient and energy-saving green buildings." Green Building Certification Institute (GBCI) is the third-party organization that certifies LEED buildings.

LEED rating systems are developed through an open, consensus-based process led by the USGBC membership. LEED provides a framework for identifying and implementing measurable green building design, construction, operations and maintenance solutions.

CAMPUS WIDE LEED PROCESS

On May 4th and 5th 2011 MU held a workshop to help the University develop a campus wide approach to building facility sustainability and LEED. A core committee was developed, led by Bobb Swanson, and including Gary Ward, Larry Hubbard, Greg Watts, Paul Hoemann, Pete Millier, Maureen Kotlas, Jim Joy Steve Burdick, Marsha Smith, and Ken Albright. Members represent the various groups on campus primarily responsible for implementing the Campus Wide Approach to LEED. Over the course of the next several months, the Core Committee has developed the strategies that have become the content of the Sustainable Design Guideline related to building sustainability on the MU Columbia Campus as contained herein.

This Committee will serve as the decision making body for all future development of this Guide.

CAMPUS WIDE APPROACH TO LEED

The Campus Wide LEED Process follows the 2010 LEED® Application Guide for Multiple Buildings and On-Campus Building Projects. The guide outlines two approaches for on-campus projects: to certify many buildings on campus at different times; or to certify multiple buildings on a campus as one project.

MU has chosen to implement Part 1 of the Guide that gives campuses the option to certify certain credits campus wide. USGBC refers to these campus wide credits as Master Site Credits. While the entire campus cannot earn certification, MU has registered the campus as a master site and has submitted these credits to be pre-certified and applied to any project associated with the master site within the campus boundary and pursuing LEED. For instance, rather than addressing storage and collection of recyclables within a particular LEED project boundary, the campus can choose to implement a campus wide approach within the entire campus boundary. Campuses that take this approach save time and money documenting credits by doing so once instead of with each project and also save 20 percent in LEED certification fees. As well, projects may end up earning credits they otherwise would not earn. For instance, an individual project may not be able to comply with water efficient landscaping, so instead, the campus plans to limit the use of potable water campus wide and earn the LEED credit for all projects.

As a result, several Master Site Credits have been secured on a campus-wide basis for all future projects located within the campus LEED boundary [see page X]. These Campus credits are available for Projects that are pursuing a LEED certification. Although certain efficiencies arise from the implementation of the Campus Wide Approach, the intent is clearly NOT to allow individual projects to benefit from the Campus efforts and to avoid the responsibility to incorporate sustainable building strategies within their boundaries. Each project is strongly encouraged to meet, to the best of their respective abilities, the requirements listed throughout this Guide.

USING THIS GUIDE

This Guide is organized to correspond to the LEED 2009 New Construction and Major Renovation rating system and is not currently intended to be strictly applied to projects not meeting the "project" definition stated previously in this introduction. In the future, MU may develop additional Design Guidelines related to interiors, existing buildings operations and maintenance, etc. However, sustainable building strategies and principles are encouraged to be utilized for all campus building projects regardless of scope and scale.

MU'S CREDIT APPROACH

Each LEED credit has been assigned one of the following designations based on the current conditions, programs, and building sustainability goals for the MU Columbia Campus.

- **Master Site**
  These credits will be earned campus wide for projects located within the LEED Campus Boundary. While the project may earn the credit due to Master Site efforts related the performance of the Campus, project teams are strongly encouraged to meet the credit intent within their credit boundary also to enhance the campus' overall building sustainability. For those projects not located within the LEED boundary project teams are strongly encouraged to meet the credit intent within their credit boundary.
- **Campus Sustainable Design Standard**
  These credits are to be included within all projects [refer to definition of "project" previously stated within this introduction] regardless of LEED registration, location within the campus LEED boundary or LEED credit pursuit.
- **By Project**
  All projects are encouraged to attempt these credits.
- **Not Pursuing**
  The campus will not pursue these credits currently.

D C

CONSTRUCTION SUBMITTAL

BY PROJECT

Design [D] / Construction [C] designates phases at which credit requirements must be considered

MR Rapidly Renewable Materials

Credit 6 1 Point

By Project

Number of credit points available

Design or Construction designates the credit documentation phase

INTENT

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

What the credit aims to accomplish

Italic text excerpted from LEED 2009 for New Construction and Major Renovations

REQUIREMENTS

Use rapidly renewable building materials and products (made from plants that are typically harvested within a 10 year cycle or shorter) for 2.5% of total value of all building materials and products used, based on cost. If only a fraction of a product of material is extracted/ harvested/ recovered and manufactured locally, then only that % (by weight) shall contribute to regional value.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. For MR c3.0, MR c4.0, MR c5.0, MR c6.0. Furniture may be included, providing it is included consistently in MR c3-7.

Specific design, construction or other requirements as well as standards or criteria based on LEED 2009 BD+C requirements established by USGBC to earn the LEED credit

Actions required, responsible party, timing

ACTIONS

Design

Who: Architect

- Identify materials with high rapidly renewable content and incorporate into design.
- MU Project Manager to review any specific maintenance and/ or cleaning requirements with Campus Facilities Operations prior to specification in bid documents.
- Create a baseline materials budget and include materials cost of all items under the CSI divisions listed in LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect

- Revise baseline materials budget.
- Incorporate rapidly renewable materials requirements into specifications including submittal requirements and rapidly renewable content requirements by product. Specify percentage of rapidly renewable content.
- Include sample materials plan and sample sustainable materials data sheet in specifications.
- See sustainability specifications guidelines available in Appendix I.

Construction Administration

Who: Architect, Contractor

- Contractor to create and submit materials plan for rapidly renewable materials as required in the specification.
- Architect to review initial materials plan submitted by contractor.
- Contractor to provide monthly rapidly renewable material content report as a part of monthly LEED progress reports.
- Architect to review product submittals and submittals for monthly LEED progress reports.
- Contractor to complete LEED template and upload supporting documentation on LEED Online.

Color Coded sidebar to identify MU's Credit Approach

Supporting documents available for credit compliance

SUPPORTING DOCUMENTATION:

1. See Appendix C for Sample Materials Plan.
2. See Appendix D for Sustainable Materials Data Sheet.
3. See Appendix E for minimum rapidly renewable material content recommendations for standard building products.
4. See Appendix I for Sustainability Specifications Guidelines.

MU's credit approach

Related notes and references

NOTES

Like MR c3, materials reuse, rapidly renewable materials would need to be a major design intent to achieve this credit.

PROCESS

During the goal setting stage, each project shall assess and establish the strategies related to Sustainable Building Design Guidelines by utilizing the LEED Project Tracker [see Appendix K]. This tracker is color-coded to match this Guide for Master Site, Campus Sustainable Design Standard, By Project or Not Pursuing. The intent of the tracker is to allow the project team to reach consensus on the strategies that will be pursued, responsible parties, and related tasks. The strategies may shift and change as the project develops, but his tool will be a valuable communication device throughout the design and construction process.

PROCESS FOR PROJECTS PURSUING LEED CERTIFICATION

Registering the Project and Fees

MU has been a USGBC member since 2002. Any MU employee participating in a LEED project should associate MU with their USGBC account using MU's USGBC Corporate Access ID: _____

Michael Stornello (stornellom@missouri.edu) in Campus Facilities Planning Design and Construction is MU's Prime LEED Administrator. Michael is responsible for registering all projects and provide oversight relative to Campus Wide LEED initiatives.

All LEED projects are administered on LEED Online at https://www.leedonline.com

MU's LEED projects are organized in to LEED Project Block which allows all MU projects to be grouped on LEED online. It allows individual project registrations to be linked together. The Master Site and individual projects are registered separately within the registered Block. Any project within the Block will be associated with the Master Site within the same Block.

University of Missouri Block ID 1000016193 Block Access ID 1256925126170953

University of Missouri – Master Site Project ID 1000016195 | Access ID 1410640610174757

Costs

Block: free
Master Site: $900 USGBC Members/ $1200 Non-Members
Registration for each project*: $900 USGBC Members/ $1200 Non-Members
Certification for each project: Varies by project size.

Requirements

To earn LEED certification the applicant project must satisfy all the prerequisites and qualify for a minimum number of points to attain the established project ratings as listed in the applicable Rating Guide. Having satisfied the basic prerequisites of the program, applicant projects are then rated according to their degree of compliance within the rating system.

After registration the project team should begin to collect information and perform the requirements to satisfy the prerequisite or credit documentation requirements; documentation should be gathered throughout the design and construction and thus the project team shall designate a LEED accredited professional that is responsible to manage its compilation [typically from the architect].

LEED for New Construction and Major Renovation provides the option of splitting certification application into two phases: design and construction. Documentation for design phase credits identified in LEED-Online can be submitted for review at the completion of the design phase and can be evaluated based on the documentation available during this phase of the project. The LEED credit however will not be awarded until the completion of the construction application. In this way, the design team is afforded the ability to execute minor modifications to the design BEFORE the construction is completed based on GBCI feedback and prior to the construction being completed. MU Columbia prefers the dual application approach.

Project Information Forms [PIF's]

For those projects that pursue LEED certification the PIF's must be completed by the MU Project representative within the LEED-Online tool. These forms are project specific and must be completed in full. In some instances additional information must be gathered with assistance from other MU Facilities.
Note:
Minimum Project requirement #6: MU Energy Management has agreed to provide energy and water use data and share data through an approved format [see Appendix J] to be completed jointly between Energy Management, Project Manager, and Project Engineer
MU Project Manager to complete PIF1.
Project Consultant to complete PIF2, PIF3, PIF4

Regional Priority Credits:

For those projects that pursue LEED certification Regional Priority [RP] credits may be available. These credits have been identified to provide incentive to address geographically specific environmental issues, USGBC regional councils and chapters have identified six credits per rating system that are of particular importance to specific areas. Each regional priority credit is worth an additional one point, and a total of four regional priority points may be earned. Upon project registration, LEED Online automatically determines a project's regional priority credits based on its zip code. If the project achieves more than four regional priority credits, the team can choose the credits for which these points will apply. Through the Master Site Campus Wide Approach these Regional Credits have been targeted. Separate documentation is unnecessary as the LEED-Online tool will calculate the appropriate additional points if Regional Priority credits are adequately documented.

For MU the following 6 credits are identified under the Regional Priority credits under the LEED® for New Construction rating system:

SSc1	Site Selection
SSc5.1	Protect or Restore Habitat
SSc6.2	Stormwater Design - Quality
EAc2	On-site Renewable Energy - 7%
MRc2	Construction Waste Management - 75% Diversion
MRc5	Regional Materials - 20% Regional Materials

Innovation in Design Credits:

For those projects that pursue LEED certification Innovation credits may be available. These credits have been made available to provide design teams and projects the opportunity to achieve exceptional performance above the requirements set by the LEED Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED Green Building Rating System. Through the Master Site Campus Wide Approach these Innovation Credits have been documented and should be referenced to by each individual project [within the LEED boundary] by providing the Master Site Project ID Number [see below] within LEED-Online documentation.

OTHER REFERENCES

2009 LEED For New Construction and Major Renovation [available on-line at www.usgbc.org] and addenda/errata
2009 LEED Reference Guide available in the Document Center at Campus Facilities
LEED Application Guide for Multiple Buildings and On-Campus Building Projects [available on-line at www.usgbc.org]
LEEDUser website reference [available on-line @ http://www.leeduser.com]
MU Campus Stormwater Master Plan Study [available on-line @ http://www.cf.missouri.edu/masterplan/]
MU Climate Action Plan [available on-line @ http://www.cf.missouri.edu/masterplan/cap/publication.html]
MU Master Plan
Labs21 Environmental Performance criteria available on-line @ http://labs21.lbl.gov/EPC/intro.htm]

Appendix referred to throughout this document

LEED 2012

The next version of LEED is due to be released sometime in 2012. Projects registered prior to its release will have the option to stay with 2009 or upgrade. All approaches outlined should consider LEED 2012 implications to the greatest extent possible. The second round of public comments for LEED 2012 will happen in the summer of 2011. At this point it will be possible to see the direction LEED 2012 is headed but impossible to predict the outcome.

CAMPUS WIDE LEED APPROACH

UNIVERSITY OF MISSOURI - Campus Wide LEED							
LEED BD+C NC 2009			Building Design & Construction				
REGIONAL PRIORITY	CREDIT #	CREDIT TITLE	MAX. POINTS	MASTER SITE #	MASTER SITE Future	CAMPUS STD	BY PROJECT
	SUSTAINABLE SITES						
	SS Pr 1	Construction Activity Pollution Prevention	Y			Y	
** RP	SS Cr 1	Site Selection *(** Regional Priority)*	1			1	
	SS Cr 2	Development Density & Community Connectivity	5				5
	SS Cr 3	Brownfield Redevelopment	1				1
	SS Cr 4.1	Alternative Transportation - Public Transportation Access	6		6		6
	SS Cr 4.2	Alternative Transportation - Bicycle Storage & Changing Rooms	1		1		1
	SS Cr 4.3	Alternative Transportation - Low-Emission & Fuel-Efficient Vehicles	3		3		
	SS Cr 4.4	Alternative Transportation - Parking Capacity	2		2		0 / 2
** RP	SS Cr 5.1	Site Development - Protect or Restore Habitat *(** Regional Priority)*	1		1	1	
	SS Cr 5.2	Site Development - Maximize Open Space	1	1			
	SS Cr 6.1	Stormwater Design - Quantity Control	1		1		1
** RP	SS Cr 6.2	Stormwater Design - Quality Control *(** Regional Priority)*	1		1		1
	SS Cr 7.1	Heat Island Effect - Non-Roof	1		1		1
	SS Cr 7.2	Heat Island Effect - Roof	1		1		1
	SS Cr 8	Light Pollution Reduction	1		1		1
	WATER RESOURCES						
	WE Pr 1	Water Use Reduction - 20%	Y			Y	
	WE Cr 1	Water Efficient Landscaping	4	2			2
	WE Cr 2	Innovative Wastewater Technologies	2				2
	WE Cr 3	Water Use Reduction	4			2	2
	ENERGY AND ATMOSPHERE						
	EA Pr 1	Fundamental Commissioning	Y			Y	
	EA Pr 2	Minimum Energy Performance	Y			Y	
	EA Pr 3	Fundamental Refrigerant Management	Y			Y	
	EA Cr 1	Optimize Energy Performance:	19			7	12
** RP	EA Cr 2	On-site Renewable Energy *(** Regional Priority - 7% On-site renewable)*	7		7	7	
	EA Cr 3	Enhanced Commissioning	2			2	
	EA Cr 4	Enhanced Refrigerant Management	2		2		2
	EA Cr 5	Measurement & Verification	3			3	
	EA Cr 6	Green Power	2		2		2
	MATERIALS AND RESOURCES						
	MR Pr 1	Storage and Collection of Recyclables	Y	Y			
	MR Cr 1.1	Building Reuse- Maintain Existing Walls, Floors, and Roof	3				3
	MR Cr 1.2	Bldg Reuse- Maintain Interior Non-structural Elements	1				1
** RP	MR Cr2	Construction Waste Management *(** Regional Priority - 75% diversion)*	2			1	1
	MR Cr 3	Materials Reuse	2				2
	MR Cr 4	Recycled Content	2			2	
** RP	MR Cr 5	Regional Materials (** Regional Priority: 20% Regional)	2			2	
	MR Cr 6	Rapidly Renewable Materials	1				1
	MR Cr 7	Certified Wood	1				1

UNIVERSITY OF MISSOURI - Campus Wide LEED

LEED BD+C NC 2009 — **Building Design & Construction**

REGIONAL PRIORITY	CREDIT #	CREDIT TITLE	MAX. POINTS	MASTER SITE #	MASTER SITE Future	CAMPUS STD	BY PROJECT
	INDOOR ENVIRONMENTAL QUALITY						
	IEQ Pr 1	Min IAQ Performance	Y			Y	
	IEQ Pr 2	Environmental Tobacco Smoke ETS Control	Y	Y			
	IEQ Cr 1	Outdoor Air Delivery Monitoring	1			1	
	IEQ Cr 2	Increased Ventilation	1				
	IEQ Cr 3.1	Construction IAQ Mgmt Plan- During Construction	1			1	
	IEQ Cr 3.2	Construction IAQ Mgmt Plan - Before Occupancy	1				1
	IEQ Cr 4.1	Low-Emitting Materials - Adhesives and Sealants	1			1	
	IEQ Cr 4.2	Low Emitting Materials- Paints and Coatings	1			1	
	IEQ Cr 4.3	Low Emitting Materials- Flooring Systems	1			1	
	IEQ Cr 4.4	Low Emitting Materials- Composite Wood and Agrifiber	1			1	
	IEQ Cr 5	Indoor Chemical And Pollutant Source Control	1				1
	IEQ Cr 6.1	Controllability of Systems - Lighting	1			1	
	IEQ Cr 6.2	Controllability of Systems- Thermal Comfort	1				1
	IEQ Cr 7.1	Thermal Comfort- Design	1				
	IEQ Cr 7.2	Thermal Comfort - Verification	1				
	IEQ Cr 8.1	Daylight and Views - Daylight	1				1
	IEQ Cr 8.2	Daylight and Views- Views	1				1
	INNOVATION IN DESIGN						
	ID Cr 1	Exemplary Performance: SSc5.2 Maximize Open Space	1	1			
		AASHE's STARS	1	1			
		Green Education Program	1	1			
		Building Management System	1	1			
		Climate Action Plan	1	1			
	ID Cr 2	LEED Accredited Professional	1			1	
	REGIONAL CREDITS						
	RP Cr 1.1	Regional Credit - SS Cr 1: Site Selection	1			1	
	RP Cr 1.2	Regional Priority credit : SS Cr 5.1: Restore Habitat Master Site	1			1	
	RP Cr 1.3	Regional Priority credit: MR Cr 5: 20% Regional	1			1	
	RP Cr 1.4	Regional Priority credit : EA Cr 2: 7% Onsite Renewable	1			1	
	Other Regional Credits	SS Cr 6.2: Stormwater Quality MR Cr 2: 75% Construction Waste Management					
	TOTAL AVAILABLE		110	8	29	40	54

SITE BOUNDARY REQUIREMENTS

LEED Master Site requires a campus boundary be determined. The boundary must be contiguous and not gerrymander. All LEED projects must be within the boundary but not all projects within the boundary must be LEED certified. When using the Master Site option, all of the buildings and land within the boundary must be considered.

DETERMINING THE LEED CAMPUS BOUNDARY

The Mizzou LEED Campus Boundary includes all campus property owned within the yellow boundary in figure 3 The total land area of these parcels is 907 acres.

Roadways and other infrastructure not owned or managed by the campus are omitted from the LEED credit calculations, as are parcels inside the campus boundary that are not owned, used, or managed by the campus.

For the purposes of illustration, the LEED credit diagrams will be drawn on aerial photographs with a golden boundary outline, as in Figure 2, which masks those parcels not owned by Mizzou, but does not visually exclude the roads. Despite this visual shorthand, roads will be omitted and only the 907 acres shown in Figure 1 will be included in the LEED credit calculations.

FIGURE 1.
Property owned by Mizzou that is included in LEED credit calculations

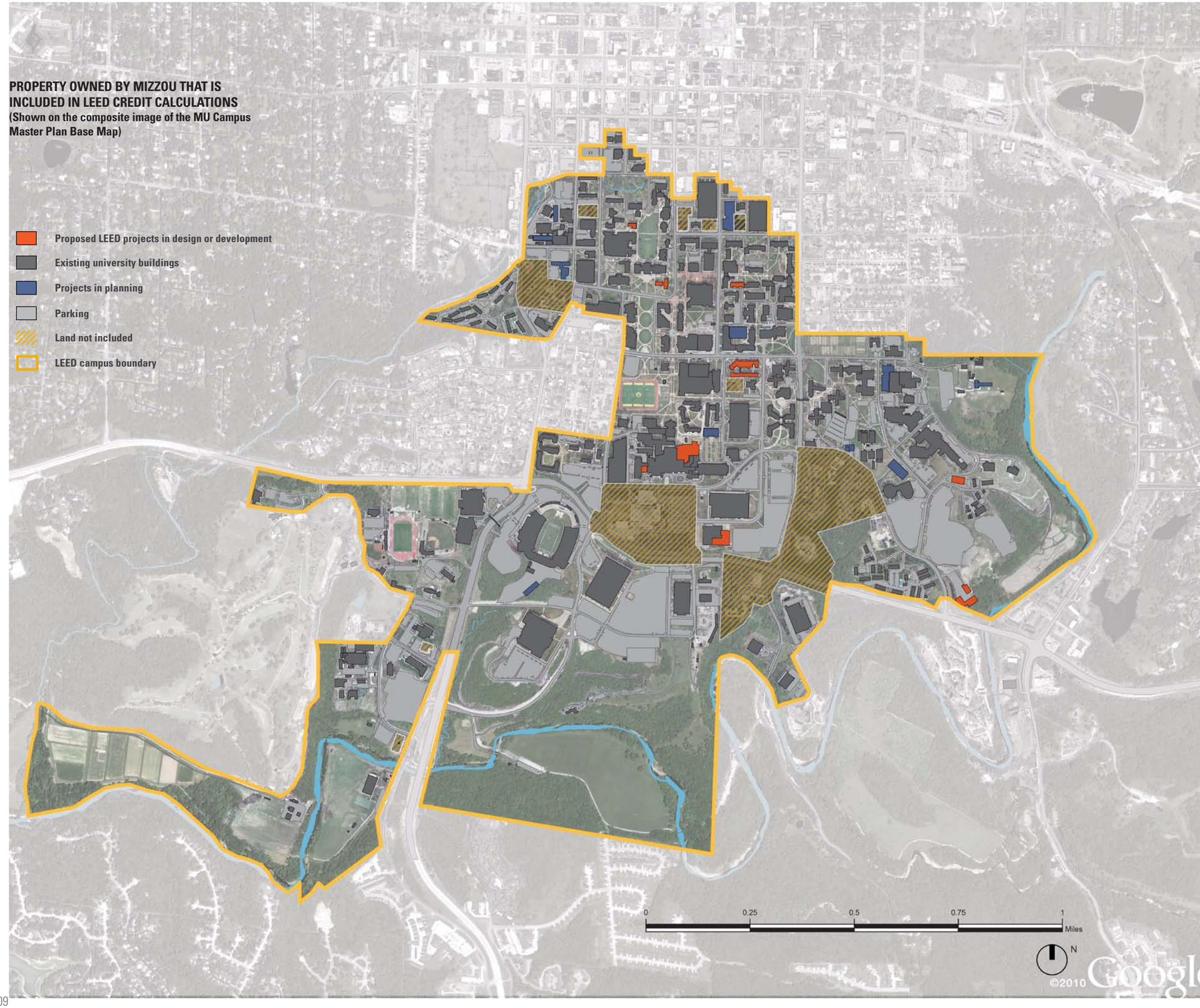
Parcels owned by MU that are included in LEED credit calculations

Total area = 39,511,171 sq. ft.
= 907 acres

FIGURE 2.
The outermost boundary around the parcels owned by Mizzou is illustrated in gold. Roads and non-MU parcels are excluded from LEED credit calculations.

Outer campus boundary; roads and non-MU parcels are excluded from all LEED credit calculations

Parcels not owned by MU



LEED BUILDINGS

For the purposes of the LEED credit calculations, this study considers 10 buildings that are proposed LEED projects either in design or development. Other projects recommended for later phases of the long-term master plan are deemed too distant to be included at this time.

PROJECTS RECENTLY COMPLETED

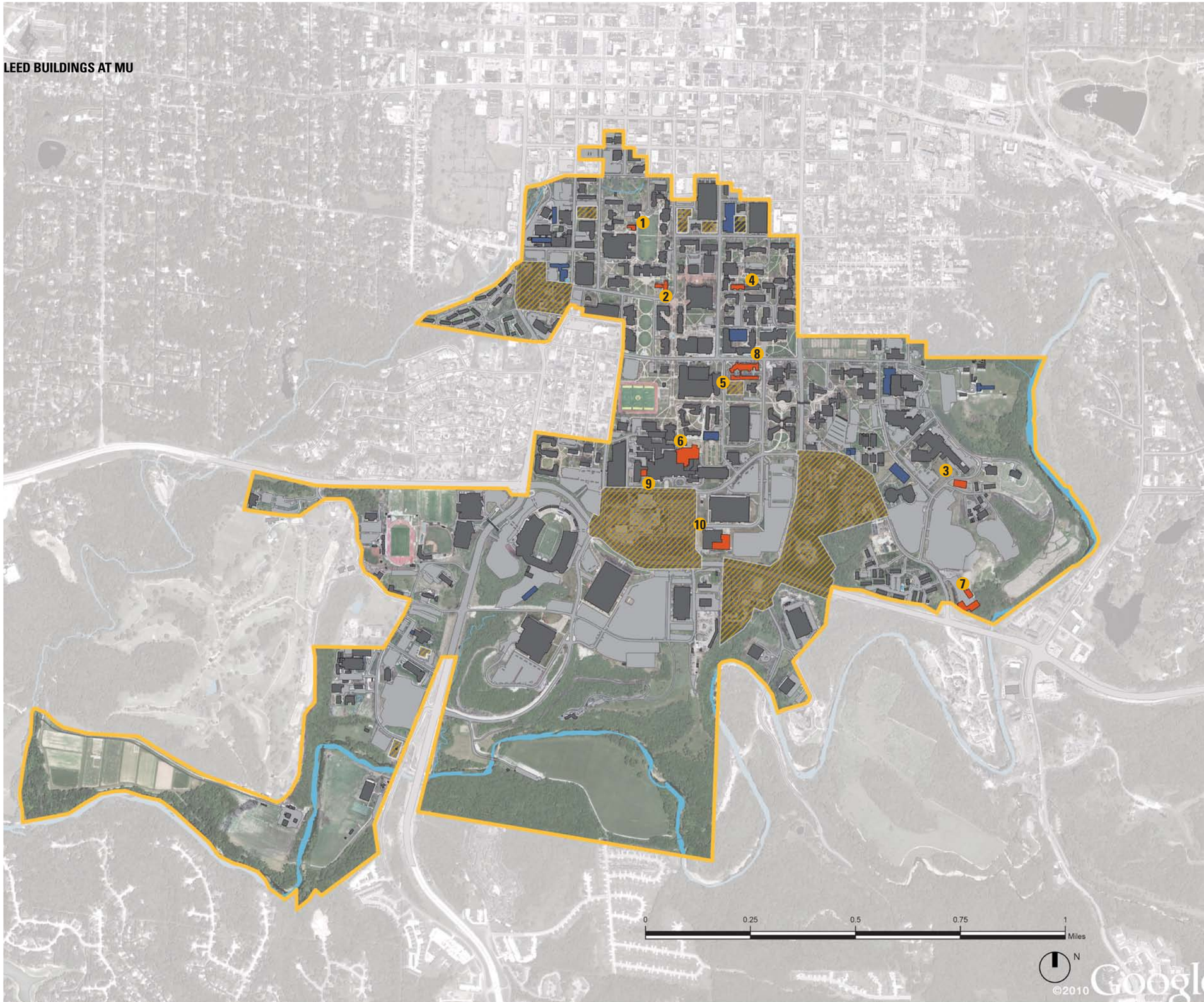
1. Switzler Hall
(scheduled to be complete in summer 2011)
2. Tate Hall
(scheduled to be complete in summer 2011)

IN DESIGN OR CONSTRUCTION

3. Animal Resource Center
4. Gwynn Hall renovation
5. Wolpers Hall
6. University Hospital Patient Care Tower
7. Food and Wine Complex
8. Johnston Hall

IN PLANNING

9. University Hospital ER expansion
10. Orthopedics Expansion



Proposed LEED projects in design or development

Existing university buildings

Projects in planning

Parking

Land not included

LEED campus boundary

Sustainable Sites

SSp1	Construction Activity Pollution Prevention	03
SSc1	Site Selection	04
SSc2	Development Density	09
SSc3	Brownfield Redevelopment	14
SSc4.1	Alternative Transportation - Public Transportation Access	15
SSc4.2	Alternative Transportation - Bicycle Storage and Changing Rooms	21
SSc4.3	Alternative Transportation - Low Emitting and Fuel Efficient Vehicles	27
SSc4.4	Alternative Transportation - Parking Capacity	27
SSc5.1	Site Development - Protect or Restore Habitat	28
SSc5.2	Site Development - Maximize Open Space	31
SSc6.1	Stormwater Design - Quantity Control	33
SSc6.2	Stormwater Design - Quality Control	34
SSc7.1	Heat Island Effect - Non Roof	36
SSc7.2	Heat Island Effect - Roof	38
SSc8	Light Pollution Reduction	41

SS

Construction Activity Pollution Prevention

Prerequisite 1

Required

Campus Standard

INTENT

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

REQUIREMENTS

Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse. Prevent sedimentation of storm sewer or receiving streams and/or pollution with dust and particulate matter. Erosion control plan conforms to the 2003 EPA Construction General Permit, or local Erosion and Sedimentation Control standards and codes, whichever is more stringent.

APPLICABLE STANDARDS

In addition to the codes and standards listed in section 2 of the Facilities Planning and Development "Consultant Procedures and Design Guidelines", the following specifically apply to construction activity pollution prevention:

1. MU Stormwater Master Plan
2. National Pollutant Discharge Elimination System (NPDES) requirements for construction activities
3. EPA Construction General Permit
4. Missouri Department of Natural Resources "Protecting Water Quality - A Field Guide to Erosion, Sediment and Stormwater Best Management Practices for Development Sites in Missouri and Kansas"

ACTIONS

Design

Who: MU Landscape Services, MU Environmental Health and Safety, Civil Engineer

- MU and Professional consultant should develop Erosion and Sedimentation Control (ESC) Plan.

Construction Documents

Who: Civil Engineer

- Incorporate ESC plan in all construction documents and specifications.
- Require submittals of monthly LEED progress report with updates on the ESC plan implementation.

Construction Administration

Who: General Contractor

- Contractor to provide photographs and narrative for the ESC measures implemented on site during all stages of construction.
- Civil Engineer should regularly inspect for compliance.
- Contractor to upload ESC plan, drawings, photographs and a list of ESC measures undertaken and complete LEED template on LEED Online.

SS

Site Selection

Credit 1

1 point

Regional Priority

Campus Standard

INTENT

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

REQUIREMENTS

Avoid the development of inappropriate sites like prime agricultural land, floodplain, previous park lands, and wetlands.

ACTIONS

Site Selection

Who: University of Missouri

- Refer to MU's campus site selection map, available on LEED Online Master Site, for project site selection.
- Review the important environmental characteristics, including wetlands, sloped areas, important habitat areas, and forested areas on the project site and evaluate potential environmental disturbance that will occur as a result of construction.

Design

Who: Architect, MU Landscape Services

- Avoid developing on areas which exhibit any of the characteristics listed in the restricted criteria.
- MU to upload project specific Site Selection Map if available on LEED Online Master Site, or refer to the MU Campus Site Selection Map to create one specific to the project site and upload it to LEED Online.
- MU to complete LEED template on LEED Online.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. Campus-wide Site Selection Map
2. Project specific Site Selection Maps for proposed LEED projects identifying important environmental characteristics on site.

NOTE

A study is currently underway to map the habitat of the endangered Indiana bats. If applicable, the results of this study will need to be added to this LEED site selection map analysis.

CREDIT COMPLIANCE

Prime farmland

The campus does include a historical field, Sanborn Field and a historic garden, which are protected plots that will not be developed. Otherwise there is no land presently classified as prime farmland on the campus.

Previously undeveloped land whose elevation is lower than 5 feet above the 100 year flood elevation

The map illustrates the location of the 100 year flood elevations. The topography lines illustrate the change in elevation at 10 foot increments. Therefore, development on undeveloped land that is one 10 foot increment away from the 100 year flood elevation meets the criterion specified above.

Land identified as habitat for threatened or endangered species

Not applicable. There is no land presently classified as habitat for threatened or endangered species on the campus. Research is underway to document bat habitat on campus. As evidence of bats on campus becomes available, the habitat for threatened or endangered species will be updated.

Wetlands, including a 100 foot buffer

Not applicable. There is no land presently classified as wetlands on the campus.

Previously undeveloped land within 50 feet of a water body

The map illustrates the location of water bodies, specifically stream lines and water polygons where the part of the line or polygon is within 1 mile of the downtown University of Missouri Campus. Stream lines and water polygons generated from 2 foot planimetric data set based on 2007 imagery.

The hatched polygons indicate a 50 foot buffer around the water bodies.

Land that prior to acquisition was public parkland

Not applicable. There is no recently acquired land that was public parkland.

SS

Site Selection

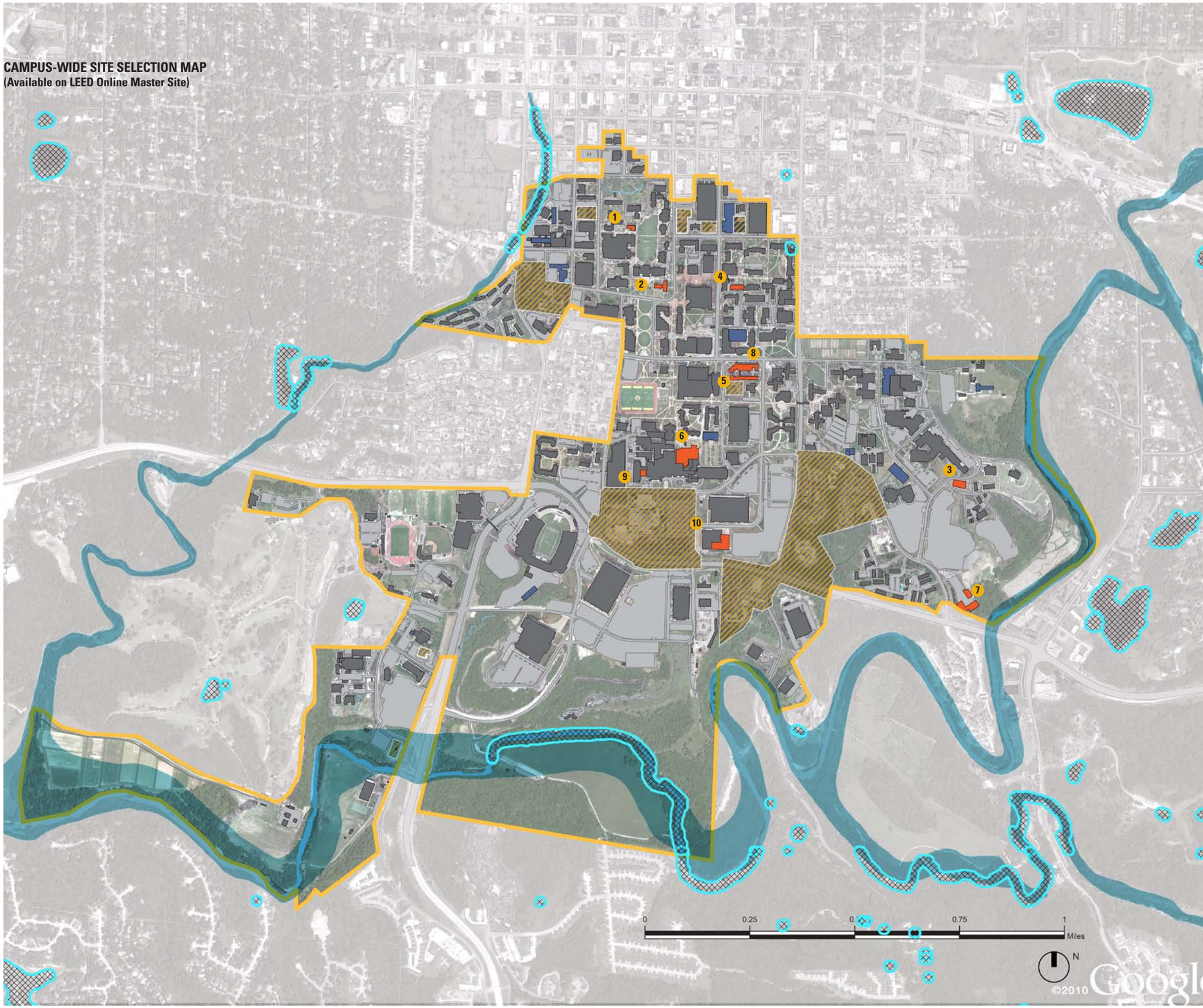
Credit 1

1 point

Regional Priority

Campus Standard

CAMPUS-WIDE SITE SELECTION MAP
(Available on LEED Online Master Site)



- 50 foot buffer region around water bodies
- 100 year flood zone
- Proposed LEED projects in design or development
- Existing university buildings
- Projects in planning
- Parking
- Land not included
- LEED campus boundary

PROJECT SPECIFIC SITE SELECTION MAPS
(Available on LEED Online Master Site)

- 50 foot buffer region around water bodies
- 100 year flood zone
- Proposed LEED projects in design or development
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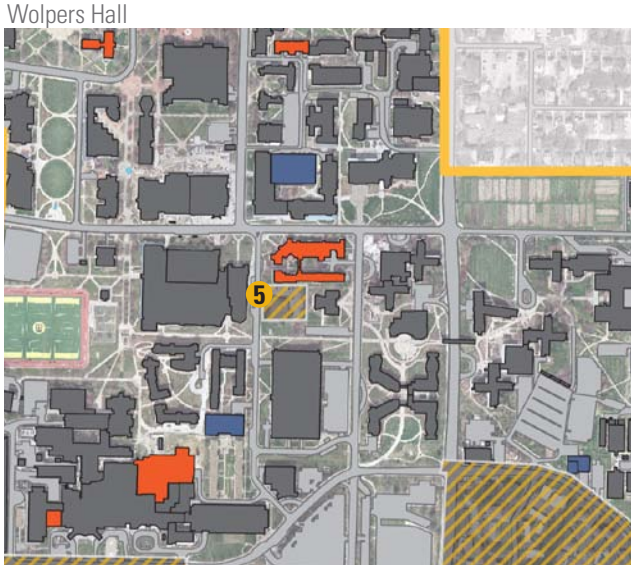
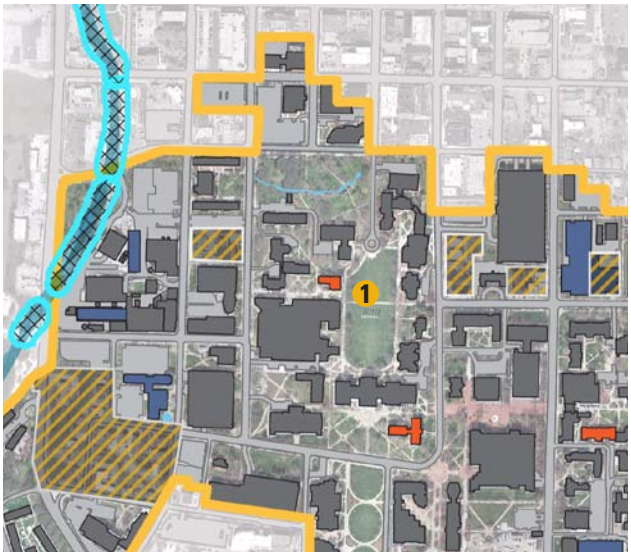
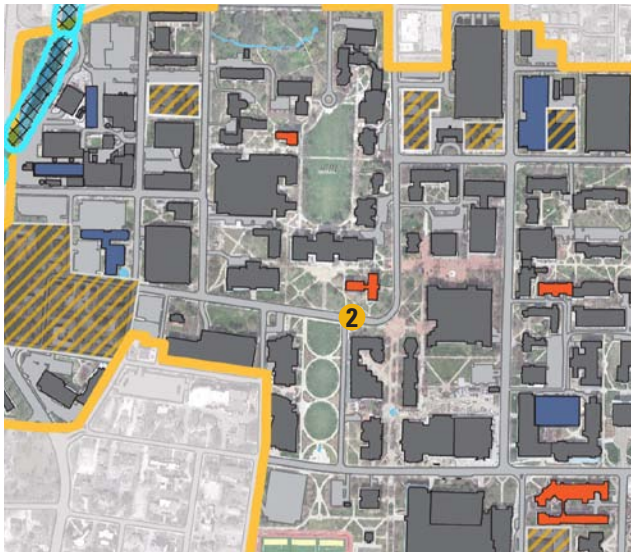
Wolpers Hall



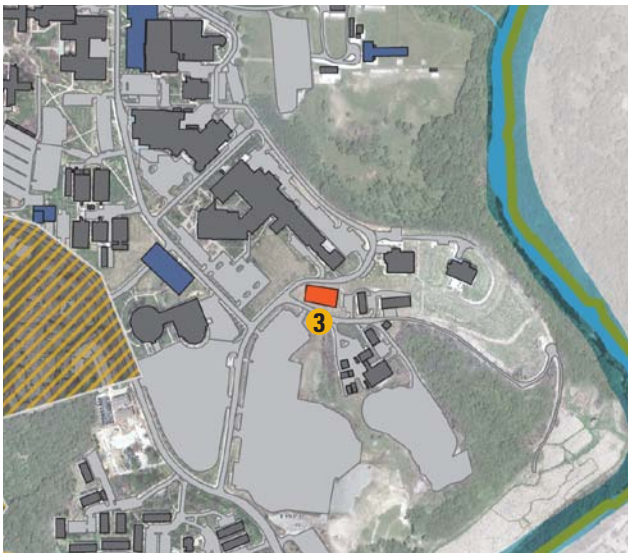
Switzler Hall



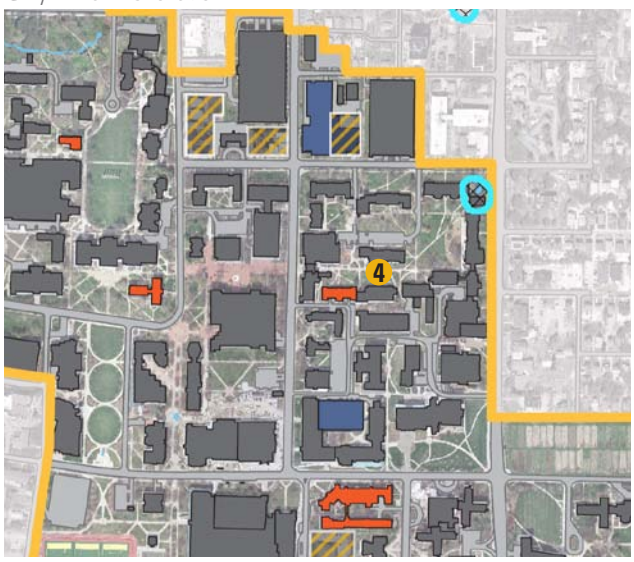
Tate Hall



Animal Resource Center



Gwynn Hall Renovation



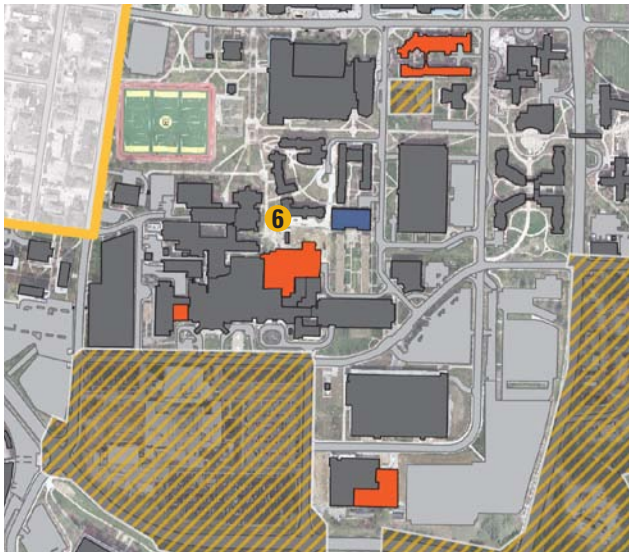
0 0.25 0.5 miles

N

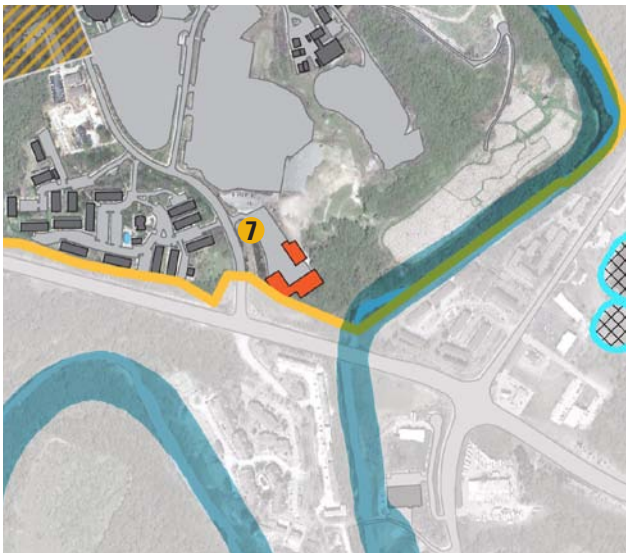
PROJECT SPECIFIC SITE SELECTION MAPS
(Available on LEED Online Master Site)

- 50 foot buffer region around water bodies
- 100 year flood zone
- Proposed LEED projects in design or development
- Existing university buildings
- Projects in planning
- Parking
- Land not included
- LEED campus boundary

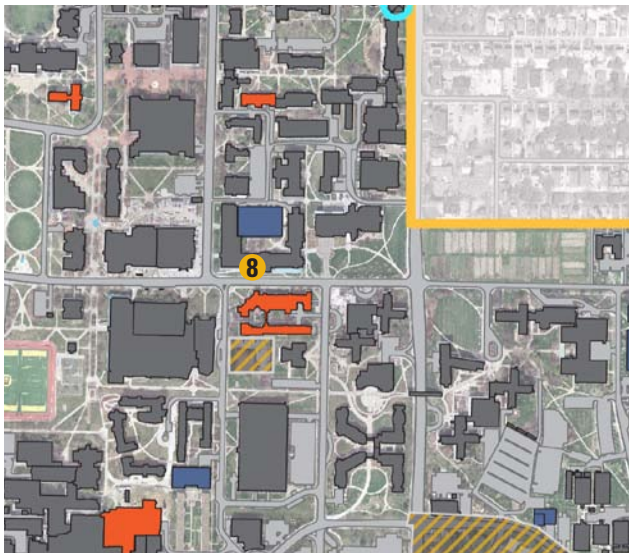
University Hospital Patient Care Tower



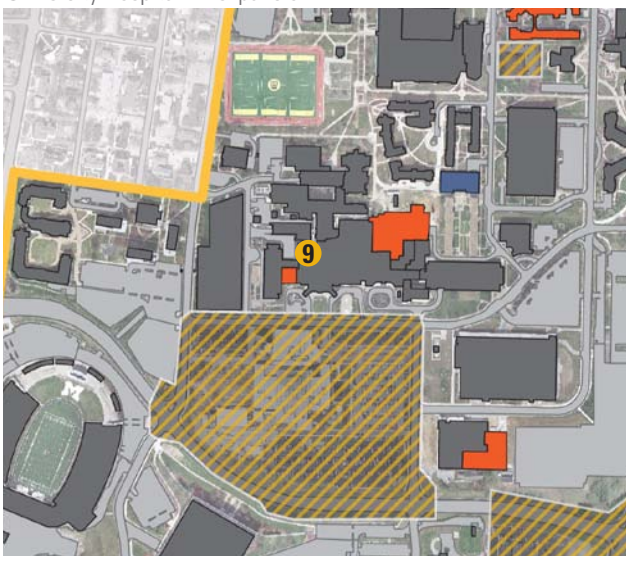
Food and Wine Complex



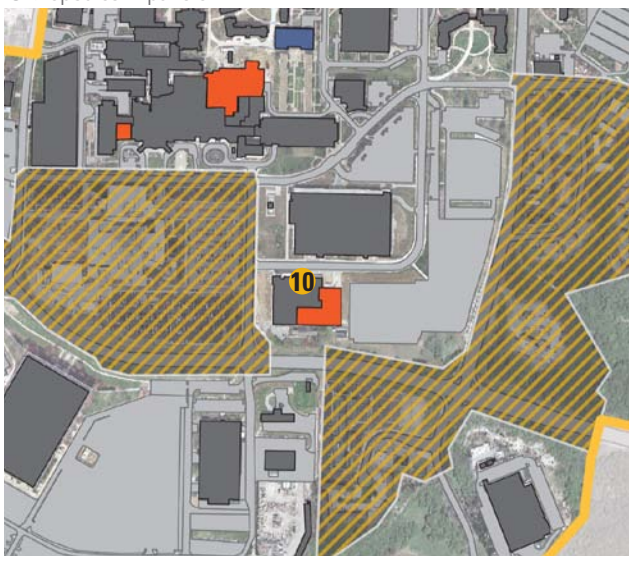
Johnston Hall

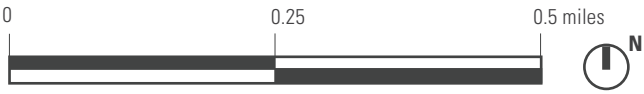


University Hospital ER expansion



Orthopedics Expansion





SS

Credit 2

By Project

Development Density and Community Connectivity

5 points

INTENT

To channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.

REQUIREMENTS

Option 1: Increase localized density to conform to existing or desired density goals by utilizing sites that are located within an existing minimum development density of 60,000 square feet per acre (2 story downtown developments).

Option 2: Construct or renovate building on a previously developed site, within 1/2 mile of a residential zone or neighborhood with an average density of 10 units per acre net and within 1/2 mile of at least 10 Basic Services with pedestrian access between the building and the services. Distance is determined by drawing a 1/2 mile radius around main building entrance on site map and counting services within.

ACTIONS

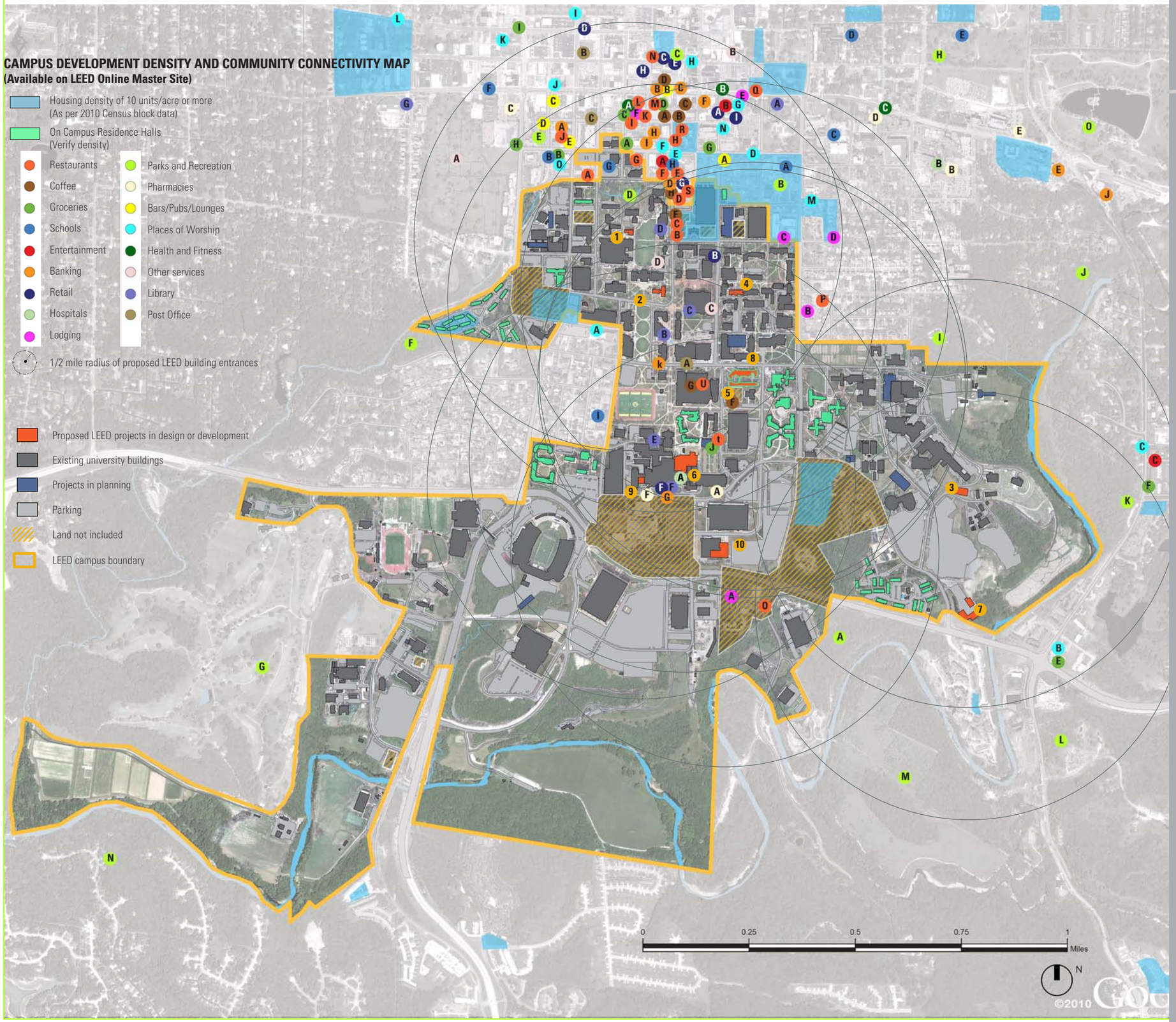
Design

Who: Architect

- Refer to MU's Campus Development Density and Community Connectivity Map, available on LEED Online Master Site, to identify basic services in proximity of project site.
- Develop strategy to meet credit intent.
- Architect to upload Project specific Community Connectivity Map if available on LEED Online Master Site, or create one specific to the project site and upload to LEED Online.
- Architect to complete LEED template on LEED Online.

SUPPORTING DOCUMENTATION
AVAILABLE ON LEED ONLINE MASTER SITE

1. Campus Development Density and Community Connectivity Map
2. Project specific Community Connectivity Maps for proposed LEED projects identifying nearby services and density of residential units
3. Basic Services Key for Community Connectivity Maps



(PROJECT SPECIFIC COMMUNITY CONNECTIVITY MAPS
(Available on LEED Online Master Site)

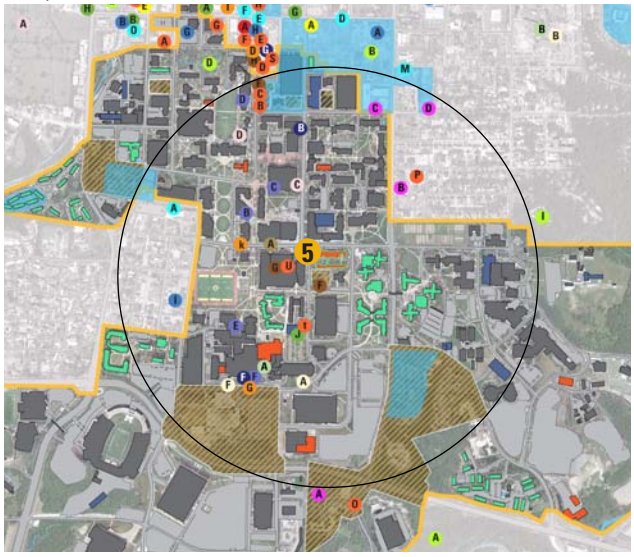
Housing density of 10 units/acre or more
(As per 2010 Census block data)

On Campus Residence Halls
(Verify density)

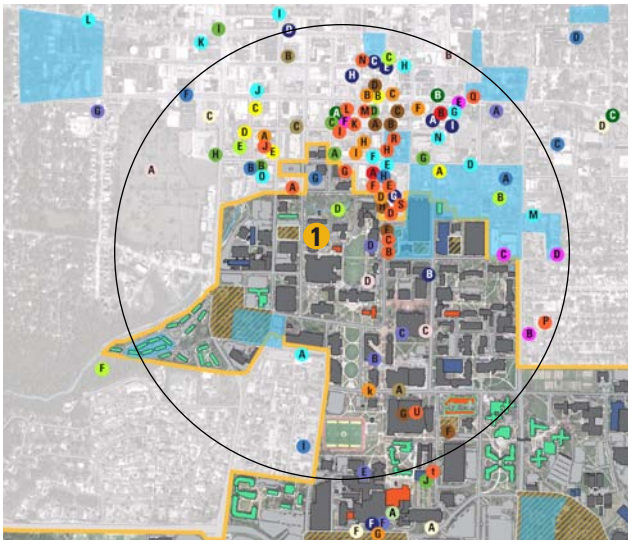
- Restaurants
- Coffee
- Groceries
- Schools
- Entertainment
- Banking
- Places of Worship
- Health and Fitness
- Lodging
- Parks and Recreation
- Pharmacies
- Bars/Pubs/Lounges
- Retail
- Hospitals
- Other services
- Library
- Post Office

1/2 mile radius of proposed LEED building entrances

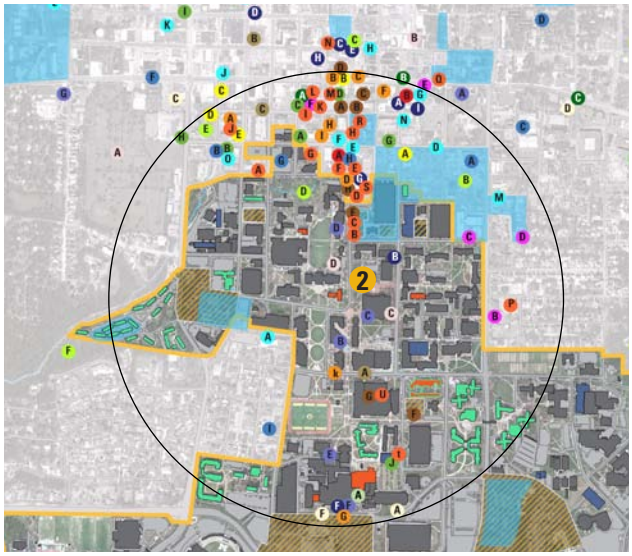
Wolpers Hall



Switzler Hall



Tate Hall



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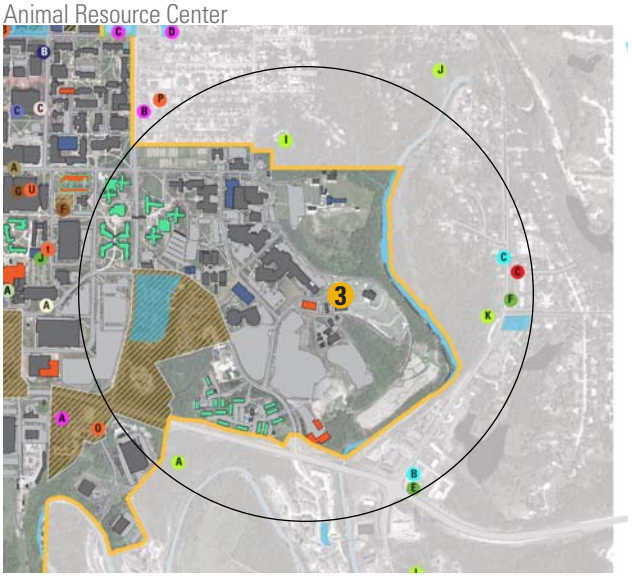
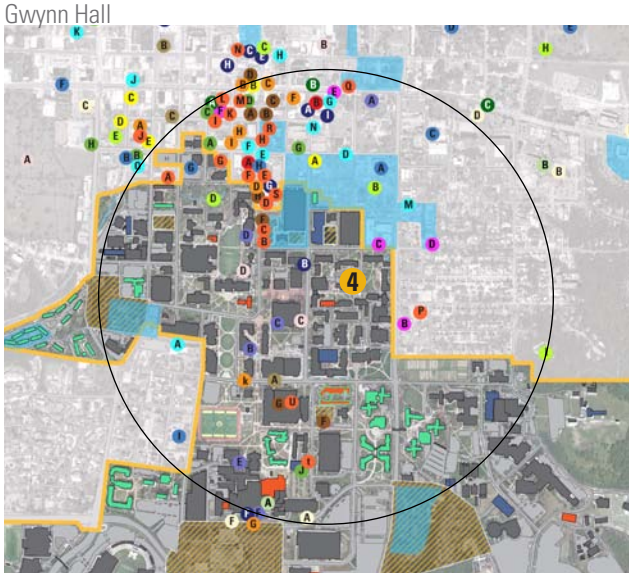


Gwynn Hall



0 0.25 0.5 mile N

(PROJECT SPECIFIC COMMUNITY CONNECTIVITY MAPS
(Available on LEED Online Master Site)

Housing density of 10 units/acre or more
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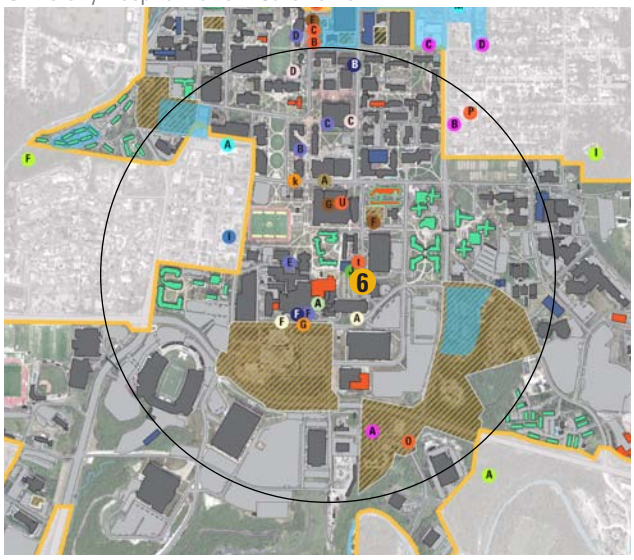
1/2 mile radius of proposed LEED building entrances

University Hospital Patient Care Tower



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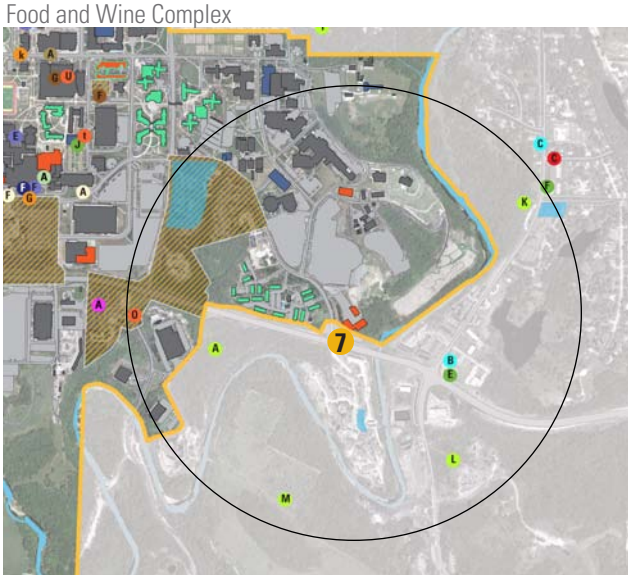
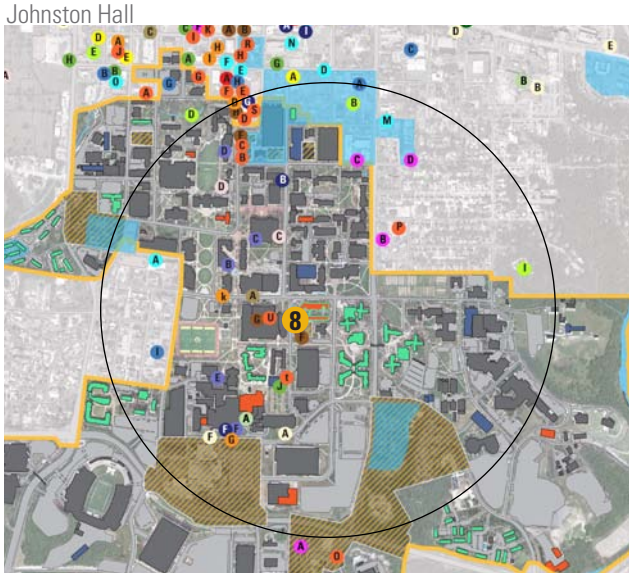
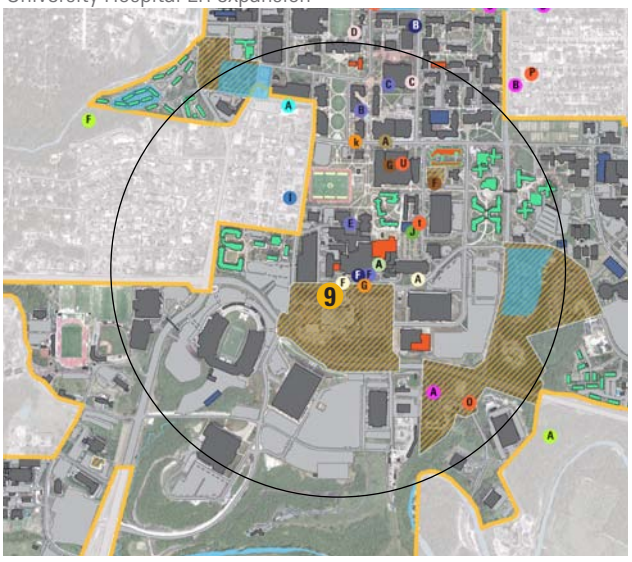


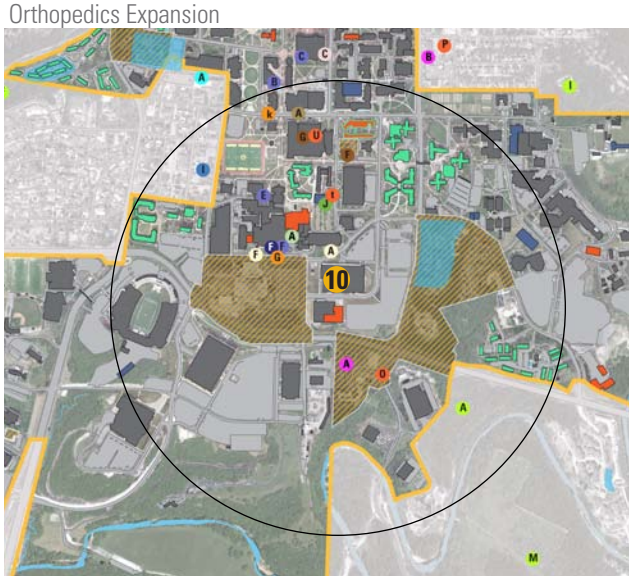
Johnston Hall



University Hospital ER expansion



Orthopedics Expansion



0 0.25 0.5 mile N

BASIC SERVICES KEY FOR COMMUNITY CONNECTIVITY MAPS
(Available on LEED Online Master Site)

01 RESTAURANTS

a	Bengal's Bar and Grill	227 S 6th Street
b	Heidelberg Restaurant	410 S 9th Street
c	Noodles and Company	406 S 9th Street
d	Campus Bar and Grill	304 S 9th Street
e	Chipotle Mexican Grill	306 S 9th Street
f	Shakespeare's Pizza	225 S 9th Street
g	Sub Shop	209 S 8th Street
h	Rome Restaurant	114 S 9th Street
i	Addison's - An American Grill	709 Cherry Street
j	Flat Branch Pub and Brewing	115 S 5th Street
k	Bleu Restaurant and Wine Bar	29 S 8th Street
l	Tiger Hotel	23 S 8th Street
m	Sycamore Restaurant	800 E Broadway
n	Boone Tavern and Restaurant	811 E Walnut
o	Stadium Grill	1219 Fellows Place
p	Lee Street Deli	603 Lee Street
q	Gumby's Pizza	1201 East Broadway
r	Panera Bread	102 South 9th Street
s	Upper Crust bakery	94 Elm Street #108
t	Subway	Pershing Commons- off Hitt Street
u	Wheatstone Bistro	Memorial Union

02 COFFEE

a	Kaldi's Coffee House	29 S. 9th Street
b	Lakota Coffee Company	24 S. 9th Street
c	Kayotea	912 E Broadway
d	Coffee Zone	11 N. 9th Street
e	Osamas	406 S 9th Street
f	Vida Coffee Company	812 Hitt Street
g	Starbucks	Memorial Union
h	Starbucks	304 South 9th Street

03 GROCERIES

a	Chong's Oriental Market	701 Locust
b	Campus Eastern Foods	408 Locust
c	Candy Factory	701 Cherry Street
d	Root Cellar	814 E. Broadway
e	Break Time	1416 Old 63 South
f	Bee Line Snack Shops	912 Old 63 South
g	Hitt mini mart	111 Hitt Street
h	Midwest Petroleum Co	126 South Providence Road
i	Break Time	200 North Providence Road
j	24/7 Mizzou Market	Pershing Commons- off Hitt Street

04 SCHOOLS

a	Robert E. Lee Elementary School	1208 Locust
b	Islamic School of Columbia- MO	408 Locust
c	Stephens College	1200 East Broadway
d	Stephens College Children School	1400 Windsor Street
e	Windsor Street Montessori School	1616 Windsor Street
f	Ulysees S. Grant Elementary School	10 East Broadway
g	Educational technologies	200 Heinkel Building
h	Discovery Days Preschool-Mumc	204 South 9th Street
i	Children's House Montessori of Columbia Elementary School	915 Maryland Ave

05 ENTERTAINMENT

a	Missouri Theatre Center for the Arts	203 S 9th Street
b	Ragtag Cinema	10 Hitt Street
c	Pace	900 Danforth Drive

06 BANKING

a	Premier Bank	15 S 5th Street
b	Landmark Bank	801 E Broadway
c	Commerce Trust Bank	901 E Broadway
d	Landmark Bank ATM	304 South 9th Street
e	Bank of America ATM	Brady Commons, 901 Rollins Street
f	U.S. Bank	1000 E Broadway
g	Boone County National Bank	1 Hospital Drive
h	Bank of America	800 E Cherry Street
i	Boatsmen Bank MidMissouri	800 Cherry Street
j	Cardtronics ATM	122 S. 9th Street
k	U.S. Bank	911 E Rollins Street

07 RETAIL

a	Ninth Street Video	10 Hitt Street
b	Blockbuster Express	518 Hitt Street
c	Salon Nefisa	825 East Walnut Street
d	Nora Stewart Memorial Nursery	505 East Ash street
e	Mothers Day Out	101 North 10th street
f	Pediatric Plastic Surgery	1 Hospital Drive
g	Miller Dental Associates	904 Elm St
h	Doug's Chem-Dry Carpet Care	28 North 8th Street
i	Uprise Bakery	10 Hitt Street

08 HOSPITALS

a	University Hospital	1 Hospital Drive
b	Boone Hospital Center	1600 East Broadway

09 LODGING

a	Hampton Inn and Suites - Columbia at the University	1225 Fellows Place
b	Gathering Place Bed & Breakfast	606 South College Avenue
c	Liahona House	1211 University Avenue
d	University Avenue Bed & Breakfast	1315 University Avenue
e	Regency Downtown	1111 East Broadway
f	Tiger hotel	23 South 8th Street

10 PARKS AND RECREATION

a	Capen Park	
b	Paquin Park	Columbia MO
c	Village Square Park	Columbia MO
d	Peace Park	University of Missouri Columbia
e	Flat Branch Park	101 S 5th Street
f	Grasslands Park	Columbia MO
g	A.L. Gustin Golf Course	18 Stadium Blvd
h	Lion-Stephens Park	Columbia MO
i	Clyde Wilson Memorial Park	Columbia MO
j	Cliff Drive Park	Columbia MO
k	Old 63 Roadside Park	Columbia MO
l	Water Memorial Wildlife area	Columbia MO
m	Grindstone Nature Area	Columbia MO
n	Oakwood Hills Park	Columbia MO
o	Stephens Lake Park	Columbia MO

11 PHARMACIES

a	Universities Pharmacies	1101 Hospital Drive
b	Boone Plaza Pharmacy	1600 East Broadway
c	Walgreens Pharmacy	222 East Broadway
d	Flow's Pharmacy	1506 E. Broadway #118
e	Missouri Cancer Associates	1705 E. Broadway #100
f	University Hospital Pharmacies	1 Hospital Drive #1L29

12 BARS/PUBS/LOUNGES

a	Memoir	1100 Locust Street
b	Blue Note	17 N 9th Street
c	Shiloh Bar and grill	402 E Broadway
d	Déjà Vu	405 Cherry Street
e	Flat Branch Pub and Brewing	115 S 5th Street

13 PLACES OF WORSHIP

a	St Thomas More Newman Center	601 Turner Avenue
b	The Crossing Church	1310 Old 63 South
c	The church of Jesus Christ	904 Old Hwy 63S
d	Sacred Heart Catholic Church	1115 Locust Street
e	Missouri United Methodist Church	204 S 9th Street
f	Calvary Episcopal Church	123 S 9th Street
g	First Baptist Church	1112 East Broadway
h	First Christian Church	101 North 10th Street
i	St Paul Ame Church	501 Park Avenue, Columbia , MO
j	Second Baptist Church	407 East Broadway
k	St Luke United Methodist Church	204 East Ash Street
l	Imani Mission Center Community	7 East Ash Street
m	Lutheran Student Fellowship	304 S. College Avenue, Columbia
n	First Presbyterian Church	16 Hitt Street
o	Islamic Center of Central Mo	201 South 5th Street
p	Baha'I faith of Columbia	625 Cherry Street

14 HEALTH AND FITNESS

a	Alley cat Yoga	23 South 8th Street
b	Transformational Fitness	1107 East Broadway
c	Health Connection	1507 East Broadway #1

15 OTHER SERVICES

a	Columbia Cemetery	30 East Broadway
b	Columbia Fire Department	201 Orr Street
c	Museum- State Historical Society of Missouri	1020 Lowry Street #2
d	American Archaeology	104 Swallow Hall

16 LIBRARY

a	Hugh Stephens Library	1200 East Broadway
b	Law Library	820 Conley
c	Ellis Library	1020 Lowry Street
d	Journalism Library	102 Reynolds Journalism Institute
e	Family medicine Library	M246 Medical Science Bldg
f	J Otto Lottes Sciences Library	1 Hospital Drive
g	Columbia Public Library (Daniel Boone Regional library)	100 West Broadway

17 POST OFFICE

a	US Post office	911 E. Rollins Street
b	US Post office	511 E. Walnut Street
c	Fedex Office Print and Ship Center	25 South 6th street

SS

Credit 3
By Project

Brownfield
Redevelopment
1 point

INTENT

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

REQUIREMENTS

Rehabilitate damaged sites where development is complicated by environmental contamination, by reducing pressure on undeveloped land. Develop contaminated site (as per ASTM E1903-97 Phase 2 Environmental Site Assessment or a local voluntary cleanup program) OR on a site defined as a Brownfield by a local, state or federal government agency.

ACTIONS

Site Selection:

Who: MU Environmental Health and Safety and/or Environmental consultant

- MU to hire an environmental consultant to conduct site and building assessment, identify contaminants, and determine a schedule for cleanup based on the remediation methods selected.

Design

Who: Civil Engineer, Architect, MU

- Review the environmental report
- Include remediation activities in the documentation, if any
- Architect to provide project specific specifications for remediation activities along with the base specification provided by MU.
- MU to upload summary of contaminants remediation efforts and complete LEED template on LEED Online.

Construction Administration

Who: General Contractors

- Incorporate remediation activities into the construction schedule.

NOTES

Projects will or will not meet this requirement. LEED is rewarding projects that take the burden of remediating contaminating sites. Remediation includes building asbestos and PCB abatement in major renovation projects.

SS

Alternative Transportation- Public Transportation Access

Credit 4.1

6 points

By Project
Future Master Site

INTENT

To reduce pollution and land development impacts from automobile use.

REQUIREMENTS

Option 1: Locate building within 1/2 mile of an existing or planned and funded commuter rail, light rail, or subway station.

Option 2: 1/4 mile of 1 or more stops for 2 or more public or campus bus lines usable by building occupants.

ACTIONS

Design

Who: Architect, MU

- Refer to MU's Public Transit Options Map, available on LEED Online Master Site, to identify public transit options available for the project site.
- Work with MU to develop design strategies to meet credit intent.
- Architect to upload project specific map of available public transit options, if available and complete LEED template on LEED Online.
- If project specific map not available on LEED Online Master Site, Architect to create one for the project based on MU's Public Transit Options Map and highlight the walking path and the distances to the nearest bus stops and upload to LEED Online along with a completed credit template form.

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SUPPORTING DOCUMENTATION
AVAILABLE ON LEED ONLINE MASTER SITE

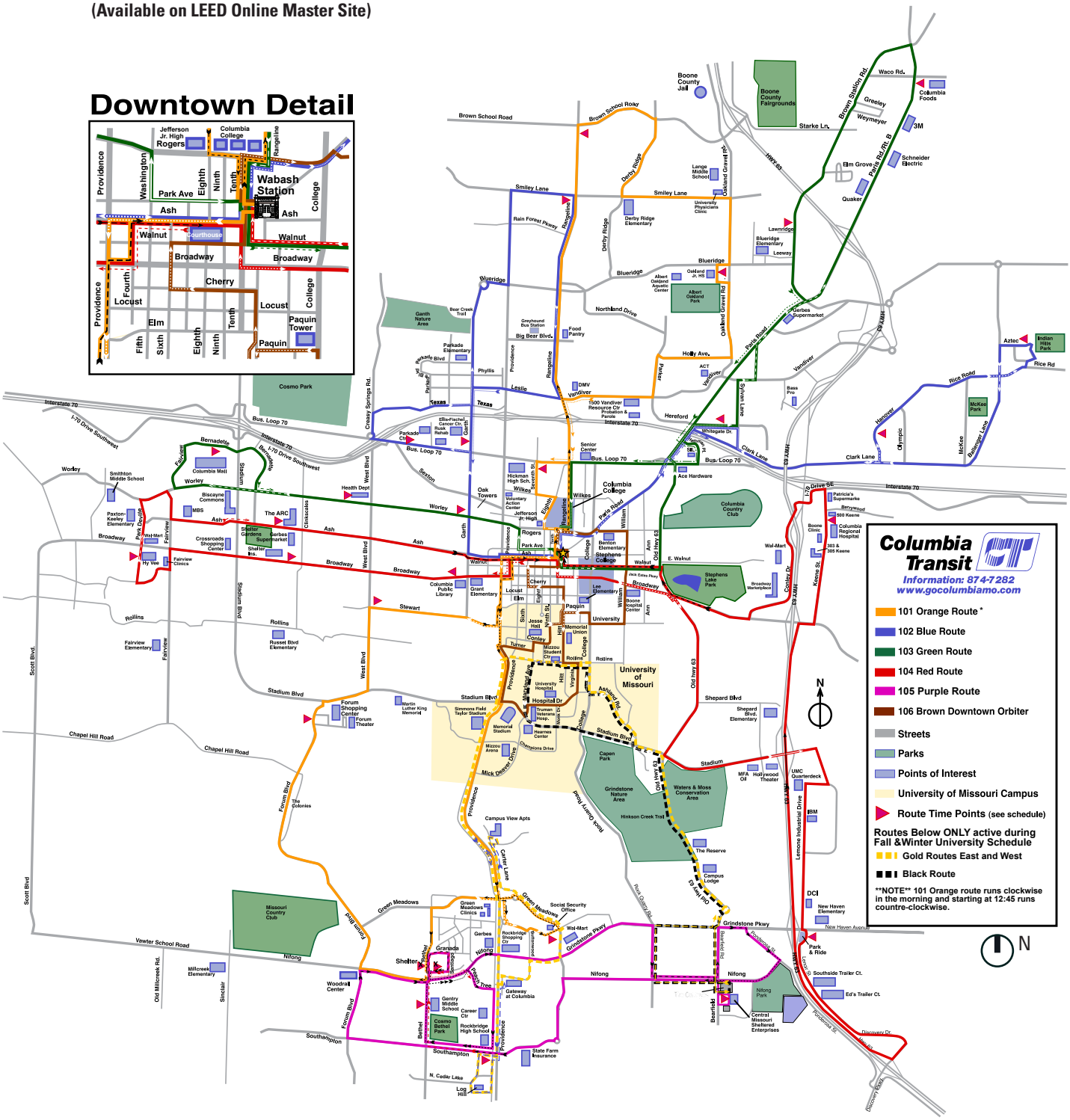
1. Columbia Transit System Map
2. MU Campus Public Transit Options Map
3. Transit Route Maps and Schedules
4. Project specific maps for proposed LEED projects identifying nearby public transit options

NOTES

Buses and shuttles serving the MU campus are only loosely tied to stops specified along the routes: city buses and campus shuttles will pick up passengers as needed at visible locations along the routes.

Per the City of Columbia Riders Handbook,
"Waiting for the Bus: At present, designated bus stops on Columbia Transit routes are marked with the blue Bus Stop sign, but buses will also stop at any street corner at the end of the block when traffic permits. It is the intention of Columbia Transit to eventually stop only at areas and intersections marked with bus stop signs. Until that time, to catch a bus at an unmarked intersection, passengers should make an effort to alert the driver to the fact they are interested in catching the bus.

COLUMBIA TRANSIT SYSTEM MAP
(Available on LEED Online Master Site)



The Columbia Transit system operates on a hub-and-spokes pattern. Routes connect at Wabash Station, just north of the MU campus.

SS

Credit 4.1

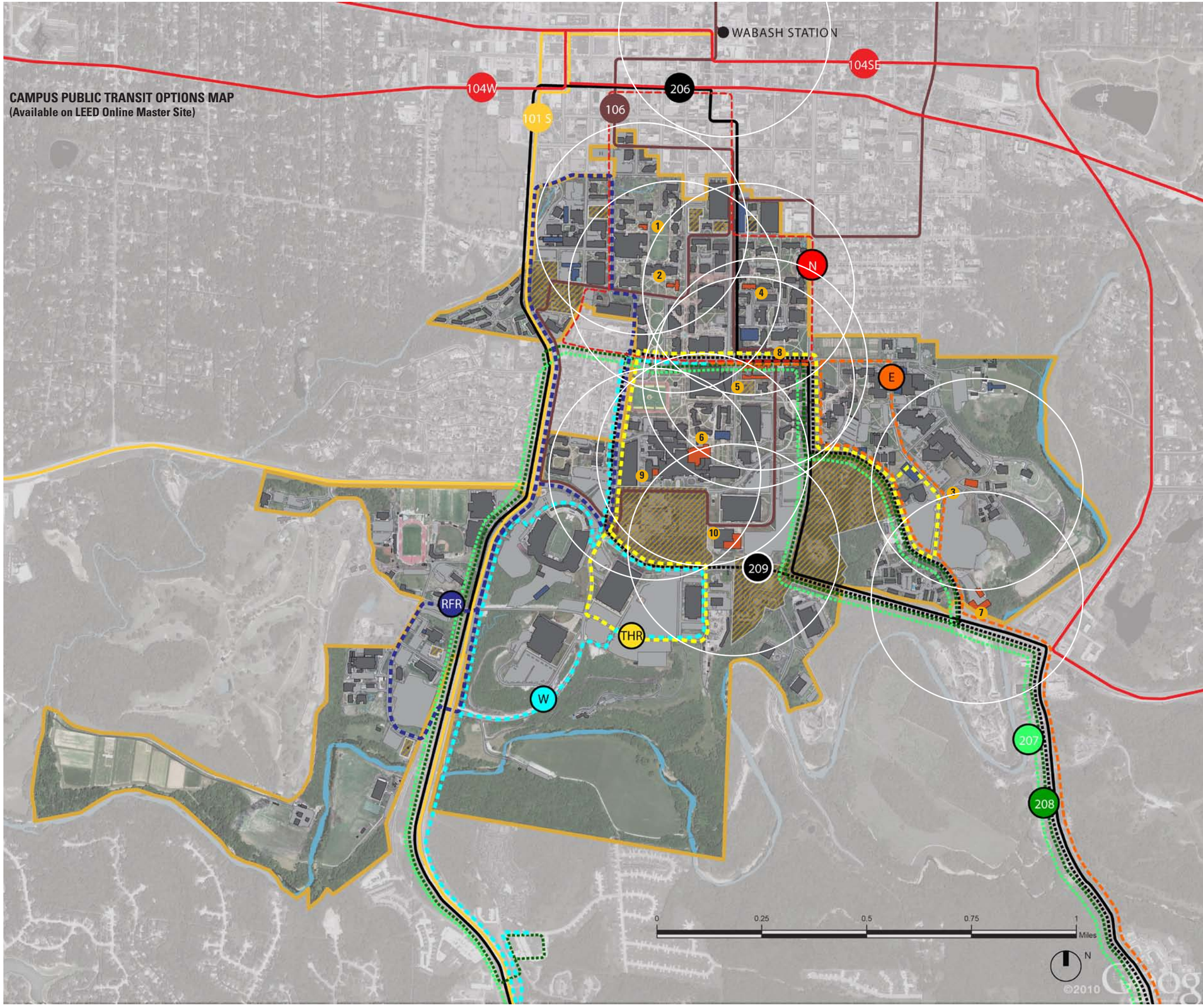
By Project

Future Master Site

Alternative Transportation-
Public Transportation
Access

6 points

CAMPUS PUBLIC TRANSIT OPTIONS MAP
(Available on LEED Online Master Site)



Columbia Transit: 104 W and 104 SE	Daily
Columbia Transit: 101 S Orange Route	Daily
Columbia Transit: 106 Brown/ Downtown	Daily
Columbia Transit: 206 Cottage Night Shuttle	Th-Sa
Columbia Transit: 209 Black Day route	M-F (Fall, Winter)
Columbia Transit: 207 W Gold Route	M-F (Fall, Winter)
Columbia Transit: 208 E Gold Route	M-F (Fall, Winter)
MU Shuttle: East Route	Evening daily (When Res Halls open)
MU Shuttle: North Route	Evening daily (When Res Halls open)
MU Shuttle: West Route	Evening daily (When Res Halls open)
MU Shuttle: Reactor Field Route	Day (Fall, Winter)
MU Shuttle: Trowbridge/Hearnes Route	Day (Fall, Winter)

1/4 mile walking radius of public and/or campus bus lines

City bus stops

Campus shuttle bus stops

Proposed LEED projects in design or development

PROJECT SPECIFIC PUBLIC TRANSIT OPTIONS MAPS
(Available on LEED Online Master Site)

Columbia Transit: 104 W and 104 SE	Daily
Columbia Transit: 101 S Orange Route	Daily
Columbia Transit: 106 Brown/ Downtown	Daily
Columbia Transit: 206 Cottage Night Shuttle	Th-Sa
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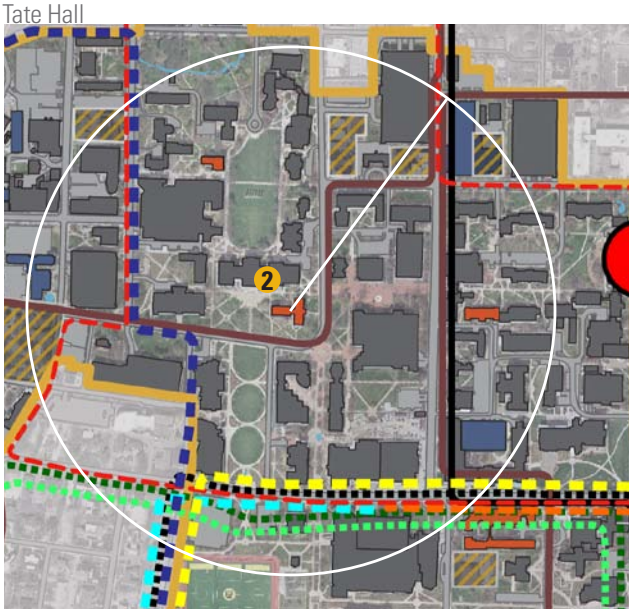
1/4 mile walking radius of public and/or campus bus lines

Proposed LEED projects in design or development

Tate Hall



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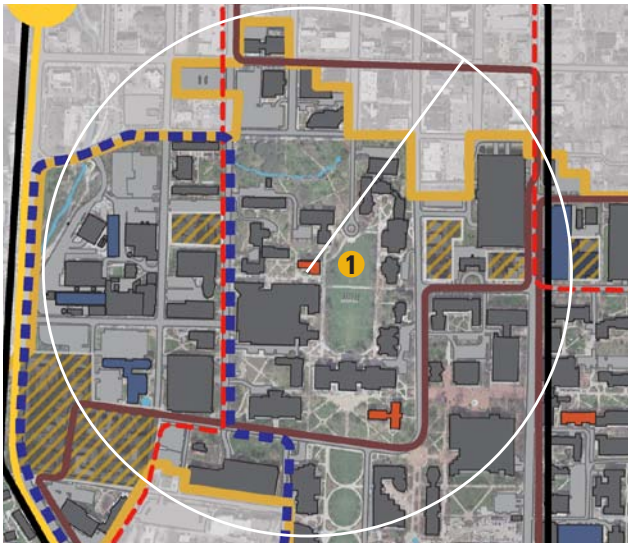
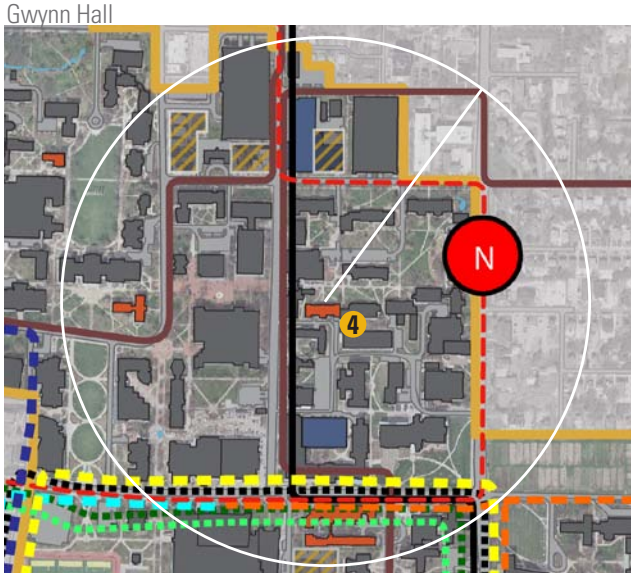
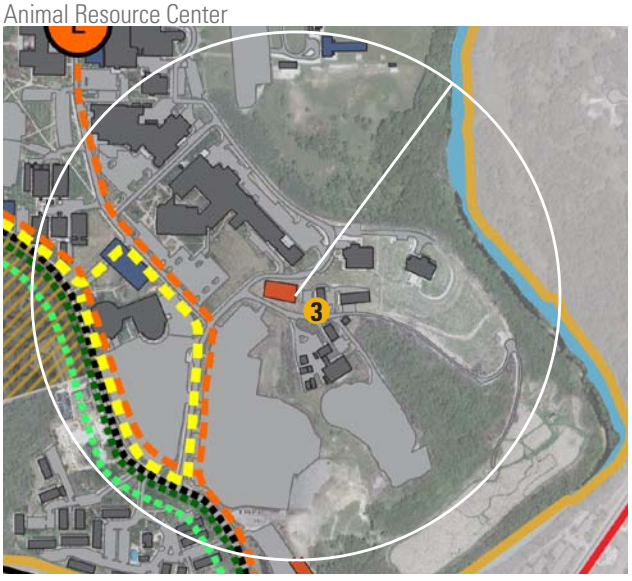


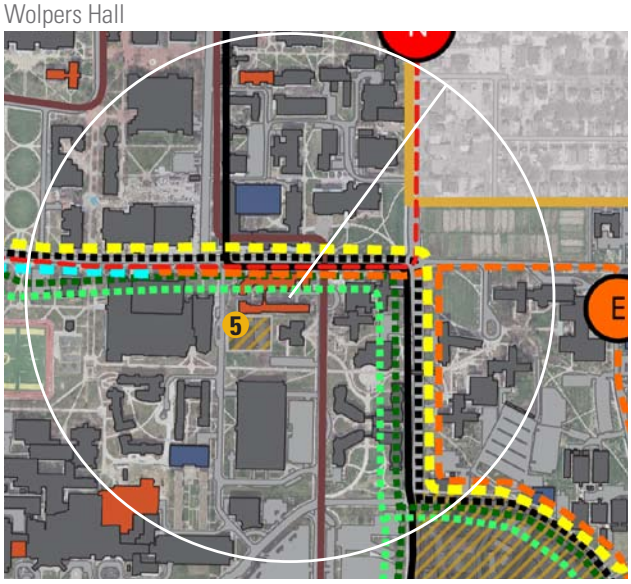
Gwynn Hall



Animal Resource Center



Wolpers Hall



0 0.25 0.5 miles N

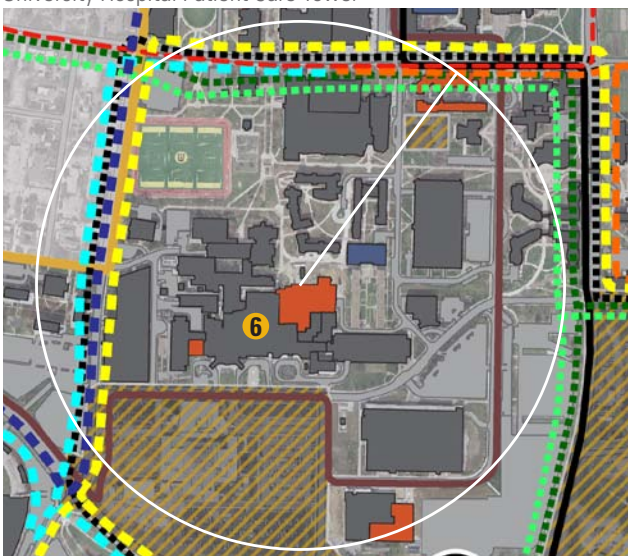
PROJECT SPECIFIC PUBLIC TRANSIT OPTIONS MAPS
(Available on LEED Online Master Site)

Columbia Transit: 104 W and 104 SE	Daily
Columbia Transit: 101 S Orange Route	Daily
Columbia Transit: 106 Brown/ Downtown	Daily
Columbia Transit: 206 Cottage Night Shuttle	Th-Sa
Columbia Transit: 209 Black Day route	M-F (Fall, Winter)
Columbia Transit: 207 W Gold Route	M-F (Fall, Winter)
Columbia Transit: 208 E Gold Route	M-F (Fall, Winter)
MU Shuttle: East Route	Evening daily (Res Halls open)
MU Shuttle: North Route	Evening daily (Res Halls open)
MU Shuttle: West Route	Evening daily (Res Halls open)
MU Shuttle: Reactor Field Route	Day (Fall, Winter)
MU Shuttle: Trowbridge/Hearnes Route	Day (Fall, Winter)

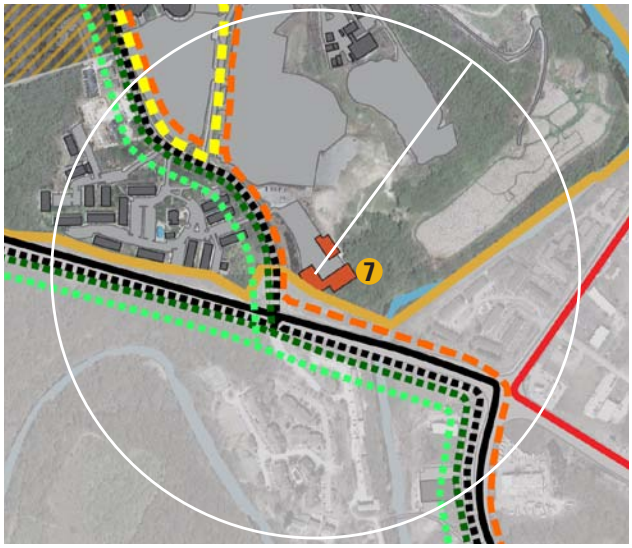
1/4 mile walking radius of public and/or campus bus lines

Proposed LEED projects in design or development

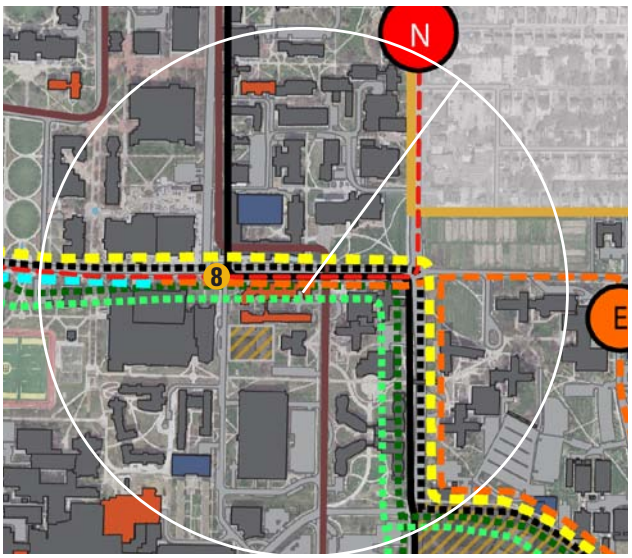
University Hospital Patient Care Tower



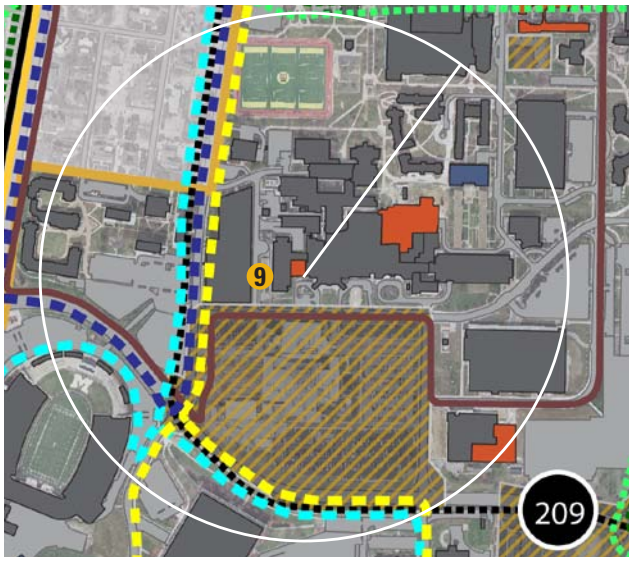
Food and Wine Complex



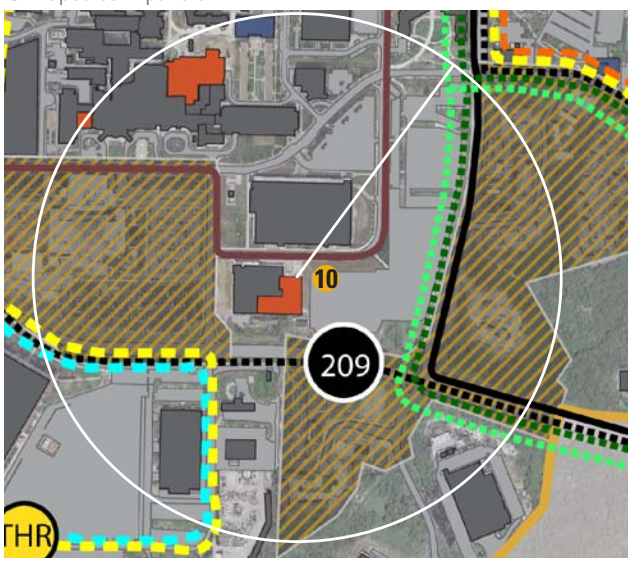
Johnston Hall



University Hospital ER expansion



Orthopedics Expansion



0 0.25 0.5 miles N

SS

Alternative Transportation - Bicycle Storage and Changing rooms

Credit 4.2

1 point

By Project

Future Master Site

INTENT

To reduce pollution and land development impacts from automobiles.

REQUIREMENTS

Bicycle rack within 200 yards of building entrance for 5% or more peak period building users. Provide shower and changing facilities in building or within 200 yards of a building entrance, for 0.5% FTE occupants. At residential buildings provide covered storage facilities for secure bicycles for 15% or more of building occupants.

ACTIONS

Design

Who: Architect

- Refer to MU's Campus-wide Bike Rack Location Map and the table for bike storage capacity at each location, available on LEED Online Master Site to identify nearest bike rack locations and work with MU's Sustainability Office to identify the number of bike parking spots at these locations available for the proposed building's occupants.
- Work with MU Sustainability Office to identify nearby shower facilities available for use by the proposed building occupants.
- Calculate number of peak building occupants as per the calculations provided in the LEED BD&C 2009 reference guide and design sufficient bicycle storage and shower facilities on project site to ensure compliance with credit requirement.
- Architect to upload project specific bike rack location map, if available, LEED template on LEED Online or create and upload a bike and shower location map as per credit requirement.

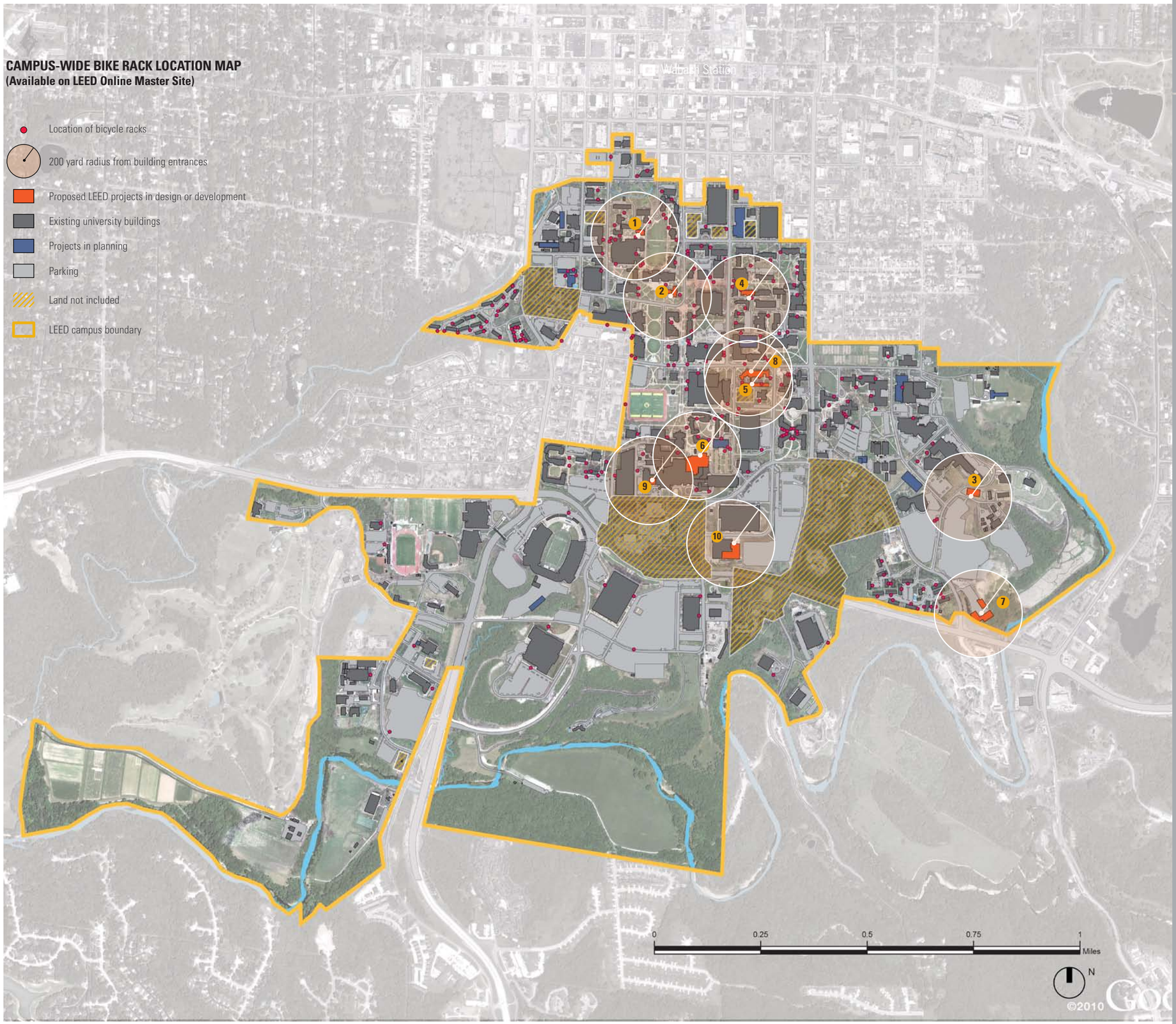
MASTER SITE CALCULATIONS

Undergraduate FTE	22,806
Graduate FTE	4,271
Faculty FTE	3,224
Staff FTE	12,266
Visitors	+/- 200
Bicycle racks	237, with a capacity of 5411 bikes
Showers	Unknown

SUPPORTING DOCUMENTATION
(AVAILABLE ON LEED ONLINE MASTER SITE)

1. MU's Campus-wide Bike Rack Location Map
2. Project Specific Map of Bike Rack Locations
3. Table for number of bike racks at various locations on campus
4. FTE Shower requirements

CAMPUS-WIDE BIKE RACK LOCATION MAP
(Available on LEED Online Master Site)



PROJECT SPECIFIC BIKE RACK LOCATION MAPS
(Available on LEED Online Master Site)

Location of bicycle racks

200 yard radius from building entrances

Proposed LEED projects in design or development

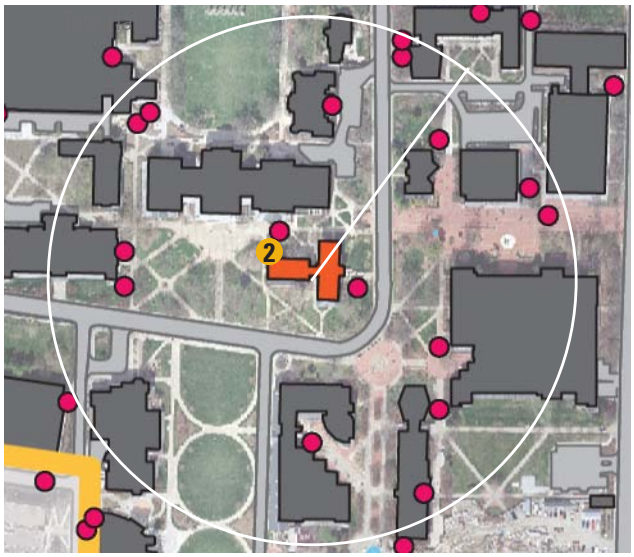
Existing university buildings

Projects in planning

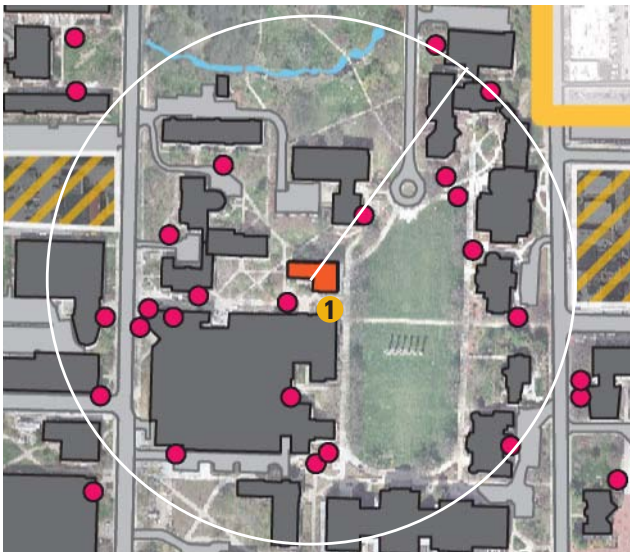
Parking

Land not included

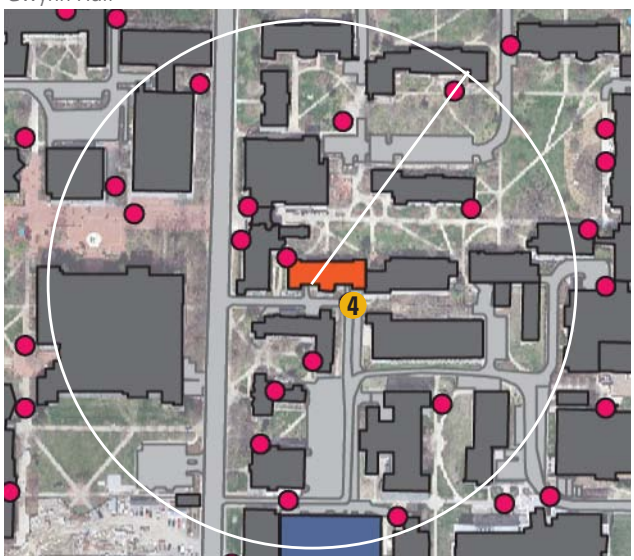
LEED campus boundary



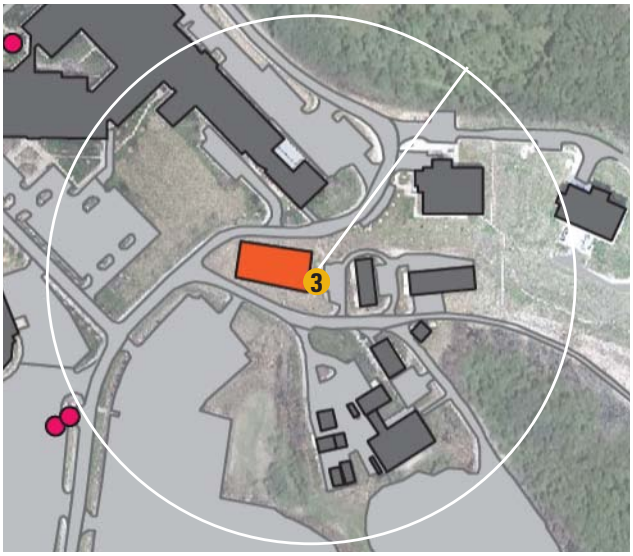
Switzler Hall



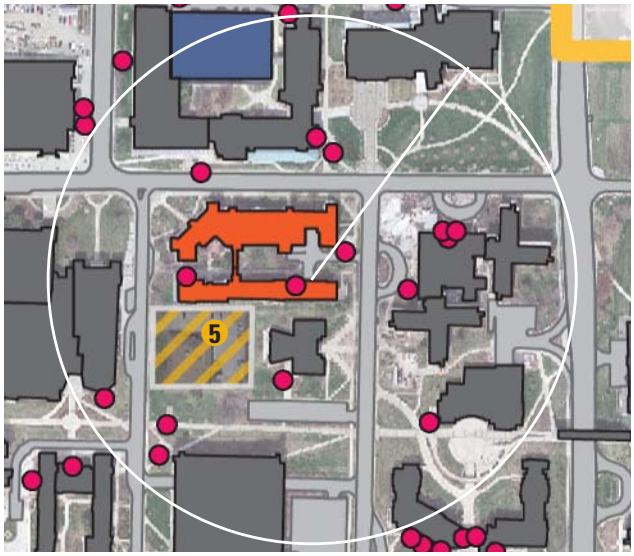
Gwynn Hall



Animal Resource Center



Wolpers Hall



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200 yard radius from building entrances

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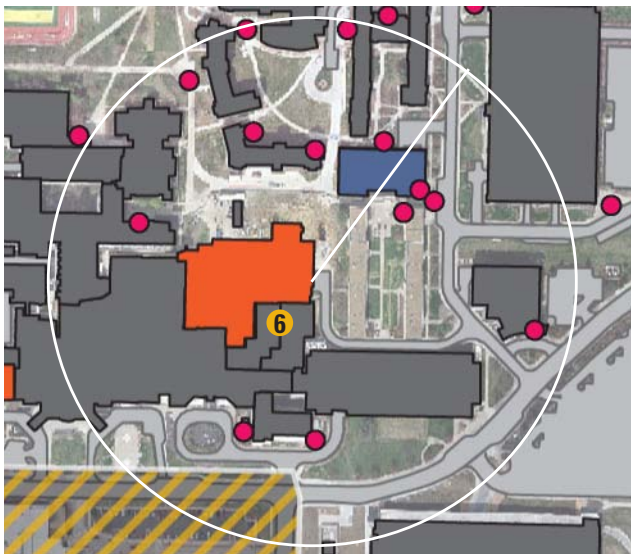
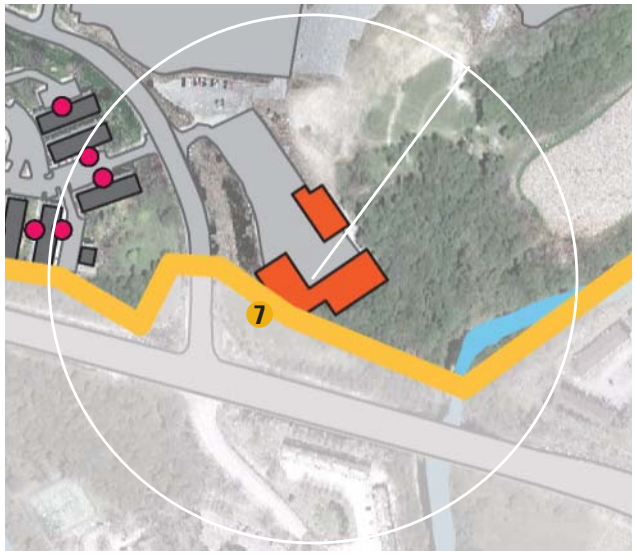
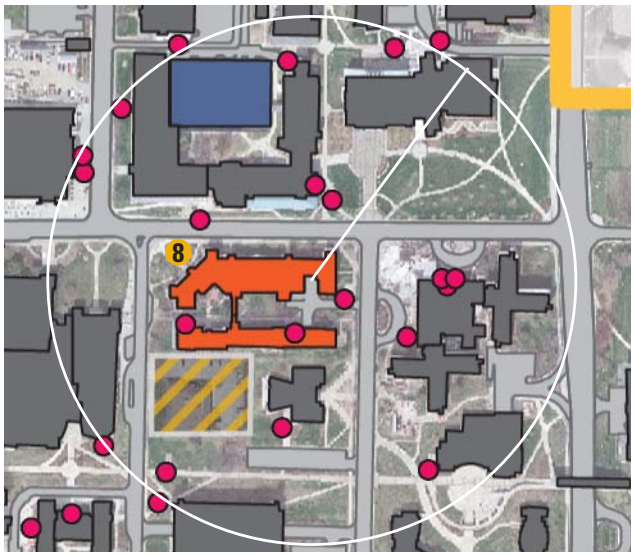
University Hospital Patient Care Tower



Food and Wine Complex

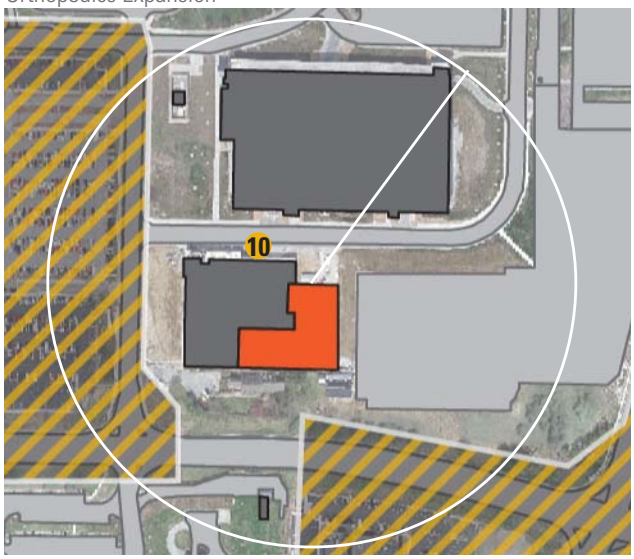


Johnston Hall



University Hospital ER expansion

Orthopedics Expansion



0 0.05 0.10 0.15 0.20 0.25 miles

N

TABLE SHOWING NUMBER OF BIKE RACKS AT VARIOUS LOCATIONS ON CAMPUS AS OF JUNE 2011
(Available on LEED Online Master Site)

Bike Racks

LOCATION	DIRECTION	CAPACITY	LOCATION	DIRECTION	CAPACITY	LOCATION	DIRECTION	CAPACITY
1 University Heights	SOUTH WEST	5	Heinkel Building	WEST	16	Reynolds Journal Institute	SOUTH WEST	33
1 University Heights	NORTH WEST	5	Hitt Street Garage	SOUTH	14	Reynolds Journalism Inst	WEST	11
1000 Tara Apartments	NORTH EAST	9	Hitt Street Garage	EAST	18	Rock Quarry Center	SOUTH EAST	5
2 University Heights	NORTH CENTER	5	Hospital Bike Shelter	SOUTH	22	Rollins Commons	NORTH	16
3 University Heights	EAST CENTER	5	Hospital Parking Garage	SOUTH	24	Rollins Commons	NORTH	25
3 University Heights	NORTH EAST	5	Hulston	COURTYARD	18	Rollins Commons	NORTH	25
4 University Heights	SOUTH CENTER	5	Jesse Hall	SOUTH	18	Rollins Commons	NORTH	35
4 University Heights	SOUTH WEST	5	Johnston Hall	SOUTH	193	Rollins Commons	NORTH	32
600 Tara Apartments	EAST	20	Johnston Hall	Southeast	60	Rollins Commons	WEST	42
604 University Village	SOUTH WEST	7	Jones Hall	EAST	45	RP-10	SOUTH	9
703 University Village	WEST	11	Lafferre Hall	SOUTH EAST	22	Schlundt Annex	NORTH	20
705 University Village	NORTH WEST	7	Lafferre Hall	WEST	25	Schlundt Annex	WEST	22
A.B.N.R.B.	EAST	18	Lafferre Hall	EAST	31	School of Nursing	SOUTH	81
A.B.N.R.B.	SOUTH EAST	22	Lafferre Hall	SOUTH	66	Schurz	WEST	66
Academic Support	EAST	14	Lafferre Hall	SOUTHEAST	22	Schweitzer	WEST	18
Ag Campus Bus Stop	NORTH EAST	12	Lafferre Hall	NORTH WEST	14	Schweitzer	WEST	12
Agricultural Engineering	SOUTH	11	Lafferre Hall	NORTH WEST	22	Southwest Campus Housing	EAST	42
Agricultural Engineering	WEST	9	Lathrop Hall	EAST	43	Southwest Campus Housing	EAST	84
Agriculture Building	SOUTH	29	Lathrop Hall	NORTH	18	Stankowski	WEST	44
Agriculture Building	WEST	22	Lathrop Hall	WEST	16	Stewart	EAST	33
Arts & Science	SOUTH	45	Lathrop Hall	WEST	16	Student Recreation Center	SOUTH EAST	18
Arts & Sciences	EAST	20	Laws Hall	NORTH	92	Student Recreation Center	WEST	9
ASRC	NORTH	16	Laws Hall	WEST	20	Student Recreation Center	NORTH	8
ASRC	EAST	16	Lee Hills	NORTH	22	Student Recreation Center	WEST	9
ASRC	NORTH EAST	25	Lee Hills	WEST	14	Student Recreation Center	WEST	9
AV14 Parking Lot	EAST	22	Lefevre	WEST	9	Student Success Center	EAST	101
Bingham Canapy	SOUTH	168	Lewis Hall	EAST	16	Swallow	EAST	18
Black Culture Center	SOUTH WEST	9	Life Science	SOUTH	54	Switzler	SOUTH	11
Brady Commons	NORTH	55	Life Science Bus Incubator	NORTHEAST	9	Tara Apartments Office	NORTH EAST	11
Brady Commons	East	11	Lottes	EAST	54	Tara Building 500	Inside	12
Brady Commons	East	11	Lowry Hall	NORTH	56	Tara Building 100	Inside	12
Clydesdale Hall	NORTH	16	Manor House	NORTH	11	Tara Building 1000	Inside	12
College Avenue Housing	SOUTH	18	Mark Twain	EAST	60	Tara Building 1100	Inside	12
College Avenue Housing	SOUTH	36	Mark Twain	SW	18	Tara Building 1200	Inside	12
Conaway	SOUTH	14	Mark Twain	NE	36	Tara Building 1300	Inside	12
Conley Ave Parking Garage	NORTHEAST	9	Mark Twain	NORTH	22	Tara Building 1400	Inside	12
Cornell Hall	WEST	9	Maryland Avenue Garage	WEST	11	Tara Building 1500	Inside	16
Cornell Hall	SOUTH WEST	27	McAlester	SOUTH	20	Tara Building 1600	Inside	12
Cornell Hall	SOUTH WEST	11	McDavid	NORTH	77	Tara Building 200	Inside	12
Cornell Hall	NORTH WEST	14	McKee	SOUTH	20	Tara Building 300	Inside	12
Crowder Hall	NORTH EAST	22	McKee	NORTH	11	Tara Building 400	Inside	12
Dalton	WEST	12	McReynolds Hall	SOUTH	33	Tara Building 600	Inside	12
Defoe-Graham	NORTH	39	Medical School	WEST	11	Tara Building 700	Inside	12
Defoe-Graham	NORTHWEST	36	Memorial Student Union	WEST	11	Tara Building 800	Inside	12
Discovery	WEST	27	Memorial Union	WEST	33	Tara Building 900	Inside	12
Dogwood	EAST	14	Mid MO Mental Health	NORTH WEST	11	Tate	EAST	16
Dogwood	NORTHEAST	40	Middlebush	WEST	25	Tiger Team Store	NORTH	11
Eckles	NORTH	11	Middlebush	NORTH	11	Townsend	EAST	58
Eckles	SOUTH	11	Middlebush	WEST	25	Townsend Hall	SOUTH EAST	33
Eckles	EAST	5	Mizzou Arena	NORTH	7	Tucker	SOUTH	64
Eckles	NORTH WEST	16	Mizzou Arena	SOUTH	7	Tucker	NORTH EAST	24
Ellis Library	WEST	60	MU Police Station	EAST	12	Turner Avenue Parking Garage	INSIDE	7
Ellis Library	WEST	99	MU Student Center	South Center	22	Turner Avenue Parking Garage	SOUTH EAST	9
Engineering West	EAST	40	MU Student Center	NORTH CENTER	18	Turner Avenue Parking Garage	NORTH EAST	14
Excellence	WEST	27	MU Student Center	SW	20	University Hall	NORTH EAST	7
Excellence	In Courtyard	9	Museum Support	EAST	9	University Village 1	INSIDE	12
Excellence	In Courtyard	9	Neff Annex	EAST	10	University Village 3	INSIDE	3
Fine Arts	EAST	9	Neff Annex (Missourian)	WEST	22	University Village 4	INSIDE	6
Fine Arts	SOUTH	22	Noyes	SOUTH	7	University Village 601	INSIDE	6
Fine Arts	NORTH WEST	11	Parker	SOUTH	9	University Village 602	INSIDE	6
Galena	WEST	16	Pershing Commons	NORTH	28	University Village 603	INSIDE	11
Gannett	SOUTH EAST	11	Pershing Commons	EAST	11	University Village 604	INSIDE	6
General Classroom Building	SOUTH	11	Pershing Commons	EAST	7	University Village 604	INSIDE	6
General Classroom Building	SOUTH	18	Pershing Hall	SOUTH EAST	11	University Village 605	INSIDE	12
General Classroom Building	NORTH WEST	105	Physicians Medical Bldg	EAST	14	University Village 701	INSIDE	3
General Services Building	NORTH EAST	9	Physics	NORTH	48	University Village 702	INSIDE	11
General Services Building	EAST	9	Physics	SOUTH WEST	11	University Village 703	INSIDE	12
Gentry	SOUTH WEST	9	Pickard	SOUTH EAST	11	University Village 704	INSIDE	11
Geology Building	EAST	81	Plaza 900	WEST	36	University Village 706	INSIDE	6
Green Chapel	SOUTH	25	Read Hall	NORTH	7	University Village 707	INSIDE	6
Gwynn	SOUTH	22	Research Reactor	EAST	11	University Village 708	INSIDE	6
Hatch Hall	NORTH	54	Respect	EAST	27	University Village 709	INSIDE	11
Hatch Hall	SOUTH WEST	11	Respect	SOUTH	7	Veterinary Medicine	WEST	44
Hatch Hall	SOUTH WEST	44	Respect	SOUTH	7	Virginia Avenue Parking	NORTH WEST	18
Hatch Hall	SOUTH WEST	11	Respect	SOUTH	7	Virginia Avenue Parking	NORTH WEST	20
Hawthorn	CENTER WEST	31	Responsibility	EAST	27	Walton Stadium	NORTH WEST	8
Hearnes Bus Stop	WEST	24	Responsibility	NORTH	7	Waters Hall	SOUTH	16
Hearnes Center	EAST	5	Responsibility	NORTH	7	Waters Hall	SOUTH WEST	88
Hearnes Center	WEST	9	Responsibility	NORTH	7	Wolpers Hall	NORTH	44

TABLE SHOWING FTE SHOWER REQUIREMENTS
(Available on LEED Online Master Site)

FTE Showers

Building Code	Building Name	Employee Count	Total FTE	Shower Requirement	Circle
37051	Albert Ross Hill Hall	52	48.88	0.24	Tate
37012	Arts & Science Building	24	24.00	0.12	Tate
37056	Ellis Library	34	33.25	0.17	Tate
37053	Jesse Hall	207	165.54	0.83	Tate
37243	Jesse Hall Auditorium	3	2.25	0.01	Tate
37376	Reynolds (Donald W.) Alumni Center	24	23.63	0.12	Tate
37079	Swallow Hall	1	1.00	0.01	Tate
37021	Townsend Hall	69	66.73	0.33	Tate
	Lowry				Tate
	Student Success Center				Tate
	Hulston				Tate
	Tate				Tate
	Tate Circle Totals	**414**	**365.28**	**1.83**	**Tate**
37022	Engineering Building West	33	32.25	0.16	Switzler
37061	Gannett Hall	17	17.00	0.09	Switzler
37027	Geological Sciences Building	4	4.00	0.02	Switzler
37059	McAlester Hall	47	45.21	0.23	Switzler
37063	Neff Hall	11	10.70	0.05	Switzler
37263	Neff Hall - 1959 Addition	9	9.00	0.05	Switzler
37129	Noyes Hall	4	4.00	0.02	Switzler
37066	Parker Hall	4	3.48	0.02	Switzler
37015	Pickard Hall	18	16.78	0.08	Switzler
37023	Thomas & Nell Lafferre Hall	19	17.75	0.09	Switzler
37101	Walter Williams Hall	1	1.00	0.01	Switzler
	Switzler				Switzler
	Reynold's Journalism Institute				Switzler
	Switzler Circle Totals	**167**	**161.17**	**0.81**	**Switzler**
37155	Fine Arts Annex	6	4.05	0.02	Mumford
37026	Fine Arts Building (Art)	11	11.00	0.06	Mumford
37232	Fine Arts Building (Music & Dramatic Arts)	23	22.35	0.11	Mumford
37050	Gwynn Hall	13	10.85	0.05	Mumford
37128	Memorial Student Union	15	14.30	0.07	Mumford
37014	Middlebush Hall	75	61.75	0.31	Mumford
37062	Mumford Hall	47	45.55	0.23	Mumford
37076	Stanley Hall	15	14.03	0.07	Mumford
37233	Stanley Hall Addition	14	13.75	0.07	Mumford
37064	Stewart Hall	34	24.75	0.12	Mumford
37102	Waters Hall	17	16.83	0.08	Mumford
37103	Whitten Hall	42	41.88	0.21	Mumford
37279	Parking Garage - Hitt Street	23	23.00	0.12	Mumford
	Mumford Circle Totals	**335**	**304.09**	**1.52**	**Mumford**
37257	Chemistry Building	8	8.00	0.04	Curtis
37278	Chemistry Teaching Laboratory - 1997 Addition	2	2.00	0.01	Curtis
37019	Curtis Hall	10	6.53	0.03	Curtis
37115	Gentry Hall	22	17.30	0.09	Curtis
37055	LeFevre Hall	32	20.16	0.10	Curtis
37078	Physics Building	37	31.75	0.16	Curtis
37071	Schlundt Hall	5	5.00	0.03	Curtis
37072	Schlundt Hall Annex	8	8.00	0.04	Curtis
37073	Schweitzer Hall	5	5.00	0.03	Curtis
37316	Schweitzer Hall Addition	7	6.75	0.03	Curtis
37077	Stephens Hall	3	2.50	0.01	Curtis
37251	Tucker Hall	102	78.69	0.39	Curtis
37393	Ernie & Lotti Sears Plant Growth Facility	1	1.00	0.01	Curtis
	Read				Curtis
	Curtis Circle Totals	**242**	**192.68**	**0.96**	**Curtis**
37003	Agriculture Laboratory	3	3.00	0.02	McKee
37002	Agriculture Science Building	15	14.50	0.07	McKee
37175	Anheuser-Busch Natural Resources Building	69	61.46	0.31	McKee
37156	Bond Life Sciences Center	164	133.22	0.67	McKee
37157	Bond Life Sciences Ctr Mechanical Bldg	2	2.00	0.01	McKee
37268	MU Student Center	7	7.00	0.04	McKee
	McKee				McKee
	McKee Circle Totals	**260**	**221.18**	**1.11**	**McKee**
37154	Agricultural Engineering Building	30	27.40	0.14	Agri Eng
37379	Clydesdale Hall	98	89.95	0.45	Agri Eng
37017	Connaway Hall	11	10.25	0.05	Agri Eng
37020	Eckles Hall	13	13.00	0.07	Agri Eng
37099	Veterinary Medicine - East	24	22.25	0.11	Agri Eng
37229	Veterinary Medicine West Building	60	54.25	0.27	Agri Eng
37100	Veterinary Science Building	10	8.75	0.04	Agri Eng
37368	William C. Stringer Wing	7	6.80	0.03	Agri Eng
	Agricultural Engineering Circle Totals	**253**	**232.65**	**1.16**	**Agri Eng**
37254	Animal Science Research Center	29	27.25	0.14	Green H
37043	Greenhouse 20	1	1.00	0.01	Green H
	Green House Circle Totals	**30**	**28.25**	**0.14**	**Green H**

FTE Showers

Building Code	Building Name	Employee Count	Total FTE	Shower Requirement	Circle
37230	Veterinary Diagnostics Laboratory Building	32	24.71	0.12	Vet Lab
	Mule Barn				
	Eagle Aviary				
	Veterinary Diagnostics Lab Circle Totals	**32**	**24.71**	**0.12**	**Vet Lab**
37010	1105 Carrie Francke Drive	23	23.00	0.12	
41010	2910 LeMone Boulevard	18	17.50	0.09	
42182	3211 South Providence Road	11	10.03	0.05	
41404	3215 Lemone Blvd.	2	2.00	0.01	
37473	601 W. Nifong, Suite 1C	1	1.00	0.01	
44173	Allton Building	6	6.00	0.03	
37258	Arvarh E. Strickland Hall	62	48.78	0.24	
37244	Bingham Dining Hall	2	2.00	0.01	
37091	Clark Hall	18	18.00	0.09	
42000	Clinical Support and Education Building	4	1.73	0.01	
37024	Columbia Professional Building	54	49.00	0.25	
37025	Conley House	1	1.00	0.01	
37280	Cornell Hall - Business & Public Administration Building	7	5.33	0.03	
37414	Corporate Lake Drive	4	4.00	0.02	
45450	CRH - Health Pavilion	14	12.95	0.06	
37018	Crowder Hall	12	8.23	0.04	
37253	Dalton Cardiovascular Research Building	45	38.80	0.19	
37114	Dobbs Pavilion	1	1.00	0.01	
44085	Ellis Fischel Cancer Center	17	15.75	0.08	
37429	FAPRI - 101 Park DeVille Drive, Ste. E	2	1.70	0.01	
37224	General Services Building	17	17.00	0.09	
44174	Greene Building	6	5.80	0.03	
37052	H. H. London Hall	14	13.00	0.07	
37422	Harry S Truman VA Hospital	1	1.00	0.01	
44405	Health South - Rusk Rehabilitation Center	25	24.20	0.12	
37143	Heinkel Building	215	76.24	0.38	
37286	International Institute for NANO and Molecular Medicine	4	4.00	0.02	
37120	Johnston Hall	2	2.00	0.01	
37090	Lewis Hall	19	16.35	0.08	
37301	Locust Street Building - East - 615 Locust Street	149	147.83	0.74	
37371	Locust Street Building - West - 615 Locust Street	36	36.00	0.18	
37124	Loeb Hall	1	1.00	0.01	
37185	Mark Twain Hall	1	1.00	0.01	
42089	Mason Institute Building	30	26.53	0.13	
37252	Mathematical Sciences Building	67	56.00	0.28	
42127	McHaney Hall	70	63.88	0.32	
37126	McReynolds Hall	31	29.25	0.15	
37146	Medical Science Addition	69	66.78	0.33	
37060	Medical Science Building	94	88.27	0.44	
41401	MORENET Building, 3212 Lemone Industrial Blvd.	91	90.75	0.45	
37370	MURR - Reactor Building	40	39.50	0.20	
37394	MURR - Temporary Office Building (TOBS) #4	4	2.98	0.01	
37147	MURR - Temporary Office Building (TOBS) #5	1	0.50	0.00	
37228	MURR Machine Shop	5	5.00	0.03	
37340	MURR North Office Addition	49	46.18	0.23	
37007	Museum Support Center	6	3.58	0.02	
37274	Office of Animal Resources Building	5	5.00	0.03	
37133	Old Student Health Center	24	21.66	0.11	
37131	Parking Garage - Virginia Avenue	7	7.00	0.04	
37323	Parking Structure #7	34	32.43	0.16	
37130	Pershing Dining Hall & Hitt Street Market	1	1.00	0.01	
37044	Plaza 900 Dining Facility	14	14.00	0.07	
37380	Printing & Publication Facilities - 2800 McGuire	48	46.36	0.23	
37375	Psychology Building	6	6.00	0.03	
42200	Quarterdeck - LeMone Blvd.	21	19.83	0.10	
37264	Regional Biocontainment Laboratory	1	1.00	0.01	
37288	Research Animal Diagnostic Laboratory	56	54.85	0.27	
37048	Research Park Botany Greenhouse	1	1.00	0.01	
37075	Research Park Development - Environmental Health	27	27.00	0.14	
37089	Rock Quarry Center - E & G	18	18.00	0.09	
37089A	Rock Quarry Center Warehouse Non E & G	27	26.75	0.13	
37139	Rock Quarry Surplus Warehouse	5	5.00	0.03	
37336	Rollins Dining Hall (New)	1	1.00	0.01	
37347	RRC - Lowlevel Radioactive Waste Storage Building	5	5.00	0.03	
37083	RRC Chemical Recycling Building	5	5.00	0.03	
37087	Sinclair Nursing School Building	69	66.20	0.33	
37142	Telecommunications Center	61	61.00	0.31	
41005	University Hall	66	65.60	0.33	
42083	University of Missouri Teaching Hospital	24	21.85	0.11	
37410	University Place	24	20.75	0.10	
37265	Veterinary Medicine Temporary Office Building #1	3	2.50	0.01	
37402	Wilderness Adventures	19	18.50	0.09	
37413	Woodrail Building #7	36	35.48	0.18	

SS Credit 4.3

Alternative Transportation - Low Emitting and Fuel Efficient Vehicles

3 points

Not Pursuing

Future Master Site

INTENT

To reduce pollution and land development impacts from automobile use.

REQUIREMENTS

Option 1: Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of total vehicle parking capacity of site. OR Provide at least 20% discounted parking rate for preferred parking for low emitting/fuel-efficient vehicles available for all customers and publicly posted at the entrance of parking area, available for minimum of 2 years.

Option 2: Provide alternative fueling stations for 3% of total parking capacity of the site. Liquid or gaseous fueling facilities must be separately ventilated or located outdoors.

Option 3: Provide alternative fuel vehicles for 3% of FTE building occupants and provide preferred parking for these vehicles.

Option 4: Provide building occupants access to a low emitting or fuel efficient vehicle sharing program where 1 low emitting/fuel-efficient vehicle per 3% FTE occupants assuming 1 shared van can carry 8 persons (i.e.: 1 vehicle/267 FTE). 1 vehicle to be provided minimum for FTE below 267. Commit to an agreement of 2 years. Estimated customers served per vehicles must have supporting documentation and narrative explaining the vehicle sharing program and its administration. Parking for low emitting and fuel efficient vehicles must be located nearest available spaces in nearest available parking area. Provide site plan or area map highlighting walking path from parking area to the project site and noting the distance.

NOTES

It is not currently MU's policy to provide preferred parking or discounted parking for any reason on campus. Campus policy would need to change. Parking and Transportation does not support this. If the campus chose to pursue as Master Site Option 1 would be most likely.

SS Credit 4.4

Alternative Transportation - Parking Capacity

2 point

Not Pursuing / By Project

Future Master Site

INTENT

To reduce pollution and land development impacts from automobiles.

REQUIREMENTS

Option 1: Parking capacity must meet but not to exceed minimum zoning requirements AND preferred parking for carpools or van pools for 5% of total parking spaces.

Option 2: For projects providing parking for less than 5% of FTE occupants, provide preferred parking for carpool/ van pool for 5% of total parking spaces. OR provide at least 20% discounted parking rate for preferred parking for low emitting/ fuel-efficient vehicles available for all customers AND publicly posted at the entrance of parking area and available for min. 2 years.

Option 3: Provide no new parking

ACTIONS

Design

Who: Architect

- Architect to verify no new parking is added on site.

NOTES

A project can meet this credit **by providing no new parking**. It is not currently MU's policy to provide preferred parking or discounted parking for any reason on campus. Campus policy would need to change. MU's Parking and Transportation does not support this. If the campus chose to pursue as Master Site Option 1 would be most likely. MU does not have zoning requirements for parking.

SS Site Development - Protect or Restore Habitat

Credit 5.1 1 point

Regional Priority

Campus Standard

Future Master Site

INTENT

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

REQUIREMENTS

On previously developed or graded sites restore or protect a minimum of 50% of the remaining open area by planting native or adapted vegetation

OR

20% of the total site area including the building footprint whichever is greater.

Projects earning SS credit 2 may include vegetated roof surface in this calculation (native or adapted plants provide habitat and promote biodiversity)

ACTIONS

Design

Who: MU Landscape Services, Civil Engineer

- MU Landscape Services to determine project boundary with Civil Engineer
- Identify sufficient area to protect or restore
- Work with MU Landscape Services to create plan with native and adaptive vegetation.

Construction

Who: MU Landscape Services

- MU Landscape Services to complete LEED template and upload site plan with a list of native or adapted plant species to LEED Online.

MASTER SITE REQUIREMENTS

The development footprints of all of the projects contained within the LEED Campus Boundary (including projects within the LEED Campus Boundary that are not pursuing LEED certification) must be included in the credit calculations. Projects cannot use the green roof option until SS Credit 2: Development Density is achievable as a campus credit.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. MU's Campus Habitat Map

SS

Site Development - Protect or Restore Habitat

Credit 5.1 1 point

Regional Priority

Campus Standard

Future Master Site

MASTER SITE CREDIT COMPLIANCE CALCULATIONS

Building footprints	=	5,639,059 sf
Total site area	=	39,511,171 sf
	=	14% of site area is buildings

Requirement: Greater value of the two equations

Equation 1

50% of site, (excluding building footprint)	=	16,936,056 sf

Equation 2

20% of total site	=	7,902,234 sf

Credit Requirement

Minimum area to be protected or restored	=	50% of site area (excluding building footprint)
	=	16,936,056 sf should consist of native or adapted vegetation to provide habitat and promote biodiversity

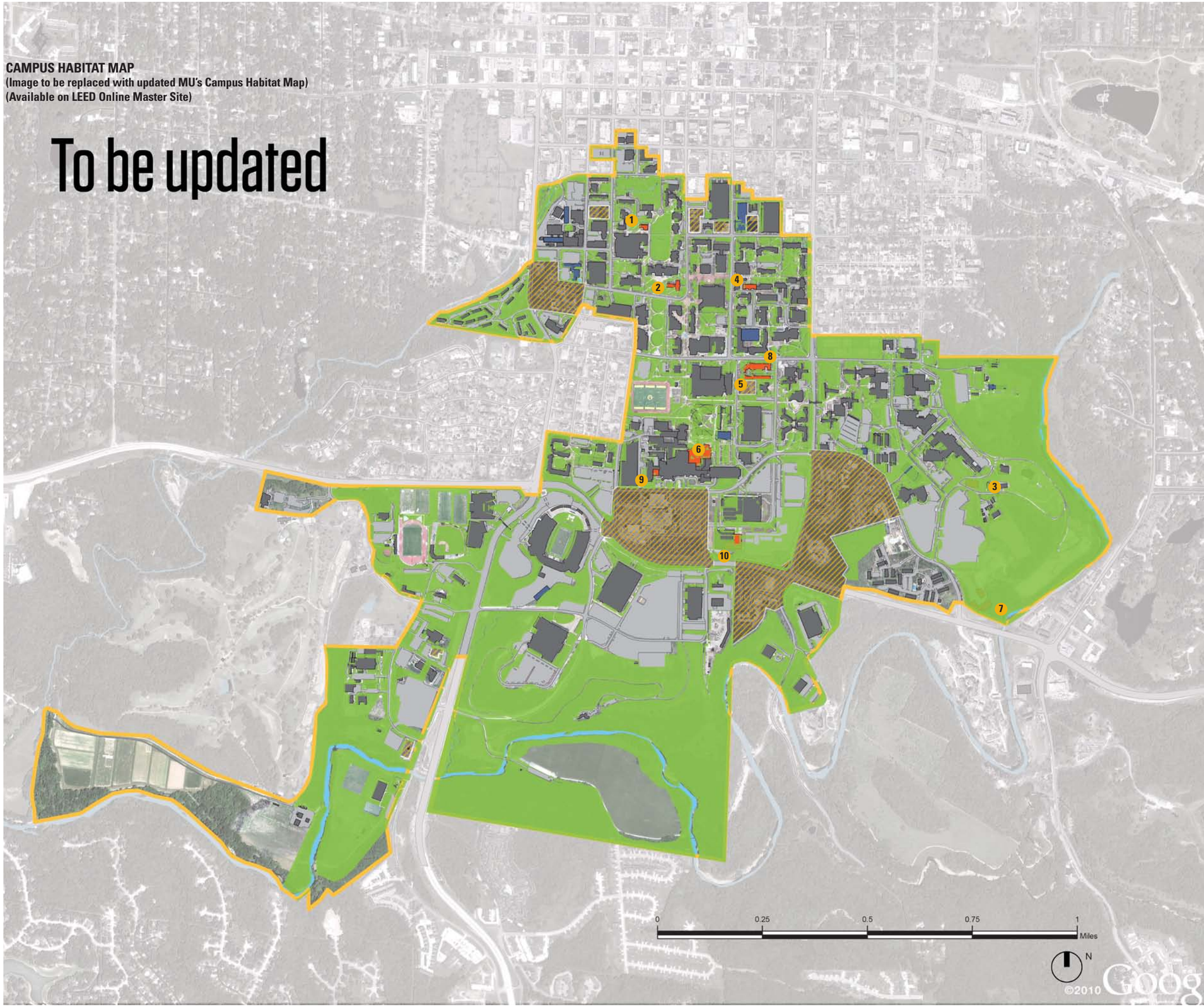
Current conditions

Total area available for native or adapted vegetation	=	24,643,460 sf (Derived from water efficiency calculations)
Total area planted to turf grass based on area mowed	=	11,200,000 sf (Based on GIS records)
Subtotal	=	13,443,460 sf
Annual flower planting	=	7,400 sf
Non-adapted on Francis Quad (50% of gardens)	=	8,700 sf
Non-adapted on Carnahan Quad (50% of gardens)	=	6,000 sf
Total deductions	=	22,100 sf
Area Planted to native or adapted vegetation	=	13,421,360 sf

- Areas classified as grass
- Proposed LEED projects in design or development
- Existing university buildings
- Projects in planning
- Parking
- Land not included
- LEED campus boundary

CAMPUS HABITAT MAP
(Image to be replaced with updated MU's Campus Habitat Map)
(Available on LEED Online Master Site)

To be updated



SS
Credit 5.2
Master Site

Site Development -
Maximize Open Space

1 point

INTENT

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

REQUIREMENTS

For areas with no local zoning requirements (e.g., university campuses, military bases), designate open space area that is equal to the building footprint for the life of the building. Vegetated roof, wetlands/ naturally designed ponds count.

For projects in urban areas earning SSc2, pedestrian oriented hardscape area counts IF min. 25% open space vegetated.

INNOVATION CREDIT REQUIREMENTS

Provide two times required area for credit compliance

ACTIONS

Design

Who: MU Project Manager

- MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit ((Master Site Project Number 1000016195).

MASTER SITE REQUIREMENTS

The development footprints of all of the projects contained within the LEED Campus Boundary (including those projects not pursuing LEED certification) must be included in the credit calculations

MASTER SITE CREDIT COMPLIANCE CALCULATIONS

Total site area	=	39,511,171 sq. ft.
Total building footprint	=	5,639,059 sq. ft. (127.45 Acres)
2 x building footprint (For Innovation credit)	=	11,278,118 sq. ft. (258.91 Acres)
20% future growth allowance	=	2,255,624 sq. ft (51.78 Acres)
Total open space to be preserved	=	13,533,742 sq. ft. (310.69 Acres)
Total Open Space preserved by MU	=	13,533,742 sq. ft. (311 Acres)

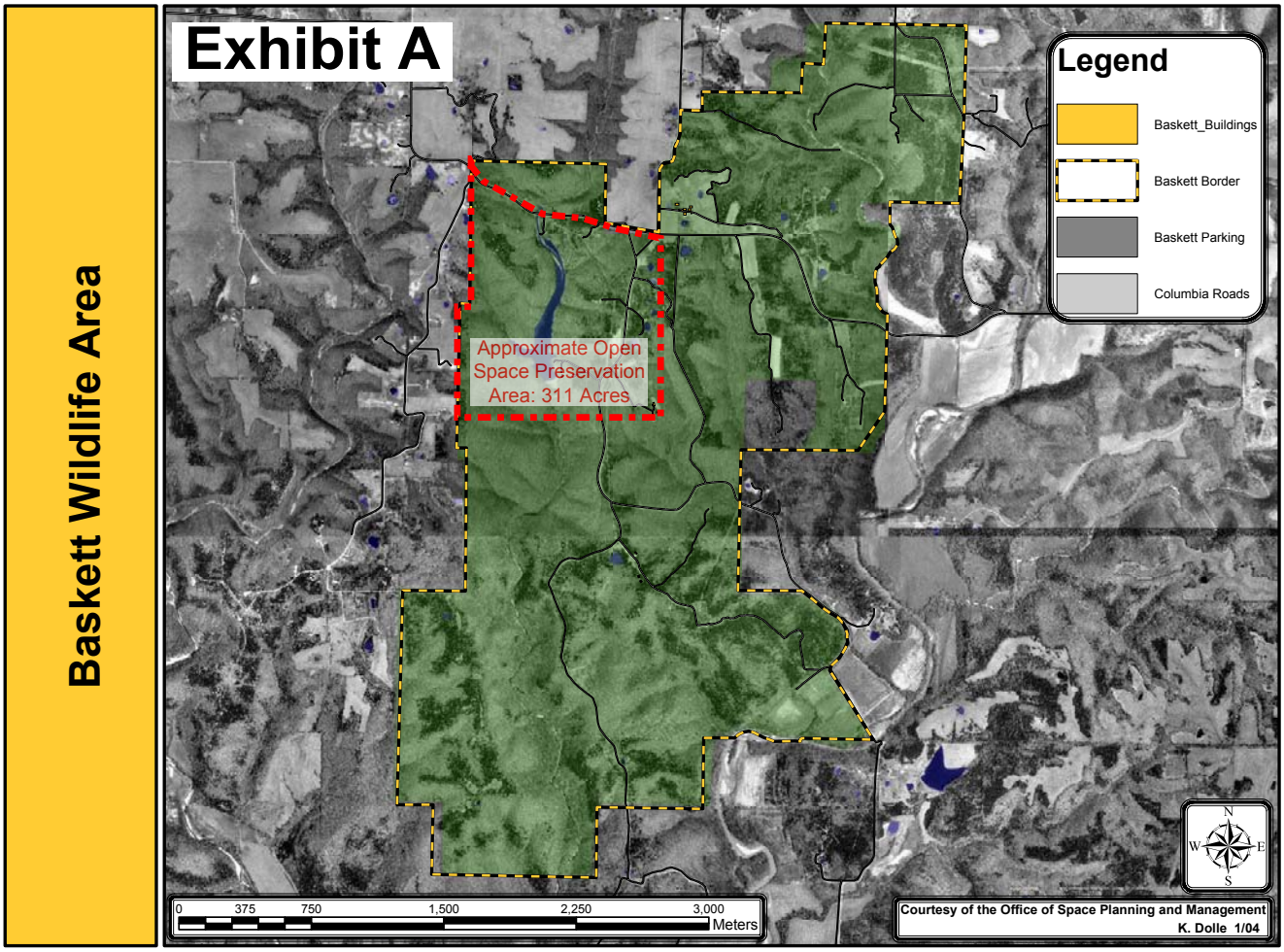
SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. Letter stating land will be preserved for life of the buildings on campus
2. Map of the preserved area.

NOTE

MU has set aside land to be preserved for the life of the buildings on campus for this credit.

SIGNED PROCLAMATION FROM MU VERIFYING LAND IS SET ASIDE FOR CREDIT COMPLIANCE
(Available on LEED Online Master Site)



SS

Credit 6.1

By Project
Future Master Site

Stormwater Design - Quantity Control

1 point

INTENT

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

REQUIREMENTS

For Existing imperviousness less than or equal to 50%:

Option 1: Implement a stormwater management plan that prevents post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the 1 and 2 yr., 24 hour design storms.

Option 2: Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

For Existing imperviousness greater than 50%:

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

ACTIONS

Design

Who: Architect, Civil Engineer

- Refer to MU's Stormwater Management Plan, available on LEED Online Master Site, and work with MU Landscape Services to decrease impervious area and runoff volumes.
- Refer to LEED BD&C 2009 reference guide to perform preliminary calculations and verify compliance with MU's Stormwater Management Plan
- Civil Engineer to complete LEED template on LEED Online, list of stormwater management strategies and a stormwater plan.
- If on-site mitigation is not possible , design team to work with MU Planning Design and Construction to identify sites elsewhere on campus where mitigation can occur.
- The GBCI should accept this as an alternative compliance path.

MASTER SITE REQUIREMENTS

The stormwater runoff calculations must account for the total shared-site/campus area. The rate and quantity reduction requirements must be met at the LEED Campus Boundary.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. MU's Stormwater Management Plan

NOTE

Refer to Appendix I : Storm Water Management Plan for guidance.

SS

Credit 6.2

Regional Priority

By Project

Future Master Site

Stormwater Design - Quality Control

1 point

INTENT

To limit disruption and pollution of natural flows by managing stormwater runoff.

REQUIREMENTS

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMP).

Best Management Practices to be designed in accordance with standards and specifications from state or local program that has adopted these performance standards. OR in-field performance monitoring data to demonstrate compliance. Data must conform to accepted protocol (e.g. TARP, Washington State Dept. of Ecology) for BMP monitoring.

ACTIONS

Design

Who: Architect, Civil Engineer

- Refer to MU's Stormwater Management Plan, available on LEED Online Master Site, and work with MU Landscape Services to decrease impervious area and runoff volumes.
- Refer to LEED BD&C 2009 reference guide to perform preliminary calculations to verify compliance with MU's Stormwater Management Plan
- Civil Engineer to complete LEED template on LEED Online, list of stormwater management strategies and a Stormwater Management Plan.
- If on-site mitigation is not possible , design team to work with MU Planning Design and Construction to identify sites elsewhere on campus where mitigation can occur.
- The GBCI should accept this as an alternative compliance path.

MASTER SITE REQUIREMENTS

The credit requirements are applied to the total area within the site/campus boundary

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. MU's Stormwater Management plan

NOTES

Refer to Appendix I : Storm Water Management Plan for guidance.

Stormwater Management Plan

SS

Credit 7.1

Heat Island Effect - Non Roof

1 point

By Project

Future Master Site

INTENT

To reduce heat islands to minimize impacts on micro climates and human and wildlife habitats.

REQUIREMENTS

Option 1: For 50% of the site hardscape, provide shade (within 5 years) and/or uses paving materials with a SRI of at least 29 and/ or use an open grid pavement system and/or provide shade from structures covered by solar panels that produce energy to offset some non-renewable resource use and/or Provide shade from Architectural device or structures that have SRI of at least 29.

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

ACTIONS

Design

Who: MU Landscape Services, Architect, Civil Engineer

- Develop strategy to meet credit intent.
- During design do early calculations to verify compliance based on calculations in the LEED BD&C 2009 reference guide.
- Specify products meeting credit requirement.
- Require SRI values in product submittals.

Construction Administration

Who: Architect, MU Landscape Services

- Review product submittals.
- Landscape Architect to upload site plan highlighting all non-roof hardscape areas and or parking spaces and a list of compliant surfaces with their SRI values on LEED online and complete LEED template.

MASTER SITE REQUIREMENTS

(Note: Construction Phase Credit)

The area of all of the site hardscape contained within LEED Campus Boundary (including hardscape associated with projects within the LEED Campus Boundary that are not pursuing LEED certification) must be included in the calculations for Option 1. All of the parking located within the LEED Campus Boundary must be included in the calculations for Option 2

MASTER SITE CREDIT COMPLIANCE CALCULATIONS

Option 1:

Cumulative area of impervious landscape surfaces (sidewalks, MU roads, brick, concrete pads)

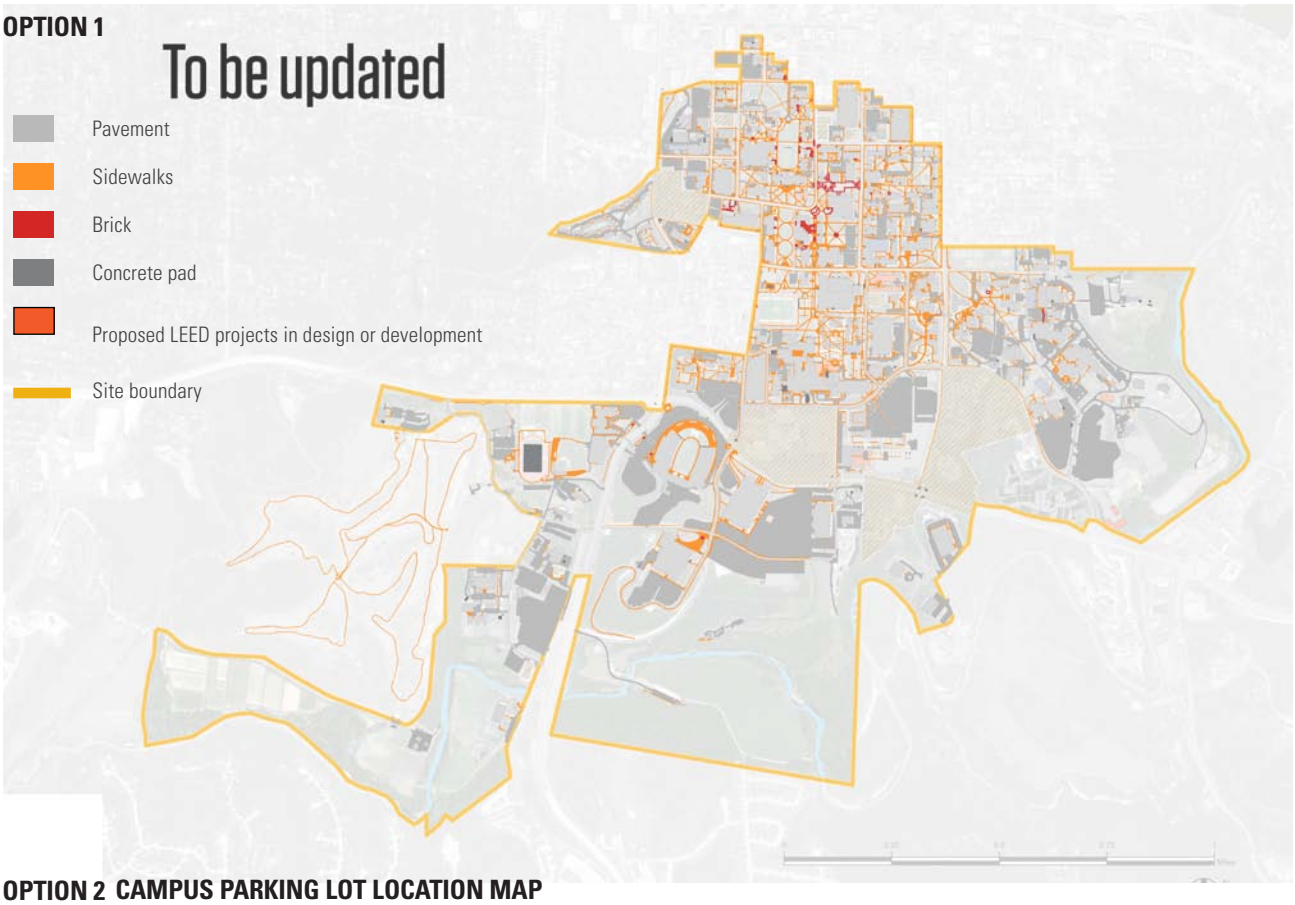
Total non roof hardscape areas	= 12,536,940 sq. ft.
a) Area of hardscape surfaces with a minimum SRI value of 29	= _____ sq. ft.
b) Shaded areas (from trees, Architectural structures with solar panels or with SRI of min. 29)	= _____ sq. ft.
c) Area of open grid pavement system (50% pervious)	= _____ sq. ft.
% Compliant hardscape area	= 100 x (a + b + c) / 12,536,940 = _____%

OPTION 2:

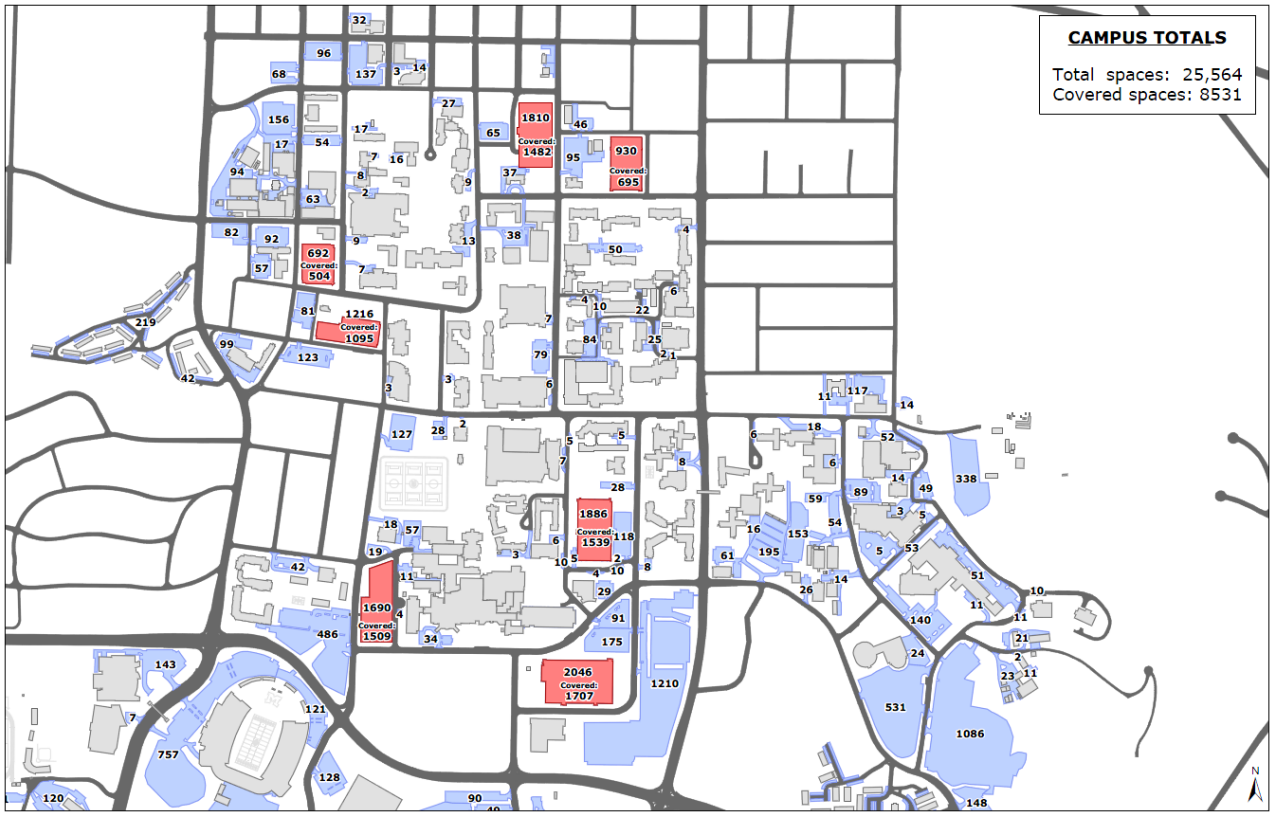
Total Parking Spaces	= 25,564
Covered Parking Spaces	= 8531
% Parking spaces under cover	= 33 %

CAMPUS HEAT ISLAND EFFECT - NON ROOF MAP
(For Master Site credit compliance)

OPTION 1



OPTION 2 CAMPUS PARKING LOT LOCATION MAP



SS

Credit 7.2

By Project
Future Master Site

Heat Island Effect - Roof

1 point

INTENT

To reduce heat islands to minimize impacts on micro climates and human and wildlife habitats.

REQUIREMENTS

Option 1: For low-sloped (less than or equal to 2:12) use roofing materials having an SRI equal to or greater than 78 (white) and for steep-sloped roof use roofing materials having an SRI equal to or greater than 29 (red clay tile, light gray, aluminum, etc) for a minimum of 75% of the roof.

Option 2: Install a green vegetated roof for at least 50% of the roof area.

Option 3: Combinations of high albedo and vegetated roof can be used

ACTIONS

Design

Who: Architect, Civil Engineer

- Develop strategy to meet credit intent.
- During design do early calculations to verify compliance based on calculations in the LEED BD&C 2009 reference guide.
- Specify products meeting credit requirement.
- MU Project Manager to consult with Campus Facilities and Operations regarding the selection of roofing materials
- Require SRI values in product submittals.
- Landscape Architect to complete LEED template and upload a roof plan and a list of roofing products and their emittance percentages, reflectance percentages, SRI values to LEED Online.

Construction Administration

Who: Architect

- Architect to review product submittals to verify compliance with credit requirements.

MASTER SITE CREDIT COMPLIANCE

The campus will not achieve this credit campus wide today but has set this as a future goal considering the majority of roofs on campus will be replaced in the next 20-30 years. There will be exceptions made for the sloped roofs at Red Campus to fit with the overall campus aesthetic.

SS

Credit 7.2

Heat Island Effect - Roof

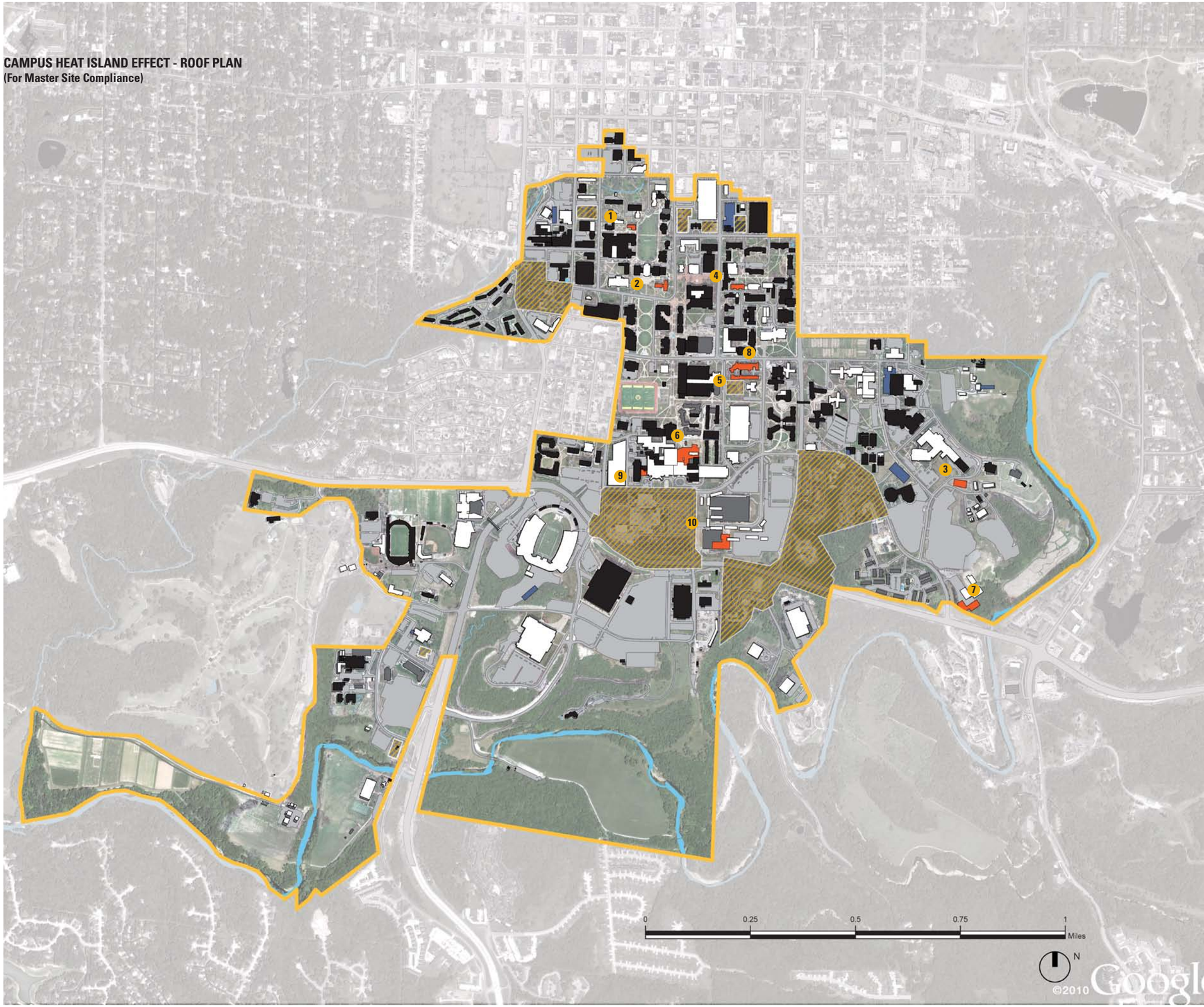
1 point

By Project
Future Master Site

MASTER SITE CREDIT COMPLIANCE CALCULATIONS

Total % SRI Compliant Roof Area	=	100 x 2,477,720 / 5,639,059 sq. ft.
	=	43.93%
Required % compliant roof area	=	75%

CAMPUS HEAT ISLAND EFFECT - ROOF PLAN
(For Master Site Compliance)



- Proposed LEED projects in design or development
- Existing buildings with dark roofs
- Existing buildings with SRI Compliant Roofs

SS

Credit 8

By Project

Future Master Site

Light Pollution Reduction

1 point

INTENT

To minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction and reduce development impact from lighting on nocturnal environments.

REQUIREMENTS

For Interior Lighting:

Option 1: Reduce input power by automated device for all non-emergency interior luminaries with a direct line of sight to any openings in the envelope (translucent or transparent) by at least 50% between 11 PM till 5 AM. Manual override is allowed if used for maximum 30 minutes.

Option 2: All openings in envelope (translucent or transparent) with a direct line of sight to any non-emergency luminaries must have shielding (controlled/closed by automated device for resultant transmittance of less than 10% between 11 PM till 5 AM).

For Exterior Lighting:

Only light areas as required for safety and comfort. Lighting Power Density (LPD) not to exceed ANSI/ASHRAE/IESNA Standard 90.1.2007 with errata but without addenda) for classified zone as defined in IESNA RP-33 and follow requirements for that zone per reference guide.

ACTIONS

Design

Who: Lighting Designer, Architect, MU Landscape Services, Electrical Engineer

- Lighting Designer to develop design strategy to meet credit intent
- Lighting Designer to perform a photometric analysis of the site to verify credit compliance.
- Design and develop a control scheme to meet interior lighting requirements

Construction Documents

Who: Lighting Designer, Electrical Engineer

- Include the preferred cut-off angles and desired light-output levels in specifications of lighting equipment
- Incorporate the lighting design into all construction documents.
- Include lighting system in the scope of commissioning to ensure proper operations and performance.
- MU Project Manager to consult with Campus Facilities and Operations regarding the selection of site fixtures, lamp type and maintenance requirements.
- Lighting Designer to complete LEED template and upload interior and exterior lighting layout, a photometric site plan, sequence of operations and the materials, assembly specifications, product data, and description of the light trespass analysis procedure showing credit compliance to LEED Online.

Post-Construction

Who: MU Campus Facility Commissioning Agent

- Ensure proper operations and performance of the installed lighting system and verify credit compliance

Campus Standards for Interior Lighting

Campus Standards for Exterior Lighting

Water Efficiency

WE Prerequisite 1	Water Use Reduction (20%)	03
WE Credit 1	Water Efficient Landscaping	05
WE Credit 2	Innovative Wastewater Technologies	09
WE Credit 3	Water Use Reduction	03

WE Water Use Reduction

Prerequisite 1 Required

Campus Standard

INTENT

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

REQUIREMENTS

Implement strategies that in aggregate use at least 30% less water than water-use-baseline calculated for building. Do not include irrigation requirement after meeting EPA-1992 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only following fixtures (as applicable to building): water closets, urinals, lavatory faucets, showers, kitchen sinks and pre-rinse spray valves. Up to two points available for demonstrating further water use reduction. (Every additional 5% = 1 point). Commercial steam cookers, commercial dishwashers, automated commercial ice makers, commercial family sized clothes washer, resident clothes washer, standard and compact residential dishwashers are out of scope for this credit.

COMMERCIAL WATER USE BASELINES
(As per LEED BD&C 2009 Reference Guide)

Commercial Fixtures	Gallons per flush (gpf)/ Gallons per minute (gpm)	Flow Duration
Toilets	1.6 gpf	
Urinals	1 gpf	
Shower heads	2.5 gpm	5 minutes
Metered Lavatory Faucets	0.5 gpm	15 seconds
Kitchen Faucets	2.2 gpm	30 seconds
Janitor Faucets	2.2 gpm	30 seconds
Commercial prerinse spray valves (for food service applications)	1.6 gpm	

WE Water Use Reduction

Credit 3 2 - 4 Points

Campus Standard - 2 points; 30% reduction
By Project - 2 points; 35-40% reduction

ACTIONS

Design

Who: MU Project Manager, Plumbing Engineer, Architect

- MU Project Manager, Plumbing Engineer and Architect to work together to calculate building occupancy.
- Calculate the water use baseline for the proposed design.
- Identify primary water loads and opportunities for savings.
- Calculate estimated water savings due to the designed occupancy and preferred water fixtures as outlined in the LEED BD&C 2009 reference guide.
- MU Project Manager to consult with the Campus Facilities and Operations regarding selection of preferred fixtures and flush/flow rates levels in specifications of plumbing equipment.
- Plumbing Engineer to upload plumbing fixture schedule highlighting flush and flow rates for all applicable plumbing fixtures within the project building and complete LEED template on LEED Online.

Construction Documents

Who: Plumbing Engineer, Architect

- Plumbing Engineer to incorporate plumbing fixture and fitting schedule into all construction documents.
- Include water fixtures in the scope of commissioning to ensure proper operations and performance.

Construction Administration

Who: Plumbing Engineer, Architect

- Architect and Plumbing Engineer to review product submittals to verify compliance with credit requirements.

Post-Construction

Who: MU Campus Facility Commissioning Agent

- Ensure proper operations and performance of the installed plumbing fixtures and fittings within the project building and verify credit compliance.

NOTE

Carefully consider the impact that unisex restrooms (without Urinal) have on the water use consumption.

WATER USE REDUCTION SCENARIOS

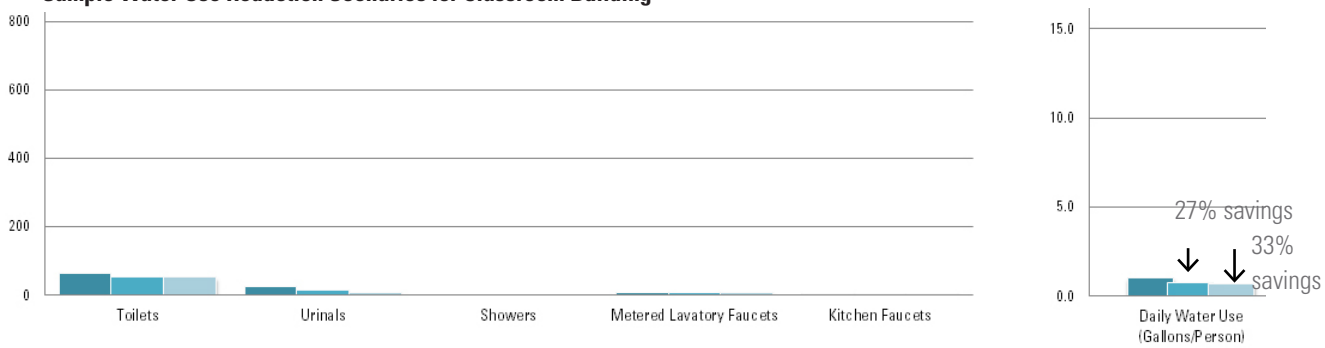
The following charts illustrate potential for water savings for different building types based on plumbing fixture flush/flow rates. The three different scenarios are described below. These are only estimates. Calculations are required for each project.

BASELINE:
Toilets(f):1.6gpf;
Toilets(m):1.6gpf;
Urinals: 1gpf;
Showers: 2.5gpm;
Metered Lavatory Faucets:0.5gpm (15sec);
Kitchen Faucets: 2.2gpm (30sec);

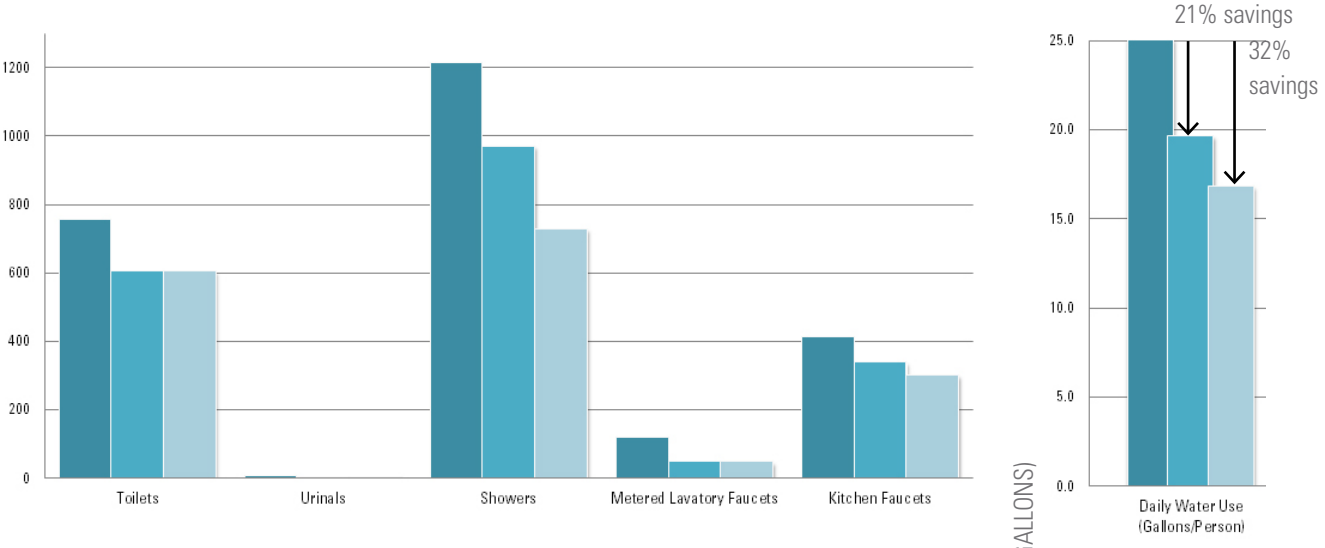
SCENARIO 1
Toilets(f):1.28gpf;
Toilets(m):1.28gpf;
Urinals: 0.5gpf;
Showers: 2.0gpm;
Metered Lavatory Faucets:0.5gpm (12sec);
Kitchen Faucet: 1.8gpm (30sec);

SCENARIO 2
Toilets(f):1.28gpf;
Toilets(m):1.28gpf;
Urinals: 0.25gpf;
Showers: 1.5gpm;
Metered Lavatory Faucets:0.5gpm (12sec);
Kitchen Faucet: 1.6gpm (30sec);

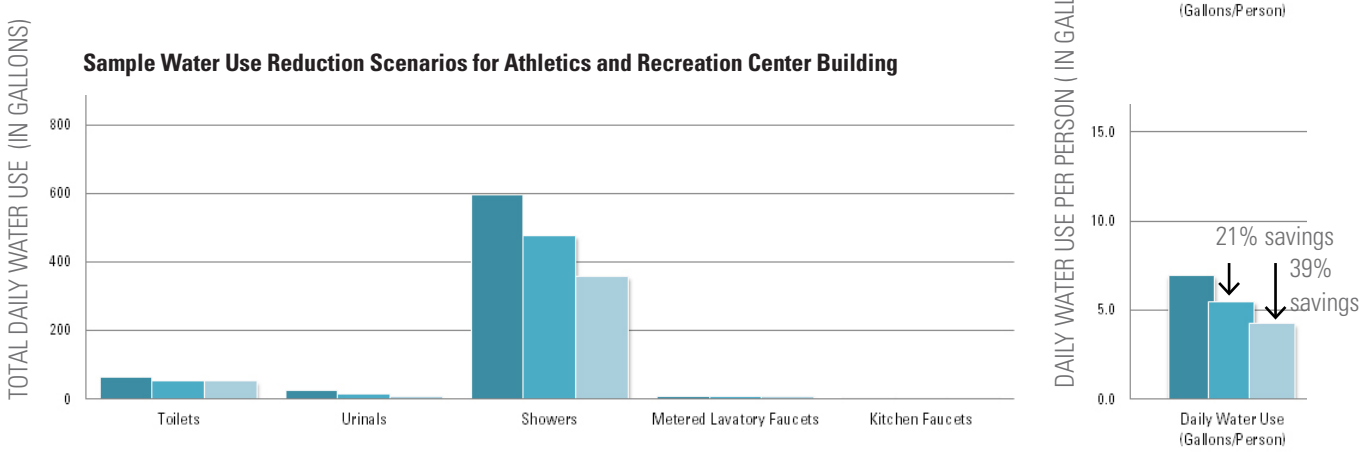
Sample Water Use Reduction Scenarios for Classroom Building



Sample Water Use Reduction Scenarios for Residence Hall Building



Sample Water Use Reduction Scenarios for Athletics and Recreation Center Building



WE Water Efficient Landscaping

Credit 1 2 - 4 Points

Master Site - 2 Points
By Project - 2 Points

INTENT

To limit or eliminate the use of potable water for irrigation by 50% from a calculated midsummer baseline case.

REQUIREMENTS

Option 1: Reduce potable water consumption for irrigation by 50% from a calculated mid-summer baseline case using any combination of following: plant species factor, irrigation efficiency, use of captured rainwater, recycled wastewater, or water treated and conveyed by a public agency specifically for non-potable uses. Ground seepage pumped away from immediate vicinity of building slabs and foundations may be used for irrigation to meet intent but must demonstrate that it does not affect site stormwater management systems.

Option 2: No potable water use or irrigation and meet requirements for option 1. Use one of the following two paths:

Path 1: Use only captured rainwater, recycled wastewater, recycled gray water, or water treated and conveyed by a public agency specifically for non-potable uses for irrigation.

Path 2: Install landscaping that does not require permanent irrigation systems.

ACTIONS

Design

Who: MU Project Manager, MU Landscape Services

- Determine planting strategy and if irrigation will be required.
- If no irrigation is required MU Landscape Services to complete LEED template on LEED Online indicating no water use for 4 points.
- If irrigation is required MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit. (Master Site Project Number 1000016195).
- Team to determine if rain water and/or gray water reuse is a viable strategy. Due to abundant water supply in Columbia and low cost of water this typically is not an economic solution.
- MU Landscape Services to update MU Campus Map for water efficient landscape irrigation strategies with new project information and confirm compliance with campus irrigation goals.

MASTER SITE REQUIREMENTS

For the option of 50% reduction, include all landscaped areas within LEED campus boundary.

SUPPORTING DOCUMENTATION
AVAILABLE ON LEED ONLINE MASTER SITE

1. Calculations for water efficient landscape irrigation strategies
2. MU Campus Map for water efficient landscape irrigation strategies.

CALCULATIONS FOR WATER EFFICIENT LANDSCAPE IRRIGATION STRATEGIES

(Provided by MU Landscape Services on September 30, 2011 and available on LEED Online Master Site)

Landscape-Type Description	K_s	K_D	K_{MC}	K_L	ET_0	ET_L	IE	SF	TPWA (gal/sf/in)	Baseline TPWA	Difference	% Decr. TPWA
Francis Quadrangle:	0.72	1.12	1	0.81	0.27	0.22	0.67	223,766	45,326			
<50% tree canopy, 60% Turf, 15% Mixed Irrig. 15% drip, 85% pop-up												
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	223,766		42,179	-3,148	-7%
Peace Park												
60% canopy coverage, 40% average density turf, smattering of shrubs												
	0.36	1.18	1	0.42	0.27	0.11	0.00	727,199	0			
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	727,199		137,073	137,073	100%
Res Life Irrigated	0.58	1.07	1	0.62	0.27	0.17	0.65	124,307	19,974			
10% shrubs, 20% canopy coverage, irrigated courtyards,												
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	124,307		23,431	3,457	15%
Stankowski	0.46	1.00	1	0.46	0.27	0.12	0.00	3,695,133	0			
5% shrubs, decent number of trees when mature, no irrigation; includes non-irrigated Res Life areas												
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	3,695,133		696,514	696,514	100%
Jesse Hall South = Peace Park + Irrigation	0.32	1.21	1	0.39	0.27	0.10	0.63	64,167	6,690			
>60% canopy plus irrigation												
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	64,167		12,095	5,405	45%
Carnahan Quadrangle (S. Quad)	0.55	0.85	1	0.47	0.27	0.13	0.65	295,465	35,765			
Same as Francis Quad only 10% perennials/shrubs & lower density of tree canopy												
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	295,465		55,694	19,929	36%
Mixed Trees/shrubs & mulch - No Irrigation (917)	0.2	1.15	1.3	0.30	0.27	0.08	0.00	551,326	0			
Hot microclimate; usually along roads or parking lots; sometimes just trees and grass; narrow or confined planting areas												
Baseline	0.7	1.00	1.3	0.91	0.27	0.25	0.63	551,326		135,099	135,099	100%
Annual Flower Beds	0.9	1.10	1.2	1.19	0.27	0.32	0.90	7,401	1,644			
Drip irrigation; very sunny and typically hot: near roads or large pavement areas												
Baseline	0.7	1.00	1.2	0.84	0.28	0.24	0.63	7,401		1,736	92	5%
Large Grass Areas - No irrigation	0.7	1.00	1	0.70	0.27	0.19	0.00	3,974,351	0			
Dairy Lawn, Mule Barn etc.												
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	3,974,351		749,145	749,145	100%
Wildflowers/Bioretention Areas	0.2	1.00	1	0.20	0.27	0.05	0.00	346,096	0			
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	346,096		65,237	65,237	100%
Stankowski + Irrigation	0.46	1.00	1	0.46	0.27	0.12	0.63	170,710	21,146			
GSB, Townsend												
Baseline	0.7	1.00	1	0.70	0.27	0.19	0.63	170,710		32,178	11,032	34%
Mixed Trees/shrubs & mulch + Drip Irrigation (929)	0.2	1.15	1.3	0.30	0.27	0.08	0.90	113,750	6,360			
Baseline	0.7	1.00	1.3	0.91	0.27	0.25	0.63	113,750		27,874	21,514	77%
Solid Narrow Grass Strips Along Road - No irrigation (1065)	0.6	1.00	1.2	0.72	0.27	0.19	0.00	663,718	0			
Hot & windy environment												
Baseline	0.7	1.00	1.20	0.84	0.27	0.23	0.63	663,718		150,129	150,129	100%
Agricultural Fields								1,936,066				
Baseline								1,936,066				
Natural Areas								11,425,464	0	0	0	0%
Baseline								11,425,464				
ICA + Irrig. (Grass Only Areas + Irrigation)	0.6	1.00	1.2	0.72	0.27	0.19	0.63	324,541	62,922			
Athletic fields plus Irrigation												
Baseline	0.7	1.00	1.20	0.84	0.27	0.23	0.63	324,541		73,409	10,487	14%
Total								**24,643,460**	**199,828**	**2,201,794**	**2,001,966**	**91%**

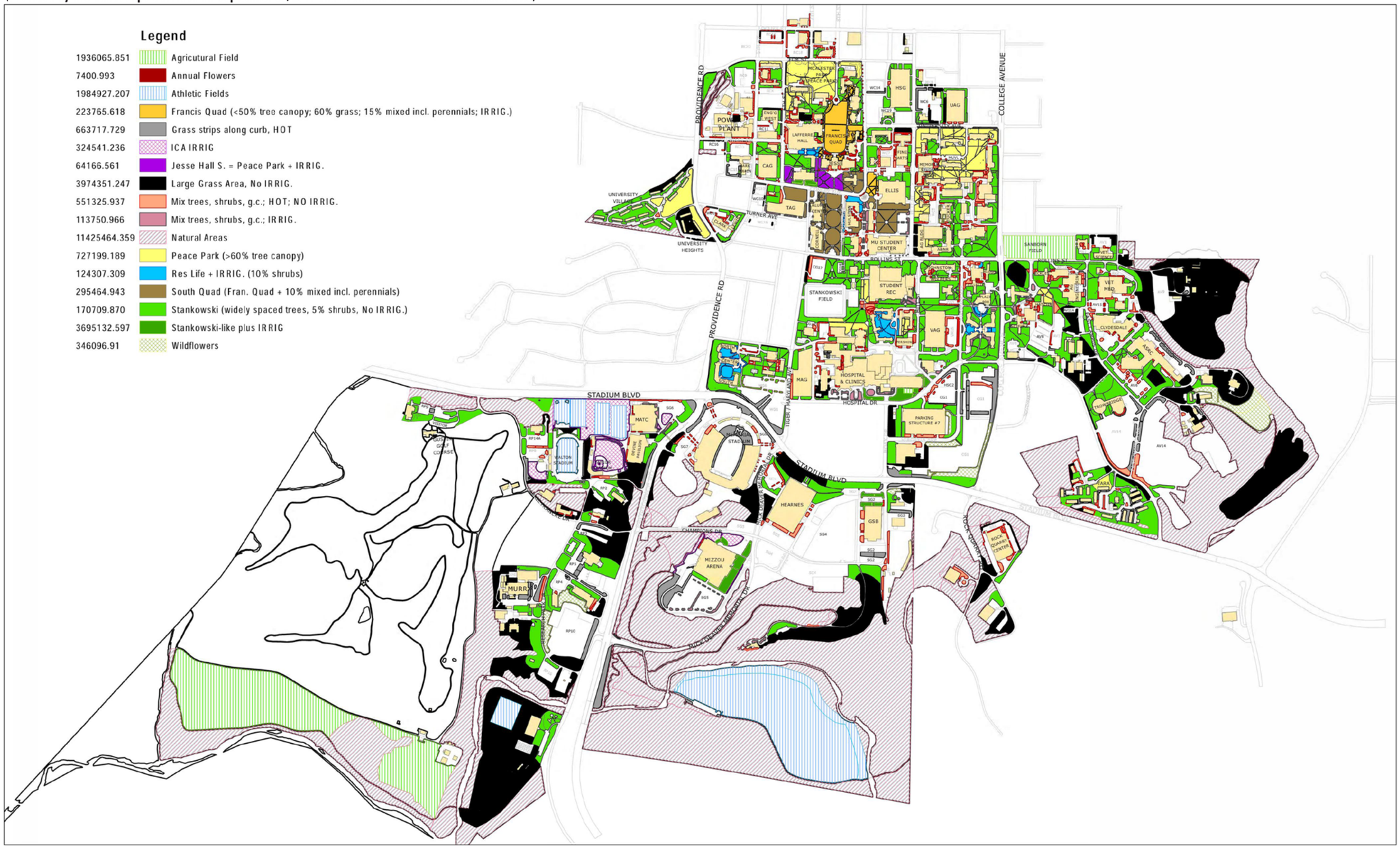
Athletic Fields Irrigated or Not	0.6	1.00	1.2	0.72	0.27	0.19	0.63	1,984,927	384,839			
Athletic fields not incl. in base map as greenspace i.e. Hinkson, Football Practic fields												
Baseline	0.7	1.00	1.20	0.84	0.27	0.23	0.63	1,984,927		448,979	64,140	14%

WE Water Efficient Landscaping

Credit 1 2 - 4 Points

Master Site - 2 Points
By Project - 2 Points

MU CAMPUS MAP FOR WATER EFFICIENT LANDSCAPE IRRIGATION STRATEGIES
(Provided by MU Landscape Services on September 30, 2011 and available on LEED Online Master Site)



All data displayed in this map is intended for reference purposes only. This information is to be used to locate and identify geographical features and university facilities and is NOT to be construed as a "legal description" or survey grade documentation. Map information is believed to be accurate but accuracy is not guaranteed.

Campus Facilities

Map Provided By
SPACE PLANNING & MANAGEMENT
(573) 882-4506
J Richardson
http://www.cf.missouri.edu/spm
MUSpace@missouri.edu

Climate Action Areas

WE

Innovative Waste Water technologies

Credit 2

2 Points

By Project

INTENT

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

REQUIREMENTS

Option 1: Reduce potable water use for building sewage conveyance by 50% through use of water-conserving fixtures or non-potable water.

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

ACTIONS

Design

Who: MEP Engineer, Civil Engineer, MU Landscape Services

- Examine the feasibility of earning this credit through enhanced fixture efficiencies, or using gray water / rain water for sewage conveyance.
- MEP Engineer to complete LEED template on LEED Online.

Construction Documents

Who: Architect, MEP Engineer

- The design team shall develop and design waste reuse and treatment systems, document these within plans and specifications, provide adequate calculations and supporting documentation to illustrate compliance with the credit requirements.
- Include water fixtures in commissioning scope.

Construction Administration

Who: MEP Engineer, MU Campus Facility Commissioning Agent

- Architect and MEP Engineer to review submittals
- Confirm proper selection, installation and operation of water systems.

NOTES

This can be a costly credit to earn. Water is abundant and particularly inexpensive in Columbia. Projects are encouraged to examine the feasibility of earning this credit through enhanced fixture efficiencies, or using gray water / rain water for sewage conveyance. Rain water harvesting for sewage conveyance may be incorporated into the overall storm water management strategy.

MU will require a full life-cycle analysis (per project or projects) of the proposed wastewater technology in order to consider pursuit of this credit.

MU will require the design team to coordinate with Maintenance and Operations requirements for treatment and reuse equipment and technologies prior to proceeding with on-site wastewater technology project specific design.

Energy And Atmosphere

EA Prerequisite 1	Fundamental Commissioning of Building Energy Systems	03
EA Prerequisite 2	Minimum Energy Performance	05
EA Prerequisite 3	Fundamental Refrigerant Management	07
EA Credit 1	Optimize Energy Performance	05
EA Credit 2	On-site Renewable Energy	10
EA Credit 3	Enhanced Commissioning	03
EA Credit 4	Enhance Refrigerant Management	09
EA Credit 5	Measurement and verification	13
EA Credit 6	Green Power	14

EA Prerequisite 1

Fundamental Commissioning of Building Energy Systems

Required

Campus Standard

EA Credit 3

Enhanced Commissioning

2 Points

Campus Standard

INTENT

To verify that the project's energy-related systems are installed, calibrated and perform according to the owner's project requirements, basis of design and construction documents.

REQUIREMENTS

Verify that the building's energy related systems are installed, calibrated and perform according to owner's project requirements, basis of design, and construction documents.

ACTIONS

Design

Who: MU Campus Facility Commissioning Agent, MEP Engineer, MU Energy Management, Architect

- MU to develop Owner Project Requirements (OPR) based on MU's OPR Template available in Appendix G.
- MU and Architect to develop Basis of Design (BOD) based on MU's BOD Template available as available in Appendix H.
- MU Campus Facility Commissioning Agent to develop and implement Commissioning Plan.

Construction Documents

Who: MU Campus Facility Commissioning Agent, MEP Engineer

- MU Campus Facility Commissioning Agent and MEP Engineer to incorporate commissioning requirements into construction documents.
- MU Campus Facility Commissioning Agent to conduct commissioning design review prior to mid construction documents.

Construction Administration

Who: MU Campus Facility Commissioning Agent, MEP Engineer, Contractor

- MU Campus Facility Commissioning Agent and MEP Engineer to review contractor submittals applicable to systems being commissioned.
- MU Campus Facility Commissioning Agent to verify installation and performance of commissioned systems.
- MU Campus Facility Commissioning Agent to develop systems manual for commissioned systems.
- MU Campus Facility Commissioning Agent to verify that requirements for training are completed.
- Complete a summary commissioning report.
- MU Campus Facility Commissioning Agent to upload the summary commissioning report and complete LEED template on LEED Online.

Occupancy

Who: MU Campus Facility Commissioning Agent

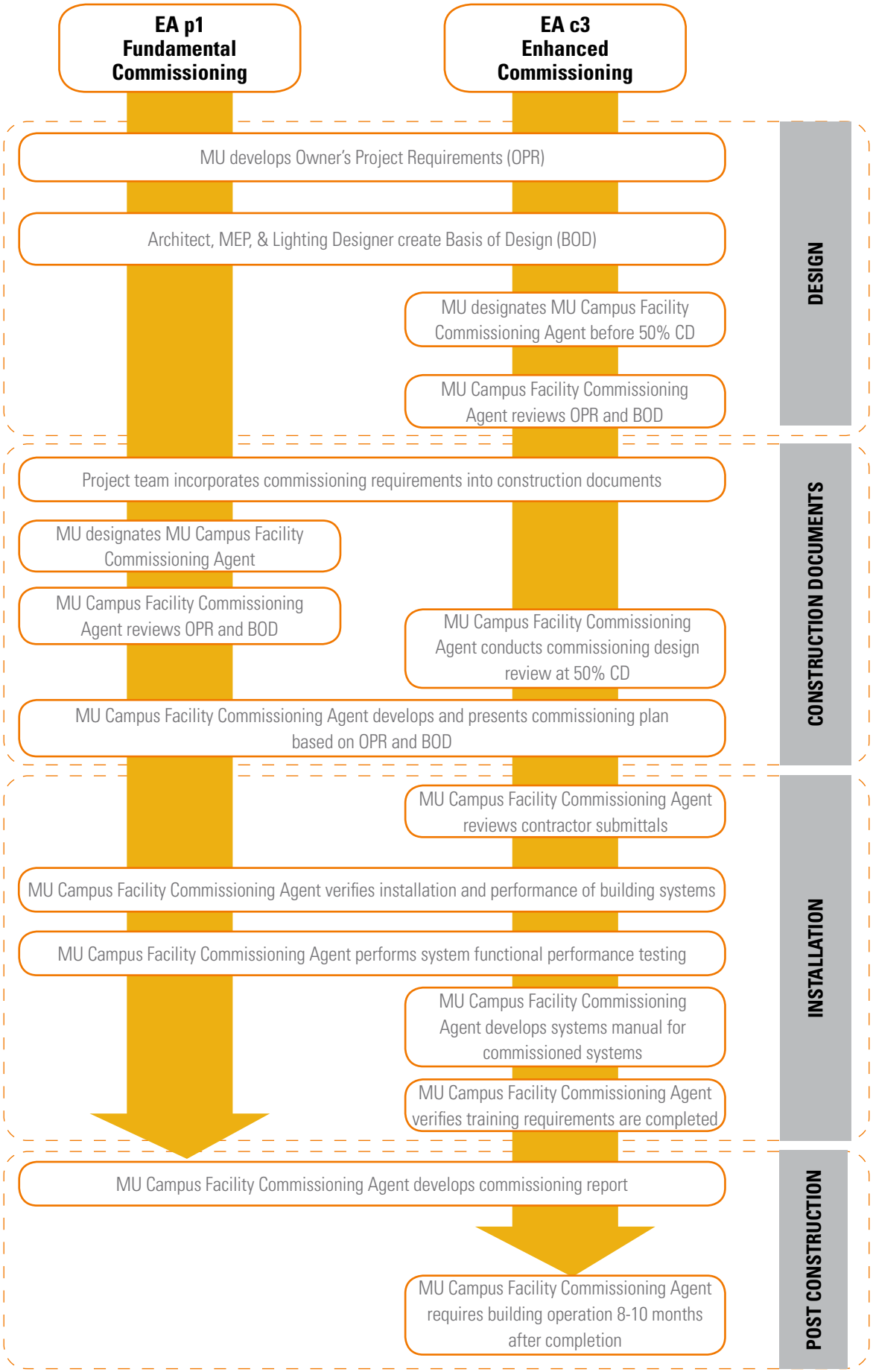
- MU Campus Facility Commissioning Agent to review building operation within ten months after substantial completion.

NOTES

Refer to Appendix G : MU's template for Owner's Project Requirement (OPR)

Refer to Appendix H: MU's template for Basis of Design (BOD).

FUNDAMENTAL AND ENHANCED COMMISSIONING ACTIONS TIMELINE



EA

Minimum Energy Performance

Prerequisite 2

Required

Campus Standard

EA

Optimize Energy Performance

Credit 1

1 - 19 Points

Campus Standard	Min. 7 Points; 25%- New Construction
	Min. 4 Points; 15%- Major Renovation
By Project	Remaining Points

INTENT

To establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.

REQUIREMENTS

Target 25% improvement in proposed building performance for new buildings or 15% for major renovations to existing buildings compared to baseline performance rating using Appendix: G of ANSI/ ASHRAE/ IESNA Standard. 90.1.2007 (with errata but without addenda) using computer simulation model for whole building project.

ACTIONS

Design

Who: MEP Engineer, Architect

- Develop Owner Project Requirements (OPR) based on MU's OPR Template available as Appendix G in this document.
- Develop Basis of Design (BOD) based on MU BOD Template available as available as Appendix H in this document.
- Include whole building performance based goals as well as prescriptive goals for lighting efficiency and envelope effectiveness.
- Identify building's energy load profile early in design to determine opportunities for energy saving.
- Identify potential strategies and test early in design.
- Refer to the energy efficiency standards set by MU Planning Design and Construction (PD&C) and MU Energy Management in MU's Climate Action Plan and develop strategies to meet credit intent.
- MU's Building Energy Consultant or MEP Engineer to advise on the project and provide energy modeling services throughout design.
- Architect to review energy model report with the MEP Engineer and make design adjustments as required to at least meet campus standard requirements.

Construction Documents

Who: MEP Engineer

- Revise energy model to reflect any changes.
- MEP Engineer or MU's Building Energy Consultant to complete LEED template and upload the final energy model report on LEED Online.

Construction Administration

Who: MEP Engineer

- MEP Engineer to review submittals.
- Revise energy model to reflect any changes.

NOTE

- See Appendix G: MU's template for Owner's Project Requirements (OPR)
- See Appendix H: MU's template for Basis of Design (BOD)

MINIMUM ENERGY COST SAVINGS PERCENTAGE FOR CREDIT POINTS THRESHOLD

(As per LEED BD&C 2009 Reference Guide)

NEW BUILDINGS	EXISTING BUILDING RENOVATIONS	CREDIT POINTS
12%	8%	1
14%	10%	2
16%	12%	3
18%	**14% (MU TARGET)**	4
20%	16%	5
22%	18%	6
24% (MU TARGET)	20%	7
26%	22%	8
28%	24%	9
30%	26%	10
32%	28%	11
34%	30%	12
36%	32%	13
38%	34%	14
40%	36%	15
42%	38%	16
44%	40%	17
46%	42%	18
48%	44%	19

ENERGY TARGETS - GOAL SETTING CHART

GOAL SETTING CHART

PRIMARY SPACE TYPE	Average building (source: AIA2030 commitment table; CBECS2003 survey)	60% better than Average building	70% better than Average building	80% better than average building	90% better than average building	per ASHRAE 90.1.2007(25% better than average building)	10% better than ASHRAE 90.1.2007	20% better than ASHRAE 90.1.2007	25% better than ASHRAE 90.1.2007	30% better than ASHRAE 90.1.2007	40% better than ASHRAE 90.1.2007	50% better than ASHRAE 90.1.2007
	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf	kbtu/sf
athletic/recreation	**65**	26	20	13	7	**49**	42	36	33	29	23	16
office	**77**	31	23	15	8	**58**	50	42	39	35	27	19
facility office	**77**	31	23	15	8	**58**	50	42	39	35	27	19
library	**104**	42	31	21	10	**78**	68	57	52	47	36	26
other	**104**	42	31	21	10	**78**	68	57	52	47	36	26
dining	**302**	121	91	60	30	**227**	196	166	151	136	106	76
student center	**66**	26	20	13	7	**50**	43	36	33	30	23	17
labs	**370**	148	111	74	37	**278**	241	204	185	167	130	93
residential	**89**	36	27	18	9	**67**	58	49	45	40	31	22
classroom	**120**	48	36	24	12	**90**	78	66	60	54	42	30
religious buildings	**46**	18	14	9	5	**35**	30	25	23	21	16	12
public assembly -entertainment/culture	**95**	38	29	19	10	**71**	62	52	48	43	33	24

EA Fundamental Refrigerant Management

Prerequisite 3 Required

Campus Standard

INTENT

To reduce stratospheric ozone depletion.

REQUIREMENTS

Reduce ozone depletion by zero use of CFC based refrigerants in new base building HVAC&R systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion prior to project completion. Phase-out plans extending beyond the project completion date will be considered on their merits.

ACTIONS

Design

Who: MU Project Manager, MEP Engineer

For projects connected to MU's Central Plant:

- Refer to MU's CFC phase out plan letter available on LEED Online Master Site.
- MEP Engineer to upload the CFC phase out plan letter provided by MU and complete LEED template on LEED Online.

For Projects not connected to MU's Central Plant:

Who: MEP Engineer, MU Energy Management

- MEP Engineer to work with MU Energy Management to meet prerequisite.
- MEP Engineer to upload credit compliance documentation and complete LEED template on LEED Online.

MASTER SITE REQUIREMENTS

Not applicable for CFC phase out plan.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. Letter from Energy Management describing the CFC phase out plan.

MU ENERGY MANAGEMENT'S LETTER DESCRIBING CFC PHASE OUT PLAN
(Available on LEED Online Master Site)

UNIVERSITY of MISSOURI

CAMPUS FACILITIES - ENERGY MANAGEMENT

Paul Hoemann, P.E.
Director – Campus Facilities-Energy Management
417 South Fifth Street
Columbia, MO 65211

Subject: Campus Chilled Water Loop CFC Phase-out Plan

Chilled Water Utility Description

The main loop consists of 34 chillers in 18 distributed chiller plants serving approximately 100 buildings. The total installed design capacity is approximately 23,000 Tons. The chillers consist of electric driven, steam driven, and steam absorbers. The pumping system is a primary/secondary/tertiary system. The primary is constant speed. The secondary and tertiary pumps are variable speed.

The chillers are dispatched automatically based on efficiency and/or cogeneration requirements. A variable speed centrifugal (or two) is always base loaded to handle the low end loads. If heavy cogeneration is required, the steam turbine driven and double stage steam absorbers are started until all are online, then the variable speed electric centrifugals, then constant speed electric centrifugals, and finally the single stage steam absorbers. If moderate cogeneration is required the VSD electric centrifugals and steam absorbers are mixed and matched to the overall system needs. During the winter a free cooling heat exchanger, direct connected to a cooling tower, provides chilled water to the loop without running a chiller.

Ten of the electric chillers use HFC-134a for refrigerant. Four use HCFC-22. One uses HCFC-123, and one uses CFC-12. The steam turbine driven chiller also uses HFC-134a. The steam absorption chillers use water as a refrigerant.

The Research Park loop consists of 4 chillers in 2 distributed chiller plants serving 7 buildings. The total installed design capacity is approximately 1,860 Tons. The chillers consist of both electric driven and steam absorbers. The pumping system is a primary/secondary/tertiary system. The primary is constant speed. The secondary and tertiary pumps are variable speed.

This loop dispatches chillers using the same strategy as the main loop including free cooling.

One electric chiller uses HFC-134a and the other uses HCFC-22 for refrigerant.

CFC Phase-out

The only chiller that uses a CFC based refrigerant is the 400 ton electric constant speed centrifugal chiller located in the basement of Memorial Union. It was installed in 1992 and currently has approximately 1500 lbs of CFC-12. The building is connected to the campus main chilled water loop. The chiller usually operates only as a peaking machine on extremely hot days. Very little chilled water production from this chiller serves the loop as the building load is close to the capacity of the chiller.

This chiller will be decommissioned after the summer of 2012. The East Campus Chiller Plant (ECCP) will be online the following summer to replace the capacity of this CFC machine. The ECCP first phase will consist of three 1500 ton electric centrifugal chillers using HFC-134a for a refrigerant.

Paul Coleman
Manager – Energy Controls and Chilled Water
Campus Facilities – Energy Management

/PMC

EA

Enhanced Refrigerant Management

Credit 4

2 Points

By Project

Future Master Site

INTENT

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

REQUIREMENTS

Select refrigerants and HVAC&R that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. Small HVAC units(<0.5 pounds of refrigerant), standard refrigerators, small water coolers and cooling equipment that contains less than 0.5 pounds of refrigerant not subject to requirement of the credit.

ACTIONS

Design

Who: Mechanical Engineer, MU Energy Management

- Team to work with MU Energy Management to determine if credit can be achieved.
- If credit is being pursued, MEP Engineer to perform calculations, upload credit compliance documentation and complete LEED template on LEED Online.

NOTE

Most projects at this time will not meet this credit due to refrigeration in Central Plant.

EA On-Site Renewable Energy

Credit 2 1 - 7 Points

Regional Priority - 7% on-site

Campus Standard - 7 Points; 13% On-site

Future Master Site

INTENT

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

REQUIREMENTS

Use on-site renewable energy systems to offset building energy cost. Calculate project performance by expressing the energy produced by the renewable systems as a percentage of the building annual energy cost. Use the building annual energy cost calculated in EA Credit 1 or use the DOE Commercial Buildings Energy Consumption Survey database to determine the estimated electricity use. Supply building's energy use through on-site renewable energy systems. Minimum 1% on-site renewable energy required. For each additional 2% on-site renewable energy installed will earn 1 point (maximum 7 points available)

ACTIONS

Design

Who: MU Energy Management, MU Project Manager, Design team

- Design team to provide MU Energy Management with predicted total building energy use from energy model.
- MU Project Manager to coordinate with MU Energy Management to update building renewable energy allotment records and provide team with letter stating renewable energy allotted to the project.
- MU Project Manager to upload Biomass contract and letter describing biomass and map of on-site renewables, allotment letter for the project and complete LEED template on LEED Online.

NARRATIVE FOR CREDIT COMPLIANCE AVAILABLE ON LEED MASTER SITE

MU has a 6 year contract for Biomass with options to renew for up to 10 years. Biomass will come from the central Missouri region, mainly within a 75 mile radius from the MU campus.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. Biomass Contract
2. Letter describing biomass and template for project allotment
3. Map of on-site renewables.

NOTES

Renewable energy produced in other locations on campus is eligible for this credit. The biomass and PV on campus contribute to this credit. Projects cannot double count renewable energy.

For projects outside of the LEED boundary area or not able to connect to the campus central plant, this credit will most likely not be achieved.

MINIMUM RENEWABLE ENERGY PERCENTAGE FOR CREDIT POINTS THRESHOLD

(As per LEED BD&C 2009 Reference Guide)

% RENEWABLE ENERGY	CREDIT POINTS
1%	1
3%	2
5%	3
7%	4
9%	5
11%	6
13% (MU TARGET)	7

ENERGY MANAGEMENT'S PREDICTED ENERGY ESTIMATES FOR FUTURE LEED PROJECTS.

Building	In Service Date	GSF	Annual kwhrs	Annual MMBTU
Switzler	FY12	28,467	167,616	1,880
Tate	FY12	42,930	319,632	2,837
ARC	FY13	20,758	619,545	8,899
Gwynn	FY15	38,600	328,409	3,253
UMC - ER	FY14	36,900	1,327,072	7,686
UMC - Patient Care	FY13	310,000	8,952,800	70,151
UMC - Orthopedics Expansion	FY13	6,000	143,801	1,464
Wolpers & Johnson	FY15	211,318	1,919,808	24,966
Food & Wine				
Total		**694,973**	**13,778,682**	**121,136**

BIOMASS CONTRACT
(Available on LEED Online Master Site)

Biomass Contract

LOCATION MAP FOR ON-SITE RENEWABLE ENERGY
(Available on LEED Online Master Site)

Location map for on-site renewable energy source

SAMPLE RECORD OF ALLOTMENT OF ON-SITE RENEWABLE ENERGY
(Available on LEED Online Master Site)

Sample allotment record

EA

Measurement And Verification

Credit 5

3 Points

Campus Standard

INTENT

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

REQUIREMENTS

Option 1 or Option 2: Provide for the ongoing accountability of building energy consumption over time.

Develop and implement a Measurement and Verification (M&V) Plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2) OR consistent with Option B: Energy Conservation Measure Isolation (Savings Estimation Method 2), as specified in IPMVP April 2003

M&V period must cover at least 1 year of Post-construction occupancy. Process corrective actions if results of the M&V plan indicate that energy savings are not achieved.

ACTIONS

Design

Who: MU Energy Management, MEP Engineer, Architect

- MU Energy Management to determine Measurement and Verification Plan for building.
- Team to develop plan to achieve Measurement and Verification goals.
- Plan should address
  - Table or listing of the project's energy end uses;
  - Indication of the method proposed to calibrate the energy model and identify the party responsible for the calibration;
  - Specific information regarding the baseline conditions established for the project;
  - Specific information regarding the method/frequency for calibration, and analysis against the documented baseline conditions;
  - Specific information regarding corrective action strategy if calibrated data derivates from the anticipated performance and
  - Confirmation that the M&V period covers a minimum of one year of post construction occupancy.
- MEP Engineer to incorporate metering into design.

Construction Documents

Who: MEP Engineer

- MEP Engineer to incorporate metering into construction documentation.

Construction

Who: MEP Engineer, MU Campus Facility Commissioning Agent

- Verify controls installed and calibrated properly.

Post Construction

Who: MU Energy Management

- Implement Measurement and Verification Plan.

EA

Green Power

Credit 6

2 Points

By Project

Future Master Site (if LEED allows)

INTENT

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

REQUIREMENTS

Provide at least 35% of the building's electricity from renewable sources by engaging in at least a 2 year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements. Purchase of green power shall be used on quantity of energy consumed not the cost.

Option 1: Use the annual electricity consumption from the results of EA Credit 1

Option 2: Use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine estimated electricity use.

ACTIONS

Design

Who: MU Energy Management, Design team

- MU Energy Management to provide allotment letter for project showing total purchased renewable energy and percentage assigned to the project.
- Design team to refer to the wind power purchase agreement contract and letter of allotment available on LEED Online Master Site.
- MU to upload wind power purchase agreement contract and allotment letter for the project and complete LEED template on LEED Online.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. Wind power contract
2. Letter describing wind power and sample allocations
3. Energy Management's predicted energy use estimates for future LEED projects

NOTE:

EM is in the process of purchasing enough wind power to account for 100% of the future LEED projects' projected electricity usage.

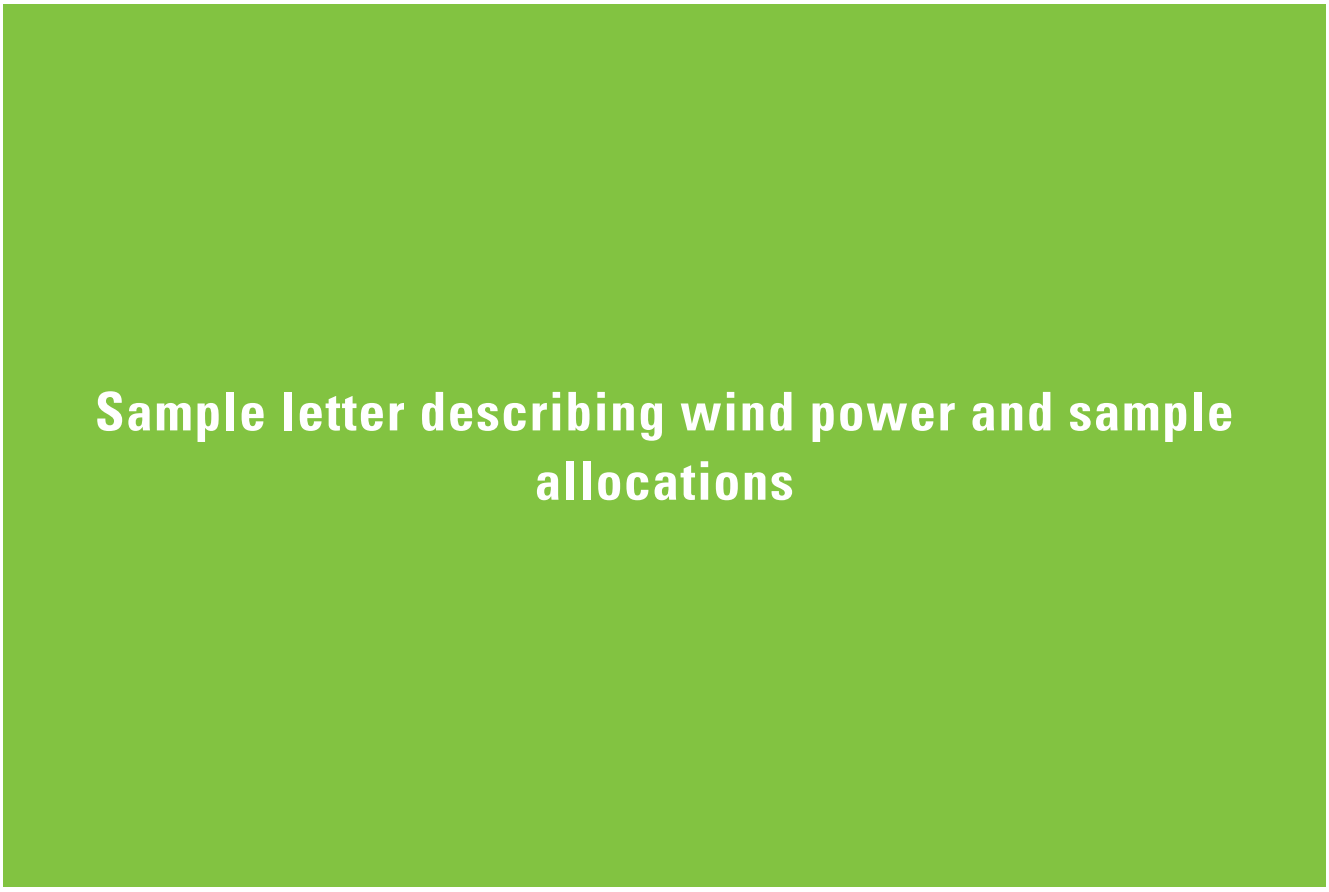
For projects outside of the LEED boundary area or not able to connect to the campus central plant, this credit will most likely not be achieved.

ENERGY MANAGEMENT'S PREDICTED ENERGY ESTIMATES FOR FUTURE LEED PROJECTS
(Available on LEED Online Master Site)

Building	In Service Date	GSF	Annual kwhrs	Annual MMBTU
Switzler	FY12	28,467	167,616	1,880
Tate	FY12	42,930	319,632	2,837
ARC	FY13	20,758	619,545	8,899
Gwynn	FY15	38,600	328,409	3,253
UMC - ER	FY14	36,900	1,327,072	7,686
UMC - Patient Care	FY13	310,000	8,952,800	70,151
UMC - Orthopedics Expansion	FY13	6,000	143,801	1,464
Wolpers & Johnson	FY15	211,318	1,919,808	24,966
Food & Wine				
Total		**694,973**	**13,778,682**	**121,136**

WIND POWER CONTRACT
(Available on LEED Online Master Site)

LETTER DESCRIBING WIND POWER ALLOCATIONS
(Available on LEED Online Master Site)



SAMPLE RECORD OF ALLOTMENT OF WIND POWER
(Available on LEED Online Master Site)

Materials And Resources

MR Prerequisite 1	Storage and Collection of Recyclables	03
MR Credit 1.1	Building Reuse - Maintain Existing Walls, Floors, and Roof	05
MR Credit 1.2	Building Reuse - Maintain Interior Non-Structural Elements	06
MR Credit 2	Construction Waste Management	07
MR Credit 3	Materials Reuse	09
MR Credit 4	Recycled Content	10
MR Credit 5	Regional Materials	11
MR Credit 6	Rapidly Renewable Materials	12
MR Credit 7	Certified Wood	13

MR Storage And Collection Of Recyclables

Prerequisite 1 Required

Master Site

INTENT

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

REQUIREMENTS

Provide an easily accessible area that serves the entire building that is dedicated to the collection and storage of non-hazardous materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics and metal.

ACTIONS

Design

Who: Architect, MU Sustainability Office

- MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit. (Master Site Project Number 1000016195).
- The design team shall coordinate with the MU Sustainability Office to provide appropriate spaces within the plan, signage, and consideration for indoor environmental quality [odors, noise, air contaminants] to accommodate the recycling program. The design team will utilize the prepared documentation within this Sustainable Design guidelines for each project as well as project specific plan documentation illustrating designated recycling areas.

MU RECYCLING GUIDE

(Available on LEED Online Master Site)

MASTER SITE REQUIREMENTS

A central collection area designed to consolidate a project's recyclables meets the credit requirements as long as the intent of the credit and the recycling needs of the occupants are met. For projects with larger site area, it may be possible to create a central collection area that is outside the project footprint or project site boundary. In this case, document how the recyclable materials will be transported to the separate collection area

CREDIT COMPLIANCE NARRATIVE AVAILABLE ON LEED ONLINE MASTER SITE

This credit is being submitted as a Master Site credit. The University of Missouri has a campus wide recycling program. The Sustainability Coordinator and MU Sustainability Office are in charge of the implementation of the recycling program. They assess the needs on a regular basis and ensure compliance with the recycling program. The university recycles mixed paper, cardboard, newspaper, electronics, steel, aluminum, plastic bottles, glass, used oil, grass clippings, batteries and other miscellaneous items. Additionally boiler ash, tire deprived fuel, wood chips, boiler fuel are also utilized.

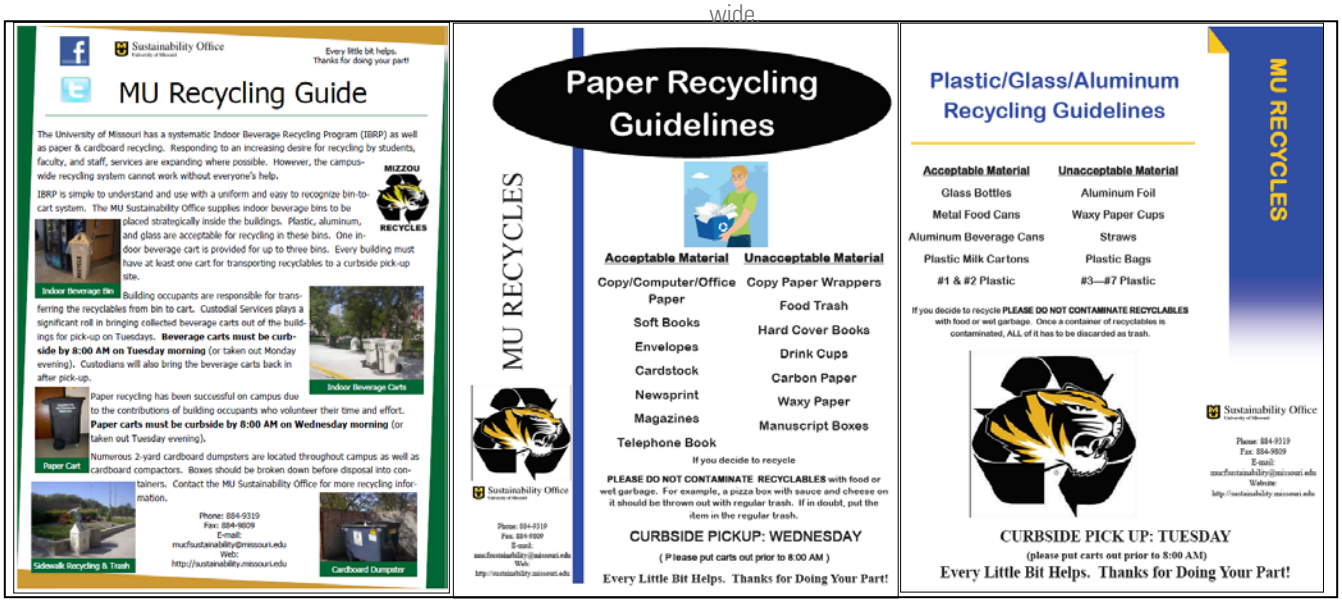
Recycling projects like Tiger Treasures (end of year residence hall recycling), Tiger Tailgate Recycling, Drop-Off Recycling (Beverage, Fiber), Sidewalk Recycling contributed to the success of the recycling program. In the year 2010, a total of 1973 tons of post-consumer waste was recycled. For all new construction projects MU Sustainability Office will coordinate with the design team to ensure effective recycling.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE:

1. MU Recycling Guide
2. Solid Waste Recycling at MU FY 2010

NOTE

For projects outside of the LEED boundary area: NO CHANGE- MU will require accommodation for a recycling program University wide.



SOLID WASTE RECYCLING AT MU FY 2010
(Available on LEED Online Master Site)

Solid Waste and Recycling at MU FY 2010

5/25/2011

Summary	Tons	Dollars
Solid Waste (tons include recyclables)	7,908	$442,803.82
Recycled Tonnage	1,974	$0.00
Amount Landfilled	5,934	$442,803.82
Percent Recycled	24.96%	
Cost / ton landfilled		$74.62
Cost / ton recycled		$0.00
Avoided cost from Recycling		$147,950.00
Income from Sale of Recyclables		$10,744.21
Avoided cost from Chemical and Glass Recycling		$171,451.00
Total savings due to recycling		$330,145.21

Recycled Material Type	Tons	Pounds
Mixed Paper	922.58	1,845,162
Cardboard	404.32	808,636
Newspaper	13.64	27,280
Electronics	62.14	124,276
Steel	242.75	485,500
Aluminum	18.30	36,597
Plastic Bottles	46.20	92,395
Glass	59.65	119,303
Used Oil	0.00	0
Grass Clippings	109.03	218,064
Miscelaneous	89.85	179,697
Batteries	5.26	10,510
Post Consumer Totals	1,973.71	3,947,420
Waste Utilization (not included in above)		
Boiler Ash		
Tire Derived Fuel	2,657.00	5,314,000
Wood Chips/Boiler Fuel	2,394.00	4,788,000
Total Waste Utilization for UMC	5,051.00	10,102,000

FY 2010 Projects (Totals Included Above)	Tons	Pounds
Tiger Treasures (end of year residence hall recycling)	15.00	30,000
Indoor Beverage Container Recycling	49.04	98,079
Tiger Tailgate Recycling	20.93	41,860
Drop off Recycling (beverage)	19.48	38,960
Drop off Recycling (fiber)	30.24	117,640
Sidewalk Recycling	12.27	24,540
Paper Recycling (academic, administrative, support)	922.58	1,845,162
Cardboard (academic, administrative, support)	404.32	808,636
Newsprint (academic, administrative, support)	13.64	27,280
Total	1487.50	2,974,997

MR Building Reuse - Maintain Existing Walls, Floors, and Roof

Credit 1.1 1 to 3 Points

By Project

INTENT

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

REQUIREMENTS

Maintain at a minimum 55% of the existing building structure and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing material). Hazardous materials that are remediated as a part of the project scope shall be excluded from the calculation of the percentage maintained. If the project includes an addition to an existing building, this credit is not applicable if the square footage of the addition is more than two times the square footage of the existing building. One point is available for each additional 20% maintained (maximum 3 points).

ACTIONS

Design

Who: Architect, Structural Engineer

- If program permits, design team to work with MU Planning Design and Construction (PD&C) and Campus Facilities and Operations to identify opportunities and cost savings associated with building reuse.
- If the project will reuse part of existing building, Structural Engineer to survey existing structure and shell to see what can be saved and create an inventory.
- Architect to create floor plans showing location of existing structural components and shell attributes and calculate total area of existing, new and reused elements as described in the LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect, Structural Engineer

- Include in specifications and construction documents measures to preserve the building during construction process.

Construction Administration

Who: General Contractor

- Architect and Structural Engineer to review submittals.
- Contractor to ensure care is taken to retain and maintain the existing structure to be reused.
- Architect to complete LEED template and upload supporting documentation and calculations to LEED Online.

NOTE

This credit **only pertains to renovation projects** and is dependent on project program. It is recommended that renovation projects attempt to preserve as much of the existing walls, floor, and roof as possible.

MR Building Reuse - Maintain Interior Non-Structural Elements

Credit 1.2
1 Point
By Project

INTENT

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

REQUIREMENTS

Use existing interior non-structural elements (interior walls, doors, floor coverings and ceilings systems) in at least 50% (by area) of the completed building (including additions). If the project includes an addition to an existing building, this credit is not applicable if the square footage of the addition is more than two times the square footage of the existing building.

ACTIONS

Design

Who: Architect

- If program permits, work with MU Planning Design and Construction (PD&C) and Campus Facilities and Operations to identify opportunities for retaining and reusing non-structural building components and analyze associated cost savings.
- If the project will reuse part of existing building, survey existing building interior to see what can be saved.
- Calculate total surface area of all elements to be reused using methods listed in LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect

- Include in specifications and construction documents measures to retain and protect the building components during construction process.

Construction Administration

Who: General Contractor, Architect

- Contractor to verify that designated elements are retained and maintained for reuse.
- Architect to complete LEED template and upload supporting documentation and calculations to LEED Online.

NOTE

This credit **only pertains to renovation projects** and is dependent on project program. It is recommended that renovation projects attempt to preserve as much of interior non-structural elements as possible.

MR Construction Waste Management

Credit 2 1 to 2 Points

Regional Priority - 75% diversion

Campus Standard- 1 Point; 50% diversion

By Project - Greater than 50% diversion

INTENT

To divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

REQUIREMENTS

Develop and implement a Construction Waste Management Plan that, at a minimum, identifies materials to be diverted from disposal and whether the materials will be sorted on-site or commingled. Excavated soil and land-clearing debris does not contribute. Calculations can be done by weight or volume, but must be consistent throughout.

Recycle and/or salvage 50% (for 1 point) or 75% (for 2 points) of non-hazardous construction and demolition.

ACTIONS

Construction Documents

Who: Architect

- Integrate MU's Construction Waste Management Plan requirements (Appendix F) and sample Construction Waste Management Action Plan available on LEED Online Master Site, into specifications.

Construction Administration

Who: Contractor, Architect

- Contractor to create Construction Waste Management (CWM) Plan based on specifications.
- Architect to review CWM Plan submittal.
- Contractor to train subcontractors and staff about CWM plan implementation and documentation.
- Contractor to implement CWM plan and provide monthly progress reports for Architect's review.
- Architect to review monthly construction waste management reports as part of monthly LEED progress reports.
- Contractor to complete LEED template and upload the construction waste management reports with supporting photo documentation to LEED Online.

SUPPORTING DOCUMENTATION

1. Refer to Sample Waste Management Action Plan spreadsheet.
2. Refer to the list of local recycling and sorting facilities for construction waste management.
3. See Appendix F for the Construction Waste Management Plan requirements.

SAMPLE WASTE MANAGEMENT ACTION PLAN
(Available on LEED Online Master Site)

Waste Management Action Plan							
Type of Construction Material	**Estimated Quantity of waste generated (Tons)**	**Estimated Quantity of Waste recycled (Tons)**	**Estimated % Waste recycled/ diverted (%)**	**Estimated Cost of Diversion ($)**	**Material Handling Procedure**	**Means of Transportation**	**Where is the material going?**
a Cardboard and paper products							
b Clean dimensional wood							
c Beverage containers							
d Concrete							
e Metals							
f Mechanical and Electrical Equpiment							
g Building components removed intact from existing construction							
h Packaging materials							
i Glass							
j Scraps from gypsum wall board							
k Carpet and pad							
l Acoustical wall panels							
m Plastics							
TOTAL							
ESTIMATED TOTAL WASTE GENERATED =							
ESTIMATED TOTAL WASTE DIVERTED =							
ESTIMATED % TOTAL WASTE DIVERTED =							

LOCAL RECYCLING AND SORTING FACILITIES FOR CONSTRUCTION WASTE MANAGEMENT.

MATERIALS ACCEPTED	FACILITY	ADDRESS	PHONE	FAX	SERVICES
Lamps that are recycled: Fluorescent, straight, U-tubes, coated, dipped or sleeved lamps, high-intensity discharge or HID, and lamps with built in ballasts or starters. Ballasts are collected for recycling	**WM LampTracker**	415 Kaiser Industrial Dr. Kaiser, MO 65047	888.537.4874 573.302.7575	573.302.7579	Missouri Certified Resource Recovery Facility
recyclable paper cardboard aluminum glass other materials	**ALLIED WASTE SERVICES OF JEFFERSON CITY (Republic Services Company)**	5604 Moreau River Access Rd Jefferson City, MO			Roll-off box service is also available for industrial operations and construction projects, We collect the containers or compacted waste and transport the waste either to a landfill or a transfer station; offered services: Waste audits, cost analysis, program development, equipment specification, sales, leasing
landfill	**Jefferson City landfill (Republic Services Company)**	5604 Moreau River Access Road Jefferson City, MO	573.635.8805		The Jefferson City landfill is equipped to take construction debris, roofing material and other heavy waste
construction waste	**City of Columbia Commercial Rolloff and Trash Collection**	Grissum Building 1313 Lakeview Ave Columbia, MO 65201	573.874.6291	573.449.9641	Various sizes of containers are available for construction use within the city limits. Only 14-yard mini roll-offs and 20-yard roll-offs are rented for ROOFING MATERIALS.
wood products, plastics, roofing, soil-rock-sand, concrete products, glass, cardboard, electrical wiring, ceramic tile, metals, sheetrock, non asbestos insulation, bricks, asphalt, plumbing fixtures and yard waste	**Manchester Transfer and Recycle**	7801 E Truman Road Kansas City, MO 64126	816.920.6697	816.920.6869	??

MR

Material Reuse

Credit 3

1 to 2 Points

By Project

INTENT

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

REQUIREMENTS

Use salvaged, refurbished or reused materials such that the sum of these materials constitutes at least 5%, based on cost, of the total value of materials on the project. Only materials permanently installed in the project qualify.

Salvaged materials or Reused materials found on-site: Items that were fixed on-site before construction, these items must no longer be able to serve their original functions and must then be installed for a different use. (e.g.: A partition can be reused as the desk top).

Salvaged materials or Reused materials found off-site: Materials obtained off-site qualify under this category; These materials may be purchased as salvaged, or they may be relocated from another facility.

Refurbished materials: Products that could have been disposed of as solid waste. These products have completed their life cycle as consumer items and are then refurbished for reuse without substantial alteration of their form. Refurbishing includes renovating, repairing, restoring, or generally improving the appearance, performance, quality, functionality, or value of a product.

Remanufactured materials: Items that are made into other products. One example is concrete that is crushed and reused as subbase.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. For MR c3.0, MR c4.0, MR c5.0, MR c6.0. Furniture may be included, providing it is included consistently in MR c3-7.

ACTIONS

Design

Who: Architect

- Evaluate what materials the project will use that might be targeted for reuse and research the availability of appropriate salvaged materials for the project.
- Set goals in Owner's Project Requirements regarding salvaged materials.
- Create a baseline materials budget and include materials cost of all items under the CSI divisions listed in LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect

- Revise baseline materials budget.
- Incorporate reused materials requirements into specifications.
- Include sample materials plan and sample sustainable materials data sheet in specifications.

Construction

Who: Architect, Contractor

- Contractor to create and submit materials reuse plan as required in the specification.
- Contractor to provide monthly materials reuse progress reports with monthly LEED progress report.
- Architect to review submittals.
- Contractor to complete LEED template and upload supporting documentation on LEED Online.

SUPPORTING DOCUMENTATION

1. See Appendix C for Sample Materials Plan.
2. See Appendix D for Sustainable Materials Data Sheet.

NOTE

To achieve this credit reused / salvaged materials would need to be a major design objective for the project.

MR Recycled Content

Credit 4 1 to 2 Points

Campus Standard: 2 Points; 20% recycled

INTENT

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

REQUIREMENTS

Use materials with recycled content such that the sum of post-consumer recycled content + 1/2 of the pre-consumer content constitute at least 20% (based on cost) of the total value of materials in the project.

Recycled content value of a material assembly shall be determined by weight. Recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value. Only include materials permanently installed in the project. Exclude salvaged materials

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. For MR c3.0, MR c4.0, MR c5.0, MR c6.0. Furniture may be included, providing it is included consistently in MR c3-7.

Post consumer recycled content: The percentage of material in a product that was consumer waste. The recycled material was generated by household, commercial, industrial, or institutional end users and can no longer be used for its intended purpose. It includes returns of materials from the distribution chain (ISO 14021). Examples include construction and demolition debris, materials collected through recycling programs, discarded products (e.g.: furniture, cabinetry, decking), and landscaping waste (e.g.: leaves, grass, clippings, tree trimmings).

Pre consumer recycled content: (Post industrial recycled content): The percentage of material in a product that is recycled from manufacturing waste. Examples include planer shavings, sawdust, bagasse, walnut shells, culls, trimmed materials, overissue publications, and obsolete inventories. Excluded are rework, regrind or scrap materials capable of being reclaimed within the same process that generated them (ISO 14021).

ACTIONS

Design

Who: Architect

- Identify materials with high recycled content and incorporate into design. Choose materials with high recycled content.
- Create a baseline materials budget and include materials cost of all items under the CSI divisions listed in LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect

- Revise baseline materials budget.
- Incorporate recycled materials requirements into specifications including submittal requirements and recycled content requirements by product. Specify percentage of post-consumer and pre-consumer recycled content.
- Include in specifications sample materials plan and sample sustainable materials data sheet.
- See sustainability specifications guidelines available in Appendix I.

Construction Administration

Who: Architect, Contractor

- Contractor to create and submit materials plan for recycled materials as required in the specification.
- Architect to review initial materials plan submitted by contractor.
- Contractor to provide monthly recycled content materials report as a part of monthly LEED progress reports.
- Architect to review product submittals and submittals for monthly LEED progress reports.
- Contractor to complete LEED template and upload supporting documentation on LEED Online.

SUPPORTING DOCUMENTATION

1. See Appendix C for Sample Materials Plan.
2. See Appendix D for Sustainable Materials Data Sheet.
3. See Appendix E for Minimum Recycled Content Recommendations for Standard Building Products.
4. See Appendix I for Sustainability Specifications Guidelines.

NOTES

This credit is achievable if it is planned and not left to chance. It depends on the design team specifying materials with high recycled content particularly high dollar value items like structural steel, concrete, and gypsum. It also depends on the contractor establishing a plan based on the cost estimate and the specification to determine the estimated recycled content for each project. The contractor updates the plan with actual data throughout construction as products are procured. The plan allows the team to carefully monitor the recycled content throughout the construction. It is also a tool for evaluating substitutions, giving the contractor greater flexibility.

MR Regional Materials

Credit 5 1 to 2 Points

Regional Priority - 20% regional

Campus Standard: 2 Points; 20% regional

INTENT

To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

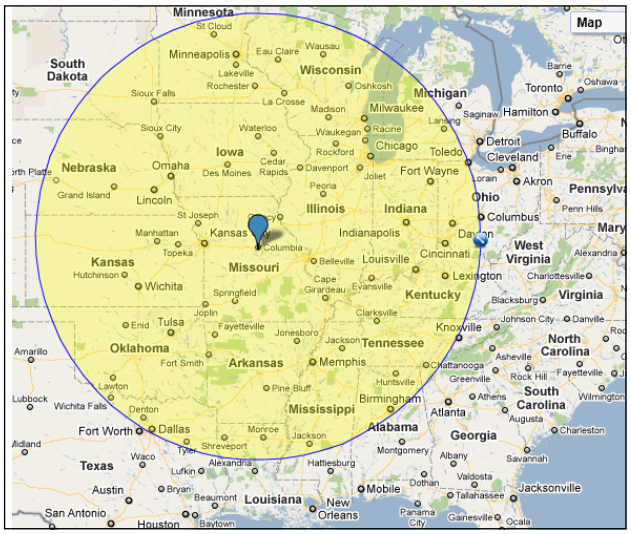
REQUIREMENTS

Use materials that are extracted/recovered/harvested and manufactured from within 500 miles of the project site.

Regional content value of a material assembly shall be determined by weight. Regional fraction of the assembly is then multiplied by the cost of assembly to determine the regional content value. For salvaged items, use the vendor location as the manufacturing location and the place the vendor salvaged an item from as the extraction location.

Only include materials permanently installed in the project. Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. For MR c3.0, MR c4.0, MR c5.0, MR c6.0. Furniture may be included, providing it is included consistently in MR c3-7.

500 MILE RADIUS FROM CAMPUS.
(Prefer products manufactured and extracted/recovered/harvested from within this radius).



ACTIONS

Design

Who: Architect

- Identify materials with high regional content and incorporate into design. Choose materials that are extracted/recovered/harvested and manufactured from within 500 miles of the project site. See Appendix E for minimum regional material content recommendations for standard building products.
- Create a baseline materials budget and include materials cost of all items under the CSI divisions listed in LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect

- Revise baseline materials budget.
- Incorporate regional materials requirements into specifications including submittal requirements and regional content requirements by product. Specify percentage of regional content.
- Include in specifications sample materials plan and sample sustainable materials data sheet.
- See sustainability specifications guidelines available in Appendix I.

Construction Administration

Who: Architect, Contractor

- Contractor to create and submit materials plan for regional materials as required in the specification.
- Architect to review initial materials plan submitted by contractor.
- Contractor to provide monthly regional material content report as a part of monthly LEED progress reports.
- Architect to review product submittals and submittals for monthly LEED progress reports.
- Contractor to complete LEED template and upload supporting documentation on LEED Online.

SUPPORTING DOCUMENTATION:

1. See Appendix C for Sample Materials Plan.
2. See Appendix D for Sustainable Materials Data Sheet.
3. See Appendix E for Minimum Regional Material Content Recommendations for Standard Building Products.
4. See Appendix I for Sustainability Specifications Guidelines.

MR Rapidly Renewable Materials

Credit 6
1 Point
By Project

INTENT

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

REQUIREMENTS

Use rapidly renewable building materials and products (made from plants that are typically harvested within a 10 year cycle or shorter) for 2.5% of total value of all building materials and products used, based on cost. If only a fraction of a product of material is extracted/ harvested/ recovered and manufactured locally, then only that % (by weight) shall contribute to regional value.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. For MR c3.0, MR c4.0, MR c5.0, MR c6.0. Furniture may be included, providing it is included consistently in MR c3-7.

ACTIONS

Design

Who: Architect

- Identify materials with high rapidly renewable content and incorporate into design.
- MU Project Manager to review any specific maintenance and/ or cleaning requirements with Campus Facilities Operations prior to specification in bid documents.
- Create a baseline materials budget and include materials cost of all items under the CSI divisions listed in LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect

- Revise baseline materials budget.
- Incorporate rapidly renewable materials requirements into specifications including submittal requirements and rapidly renewable content requirements by product. Specify percentage of rapidly renewable content.
- Include sample materials plan and sample sustainable materials data sheet in specifications.
- See sustainability specifications guidelines available in Appendix I.

Construction Administration

Who: Architect, Contractor

- Contractor to create and submit materials plan for rapidly renewable materials as required in the specification.
- Architect to review initial materials plan submitted by contractor.
- Contractor to provide monthly rapidly renewable material content report as a part of monthly LEED progress reports.
- Architect to review product submittals and submittals for monthly LEED progress reports.
- Contractor to complete LEED template and upload supporting documentation on LEED Online.

SUPPORTING DOCUMENTATION:

1. See Appendix C for Sample Materials Plan.
2. See Appendix D for Sustainable Materials Data Sheet.
3. See Appendix E for minimum rapidly renewable material content recommendations for standard building products.
4. See Appendix I for Sustainability Specifications Guidelines.

NOTES

Like MR c3, materials reuse, rapidly renewable materials would need to be a major design intent to achieve this credit.

MR FSC Certified Wood

Credit 7 1 Point

By Project

INTENT

To encourage environmentally responsible forest management.

REQUIREMENTS

Use a minimum of 50% of wood-based materials and products, which are certified in accordance with the Forest Steward Council's (FSC) principles and criteria, for wood building components including, but not limited to, structural and general dimensional framing, flooring, sub-flooring, wood doors and finishes.

Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR c3-7.

Chain-of-Custody Requirements

Collect all vendor invoices for permanently installed wood products, FSC certified or not, purchased by the project contractor and subcontractors. Vendors are defined as those companies that sell products to the project contractor or subcontractors.

- *Each vendor invoice must conform to the following requirements (except as noted below):*
- *Each wood product must be identified on a line-item basis.*
- *Fsc Products must be identified as such on a line-item basis.*
- *The dollar value of each line item must be shown.*
- *The vendor's COC certificate number must be shown on any invoice that includes FSC products.*
- *Each wood product's vendor that invoices FSC certified products must be COC certified by an FSC accredited certifier.*

Exceptions: In some rare instances , it may not be practical for a vendor to invoice wood products on a line-item basis because the invoice would be dozens of pages long. In such cases, the invoice should indicate the aggregate value of wood products sold by the vendor. If the wood products are FSC-certified, comply with the following requirements:

- *The vendor's COC number must be shown on the invoice.*
- *The invoice must be supplemented by a letter from the vendor stating that the products invoiced are FSC certified.*
- *The invoice or the letter must state whether the products are FSC Pure, FSC Mixed Credit, or FSC Mixed (NN)%*

ACTIONS

Design

Who: Architect

- Identify FSC wood building components and incorporate into design. Choose products that have high FSC certified wood content.
- Create a baseline materials budget for all wood products and include materials cost of all items under the CSI divisions listed in LEED BD&C 2009 reference guide.

Construction Documents

Who: Architect

- Revise baseline materials budget.
- Incorporate FSC certified wood requirements into specifications including submittal requirements and FSC certified wood requirements by product. Specify percentage of FSC certified wood content. Include requirements for Chain-of-custody submittals.
- Include in specifications sample materials plan and sample sustainable materials data sheet.
- See sustainability specifications guidelines available in Appendix I.

Construction Administration

Who: Architect, Contractor

- Contractor to create and submit materials plan for FSC certified wood materials as required in the specification.
- Architect to review initial materials plan submitted by contractor.
- Contractor to provide monthly FSC content report as a part of monthly LEED progress reports.
- Architect to review product submittals and submittals for monthly LEED progress reports.
- Contractor to complete LEED template and upload supporting documentation on LEED Online.

SUPPORTING DOCUMENTATION:

1. See Appendix C for Sample Materials Plan.
2. See Appendix D for Sustainable Materials Data Sheet.
3. See Appendix E for minimum FSC content recommendations for standard building products.
4. See Appendix I for Sustainability Specifications Guidelines.

Indoor Environmental Air Quality

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IEQ

Minimum Indoor Air Quality Performance

Prerequisite 1 Required

Campus Standard

INTENT

To establish minimum Indoor Air Quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

REQUIREMENTS

For mechanically ventilated buildings, meet the minimum requirements of sections 4 through 7 of ASHRAE 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata without addenda). Mechanical ventilation systems shall be designed using the ventilation rate procedure or the applicable local code, whichever is more stringent.

Naturally ventilated buildings, shall comply with ASHRAE 62.1.2007 (with errata without addenda), paragraph 5.1.

ACTIONS

Design

Who: Mechanical Engineer, Architect

- Determine and design the most appropriate ventilation system for the project as per the Owner's Project Requirements (OPR) and Basis of Design (BOD) established with the MU Project Manager and MU Campus Facility Commissioning Agent.
- Mechanical Engineer to ensure that the project meets or exceed ASHRAE 62.1.2007
- Determine the required ventilation rates for indoor spaces based on occupancy and space types.
- Perform ventilation rate calculations as per the LEED BD&C 2009 reference guide and determine the outdoor airflow.

Construction Documents

Who: Mechanical Engineer

- Verify ventilation rate calculations for the final design.
- Add installation and performance of the ventilation systems to scope of commissioning
- Mechanical Engineer to complete LEED template and upload any supporting documentation as needed to LEED Online.

Construction

Who: Contractor, MU Campus Facility Commissioning Agent

- Contractor to coordinate the installation of ventilation systems with the project's commissioning process.
- MU Campus Facility Commissioning Agent to confirm that installed systems are providing the outside air rates specified in the design.

IEQ

Environmental Tobacco Smoke (ETS) Control

Prerequisite 2

Required

Master Site

INTENT

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

REQUIREMENTS

Case 1: All Projects

Option 1: Prohibit smoking in the building

Option 2: Prohibit smoking in the building except in designated smoking areas. Smoking room must be directly exhausted to outdoors with no re-circulation of ETS-containing air to non-smoking area of building, and enclosed with impermeable deck-to-deck partitions.

Locate outdoor designated smoking areas at least 25 feet way from entries, outdoor air intakes and operable windows.

Case 2: Residential and Hospitality Projects Only

For Residential and hospitality projects, also prohibit smoking in all common areas of building, locate any exterior designated smoking areas including balconies at least 25 feet away from entries, outdoor air intakes and operable windows opening to common areas. Prohibit on-property smoking within 25 feet from these areas. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas or prohibit smoking on entire property.

Minimize leakages from outdoors by weather stripping all exterior doors and operable windows in residential units and all doors in residential units leading to common hall ways. Minimize uncontrolled pathways for ETS transfer between individual units by sealing penetrations in walls, ceilings and floors in residential units and sealing vertical chases adjacent to units.

Perform blower door test as per ANSI/ASTM-E779-03. Residential units need leakage area of <1.25 sq. inches/ 100 sf of enclosure.

ACTIONS

Design

Who: Architect, MEP Engineer, MU Project Manager

- Architect and MEP Engineer to specify the appropriate materials, products and exhaust systems MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit. (Master Site Project Number 1000016195).

MASTER SITE REQUIREMENTS

Only Option 1 (Site Smoking Policy - Smoking is prohibited in all projects and within 25' of entries, operable windows and outdoor air intakes) may be attempted on a campus basis. In order to document prerequisite compliance, provide evidence of signage communicating the exterior smoking policy for the entire site/ campus. Drawing(s) with signage details or photos are acceptable.

NARRATIVE AVAILABLE ON LEED ONLINE MASTER SITE

In recognition of the health, safety and comfort benefits of smoke-free air and the responsibility to provide and maintain an optimally healthy and safe working and living environment for faculty students, staff and visitors, the University of Missouri will be smoke free by January 1, 2014.

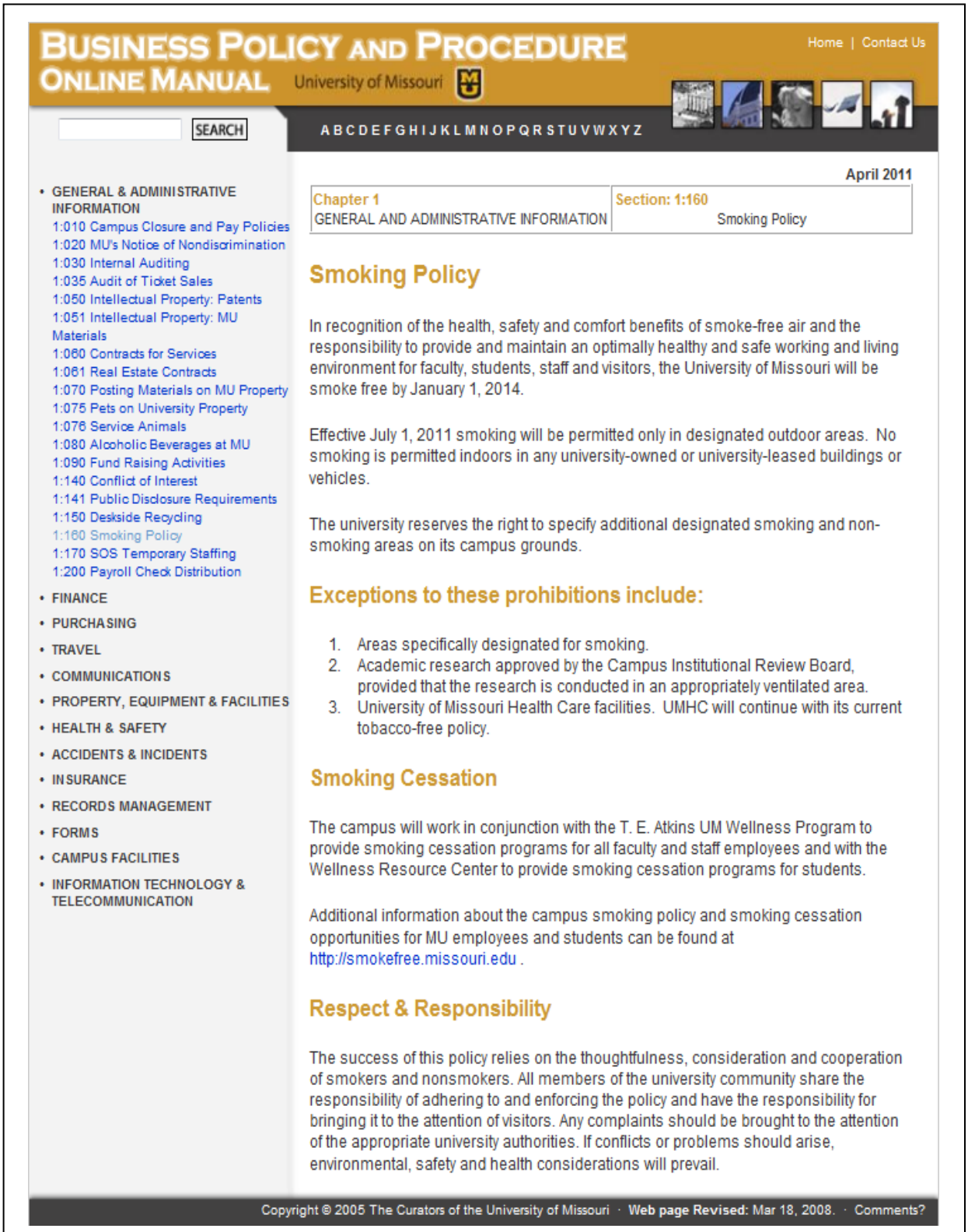
Smoking is permitted only in designated outdoor areas. No smoking is permitted indoors in any university-owned or university-leased buildings or vehicles.

This policy is available on University of Missouri's website. A campus map showing the interim designated smoking areas is also provided on the website. In addition MU provides resources on the website for people to quit smoking.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. Smoking policy communicated on university's website
2. MU website resources for going smoke free
3. Campus map of interim designated smoking locations

SMOKING POLICY COMMUNICATED ON UNIVERSITY'S WEBSITE
(Available on LEED Online Master Site)



BUSINESS POLICY AND PROCEDURE ONLINE MANUAL
University of Missouri

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SEARCH

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- CAMPUS FACILITIES
- INFORMATION TECHNOLOGY & TELECOMMUNICATION

April 2011

Chapter 1	Section: 1:160
GENERAL AND ADMINISTRATIVE INFORMATION	Smoking Policy

Smoking Policy

In recognition of the health, safety and comfort benefits of smoke-free air and the responsibility to provide and maintain an optimally healthy and safe working and living environment for faculty, students, staff and visitors, the University of Missouri will be smoke free by January 1, 2014.

Effective July 1, 2011 smoking will be permitted only in designated outdoor areas. No smoking is permitted indoors in any university-owned or university-leased buildings or vehicles.

The university reserves the right to specify additional designated smoking and non-smoking areas on its campus grounds.

Exceptions to these prohibitions include:

1. Areas specifically designated for smoking.
2. Academic research approved by the Campus Institutional Review Board, provided that the research is conducted in an appropriately ventilated area.
3. University of Missouri Health Care facilities. UMHC will continue with its current tobacco-free policy.

Smoking Cessation

The campus will work in conjunction with the T. E. Atkins UM Wellness Program to provide smoking cessation programs for all faculty and staff employees and with the Wellness Resource Center to provide smoking cessation programs for students.

Additional information about the campus smoking policy and smoking cessation opportunities for MU employees and students can be found at http://smokefree.missouri.edu .

Respect & Responsibility

The success of this policy relies on the thoughtfulness, consideration and cooperation of smokers and nonsmokers. All members of the university community share the responsibility of adhering to and enforcing the policy and have the responsibility for bringing it to the attention of visitors. Any complaints should be brought to the attention of the appropriate university authorities. If conflicts or problems should arise, environmental, safety and health considerations will prevail.

MU WEBSITE RESOURCES FOR GOING SMOKE FREE
(Available on LEED Online Master Site)

SMOKE-FREE MIZZOU
University of Missouri

GOING SMOKE-FREE

MESSAGE FROM CHANCELLOR BRADY DEATON

As spring warms our days and nights, Anne and I marvel at the beauty of the Mizzou Botanic Garden bursting with brilliant colors. We are fortunate to live in the Residence on Francis Quadrangle set in the heart of campus.

One of the benefits of living in such a beautiful space is the healthy lifestyle that accompanies sunshine and clean air. In that regard, the second phase of the MU smoking policy will be implemented on July 1, permitting smoking only in designated outdoor areas.

Based on recommendations from groups representing students, faculty and staff, the University of Missouri will be a smoke-free campus by Jan. 1, 2014. Currently more than 500 other U.S. colleges and universities have smoke-free or tobacco-free policies.

I understand that this change will be difficult for those who may have smoked for many years and previously attempted to quit. For employees and students who would like to stop, the university will work in conjunction with the T.E. Atkins UM Wellness Program and Wellness Resource Center to offer cessation programs. In some cases, cessation tools and nicotine replacement therapy will be free to students and employees.

Together, we will continue to build a healthy learning community at Mizzou.

Sincerely,

Brady J. Deaton
Chancellor

IMPLEMENTATION

The University of Missouri will be a smoke-free campus on or before Jan. 1, 2014. To begin the transition, on July 1, 2011, the new tobacco use policy allows smoking only at designated outdoor areas inclusive of the entire Columbia campus and all properties owned, operated, leased or controlled by MU.

Violation of the policy is defined as smoking any tobacco products, including e-cigarettes, within the prohibited areas.

All MU employees and students will be informed of the University of Missouri Smoking Policy, and all students, visitors and employees are expected to comply with it.

Employees include everyone employed by the University of Missouri (faculty, staff, student and temporary). Any employee who violates the policy will be subject to corrective action under the Human Resources Policies and Procedures or other applicable university regulations or policies.

COMPLIANCE TIPS

Successful implementation of the University of Missouri Smoking Policy will engage everyone in creating a culture of compliance. Employees and students are expected to courteously remind any employee, student, visitor, vendor or contractor violating the policy that the university prohibits smoking of all tobacco products outside of designated areas.

ADDRESSING A VIOLATION

Compliance is everyone's business. If you see someone violating the smoking policy, please approach the violator in a kind, compassionate way. You might say, "I want to make you aware that at MU we allow smoking only at designated areas" or "If you want to smoke, you will need to find a designated smoking area."

If a violator continues to smoke after being reminded about the policy, you're encouraged report the violator to the dean or building manager in charge of the nearest building. You may report an employee to his or her supervisor or to Human Resources.

EDUCATING EMPLOYEES

To request a group presentation about the smoking policy and smoking-cessation options for employees, please contact us.

CAMPUS MAP OF INTERIM DESIGNATED SMOKING LOCATIONS
(Available on LEED Online Master Site)

Designated smoking areas with smoking urns are located outdoors near these buildings and gathering places:

- Bond Life Sciences Center
- Hearnes Center
- Jesse Hall
- Laferre Hall
- Lowry Mall
- McAlester Hall
- McReynolds Hall
- MU Student Center
- Noyes Hall
- Pickard Hall
- Professional Building
- Reynolds Alumni Center
- Schweitzer Hall
- Speakers Circle
- Student Recreation Complex

Smoking is permitted in these designated parking lots and on the top levels of designated parking structures. Smoking is not permitted in University Hospital parking structures or anywhere else on MU Health care properly:

- Athletics Lot G
- Athletics Lot H
- AV1
- AV1 - 1A
- AV12
- AV14 (Trowbridge)
- AV15
- AV16
- AV2
- AV6
- AV(
- CG1
- CG15
- CG17

IEQ

Outdoor Air Delivery Monitoring

Credit 1 — 1 Point

Campus Standard

INTENT

To provide capacity for ventilation system monitoring to help promote occupant comfort and well-being.

REQUIREMENTS

Install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements. Configure all monitoring equipment to generate an alarm when the conditions vary by 10% or more from set point, via either a building automation system alarm to building operator or via a visual or audible alert to building occupants.

For mechanically ventilated spaces, monitor CO_2 concentrations within all densely occupied spaces (occupant density ≥ 25people/1000sf) between 3' and 6' above floor. Provide direct airflow measurement device capable of measuring minimum outdoor air intake flow with accuracy of minus 15% of design minimum outdoor air rate as defined by ASHRAE 62.1.2007 for mechanically ventilated spaces where 20% or more design supply airflow serves non-densely occupied spaces.

For naturally ventilated spaces, monitor CO_2 concentrations within all naturally ventilated spaces between 3' and 6'.

ACTIONS

Design

Who: Mechanical Engineer, Architect

- Determine and design the most appropriate ventilation system for the project as per the Owner's project Requirements (OPR) and Basis of Design (BOD) established with the MU Project Manager and Commissioning Agent.
- Incorporate CO_2 sensors or outdoor airflow monitors into building design.
- Mechanical Engineer to ensure that the project meets or exceed requirements for outside air requirements as per ASHRAE 62.1.2007.
- Determine the best option for corrective action in the project.

Construction Documents

Who: Mechanical Engineer

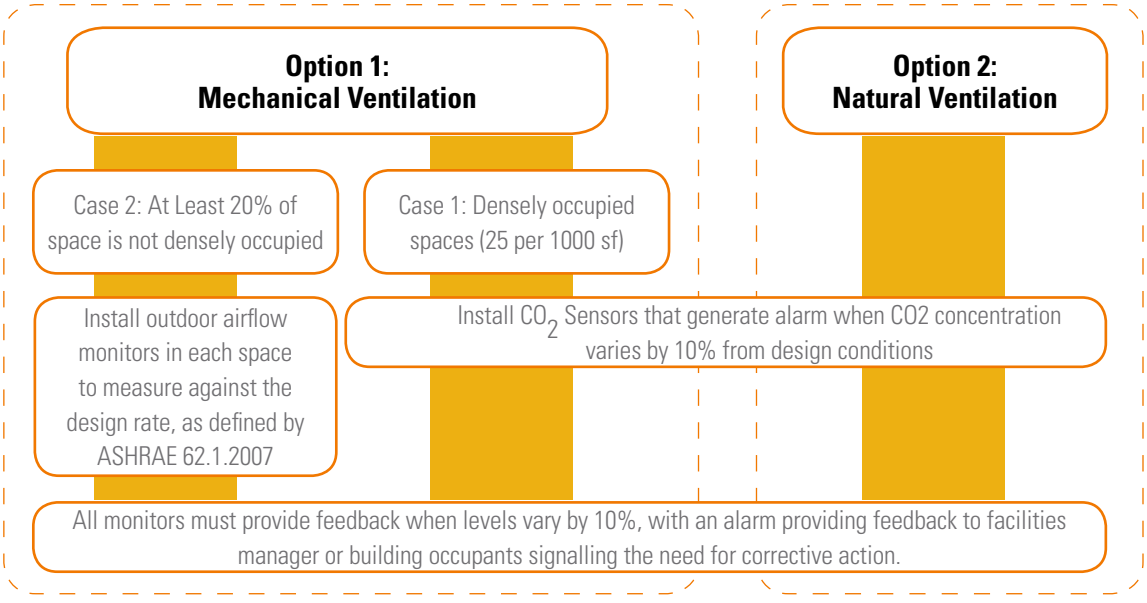
- Incorporate CO_2 sensors and outdoor air delivery monitoring devices in construction documents and specifications.
- Add installation and performance of HVAC, monitoring, and alarm systems to scope of commissioning.
- Calculate credit compliance using ASHRAE calculator.
- Mechanical Engineer to complete LEED template and upload any supporting documentation as needed to LEED Online.

Construction

Who: Contractor, MU Campus Facility Commissioning Agent

- Mechanical Engineer to review submittals.
- Contractor to install monitoring devices and CO_2 sensors as documented.
- MU Campus Facility Commissioning Agent to confirm that installed systems are providing the outside air rates specified in the design.

INCREASED VENTILATION CREDIT REQUIREMENTS



IEQ

Increased Ventilation

Credit 2

1 Point

Not Pursuing

INTENT

To provide additional outdoor air ventilation to improve indoor air quality (IAQ) and promote occupant comfort, well-being and productivity.

REQUIREMENTS

For mechanically ventilated spaces, increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Std. 62.1.2007 (with errata without addenda) as determined by IEQ Prerequisite 1: Minimum Indoor Air Quality Performance.

For naturally ventilated spaces, design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon trust "Good Practice Guide 237" (1998). Determine that natural ventilation is an effective strategy for the project following the flow diagram process shown in figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Application Manual 10:2005, Natural Ventilation in Non-domestic Buildings. Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Application Manual 10:2005, Natural Ventilation in Non-domestic Buildings. OR Use a macroscopic, multi zone, analytical model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE Std. 62.1.2007 Chapter 6 (with errata without addenda), for at least 90% of occupied spaces.

ACTIONS

Design

Who: Mechanical Engineer

- Mechanical Engineer to verify with MU Project Manager that the project does not meet the credit by design, as per the Owners Project Requirements (OPR) and Basis of Design (BOD) established with the MU Project Manager and Commissioning Agent.

If project meets requirements:

Design:

Who: Mechanical Engineer

- Determine the required ventilation rates for indoor spaces based on occupancy and space types.
- Set ventilation quality goals and perform preliminary ventilation rates calculations to confirm compliance with this credit and to inform the design, as per the procedure explained in section 6 of ASHRAE 62.1-2007.

Construction Documents

Who: Mechanical Engineer

- Run final calculations to confirm credit compliance.
- Add requirements for installation and commissioning in the construction specifications.
- During the design submittal phase, Mechanical Engineer to complete LEED template and upload any supporting documentation as needed to LEED Online.

Construction

Who: Mechanical Engineer, MU Campus Facility Commissioning Agent

- Mechanical Engineer to coordinate the installation of mechanical systems with the project's commissioning process.
- Commissioning Agent to confirm that the installed systems are providing the outside air rates specified in the design.

NOTE

There may be some projects that require high ventilation rates that meet this credit by design. Based on the typical MU ventilation standards the majority of projects on the campus will not pursue this credit, however credit may be obtainable due to programmatic and occupancy requirements for high ventilation rates. Each project team shall analyze the project requirements to determine if pursuit of this credit is advisable.

IEQ

Construction Indoor Air Quality Management Plan - During Construction

Credit 3.1

1 Point

Campus Standard

INTENT

To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants.

REQUIREMENTS

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows: During Construction meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3 2nd edition 2007, ANSI/SMACNA 008-2008 (Chapter 3) AND protect stored on-site or installed absorptive materials from moisture damage AND if permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-1999. Replace all filtration media immediately prior to occupancy.

ACTIONS

Construction Documents

Who: Architect, Mechanical Engineer

- Add requirements for Indoor Air Quality (IAQ) Management plan to construction specifications.
- Create IAQ Management Plan specifications based on MU's template, available in Appendix A.
- Incorporate HVAC protection, source control, pathway interruption, housekeeping and scheduling into the specifications and require submittals on monthly LEED progress reports.

Construction

Who: Contractor

- Contractor to develop and submit Indoor Air Quality Management Plan within 14 days of notice to proceed as required by the construction specifications.
- Mechanical Engineer and Architect to review IAQ Management Plan for the project.
- Contractor to submit a monthly IAQ management report as a part of the monthly LEED progress report, including a list of strategies reported with supporting photographs, documenting location and date of implementation.
- Contractor to complete LEED template and upload supporting IAQ management report and photo documentation to LEED Online.

NOTE

Refer to Appendix A: MU's IAQ Management Plan Template.
Refer to Appendix B: Hospital's IAQ Management Plan.

IEQ

Construction Indoor Air Quality Management Plan- Before Occupancy

Credit 3.2

1 Point

By Project

INTENT

To reduce indoor air quality (IAQ) problems resulting from construction or renovation to promote the comfort and well-being of construction workers and building occupants.

REQUIREMENTS

Reduce indoor air quality problems resulting from the construction/ renovation process in order to help sustain the comfort and well-being of construction workers and building occupants. Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase following requirements in the Reference Guide for both options. Option 1: Flush out OR Option 2: Air Quality Testing.

Option 1: Flush-Out

Path 1: After construction, prior to occupancy and with all interior finishes installed, install new filtration media and preform a building flush-out by supplying a total air volume of 14,000 cubic feet of outside air per sq. ft. of floor area while maintaining an internal temperature of at least 60˚F and relative humidity no higher than 60%.

Path 2: If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cubic feet of outdoor air per sq. ft. of floor area. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic feet per minute (cfm) per sq. ft. of outside air or the design minimum outside air rate determined in IEQ Prerequisite 1: Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin a minimum of 3 hours prior to occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per sq. ft. of outside air has been delivered to the space.

Option 2: Air Testing

Conduct baseline IAQ testing after construction ends and prior to occupancy, using testing protocols consistent with the EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the LEED 2009 BD&C Reference Guide.

ACTIONS

Construction Documents

Who: Mechanical Engineer

- Project team and MU Project Manager must determine appropriate path for testing and related impact to scope, schedule, and budget and must carefully consider testing requirements for renovation projects as newly renovated projects can be physically attached to existing building which may affect the test data results.
- Include the building flush-out or Indoor Air Quality (IAQ) testing requirements in Division 1 of specifications based on MU's template for IAQ Management Plan, available in Appendix A.
- Include MU's guidelines on IAQ Management Plan with requirements for complying with IEQc3.2 found in Appendix A.

Construction

Who: Contractor, Mechanical Engineer

- Contractor to submit an IAQ Management Plan as required by the construction specifications.
- Contractor to work with the Mechanical Engineer and MU Construction Project Manager to establish the required time for flush-out or testing and incorporate it in the construction schedule.
- Mechanical Engineer and Architect to review IAQ Management Plan for the project.
- Contractor to replace filters with new filtration media with a MERV 13 or higher prior to occupancy as required in the specifications.
- Contractor to record information on IAQ testing or flush-out including description of the testing processes, test dates, scope, sampling locations and any corrective measures implemented to achieve the credit.
- Prior to move-in, contractor to ensure that flush-out procedures or IAQ testing procedures have been completed and comply with credit requirements.
- Contractor to complete LEED template and upload supporting documentation on testing/flush-out procedure reports on LEED Online.

NOTE

Refer to Appendix A: MU's IAQ Management Plan.
Refer to Appendix B: Hospitals IAQ Management Plan.

IEQ

Low Emitting Materials-
Adhesives and Sealants
Paints and coatings
Carpets and Furnishings
Composite Wood and Agrifiber Wood Products

Credit 4.1 - 4.4
1 Point each

Campus Standard

INTENT

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

REQUIREMENTS

IEQ Credit 4.1: Adhesives and Sealants:

All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the VOC limits as listed in the LEED BD&C 2009 reference guide (with errata and addenda).Adhesives, Sealants and Sealant Primers must comply with South Coast Air Quality Management District (SCAQMD) Rule # 1168. Aerosol Adhesives must comply with Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.

IEQ Credit 4.2: Paints and Coatings:

Paints and coatings used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the following criteria as applicable to the project scope.

Architectural paints and coatings applied to interior walls and ceilings must not exceed the VOC limits established in Green Seal standard GS-11 Paints, 1st edition, May 20, 1993. Anti Corrosive and anti-rust paints applied to interior ferrous metal substrates must not exceed the VOC content limit of 250g/L established in Green Seal standard GC-03, Anti Corrosive Paints, 2nd edition, January 7, 1997. Clear wood finishes, floor coatings, stains, primers and shellacs applied to interior elements must not exceed the VOC content limits established in SCAQMD Rule#1113, Architectural Coatings, rule in effect on January 1, 2004.

IEQ Credit 4.3: Carpets and Flooring:

Option 1: All carpet installed in the building interior shall meet testing and product requirements of Carpet and Rug Institute's Green Label Plus program All carpet cushion installed in the building interior shall meet requirements of the Carpet and Rug Institute's Green Label Plus program All carpet adhesive to meet requirements of IEQc4.1 : VOC limit of 50 g/L. All hard surface flooring must be certified as FloorScore compliant (current as of date of this rating system, or more stringent version) by independent third party. Alternative compliance path using FloorScore is acceptable when min. 25% of finished floor area is non-carpet finished flooring and 100% of this non-carpet finished flooring is FloorScore certified. Concrete, wood, bamboo and cork floor finishes such as sealer stain and finish must meet requirements of SCAQMD Rule 1113. Tile setting adhesives and grout to meet SCAQMD Rule 1168.

Option 2: All flooring elements installed in the building interior must meet the testing and product requirements of California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 addenda

IEQ credit 4.4: Composite Wood and Agrifiber Wood Products:

Composite wood and agrifiber products used on the interior of the building (i.e., inside the weatherproofing system) must contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies must not contain added urea-formaldehyde resins. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores. Materials considered fixtures, furniture and equipment (FF&E) are not considered base building elements and are not included.

ACTIONS

Design

Who: Architect

- Select materials that meet credit requirements.

Construction Documents

Who: Architect

- Add requirements for VOC limits, no added urea formaldehyde, floorscore certification for materials specified for interior applications to specifications.
- Include requirements for product submittals for materials plan in specifications.
- Include sample materials plan and sample sustainable materials data sheet in specifications.
- See sustainability specifications guidelines available in Appendix I.

Construction Administration

Who: Contractor, Architect

- Contractor to create and submit materials tracking plan for low emitting materials as required in the specification.
- Architect to review initial materials tracking plan submitted by contractor.
- Contractor to provide monthly low emitting materials report as a part of monthly LEED progress reports.
- Architect to review product submittals and submittals for monthly LEED progress reports.
- Contractor to complete LEED template and upload supporting documentation on LEED Online.

NOTES

1. Refer to maximum VOC limits as required by LEED BD&C 2009 reference guide (with errata and addenda).
2. See Appendix C for Sample Materials Plan.
3. See Appendix D for Sustainable Materials Data Sheet.
4. See Appendix E for recommended maximum VOC limits for standard building products.
5. See Appendix I for Sustainability Specifications Guidelines

DEFINITIONS

Laminate Adhesive: A product used in wood or agrifiber products (veneered panels, composite wood products contained in engineered lumber, door assemblies, etc.).

Formaldehyde : A naturally occurring VOC found in small amounts in animals and plants, but is carcinogenic and an irritant to most people when present in high concentrations, causing headaches, dizziness, mental impairment, and other symptoms. When present in the air levels above 0.1 ppm parts of air, it can cause watery eyes, burning sensations in the eyes, nose and throat, nausea, coughing, chest tightness, wheezing, skin rashes and asthmatic and allergic reactions.

Indoor composite wood or agrifiber: A product installed inside the building's weatherproofing system.

Composite wood: consists of wood or plant particles or fibers bonded together by a synthetic resin or binder. Examples include plywood, particle board, oriented-strand board (OSB), medium-density fiberboard (MDF), and composite door cores. Composite wood products found inside the building's waterproofing system, used in assemblies or as a part of the base building systems must comply with credit requirements.

Agrifiber board: A composite panel product that is derived from recovered agricultural waste fiber from sources cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks, and agricultural prunings. The raw fibers are processed and mixed with resins to produce panel products with characteristics similar to those derived from wood-fiber. Agrifiber board products found inside the building's waterproofing system, used in assemblies or as a part of the base building systems must comply with credit requirements.

MAXIMUM VOC LIMITS AS REQUIRED BY LEED 2009

IEQ CREDIT 4.1: LOW EMITTING MATERIALS - ADHESIVES AND SEALANTS		
Architectural Applications	VOC Limit (g/L less water)	Referenced Standard
Indoor Carpet Adhesives	50	SCAQMD Rule 1168, 2005
Carpet Pad Adhesives	50	SCAQMD Rule 1168, 2005
Wood Flooring Adhesives	100	SCAQMD Rule 1168, 2005
Rubber Floor Adhesives	60	SCAQMD Rule 1168, 2005
Sub floor Adhesives	50	SCAQMD Rule 1168, 2005
Ceramic Tile Adhesives	65	SCAQMD Rule 1168, 2005
VCT and Asphalt Adhesives	50	SCAQMD Rule 1168, 2005
Drywall and Panel Adhesives	50	SCAQMD Rule 1168, 2005
Cove Based Adhesives	50	SCAQMD Rule 1168, 2005
Multipurpose Construction Adhesives	70	SCAQMD Rule 1168, 2005
Specialty Adhesives	VOC Limit (g/L less water)	Referenced Standard
PVC Welding	510	SCAQMD Rule 1168, 2005
CPVC Welding	490	SCAQMD Rule 1168, 2005
ABS Welding	325	SCAQMD Rule 1168, 2005
Plastic Cement Welding	250	SCAQMD Rule 1168, 2005
Adhesive Primer for Plastic	550	SCAQMD Rule 1168, 2005
Contact Adhesives	80	SCAQMD Rule 1168, 2005
Special Purpose Contact Adhesive	250	SCAQMD Rule 1168, 2005
Structural Wood Member Adhesive	140	SCAQMD Rule 1168, 2005
Sheet Applied Rubber Lining Operations	850	SCAQMD Rule 1168, 2005
Top and Trim Adhesive	250	SCAQMD Rule 1168, 2005
Structural Glazing Adhesive	100	SCAQMD Rule 1168, 2005
Substrate specific applications	VOC Limit (g/L less water)	Referenced Standard
Metal to Metal	30	SCAQMD Rule 1168, 2005
Plastic Foam	50	SCAQMD Rule 1168, 2005
Porous Material (except wood)	50	SCAQMD Rule 1168, 2005
Wood	30	SCAQMD Rule 1168, 2005
Fiberglass	80	SCAQMD Rule 1168, 2005
Sealants	VOC Limit (g/L less water)	Referenced Standard
Architectural	250	SCAQMD Rule 1168, 2005
Roadway	250	SCAQMD Rule 1168, 2005
Other	420	SCAQMD Rule 1168, 2005
Sealant Primers	VOC Limit (g/L less water)	Referenced Standard
Architectural, non-porous	250	SCAQMD Rule 1168, 2005
Architectural, porous	775	SCAQMD Rule 1168, 2005
Other	750	SCAQMD Rule 1168, 2005
Aerosol Adhesives	VOC Limit by weight	Referenced Standard
General Purpose Mist Spray	65%	Green Seal GS-36 Oct 2000
General Purpose Web Spray	55%	Green Seal GS-36 Oct 2000
Special Purpose Aerosol Adhesives (all types)	70%	Green Seal GS-36 Oct 2000

MAXIMUM VOC LIMITS AS REQUIRED BY LEED 2009

IEQ CREDIT 4.2: LOW EMITTING MATERIALS - PAINTS AND COATINGS

Used on building interior (i.e., inside of the weatherproofing system, applied on-site)

Product Type	VOC Limit (g/L less water)	Referenced Standard
Interior Flat Coating or Primer	50	Green Seal GS-11, 1993
Interior Non-Flat Coating or Primer	150	Green Seal GS-11, 1993
Anti-Corrosive / Anti-Rust Paint	250	Green Seal GS-03, 2nd ed.1997
Clear Wood Finish: Lacquer	550	SCAQMD Rule 1113, 2004
Clear Wood Finish: Sanding Sealer	350	SCAQMD Rule 1113, 2004
Clear Wood Finish: Varnish	350	SCAQMD Rule 1113, 2004
Clear Brushing Lacquer	680	SCAQMD Rule 1113, 2004
Floor Coatings	100	SCAQMD Rule 1113, 2004
Sealers and Undercoaters	200	SCAQMD Rule 1113, 2004
Shellac: Clear	730	SCAQMD Rule 1113, 2004
Shellac: Pigmented	550	SCAQMD Rule 1113, 2004
Stain	250	SCAQMD Rule 1113, 2004
Concrete Curing Compounds	350	SCAQMD Rule 1113, 2004
Japans/ Faux Finishing Coatings	350	SCAQMD Rule 1113, 2004
Magnesite Cement Coatings	450	SCAQMD Rule 1113, 2004
Pigmented Lacquer	550	SCAQMD Rule 1113, 2004
Waterproofing Sealers	250	SCAQMD Rule 1113, 2004
Waterproofing Concrete / Masonry Sealers	400	SCAQMD Rule 1113, 2004
Wood Preservatives	350	SCAQMD Rule 1113, 2004
Low-Solids Coatings	120	SCAQMD Rule 1113, 2004

IEQ CREDIT 4.3: LOW EMITTING MATERIALS - FLOORING SYSTEMS

Product Type	Referenced Standard
Carpet	Meet testing and product requirements of Carpet and Rug Institute Green Label Plus Program
Carpet cushion (building interior installation)	Meet requirements of Carpet and Rug Institute Green Label Plus Program
Carpet Adhesive	IEQ c4.1; SCAQMD Rule#1168, 2005)
Hard Surface Flooring	Meet requirements of FloorScore standard
Mineral-based finish flooring products such as tile, masonry, terrazzo, and cut stone without integral organic-based coatings and sealants and unfinished/untreated solid wood flooring	-
Associated site-applied adhesives, grouts, finishes and sealers	Mineral based or unfinished/untreated solid wood flooring system
Concrete, wood, bamboo and cork floor finishes such as sealer, stain and finish	SCAQMD Rule 1113, 2004
Tile setting adhesives and grout	SCAQMD Rule 1168, 2004

IEQ CREDIT 4.4: LOW EMITTING MATERIALS - COMPOSITE WOOD AND AGRIFIBER PRODUCTS

Product Type	Referenced Standard
Composite wood and agrifiber products (used on interior of building)	No Added Urea Formaldehyde
Laminating adhesives used to fabrication on-site and shop-applied composite wood and agrifiber assemblies	No Added Urea Formaldehyde
E.g.: particleboard, MDF, Plywood, Wheat board, Strawboard, Panel Substrates and Door Cores	

IEQ

Indoor Chemical and Pollutant Source Control

Credit 5

1 Point

By Project

INTENT

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

REQUIREMENTS

Employ a permanent entryway system at least 10 foot long in the primary direction of travel to capture dirt and particulates from entering the building at regularly used exterior entrances. (Permanently installed grates, grilles, or slotted systems that allow for cleaning underneath allowed). Roll-out mats are only acceptable when maintained on a weekly basis by a contracted service organization.

Sufficiently exhaust each space where hazardous gases or chemicals may be present or used to create negative pressure with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate to be at least 0.50 cfm/sf, with no air re-circulation. (Garages, housekeeping/ laundry areas, science labs, prep rooms, art rooms, shops of any kind, and copying/printing rooms). The pressure differential with the surrounding to be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed. Note: LEED for Existing Buildings version 2.2 rating system defines high volume printing as any copy machine, print or fax station with a monthly copy usage of more than 40,000 pages.

In mechanically ventilated buildings, install new air filtration media in regularly occupied areas prior to occupancy. These filters must provide a minimum efficiency reporting value (MERV) of 13 or higher in accordance with ASHRAE Standard 52.2.1999. Filtration shall be applied to process both return and outside air that is delivered as supply air.

Provide containment (i.e. closed container for storage for off-site disposal in a regulatory compliant storage area, preferably outside the building) for appropriate disposal of hazardous liquid wastes in places where water and chemical concentrate mixing occurs (e.g.: housekeeping, janitorial and science laboratories).

ACTIONS

Design

Who: Architect, HVAC Engineer

- Develop an outline of all the IEQc5 requirements that apply to the project, and confirm that the schematic design accommodates each one.
- Work with MU Facilities and Operations Office regarding placement of the roll-out mats and cleaning process.
- Work with MU Project Management regarding isolating rooms with chemicals.

Construction Documents

Who: Architect, MEP Engineer

- Architect to include credit requirements in all appropriate specification sections. Include the general requirements in Division 1 and others in specialties or furnishings (for the entryway systems).
- MEP Engineer to incorporate MERV 13 filters, dedicated exhaust systems, and separate drainage piping into the drawings and specifications.
- Architect to complete LEED template and upload supporting documentation including MU Custodial Operations letter describing the cleaning of the entrance mats (available on LEED Online Master Site), floor plans indicating locations and lengths of entryway systems, wall details (for deck-to-deck partitions), mechanical drawings showing locations of designated exhaust systems, and mechanical schedules specifying MERV 13 filtration.
- Include ventilation and exhaust systems and proper filtration in the scope of commissioning.

Construction

Who: Contractor, MU Campus Facility Commissioning Agent

- Contractor to replace filtration media prior to occupancy. MU Campus Facility Commissioning Agent to verify performance of ventilation and exhaust systems and filtration.

Operations and Maintenance

Who: MU Facilities and Operations Office

- Provide appropriate training for maintaining entryway systems. Maintain a weekly schedule for cleaning.

NOTE:

MU standard is to provide roll-out mats that are vacuumed on a daily basis. This is an acceptable strategy for meeting the "permanent entryway" requirement. Supporting documentation is provided through Master Site.

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE:

1. Letter from University's Custodial Operations describing the University describing cleaning of entrance mats.

Letter from the University's Custodial Operations describing cleaning of entrance mats (Available on LEED online Master Site)

Campus Facilities
University of Missouri

Facility Operations

180 General Services Building
Columbia, MO 65211-3200
PHONE 573-882-3547
FAX 573-884-6032

Custodial & Special Services
PHONE 573-882-6648
FAX 573-882-6032

Maintenance
Customer Service Center
PHONE 573-882-8211

June 10, 2011

Meredith S. Elbaum
AIA, LEED AP BD+C
Director of Sustainable Design
64 Pleasant Street
Watertown, MA 02472

Meredith,

The University of Missouri mat care standard for all E&G buildings on the Columbia campus is to vacuum daily and perform an extraction clean once year. Daily vacuuming is performed with CRI-approved upright vacuums.

If you have any questions, please contact me at 573-884-5252. Thank you.

Sincerely,

Matt Maher
Manager, Custodial Operations

hb

IEQ Controllability Of Systems - Lighting

Credit 6.1
Campus Standard

1 Point

INTENT

To provide a high level of lighting system control by individual occupants or groups in multi-occupant spaces (e.g.: classrooms and conference area) and promote their productivity, comfort and well-being.

REQUIREMENTS

Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (i.e., classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants. Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. Provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustment that meets group needs and preferences. Only square footage associated with the portions of room or spaces meeting the minimum illumination level may be counted in the calculations. Exception for areas where tasks would be hindered by daylight will be considered on their merits

An open office space counts as individually occupied when each person has an individual desk and a defined space.

ACTIONS

Design

Who: Architect, Lighting Designer, Electrical Engineer

- MU and the design team to incorporate lighting goals into the Owner's Project Requirement (OPR) and Basis of Design (BOD).
- Architect to develop a list of individually occupied spaces and shared multi-occupant spaces and establish occupant-use types and lighting needs for each space.
- Design lighting controllability system for all individual and multi-occupant spaces, appropriate to programming, space type and space use.
- Electrical Engineer to perform calculations as described in the LEED BD&C 2009 reference guide to confirm credit compliance for lighting controls.

Construction Documents

Who: Architect, Electrical Engineer

- Include floor plans indicating the type and location of lighting controls in construction documents. Specify all types of lighting controls to be used in the building into the construction specification.
- Include lighting control system in the scope of commissioning.
- Electrical Engineer to complete LEED template and upload supporting documentation including occupancy type for building spaces, number of occupants/space, a description of lighting controls and project drawings showing different lighting control types and locations.

Construction

Who: MU Campus Facility Commissioning Agent, Electrical Engineer

- MU Campus Facility Commissioning Agent to calibrate occupancy sensors and other lighting control systems after installation of all office equipment and furnishings.

NOTE

Credit may require task lights for desks in open office scenarios.

IEQ Controllability Of Systems - Thermal Comfort

Credit 6.2

1 Point

By Project

INTENT

To provide a high level of thermal comfort system control by individual occupants or groups in multi-occupant spaces (e.g.: classrooms or conference areas) and promote their productivity, comfort and well-being.

REQUIREMENTS

Provide a high level of thermal comfort system control by individual occupants or by specific groups in multi-occupant spaces (i.e., classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants. Provide individual comfort controls for 50%minimum of building occupants, Operable windows can be used in lieu of comfort controls for occupants of areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. Operable window areas to meet the requirements of ASHRAE 62.1-2007 paragraph 5.1, Natural Ventilation (with errata without addenda) AND provide comfort system controls for all shared multi-occupant spaces. Thermal comfort conditions described in ASHRAE Standard 55-2004 (with errata without addenda) to include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control, for the purposes of this credit, is defined as the provision of control over at least one of these primary factors in the occupant's local environment.

NOTE:

Campus standard is to provide one control per multi-occupant space and typically 1 control per 3 offices. Ability to meet this credit will depend primarily on project program

ACTIONS

Design

Who: Architect, Mechanical Engineer

- MU and the design team to incorporate thermal comfort goals into the Owner's Project Requirement (OPR) and Basis of Design (BOD).
- Architect to develop a list of all occupied spaces including multi-occupant spaces and establish occupant-use types and thermal comfort needs for each space
- Design and configure mechanical system to include controls for thermal comfort for all individual and multi-occupant spaces, appropriate to programming, space type and space use, based on MU's standards.
- Consult with MU Energy Management.
- Mechanical Engineer to perform calculations as described in the LEED BD&C 2009 reference guide to confirm credit compliance for thermal comfort controls.

Construction Documents

Who: Architect,Mechanical Engineer

- Indicate types and locations of thermal comfort controls in construction documents. Include in specifications all thermal comfort controls selected for the building.
- Include mechanical systems, thermal comfort controls and response systems in commissioning scope.
- Mechanical Engineer to complete LEED template and upload supporting documentation including mechanical system layout with control schedule and cut-sheets

Construction

Who: MU Campus Facility Commissioning Agent

- Ensure correct installation of all mechanical systems.
- MU Campus Facility Commissioning Agent to calibrate occupancy sensors and other lighting control systems after installation of all office equipment and furnishings.

IEQ

Thermal Comfort - Design

Credit 7.1

1 Point

Not Pursuing

INTENT

To provide a comfortable thermal environment that promotes occupant productivity and well-being.

REQUIREMENTS

Provide for a comfortable thermal environment that supports the productivity and well-being of the building occupants. Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata without addenda). Demonstrate design compliance in accordance with the Section 6.1.1 Documentation. (See Appendix 1 - default Occupancy Counts for occupancy count requirements and guidance).

ACTIONS

If project meets requirements:

Design

Who: Mechanical Engineer

- Include credit requirements in the Owner's Project Requirements (OPR) and Basis of Design (BOD).
- Using ASHRAE 55-2004, Mechanical Engineer and the design team to work with MU facilities and Operations to identify appropriate conditioning systems, building and environmental controls, seasonal set point recommendations, changeover schedules, maintenance and operations instructions and a maintenance and inspection schedule.
- Mechanical Engineer to examine operating conditions, make design adjustments, and confirm compliance with credit requirements.
- During the design submittal phase, Mechanical Engineer to complete LEED template and upload narrative describing basis of design, design assumptions, diversity considerations, HVAC load calculations so as to explain how thermal comfort conditions were established for the project and how the design of conditioning systems address the thermal comfort design.

NOTE:

Based on the typical MU humidification standards the majority of projects on the campus will not pursue this credit, however credit may be obtainable due to programmatic and occupancy requirements for humidification. Each project team shall analyze the project requirements to determine if pursuit of this credit is advisable.

IEQ

Thermal Comfort - Verification

Credit 7.2

1 Point

Not Pursuing

INTENT

To provide for the assessment of building occupants' thermal comfort over time.

REQUIREMENTS

Provide for the assessment of building thermal comfort over time. Achieve IEQ credit 7.1: Thermal Comfort - Design. Agree to implement a thermal comfort survey of building occupants (Adults and students of grade 6 and above) within a period of 6 to 18 months after occupancy. (Anonymous responses, assessment of overall satisfaction with thermal performance, thermal comfort, identification of thermal comfort-related problems).

Agree to develop a plan for corrective action if the survey results indicated that more than 20% of occupants are dissatisfied with thermal comfort in the building. This plan should include measurement of relevant environmental variables in problem areas in accordance to ASHRAE Standard 55-2004 (with errata without addenda). Provide a permanent monitoring system to ensure that building performance meets desired comfort criteria as determined by IEQ c7.1: Thermal Comfort- Design. Residential Projects are not eligible for this credit.

NOTE

This credit requires a comfort survey be issued in addition to temperature and humidity sensors.

IEQ Daylight and Views- Daylight

Credit 8.1 1 Point

By Project
(Highly Recommended)

INTENT

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

REQUIREMENTS

Option 1: Demonstrate through computer simulations that applicable spaces achieve daylight illuminance level of min. 10 foot-candles (fc) and max of 500 fc in clear sky condition on Sept. 21 at 9:00 AM and 3:00 PM. Provide glare control devices to avoid high-contrast situations that could impede visual tasks. Designs that incorporate view preserving automated shades for glare control may demonstrate compliance for only minimum of 10 fc luminance level.

Option 2:

Side lighting Zone: *0.150 < VLT x WFR < 0.180 (VLT = Visible light transmittance and WFR = Window to floor area ratio). Provide glare control devices to avoid high-contrast situations that could impede visual tasks. However, designs that incorporate view-preserving automated shades for glare control may demonstrate compliance for only the 0.150 value.*

Top lighting Zone*: Check top lighting zone description mentioned in reference guide. Achieve skylight roof coverage for applicable spaces (containing top lighting zone) between 3% and 6% of the floor area with a min. of 0.5 VLT. A skylight diffuser if used must have a measured haze value of greater than 90% when tested according to ASTM D1003.*

Option 3: Demonstrate, through records of indoor light measurements, that a minimum daylight illumination level of 10 foot-candles and max of 500 foot candles has been achieved in applicable spaces. Measurements must be taken on a 10-foot grid and shall be recorded on building floor plans Provide glare control devices to avoid high-contrast situations that could impede visual tasks. Designs that incorporate view-preserving automated shades for glare control may demonstrate compliance for only the minimum 10 fc illuminance level.

Option 4: Any of the above three options may be combined to document the minimum daylight illumination in the applicable spaces.

ACTIONS

Design

Who: Architect

- Analyze building orientation for opportunities to allow daylight in the building.
- Determine which spaces in the building are "regularly occupied spaces" as defined in the LEED BD&C 2009 reference guide (with errata and addenda) and identify occupant lighting needs for each space.
- Perform modeling using daylight simulation software or prescriptive daylight calculations as described in LEED BD&C 2009 reference guide to verify credit compliance. MU prefers Option 1 modeling
- Integrate glare control into design where appropriate.

Construction Documents

Who: Architect

- Include preferred visual light transmittance (VLT) values for all types of glazing to be used in the building in construction specifications.
- Architect to complete LEED template and upload the calculations or daylight simulation results to LEED Online.

Construction Administration

Who: Architect

- Architect to review product submittals and verify VLT values for all glazing types to be used on the project.
- Architect to review all products and systems specified in relation to daylighting.

NOTE:

MU expects daylight modeling to be part of the design process, this is a synergistic credit relying on orientation, shading, window light transmission, fenestration area, etc. and thus must be addressed early in the design process as a project strategy.

IEQ Daylight and Views- Views

Credit 8.2 1 Point

By Project
(Highly Recommended)

INTENT

To provide building occupants a connection to the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

REQUIREMENTS

Achieve direct line of sight to the outdoor environment via vision glazing between 30" (2'6") and 90" (7'6") above finish floor for building occupants 90% of all regularly occupied areas. Determine the area with direct line of sight by totaling the regularly occupied squared footage that meets criteria listed in LEED BD&C 2009 reference guide requirements (with errata and addenda). In plan view, the area is within sight lines drawn from perimeter vision glazing. In section view, a direct sight line can be drawn from the area to perimeter vision glazing. Line of sight may be drawn though interior glazing.

For private offices, the entire square footage of the office can be counted if 75% or more of the area has direct line of sight to perimeter vision glazing. For classrooms and multi-occupant spaces, the actual square footage with direct line of sight to perimeter vision glazing is counted.

ACTIONS

Design

Who: Architect

- Analyze building orientation for opportunities to provide access to views to the outside.
- Determine which spaces in the building are "regularly occupied spaces" as defined in the LEED BD&C 2009 reference guide (with errata and addenda) and require access to views.
- Perform view calculations / modeling as described in the LEED BD&C 2009 reference guide to verify compliance with credit requirements.
    - Create a floor plan showing areas with access to views as distinct from areas with no access to views.
    - Create a representative building section for each type of area included in the calculation with direct line-of-sight to perimeter glazing to demonstrate access to views to the outside.

Construction Documents

Who: Architect

- Architect to complete LEED template and upload the calculations and drawings to LEED Online.

NOTE

MU expects view analysis to be a part of the design process, this is synergistic credit affecting interior layout, partition types and heights, interior lighting needs, energy performance, etc. and thus must be addressed early in design process as a project strategy.

Innovation In Design

ID Credit 1.1	Exemplary Performance: SSc5.2 Maximize Open Space	03
ID Credit 1.2	AASHE's Sustainability Tracking Assessment and rating System (STARS)	04
ID Credit 1.3	Green Education Program	06
ID Credit 1.4	Building Management Systems	08
ID Credit 1.5	Climate Action Plan	10
ID Credit 2	LEED Accredited Professional (AP)	12

ID

Credit 1.1
Master Site

Exemplary Performance- SSc5.2- Maximize Open Space

1 Point

INTENT

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

REQUIREMENTS

For areas with no local zoning requirements (e.g., university campuses, military bases), Designate open space area that is equal to two times the building footprint for the life of the building. Vegetated roof, Wetlands/ naturally designed ponds count. For projects in urban areas earning SSc2, pedestrian oriented hardscape area counts if minimum 25% open space vegetated.

ACTIONS

Design

Who: MU Project Manager

- MU Project Manager to refer project LEED template to MU Master Site credit. (Master Site Project Number 1000016195)

ID

AASHE's Sustainability Tracking Assessment and Rating System (STARS)

Credit 1.2
Master Site

1 Point

INTENT

To pursue the Sustainability Tracking, Assessment and Rating System™ (STARS), a transparent, self-reporting framework for colleges and universities to measure their sustainability performance.

REQUIREMENTS

Register for STARS, collect data and identify your institutional boundary and begin documenting the data as outlined in the STARS Technical Manual. Submit a STARS report.

ENVIRONMENTAL BENEFITS

STARS® was developed by AASHE with broad participation from the higher education community. STARS encompasses long-term sustainability goals for already high-achieving institutions as well as entry points of recognition for institutions that are taking first steps toward sustainability. It is designed to provide a framework for understanding sustainability in all sectors of higher education and enable meaningful comparisons over time and across institutions using a common set of measurements developed with broad participation from the campus sustainability community. It creates incentives for continual improvement toward sustainability, facilitates information sharing about higher education sustainability practices and performance, and builds a stronger, more diverse campus sustainability community.

APPROACH AND STRATEGIES

See attached University of Missouri STARS report ("university-of-missouri-mo[1] 7 28.pdf")

ACTIONS

Design

Who: MU Project Manager

- MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit. (Master Site Project Number 1000016195)

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. University of Missouri STARS Report

UNIVERSITY OF MISSOURI STARS REPORT
(Full report available on LEED Online Master Site)

University of Missouri
STARS REPORT

Date Submitted: Preview

Provisional Rating: Bronze

Provisional Score: 40.87

Online Report: University of Missouri

STARS Version: 1.0

This is a preview of the final STARS Report.
The final version of the STARS Report will be available after submission.
A STARS Rating (including STARS Reporter) will be given at the time of submission and the data contained in the report will become publicly available on the STARS website.

ID

Green Education Program

Credit 1.3

Master Site

1 Point

INTENT

To create awareness and facilitate sharing of information on sustainable living. To educate students, staff and faculty on the sustainable measures implemented on the campus and provide a forum for them to volunteer support and leadership in promoting sustainability across academia, administration and lifestyle.

REQUIREMENTS

Develop a website for the sustainable measures implemented on campus. Educate students and staff about these efforts at orientation fairs and tailgate events. Encourage volunteer groups, student organizations to facilitate development of new initiatives and peer education. Commit to leadership in demonstrating local and global environmental stewardship. An educational outreach program or guided tour could be developed to focus on sustainable living.

ENVIRONMENTAL BENEFITS

Through collaborative work with students, faculty and staff the university can encourage a widespread interest and support for across the board environmental education. Facilitating sustainability education can empower students to take action in area of energy conservation, recycling, local food, biking education and more.

PROPOSED APPROACH AND STRATEGIES

Sustainability on the MU campus is a multi-faceted endeavor, involving academia and administration; students, faculty and staff; and partnerships within and outside the institution. The Sustainability Office coordinates these various endeavors, facilitates the development of new initiatives, provides information for campus decision-makers and implements sustainability projects. The MU Sustainability Office sends out a weekly e-mail every Tuesday to all subscribed members with exciting events and opportunities to get involved both on the Mizzou campus and the Columbia community. For the purpose of this credit compliance we have provided two of our programs: SPROUT and sustainability integrated with the campus tours.

1. Education Program:

Sustainability Peer Resource Outreach (SPROUT) is a peer education group with the purpose of teaching Mizzou students environmentally sustainable life skills. MU's peer educators provide programs to residence halls, classrooms, student organizations, and community groups. SPROUT's role is to foster a generation of environmentally responsible Mizzou students.

2. Campus Tours:

There is a constant stream of visitors and prospective students attending campus tours over the course of the year. All new students are also given tours during orientation at Summer Welcome. All tour guides are trained in the sustainability efforts on campus and incorporate sustainability into their standard tours. The tour script has been uploaded.

ACTIONS

Design

Who: MU Project Manager

- MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit. (Master Site Project Number 1000016195)

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. Summer welcome sustainability one liners 2011 for tour guides
2. Sustainability peer education - Mizzou SPROUT - website snapshot

SUSTAINABILITY ONE LINERS 2011 FOR TOUR GUIDES
(Available on LEED Online Master Site)

Sustainability at Mizzou

"Mizzou is known for a lot of things: great Division-I athletic teams, one of the nation's largest Greek systems, not to mention fantastic academics. But now it's known for something else: being a sustainability rock star." –Princeton Review, April 2011

MU Sustainability Office W112 Virginia Ave Garage 573-884-9319 Open Mon-Fri 7:30am-4:00pm sustainability.missouri.edu	Student Sustainability 2507P MU Student Center 573-882-8207 Open Mon-Fri 8:00am-5:00pm studentsustainability.missouri.edu	Sustain Mizzou 2507 MU Student Center sustainmizzou@gmail.com sustainmizzou.org

History/who we are

- **Sustain Mizzou** is a student group that started in 2004 focused on education, cooperation and local action regarding the environment.
- The **MU Sustainability Office**, a part of Campus Facilities, was started by Chancellor Deaton in 2009. The MU Sustainability Office works on all aspects of sustainability all across campus.
- **Student Sustainability**, in the Department of Student Life, manages the Student Sustainability Fee and works to get students involved with sustainability issues through a variety of programs.

What we're doing at Mizzou:

Food
- 6% of the food that Campus Dining Services serves is local.
- Food-focused student efforts include the Mizzou Food Coalition, Tigers for Community Agriculture, and the Sustain Mizzou Food Drive.
- Mizzou hosts a monthly Farmers Market on Lowry Mall coordinated by the Wellness Resource Center.

Recycling
- 75% of buildings on campus have indoor recycling. There are also outdoor recycling containers all over campus.
- Materials that you can recycle on campus include: paper, cardboard, plastics #1 & #2, steel, aluminum and glass.
- Special materials that you can recycle in specific bins include printer cartridges, batteries, and cell phones
- Several recycling events are held throughout the year, including Tiger Tailgate Recycling (during the football season), the Sustain Mizzou electronic waste drive, Tiger Treasures (at the end of the academic year)

Energy
- Mizzou avoids costs of over $6.8 million per year through energy conservation
- Mizzou Dashboard is a student-run energy conservation effort in the residence halls. You can see the system online at mizzoudashboard.missouri.edu.
- The campus power plant is currently installing a new biomass boiler to replace an old coal boiler. This will allow Mizzou to meet up to 25% of its energy needs by burning biomass instead of coal.
- Mizzou released its first-ever Climate Action Plan in January 2011. This details how Mizzou will be reducing its greenhouse gas emissions over the next several years.
- Mizzou builds all buildings above national building standards for energy efficiency

Academics
- Environmental Studies, Environmental Science, Sustainable Agriculture, Geography, Fisheries & Wildlife, Forestry, and Meteorology are all subjects that students at Mizzou can study with a substantial focus on sustainability. There are other academic programs as well, including a minor in Captive Wild Animal Management, classes in sustainable engineering, and others. Check with your academic advisor to see what options may be available for you.

Transportation
- Bike resources include the Bike Resource Center (free bike repair) and bike safety classes. Refer to studentsustainability.missouri.edu for more info.
- The Unions started the WeCar program, a short-term car rental system for students; and Rideshare, an online carpool system.
- The free buses on campus give 7,000 rides a day.

Natural Environment
- The MU campus is a registered botanic garden that features native plants.
- Mizzou's campus includes hundreds of acres of wild areas to support local wildlife.
- MU is currently working on a storm water master plan in order to address storm water quantity and quality issues to preserve the health of local streams & rivers.
- Check out one of our campus Tree Trails to see some unique campus flora

Research
- The Mizzou Advantage program includes emphasis on Sustainable Energy and Food for the Future research.
- Ask your professors about opportunities to help with researching sustainability issues in your department.

Funding, Grants & Awards
- The Student Sustainable Initiative Fund (SSIF) gives out several thousand dollars for student-driven sustainability projects on campus every semester. Students have started a laundry drying rack program, studied wind energy using a wind turbine, and installed energy monitoring equipment in a house focused on sustainable living (among other things) with funding from SSIF.
- The Peter H. Raven Award for Environmental Leadership is given out every year to an outstanding student leader.
- The MU Sustainability Office highlights Sustainability Champions in the staff newspaper every week.
- Mizzou students have also received national awards like the Udall Scholarship and national grants.

Involvement
- If you're interested in environmental writing, you can write for Sustain Mizzou's Footprint or CAFNR Cornerpost.
- Education majors might be interested in joining SPROUT – Sustainability Peer Resource OUTreach, a peer education group about sustainability topics.
- Water Engineering Technologies (WET), Sustain Mizzou Stream Team and Environmental Science club all host Stream Team events throughout the year.
- Coal Free Mizzou works to impact changes in Mizzou's energy policy.
- Mizzou Hydrogen Car Team competes every year with their innovative designs. They need a variety of people to not only do engineering, but to write reports and present their project.
- Can't get into the football games? Stay close to the action with Tiger Tailgate Recycling every home game. Volunteers collect almost 20 tons of bottles and cans each year!
- Sustain Mizzou focuses on diverse volunteer opportunities from a range of interests including outreach, making notebooks, raising money for a local food fundraiser, a reading group, recycling and a new sustainable living and research house that's open to the entire community.

Some (but not all) of Mizzou's sustainability-related student groups include:
- CAFNR Student Council
- Coal Free Mizzou
- Environmental Science Club
- Fisheries and Aquatic Sciences Society
- Forestry Club
- Greeks Going Green
- Herpetological Society
- Mizzou Hydrogen Car Team
- MSA Sustainability Committee
- School of Natural Resources Science Society
- Soil Judging Team
- Soil and Water Conservation Society
- SPROUT
- Sustain Mizzou
- Tigers for Community Agriculture
- Tigers for Tigers
- US Green Building Council (Student Chapter)
- Weatherization Mizzou
- Wildlife Society

If you want to learn more, come talk to us at Mizzou Fair!

WEBSITE SNAPSHOT OF SUSTAINABILITY PEER EDUCATION - MIZZOU SPROUT
(Available on LEED Online Master Site)

Mizzou SPROUT

Sustainability Peer Education

HOME | ABOUT SPROUT | APPLY | REQUEST A PROGRAM | RESOURCES FOR CURRENT PEERS

SPROUT Advisor Position Open for Fall 2011 and Beyond

Posted on April 17, 2011 | Leave a comment

Student Sustainability Volunteer Internship: SPROUT Advisor
Hours: 10/week
Location: MU Sustainability Office

Position:
Sustainability Peer Resource Outreach (SPROUT) is a peer education group with the purpose of teaching Mizzou students environmentally sustainable life skills. Our peer educators provide programs to residence halls, classrooms, student organizations, and community groups. SPROUT's role is to foster a generation of environmentally responsible Mizzou students.

SPROUT is currently seeking a group adviser to help organize and promote the group. This is an opportunity to be involved with environmental sustainability on campus, improve leadership skills, and gain supervisory experience.

Responsibilities:
1.Advise and organize the SPROUT program. Includes: weekly meetings (Thursdays 5:00 – 7:00), peer trainings, scheduling programs, and program evaluations.
2.Advertising. Maintain wordpress site, update calendars, volunteer recruitment,

CONTACT US

Email us at:
mizzousprout (at) gmail.com

LINKS

- MU Student Sustainability
- SPROUT Facebook Page
- University of Missouri

FOLLOW SPROUT ON TWITT

- SPROUT will be at Global Soun Festival April 30th! Global Sou free minimal-waste festival that http://fb.me/Y8r7yzcV 2 mont
- Playground Concept Teaches Cl Energy « http://fb.me/XDoHP 2 months ago
- If you have any interest in the h present and future of agricultur and our wellbeing, consider... http://fb.me/zOzdYmg9 5 mon
- Real Food at Mizzou is coming! Friday (1/28) and Saturday (1/2 Registration and food is FREE b must register! 5 months ago

ID

Campus Wide
Building Management
System

Credit 1.4
Master Site

1 Point

INTENT

To allow for quick maintenance, increase efficiency of operating the campus wide HVAC systems.

REQUIREMENTS

Provide a narrative describing the building automation system. Describe the use of the system in centralized viewing and operation of the system and how it benefits the university operations and contributes to saving energy.

ENVIRONMENTAL BENEFITS

Centralized viewing and operations of systems allow ease in troubleshooting problem areas, and facilitate quick service and maintenance of systems when needed. This increases the energy performance of the buildings, the life of the installed HVAC system and saves costly replacements in future.

APPROACH AND STRATEGIES

The University of Missouri – Columbia campus utilizes the Johnson Controls Metasys system to efficiently operate the various campus heating, ventilating, and air conditioning (HVAC) systems.

A separate fiber optic process control network connects the buildings together and allows centralized viewing and operation of the system. Metasys controls are currently in 120 campus buildings with 78 network engines and over 82,000 input/output points. The system is used to operate, optimize, troubleshoot, and service campus HVAC systems. It is used to control air handling units, exhaust fans, refrigeration equipment, heat exchangers, fan coil units, variable air volume boxes, occupancy sensors, chillers, cooling towers, pumps.

ACTIONS

Design

Who: MU Project Manager

- MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit. (Master Site Project Number 1000016195)

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. A letter from MU Energy Management describing MU's campus control system.

A LETTER FROM EM DESCRIBING MU'S CAMPUS CONTROL SYSTEM
(Available on LEED Online Master Site)

UNIVERSITY *of* MISSOURI

CAMPUS FACILITIES – ENERGY MANAGEMENT

Paul Hoemann, P.E.
Director – Campus Facilities-Energy Management
417 South Fifth Street
Columbia, MO 65211

Subject: Campus Control System

Control System Description

The University of Missouri – Columbia campus utilizes the Johnson Controls Metasys system to efficiently operate the various campus heating, ventilating, and air conditioning (HVAC) systems. A separate fiber optic process control network connects the buildings together and allows centralized viewing and operation of the system. Metasys controls are currently in 120 campus buildings with 78 network engines and over 82,000 input/output points. The system is used to operate, optimize, troubleshoot, and service campus HVAC systems. It is used to control air handling units, exhaust fans, refrigeration equipment, heat exchangers, fan coil units, variable air volume boxes, occupancy sensors, chillers, cooling towers, pumps,

Paul Coleman
Manager – Energy Controls and Chilled Water
Campus Facilities – Energy Management

/PMC

ID

Climate Action Plan

Credit 1.5

1 Point

Master Site

INTENT

To create a comprehensive climate action plan to address climate change by modeling ways to minimize global warming emissions, provide the knowledge and educate graduates to achieve climate neutrality, and to exercise leadership in their communities and throughout society.

REQUIREMENTS

Develop a comprehensive plan to achieve climate neutrality. Create institutional structures to guide the development and implementation of the plan. Complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) and update it periodically. Develop an institutional action plan for becoming climate neutral will include:

1. Target dates for goals and actions that will lead to climate neutrality.
2. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
3. Actions to expand research or other efforts necessary to achieve climate neutrality.
4. Mechanisms for tracking progress on goals and actions.

ENVIRONMENTAL BENEFITS

Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society. These colleges and universities will be providing students with the knowledge and skills needed to address the critical, systemic challenges faced by the world in this new century and enable them to benefit from the economic opportunities that will arise as a result of solutions they develop. This will allow the institutions to stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities.

APPROACH AND STRATEGIES

MU is committed to becoming carbon neutral and has set a rolling date to achieve that goal. Since the university intends to progress as rapidly as possible, MU will not set that date far into the future; rather, it will review progress at the conclusion of every calendar year and provide a status report to the campus.

In the first phase of the Climate Action Plan, MU by 2015 will reduce carbon emissions by 20% from the 2008 emissions baseline. Going forward, MU will have a rolling 5 year plan that will be reviewed on an annual basis in conjunction with the campus master plan. Like the Campus Master Plan, the Climate Action Plan will be a working tool used to stimulate dialogue and interaction among the many campus groups that might have direct or indirect interest in the development of the campus as it relates to MU's environmental, economic and social footprint. The plan will include areas required by the American College and University Presidents' Climate Commitment: energy, transportation, education, research and financing. It will also include other areas of sustainability - water, site selection, waste management, purchasing, building design and construction, and food.

ACTIONS

Design

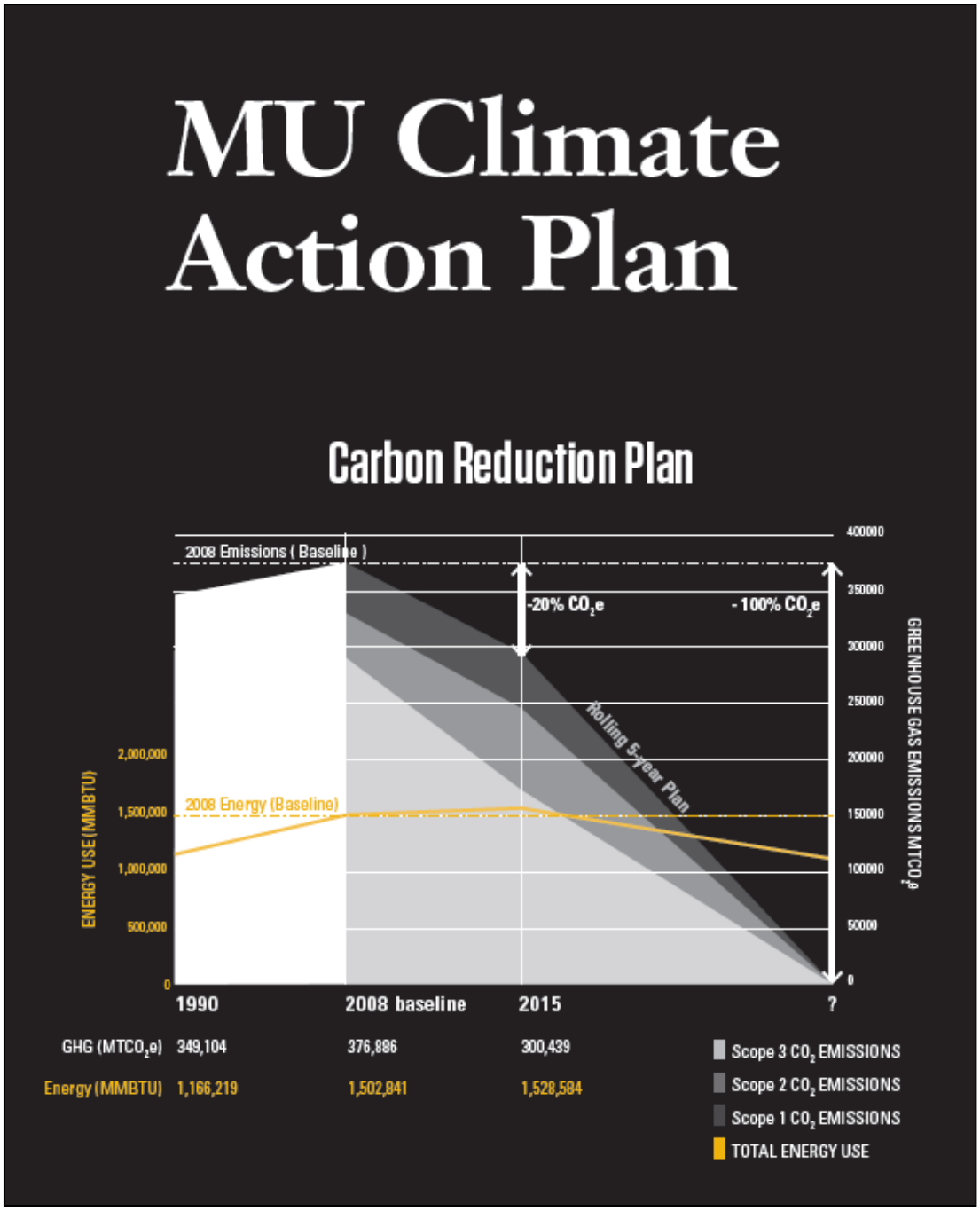
Who: MU Project Manager

- MU Project Manager to refer project LEED template on LEED Online to MU Master Site credit. (Master Site Project Number 1000016195)

SUPPORTING DOCUMENTATION AVAILABLE ON LEED ONLINE MASTER SITE

1. MU's Climate Action Plan

MU CLIMATE ACTION PLAN
(Complete document available on LEED Online Master Site)



ID

LEED Accredited Professional

Credit 2

1 Point

Campus Standard

INTENT

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

REQUIREMENTS

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

ACTIONS

Construction

Who: LEED AP on the project

- Complete LEED template and upload certificate of LEED AP on LEED Online.

Appendix

Appendix A	MU's Indoor Air Quality Management Plan
Appendix B	Hospital's Indoor Air Quality Management Plan
Appendix C	Sample Material Plan
Appendix D	Sample Sustainable Materials Data Sheet
Appendix E	Recommended Sustainable Requirements for Standard Building Products
Appendix F	Construction Waste Management Requirements
Appendix G	Template for Owners project Requirements
Appendix H	Template for Basis of Design
Appendix I	Sustainable Specifications Guidelines
Appendix J	Minimum Program Requirement #6: Energy and Water Use data
Appendix K	LEED Project Tracker

A

Appendix

MU's Indoor Air Quality Management Plan

University of Missouri's IAQ management plan

Appendix B

Hospital's Indoor Air Quality Management Plan

Hospital's IAQ management plan

C

Appendix

Sample Materials Plan

Sample Materials Plan

Appendix D

Sample
Sustainable Materials
Data Sheet

Sample Sustainable Materials Data Sheet

E

Appendix

Recommended Sustainable Requirements for Standard Building Products

Recommended Sustainable Requirements for Standard Building Products

F

Appendix

Construction Waste
Management Requirements

Construction Waste Management Requirements

G

Appendix

Template for
Owners Project
Requirements

Template for Owner's Project Requirements

H

Appendix

Template for
Basis of Design

Template for Basis of Design

I

Appendix

Sustainability
Specifications
Guidelines

Sustainability Specifications Guidelines

J

Appendix

Minimum Program
Requirement #6:
Energy and Water Use data

Minimum Program Requirement #6:

Energy and Water Use data

LEED Project Tracker

University of Missouri

180 General Services Building

Columbia, MO 65211

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