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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:

- 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.
CAMPUSED 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.

CAMPUSED 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.
MR: Rapidly Renewable Materials

Credit 6
By Project
1 Point

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 25% 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.

Construction Documents
Who: Architect
- Identify materials with high rapidly renewable content and incorporate into design.
- MU Project Manager to review any specific maintenance and/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 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.
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

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<tr>
<th>Regional Priority</th>
<th>CREDIT #</th>
<th>CREDIT TITLE</th>
<th>MAX. POINTS</th>
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<th>CAMPUS Std by Project</th>
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## LEED BD+C NC 2009 - Campus Wide LEED

### Indoor Environmental Quality

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### Innovation in Design

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<td>SS Cr 6.2: Stormwater Quality</td>
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<td>MR Cr 2: 75% Construction Waste Management</td>
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### Total Available

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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

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.

Parcels owned by MU that are included in LEED credit calculations

Parcels not owned by MU

Parcels in planning

Existing university buildings

Proposed LEED projects in design or development

Parking

Land not included

LEED campus boundary

PROPERTY OWNED BY MIZZOU THAT IS INCLUDED IN LEED CREDIT CALCULATIONS (Shown on the composite image of the MU Campus Master Plan Base Map)
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. Switzer 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
<table>
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<tr>
<th>SSx</th>
<th>Description</th>
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<tr>
<td>SSp1</td>
<td>Construction Activity Pollution Prevention</td>
<td>03</td>
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<td>SSc1</td>
<td>Site Selection</td>
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<td>SSc2</td>
<td>Development Density</td>
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<td>SSc3</td>
<td>Brownfield Redevelopment</td>
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<td>Alternative Transportation - Public Transportation Access</td>
<td>15</td>
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<td>SSc4.2</td>
<td>Alternative Transportation - Bicycle Storage and Changing Rooms</td>
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<td>SSc4.3</td>
<td>Alternative Transportation - Low Emitting and Fuel Efficient Vehicles</td>
<td>27</td>
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<td>SSc4.4</td>
<td>Alternative Transportation - Parking Capacity</td>
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<td>SSc5.1</td>
<td>Site Development - Protect or Restore Habitat</td>
<td>28</td>
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<td>SSc5.2</td>
<td>Site Development - Maximize Open Space</td>
<td>31</td>
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<td>Stormwater Design - Quantity Control</td>
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<td>SSc6.2</td>
<td>Stormwater Design - Quality Control</td>
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<td>SSc7.1</td>
<td>Heat Island Effect - Non Roof</td>
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<td>SSc7.2</td>
<td>Heat Island Effect - Roof</td>
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<tr>
<td>SSc8</td>
<td>Light Pollution Reduction</td>
<td>41</td>
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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

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

Credit 1

Site Selection

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.
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

Switzler Hall

Tate Hall

Animal Resource Center

Gwynn Hall Renovation

Wolpers Hall
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
Credit 2
By Project

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

1/2 mile radius of proposed LEED building entrances
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

1/2 mile radius of proposed LEED building entrances
BASIC SERVICES KEY FOR COMMUNITY CONNECTIVITY MAPS
(Available on LEED Online Master Site)

01 RESTAURANTS
a. Bengali Bar and Grill 227 S 8th 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 708 E 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. Borens Tavern and Restaurant 811 E Walnut
do. Subway 226 E Broadway
e. Kaldi's Coffee House 29 S 9th Street
f. Bengal's Bar and Grill 227 S 6th Street

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 801 E Broadway
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. Bee Time Snack Shops 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 Mizou Market 129 E Broadway

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 1615 Windsor Street
f. Ulysses S. Grant Elementary School 10 East Broadway
go. Educational technologies 200 Heinkel Building
h. Discovery Days Preschool-Munc 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

d. Commerce Trust Bank 901 E Broadway
d. Landmark Bank 1200 East Broadway
e. Landmark Bank ATM 1400 Windsor Street
f. Bank of America ATM 814 E Broadway
g. Brady Commons, 301 Rollins Street
h. U.S. Bank 1001 E Broadway
i. Boone County National Bank 1 Hospital Drive
j. Bank of America 800 E Cherry Street
k. Boatmen Bank MidMissouri 800 Cherry Street
l. Caridnians ATM 122 S. 9th Street
m. U.S. Bank 911 E Rollins Street

07 RETAIL
a. Ninth Street Video 10 Hitt Street
b. Blockbuster Express 516 Hitt Street
c. Salon Nefis 825 E walnut Street
d. Nona Stewart Memorial Nursery 505 East avenue
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. Uprose Bakery 10 Hitt Street

08 HOSPITALS
a. University Hospital 1 Hospital Drive
b. Boone Hospital Center 1600 East Broadway

c. Columbia College Library 301 Park Avenue, Columbia, MO

11 PHARMACIES
a. University 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 #112

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. Deja 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 63 S
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. Lutheran 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. Bahá’i faith of Columbia 625 Cherry Street

14 HEALTH AND FITNESS
a. Alley cat Yoga 23 South 8th Street
b. Transformational Fitness 1102 East Broadway
c. Health Connection 1507 East Broadway

15 OTHER SERVICES
a. Columbia Cemetery 30 East Broadway
b. Columbia Fire Department 2010 Lowry Street #2
c. Museum- State Historical Society of Missouri 104 Swallow Hall

16 LIBRARY
a. Hugh Stephens Library 1200 East Broadway
b. Law Library 620 Conley
c. Ellis Library 1020 Lowry Street
d. Journalism Library 1020 Lowry Street
f. J Otto Lottes Sciences Library 1 Hospital Drive

g. Columbia Public Library (Daniel Boone Regional library)

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 8th Street
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
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.

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."
The Columbia Transit system operates on a hub-and-spokes pattern. Routes connect at Wabash Station, just north of the MU campus.
Alternative Transportation - Public Transportation Access
Credit 4.1 6 points
By Project Future Master Site

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

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)
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
- 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)
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1/4 mile walking radius of public and/or campus bus lines
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
- Columbia Transit: 209 Black Day route M-F (Fall, Winter)
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- 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

Food and Wine Complex

University Hospital Patient Care Tower

Johnston Hall

University Hospital ER expansion

Orthopedics Expansion
Credit 4.2
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 showers 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: 13,266
Visitors: +/- 200
Bicycle racks: 237, with a capacity of 5,411 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
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

Wolpers Hall

Gwynn Hall

Tate Hall

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
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

Food and Wine Complex

University Hospital Patient Care Tower

Johnston Hall

University Hospital ER expansion

Orthopedics Expansion
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Curtis Circle Totals 242 192.68 0.96 Curtis

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Moebe Circle Totals 200 181.18 1.11 Moebe

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Agri Eng Circle Totals 253 232.05 1.16 Agri Eng

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## 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.
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
Site Development - Protect or Restore Habitat

Credit 5.1  1 point

Regional Priority
Campus Standard
Future Master Site

MASTER SITE CREDIT COMPLIANCE CALCULATIONS

Site Development:
- Protect or Restore Habitat

Credit 5.1  1 point

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
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)

Approximate Open Space Preservation Area: 311 Acres

Exhibit A

Legend
- Baskett Buildings
- Baskett Border
- Baskett Parking
- Columbia Roads

Courtesy of the Office of Space Planning and Management
K. Dolle 1/04
Stormwater Design - Quantity Control

Credit 6.1  1 point
By Project
Future Master Site

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.
Stormwater Design - Quality Control

Credit 6.2  1 point

Regional Priority

By Project

Future Master Site

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
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

To be updated

- Pavement
- Sidewalks
- Brick
- Concrete pad
- Proposed LEED projects in design or development
- Site boundary

OPTION 2 CAMPUS PARKING LOT LOCATION MAP

CAMPUS TOTALS
Total spaces: 25,564
Covered spaces: 8531
Heat Island Effect - Roof

Credit 7.2 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 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%
SS:41

**SS**

**Credit 8**
By Project
Future Master Site

**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
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
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)

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

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.

**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**
**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)

<table>
<thead>
<tr>
<th>Landscape-Type Description</th>
<th>$K_r$</th>
<th>$K_d$</th>
<th>$K_{MC}$</th>
<th>$K_L$</th>
<th>$ET_0$</th>
<th>$ET_L$</th>
<th>IE</th>
<th>SF</th>
<th>TPWA (gal/sf/in)</th>
<th>Baseline TPWA</th>
<th>Difference</th>
<th>% Decr. TPWA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Francis Quadrangle:</strong></td>
<td>0.32</td>
<td>1.18</td>
<td>1.00</td>
<td>0.42</td>
<td>0.27</td>
<td>0.11</td>
<td>0.00</td>
<td>727,199</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>223,766</td>
<td>42,179</td>
<td>-3,148</td>
<td>-7%</td>
<td></td>
</tr>
<tr>
<td><strong>Peace Park</strong></td>
<td>0.36</td>
<td>1.18</td>
<td>1.00</td>
<td>0.42</td>
<td>0.27</td>
<td>0.11</td>
<td>0.00</td>
<td>727,199</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>223,766</td>
<td>42,179</td>
<td>-3,148</td>
<td>-7%</td>
<td></td>
</tr>
<tr>
<td><strong>Res Life Irrigated</strong></td>
<td>0.58</td>
<td>1.07</td>
<td>1.00</td>
<td>0.62</td>
<td>0.27</td>
<td>0.17</td>
<td>0.65</td>
<td>124,307</td>
<td>19,974</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>124,307</td>
<td>23,431</td>
<td>3,457</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td><strong>Stankowski</strong></td>
<td>0.46</td>
<td>1.00</td>
<td>1.00</td>
<td>0.46</td>
<td>0.27</td>
<td>0.12</td>
<td>0.00</td>
<td>3,695,133</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Jesse Hall South = Peace Park + Irrigation</strong></td>
<td>0.32</td>
<td>1.21</td>
<td>1.00</td>
<td>0.39</td>
<td>0.27</td>
<td>0.10</td>
<td>0.63</td>
<td>64,167</td>
<td>6,690</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-60% canopy plus irrigation</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>64,167</td>
<td>12,095</td>
<td>5,405</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td><strong>Carnahan Quadrangle (S. Quad)</strong></td>
<td>0.55</td>
<td>0.85</td>
<td>1.00</td>
<td>0.47</td>
<td>0.27</td>
<td>0.13</td>
<td>0.65</td>
<td>295,465</td>
<td>36,765</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same as Francis Quad only 10% perennials/shrubs &amp; lower density of tree canopy</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>295,465</td>
<td>55,694</td>
<td>19,929</td>
<td>36%</td>
<td></td>
</tr>
<tr>
<td><strong>Mixed Trees/shrubs &amp; mulch - No Irrigation (917)</strong></td>
<td>0.2</td>
<td>1.15</td>
<td>1.3</td>
<td>0.30</td>
<td>0.27</td>
<td>0.08</td>
<td>0.00</td>
<td>551,326</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot microlclimate; usually along roads or parking lots; sometimes just trees and grass; narrow or confined planting areas</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>551,326</td>
<td>135,099</td>
<td>135,099</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td><strong>Annual Flower Beds</strong></td>
<td>0.9</td>
<td>1.10</td>
<td>1.2</td>
<td>1.19</td>
<td>0.27</td>
<td>0.32</td>
<td>0.90</td>
<td>7,401</td>
<td>1,644</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drip irrigation; very sunny and typically hot: near roads or large pavement areas</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>1.2</td>
<td>0.84</td>
<td>0.28</td>
<td>0.24</td>
<td>7,401</td>
<td>1,736</td>
<td>92</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Large Grass Areas - No irrigation</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.00</td>
<td>3,974,351</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>84% of large lawns, 16% of parking lots</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>3,974,351</td>
<td>749,145</td>
<td>749,145</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td><strong>Wildflowers/Bioretention Areas</strong></td>
<td>0.2</td>
<td>1.00</td>
<td>1.00</td>
<td>0.20</td>
<td>0.27</td>
<td>0.05</td>
<td>0.00</td>
<td>346,096</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.10</td>
<td>0.00</td>
<td>346,096</td>
<td>749,145</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stankowski + Irrigation</strong></td>
<td>0.46</td>
<td>1.00</td>
<td>1.00</td>
<td>0.46</td>
<td>0.27</td>
<td>0.12</td>
<td>0.63</td>
<td>170,710</td>
<td>45,326</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50% of large lawns, 50% of parking lots</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>170,710</td>
<td>32,178</td>
<td>11,032</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td><strong>Mixed Trees/shrubs &amp; mulch + Drip Irrigation (829)</strong></td>
<td>0.2</td>
<td>1.15</td>
<td>1.3</td>
<td>0.30</td>
<td>0.27</td>
<td>0.08</td>
<td>0.00</td>
<td>113,750</td>
<td>6,360</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20% of large lawns, 80% of parking lots</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.00</td>
<td>113,750</td>
<td>27,874</td>
<td>21,514</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td><strong>Solid Narrow Grass Strips Along Road - No Irrigation (1085)</strong></td>
<td>0.8</td>
<td>1.00</td>
<td>1.00</td>
<td>0.72</td>
<td>0.27</td>
<td>0.19</td>
<td>0.00</td>
<td>663,718</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot &amp; windy environment</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>1.20</td>
<td>0.84</td>
<td>0.27</td>
<td>0.23</td>
<td>663,718</td>
<td>150,129</td>
<td>150,129</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td><strong>Athletic Fields</strong></td>
<td>0.6</td>
<td>1.00</td>
<td>1.2</td>
<td>0.72</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>324,541</td>
<td>62,922</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athletic fields plus irrigation</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>1.20</td>
<td>0.84</td>
<td>0.27</td>
<td>0.23</td>
<td>324,541</td>
<td>73,409</td>
<td>10,487</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24,643,460</td>
<td>199,828</td>
<td>2,201,794</td>
<td>2,001,966</td>
<td>91%</td>
</tr>
</tbody>
</table>

### Athletic Fields Irrigated or Not

- Athletic fields not incl. in base map as greenspace
- i.e. Hinkle, Football Practic fields

<table>
<thead>
<tr>
<th>Landscape-Type Description</th>
<th>$K_r$</th>
<th>$K_d$</th>
<th>$K_{MC}$</th>
<th>$K_L$</th>
<th>$ET_0$</th>
<th>$ET_L$</th>
<th>IE</th>
<th>SF</th>
<th>TPWA (gal/sf/in)</th>
<th>Baseline TPWA</th>
<th>Difference</th>
<th>% Decr. TPWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0.7</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.27</td>
<td>0.19</td>
<td>0.63</td>
<td>1,984,927</td>
<td>448,979</td>
<td>64,140</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>

WE:06
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)

Legend

- Agricultural Field
- Annual Flowers
- Athletic Fields
- Francis Quad (+50% tree canopy, 60% grass, 15% mixed incl. perennials; IRIG)
- Grass edge along walks, HST
- ICA + Irrig.
- Jesse Hall S. = Peace Park + Irrigation
- Large Grass Area, No Irrig.
- Mule Barn etc.
- Mixed Trees/shrubs, g.c., HST, No IRIG.
- Mixed Trees/shrubs, g.c.; IRIG.
- Natural Areas
- Peace Park + Irrigation
- Peace Park
- Res Life Irrigated
- Stankowski + Irrigation
- Stankowski
- Large Grass Areas - No irrigation
- Solid Narrow Grass Strips Along Road - No irrigation
- Mixed Trees/shrubs & mulch - No Irrigation
- Mixed Trees/shrubs & mulch + Drip Irrigation
- Annual Flower Beds
- Grass Only Areas + Irrigation
- Grass

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 acreage boundaries, and must not be construed as a legal description or survey grade documentation. Any information is believed to be accurate but accuracy is not guaranteed.
Innovative Waste Water technologies

Credit 2
By Project

2 Points

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.
<table>
<thead>
<tr>
<th>EA Prerequisite</th>
<th>Description</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fundamental Commissioning of Building Energy Systems</td>
<td>03</td>
</tr>
<tr>
<td>2</td>
<td>Minimum Energy Performance</td>
<td>05</td>
</tr>
<tr>
<td>3</td>
<td>Fundamental Refrigerant Management</td>
<td>07</td>
</tr>
<tr>
<td>1</td>
<td>Optimize Energy Performance</td>
<td>05</td>
</tr>
<tr>
<td>2</td>
<td>On-site Renewable Energy</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Enhanced Commissioning</td>
<td>03</td>
</tr>
<tr>
<td>4</td>
<td>Enhance Refrigerant Management</td>
<td>09</td>
</tr>
<tr>
<td>5</td>
<td>Measurement and verification</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>Green Power</td>
<td>14</td>
</tr>
</tbody>
</table>
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 Commissioning**

- MU develops Owner's Project Requirements (OPR)
- Architect, MEP, & Lighting Designer create Basis of Design (BOD)
- Project team incorporates commissioning requirements into construction documents
- MU designates MU Campus Facility Commissioning Agent before 50% CD
- MU Campus Facility Commissioning Agent reviews OPR and BOD

**Enhanced Commissioning**

- MU designates MU Campus Facility Commissioning Agent before 50% CD
- MU Campus Facility Commissioning Agent reviews OPR and BOD
- MU Campus Facility Commissioning Agent conducts commissioning design review at 50% CD
- MU Campus Facility Commissioning Agent develops and presents commissioning plan based on OPR and BOD

**MU Campus Facility Commissioning Agent**

- MU Campus Facility Commissioning Agent develops and presents commissioning plan based on OPR and BOD
- MU Campus Facility Commissioning Agent reviews OPR and BOD
- MU Campus Facility Commissioning Agent reviews contractor submittals
- MU Campus Facility Commissioning Agent verifies installation and performance of building systems
- MU Campus Facility Commissioning Agent performs system functional performance testing
- MU Campus Facility Commissioning Agent develops systems manual for commissioned systems
- MU Campus Facility Commissioning Agent verifies training requirements are completed
- MU Campus Facility Commissioning Agent develops commissioning report

**MU Campus Facility Commissioning Agent**

- MU Campus Facility Commissioning Agent develops commissioning report
- MU Campus Facility Commissioning Agent requires building operation 8-10 months after completion
**EA**

Minimum Energy Performance

Prerequisite 2

Required

**EA**

Optimize Energy Performance

Credit 1

Campus Standard

By Project

1 - 19 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 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)

<table>
<thead>
<tr>
<th></th>
<th>New Buildings</th>
<th>Existing Building Renovations</th>
<th>Credit Points</th>
</tr>
</thead>
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<tr>
<td>12%</td>
<td>8%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>14%</td>
<td>10%</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>16%</td>
<td>12%</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>18%</td>
<td>14% (MU Target)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>20%</td>
<td>16%</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>22%</td>
<td>18%</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>24% (MU Target)</td>
<td>20%</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>26%</td>
<td>22%</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>28%</td>
<td>24%</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>30%</td>
<td>26%</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>32%</td>
<td>28%</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>34%</td>
<td>30%</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>36%</td>
<td>32%</td>
<td></td>
<td>13</td>
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<tr>
<td>38%</td>
<td>34%</td>
<td></td>
<td>14</td>
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<td>40%</td>
<td>36%</td>
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<td>42%</td>
<td>38%</td>
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<td>44%</td>
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<td>46%</td>
<td>42%</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>48%</td>
<td>44%</td>
<td></td>
<td>19</td>
</tr>
</tbody>
</table>

#### Energy Targets - Goal Setting Chart

**Goal Setting Chart**

<table>
<thead>
<tr>
<th>Primary Space Type</th>
<th>Average Building (source: AIA2030 commitment table; CBEECS2003 survey)</th>
<th>60% Better than Average Building</th>
<th>70% Better than Average Building</th>
<th>80% Better than Average Building</th>
<th>90% Better than Average Building</th>
<th>per ASHRAE 90.1.2007/25% (better than average building)</th>
<th>10% Better than ASHRAE 90.1.2007</th>
<th>20% Better than ASHRAE 90.1.2007</th>
<th>25% Better than ASHRAE 90.1.2007</th>
<th>30% Better than ASHRAE 90.1.2007</th>
<th>40% Better than ASHRAE 90.1.2007</th>
<th>50% Better than ASHRAE 90.1.2007</th>
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<td>Athletics/Recreation</td>
<td>65 26 20 13 7</td>
<td>49 50 42 39 36 33 30 27 24 21 18 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>77 31 23 15 8</td>
<td>58 50 42 39 36 33 30 27 24 21 18 16</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Library</td>
<td>104 42 31 21 10</td>
<td>78 68 57 52 47 43 39 36 33 30 27 24 21 18 16</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
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<td>78 68 57 52 47 43 39 36 33 30 27 24 21 18 16</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Dining</td>
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<td>227 196 166 131 106 81 65 51 48 43 40 36 33 30 27 24 21 18 16</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Student Center</td>
<td>66 26 20 13 7</td>
<td>50 43 36 33 30 27 24 21 18 16 13 10</td>
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<tr>
<td>Labs</td>
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<td>278 241 204 185 167 142 120 100 87 74 60 54 42 39 36 33 30 27 24 21 18 16</td>
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<tr>
<td>Residential</td>
<td>89 36 27 18 9</td>
<td>67 56 49 45 40 37 34 31 28 25 22 20 17 14 12 10 8 6 4</td>
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<td></td>
<td></td>
<td></td>
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<td>Religious Buildings</td>
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<td>35 30 25 22 21 16 13 10 7 4 1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Assembly/Entertainment/Culture</td>
<td>95 38 29 19 10</td>
<td></td>
<td>71 62 53 48 43 33 30 27 24 21 18 16 13 10 7 4 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 HFC-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.
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

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)

<table>
<thead>
<tr>
<th>% RENEWABLE ENERGY</th>
<th>CREDIT POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>1</td>
</tr>
<tr>
<td>3%</td>
<td>2</td>
</tr>
<tr>
<td>5%</td>
<td>3</td>
</tr>
<tr>
<td>7%</td>
<td>4</td>
</tr>
<tr>
<td>9%</td>
<td>5</td>
</tr>
<tr>
<td>11%</td>
<td>6</td>
</tr>
<tr>
<td>13% (MU TARGET)</td>
<td>7</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Building</th>
<th>In Service Date</th>
<th>GSF</th>
<th>Annual kWhrs</th>
<th>Annual MMBTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzler</td>
<td>FY12</td>
<td>28,467</td>
<td>157,616</td>
<td>1.880</td>
</tr>
<tr>
<td>Tate</td>
<td>FY12</td>
<td>42,930</td>
<td>319,532</td>
<td>2.837</td>
</tr>
<tr>
<td>ARC</td>
<td>FY13</td>
<td>20,758</td>
<td>619,545</td>
<td>8.899</td>
</tr>
<tr>
<td>Gwynn</td>
<td>FY15</td>
<td>38,600</td>
<td>328,409</td>
<td>3.253</td>
</tr>
<tr>
<td>UMC - ER</td>
<td>FY14</td>
<td>36,500</td>
<td>1,327,072</td>
<td>7.686</td>
</tr>
<tr>
<td>UMC - Patient Care</td>
<td>FY13</td>
<td>310,000</td>
<td>8,952,300</td>
<td>70.151</td>
</tr>
<tr>
<td>UMC - Orthopedics Expansion</td>
<td>FY13</td>
<td>6,000</td>
<td>143,801</td>
<td>1.464</td>
</tr>
<tr>
<td>Wolpers &amp; Johnson</td>
<td>FY15</td>
<td>211,218</td>
<td>1,919,808</td>
<td>24,966</td>
</tr>
<tr>
<td>Food &amp; Wine</td>
<td></td>
<td>694,573</td>
<td>13,778,882</td>
<td>121,130</td>
</tr>
</tbody>
</table>
Biomass Contract

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

<table>
<thead>
<tr>
<th>Building</th>
<th>In Service Date</th>
<th>GSF</th>
<th>Annual kwhrs</th>
<th>Annual MMBTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzler</td>
<td>FY12</td>
<td>28,467</td>
<td>167,616</td>
<td>1,880</td>
</tr>
<tr>
<td>Tate</td>
<td>FY13</td>
<td>42,930</td>
<td>319,632</td>
<td>2,837</td>
</tr>
<tr>
<td>ARC</td>
<td>FY13</td>
<td>20,758</td>
<td>619,545</td>
<td>8,899</td>
</tr>
<tr>
<td>Gwynn</td>
<td>FY15</td>
<td>38,600</td>
<td>328,409</td>
<td>3,253</td>
</tr>
<tr>
<td>UMC - ER</td>
<td>FY14</td>
<td>36,900</td>
<td>1,327,072</td>
<td>7,686</td>
</tr>
<tr>
<td>UMC - Patient Care</td>
<td>FY13</td>
<td>310,000</td>
<td>8,952,800</td>
<td>70,151</td>
</tr>
<tr>
<td>UMC - Orthopedics Expansion</td>
<td>FY13</td>
<td>6,000</td>
<td>143,801</td>
<td>1,464</td>
</tr>
<tr>
<td>Wolpers &amp; Johnson</td>
<td>FY15</td>
<td>211,318</td>
<td>1,919,808</td>
<td>24,966</td>
</tr>
<tr>
<td>Food &amp; Wine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>694,973</td>
<td>13,778,682</td>
<td>121,136</td>
</tr>
</tbody>
</table>
Sample letter describing wind power and sample allocations

Sample allotment record
<table>
<thead>
<tr>
<th>MR Prerequisite 1</th>
<th>Storage and Collection of Recyclables</th>
<th>03</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR Credit 1.1</td>
<td>Building Reuse - Maintain Existing Walls, Floors, and Roof</td>
<td>05</td>
</tr>
<tr>
<td>MR Credit 1.2</td>
<td>Building Reuse - Maintain Interior Non-Structural Elements</td>
<td>06</td>
</tr>
<tr>
<td>MR Credit 2</td>
<td>Construction Waste Management</td>
<td>07</td>
</tr>
<tr>
<td>MR Credit 3</td>
<td>Materials Reuse</td>
<td>09</td>
</tr>
<tr>
<td>MR Credit 4</td>
<td>Recycled Content</td>
<td>10</td>
</tr>
<tr>
<td>MR Credit 5</td>
<td>Regional Materials</td>
<td>11</td>
</tr>
<tr>
<td>MR Credit 6</td>
<td>Rapidly Renewable Materials</td>
<td>12</td>
</tr>
<tr>
<td>MR Credit 7</td>
<td>Certified Wood</td>
<td>13</td>
</tr>
</tbody>
</table>
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)

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 and Recycling at MU FY 2010

### Summary

<table>
<thead>
<tr>
<th>Description</th>
<th>Tons</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Waste (tons include recyclables)</td>
<td>7,908</td>
<td>$442,803.82</td>
</tr>
<tr>
<td>Recycled Tonnage</td>
<td>1,974</td>
<td>$0.00</td>
</tr>
<tr>
<td>Amount Landfilled</td>
<td>5,934</td>
<td>$442,803.82</td>
</tr>
<tr>
<td>Percent Recycled</td>
<td>24.96%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost / ton landfilled</td>
<td></td>
<td>$74.62</td>
</tr>
<tr>
<td>Cost / ton recycled</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Avoided cost from Recycling</td>
<td></td>
<td>$147,950.00</td>
</tr>
<tr>
<td>Income from Sale of Recyclables</td>
<td></td>
<td>$10,744.21</td>
</tr>
<tr>
<td>Avoided cost from Chemical and Glass Recycling</td>
<td></td>
<td>$171,451.00</td>
</tr>
<tr>
<td>Total savings due to recycling</td>
<td></td>
<td>$330,145.21</td>
</tr>
</tbody>
</table>

### Recycled Material Type

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Tons</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Paper</td>
<td>922.58</td>
<td>1,845,162</td>
</tr>
<tr>
<td>Cardboard</td>
<td>404.32</td>
<td>808,638</td>
</tr>
<tr>
<td>Newspaper</td>
<td>13.64</td>
<td>27,280</td>
</tr>
<tr>
<td>Electronics</td>
<td>62.14</td>
<td>124,276</td>
</tr>
<tr>
<td>Steel</td>
<td>242.75</td>
<td>485,500</td>
</tr>
<tr>
<td>Aluminum</td>
<td>18.30</td>
<td>36,587</td>
</tr>
<tr>
<td>Plastic Bottles</td>
<td>46.20</td>
<td>92,395</td>
</tr>
<tr>
<td>Glass</td>
<td>59.65</td>
<td>119,303</td>
</tr>
<tr>
<td>Used Oil</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>Grass Clippings</td>
<td>109.03</td>
<td>218,064</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>88.85</td>
<td>179,087</td>
</tr>
<tr>
<td>Batteries</td>
<td>5.20</td>
<td>10,510</td>
</tr>
<tr>
<td>Post Consumer Totals</td>
<td>1,973.71</td>
<td>3,947,420</td>
</tr>
</tbody>
</table>

### Waste Utilization (not included in above)

<table>
<thead>
<tr>
<th>Waste Utilization</th>
<th>Tons</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler Ash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tire Derived Fuel</td>
<td>2,657.00</td>
<td>5,314,000</td>
</tr>
<tr>
<td>Wood Chips/Boiler Fuel</td>
<td>2,394.00</td>
<td>4,788,000</td>
</tr>
<tr>
<td>Total Waste Utilization for UMC</td>
<td>5,051.00</td>
<td>10,102,000</td>
</tr>
</tbody>
</table>

### FY 2010 Projects

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Tons</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiger Treasures (end of year residence hall recycling)</td>
<td>15.00</td>
<td>30,000</td>
</tr>
<tr>
<td>Indoor Beverage Container Recycling</td>
<td>49.04</td>
<td>98,079</td>
</tr>
<tr>
<td>Tiger Tailgate Recycling</td>
<td>20.93</td>
<td>41,800</td>
</tr>
<tr>
<td>Drop off Recycling (beverage)</td>
<td>19.48</td>
<td>38,960</td>
</tr>
<tr>
<td>Drop off Recycling (fiber)</td>
<td>30.24</td>
<td>117,040</td>
</tr>
<tr>
<td>Sidewalk Recycling</td>
<td>12.27</td>
<td>24,540</td>
</tr>
<tr>
<td>Paper Recycling (academic, administrative, support)</td>
<td>922.58</td>
<td>1,845,162</td>
</tr>
<tr>
<td>Cardboard (academic, administrative, support)</td>
<td>404.32</td>
<td>808,636</td>
</tr>
<tr>
<td>Newsprint (academic, administrative, support)</td>
<td>13.64</td>
<td>27,280</td>
</tr>
<tr>
<td>Total</td>
<td>1487.50</td>
<td>2,974,967</td>
</tr>
</tbody>
</table>
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.
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.
Waste Management Action Plan

<table>
<thead>
<tr>
<th>Type of Construction Material</th>
<th>Estimated Quantity of waste generated (Tons)</th>
<th>Estimated Quantity of Waste recycled (Tons)</th>
<th>Estimated % Waste recycled/dverted (%)</th>
<th>Estimated Cost of Diversion ($)</th>
<th>Material Handling Procedure</th>
<th>Means of Transportation</th>
<th>Where is the material going?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Cardboard and paper products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b Clean dimensional wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c Beverage containers</td>
<td></td>
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</tr>
<tr>
<td>d Concrete</td>
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<tr>
<td>e Metals</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>f Mechanical and Electrical Equipment</td>
<td>Building components removed intact from existing construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g Packaging materials</td>
<td></td>
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</tr>
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<td></td>
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</tr>
<tr>
<td>i Scraps from gypsum wall board</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j Carpet and pad</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k Acoustical wall panels</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m Plastics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**

**ESTIMATED TOTAL WASTE GENERATED** =

**ESTIMATED TOTAL WASTE DIVERTED** =

**ESTIMATED % TOTAL WASTE DIVERTED** =

---

**LOCAL RECYCLING AND SORTING FACILITIES FOR CONSTRUCTION WASTE MANAGEMENT.**

<table>
<thead>
<tr>
<th>MATERIALS ACCEPTED</th>
<th>FACILITY</th>
<th>ADDRESS</th>
<th>PHONE</th>
<th>FAX</th>
<th>SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Fluorescent</td>
<td>WM LampTracker</td>
<td>415 Kato Industrial Dr.</td>
<td>888.537.4674</td>
<td>573.302.7575</td>
<td>Missouri Certified Resource Recovery Facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recyclable paper</td>
<td>ALLIED WASTE SERVICES</td>
<td>5604 Missouri River Access Rd</td>
<td>573.635.8805</td>
<td>573.449.9641</td>
<td>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 transfer station. Offered services: Waste audits, cost-analysis, program development, equipment specification, sales, leasing.</td>
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<td></td>
<td>OF JEFFERSON CITY (Republic Services Company)</td>
<td>Jefferson City, MO</td>
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<tr>
<td>Wood</td>
<td>Jefferson City landfill (Republic Services Company)</td>
<td>5604 Missouri River Access Road</td>
<td>573.635.8805</td>
<td></td>
<td>The Jefferson City landfill is equipped to take construction debris, roofing material and other heavy waste</td>
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<tr>
<td>Construction waste</td>
<td>City of Columbia Commercial Rolloff and Trash Collection</td>
<td>Gillem Building Columbia, MO</td>
<td>573.574.6291</td>
<td>573.449.9641</td>
<td>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 ROCKING MATERIALS.</td>
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<tr>
<td></td>
<td>Manchester Transfer and Recycle</td>
<td>7801 E 6th Street Kansas City, MO</td>
<td>816.920.6897</td>
<td>816.920.6897</td>
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</tr>
</tbody>
</table>

MR:08
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.
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.

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.

SUPPORING 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.
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.
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<th>03</th>
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<td>Low-Emitting Materials - Adhesives and Sealants</td>
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<td>Low Emitting Materials - Paints and Coatings</td>
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<td>Low Emitting Materials - Flooring Systems</td>
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<td>Thermal Comfort - Design</td>
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<td>IEQ Credit 8.1</td>
<td>Daylight and View - Daylight</td>
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<td>22</td>
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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.
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)

**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 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](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.
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 in 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.
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:

Designated Smoking Locations

Designated Smoking Areas
- Parking Lots
- Parking Structures
- (Top Floor, Sky Above Only)
**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 CO₂ concentrations within all densely occupied spaces (occupant density ≥ 25 people/1000 sf) 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 CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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**

**Option 1:**  
**Mechanical Ventilation**
- Case 1: Densely occupied spaces (25 per 1000 sf)
- Install outdoor airflow monitors in each space to measure against the design rate, as defined by ASHRAE 62.1.2007
- All monitors must provide feedback when levels vary by 10%, with an alarm providing feedback to facilities manager or building occupants signalling the need for corrective action.

**Option 2:**  
**Natural Ventilation**
- Case 2: At Least 20% of space is not densely occupied
- Install CO₂ Sensors that generate alarm when CO₂ concentration varies by 10% from design conditions

All monitors must provide feedback when levels vary by 10%, with an alarm providing feedback to facilities manager or building occupants signalling the need for corrective action.
**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.
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.
Credit 3.2
By Project
1 Point

**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 perform 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.
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

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.


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.
### IEQ CREDIT 4.1: LOW EMITTING MATERIALS - ADHESIVES AND SEALANTS

<table>
<thead>
<tr>
<th><strong>Architectural Applications</strong></th>
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<th><strong>Referenced Standard</strong></th>
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<tbody>
<tr>
<td>Indoor Carpet Adhesives</td>
<td>50</td>
<td>SCAQMD Rule 1168, 2005</td>
</tr>
<tr>
<td>Carpet Pad Adhesives</td>
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</tr>
<tr>
<td>Wood Flooring Adhesives</td>
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<td>SCAQMD Rule 1168, 2005</td>
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<tr>
<td>Rubber Floor Adhesives</td>
<td>60</td>
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<tr>
<td>Sub floor Adhesives</td>
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<td>Ceramic Tile Adhesives</td>
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<td>VCT and Asphalt Adhesives</td>
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<tr>
<td>Drywall and Panel Adhesives</td>
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<tr>
<td>Cove Based Adhesives</td>
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<tr>
<td>Multipurpose Construction Adhesives</td>
<td>70</td>
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<thead>
<tr>
<th><strong>Specialty Adhesives</strong></th>
<th><strong>VOC Limit (g/L less water)</strong></th>
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<td>PVC Welding</td>
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<td>CPVC Welding</td>
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<td>ABS Welding</td>
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<td>Plastic Cement Welding</td>
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<td>Adhesive Primer for Plastic</td>
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<td>Contact Adhesives</td>
<td>80</td>
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<tr>
<td>Special Purpose Contact Adhesive</td>
<td>250</td>
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<tr>
<td>Structural Wood Member Adhesive</td>
<td>140</td>
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<tr>
<td>Sheet Applied Rubber Lining Operations</td>
<td>850</td>
<td>SCAQMD Rule 1168, 2005</td>
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<tr>
<td>Top and Trim Adhesive</td>
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<tr>
<td>Structural Glazing Adhesive</td>
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<tr>
<th><strong>Substrate specific applications</strong></th>
<th><strong>VOC Limit (g/L less water)</strong></th>
<th><strong>Referenced Standard</strong></th>
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<tbody>
<tr>
<td>Metal to Metal</td>
<td>30</td>
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<tr>
<td>Plastic Foam</td>
<td>50</td>
<td>SCAQMD Rule 1168, 2005</td>
</tr>
<tr>
<td>Porous Material (except wood)</td>
<td>50</td>
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<tr>
<td>Wood</td>
<td>30</td>
<td>SCAQMD Rule 1168, 2005</td>
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<tr>
<td>Fiberglass</td>
<td>80</td>
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<table>
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<tr>
<th><strong>Sealants</strong></th>
<th><strong>VOC Limit (g/L less water)</strong></th>
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<tr>
<td>Architectural</td>
<td>250</td>
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<tr>
<td>Roadway</td>
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<td>Other</td>
<td>420</td>
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<th><strong>Sealant Primers</strong></th>
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<th><strong>Referenced Standard</strong></th>
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<tr>
<td>Architectural, non-porous</td>
<td>250</td>
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<tr>
<td>Architectural, porous</td>
<td>775</td>
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<tr>
<td>Other</td>
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<th><strong>Aerosol Adhesives</strong></th>
<th><strong>VOC Limit by weight</strong></th>
<th><strong>Referenced Standard</strong></th>
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<tbody>
<tr>
<td>General Purpose Mist Spray</td>
<td>65%</td>
<td>Green Seal GS-36 Oct 2000</td>
</tr>
<tr>
<td>General Purpose Web Spray</td>
<td>55%</td>
<td>Green Seal GS-36 Oct 2000</td>
</tr>
<tr>
<td>Special Purpose Aerosol Adhesives (all types)</td>
<td>70%</td>
<td>Green Seal GS-36 Oct 2000</td>
</tr>
<tr>
<td>Product Type</td>
<td>VOC Limit (g/L less water)</td>
<td>Referenced Standard</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Interior Flat Coating or Primer</td>
<td>50</td>
<td>Green Seal GS-11, 1993</td>
</tr>
<tr>
<td>Interior Non-Flat Coating or Primer</td>
<td>150</td>
<td>Green Seal GS-11, 1993</td>
</tr>
<tr>
<td>Anti-Corrosive / Anti-Rust Paint</td>
<td>250</td>
<td>Green Seal GS-03, 2nd ed.1997</td>
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<tr>
<td>Clear Wood Finish: Lacquer</td>
<td>550</td>
<td>SCAQMD Rule 1113, 2004</td>
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<tr>
<td>Clear Wood Finish: Sanding Sealer</td>
<td>350</td>
<td>SCAQMD Rule 1113, 2004</td>
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<tr>
<td>Clear Wood Finish: Varnish</td>
<td>350</td>
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<tr>
<td>Clear Brushing Lacquer</td>
<td>680</td>
<td>SCAQMD Rule 1113, 2004</td>
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<tr>
<td>Floor Coatings</td>
<td>100</td>
<td>SCAQMD Rule 1113, 2004</td>
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<td>Sealers and Undercoaters</td>
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<td>Shellac: Clear</td>
<td>730</td>
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<tr>
<td>Shellac: Pigmented</td>
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<tr>
<td>Stain</td>
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<tr>
<td>Concrete Curing Compounds</td>
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<td>Japans/ Faux Finishing Coatings</td>
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<td>Magnesite Cement Coatings</td>
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<tr>
<td>Pigmented Lacquer</td>
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<td>Waterproofing Sealers</td>
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<td>Waterproofing Concrete / Masonry Sealers</td>
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<td>Wood Preservatives</td>
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<tr>
<td>Low-Solids Coatings</td>
<td>120</td>
<td>SCAQMD Rule 1113, 2004</td>
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</tbody>
</table>

**IEQ CREDIT 4.3: LOW EMITTING MATERIALS - FLOORING SYSTEMS**

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Referenced Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpet</td>
<td>Meet testing and product requirements of Carpet and Rug Institute Green Label Plus Program</td>
</tr>
<tr>
<td>Carpet cushion (building interior installation)</td>
<td>Meet requirements of Carpet and Rug Institute Green Label Plus Program</td>
</tr>
<tr>
<td>Carpet Adhesive</td>
<td>(IEQ c4.1; SCAQMD Rule#1168, 2005)</td>
</tr>
<tr>
<td>Hard Surface Flooring</td>
<td>Meet requirements of FloorScore standard</td>
</tr>
<tr>
<td>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</td>
<td>-</td>
</tr>
<tr>
<td>Associated site-applied adhesives, grouts, finishes and sealers</td>
<td>Mineral based or unfinished/untreated solid wood flooring system</td>
</tr>
<tr>
<td>Concrete, wood, bamboo and cork floor finishes such as sealer, stain and finish</td>
<td>SCAQMD Rule 1113, 2004</td>
</tr>
<tr>
<td>Tile setting adhesives and grout</td>
<td>SCAQMD Rule 1168, 2004</td>
</tr>
</tbody>
</table>

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

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

IEQ.15
Indoor Chemical and Pollutant Source Control
Credit 5
By Project

1 Point

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.
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,

[Signature]
Matt Maher
Manager, Custodial Operations

hb
IEQ

Controllability Of Systems - Lighting

Credit 6.1
1 Point

Campus Standard

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.
Controllability Of Systems - Thermal Comfort
Credit 6.2
By Project

1 Point

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.
thermalcomfort-design

**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.

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thermalcomfort-verification

**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:** $0.150 < \text{VLT} \times \text{WFR} < 0.180$ (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
- **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.
<table>
<thead>
<tr>
<th>ID Credit</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID Credit 1.1</td>
<td>Exemplary Performance: SSC5.2 Maximize Open Space</td>
<td>03</td>
</tr>
<tr>
<td>ID Credit 1.2</td>
<td>AASHE’s Sustainability Tracking Assessment and rating System (STARS)</td>
<td>04</td>
</tr>
<tr>
<td>ID Credit 1.3</td>
<td>Green Education Program</td>
<td>06</td>
</tr>
<tr>
<td>ID Credit 1.4</td>
<td>Building Management Systems</td>
<td>08</td>
</tr>
<tr>
<td>ID Credit 1.5</td>
<td>Climate Action Plan</td>
<td>10</td>
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<tr>
<td>ID Credit 2</td>
<td>LEED Accredited Professional (AP)</td>
<td>12</td>
</tr>
</tbody>
</table>
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)
AASHE’s Sustainability Tracking Assessment and Rating System (STARS)

Credit 1.2 1 Point

Master Site

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

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.
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

History/Where we are

> Sustain Mizzou is a student group that was formed in 2004 focused on education, cooperation and local action regarding the environment.
> The Mizzou Sustainability Office, a part of Campus Facilities, was started by Chancellor B�uston in 2009. The Mizzou Sustainability Office works on all aspects of sustainability all across campus.
> The Student Sustainability office, a part of Campus Facilities, 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:

Eats

> 60% 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 Sustainable Mizzou Food Drive.

Recycle

> 56% 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 & #5, metal, aluminum and glass.
> Special materials that you can recycle in specific bins include printer cartridges, batteries, and old phones.
> Several recycling events are held throughout the year, including Tiger Tailgate Recycling during the football season, the Sustainable Mizzou electronic waste drive Tiger Treasures (at the end of the academic year).

Eco-Friendly Awards

> Mizzou awards costs over $100,000 per year through energy conservation.
> Mizzou Development is a student-run energy conservation effort in the residence halls. You can see the system online at mizzou.development.
> The campus power plant is currently recycling fly ash to replace an old real boiler. This will allow Mizzou to meet up to 55% 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, University, and many more. All of these majors and minors at Mizzou are taught with a substantial focus on sustainability. There are also academic programs as well, including a minor in Campus Wildlife Animal Management, classes in sustainable engineering, and others. Check with your academic advisor to see what options may be available for you.

Resources

Renewables

> Mizzou has a monthly farmers market on Lowry Mall every Saturday.
> Mizzou hosts a monthly Farmers Market on Lowry Mall every Saturday.
> Sustainable Mizzou Classroom: a student run classroom that focuses on sustainable living.
> Mizzou hosts a monthly farmers market on Lowry Mall every Saturday.

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

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 Resources 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 advisor 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 workshop site, update calendars, volunteer recruitment,
3. Any other tasks as needed.

To apply, please email us at mzzouproot@gmail.com

CONTACT US
Email us at: mizzouproot@gmail.com

LINKS
- 165 Student Sustainability
- SPROUT Facebook Page
- University of Missouri

FOLLOW SPROUT ON TWT

- SPROUT will be at global neuro Festival April 30th! Global first annual waste festival! http://bit.icio.us/le7rjy & newsletter.4 months ago
- Playground Concept Trash C. http://bit.icio.us/6RZ7Z 4 months ago
- If you have any interest in the present and future of agriculture and our well-being, consider http://bit.icio.us/0S59n 3 months ago
- Real Food at Mizzou is coming http://bit.icio.us/0S59n 3 months ago
- Registration and food is FREE, must register 3 months ago
Campus Wide Building Management System

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
**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

Carbon Reduction Plan

<table>
<thead>
<tr>
<th>Year</th>
<th>GHG (MTCO₂e)</th>
<th>Energy (MMBTU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>348,704</td>
<td>1,164,219</td>
</tr>
<tr>
<td>2000 baseline</td>
<td>376,886</td>
<td>1,502,841</td>
</tr>
<tr>
<td>2015</td>
<td>300,439</td>
<td>1,528,584</td>
</tr>
</tbody>
</table>

Scope 3 CO₂ EMISSIONS
Scope 2 CO₂ EMISSIONS
Scope 1 CO₂ EMISSIONS
TOTAL ENERGY USE
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
University of Missouri’s
IAQ management plan
Hospital’s IAQ management plan
Sample Materials Plan
# SAMPLE MATERIALS PLAN WORKSHEET

## LEED 2009 STATUS

<table>
<thead>
<tr>
<th>LEED 2009 STATUS</th>
<th>Total Cost of LEED complying materials</th>
<th>Total Materials Cost</th>
<th>Complying %</th>
<th>Points Achievable</th>
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<tr>
<td>MR Cr 4 Recycled Content</td>
<td>$7,225,323</td>
<td>$10,623,554</td>
<td>68.0%</td>
<td>2 + 1 exemplary point</td>
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<tr>
<td>MR Cr 5 Regional Materials</td>
<td>$6,900,221</td>
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<td>2 + 1 exemplary point</td>
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<tr>
<td>MR Cr 7 FSC Certified Wood</td>
<td>$5,089</td>
<td>$5,111</td>
<td>99.6%</td>
<td>1 + 1 exemplary point</td>
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</tbody>
</table>

## MATERIALS WORKSHEET

### PROJECT: Sample Project Name ABC, City, XX

### DATE: mm/dd/yyyy

### LEED 2009 - MATERIALS WORKSHEET

#### SPECIFICATION

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<tr>
<th>Csi Section based on CSI 2004</th>
<th>Product Name</th>
<th>Manufacturer</th>
<th>Contractor</th>
<th>Material Cost</th>
<th>% Post Cons.</th>
<th>% Pre Cons.</th>
<th>$ recycled</th>
<th>Distance From</th>
<th>RECUPED CONTENT</th>
<th>REGIONAL MATERIALS</th>
<th>FSC CERTIFIED</th>
<th>Indoor Air Quality</th>
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<td>DIVISIONS 3 - 10</td>
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<tr>
<td>0321XX SAMPLE PRODUCT 1</td>
<td>blank xyz manufacturer Joe Smith Contractor</td>
<td>$1,111,111</td>
<td>50% 75%</td>
<td>$972,222</td>
<td>200 200 40%</td>
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<td>400 600 0%</td>
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<td>$88</td>
<td>50 g/L</td>
<td>20 g/L</td>
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<td>$3,333</td>
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<td>DIVISION 11 - 26</td>
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<td>$1,111,111</td>
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<td>316000 Foundations</td>
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<tr>
<td>3121XX SAMPLE PRODUCT 1</td>
<td>blank xyz manufacturer Joe Smith Contractor</td>
<td>$5,000,000</td>
<td>50% 75%</td>
<td>$4,375,000</td>
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<td>321000 Paving Specialties</td>
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<td>3210XX SAMPLE PRODUCT 1</td>
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<td>50% 5%</td>
<td>$588,333</td>
<td>50 30 100%</td>
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<td>50% 30%</td>
<td>$722,222</td>
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<td>$555,556</td>
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<td>3291XX SAMPLE PRODUCT 1</td>
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<td><strong>TOTALS</strong></td>
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<td>$10,623,554</td>
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<td>68% 65%</td>
<td>$6,900,221</td>
<td>$5,111 100%</td>
<td>$5,089</td>
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</table>

**APPENDIX C: 1**
Sample Sustainable Materials Data Sheet
LEED DATA SHEET

DATE:

RE:

Contractor Information

Company: Representative:

Vendor/Supplier: Representative:

Product Data

Specification Section:

Product/Material Description (excluding labor and equipment):

Total Product Material Cost:

% Post-Industrial Recycled Content*:

% Post-Consumer Recycled Content*:

Regional materials*: List materials’ regional components and percentage by weight of each regional component and location of extraction, processing and manufacturing for each regional component. Refer to Section 018113, SUSTAINABLE DESIGN REQUIREMENTS for further requirements.

<table>
<thead>
<tr>
<th>Regional Component</th>
<th>% by Weight</th>
<th>Location of Extraction</th>
<th>Location of Processing</th>
<th>Location of Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Percentage Rapidly Renewable by Weight*:

FSC Certified Wood: Yes No N/A

VOC Content: VOC Content meets specified levels? Yes No N/A

CRI Green Label Plus Certified*: Yes No N/A

Floor Score Certified*: Yes No N/A

Contains no added Urea-Formaldehyde*: Yes No N/A

*Definitions can be found in Section 018113, SUSTAINABLE DESIGN REQUIREMENTS.

Signature Date

APPENDIX D: 1
Recommended Sustainable Requirements for Standard Building Products
### Recommended Sustainable Requirements for Standard Building Products

<table>
<thead>
<tr>
<th>DIVISION</th>
<th>SECTION TITLE</th>
<th>SS/C7.1-7.2</th>
<th>MR c4</th>
<th>MR c5</th>
<th>MR c7</th>
<th>EQ 4.1-4.2</th>
<th>EQ 4.4</th>
<th>EQ 5, 6, 8, 9</th>
<th>EQ c3</th>
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<td>300000</td>
<td>CAST IN PLACE CONCRETE</td>
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<td></td>
</tr>
<tr>
<td>2 Products</td>
<td>reinforcing bars</td>
<td>min post consumer 80%, 15% pre consumer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td> </td>
<td>concrete</td>
<td>min post consumer 80%, 15% pre consumer</td>
<td></td>
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<tr>
<td> </td>
<td>use fly ash content</td>
<td>must be manufactured and extracted/recovered/harvested from within 500 miles</td>
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<td>420000</td>
<td>UNIT MASONRY</td>
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<td>2 Products</td>
<td>clay masonry units</td>
<td>min 25% pre consumer</td>
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<td> </td>
<td>concrete masonry units</td>
<td>min 40% pre consumer content</td>
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<td> </td>
<td>mortar and grout mixes</td>
<td>min 80% post consumer for grout,</td>
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<td></td>
<td></td>
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<tr>
<td> </td>
<td>joint reinforcing and anchors</td>
<td>min 25% post consumer, 75% pre consumer</td>
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<td> </td>
<td>copper-fabric laminate flashing</td>
<td>min 90% post consumer content</td>
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<td> </td>
<td>SS thru wall flashing</td>
<td>min 60% min post consumer</td>
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<td>Polyisocyanurate Board Insulation</td>
<td>min 25% post consumer 10% pre consumer</td>
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<td></td>
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<tr>
<td> </td>
<td>adhesive (for polyisocyanurate board insulation)</td>
<td>Maximum VOC Limit of 250g/L</td>
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<td>     </td>
<td>Steel 60% post consumer for grout, 40% post consumer for adhesive</td>
<td>No added Urea Formaldehyde</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td> </td>
<td>No added Urea Formaldehyde</td>
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<tr>
<td>2 Products</td>
<td>W-Shapes</td>
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<td>Channels, Angles, M, S-Shapes</td>
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<td>Plate and Bar</td>
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<td>Cold-Formed Hollow Structural Sections</td>
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<td>Steel Pipe</td>
<td>min post consumer 6% post consumer (if BOP method) 55% post consumer and 30% pre consumer by EAF method</td>
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<td>All Other Steel Materials</td>
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<td>2 Products</td>
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<td>Steel bearing plates</td>
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<tr>
<td>2 Products</td>
<td>Steel roof deck</td>
<td>min post consumer 55%, 10% pre consumer</td>
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APPENDIX E: 1
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<th>BSC7.1-7.2 Heat Island Effect - SRI Index</th>
<th>MR c 4 Recycled content</th>
<th>MR c8 Regional content (&lt;500 miles from mfrd+harvested)</th>
<th>MR c7 FSC Certified</th>
<th>IEQ 4.1-4.2 VOC Limits</th>
<th>IEQ 4.4 Urea Formaldehyde</th>
<th>IEQ 4.3.1, 4.2 Daylight and Views</th>
<th>IEQ c3 Certification</th>
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<td></td>
<td>Piping bollards</td>
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<td>Is it a wood preservative? TF as 350g/L limit.</td>
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APPENDIX E: 2
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<th>MR c7</th>
<th>EQ c4.1-4.2</th>
<th>EQ c4.4</th>
<th>EQ c8.1, 8.2</th>
<th>EQ c3</th>
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### 061753 Shop Fabricated Wood Trusses
1. **LEED Submittals**
   - Add Product Data for LEED Credit MRc4, MRc5, MRc7, EQc4.1, EQc4.4
2. **Products**
   - Lumber
     - FSC Certified
     - No added Urea Formaldehyde

### 064021 Interior Architectural Woodwork
1. **LEED Submittals**
   - Add Product Data for LEED Credit MR C4, MRc5, MRc7, EQc4.1, EQc4.4
2. **Products**
   - High pressure laminate
     - Min 100% post consumer
     - No added urea formaldehyde
   - Medium density fiberboard
     - Min 100% post consumer
     - FSC Certified
   - Particle board
     - Min 100% pre consumer
     - No added urea formaldehyde
   - Softwood plywood
     - Min 100% pre consumer
     - No added urea formaldehyde
   - Duraface particleboard
     - Min 55% post consumer
     - No added Urea Formaldehyde
   - Fire-Retardant Fiberboard
     - Min 100% pre consumer
   - Joint adhesive
   - Medium density fiberboard
   - Particle board
   - Softwood plywood
   - Duraface particleboard
   - Fire-Retardant Fiberboard
   - Joint adhesive

### 071321 Sheet Membrane Waterproofing
1. **LEED Submittals**
   - Add Product Data for LEED Credit MRc4, MRc5
2. **Thermal Insulation**
   - Add Product Data for LEED Credit MRc4, MRc5, EQc4.1, EQc4.4

### 072100 Thermal Insulation
1. **LEED Submittals**
   - Add Product Data for LEED Credit MRc4, MRc5, EQc4.1, EQc4.4
2. **Products**
   - Extruded polystyrene board insulation
     - Min 40% post consumer
     - No added Urea Formaldehyde
   - Unfaced mineral fiber blanket insulation
     - Min 20% post consumer, 5% pre consumer
     - No added Urea Formaldehyde
   - Adhesive for bonding insulation
     - If within the vapor barrier specify VOC limit of 250g/L

### 074113 Metal Roof Panels
1. **LEED Submittals**
   - Add Product Data for LEED Credit SS c 7.2, MRc4, MRc5
2. **Products**
   - Steel roof panels and shingles
     - SRI Index 78min for slopes less than 2:12 SRI of 29 min for slopes of 2:12 or more
     - Min 30% post consumer and 15% pre consumer
   - Aluminum zinc alloy coated Steel sheet
   - Integrated standing seam metal roof panels
     - SRI Index 78min for slopes less than 2:12 SRI of 29 min for slopes of 2:12 or more

### 074244 Manufactured Roof Wall Panels
1. **LEED Submittals**
   - Add Product Data for LEED Credit MR C4, MRc5, EQc4.4
2. **Products**
   - Laminated wall panel system
     - Min 5% post consumer recycled content, 6% pre consumer recycled content
   - Core insulation
     - Min 25% post consumer 10% pre consumer
     - No added Urea Formaldehyde

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**APPENDIX E: 3**
<table>
<thead>
<tr>
<th>DIVISION</th>
<th>Section title</th>
<th>SS57-1.7-2</th>
<th>MR c4</th>
<th>MR 05</th>
<th>MR c7</th>
<th>IEQ 4.1-4.2</th>
<th>IEQ c4.4</th>
<th>EQc8.1, 8.2</th>
<th>EQc3</th>
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<td>075216</td>
<td>THERMAL MIRROR MODIFIED BITUMINOUS MEMBRANE ROOFING</td>
<td>Hot Island Effect - SRI Index</td>
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<td>Regional content (&lt;500 miles from manufacturer)</td>
<td>FSC Certified</td>
<td>VOC Limits</td>
<td>Urea Formaldehyde</td>
<td>Daylight and Views</td>
<td>Certification</td>
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<td><strong>1</strong> LEED Submittals</td>
<td>Add Product Data for LEED Credit SS57. EEq4.4</td>
<td><strong>NOTE:</strong> Verify modbit meet SRI of 75smin. Firestone ultralite is not compliant. May require additional coating.</td>
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<td><strong>2</strong> Products</td>
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<tr>
<td></td>
<td>polyiso/polyurathane form board insulation</td>
<td>min 15% post consumer and 9% pre consumer</td>
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<td>No added Urea Formaldehyde</td>
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<td>Asbestos containing materials shall not be incorporated into the Work.</td>
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077100 Manufactured Roof Specialties

| **1** LEED Submittals | MRc4, MRc5, EEq4.1 |
| **2** Products | aluminum | min 80% post consumer, 9% pre consumer |

077200 Roof Accessories

| **1** LEED Submittals | MRc6 |

077200 Firestopping

| **1** LEED Submittals | Add Product Data for LEED Credit EEq4.1, EEq4.2, EEq4.4 |
| **2** Products | Firestop mortar | min 6% post consumer | | | | | | |
| | Firestop sealants and caulks | | | | | | | |
| | Firestop colarts | | | | | | | |
| | Firestop mastic | | | | | | | |
| | Foams | | | | | | | |
| | primer, sealant and solvent cleaners | | | | | | | |

079200 Joint Sealants

| **1** LEED Submittals | Add Product Data for LEED Credit EEq4.1 |
| **2** Products | interior sealants: Architectural Sealants 250g/L | | | | | | |
| | interior sealants: Sealant primers for non-porous substrates 250g/L | | | | | | |
| | Silicone Acrylic Latex Sealant 250g/L | | | | | | |
| | Multi-Part Pourable UniFlame Sealant for Use T 250g/L | | | | | | |
| | Silicone Sanitary Sealant: Plastic Foam Joint Fillers 250g/L | | | | | | |
| | Bond Breaker Tape: Primer 250g/L | | | | | | |

081113 Hollow Metal Doors and frames

| **1** LEED Submittals | Add product information for MR c4, MR c5 |
| **2** Products | hollow metal door and frame | min 25% post consumer and 8% pre consumer |

081613 Fibreglass reinforced plastic doors and frames

| **1** LEED Submittals | Add Product Data for LEED Credit MR c4, MRc5, EEq4.4 |
| **2** Products | wp doors | | | | |

APPENDIX E: 4
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<td>VOC Limits</td>
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<td>Daylight and Views</td>
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**NOTE:** Add desired VLT, SHGC, and U value properties for each glass type in schedule.
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<th>DIVISION, Section title</th>
<th>USGBC v 1.7-2 Heat Island Effect - BRI Index</th>
<th>MR c 4 Recycled content</th>
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<th>EQ c4.4 Urea Formaldehyde</th>
<th>EQ c3 Daylight and Views Certification</th>
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<td>Rubber Floor Adhesives</td>
<td>Resilient Base Adhesives max limit of 50g/L</td>
<td>MR c 5 max limit of 50g/L</td>
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<td>Vapor barrier lap adhesive</td>
<td>Maximum VOC Limit of 70 g/L (multipurpose construction adhesive)</td>
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<td>Cellular foam flexible insulation</td>
<td>No added Urea Formaldehyde</td>
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<td>elastomeric foam adhesive air dried contact adhesive</td>
<td>Maximum VOC Limit of 80 g/L</td>
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<td>canvas lagging adhesive</td>
<td>Maximum VOC Limit of 70 g/L</td>
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<td>HVAC piping insulation</td>
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<td>Add Product Data for LEED Credit EQc4.1, EQc4.4</td>
<td>No added Urea Formaldehyde</td>
<td>Maximum VOC Limit of 50 g/L</td>
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<td>2</td>
<td>Products</td>
<td>Glass fiber rigid molded insulation non combustible</td>
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<td>Vapor barrier lap adhesive</td>
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<td>Insulating Cement / Mastic</td>
<td>Maximum VOC Limit of 70 g/L (multipurpose construction adhesive)</td>
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<td>Glass fiber rigid</td>
<td>No added Urea Formaldehyde</td>
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<td>Indoor vapor barrier finish: vinyl emulsion type acrylic</td>
<td>Maximum VOC Limit of 50 g/L</td>
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<td>Cellular foam insulation flexible elastomeric</td>
<td>No added Urea Formaldehyde</td>
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<td>Cellular foam elastomeric foam adhesive air dried contact adhesive</td>
<td>Maximum VOC Limit of 80 g/L</td>
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<td>Insulation high density insulation (fiberglass, mineral wool, ceramic fiber) with coated glass fabric</td>
<td>No added Urea Formaldehyde</td>
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<td>Covering adhesive mastic</td>
<td>Maximum VOC Limit of 50 g/L</td>
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<td>2</td>
<td>Products</td>
<td>Non hardening water resistant fire resistant sealant</td>
<td>Maximum VOC Limit of 30 g/L</td>
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<td>Air handling Units</td>
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<td>LEED Submittals</td>
<td>Add Product Data for LEED Credit MR c4, MRc5, SSc7.1</td>
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<td>2</td>
<td>Products</td>
<td>Concrete SRI 29 minimum fly ash content</td>
<td>must be manufactured and extracted/recovered/harvested from within 500 miles</td>
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<td>Concrete paving</td>
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<td>2</td>
<td>Products</td>
<td>Steel Chain Link Fence</td>
<td>must be manufactured and extracted/recovered/harvested from within 500 miles</td>
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<td>323119</td>
<td>Chain Link Fences and Gates</td>
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<td>Steel Chain Link Fences</td>
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Construction Waste Management Requirements
Template for Owner’s Project Requirements
Sustainability Specifications Guidelines

Sustainable Design Requirements
GENERAL PHILOSOPHY (not included in specifications)

LEED certification is dependent on the entire team. However, the entire team is not responsible for all of the credits. For instance, the contractor has no relationship with the project being located near public transportation.

The contractor is obligated to achieve the requirements outlined in the specification therefore only include definitions, submittals, products, and execution relative to the LEED credits assigned to the contractor.

The design team is responsible for designing the project to meet the LEED Construction related credits. The contractor is responsible for adhering to the design, notifying the team if the design will not meet the intent, and ensuring construction meets the credit requirements. The design team and contractor need to work together to earn the credits.

The contractor does not need to know what level of LEED the project is seeking. This keeps the contractor focused on meeting the document requirements and from trying to “trade” credits.

The project owner may choose to relieve the contractor of obligations based on the overall LEED rating.

These guidelines will change based upon the pursued credits for each project. Consultants should use these guidelines to guide the development of the Specification [Project Manual]. Each Project Manual should be created specifically to meet the project requirements including formatting, numbering and organization.

GENERAL REQUIREMENTS / Special Conditions

LEED Pre-Bid:
Review LEED requirements described within specification.

LEED PRE-CONSTRUCTION MEETING:
This should be the next meeting after the first construction meeting.

Suggested Attendees:
Architect, Engineers, Commissioning Agent, Owner representative, Construction Waste Manager, Contractor’s LEED manager, Contractor and subs with responsibility for achieving LEED credits.

Suggested Agenda:
- Introductions
- Submittal Process, Documentation Format, Information required specifically for LEED Certification
- Review Required Submittals.
- Discuss required periodic reporting criteria/requirements for a. construction meetings, b. pay applications
- Review the Contractor’s Plans to achieve the contractor assigned LEED credits. The plans must be submitted within 15 days of notice to proceed

CONSTRUCTION PROGRESS MEETINGS:
Include LEED Progress report

PRIOR TO FIRST APPLICATION FOR PAYMENT:
Provide LEED plans Submittals in Sustainable Design Requirements
PRIOR TO FINAL APPLICATION FOR PAYMENT:
Complete LEED documentation required in Sustainable Design Requirements

PROCEDURES, CLEAN-UP:
Comply with Construction Waste Management Plan and Construction Indoor Air Quality Management Plan

SUBMITTALS:
Comply with Sustainable Design Requirements.

SUBMITTAL SCHEDULE:
Must include submittals required in Sustainable Design Requirements

CUTTING AND PATCHING:
Must meet Sustainable Design Requirements

SUBSTITUTION REQUEST AND SUSTAINABLE DESIGN INTENT:
Proposed substitutions may be rejected where data is not provided or where data that is significantly different than specified materials would negatively impact the project’s sustainable design intent

RECORD DOCUMENTS:

SUBSTANTIAL COMPLETION PAYMENT:
Verify all contractor-related credit letter templates have been completed, submitted to LEED online and approved by owner.

FINAL APPLICATION FOR PAYMENT:
Verify all contractor-related credit letter templates have been approved by the GBCI.

MOCKUPS:
Comply with Sustainable Design Requirements

EROSION AND SEDIMENT CONTROL:
Erosion control plans shall be created for every project and shall conform to the 2003 EPA Construction General Permit and/or 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

PEST CONTROL:
Follow integrated pest management practices.

SMOKING:
No smoking is allowed on the construction site.

FINAL CLEANING:
Use only Green Seal Certified Cleaning Products.

Appendix I: 2
TEMPORARY FACILITIES AND UTILITY:

FIELD OFFICE:
Provide for recycling for at minimum paper, cardboard, plastic, glass, and metal.

STORAGE OF MATERIALS:
Comply with requirements in Section XX-XX-XX Indoor Air Quality Management.

**SUSTAINABLE DESIGN REQUIREMENTS**

**DESCRIPTION OF WORK**

**WORK INCLUDED:**
General requirements and procedures for compliance with selected credits included in the U.S. Green Building Council’s (USGBC) Leadership in Energy & Environmental Design (LEED) 2009 for New Construction Rating System

Sustainable Design Requirements contain Contractor requirements for LEED credits the Contractor is primarily responsible for achieving. (CHANGE BASED ON CREDITS PURSUING)
- Materials & Resources Credit 2: Construction Waste Management
- Materials & Resources Credit 3: Materials Reuse
- Materials & Resources Credit 4: Recycled Content
- Materials & Resources Credit 5: Regional Materials
- Materials & Resources Credit 6: Rapidly Renewable Materials
- Materials & Resources Credit 7: Certified Wood
- Indoor Environmental Quality Credit 3.1: Construction Indoor Air Quality Management Plan During Construction
- Indoor Environmental Quality Credit 3.2: Construction Indoor Air Quality Management Plan Before Occupancy
- Indoor Environmental Quality Credit 4: Low Emitting Materials

Sustainable Design Requirements contain Contractor requirements for LEED credits the Contractor contributes to but is not primarily responsible for achieving (CHANGE BASED ON CREDITS PURSUING)
- Sustainable Sites Prerequisite 1: Construction Activity Pollution Prevention
- Sustainable Sites Credit 5: Protect and Restore Habitat on Greenfield Sites
- Sustainable Sites Credit 7.1: Heat Island Effect – Non-roof
- Sustainable Sites Credit 7.2: Heat Island Effect – Roof
- Energy & Atmosphere Prerequisite 1: Fundamental Commissioning
- Energy & Atmosphere Credit 3: Enhanced Commissioning
- Energy & Atmosphere Credit 5: Measurement & Verification

**RELATED WORK:**
Divisions 01 through 33 Sections for LEED Requirements specific to the work of each of these sections;
Requirements may or may not include reference to LEED.

**DEFINITIONS**

**LEED:**
Leadership in Energy & Environmental Design Green Building Rating System

**RECYCLED MATERIAL:**
The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer);
Appendix I: 4

1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.

2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

3. Recycled content shall be defined according to ISO 14021 - Environmental labels and declarations - Self-declared environmental claims (Type II environmental labeling)

RAPIDLY RENEWABLE MATERIAL:
Materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

REGIONALLY EXTRACTED, HARVESTED, OR RECOVERED MATERIALS:
Materials that are extracted, harvested, or recovered within a radius of 500 miles (800 km) from the Project site.

REGIONALLY MANUFACTURED MATERIALS:
Materials that are manufactured within a radius of 500 miles (800 km) from the Project location; Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.

FSC CERTIFIED WOOD:
Products milled or otherwise altered by manufacturers certified to be in compliance with the standards endorsed by the Forest Stewardship Council. FSC certification requires a chain of custody.

CHAIN OF CUSTODY CERTIFICATES:
Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship.” Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC accredited certification body.

SOLAR REFLECTIVE INDEX (SRI):
Solar Reflective Index is a measure of the constructed surface’s ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

VOC:
Volatile Organic Compounds are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors.

CRI GREEN LABEL PLUS:
Green Label Plus is a voluntary, industry testing program for carpet and adhesive products that establishes the highest standard for indoor air quality (IAQ) ever set by the carpet industry. The Carpet and Rug Institute (CRI) created Green Label Plus to identify carpets and adhesives that are tested by an independent, certified laboratory and meet stringent criteria for low chemical emissions.

FLOORSORE CERTIFICATION:
Developed by the Resilient Floor Covering Institute (RFCl) in conjunction with Scientific Certification Systems (SCS), FloorScore tests and certifies hard surface flooring and flooring adhesive products for compliance with rigorous indoor air quality emissions requirements. Individual volatile organic compounds (VOCs) are evaluated using health-based specifications.
GENERAL REQUIREMENTS

CONTRACTOR LEED COORDINATOR:
The contractor shall assign one person on the team to be the LEED Coordinator. This person must be a LEED BD+C Accredited Professional. The LEED Coordinator will take prime responsibility for LEED.

CONTRACTOR PRIMARY LEED CREDITS:
Contractor is primarily responsible for achieving LEED and completing the LEED online Letter Templates for the following LEED Credits (CHANGE BASED ON CREDITS PURSUING)
Materials & Resources Credit 2: Construction Waste Management
Materials & Resources Credit 3: Materials Reuse
Materials & Resources Credit 4: Recycled Content
Materials & Resources Credit 5: Regional Materials
Materials & Resources Credit 6: Rapidly Renewable Materials
Materials & Resources Credit 7: Certified Wood
Indoor Environmental Quality Credit 3.1: Construction Indoor Air Quality Management Plan During Construction
Indoor Environmental Quality Credit 3.2: Construction Indoor Air Quality Management Plan Before Occupancy
Indoor Environmental Quality Credit 4: Low Emitting Materials

CONTRACTOR CONTRIBUTING LEED CREDITS:
Contractor’s work contributes to requirements for achieving the following LEED credits. The Contractor is not primarily responsible for achieving the credits nor completing the LEED Online Letter Template (CHANGE BASED ON CREDITS PURSUING)
Sustainable Sites Prerequisite 1: Construction Activity Pollution Prevention
Sustainable Sites Credit 5: Protect and Restore Habitat on Greenfield Sites
Sustainable Sites Credit 7.1: Heat Island Effect – Non-roof
Sustainable Sites Credit 7.2: Heat Island Effect – Roof
Energy & Atmosphere Prerequisite 1: Fundamental Commissioning
Energy & Atmosphere Credit 3: Enhanced Commissioning
Energy & Atmosphere Credit 5: Measurement & Verification

SUBMITTALS
MATERIALS CREDITS DOCUMENTATION SHEET:
Provide a Materials Credit Documentation Sheet with each product submittal as required by other Specification Sections. Provide, at minimum, the information requested on the Materials Credits Documentation Sheet provided at the end of this Section. (See MU Sustainable Design Guidelines Appendix D: Sample Sustainable Materials Data Sheet)

SUPPORTING PRODUCT DATA:
With each Materials Credit Documentation Sheet provide supporting documentation for each claim made related to recycled content, regional materials, reused materials, rapidly renewable materials, VOC content, urea formaldehyde, cri green label plus and FloorScore certification. Supporting Documentation may be in the form of a letter from the product manufacturer, product cut-sheet, product material safety data sheet, or print outs from the manufacturer’s website attesting to the claim.
Provide FSC chain-of-custody certificates for products containing certified wood.

PROJECT MATERIALS COST DATA:
Provide statement indicating total cost for building materials used in the project only in CSI MasterFormat 2004 Edition Divisions 03-10, 31 (Section 31.60.00 Foundations) and 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting from the project schedule of values. Materials costs include all expenses to deliver the materials to the project site. Materials costs should account for all taxes and transportation costs incurred by the contractor but exclude any cost for labor and equipment once the material has been delivered to the site.

Appendix I: 5
1. Include statement indicating total cost for new wood products (not reclaimed, salvaged, or recycled) on the project. Do not include wood products identified as FSC recycled or FSC Recycled Credit. If a product is partially comprised of wood only the new wood value should be included in the cost. To determine the value of the partial wood component, calculate the amount of new wood as a percentage of the total weight, volume, or cost and multiply by the total product value as invoiced.

LEED ACTION PLANS:
Provide preliminary submittals within 15 days of date established for commencement of the Work. LEED Action Plans identify how the contractor intends to meet the requirements of the credits the Contractor is Primarily Responsible for.

Construction Waste Management Plan complying with Construction Waste Management Section.

LEED MATERIALS ACTION PLAN (CHANGE ACCORDING TO CREDITS):
The LEED Materials Plan explains how the contractor intends to meet the requirements of the credits identified in this Section that the Contractor is primarily responsible for achieving.
List all products in the project in CSI MasterFormat 2004 Edition Divisions 03-10, 31 (Section 31.60.00 Foundations) and 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting) and additional materials with potential VOC content.
List products in order by CSI MasterFormat 2004 Edition
Use the LEED 2009 Materials Worksheet provided at the end of this section as a template. (See MU Sustainable Design Guidelines Appendix C: Sample Materials Plan)
For each product provide:
1. Specification Section
2. Product Name
3. Product Manufacturer
4. Contractor
5. Material Cost from schedule of values. If materials cost is not known for the plan, use 45% of the total cost.
6. Percentage of Post-consumer Recycled Content by weight
7. Percentage of Pre-consumer Recycled Content by weight
8. Dollar value of Recycled Content by multiplying the percentage of post-consumer recycled content plus one-half the percentage of pre-consumer recycled content by the material cost
9. Distance from extraction, harvest, or recovery location
10. Distance from manufacturing
11. Percentage of product that is extracted, harvested, or recovered and manufactured within 500 miles of the project site
12. Dollar value of Regional material by multiplying the percentage of regional material by the material cost
13. Dollar value of new wood
14. Percentage of new wood that is FSC certified by weight
15. Dollar value of FSC wood
16. Allowable VOC content
17. Actual VOC content
Provide total projected materials cost all products in the project in CSI MasterFormat 2004 Edition Divisions 03-10, 31 (Section 31.60.00 Foundations) and 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting.
Provide projected percentage of the dollar value of materials with:
1. reused content
2. recycled content
3. regional content
4. rapidly renewable content
Provide projected percentage of dollar value of new wood that will be FSC certified
Verify all products with potential to have VOCs are projected to meet the VOC requirements.

Indoor Air Quality Management Plan During Construction complying with Indoor Air Quality Management Section
Indoor Air Quality Management Plan Prior to Occupancy complying with Indoor Air Quality Management Section
LEED PROGRESS REPORTS:
Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans:
Credit SS PR1: Erosion and sedimentation control plan.
  1. Provide statement regarding activity and any corrective action if necessary
  2. Provide dated images illustrating compliance

Credit MR 2: Waste reduction progress reports complying with Section 017400 - CONSTRUCTION WASTE MANAGEMENT.
Provide statement indicating original estimated total diversion rate, diversion to date, and expected final diversion rate. Include narrative regarding discrepancies or activity since the previous report.
Credit MR 3: Reused Materials
Provide statement indicating original estimated recycled content based on LEED Materials Plan, reused content to date, and expected final reused content percentage. Include narrative regarding discrepancies or activity since the previous report.

Credit MR 4: Recycled Content
Provide statement indicating original estimated recycled content based on LEED Materials Plan, recycled content to date, and expected final recycled content percentage. Include narrative regarding discrepancies or activity since the previous report.

Credit MR 5: Regionally Extracted, Processed and Manufactured Materials.
Provide statement indicating original estimated regional content based on LEED Materials Plan, regional content to date, and expected final regional content percentage. Include narrative regarding discrepancies or activity since the previous report.

Credit MR 6: Rapidly Renewable Materials.
Provide statement indicating original estimated rapidly renewable content based on LEED Materials Plan, rapidly renewable content to date, and expected final rapidly renewable percentage. Include narrative regarding discrepancies or activity since the previous report.

Credit MR 7: FSC content of New Wood Products.
Provide statement indicating original estimated FSC content of new wood products based on LEED Materials Plan, FSC content of new wood products content to date, and expected final FSC content of new wood products percentage. Include narrative regarding discrepancies or activity.

Credit IEQ 3.1: Indoor Air Quality Management plan.
Provide statement indicating indoor-air-quality measures employed since the prior report. Include 6 photographs of different IAQ management strategies listed in the IAQ Management Plan. The photos must be dated and include a description of the management measure.

Credit IEQ 4.1 - 4.4: Low emitting materials.
  1. Identify products which products have been purchased or installed since the previous report and verify compliance with VOC limits.
  2. Indicate carpet that has been submitted since the previous report and verify it is CRI Green Label Plus Certified
  3. Indicate resilient flooring that has been submitted since the previous report and verify it is FloorScore Certified.
  4. List which products with potential for added urea-formaldehyde have been submitted or installed since the previous report and verify there is no added urea-formaldehyde.

LEED MATERIALS PLAN UPDATE:
With LEED progress report provide a LEED Materials Plan Update that has actual values for products already submitted and approved and continues to have estimated values for products yet to be submitted and approved. Clearly indicate which products are purchased/installed and which are estimated.
LEED ONLINE LETTER TEMPLATES:
Submit verification that all LEED online Letter Templates assigned to the contractor as described in this Section have been completed and approved by the Green Building Certification Institute.

Electronic compilation of Materials Data Sheets with supporting documentation in order by CSI Format

PRODUCTS (CHANGE ACCORDING TO CREDITS)

REUSED MATERIALS: Provide building materials with reused content constitutes a minimum of (5 or 10) percent of cost of materials used for Project in CSI MasterFormat 2004 Edition Divisions 03-10, Division 31 (Section31.60.00 Foundations) and Division 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting).

RECYCLED MATERIALS: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 20 percent of cost of materials used for Project in CSI MasterFormat 2004 Edition Divisions 03-10, Division 31 (Section31.60.00 Foundations) and Division 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting).

REGIONAL MATERIALS: Provide a minimum of 20 percent of building materials (by cost) that are regional materials for Project in CSI MasterFormat 2004 Edition Divisions 03-10, Division 31 (Section31.60.00 Foundations) and Division 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting).

RAPIDLY RENEWABLE: Provide a minimum of 2.5 percent of building materials (by cost) that are rapidly renewable for Project in CSI MasterFormat 2004 Edition Divisions 03-10, Division 31 (Section31.60.00 Foundations) and Division 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting).

CERTIFIED WOOD: Provide a minimum of (75-95) percent of new wood materials (by cost) that are produced from wood obtained from forests certified by an FSC-accredited Certification body to comply with FSC STD-01-011, for Project in CSI MasterFormat 2004 Edition Divisions 03-10, Division 31 (Section31.60.00 Foundations) and Division 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting).

LOW-EMITTING MATERIALS ADHESIVES AND SEALANT: For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the following limits for VOC content when calculated according to South Coast Air Quality Management District (SCAQMD) Rule #1168, requirements in effect on July 1, 2005, and rule amendment date January 7, 2005:

1. Wood Glues: 30 g/L.
2. Metal to Metal Adhesives: 30 g/L.
3. Adhesives for Porous Materials (Except Wood): 50 g/L.
4. Subfloor Adhesives: 50 g/L.
5. Plastic Foam Adhesives: 50 g/L.
6. Carpet Adhesives: 50 g/L.
7. Gypsum Board and Panel Adhesives: 50 g/L.
8. VCT and Asphalt Tile Adhesives: 50 g/L.
9. Cove Base Adhesives: 50 g/L.
10. Contact Adhesive: 50 g/L.
11. Structural Glazing Adhesives: 100 g/L.
12. Wood Flooring Adhesive: 100 g/L.
13. Structural Wood Member Adhesive: 140 g/L.
Appendix I

19. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, Teflon, ultra-high molecular weight polyethylene, rubber or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
20. Top and Trim Adhesive: 250 g/L.
21. Plastic Cement Welding Compounds: 250 g/L.
22. ABS Welding Compounds: 325 g/L.
23. CPVC Welding Compounds: 490 g/L.
24. PVC Welding Compounds: 510 g/L.
25. Adhesive Primer for Plastic: 550 g/L.
26. Sheet Applied Rubber Lining Adhesive: 850 g/L.
27. Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.
29. Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.
30. Other Adhesives: 250 g/L.
31. Architectural Sealants: 250 g/L.
32. Non membrane Roof Sealants: 300 g/L.
33. Other Sealants: 420 g/L.
34. Sealant Primers for Nonporous Substrates: 250 g/L.
35. Sealant Primers for Porous Substrates: 775 g/L.
36. Modified Bituminous Sealant Primers: 500 g/L.
37. Other Sealant Primers: 750 g/L.

LOW-EMITTING MATERIALS ARCHITECTURAL PAINTS AND COATINGS: For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to the following:
1. Flat Paints, Coatings, and Primers: 50 g/L.
2. Non flat Paints, Coatings, and Primers: 150 g/L.

LOW-EMITTING MATERIALS ANTI-CORROSIVE AND ANTI-RUST PAINTS (applied to interior ferrous metal substrates): For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to the following:
2. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.

LOW-EMITTING MATERIALS CLEAR WOOD FINISHES, FLOOR COATINGS, STAINS, PRIMERS, AND SHELLACS: For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to the following:
1. Clear Wood Finishes, Varnishes: 350 g/L.
2. Clear Wood Finishes, Lacquers: 550 g/L.
3. Floor Coatings: 100 g/L.
4. Sealers:
5. Waterproofing Sealers: 250 g/L.
6. Sanding Sealers: 275 g/L.
7. Other Sealers: 200 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.
10. Stains: 250 g/L.

LOW-EMITTING MATERIALS FLOORING SYSTEMS: For flooring systems installed in the building interior, use products that comply with the following:
Carpet and Carpet Cushion: Carpet and Rug Institute (CRI) Green Label Plus program.
1. Carpet Adhesives: 50 g/L.
2. Hard Surface Flooring: FloorScore standards.
3. Concrete, Wood, Bamboo And Cork Floor Finishes:
   1. Floor Coatings: 100 g/L.
   2. Sealers:
      i. Waterproofing Sealers: 250 g/L.
      ii. Sanding Sealers: 275 g/L.
      iii. Other Sealers: 200 g/L.
   3. Stains: 250 g/L.
   4. Floor Tile Setting Adhesives: 65 g/L.

All resilient flooring must be certified as compliant with the FloorScore standard.

LOW EMITTING MATERIALS ADDED UREA FORMALDEHYDE:
Do not use composite wood, agrifiber products and laminating adhesives that contain added urea-formaldehyde resins.

Heat Island Reducing Roof Materials

EXECUTION

Construction Waste Management

IAQ Management Plan

Measurement and Verification

Commissioning

A. Credit EQ 3.1: Comply with SMACNA’s “SMACNA IAQ Guideline for Occupied Buildings under Construction.”
   1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in
      Division 01 Section “Temporary Facilities and Controls,” install filter media having a MERV 8 according to ASHRAE 52.2 at
      each return air inlet for the air-handling system used during construction.
   2. Replace all air filters immediately prior to occupancy.

B. Credit EQ 3.2: Comply with one of the following requirements:
   1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying
      a total volume of 14000 cu. ft. (4300000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal
      temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
   2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500
      cu. ft. (1070000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated
      at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate
      determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a
      minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a
      total of 14000 cu. ft./sq. ft. (4300000 L/sq. m) of outside air has been delivered to the space.

   3. Air-Quality Testing:
      a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols
         consistent with the EPA’s “Compendium of Methods for the Determination of Air Pollutants in Indoor Air,” and as
         additionally detailed in the USGBC’s “LEED-NC: Reference Guide.”
      b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
         1. Formaldehyde: 50 ppb.
         2. Particulates (PM10): 50 micrograms/cu. m.
         3. Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
         4. 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.

Appendix I: 10
5. Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from same locations as in the first test.

d. Air-sample testing shall be conducted as follows:
   1. All measurements shall be conducted prior to occupancy but during normal.
   2. Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Non fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
   3. Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.
   4. Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.
LEED Project Tracker
## LEED PROJECT TRACKER

### GOAL SETTING: LEED NC 2009

**Master Site Credit**

### COLOR LEGEND

- Campus Standard
- Pursued By Project
- Not Pursuing

### SUSTAINABLE SITES

<table>
<thead>
<tr>
<th>Credit #</th>
<th>Credit Title</th>
<th>Credit Intent and Requirements</th>
<th>Summary</th>
<th>Anticipated</th>
<th>Notes</th>
<th>Primary Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 3</td>
<td>Construction Activity Pollution prevention</td>
<td>Prevent loss of soil during construction by storm water runoff and 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.</td>
<td>C Y</td>
<td>Develop SWPPs despite site damage/erosion area</td>
<td>Y</td>
<td>MU Docs</td>
</tr>
<tr>
<td>D 1**</td>
<td>Site Selection (Regional Priority)</td>
<td>Avoid the development of inappropriate sites (e.g., prime agricultural land, flood plains, previous parkland, wetlands) &amp; reduce the environmental impact from the location of a building on a site.</td>
<td>D 1**</td>
<td>**Regional Priority Credit</td>
<td>1</td>
<td>Design Team</td>
</tr>
</tbody>
</table>
| D 1 | Development Density & Community Connectivity | Option 1: Increase localized density to confirm to existing or desired density goals by utilizing sites that are located within an existing minimum development density of 80,000 square feet per acre (2 story downtown development). 
Option 2: Construct or renovate building on a previously developed site AND within 1/2 mile of a residential zone or neighborhood with an average density of 10 units per acer net AND within 1/2 mile of at least 10 Basic Services AND with pedestrian access between the building and the services AND distance determined by drawing a 1/2 mile radius around main building entrance on site map and counting services within. | D 1 | | | Contractor |
| D 1 | Brownfield Redevelopment | Rehabilitate damaged sites where development is complicated by environmental contamination, by reducing pressure on undeveloped land. Develop contaminated sites (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. | D 1 | | | |
| D 6 | Alternative Transportation Public Transportation Access | Option 1: Locate building within 1/4 mile of an existing or planned and funded commuter rail, light rail, or subway station. 
Option 2: Provide 1 mile or more stops for 2 or more public or campus bus lines usable by building occupants. | D 6 | | | |
<p>| D 1 | Commercial or Institutional Projects: | Bicycle rack within 200 yards of HHD, entrance for 5% or more peak period building users AND provide shower &amp; changing facilities in building or within 200 yards of a building entrance, for 3.5% FTE occupants. Refer Ref. guide's Appendix 1: Default Occupancy Counts requirements &amp; guidance. | D 1 | | | |
| D 3 | Residential Projects: | Covered storage facilities for secure bicycles for 15% or more of building occupants. Refer Ref. guide's Appendix 1: Default Occupancy Counts requirements &amp; guidance | D 3 | | | |
| D 3 | Alternative Transportation - Low-Emission &amp; Fuel-efficient Vehicle | Option 1: Provide preferred parking for low-emitting &amp; 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 2yrs. | D 3 | | | |
| D 3 | Alternative Transportation - Low-Emission &amp; Fuel-efficient Vehicle | 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. | D 3 | | | |
| D 3 | Alternative Transportation - Low-Emission &amp; Fuel-efficient Vehicle | Option 3: Provide alternative fuel vehicles for 3% of FTE building occupants AND provide preferred parking for these vehicles. | D 3 | | | |
| D 3 | Alternative Transportation - Low-Emission &amp; Fuel-efficient Vehicle | 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. AND agreement of 2 yrs. AND estimated customers served per vehicles must have supporting documentation AND narrative explaining the vehicle sharing program and its administration AND parking for low emitting and fuel efficient vehicles must be located nearest available spaces in nearest available parking area. AND provide site plan or area map highlighting walking path from parking area to the project site &amp; noting the distance. | D 3 | | | |</p>
<table>
<thead>
<tr>
<th>Credit #</th>
<th>Credit title</th>
<th>Credit Intent and Requirements</th>
<th>SS Credit</th>
<th>Design/Documents</th>
<th>Contractor</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS CR 4</td>
<td><strong>Regional Priority Credit</strong></td>
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<tr>
<td>SS CR 4.1</td>
<td><strong>Regional Priority Credit</strong></td>
<td></td>
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</tr>
</tbody>
</table>

**Site Development - Protect or Restore Habitat (Regional Priority)**

**Option 1:** On existing Greenfield sites: Reduce the development footprint and/or provide vegetated open space within the project boundary to exceed the local zoning's open space requirement for the site by 25% vegetated roof or native or adapted vegetation.

**Option 2:** On previously developed or graded sites: Provide vegetated open space equal to 20% of the project area, whichever is greater, with native/adapted vegetation.

**Option 3:** Provide no new parking.

**SS CR 4.2**

**Stormwater Design - Quantity Control (Regional Priority)**

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

**SS CR 4.2.1**

**Stormwater Design - Quantity Control (Regional Priority)**

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, & captures & treats the stormwater runoff from 90% of the avg. annual rainfall using acceptable best management practices. BMP to be designed in accordance with local standards & specifications from state or Local program that has adopted these performance standards. OR, in-field performance monitoring data demonstrates compliance & Data must conform to accepted protocol (e.g. TARP, Washington State Dept. of Ecology) for BMP monitoring.

**APPENDIX K: 2**
<table>
<thead>
<tr>
<th>Credit title</th>
<th>Credit Intent and Requirements</th>
<th>MU Docs</th>
<th>Design Team</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>WE Cr 1 Water Use Reduction</td>
<td>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 &amp; conveyed by a public agency specifically for non-potable uses.</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>WE Cr 1 Water Efficient Landscaping</td>
<td>Option 1: No Potable Water use or irrigation AND meet requirements for opt PATH 1: Use only captured rainwater, recycled wastewater, recycled gray water, or water treated &amp; conveyed by a public agency specifically for non-potable uses for irrigation.</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>WE Cr 2 Innovative Wastewater Technologies</td>
<td>Option 1: Reduce potable water use for building sewage conveyance by 50% through use of water-conserving fixtures or non-potable water.</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>WE Cr 3 Water Use Reduction</td>
<td>Option 2: 100% reduction in potable water use for sewage conveyance OR demonstrate on-site treatment &amp; reuse/Wetland of 100% generated wastewater.</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

APPENDIX K: 3
<table>
<thead>
<tr>
<th>EA/Pr</th>
<th>Minimum Energy Performance</th>
<th>Exemplary Perf. New Bldg. f 50%, EB renovations f 46%</th>
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</thead>
<tbody>
<tr>
<td><strong>GFA Pr 2</strong></td>
<td>Option 1: Prescriptive compliance path</td>
<td><strong>PAUSE</strong></td>
</tr>
<tr>
<td><strong>EA Pr 2</strong></td>
<td>Minimum Energy Performance</td>
<td><strong>PAUSE</strong></td>
</tr>
<tr>
<td><strong>Option 3:</strong> Prescriptive Compliance Path</td>
<td>Compel with the prescriptive measures of the ASHRAE Advanced Buildings core performance guide developed by New Buildings Institute AND comply with Section 1: Design Process Strategies and Section 2: Core performance requirements AND office public assembly and retail projects &lt;100,000 sq. ft. must comply with Section 1 &amp; section 2 of Core Performance Guide OR Other project types must implement the basic requirement of core performance Guide. Health care, warehouse &amp; laboratory projects are ineligible for this path</td>
<td><strong>PAUSE</strong></td>
</tr>
<tr>
<td><strong>Option 1:</strong> WHOLE BUILDING SIMULATION (1-19 Points)</td>
<td>10% improvement in the proposed bldg. compared to baseline bldg. performance rating per ASHRAE/IESNA Std. 90.1-2007 (w/o amendments) by a whole bldg. project computer simulation using the Building Performance Rating Method in Appendix G of the Std. See Table on pg. 173 for min energy cost savings % for each point threshold. AND Design to comply with both - mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) of ASHRAE/IESNA 90.1-2007 (w/o errata w/o addenda) AND include all energy costs within &amp; associated with the bldg. project AND IF bldg. process energy cost is less than 20% of baseline bldg., submit documentation supporting process energy inputs</td>
<td><strong>PAUSE</strong></td>
</tr>
<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 8%</td>
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<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 10%</td>
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<td><strong>New Bldg.</strong></td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 14%</td>
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<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 16%</td>
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</tr>
<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 18%</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 20%</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 22%</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 24%</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 26%</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 28%</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 30%</td>
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<td><strong>EBI renovations</strong> - 32%</td>
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<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 34%</td>
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<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 36%</td>
<td>1</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 38%</td>
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<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 40%</td>
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<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 42%</td>
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<tr>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 44%</td>
<td>1</td>
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<tr>
<td><strong>Exemplary Per.</strong></td>
<td><strong>New Bldg.</strong></td>
<td><strong>EBI renovations</strong> - 46%</td>
</tr>
<tr>
<td>Credit title</td>
<td>Credit Intent and Requirements</td>
<td>Sub Total</td>
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<tr>
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</tr>
<tr>
<td>Option 1 - Prescriptive Compliance</td>
<td>Project MUST be less than 100,000 sf. Comply with the Prescriptive Measures of Advanced Buildings Core Performance Guide by New Buildings Institute AND comply with section 1: Design Process Strategies and Section 2: Core performance requirements (office, public assembly &amp; retail) see ref guide for details</td>
<td>1** 1</td>
</tr>
<tr>
<td>Enhanced Renewable Energy (Regional Priority)</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>EA Cr 2</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Enhanced Commissioning</td>
<td>Implement additional 3 Performance strategies listed in Section 3: Enhanced Performance. cool roofs, Night venting, additional commissioning not eligible</td>
<td></td>
</tr>
<tr>
<td>Enhanced Refrigerant Management</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>EA Cr 4</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Measurement &amp; Verification</td>
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<tr>
<td>EA Cr 4.0</td>
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<tr>
<td>Green Power</td>
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<td>EA 6</td>
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<td></td>
</tr>
<tr>
<td>Storage and Collection of Recyclables</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Option 1: DETERMINE THE BASELINE ELECTRICITY USE. Use the annual electricity consumption from the results of EA Cr 1.**

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

**Example p: Purchase 100% electricity from renewable sources.**

| Sub Total | 19 | 10 | 8.5 | 0.5 |

**Note:**
- MU Docs
- Design Team
- Contractor

APPENDIX K. 5
<table>
<thead>
<tr>
<th>Credit #</th>
<th>Credit title</th>
<th>Credit Intent and Requirements</th>
<th>Exemplary p.</th>
<th>Sub Total:</th>
</tr>
</thead>
<tbody>
<tr>
<td>M R Cr 1.1.1</td>
<td>Building Reuse- Maintain Existing Walls, Floors, and Roof</td>
<td>Maintain existing building structure and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing materials). 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, the Cr is not applicable if the square footage of the addition is more than 2 times the square footage of the existing building. Maintain 55%</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>M R Cr 1.2</td>
<td>Building Reuse- Maintain Interior Non-structural Elements</td>
<td>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 2 times the square footage of the existing building.</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>M R Cr 3</td>
<td>Construction Waste Management (Regional Priority)</td>
<td>Develop and implement a waste management plan. Recycle and/or salvage 50% of non-hazardous construction and demolition. 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.</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>M R Cr 4</td>
<td>Materials Reuse</td>
<td>Materials used in the project must be recycled content such that the sum of post-consumer recycled content + 1/3 of the pre-consumer content constitutes at least 10% (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 count.</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>M R Cr 5</td>
<td>Regional Materials (Regional Priority)</td>
<td>Use bldg. materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of project site for a min 10% (based on cost) of total materials value. If only a fraction of a product of material is extracted/ harvested/ recovered &amp; manufactured locally, then only that % (by weight) shall contribute to the regional value.</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>M R Cr 6</td>
<td>Rapidly Renewable Materials</td>
<td>Use rapidly renewable bldg. materials &amp; products (made from plants that are typically harvested within a 10-year cycle or shorter) for 2.5% of total value of all bldg. materials &amp; products used, based on cost. Only a fraction of a product of material is extracted/ harvested/ recovered &amp; manufactured locally, then only that % (by weight) shall contribute to regional value.</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>M R Cr 7</td>
<td>Certified Wood</td>
<td>Use a minimum of 80% 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 &amp; general dimensional framing, flooring, sub-flooring, wood doors and finishes. Only include materials permanently installed in the project count.</td>
<td>C</td>
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</tr>
</tbody>
</table>

**Credit Intent and Requirements**

- **M R Cr 1.1.1**
  - Maintain additional 20% = 75%
  - Maintain additional 20% = 66%

- **M R Cr 1.2**
  - Maintain additional 20% = 75%
  - Maintain additional 20% = 75%

- **M R Cr 3**
  - Maintain additional 20% = 75%
  - Maintain additional 20% = 75%
  - Maintain additional 20% = 95%
  - Maintain additional 20% = 95%

- **M R Cr 4**
  - Additional 5% = total 10% Material reuse
  - Additional 5% = total 10% Material reuse

- **M R Cr 5**
  - Additional 10% = total 20% regional material

- **M R Cr 6**
  - Additional 10% = total 20% regional material

- **M R Cr 7**
  - Additional 10% = total 20% regional material

**Exemplary p.**

- **M R Cr 1.1.1**
  - Divert 95% or more construction waste.

- **M R Cr 3**
  - Use salvaged, refurbished or reused materials such that the sum of these materials constitutes min. 5%, based on cost, of total value of materials on the project. Only materials permanently installed in the project count.

- **M R Cr 4**
  - Use materials with recycled content such that the sum of post-consumer recycled content + 1/3 of the pre-consumer content constitutes at least 10% (based on cost) of the total value of materials in the project.

- **M R Cr 5**
  - Use bldg. materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of project site for a min 10% (based on cost) of total materials value.

- **M R Cr 6**
  - Use rapidly renewable bldg. materials & products (made from plants that are typically harvested within a 10-year cycle or shorter) for 2.5% of total value of all bldg. materials & products used, based on cost.

- **M R Cr 7**
  - Use a minimum of 80% 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 & general dimensional framing, flooring, sub-flooring, wood doors and finishes.

**Note:**

- **M R Cr 1.1.1**
  - Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. For MR Cr 3.0, MR Cr 4.0, MR Cr 5.0, MR 6.0

- **M R Cr 1.2**
  - Furniture may be included, provided it is included consistently in MR Cr 3-7.

**Sub Total:** 5 0 2.5 2.5
### IIndoor Environmental Quality

**Ideal Peformance**

**CASE 1: Mechanically ventilated:**
- Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2007 Ventilation for Acceptable Indoor Air Quality (with errata w/o addenda).
- Mechanical ventilation systems shall be designed using the Ventilation Rate Procedure or the applicable local code, whichever is more stringent.

**CASE 2: Naturally ventilated:**
- Naturally ventilated buildings shall comply with ASHRAE 62.1-2007 (with errata w/o addenda), paragraph 5.1.

**Option 1: All projects:**
- Option 1: Prohibit smoking in the building and locate any interior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

**Case 2: Residential and hospitality projects:**
- Prohibit smoking in all common areas of building, locate any interior designated smoking areas including balconies at least 25 ft. away from entries, outdoor air intakes & operable windows opening to common areas and 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 outside of smoking rooms to adjacent spaces. Monitor CO2 concentrations within all densely occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004, as determined by EIQ requirement 1. Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004, as determined by EIQ requirement 1.

**Option 2: Use existing documentation and ASHRAE literature to confirm specification of required signage.**

### EIQ 1: Increased Ventilation

**Option 1:**
- Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10:2005, Natural ventilation in non-domestic buildings.

**Option 2:**
- Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflow effectively naturally ventilated, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2007 Chapter 6, for at least 90% of occupied space.

---

**Notes:**
- D = Derive to consider, calculate and document. Add to in applicable LEED On-line docs.
- Y = Y
- N = N
- 1 = 1
- 2 = 2
- 3 = 3
- 4 = 4
- 5 = 5
- 6 = 6
- 7 = 7
- 8 = 8
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<th>Primary Responsibility</th>
<th>Design/Documents</th>
<th>Contractor</th>
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<tr>
<td>EIQ-C.3.1</td>
<td>Construction IAQ Management Plan During Construction</td>
<td>Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows: Design 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 608-2008 (Chapter 3) AND select stained on-site or installed abrasive 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 at each return air grille, as determined by ASHRAE 52.2-1999. Replace all filtration media immediately prior to occupancy.</td>
<td>C 1 1</td>
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<tr>
<td>EIQ-C.3.2</td>
<td>Construction IAQ Management Plan - before occupancy</td>
<td>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.</td>
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<tr>
<td>EIQ-C.4.1</td>
<td>Low-Emitting Materials - Adhesives and Sealants</td>
<td>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 requirements of the following reference standards: Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168 VOC limits are listed in the table in reference guide page: 471 and correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005 AND Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.</td>
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<tr>
<td>EIQ-C.4.2</td>
<td>Low-Emitting Materials - Paints and Coatings</td>
<td>Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of occupants and occupants. Paints and coatings used on the interior of the bldg. (defined as inside of the weatherproofing system and applied on-site) shall comply with the criteria on page 481 of reference guide.</td>
<td>C 1 1</td>
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<td>0.5</td>
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<tr>
<td>EIQ-C.4.3</td>
<td>Low Emission Materials - Flooring Systems</td>
<td>Option 1: All carpet installed in the bldg, interior shall meet testing &amp; product requirements of Carpet &amp; Rug Institute's Green Label Plus program AND All carpet cushion installed in the building interior shall meet the requirements of the Carpet &amp; Rug Institute's Green Label Plus program AND All carpet adhesive to meet requirements of EIQ-C.4.1: VOC limit of 50 g/L AND all hard surface flooring must be certified as compliant with FloorScore Standard (current as of date of the rating system, or more stringent version by independent third party OR alternative compliance path using FloorScore is acceptable when min 25% of finished floor area is non-carpet finished flooring &amp; 100% of this non-carpet finished flooring is FloorScore certified AND Concrete: bamboo &amp; cork floor finishes such as sealer stain &amp; floor must meet requirements of SCAQMD Rule 1113 AND Tile setting adhesives &amp; grout to meet SCAQMD Rule 1168.</td>
<td>C 1 1</td>
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<tr>
<td>EIQ-C.4.4</td>
<td>Low Emission Materials - Composite Wood and Agrifiber Products</td>
<td>Composite wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site &amp; shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Composite wood and agrifiber products are defined as: particleboard, medium density fibreboard (MDF), plywood, wheat board, strawboard, panel substrates and door cores. Materials considered fit-out, furniture, and equipment (FF&amp;E) are not considered building elements and are not included.</td>
<td>C 1 1</td>
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<td>0.5</td>
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<tr>
<td>EIQ-C.5</td>
<td>Indoor Chemical And Pollutant Source Control</td>
<td>Employ a permanent entryway system at least 10 ft. long in the primary direction of travel to capture dirt &amp; particulates entering the building at regularly used exterior entrances. (Permanently installed gates, 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 AND where hazardous gases or chemicals may be present or used, exhaust each space sufficiently 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./sq. ft., with no air re-circulation. Garages, housekeeping/laundry areas, science labs, prep rooms, art rooms, shops of any kind must be provided with pressurization 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 AND in mechanically ventilated buildings, provide regular occupied areas of the building with air filtration media prior to occupancy that provides a MERV 13 or better. Filtration should be applied to process both return and outside air that is to be delivered as supply air AND Provide containment (i.e. a 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, asestical and science laboratories).</td>
<td>D 1 1</td>
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<tr>
<td>EIQ-C.6.1</td>
<td>Controllability of Systems - Lighting</td>
<td>Provide a high level of lighting system control for 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 control for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences AND provide lighting system controllability for all shared multi-occupant spaces to enable lighting control that meets group needs and preferences AND 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.</td>
<td>D 1 1</td>
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<td>0.5</td>
<td>1</td>
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<tr>
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<tr>
<td>IEO 6.2</td>
<td>Controlability of Systems: Thermal Comfort</td>
<td>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 60% of 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 Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata s/w/ addenda) AND provide comfort system controls for all shared multi- occupant spaces.</td>
<td>D 1</td>
<td></td>
<td>Design/Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEO 7.1</td>
<td>Thermal Comfort - Design</td>
<td>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 s/w/ 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)</td>
<td>D 1</td>
<td></td>
<td>Design/Team</td>
<td></td>
<td></td>
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<tr>
<td>IEO 7.2</td>
<td>Thermal Comfort - Verification</td>
<td>Provide for the assessment of building thermal comfort over time. (1) Achieve IEO credit 7.1: Thermal Comfort - Design AND (2) Agree to implement a thermal comfort survey of building occupants (adults and students of grades 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.) AND Agree to develop a plan for corrective action. The survey results indicate 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 with ASHRAE Standard 55-2004 (with errata s/w/ addenda). AND Provide a permanent monitoring system to ensure that building performance meets desired comfort criteria as determined by IEO credit 7.1: Thermal Comfort - Design. Residential Projects are not eligible for this credit.</td>
<td>D 1</td>
<td></td>
<td>Design/Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ 8.1</td>
<td>Daylight and Views - Daylight</td>
<td>Achieve daylighting for min 75% regularly occupied spaces a minimum glazing factor of 2% using one of the following options:</td>
<td></td>
<td></td>
<td>Design/Team</td>
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</tbody>
</table>

**OPTION 1:** Simulation:
- Demonstrate through computer simulations that 75% of all regularly occupied spaces achieve daylighting of min 25 foot-candles (fc) and max of 500fc in clear sky conditions Sept 21 at 9am and 3pm. Areas outside this range do not comply. However, designs that incorporate view preserving automated shades for glare control may demonstrate compliance for only min 25 fc luminance level.

**OPTION 2:** Prescriptive: A: For side lighting day zones:
- Window area included in calculation MUST be at least 30° above floor level AND 0.150 < VLT x WFR < 0.180 (VLT = Visible light transmittance and WFR = Window to floor area ratio). AND Glazing must not obstruct line in section from window head to line on floor which is twice the height of window head above floor area as measured perpendicular to the plane of glass. AND Provide sunlight redirection and/or glare control devices to ensure daylight effectiveness. SEE NOTE 1

**OPTION 2:** Prescriptive: B: For Toplighting day zones:
- Check daylight zone description mentioned in ref guide pg. 563. Achieve skylight roof coverage between 3% and 6% of the roof area in addition to the 0.057 AND the distance between skylights ≤ 1.4 times the ceiling height. AND A skylight diffuser, IF used must have a measured haze value of greater than 90% when tested according to ASTM D1003. Avoid direct line of sight to the skylight diffuser. SEE NOTE 1

**OPTION 3:** Measurement:
- Demonstrate through records of indoor light measurements, that a minimum daylight illumination level of 25 foot-candles has been achieved in at least 75% of all regularly occupied areas. Measurements must be taken on a 10-foot grid for all occupied spaces and must be recorded on building floor plans. AND Provide daylight redirection and/or glare control devices to avoid high-contrast situations that could impede visual tasks. SEE NOTE 1, 2

**OPTION 4:** Combination:
- Any of the above three options may be combined to document the minimum daylight illumination in at least 75% of all regularly occupied spaces. Different methods used must be clearly recorded on all building plans. In all cases provide glare control devices to avoid high-contrast situations that could impede visual tasks. SEE NOTE 1, 2

**Note 1:** Exception for areas where tasks would be hindered by daylight will be considered on their merits. **Note 2:** Only square footage associated with the portions of room or spaces meeting the minimum illumination level may be counted in the calculations

Exemplary p. Achieve 95% daylighting
<table>
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</tr>
</thead>
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<tr>
<td>EQ 1.2</td>
<td>Daylight and Views-Views</td>
<td>Achieve direct line of sight to the outdoor environment via vision glazing between 70° (21°) and 90° (7°) above finish floor for building occupants. Include at least 50% of all regularly occupied spaces. Determine the area with direct line of sight by totaling the regularly occupied squared footage that meets the criteria on page 383. 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 through 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.</td>
<td>D 1</td>
<td>Add: Team to consider design concepts and specifications</td>
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**INNOVATION IN DESIGN**

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<tr>
<td>EQ 1.1</td>
<td>Innovation in Design</td>
<td>Provide design teams and projects the opportunity to be awarded points for exceptional performance above requirements set by the LEED Rating System and/or innovative performance in categories not specifically addressed by the LEED Rating System. Credit can be achieved through any combination of the paths below. Path 1: [1-5 pt] Innovation in design: Path 2: (1-3 pts): Exemplary Performance</td>
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**LEED Accredited Professional**

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<th>Y/N</th>
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<tr>
<td>EQ 2</td>
<td>LEED Accredited Professional</td>
<td>Support and encourage the design integration process required by a LEED Green Building project and streamline the application and certification process by having at least one principle participant of the project team who has successfully completed the LEED Accredited Professional (AP) exam</td>
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**REGIONAL CREDITS**

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<tr>
<td>RP Cr 1</td>
<td>Regional Priority</td>
<td>To provide incentive for an achievement of credits that address geographically specific environmental priorities. Earn 1-4 of the 6 regional priority credits identified by the USGBC regional councils and chapters as having environmental importance for a projects region. Refer to <a href="http://www.usgbc.org">http://www.usgbc.org</a> for list of priority credits. One point for each regional priority credit achieved. Projects out of U.S. are not eligible for regional Priority credits.</td>
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<tr>
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<tr>
<td>RP Cr 1.1</td>
<td>Regional Priority credit: SS Cr 1 Site Selection</td>
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<td>RP Cr 1.2</td>
<td>Regional Priority credit: SS Cr 1.2 Neutra Habitats Master Site</td>
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<td>RP Cr 1.3</td>
<td>Regional Priority credit: MR Cr 1.3 25% Regional</td>
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<td>RP Cr 1.4</td>
<td>Regional Priority credit: EA Cr 2 U.S. Native</td>
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Other Regional: SS Cr 6.2 Stormwater Quality, MR Cr 2.5 Construction Waste Management

Sub Total: 1 1 1 1 1 1 0.5 0.5 1 1 4 3 0.5 0.5

**TOTAL AVAILABLE**

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<td>Silver 60 to 69</td>
<td>ANTICIPATING - CONSTRUCTION</td>
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<td>Gold 60 to 79</td>
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<td>Platinum 80 onwards</td>
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APPENDIX K. 10