MARKIM HALL

LEED PLATINUM

LEED FOR NEW CONSTRUCTION V2.2

LEED for New Construction

Macalester IGC (10110542)

St. Paul, MN, US

Certification Level: Platinum

Certification Date: 2009.09.22

0	**Points Achieved**	**Possible Points:**	69

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points

10	**Sustainable Sites**	**Possible Points:**	14

Y	Prereq 1	Construction Activity Pollution Prevention	
1	Credit 1	Site Selection	1
1	Credit 2	Development Density & Community Connectivity	1
	Credit 3	Brownfield Redevelopment	1
1	Credit 4.1	Alternative Transportation, Public Transportation Access	1
1	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
1	Credit 4.3	Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles	1
1	Credit 4.4	Alternative Transportation, Parking Capacity	1
	Credit 5.1	Site Development, Protect or Restore Habitat	1
1	Credit 5.2	Site Development, Maximize Open Space	1
1	Credit 6.1	Stormwater Design, Quantity Control	1
1	Credit 6.2	Stormwater Design, Quality Control	1
	Credit 7.1	Heat Island Effect, Non-Roof	1
1	Credit 7.2	Heat Island Effect, Roof	1
	Credit 8	Light Pollution Reduction	1

4	**Water Efficiency**	**Possible Points:**	5

1	Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
	Credit 2	Innovative Wastewater Technologies	1
1	Credit 3.1	Water Use Reduction, 20% Reduction	1
1	Credit 3.2	Water Use Reduction, 30% Reduction	1

14	**Energy & Atmosphere**	**Possible Points:**	17

Y	Prereq 1	Fundamental Commissioning of the Building Energy Systems	
Y	Prereq 2	Minimum Energy Performance	
Y	Prereq 3	Fundamental Refrigerant Management	1
1	Credit 1.1	Optimize Energy Performance, 10.5% New / 3.5% Existing	1
1	Credit 1.2	Optimize Energy Performance, 14% New / 7% Existing	1
1	Credit 1.3	Optimize Energy Performance, 17.5% New / 10.5% Existing	1
1	Credit 1.4	Optimize Energy Performance, 21% New / 14% Existing	1
1	Credit 1.5	Optimize Energy Performance, 24.5% New / 17.5% Existing	1
1	Credit 1.6	Optimize Energy Performance, 28% New / 21% Existing	1
1	Credit 1.7	Optimize Energy Performance, 31.5% New / 24.5% Existing	1
1	Credit 1.8	Optimize Energy Performance, 35% New / 28% Existing	1
1	Credit 1.9	Optimize Energy Performance, 38.5% New / 31.5% Existing	1
1	Credit 1.10	Optimize Energy Performance, 42% New / 35% Existing	1
	Credit 2.1	Renewable Energy, 2.5%	1
	Credit 2.2	Renewable Energy, 7.5%	1
	Credit 2.3	Renewable Energy, 12.5%	1
1	Credit 3	Enhanced Commissioning	1
1	Credit 4	Enhanced Refrigerant Management	1
1	Credit 5	Measurement & Verification	1
1	Credit 6	Green Power	1

6	**Materials & Resources**	**Possible Points:**	13

Y	Prereq 1	Storage & Collection of Recyclables	
	Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors, & Roof	1
	Credit 1.2	Building Reuse, Maintain 95% of Existing Walls, Floors, & Roof	1
	Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
1	Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
1	Credit 2.2	Construction Waste Management, Divert 75% from Disposal	1
	Credit 3.1	Materials Reuse, 5%	1
	Credit 3.2	Materials Reuse, 10%	1
1	Credit 4.1a	Recycled Content, 10% (Post-consumer + 1/2 pre-consumer)	1
	Credit 4.1b	Recycled Content, 20% (Post-consumer + 1/2 pre-consumer)	1
1	Credit 5.1	Regional Materials, 10% Extracted, Processed, and Manufactured Regionally	1
1	Credit 5.2	Regional Materials, 20% Extracted, Processed, and Manufactured Regionally	1
	Credit 6	Rapidly Renewable Materials	1
1	Credit 7	Certified Wood	1

15	**Indoor Environmental Quality**	**Possible Points:**	15

Y	Prereq 1	Minimum IAQ Performance	
Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1	Credit 1	Outdoor Air Delivery Monitoring	1
1	Credit 2	Increased Ventilation	1
1	Credit 3.1	Construction IAQ Management Plan, During Construction	1
1	Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
1	Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
1	Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
1	Credit 4.3	Low-Emitting Materials, Carpet Systems	1
1	Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
1	Credit 5	Indoor Chemical & Pollutant Source Control	1
1	Credit 6.1	Controllability of Systems, Lighting	1
1	Credit 6.2	Controllability of Systems, Thermal Comfort	1
1	Credit 7.1	Thermal Comfort, Design	1
1	Credit 7.2	Thermal Comfort, Verification	1
1	Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
1	Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

5	**Innovation & Design Process**	**Possible Points:**	5

1	Credit 1.1	Innovation in Design	1
1	Credit 1.2	Innovation in Design	1
1	Credit 1.3	Innovation in Design	1
1	Credit 1.4	Innovation in Design	1
1	Credit 2	LEED® Accredited Professional	1

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MARKIM HALL

SUSTAINABLE SITES CATEGORY

LEED FOR NEW CONSTRUCTION V2.2

10	**Sustainable Sites**	**Possible Points:**	14

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1	Credit 4.1	Alternative Transportation, Public Transportation Access	1
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SUSTAINABLE SITES PREREQUISITE 1: CONSTRUCTION ACTIVITY POLLUTION PREVENTION

REQUIRED

Intent

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

Requirements

Create and implement an Erosion and Sedimentation Control (ESC) Plan for all construction activities associated with the project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local erosion and sedimentation control standards and codes, whichever is more stringent. The Plan shall describe the measures implemented to accomplish the following objectives:

❑ Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.

❑ Prevent sedimentation of storm sewer or receiving streams.

❑ Prevent polluting the air with dust and particulate matter.

The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. While the CGP only applies to construction sites greater than 1 acre, the requirements are applied to all projects for the purposes of this prerequisite.

Information on the EPA CGP is available at: http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.

Potential Technologies & Strategies

Create an Erosion and Sedimentation Control Plan during the design phase of the project. Consider employing strategies such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps and sediment basins.

CREDIT COMPLIANCE

The project created and implemented an Erosion Control Plan.

Erosion Control Plan:

1. All erosion control facilities shall be installed prior to any site grading operations. The city engineer must be notified upon completion of the installation of the required erosion control facilities and prior to any grading operation being commenced. The contractor is responsible to schedule a pre-construction grading meeting on-site with the city engineer. If damaged or removed during construction, all erosion control facilities shall be restored and in place at the end of each day.

2. Any erosion control facilities deemed necessary by the city; before, during or after the grading activities, shall be installed at the request of the city.

3. No deviations shall be made from the elevations shown on the approved grading plan, without prior approval from the city.

4. Soils tracked from the site by motor vehicles or equipment shall be cleaned daily from paved roadway surfaces, or more frequently if requested by the city throughout the duration of construction.

5. Dust control measures shall be performed periodically when conditions require and/or as directed by the city.

6. All erosion control measures shall be used and maintained for the duration of site construction. If construction operations or natural events damage or interfere with these erosion control measures, they shall be restored to serve their intended function at the end of each day or as soon as field conditions allow access.

7. All construction areas disturbed during construction shall be restored as soon as possible. Any areas which have been finished graded or areas that have been disturbed and for which grading or site building construction operations are not actively underway shall be seeded and mulched as set forth in the following paragraphs within 14 days:

A. All seeded areas shall be either mulched and disc-anchored or covered by fibrous blankets to protect seeds and limit erosion. Temporary much shall be dish-anchored and applied at a uniform rate of not less than two tons per acre and not less than 80% coverage.

B. If the graded area is anticipated to be re-disturbed/developed within six months, provide a temporary vegetative cover of Minnesota Department of Transportation (MNDOT) seed mixture 100 at a rate of 100 pounds per acre.

C. If graded area will not be developed for a period greater than six months, provide permanent vegetative cover of seed mixture MNDOT 190 at a rate of 60 pounds per acre.

D. Grading bods or the equivalent securities shall be retained until turf has germinated and survived a 6-day growing period.

E. Whenever other erosion and sediment control practices are inadequate, temporary on-site sediment basins that conform to the criteria for on-site detention basins shall be provided.

8. Runoff shall be prevented from entering all storm sewer catch basins providing they are not needed during construction. Where storm sewer catch basins are necessary for site drainage during construction, a silt fence or sediment protection devices as detailed shall be installed and maintained around all catch basins until the area tributary to the catch basin is restored.

9. Grading activities proposed to begin after October 15 will require an approved phasing schedule. The area of land that the city will allow to be disturbed at this time of year will be severely limited. The city will also require additional erosion control devises i.e. temporary sediment basins, dormant seeding and high rates of application of booth seed and mulch.

10. Erosion control facilities shall be installed and maintained around area to be graded until the area tributary to the area is restored.

11. Accumulation of all sediment occurring in storm sewers shall be removed prior to, during and after completion of grading activities.

12. Erosion control items and devices should be removed only as directed by the city.

<u>Grading Notes:</u>

1. The contractor is to visit the site, review all construction documents and field verify the existing conditions prior to bidding. No additional compensation will be given for work that could have been identified by a site visit or construction document review.

2. The background information was prepared by Sunde Land Surveying. (952) 881-2455.

3. It is the contractor's responsibility to ascertain the location of all existing utilities. The contractor shall verify the location, elevation and mark all existing utilities 48 hours before construction starts. the engineer, architect or owner does not guarantee that all utilities are mapped, or if mapped, are shown

correctly. Contact Gopher One at 651-454-0002 for field locating existing utilities. Contact utility owner if damage occurs due to construction.

4. Protect all existing structures and utilities which are not scheduled for removal.

5. Notify city building inspector before trenching and excavation work commences. The contractor shall obtain all applicable permits prior to start of construction.

6. All spot elevations shown as 4.45, for example, are to be understood to mean 944.45.

7. No slopes are to exceed 3:1 (3 feet horizontal to 1 foot vertical) unless noted otherwise.

8. Provide positive drainage from buildings at all times.

9. Upon completion of the grading and utility work, the contractor shall certify that all grading and utility work was performed in accordance with the approved grading and utility permits. A record grading and utility plan shall be submitted to the city for review and distribution.

10. Prior to issuance of building permits, all necessary erosion control devices must be in place and function. The city will inspect the site to determine its suitability for building activities. If the public utilities have bet been installed at this point, it may be necessary to withhold building permits for various lots to allow the contractor adequate space to perform this work.

11. All debris created in the process of clearing and grading the site shall be removed from the site. This includes trees and shrubs. Under no circumstances shall this type of material be buried or burned on the site.

12. All topsoil shall be stripped and salvaged for re-spreading on the site. Six inches of topsoil – after compaction- shall be re-spread prior to seeding and mulching. Excess topsoil may be removed from the site providing there is adequate topsoil remaining to properly finish the site as noted above. The topsoil stripping, stockpiling and re-spreading shall be done in accordance to, and noted on, the approved grading plan and specifications.

13. All grading operations shall be conducted in a manner to minimize the potential for site erosion. Erosion control measures shall be installed to prevent sediment from running off onto adjacent properties. Any damage to adjacent properties must be corrected and restored as soon as permission is granted from the adjacent property owner(s).

14. If construction of the site work proceeds through the winter months, any disturbed areas outside the building footprint are to be minimally stabilized prior to March 1, as follows: Areas planned to receive pavements are to have Class 5 base installed, all other disturbed areas are to be seeded, straw mulch placed, and disc-mulched.

15. The contractor shall limit the disturbed area as much as possible.

SUSTAINABLE SITES CREDIT 1: SITE SELECTION

1 POINT

Intent

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

Requirements

Do not develop buildings, hardscape, roads or parking areas on portions of sites that meet any one of the following criteria:

❑ Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5)

❑ Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA (Federal Emergency Management Agency)

❑ Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists

❑ Within 100 feet of any wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent

❑ Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams and tributaries which support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act

❑ Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt)

Potential Technologies & Strategies

During the site selection process, give preference to those sites that do not include sensitive site elements and restrictive land types. Select a suitable building location and design the building with the minimal footprint to minimize site disruption of those environmentally sensitive areas identified above.

CREDIT COMPLIANCE

The project complied with all requirements.

SUSTAINABLE SITES CREDIT 2: DEVELOPMENT DENSITY & COMMUNITY CONNECTIVITY

1 POINT

Intent

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

Requirements

OPTION 1 — DEVELOPMENT DENSITY

Construct or renovate building on a previously developed site AND in a community with a minimum density of 60,000 square feet per acre net (Note: density calculation must include the area of the project being built and is based on a typical two-story downtown development).

OR

OPTION 2 — COMMUNITY CONNECTIVITY

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 acre net AND within 1/2 mile of at least 10 Basic Services AND with pedestrian access between the building and the services.

Basic Services include, but are not limited to:
1) Bank; 2) Place of Worship; 3) Convenience Grocery; 4) Day Care; 5) Cleaners; 6) Fire Station; 7) Beauty; 8)Hardware; 9) Laundry; 10) Library; 11) Medical/Dental; 12) Senior Care Facility; 13) Park; 14) Pharmacy; 15) Post Office; 16) Restaurant; 17) School; 18) Supermarket; 19) Theater; 20) Community Center; 21) Fitness Center; 22) Museum. Proximity is determined by drawing a 1/2 mile radius around the main building entrance on a site map and counting the services within that radius.

Potential Technologies & Strategies

During the site selection process, give preference to urban sites with pedestrian access to a variety of services.

CREDIT COMPLIANCE

The project met Option 2:

Key #	Category	Business	Address	Distance (mi)
1	Bank	Wells Fargo	56 Snelling Ave. N.	0.3
2	Child Care	La Petite Academy	1770 Grand Ave.	0.4
3	Place of Worship	Immaculate Heart of Mary	1550 Summit Ave.	0.1
4	Cleaners	Grand Laundromat	1700 Grand Ave.	0.2
5	Supermarket	Whole Foods Market	30 Fairview Ave. S.	0.5
6	Library	Dewitt Wallace Library	1600 Grand Ave.	0.1
7	Dental	Kubes Dental Care	91 Snelling Ave. N.	0.3
8	Pharmacy	St. Paul Corner Drug	240 Snelling Ave. S.	0.4
9	Restaurant 1	Caribou Coffee	68 Snelling Ave. S.	0.1
10	Beauty	Grand Hair & Beyond	1674 Grand Ave.	0.1
11	Restaurant 2	Carmelo's Ristorante	238 Snelling Ave. S.	0.4
12	Convenience Grocery	Superamerica	56 Snelling Ave. N.	0.3

Key #	Category	Business	Address	Distance (mi)
13	Fire Station	St. Paul Fire Department	111 Snelling Ave. N.	0.4
14	Hardware	Ace Hardware	1676 Grand Ave.	0.2
15	Senior Services	Rakhma Incorporated	123 Wheeler St. S.	0.5
16	K-12 School	Highland Park Montessori School	1550 Summit Ave.	0.2
17	Theater	Mann Grandview 2 Theater	1830 Grand Ave.	0.5
18	Fitness Center	Sweatshop Fitness Training Center	171 Snelling Ave. N.	0.4

Map of Population density (people per square mile)2000 in Minneapolis-St. Paul, MN Metro

(c) 2008 Fannie Mae Foundation. Printed from DataPlace -- www.dataplace.org

SUSTAINABLE SITES CREDIT 4.1: ALTERNATIVE TRANSPORTATION: PUBLIC TRANSPORTATION ACCESS
1 POINT

Intent
Reduce pollution and land development impacts from automobile use.

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

OR

Locate project within 1/4 mile of one or more stops for two or more public or campus bus lines usable by building occupants.

Potential Technologies & Strategies
Perform a transportation survey of future building occupants to identify transportation needs. Site the building near mass transit.

CREDIT COMPLIANCE
Three public bus stops are within ½ mile from the project:

Distance to Station/Stop (mi)	Line Designation
0.5	Route 84/From Roseville to St. Paul and S. Minneapolis
0.5	Route 64/ From Grand Ave. to Lower Afton Rd. and McKnight Rd. via downtown St. Paul
0.5	Route 144/ From Highland Park to Minneapolis via Snelling, I-94 and U of M.

SUSTAINABLE SITES CREDIT 4.2: ALTERNATIVE TRANSPORTATION: BICYCLE STORAGE & CHANGING ROOMS

1 POINT

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

For commercial or institutional buildings, provide secure bicycle racks and/or storage (within 200 yards of a building entrance) for 5% or more of all building users (measured at peak periods), AND, provide shower and changing facilities in the building, or within 200 yards of a building entrance, for 0.5% of Full-Time Equivalent (FTE) occupants.

OR

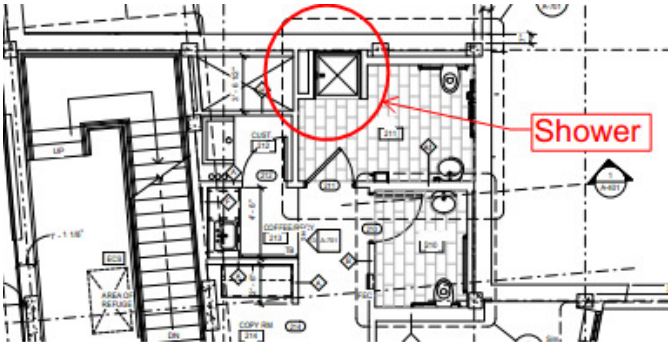
For residential buildings, provide covered storage facilities for securing bicycles for 15% or more of building occupants in lieu of changing/shower facilities.

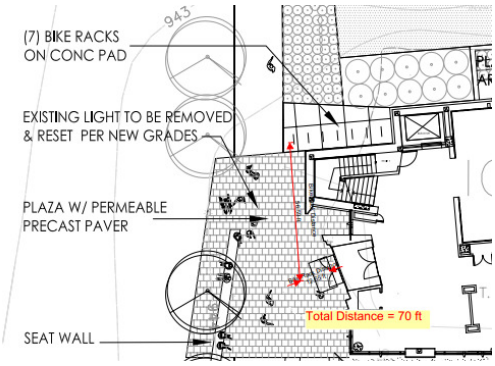
Potential Technologies & Strategies

Design the building with transportation amenities such as bicycle racks and showering/changing facilities.

CREDIT COMPLIANCE

The building contains one shower and six outdoor bicycle racks.





SUSTAINABLE SITES CREDIT 4.3: ALTERNATIVE TRANSPORTATION: LOW EMITTING & FUEL EFFICIENT VEHICLES

1 POINT

Intent

Reduce pollution and land development impacts from automobile use.

Requirements

OPTION 1

Provide low-emitting and fuel-efficient vehicles for 3% of Full-Time Equivalent (FTE) occupants AND provide preferred parking for these vehicles.

OR

OPTION 2

Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.

OR

OPTION 3

Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors).

For the purposes of this credit, low-emitting and fuel-efficient vehicles are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide. "Preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.

Potential Technologies & Strategies

Provide transportation amenities such as alternative

CREDIT COMPLIANCE

The project met Option 3.

Credit Narrative:

Zero parking spaces are associated specifically with the IGC project. The College intends to implement a Preferred Parking Program on a campus-wide basis, beginning July 1, 2008. At least 5% of the campus's total parking spaces may be designated for this purpose. Drivers of vehicles that meet the definition of "Low-Emitting" or "Fuel-Efficient" will be provided with a reserved parking space in an appropriate location (based on need) upon request. Signage will be placed at the designated spaces. The program will be advertised on the Macalester College Parking webpage, and in the Bulletin. Drivers may apply for a Preferred Parking Space through the Facilities Management Office.

MACALESTER COLLEGE

1600 GRAND AVENUE
SAINT PAUL, MINNESOTA 55105-1899

TELEPHONE:
651-696-6000

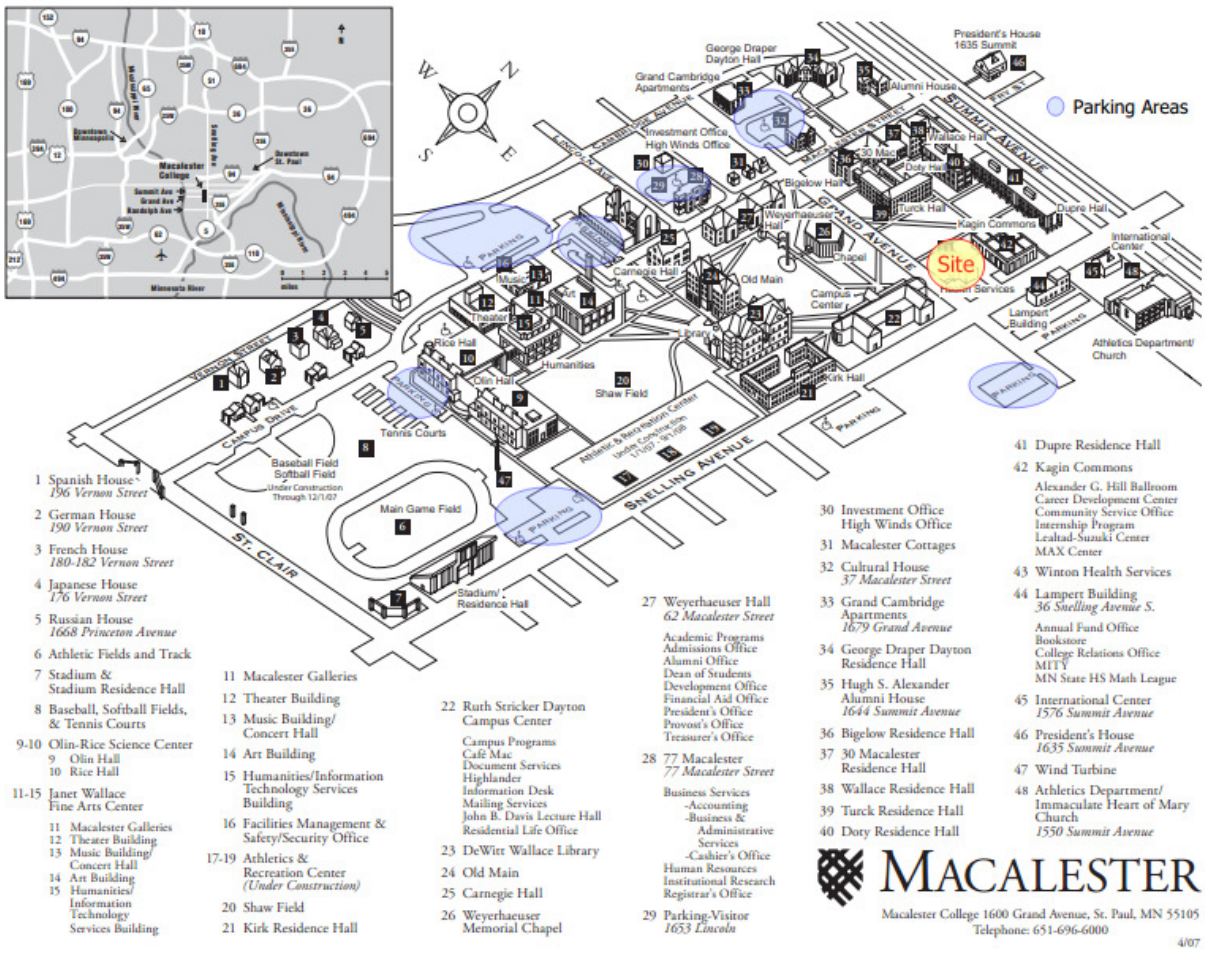
SSc4.3: Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles

Zero parking spaces are associated specifically with the IGC project. The College intends to implement a Preferred Parking Program on a campus-wide basis, beginning July 1, 2008. This program will be available for the life of the building, at a minimum.

Because convenience is relative to the building that the driver occupies, parking spaces will be designated on an on-request basis. At least 5% of the campus's total parking spaces may be designated for this purpose, and at least 3% of the campus's total parking spaces may be designated for qualified occupants of the IGC.

Drivers of vehicles that meet the definition of "Low-Emitting" or "Fuel-Efficient" will be provided with a reserved parking space in an appropriate location (based on need) upon request. Signage will be placed at the designated spaces upon assignment. The program will be advertised on the Macalester College Parking webpage, and in the Bulletin. Drivers may apply for a Preferred Parking Space through the Facilities Management Office.

David Wheaton
Vice President for Administration and Finance


Parking Areas
Site
SUMMIT AVENUE
GRAND AVENUE
SHELLING AVENUE
ST. CLAIR
FINANCE STREET
CAMPUS DRIVE
CAMBRIDGE AVENUE
LINCOLN AVENUE
Macalester College
Downtown Minneapolis
Downtown St. Paul
Minnesota River
George Draper Dayton Hall
Grand Cambridge Apartments
Investment Office
High Winds Office
Alumni House
President's House
1635 Summit
Wallace Hall
30 Macalester
Doty Hall
Bigelow Hall
Turck Hall
Dupre Hall
Kagin Commons
Weyerhaeuser Hall
Chapel
Carnegie Hall
Old Main
Campus Center
Student Services
International Center
Lampert Building
Athletics Department/ Church
Rice Hall
Theater
Humanities
Olin Hall
Shaw Field
Kirk Hall
Tennis Courts
Baseball Field
Softball Field
Under Construction
Through 12/1/07
Main Game Field
Stadium/
Residence Hall
Athletic & Recreation Center
Under Construction
11/1/07 - 9/1/08
1 Spanish House
196 Vernon Street
2 German House
190 Vernon Street
3 French House
180-182 Vernon Street
4 Japanese House
176 Vernon Street
5 Russian House
1668 Princeton Avenue
6 Athletic Fields and Track
7 Stadium & Stadium Residence Hall
8 Baseball, Softball Fields, & Tennis Courts
9-10 Olin-Rice Science Center
9 Olin Hall
10 Rice Hall
11-15 Janet Wallace Fine Arts Center
11 Macalester Galleries
12 Theater Building
13 Music Building/ Concert Hall
14 Art Building
15 Humanities/ Information Technology Services Building
11 Macalester Galleries
12 Theater Building
13 Music Building/ Concert Hall
14 Art Building
15 Humanities/ Information Technology Services Building
16 Facilities Management & Safety/Security Office
17-19 Athletics & Recreation Center (Under Construction)
20 Shaw Field
21 Kirk Residence Hall
22 Ruth Stricker Dayton Campus Center
Campus Programs
Café Mac
Document Services
Highlander
Information Desk
Mailing Services
John B. Davis Lecture Hall
Residential Life Office
23 DeWitt Wallace Library
24 Old Main
25 Carnegie Hall
26 Weyerhaeuser Memorial Chapel
27 Weyerhaeuser Hall
62 Macalester Street
Academic Programs
Admissions Office
Alumni Office
Dean of Students
Development Office
Financial Aid Office
President's Office
Provost's Office
Treasurer's Office
28 77 Macalester
77 Macalester Street
Business Services
-Accounting
-Business & Administrative Services
-Cashier's Office
Human Resources
Institutional Research
Registrar's Office
29 Parking-Visitor
1653 Lincoln
30 Investment Office
High Winds Office
31 Macalester Cottages
32 Cultural House
37 Macalester Street
33 Grand Cambridge Apartments
1679 Grand Avenue
34 George Draper Dayton Residence Hall
35 Hugh S. Alexander Alumni House
1644 Summit Avenue
36 Bigelow Residence Hall
37 30 Macalester Residence Hall
38 Wallace Residence Hall
39 Turck Residence Hall
40 Doty Residence Hall
41 Dupre Residence Hall
42 Kagin Commons
Alexander G. Hill Ballroom
Career Development Center
Community Service Office
Internship Program
Lealtad-Suzuki Center
MAX Center
43 Winton Health Services
44 Lampert Building
36 Snelling Avenue S.
Annual Fund Office
Bookstore
College Relations Office
MITY
MN State HS Math League
45 International Center
1576 Summit Avenue
46 President's House
1635 Summit Avenue
47 Wind Turbine
48 Athletics Department/ Immaculate Heart of Mary Church
1550 Summit Avenue
MACALESTER
Macalester College 1600 Grand Avenue, St. Paul, MN 55105
Telephone: 651-696-6000
4/07

SUSTAINABLE SITES CREDIT 4.4: ALTERNATIVE TRANSPORTATION: PARKING CAPACITY
1 POINT

Intent
Reduce pollution and land development impacts from single occupancy vehicle use.

Requirements
OPTION 1 — NON-RESIDENTIAL
❑ Size parking capacity to meet, but not exceed, minimum local zoning requirements, AND, provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces.

OR

OPTION 2 — NON-RESIDENTIAL
For projects that provide parking for less than 5% of FTE building occupants:
❑ Provide preferred parking for carpools or vanpools, marked as such, for 5% of total provided parking spaces.

OR

OPTION 3 — RESIDENTIAL
❑ Size parking capacity to not exceed minimum local zoning requirements, AND, provide infrastructure and support programs to facilitate shared vehicle usage such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle services to mass transit.

OR

OPTION 4 — ALL
Provide no new parking.
"Preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.

Potential Technologies & Strategies
Minimize parking lot/garage size. Consider sharing parking facilities with adjacent buildings. Consider alternatives that will limit the use of single occupancy vehicles.

CREDIT COMPLIANCE
The project followed Option 4 – No new parking is provided (Residential OR Non-Residential)

SUSTAINABLE SITES CREDIT 5.2: SITE DEVELOPMENT: MAXIMIZE OPEN SPACE
1 POINT

Intent
Provide a high ratio of open space to development footprint to promote biodiversity.

Requirements
OPTION 1
Reduce the development footprint (defined as the total area of the building footprint, hardscape, access roads and parking) and/or provide vegetated open space within the project boundary to exceed the local zoning's open space requirement for the site by 25%.

OR

OPTION 2
For areas with no local zoning requirements (e.g., some university campuses, military bases), provide vegetated open space area adjacent to the building that is equal to the building footprint.

OR

OPTION 3
Where a zoning ordinance exists, but there is no requirement for open space (zero), provide vegetated open space equal to 20% of the project's site area.

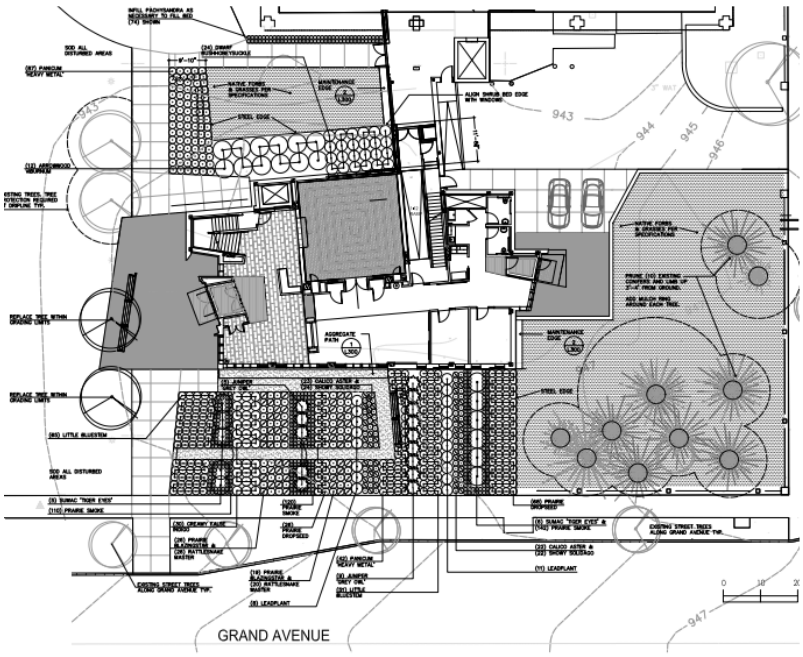
ALL OPTIONS:
❑ For projects located in urban areas that earn SS Credit 2, vegetated roof areas can contribute to credit compliance.

❑ For projects located in urban areas that earn SS Credit 2, pedestrian oriented hardscape areas can contribute to credit compliance. For such projects, a minimum of 25% of the open space counted must be vegetated.

❑ Wetlands or naturally designed ponds may count as open space if the side slope gradients average 1:4 (vertical: horizontal) or less and are vegetated.

Potential Technologies & Strategies
Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with a minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors to maximize open space on the site.

CREDIT COMPLIANCE
The project met Option 2. The total building square footprint area is 4,930 ft^2 and the vegetated open space provided by the project is 9,856 ft^2. The full site plan can be found in the appendix.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SUSTAINABLE SITES CREDIT 6.1: STORMWATER DESIGN: QUANTITY CONTROL
1 POINT

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

Requirements
CASE 1 — EXISTING IMPERVIOUSNESS IS LESS THAN OR EQUAL TO 50%
Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.

OR

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

OR

CASE 2 — EXISTING IMPERVIOUSNESS IS GREATER THAN 50%
Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

Potential Technologies & Strategies
Design the project site to maintain natural stormwater flows by promoting infiltration. Specify vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse stormwater volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses.

CREDIT COMPLIANCE
The project met Case 1.

Credit Narrative:
The storm water runoff rate and quantity from the proposed conditions has been reduced from the existing conditions for the one and two year storm events with the use of permeable pavers and underground infiltration pipes. The one year storm event's runoff rate was reduced from 0.75 cubic feet per second (cfs) to 0.23 cfs. The volume of the one year storm event was reduced from 1,612 cubic feet (cf)to 1,481 cubic feet.

2-year runoff rates:

Pre-development Site Runoff Rate	0.930 cfs
Pre-development Site Runoff Quantity	2,004.000 cf
Post-development Site Runoff Rate	0.360 cfs
Post-development Site Runoff Quantity	1,917.00 cf

The full hydrology reports can be found in the appendix.

SUSTAINABILE SITES CREDIT 6.2: STORMWATER DESIGN: QUALITY CONTROL

1 POINT

Intent

Limit disruption and pollution of natural water 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 (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

Potential Technologies & Strategies

Use alternative surfaces (e.g., vegetated roofs, pervious pavement or grid pavers) and nonstructural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to reduce imperviousness and promote infiltration thereby reducing pollutant loadings.
Use sustainable design strategies (e.g., Low Impact Development, Environmentally Sensitive Design) to design integrated natural and mechanical treatment systems such as constructed wetlands, vegetated filters, and open channels to treat stormwater runoff.

CREDIT COMPLIANCE

The stormwater run-off from 90% of the average annual rainfall is captured or treated such that 80% of the average annual post-development Total Suspended Solids (TSS) is removed.

Non-Structural Controls:

Best Management Practices (BMP)	Description of BMP's Contribution to Stormwater Filtration
Grassed Swales	Sidewalk areas on the west side of the site were graded to flow onto grass areas before entering the storm sewer system. There are existing storm sewer catch basins within the grassed areas. The TSS removed by grassed swales is 30%

Structural Controls:

Structural Control	Description of Structural Control's Pollutant Removal Performance	% of Annual Rainfall Volume Treated by Structural Control
Permeable Pavers	Approximately 1,500 sf of permeable pavers will be installed in the plaza areas on the east and west sides of the building. Since all runoff on the permeable pavers in infiltrated, TSS removal is 100%	7.0
Underground Infiltration Pipes	184 feet of 36" perforated underground infiltration pipes which remove 100% of total suspended solids through infiltration. The tanks have been designed to capture and infiltrate a 1-inch storm event by setting the four inch outflow orifice six inches above the invert of the infiltration pipes. There are sandy soils present on-site so an infiltration rate of 0.6 inches per hour was used in designing the pipes.	71.0

An input and results table can be found in the appendix.

SUSTAINABILE SITES CREDIT 7.2: HEAT ISLAND EFFECT: ROOF

1 POINT

Intent

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Requirements

OPTION 1

Use roofing materials having a Solar Reflectance Index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface.

OR

OPTION 2

Install a vegetated roof for at least 50% of the roof area.

OR

OPTION 3

Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria:

(Area of SRI Roof / 0.75) + (Area of vegetated roof / 0.5) >= Total Roof Area

Roof Type	Slope	SRI
Low-Sloped Roof	≤2:12	78
Steep-Sloped Roof	>2:12	29

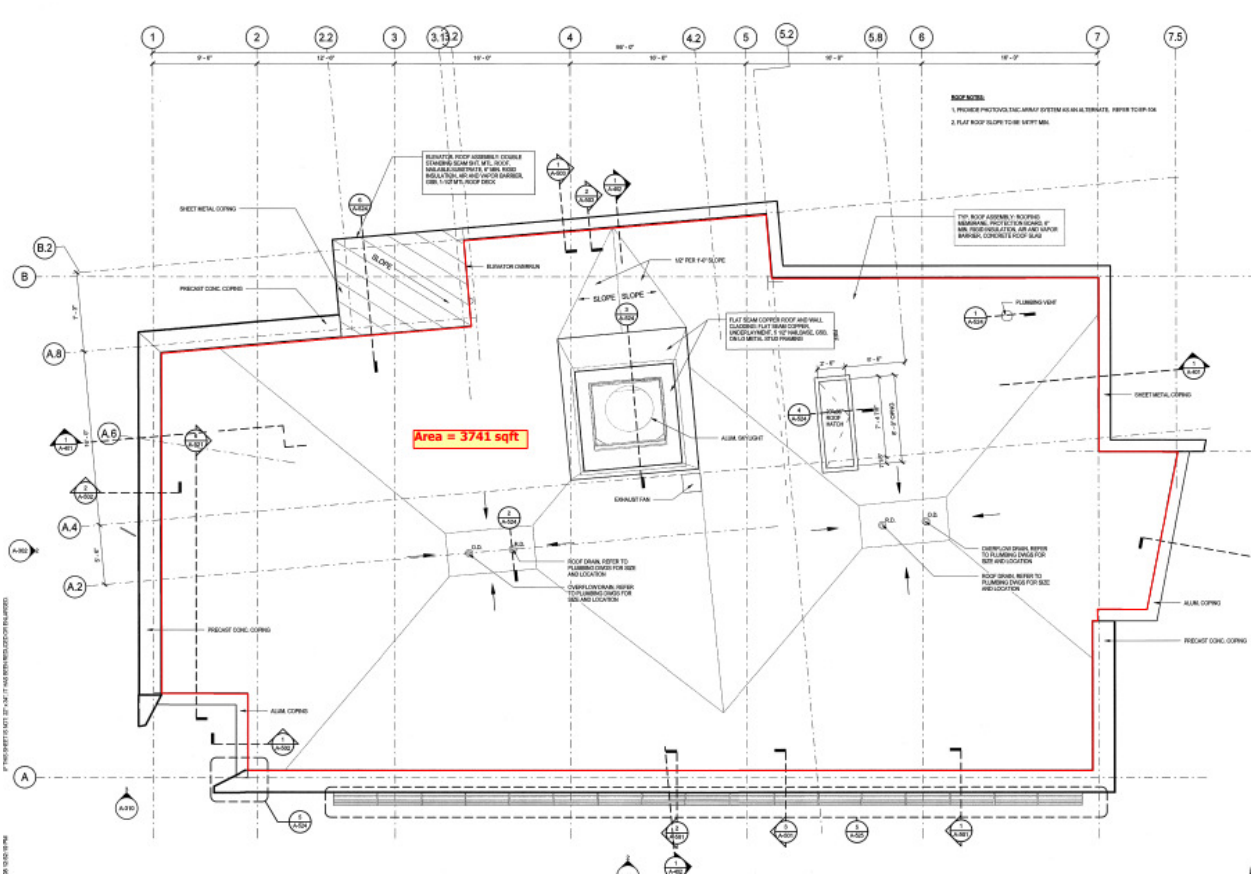
Potential Technologies & Strategies

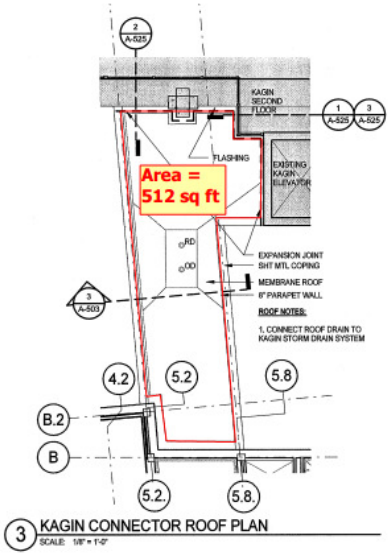
Consider installing high-albedo and vegetated roofs to reduce heat absorption. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values will be available in the LEED for New Construction v2.2 Reference Guide. Product information is available from the Cool Roof Rating Council website, at www.coolroofs.org.

CREDIT COMPLIANCE

The building contains 4,253 sf of roof. A Johns Manville GlasKap CR white roof with SRI of 92 was used. The GlasKap CR is a white mineral surfaced, white acrylic coated, fiber glass cap sheet of use in built-up roofing systems.

SRI = The Solar Reflectance Index (SRI) 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.





The specification sheet for the roofing material can be found in the appendix.

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WATER EFFICIENCY CATEGORY

LEED FOR NEW CONSTRUCTION V2.2

4	**Water Efficiency**	**Possible Points:** 5

1	Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
	Credit 2	Innovative Wastewater Technologies	1
1	Credit 3.1	Water Use Reduction, 20% Reduction	1
1	Credit 3.2	Water Use Reduction, 30% Reduction	1

WATER EFFICIENCY CREDIT 1.1: WATER EFFICIENT LANDSCAPING: REDUCE BY 5O%

&

WATER EFFICIENCY CREDIT 1.2: WATER EFFICIENT LANDSCAPING: NO POTABLE WATER USE OR NO IRRIGATION

2 POINTS

Intent

Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.

Requirements

Reduce potable water consumption for irrigation by 50% from a calculated mid-summer baseline case. Reductions shall be attributed to any combination of the following items:

- ❑ Plant species factor
- ❑ Irrigation efficiency
- ❑ Use of captured rainwater
- ❑ Use of recycled wastewater
- ❑ Use of water treated and conveyed by a public agency specifically for non-potable uses

Potential Technologies & Strategies

Perform a soil/climate analysis to determine appropriate plant material and design the landscape with native or adapted plants to reduce or eliminate irrigation requirements. Where irrigation is required, use high-efficiency equipment and/or climate-based controllers.

CREDIT COMPLIANCE

The installed landscaping for the project did not require permanent irrigation systems. Temporary irrigation systems were used for plant establishment and were removed within one year of installation.

WATER EFFICIENCY CREDIT 3.1: WATER USE REDUCTION: 20% REDUCTION

&

WATER EFFICIENCY CREDIT 3.2: WATER USE REDUCTION: 30% REDUCTION

2 POINTs

Intent

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

Requirements

Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, showers and kitchen sinks.

Potential Technologies & Strategies

Use high-efficiency fixtures, dry fixtures such as composting toilet systems and non-water using urinals, and occupant sensors to reduce the potable water demand. Consider reuse of stormwater.

CREDIT COMPLIANCE

Occupancy:

	Full Time Equivalent (FTE)*	Student/Visitor**
Male	11	55
Female	11	55
Total	22	110

*Full Time Equivalent is defined as a regular building occupant who spends 40 hours per week in the project building

** Student/Visitors, or Transient Users, are defined as occupants who do not use the project building on a consistent, regular, daily basis.

Annual Days of Operation: 250

Baseline Water Use:

Baseline Flush Fixture Type	Gender	Flush Rate (GPF)	Use Per Person	
			FTE	Student/Visitor
Conventional Water Closet	Male	1.6	3.0	.5
Conventional Water Closet	Female	1.6	3.0	.5

Note: No urinals were used in this project.

Annual Baseline Flush Fixture Usage: 48,400 gal/yr

Sample Calculation (11 male FTE):

3 uses/day x 11 FTE = 33 uses/day x 250 day/yr = 8,250 uses/yr x 1.6 gal = 13,200 gal/yr

Baseline Flow Fixture Type	Flow Rate (GPM)	Duration (sec)	Use Per Person	
			FTE	Student/Visitor
Conventional Lavatory	2.5	15	3.0	0.5
Conventional Shower	2.5	300	0.1	
Kitchen Sink	2.5	15	1.0	
Janitor Sink	2.5	15	0.1	

Annual Baseline Flow Fixture Usage: 29,562 gal/yr

TOTAL BASELINE WATER USAGE: 77,962 gal/yr

Note: Baseline flush and flow fixture rates are based on the Energy Policy Act of 1992.

Design Case Use:

Design Flush Fixture Type	Gender	Fixture Manuf.	Fixture Model	Flush Rate (GPF)	% of Occupants	FTE	Student/Visitor
Dual-Flush WC, Full- Flush	Female	Caroma	326013	1.6	33	3.0	0.5
Dual-Flush WC, Low-Flush	Male	Caroma	326013	0.8	67	3.0	0.5
Dual-Flush WC, Full-Flush	Female	Caroma	326013	1.6	33	3.0	0.5
Dual-Flush WC, Low-Flush	Male	Caroma	326013	0.8	67	3.0	0.5

Annual Design Case Flush Fixture Water Usage: 32,186 gal/yr.

Design Flow Fixture Type	Fixture Manuf.	Fixture Model	Flow Rate (GPM)	% of Occupants	Duration (sec)	Use Per Person	
						FTE	Student/Visitor
Ultra Low-Flow Lavatory	Zurn	Z6915-GEN-F-MT	0.5	100	15	3.0	0.5
Low-Flow Shower	Delta	RP46384	1.6	100	300	0.1	
Low-Flow Kitchen	Chicago	786-GN2FC	1.8	100	15	1.0	
Janitor Sink	Chicago	897-CP	2.5	100	15	0.1	

Annual Design Case Flow Fixture Water Usage: 11,000 gal/yr
Total Annual Design Case Water Usage: 43,186 gal/yr

Non-Potable Source Water

Water Source	Annual Quantity (gal)
Grey Water Re-Use	0
Rainwater Re-Use	0

Water Use Summary:

Baseline Case-Annual Water Consumption: 77,962 gal/yr
Design Case-Annual Water Consumption: 43,186 gal/yr
Total Annual Non-Potable Water Consumption: 0 gal/yr
Total Water Savings: 44.6%

Water savings of at least 20% earns 1 LEED point (Credit 3.1), and water savings of at least 30% earns an additional LEED point (Credit 3.2)

Credit Narrative:
This project is achieving a 44% overall reduction in water consumption by utilizing several technologies.

Dual-Flush water closets are to be utilized for both male and female restrooms. Urinals have been excluded from this project altogether.

The showers provided reduce water consumption in two ways. The first of which is the valve itself. The shower valve is a push button actuated limiting valve model #4-427 manufactured by Symmons Industries. The showerhead is manufactured by Delta Faucet and uses only 1.6 gallons per minute.

The kitchen sink faucets are to use a maximum 1.6 gallons per minute. The lavatory faucets are 0.5 GPM, self- generating hydroelectric powered, and sensor operated. Zurn Industries model #Z6915-GEN-F-MT.

Fixture specification sheets can be found in the appendix.

MARKIM HALL

ENERGY & ATMOSPHERE CATEGORY

LEED FOR NEW CONSTRUCTION V2.2

14	Energy & Atmosphere	Possible Points:	17

Y	Prereq 1	Fundamental Commissioning of the Building Energy Systems	
Y	Prereq 2	Minimum Energy Performance	
Y	Prereq 3	Fundamental Refrigerant Management	1
1	Credit 1.1	Optimize Energy Performance, 10.5% New / 3.5% Existing	1
1	Credit 1.2	Optimize Energy Performance, 14% New / 7% Existing	1
1	Credit 1.3	Optimize Energy Performance, 17.5% New / 10.5% Existing	1
1	Credit 1.4	Optimize Energy Performance, 21% New / 14% Existing	1
1	Credit 1.5	Optimize Energy Performance, 24.5% New / 17.5% Existing	1
1	Credit 1.6	Optimize Energy Performance, 28% New / 21% Existing	1
1	Credit 1.7	Optimize Energy Performance, 31.5% New / 24.5% Existing	1
1	Credit 1.8	Optimize Energy Performance, 35% New / 28% Existing	1
1	Credit 1.9	Optimize Energy Performance, 38.5% New / 31.5% Existing	1
1	Credit 1.10	Optimize Energy Performance, 42% New / 35% Existing	1
	Credit 2.1	Renewable Energy, 2.5%	1
	Credit 2.2	Renewable Energy, 7.5%	1
	Credit 2.3	Renewable Energy, 12.5%	1
1	Credit 3	Enhanced Commissioning	1
1	Credit 4	Enhanced Refrigerant Management	1
1	Credit 5	Measurement & Verification	1
1	Credit 6	Green Power	1

ENERGY & ATMOPSHERE PREREQUISITE 1: FUNDAMENTAL COMMISSION OF THE BUILDING ENERGY SYSTEMS

REQUIRED

Intent

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

Benefits of Commissioning

Benefits of commissioning include reduced energy use, lower operating costs, reduced contractor callbacks, better building documentation, improved occupant productivity, and verification that the systems perform in accordance with the owner's project requirements.

Requirements

The following commissioning process activities shall be completed by the commissioning team, in accordance with the LEED for New Construction 2.2 Reference Guide.

1) Designate an individual as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities.

a) The CxA shall have documented commissioning authority experience in at least two building projects.

b) The individual serving as the CxA shall be independent of the project's design and construction management, though they may be employees of the firms providing those services. The CxA may be a qualified employee or consultant of the Owner.

c) The CxA shall report results, findings and recommendations directly to the Owner.

d) For projects smaller than 50,000 gross square feet, the CxA may include qualified persons on the design or construction teams who have the required experience.

2) The Owner shall document the Owner's Project Requirements (OPR). The design team shall develop the Basis of Design (BOD). The CxA shall review these documents for clarity and completeness. The Owner and design team shall be responsible for updates to their respective documents.

3) Develop and incorporate commissioning requirements into the construction documents.

4) Develop and implement a commissioning plan.

5) Verify the installation and performance of the systems to be commissioned.

6) Complete a summary commissioning report.

Commissioned Systems

Commissioning process activities shall be completed for the following energy-related systems, at a minimum:

❑ Heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls

❑ Lighting and daylighting controls

❑ Domestic hot water systems

❑ Renewable energy systems (wind, solar etc.)

Potential Technologies & Strategies
Owners are encouraged to seek out qualified individuals to lead the commissioning process. Qualified individuals are identified as those who possess a high level of experience in the following areas:

❑ Energy systems design, installation and operation

❑ Commissioning planning and process management

❑ Hands-on field experience with energy systems performance, interaction, start-up, balancing, testing, troubleshooting, operation, and maintenance procedures

❑ Energy systems automation control knowledge

Owners are encouraged to consider including water-using systems, building envelope systems, and other systems in the scope of the commissioning plan as appropriate. The building envelope is an important component of a facility which impacts energy consumption, occupant comfort and indoor air quality. While it is not required to be commissioned by LEED, an owner can receive significant financial savings and reduced risk of poor indoor air quality by including building envelope commissioning.
The LEED for New Construction 2.2 Reference Guide provides guidance on the rigor expected for this prerequisite for the following:

❑ Owner's project requirements

❑ Basis of design

❑ Commissioning plan

❑ Commissioning specification

❑ Performance verification documentation

❑ Commissioning report

CREDIT COMPLIANCE
All requirements for commissioning of the building were met. The complete commissioning scope of work and report can be found in the digital appendix.

ENERGY & ATMOPSHERE PREREQUISITE 2: MINIMUM ENERGY PERFORMANCE

REQUIRED

Intent
Establish the minimum level of energy efficiency for the proposed building and systems.

Requirements
Design the building project to comply with both—

❑ the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ASHRAE/IESNA Standard 90.1-2004 (without amendments); and

❑ the prescriptive requirements (Sections 5.5, 6.5, 7.5 and 9.5) or performance requirements (Section 11) of ASHRAE/IESNA Standard 90.1-2004 (without amendments).

Potential Technologies & Strategies
Design the building envelope, HVAC, lighting, and other systems to maximize energy performance. The ASHRAE 90.1-2004 User's Manual contains worksheets that can be used to document compliance with this prerequisite. For projects pursuing points under EA Credit 1, the computer simulation model may be used to confirm satisfaction of this prerequisite.

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy standard process for commercial energy code determination, then it may be used to satisfy this prerequisite in lieu of ASHRAE 90.1-2004. Details on the DOE process for commercial energy code determination can be found at www.energycodes.gov/implement/determinations_com.stm.

CREDIT COMPLIANCE
The project complies with all minimum energy performance requirements.

ENERGY & ATMOPSHERE PREREQUISITE 3: FUNDAMENTAL REFRIGERANT MANAGEMENT

REQUIRED

Intent
Reduce ozone depletion.

Requirements
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.

Potential Technologies & Strategies
When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC refrigerants and provide a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment in the base building that uses no CFC refrigerants.

CREDIT COMPLIANCE
The new IGC Building is served from a central campus chilled water plant. This plant contains a series of water cooled Chillers utilizing HCFC-123 as their refrigerant. No CFC refrigerants are in use.

ENERGY & ATMOPSHERE CREDIT 1: OPTIMIZE ENERGY PERFORMANCE (1-10 POINTS)

10 POINTS

Intent

Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements

Select one of the four compliance path options described below. Project teams documenting achievement using any of these options are assumed to be in compliance with EA Prerequisite 2.
NOTE: LEED for New Construction projects registered after June 26th, 2007 are required to achieve at least two (2) points under EAc1.

OPTION 1 — WHOLE BUILDING ENERGY SIMULATION (1–10 Points)
Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard. The minimum energy cost savings percentage for each point threshold is as follows:

New Buildings	Existing Building	Renovations Points
10.5%	3.5%	1
14%	7%	2
17.5%	10.5%	3
21%	14%	4
24.5%	17.5%	5
28%	21%	6
31.5%	24.5%	7
35%	28%	8
38.5%	31.5%	9
42%	25%	10

** Note: Only projects registered prior to June 26, 2007 may pursue 1 point under EAc1.*

Appendix G of Standard 90.1-2004 requires that the energy analysis done for the Building Performance Rating Method include ALL of the energy costs within and associated with the building project. To achieve points using this credit, the proposed design—

❑ must comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1-2004;

❑ must include all the energy costs within and associated with the building project; and

❑ must be compared against a baseline building that complies with Appendix G to Standard 90.1-2004. The default process energy cost is 25% of the total energy cost for the baseline building. For buildings where the process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include supporting documentation substantiating that process energy inputs are appropriate.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g., lighting integral to medical equipment) and other (e.g., waterfall pumps). Regulated (non-process) energy includes lighting (such as for the interior, parking garage, surface parking, façade, or building

grounds, except as noted above), HVAC (such as for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

For EA Credit 1, process loads shall be identical for both the baseline building performance rating and for the proposed building performance rating. However, project teams may follow the Exceptional Calculation Method (ASHRAE 90.1-2004 G2.5) to document measures that reduce process loads. Documentation of process load energy savings shall include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

OR

OPTION 2 — PRESCRIPTIVE COMPLIANCE PATH: ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004 (4 Points)

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004. The following restrictions apply:

❑ Buildings must be under 20,000 square feet.

❑ Buildings must be office occupancy.

❑ Project teams must fully comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located.

OR

OPTION 3 — PRESCRIPTIVE COMPLIANCE PATH: Advanced Buildings™ Core Performance™ Guide (2-5 Points)

Comply with the prescriptive measures identified in the Advanced Buildings™ Core Performance™ Guide developed by the New Buildings Institute. The following restrictions apply:

❑ Buildings must be under 100,000 square feet.

❑ Buildings may NOT be health care, warehouse or laboratory projects.

❑ Project teams must fully comply with Sections One, Design Process Strategies, and Two, Core Performance Requirements.

Minimum points achieved under Option 3 (2-3 points):

❑ Three (3) points are available for all office, school, public assembly, and retail projects under 100,000 square feet that comply with Sections One and Two of the Core Performance Guide.

❑ Two (2) points are available for all other project types under 100,000 square feet (except health care, warehouse, or laboratory projects) that implement the basic requirements of the Core Performance Guide Additional points available under Option 3 (up to 2 additional points):

❑ Up to two (2) additional points are available to projects that implement performance strategies listed in Section Three, Enhanced Performance. For every three strategies implemented from this section, one point is available.

❑ Any strategies applicable to the project may be implemented except:

- 3.1-Cool Roofs
- 3.8-Night Venting
- 3.13-Additional Commissioning

These strategies are addressed by different aspects of the LEED program and are not eligible for additional points under EA Credit 1.

OR

OPTION 4 — PRESCRIPTIVE COMPLIANCE PATH: Advanced Buildings Benchmark™ Basic Criteria and Prescriptive Measures (1 Point)

Note: projects registered after June 26, 2007 may not use this option.

Comply with the Basic Criteria and Prescriptive Measures of the Advanced Buildings Benchmark™ Version 1.1 with the exception of the following sections: 1.7 Monitoring and Trend-logging, 1.11 Indoor Air Quality, and 1.14 Networked Computer Monitor Control. The following restrictions apply:

❑ Project teams must fully comply with all applicable criteria as established in Advanced Buildings Benchmark for the climate zone in which the building is located.

Potential Technologies & Strategies
Design the building envelope and systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. Quantify energy performance as compared to a baseline building.
If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy standard process for commercial energy code determination, then the results of that analysis may be used to correlate local code performance with ASHRAE 90.1-2004. Details on the DOE process for commercial energy code determination can be found at www.energycodes.gov/implement/determinations_com.stm.

CREDIT COMPLIANCE
The USGBC required two energy simulations to be run comparing a baseline building to the proposed design. The first, Step 1, used utilities from the campus central plant. The second, Step 2, was modeled according to the Performance Rating Method, ASHRAE 90.1-2004 Appendix G for the baseline building and 'virtual' chiller and boiler plants for the proposed building. Using the Step 1 model, 56% of energy and 53.3% in cost was saved when compared to the baseline.

Step 1 – The building was modeled using purchased campus chilled water (CHW) and heating hot water (HHW) from the central plant. The campus does not charge users for utilites but the following prices were used for modeling puposes and were based on annual average costs. Utility prices used for purchased HHW are $9.41/MB and 0.7-KW/ton or $0.052/ton-hr or $4.33/MB for CHW.

General Information:
Principle Heating Source: Fossil Fuel
Quantity of Stories: 4
Weather File: Minneapolis MN TMY2
Climate Zone: 6A
Energy Code Used: ASHRAE 90.1-2004 Appendix G
New Construction Percent: 100
Energy Star Target Finder Score: 98

Space summary:

Building Use (Occupancy Type)	Conditioned Area (sf)	Unconditioned Area (sf)	Total Area (sf)
IGC Court	850		850
Enclosed Offices	3,593		3,593
Mechanical/Electrical		1,441	1,441
Restrooms	622		622
Stairwells	1,959		1,959
Open Office/Hallway	5,428		5,428
Storage	2,549		2,549
Total	15,001	1,441,	16,442

Advisory Messages (from simulation output files):

	Proposed Building	Baseline Building	Difference
Num. of Hours Heating Loads not Met	243	193	50
Numb. of Hours Cooling Loads not Met	0	0	0
Number of Warning Messages	0	0	0
Number of Error Messages	0	0	0
Number of Defaults Overridden	0	0	0

Comparison of Proposed Design Versus Baseline Design:

Model Input Parameter	Proposed Design Input	Baseline Design Input
Exterior Wall Construction	R-34, 6" HD SPF	Steel Framed, U=0.058 (R-17.24)
Roof Construction	R-50, Minimum	Insulation entirely above deck
Floor/Slab Construction	R-30	Unheated, F-0.73
Window-to-Gross Wall Ratio	19%	19%
Fenestration Type	Triple Low-e w/Argon, except double on S.	Fixed, double Low-e (std properties)
Fenestration U-factor	Double=0.3, Triple=0.2	0.57
Fenestration SHGC-south	Double=0.33	0.49
Fenestration SHGC-non-south	Triple=0.29	0.39
Fenestration Visual Light transmittance	Double=0.7, Triple=0.56	0.9
Shading Devices	Overhangs on select windows on south face	None
Interior Lighting Power Density (W/sf)	0.8	1.2
Daylighting Controls	Yes, continuous daylight dimming	None
Other Lighting Control Credits	None	None
Exterior Lighting Power (kW)	0	0

Model Input Parameter	Proposed Design Input	Baseline Design Input
Process Lighting (kW)	0	0
Receptacle Equipment Power Density (W/sf)	0.65	0.65
Primary HVAC System Type	Dedicated outdoor air ventilation system with radian ceiling panels for heating and cooling	Table G3.1.1B System #7- Packaged rooftop variable air volume CHW cooling with HW reheat
Fan supply, exhaust or return flowrate	4,250 CFM SA and EA	14,420 CFM SA, 10,4855 CFM RA
Fan Power	1.55 KW each SA and EA	90.1=13.8 KW SA, 10.0 KW RA
Economizer Control	70F dry bulb	70F dry bulb high limit shutoff
Demand Control Ventilation	No	No
Unitary Equipment Cooling Efficiency	N/A	N/A
Unitary Equipment Heating Efficiency	N/A	N/A
Chiller Parameters	Step 1, purchased CHW from campus system	Step 1, purchased CHW from campus system
Chilled Water Loop & Pump Parameters	44-556 F	44-56 F
Boiler Parameters	Step 1, purchased steam from campus system with HW converter	Step 1, purchased steam from campus system with HW converter
Hot Water Loop & Pump Parameters	180-130F	180-130F
Cooling Tower Parameters	N/A	N/A
Condenser Water Loop & Pump Parameters	N/A	N/A

Energy Type Summary:

Energy Type	Utility Rate Description	Units of Energy	Units of Demand
Electricity	Xcel rate A-14 General Service	kWh	Kw
Purchased Chilled Water	CHW from Campus Plant	MBtu	MBH
Purchased Steam	LP Steam from Campus Plant	MBtu	MBH
Natural Gas	Xcel rate #118 Large	Therms	MBH

Performance Rating:

End Use	Proposed Design Energy Type	Proposed Design Units	Proposed Building Results	Baseline Building Units	Baseline Building Results	Percent Savings
Interior Lighting	Electricity	Energy Use (kWh)	25,923	Energy Use (kWh)	51,480	49.6%
Exterior Lighting	Electricity	Energy Use (kWh)	0	Energy Use (kWh)	0	0%
Space Heating	Purchased Steam	Energy Use (MBtu)	385	Energy Use (MBtu)	987.3	61%
Space Cooling	Purchased Chilled Water	Energy Use (MBtu)	106	Energy Use (MBtu)	229.8	53.9%
Pumps	Electricity	Energy Use (kWh)	1,206	Energy Use (kWh)	11,494.5	89.5%
Heat Rejection	Electricity	Energy Use (kWh)	0	Energy Use (kWh)	0	0%
Fans-Interior	Electricity	Energy Use (kWh)	12,485	Energy Use (kWh)	31,255	60.1%
Service Water Heating	Electricity	Energy Use (kWh)	10,735	Energy Use (kWh)	10,735	0%
Receptacle Equipment (Process Energy)	Electricity	Energy Use (kWh)	16,018	Energy Use (kWh)	16,018	0%
Energy Totals	**Total Annual Energy Use (MBtu/yr)**		**717**		**1,630**	**56%**
	Annual Process Energy (MBtu/yr)		**55**		**55**	**0%**

Energy Cost and Consumption by Energy Type:

	Proposed Design		Baseline Design		Percent Savings	
Energy Type	Energy Use	Cost	Energy Use	Cost	Energy Use	Cost
Electricity	66,367 kWh	$4,932	120,982 kWh	$8,989	45.1%	45.1%
Purchased Chilled Water	106 MBtu	$458	229 MBtu	$995	53.7%	54%
Purchased Steam	385 MBtu	$3,619	987 MBtu	$9,289	61%	61%
Natural Gas	0 therms		0 therms	0	0%	0%
Total	**717 (MBtu/yr)**	**$9,009**	**1,630 (MBtu/yr)**	**$19,273**	**56%**	**53.3%**

Energy Units:
1 kBtu = 1,000 Btu 1 MBtu = 1,000 kBtu
1 kWh = 3.412 kBtu 1 MWh = 3,412 kBtu
1 therm = 100 kBtu 1 ton hr = 12 kBtu

Step 2- The baseline building was modeling according to ASHRAE 90.1 using two gas-fired HHW boiler and a packaged DX VAV system and billed under local electric and firm gas rates. The proposed building was modeled using CHW and HHW from 'virtual' dedicated chiller and boiler plants that reflect the operating efficiencies and losses described above, and billed under local electric and firm gas rates.

General Information:

Principle Heating Source: Fossil Fuel
Quantity of Stories: 4
Weather File: Minneapolis MN TMY2
Climate Zone: 6A
Energy Code Used: ASHRAE 90.1-2004 Appendix G
New Construction Percent: 100
Energy Star Target Finder Score: 98

Space summary:

Building Use (Occupancy Type)	Conditioned Area (sf)	Unconditioned Area (sf)	Total Area (sf)
IGC Court	850		850
Enclosed Offices	3,593		3,593
Mechanical/Electrical		1,441	1,441
Restrooms	622		622
Stairwells	1,959		1,959
Open Office/Hallway	5,428		5,428
Storage	2,549		2,549
Total	15,001	1,441	16,442

Advisory Messages (from simulation output files):

	Proposed Building	Baseline Building	Difference
Num. of Hours Heating Loads not Met	243	193	50
Numb. of Hours Cooling Loads not Met	0	0	0
Number of Warning Messages	3	2	1
Number of Error Messages	0	0	0
Number of Defaults Overridden	0	0	0

Comparison of Proposed Design Versus Baseline Design:

Model Input Parameter	Proposed Design Input	Baseline Design Input
Exterior Wall Construction	R-34, 6" HD SPF	Steel Framed, U=0.058 (R-17.24)
Roof Construction	R-50, Minimum	Insulation entirely above deck
Floor/Slab Construction	R-30	Unheated, F-0.73
Window-to-Gross Wall Ratio	19%	19%
Fenestration Type	Triple Low-e w/Argon, except double on S.	Fixed, double Low-e (std properties)
Fenestration U-factor	Double=0.3, Triple=0.2	0.57
Fenestration SHGC-south	Double=0.33	0.49
Fenestration SHGC-non-south	Triple=0.29	0.39
Fenestration Visual Light Transmittance	Double=0.7, Triple=0.56	0.9
Shading Devices	Overhangs on select windows on south face	None
Interior Lighting Power Density (W/sf)	0.8	1.2
Daylighting Controls	Yes, continuous daylight dimming	None
Other Lighting Control Credits	None	None
Exterior Lighting Power (kW)	0	0
Process Lighting (kW)	0	0
Receptacle Equipment Power Density (W/sf)	0.65	0.65
Primary HVAC System Type	Dedicated outdoor air ventilation system with radian ceiling panels for heating and cooling	Table G3.1.1B System #7-Packaged rooftop variable air volume CHW cooling with HW reheat
Fan Supply Volume	3,820 CFM	14,420 CFM
Fan Power (SA,EA or RA)	1.5, 1.5-kW	13.8, 10.0-kW
Economizer Control	65F dry bulb	70F dry bulb high limit shutoff
Demand Control Ventilation	No	No
Unitary Equipment Cooling Efficiency	N/A	9.3-EER from Table 6.8.1-A
Unitary Equipment Heating Efficiency	N/A	N/A
Virtual Chiller Parameters	0.67 –KW/T average at campus chiller plant	N/A-Packaged DX Cooling
Chilled Water Loop & Pump Parameters	USGBC default 5% distribution loss	N/A
Boiler Parameters	USGBC default 70% boiler plant efficiency	Two 90% gas-fired HHW boilers
Hot Water Loop & Pump Parameters	USGBC default 15% distribution loss	50-degree delta-T system
Cooling Tower Parameters	N/A	N/A

Model Input Parameter	Proposed Design Input	Baseline Design Input
Condenser Water Loop & Pump	N/A	N/A

Energy Type Summary:

Energy Type	Utility Rate Description	Units of Energy	Units of Demand
Electricity	Xcel rate A-14 General Service	kWh	Kw
Natural Gas	Xcel Firm rate #118 Large	Therms	MBH

Performance Rating:

End Use	Proposed Design Energy Type	Proposed Design Units	Proposed Building Results	Baseline Building Units	Baseline Building Results	Percent Savings
Interior Lighting	Electricity	Energy Use (kWh)	25,923	Energy Use (kWh)	51,480	49.6%
Exterior Lighting	Electricity	Energy Use (kWh)	0	Energy Use (kWh)	0	0%
Space Heating	Purchased Steam	Energy Use (MBtu)	6,382	Energy Use (MBtu)	13,949	54.2%
Space Cooling	Purchased Chilled Water	Energy Use (MBtu)	6,449	Energy Use (MBtu)	29,992.8	78.5%
Pumps	Electricity	Energy Use (kWh)	1,210	Energy Use (kWh)	4,427.3	72.7%
Heat Rejection	Electricity	Energy Use (kWh)	0	Energy Use (kWh)	0	0%
Fans-Interior	Electricity	Energy Use (kWh)	16,458	Energy Use (kWh)	31,848.5	48.3%
Service Water Heating	Electricity	Energy Use (kWh)	10,735	Energy Use (kWh)	10,735	0%
Receptacle Equipment (Process Energy)	Electricity	Energy Use (kWh)	16,018	Energy Use (kWh)	16,018	0%
Energy Totals	**Total Annual Energy Use (MBtu/yr)**		**900**		**1,888**	**52.3%**
	Annual Process Energy (MBtu/yr)		**55**		**55**	**0%**

Energy Cost and Consumption by Energy Type:

	Proposed Design		Baseline Design		Percent Savings	
Energy Type	Energy Use	Cost	Energy Use	Cost	Energy Use	Cost
Electricity	76,793 kWh	$5,083	144,500 kWh	$9,333	46.9%	45.5%
Natural Gas	6,382 therms	$6,564	13,949 therms	$13,837	54.2%	52.6%
Total	**900 (MBtu/yr)**	**$11,647**	**1,888(MBtu/yr)**	**$23,170**	**52.3%**	**49.7%**

Energy Units:
1 kBtu = 1,000 Btu 1 MBtu = 1,000 kBtu
1 kWh = 3.412 kBtu 1 MWh = 3,412 kBtu
1 therm = 100 kBtu 1 ton hr = 12 kBtu

The building saved 56% in energy use and 53.3% in cost over the baseline.

The Basis of Design Docuptement for MEP Systems and the eQuest energy simulation output can be found in the appendix.

ENERGY & ATMOPSHERE CREDIT 3: ENHANCED COMMISSIONING

1 POINT

Intent

Begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed.

Requirements

Implement, or have a contract in place to implement, the following additional commissioning process activities in addition to the requirements of EA Prerequisite 1 and in accordance with the LEED for New Construction 2.2 Reference Guide:

1. Prior to the start of the construction documents phase, designate an independent Commissioning Authority (CxA) to lead, review, and oversee the completion of all commissioning process activities. The CxA shall, at a minimum, perform Tasks 2, 3 and 6. Other team members may perform Tasks 4 and 5

    a. The CxA shall have documented commissioning authority experience in at least two building projects.
    b. The individual serving as the CxA shall be—
        i. independent of the work of design and construction;
        ii. not an employee of the design firm, though they may be contracted through them;
        iii. not an employee of, or contracted through, a contractor or construction manager holding construction contracts; and
        iv. (can be) a qualified employee or consultant of the Owner.
    c. The CxA shall report results, findings and recommendations directly to the Owner.
    d. This requirement has no deviation for project size.

2. The CxA shall conduct, at a minimum, one commissioning design review of the Owner's Project Requirements (OPR), Basis of Design (BOD), and design documents prior to mid-construction documents phase and back-check the review comments in the subsequent design submission.

3. The CxA shall review contractor submittals applicable to systems being commissioned for compliance with the OPR and BOD. This review shall be concurrent with A/E reviews and submitted to the design team and the Owner.

4. Develop a systems manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems.

5. Verify that the requirements for training operating personnel and building occupants are completed.

6. Assure the involvement by the CxA in reviewing building operation within 10 months after substantial completion with O&M staff and occupants. Include a plan for resolution of outstanding commissioning related issues.

Potential Technologies & Strategies

Although it is preferable that the CxA be contracted by the Owner, for the enhanced commissioning credit, the CxA may also be contracted through the design firms or construction management firms not holding construction contracts. The LEED for New Construction 2.2 Reference Guide provides detailed guidance on the rigor expected for following process activities:

- ❑ Commissioning design review
- ❑ Commissioning submittal review

❑ Systems manual

CREDIT COMPLIANCE

The commissioning agent met all the requirements. The scope of work and final commissioning report can be found in the appendix under Energy and Atmosphere Prerequisite 1.

ENERGY & ATMOPSHERE CREDIT 4: ENHANCED REFRIGERANT MANAGEMENT

1 POINT

Intent

Reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming.

Requirements

OPTION 1

Do not use refrigerants.

OR

OPTION 2

Select refrigerants and HVAC&R that minimize or eliminate the emission of compounds that contribute to ozone depletion and global warming. The base building HVAC&R equipment shall comply with the following formula, which sets a maximum threshold for the combined contributions to ozone depletion and global warming potential:

$$LCGWP + LCODP \times 105 \leq 100$$

Where:

$$LCODP = [ODPr \times (Lr \times Life + Mr) \times Rc]/Life$$

$$LCGWP = [GWPr \times (Lr \times Life + Mr) \times Rc]/Life$$

LCODP: Lifecycle Ozone Depletion Potential (lbCFC11/Ton-Year)
LCGWP: Lifecycle Direct Global Warming Potential (lbCO2/Ton-Year)
GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lbCO2/lbr)
ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 lbCFC11/lbr)
Lr: Refrigerant Leakage Rate (0.5% to 2.0%; default of 2% unless otherwise demonstrated)
Mr: End-of-life Refrigerant Loss (2% to 10%; default of 10% unless otherwise demonstrated)
Rc: Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of cooling capacity)
Life: Equipment Life (10 years; default based on equipment type, unless otherwise d emonstrated)

For multiple types of equipment, a weighted average of all base building level HVAC&R equipment shall be applied using the following formula:

$$[\ \Sigma\ (LCGWP + LCODP \times 105) \times Qunit\ ]\ /\ Qtotal \leq 100$$

Where:

Qunit = Cooling capacity of an individual HVAC or refrigeration unit (Tons)
Qtotal = Total cooling capacity of all HVAC or refrigeration

Small HVAC units (defined as containing less than 0.5 lbs of refrigerant), and other equipment such as standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 lbs of refrigerant, are not considered part of the “base building” system and are not subject to the requirements of this credit.

AND

Do not install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs or Halons).

Potential Technologies & Strategies

Design and operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is used, utilize base building HVAC and refrigeration systems for the refrigeration cycle that minimize direct impact on ozone depletion and global warming. Select HVAC&R equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Utilize fire suppression systems that do not contain HCFCs or Halons.

CREDIT COMPLIANCE

Refrigerant Impact Calculation:

	HBAC&R Equipment Type	
	Centrifugal Chiller	Centrifugal Chiller
#	1	3
Q (tons)	650	860
Refrigerant	R-123	R-123
GWPr	76	76
ODPr	0.02	0.02
RC (lb/ton)	2.31	1.86
Life (yrs)	23	23
Lr (%)	2	2
Mr (%)	10	10
LCGWP	4.3	3.4
LCODP x 10^5	1,125	90.6
Refrigerant Impact Per Ton	116.8	94
Refrigerant Impact Total	75,895	242,561

Credit Narrative

The new building is served with Chilled Water from The Macalester College central campus plant. This plant contains 4 water cooled chillers utilizing HCFC-123 as their refrigerant. This equipment has been newly installed and the expected leakage rate from the Equipment Manufacturer's literature is assumed to be less than the 2% used in the table calculation above. The expected rate is in the order of 0.5% which would change the above calculation to show a Total Refrigerant Impact per Ton of 37.9. In either case (2% or 0.5% leakage) this plant complies with the requirements of this credit.

ENERGY & ATMOPSHERE CREDIT 5: MEASUREMENT & VERIFICATION

1 POINT

Intent

Provide for the ongoing accountability of building energy consumption over time.

Requirements

❑ Develop and implement a Measurement & Verification (M&V) Plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2), or Option B: Energy Conservation Measure Isolation, as specified in the *International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction, April, 2003*.

❑ The M&V period shall cover a period of no less than one year of post-construction occupancy.

Potential Technologies & Strategies

Develop an M&V Plan to evaluate building and/or energy system performance. Characterize the building and/or energy systems through energy simulation or engineering analysis. Install the necessary metering equipment to measure energy use. Track performance by comparing predicted performance to actual performance, broken down by component or system as appropriate. Evaluate energy efficiency by comparing actual performance to baseline performance.

While the IPMVP describes specific actions for verifying savings associated with energy conservation measures (ECMs) and strategies, this LEED credit expands upon typical IPMVP M&V objectives. M&V activities should not necessarily be confined to energy systems where ECMs or energy conservation strategies have been implemented. The IPMVP provides guidance on M&V strategies and their appropriate applications for various situations. These strategies should be used in conjunction with monitoring and trend logging of significant energy systems to provide for the ongoing accountability of building energy performance.

CREDIT COMPLIANCE

The project followed Option D: Calibrated Simulation (savings Estimation Method 2). The following tables are taken from the Measurement and Verification Plan. The entire plan can be found in the appendix.

Table A-1 Macalester College - IGC

BUILDING AS DESIGNED - Anticipated Results (from Energy Model)

Electrical Usage - metered at Building

Units (kWh x 000)

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
Hot Water Usage	1.07	1.15	1.02	1.05	1.20	0.59	0.66	0.94	0.65	0.84	0.95	0.63	**10.75**
Fans	1.59	1.43	1.53	1.35	1.22	1.05	0.77	0.35	0.17	0.53	0.95	1.54	**12.48**
Pumps	0.13	0.11	0.13	0.12	0.14	0.13	0.10	0.06	0.04	0.05	0.08	0.12	**1.21**
Misc Equipment (plugs)	1.44	1.48	1.31	1.36	1.70	0.90	1.11	1.70	1.17	1.44	1.50	0.91	**16.02**
Lighting	2.47	2.47	2.12	2.15	2.57	1.38	1.68	2.58	1.85	2.38	2.62	1.64	**25.91**
TOTAL	**6.70**	**6.64**	**6.11**	**6.03**	**6.83**	**4.05**	**4.32**	**5.63**	**3.88**	**5.24**	**6.10**	**4.84**	**66.37**

Cooling Energy (purchased CHW from Campus Plant, Metered at Building)

Units (MBTU)

Cooling Energy	0	0	0	0.874	11.325	19.428	26.469	31.572	12.96	1.326	0	0	**103.954**

Heating Energy (purchased HW/steam from Central Plant, Metered at Building)

Units (MBTU)

Heating Energy	74.1	60.7	58.2	41.5	20.2	6.3	3.7	2.5	2	11.7	34.4	69.4	**384.7**

Table A-2 Macalester College - IGC

BASELINE BUILDING - Minimum Code Complaint (From Energy Model)

Electrical Usage - metered at Building

Units (kWh x 000)

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
Hot Water Usage	1.07	1.15	1.02	1.04	1.20	0.58	0.66	0.94	0.65	0.84	0.95	0.63	**10.73**
Fans	3.73	3.13	3.32	3.20	3.16	2.68	2.10	1.60	0.96	1.75	2.55	3.38	**31.56**
Pumps	1.30	1.15	1.24	1.17	1.15	1.01	0.80	0.59	0.34	0.64	0.96	1.24	**11.59**
Misc Equipment (plugs)	1.44	1.48	1.31	1.36	1.70	0.90	1.11	1.70	1.17	1.44	1.50	0.91	**16.02**
Lighting	4.62	4.76	4.20	4.39	5.47	2.90	3.56	5.47	3.75	4.62	4.81	2.92	**51.47**
TOTAL	**12.16**	**11.67**	**11.09**	**11.16**	**12.68**	**8.07**	**8.23**	**10.30**	**6.87**	**9.29**	**10.77**	**9.08**	**121.37**

Cooling Energy (purchased CHW from Campus Plant, Metered at Building)

Units (MBTU)

Cooling Energy	2	2	2	5	28	50	64	59	12	4	2	2	**232**

Heating Energy (purchased HW/steam from Central Plant, Metered at Building)

Units (MBTU)

Heating Energy	237	180	130	59	19	4	4	3	3	34	102	207	**982**

ENERGY & ATMOPSHERE CREDIT 6: GREEN POWER

1 POINT

Intent

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

Requirements

Provide at least 35% of the building's electricity from renewable sources by engaging in at least a two-year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements.

DETERMINE THE BASELINE ELECTRICITY USE
Use the annual electricity consumption from the results of EA Credit 1.
OR
Use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use.

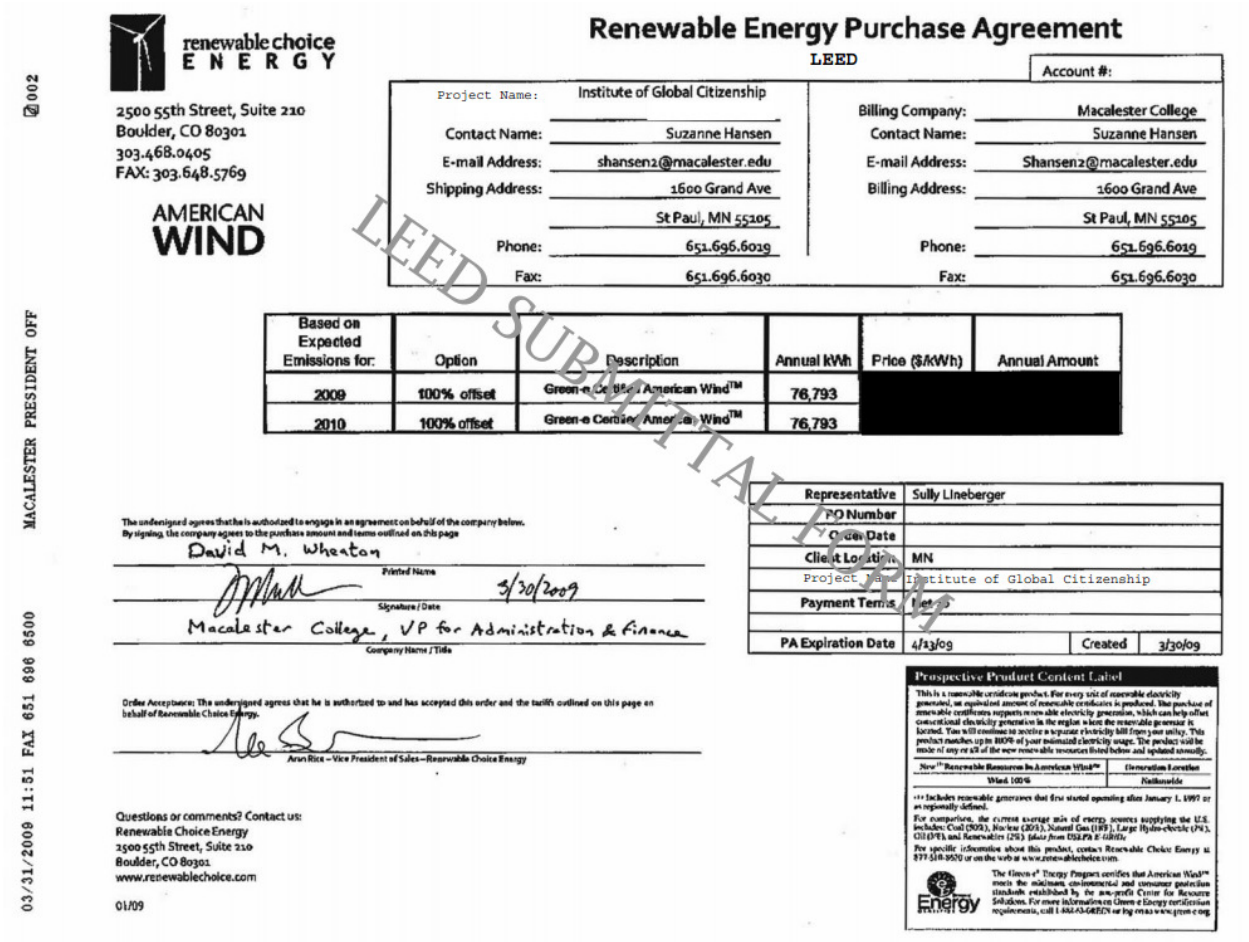
Potential Technologies & Strategies

Determine the energy needs of the building and investigate opportunities to engage in a green power contract. Green power is derived from solar, wind, geothermal, biomass or low-impact hydro sources. Visit www.green-e.org for details about the Green-e program. The power product purchased to comply with credit requirements need not be Green-e certified. Other sources of green power are eligible if they satisfy the Green-e program's technical requirements. Renewable energy certificates (RECs), tradable renewable certificates (TRCs), green tags and other forms of green power that comply with Green-e's technical requirements can be used to document compliance with EA Credit 6 requirements.

CREDIT COMPLIANCE

Based on the design energy cost from Energy & Atmosphere Credit 1, the total annual electric energy usage is 66,367 kWh. Macalester College entered a two year contract for green energy from Renewable Choice Energy to offset 100% of both the projected electricity and heat for the building.

The electricity use offset with a renewable energy credit (REC), clean source energy. In this case, wind energy was requested. All of the RECs are Green E certified. The heat is offset with Choice Carbon. The funds will be used by the Upper Rock Islands Co Landfill in Illinois and are certified by the American Carbon Registry.



renewable choice ENERGY

2500 55th Street, Suite 210
Boulder, CO 80301
303.468.0405
FAX: 303.648.5769

AMERICAN WIND

Renewable Energy Purchase Agreement

LEED

Account #:

Project Name:	Institute of Global Citizenship		
Contact Name:	Suzanne Hansen	Billing Company:	Macalester College
E-mail Address:	shansen2@macalester.edu	Contact Name:	Suzanne Hansen
Shipping Address:	1600 Grand Ave	E-mail Address:	Shansen2@macalester.edu
	St Paul, MN 55105	Billing Address:	1600 Grand Ave
Phone:	651.696.6019		St Paul, MN 55105
Fax:	651.696.6030	Phone:	651.696.6019
		Fax:	651.696.6030

Based on Expected Emissions for:	Option	Description	Annual kWh	Price ($/kWh)	Annual Amount
2009	100% offset	Green-e Certified American Wind™	76,793	[redacted]	
2010	100% offset	Green-e Certified American Wind™	76,793		

Representative	Sully Lineberger
PO Number	
Order Date	
Client Location	MN
Project Name	Institute of Global Citizenship
Payment Terms	Net 0
PA Expiration Date	4/13/09
Created	3/30/09

The undersigned agrees that he is authorized to engage in an agreement on behalf of the company below. By signing, the company agrees to the purchase amount and terms outlined on this page

David M. Wheaton
Printed Name

3/30/2009
Signature / Date

Macalester College, VP for Administration & Finance
Company Name / Title

Order Acceptance: The undersigned agrees that he is authorized to and has accepted this order and the tariffs outlined on this page on behalf of Renewable Choice Energy.

Ann Rice – Vice President of Sales – Renewable Choice Energy

Questions or comments? Contact us:
Renewable Choice Energy
2500 55th Street, Suite 210
Boulder, CO 80301
www.renewablechoice.com

01/09

Prospective Product Content Label

This is a renewable certificate product. For every unit of renewable electricity generated, an equivalent amount of renewable certificates is produced. The purchase of renewable certificates supports renewable electricity generation, which can help offset conventional electricity generation in the region where the renewable generator is located. You will continue to receive a separate electricity bill from your utility. This product matches up to 100% of your estimated electricity usage. The product will be made of any or all of the new renewable resources listed below and updated annually.

New™ Renewable Resources in American Wind™	Generation Location
Wind 100%	Nationwide

††† Includes renewable generators that first started operating after January 1, 1997 or as regionally defined.

For comparison, the current average mix of energy sources supplying the U.S. includes: Coal (50%), Nuclear (20%), Natural Gas (18%), Large Hydro-electric (7%), Oil (3%), and Renewables (2%). (data from DOE/EIA-0384).

For specific information about this product, contact Renewable Choice Energy at 877.510.9510 or on the web at www.renewablechoice.com.

Energy

The Green-e® Energy Program certifies that American Wind™ meets the minimum environmental and consumer protection standards established by the non-profit Center for Resource Solutions. For more information on Green-e Energy certification requirements, call 1-888-63-GREEN or log on to www.green-e.org.

LEED SUBMITTAL FORM

03/31/2009 11:51 FAX 651 696 6500 MACALESTER PRESIDENT OFF 002

The Emissions Impact Report and proposal for purchasing renewable energy from Renewable Choice Energy can be found in the appendix.

MARKIM HALL

MATERIALS & RESOURCES CATEGORY

LEED FOR NEW CONSTRUCTION V2.2

6	**Materials & Resources**	**Possible Points:**	13

Y	Prereq 1	Storage & Collection of Recyclables	
	Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors, & Roof	1
	Credit 1.2	Building Reuse, Maintain 95% of Existing Walls, Floors, & Roof	1
	Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
1	Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
1	Credit 2.2	Construction Waste Management, Divert 75% from Disposal	1
	Credit 3.1	Materials Reuse, 5%	1
	Credit 3.2	Materials Reuse, 10%	1
1	Credit 4.1a	Recycled Content, 10% (Post-consumer + 1/2 pre-consumer)	1
	Credit 4.1b	Recycled Content, 20% (Post-consumer + 1/2 pre-consumer)	1
1	Credit 5.1	Regional Materials, 10% Extracted, Processed, and Manufactured Regionally	1
1	Credit 5.2	Regional Materials, 20% Extracted, Processed, and Manufactured Regionally	1
	Credit 6	Rapidly Renewable Materials	1
1	Credit 7	Certified Wood	1

MATERIALS & RESOURCES PREREQUISITE 1: STORAGE & COLLECTION OF RECYCLABLES

REQUIRED

Intent

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 and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.

Potential Technologies & Strategies

Coordinate the size and functionality of the recycling areas with the anticipated collection services for glass, plastic, office paper, newspaper, cardboard and organic wastes to maximize the effectiveness of the dedicated areas. Consider employing cardboard balers, aluminum can crushers, recycling chutes and collection bins at individual workstations to further enhance the recycling program.

CREDIT COMPLIANCE

Recycling collection bins are provided on every occupied floor of the building. There are built-in containers for commingled items in the coffee area and/or kitchen on each floor. There are also bins for paper and cardboard in the copy rooms on each floor. Built-in containers for paper and commingled items are available in the IGC Court. In addition, each office and conference/meeting room has its own recycling bin. The College maintenance staff collects the items placed in these bins nightly.

The College has a comprehensive recycling program for paper and cardboard, plastic, glass, and metal.

MATERIALS & RESOURCES CREDIT 2.1: CONSTRUCTION WASTE MANAGEMENT: DIVERT 50% FROM DISPOSAL

&

MATERIALS & RESOURCES CREDIT 2.2: CONSTRUCTION WASTE MANAGEMENT: DIVERT 75% FROM DISPOSAL

2 POINTS

Intent

Divert construction, demolition and land-clearing debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Requirements

Recycle and/or salvage at least 50% of non-hazardous construction and demolition debris. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or co-mingled. Excavated soil and land-clearing debris do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout.

Potential Technologies & Strategies

Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or comingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.

CREDIT COMPLIANCE

A construction waste management plan was developed and implemented by both the construction contractor and architect. The following was diverted from the site:

Diverted Construction Waste Calculation:

Diverted/Recycled Materials Description	Diversion/Recycling Hauler or Location	Quantity of Diverted/Recycled Waste (tons)
Metal	Veit Como Recycling Transfer	10.32
Concrete	Veit Como Recycling Transfer	27.70
Cardboard – off site separation	Veit Como Recycling Transfer	1.96
Wood	Veit Como Recycling Transfer	28.82
Miscellaneous Construction Debris	Veit Como Reycling Transfer	27.61
Metal	Alliance Steel	3.33
Metal	American Iron	7.40
Metal	Great Western	7.94
Metal	Re-Alliance	3.32

Diverted/Recycled Materials Description	Diversion/Recycling Hauler or Location	Quantity of Diverted/Recycled Waste (tons)
Concrete	Veit Facilities	269.27
Concrete	Frador	90.00
Concrete	Hammes Sand & Gravel	360.00
Concrete	Carl Bolander	10.00
Concrete	CS McCrossan	20.00
Cardboard	Rock-Tenn	1.27
Cardboard- on site separation	Veit Como Recycling Transfer	1.01
Wood	Environmental Wood Supply	29.43
Ceiling Tile	Architectural Sales	0.75
Sheetrock	Vonco II	11.57

Landfill Construction Waste Calculation:

Landfill Materials Description	Landfill Hauler or Location	Quantity of Landfilled Waste
Miscellaneous Construction Debris non-recyclable	Veit Como Transfer/Recycling	64.84

Total Construction Waste Generated **976.54 tons**
Total Construction Waste Diverted **911.70 tons**
Total % Construction Waste Diverted From Landfill **93.360%**

The Waste Management Plan can be found in the appendix.

MATERIALS & RESOURCES CREDIT 4.1: RECYCLED CONTENT: 10% (post- consumer + ½ pre-consumer)

1 POINT

Intent

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 plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.

The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3–7.

Recycled content shall be defined in accordance with the International Organization of Standards document, *ISO 14021—Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling*).

Post-consumer material is defined as waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose.

Pre-consumer material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Potential Technologies & Strategies

Establish a project goal for recycled content materials and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

CREDIT COMPLIANCE

Material Name	Manufacturer	Material Cost ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Info. Source
Aluminum Framing	EFCO	26,625.00	49.00	21.00	Manufacturer
Glass (wood framed windows)	Cardinal	58,466.00	0	23.00	Manufacturer
Nailbase-ISO 95+ Insulation	Firestone	23,600.00	15.00	19.00	Manufacturer
Exterior Alum.	Firestone	43,169.00	0	30.00	Manufacturer

Material Name	Manufacturer	Material Cost ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Info. Source
Exterior Copper Panel	Firestone	16,899.0	0	82.00	Manufacturer
Exterior Zinc Panel	Firestone	71,501.00	0	30.00	Manufacturer
Miscellaneous Steel	Metro Manufacturing	55,289.00	25.00	0	Industry Standard
Gypsum Wallboard	National Gypsum	15,300.00	5.00	4.00	Manufacturer
Exterior Sheathing	DensGlass Gold	7,500.00	0	4.0	Manufacturer
Steel Studs	Clark Western	32,000.00	32.00	16.00	Manufacturer
Shaftwall Metal Framing	USG	1,000.00	0	25.00	Manufacturer
Shaftwall Liner Panels	USG	800.00	5.00	0	Manufacturer
Thermal Batt Insulation	Owens Corning	7,200.00	9.00	26.00	Manufacturer
Board Insulation	Dow Thermax	1,500.00	11.00	0	Manufacturer
Ceramic Tile	EcoDark Slate	17,000.00	0	73.00	Manufacturer
Ceramic Tile	EcoGrey Matte	3,300.00	0	15.20	Manufacturer
Ceramic Tile	Oceanside Shire	4,500.00	0	30.00	Manufacturer
Ceramic Tile	Oceanside Moroccan Desert	2,700.00	72.29	13.19	Manufacturer
Carpet	Patcraft Velvet	26,357.00	0	36.80	Manufacturer
Linoleum Floor	Forbo Maarmoleum Dual	722.00	0	45.00	Manufacturer
Ultima Acoustic Tile	Armstrong	4,660.00	15.00	65.00	Manufacturer
Suprafine Ceiling Grid	Armstrong	2,045.00	23.00	7.00	Manufacturer
Metalworks Vector Ceiling Tile	Armstrong	7,933.00	0	25.00	Manufacturer
Prelude XL Ceiling Grid	Armstrong	4,090.00	23.00	7.00	Manufacturer
New Dimensions Ceiling Panel	Wall Technology	3,795.00	9.00	26.00	Manufacturer
Concrete Cast-in-place	Cemstone	84,301.00	0	7.60	Manufacturer
Rebar	Ambassador	59,831.00	83.00	15.00	Manufacturer
Aggregate	Buck Blacktop	691.00	100.00	0	Manufacturer

Material Name	Manufacturer	Material Cost ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Info. Source
Arreis Fiberboard	SierraPine	1,150.00	0	100.00	Manufacturer
Purekor MDF Plus	Panel Source	24,050.00	0	100.00	Manufacturer
Signage-Interior	Shetkastone	7,860.00	85.00	0	Manufacturer
Countertops/Interior Window Sills	Shetkastone	30,516.00	85.00	0	Manufacturer
Dakota Burl	Environ Biocomposites	1,589.00	0	84.00	Manufacturer
Novodor PC-5 FSC	Algoma	7,573.00	0	12.00	Manufacturer
Fire Core Door	Algoma	4,958.00	0	16.00	Manufacturer
Carousel Tables-Site Furniture	Landscapeforms	9,580.00	59.00	31.00	Manufacturer
Sonoma Bench	Landscapeforms	7,200.00	41.00	22.00	Manufacturer
Sonoma Backless Bench	Landscapeforms	3,550.00	14.00	7.00	Manufacturer

Actual Materials Cost (excluding labor and equipment)	**$1,517,029.00**
Total Value of Post-Consumer Content	**$138,754.96**
Total Value of Pre-Consumer Content	**$159,343.64**
Total Combined Recycled Content Value: post-consumer + ½ pre-consumer	**$218,426.78**
Combined Recycled Content Values as a Percentage of Total Materials Cost	**14.398%**

MATERIALS & RESOURCES CREDIT 5.1: REGIONAL MATERIALS: 10% EXTRACTED, PROCESSED & MANUFACTURED REGIONALLY

&

MATERIALS & RESOURCES CREDIT 5.2: REGIONAL MATERIALS: 20% EXTRACTED, PROCESSED & MANUFACTURED REGIONALLY

2 POINTS

Intent

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 building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3–7.

Potential Technologies & Strategies

Establish a project goal for locally sourced materials, and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed and quantify the total percentage of local materials installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.

CREDIT COMPLIANCE

Product Name	Manuf.	Total Product Cost ($)	% Compliance	Compliant Product Value	Harvest Dist. (mi)	Manuf.Dist. (mi)	Harvest/Manufacture Location Info Source
Granite Sill	Cold Spring Granite	14,007.00	100	14,007.00	80.00	80.00	Manufacturer
Valders Stone	Acme-Ochs Brick	137,921.00	100	137,921.00	101.00	101.00	Manufacturer
Gypsum Wallboard	National Gypsum	15,400.00	100	15,300.00	184.00	176.00	Manufacturer
Exterior Sheathing	DensGlass Gold	7,500.00	100	7,500.00	176.00	176.00	Manufacturer
Countertops /Interior Window Sills	Shetkastone	30,516.00	100	30,516.00	47.00	47.00	Manufacturer
Dakota Burl	Environ Bicomposite	1,589.00	100	1,589.00	317.00	67.00	Manufacturer

Product Name	Manuf.	Total Product Cost ($)	% Compliance	Compliant Product Value	Harvest Dist. (mi)	Manuf.Dist. (mi)	Harvest/Manufacture Location Info Source
Granite – Interior	Cold Spring	5,241.00	100	5,241.00	80.00	80.00	Manufacturer
Signage-Interior	Shetkastone	7,869.00	100	7,860.00	47.00	47.00	Manufacturer
Cast-in-place Concrete	Cemstone	84,301.00	100	84,301.00	435.00	3.00	Manufacturer
Landscape Plantings	Arteka	9,828.00	100	9,828.00	19.00	19.00	Manufacturer
Native Prairie Grass	Arteka	1,200.00	100	1,200.00	19.00	19.00	Manufacturer
Drainage Rock	Aggregate Industries	4,020.00	100	4,020.00	21.00	21.00	Manufacturer
Rock at Slab on Grade	Aggregate Industries	9,500.00	100	9,500.00	21.00	21.00	Manufacturer
Rock at Pavers	Aggregate Industries	2,250.00	100	2,250.00	21.00	21.00	Manufacturer
Granular Backfill	Rehbein	8,400.00	100	8,400.00	16.00	16.00	Manufacturer
Asphalt Paving	Buck Blacktop	2,882.00	95	2,737.90	7.00	7.00	Manufacturer

Actual Materials Cost (excluding labor and equipment)	**$1,517,029.00**
Total Value of Locally Manufactured and Extracted Materials	**$342,170.90**
Local Material Value as a % of Total Material Cost	**22.555%**

MATERIALS & RESOURCES CREDIT 7: CERTIFIED WOOD

1 POINT

Intent
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 Stewardship Council's (FSC) Principles and Criteria, for wood building components. These components include, but are not limited to, structural framing 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 Credits 3–7.

Potential Technologies & Strategies
Establish a project goal for FSC-certified wood products and identify suppliers that can achieve this goal. During construction, ensure that the FSC-certified wood products are installed and quantify the total percentage of FSC-certified wood products installed

CREDIT COMPLIANCE

Product Name	Vendor	Product Cost ($)	Wood Component Percentage (%)	FSC Certified Wood % of Wood Component (%)	FSC Chain-of-Custody Certificate# from Vendor Invoice
Miscellaneous Blocking, Backing	Certified Wood Products	21,750.00	100.00	100.00	SW-COC-419
H Window-Wood Frame	H Window Company	26,959.00	100.00	100.00	SW-COC-740
Nailbase-ISO 95+ Insulation	Firestone	23,600.00	35.00	0.00	n/a
Fire Core Door FSC	Algoma Hardwoods	4,561.00	15.50	100.00	SW-COC-342
Novodor PC-5 FSC	Algmoa Hardwoods	7,118.00	100.00	82.00	SW-COC-342
Sonoma Bench	Landcapeforms	7,200.00	50.00	100.00	SW-COC-1261
Sonoma Backless Bench	Landscapeforms	3,550.00	68.00	100.00	SW-COC-1261
Architectural Millwork	Aaron Carlson	105,961.00	100.00	57.66	SW-COC-2114

Total Value of Wood Components	**$176,768.95**
Total Value of FSC Certified Wood Components	**$122,363.83**
FSC Certified Wood Value as a % of Total New Wood-Based Cost	**69.222%**

MARKIM HALL

INDOOR ENVIRONMENTAL QUALITY CATEGORY

LEED FOR NEW CONSTRUCTION V2.2

15	**Indoor Environmental Quality**	**Possible Points:** 15

Y	Prereq 1	Minimum IAQ Performance	
Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1	Credit 1	Outdoor Air Delivery Monitoring	1
1	Credit 2	Increased Ventilation	1
1	Credit 3.1	Construction IAQ Management Plan, During Construction	1
1	Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
1	Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
1	Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
1	Credit 4.3	Low-Emitting Materials, Carpet Systems	1
1	Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
1	Credit 5	Indoor Chemical & Pollutant Source Control	1
1	Credit 6.1	Controllability of Systems, Lighting	1
1	Credit 6.2	Controllability of Systems, Thermal Comfort	1
1	Credit 7.1	Thermal Comfort, Design	1
1	Credit 7.2	Thermal Comfort, Verification	1
1	Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
1	Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

INDOOR ENVIRONMENTAL QUALITY (IEQ) PREREQUISITE 1: MINIMUM IAQ PERFORMANCE

REQUIRED

Intent

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

Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality. 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 62.1-2004, paragraph 5.1.

Potential Technologies & Strategies

Design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE standard. Balance the impacts of ventilation rates on energy use and indoor air quality to optimize for energy efficiency and occupant health. Use the ASHRAE 62 User's Manual for detailed guidance on meeting the referenced requirements.

CREDIT COMPLIANCE

The implemented a radiant ceiling system to provide sensible heating and cooling within the building. To handle ventilation and the latent cooling loads, a dedicated outdoor air system (DOAS) is being used. The DOAS has been sized to deliver a minimum of 20 CFM per person of outdoor air continuously during occupancy.

The required OA ventilation for this building per ASHRAE 62.1-2004 has been calculated at 1,528 CFM.

The DOAS Air handling system will be delivering a greater volume of air than this required level to each zone for a total system capacity of 3,460 CFM (minimum).

Two "zones" do not meet the individual ventilation requirements of ASHRAE 62.1-2004, however these zones are not separate, isolated spaces. These "zones" are actually separated named areas within a greater space volume. When the requirements and ventilation delivery is looked at in aggregate for the entire space, the required ventilation rates are exceeded.

The Minimum IAQ Performance Table, Mechanical Diagrams and floor plans can be found in the appendix.

IEQ PREREQUISITE 2: ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL REQUIRED

REQUIRED

Intent

Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS).

Requirements

OPTION 1

❑ Prohibit smoking in the building.

❑ Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

OR

OPTION 2

❑ Prohibit smoking in the building except in designated smoking areas.

❑ Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

❑ Locate designated smoking rooms to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no re-circulation of ETS-containing air to the non-smoking area of the building, and enclosed with impermeable deck-to-deck partitions. With the doors to the smoking room closed, operate exhaust sufficient to create a negative pressure with respect to the adjacent spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water gauge).

❑ Performance of the smoking room differential air pressures shall be verified by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. The testing will be conducted with each space configured for worst case conditions of transport of air from the smoking rooms to adjacent spaces with the smoking rooms' doors closed to the adjacent spaces.

OR

OPTION 3 (For residential buildings only)

❑ Prohibit smoking in all common areas of the building.

❑ Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows opening to common areas.

❑ Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units, and by sealing vertical chases adjacent to the units.

❑ All doors in the residential units leading to common hallways shall be weather-stripped to minimize air leakage into the hallway.

❑ If the common hallways are pressurized with respect to the residential units then doors in the residential units leading to the common hallways need not be weather-stripped provided that the positive differential pressure is demonstrated as in Option 2 above, considering the residential unit as the smoking room. Acceptable sealing of residential units shall be demonstrated by a blower door test conducted in accordance with ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization, AND use the progressive sampling methodology defined in Chapter 4 (Compliance Through Quality Construction) of the Residential Manual for Compliance with California's 2001 Energy Efficiency Standards (www.energy. ca.gov/title24/residential_manual). Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet of enclosure area (i.e. sum of all wall, ceiling and floor areas).

Potential Technologies & Strategies

Prohibit smoking in commercial buildings or effectively control the ventilation air in smoking rooms. For residential buildings, prohibit smoking in common areas, design building envelope and systems to minimize ETS transfer among dwelling units.

CREDIT COMPLIANCE

The project followed Option 1. Smoking is prohibited within the building AND designated exterior smoking areas have been located at least 25 feet away from entries, outdoor air intakes and operable windows.

IEQ CREDIT 1: OUTDOOR AIR DELIVERY MONITORING
1 POINT

Intent
Provide capacity for ventilation system monitoring to help sustain 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 setpoint, via either a building automation system alarm to the building operator or via a visual or audible alert to the building occupants.

FOR MECHANICALLY VENTILATED SPACES

❑ Monitor carbon dioxide concentrations within all densely occupied spaces (those with a design occupant density greater than or equal to 25 people per 1000 sq.ft.). CO2 monitoring locations shall be between 3 feet and 6 feet above the floor.

❑ For each mechanical ventilation system serving non-densely occupied spaces, provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor airflow rate with an accuracy of plus or minus 15% of the design minimum outdoor air rate, as defined by ASHRAE 62.1-2004.

FOR NATURALLY VENTILATED SPACES
Monitor CO2 concentrations within all naturally ventilated spaces. CO2 monitoring shall be located within the room between 3 feet and 6 feet above the floor. One CO2 sensor may be used to represent multiple spaces if the natural ventilation design uses passive stack(s) or other means to induce airflow through those spaces equally and simultaneously without intervention by building occupants.

Potential Technologies & Strategies
Install carbon dioxide and airflow measurement equipment and feed the information to the HVAC system and/or Building Automation System (BAS) to trigger corrective action, if applicable. If such automatic controls are not feasible with the building systems, use the measurement equipment to trigger alarms that inform building operators or occupants of a possible deficiency in outdoor air delivery.

CREDIT COMPLIANCE
A permanent Co_2 monitoring system that provides feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements has been installed. The system is configured to generate an alarm when the conditions vary by 10% or more from setpoint, via either a building automation system alarm to the building operator or via a visual or audible alert to the building occupants.

The breakdown by room of outdoor air delivery monitoring, CO_2 specification sheet and mechanical drawings can be found in the appendix.

IEQ CREDIT 2: INCREASED VENTILATION
1 POINT

Intent
Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, wellbeing 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 Standard 62.1-2004 as determined by EQ Prerequisite 1.

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 by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural ventilation in non-domestic buildings.

AND

❑ 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.

OR

❑ Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2004 Chapter 6, for at least 90% of occupied spaces.

Potential Technologies & Strategies
For Mechanically ventilated Spaces: Use heat recovery, where appropriate, to minimize the additional energy consumption associated with higher ventilation rates.

For Naturally ventilated Spaces: Follow the eight design steps described in the Carbon Trust Good Practice Guide 237 – 1) Develop design requirements, 2) Plan airflow paths, 3) Identify building uses and features that might require special attention, 4) Determine ventilation requirements, 5) Estimate external driving pressures, 6) Select types of ventilation devices, 7) Size ventilation devices, 8) Analyze the design. Use public domain software such as NIST's CONTAM, Multizone Modeling Software, along with LoopDA, Natural Ventilation Sizing Tool, to analytically predict room-by-room airflows.

CREDIT COMPLIANCE
The project implemented a radiant ceiling system to provide sensible heating and cooling within the building. To handle ventilation and the latent cooling loads, a dedicated outdoor air system (DOAS) was used. All spaces met the requirement s of ASHRAE 52.1-2004 and exceeded the standard by more than 30%.

A table with a ventilation calculation matrix can be found in the appendix.

IEQ CREDIT 3.1: CONSTRUCTION IAQ MANAGEMENT PLAN: DURING CONSTRUCTION
1 POINT

Intent
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.

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 National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.

❑ Protect stored on-site or installed absorptive materials from moisture damage.

❑ 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.

Potential Technologies & Strategies
Adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard. Coordinate with Indoor Environmental Quality Credits 3.2 and 5 to determine the appropriate specifications and schedules for filtration media.

If possible, avoid using permanently installed air handlers for temporary heating/cooling during construction. Consult the LEED for New Construction v2.2 Reference Guide for more detailed information on how to ensure the well-being of construction workers and building occupants if permanently installed air handlers must be used during construction.

CREDIT COMPLIANCE
An Indoor Air Quality Management Plan During Construction was created and implemented. The full report and photo documentation can be found in the appendix.

IEQ CREDIT 3.2: CONSTRUCTION IAQ MANAGEMENT PLAN: BEFORE OCCUPANCY
1 POINT

Intent
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.

Requirements
Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase as follows:

OPTION 1 — Flush-Out

❑ After construction ends, prior to occupancy and with all interior finishes installed, perform a building flushout by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.
OR

❑ If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq.ft. 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 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

OR

OPTION 2 — Air Testing

❑ Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the Reference Guide.

Contaminant Maximum	**Concentration**
Formaldehyde	50 parts per billion
Particulates (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compunds (TVOC)	500 micrograms per cubic meter
* 4-Phenylcyclohexene (4-PCH)	6.5 micrograms per cubic meter
	Carbon Monoxide (CO) 9 part per million and no greater than 2 parts per million above

** This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.*

❑ Demonstrate that the contaminant maximum concentrations listed below are not exceeded.

❑ For each sampling point where the maximum concentration limits are exceeded conduct additional flushout 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 the same locations as in the first test.

❑ The air sample testing shall be conducted as follows:

1) All measurements shall be conducted prior to occupancy, but during normal occupied hours, and with the building ventilation system starting at the normal daily start time and operated at

the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
2) The 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) The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq.ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.
4) Air samples shall be collected between 3 feet and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

Potential Technologies & Strategies
Prior to occupancy, perform a building flush-out or test the air contaminant levels in the building. The flush-out is often used where occupancy is not required immediately upon substantial completion of construction. IAQ testing can minimize schedule impacts but may be more costly. Coordinate with Indoor Environmental Quality Credits 3.1 and 5 to determine the appropriate specifications and schedules for filtration media.

CREDIT COMPLIANCE
The project followed Option 2. The building flushout was performed prior to occupancy and utilized a temporary 25,000 cubic feet per minute (CFM) air handling unit (AHU) and the building's permanent 3,800 CFM AHU. The building was flushed continuously with 100% outside air for 7.5 days.

The complete Indoor Air Quality Management Plan During Construction and flushout narrative, data, and airflow balance report can be found in the appendix.

IEQ CREDIT 4.1: LOW-EMITTING MATERIALS: ADHESIVES & SEALANTS
1 POINT

Intent
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
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:

Architectural Application	VOC Limit (g/L less water)	Specialty Applications	VOC Limit (g/L less water)
Indoor Carpet Adhesives	50	PVC Welding	510
Carpet Pad Adhesive	50	CPVC Welding	490
Wood Flooring Adhesives	100	ABS Welding	325
Rubber Flood Adhesives	60	Plastic Cement Welding	250
Subfloor Adhesives	50	Adhesive Primer for Plastic	550
Ceramic Tile Adhesives	65	Contact Adhesive	80
VCT & Asphalt Adhesive	50	Special Purpose Contact Adhesive	250
Drywall & Panel Adhesive	50	Structural Wood Member Adhesive	140
Cove Base Adhesives	50	Sheet Applied Rubber Lining Operations	850
Multipurpose Construction Adhesive	70	Top & Trip Adhesive	250
Structural Glazing Adhesive	100		

Substrate Specific Applications	VOC Limit (g/L less water)	Sealants	VOC Limit (g/L less water)
Metal to Metal	30	Architectural	250
Plastic Foams	50	Nonmembrane Roof	300
Porous Material (except wood)	50	Roadway	250
Wood	30	Single-Ply Roof Membrane	450
Fiberglass	80	Other	420

Sealant Primers	VOC Limit (g/L less water)
Architectural Non Porous	250
Architectural Porous	775
Other	750

❑ Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168. VOC limits are listed in the table below and correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

❑ Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.

Aerosol Adhesive	VOC Weight (g/L minus water)
General Purpose Mist Spray	65% VOCs by weight
General Purpose Web Spray	55% VOCs by weight
Special Purpose Aerosol Adhesives (all types)	70% VOCs by weight

Potential Technologies & Strategies
Specify low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where adhesives and sealants are addressed. Common products to evaluate include: general construction adhesives, flooring adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives, and cove base adhesives.

CREDIT COMPLIANCE

All Indoor Adhesives, Sealant and Sealant Primer Products:

Product Manufacturer	Product Name/Model	Product VOC Content (g/L)	SCAQMD Allowable VOC Content (g/L)	Source of VOC Data
Hilti	CP 606 Flexible Firestop Sealant	71.00	250.00	Product MSDS
BASF	Sonolastic 150 with VLM Technology	2.07	250.00	Product Info. Sheet and Letter from Manufacturer
Dow Corning	795 Silicone Building Sealant	28.00	250.00	Product Info. Sheet
GE Advanced Materials	SilPruf SCS2000 Silicone Sealant & Adhesive	20.00	100.00	Product Info. Sheet
Saint-Gobain Performance Plastics	V744 and V744F	1.00	250.00	Letter from Manufacturer
USG	Sheetrock Acoustical Sealant	65.00	250.00	MSDS
Laticrete International	Hydro Ban	2.39	65.00	Technical Data Sheet

Product Manufacturer	Product Name/Model	Product VOC Content (g/L)	SCAQMD Allowable VOC Content (g/L)	Source of VOC Data
Franklin International	Titebond Solvent Free Construction Adhesive	6.60	70.00	MSDS
Franklin International	Titebond Solvent Free Acoustical Ceiling Tile	4.77	70.00	MSDS
Franklin Internationl	Titebond Greenchoice Heavy Duty Construction	6.60	70.00	Product Website
Armstrong	S-760 Linoleum Adhesive	5.00	60.00	MSDS
Henry	440 Cove Base Adhesive	0.00	50.00	MSDS
Shaw Contract Group	5000 Pressure Sensitive Adhesive	0.00	50.00	Product Info. Sheet
Parabond Signature Series	5080 Pressure Sensitive Adhesive	4.00	50.00	Product Info. Sheet
Hilti	FS 601 Elastomeric Firestop Sealant	0.00	250.00	MSDS
Ductmate Industies, Inc.	Proseal/Fiberseal Water Based Duct Sealant	0.00	250.00	MSDS
Franklin International	Titebond Solvent-Free FRP Adhesive	2.60	250.00	Letter from Manufacturer
PPG	Top Gun 200 Siliconized Acrylic Caulk	34.00	250.00	Product Data Sheet
DAP	DYNAFLEX 230	23.50	70.00	MSDS

All Indoor Aerosols Adhesives:

Product Manufacturer	Product Name/Model	Product VOC Content (g/L)	Green Seal, GS-36. Allowable VOC Content (g/L)	Source of VOC Data
3M	Hi-Strength 90 Spray Adhesive	544/00	641.00	MSDS

Note: The 3M Hi-Strength Spray Adhesive contains 533g/L, or 54% VOCs. The Letter Template asks for Allowable VOC Content in g/L, but the VOC limit provided in GreenSeal Standard GS-36 is given as a percentage (65%). Therefore, the allowable VOCs in g/L was back-calculated based on this percentage and product data.

IEQ CREDIT 4.2: LOW-EMITTING MATERIALS: PAINTS AND COATINGS
1 POINT

Intent
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
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:

❑ Architectural paints, coatings and primers applied to interior walls and ceilings: Do not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993.
- Flats: 50 g/L
- Non-Flats: 150 g/L

❑ Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates: Do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

❑ Clear wood finishes, floor coatings, stains, and shellacs applied to interior elements: Do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
- Clear wood finishes: varnish 350 g/L; lacquer 550 g/L
- Floor coatings: 100 g/L
- Sealers: waterproofing sealers 250 g/L; sanding sealers 275 g/L; all other sealers 200 g/L
- Shellacs: Clear 730 g/L; pigmented 550 g/L
- Stains: 250 g/L

Potential Technologies & Strategies
Specify low-VOC paints and coatings in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where paints and coatings are addressed. Track the VOC content of all interior paints and coatings during construction.

CREDIT COMPLIANCE

Indoor Paint and Coating Products:

Product Manufacturer	Product Name/Model	Product VOC Content (g/L)	Green Seal GS-11 Allowable VOC Content (g/L)	Source of VOC Data
Scuffmaster	Smooth Pearl	146.00	150.00	MSDS
PPG	PITT-GLAZE WB Water Borne Acrylic Epoxy	148.00	150.00	Product Data Sheet
PPG	Pure Performance Interior Latex Primer 9-900	0.00	150.00	Product Data Sheet

Product Manufacturer	Product Name/Model	Product VOC Content (g/L)	Green Seal GS-11 Allowable VOC Content (g/L)	Source of VOC Data
PPG	Pure Performance Interior Semi-Gloss Latex 9-500	0.00	150.00	Product Data Sheet
PPG	Speedhide Latex Masonry Block Filler 6-70	17.00	50.00	Product Data Sheet
PPG	Pure Performance Interior Eggshell Latex 9-300	0.00	150.00	Product Data Sheet
PPG	Pure Performance Interior Latex Flat 9-100	0.00	50.00	Product Data Sheet

Indoor Anti-Corrosive and/or Anti-Rust Paint Products:

Product Manufacturer	Product Name/Model	Product VOC Content (g/L)	Green Seal GS-11 Allowable VOC Content (g/L)	Source of VOC Data
PPG	PITT-GUARD All Weather Direct-To-Rust-Epoxy	241.00	250.00	Product Data Sheet
PPG	PITT-TECH Int/Ext Satin DTM Industrial Enamel	227.00	250.00	Product Data Sheet

IEQ CREDIT 4.3: LOW-EMITTING MATERIALS: CARPET SYSTEMS
1 POINT

Intent
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
All carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program. All carpet adhesive shall meet the requirements of EQ Credit 4.1: VOC limit of 50 g/L.

Potential Technologies & Strategies
Clearly specify requirements for product testing and/or certification in the construction documents. Select products that are either certified under the Green Label Plus program or for which testing has been done by qualified independent laboratories in accordance with the appropriate requirements.

The Green Label Plus program for carpets and its associated VOC emission criteria in micrograms per square meter per hour, along with information on testing method and sample collection developed by the Carpet & Rug Institute (CRI) in coordination with California's Sustainable Building Task Force and the California Department of Health Services (DHS), are described in Section 9, Acceptable Emissions Testing for Carpet, DHS Standard Practice CA/DHS/EHLB/R-174, dated 07/15/04. This document is available at: www.dhs.ca.gov/ps/deodc/ehlb/ iaq/VOCS/Section01350_7_15_2004_FINAL_PLUS_ADDENDUM-2004-01.pdf. (also published as Section 01350 Section 9 [dated 2004] by the Collaborative for High Performance Schools [www.chps.net]).

CREDIT COMPLIANCE

Installed Indoor Carpet System:

Product Manufacturer	Product Name/Model	Product meets the requirements of CRI Green Label Plus Program	Source of Compliance Statement
Patcraft	Z6451-Velvet	Yes	Product Website

Note: There were NO Indoor Carpet Cushions used for this project.

IEQ CREDIT 4.4: LOW-EMITTING MATERIALS: COMPOSITE WOOD & AGRIFIBER PRODUCTS
1 POINT

Intent
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
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 and 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 fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores. Materials considered fit-out, furniture, and equipment (FF&E) are not considered base building elements and are not included.

Potential Technologies & Strategies
Specify wood and agrifiber products that contain no added urea-formaldehyde resins. Specify laminating adhesives for field and shop applied assemblies that contain no added urea-formaldehyde resins.

CREDIT COMPLIANCE

Product Manufacturer	Product Name/Model	Product Contains No Added Urea-Formaldehyde Content	Source of Compliance Statement
Environ Biocomposities	Dakota Burl	True	Manufacturer Website
Sierra Pine	Arreis Fiberboard	True	Product Website
Panel Source	Purekor MDF Plus	True	Product Data Sheet
Algoma Hardwoods	Fire Core Door FSC	True	Manufacturer Website
Algoma Hardwoods	Movodor PC-5 FSC	True	Product Website
Certified Wood Products	Plywood	True	Product Website

IEQ CREDIT 5: INDOOR CHEMICAL & POLLUTION SOURCE CONTROL

1 POINT

Intent

Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants.

Requirements

Design to minimize and control pollutant entry into buildings and later cross-contamination of regularly occupied areas:

❑ Employ permanent entryway systems at least six feet long in the primary direction of travel to capture dirt and particulates from entering the building at all entryways that are directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. Roll-out mats are only acceptable when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users.

❑ Where hazardous gases or chemicals may be present or used (including garages, housekeeping/laundry areas and copying/printing rooms), 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 shall be at least 0.50 cfm/sq.ft., with no air recirculation. The pressure differential with the surrounding spaces shall 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.

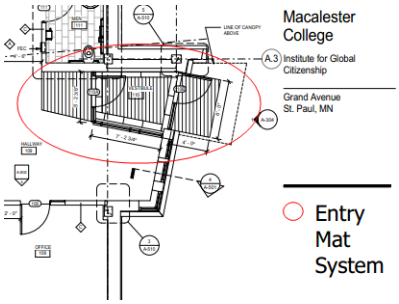
❑ In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better. Filtration should be applied to process both return and outside air that is to be delivered as supply air.

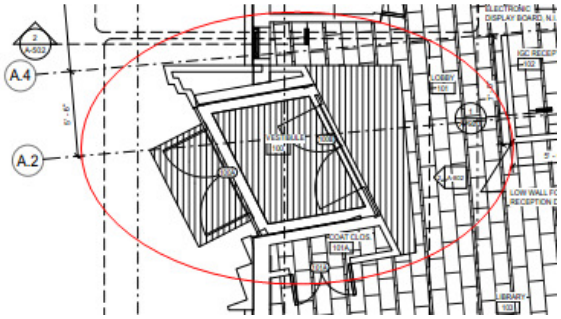
CREDIT COMPLIANCE

Permanent Entry Systems:

System Manuf.:

Mats Inc.	Ultra Track	Heavy gauge extruded ally grids with T-shaped blades. Recessed. Located and exterior of building.
	Dual Track	Heavy gauge aluminum with scraping and drying inserts. Located inside vestibule.
	Supreme Nop	Roll up mat, 100% polypropylene; located at building interior

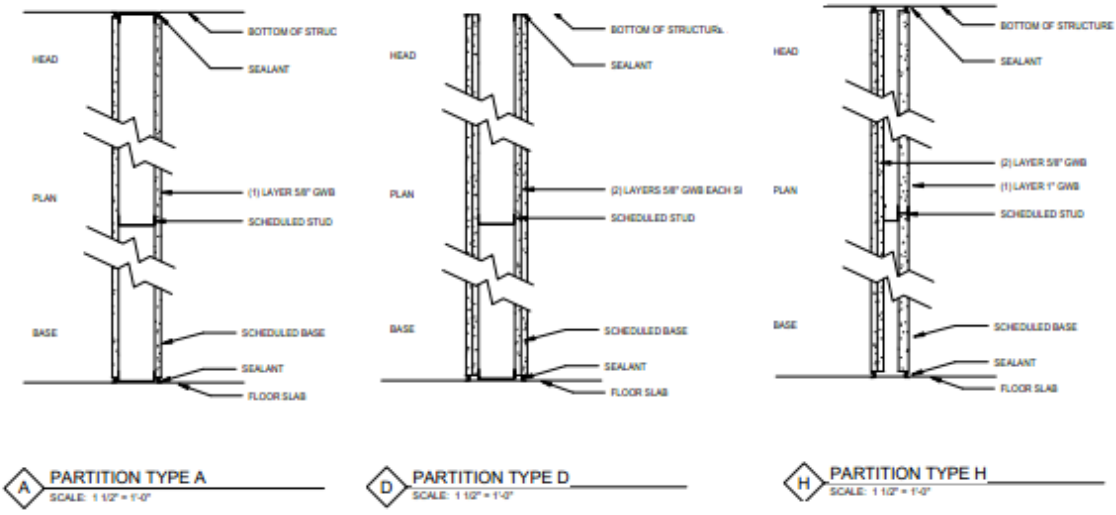




Pollution Source Control:

Room	Description of Room Separation	Neg. Press. When Closed (CFM)
113 (Custodial Closet)	Deck to deck partitions. Door provided.	50
114 (Copy Room)	Deck to deck partitions. Door provided, not self-closing.	150
212 (Custodial Closet)	Deck to deck partitions. Door provided.	50
214 (Copy Room)	Deck to deck partitions. Door provided.	150
314 (Copy Room)	Deck to deck partitions. Door provided, not self-closing.	150

Partition types:



All mechanical ventilation filtration is equipped with MERV (miniumu efficiency reporting value)13 air filters or better.

Full floor plans can be found in the appendix.

IEQ CREDIT 6.1: CONTROLABILITY OF SYSTEMS: LIGHTING

1 POINT

Intent

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.

Requirements

Provide individual lighting controls 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 adjustment that meets group needs and preferences.

Potential Technologies & Strategies

Design the building with occupant controls for lighting. Strategies to consider include lighting controls and task lighting. Integrate lighting systems controllability into the overall lighting design, providing ambient and task lighting while managing the overall energy use of the building.

CREDIT COMPLIANCE

# of Individual Workstations	15
# of Individual Workstation Lighting Controls Provided	15
% of Workstations provided with Controls	100

Space Name	Installed Light Controls
IGC Court 117	Lutron Grafic Eye QS Control Unit
Library 103	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.
CES Student Workers 105	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.
Conference Rm 201	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.
Small Conference Rm. 303	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.
IGC Student Council 310	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.
IC Library 202	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.
Student Workroom 301	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.
Lounge 318	Daylight sensor w/local override controls. Fixtures have integral occupancy sensors.

Projects lighting control summary:
The lighting control strategy is predominately automatic, utilizing occupancy sensors and daylight dimming for daylight harvesting. The intention is to provide only the light that is necessary at the time of use and to optimize the use of daylight.

In private offices and individual work areas, light fixtures contain an integral daylight sensor. There is a passive infrared occupancy sensor in each room. The lighting will be set to a predetermined level. Lighting will automatically turn on to that level when the occupancy sensor activates the lighting . The user can reduce the light level through the local override switch.

The use of daylight sensors and dimming ballasts in these rooms is important due to the optimum configuration of the fenestrations. Many of these rooms are south facing and have two windows each, providing maximum daylight and using the dimming capabilities of the lighting system effectively. Other enclosed spaces use occupancy sensors with local override switches. These rooms include toilets, copy rooms, student work rooms, storage and custodian spaces. Mechanical spaces and utility areas utilize switches with timers.

Circulation spaces with usable levels of daylight are equipped with daylight sensors and local override switches.

IEQ CREDIT 6.2: CONTROLABILITY OF SYSTEMS: THERMAL COMFORT
1 POINT

Intent
Provide a high level of thermal comfort system control by individual occupants or by specific groups in multioccupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.

Requirements
Provide individual comfort controls for 50% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. 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. The areas of operable window must meet the requirements of ASHRAE 62.1-2004 paragraph 5.1 Natural Ventilation.

AND

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

Conditions for thermal comfort are described in ASHRAE Standard 55-2004 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.

Potential Technologies & Strategies
Design the building and systems with comfort controls to allow adjustments to suit individual needs or those of groups in shared spaces. ASHRAE Standard 55-2004 identifies the factors of thermal comfort and a process for developing comfort criteria for building spaces that suit the needs of the occupants involved in their daily activities. Control strategies can be developed to expand on the comfort criteria to allow adjustments to suit individual needs and preferences. These may involve system designs incorporating operable windows, hybrid systems integrating operable windows and mechanical systems, or mechanical systems alone. Individual adjustments may involve individual thermostat controls, local diffusers at floor, desk or overhead levels, or control of individual radiant panels, or other means integrated into the overall building, thermal comfort systems, and energy systems design. In addition, designers should evaluate the closely tied interactions between thermal comfort (as required by ASHRAE Standard 55-2004) and acceptable indoor air quality (as required by ASHRAE Standard 62.1-2004, whether natural or mechanical ventilation).

CREDIT COMPLIANCE

# of Individual Workstations (includes private offices and cubicles)	15
# of Thermal Comfort Controls Provided	14
% of Workstations provided with Controls	93

Multi-Occupant Space ID/Name	Brief Description of Installed Comfort Controls
IGC Court 117	Wall sensor to regulate space temperature in both heating and cooling
Library 103	Wall sensor to regulate space temperature in both heating and cooling
CEC Student Workers 105	Wall sensor to regulate space temperature in both heating and cooling
Conference Room 201	Wall sensor to regulate space temperature in both heating and cooling
Small Conference Room 303	Wall sensor to regulate space temperature in both heating and cooling
IGC Student Council 310	Wall sensor to regulate space temperature in both heating and cooling
Student Workers 301	Wall sensor to regulate space temperature in both heating and cooling
Lounge 318	Wall sensor to regulate space temperature in both heating and cooling
IC Library/IC student Workers 202/204	Wall sensor to regulate space temperature in both heating and cooling

Credit Narrative

Temperature sensor in each space regulate the amount of heating or cooling delivered to the space through overhead radiant panels. Local Sensor has user adjustable set-point control. Excerpts from project specifications provided which identify this feature for space temperature

The Control Systems and Sequence of Operations project specifications and locations of sensors can be found in appendix.

IEQ CREDIT 7.1: THERMAL COMFORT: DESIGN
1 POINT

Intent
Provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

Requirements
Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy. Demonstrate design compliance in accordance with the Section 6.1.1 Documentation.

Potential Technologies & Strategies
Establish comfort criteria per ASHRAE Standard 55-2004 that support the desired quality and occupant satisfaction with building performance. Design building envelope and systems with the capability to deliver performance to the comfort criteria under expected environmental and use conditions. Evaluate air temperature, radiant temperature, air speed, and relative humidity in an integrated fashion and coordinate these criteria with EQ Prerequisite 1, EQ Credit 1, and EQ Credit 2.

CREDIT COMPLIANCE

Project Temperature and Humidity Design Criteria:

Season	Max. Indoor Space Design Temp. (F^o)	Min. Indoor Space Design Temp.	Max. Indoor Space Design Humidity
Spring	78.0	74.0	55.0
Summer	78.0	74.0	55.0
Fall	78.0	74.0	55.0
Winter	74.0	70.0	30.0

Credit Narrative
Space temperature will be the method of control for the radiant heating and cooling systems. However, the radiant approach taken indirectly modifies the space air temperature. The radiant delivery of sensible heating and cooling affects the mean radiant temperature of the occupants directly. Therefore higher (cooling) and lower (heating) ambient temperature will be used. The max/min values presented reflect the anticipated air temperature dynamic, however they do not completely define the comfort criteria that this project has utilized.

The design is based on the operative mean radiant temperature for occupants of approximately 2 degrees less than the air temp in cooling and 2 degrees more than the air temp in heating reflecting radiant delivery of sensible heating and cooling to the space. The design reflects compliance with ASHRAE 55-2004.

In the Temperature and Humidity Design Criteria table above, the criteria for spring and fall conditions have been set to be similar to the summer conditions. With the disconnect of ventilation air delivery (which will regulate space dew-point) from sensible only (Radiant) htg/clg terminals, RH levels are independently controlled and maintained from space temperature. Therefore, space temperature is maintained within the prescribed comfort zone without significant effect on the space RH since that is

controlled by the introduction of dry ventilation air when outdoor conditions are moist (summer) and moist ventilation air when outdoor conditions are dry (winter) through the enthalpy heat recovery wheel and chilled water/heat pipe free reheat arrangement on the DOAS air handler.

IEQ CREDIT 7.2: THERMAL COMFORT: VERIFICATION

1 POINT

Intent

Provide for the assessment of building thermal comfort over time.

Requirements

Agree to implement a thermal comfort survey of building occupants within a period of six to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the building including an assessment of overall satisfaction with thermal performance and identification of thermal comfort-related problems. Agree to develop a plan for corrective action if 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.

Potential Technologies & Strategies

ASHRAE Standard 55-2004 provides guidance for establishing thermal comfort criteria and the documentation and validation of building performance to the criteria. While the standard is not intended for purposes of continuous monitoring and maintenance of the thermal environment, the principles expressed in the standard provide a basis for design of monitoring and corrective action systems.

CREDIT COMPLIANCE

Summary

The Macalester College IGC building has been designed to meet the requirement of EQ Credit 7.1: Thermal Comfort – Design, and is intended to provide all occupants with a high degree of comfort and control over their space.

Macalester will implement a thermal comfort survey of building occupants within 6 to 18 months after occupancy. The survey will collect anonymous responses from the occupants regarding thermal comfort in the building, including an assessment of overall satisfaction with thermal performance and identification of thermal comfort-related problems.

Based on the results of this survey, if greater than 20% of the building occupants express dissatisfaction, the College will implement a corrective action plan. The corrective action plan will include measurement of relevant environmental variables in problem areas, in accordance with ASHRAE Standard 55-2004.

Survey Description

The survey will address the factors identified in AS HRAE Standard 55-2004, including temperature, thermal radiation, humidity, and air speed. The survey will be administered by Macalester College Facilities Staff.

The primary parameter to be measured is satisfaction with thermal environment. The answer will be posed in a seven-point scale format, running from very satisfied (+3) to very dissatisfied (-3), with the center (0) signifying the neutral point. The survey will include follow-up questions to be asked if the respondent indicates dissatisfaction, in order to identify the nature and cause of the problem. Survey respondents will identify their approximate location by building nominal zone, or can voluntarily specify

their exact location. The survey will be administered on paper in a consistently applied manner and be made available for participation by all regular building occupants. Participation will be encouraged, though voluntary.
"Percent dissatisfied" will be the percentage of respondents who answer "dissatisfied" (any of the lower three points of the seven-point scale) on the satisfaction with the thermal environment question.

Plan for Corrective Action
Once the survey has identified the location and nature of any thermal environmental problems, the direction of corrective action measures will be determined. Corrective action measures may include (but are not limited to) control adjustments (e.g., temperature setpoints, schedules, operating modes), diffuser airflow adjustments, and solar control. The resolution of thermal comfort problems will be at the discretion of the Facilities O&M staff and design team. Short-term monitoring and spot measurements of environmental variables with temporary equipment will be done once problem areas have been identified through the survey. Corrective action measures will be determined and implemented by Macalester College Facilities Staff.

MACALESTER COLLEGE FA CILITIES SERVICES
Occupant Comfort Survey

The Institute for Global Citizenship building is a high-performance building, a nd has been designed with occupant comfort in mind. In effective design, a wide va riety of comfort levels must be accommodated. Thus, to help make occupants as comfortable as possible, while al so making the building energy efficient, an array of amenities and controls has been provided.

Macalester College is providing this survey to regular building occupants. Your answers will help the College determine the efficiency and effectiveness of this building and influence future design decisions. Please take a few minutes to complete the survey. Thank you for your participation.

Date: _____ Name (optional): _____

PART 1: BACKGROUND
1. How would you describe your occupation?
Faculty _____ Staff _____ Administrative Support _____ Student _____

2. What is your gender? Male _____ Female _____

3. Room # (optional): _____

4. On which floor is your space located? First _____ Second _____ Third _____

5. Which direction does your space face?
South _____ East _____ West _____ Don't Know _____

6. Is your workspace located in a closed office or an open area?
Closed office (private) _____ Closed office (shared) _____ Open space _____

7. In an average week, how many hours do you spend in your workspace?
> 10 _____ 10-20 _____ 20-30 _____ 30-40 _____ < 40 _____

8. What is your typical activity level in this building?
Standing _____ Mostly sedentary (sitting) _____
Medium activity _____ High activity (constantly moving) _____

PART 2: THERMAL COMFORT
9. Which of the following do you personally adjust in your workspace?
Window _____ Blinds _____ Thermostat _____ Door to interior space _____
Personal heater _____ Portable fan _____ None of these _____

10. How satisfied are you with your workspace temperature? (+3 = very satisfied, 0=neutral, -3=very dissatisfied)
+3 _____ +2 _____ +1 _____ 0 _____ -1 _____ -2 _____ -3 _____

If you responded with -1, -2, or -3, please continue with questions 11 through 16.

11. In cool/cold weather, your work space is (check any that apply):
Often too hot _____ Often too cold _____

12. In warm/hot weather, your work space is (check any that apply):
Often too hot _____ Often too cold _____

13. At what time of day is this most often a problem (check all that apply)?
Morning (before 11 AM) _____ Midday (11 AM – 1 PM) _____ Afternoon (2 – 5 PM) _____
Evening (After 5 PM) _____ Weekdays/holidays _____ Monday mornings _____
No particular time _____ Other _____

14. What are some of the possible reasons for your discomfort (check all that apply)?
Air movement too high _____
Air movement too low _____
Humidity too high _____
Humidity too low _____
Incoming sun _____
Draft from window _____
Draft from vent _____
My workspace is hotter or colder than other areas _____
Dress code not flexible enough _____
Heating/Cooling system does not respond quickly enough to thermostat adjustment _____
Temperature shifts too frequent _____
Temperature shifts too large _____
Thermostat adjusted by others _____

15. Do the temperature problems in your workspace have a negative effect on your work performance?
No negative effect_____ Mild negative effect _____
Moderate negative effect _____ Significant negative effect ____

16. Please describe any other temperature-related concerns you may have with your workspace.

IEQ CREDIT 8.1: DAYLIGHT & VIEWS: DAYLIGHT 75% OF SPACES
1 POINT

Intent
Provide for the building occupants 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 — CALCULATION
Achieve a minimum glazing factor of 2% in a minimum of 75% of all regularly occupied areas. The glazing factor is calculated as follows:

$$\text{Glazing Factor} = \frac{\text{Window Area (sf)}}{\text{Floor Area (sf)}} \times \text{Window Geometry Factor} \times \frac{\text{Actual Tvis}}{\text{Minimum Tvis}} \times \text{Window Height Factor}$$

OR

OPTION 2 — SIMULATION
Demonstrate, through computer simulation, that a minimum daylight illumination level of 25 footcandles has been achieved in a minimum of 75% of all regularly occupied areas. Modeling must demonstrate 25 horizontal footcandles under clear sky conditions, at noon, on the equinox, at 30 inches above the floor.

OR

OPTION 3 — MEASUREMENT
Demonstrate, through records of indoor light measurements, that a minimum daylight illumination level of 25 footcandles 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.
In all cases, only the square footage associated with the portions of rooms or spaces meeting the minimum illumination requirements can be applied towards the 75% of total area calculation required to qualify for this credit.

In all cases, provide daylight redirection and/or glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.

Potential Technologies & Strategies
Design the building to maximize interior daylighting. Strategies to consider include building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, high performance glazing and automatic photocell-based controls. Predict daylight factors via manual calculations or model daylighting strategies with a physical or computer model to assess footcandle levels and daylight factors achieved.

CREDIT COMPLIANCE
The project followed Option 1.

Total Regularly Occupied Space Area:	5,804.00 sf
Total Regularly Occupied Space with a Minimum 2% Glazing Factor:	5,204.00 sf
Percentage of Regularly Occupied Space with a 2% Glazing Factor:	89.55%

Credit Narrative

The Macalester IGC building has been designed to take advantage of natural daylight whenever possible. All regularly occupied spaces have been included in the calculations. Only stairwells, hallways, restrooms, closets, and support areas have been excluded. All offices but one face south, and the conference rooms and group work spaces face east or west. The large IGC Court, the kitchen, and one group work space face north. The remaining office faces east. All windows have sun control roller shades, and windows facing east and west have automatic roller shades with manual overrides. There are also fixed external sun screens on the west facade. On the south facade, fixed exterior shades help control glare and solar heat gain at the first and third floors windows. All windows have low-e glazing. South-facing office windows are double-glazed. All other windows are triple-glazed. The lobby entrance is double-glazed.

A slightly modified version of the LEED-NCv2.0 Daylight & Views calculator was used because some of the glazing and space configurations were more complicated than the v2.2 calculator could accommodate.

Daylight calculations and locations can be found in the appendix.

IEQ CREDIT 8.2: DAYLIGHT & VIEWS: VIEWS FOR 90% OF SPACES

1 POINT

Intent

Provide for the building occupants a connection between indoor spaces and 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 2'6" and 7'6" above finish floor for building occupants in 90% of all regularly occupied areas. Determine the area with direct line of sight by totaling the regularly occupied square footage that meets the following criteria:

- ❑ 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 multi-occupant spaces, the actual square footage with direct line of sight to perimeter vision glazing is counted.

Potential Technologies & Strategies

Design the space to maximize daylighting and view opportunities. Strategies to consider include lower partition heights, interior shading devices, interior glazing, and automatic photocell-based controls.

CREDIT COMPLIANCE

Total Regularly Occupied Space Area:	5,804.00 sf
Total Regularly Occupied Space Area with Access to Views:	5,757.00 sf
Percentage of Regularly Occupied Space with Access to Views:	99.19%

View calculations and locations can be found in the appendix.

MARKIM HALL

INNOVATION IN DESIGN CATEGORY

LEED FOR NEW CONSTRUCTION V2.2

5	**Innovation & Design Process**	**Possible Points:** 5

1	Credit 1.1	Innovation in Design	1
1	Credit 1.2	Innovation in Design	1
1	Credit 1.3	Innovation in Design	1
1	Credit 1.4	Innovation in Design	1
1	Credit 2	LEED® Accredited Professional	1

INNOVATION AND DESIGN CREDIT 1.1: INNOVATION & DESIGN PROCESS: PUBLIC EDUCATION
1 Point

Innovation and Design Intent
To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED for New Construction Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED for New Construction Green Building Rating System.

Innovation and Design Requirements
In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach (strategies) that might be used to meet the requirements.

Public Education Credit Intent
To create an ongoing education program associated with the green building strategies of the Institute for Global Citizenship at Macalester College.

Public Education Credit Requirements
Per CIR dated 9/24/2001, two of the following three criteria must be met:

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

Project's Approach to Public Education Credit
This building will consist of 16,000 gross square feet of space and house the Institute for Global Citizenship (IGC), which includes the Internship Program, the Civic engagement Center (CEC), and the International Center (IC). The IGC building consists of offices, conference rooms, workrooms, a large function space, and a kitchen and lounge. The building is designed to operate at a very high level of performance and efficiency. The project will actively incorporate Requirements #1 and #3, while the College as a whole has adopted numerous sustainable education measures.

The comprehensive signage program will be met through the use of a "Green Touchscreen". Green Touchscreen is a web-based kiosk, which will be permanently installed in the building's lobby. The Green Touchscreen will be accessible to all who enter the building, as well as anyone in the Macalester community, from anywhere on campus, via on-line access.

The Green Touchscreen will provide the following information modules:

1) **Green Building Information** (i.e., Answers the questions, What is sustainability? What is LEED?)

2) **Live Building Data**. The system will be tied into the building automation system and will show live data for water and energy use, amount of carbon saved, and outdoor air conditions. Historical data will also be shown by day, week, month, or year.
3) **Animated Educational Graphics** will be overlaid with live building data (e.g., schematic of HVAC system and water pumps, with actual energy or water usage.
4) **Green Features Map**. A map of the building will highlight the locations of "green" features and describe, and compare the "green" feature to standard features, including the "intent/solution" of the green feature.
5) **Interactive LEED Checklist**. The user can select a LEED credit to see information on the intent of each credit, how the credit was achieved, and the occupant/environmental benefit.
6) **Green Calculators.** Interactive calculators will show resource and monetary savings (e.g., light bulb savings, water savings, ect.). Users can experience via the calculator how even small changes can make a difference.

The guided building tour will include highlights of the interior and exterior green features of the project, including the mechanical and ventilation systems; water-saving features; low-emitting, recycled, and local materials; site orientation and daylighting; envelope construction; native landscaping; permeable pavers; ect. The tour will be given to students and the Macalester community, as well as visitors to the campus, and by appointment to interested groups.

Green Touchscreen information and tour narrative can be found in the appendix.

INNOVATION AND DESIGN CREDIT 1.2: WATER USE REDUCTION, 40%

1 Point

Innovation and Design Intent

To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED for New Construction Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED for New Construction Green Building Rating System.

Innovation and Design Requirements

In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach (strategies) that might be used to meet the requirements.

Water Use Reduction Credit Intent

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

Water Use Reduction Credit Requirements

Employ strategies that in aggregate use 40% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, showers, an d kitchen sinks.

Project's Approach to Water Use Reduction Credit

This project is achieving a 44% overall reduction in water consumption by utilizing several technologies, and is therefore eligible for an innovation credit.

Dual-Flush water closets are to be utilized for both male and female restrooms. Urinals have been excluded from this project altogether. Water closets are designed to utilize either 0.8 GPF (half flush) or 1.6 GPF (full flush).

The showers provided reduce water consumption in two ways. The first of which is the valve itself. The shower valve is a push button actuated limiting valve. The valve is designed to run for 45 seconds before shutting off automatically. The valve is model #4-427 as manufactured by Symmons Industries. The showerhead uses only 1.6 gallons per minute. Showerhead model #RP46384 as manufactured by Delta faucet Co.

The kitchen sink faucets (Chicago faucet model #786-GN2FC) are to use a maximum 1.6 gallons per minute. The lavatory faucets are 0.5 GPM, self- generating hydroelectric powered, and sensor operated. Zurn Industries model #Z6915-GEN-F-MT

INNOVATION AND DESIGN CREDIT 1.3: GREEN CLEANING

1 Point

Innovation and Design Intent

To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED for New Construction Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED for New Construction Green Building Rating System.

Innovation and Design Requirements

In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach (strategies) that might be used to meet the requirements.

Green Cleaning Credit Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical contaminants that adversely impact air quality, occupant well-being, and the environment.

Green Cleaning Credit Requirements

- Statement of purpose
- Contractual or procedural requirement with operations staff.
- Clear set of acceptable performance level standards.
- Documentation of the program's housekeeping policies and environmental cleaning solution specifications, including a list of approved and prohibited chemicals and practices.

Project's Approach to Water Use Reduction Credit

The Macalester College IGC project incorporates a comprehensive Green Cleaning program, including training, performance standards, and a list of approved chemicals and practices.

The Macalester College Facility Services Green Cleaning Procedures can be found in the appendix.

INNOVATION AND DESIGN CREDIT 1.4: EXEMPLARY PERFORMANCE: OPTIMIZE ENERGY PERFORMANCE

1 Point

Innovation and Design Intent

To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED for New Construction Green Building Rating System and/or innovative performance in Green Building categories not specifically addressed by the LEED for New Construction Green Building Rating System.

Innovation and Design Requirements

In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach (strategies) that might be used to meet the requirements.

Exemplary Performance: Optimize Energy Intent

Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Exemplary Performance: Optimize Energy Intent Credit Requirements

Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard. Demonstrate a percent improvement in the proposed building performance rating by a minimum of 45.5% for New Buildings.

Project's Approach to Optimize Energy

The project has exceeded the requirements for an Exemplary Performance Innovation Credit point by achieving an improvement over the baseline of 53.3%. Please see EAc1 for additional information.

INNOVATION AND DESIGN CREDIT 2: LEED ACCREDITED PROFESIONAL

1 Point

Intent

To support and encourage the design integration required by a LEED for New Construction green building project and to streamline the application and certification process.

Requirements

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

Potential Technologies & Strategies

Educate the project team members about green building design & construction and application of the LEED Rating System early in the life of the project. Consider assigning the LEED AP as a facilitator of an integrated design & construction process.

Credit Compliance

Erica Downs of Bruner/Cott & Associates was the project Sustainability Program Manager.

A copy of the LEEP AP certificate can be found in the appendix