Gibbs House Education Space Design Challenge

Fall 2013 Status Report

Kelsey Pitschel
Research Intern
PROJECT SCOPE

• New-build outdoor education space at Gibbs House site
• Initial design phase will be facilitated through a student- and community-wide design challenge open to the greater Kalamazoo area
• Responsibilities:
  • To develop design guidelines for the Education Space
  • To develop and conduct a design competition for the Education Space
BASIC DESIGN GUIDELINES

1. Structural Design / Materials
   1. Multi-purpose presentation space for hosting of campus/community events
   2. Constructed from local, salvaged and renewable materials
   3. 30’ x 30’ footprint with two conjoining walls opening south
   4. Suggested cedar or pine timber framing with reclaimed cement tile flooring
   5. Natural acoustic projection to outdoor patio space

2. Photovoltaic Integration
   • 6 kW DC nameplate sizing
   • Suggested awning structure
   • Grid-tied

3. Interpretive Displays
   • Roadmap of electrical and operation components – all working parts visible and explanatory
   • Educate about on-site renewable energy generation
   • Educate about sustainable design features
   • The structure itself should act as a teacher
THE CHALLENGE

• To provide an applied learning experience to engage student-community teams in the principles of regenerative design, renewable energy, sustainability and innovation, all of which advance WMU’s sustainability commitments

• Opportunity to have winning design implemented as the new Gibbs House Education Space

• Eligible students / advisors from field of building and design in greater Kalamazoo area

• $50,000 budget for design and construction – includes materials, labor, PV and interpretive displays

• Expected launch date TBD

• Design Charrette to take place during design process
Western Michigan University
Gibbs House
Property Master Plan

Facts and Figures
Founded: 2003
Property Size: 1.75 acres
Elevation Change: 7 feet
Latitude: 42°15'33.76" N
Longitude: 85°38'24.32" W
Fellows: 4-5

Legend
- Fruit Tree
- Deciduous Tree
- Coniferous Tree
- Building
- G.H. Greenhouse
- Paved Road
- Driveway
- Hoop House
- Vegetable Garden
- Solar Panel
- Living Fence
- Fence
- Walking Path
- Swale
- Hoop House

Newell Rubbermaid Stage II Facility (Planned)
Newell Rubbermaid Stage I Facility (Under Construction)
COLLABORATORS

- Jeff Spoelstra – Project Supervisor and Sustainability Coordinator, WMU
- Harold Glasser – Executive Director for Campus Sustainability, WMU
- Derek Kanwischer – Coordinator of Sustainability Projects, WMU
- Will Derouin – Permaculture Coordinator, WMU
- Jane Talkington – Ecovillage Project Director, OSU
- Stephan Keto – Natural Areas Preserves Manager, WMU
- Margaret Spyker – GIS Analyst, WMU and LBCCC winner
- Matthew Hollander – Former Sustainability Coordinator, WMU
- Dick Roosenberg – Executive Director, Tillers International, Inc.
- Rob Burdick – Construction Manager, Tillers International, Inc.
- Gretchen Hooker – Biomimicry Student Design Challenge, Biomimicry 3.8 Institute
- Ann Simonson – Facility Rental and Volunteer Service Chair, Glen Helen Ecology Institute
- Koorosh Naghshineh – Professor and Director, Noise and Vibration Lab, WMU
FUTURE DEVELOPMENTS

• Launching of Design Challenge
  • Timeline
  • Promotion
  • Selection of Jury Panel members
• Further allocation of resources
• Design Guideline and Competition Template
Gibbs House Education Space Design Challenge
Fall 2013 Status Report
Kelsey Pitschel

PROJECT OVERVIEW
In Spring 2014, the Office for Sustainability plans to launch a sustainable design challenge for an outdoor Education Space at the Gibbs House property. The challenge will ask student-community teams to design a low-impact, multi-purpose presentation space that will innovatively integrate a 6 kW photovoltaic array and educational interpretive displays. The winning team has the opportunity to have their design implemented as one of the latest sustainable new-builds on Western Michigan University’s campus as chosen by selected sustainability leaders and peers, industry professionals, and Western faculty.

The scope of this project and the duties of the Design Challenge Coordinator include two main goals: (1) To develop design guidelines for the Education Space (regarding structural/material design, photovoltaic integration and educational components), and (2) To develop and conduct a design competition for the Education Space.

The Space
The Education Space will be designed as an active learning environment for students and community members. The space has three main components: (1) a multi-purpose structure built from sustainable material allocation, (2) an integrated solar photovoltaic array, and (3) educational displays to transform the structure itself into a teacher.

Further technical guidelines may be found in the Gibbs House Education Space Design Challenge Overview document.

The Challenge
The Gibbs House Education Center Design Challenge will provide an applied learning experience to engage students, faculty and community teams in the principles of regenerative design, sustainability, renewable energy, permaculture and innovation, all of which advance WMU’s sustainability commitments.

The Education Center Design Challenge will ask student- and community-wide teams to design an outdoor education space that will meet all of the following needs sustainably: (1) Design a low impact shelter that allows for a variety of settings such as lectures, educational activities, community events, entertainment, and other university engagement activities while creating an atmosphere of inclusion and community. (2) Design an innovative and beautiful space, which cultivates learning, creativity, and sustainability while complimenting the historic nature of the Gibbs House building. (3) Seamlessly integrate a 6 kW DC array of photovoltaic solar panels in a way that enhances the structural design and natural environment while also optimizing annual energy production. (4) Educate visitors about on-site sustainable design features through the use of an interpretive display, which also roadmaps operational components of the space.

Keywords: Gibbs House, education space, design challenge, Gibbs House Property Master Plan, presentation space, sustainable design, photovoltaics, interpretive display, student-community collaboration, interdisciplinary teams.
SEMESTER SUMMARY / PROJECT DEVELOPMENTS

Budget
Teams should design the space with a $50,000 budget in mind. This budget includes construction materials, the photovoltaic system (panels, inverters, mounting, wiring, etc.), the interpretive display, labor costs, and other design features of the space. This budget imposes the challenge of simplicity and tactful resource allocation. The Office for Sustainability is open to further support, funding, resource allocation and groundbreaking suggestions. Groundbreaking suggestions are transformative ideas from teams that extend beyond the $50,000 budget, but have the potential to break ground based on future funding, resource efforts and creativity.

Eligibility
The Challenge is designed for student-professional teams in order to encourage interdisciplinary collaboration and community inclusion. Eligible design teams of two to four members will include: any student enrolled in a higher education undergraduate or graduate program related to building and design in the greater Kalamazoo area. Teams are required to include an experienced advisor also from the greater Kalamazoo area. Number of advisors per team must not exceed number of students.

Awards
The winning team, as chosen by a selected Jury Panel of WMU affiliates and industry professionals, has the chance to have their design implemented as the new Gibbs House Education Space. Materialization of the winning Design Plan is not guaranteed and building contracts will not be drawn. The Office for Sustainability will own the rights to submitted design plans, and may alter plans to meet the needs of the Space. The winning team is guaranteed a press piece by the Western Herald and a plaque of recognition at the future location of the Education Space.

Collaborations
Campus and community partners involved in the research and development of this project include: Jeff Spoelstra, Harold Glasser, Derek Kanwischer, Steve Keto, Jane Talkington, Margaret Spyker, Matthew Hollander, William Derouin, Ann Simonson, Dick Roosenberg, Gretchen Hooker, and Koorosh Naghshineh. Number of collaborators is expected to increase within the disciplines of structural design, design challenge coordination, materials, interpretive planning and all other aspects of the design challenge project. Jeff Spoelstra acted as Office for Sustainability Project Supervisor.

Events
A pre-launch Call for Design of the Education Space Design Challenge took place at the Fall 2013 National Campus Sustainability Day. Expected launch date was not announced, but is hoped to take place in Spring or Summer 2014. Actual launch is date is to be determined based on pending approval from WMU affiliates.

Project related events suggested to take place include a Gibbs House Site Visit, a Design Charrette, an Open House Award Ceremony, a Tillers Practical Timber Frame Design course, and a Tillers Timber Frame Raising Course. The Site Visit will be lead by an Office for Sustainability representative and will educate teams about the Property Plan and the current and future states of the property. The Design Charrette will invite the community to discuss the implementation of an Education Center at the Gibbs House with active input from passionate community members. At the Open House Award Ceremony, teams will defend their Design Plans, judges will finalize their decisions and a winner will be announced. Further planning for these events falls under Work Awaiting Completion. Tillers may host the construction of the Space at the Gibbs House as a training and laborious event open to the public.
WORK COMPLETED
Gibbs House Education Space Design Challenge Overview
Gibbs House Education Space Design Challenge Cover Page
Design Challenge Rubric
Education Space Models
Design Challenge Models
Team Registration Form

WORK AWAITING COMPLETION
Selection of Jury Panel members
Finalization of Design Challenge Overview
Additions to List of supportive industry collaborators (authorizations pending)
Promotional measures: Creation of poster/flyer, other promotional actions.
Design Guideline and Competition Template
Gibbs House Education Space Design Challenge

Abstract

In Spring 2014, the Office for Sustainability plans to launch a sustainable design challenge for an outdoor Education Space at the Gibbs House property. The challenge will ask student-community teams to design a low-impact, multi-purpose presentation space that will innovatively integrate a 6 kW photovoltaic array and educational interpretive displays. The winning team has the opportunity to have their design implemented as one of the latest sustainable new-builds on Western Michigan University’s campus as chosen by selected sustainability leaders and peers, industry professionals, and Western faculty. A tentative timeline for the Design Challenge launch in Spring 2014 is as follows:

- Registration opens / Guidelines viewable: March 1
- Registration closes: May 15
- Gibbs House Site Visit: May 19
- Design Charrette: June 2
- Entries due: August 15
- Open House / Winners announced: September 10
- Timber Frame Raising Event: September 30 – October 5
Gibbs House Education Space Design Challenge

This document is formatted to transition to a public access webpage where Challenge Details will be available at a later date.

DESIGN CHALLENGE THEME

As part of the ACUPCC and the Western Michigan University Strategic Plan, WMU has pledged to incrementally advance the university toward climate neutrality while also creating a fulfilling culture of sustainability.

The Western Michigan University Gibbs House Education Center Design Challenge will provide an applied learning experience to engage students, faculty and community in the principles of regenerative design, sustainability, renewable energy, responsible industry, innovation, and social consciousness, all of which advance WMU’s sustainability commitments.

THE CHALLENGE

The Education Center Design Challenge asks student- and community-wide teams to design an outdoor education space that will meet all of the following needs sustainably:

1. Design a low-impact, multi-purpose presentation space to be constructed from locally harvested timber that allows for a variety of settings such as lectures, educational activities, community events, entertainment, and other university engagement activities
2. Seamlessly integrate a 6 kW DC array of photovoltaic solar panels in a way that will enhance the structural design of the space while also optimizing energy production
3. Create an active learning environment though the use of interpretive displays to educate visitors about on-site renewable energy generation and sustainable design features
4. Design an innovative and beautiful space, which cultivates learning, creativity, and sustainability while complimenting the historic nature of the Gibbs House building

DESIGN CHALLENGE ELIGIBILITY

1. The Challenge is open to any student currently enrolled in a higher education undergraduate or graduate program related to building and design in the greater Kalamazoo area. Universities and colleges include, but are not limited to: Western Michigan University, Kalamazoo College and Kalamazoo Valley Community College.
2. Eligible programs related to building and design include but are not limited to: (i) architecture, (ii) landscape architecture, (iii) engineering, (iv) community and regional planning, and (v) construction. Teams members from other related interdisciplinary fields are encouraged.
3. Teams with a minimum of two members and a maximum of four are permitted to enter.
4. Inclusion of at least one experienced advisor from a related field in the greater Kalamazoo area is required. Examples of experienced advisors include industry professionals, academic faculty or staff, and passionate community members in the fields of sustainability, building or design.
5. Number of advisors per team must not exceed number of students per team.
6. Teams must designate a student Primary Contact who will act as liaison between the Design Challenge Coordinator and the team.
7. Only one entry may be submitted per team.
8. Members of the selected Jury Panel are not eligible as team members. However, collaboration throughout the design process with willing Jury Panel members is strongly encouraged.

SUBMISSION REQUIREMENTS

2. All documentation is to be entered via email to the Design Challenge Coordinator. All files must be zipped so that content may be sent in a single email. A confirmation email will be sent upon receiving full entry documentation. Only complete entries will be accepted.
3. All entries must be the original work of the teams.
4. Western Michigan University and the Office for Sustainability retain the right to alter submitted entry materials to further meet the needs of the institution and the Education Space.
5. Western Michigan University and the Office for Sustainability retain the right to reproduce and distribute submitted entry materials for public view for educational and reporting purposes.
6. Design entries should be submitted with the full understanding of WMU’s Intellectual Property Rights. In short, any entry that utilizes any WMU resource results in the right, title and interest of submitted Intellectual Property to belong to the Board of Trustees of Western Michigan University.
7. The team is required to submit the following items via email:
   - 2’ by 3’ presentation board complete with site plan, perspective vignettes, and feature descriptions to effectively substantiate submitted design plan
   - Presentation board content must also be submitted in a high-resolution PDF
   - 10 PowerPoint slides representative of the Design Plan (PowerPoint will be presented to the Jury Panel at the Open House event if designated as the winning entry)
   - Abstract of Education Space Design Strategy (1000 words) describing principal design features and overall design approach
   - Cost Mitigation Strategy (1000 words) accessing structure, design features, selected materials and their associated costs
   - List of Suggested Materials and their sources
   - Photovoltaic System Energy Calculations (PVWatts predictions)

REGISTRATION

1. Registration Opens March 1, 2014.
2. Teams must be registered by May 15, 2014.
3. A team will be considered registered upon:
   - Completion and submission of one Registration Form per team to the Design Challenge Coordinator by registration deadline via email from the team’s Primary Contact
• Confirmation email sent by Design Challenge Coordinator affirming registration completion to the team’s Primary Contact

4. The following information is required on the registration form:

• Team Name
• Team Member Identification: Full name, current school, current degree program, expected graduation date, and email address
• Designation of Primary Contact. Primary Contact must be a student.
• Experienced Advisor Identification: Full name, current affiliation, field, and email address

**TIMELINE FOR 2014**

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<th>Event</th>
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**AWARDS**

1. The winning team has the opportunity to have its Design Plan implemented at WMU’s Gibbs House property. Materialization of the winning Design Plan is not guaranteed and building contracts will not be drawn.
2. The winning team will receive a press piece by the Western Herald and a plaque of recognition at the future location of the Education Space.
3. A select Jury Panel will evaluate the submitted Design Entries. The Jury Panel will be composed of the following qualified members: Office for Sustainability leadership and interns, WMU operations, WMU administration, local industry professionals, Kalamazoo Public School administration, and Gibbs House community members.
4. Teams should review the Design Challenge Rubric throughout the design process. The Rubric will be utilized by the Jury Panel to evaluate submitted entries. Winning entry will not necessarily receive the highest score. All Jury Panel decisions are final.
5. The Jury Panel will meet prior to the Open House Event to evaluate designs and designate a winner. The winning design will be announced at the Open House Event, where the winning team will be asked to present their Design Plan PowerPoint.

**EVENTS**

1. A **Gibbs House Site Visit will take place on May 19, 2014**. The Site Visit will be lead by an Office for Sustainability representative and will educate teams about the current and future state of the property.
Discussion of the Gibbs House Permaculture Plan will be included, for an understanding of the ecology and overall mechanics of the property is tantamount to the success of the Education Space.

2. A Design Charrette will take place on June 2, 2014. The Charrette will be hosted by the Office for Sustainability and invites the community to discuss the implementation of an Education Center at the Gibbs House. The Charrette aims to clearly define the objectives of the space for teams and allows for active input from passionate community members. The Charrette is open to the public and is mandatory for at least one team member from every team.

3. The Open House Award Ceremony will take place on September 10, 2014. Teams will present their Design Plans, judges will ask questions and a winner will be announced at the Open House event. Further information on this event is available in the Open House Award Ceremony section.

4. The Timber Frame Raising Event will take place from September 30 – October 5, 2014. Located at the Education Space Gibbs House site, Tillers will host a framing and raising course for the winning timber framed design (or altered timber frame design). The labor-intensive and hands-on course will result in the final timber framed structure through the training and expertise of Tillers’ timber framers. The event requires real teamwork and is open to the public. Cost for enrollment to be determined.

OPEN HOUSE AWARD CEREMONY

1. The Open House Award Ceremony will take place on September 10, 2014.
2. A public event hosted by the Office for Sustainability allows for teams to spotlight their presentation boards and mix with interested attendees. The winner will be announced and asked to present their Design Plan PowerPoint.
3. The event will have two parts:
   - Open House as the first half of the event where all submitted design plans will be on display and teams will have the opportunity to mingle and network with attendees. The event will be catered and is open to the public.
   - Award Ceremony as the latter half of the event where the winner will be announced and asked to present their Design Plan PowerPoint.

DESIGN GUIDELINES

Teams should design the space with a $50,000 budget in mind. This budget includes construction materials, the photovoltaic system (panels, inverters, mounting, wiring, etc.), the interpretive display, labor costs, and other design features of the space. This budget imposes the challenge of simplicity and tactful resource allocation.

Structural Design / Materials

1. 30’ by 30’ structure footprint at its designated location on the Master Plan
2. 8’ wall height minimum
3. Low impact structure must not disrupt or harmfully displace native ecology. In other words, the structure must be streamlined with the Gibbs House Permaculture Master Plan and overall objectives of the Office for Sustainability.

4. Strongly suggested timber frame structure. Timber must be locally grown, harvested and milled.

5. Two load bearing walls in support of a weather resistant roof and solar photovoltaic system. The load bearing walls must provide protection from the elements.

6. Walls must open south to a patio space to minimize road noise and visibility

7. Designated space for bulk materials storage (for tables, chairs and miscellaneous supplies) and a recycling pod (for at least compost, paper/cardboard, and landfill bins).

8. The Design Plan should aim to follow the Living Building Challenge Red List Materials. Frowned upon materials include: asbestos, chlorinated polyethylene, chlorosulfonated polyethylene, chloroprene (Neoprene), chlorofluorocarbons (CFCs), formaldehyde, halogenated flame retardants, hydrochlorofluorocarbons (HCFCs), lead, mercury, petrochemical fertilizers and pesticides, phthalates, polyvinyl chloride (PVC), wood treatments containing creosote, arsenic or pentachlorophenol.

**Photovoltaic Energy Generation**

1. A 6 kW DC solar photovoltaic (PV) system to be integrated into the structural design of the Education Center. Space for a second phase 6 kW DC array should be allocated on or near the structure. Integration of both of these arrays will account for the entire electrical load of the property.

2. All energy consumption of the Education Space must be kept at a minimum and neutralized by the PV array on an annual basis. Electrical necessities in order to increase habitability of the Space include overhead lighting and electrical outlets for presentation materials, gardening tools, power tools and space heaters. The Space is suggested to be grid-tied so that there will be no need for a battery system.

3. The array must cater to solar insolation conditions in order to reach peak energy production during peak consumption times, or otherwise reach peak annual energy production. The Photovoltaic System Energy Calculations based on PVWatts predictions must use the parameters set in the Photovoltaic Fundamentals supplement.

4. The array must be fixed. The suggested mounting solution is an integrated awning.

5. The array must enhance the overall aesthetics of the Space.

6. System materials (panels/ inverters/ mounting) should meet at least one of the following requirements: be at least 50% manufactured within the U.S., sourced and assembled in the U.S., or changed in character within the U.S.

**Interpretive Display**

1. The goal of the Interpretive Display is to educate about on-site sustainability features through engaging visual and explanatory displays. The Education Space itself should be a teacher.

2. The Interpretive Display will consist of a roadmap identifying and defining all operational and informative parts of the Education Space. The roadmap should identify and define the following components:
   - Electrical System: Utility and PV subpanel. Subpanel includes inverters, meters, transformers, wiring, etc. The system components should be made visible in a transparent glass casing near the location of the interpretive display.
- Photovoltaic System: the PV system and how it works. This is different from the Electrical System Schematic. The PV Schematic should include explanations of panel type, inverter type, panel orientation and how these components interact to produce enough annual energy to offset the electrical load of the Space.
- Sustainable design features: each design feature should be denoted at its individual location through the use of plaques.

**GROUNDBREAKING IDEAS**

The Office for Sustainability is open to receiving groundbreaking suggestions that may extend beyond the $50,000 budget. The purpose of this request is to encourage transformative designs that may not seem feasible within the current parameters, but may be made possible through resourceful efforts or future funding. Teams are encouraged to submit their Groundbreaking Ideas along with their Design Plans in order to increase their overall score. The Office for Sustainability may be open to breaking ground on innovative submitted ideas.

Groundbreakers, suggestions and resources we’ve considered are:

- Sustainable rainwater collection techniques. The Office for Sustainability owns a 500-gallon water collection tank that currently not in operation. Tank does not include a pump.
- A restroom solution that will provide a bathroom for Education Space visitors. The restroom may or may not be attached to the Space, and must have minimal to no electrical load and water waste. Thoughts of a composting toilet have been suggested.
- An outdoor pizza oven that also acts as a possible space heater and/or congregational fire pit.
- The implementation of a moveable weather protectant curtain or sliding door for winter months. The curtain must not result in more extensive building codes or significant cost.
- Suggested structure is timber framing. Suggested timber species are Eastern White pine, Eastern Hemlock, and red or white oak. Suggested joinery material is unseasoned Eastern Hemlock. Participation in Tillers courses and collaboration with timber framers is strongly encouraged.
- Suggested infill materials are glass, straw bale, bevel, or tongue and groove must be considered.
- Concrete tiling is the suggested flooring material. Reusing of past concrete, and mixing in reclaimed materials such as broken glass or crushed shells to minimize cost and to create mosaics. The Office has utilized these techniques before and is open to pursuing them again in order to decrease labor costs and increase the hands-on nature of the Space.
- The Office for Sustainability is open to providing labor for smaller construction projects that will enhance the Education Space and Gibbs House property.

**DESIGN RESOURCES**

The following resources are provided for the benefit of design teams so they have the proper tools to design a successful Education Space.

- Photovoltaic Fundamentals and Guidelines (see below)
- Tillers International Practical Timber Frame Design course (TBA)
- List of supportive industry collaborators (TBA)
THE WHO

The Office for Sustainability aims to grow an advanced learning community around the culture of sustainability. In order to enhance this living learning community, we strongly encourage ongoing conversations between teams, industry professionals, community members, and the Office for Sustainability.

With this in mind, the Office for Sustainability is available to discuss any and all Design Challenge concerns, inquires and suggestions. We believe a collaborative, transparent effort will produce the most impressive and impactful product.

Feel free to contact the Design Challenge Coordinator at kelsey.m.pitschel@wmich.edu or visit the WMU Office for Sustainability at W. Michigan and Howard.
PHOTOVOLTAIC FUNDAMENTALS

This supplemental document highlights meaningful components the design team should be aware of when designing a photovoltaic system. The contents of this list are not specific elements the teams will be graded on, but teams must be aware that practicality of the entire system will be highly regarded during the evaluation process. Further inquiries should be made to the Design Challenge Coordinator or supportive industry professionals.

1. The array must be designed so that there is access and ability to conduct operations and maintenance.
2. The array must be six (6) kW DC nameplate size, with space to add another six (6) kW installation at a later date.
3. Grid-tied systems may be eligible for funding incentive programs such as the Environmental Advanced Renewable Program from Consumers Energy.
4. Projected AC energy output of the designed system is required in the submission as a key argument for design applicability. Once photovoltaics are integrated into the design plan, projections can be made using the NREL PVWatts Site Specific Calculator Version 1. Teams should aim to meet at least a 6500 kWh/year energy production minimum. The program is available here: http://rredc.nrel.gov/solar/calculators/PVWATTS/version1/. Please follow these parameters:
   - Grand Rapids, MI 94860
   - DC Rating (kW): 6.0
   - DC to AC Derate Factor: 0.77
   - Array Type: Fixed Tilt
   - Array Tilt: Determined by design
   - Array Azimuth: Determined by design
   - Cost of Electricity (cents/kWh): Default
5. Snow and wind loads should be considered. Maximum static load for a panel is typically 50 psf for one panel.
6. Typical total PV awning system weight is about 5 psf. Pavilion structure must account for this.
7. Mounting solutions must also be addressed. This system component largely dictates overall design aesthetic and should be justified based on energy performance and cost. PV panels function more efficiently under cooler temperatures. So, awning designs rather than a roof-mounted designs allows for possible air flow to dissipate heat accumulation. Proper sealant measures should be taken into account for awning designs.
8. Light passivity is an important aspect of an awning design. A good benchmark is about 20% light passivity in order to reduce the need for electric lighting during the day. This can be related to about 0.5 inch minimum spacing between cells laminated between clear glass panes.
9. Allocate at least 7 feet of horizontal wall space for inverter equipment mounting and at least 3 feet of open space in front of the wall.
10. Helpful guidelines to follow so that the PV system materials are responsible sourced are the ARRA compliance guidelines. Here is a provided helpful link: http://www.gogreensolar.com/pages/buy-arra-solar-panels-and-solar-energy-products.
11. Inverter Solutions must also be addressed. The inverter type should complement the overall objectives of the space and be oriented to bolster educational goals of the interpretive display. The two main types to explore are central string tied and microinverters. Place the inverter in a well-ventilated area that is sheltered from direct sunlight.
EDUCATION SPACE DESIGN CHALLENGE RUBRIC 2014

I. STRUCTURE / MATERIALS 25
   1 Basic Guidelines
      - 30'x30' footprint
      - 8' wall height minimum
      - two walls opening southward
      - acoustic projection via roofline and flooring
   2 Safe and Sustainable materials (local, reclaimed, reused)
   3 Space for storage and recycling pod
   4 Low impact / Simple Design
   5 Beauty / Innovation

II. PHOTOVOLTAIC INTEGRATION 25
   1 Basic Guidelines
      - 6 kW DC size
      - Fixed
      - Practical mounting solution
   2 PVWatts Projection near 6500 kWh/year
   3 Production > Consumption
   4 Responsible materials
   5 Beauty / Innovation

III. EDUCATIONAL DISPLAYS 25
    1 Viewable electrical systems
    2 Roadmap identifying and defining electrical systems
    3 Interpretive Display for PV
    4 Interpretive Display for sustainable features
    5 Plaques denoting sustainable features
    6 Creativity / Innovation

IV. COST MITIGATION 25
    1 Within $50,000 budget
    2 Practical Design
    3 Resourcefulness

V. GROUNDBREAKING IDEAS Extra
    1 Applicability
    2 Creativity

TOTAL
# Gibbs House Education Space Design Challenge

**Registration Form 2014**

**Form Due May 15, 2014 via email to kelsey.m.pitschel@wmich.edu**

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**Team Member 1/Primary Contact:**

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**Team Member 4:**

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