The Outdoor Education Space Design Challenge
at Western Michigan University's Gibbs House

THE CHALLENGE

The Education Space Design Challenge is for collaborative student and community teams that design a Living Building Challenge-inspired outdoor education space to complete the Gibbs House Permaculture Demonstration and Research Facility. Successful submissions will satisfy the following four imperatives (see design rubric for details):

1. Design a low-impact, cost-effective, multi-purpose presentation space that can be constructed from sustainable materials and allow for a variety of functions such as lectures, educational activities, community events, and entertainment.
2. Seamlessly integrate a 6 kW, grid-interconnected photovoltaic array in a way that will enhance the structural design and aesthetics of the space and optimize annual energy production.
3. Create an active learning environment through the use of a sustainability exhibit that will educate visitors about on-site renewable energy generation and the sustainable design features of the space.
4. Design an innovative and beautiful space that cultivates learning, creativity, and sustainability while complementing the historic nature of the Gibbs House.

DESIGN CHALLENGE ELIGIBILITY

1. Participants are strongly encouraged to build diverse teams of students and professionals from interdisciplinary fields and institutions across southwest Michigan.
2. To participate in the Design Challenge, teams must have:
   - 3 - 5 members.
   - At least 2 students.
   - At least 1 design professional.
3. For a student to participate on a design team, he or she must:
   - Be currently enrolled in, or recently (within the last 6 months) graduated from, a higher education institution in southwest Michigan.
   - Not be a jury panel member.
4. Eligible institutions include: Western Michigan University, Kalamazoo College, Kalamazoo Valley Community College, Grand Valley State University, Grand Rapids Community College, Calvin College, Aquinas College, Hope College, Kendall College of Art and Design.
REGISTRATION

1. **Registration opens Friday, April 18.** The online registration form will be available at (http://www.wmich.edu/sustainability/projects/gibbs/design-challenge/registration).

2. **Registration forms must be completed by Sunday, June 1** through the online form provided. Only one registration form is required per team. Possible registration deadline extensions may be posted on the website.

3. Each team must designate a student primary contact. The primary contact will receive a Dropbox invitation within 5 business days of completing the online registration form. All submitted materials must be made through the Dropbox folder.

4. Teams are required to provide a team name.

5. Teams are required to submit any inquiries that they wish to be addressed at the Gibbs House Site Visit to the design challenge coordinator via email (kelsey.m.pitschel@wmich.edu) by Sunday, June 1.

6. The registration form requires each team member to provide:
   - Full name
   - Team member role
   - Current institution / Affiliation
   - Degree program / Professional field
   - Expected graduation date
   - Email address

7. Team members must choose roles from the following list of options. All roles must be assigned. Team members may have multiple roles. Only students are eligible to act as project manager/primary contact.
   - **Project manager/primary contact:** Responsible for overseeing all project operations and ensuring that communications between the team and design challenge coordinator are distributed to all team members.
   - **Lead architect:** Responsible for the architectural and construction design effort. License not required.
   - **Project engineer:** Responsible for the engineering design effort. License not required.
   - **Lead officer for sustainability education:** Responsible for all educational and interpretive display efforts.
   - **Lead financial officer:** Responsible for all budgetary efforts.
   - **Lead author:** Responsible for organizing all submitted materials and maintaining a unified voice throughout written material.

TIMELINE FOR 2014

- Kick-Off at SustainabiliBASH / Registration opens: Friday, April 18
- Registration closes / Inquiries due: Monday, May 19
- Gibbs House Site Visit: Friday, May 23
- Living Building Challenge 2.1 Overview: Wednesday, July 30
- Design Panel Event: Monday, September 8
- Submissions due: Wednesday, October 1, 2014
- NCSD Reception / Winner announced: Oct 2014 (Not to conflict with AASHE on Oct 26)
SPONSORSHIPS

Team Sponsors
Teams are encouraged to seek sponsors to support their design effort. The role of the sponsor may be to provide in-kind labor for the design effort and/or future construction and donation of materials. Team sponsors may be identified in writing through text and identities on submitted design materials. Text and identities must not exceed 4% of total material area.

Health Product Declaration
Teams are encouraged to help advocate for the creation of a Health Product Declaration (HPD) for at least one product chosen from their design plan by requesting additional participation from the product manufacturer(s). Teams must contact the product manufacturer(s) to request the creation of an HPD for their chosen product(s), but it is not required that the manufacturer agree to participate. In order for teams to receive extra possible points for their Health Product Declaration effort, they must complete a Product Declaration Form (http://www.declareproducts.com/sites/default/files/Declare Product Declaration Form_1.docx), and provide proof of advocacy through correspondence documentation including all feedback from the manufacturer. Chosen manufacturers may also be a team sponsor.

SUBMISSION REQUIREMENTS

1. Final submissions due October 1, 2014 by 11:59 PM. A confirmation email will be sent to the primary contact within 48 hours of submitting a complete entry. The team will be disqualified if a complete entry is not submitted by the deadline.
2. Teams transfer full rights for use and distribution of all submitted materials to the WMU Office for Sustainability upon submitting an entry. The WMU Office for Sustainability retains the right to alter and distribute submitted entry materials for project development, reporting, fundraising, and educational purposes in accordance with the WMU Intellectual Property Policy.
3. All submitted entries must:
   - Effectively communicate the scope of the Design Plan to the jury panel.
   - Be of sufficient quality and detail to enable a contractor to generate an accurate, detailed construction plan and cost estimate.
   - Be submitted through the team’s designated Dropbox folder.
   - Meet all submission requirements.
   - Be the original work of the team.
4. Design Plans must include all of the following items each in the format of a 2:3 aspect ratio PDF:
   - Site plan
   - Foundation plan
   - Roof plan with full photovoltaic array assembly
   - Exterior renderings (4)
   - Interior rendering (1)
   - Sustainable exhibit renderings
   - Sustainable restroom solution rendering (1)
   - Abstract of education space design strategy (500 words)
- Budget (1-pg spreadsheet detailing total project costs submitted. Teams must identify each design element, name and address of supplier, and relevant cost documentation for each element)
- Material conservation management plan (1-2 pg including design, construction, operation, and end of life phases of each material)
- Photovoltaic system (system specifications and photovoltaic energy analysis)
- 2’ by 3’ presentation board complete with site plan, perspective vignettes, and feature descriptions to effectively substantiate the submitted design plan. The presentation board must include: 2 exterior renderings; 1 interior rendering; and sustainability exhibit renderings (Teams must also submit a hard copy of their presentation board for the NCSD Reception)
- 10 PowerPoint slides that substantiate the Design Plan. The PowerPoint slides must include: site plan; foundation plan; 2 exterior renderings; 1 interior rendering; restroom solution rendering; overview of the budget; material conservation management plan; and photovoltaic system specifications

**AWARDS**

1. The winning team will:
   - Have the opportunity to have its Design Plan implemented, all or in part, at the WMU Gibbs House property.
   - Receive a substantial monetary prize to be announced on National Campus Sustainability Day.
   - Receive Premium Conference Proceedings of the 2014 US Greenbuild International Conference on October 22-24 that includes full video and audio recordings of the master speakers, keynote presentation, and all education sessions synchronized with the PowerPoint slides.
   - Have a tree planted and a plaque of recognition at the future Gibbs House Permaculture Demonstration and Research Facility.
   - Be featured in the 2014 WMU Office for Sustainability Highlights report.
   - Have their design featured on the WMU Office for Sustainability website.
   - Have their team highlighted on an Office for Sustainability website carousel slide.
   - Earn press recognition from the Western Herald and WMU News.

**JURY PANEL**

1. The jury panel will:
   - Receive all electronic (or paper per request) materials of the design plan and begin evaluating submitted materials on October 1, 2014.
   - Utilize the design rubric to evaluate submitted entries. The rubric is available to teams and jury panelists at [http://www.wmich.edu/sustainability/projects/gibbs/design-challenge](http://www.wmich.edu/sustainability/projects/gibbs/design-challenge).
   - Provide in-depth and comprehensive feedback, notes, and critiques based on the design challenge rubric at least five business days prior to National Campus Sustainability Day. Feedback is intended to accelerate the design development phase toward completion of construction documents.
   - Consist of members from WMU Facilities Management Planning Division, WMU Projects/Construction Division, Office for Sustainability employees and other non-WMU qualified professional parties. The number of WMU officials will not exceed the number of non-WMU professionals and Office for Sustainability students and staff.
EVENTS

Design Challenge Kick-Off at SustainabiliBASH

- Friday, April 18, 2014
- Gibbs House, 3403 Parkview Avenue, Kalamazoo, MI
- Design Challenge will be officially launched by Office for Sustainability
- Design Plan guidelines will become viewable at
  (http://www.wmich.edu/sustainability/projects/gibbs/design-challenge)
- Design challenge coordinator will be available for inquiries

Gibbs House Site Visit

- Friday, May 23
- Gibbs House, 3403 Parkview Dr., Kalamazoo, MI
- At least one team member must attend
- Site visit will include a guided tour of property and discussion of the site’s permaculture plan and solar envelope

Design Charrette I

- Living Building Challenge 2.1 Overview presented by Matthew Hollander
- Wednesday, July 30
- Western Michigan University Office for Sustainability, 2529 W Michigan Ave, Kalamazoo, MI
- At least one team member must attend
- A nuts-and-bolts overview of the most recent Living Building Challenge 2.1 publication released by the International Living Futures Institute. Topics to be covered include all Petals and Imperatives with technical insights and best practice examples.

Design Charrette 2

- Design Panel and Charrette with local experts from Steelcase, ChemLink, Solar Winds Power Systems, and the Alliance for Environmental Sustainability
- Monday, September 8
- Western Michigan University Office for Sustainability, 2529 W Michigan Ave, Kalamazoo, MI
- At least one team member must attend each charrette. Event is open to the public.
- Panelists and attendees will discuss in-depth innovative and sustainable design strategies with teams and participants based on the current progress of design plans. Topics of discussion include responsible materials allocation and integration, solar panel system design, Living Building Challenge compliances, rainwater collection techniques, and many more.

National Campus Sustainability Day Reception

- Tentatively October 17
- Event will be located at the Office for Sustainability and open to the public.
- Submitted design plan(s) will be on display during the National Campus Sustainability Day Open House session.
- Current progress of the design plan will be shared at the Open House based on provided feedback from Jury Panelists. The winning team will be awarded and announced as deemed applicable by the Jury Panel and Office for Sustainability personnel.
DESIGN PLAN GUIDELINES

Teams are encouraged to explore Design Plans within a $75,000 budget. This budget imposes the challenge of simplicity and frugality. It includes construction materials, the photovoltaic system (panels, balance-of-system, etc.), the interpretive display, labor costs, and other design elements of the space. Teams are encouraged to pursue strategies to reduce the total cost of the space through team sponsorship, in-kind labor and donation of materials. Design Plans must be engineered for construction and meet Michigan building codes and regulations.

Structural Design / Materials

1. The education space must be a low-impact, multi-purpose presentation space that allows for a variety of functions such as lectures, educational activities, community events, and entertainment to be constructed from sustainable materials.
2. Teams must create a material conservation management plan (as detailed in the Living Building Challenge Conservation + Reuse imperative) that explains how the project optimizes materials in each of the following phases:
   - Design phase, including the consideration of appropriate durability in product specification
   - Construction phase, including product optimization and collection of wasted materials
   - Operation phase, including a collection plan for consumables and durables
   - End of life phase, including a plan for adaptable reuse and deconstruction
3. The space must:
   - Be a sheltered outdoor pavilion with at least two walls for presentations, educational and classroom activities, and community events that will provide protection from wind, rain, snow, sunlight and other elements during all seasons.
   - Be a nourishing, highly-productive and healthful space that will promote wellness, foster creativity, and encourage active learning for all.
   - Adhere to petal requirements for the Living Building Challenge 2.1 of the International Living Future Institute by satisfying requirements for at least Materials, Energy, Water and Beauty petals. The PV system is not required to adhere to Material petal requirements.
   - Adhere to imperative requirements for Living Building Challenge 2.1 of the International Living Future Institute 08: Civilized Environment imperative.
   - Be an architecturally acoustic space that will reduce the need for microphones and other sound amplifying devices for presentations and lectures that also minimizes road noise from Parkview Avenue and other surrounding noise pollutants.
   - Be a flexible space that allows for easy set up and tear down of removable seating, tables, and other equipment.
   - Be open or open-able to the south and east to allow for more frequent usage in harsher weather conditions. Maximum and minimum square footages that depend on convertible or moveable parts must always remain within the designated site coordinates.
   - Be, in its entirety, within a 70’ by 70’ envelope (±1%) located 70’ west of the Eastern property line and 5’ South of the building setback. The education space, PV array, bulk storage and all other components must fit in the designated envelope.
   - Meet MCL 408.30418 for occupancy levels of at least 50 people with a minimum total building footprint of 950 ft², but shall not exceed 1300 ft² (exclusive of PV array).
- Include a low-maintenance sustainable restroom solution that allows for visitor traffic of at least 50 people during events, activities, etc. Non-liquid restroom solutions must adhere to NSF/ANSI 41: Non-Liquid Systems standards; liquid restroom solutions must adhere to NSF/ANSI 350 for Water Reuse Treatment Systems.
- Include 200 ft² (±10%) for enclosed bulk storage for tables, chairs, and gardening equipment within total building footprint.
- Meet or exceed WMU Facility Life Cycle Design Guidelines.
- Meet American Recovery and Reinvestment Act (ARRA) Section 1605.
- Meet Americans with Disabilities Act (ADA) Standards for Accessible Design.

**Energy**

1. The education space must integrate a grid-tied solar photovoltaic (PV) array that will optimize on-site renewable energy generation and enhance the overall aesthetics of the space. Major PV system components include: solar panels, inverters, and mounting structure. Other balance-of-system components include wiring, combiner box, DC/AC disconnects, meters, and a secure data monitoring system. Teams must submit technical system specifications for their designed system, product datasheets, and an energy analysis.

2. The PV system must:
   - Be a highly-efficient, fully-functioning system including all balance-of-system components that will supply at least 100% of the space’s energy needs on a net annual basis.
   - Optimize annual energy production based on seasonal and regional solar irradiation and weather patterns such as sun angles, panel soiling, and winter snow accumulation.
   - Be a grid-tied 6 kW (±10%) array.
   - Be a translucent shading structure that is sealed, weatherproof, and meets static load capacity of at least 113 psf.
   - Have a secure data monitoring system linked to the sustainability exhibit to track energy production.
   - Be located in its entirety within the designated site coordinates.
   - Meet IEC 61215 (for crystalline) or IEC 61646 (for thin film), and IEC 61730.
   - Meet UL 1703 standards.

4. Teams must submit a photovoltaic energy analysis in order to effectively communicate the expected energy production and performance of their PV system. Teams must use at least one of the following models, tools, or simulations for their photovoltaic energy analysis: Autodesk Green Building Studio; eQUEST; PVWatts; or EnergyPlus Simulation Program. A list of NREL Energy Analysis Models and Tools can be found at: (http://www.nrel.gov/analysis/models_tools.html). Teams are required to supply the following PV specifications:
   - Total DC nameplate size (kW)
   - Panel type, tilt angle(s), azimuth angle(s), manufacturer, product datasheet and number of panels
   - Inverter type, product datasheet, and number of inverters
   - Mounting type (roof integrated, pole mounted, etc.), materials, and product datasheet
   - Expected annual energy production (in kWh)
**Sustainability Education**

1. The education space must be an active learning environment that communicates about innovative and traditional sustainable practices through the use of sustainability exhibits. Teams are required to integrate a Sustainability Exhibit into the structural design of the space that creatively and effectively communicates their design philosophy while also highlighting Living Building Challenge requirements.

2. The sustainability exhibit must:
   - Be a beautifully and seamlessly integrated educational exhibit that enhances the overall aesthetics of the space in the form of a physical model, interpretive display, digital installation, sculpture, or any other form-finding solution that promotes active learning for sustainability.
   - Be a thought-provoking but easy-to-understand exhibit that caters to a diverse group of visitors such as community members, tourists, professionals, and elementary-level to higher education students.
   - Highlight key sustainable design features of the space using visual diagrams with vignette descriptions that communicate: what the design feature is; where it is located at the space; and how it is designed for function and use. Teams are required to place plaques at the location of each design feature that explains its function and use.
   - Highlight each Living Building Challenge petal and imperative effort using visual diagrams with vignette descriptions that communicate: the petal or imperative requirement; where it is located at the space; and how it is designed for function and use. Required petal and imperative efforts include: Materials, Energy, Water and Beauty petals; and Civilized Environment imperative.
   - Highlight the on-site photovoltaic energy system using schematic diagrams with vignette descriptions that communicate: what the major components of the system are; where the components are located; how the overall system is designed for function and use; and the importance of renewable energy generation. Required components of the exhibit include: panels and their type, orientation and tilt; inverters and their type; mounting structure and its multi-functions; meters and their functions; and the web-interfaced data monitoring system.
   - Adhere to Living Building Challenge Materials petal requirements.
   - Meet Americans with Disabilities (ADA) Standards for Accessible Signage Design Section 4.30.

**SCALE JUMPING**

The Scale Jumping component is to provide inventive and relevant solutions beyond the Gibbs House Design Challenge project framework. Teams are encouraged to explore novel and highly innovative sustainable ideas for the education space that are not included in the Design Plan Requirements and may not be achievable under current limits of cost. This allows teams to explore their own far-reaching innovations in an attempt to make them a reality by developing a realistic plan of action through keen resource allocation or potential future funding. Scale Jumping efforts may be considered for possible extra points toward an overall score.

**RESOURCES**

All design challenge inquires and issues must be directed to Kelsey Pitschel, Design Challenge Coordinator, via email. Design challenge coordinator email: (kelsey.m.pitschel@wmich.edu).
BACKGROUND INFORMATION

The Gibbs House Education Space Design Challenge was informed by the following projects and sources. These projects and sources acted as guides for the development of a successful design challenge.

**Biomimicry 3.8 Institute**  
2013 – 2014 Biomimicry Student Design Challenge

**International Living Future Institute**  
Living Building Challenge

**Living Building Challenge Collaborative: Chicago**  
Eli Whitney School Annex Design Competition

**United States Department of Energy**  
Solar Decathlon 2013

**United States Green Building Council**  
2013 North Carolina Natural Talent Design Competition

**The Wege Foundation**  
2013 – 2014 Wege Prize

**WMU Facilities Management**  
www.fm.wmich.edu

DESIGN RESOURCES


**American Recovery and Reinvestment Act (ARRA)**  
ARRA Section 1605  

**Americans with Disabilities (ADA)**  
ADA Standards for Accessible Design  
Accessibility Guidelines for Buildings and Facilities Section 4.30  
Quick Reference Guide to ADA Signage

**Forest Stewardship Council**  
FSC Principles and Criteria for Forest Stewardship  
FSC Labeling Authentication  
FSC Public Certificate Holder Search

**Health Product Declaration Collaborative**  
Health Product Declaration Standard 1.0  
Declare Product Declaration Form
International Electrotechnical Commission
Basic Understanding of IEC Standard Testing for Photovoltaic Panels
UL 61215 Scope
UL 61646 Scope

International Living Future Institute
Living Building Challenge 2.1

Michigan Building Code
IBC 2009
Michigan Building Code Part 4 – MCL 408.30418

National Renewable Energy Laboratory
Energy Analysis Models and Tools

National Science Foundation / American National Standards Institute
NSF/ANSI Standard 250 Overview
NSF/ANSI Standard 41

Underwriters Laboratories
UL 1703 Scope

U.S. Environmental Protection Agency
EPA Construction General Permit 2008
NPDES Construction Storm Water Program: Rule 2190 of Part 21 of Act 451

U.S. Green Building Council
LEED Green Building Rating System New Construction and Major Renovations 2009

Western Michigan University
WMU Facility Life Cycle Design Guidelines 2011
WMU Intellectual Property Policy