

CU Solar Decathlon 2007 Conceptual Design Competition

March 14, 2006



The Solar Decathlon is an international collegiate competition. Student teams compete to design, build, and operate highly energy-efficient, completely solar-powered houses that incorporate building integrated photovoltaics (BIPV).

The purpose of this design competition is to provide an opportunity to all students of the University of Colorado to make a contribution to the University's submission for the 2007 Solar Decathlon Competition, which is sponsored by the U. S. Department of Energy (DOE), managed by the National Renewable Energy Laboratory (NREL), and held in Washington, D.C. in October of 2007. (For more information, visit the website <http://www.solardecathlon.org>.) Participants in this competition need not necessarily have thorough knowledge of the architectural design process, standards, or solar energy systems to submit an entry. This is a concept-driven competition that will hopefully yield good design ideas for the initial design of the team's official entry. It is mainly a preliminary call for ideas to help the burgeoning 2007 team get started with a well-surveyed perspective from the student body, and to ensure that the entire CU system, including Boulder, Colorado Springs and Denver, has ample opportunity to contribute and be involved in the project.

A large emphasis of the Solar Decathlon's categorical point rating system is to assess the ability of the respective schools' submission to showcase their conceptual ideas, architectural designs, and solar power technologies in an intelligible and compelling manner. In addition to the great amount of promotion, research and development this nationwide competition contributes to the design and engineering industries, it is a successful educational event that extols the virtues of sustainability to the American public. This unique quality makes the Decathlon challenge universities to not only design and build an energy self-sufficient home well, but to also successfully brand and markets its features.

The fact that the National Mall in Washington, D.C. is over 1300 miles away, makes for a another factor of originality. Not only do the homes need to be constructed days before the competition, they need to be transported. As a consequence, transportation has proven to be a major constraint on structural design and induces an extra level of variation in design, from to team to team.

Standard transportation methods of America's manufactured home production industry are the most common techniques utilized to get the houses to D.C. These methods result in designs ranging from single chassis mobile homes to modular homes carried on flatbed trucks, to partition-based wall systems that are put into place upon arrival.

All entries in this preliminary design competition should clearly demonstrate the ideas, themes, and designs for each of the following Categories:

- Architectural Design
- Construction Methods and Materials
- Integrated Solar and Alternative Technologies
- Transportation
- Ways the design could transform the Production Home Industry

Mission Statement and Design Goals

The new CU Solar Decathlon 2007 team has created the following mission statement to help inform initial theory and values it holds:

“Preserving the beauty of the American West by uniting new technologies and time-tested natural systems to transform the production home market.”

Architectural Program

Solar Decathlon entries are generally mobile and/or modular designs that do not exceed the contest’s 800 sq. ft. maximum footprint. Historically, their Architectural programs are commonly based on small, single bedroom dwellings, resulting in a small amount of inhabitable square footage coupled with oversized, competition-oriented systems. This year CU’s 2007 team is entertaining the possibility of a larger, family-sized home that presents a more realistic example of good solar home design to the general public.

Hence, participants of this contest face the challenge of designing a full-size home with a detachable “competition module” that can be transported to Washington, D.C. This unique idea is an attempt to broaden the scope of the Solar Decathlon Competition’s archetypical array of entries to include larger home designs that meet the needs of a more typical American homeowner. The 2007 Team would like to gather ideas for the possibility of designing and building a home to place within a suburban neighborhood, yet no client has defined any specific design needs or aesthetic desires. Being a conceptual design contest, the entries, will ultimately be gauged on how well the home is resolved architecturally, both as a portable, competition unit, and as an integrated, complete home.

A 1500 sq. ft. min. to 2200 sq. ft. max design should include:

- Kitchen
- Living/Dining
- Office
- Bedroom(s)
- Bathroom(s)
- Mechanical Room.
- Storage
- Decks
- Garage (optional)
- Laundry (optional)_

Competition Module Program

Detachable from the larger structure, the Competition Module should include essential Solar Decathlon elements. Maximum finished floor area should be 700 ft² and the maximum height should be 18 ft. The front of the house and solar panels must face south. Please include an attractive, formal entrance placed somewhere on the southern side or half of the module, as the site dictates. This also means the decks need to be placed here as well as on the North side. The front and rear deck will need to be appropriate for partially accommodating large lines, landscaping, and educational devices or stations. These can be designed for varying configurations, whether for the competition or upon final destination. The design must also meet American with Disabilities Act requirements (3' doors and passages, ramp with maximum slope of 1:12).

The recommended program for this separate module is the following:

- Kitchen
- 1 Bath
- 1 Bedroom
- Living area
- Office, possibly integrated into bedroom or living area
- Some Storage
- Decks

Lot 111 has been designated at the National Mall in Washington, D.C. for the CU house. It will face a walking thoroughfare to the south and most likely be on a corner. See aerial photo and lot dimensions below.

The house must also fit into a solar envelope to prevent shading of other homes. See Figure 1. Units are feet.

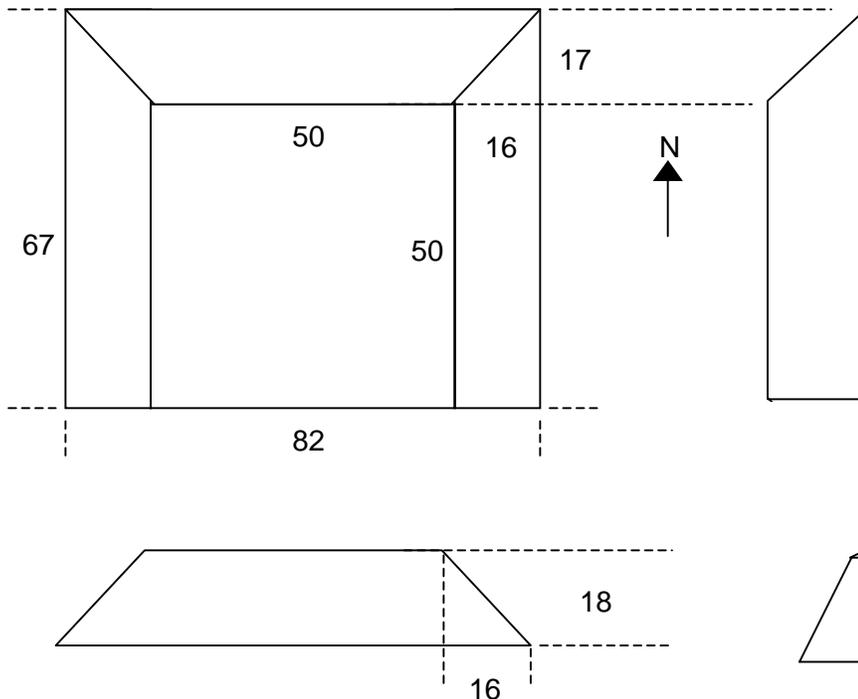


Figure 1: Solar Envelope and Lot Dimensions (ft)



Figure 2: Aerial Photo of 2005 Competition (lot numbers same for 2005)

Design Guidelines

1. **Aesthetic Integration of PV and Solar Thermal**
Solar energy systems must be integrated into the architecture.
2. **Incorporate Passive Heating and Cooling**
Consider passive solar heating, natural ventilation, summer shading.
3. **Include Daylighting**
Lighting is alone is one of the ten contests.
4. **Thermal Storage/Massing**
Remember we have to take this thing across the country.
5. **Transportability**
Your design should take into account the long trip to and back from Washington, D.C. and your text should describe a basic transportation plan. Hint: 13' 6 is the average height for overpasses, but the competition stipulates 18' maximum ridge height.

6. Water Recycling/ Rainwater Collection

Water conservation is important in the West – you are encouraged to address it.

7. Outdoor Living Spaces...deck, patio

Outdoor living spaces should be integrated into the design. Consider decking or patios on the front (south) of the house to accommodate tours.

8. Innovative Aesthetic Qualities

The contests of Architecture and Dwelling make up a large portion of the subjective judging (up to 300 points). Thus, standard residential architecture just doesn't get noticed by the Architectural Jury. We are looking for good design, with sound reasoning.

2005 Decathlon Categories

The Decathlon 's actual categories are adjusted yearly, but general knowledge of the Decathlon's Categories are critical to any design . The 2005 competition categories can be found at

http://www.eere.energy.gov/solar_decathlon/contests_scoring.html

Codes and Regulations

Ultimately the home design will be subjected to standard building code review before and after construction is completed. If questions should arise concerning codes, please see the:

- IECC 2004 and
- IRC 2003
- Rules and Regs of the 2005 Solar Decathlon,
http://www.eere.energy.gov/solar_decathlon/rules_regs.html

Contest Rules

Eligibility

The competition is open to any CU student or team of students except members of the jury. All entrants will remain anonymous so entries will be judged equally. Each entry must be registered separately. Teamwork with designers from different disciplines is encouraged, but not required.

Submission Requirements

Entries must be submitted to the following address with a postmark no later than April 7, 2006 by 5 PM. All entries must include a signed registration form available at the end of this document. No late submissions will be accepted.

Although pre-registration is not required, please notify the team at the following email address to confirm your intention to enter. CU07SolarContest@yahoogroups.com

Deliver or mail entries to:

Department of Civil, Environmental, and Architectural Engineering
c/o CU Solar Decathlon 2007
Engineering Center ECOT 441, UCB 428
Boulder, CO 80309

Anonymity

Jurors will not be informed of any entrant's identity. Submission presentations should include no name or other information that could lead to identification of the entrant. Contest coordinators will assign a number to each entrant which the jurors will use to identify the submission.

Submission Requirements

All submissions should include the following:

1. 32" x 40" sturdy board poster displaying the project in landscape format no more than ½" thick. The poster should include the following items:
 - Site plan
 - 3-D rendering or sketch of structure
 - Elevations
 - Floor plan
 - Text descriptions of pertinent concepts
2. A CD with digital copies of the poster and text descriptions. All graphics including the poster should be a minimum of 150 dpi and a maximum of 300 dpi.
3. Completed Registration Form (last page)

As stated in the above section, to maintain entrant anonymity no presentation material should include the name of the entrant or information that may lead to the identification of the entrant.

Presentation material should also not include any information regarding the professional or academic experience of the entrant. Submissions will be judged on design ideas only and any other information will be deleted before submissions are presented to judges.

Questions and Answers

To maintain an environment of fairness, selected questions and answers will be made available to all entrants who sign on to the CU Solar Decathlon Conceptual Design Competition Yahoo Group. All entrants and interested parties are encouraged to join the Yahoo Group located at:

<http://groups.yahoo.com/group/CU07SolarContest>

Members of the CU Solar Decathlon Team will answer questions from entrants during the competition on a selective basis. All questions must be submitted via email to CU07SolarContest@yahoogroups.com.

No answers will be sent exclusively to entrants unless the question is determined to be solely regarding an entrant's individual submission.

Although pre-registration is not required, please notify the team at the above email address to confirm your intention to enter.

Rights

The CU Solar Decathlon Team plans to exhibit up to 20 submission presentations following the jury competition. All entrants will be notified of the exhibition.

Upon submission of presentations, entrants grant The CU Solar Decathlon Team unrestricted license to exercise entrant's rights to the submission including, but not limited to, reproduction, preparation of derivative works and distribution of copies of the submission presentations, and the right to authorize such use by others.

Return of Entries

Submissions will not be returned to entrants. The CU Solar Decathlon Team will retain ownership of all prize-winning submissions. Any intellectual property of the submissions will become the property of the team, however ALL ENTRANTS are encouraged to participate in the design development, regardless of chosen designs aspects.

Awards

A jury of four to seven judges will select first, second and third prize-winning entrants shortly after the contest deadline. Jury voting procedure will prevent any ties for occurring. Award notification will be made confidentially to each winner.

The following prizes will be awarded to winners:

- First Prize: \$500 & announcement at awards ceremony
- Second, Third Prizes: Announcement at awards ceremony

Several contestants may also receive the prize of honorable mention with announcements at the awards ceremony.

Registration Form

First Name

Last Name

Organization or Team Name (if any)

Street Address

City

State

Zip

Phone

Fax

Email

I have read the contest rules for the CU Solar Decathlon 2007 Conceptual Design Competition and agree to all conditions stated therein.

Signature

Date

Submission Deadline

Friday, April 7, 2006, 5 PM.

No late submissions will be accepted.

Deliver or mail entries to

Department of Civil, Environmental, and Architectural Engineering
c/o CU Solar Decathlon 2007
Engineering Center ECOT 441, UCB 428
Boulder, CO 80309