LIVING, LEARNING, BUILDING AND SHARING (ONE PETAL AT A TIME)

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01 ACTIVE SYSTEM

sip infill
provide a more airtight dwelling

mechanical center
houses mechanical equipment

SEER 30-GHP
2 Ton

50/80 Gallon Tank
Water Heater
Desuper Heater

Floor Slab
Radiant Slab

200'-250' (1 well only)

duct and pipe runs
branch from central core minimized

ground coupling
uses geothermal heat pump

02 BEAUTY & SPIRIT

rhythm

green roof

green house

stone
IT WAS DETERMINED, THROUGH MANY OF THE INITIAL SCHEMES, THAT THE BUILDING SHOULD TAKE ADVANTAGE OF THE EXISTING GRADE TO INTEGRATE THE NATURAL INSULATIVE PROPERTIES OF THE SOIL.

The Tanax (earth) House was the design submission of the Southern Polytechnic State University (www.spsu.edu/architecture) third year architecture class for the 2011 Living Aleutian Home Design Competition. The entry was the result of a focused, semester-long, lab exercise that integrated the competition requirements, and Living Building ChallengeTM guidelines, into the learning objectives of a required course in the SPSU academic curriculum.

The following documentation summarizes the process through which lab assignments were replaced with the competition priorities set forth by the International Living Future InstituteTM. Students found opportunities for learning outside of textbook-based instruction and provide this summation of their work as a resource for educators and students seeking similar results on their campuses.

Within the Architectural curriculum of SPSU, the Environmental Technology II lecture course introduces students to the integration of systems, emerging sustainable technologies, and the development of environmentally conscientious designs that are responsive to their surroundings. To achieve the applied learning objectives of this course, Assistant Professor and Environmental Technologies coordinator Ed Akins presented the Living Aleutian Home Design Competition to the class as a format for the lab portion of course instruction.

After discussing the competition requirements, the class agreed that this competition would be the perfect opportunity to work on a project that can potentially be recognized both nationally and internationally. There was a real appeal to designing something that was going to be more than just a hypothetical course assignment. In the students’ excitement and enthusiasm, they did not realize how much of a challenge this project would soon become, but eagerly set about the tasks of applying lecture content to the completion of tasks.

To begin, the entire class was divided into groups (with two to three students each) and asked to create original designs for the competition. After two more sessions of narrowing down ideas and consolidating groups, the class collectively decided on one final design that best expressed their ideas. With the support of their enthusiastic coordinator, they were able to come up with a design that had truly proven to be beyond anything they had accomplished in their design studios or that they would have individually accomplished within that time frame.

Driven by the local climate, culture, and guidelines given by the Institute, their main design priority was to provide energy efficient protection from the environment, while incorporating traditional home design elements. It was determined, through many of the initial schemes, that the building should take advantage of the existing grade to incorporate the natural insulative properties of the soil. Furthermore, the design incorporated an attached greenhouse, which would serve as a sunspace and give added interior insulation value, while providing an open view to the bay. Because the students’ initial design concept was to burrow the home, they decided to appropriately name their project after the Inuit word tanax (pronounced ta-nya), which comes from the Aleutian word for “earth.”
“GIVEN THE SITE CONDITIONS, THE MOST CHALLENGING IMPERATIVE WOULD HAVE TO BE NET-ZERO ENERGY, BECAUSE IT IS THE UNDERLYING THEME OF ALMOST ALL THE IMPERATIVES.”
During the design process, a group of students took the time to interview their peers and get their opinions about the Challenge and the competition entry. This effort raised awareness for the entire class and helped to prioritize the tasks ahead. “Given the site conditions, the most challenging imperative would have to be Net-Zero Energy, because it is the underlying theme of almost all the imperatives,” said Drew Bell, one of the student participants. The collection of water and solar energy and the transportation and provision of materials within the given climatic conditions of Alaska were among the other challenges that students highlighted as major design opportunities within the project. The research process the students went through to develop the shape of their building was very beneficial toward fabricating a sustainable design solution. Another student, Jessika Nelson, stated that “with regard to cost and construction, the most challenging guideline to achieve was finding products that did not use harmful substances within the specified distances from Atka.”

For many of the students, this lab was their first exposure to the goals set forth by the Challenge and the consideration of real-world constraints on design development. Utilizing case study projects and systems research, they were able to investigate how contemporary and vernacular ecological building designs implemented energy efficient design techniques. The project also supported the lecture portion of the class because it provided goals, case studies, and real world application of the concepts discussed in the course material. “The competition integrated well with our Environmental Technology lecture course because we learned about passive solar, zero energy, water control, and many other aspects that tie in directly with this project. This is beneficial because we are not just learning from a text but applying what we have learned into a project,” said students Tyler Vernon and CJ Chang.

Essentially, the class operated in specialty groups throughout the semester. Commonly used among real
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World collaborative design, this working structure required students to rely upon each other to accomplish their design objectives and integrate them with the work of their classmates. Performing tasks in smaller groups as experts on their assigned subjects proved to be beneficial and allowed many students with the opportunity to gain leadership skills.

The class group structure was organized as follows:

- **Living Building Challenge Experts**
  - Review all design developments for adherence and opportunities based upon the imperatives list
- **File Managers**
  - File organization and review;
  - proof-reading all documents; and,
  - file size management and requirements management
- **Narrative**
  - Work closely with design group and construction cost group to clearly define the approach and features of the design and to capture their data into a concise narrative of scope and operations
- **Construction Cost Analysis**
  - Provide side by side comparison with conventional construction
- **Systems Diagrams**
  - Research and conduct energy modelling of the proposed design and recommend changes that will benefit performance within the goals of the Challenge;
  - provide in depth calculations for water and energy; and
  - produce annotated diagrams
- **Design Drawings**
  - Provide necessary drawings and renderings for the completion of the project
For student awareness of their ability to significantly reduce fossil fuel consumption of buildings, through design, was dramatically increased during the semester and many felt more empowered to integrate these ideas beyond the assigned competition.

The teams were asked to report on their progress and to “cross-pollinate” with other groups so that work was not replicated and lessons learned were shared within each associated discipline.

Throughout this project, the students learned that working collaboratively on a single project required clear communication, scheduling, motivation and discipline. As challenging as the project was, they realized that when all the goals were achieved and when everyone pulled their own weight, the detail and precision that they accomplished in the design was indeed very rewarding. They felt that they had a very strong entry into the competition and were all very proud of what they achieved during the semester. This project, although not selected as a winner for the competition, was a great opportunity for the students to have a realistic experience of what architectural practice will bring after graduation and of what will be required of them in response to growing environmental concerns.

Understanding the effort and details that go into a full competition entry versus what they typically present for studio projects was definitely a humbling and educational experience, but one that was accomplished with enthusiasm and resulted in unexpected learning opportunities.

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Overall, it was found that the application of lecture topics to this competition raised awareness of student participants regarding their role in creating work that will be “educationally and environmentally beneficial to our society.” One student, Inga Schroder, summarized the experience by stating that “the Challenge guidelines pick up important features, which should be included in every design to help the environment.” It is this level of awareness that clearly supports the integration of practice into academic curriculum and, in doing so, contributes to the preparedness of our students to become leaders in the responsible evolution of our built environment.

**STUDENT TEAM**

**FACULTY:**

Ed Akins - Team Leader / Course Instructor (Architecture) / Article

Dr. Hussein Abaza - Consultant / Energy calculations (Construction Management)

**LBC EXPERTS:**

Drew Bell, Jessi Pickelsimer, Marvin Toure, Sonya Tejada, Stanley Jacques
FILE MANAGERS / NARRATIVE:
Kristin Tolentino, Stephen Sandberg, Eric Moritz, Andres Valencia, Yen Nguyen, Vicky Chavez

CONSTRUCTION COSTS:
Jessika Nelson, Garrett Womble, Tyler Vernon, Patricija Pericic, Johnathan Greenage

SYSTEMS:
Agnes Dang, Inga Schröder, CJ Chang, Andrienne Francis

DESIGN DOCUMENTS:
Brad Wicka, Dan Deckert, Enrique Sanchez, Stephen Cook, Neal Pratt

From left: Professor Ed Akins, Jonathan Greenage, Andrienne Francis, Marvin Toure, Patricija Pericic, Kristin Tolentino, Tyler Vernon, Drew Bell, Inga Shroeder, CJ Chang, Stephen Sandberg, Jessika Nelson, Stephen Cook, Yen Nguyen, Dan Deckert, Vicky Chavez, Sonya Tejada, Brad Wicka (from left, above) Stanley Jacques, Neal Pratt, Andres Valencia, Agnes Dang, Jessi Pickelsimer, Eric Moritz