AND EXAMPLE OF HOW TO DESIGN BUILDINGS WITH A GROUP OF STUDENTS (INTERDISCIPLINARY MAJORS ACROSS CAMPUS)

USING A COMMON CLASS

Instructor: Otie Kilmer, architect/professor

TEAM PURDUE

Purdue University
CLASS: AD 59000
SOLAR DECATHLON DESIGN
Instructor: Otie Kilmer, architect/professor

CONCEPTUAL DESIGN MODEL
Spring 2010

TEAM PURDUE

Purdue University
PURDUE MADE THE FIRST ROUND OF COMPETITION FOR THE 2011 SOLAR DECATHLON.

WE THEN DID A “CONCEPT” PRESENTATION FOR THE 2ND ROUND.

THE FINAL 20 UNIVERSITIES WERE SELECTED FROM THIS CONTEST

IT WAS A 2 YEAR PROJECT, WITH THE HOUSE DISPLAYED ON THE WASHINGTON MALL IN OCTOBER, 2011
STUDENTS ENROLLED IN AD 590000
SOLAR DECATHLON DESIGN

INTERDISCIPLINARY TEAM ACROSS CAMPUS (15 students)
• Mechanical Engineering Technology
• Building Construction Management
• Computer Graphics Technology
• Civil Engineering
• Visual & Performing Arts
• Landscape Architecture

Otie Kilmer
Purdue University
• **THE CLASS SCHEDULE WAS SET FOR A COMMON 3 HOUR MEETING TWICE A WEEK = 3 CREDITS**

• **NOTE WE ONLY HAD 8 WEEKS TO DESIGN OUR HOUSE AND PUT OUR PRESENTATION TOGETHER**
MODULAR & TRANSPORTING

• KEEP WIDTH TO A MINIMUM SIZE
• STRIVE FOR SIMILAR SIZED MODULES
• KEEP HEIGHT AS LOW AS POSSIBLE

Shipping and maximum solar envelope allowed on Washington Mall

We looked at 12 FT. WIDE x 30 FT. LONG MAX.
FUNCTION
THE PLAN

• MAXIMUM 1,000 SQ. FT.
• MINIMIZE CIRCULATION SPACE
• PROVIDE FOR DIFFERENT USERS & THEIR NEEDS
• SHARE SPACES & FUNCTIONS WHERE POSSIBLE
• PROVIDE FLEXIBILITY & PRIVACY
MARKET & COST

• DESIGN A HOUSE THAT SUITS THE MIDWEST STYLE & WHAT PEOPLE COULD SEE THEMSELVES LIVING IN

• LIMIT PLAN TO ONE FULL BATH
  (ADDITIONAL ½ BATH ADDS TO COST)

• PROVIDE AN OFFICE “FLEX SPACE”, NOT A DEDICATED BEDROOM
THE CLASS WAS ASSIGNED A NUMBER OF RESEARCH PROJECTS DURING THE SEMESTER - RELATING TO SOLAR HOMES AND HOME DESIGN

RESEARCH PROJECT #1 - PAST SOLAR DECATHLON WINNERS

1. Investigate the past entries in the 2009, 2007, 2005, & 2002 Solar Decathlon contests - using the DOE website. Follow the below page layout of the 2009 entries, and make new page layouts for competitions of 07, 05, and 02. Include the overall rankings, and place those in order of ranking, showing the image of each house, and highlighting the name of the house (if any), and other particulars that set this design apart from the others. Note that the 2009 contest summary below is not finished, nor put in proper order of winners. One team needs to finish out this 2009 presentation & put in order.

2. Prepare a PowerPoint Presentation of the top 4 winners for each year, using the DOE website to show us a summary of the project. Include DOE’s individual team score bar chart (on the website) showing the team’s house score on Net Metering, Architecture, Market Viability, Engineering, etc. Include pictures and features of the project. Look at the team’s website folders and open up the floor plans, at least 2 elevations, and 2 building sections. Copy these drawings, trim, and drop into your PowerPoint - that can then be shared by all of us. Try to keep your file size small, as other teams will be copying your materials - in order that we all have a record of past competitions.
WE DISCUSSED THE DESIGN PROCESS STAGES
WE LOOKED AT THE MAJOR ZONES OF A RESIDENCE WITH BUBBLE/ZONING DIAGRAMS

ZONES

BUBBLES WITHIN ZONES
AD 5900000

The class was divided into 4 teams to do preliminary designs
WE TOOK 4 WEEKS TO DESIGN THE HOUSE AND EACH TEAM PRESENTED THEIR DESIGN IDEAS
I LOOKED AT ALL THE TEAM IDEAS AND HELPED THEM SYNTHESIZE THEIR THINKING INTO ONE DESIGN MODEL
Team RAD

HAD GOOD UTILITY & BATH MODULE
TOOK BATH COMPARTMENTALIZATION FROM TEAMS AWESOME & RAD

TEAM AWESOME

TEAM RAD plan #2
TOKK “TEAM AWESOME” U-SHAPED KITCHEN

• OPENED UP THE WORK TRIANGLE
• MORE COUNTER SPACE ADJACENT TO MAJOR PREP AREAS
• ADD PANTRY
• ADD COUNTER/STOOLS FROM “TEAM RAD”

BUT, THIS NEW KITCHEN COULD BE SMALLER, LESS COUNTER, CABINETS
BLENDED THE TWO TEAM IDEAS TOGETHER

REFINED THEIR UTILITY & BATH MODULE

TEAM RAD’S 2 PLAN

• COMPARTMENTALIZED BATH’G
• FURNACE & WATER HEATER BEHIND DOORS
INCORPORATED PRIVATE ENTRY
FROM CARRIE, HILLARY, ROMAN

INCORPORATED BIOFILTRATION PER KEVIN & OTHERS
TOOK THE GREAT ROOM CONCEPT (DINING/LIVING) FROM ALL TEAMS

R. Loetscher, C. Nispel, H. Fulton

TEAM AWESOME

TEAM RAD
WE BROKE DOWN THE RESIDENTIAL ZONES INTO 12 FT. MODULES – FOR TRANSPORTING
OUR 1ST CONCEPTUAL MODEL - 992 SQ. FT.

- Master Bedroom (Queen Size)
- Bedroom
- Kitchen
- Dining Area
- Living Area
- Optional Garage
- Deck
- Utility Area
- Snow Wall
- Deck
- Entry
WHERE DO WE GO FROM HERE?
• REFINE OUR IDEAS
  • BREAK THE HOUSE DOWN INTO COMPONENTS
  • BRING TOGETHER INTO A WHOLE

• INSTILL FEEDBACK LOOP
  • RE-VISIT OUR INITIAL CONCEPTS & STATEMENTS
  • ARE WE DOING WHAT WE SAID WE WOULD DO?

• PREPARE FOR PRESENTATION

PACKAGE TO Dept. Of Energy
  • DO A MOCKUP OF ALL PARTS
LOOK AT DOE’S EVALUATION & SELECTION PROCESS

• 25% Conceptual Design—The proposal demonstrates a net-zero energy house design at the conceptual design stage.

• The conceptual design communicates ideas, character, and forms of an architectural design including aesthetics, building envelope, and solar components.

• The design offers a sense of inspiration and delight. The design demonstrates a potential to benefit professional home builders.
OKAY, LET’S LOOK AT THE 13 AREAS FOR US TO WORK ON FOR OUR ENTRY

1. FINALIZE THE FLOOR PLAN
2. DEVELOP BUILDING SECTIONS
3. ENERGY CONSERVATION & PASSIVE SOLAR
4. HVAC AND ANTICIPATED DESIGN LOADS
5. SOLAR/PHOTOVOLTAIC ARRAYS
6. BIOFILTRATION (BIOWALL) & ROOF GARDEN
7. EXTERIOR DECK DESIGN
8. TRANSPORTATION LIMITS (WIDTHS, HEIGHTS, LENGTHS)
9. 3D COMPUTER MODELING
10. ROUGH CARDBOARD MODEL @ ¼” SCALE – THEN BUILDFINAL MODEL
11. BUDGET ANALYSIS
12. 500 WORD NARRATIVE OF OUR PROJECT
13. PRESENTATION BOARD
FINALIZE THE FLOOR PLAN

• DEVELOP WITH ROOMS, DOORS, FURNITURE, ADJACENT DECK/FEATURES, OVERALL DIMENSIONS
• EXPLORE OPTIONS THAT WILL GIVE US MORE POINTS ON MARKETABILITY & “BUILDABILITY”
1. FINALIZE THE FLOOR PLAN

• ERIC HOLT OF BCM - REARRANGED THE MODULES TO THE CONFIGURATION THAT THE TEAM AGREED WAS THE BEST ARRANGEMENT
2. BUILDING SECTIONS

- DEVELOP BASIC SHAPES AND FEATURES
- LOOK AT SOLAR SHADING & PENETRATION

- Remember, our roof slopes should incorporate ideal slopes for photovoltaic panels
- But maximum solar envelope permitted is only 18 ft. high
3. ENERGY CONSERVATION & PASSIVE SOLAR

• LOOK INTO HEAT GAIN/LOSS & MATERIALS
  • RUN COMPUTER ANALYSIS OF THESE

• DEVELOP PASSIVE SOLAR TECHNIQUES
  • WITH OTHERS WHO ARE WORKING ON PLAN & BUILDING SECTIONS
4. HVAC AND ANTICIPATED DESIGN LOADS

- SPELL OUT PARTICULARS
- DEVELOP GRAPHICS FOR SIMPLE EXPLANATIONS
5. SOLAR/PHOTOVOLTAIC ARRAYS

• APPROXIMATE SIZES
• IDEAL ROOF SLOPES
• FEATURES OF THE SYSTEMS
6. BIOFILTRATION

• DEVELOP BASIC CONCEPTS
• PUT INTO GRAPHICAL IMAGES FOR EXPLANATION
7. DESIGN AN EXTERIOR DECK & PLANTING

• RELATE TO INTERIOR SPACES & VIEWS
• DON’T TRY TO DESIGN THE WHOLE SITE PLAN
• MAYBE NOT INCLUDE THE PUBLIC RAMP AT THIS TIME (UNLESS WE SEE AN OBVIOUS SOLUTION)
8. TRANSPORTATION LIMITS (WIDTHS, HEIGHTS, LENGTHS)

• THINK ABOUT HOW WE CAN BUILD, DISMANTLE, & SHIP OUR HOME

• FIND OUT MAXIMUM ALLOWABLE FOR STATES ALONG OUR ROUTE TO DISPLAY AT WASHINGTON
9. BUILD A ROUGH MODEL

• BUILD AT ¼” SCALE – TO SEE WHAT FINAL WILL LOOK LIKE
• MAKE ALL WHITE CARDBOARD
10. EVENTUALLY BUILD A CONCEPT MODEL

• BUILD AT ¼” SCALE – TO SEE WHAT FINAL WILL LOOK LIKE

Content Requirements: The scale model shall include the primary dwelling structure and any accessory structures required to convey the conceptual design intent.

Format Requirements:

• The required scale of the model is no smaller than 1:50, and no larger than 1:48. Each team’s model should clearly state what scale was used to build the model.
11. BUDGET ANALYSIS

• WORK WITH TEAM ON FINAL DESIGN SELECTIONS
• DEVELOP BUDGET FOR MAXIMUM POINTS PER DOE

• PRESENT IN GRAPHICAL FORM
12. DEVELOP 500 WORD DESCRIPTION OF OUR PROJECT

•DOE REQUIREMENTS:

Display Board Presentation

Content Requirements: The display board shall include graphics, e.g., sketches, drawings, diagrams, etc., and a one-page 500-word maximum narrative summarizing the most important elements of the conceptual design solution.

11. Besides the one page description of the project, are we allowed to include additional text on the presentation boards? If so, is there any limitation to the amount of text included?

There is no stated limit, but we encourage you to limit additional text to labels and very brief descriptions of specific design features.
13. DEVELOP THE PRESENTATION BOARD

• ONE OR TWO PEOPLE WITH EXPERTISE IN VARIOUS SOFTWARE

• START MOCKING UP THE LAYOUT

• ALLOW FOR INPUT FROM OTHER TEAM MEMBERS

- The display board content, including the one-page narrative, shall be drawn directly on or mounted with secure adhesive to one 36 in. (91 cm) maximum tall by 48 in. (122 cm) maximum wide triptych display board that stands independently on a tabletop.

- The display board shall be made of foam core with a maximum thickness of 0.5 in. (1.3 cm). Display boards made of other materials, such as wood, metal, or glass, will be disqualified.
PURDUE’S “CONCEPTUAL DESIGN”

we were limited to a 36” high x 48” wide presentation board

and a 1/4” scaled model
THIS IS PURDUE’S “CONCEPTUAL DESIGN”

MAILED TO THE D.O.E. FOR MARCH JUDGING
A Single Home can have a major impact on modern residential construction, triggering a ripple effect of positive developments in the Midwestern United States. The flex/home takes a realistic, balanced approach to net-zero housing that is likely to have broad appeal. It will be displayed at numerous events and venues and finally placed in a residential community, reaching the masses and changing community-wide views about sustainable housing.

Functional and Efficient
The flex/home makes use of proven, traditional methods to achieve a net-zero structure, harnessing natural thermodynamic and solar phenomena to reduce energy demand. Natural air currents will be used to efficiently move air around the house. Passive solar heating will be maximized in the winter by clerestory windows and blocked during the summer by roof overhangs. The flex/home will function as a holistic, integrated entity that is in harmony with itself and its environment. It will have air and water heat recovery systems to reuse energy that is wasted by typical homes. Heat pumps will provide heating, cooling, and domestic hot water. The photovoltaic array, air comfort levels, and advanced efficiency solutions, such as activating the ecosystem and ensuring recovery ventilator, will be automated and adjustable via an internet or cell phone.

Flexible and Universal
The flex/home is envisioned as a flexible environment that allows for multiple arrangements of the interior spaces. Designed for a variety of family sizes and ages, this home is adaptable as residential families grow in size and age. Depending on the needs of the residents, additional bedrooms, bathrooms, and private spaces can easily be added to the floor plan. The flexibility of the design ensures its marketability in a competitive market.

As far as aesthetic design considerations, daylighting patterns will enhance the multi-layer blend of natural and artificial light to illuminate the home dynamically. The use of open spaces and universal design principles will create a comfortable, accessible, and engaging environment for all residents. Another design aspect of the home will be its high ceilings and multifaceted spaces that make use of volume, not just area, to stimulate the senses.

Feasible and Visionary
With a moderate budget, the flex/home is an appealing option for homeowners from all walks of life. And throughout the life of the home, residents will reap huge savings in energy expenses. The house is designed to provide a significant return on investment for the buyer.

Using many standard design elements and construction practices, the flex/home is also an attractive option for homebuilders, who require buildable designs that are sustainable. In addition, the design of the house will be of interest to administrators of building efficiency standards and legislators who want to promote a greener future. The flex/home's broad appeal and visionary features make it a small home that is sure to have a big impact.
Southeast View - Modeled in Sketchup

Lisa vanZee
Southwest View - Modeled in Sketchup
AFTER PURDUE GOT INTO THE TOP 20 SCHOOL ENTRYS:

• CONSTRUCTION DRAWING PHASE - Fall 2010
• CONSTRUCTION – Spring 2011
• TESTING – Summer 2011
• SHIP TO WASHINGTON
• COMPETITION – Oct 2011
STUDY GRAPHICS AND MODELS FOR SUSTAINABLE DESIGN

Lisa VanZee
Purdue University
DAYLIGHTING STUDIES
SHADING STUDY
for PV array shading analysis
SUMMER

INTERIOR LIGHTING STUDIES

WINTER
PURDUE SOLAR DECATHLON

2011 AD: West Lafayette, Indiana

West Lafayette, Indiana has mild temperatures and sunny skies in the spring (April to May) and fall (September to October). The summer months can be warm to hot with humid temperatures, and the winter months have a fair amount of snow and wind. The Solar Decathlon INHome uses high clerestory windows to provide a large majority of the daylight to the interior of the space. The large windows throughout the rest of the house seek to capitalize on the rest of the available daylight.

12:00 pm June

12:00 pm December

Daylight Analysis
The above diagrams represent the amount of illuminance measured in footcandles for the Purdue Solar Decathlon home. The summer solstice and winter solstice are both shown, and provide the actual measurements dispersed over the floor plan. Comparing the data reveals that the winter sun at noon provides an average illuminance level that is lower than the illuminance level from the summer sun. The summer sun also penetrates farther into the spaces, showing areas particularly from the clerestory windows that receive more daylight.

Solar Geometry
The solar geometry shows the sun path diagram that represents the annual changes in the path of the sun through the sky. This diagram provides a unique summary of solar position that a designer can refer to when considering shading requirements and design options.

illuminating the past, present, and future with natural light
PURDUE SOLAR DECATHLON INhome
2011 AD: West Lafayette, Indiana

Architect:
Various - Purdue University

Main Natural Light Sources:
Clerestory Windows
South Facing Windows

illuminating the past, present, and future with natural light
EXTERIOR COLOR STUDIES
INTERIOR DESIGN FOR SUSTAINABLE SPACES

Rosemary, ASID, IDEC, LEED AP

Purdue University
Residential Lighting
The Johnston Family

Concept
The design inspiration for this Transitional style residence was sparked by the serenity and serenity of Central Park in New York City. The blend of city's urban architecture and materials of the steel superstructure led to a study of textures and furniture finishes. However, the historical and classic design of Central Park influenced more traditional elements into the design.

The goal was to use a variety of shapes and ornamentation, while keeping contemporary design intact. The fall leaves of the trees and texture of the winding paths, stones, and wrought iron posts inspired the use of natural materials as well as, their textures and finishes. The Johnston residence is a sophisticated, casual retreat for each family member to enjoy.

Materials

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  

Floor Plan
Scale: 1/16" = 1'

New Sitting Area  Dining Room

Board 1 of 3

Jillian Birk  AD 320  Residential Lighting  Rosemary Kilmer  11/1/2011
## Lighting Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>Hours</th>
<th>Cost</th>
<th>Adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hallway</td>
<td>Entry</td>
<td>8-10</td>
<td>200</td>
<td>10%</td>
</tr>
<tr>
<td>Stairwell</td>
<td>Middle</td>
<td>8-9</td>
<td>150</td>
<td>5%</td>
</tr>
<tr>
<td>Door</td>
<td>Kitchen</td>
<td>6-7</td>
<td>100</td>
<td>20%</td>
</tr>
</tbody>
</table>

### Notes:
- Hallway lighting is increased by 10% during peak hours.
- Stairwell lighting is reduced by 5% during off-peak hours.
- Door lighting is adjusted by 20% based on energy consumption.

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### Additional Information:
- Hallway lighting is automatically adjusted based on occupancy sensors.
- Stairwell lighting is manually controlled by a switch.
- Door lighting is controlled by a timer to reduce energy expenditure.

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### Table:

<table>
<thead>
<tr>
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<th>Hours</th>
<th>Location</th>
<th>Cost</th>
<th>Adjustments</th>
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<td>6-7</td>
<td>Kitchen</td>
<td>100</td>
<td>20%</td>
</tr>
</tbody>
</table>

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### Diagram:

- Hallway lighting is shown with a switch icon.
- Stairwell lighting is shown with a manual control icon.
- Door lighting is shown with a timer icon.

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### Board 3 of 3:

- Jillian Birk  AD 320  Residential Lighting  Rosemary Kilmer  11/1/2011
## ROOM FINISH SCHEDULE

<table>
<thead>
<tr>
<th>ROOM NO</th>
<th>ROOM NAME</th>
<th>FLOOR</th>
<th>BASE</th>
<th>WALLS</th>
<th>CEILING</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>100</td>
<td>Living</td>
<td>WD 1</td>
<td>B1</td>
<td>PT4</td>
<td>PT5</td>
<td>PT5 PT6 Vaulted Bar Counter Half Wall PT4</td>
</tr>
<tr>
<td>101</td>
<td>Dining</td>
<td>WD 1</td>
<td>B1</td>
<td>-</td>
<td>PT5</td>
<td>PT5 PT6 Vaulted S/WW 36&quot; to 48&quot; A.F.F. on South Wall CT3 36&quot; to 42&quot; A.F.F. on North Wall</td>
</tr>
<tr>
<td>102</td>
<td>Kitchen</td>
<td>WD 1</td>
<td>B1</td>
<td>PT4/CT3</td>
<td>PT4/CT3</td>
<td>PT6 6 Vaulted S/WW 36&quot; to 42&quot; A.F.F. on North Wall CT3 36&quot; to 42&quot; A.F.F. on North Wall</td>
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<tr>
<td>103</td>
<td>Bathroom</td>
<td>CT 1</td>
<td>B2</td>
<td>PT3</td>
<td>PT2/CT2/CT5/CT6</td>
<td>PT6 6 Vaulted S/WW 36&quot; to 42&quot; A.F.F. on North Wall CT3 36&quot; to 42&quot; A.F.F. on North Wall</td>
</tr>
<tr>
<td>104</td>
<td>Utility</td>
<td>WD 1</td>
<td>B1</td>
<td>PT1</td>
<td>PT1 PT1</td>
<td>PT1 PT6 6 8'-0&quot;  Tray Ceiling, see details</td>
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<tr>
<td>105</td>
<td>Mechanical</td>
<td>WD 1</td>
<td>B1</td>
<td>-</td>
<td>PT1</td>
<td>PT1 PT1 PT1 6-0&quot;  Tray Ceiling, see details</td>
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<tr>
<td>106</td>
<td>Hallway 1</td>
<td>WD 1</td>
<td>B1</td>
<td>-</td>
<td>-</td>
<td>PT6 PT6 - 8'-0&quot;</td>
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<tr>
<td>107</td>
<td>Master Bedroom</td>
<td>WD 1</td>
<td>B1</td>
<td>PTX</td>
<td>PT1</td>
<td>PT1</td>
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<td>108</td>
<td>Bedroom 2</td>
<td>WD 1</td>
<td>B1</td>
<td>PT1</td>
<td>PT1</td>
<td>PT6 6 8'-0&quot; Tray Ceiling, see details</td>
</tr>
<tr>
<td>109</td>
<td>Garage</td>
<td>SC</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- 8'-0&quot;</td>
</tr>
<tr>
<td>110</td>
<td>Hallway 2</td>
<td>WD 1</td>
<td>B1</td>
<td>PT1</td>
<td>PT1</td>
<td>PT1 PT4 PT6 6 8'-0&quot;</td>
</tr>
</tbody>
</table>

## ROOM FINISH LEGEND

### WALLS

- **Paint:**
  - PT1: Porter Paints 414-3 Toasted Almond
  - PT2: Porter Paints 311-4 Cross Green
  - PT3: Porter Paints 311-2 River Reed
  - PT4: Porter Paints 556-5 Aqua Smoke
  - PT5: Porter Paints 556-4 Misty Surf

- **Ceramic Tile:**
  - CT3: Crossville: Glass Blos: Blends GB11 Blue Hazel/Ocean Air/North Sea (4" x 4" Sheets)
  - CT5: Crossville: Bella Via S032 Napolina (12" x 12")
  - CT6: Crossville: Chair Rail Napolina (2" x 12")

### BASE

- **Wood:**
  - B1: Shamrock Plank Flooring Pre-finished Solid Hickory
  - B2: XXXXX

### FLOOR

- **Wood:**
  - WD 1: Shamrock Plank Flooring Pre-finished Solid Hickory

### CEILING

- **Ceramic Tile:**
  - CT1: Terra Green Ceramics: Terra Fusion: Indigo (8" x 8")
  - CT4: Crossville: Bella Via S032 Napolina (1" x 1")

- **PT6:** Porter Paints 518-1 Delicate White
CONCEPT

Inspired by the fields of Texas, the postpartum wing incorporates comfort, warmth and security through a modern design. The use of warm colors such as tan and brown conveys passion while maintaining an ease within the space. The flowers and puppies present in the space create a soothing effect for the new mothers and families. The flow of the spaces allows for easy access of employees and patients through wide hallways and a legible wayfinding system in all areas. Lockable doors and a vigilant centralized nurse's station provide a sense of security reminiscent of a swaddled baby.

L.E.E.D. STATEMENT

The new postpartum wing of the Texas Star Memorial Hospital was designed with the intention of minimizing its environmental impact while still creating a modern, comfortable space for the patients. Beginning with the equipment and plumbing fixtures, the waived & efficient fixtures and mechanical systems are designed to provide the highest level of comfort for the patients. Low-flow plumbing fixtures use less water helping gain points towards a Nurse Efficiency credit and will be used for water-saving devices and appliances. Systemic points are provided in the patient rooms. Next, the new wing of the hospital utilizes water and energy-efficient systems, providing for the highest level of comfort for the patients. The water system uses low-flow fixtures and equipment, reducing the amount of water used per unit. The mechanical systems include a central heat and air conditioning system, providing for the highest level of comfort for the patients. The mechanical systems also include a central cooling system, providing for the highest level of comfort for the patients. The building envelope is designed to provide the highest level of comfort for the patients, and the building is designed to be LEED-certified.

TEXAS STAR MEMORIAL HOSPITAL HEALTHCARE PROJECT

KELLEY SHORT
ASHLEY WELLS
AD 350
SPRING 2011
BOARD 1 OF FOUR
TEXAS STAR MEMORIAL HOSPITAL
KELLEY SHORT  AD 350  SPRING 2011  BOARD 3 OF FOUR  HEALTHCARE PROJECT
EPA P3 Competition

Lisa VanZee
Purdue University
WHAT IS EPA’s P3 Program? P3 stands for People, Prosperity and the Planet. Through this EPA program, college students can benefit people, promote prosperity and protect the planet by designing solutions that move us towards a sustainable future.

WHAT AREAS OF SUSTAINABILITY ARE ELIGIBLE FOR THE P3 COMPETITION? EPA considers projects that address challenges from a wide range of categories: water, energy, agriculture, built environment, and materials and chemicals. The categories of clean cookstoves and green infrastructure were added to the 2012 solicitation. These can be challenges found in the developed or developing world.

WHAT IS THE P3 AWARD COMPETITION? The P3 Award competition is a two-phase team contest. For the first phase, interdisciplinary student teams compete for $15,000 grants. Recipients use the money to research and develop their design projects during the academic year. The final projects include a Phase I project report and a Phase II proposal.
In the spring, all teams submit their reports and proposals, and then bring their projects to Washington, DC for judging by a panel of experts convened by the American Association for the Advancement of Science (AAAS). Judging takes place at the annual National Sustainable Design Expo on the National Mall.

Scores from the reports, proposals and the presentations on the Mall are combined into a final overall score for each P3 team. Based on these scores, the AAAS judges recommend to EPA which teams should receive the EPA P3 Award and the opportunity for Phase II funding.

WHAT IS THE P3 AWARD? Given to the best student designs, this is an award and opportunity for grant funding up to $90,000 to further the project design, implement it in the field, and move it to the marketplace.
APPLICATION REVIEW: A peer review panel evaluates all EPA P3 Phase I applications for problem definition; innovation and technical merit; connections to sustainability in terms of people, prosperity and the planet; measurable results, evaluation method, implementation strategy; and integration of the P3 Award competition as an educational tool. Final funding decisions are made by EPA.

WHAT IS THE NATIONAL SUSTAINABLE DESIGN EXPO? Held each spring on the National Mall in Washington, DC, the National Sustainable Design Expo featuring EPA’s P3 Award brings together students, nonprofit organizations, government agencies, and businesses that are working to create a sustainable future. The Expo is a unique opportunity to discover innovative, cutting-edge technologies developed by university students and their faculty advisors, learn what nonprofit organizations and government agencies are doing to advance sustainability, experience sustainable products that are currently available, and recruit talented hires with backgrounds in the broad range of disciplines found the sustainability arena. The Expo is open to the public.
<table>
<thead>
<tr>
<th>Institution</th>
<th>Project Description</th>
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<tbody>
<tr>
<td>Appalachian State University</td>
<td>An On-Site Biological Graywater Treatment System Suitable for a Small Business</td>
<td>Appalachian State University students are developing an artificial wetland suitable for recycling of graywater from small businesses for immediate reuse.</td>
<td></td>
</tr>
<tr>
<td>Butte College Sustainable Community Development Institute</td>
<td>Rice Hulls as Alternative Building (RHAB) Project</td>
<td>Butte College students are developing structural insulated panels for building construction using rice hulls, an abundant agricultural waste, as their primary raw material.</td>
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</tr>
<tr>
<td>Gonzaga University</td>
<td>Integrating Improved Sustainable Technologies into the Heart of the Home — The Kitchen</td>
<td>Gonzaga University students are developing a simple ventilation system for kitchens in rural dwellings using electrical power generated from thermoelectric cells driven by waste heat from cooking fires.</td>
<td></td>
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