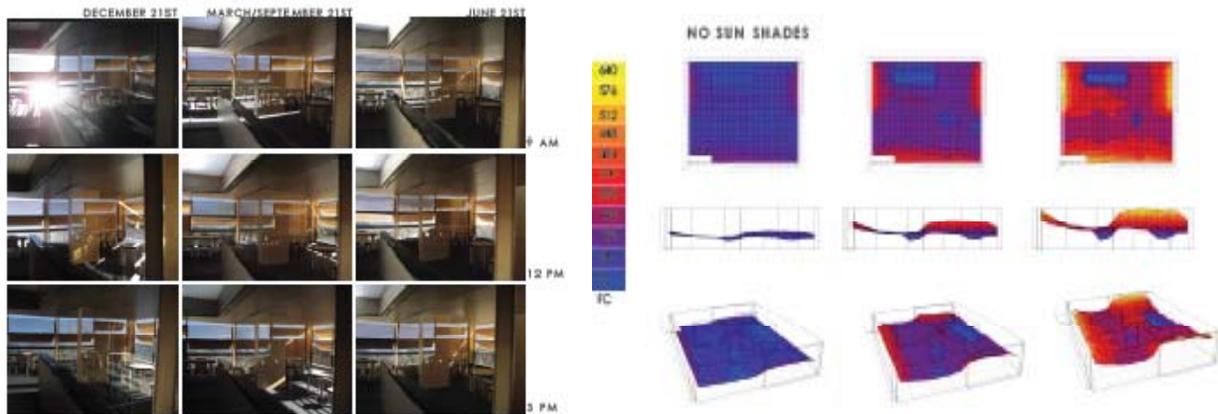


# ARCH 5516 • LUMINOUS AND THERMAL DESIGN ECOLOGICAL DESIGN FOR THE 21<sup>ST</sup> C



*My most inspiring thought is that this place, if I am to live well in it, requires and deserves a lifetime of the most careful attention. -- Wendell Berry*

*During the four perilous days of solar transition, each household in San Juan Pueblo shares in a period of rest and spiritual retreat within their home as an expression of collective awe and respect for the Sun. --The Tewa, Southwest U.S., Days of the Sun Ritual*

## PROJECT ONE – Phase 2

### LIGHTSCAPES: Light in Place and Time

## Phase 2: Qualitative & Quantitative Analysis

#### Project One – Phase 2 Due Dates:

- Step A: due: Friday, January 20: in-process desk critique
- Step B due: Monday, January 24: in-process desk critique
- Step C due: Wednesday, February 2; formal presentation; courtyard

**Grade weighting:** 20% total grade (200 points); team and individual grade

#### Electronic Reading:

- Guzowski, Mary. *A New Architecture of the Sun*, AIA COTE, 2008 (PDF on e-reserve).
- Lechner, Norbert. *Heating, Cooling, Lighting*. New York: John Wiley & Sons, Chapters on “Shading and Daylighting” (Chapters 9 and 13; second edition; see comparable chapters in third edition).

#### Project One – Phase 2 Objectives:

*To investigate the roles of qualitative and quantitative assessments in informing and inspiring design thinking.*

Daylight is a dynamic and constantly changing force. It is always in a process of transition, varying from hour to hour and season to season. Each moment offers new colors, positions, and qualities of light which are particular to a given place and geographic location. In *The Poetics of Light*, Henry Plummer states: “...living structures can *be* only if they *become*, they can *exist* only if they *change*. Change and growth are inherent qualities of the life process.” Daylight provides an opportunity to explore the changing and evolving qualities of architectural experience. In Project One, Phase 2 your team will use quantitative and qualitative methods to assess how your design proposals respond to the daylighting program through time. Please use the following procedure:

#### Step A:

### DAYLIGHTING PROGRAM AND REFINEMENT OF MASSING PROPOSALS

**Due: Desk Critique Friday, January 28 (TAs will post review schedule)**

1. **Define the Team’s Daylighting Program and Goals:** As a team, use the “*Program Narrative Handout*” (who, what, when, where, how, etc.) and the criteria from the *IESNA Lighting Handbook* (book is also on reserve in the library) to define your team’s daylighting program goals (qualitatively and quantitatively). Prepare a brief written description of your “Daylighting Program Goals” (including answers to the “Program

Narrative: who, what, when, where, how” and the target illuminance levels in different spaces). Consider the relationship between daylight and thermal conditions. Use the program to refine your massing models.

2. **Massing Proposal Development: Physical Models at 1/16” (one per team member):** Based on your balcony review and program development, the team is asked to further develop, clarify, and refine your daylighting and bioclimatic massing models. Please four FOUR 1/16” physical site/massing model and building section model proposals in response to site, bioclimate, and your new daylighting program.
3. **Develop a Quantitative Analysis of the FOUR Proposals Using Ecotect.** The team is asked to develop a draft quantitative analysis of each of the proposals using Ecotect (use a simple computer model of each design).
  - **Illuminance Levels:** Evaluate the illuminance level in footcandles (1 footcandle = 10 lux) for 3 times of the year: Noon for June 21, March/September 21, and December 21 (this is the maximum, average, and minimum illumination seasonally).
    - **Ecotect Graphics:** Present the Ecotect analysis in plan, section, and/or 3-D axonometric for each of the three specified times and seasons (e.g. noon in June, Mar/Sept, and Dec).
  - **Ecotect Critique:** When the analyses are done, meet as a team to critique your Ecotect studies: what do they tell you about the amount of light, distribution, and program needs? Do you have sufficient light? Are there issues of solar control? How might you modify the design to improve the lighting to meet your program needs?

***NOTE:** If you run into problems with the Ecotect analysis, please move on to other aspects of the project and troubleshoot with Mary, Loren, Ian, and the TAs. Plan to present your draft Step B and Ecotect studies at the in-process desk critique on Friday, January 28.*

Step B:

## **QUALITATIVE AND QUANTITATIVE ASSESSMENTS**

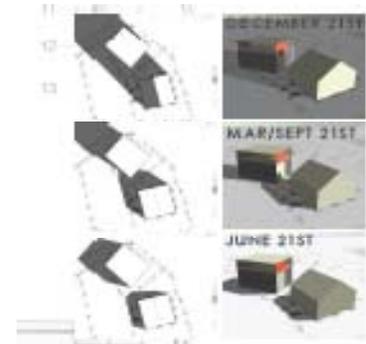
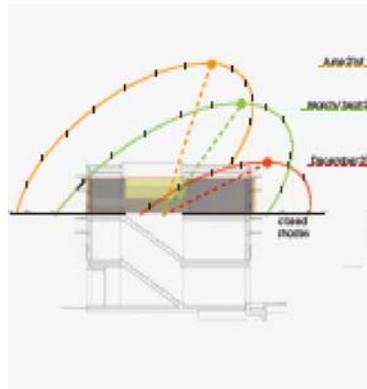
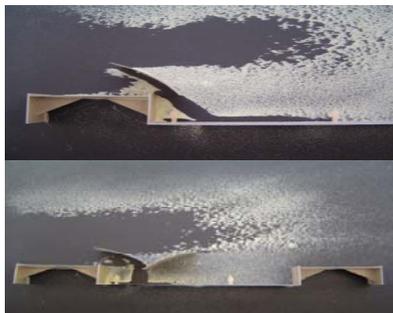
**Due: Desk Critique Monday, January 31, (TAs will post review schedule)**

**Photo-document your Qualitative Solar and Wind Analyses of the FOUR Proposals:** Using the same viewing angle, use a digital camera to photo-document the solar studies and windflow conditions using massing and/or section models (please use the same “view angle” for all photos). Organize the photos to easily compare and contrast the solar and wind attributes of each design proposal. Critique the design proposals.

1. **Solar Studies using the 1/16” Massing Models:**

After constructing the “final” team massing models, use a sunpeg to photograph the model outside. Please use a digital camera to document the following nine times of day for each of the TWO 1/16” massing models (a sunpeg for 44° NL was provided in class). Critique your design proposals. Do you admit sun or block sun when needed?

  - MARCH/SEPT. at 9:00, noon, and 3:00
  - JUNE at 9:00, noon, and 3:00 (or 3 other times for the same day).
  - DECEMBER at 9:00, noon, and 3:00 (or 3 other times for the same day).
2. **Wind Studies using the 1/16” Section Models:** Photo-document your FOUR section models using the “semolina flour method” to illustrate how your sections block wind in the winter and admit wind in the summer. Critique your design proposals. Do they admit or block wind when needed?
3. **Rendered and Annotated Sections and Plans of the FOUR proposals:** Please include 1/16” plan and sections for the final presentation to illustrate and compare your response to sun and wind in the winter and summer in each proposal. Develop concept drawings as appropriate.



## Step C: Final Phase 2 Requirements

### **Written Submission & Graphic Presentation Checklist for Project One: Phases 1-2:**

Work as a team to prepare a final graphic presentation using a vertical 24"x36" format (4-6 boards; 6 maximum). Please submit your 24"x36" boards, (2) 11"x17" color copies, and a CD with PDFs of your submission (labeled with team member names). All materials are due at the final presentation at 10:00 a.m. on Wednesday, Feb. 2.

1. **Phase 1: Site and Bioclimatic Design (100 points):** (1-2 board suggested)

Please see the "Submission Checklist" from Project One – Phase 1 (page 3).

2. **Phase 2: Qualitative & Quantitative Analysis (200 points):** (3-4 boards suggested)

Please include the following in your final submission for Project One - Phase 2:

- **Step A: Daylighting Program and Goals:** Include a brief graphic and written summary of daylight program and goals; including your IESNA research on this program type, target illuminance levels, daylighting tasks and issues, and related thermal issues from Step A.
- **Step B: Final Massing Proposals and Assessment:** Please develop a graphic proposal to compare and contrast the design attributes of your FOUR proposals. Clearly label which team member was responsible for which design proposal:
  - **Physical Models:** Submit the FOUR final 1/16" physical site/massing models.
  - **Ecotect Graphics:** Graphically compare the proposals using Ecotect images at noon for 3 designated seasons (plan, section, and/or axon).
  - **Photos of Solar and Wind Analyses** (Steps B1 and B2 – solar and wind photos).
  - **Rendered Annotated 1/16" Sections and Plans for the FOUR proposals** (winter and summer; Step B3)
  - **Concept Diagrams:** Develop concept diagrams to compare and contrast the essential design strategies for your proposals. Include other images, diagrams, and information as appropriate.
  - **Written Critique:** Develop a brief written summary to assess the Ecotect analysis and the photo-documentation to evaluate the strengths and weaknesses of the FOUR proposals (see following critique topics) :
    - **Ecotect Critique:** Summarize your Ecotect study critique from Step A3
    - **Solar and Wind Study Critiques:** Summarize your sun and wind critique from Step B3.
    - **Design Critique:** Compare and contrast the proposals by briefly summarizing the strengths and weaknesses and identifying any changes you would make to the designs.

*GRAPHIC NOTE: Please label all plans, elevations, sections and other diagrams. Include graphical scales and indicate "north" on all plans (by convention north should be upward on your plans). Include site elements and scaled figures. Include bibliographic information and citations as appropriate.*

## **GRADING SUMMARY: Project One – Phase 1 and 2**

Tentative Project One Grading Summary for Phases 1-2

### **Phase 1 Grading Criteria: Team Grade 10% overall grade (100 points total)**

1. **Site and Bioclimatic Analysis: (40 points)**

- Clarity, accuracy, and craft of site and bioclimatic analysis

2. **Bioclimatic Massing Model Proposals: (60 points)**

- Clarity and craft of design intentions demonstrated in the models and drawings
- Clarity of the design critique for each of the four massing proposals
- Overall craft and graphic clarity of presentation boards

### **Phase 2 Grading Criteria: Team Grade 20% overall grade (200 points total)**

1. **Daylight Program: (40 points)**

- Clarity, appropriateness, and accuracy of program
- Overall craft of program presentation

2. **Design Proposals: Qualitative & Quantitative Studies: (160 points)**

- Clarity of design proposal in response to site, bioclimate, and daylighting forces and program
- Clarity, craft, and accuracy of quantitative and qualitative analyses
- Overall craft and graphic clarity of presentation boards