Section Two: Lighting Depth

Existing Conditions

The existing lighting design consists of primary use of linear/compact fluorescent and metal halide luminaires. All lighting is on a Digital Addressable Lighting Interface (DALI) system. These luminaires will either be controlled by local occupant input, automatic dimming from daylight sensor integration, time clocks, or astronomical time clocks.

Proposed spaces

The four spaces to be analyzed and redesigned are: the main gathering Space, Tiered Classroom, Roof Garden, and Library/Reading Lounge. Since some of these spaces are not completely enclosed, additional work will be completed when out-of-scope areas are an integrated into proposed spaces due to perimeter openings. (Please see Technical Report III for more detailed information of lighting implementation)

Summary Design Solution

The main purpose of the lighting design in GCC is to accentuate and support the overall architectural concepts found within the forms and features of the building and Perkins + Will's objectives for the new campus location. As stated in the architectural design intent, GCCs foremost purpose is to create a new identity for the education facility housed in the urban center of New Haven, Connecticut. In that respect, the lighting will reflect contemporary ideas and aesthetics as it assimilates into the current architectural design.

Within the proposed spaces, an optimum visual environment will be maintained by avoiding glare, extreme levels of transient adaptation, and unflattering patterns and shadows created by luminaires. By abiding to these cautionary standards, lighting will enhance productivity and not hinder working or social interactions. Furthermore, integration with the exterior environment is a key feature for the prosperity of proposed areas. Daylight shall be used effectively and efficiently in the attempt to supplant the need for electric lighting and therefore lower electrical consumption.

Gathering Space

Student gathering is the central transition space in GCC, and is meant to be P+Ws version of an interior street. Similar aesthetics to existing exterior lighting conditions should be mimicked to help connect the concept to the occupants. The five-story-high white masonry unit wall continues from the gathering space to the roof garden and will be lighted similarly to maintain cohesiveness between spaces. Dynamic lighting and emphasis on walls will contribute to the impression of preference while additional general non-uniform lighting will facilitate passage through the space. Daylight is an important factor in this space as well. Like the library, daylight should be used to conserve electric power and efficiently light the space (when possible). Localized lighting will be placed to illuminate ground plane and higher luminances will mark means of access to other areas of the college.

Tiered Classroom

Classrooms often incorporate a number of activities—which means a number of tasks—into lessons. This classroom is no different. The lighting should reflect the variability within the space and the specific task at hand at any time. Uniform lighting will be needed for typical classroom activities and to add to the impression of clarity. Peripheral modes could be incorporated during multiple tasks for added light (and interest) into the space. A variable control of systems should be available to occupants; who will have the need to change lighting effects and settings per task. Glare and distracting lighting elements should be avoided.

Roof Garden

As a public space, the roof should be a preferred space to escape to, as well as a relaxing area where one can experience a more natural environment amongst the urban setting. Nature's "modulations" should be accented in an attempt to connect the space more with the natural environment. Lighting surrounding walls on the roof is one way to strengthen impressions of relaxation, pleasantness and preference. A lower light level will be used (as compared to interior spaces) to reflect upon the outside setting. The roof garden will serve as an exterior continuation of the library at night. Light emanating from within the reading lounge will be topped by the soft glow from the garden above. The result will be a less dramatic drop in luminance from space to space and a more cohesive flow created from light. Additional accent will be placed on localized areas that are most occupied.

Library and Reading Lounge

As a work space, comfort level is extremely important. A uniform lighting scheme with glare elimination will allow the occupants to stay productive and will increase visual clarity. By accenting peripheral walls and around the opening to the second floor visual interest can be added to the space, further increasing its quality and visual clarity. Daylight should be taken advantage of—and controlled—within this space. The enormous span of the South-facing curtain wall allows for a large amount of options for daylight management. It will be a focus of this space to limit the amount of light entering through the glass to an exitance that will eliminate the need for a considerable amount of electric light. This limitation however, should not decrease the amount of exterior views from the Library. During nighttime hours, exterior views should be maintained as much as possible, while still providing adequate light levels for a productive environment. The curved library corner serves as the conceptual "gateway" in Perkins + Will's architectural theme. This will be reinforced by reflections from interior surfaces making the curtain wall glow (from within) at night.

It is essential in this design to integrate a control system (into each of the four spaces) that is an equivalent to or better than the current DALI system. This system should be able to communicate to the owner and maintenance employees complete information for each luminaire and ballast combination in the design while also notifying occupants about energy use and savings. This is important for a LEED rated building; to not only inform the owner and people who will upkeep lamps/luminaires, but to inform the public and create a "sustainable" identity for the building.

Other considerations will consist of abiding by LEED criteria for gaining as many points as possible—increasing the building's total rating—while not sacrificing lighting quality.

Designer Comments from Tech III Presentation at Lutron (12.11.08)

Sandra Stashik

- Consider changing black background
- Good presentation of design criteria
- Will wash in gathering space benefit facial modeling?
- Consider multiple uplight options in the classroom
- Sconces in the back may not be appropriate
- The roof was overdone
- Consider the view from the ground level
- Look at LEED criteria

Lee Brandt

- The classroom may not achieve needed illuminance level
- Consider how to make the pavers glow from behind and how it would be accessed
- Third option may distract drivers on the street
- The curved light in the Library could be recessed cove
- The section showed was confusing

Adjustments from Designer Comments

Besides general aesthetic issues with the presentation, I will use the advice given by the designers to help better my current designs for the four spaces.

In the Student Gathering space, I will consider using light from multiple angles above the occupant to better model faces. Special consideration will be given to the occupants in neighboring classrooms where light boxes are a feature on the Eastern (back) wall. In this example, the goal is to not distract the students from their activity in the space.

In the classroom, I will be considering multiple uplighting techniques and different luminaires in the back to add light to the ground plane. The possible use of high-output T5 fluorescent lamps may increase the amount of light on the horizontal task plane.

For the Roof Garden, I will reduce the amount of ambient light and uplight to better abide by LEED criteria for sustainable sites. Since light trespass and pollution are more prevalent for this exterior space, more in-depth studies will be made to limit the total amount of light going up and out of the space's boundaries. Additionally, simpler solutions for providing light on the ground plane, plantings, and the continued white masonry wall will be proposed.

In the Library, more detail will surround the custom chandelier and implementation of custom linear luminaries for the ceiling. Since a *true* curve is impossible to achieve with standard recessed luminaries, it will be an attempt to design a custom luminaire that will fit standard fluorescent lamps that will actually curve in the ceiling.

Solution Method

Conceptual designs will be updated with comments from faculty advisers and design professionals. Equipment will be chosen based upon design considerations made in Technical Report I, and will be incorporated into computer model calculations. Calculations will be modeled with accurate luminaire definitions, architectural geometry, and material properties. For final solutions, all equipment cut sheets and information, lighting plans, energy code compliance, and calculation results/renderings will be presented.

Tools

Regulations in ASHRAE Standard 90.1 will be followed to ensure a realistic and feasible design. Guidelines set in the IENA Handbook will also be followed when design is based on a known and legitimized standard within the lighting practice. Implementation of these standards or recommendations will be set by design considerations in Technical Report I.

AGI 32 will serve as the main reinforcing 3D computer simulation for quality control of designs. Additional calculations and renderings may be prepared in 3D Studio Max.

Tasks

1. Conceptual Design
   The conceptual design will be substantially complete by the end of Fall semester. During winter break, the design will be fine-tuned in accordance with professional feedback from the Lutron presentation. The design will be finalized by the beginning of the Spring semester.

2. Equipment selection
   Equipment will be selected to match the conceptual design. Custom fixtures will be designed and coordinated with considerable detail. Other equipment, including daylight sensors, daylight dimming control, and other lighting controls will be selected.

3. Preliminary Renderings
   AGI 32 will be used to create preliminary renderings and verify desired illuminance levels.

4. Calculations
   Illuminance and luminance levels will be verified using AGI 32. Power density calculations will be done in Comcheck, with verifying calculations in excel.

5. Design Review
   All models and calculations will be scrutinized and checked to verify accuracy and legitimacy.

6. Documentation
   Design documentation will included lighting plans, fixture schedules, calculation summaries, and fixture cut sheets.

7. Final Renderings
   AGI 32 and 3D Studio Max will be used to create final renderings.