The School of Forest Resources Building

During the course of the upcoming semester, I will be evaluating and redesigning some of the lighting and electrical systems in the School of Forest Resources Building. The depth of this Thesis Study will be focused on the lighting and electrical systems. Additional breadth work will be performed on structural and mechanical aspects of the building. These two disciplines were selected because they are directly involved with elements of my depth redesigns. At the end of the semester I hope to have produced a design that has increased in quality and functionality over the original.

Depth Work- Lighting Design

The School of Forest Resources Building serves as a home for education and research involving natural resource conservation. It includes spaces for administration, research, classes, and hands-on learning. There are four spaces in particular which I have chosen to examine in my thesis. The first is the building Atrium, a four-floor space rising through the central core of the building. The second is the Video Conference room located on the first floor of the building. Next is the Aquaculture lab in the basement of the building. Finally, I plan to examine the lighting at the main entrance of the building as well as the meadow shared with the Smeal Business Building. Information on the existing lighting in these spaces can be found in Tech Assignment #1.

Schematic designs of the four spaces were prepared during this semester. After my presentation to the lighting designers at Lutron in December, I utilized their feedback to improve my new design concepts. This feedback and the original schematic designs can be

found in Tech Assignment #3. For the Atrium I plan to apply a theme of "light in the forest". This space receives a high amount of daylight due to the large areas of glazing. As discussed in my Lutron presentation, the ceiling area above the atrium presents a great opportunity for skylights. Adding these skylights along with a series of horizontal trellises will help give the effect light filtering down through a forest canopy. At night, a series of metal halide downlights will filter down through the trellises in a similar manner. A flexible control system with zoned switching will allow the lighting to compensate for diminishing daylight in the evening hours while still saving energy.

For the Video Conference room I will be focusing on designing a lighting system that is capable of creating good facial rendering when viewed through a camera. Additionally, I will need a flexible system that will be useful when the space is being used for other functions. The schematic designs presented at Lutron called for fluorescent directional fixtures for table and facial lighting with wall washers behind to reduce contrast. Further study on these systems, as well as room layout, will be analyzed during the spring semester. Control systems will be studied to allow for quick and customizable changes in the lighting based on the needs of the users. Additionally, I would like to incorporate control for the room shades with that for the lighting, creating one central system for all aspects of lighting in the room.

The Aquaculture Lab contains two main elements. The first is the lighting for the individual aquariums, and the second is the general lighting for the space. For the aquarium lighting, I will be focusing on control systems and how to apply them. This is of particular interest as the aquariums require automatic day-night cycling for a natural environment. As it exists, the general space lighting includes industrial suspended fluorescent fixtures with exposed

piping above. After discussing some concepts at Lutron, I will be examining the possibilities of adding a type of drop ceiling with LED lighting to achieve an underwater feel in the room. This could be done in sections of the room while still leaving access to the piping above.

The Main Building Entrance will be examined along with the lighting in the meadow between The Forest Resources Building and the Smeal Building. Redesign will focus on providing adequate lighting levels to make students feel safe while walking outdoors at night. Additionally, I want to maintain a level of balance across the meadow, which serves as an image of the campus to the outside. I will be choosing fixtures to match existing campus styles to maintain harmony with the surrounding area. The schematic design concept included a mix of bollards and pole-mounted street lights. Control systems, particularly those with automatic day-night cycling, will be examined to help save energy.

During the next semester, I will be performing analyses on all of these spaces. I will be selecting light fixtures, lamps, and ballasts for all systems. Analyses will be preformed using AGI32. This will allow me to research lighting levels and aesthetic values of various systems and layouts. Luminaire types and layouts will evolve throughout the course of the semester. To ensure good lighting practice, I will be using the IESNA Lighting Handbook as well as the ASHRAE 90.1 Standard to help guide my designs.

Depth Work- Electrical Design

Any change in lighting systems requires an examination of the building electrical systems. As stated in previous sections, control systems will be studied to find the most energy efficient

ways of providing adequate and aesthetically pleasing lighting. Programmable or automatic systems will likely be best. The electrical systems will need to be examined and updated to meet the needs of the new lighting systems. Coordination of protective devices will help keep any necessary shutdowns restricted to as small an area as possible. For my redesign spaces I will calculate the new loads created by my systems. New panelboards, overcurrent protection devices, and branch circuit sizes will need to be applied. The National Electrical Code will be used to ensure the design is up to code standards.

Tentative Schedule

1/9-1/13	Create Three Dimensional Models, Begin Equipment Selection
1/16-1/20	Finalize Layouts, Begin Initial Rendering
1/23-1/27	Finalize Initial Rendering, Analyze Designs, Correct Problems
1/30-2/3	Analyze Mechanical Loads in Atrium
2/6-2/10	Mechanical and Structural Calculations
2/13-2/17	Electrical Loads in Redesign Spaces
2/20-2/24	Panelboard and Branch Circuit Design
2/27-3/3	Begin Final Rendering
3/6-3/10	Spring Break
3/13-3/17	Final Rendering
3/20-3/24	Compose Final Report
3/27-3/31	Create Final Presentation
4/5	Final Report Due
4/10-4/12	Present Thesis