Executive Summary

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In this upcoming spring semester, I will be redesigning the University of California, San Diego Cal IT^2's lighting system. As required by The Penn State Architectural Engineering Department, an in-depth study on the lighting, electrical systems and two breadth topic studies must be done for my thesis building.

My proposal discusses the five spaces I will be redesigning: the main lobby, black-box theater, 3100 research cluster, courtyard, and underground tunnel. The new lighting scheme for these spaces is discussed in my schematic design presentation. As part of the lighting design, I will be creating a new controls system for the lighting as part of my electrical design. This will also include a study on the emergency power system.

One of breadth topics includes designing a new acoustical system for the black-box theater. New ceiling and wall materials will be used to determine the correct reverberation times and implemented into my lighting design. The other breadth topic includes providing a cost analysis on the new lighting system. The analysis will include a comparison on the existing and redesign conditions for the lighting fixtures.

Through this whole process, I hope to learn a great deal about energy savings and how light can guide people through a space. With my new innovative lighting scheme, I hope to achieve a technological and intriguing space for Cal IT^2.

Depth Part 1: Lighting Design

The Cal IT^2 building is a major staple on the University of California, San Diego's campus. With its innovative and technological design, it brings with it the opportunity to try new ideas and explore information technology. The building is used for many purposes such as: researching information technology, holding seminars, housing private offices for professors, and holding small student theater performances. The building is used as a computer hub for moving information from one place to another. This is why in my redesign, I will be designing the light to guide people through the building fast and efficiently while also bringing a technological edge to the space.

I have chosen five spaces to redesign. I am going to start with the main lobby from the courtyard side. In this space, I will be using lines of light to direct people to the elevators and corridors. I will then be redesigning the lighting in the Black-Box Theater located in section C of the building. The theater is used for educational purposes as well as small student theater performances. The next space will be a research cluster space on the third floor. This is a typical space in the building on all 7 floors. For the exterior of the building, I will be focusing on two items: the exterior courtyard and the underground tunnel running through the building. By looking at my Technical Assignment #3 on the CPEP site, this schematic design presentation shows my design intent for both these spaces.

By presenting my technical assignment to the designers at Lutron, I received some good comments on my design and how I should approach or change them to make it work in each space. By looking at my Lutron comments page on my website, you can get a good understanding of what was talked about and how I will continue to enhance the design of these spaces.

Finally, I will be using AGI32 for daylighting studies in my research cluster as well as for electric lighting calculations in every space. This will produce realistic images of how each space will appear with my redesigned lighting scheme.

Depth Part 2: Electrical Design

An electrical redesign is necessary to incorporate my lighting redesign into the building. For the research cluster, I want to incorporate a controls system to integrate with my daylighting design. Certain fixtures will be turned off during day-time hours when electrical light is not needed. In the lobby, the current controls system does not work well for the space. Since the glass façade on the entrance allows a lot of daylight into the space, electric light integration must be taken into account. The underground tunnel will probably be the most complicated controls system because of the constant oscillations of light. A Lutron Grafik Eye system will be used to properly control the lighting equipment in this space.

Since the current electrical system is sized properly, a study on the emergency power systems, emergency lighting equipment, and on-site emergency generators will be conducted to maintain the bare minimum amount of energy needed in case of power failure.

Breadth Topic Part 1: Acoustical Analysis

The Black-Box theater space in Cal IT2 is one of the more interesting spaces in the building. Being all black and used for educational purposes as well as small theatrical performances, acoustics are very important to the rather small space. A study will be done on the reverberation times and acoustical panels throughout the space to see if any changes are relevant. The black mesh ceiling may be changed to integrate my lighting system into the space and creating a more acoustically sound, and architecturally pleasing space.

Breadth Topic Part 2: Construction Management Cost Analysis

After my proposed lighting and electrical redesign are complete, I will be researching costs for fixtures, labor, and installation. I will then be comparing this to the current installations to see the cost difference and whether the redesign is beneficial to the client.

Schedule

Christmas Break	Finalize 3D models of three spaces
January 9 - 20	Finalize fixture selection, IES files, and ballast information
January 21 – February 1	Input fixtures and IES files into AGI32 and start to check illuminance values on surfaces
February 2 - 17	Collect control equipment and group into panelboards and control sections
February 18 - 28	Change mesh sizes and work on AGI model to become realistic images
March 1 - 3	Perform acoustical analysis and cost analysis for breadth work
March 4 - 12	Spring Break - relax
March 13 - 19	Create Floor plans, electrical plans, control diagrams
March 20 - 26	Finalize renderings and group data into tables and schedules
March 27 – April 5	Write Thesis report
April 1 - 9	Prepare power point presentation
April 10 - 12	Thesis presentations