Summary | Conclusion

Lighting Depth

The Lighting Depth looked at the redesign of four different spaces within the Duke School of Nursing. The lighting design in each space meets IESNA design criteria and ASHRAE 90.1 power density allowances. The design goal of tying all the spaces together with the lighting was met. The previously mentioned goal starts in the lobby, where the lights are in square patterns within the square wooden beam pattern and a custom chandelier that contains arches and the school logo. Then in the auditorium the ceiling was dropped and a square pattern cove system was put in place with down lights running down the "beams", the dropped part of the ceiling. Next in the café the same custom chandelier from the lobby were used and visually framed out by the arches. Also in the café the downlights were placed within the roof beam supports which create a square pattern. Finally, the courtyard retaining walls are arcs which are highlighted by an in-ground luminaire which housing is square in shape. The other design goals were achieved as well with the aesthetically pleasing simple lighting design.

During the calculation part of the lighting design process I was faced by an over lit and a high energy use auditorium space. In order to get a uniformly lit cove system, a large quantity of 4-ft luminaires had to be utilized. Since the illuminance in the space was greater than the recommended IESNA values, I was able to use a low ballast factor ballast (0.77). By reducing the ballast factor, fewer watts are used per fixture and less lumens are produced from the lamps. By doing this I was able to meet the ASHRAE 90.1 power density allowance and still meet the IESNA design criteria. The disadvantage to using a low ballast factor ballast is that they are not capable of being dimmed. For this reason, the specified Lutron Graffic Eye will only switch a certain quantity of these fixtures on or off to raise or lower the light level in the space.

Electrical Depth

The Electrical Depth analyzed several components of the entire building electrical system designed lighting spaces was conducted. A panelboard coordination study was conducted for all the lighting changes made in the Lighting Depth. The panelboard loads were adjusted accordingly and then all the associated equipment (circuit breakers, feeders, and possibly transformers) was resized to reflect the lighting changes. However, due to the fact that the there were no substantial lighting load changes from the existing lighting system the equipment nearly stayed the same.

In the energy efficient transformer feasibility-cost comparison, known electrical metering data as well as other building energy variables were entered into Powersmiths payback calculator. It was determined that implementing energy efficient transformers in the entire building is not only a money saver after the 6 year payback period but also environmentally friendly because of the reduced energy

production. In the central transformer system cost comparison to the distributed transformer system, it was determined that it is beneficial to use the proposed system. The challenging part to doing the central transformer study was that my panelboard schedules did not have loads per circuit for most of the panelboards in the building. The mechanical loads were determined from the mechanical motor schedule and I had to make assumptions as to the loading on all the receptacle loads. After computing the estimated loads the panelboard sizes matched the panelboard sizes on the single line diagram. Once the loads on the existing panelboards were known, the comparison was relatively simple.

The Mechanical Breadth looked at modifying the mechanical duct system of the café in order to be able to integrate it with proposed lighting system. This integration of systems improved the visual appearance of the space, which equated to the improvement of the architectural integrity of the space. The breadth concluded that the results of the integration are worth the minimal cost.

The Acoustical Breadth looked at reducing the reverberation times in the café, since this space is a study lounge and a large social gathering, the amount of noise and the quality of speech in the space are important elements. The breadth concluded that the quality of speech could be improved with the replacement of the fabric on the wrapped wall panels with thicker fabric, at a minimal cost difference.