

Executive Summary

This report is the culmination of all work done on the PSU AE Senior Thesis beginning in June, 2013. This study has been completed using the State University of New York's new Student Life Center at the SUNY, Cortland campus.

There are four main sections to this report after the Building Introduction and Proposal Overview:

1. Lighting Depth
2. Electrical Depth
3. Façade Breadth
4. Mechanical Breadth

The Lighting Depth entails the redesign of the lighting systems for four spaces within the SLC. These spaces are the northeast courtyard; entrance lobby; weight lifting and cardio space; and running track. The criteria for which all design decisions were based on vary for each space, but a common design concept guided the overall lighting design. The energy savings from this lighting design achieved 11 points towards LEED, mainly by providing a lighting power density that was 30% below code.

The Electrical Depth involves the re-evaluation of existing lighting circuits, in order to redesign all panelboards to reflect the new lighting design. A short circuit analysis was completed as part of the electrical depth, along with the design of an energy harvesting system for the spinning room. This system will use power generated by the bikers to run the television at the front of the room. This system will also power indication lighting that will give feedback to all members of the class on how much energy they are producing.

The façade breadth and mechanical breadth are tightly connected, since both involve studies on rain screen façade types. Research was completed initially on rain screen facades, proving that they are advantageous in certain situations. These facades were designed initially to manage water penetration better than other façade types, but provide an advantage in that a lighter, more unique, and potentially cheaper cladding material can be utilized by the architect. They are also very effective thermally, but in the mechanical breadth, energy simulation proved that this makes only a small difference. This was because the majority of the space load was internal to the space used, which is also the case with most other building spaces and climates, so a rain screen façade should certainly not be selected for thermal purposes alone.