

## Executive Summary

The following report outlines the Architectural Engineering Senior Thesis, which includes four lighting and electrical redesigns, two electrical depth topics, and three additional breadth topics that result in the redesign of multiple aspects of the Pennsylvania State Employees Credit Union Corporate Headquarters.

The lighting depths examine four spaces, which include the façade and entry plaza, the lobby, the marketing office, and the Board Room all of which were redesigned following the design process from schematic design to construction documentation. Each space had unique aspects that needed to be emphasized. The overall design concepts of strong lines and angles, encouraging daylight, minimalist design, and emphasis on materials drive the designs. Wood paneling and sustainable materials are frequently found throughout the building and therefore are highlighted. Also, a landscape architecture breadth allowed for the redesign of the entry plaza in order to further incorporate the lighting into the space. As the main feature of the building, it served not only a safety purpose, but also the first impression of the PSECU Corporate Headquarters.

The electrical depth examined the redesign of the branch circuits, distribution for the relighted spaces, along with a redesign of the feeders and panelboards for coordination purposes. A protective device coordination study was completed from the utility to a lighting panel in order to determine if the protective device was designed properly. Additionally, a design of a photovoltaic system was designed and the feasibility of the system was determined. A cost benefit analysis of increasing the feeder sizes of all of the feeders in the Pennsylvania State Employees Credit Union Corporate Headquarters was performed to study the advantages and disadvantages of increasing feeders, such as cost and energy savings.

A daylighting analysis for the M.A.E. focus was performed to determine the dimming algorithm for the marketing office, along with cost savings. The marketing open office was selected due to the addition of the north facing clearstories, along with the lightshelf and overhang. Also, a mechanical analysis of the marketing office was performed to determine if the alterations in the heating and cooling loads would require a redesign of the mechanical equipment.