

## EXECUTIVE SUMMARY |

The following report is the culmination of a semester of work to research the building, study redesign possibilities, and develop final designs and recommendations. The report focuses on the lighting and electrical aspects of the building as the senior thesis depth topics. Additionally, a daylighting study was performed as an MAE special topic based on work done in graduate courses. And finally, two breadth topics were studied to display the wide base of knowledge that the Penn State Architectural Engineering has provided.

The existing lighting for four select spaces in the new Engineering Center at Oakland University was redesigned. The lighting redesign is focused on a central concept of furthering the engineering industries through the studies undergone at Oakland University which ultimately pave the way for progress. The lighting design also attempts to accent the very geometric forms of the Engineering center and provide spaces that are visually appealing and conducive to collaboration.

From these redesigns, the effects on the electrical system were analyzed and branch circuits were altered to show the differences in connected loads. The electrical system was not drastically altered and no changes would have to be made to the main electrical equipment.

The two breadth topics, as well as the daylighting analysis are centered around the addition of three Kalwall pre-engineered Skyroof products to the project labs space on the first level. The main purpose for these skylights was to increase the daylighting in the project labs space to further the lighting concept and save energy through photosensor dimming of the electric lighting. The addition of these skylights also decreased the structural dead load providing the possibility to downsize the members directly affected by this decrease. Hand calculations were done to show this possible change in structure. Likewise, the mechanical heating and cooling loads were affected by the addition of the skylights and analyzed. A simple payback period was calculated based on an official quote of the Kalwall system and final recommendations are given.