

## Executive Summary

The following report is a comprehensive collection of the work done during the spring semester for Senior Thesis. For the lighting portion of this thesis, four spaces were analyzed and new designs were applied. These spaces include the Atrium, the Videoconference Room, the Aquaculture Laboratory, and the Meadow outside the front of the building. The primary goal of these new designs was to improve the performance of the spaces over the original in terms of lighting levels, lighting quality, system flexibility, and efficiency. Criteria were set forth in all locations and met, creating quality lighting systems while maintaining acceptable power densities.

For the electrical section of this thesis, analyses of the impacts of the new lighting systems were performed. An effort was made to curtail increased power consumption in the new designs. As such, the impact on the electrical distribution systems was minimal. In addition to providing enough distribution capacity in the system, the voltage drop along the longest circuit was checked to ensure code requirements were met. The short-circuit capacity of the wires in the building was also checked. Finally, the main building feeder size was increased to more easily allow growth in the system in the future.

Two breadth design topics flowed from the new lighting designs. The first was a new steel beam across the atrium to allow for suspended lighting fixtures in that space. While the load on the beam was found to be minimal, design considerations such as construction loading and unbraced length forced the beam size up. The second breadth topic was an acoustical analysis in the Videoconference room. Reverberation time for the space was calculated to ensure a high level of speech-intelligibility during conferences. Combined with the new lighting system, this breadth topic helped improve the quality and functionality of the space dramatically.