EXECUTIVE SUMMARY

Natural Science Unit II is a notable new building on the campus of The University of California Irvine. This report presents a summary of work completed in the spring semester of 2009, and is the culmination of a year-long study of various systems within the building and their interaction with one another. The primary focus of this report is the lighting and electrical systems within Natural Sciences Unit II.

The lighting depth section presents a redesign of the architectural lighting for four student-selected spaces: the building's north façade and entry plaza, the main entry lobby, the main conference room, and a third floor open office space. New designs have been conceived based on several technical and aesthetic criteria relating to the use and architectural style of the facility. Calculations and renderings have been performed to confirm the effectiveness of the proposed redesigns for each of the four spaces. Unique design concepts and developments are also discussed in each section. Proposed solutions are generally responsive to design goals and are successful in meeting the design criteria set forth.

In addition to the lighting redesign, an electrical systems redesign was also performed to accommodate changes in the building illumination systems. Panelboards and feeders for each room were sized according to the redesigned load, and circuiting and control diagrams are presented. A protective device coordination and short circuit analysis have also been performed for a path through the electrical distribution system. Additional depth studies in the electrical section include a feasibility analysis of the installation of a photovoltaic array on the roof of the building, and a study of the possible financial and performance implications of changing the building's feeder material from copper to aluminum. Both of these solutions represent a significant opportunity for fiscal savings by the university.

As energy efficiency is a major concern in most modern institutional projects, a daylighting study has been performed for the open office space on the third floor. Daylight conditions throughout the year have been evaluated an appropriate photosensor-based system has been designed for the space to allow wiser use of energy and materials.
Two additional topics outside the lighting and electrical focus have been studied and are also presented here. First, a mechanical study evaluating the heat loss through a large expanse of glass in the main lobby has been performed, and suggestions for improving the building's glazing system are given. An acoustical study of the lobby space was also completed through the discussion of architectural modifications, building materials, and reverberation times and was found to be acceptable.

Through the simultaneous evaluation of all these topics, this report provides insight into the unique building systems and integration issues concerning UCI Natural Science Unit II.