

Thesis Proposal

Christine Clowes

Lighting/Electrical Option

Faculty Consultants: Professor Dannerth & Professor Mistrick

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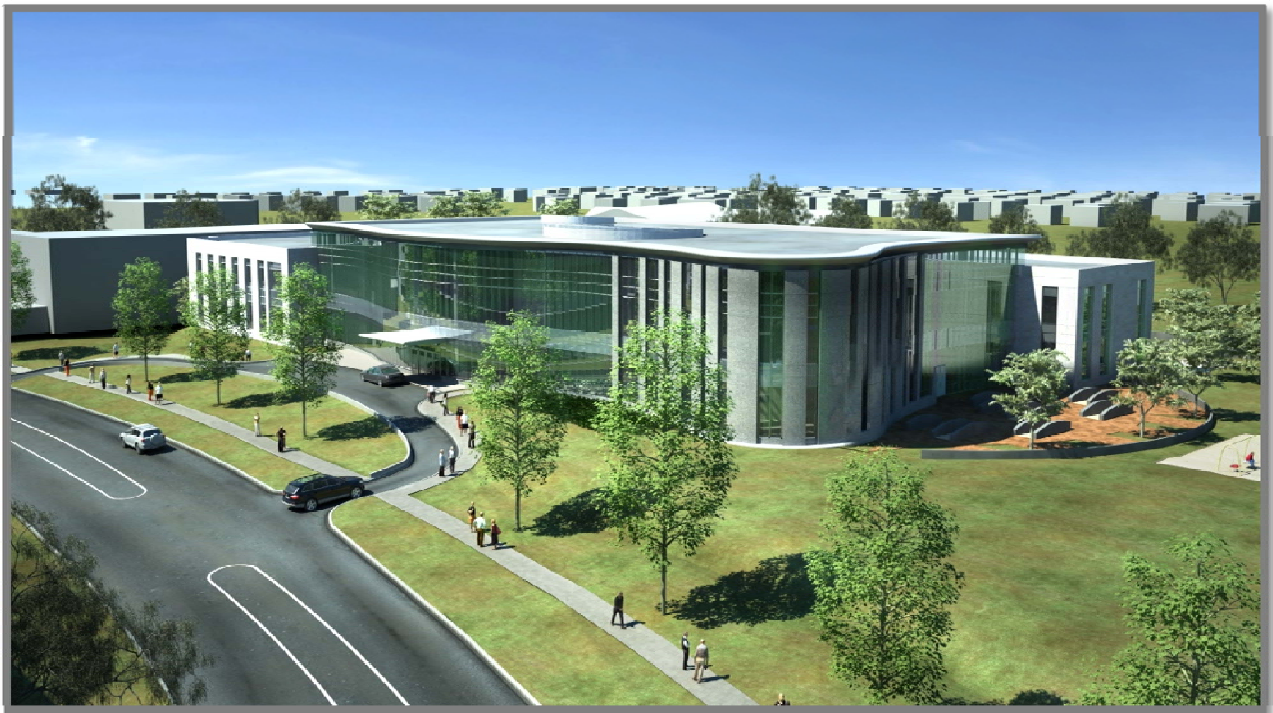


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Executive Summary

This proposal details the work to be completed in the Spring of 2009. It presents a description of the redesign of several systems present in the National Intrepid Center of Excellence (NICoE). Included are explanations of two depth and two breadth topics. This document does not conclude that there are actual problems with the existing systems, it is just meant to provide an approach to alternate solutions.

The lighting depth presents new design concepts in four proposed spaces: exterior site and façade, lobby, auditorium, and physical and occupational therapy/waiting areas. The new design aims to create a comfortable, pleasant, and workable atmosphere that is tailored to the needs of the occupants. The space should also be functional, with light levels that meet those specified in the IESNA Handbook. All power density requirements present in ASHRAE 90.1 should also be met.

The electrical depth includes a redesign of the branch circuit distribution for the four spaces to be re-lighted. A protective device coordination study and short circuit analysis will also be conducted. A voltage drop analysis will lead to a comparative cost study of increasing feeder sizes to save energy and money. SKM software will then be used to perform a short circuit analysis, protective device coordination, and arc fault study for the distribution system.

The mechanical and architectural breadths will be developed as a direct result of daylighting and systems integration. The mechanical breadth will cover the effect of eliminating the east-facing clerestory in the physical therapy/occupational therapy space. The change in cooling loads will be closely analyzed. The architectural breadth will include a redesign of the size, layout, and materials used for the wood ceiling panels located in the auditorium. This will enable the full integration of all building systems.

Breadth 1: Architecture

The auditorium has some very unique architectural features. The ceiling geometry is especially important in terms of the lighting layout. In order to accommodate for a lighting design that is both functional and visually pleasing, the ceiling details will be slightly modified. The materials, shape, and location of the existing wood panels will be altered, and additional paneling will be placed. This will make the space more architecturally pleasing and create a more efficient lighting design. The location of mechanical equipment and the coordination with other components located above the ceiling will be considered to fully integrate all building systems.

Breadth 2: Mechanical

The therapy waiting area contains a 2.5' clerestory that runs along the east wall. The location of this clerestory above the dropped ceiling does not enable this window to contribute an adequate amount of daylight into the space. The elimination of the element will greatly affect the total cooling load necessary in the space. A comparative study will be completed to determine the difference in energy load between the glass and a standard wall system. Additional cooling load contributors within the space will also be calculated.