Benjamin Hagan
Lighting/Electrical Option
James J. Whalen Center for Music, Ithaca, NY
Primary Faculty Consultant: Mistrick

Photo courtesy of HOLT Architects, P.C.

Thesis Proposal

December 15, 2003

Building Background

The James J. Whalen Center for Music is an all-in-one home for the school of music at Ithaca College in Ithaca, NY. The Whalen Center is a 69,000 sf addition to the existing Ford Hall, a large performance hall constructed in 1964. The school of music holds a very high profile at Ithaca College, as the college was founded in 1867 as the ‘Ithaca Conservatory of Music’ and remains one of the staples of the Ithaca College campus. The new facility contains 30 new faculty studios, a 250-seat recital hall, designed primarily for solo and chamber music recitals, choral and jazz rehearsal rooms, a professionally equipped recording studio that will also serve as a laboratory/ classroom for a new major in audio recording, an electroacoustic music suite, a music education resource center with an attached observation room for student teacher preparation, a music technology classroom and laboratory, a user-friendly library for the ensemble music collection, and a covered walkway from the upper parking lot that will provide easier access to concerts and recitals.

The building was designed by HOLT Architects, construction began in December 1997, and reaction to the building upon its completion in August 1999 was extremely positive. The overall project cost was $14.4 million, of which $4.6 million went to mechanical and electrical systems. The architecture of the building exudes an appropriately scholastic feel, yet presents a dramatic and professional exterior to the surrounding campus. A balance between education center and performance venue is sought through the use of a limestone accented brick envelope with sleek dark glass and bright aluminum glazing.

Depth Topic – Lighting Design

Five specific and separate lighting systems will be redesigned with minimal impact to current architectural design features. The overall goal of the lighting system redesign is to function appropriately for the various activities taking place here while maintaining an enhanced aesthetic quality that emphasizes the quality of the architectural design and creating an atmosphere where emotions can be developed, explored, and understood. Music is very emotional, as all arts are, and as any art, music can mean many different things to many different people. Visitors, students and faculty alike should have their emotions enhanced, not influenced, by their surroundings so that the music can be fully appreciated. Equally important as these special design considerations, standard design parameters such as safety, cost, and energy consumption will be considered during the design process.

Specific design goals have already been developed for each of the five spaces to be redesigned, and preliminary lighting system designs have been developed to accomplish these goals. The preliminary designs were presented to a panel of peers and professionals on Tuesday December 9, 2003 at the Lutron Corporate Headquarters in Coopersburg, PA. Notes and comments on the Schematic Design Proposal are available as part of the attachments to this document and the presentation in .PPT format is available for viewing at:
http://www.arche.psu.edu/thesis/2004/bmh157/bmh157Proposal.htm

During the Spring 2004 semester, the comments will be incorporated into the schematic designs and detailed lighting systems will be designed for each of the five spaces. The aesthetic and functional performance of the systems will be analyzed using lighting analysis software such as Lightscape. If available, Lumen Designer by Lighting Technologies, Inc. will be used in the analysis rather than Lightscape. Daylight studies will be performed in AGI32, or Radiance, or both, depending on the specific situation. All designs will be checked for compliance with IESNA guidelines as well as ASHRAE/IESNA Standard 90.1-1999. Control systems, where appropriate, will be specified as part of the lighting system design. Lighting plans, schedules, and specifications will be developed in order clearly convey the final lighting system designs.

Depth Topic – Electrical Design

During the Spring 2004 semester the existing electrical system, designed by M/E Engineering, will be analyzed and any appropriate changes to the design will be suggested and supported. Building loads, distribution equipment, protective devices, and feeders will be redesigned if affected by the proposed changes to the system. A motor control center which feeds a significant mechanical load will be redesigned and appropriate feeders and protective devices will be resized. All calculations for the redesign of the electrical systems will be documented and will be accompanied by brief narratives describing the design procedure. All equipment selected for use in the redesign will be noted and manufacturer's technical information will be made available.

Breadth Topic – Structural Design

The large instrumental rehearsal space currently suffers from a lack of daylight. The current lighting system is a direct/indirect system, but in a tall space like this, much of the indirect component of light is lost before getting down to the work plane. Special acoustic ceiling tiles and heavy wall curtains, installed for acoustic reasons, have comparatively low reflectance values and therefore contribute greatly to the loss of light before reaching the work plane. The ceiling of such a tall space, however, should still remain light, to avoid giving a mysterious, hollow, feel to the room. A skylight or light-shelf system should be added to the space to bring in vibrant, free light, and a supplemental lighting system should be installed to mimic the appearance of daylight during hours of darkness.

Although a proper skylight/light-shelf system will be defined through the lighting depth portion of the thesis, the structural implications of the addition of this system will be analyzed as a breadth study. A daylighting system will disrupt the existing wall structure or roof framing, or possibly both. For the light-shelf system, steel framing will be designed for the glazing area. The building weight will be reduced due to material changes and framing will be resized appropriately. For the sky light system, roof framing will be designed like any roof penetration, and members will be checked for satisfactory conditions under lateral loading. If necessary, a RAMSteel model will be incorporated.

Breadth Topic – Mechanical Design

During the design and construction phases of this facility, several changes were made to the plans, which may have reduced the acoustic integrity in critical spaces in the facility. Also, the addition of a daylighting system in the instrumental rehearsal room will change the acoustic performance of that space. Faculty and students who use the space have reported dissatisfaction with the 'liveliness' of the recital hall and instrumental rehearsal space, resulting in a one dimensional sound rather than a rich multi-layered sound. An acoustically 'live' space also makes recording audio difficult due to the relatively large variance in loudness of the space and the inability to isolate a single audible source.

Budget constraints are most likely the reason for the elimination of several acoustic considerations in this facility, and that is a factor which cannot be removed from the story of how this building was developed. The current acoustic conditions of the rehearsal space and the recital hall will be analyzed, and compared with the deleted acoustic treatments to see if the cost savings was worth the overall acoustic effect. Architectural features, material selection, and HVAC systems in both of these spaces will be analyzed and suggestions will be made on how to increase the acoustic quality while adding little or no cost to the existing design. Also, the acoustic impact of the addition of a daylighting system to the rehearsal space will be analyzed and, if necessary, compensating acoustic treatments will be suggested.

Progress Timetable

12 January	– Classes begin, schedule absorbed.
19 January	– Begin work on 3D cad models for import into lighting analysis software.
26 January	– 3D cad models continued.
2 February	– 3D cad models continued, electrical depth analysis.
9 February	– 3D cad models continued, electrical depth calculations.
16 February	– Electrical depth completed, acoustic research begin.
23 February	– Acoustic breadth complete.
1 March	– Lighting system designs finalized, best open area plan selected.
8 March	– Lighting system plans, schedules and specs.
15 March	– Lighting software modeling, structural breadth research.
22 March	– Lighting software modeling, structural breadth complete.
29 March	– Lighting software modeling, begin .PPT presentation.
5 April	– Thesis Book due, .PPT presentation touch-ups.
12 April	– Thesis presentations.
14 May	– Graduation