

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 Breadth Proposal December 5, 2003

Executive Summary

Background:

See <http://www.arche.psu.edu/thesis/2004/bmh157/bmh157BldgStats.htm> for building information.

Structural Breadth:

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.

Acoustic Breadth:

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.