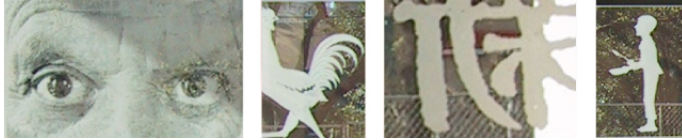


HARRY RANSOM CENTER RENOVATION

University of Texas at Austin



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Lighting/Electrical Emphasis
The Pennsylvania State University
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THESIS RESEARCH PROPOSAL

2 FEBRUARY 2007

Executive Summary

This report outlines thesis work to be completed during spring semester 2007. Extensive research and design work will be undertaken in Harry Ransom Center's lighting and electrical distribution systems. The redesign of the electrical distribution system will concentrate on the renovated first and second floors, including the Prothro Family Theatre. Most of the fluorescent lighting systems are currently fed at 120 Volts will be redesigned to operate at 277 Volts. Likewise, branch circuits and panel boards in these areas will be redesigned. Lighting system work will be limited to the entrance canopy/building façade, lobby, north and south corridor/lobby areas, theatre, the Ransom Center gallery, and the second floor reading room. Within these spaces a concentrated study and redesign will be developed for unique situations such as the first photograph display area, the Gutenberg Bible display, donor walls and easel wall displays for temporary artifact research. In conjunction with electrical and lighting systems, a breadth study of architectural and mechanical elements will be incorporated into the thesis work. Breadth work, limited to the Ransom Center gallery and theatre, will encompass the following: a complete redesign of the ceiling systems, including selection of new material; a reorganization of temporary and permanent gallery display partitions; redesign of mechanical distribution systems; an acoustical study; overall coordination and integration of all systems to complete construction documentation of these areas.

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Depth Work - Lighting

Six spaces within the Harry Ransom Center have been selected for extensive lighting redesign in this thesis research paper. These spaces include the entry canopy/vestibule, the main lobby, north and south lobby/corridor space, theatre, art gallery, and library reading room. The main lobby as well as north and south lobby/corridor areas are interconnected and share common materiality, therefore during the design phase they will be treated as one large space and share common fixture types. All of these spaces will be designed with target power density values as stipulated in ASHRAE/IES 90.1 version 2004. Room power density trade-offs should be considered to allow more lighting flexibility in areas such as the art gallery.

There are several sub-spaces within the Harry Ransom Center that will require specific attention during redesign. In technical assignment three, window grazing with light emitting diodes (LEDs) on the entry vestibule signature wall and north/south lobby windowpanes was proposed. A study will need to be made to determine the necessary light levels needed on the etched glass windows to overcome ambient light from within the Ransom Center and the exterior surrounds. Coordination with architectural details will also be examined to make an assessment of overall design feasibility. The Gutenberg Bible display area will also be examined extensively. The use of an occupancy sensor and selection of fixtures with improved ultraviolet and radiant heat performance may help preserve this important artifact for future generations. A similar assessment will be made for the First Photograph display area. As discussed in technical assignment three, significant glare on the photograph display casing limits the ability for guests to clearly see the image. A feasibility study of three systems will be preformed: light emitting diodes, fiber optic lighting, and halogen accent lights. One system will be selected for final design. Another area of intense study will be the ceiling systems in the gallery space and theatre. These areas will be discussed more in the breadth proposal.

In addition to the work mentioned above, effort will be made to incorporate dimming controls into all new lighting systems. Either localized controls or a centralized dimming rack will be implemented to allow added lighting system flexibility. The Ransom Center's use is limited to specific hours of the day and is an excellent candidate for a timeclock/energy management system. In a discussion with facility managers at the Ransom Center, it was mentioned that their current lighting system is extremely difficult to understand and control. These problems are further exaggerated because there are currently no time controls; a schedule has been developed which requires manual changes to the lighting controls in each room during morning, afternoon, evening and overnight hours as well as specific changes for theatre events. Simplifying controls and automating many of these lighting systems may save energy while improving facility management's control of the spaces.

Depth Work – Electrical Systems

In addition to redesigning the lighting systems for these select spaces, an electrical redesign of all branch circuit distributions will be completed. This will include the preparation of panelboard schedules for all areas of redesign that are affected by lighting system changes, sizing of all feeders for the panelboards, and the layout of branch circuits and controls in each space. Currently 120 volt lighting systems are used in the Ransom Center, and during the redesign of these spaces most lighting systems will be changed to 277 volt. There is a considerable amount of fluorescent lighting in the Ransom Center, and implementing a 277 volt system should increase lighting system efficiency. Further electrical systems study will include the redesign of one of the primary distribution panelboards. This panelboard supplies power to the gallery and lobby areas. In conjunction with mechanical breadth work study, design loads for all modified building HVAC systems will be completed. Lastly, a protective device coordination study shall be studied to test the redesigned system for safety.

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Breadth Work – Architectural Redesign and Systems Coordination

An architectural breadth study will be completed for the Ransom Center's Prothro Family Art Gallery. This space is the main attraction to the Ransom Center and acts as the "heart" of the building; the Ransom Center's most valuable archives are displayed here on a rotating basis. The center prides itself with having one of the world's most complete set of archives; many scholars visit this building to investigate an artist's life in his or her entirety – from their lifelong books of sketches, journals and diaries to their most important novels and paintings. Unfortunately, this overall cohesiveness was not always carried out in the Ransom Center gallery. Guidelines provided by the Americans with Disabilities Act as well as restrictions within the renovated space have resulted in a cluttered, cavernous feel in the gallery.

An architectural redesign of this space will be implemented to provide a more cohesive gallery that draws attention to the collections. A handicapped ramp will be redesigned, wall materiality and color choices will be selected to brighten the space, and a coffered ceiling with structural elements will be implemented to neatly tuck away the many adjustable lighting fixtures that are needed within the space. Partitions will be moved to allow better use of the gallery's lightwell. Likewise, partitions throughout the space will be redesigned to be lower in height and open on the bottom. This will make moving the display partitions easier and reduce room clutter. Technical aspects such as the selection of wood, concrete, or composite products for the new coffered ceiling will be completed. The new ceiling design will be coordinated with existing mechanical ductwork and provide mounting points for artwork lighting. Lastly, the emergency lighting system will be removed and integrated into the general lighting system. This should further reduce clutter and provide tremendous savings in construction costs.

Breadth Work – Acoustics

A reverberation time calculation will be completed for the Ransom Center's theatre. Based upon these findings, the ceiling, to be redesigned for the new lighting system, will provide better room acoustics. Seating, floor, and wall materials will also be adjusted as required.

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Schedule

WEEK	Description
January 15 - 21	Update 3D models, genral thesis planning with consultants
January 22 - 27	Luminaire selection, cut sheets, ies files for lobby/corridor spaces, reading room, exterior
January 28 - 30	Attend IESNA annual conference (Phoenix, Arizona)
January 31 - February 4	Redesign Gallery space - preliminary concepts and materials
February 5 - 11	Luminaire selection, cutsheets, ies files for gallery and theatre. Electrical load redesign lobby/corridor spaces.
February 12 - 18	Electrical redesign reading room, theatre, lighting design for Bible Display.
February 19 - 25	Investigate lighting strategies for first photoraph display, continue gallery redesign.
February 28 -March 4	Finalize lighting layouts for gallery, calculate electrical loading
March 5 - 11	Begin dimming/timeclock and controls specification and planning. Finalize renderings for corridors, reading room.
March 12-16	Spring Break - pause on thesis. Work on any tasks not completed on schedule (if necessary).
March 17 - 23	Investigate lighting strategies for curtain walls. Make specifications, find ies files. Finalize first photograph display. Finalize renderings for gallery and theatre.
March 24 - 30	Acoustical calculations for existing theatre conditions. Recalculate for new ceiling and wall systems. Finalize all electrical panelboards and calcuations.
March 31 - April 5	Finalize anything not yet completed. Bind thesis report.
April 6	Final thesis report due
April 6 -17	Prepare thesis slideshow presentation, prepare speech
April 17	Present thesis