

CHRISTOPHER NEWPORT UNIVERSITY

Paul & Rosemary Tribble Library

Senior Project Proposal for Spring Semester

01.22.2021 - TECH REPORT 4B

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I. Anticipated Work for Spring 2021

1. Introduction

a. EXECUTIVE SUMMARY

The Paul & Rosemary Tribble Library lies at the heart of Christopher Newport University's campus. Due to its age, the building has undergone a number of additions and renovations. This proposal focuses on the 2016 addition. Specifically, the report addresses the lighting and electrical work intended for completion in the Spring 2021 semester, as well as the structural and acoustical breadths which will be undertaken. Also included is a summary of the feedback received for the initial design development presentation given to a board of industry professionals, as well as action items associated with this feedback. Finally, this report discusses the intended additional component of study required for the integrated MAE program.

2. Lighting Depth

a. SCOPE

The main portion of the work to be completed in Spring 2021 will be within the lighting design depth. This includes design completion of the six spaces detailed in Tech Reports 1A, 1B, and 3. Design completion will include (but not be limited to) light level calculations, fixture selection and potential installation options, and final renderings of each space.

b. QUANTITATIVE ANALYSIS

The quantitative analysis portion of the lighting depth will include light level calculations in AGI32 (or another approved software, such as 3DSMax), selection of fixture specifications, and ensuring IES recommendations are met and justified.

This portion will also tie into the MAE component being studied, in the form of daylight analysis in the Media & Technology Commons. This daylight analysis will be carried out in Grasshopper (or another approved software).

c. QUALITATIVE ANALYSIS

The qualitative analysis will consist of final design decisions which are in line with the qualitative criteria set forth in Tech 4A, as well as justifications for how each of these criteria has been met. Evaluation by other professionals from the student's personal network may be used here to supplement the analysis of each design's success.

d. DESIGN COMPLETION

The completion of the six spaces' designs will be presented in the final thesis report, and will include finished and polished renderings of each room, carried out by 3D modeling software and photoshop, as well as any other tools necessary.

3. Electrical Depth

a. CONTROL REDESIGN

The electrical depth in Spring 2021 will consist of, in at least the six spaces outlined in Tech Reports 1A, 1B, and 3: the evaluation of the current control systems in place, the detailed improvement and redesign of these systems, the integration of these controls with existing systems, a detailed look at the control devices and circuits required, and finally, the specific implementation of daylight-based control anywhere which is applicable. The final point will tie into the MAE component of the thesis, which focuses on daylighting applications in the Media & Technology commons.

4. Structural Breadth

a. ROOF ALTERATIONS TO MEDIA CENTER

In light of the fact that the Media & Technology Commons is in the core of the library, it receives little daylight. This breadth will tie into the Daylight depth explored for the MAE portion of the thesis by seeking to redesign the flat roof above the Media Center in order to better accommodate rectangular and/or tubular skylights. This will require load calculations for the supporting members of this area of the roof, as well as a redesign of any surrounding roof systems affected by the alteration.

5. Acoustical Breadth

a. PREFUNCTION & 100-PERSON THEATER

The prefunction space and 100-person theater, meant for small functions, has a dedicated A/V system but no noticeable acoustical provisions within the space. This portion of the work will evaluate the need for acoustic intervention, analyze this need, and seek to implement a solution that improves the acoustic situation within the theater. This acoustic solution will need to respond to the aesthetically-specific style of the space, and it may be integrated with the final lighting design.

II. Schematic Design Feedback & Changes

1. Summary

In reference to the specific spaces addressed in the schematic design, the panel of professionals gave the following feedback:

FACADE

- The white lines in the schematic image are too bright and detract from the light shown.
- The relative brightness of the lighting isn't very clear in the image; further investigation would elevate the design.

LOBBY

- Despite the fiber-optic stars being a pleasant aesthetic idea, they won't work for wayfinding as people don't tend to look above them.
- The information desk should be specifically addressed by the lighting design.
- A proposed alternate material for the ceiling and floor could provide further interaction with the fiber-optic element on the ceiling.

SPECIAL COLLECTIONS & DISPLAY GALLERY

- Specifically address display case lighting in your design, and be sure what will be on display in the space.

MEDIA & TECHNOLOGY COMMONS

- Address daylighting more explicitly; it's a definite issue in the space and greater implementation of the "bring nature in" idea would improve the design's conceptual cohesion.

PREFUNCTION & 100-PERSON THEATER

- Specifically label lighting modes in the theater.

READING ROOM

- Tunable white may be a good thing to investigate in this space, due to the high level of fluctuating daylight.
- The skylight should be addressed at night specifically, as the solutions that will work for it during the day won't be the same in the evening.

Additionally, a few general notes were given by the panel in regard to the design and concept as a whole.

GENERAL

- Playing with finishes may provide an extra dimension to the lighting redesign.
- In terms of presentation, eliminate the excess text on the slides.

2. Action Items

Given the above feedback, the following action items have been identified:

FACADE

- When creating schematic images, be aware of the brightness of both the linework and the different layers of light, in order to maintain visual clarity.

LOBBY

- Create a new, more explicit wayfinding element, perhaps by playing with finishes.
- Address the information desk specifically.

SPECIAL COLLECTIONS & DISPLAY GALLERY

- Reach out to the library and learn what specifically they display in this area.

MEDIA & TECHNOLOGY COMMONS

- Introduce actual daylight through the implementation of skylights (see Structural Breadth and Daylighting MAE Component).

PREFUNCTION & 100-PERSON THEATER

- Arrive at specific lighting modes the DMX network can create, and label them.

READING ROOM

- Investigate tunable white in terms of cost and fixture selection.
- Directly address the skylights at night, rather than simply in general.

As for general action items:

GENERAL

- Look into alternate floor and wall finishes, based on the existing portions of the library, and evaluate how they might improve the redesign.
- Eliminate excess text on slides in future presentations.

III. MAE Component

1. Daylighting Depth

The Media & Technology Commons, in the core of the library, is a large space without any daylight. This investigation will evaluate the need for daylight in the space, and then will propose a skylight-oriented solution. The pros and cons of standard vs. tubular skylights will be explored, as will placement, brand selection, and light level / sDA calculation. This depth will make use of the course concepts taught in AE 565 (Daylighting), AE 579 (Sustainability), and AE 597 (BIM - to be taken in Spring 2021).

The roof alterations required for the implementation of these skylights will be further explored in the Structural breadth. The associated daylight-sensor controls will be explored in the Electrical depth, and they will also be evaluated for potential energy savings and green applicability.

IV. ABET Component

1. PSU AE - ABET 2.3

The lighting changes proposed in the Lighting depth, as well as the more comprehensive sensor-based controls introduced in the Electrical depth, may positively affect HVAC loads and energy consumption, as many of the fixtures within the building are not LED and occupancy / daylight sensors are few. This green impact will be investigated as part of the MAE component of the thesis. The switch to more distinctly modern lighting modes may also provide ease of maintenance and installation in terms of construction management.

Additionally, the implementation of acoustics in the Acoustical breadth may lead to required alterations in the HVAC system surrounding the theater, although it is (as of yet) impossible to say whether those impacts will be negative. If so, this negativity will be weighed against the possible solution and addressed before it's implemented.

The structural changes to the roof above the media commons as part of the Structural breadth may provide issues in construction management, as this is near to where the addition was joined with the existing building. The difficulties surrounding this join should be addressed if the roof alterations approach them.

2. PSU AE - ABET 2.4

The redesigns offered in this thesis will meet and exceed requirements of all applicable safety codes, ensuring public health, safety, and welfare. This may be most pertinent in the Electrical depth, which will require the installation of new electrical items.

The conceptual intent of the design seeks to encourage students to learn and to invite everyone, regardless of who they are, into this public space of learning. This specific emphasis on inclusion may be especially pertinent to the current social climate in a divided America.

Finally, the investigation of more comprehensive daylighting applications and detailed controls will focus on energy conservation. That conservation will be pursued with an eye to sustainability, as well as economic (in the form of energy savings) and environmental factors.

3. PSU AE - ABET 7.2

In the Lighting depth, an in-depth analysis of the light levels of potential designs will be evaluated. This will be performed in AGI32 (or another approved software, such as 3DSMax), and will be evaluated against the recommendations set forth in the 2010 IES Handbook. Renderings will be completed in software including, but not limited to, 3DSMax, AGI32, Sketchup, Revit with ElumTools, and Photoshop.

In the Electrical depth, a detailed understanding of the fixtures and control devices will be required, information which can be acquired from the manufacturers' websites and local representatives. National Electric Code (NFPA 70) will also be specifically followed.

The Structural breadth will require calculation of loads by hand, as well as possibly by a supplemental software, such as SAP. Information about building members and materials can be gleaned from the architect's drawings.

The Acoustical breadth will require additional research into articles regarding small-theater acoustics, as well as research of comprehensive and individual acoustical system solutions. The A/V contractor listed on the drawings, as well as the library owners (the University), may also need to be contacted in order to fully understand the acoustical intentions of the space.

V. Gantt Chart for Spring 2021

