

CHRISTOPHER NEWPORT UNIVERSITY

# Paul & Rosemary Tribble Library

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Existing Lighting Conditions & Design Criteria

10.26.2020 - TECH REPORT 1B

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## I. Power Distribution Systems Report

### 1. Overview

#### 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 report focuses on the 2016 addition which nearly doubled the size of the existing building and included the installation of all-new light fixtures in said addition. What follows is an in-depth look at this lighting, including but not limited to detailing of fixtures, controls, light levels, design criteria, and finishes.

#### b. SUMMARY OF EXISTING LIGHTING

Much of the general illumination of the library is provided by lay-in troffers (both 2x4' and 2x2') and recessed 6" can lights. Because many of these are not LED fixtures, they provide a good opportunity for increased energy conservation and LEED efforts. That said, there are also numerous retrofit-LED pendants, chandeliers, and sconces, some of which are custom, for decorative purposes.

Due to the library's size, many of the spaces addressed in this report are well inside of the building and have no exterior walls; therefore, they have no daylight component. The major exceptions to this are the Reading Room (L2 & L3) and the Lobby (L1), which are detailed below.

There is a plethora of control types, including but not limited to time-controlled switches, indoor occupancy sensors (private offices, group study spaces, other small work spaces), and multi-button panels. For a detailed summary of the control devices within the library, see Section 260923, Volume 3B of the Project Manual.

## 2. Large work space - Media & Technology Commons, L2

See Sheet A9.24, A9.25 for RCPs, A3.01 for section, E1 series for fixture tags

### a. SYSTEM ELEMENTS

#### Fixtures

| TAG   | DESCRIPTION                                               | MANUFACTURER | LAMP                                 | BALLAST                           | WATTS     | USE CASE                                               |
|-------|-----------------------------------------------------------|--------------|--------------------------------------|-----------------------------------|-----------|--------------------------------------------------------|
| R12-D | Lay-in 2x4 troffer with center channel detail             | Ledalite     | 1x Philips F54T5/H O/835/AL TO       | 0-10V dimmer                      | 62 W      | Main commons, general illumination                     |
| R2-D  | Recessed 6" aperture wall wash downlight                  | Lightolier   | Integral LED, 3500K, 2031 lm         | Integral dimmable driver          | 32 W      | Surrounding corridors, throughways, and room perimeter |
| R4-D  | Recessed 6" aperture double wall wash downlight           | Lightolier   | Integral LED, 3500K, 2031 lm         | Integral dimmable driver          | 32 W      | Surrounding corridors, throughways, and room perimeter |
| R7    | Recessed flangeless accent downlight.                     | Inter-lux    | Integral LED, 3500K, 1420 lm nominal | Remote dimmable driver            | 19 W      | Accent of interior dome                                |
| L1    | Surface-mounted, continuous, modular LED cove             | CK           | Integral LED, 3500K, 653 lm/LF       | No dimming                        | 12.5 W/LF | Accent of interior dome perimeter                      |
| L1-D  | Surface-mounted, continuous, modular, & dimmable LED cove | CK           | Integral LED, 3500K, 653 lm/LF       | Integral dimmable driver          | 12.5 W/LF | Cove uplights in Technology Commons                    |
| L2    | Suspended, continuous linear fluorescent D/I pendant      | Focal Point  | Philips F32T8/TL 835/PLUS /ALTO      | Electronic program start ballasts | 8 W/LF    | Group study/editing suite rooms, general illumination  |

**Figure 1:** Abridged lighting fixture schedule. For complete fixture schedule, see Section 265100, Volume 3B of the Project Manual, and for ballast details, see Part 2.3 of referenced Section. Section 265009 may also be of use for ballast details.

## b. DAYLIGHT ELEMENTS

The daylight present in the Media and Technology Commons will primarily be provided by clerestory windows in the dome over the information commons portion of the space. There are several windows in the private offices adjacent to the Commons, but no direct windows to the exterior are present in the main space, as it is located in the core of the building.

For this reason, general illumination should not be expected to have a supplemental daylight component, which is likely the reason for the numerous 2x4 troffers located 8' on center in the majority of the space. The considerations associated with the lack of daylight will be discussed in Section II. of this report.

## c. SPACE PROPERTIES

### *Summary of Geometry*

The large work space has three primary areas of differing geometry. The first is the central information commons, with a tiered architectural dome above an atrium. This atrium is lined with decorative columns of the doric order, which may provide an interesting lighting opportunity.

The second area is the media commons, with an approx. 12' ceiling height and a slightly lower coffer around the edges. The third area is the approx. 10'-high technology commons space. Both the 10' and 12' spaces have a coffer element, but neither highlight this with architectural lighting.

### *Furnishings*

Although fully-furnished plans were not provided, many elevations and sections in the drawing set show furnishings in line with the traditional, colonial aesthetic of the library's architecture. For example, a large wooden desk is present in the information commons, and small tables with individual incandescent lamps are illustrated in a few elevations. These have been attached below for reference.

From photographs provided by the architect (also attached), it's assumed that tables for both individual and group work will be located throughout the space at regular intervals, most likely made of a mid-tone wood and at a workplane height of 2'6".

*Finishes*

| LOCATION | MATERIAL                      | REFLECTANCE |
|----------|-------------------------------|-------------|
| Floor    | Axminster & broadloom carpet  | 0.1         |
| Walls    | White / beige painted plaster | 0.7         |
| Ceiling  | Gypsum                        | 0.8         |

**Figure 2:** Abridged finish schedule. Finishes are either taken from photographs or finish plans in drawing division A8, Volume 3A. Finish reflectances are taken from finish schedule on Sheet A8.00 or otherwise a synthesized assumption from IES and other sources.

### 3. Special purpose space - Theater Pre-Function & 100-seat Auditorium, L2

See Sheet A9.23 for RCP, A3.01 for section, E1 series for fixture tags

#### a. SYSTEM ELEMENTS

##### Fixtures

| TAG  | DESCRIPTION                                                                                  | MANUFACTURER | LAMP                                 | BALLAST                                                    | WATTS | USE CASE                                          |
|------|----------------------------------------------------------------------------------------------|--------------|--------------------------------------|------------------------------------------------------------|-------|---------------------------------------------------|
| T1-D | Track mounted cylindrical accent light; 15 degrees with beam softening lens                  | LSI          | Integral LED, 3000K, 1200 lm nominal | Integral electronic dimmable driver; reverse phase ELV dim | 14 W  | Aimable accent light for stage & performances     |
| T2-D | Track mounted cylindrical accent light; 40 degrees with beam softening lens                  | LSI          | Integral LED, 3000K, 1200 lm nominal | Integral electronic dimmable driver; reverse phase ELV dim | 14 W  | Aimable accent light for stage & performances     |
| T3-D | Track mounted cylindrical accent light; 40 degrees with kick reflector & spread lens         | LSI          | Integral LED, 3000K, 1200 lm nominal | Integral electronic dimmable driver; reverse phase ELV dim | 14 W  | Aimable accent light for stage & performances     |
| TA   | Recessed flanged 2-circuit track.                                                            | LSI          | N/A                                  | N/A                                                        | 600 W | Track system for above fixtures within theater.   |
| P5-D | Pendant-mounted 42" diameter decorative bowl; faux alabaster acrylic diffuser; LED retrofit. | OCL          | (6x) 11W Cree A19P-60 W-27K-1 20V    | Integral dimmable driver                                   | 66 W  | Decorative illumination for theater & prefunction |
| R1-D | Recessed 6" aperture open dimmable LED downlight                                             | Lightolier   | Integral LED, 3500K, 2250 lm         | Integral electronic 0-10 V dimmable driver                 | 32 W  | General illumination                              |
| R2-D | See Large work space                                                                         |              |                                      |                                                            |       |                                                   |
| R4-D | See Large work space                                                                         |              |                                      |                                                            |       |                                                   |

|       |                                                                                                                             |            |                                 |                                      |      |                                                |
|-------|-----------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------|--------------------------------------|------|------------------------------------------------|
| R8-D  | Recessed 6" circular lensed wallwash LED downlight                                                                          | Lightolier | Integral LED, 3500K, 2031 lm    | Integral electronic dimmable driver  | 32 W | Accent and general illumination                |
| R16-D | Recessed 6" circular open dimmable LED downlight                                                                            | Lightolier | Integral LED, 3500K, 2250 lm    | Lutron 1% dimmable driver            | 32 W | General illumination                           |
| W6-D  | Wall surface mounted decorative torchiere sconce w/ shade; neoclassical alabaster cup with satin brass finish; LED retrofit | Brasslight | 1x 11W Cree A19P-60 W-27K-1 20V | Not specified in schedule; see below | 11 W | Decorative & perimeter illumination in theater |

**Figure 3:** Abridged lighting fixture schedule. For complete fixture schedule, see Section 265100, Volume 3B of the Project Manual, and for ballast details, see Part 2.3 of referenced Section. Section 265009 may also be of use for ballast details.

#### b. DAYLIGHT ELEMENTS

There is no daylight present in the theater pre function space, nor in the theater itself, as both rooms are in the core of the building. As with most theaters, this provides total control over the lighting conditions within and prevents daylight from interrupting a performance's aesthetic.

General illumination should not be expected to have a supplemental daylight component due to this.

#### c. SPACE PROPERTIES

##### *Summary of Geometry*

The ceiling of the theater is 12'-9 ½" high, providing ample space for large decorative fixtures and a rig with which to light the stage itself. The pre-function space is 1" higher, with a dropped coffer detail at the theater's 12'-9 ½" height.

Various neoclassical elements are present throughout the space, such as pilasters around the pre function space and at the entrance to the theater.

##### *Furnishings*



Photographs show that the theater is a richly-furnished space, with 100 closely-spaced cushioned chairs (upholstery reflectance detailed below). These are the only furnishings present within the theater, as seen in the photographs.



The pre-function space can be assumed to be without any significant furnishings, as it's a holding place for those waiting to be let into a performance.

#### Finishes

| LOCATION  | MATERIAL                             | REFLECTANCE |
|-----------|--------------------------------------|-------------|
| Floor     | Red broadloom carpet                 | 0.1         |
| Walls     | White / beige painted plaster        | 0.7         |
| Ceiling   | White gypsum                         | 0.8         |
| Doors     | Dark stained wood                    | 0.6         |
| Stage     | Pale stained wood, semi-gloss finish | 0.3         |
| Furniture | Yellow upholstery                    | 0.4         |

**Figure 4:** Abridged finish schedule. Finishes are either taken from photographs or finish plans in drawing division A8, Volume 3A. Finish reflectances are taken from finish schedule on Sheet A8.00 or otherwise a synthesized assumption from IES and other sources.

#### 4. Circulation space - Lobby, L1

See Sheet A9.11, A9.12 for RCPs, A3.01 for section, E1 series for fixture tags

##### a. SYSTEM ELEMENTS

###### Fixtures

| TAG  | DESCRIPTION                                                                                  | MANUFACTURER | LAMP                              | BALLAST                                    | WATTS | USE CASE                            |
|------|----------------------------------------------------------------------------------------------|--------------|-----------------------------------|--------------------------------------------|-------|-------------------------------------|
| P5-D | Pendant-mounted 42" diameter decorative bowl; faux alabaster acrylic diffuser; LED retrofit. | OCL          | (6x) 11W Cree A19P-60 W-27K-1 20V | Integral dimmable driver                   | 66 W  | Decorative & general illumination   |
| R1-D | Recessed 6" aperture open dimmable LED downlight                                             | Lightolier   | Integral LED, 3500K, 2250 lm      | Integral electronic 0-10 V dimmable driver | 32 W  | General & supplemental illumination |

**Figure 5:** Abridged lighting fixture schedule. For complete fixture schedule, see Section 265100, Volume 3B of the Project Manual, and for ballast details, see Part 2.3 of referenced Section. Section 265009 may also be of use for ballast details.

##### b. DAYLIGHT ELEMENTS

The lobby has tall windows to the outside, as well as a glass component to its doors. It isn't lit primarily by daylight, but as the main entrance and the most glass is on the east facade of the library, it may be pertinent to conduct a short daylight analysis on the space.

##### c. SPACE PROPERTIES

###### Summary of Geometry

Like most of the library, the lobby is styled with neoclassical elements, such as doric pilasters and columns, as well as molding along the ceiling meant to mimic entablature. These details are present on the attached sheets.

The ceiling is 12'2" high, with the molding at 10' 3 ¾", the same height as the column capitals. The space is large and rectangular, with an oval curve detail at the smaller edges, along the main axis of circulation.

### *Furnishings*

Though no complete furnishing plans have been received, it's safe to assume that there will be minimal furnishing in the lobby, as it's a highly-trafficked circulation space. Most likely, there will be some type of perimeter seating (e.g. benches or chairs along the walls, in clusters), mandating a non-negligible amount of illumination at the walls.

A large central information desk is located at the far wall of the lobby (see attached plans), which would likely require some sort of task light.

### *Finishes*

| LOCATION | MATERIAL              | REFLECTANCE |
|----------|-----------------------|-------------|
| Floor    | Stone block           | 0.2         |
| Walls    | White painted plaster | 0.7         |
| Ceiling  | Acoustical plaster    | 0.8         |
| Doors    | Wood                  | 0.6         |

**Figure 6:** Abridged finish schedule. Finishes are either taken from photographs or finish plans in drawing division A8, Volume 3A. Finish reflectances are taken from finish schedule on Sheet A8.00 or otherwise a synthesized assumption from IES and other sources.

## 5. Building facade - *East Facade, L1-3*

See Sheet A2.01 for elevation, E1 series for fixture tags

### a. SYSTEM ELEMENTS

#### *Fixtures*

| TAG  | DESCRIPTION                                                                         | MANUFACTURER             | LAMP                                 | BALLAST                             | WATTS  | USE CASE                                        |
|------|-------------------------------------------------------------------------------------|--------------------------|--------------------------------------|-------------------------------------|--------|-------------------------------------------------|
| G2-D | Ground recessed dimmable LED; in-grade                                              | Erco                     | Integral LED, 3000K, 1800 lm nominal | Trailing edge ELV dimming           | 20 W   | Exterior column uplights                        |
| L5-D | Surface-mounted continuous linear LED grazer with DMX control & remote power supply | Lumenpulse               | Integral LED, 3500K, 275 lm/LF       | DMX control per foot                | 5 W/LF | Facade graze                                    |
| P6-D | Custom exterior decorative lantern with A19 lamps. See Sheet A9.50 for detail.      | Crenshaw, Rambusch, Cole | (24x) 11W Cree A19P-60 W-27K-1 20V   | Not specified                       | 264 W  | Study porch general & decorative illumination   |
| R5-D | Recessed 6" circular aperture LED adjustable accent downlight                       | Pathway                  | Integral LED, 3500K, 4000 lm         | Integral electronic dimmable driver | 44 W   | Study porch general & supplemental illumination |
| R9   | Recessed 6" circular aperture LED lensed downlight                                  | Erco                     | Integral LED, 3000K, 800 lm          | Not specified                       | 8 W    | Ground-level arcade illumination                |
| R10  | Recessed 6" circular aperture LED lensed wallwash downlight                         | Erco                     | Integral LED, 3000K, 800 lm          | Not specified                       | 8 W    | Ground-level arcade illumination                |
| R11  | Recessed 6" circular aperture LED lensed downlight                                  | Lightolier               | Integral LED, 3000K, 1312 lm         | Integral electronic driver          | 27 W   | Study porch illumination                        |
| S7-D | Surface mounted exterior linear LED graze                                           | CK                       | Integral LED, 3000K, 650 lm/LF       | Integral dimming driver             | 15 W   | Cupola window uplights                          |
| S8-D | Surface mounted exterior                                                            | Sistimalux               | Integral                             | Integral                            | 4 W    | Cupola column                                   |

|    |                                                                      |        |                                                |                             |      |                                                       |
|----|----------------------------------------------------------------------|--------|------------------------------------------------|-----------------------------|------|-------------------------------------------------------|
|    | monopoint LED                                                        |        | LED,<br>3200K,<br>320 lm                       | dimnable<br>power<br>supply |      | uplights                                              |
| W2 | Custom wall sconce with<br>A19 lamps. See Sheet<br>A9.50 for detail. | Custom | (6x) 11 W<br>Cree<br>A19P-60<br>W-27K-1<br>20V | Not<br>specified            | 66 W | Doorway<br>decorative &<br>wayfinding<br>illumination |

**Figure 7:** Abridged lighting fixture schedule. For complete fixture schedule, see Section 265100, Volume 3B of the Project Manual, and for ballast details, see Part 2.3 of referenced Section. Section 265009 may also be of use for ballast details.

## b. DAYLIGHT ELEMENTS

There is no daylight present in the theater pre function space, nor in the theater itself, as both rooms are in the core of the building. As with most theaters, this provides total control over the lighting conditions within and prevents daylight from interrupting a performance's aesthetic.

General illumination should not be expected to have a supplemental daylight component due to this.

## c. SPACE PROPERTIES

### *Summary of Geometry*

The ceiling of the theater is 12'-9 ½" high, providing ample space for large decorative fixtures and a rig with which to light the stage itself. The pre-function space is 1" higher, with a dropped coffer detail at the theater's 12'-9 ½" height.

Various neoclassical elements are present throughout the space, such as pilasters around the pre function space and at the entrance to the theater.

### *Furnishings*

Photographs show that the theater is a richly-furnished space, with 100 closely-spaced cushioned chairs (upholstery reflectance detailed below). These are the only furnishings present within the theater, as seen in the photographs.

The pre-function space can be assumed to be without any significant furnishings, as it's a holding place for those waiting to be let into a performance.

*Finishes*

| LOCATION      | MATERIAL                       | REFLECTANCE |
|---------------|--------------------------------|-------------|
| Facade        | Red field brick                | 0.3         |
| Ornamentation | White plaster                  | 0.8         |
| Roofing       | Black synthetic slate shingles | 0.1         |
| Glazing       | Low-E coated glass             | 0.5 VT      |

**Figure 8:** Abridged finish schedule. Finishes are either taken from photographs or finish plans in drawing division A8, Volume 3A. Finish reflectances are taken from finish schedule on Sheet A8.00 or otherwise a synthesized assumption from IES and other sources.

## 6. Additional space - *Special Collections & Display Gallery, L1*

See Sheet A9.12 for RCP, A3.01 for section, E1 series for fixture tags

### a. SYSTEM ELEMENTS

#### *Fixtures*

| TAG   | DESCRIPTION                                                                                                               | MANUFACTURER  | LAMP                             | BALLAST                      | WATTS  | USE CASE                                 |
|-------|---------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------|------------------------------|--------|------------------------------------------|
| L7    | Surface mounted quarter-round LED channel; frosted lens; remote power supply                                              | Acolyte       | Integral LED, 3500K, 250 lm/LF   | See specified section below. | 3 W/LF | Inside of casework                       |
| P9-D  | Pendant-mounted 24" decorative bowl w/ faux alabaster acrylic diffuser; brushed brass finish; LED retrofit with A19 lamps | OCL           | (3x) 11W Cree A19-60W -27K-120 V | Specified by manufacturer.   | 33 W   | Decorative & general illumination        |
| P10-D | Pendant-mounted 34" decorative bowl w/ faux alabaster acrylic diffuser; brushed brass finish; LED retrofit with A19 lamps | OCL           | (8x) 11W Cree A19-60W -27K-120 V | Specified by manufacturer.   | 88 W   | Decorative & general illumination        |
| R1-D  | See <i>Special purpose space</i>                                                                                          |               |                                  |                              |        |                                          |
| R2-D  | See <i>Large work space</i>                                                                                               |               |                                  |                              |        |                                          |
| S3-D  | Surface-mounted 24" decorative bowl w/ faux alabaster acrylic diffuser; brushed brass finish; LED retrofit with A19 lamps | OCL           | (2x) 11W Cree A19-60W -27K-120 V | Specified by manufacturer.   | 22 W   | Decorative & general illumination        |
| T1-D  | See <i>Special purpose space</i>                                                                                          |               |                                  |                              |        |                                          |
| T3-D  | See <i>Special purpose space</i>                                                                                          |               |                                  |                              |        |                                          |
| TB    | Surface-mounted 1-circuit track, 120V.                                                                                    | LSI           | N/A                              | N/A                          | 600 W  | Track for aimable lights within gallery. |
| W4-D  | Wall surface mounted decorative torchiere sconce; LED retrofit                                                            | Brasslight    | (1x) 11W Cree A19-60W -27K-120 V | Specified by manufacturer.   | 11 W   | Decorative & general illumination        |
| W5-D  | Wall surface mounted LED picture light; brass                                                                             | House of Troy | Integral LED,                    | Integrated electronic        | 5 W    | Picture light                            |

|  |  |  |                                    |        |  |  |
|--|--|--|------------------------------------|--------|--|--|
|  |  |  | 2700K,<br>200 lm<br><i>nominal</i> | driver |  |  |
|--|--|--|------------------------------------|--------|--|--|

**Figure 9:** Abridged lighting fixture schedule. For complete fixture schedule, see Section 265100, Volume 3B of the Project Manual, and for ballast details, see Part 2.3 of referenced Section. Section 265009 may also be of use for ballast details.

## b. DAYLIGHT ELEMENTS

There is no daylight present in the display gallery, and there are three shaded windows into the special collections, which look out to a south-elevation arcade. Because these windows are entirely shielded, it's unlikely that they'll provide much daylight, except in the rare case where oblique late-day light enters from the west.

Still, it may be worth analyzing any daylight that enters the special collections, in case there are UV-sensitive materials inside. More information is required on what may be stored in special collections.

## c. SPACE PROPERTIES

### *Summary of Geometry*

The display gallery features a series of narrow spaces with inset glass display cases. The ceiling plane is at 11', while the surrounding coffer is approximately an inch lower. 8' open archways lead into the hall, which connects the gallery to special collections. Both the hall (11' grid ceiling) and special collections (11'7" acoustical plaster ceiling) are octagonal. Despite the lack of photos of this space, it's safe to assume there are also major neoclassical elements.

### *Furnishings*

The east and west walls are of particular note in special collections, as they have wall lights specified along each. This indicates the intention to use these as display walls, while the others (the entrance and exterior walls) won't be as important.

The display gallery will be assumed to have no furniture, as it's a small space that will require passage throughout to see the exhibits. The special collections may have a few upholstered chairs, side tables, and lamps, if anything, for guests to sit and read.



Regardless, it's safe to assume that the majority of the space will not be furnished beyond bookshelves.

*Finishes*

| LOCATION      | MATERIAL                        | REFLECTANCE     |
|---------------|---------------------------------|-----------------|
| Floor         | Stone / axminster carpet / wood | 0.2 / 0.1 / 0.2 |
| Walls         | Plaster                         | 0.7             |
| Ceiling       | Gypsum                          | 0.8             |
| Doors         | Wood                            | 0.6             |
| Display cases | Glass                           | 0.75 VT         |

**Figure 10:** Abridged finish schedule. Finishes are either taken from photographs or finish plans in drawing division A8, Volume 3A. Finish reflectances are taken from finish schedule on Sheet A8.00 or otherwise a synthesized assumption from IES and other sources.

## 7. Additional space - Reading Room, L2 & L3

See Sheet A9.12 for RCP, A3.01 for section, E1 series for fixture tags

### a. SYSTEM ELEMENTS

#### Fixtures

| TAG  | DESCRIPTION                                                                                                    | MANUFACTURER                               | LAMP                                   | BALLAST                            | WATTS     | USE CASE                 |
|------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------|------------------------------------|-----------|--------------------------|
| L1-D | Surface mounted, continuous, modular, & dimmable linear LED cove.                                              | CK                                         | Integral LED, 3500K, 653 lm/LF         | Integral dimmable driver           | 12.5 W/LF | Cove uplights            |
| L4-D | Surface mounted, continuous, modular, & dimmable linear LED grazer.                                            | CK                                         | Integral LED, 3500K, 627 lm/LF         | Integral dimmable driver           | 12.5 W/LF | Cove uplights            |
| P1-D | Suspended decorative 38" diameter chandelier, with 6 arms and 2.25" shade holders. See Sheet A9.50 for detail. | Brasslight                                 | (9x) 6W Cree A19P-40 W-27K-1 20V       | Manufacturer specifies             | 108 W     | General illumination     |
| P7-D | Suspended decorative 3-tier ring chandelier, upturned glass shades. See Sheet A9.50 for detail.                | Crenshaw                                   | (30x) 11W Cree A19P-60 W-27K-1 20V     | Manufacturer specifies             | 333 W     | General illumination     |
| R1-D | See <i>Special purpose space</i>                                                                               |                                            |                                        |                                    |           | Perimeter lighting on L2 |
| R2-D | See <i>Large work space</i>                                                                                    |                                            |                                        |                                    |           | Perimeter lighting on L2 |
| R3-D | Recessed 6" circular adjustable downlight.                                                                     | Pathway                                    | Integral LED, 3500K, 4000 lm nominal   | Integral electronic dimming driver | 44 W      | Lay lights               |
| S1-D | Surface mounted continuous linear LED; very narrow beam graze                                                  | CK                                         | Integral LED, 3500K, 700 lm/LF nominal | Integral dimming driver            | 15 W/LF   | Accent ceiling graze     |
| S2   | Custom table lamp w/ integral receptacles in base                                                              | Custom by Crenshaw, Borden, Cole, Rambusch | (1x) 11 W Cree A19P-60                 | Manufacturer specifies             | 11 W      | Task light               |

|  |  |  |                |  |  |  |
|--|--|--|----------------|--|--|--|
|  |  |  | W-27K-1<br>20V |  |  |  |
|--|--|--|----------------|--|--|--|

**Figure 11:** Abridged lighting fixture schedule. For complete fixture schedule, see Section 265100, Volume 3B of the Project Manual, and for ballast details, see Part 2.3 of referenced Section. Section 265009 may also be of use for ballast details.

## b. DAYLIGHT ELEMENTS

This space will have the most significant daylight component, due to the two large skylights and central opening to the addition's cupola. Daylight penetrates the entire double-height space and is easily reflected by the white neoclassical ornamentation elements inside.

Concrete daylight calculations, or at least a basic inclusion of daylight in renderings may be useful here, as it's supplemental to the general illumination of the space. In addition to the ceiling elements, large windows and french doors will let in a small amount of light around the perimeter from the north.

## c. SPACE PROPERTIES

### *Summary of Geometry*

The first-level gallery has a ceiling of height 11'-1 ¾," made of acoustical plaster. The main double-height space is 32'-1" AFF at the two skylights to the north and south, and the bottom of the center cupola plane is at 43'8."

Multiple ceiling coffers and copious amounts of molding are made of white plaster, as are the composite-order columns that ring the space. There are a good number of ceiling details to take advantage of here with lighting, which is why I've chosen this as the space in which I'll create three schematic designs.

### *Furnishings*

As seen below, the main reading room has closely-spaced wood tables, with six blue-upholstered chairs per table. Two custom lamps (detailed in the fixture schedule as S2) are present on each table. On the upper gallery, there are a few small seating areas .



### Finishes

| LOCATION                 | MATERIAL                          | REFLECTANCE |
|--------------------------|-----------------------------------|-------------|
| Floor                    | Blue / patterned axminster carpet | 0.2         |
| Walls                    | Cream & white painted plaster     | 0.7         |
| Ceiling                  | White gypsum                      | 0.8         |
| Doors                    | White painted wood                | 0.6         |
| Moulding & ornamentation | White plaster                     | 0.8         |

**Figure 12:** Abridged finish schedule. Finishes are either taken from photographs or finish plans in drawing division A8, Volume 3A. Finish reflectances are taken from finish schedule on Sheet A8.00 or otherwise a synthesized assumption from IES and other sources.

## II. System Performance Considerations & Design Criteria

For the purposes of this thesis, the Tribble Library will be assumed to be Lighting Zone 3, as outlined in ASHRAE 90.1, 2013. Although it could also technically fit within Lighting Zone 2, 3 was chosen in an effort to control for constant outdoor pathway illumination and the 24/7 nature of the library's hours.

### 1. Large work space - Media & Technology Commons, L2

The major considerations for the media commons will be providing enough general illumination for any reading / writing tasks that may occur, while still providing an aesthetically interesting layout.

Psychologically, it may be beneficial to promote collaborative work through the use of more public modes of lighting, including copious amounts of overhead and circulation illumination. This will be especially critical due to the lack of daylight in the space.

Finally, despite the neoclassical decor elements present in the commons, these should be less highlighted than in other spaces. Accent and decorative lighting may distract from the tasks at hand, and, as this is a space primarily for work, the design shouldn't promote lingering. This further supports the need for circulation and even perimeter lighting, to keep the space feeling open.

IES HANDBOOK - Table 22.2; 29.2 - Common Applications; Library Facilities

| SPACE              | PLANE                    | $E_h$ | $E_v$ | GAUGE | UNIFORMITY  |
|--------------------|--------------------------|-------|-------|-------|-------------|
| Computer center    | @ 2'6" AFF /<br>@ 4' AFF | 150   | 50    | Avg   | Avg/Min 2:1 |
| Enclosed offices   | @ 2'6" AFF /<br>@ 4' AFF | 150   | 50    | Avg   | Avg/Min 2:1 |
| Lobby info desktop | 3'6" AFF / 5'            | 75    | 25    | Avg   | Avg/Min 4:1 |

ASHRAE 90.1, 2013 - Table 9.6.1

Specified by VECC 2015

| SPACE                                    | LPD  | RCR Threshold | Required Controls<br>(see table for more detail)     |
|------------------------------------------|------|---------------|------------------------------------------------------|
| Computer room                            | 1.71 | 4             | Bilevel & Local; additional 1 where daylight present |
| Office (open plan)                       | 0.98 | 4             | Bilevel & Local; additional 1 where daylight present |
| Office (enclosed, <250 ft <sup>2</sup> ) | 1.11 | 8             | Bilevel & Local; additional 1 where daylight present |

## 2. Special purpose space - Theater Pre-Function & 100-seat Auditorium, L2

Considerations for the pre-function and auditorium spaces are especially important, as I will be pursuing the Flynn mode of Spaciousness in this area. This will be particularly challenging due to the pre-function space's small size and the auditorium's crowded furnishing.

In order to impress upon the occupants the psychological feeling of openness, perimeter and ceiling lighting will need to be used. More indirect light on these surfaces, combined with less direct light on the audience itself, will reinforce this idea.

Because of the crowded space, the IES requirement for the middle age bracket was referenced in this case, rather than the young age bracket. This is despite the auditorium most likely being used by college students. Increased illumination levels will be able to help not only with wayfinding, but possibly with the achievement of a spacious impression.

The LPD specified for an auditorium space in ASHRAE 90.1 is rather stringent, but the selection of Lobby (performing arts theater) should grant some tradable allowance from its relatively high 2.00 W/ft<sup>2</sup>.

IES HANDBOOK - Table 22.2; 28.2 - Common Applications; Entertainment Facilities

| SPACE                                 | PLANE                                                                           | $E_h$                                                            | $E_v$                                             | GAUGE | UNIFORMITY  |
|---------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------|-------|-------------|
| Prefunction (during event)            | @ floor / @ 5' AFF                                                              | 50                                                               | 30                                                | Avg   | Avg/Min 3:1 |
| Prefunction (pre, post, intermission) | @ floor / @ 5' AFF                                                              | 150                                                              | 75                                                | Avg   | Avg/Min 3:1 |
| Circulation (adjacency passageway)    | @ floor / @ 5' AFF                                                              | Avg $\geq 0.2$ times task $E_h$ of adjacent space; min $\geq 10$ | Avg $\geq 0.2$ times task $E_h$ of adjacent space | Avg   | Avg/Min 3:1 |
| Audience (during event)               | @ floor / @ 5' AFF                                                              | 2                                                                | 1                                                 | Avg   | Avg/Min 2:1 |
| Audience (pre, post, intermission)    | @ floor / @ 5' AFF                                                              | 100                                                              | 30                                                | Avg   | Avg/Min 2:1 |
| Stage                                 | As designed by theater lighting designer; assumption for 50 lux when not in use |                                                                  |                                                   |       |             |

ASHRAE 90.1, 2013 - Table 9.6.1

*Specified by VECC 2015*

| <b>SPACE</b>                       | <b>LPD</b> | <b>RCR Threshold</b> | <b>Required Controls</b><br>(see table for more detail) |
|------------------------------------|------------|----------------------|---------------------------------------------------------|
| Auditorium                         | 0.63       | 6                    | Bilevel & Local; no additional applicable               |
| Lobby<br>(performing arts theater) | 2.00       | 6                    | Bilevel & Local; no additional                          |

### 3. Circulation space - Lobby, L1

The lobby has many opportunities for focal and decorative lighting, particularly on the numerous neoclassical elements (columns, molding, etc.). Because this is the main entrance of the building, there should be a “wow” factor that promotes lingering, rather than passing through. The space is large and (assumedly) open enough to accommodate this without an issue.

Because the lobby leads into the display gallery and special collections, as well as the other major areas of the library, a wayfinding element to the design in this space should be considered.

Unfortunately, ASHRAE 90.1 specifies an 0.9 W/ft<sup>2</sup> allowance for this space, so budgeting power should be kept in mind accordingly. The installation of LED fixtures and forgoing of some of the current A19 lamps may do well at saving energy, in order to achieve more of the decorative and wayfinding elements discussed above. For these focal point lighting levels, see Table 15.2 in the 2010 IES handbook.

Because the general illumination in this space is supplemented by daylight, and it is primarily populated by college students, the below IES recommendations have been taken from the younger age bracket.

IES HANDBOOK - Table 22.2 - Common Applications: Transition Spaces

| SPACE                           | PLANE              | E <sub>h</sub> | E <sub>v</sub> | GAUGE | UNIFORMITY  |
|---------------------------------|--------------------|----------------|----------------|-------|-------------|
| Lobby at building entry (day)   | @ floor / @ 5' AFF | 50             | 25             | Avg   | Avg/Min 4:1 |
| Lobby at building entry (night) | @ floor / @ 5' AFF | 15             | 10             | Avg   | Avg/Min 4:1 |
| Lobby desktop                   | 3'6" AFF / 5'      | 75             | 25             | Avg   | Avg/Min 4:1 |

ASHRAE 90.1, 2013 - Table 9.6.1, See Table 9.6.3 for additional control factors  
Specified by VECC 2015

| SPACE | LPD | RCR Threshold | Required Controls<br>(see table for more detail)   |
|-------|-----|---------------|----------------------------------------------------|
| Lobby | 0.9 | 4             | Bilevel, local, & automatic daylight; additional 1 |



#### 4. Building facade - *East Facade, L1-3*

The building facade has a multi-faceted design of layered arcades, colonnades, porches, and neoclassical ornaments, including precast pediments and columns. These various layers of design should all be highlighted in some way, requiring a (preferably) higher LPD. This was part of the reason for which I chose Lighting Zone 3 rather than Zone 2 for this project; as this is a university building, this decorative outdoor lighting is likely to stay on at all times.

In addition to purely decorative and accent light on the architectural details, there are also a number of useful spaces on the east facade. The main porch and arcades all require some form of general illumination, which is currently achieved by recessed can lights and a few custom fixtures.

These custom fixtures should be kept in order to maintain the carefully-cultivated aesthetic of the exterior, but it may benefit the overall energy consumption to outfit them with LEDs rather than the current A19 lamps.

IES HANDBOOK - Table 22.2 - Common Applications: Building Entries

| SPACE         | PLANE          | $E_h$ | $E_v$ | GAUGE | UNIFORMITY  |
|---------------|----------------|-------|-------|-------|-------------|
| Entrance, LZ3 | @ grade / @ 5' | 7.5   | 4     | Avg   | Avg/Min 2:1 |
| Pedestrians   | @ 3' / @ 5'    | 5     | 4     | Avg   | Avg/Min 2:1 |

ASHRAE 90.1, 2013 - Table 9.4.2-2 - Building Exteriors  
Specified by VECC 2015

| SPACE           | LPD                                                              |
|-----------------|------------------------------------------------------------------|
| Facade walls    | 0.15 W/ft <sup>2</sup> per wall, or 3.75 W/LF per surface length |
| Entry canopy    | 0.4 W/ft <sup>2</sup>                                            |
| Main entrance   | 30 W/LF of door width                                            |
| Walkways < 10ft | 0.8 W/LF                                                         |

## 5. Additional spaces - *Special Collections & Display Gallery, L1*

### *Reading Room, L2 & L3*

#### *Special Collections & Display Gallery, L1*

The special collections and display gallery may require especially careful lighting, so as not to damage any delicate materials. More information is forthcoming on the exact contents of these rooms; however, special consideration will be taken in this report when defining illuminance criteria. The levels below are slightly lower than the IES recommends, due to this; if word is received that the materials are not in danger of being damaged, this can be altered later.

The IES handbook specifies a difference between display lighting for “dramatic,” “moderate,” and “subdued” focals. In order to keep with the classical and dignified aesthetic of the building, as well as the out-of-the-way and quiet nature of this space, I have chosen “subdued” focals below.

The selected space types for LPD were chosen based on the assumed function of the space. For the display gallery portion, the Museum function was assumed, due to the inset glass cases throughout the space. The Library (stacks) function was assumed for the special collections, although a potential shelf layout hasn’t been specified.

IES HANDBOOK - Tables 21.2; 29.2 - Art; Library Facilities: Special Collections

| SPACE                                  | PLANE                 | $E_h$                                              | $E_v$                              | GAUGE | UNIFORMITY                                          |
|----------------------------------------|-----------------------|----------------------------------------------------|------------------------------------|-------|-----------------------------------------------------|
| Displays (subdued focals)              | @ floor /<br>@ 5' AFF | Avg = 0.2<br>times object<br>$E_h$ ; min $\geq 10$ | Avg = 0.2<br>times<br>object $E_v$ | Avg   | Avg/Min 4:1                                         |
| Objects (high sensitivity to light)    | N/A (at object)       | 25                                                 | 25                                 | Max   | Avg/Min 2:1                                         |
| Special Collections (Archival Storage) | @ 3' AFF (both)       | 150                                                | 50                                 | Avg   | Avg/Min 2:1<br>Note: filter UV, use vacancy sensors |

ASHRAE 90.1, 2013 - Table 9.6.1

Specified by VECC 2015

| SPACE            | LPD  | RCR Threshold | Required Controls<br>(see table for more detail)    |
|------------------|------|---------------|-----------------------------------------------------|
| Museum           | 1.05 | 6             | Bilevel, local; no additional applicable            |
| Library (stacks) | 1.71 | 4             | Bilevel & local; additional 1 when daylight present |

### Reading Room, L2 & L3

The reading room is the focal point of the library as a whole. It has major decorative elements, as well as good circulation around the outer edge of the space. For this reason, lingering to look at the decor can be encouraged, as can accent lighting on the columns and ceiling details.

That said, much of this space will be dominated by daylight for much of its use time. Fixtures, controls, and light levels should be chosen such that they do not waste power during the day but adequately highlight the space's standout features at night. Complex daylighting controls should be implemented.

Unlike the workspace for students that the large work space (Media & Technology Commons) provides, this space is more personal and individual-focused than collaborative. The large amounts of daylight should be offset psychologically with a type of individual lighting mode, such as the current custom table lamps. The increase in preference and privacy will maintain a sense of focus, despite the high, uniform levels of general illumination.

Additionally, the large skylights and open ceiling to the cupola need to be considered when designing the schematic layout of fixtures. Ceiling-mounted fixtures may prove tricky or impossible to install, not to mention aesthetically unviable.

Because the majority of occupants using the space will be of college age, and because the space is so awash with daylight, the IES illuminance recommendation for the younger bracket is used below.

IES HANDBOOK - Table 29.2 - Library Facilities: Reading Areas

| SPACE              | PLANE                    | $E_h$ | $E_v$ | GAUGE | UNIFORMITY  |
|--------------------|--------------------------|-------|-------|-------|-------------|
| Grand Reading Room | @ 2'6" AFF /<br>@ 4' AFF | 200   | 75    | Avg   | Avg/Min 2:1 |
| Study Carrels      | @ 2'6" AFF /<br>@ 4' AFF | 250   | 100   | Avg   | Avg/Min 2:1 |
| Tables & Chairs    | @ 2'6" AFF /<br>@ 4' AFF | 200   | 100   | Avg   | Avg/Min 2:1 |

ASHRAE 90.1, 2013 - Table 9.6.1

Specified by VECC 2015

| SPACE                  | LPD  | RCR Threshold | Required Controls<br>(see table for more detail) |
|------------------------|------|---------------|--------------------------------------------------|
| Library (Reading Room) | 1.06 | 4             | Bilevel, local, automatic daylight controls      |

### III. Evaluation & Critique of Existing Lighting Conditions

*Total calculations of the large work space (Media & Technology Commons) and special purpose space (Prefunction & Auditorium) have been requested and are forthcoming from the project lighting designer.*

*Calculations of the emergency illumination levels can be found on Sheets E1.11A - E1.32A. Similar calculations anticipated for all below spaces, as requested.*

#### 1. Media & Technology Commons

This is perhaps the least aesthetically-interesting space. The vast majority of the illumination is provided by 2x4's, which provide adequate light levels but do not integrate particularly notably with the decorative architectural elements. It does meet the qualitative criterion I mentioned of promoting collaboration through high, uniform levels of general lighting. However, I also detailed that certain elements (such as the dome over the information area) should be highlighted, even if that highlight should be subdued for the purposes of circulation.

A more dynamic approach than simple troffers in a grid ceiling should be pursued, as well as trying to tie this space into the rest of the library's traditionally classical aesthetic, without sacrificing the more subdued requirements of the design here.

#### 2. Pre-function & 100-person Auditorium

Although in keeping with the traditional aesthetic of the library, the general lighting in the auditorium and pre function spaces feels slightly dated, due to the finishes and fixture selection of the main pendants. While the retrofit sconces achieve the desired "old" feeling, the pendants' acrylic faux alabaster appears yellowed in photographs and is clearly some sort of fake finish.

Additionally, while the light levels within the space appear adequate, the fact that this is such a small theater with relatively low ceilings and tightly-packed seats makes the space feel dark. Increased light levels, or a higher-CTT (cooler) source may help mitigate these issues. The pendants also close in the space further, extending into the vertical headspace of the occupants and potentially making the theater feel even less spacious.

The only form of perimeter lighting is the sconces. Again, these appear to provide adequate circulation light, but they do nothing to create the impression of spaciousness that this report asserts the space should possess. Additional details, possibly including edge / backlighting of the pilasters, will be able to help open up the space while highlighting the architectural details more deliberately. As the design stands, it's aesthetically pleasing but doesn't take full advantage of the space.

### 3. Lobby

The relatively low-ceilinged lobby appears dark when only considering the fixtures inside, but the tall windows most likely provide a more open feeling than the plans indicate. The light levels seem as if they are adequate, if not a bit bright.

Greater advantage could be taken of the interior columns and classical elements, and a subtle clash between the blue-toned daylight and the warm source temperature should also be addressed (this is detailed more in 6. *Reading Room*).

### 4. East Facade

This is a difficult space to critique. The layering described in the design considerations is well-achieved on the facade, and a dichotomy of spaces and use cases is established well through the lighting.

The main critique would possibly be a lack of clarity as to which spaces are usable and which are not. Despite the recessed can lights providing what is most likely adequate light levels, the arcades and usable porches are not designated specially from the purely decorative elements of the facade. Some subtle adjustments surrounding these areas, such as an additional in-grade graze, may prove to be the shift it needs to establish usability.

### 5. Special Collections & Display Gallery

The special collections and display gallery may have the least room for actual design, due to sensitivity restrictions on the material. That said, minor highlights on the architectural elements should be pursued, as they largely weren't present in the space. Low-output fixtures should be able to provide a subtle glow to these elements, that echoes the subtle highlighting of the displays in the gallery that was decided upon above.

Despite the perceived sensitivity of the materials, the pendants in Special Collections especially seem to provide large amounts of illumination, and the windows are untreated. This requires further investigation to determine what, exactly, is being stored here.

### 6. Reading Room

Like the East Facade, this is a very successful space, making it difficult to critique.

Light levels are not an issue in this space, as it's flooded with daylight, and each table has a task light to supplement what might be missing. The largest room for improvement / redesign I observe in this space is a clash of open, airy, cool-temperature daylight with the more warm, stuffy P1-D chandeliers in the upper and lower galleries.

Despite the central chamber appearing very inviting and bright, the perimeter is bogged down by warm CCT sources and suspended fixtures, which interrupt the path of the daylight from the gallery windows to the central atrium. If these pendants were to be replaced by a more subdued, or even cooler, source, the central space would be better able to communicate with the outer edges, encouraging students to spend more time in these less focal areas.

Additionally, a more modern approach to the outer edges could even highlight the classical elements more, by contrast. By trying to match the detailed custom fixtures to smaller, similar-but-not-identical pendants, a subtle clash of both source color and luminaire design occurs. To lean into that contrast may not only solve the problem, but also force a greater appreciation of the classical elements when contrasted with the modern.