LIGHTING EXISTING CONDITIONS SUMMARY – EXECUTIVE SUMMARY
Sara Lappano Ltg./Elec. Corron Cultural Center Middletown, VA
11.4.2002

Contained in this report is a summary of the lighting existing conditions of the Corron Cultural Center. **Because the project is just nearing the end of design development, there are no lighting plans/schedules/specs available at this time.** To get around this lack of information, I have selected luminaries based on conversations with the architect and examples of past work that this design team has done. In all cases, I assumed basic, standard light selection. I have included spec sheets for all selected luminaries at the end of the report. Due to the time required to select all the luminaries for the spaces, no modeling was done for the spaces. In the coming two weeks, modeling will be performed and reflected ceiling plans will be made. The plans I make will be what I use for the existing lighting design for this building.

LIGHTING EXISTING CONDITIONS AND DESIGN ANALYSIS

Sara Lappano Ltg./Elec. Corron Cultural Center Middletown, VA
Faculty Advisor: Dr. Moeck
11.4.2002

Large work space: Classroom

Existing lighting system information:

Luminaire:

1.) Model: 2' x 4' troffer, 3" deep parabolic, 12 cell louver
Characteristics: 3 Rapid Start T8 lamps, no air handling capabilities, 120 V.
Order No: H.E. Williams# HE3G-D24-332-36S-EB2/1-120

Lamp:

32 W T8, 3500K, 86 CRI, 2800 lumens (GE product# 22656)

Ballast:

Electronic ballast, designed for separate switching of 2 lamps and 1 lamp, no dimming

Control:

Room is switched to allow 1/3, 2/3 or all of the lamps in the luminaries to be on or off. The row of luminaries closest to the projection screen will be switched separately. Also because the two classrooms are actually one large room divided in two by a movable partition, the two halves are switched separately at each door leading into the respective areas.

2.) Model: Chalkboard fixture, 6" deep, 6" offset from wall, painted matte white
Characteristics: 1 Rapid Start T8 lamp, 120 V
Order No: Litecontrol: W-AD@-66N14T8-6044-CWM-ELB-WCB-120

Lamp:

32 W T8, 3500K, 86 CRI, 2800 lumens (GE product# 22656)

Ballast:

Electronic ballast, Sound Rated A, 20% THD or less

Control:

Standard switch directly next to chalkboard

Daylighting:

The west wall of the classroom area is an aluminum-framed insulated glass curtain wall. No transmittance values for the insulated glass are shown on any available plans. This will need to be clarified with the architect. Until then, the glass will have an assumed transmittance of 64.7% (see ppg-AZURL_8 in Radiance). There are also blinds along the curtain wall. These are also not specified in detail, so it will be assumed that they are an opaque material with transmittance close to zero.

Space Properties:

On walls, semi-gloss white paint with reflectance of 60%. On ceiling, 2' by 4' acoustical ceiling tile grid with reflectance of 80%. On the floor, there is low pile light gray carpeting with a reflectance of 20%.

Furnishings:
Movable 3' by 5' tables, seating two, are used in the spaces. The tables can be removed to provide more condensed seating for presentations and speeches. Two ceiling-recessed projection screens are located in the space, one at the north end and one at the south end. There are also two speaker podiums with computers (vertical/upright monitor), each located to the side of a projection screen. On the walls behind where the projection screens would be when lowered, there are black chalkboards.

Design Criteria, Classroom:

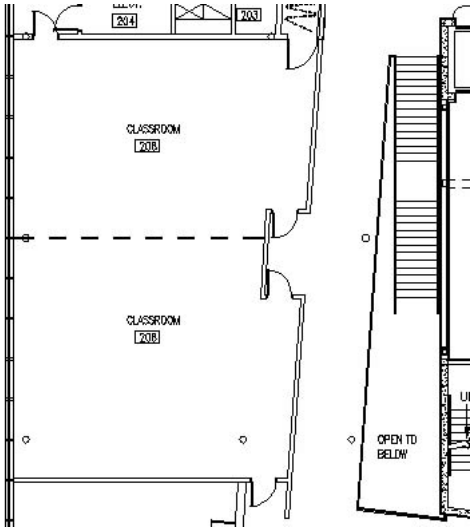
- Vertical Illuminance:
  - On chalkboard, **50 fc** (IES, Reading, Whiteboards)
  - At speaker podium, **5 fc** (IES, Conference Rooms, Meeting)
- Horizontal Illuminance:
  - For general seating area, **30 fc** (IES, Reading, Photocopies & Ballpoint pen)
- Performance Considerations:
  - Reflected glare on the whiteboard, from both daylight and luminaires
  - Reflected glare on horizontal reading surface, from both daylight and luminaires
  - Direct glare from daylight entering space
  - Facial modeling for speaker at podium
  - Appearance of space and luminaires (this space will be used more for meetings and seminars than for typical college classes)
  - VDT considerations must be applied to computer terminal at the podium
- Luminance Ratios:
  - Desk to immediate surroundings (i.e. floor): 3:1; this value is the highest recommended ratio. Ideally, the surrounding areas would have just a slightly lower luminance than the task (desk surface).
  - Desk to further surroundings (i.e. walls): 3:1; the overall rule for luminance ratios would make this 9:1, but for classrooms lower luminance ratios are desired to avoid distraction and eye fatigue from looking a distant blackboard.
- Psychological Aspects:
  - The lighting should be subtle so as not to create distractions for occupants of the room, which ties into the low luminance ratios that are desired. Also, allowing daylight into the room could create more of a comfortable, cheerful environment for people to learn in.
- Power Allowance: 1.5 W/ft^2

Lighting Critique, Classroom:

The existing lighting design is fairly standard for classroom lighting. The daylight entering the space through the large west-facing glass curtain wall is simply dealt with through the use of shades. LEED points and power savings may possibly

be obtained through incorporating the daylight into the classroom lighting, rather than blocking it with a shade. However, the fact that it is a west-facing wall will probably prevent any substantial savings.

Because all of the furniture in the space is movable, the uniform lighting layout used will allow consistent lighting levels regardless of location in the room.



Only architectural plans are available at this time. The assumptions made for luminaire selection will be used to generate reflected ceiling plan in a future revision of this report.

Special Purpose Space: Theater

Existing lighting system information: No specific information available at this time. All luminaires listed are assumptions on the type of lighting used in the space.

Luminaire:
1.) Model: 18" diam. pendant downlight
Characteristics: cast aluminum housing, 120V
Order No: ERCO#87606.023 (incandescent model, will verify it is not HID)
Lamp:
250W, PAR38, 3100 lumens (Philips# 046677-37432-2)
Ballast:
None
Control:
Information not available at this time. Assume these lights are dimmable and are controlled at the stage lighting control board and staff entrance into the theater (IES recommendation for theater seating area).
Note: These downlights are hung in between the catwalks about the audience so that the bottom of the light is level with the bottom of the catwalk.

2.) Model: Recessed steplight, 3” by 5”
Characteristics: black casing, 12 V
Order No: a2zelectric.com# CL-351
Lamp:
6W, T-41/2, 40 lumens (Philips# 046677-37377-9)
Ballast:
None
Control:
Information not available at this time. Assume these lights are on at all times.

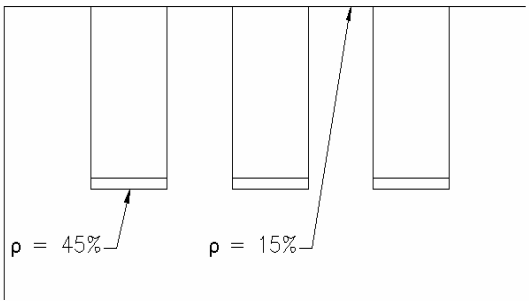
3.) Model: Wall sconce
Characteristics: White acrylic lens
Order No: Lithonia # 11908 (Half Round)
Lamp:
2-13W CFL lamps (need to verify this), CCT 2700K, CRI 82, 860 lumens, Philips#046677-38310-9
Ballast:
Advance # H-1B13-TP-BLS, CFL, 120V Ballast
Control:
Information not available at this time. Assume these lights over the audience chamber are switched backstage.

4.) Model: Lensed fluorescent worklight, 1’ by 4’, 2-T8 lamps
Characteristics: Clear prismatic acrylic lens, surface mounted to unfinished ceiling above catwalks.
Order No: H.E. Williams # 15-4-232-RA12125-EB2-120
Lamp:
2-32W T8 lamps, 3500K, 86 CRI, 2800 lumens (GE product# 22656)
Ballast:
Electronic ballast, Sound Rated A, 20% THD or less
Control:
Information not available at this time. Assume these lights are switched backstage and at the access entrance to the catwalks. These lights will only be used by stagecrew/maintenance when the theater is not in use.

Daylighting:
No daylighting in this space.
Space Properties:
On walls, semi-gloss beige paint with reflectance of 45%. On ceiling, bottoms of catwalks finished with drywall painted with same beige paint with reflectance of 45%. There is no finish on areas between catwalks, upper ceiling is exposed and painted black with a reflectance of 15%. See detail below for section of the ceiling area.

On the floor, the concrete slab is exposed (no carpeting), with an assumed reflectance of 20%. Seating is upholstered with maroon fabric (assume

reflectance of 10%), and trim on seating is light wood, resembling pine (assume reflectance of 25%).



This section shows the exposed upper ceiling between the catwalks.

To the right is a photograph of a similar theater this company designed. Note the wall sconces, recessed steplights, pendant downlights, and fluorescent worklights above the catwalks.

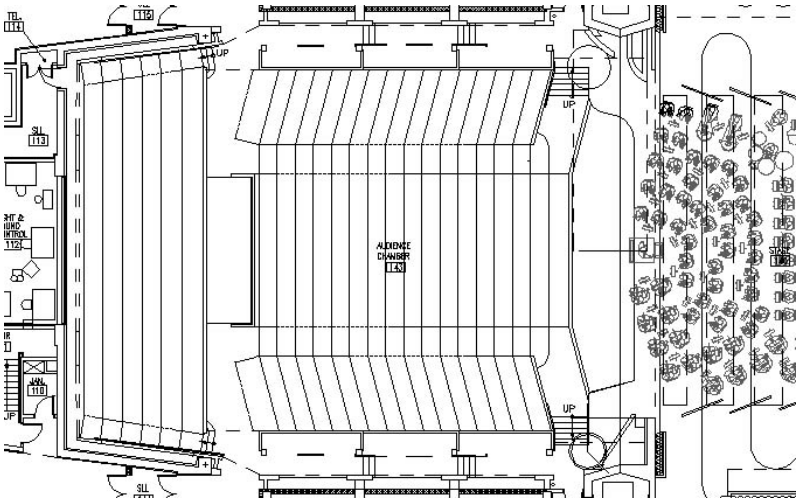
Furnishings:
Seating is upholstered with maroon fabric (assume reflectance of 10%), and trim on seating is light wood, resembling pine (assume reflectance of 25%).

Design Criteria, Theater (Audience Seating Area):

- Vertical Illuminance:
  - Not critical for audience area
- Horizontal Illuminance:
  - For general seating area, **10 to 20 fc** (IES, Theater, Seating Area, Ch.15) while performances are not occurring.
- Performance Considerations:
  - Appearance of the space is important to give credibility to the performances it hosts and make a positive impression on the audience
  - System control and flexibility will be important to accommodate the different types of activities occuring in the space – performances, pre and post show where the audience enters and exits, and maintenance of the space.
- Power Allowance:
  - Listed as 0.5 to 3.2 W/ft^2, will use average value of 1.9 W/ft^2.

Lighting Critique, Theater:
The lighting used in the theater is fairly straight-forward and utilitarian. The wall sconces in the box seating areas are the most aesthetic element of the lighting design, and add a pleasing glow to the wall each is mounted on. The steplighting

selected may be a difficult to install in the poured concrete steps. After talking with the architect, these steplights were used on a similar project and the contractor had problems with pouring the concrete steps around the lights while keeping them in line from step to step. Otherwise, the lighting design seems to provide ample horizontal illuminance for the audience to seat themselves safely and maneuver around before performances start. It would be interesting to explore more linear light sources rather than the circular downlights which were selected to illuminate the seating area. Also, incandescent downlights were used, so the possibility of switching to more efficient sources should also be explored.



This is a plan view of the theater area. An orchestra is shown seated on the stage.

<u>Circulation Space:</u> Lobby

Existing lighting system information: No specific information available at this time. All luminaires listed are assumptions on the type of lighting used in the space.

<u>Luminaire:</u>
1.) Model: 4.5" circular recessed downlight
Characteristics: Semi-specular aluminum reflector, 120V
Order No: Infinity# PV45-118Q-G24d-2 (2-pin/no dimming)
<u>Lamp:</u>
18W, PL-C, 1250 lumens, CCT 4100K, CRI 82 (Philips# 046677-38319-0)
<u>Ballast:</u>
Advance Transformer # H-1Q18-TP-BLS
<u>Control:</u>
Assume 3-way switching, with one switch on either side of lobby

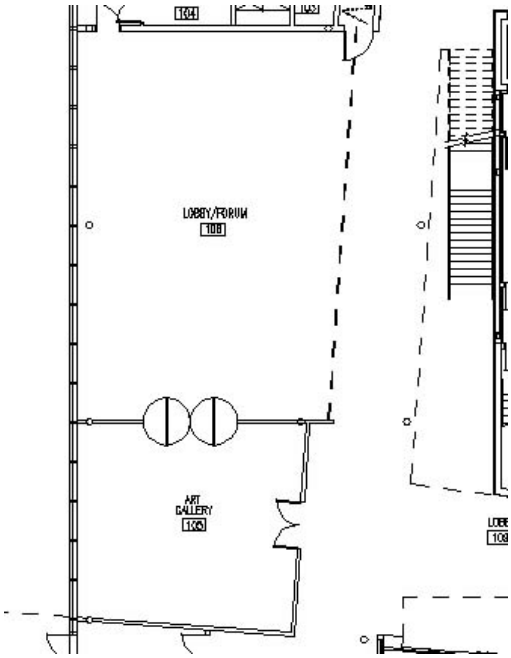
Daylighting:
The west wall of the lobby area is an aluminum-framed insulated glass curtain wall. No transmittance values for the insulated glass are shown on any available plans. This will need to be clarified with the architect. Until then, the glass will have an assumed transmittance of 64.7% (see ppg-AZURL_8 in Radiance). Unlike the classroom, there are no blinds along this portion of the curtain wall.
Space Properties:
On walls, semi-gloss white paint with reflectance of 60%. On ceiling, semi-gloss white paint with reflectance of 80%. On the floor, there is low pile light gray carpeting with a reflectance of 20%.
Furnishings:
I will be assuming that there is artwork hung on the north wall of this space. No furnishings are shown, however because this space can be rented for functions, assume that 3' by 5' tables, seating two, or seating without any tables may be moved into the space when needed.

Design Criteria, Lobby:

- Vertical Illuminance:
  - General areas, **3 fc** (IES, Offices, Lobbies)
  - On artwork, **30 fc** (IES, Museums, Flat displays on vertical surfaces)
- Horizontal Illuminance:
  - The IES handbook states that a theater lobby should have **20 fc** of illuminance. For a general use lobby, it recommends **10 fc**. The 20 fc standard will be used in calculations.
- Performance Considerations:
  - Appearance of the space is important because it is visitors' first impression of the building, and its' appearance will help give credibility to the performances it hosts
  - Color appearance and facial modeling is important because receptions and meetings will be held in this area
  - Luminances of room surfaces are important because they will act as a guide to people for where they should be moving to.
- Power Allowance: 1.1 W/ft^2 (average of the range 0.8 to 1.3 W/ft^2)

Lighting Critique, Lobby:
The recessed downlights in the lobby provide a clean, low profile source of light that corresponds well to the clean lines of the building architecture. The daylight entering the space through the large west-facing glass curtain wall could be a potential problem because it is not controlled in any way. LEED points and power savings may possibly be obtained through incorporating the daylight into the lighting, rather than leaving the downlights on regardless of whether or not there is light. Because it is west-facing, more light will be entering in the late afternoon, which could interfere with evening performances. Also, the uniform lighting layout does not help to highlight the entrance to the art gallery on the

south side of the lobby. This is an instance where higher luminance values could be used to draw people into a space.



Plan view of the lobby area

Below is a picture of a similar lobby that the architecture team designed for another project.

<u>Outdoor Space:</u> Main Entrance

<u>Luminaire:</u>

1.) Model: Bollard, 40" high

Characteristics: 120 V, black finish

Order No: Bega# 8418MH

<u>Lamp:</u>

100W Metal Halide, universal burn position, 3000K, 75 CRI, 8500 lumens (Sylvania # 64417)

<u>Ballast:</u>

ANSI Code M140/M90, UL Listed Class P, Type 1 Outdoor, Universal Voltage (Sylvania Product# 51944)

<u>Control:</u>

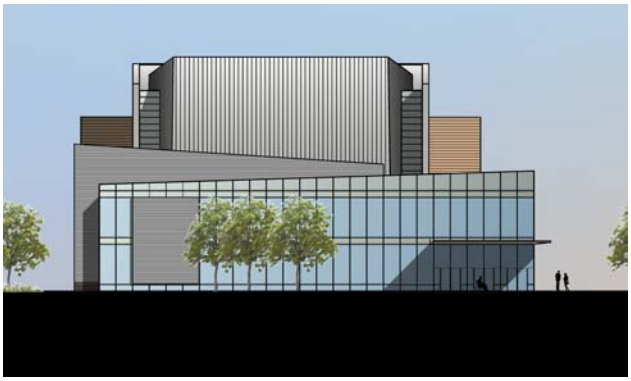
Photosensor turns bollards on and off.

2.) Model: Pole Light
Characteristics: 20' pole, symmetrical light distribution, 100W MH
Order No: Bega# 8092MH
Lamp:
100W Metal Halide, universal burn position, 3000K, 75 CRI, 8500 lumens (Sylvania # 64417)
Ballast:
ANSI Code M140/M90, UL Listed Class P, Type 1 Outdoor, Universal Voltage (Sylvania Product# 51944)
Control:
Photosensor turns pole lights on and off.

3.) Model: Recessed 9" downlights in canopy
Characteristics: Brushed aluminum finish, glass cover
Order No: Bega# 6942MH
Lamp:
100W PAR38 Metal Halide, universal burn position, 3000K, 85 CRI, 6500 lumens (Sylvania # 64752)
Ballast:
ANSI Code M140/M90, UL Listed Class P, Type 1 Outdoor, Universal Voltage (Sylvania Product# 51944)
Control:
Photosensor turns downlights on and off.

4.) Model: Wallwash downlight
Characteristics: Aluminum reflector, tempered glass cover
Order No: Bega# 2483MH
Lamp:
70W Metal Halide, universal burn position, 3000K, 88 CRI, 5500 lumens (Sylvania # 64760)
Ballast:
ANSI Code M140/M90, UL Listed Class P, Type 1 Outdoor, Universal Voltage (Sylvania Product# 51944)
Control:
Photosensor turns downlights on and off.

Space Properties:
Various materials used on building façade (see rendering below). The glass curtain is assumed to have glass with a transmittance of 64.7% (see ppg-AZURL_8 in Radiance). The two large "shapes" above and behind the curtain wall are clad in corrugated metal. The specific material has not been selected yet, but it will have a textured surface and have an assumed reflectance of 40%. The brick portion of the building is barely visible from this side, but it is beige-colored brick with an assumed reflectance of 10%.

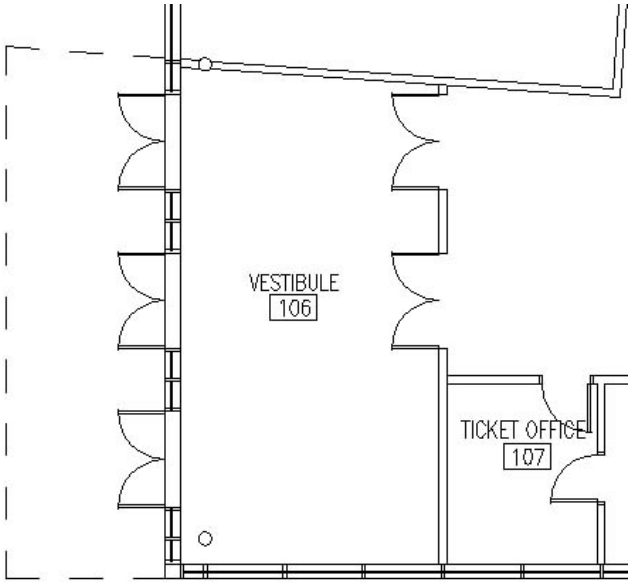


Design Criteria, Main Entrance:

- Vertical Illuminance:
  - On corrugated metal, **3 fc** (IES, Buildings, Floodlighted, Dark surroundings, medium dark surfaces)
  - On brick, **3 fc** (IES, Buildings, Floodlighted, Dark surroundings, medium light surfaces)
- Horizontal Illuminance:
  - On pedestrian areas, **5 fc** (Building Exteriors, Entrances, Active)
- Performance Considerations:
  - Appearance of Space-important because the lighting used helps to define the building to visitors
  - Color appearance and contrast-add definition to various building materials used and highlight their unique qualities
  - Surface characteristics-the texture of the metal finish and the brick should be visible to pedestrians
  - Direct glare-glare could temporarily blind pedestrians at night
  - Reflected glare-metal portion of the façade will easily have a reflected glare if care is not taken to prevent it
  - Light distribution on surfaces-building is massive and it will be a challenge to evenly light all of its different sources evenly. However, this is vital to give definition to the interesting architectural features of the building
  - Points of interest-entrance must be highlighted to help guide pedestrians to the doors.
  - Shadows-must be prevented in pedestrian areas to allow them to safely move towards the building
- Power Allowance:
  - Canopy Area: 3 W/ft^2
  - Façade Area: 0.25 W/ft^2

Lighting Critique, Main Entrance:

As with the rest of the building, no lighting design has been completed for this area. Because there are so many ways to light a façade, it is difficult to make assumptions for how this was done. I assumed that wallwash downlights were mounted on the exterior, which I believe is a fairly accurate assumption based on the designs for other similar buildings that I looked at. The bollards and pole lighting are standard practice and do a good job of providing the basic illumination necessary for pedestrians. The recessed downlights in the canopy also perform well for highlighting the entrance area. Because the façade of this building is so unique, I would prefer to see more creative lighting used to highlight the massive shapes which together compose the building. The corrugated metal façade will have such a different appearance that attention should be drawn to it and its texture.



This is a plan view of the canopy over the main entrance to the building.