



**Bradley Sisenwain**  
Lighting / Electrical Option  
Faculty Advisor: Dr. Houser

**Gateway Community College**  
New Haven, CT  
September 29, 2008

---

**Executive Summary****Lighting Existing Conditions and Design Criteria**

---

Lighting for Gateway Community College is being designed by Horton Lees Brogden Lighting Design; based in New York City, NY. Under strict LEED regulations, HLB has designed an integrated space that can interact with the natural environment and be beneficial for occupants.

Through exploration, I have discovered that HLB has demonstrated efficient use of multiple types of lighting in meeting IESNA criteria. Overall HLB has provided recommended illuminance levels, produced interesting custom fixtures, and has met the concept of the architecture.

Although HLB has designed an excellent control system, visually interesting layout, and has met recommended lighting levels in multiple spaces, changes could be made to better the system. In specific, special regard should be paid to light distribution on surfaces, system flexibility, and highlighting important features for architectural concept.

**Section One:** GCC Existing Conditions..... **3**

**Section Two:** As Designed Analysis ..... **11**

**Section Three:** Program Objectives ..... **16**

**Section Four:** Design Criteria/Considerations ..... **18**

**Section Five:** Appendix A ..... **31**

**A.1:** Library Reading Room Drawings ..... 31

**A.2:** Roof Garden Drawings..... 37

**A.3:** Student Gathering Drawings ..... 39

**A.4:** Tiered Classroom Drawings ..... 45

**Section Five:** Appendix B ..... **48**

**B.1:** Lighting Schedule ..... 48

**B.2:** Lighting Specification ..... 53

**Section Five:** Appendix C ..... **63**

**C.1:** AGI Calculations and Settings..... 63

**C.1:** Library Reading Lounge AGI Calculations..... 64

**C.1:** Tiered Classroom AGI Calculations..... 69

**C.1:** Endnotes ..... 71

**Building Description:**

The new campus for Gateway Community College is meant to “create a meaningful identity for the College while enhancing the urban qualities of the surrounding New Haven neighborhood.”<sup>ii</sup> The new identity created from joining programs from the Long Wharf and North Haven campuses will have a LEED Gold rating when completed and a number of dramatic spaces. The use of sustainable methods is prevalent throughout the building, and includes: photo-voltaic panels on the roof, daylight harvesting, and chillers that produce ice during off-peak hours that cools air during the day.

Overall, I believe the building will be the pride and treasure of New Haven and a model example of a learning institution for later building projects.

---

**Space #1 (large work space)****Library Reading Lounge**

---

**Drawings:****Spatial Description:**

The Reading Lounge forms the South East corner of the South Tower and has a “quartered circle” plan that extends up to the fourth floor. It has two floors, the first which connects to computer stations and the stacks housed by the library. The second connects to more stacks, service desk, and also has an opening in the center where people can see through to the two story height space on the floor above. A curving staircase mimics the curve of the exterior curtain wall which extends the whole height of the expansive room. Openness is reinforced through the openings in the North and West walls through which passage is un-hindered. Louvers and fritted glass have been added to reduce direct sun penetration from the glass wall due South.

**List of Activities:**

Used in addition to other parts of the library, the reading room is home to stacks located on the first floor. Like its name implies, the space is primarily used for reading, studying and various homework activities, but also has computer stations positioned around the stairs on the second floor.

**Furnishings:** (Material properties and description can be found on the Material Legend)

Book stacks (BK-1) are organized around the same curve as the exterior curtain wall; the ends of the stacks face the curtain wall and if one is looking at the book titles than one is facing perpendicular to the curtain wall. In the same fashion, tables and chairs (TB-1 and CH-1)—typical to libraries—are positioned so the main view of occupant is



perpendicular to the exterior wall. Upholstered couches (CH-2) are placed in the same area, some facing towards and some away from the large expanse of glass. Additional stacks are located behind the stairs, on the first floor, one row in the direction of the West wall and one along the North. Similar conditions exist on the second floor; tables, chairs, and couches are arrayed in the same position (in respect to the exterior glass). Computer stations (one table with two computers side-by-side and back-to-back—four per table) create another circular pattern and face perpendicular to the glass. Additional stations behind the stairs curve with the curtain wall but face directly towards it.

### **Dimensions:**

North Boundary Length: 73'-2"

West Boundary Length: 73'-10"

Curtain Wall Radius: 79'-6"

Curtain Wall Length: 99'-6"

Floor Area (first floor): 4319 SF

Floor Area (second floor): 3137 SF

Ceiling Height (first floor): 10'-6" A.F.F.

Plenum and Floor Thickness: 4'-4"

Ceiling Height (second floor): 24' (ACT) 24'-6" (GYP)

Total Height (interior): 38'-10"

### **Materials:** (Material properties and description can be found on the Material Legend)

#### a. Floor

- i. 1<sup>st</sup> and 2<sup>nd</sup> Floor carpet wall to wall (C-1)
- ii. Stairs – wood plank tread and riser (WD-1)

#### b. Walls

- i. Curtain wall (South East wall)– glass panels with structural silicone glazing (CW-200 refer to drawing A-490 for details)
- ii. 1<sup>st</sup> floor North AND West Walls Ptd. Gyp. Bd. (P-1)
- iii. Wood acoustic panel (AP-1)
- iv. Drywall partition with reveal (2<sup>nd</sup> floor) – (P-1)

#### c. Ceiling

- i. Gyp. Bd. ceiling 1<sup>st</sup> and 2<sup>nd</sup> floors (P-1)
- ii. Acoustical ceiling tile -2<sup>nd</sup> floor (ACT-11)

d. Window Systems (refer to drawing A-490 for glass arrangement)

- i. Mullion - (M-1)
- ii. Clear Curtain Wall - (GL-1)
- iii. Frit Curtain Wall - (GL-2)

e. Miscellaneous

- i. Metal enclosures to columns (MP-20/21)

**Existing Systems and Hardware:** (More detail is available in the Luminaire Schedule and Specification)

On the first floor, the majority of light is provided by 4' fluorescent luminaires (**F34A**), each with one 28W T5 lamp in cross section. Additional light around the stairs is provided by 26W compact fluorescent downlights (**F22**) and a 12W/lf cold-cathode tube (**F68**) in an elliptical shape; both meant to be decorative. An additional cove fixture (**F53**) is located by the librarian offices and workroom. When walking up the stairs, the students and faculty will see a custom fixture (**F20**). It has two 28W T5 linear fluorescent tubes running vertically and a metal halide par 20 in the bottom for some extra punch. The second floor replaces the CFLs with T-6 metal halide lamps—in semi-recessed fixtures (**F27**)—to provide extra punch from the higher ceiling height. The same recessed fluorescent luminaires are used. Decorative pendants (F20) are suspended in the opening on the second floor and descend below that level.

Open-loop daylight sensors control luminaires within 15' of windows to pre-programmed lighting levels in concurrence with daylight penetration. Astronomical time-clocks control non-fluorescent loads and occupancy sensors will turn lights on during off-hours. Library stack areas are divided into a minimum of 4 zones with each zone controlled by a closed loop, ultra-sonic occupancy sensor. A DALI interface is used to control the integral electronic DALI dimming ballasts—which serve two lamps each—in this space. <sup>ii</sup>

---

## Space #2 (outdoor space)

## Roof Garden

---

**Drawings:**

**Spatial Description:**

Located on the roof of the Reading Lounge, the Roof Garden serves as an escape to the outdoors. The Student Gathering space leads directly to the garden which is on the fourth floor. The students will be greeted by a piece of custom art-work (sculpture). Benches surround round planters that hold trees, which are also surrounded by a pathway that leads around the exterior façade of the lounge below.

**List of Activities:**

Transition through the space (mostly walking) is obviously the main activity. Others could potentially include reading (books), face-to-face interactions, and computer use.

### **Furnishings:**

Precast benches (B-2) surround the plant bed and planters (PLNT-1) are scattered across the space.

### **Dimensions:**

North Wall Length: 73'-2"

West Wall Length: 73'-10"

Parapet Radius: 79'-6"

Parapet Length: 99'-6"

Area: 4319 SF

### **Materials:**

#### a. Floor

- i. Wood deck (WD-3)
- ii. Roof deck plant bed (PB-1)
- ii. Architectural concrete pavers (PV-1)
- iii. Stepping Stones, Arch. Concr. Pavers, (PV-2)
- iv. Bluestone Curb (CB-1)

#### b. Walls

- i. Aluminum Composite Metal wall panel system (MP-21)
- ii. Face Brick (BR-1)
- iii. Metal wall panel system (MP-20)

#### c. Windows Systems

- i. Mullion – (M-1)
- ii. Windows (exterior) – (GL: 1, 1A, 1B, 2A, and 2B)

#### d. Miscellaneous

- i. Sculpture (SCLP-1)

**Existing System and Hardware:** (More detail is available in the Luminaire Schedule and Specification)

To continue the Student Gathering space outside, one pole-mounted luminaire **(E3)** is used in the quarter-circle space students will enter into out of the atrium. Precast benches and planters—located on the plant bed—have integrated strip LEDs **(E10)** in the underside of the overhanging lip. This makes the planters appear to float in the air. Surrounding the plant bed is an in-grade LED strip that surrounds the entire area; this also contributes to the floating theme.

All exterior fixtures are controlled by photocells and respond to time-clock commands for shut-down.<sup>iii</sup>

## Space #3 (circulation space)

## Student Gathering

---

### Drawings:

### Spatial Description:

This space provides the main distribution outlet in Gateway. It runs North to South and extends from the first level up to the fourth with and bridges cutting through the main central space. A walkway borders on the East side of the atrium on every floor. Openings extend from stairs and large landings up to the ceiling above, which seemingly hovers in the air, as light streams in from East and West clerestories which extend the length of the space. Over George St. (which splits the North and South Towers) a walkway joins portions of the Student Gathering space. This space is a continuous climb in through the middle of the building and ends when you reach the top of the Reading Lounge; it's Roof Garden.

### List of Activities:

Transition through the space (mostly walking) is the main activity through this space. Others could potentially include reading (books and vertically posted materials), face-to-face interactions, or computer use.

### Furnishings: (Material properties and description can be found on the Material Legend)

Benches (B-1) are the only furnishings in the Student Gathering. Spanning bridges have benches near the edge to provide interesting and key views through the breathtaking space.

### Dimensions:

Length (North Tower): 92'-8"

Length (walkway): 76'-5"

Length (South Tower): 261'

Width (NT): 19'-6"

Width (walkway): 27'

Width (start/end ST): 24'-10" / 38'-7"

Area (approx. total): 15867 SF

**Materials:** (Material properties and description can be found on the Material Legend)

- a. Floor
  - i. Carpet (C-2)
  - ii. Resilient Flooring (NF-1)
  - iii. Resilient Flooring (RF-8)
  - iv. Resilient Flooring (RF-11)
  - v. Wood (WD-2)
  - vi. Epoxy terrazzo with multiple colors and complex patterns w/ carpet insert (TZ-1)
- b. Walls
  - i. Painted Masonry Units (P-9)
- c. Ceiling
  - i. Acoustic Ceiling Tile (ACT-11)
- d. Window Systems
  - i. Mullion – (M-1)
  - ii. Clerestories - Outboard ¼" cl. low E insulating, ½" air space, inboard lam. cl. ¼" (GL-1)
  - iii. Walkway Windows (exterior) – (GL: 1, 1A, 1B, 2A, and 2B)
  - iv. Interior Windows (F: 40, 43, 44, 45, 46, and 47) - (GL-INT2)
  - v. Glass Mosaic – (GL-INT1)
- e. Miscellaneous
  - i. Metal beam enclosures - (MB-2)
  - ii. Pt. GWB. Column cover (P-3)

**Existing System and Hardware:** (More detail is available in the Luminaire Schedule and Specification)

To convey the architectural concept of the Student Gathering space being an interior street, (typically) exterior pole-mounted luminaires (**F15**) are used. Mounted in the ceiling, high-bay luminaires (**F14**) add additional punch into the high-ceilinged atrium. Both utilizing metal halide lamps, one 150W T6 in the pole and one 250W MH/ED-28 in the high-bay, these two systems provide most of the light into the space.

On the first floor of the atrium, near the George St. entrance of the South Tower, fluorescent pendants (**F52**) are hung at varying heights. As you rise in level more systems can be seen. Recessed into the stairs, a 1-.5W LED steplight (**F12**) creates interest and helps way-finding. Beneath extending bridges, recessed CFL (26W triple tube) luminaires (**F38**) fill spaces on the floors, where light from the ceiling does not reach. The eastern walkways (floors 1<sup>st</sup> through 3<sup>rd</sup>) are lit by recessed fluorescent fixtures (**F34**) with one F28 T5 lamp each. The fourth floor walkway is lit by direct fluorescent pendant (**F41C**), with one 28W T5. Perpendicular to wall mounting with cable ties to wall from above reinforces the interior street theme.

All fluorescent lamps are operated by DALI ballasts for one lamp. Electronic metal halide ballasts operate one lamp each in the pole and high-bay systems. During normal operating hours open-loop daylight sensors control lights to pre-programmed minimum levels in conjunction with daylight penetration. All fixtures are controlled via timeclock operation during off-hours with some fixtures on at all times for safety.<sup>iv</sup>

## Space #4 (special purpose space)

## Tiered Classroom

---

### Drawings:

### Spatial Description:

The Tiered Classroom is located in the middle of the South Tower on the second floor and is a simple rectangular plan. Four 4" curved tiers increase the elevation in the back of the room 16". The room is wider (in the direction of the rows) than it is long (the direction the speaker will give lectures). The teacher will be located at the front of the room with two exits on either side. The ceiling mimics the tiered seating and will surely affect acoustic performance in the space. The ceiling has four sections, front, two middle, and a back; these are symmetrical if looking at the side walls. The front panel slants up away from the speaker, the middle two create a "pyramid" and the back slants down from the ceiling to the back of the room. A drop ceiling surrounds these panels and is a few inches lower than their bottom.

### List of Activities:

Students will receive lectures which would be presented with the use of white boards and video projectors at the front of the room. The use of laptops to keep notes is possible. Additional activities TBD.

### Furnishings: (Material properties and description can be found on the Material Legend)

Fifty tables —each seating two— (TB-1 and CH-1) are organized in a continental pattern on the curved tiers. Four spaces are provided in the front for handicapped individuals. Tables and seats are typical to that of classrooms. A podium and stool (PD-1 and ST-1) are also provided for the professor of the class.

### Dimensions:

L x W: 64' x 36'-10"

Floor Area: 2256.75 SF

Ceiling Height (front): 9'-2" A.F.F.

Ceiling Height (back): 7'-10" A.F.F.

Approx. Ceiling Height (center): 11' A.F.F.

### **Materials:**

- a. Floor (Main) – Carpet (C-2)
- b. Walls –
  - i. Ptd. Gyp. Bd. (P-1)
  - ii. Fabric wrapped Gyp. Bd. (WC-1)
  - iii. Fabric wrapped acoustic panels (WC-1)
  - iv. Drywall partition with reveal (PT-1)
  - v. White Boards (WC-3)
  - vi. Presentation Screen (PS-1)
- c. Ceiling
  - i. Ptd. Gyp. Bd. (P-1)
  - ii. Acoustic Ceiling Tile (ACT-6)

### **Existing Systems and Hardware:** (More detail is available in the Luminaire Schedule and Specification)

Task lighting is provided by a pendant linear fluorescent (direct) luminaire (**F41A**); this fixture is mounted between the two middle ceiling tiles and is supported from the ceiling above. Cove lighting (**F53**) provides extra diffuse light into the space by illuminating the front and back ceiling panels. These luminaires are mounted to the middle ceiling panels. Both fixture types use one 28W T8 lamp and DALI dimming ballasts that serve 1 lamp each. Another recessed fluorescent slot (**F7**) in the front of the room spills light onto the dry-erase board. In addition to the fluorescent task lighting, downlights (**F24**) using 26W CFLs provide extra light to the tables on the tiered floors—these luminaires also incorporate DALI dimming ballasts that serve one lamp each. Wallwashers (**F10**), using one 14W T5, supply peripheral lighting in the back of the room; these fixtures also use DALI dimming ballasts. Path lighting (**F12**)—in grade on the tiered stairs—helps students find their way during presentations when task lighting is either dimmed or off. A 1-.5W LED is the source of this steplight.

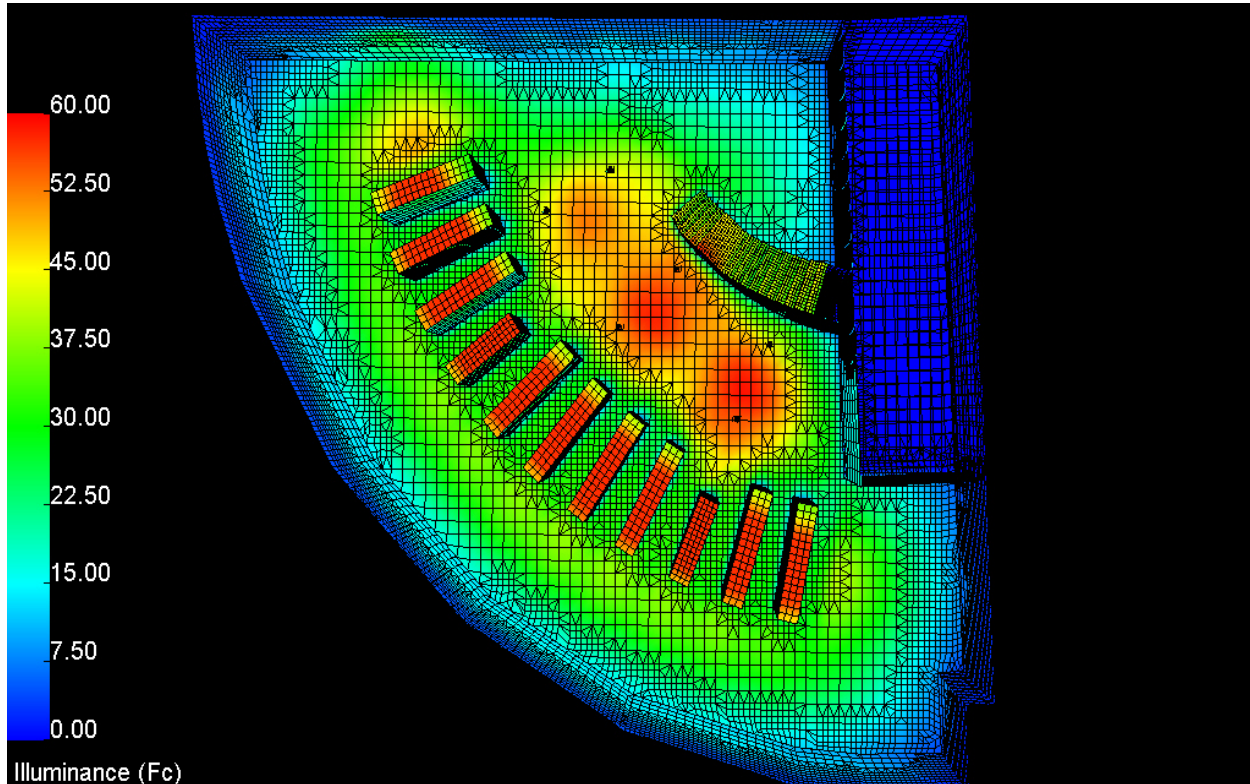
This classroom has occupancy sensors to turn lights off when not occupied. A manual switch shall be required to energize lights once occupancy is detected. Once energized, lights will turn on to a pre-set lighting scene. Multi-Scene switchplates allow the user to choose up to four pre-set lighting scenes for various functions such as A/V

presentations, lectures, or test taking. The multi-scene controls may be incorporated with A/V system controls as well.<sup>v</sup>

## Section Two

## Existing System Critique

### Library Reading Lounge (based on AGI calculation and plans):

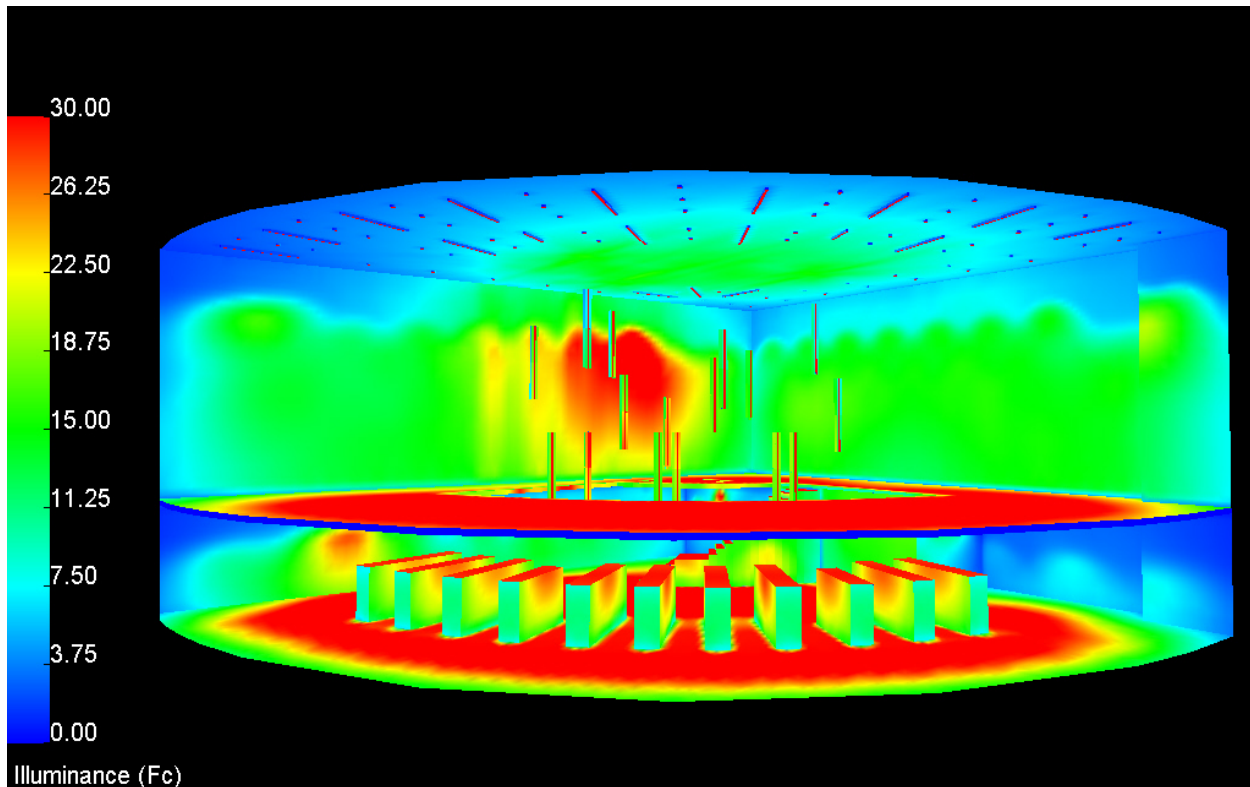


#### **C2.1: First Floor Illuminance Levels Pseudo Color** (refer to Appendix C for additional calculations and views)

After investigating the AGI model provided by HLB Lighting Design, I was impressed by the uniformity provided on the workplane. The pseudo color plans (seen above and in Appendix C pg ) show that the illuminance on the floor is in the range of 15 to 30 fc—first floor—and 30 to 45 fc—second floor. These illuminance values would then increase when measured on the work plane of 2.5' A.F.F. This proves that adequate amounts of light provided by the current design for library tasks.

The view North (below) shows a maximum of 30 fc in red, which would be the minimum illuminance measured on surfaces. Vertical surfaces between book stacks receive light, which is provided by F34A luminaires. Illuminance tends to trail off when approaching the floor, which is expected from a vertical surface located beneath the luminaires. Books on the bottom shelf may be difficult to read/find; a more uniform vertical illuminance would alleviate this problem.





**C2.6: View North Illuminance Levels Pseudo Color** (refer to Appendix C for additional calculations and views)

The RGB rendering shows the array of luminaires in a pin-wheel fashion. This arrangement is efficient at providing a purposeful illuminance on the task plane and accents the shape of the space. The curve of the space can be interpreted from the convergence of luminaires toward the North corner of the room. Still, this layout might be disorienting and hard to view from certain perspectives. Linear fixtures that flow with the curve instead of towards the center point of the arc may be easier to read. The metal halide downlights on the second floor create scallops on the walls that should be evaded. Though there are openings in the walls shown in the drawings, they were left out to simplify the calculation. The West wall of the AGI file is also a lower reflectance than other surfaces. This is an attempt to even-out the reflectance of the walls, but may not be the best way to accomplish realistic scenarios.

This design supplies enough light to the work plane to accomplish different tasks present, but does not relate directly to the architecture of the space.

**Roof Garden (based on renderings and plans):**

The main focus in the terrace is to make the concrete features appear to float. Mounting strip LEDs under the benches and planters (See Appendix A2 pg 35) will spill light onto the surrounding ground giving low levels of light for movement across and through the space. My main concern is not about the concept behind the design but the functionality. The .5W LED in the strips may not be able to produce enough light onto the paths set with stones. Floating features may also appear too frequently; there are many benches and planters on the roof and the space may seem cluttered once all are illuminated.

In the lighting plan, E13s are called out under the bench, which are listed in the schedule as in-grade luminaires using one metal halide lamp each. This conflicts with the linear fixtures shown. I believe that the same LED rope is used in both the planters and the benches. This may be an updated lighting schedule that calls for uplighting onto trees, but also may be mislabeled in this drawing. Either way, I think the need for uplighting or accenting the trees would be appropriate, as long as it follows LEED criteria for light pollution and trespass.

An E3 fixture sits by itself in the middle of the deck and is a continuation of the poles inside the atrium. I think this works very well to tie the spaces together. The outline around the plant bed also works well to differentiate between the materials on the roof and to add light to the surrounding path. I am assuming this is a similar LED rope to E10. Signage is proposed for this space in the form of the Gateway symbol, which is not present in the current set of drawings but can be seen on the rendering in Appendix A1 pg 34.

I think this design accents and brings attention to the terrace, but lacks accent on the natural forms present. I see this space as an escape to nature and would bring more awareness to this fact through lighting trees and the multitude of different textures.

### **Gathering Space (based on renderings and plans):**

The concept of an interior street is supported by the lighting design with F15 pole mounted fixtures. The head of the luminaire is aesthetically pleasing and represents contemporary design and materials. Still, it appears out of human scale (See rendering in Appendix A3 on pg 41). The diameter of the reflector is approximately 3' and the 4" pole is 12' high. Its appropriateness is questionable for this avenue of GCC. The T6 metal halide source in this fixture is hidden from view and is reflected from the top reflector, which reduces direct glare. However, the source is 150W. I believe it will produce too much illuminance around the floor which will stand out around the lower level of illuminance provided by other ambient lighting.

The high-bay system mounted in the geometrix ceiling (See Appendix A3 pg 39) is not a decorative element of the space, but purely functional. This does not hurt the space, but only helps in the matter of recommended light levels. It will also produce scallops on the side walls. This is in conflict with the architectural form of the walls and should be prevented or removed. Instead of using high-bay downlighting, perhaps a metal halide wallwash would be more appropriate. This may be able to use the same wattage and produce an even gradient on the walls (and more of an even distribution on the floor). In turn, this might even-out the strong variations between pools of light.

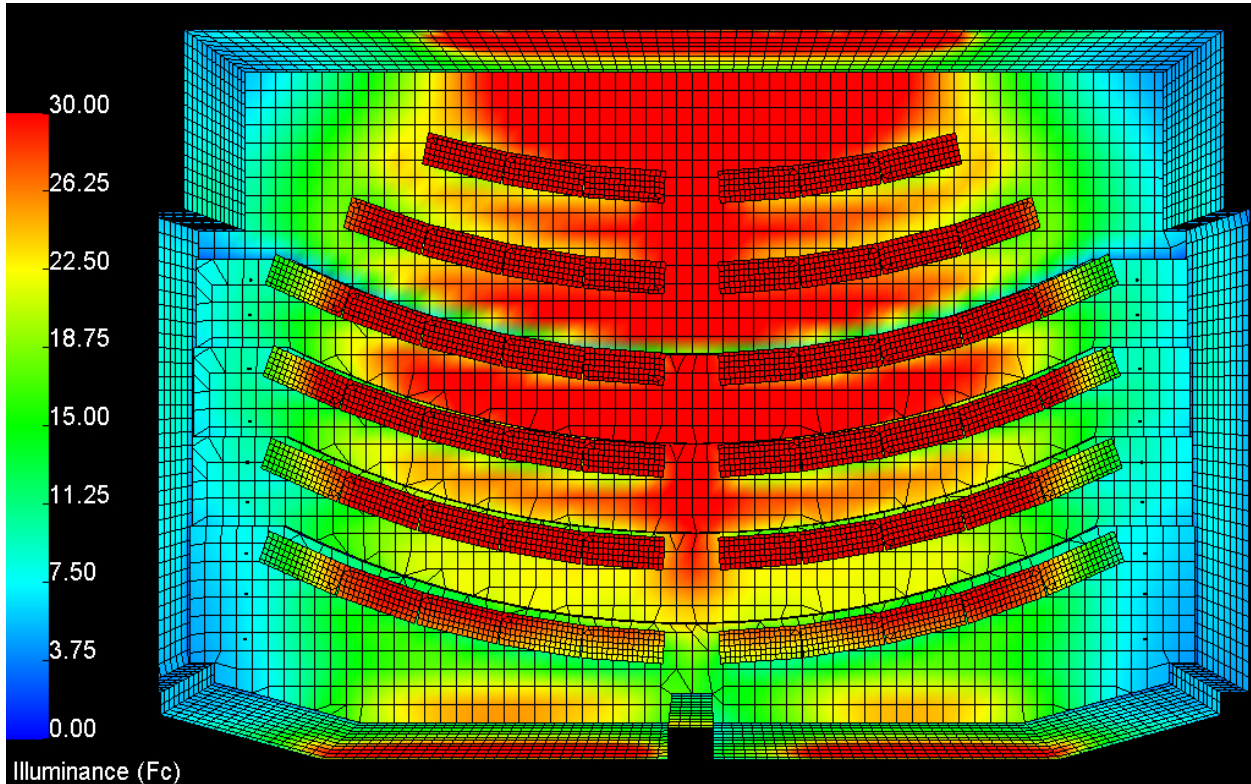
Other items of interest are the methods of grouping luminaires. Upon entry to the first floor lobby, the irregular layout of F52s (seen on pg 39) may be visually bewildering. Added clutter may stem from the dense organization of F3Bs (seen on pg 39). These arrangements do not seem to best compliment architectural forms or direct flow throughout the space. It may be better to light from the horizontal bridges with linear sources. This would produce lines of light on the bridge and light under the bridge. Occupants would then be led from the lighting into the transition spaces around the main atrium.

The daylight integration plan is very strong within this space. Being a LEED rated building has great influence on the controls of the lighting systems and overall integration. Metal halide was chosen to provide useful light from a high ceiling, but dimming metal halide is not an excellent option. Color shift prevents from dimming this source to a low

input wattage, which saves less energy. This will either cause them to be on at all times or shut off when the daylight is sufficient enough to replace them.

This space is so vast that analyzing from plans and renderings (which have included only specific information) is somewhat difficult. Even though I think the current design is an adequate and functional system, I do see room to make the space more cohesive and more helpful to direct students or visitors.

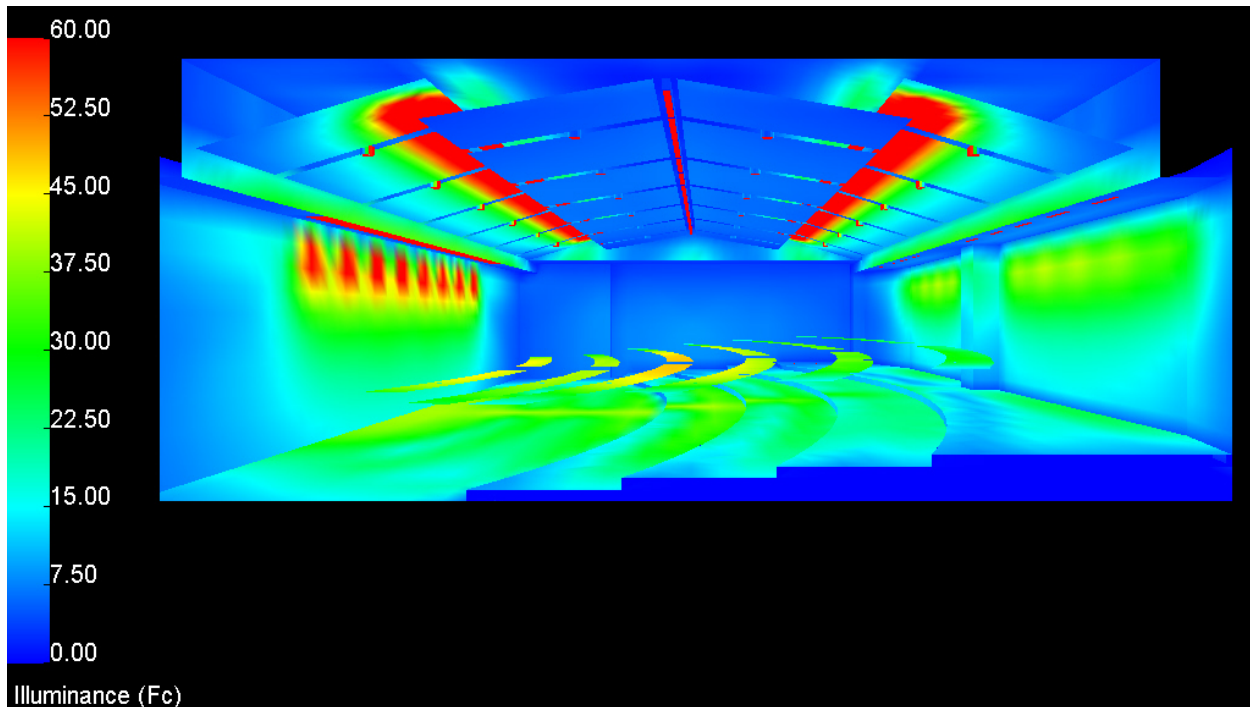
**Tiered Classroom (based on AGI calculation and plans):**



**C3.1: Illuminance Levels Pseudo Color Plan** (refer to Appendix C for additional calculations and views)

Based on the plan view of the AGI calculation (above), the present lighting design illuminates the majority of this desk top area to 30 (or more) fc. Similar levels also saturate the floor of the space. Added light from the direct linear fluorescent (above), the CFL downlights (above), and the asymmetric linear fluorescent (front of the room) create a very bright space.

In the back and front of the room, different types of asymmetric fixtures are used. Even though the luminaires at the back wall are spaced further apart, they wash the wall evenly. This is not so in the front of the room, where hot-spots are created by the F53 fixture. Stated in the luminaire specification provided, the recessed fluorescent has only one lamp in cross section. This means that socket shadows may be a concern. The AGI model supports this claim, and you can see definite variations of illuminance close to the mounting height of this fixture. An even wash—similar to the back wall—should be used to illuminate the front boards. Caution must also be used when choosing a source to light the white dry-erase boards. Due to their specular surface, the current fixture may create glare issues for the students; especially in the front row.



**C3.1: View North Illuminance Levels Pseudo Color** (refer to Appendix C for additional calculations)

This design lacks peripheral highlights on the side walls, which can be seen above. The different bulkhead heights prevent light from reaching these surfaces. F12 (in-grade) uprights provide some light to the stairs on the sides of the continental seating, but fail to illuminate or create any interest on the walls. Illuminance on walls and other surrounding surfaces is considerably lower than the hot-spots created on the first tier and below the dry-erase boards. The distribution of light should be more uniform throughout the room, although all surfaces should not be lit to the same level.

### **Scope:**

Main areas of interest—in regard to this Program Statement—are the architectural lighting design, daylight analysis, and control of the spaces of previous (and future) mention, within Gateway Community College.

### **Overall Design Objectives:**

The main purpose of the lighting design in GCC is to accentuate and support the overall architectural concepts found within the forms and features of the building and Perkins + Will's objectives for the new campus location. As stated in the architectural design intent, GCC's foremost purpose is to create a new identity for the education facility housed in the urban center of New Haven, Connecticut. In that respect, the lighting will reflect contemporary ideas and aesthetics as it assimilates into the current architectural design.

Within the proposed spaces, an optimum visual environment will be maintained by avoiding glare, extreme levels of transient adaptation, and unflattering patterns and shadows created by luminaires. By abiding to these cautionary standards, lighting will enhance productivity and not hinder working or social interactions. Furthermore, integration with the exterior environment is a key feature for the prosperity of proposed areas. Daylight shall be used effectively and efficiently in the attempt to supplant the need for electric lighting and therefore lower electrical consumption.

### **Library Reading Lounge:**

As a work space, comfort level is extremely important. A uniform lighting scheme with glare elimination will allow the occupants to stay productive and will increase visual clarity. By accenting peripheral walls and around the opening to the second floor visual interest can be added to the space, further increasing its quality and visual clarity. Daylight should be taken advantage of—and controlled—within this space. The enormous span of the South-facing curtain wall allows for a large amount of options for daylight management. It will be a focus of this space to limit the amount of light entering through the glass to an extent that will eliminate the need for a considerable amount of electric light. This limitation however, should not decrease the amount of exterior views from the Library. During nighttime hours, exterior views should be maintained as much as possible, while still providing adequate light levels for a productive environment. The curved library corner serves as the conceptual “gateway” in Perkins + Will's architectural theme. This will be reinforced by reflections from interior surfaces making the curtain wall glow (from within) at night.

### **Roof Garden:**

As a public space, the roof should be a preferred space to escape to, as well as a relaxing area where one can experience a more natural environment amongst the urban setting. Nature's “modulations” should be accented in an attempt to connect the space more with the natural environment. Lighting surrounding walls on the roof is one way to strengthen impressions of relaxation, pleasantness and preference. A lower light level will be used (as compared to interior spaces) to reflect upon the outside setting. The roof garden will serve as an exterior continuation of the library at night. Light emanating from within the reading lounge will be topped by the soft glow from the garden above. The result will be a less dramatic drop in

luminance from space to space and a more cohesive flow created from light. Additional accent will be placed on localized areas that are most occupied.

### **Student Gathering:**

Student gathering is the central transition space in GCC, and is meant to be P+Ws version of an interior street. Similar aesthetics to existing exterior lighting conditions should be mimicked to help connect the concept to the occupants. Analogous impressions to the roof garden will be created throughout the exaggerated stair/corridor. The five-story-high white masonry unit wall continues from the gathering space to the roof garden and will be lighted similarly to maintain cohesiveness between spaces. Lighting and emphasis on walls will contribute to the impression of preference while additional general non-uniform lighting will facilitate passage through the space. Daylight is an important factor in this space as well. Like the library, daylight should be used to conserve electric power and efficiently light the space (when possible). Localized lighting will be placed to mark means of access to other areas of the college.

### **Tiered Classroom:**

This is the other work space amongst my chosen spaces. Classrooms often incorporate a number of activities—which means a number of tasks—into lessons. This classroom is no different. The lighting should reflect the variability within the space and the specific task at hand at any time. Uniform lighting will be needed for typical classroom activities and to add to the impression of clarity. Peripheral modes could be incorporated during multiple tasks for added light (and interest) into the space. A variable control of systems should be available to occupants; who will have the need to change lighting effects and settings per task. Glare and distracting lighting elements should be avoided.

### **Library Reading Lounge:**

#### **Appearance of Space and Luminaires:** Very Important

The reading lounge is an integral portion of GCC. A large view inside provides access to the public to one of the main working spaces for students, and represents (conceptually) the school's name itself (as a "gateway"). The space should represent the quality and innovation of the new institution and be a focal point at the intersection of North Frontage Road and Church Street. Luminaire appearance should be medium to high quality to better integrate into the space.

#### **Color Appearance and Color Contrast:** Important

Lamps should have cooler CCT; closer to that of daylight (in the range 3000-4000K). Because of large amounts of daylight entering the space, contrast between it and warmer electric light may lessen the overall quality of the library. This will also benefit the space due to the light colored materials used (mostly white and blues). Lamps should match daylight as close as possible without sacrificing CRI, efficacy, and overall efficiency. A good CRI is required to render multiple types of book labels (on stacks) and people during face-to-face interactions or meetings.

#### **Maintenance:** Important

The second floor has a high ceiling height. High and flat ceiling heights are not the most difficult to work around, still, long-life luminaires should be used on the second floor to reduce the maintenance cost and execution lapses in the future.

#### **Daylight integration and control:** Very Important

To coincide with LEED criteria (to reach GOLD rating) and create a known example of sustainable methods in GCC, daylight integration should be taken advantage of to the fullest extent. Dimmable systems should automatically lower or increase electric levels in concurrence with the daylight level entering the space. The number (and placement) of these dimming systems will be based on the depth of sufficient daylight penetration into the space. The use of passive control devices should be used. In accordance with the dimming system, passive devices should block distracting light that may also produce large heat gains within the space, while letting light through that can be useful for the tasks at hand. This system should be fixed and not a moving system, to avoid large initial and maintenance costs and the potential failure in the future. It also should not hinder exterior views from the space.

#### **Direct Glare:** Very Important

For reading spaces, direct glare can severely hinder the quality of environment and task at hand. Glare should be avoided from both daylighting (on the curtain wall surfaces) and electric lighting. This is most important on the first floor, where there is a lower ceiling height. Primary candela distribution should be in the 0-60 vertical angle range, luminaires with higher intensities nearer to 60-90 degree vertical angles should not be used on the first floor. View into bare-lamps

should be avoided on every level. Glare created from luminaires is less important on the second floor, due to the higher viewing angle (that is less likely to be in-frame during task activities). However, daylight glare is still an issue and should be handled similarly to that on the first floor.

**Flicker and strobe:** Not Important

Flicker and strobe are most important when there is rotating machinery; there are none in the library.

**Light distribution on surfaces:** Somewhat Important

Patterns of shadows and brightness created by flawed spacing and organization of luminaires should be avoided. Flatness created by similar luminance ratios of surface should also be avoided in order to create visual interest in the space. Surrounding walls should be subtly lit; in addition to task. This will not be as noticeable during the day unless very powerful and should be used mostly during nighttime hours. A nighttime luminance ratio of ceiling to walls should be 3:1.<sup>vi</sup> The flat walls would be best accented with a wash that highlighted its size. This wall emphasis will continue to the roof garden and then gathering space on the wall surface that is repeated throughout as a feature which ties these spaces together. In the same respect, light will also help tie one space to the other and create a flow through the building. Primary surfaces to light will be the task plane.

**Light distribution on task plane:** Important

Task planes include: desks—approx. 2.5' A.F.F.—for class work, vertical book shelves, and floors for transition. Reading is the principal task and desk tops should have a luminance 1.5 to 3 times higher than surrounding surfaces.<sup>vii</sup> Uniformity on all task planes should not vary much to keep occupants focused and enable them to complete task with comfort. Narrow beam luminaires should be avoided to lessen hot-spots on desks.

**Luminances of room surfaces:** Important

Luminous surfaces should decrease in intensity as follow: curtain wall surfaces, desk tops/ceiling, book shelves, and floor. Curtain wall surfaces should not be more than 5 times task luminance, while interior walls should be no less than 1/3 task luminance to not distract from work.<sup>viii</sup> Maximum luminance on ceiling should be 850 cd/m<sup>2</sup>, also, an 8:1 max:min ratio will be sustained.

**Modeling of faces and objects:** Important

This is important in the reading lounge because activities can (and probably will) be done in groups. These could include studying, doing group project, or having group meetings. Direct sources should not have spot distributions, so candela distribution will be higher in vertical angle and illuminate faces from multiple angles. Indirect sources on the lower level are a good way to increase the vertical illuminance that would highlight faces.



**Points of interest:** Important

Geometry in this space is somewhat simple, so accenting stand-out elements will make the overall experience more interesting. Columns (supporting the second floor) and the curving stairway are the most obvious and exposed elements. Attention should be brought to them due to their differing finishes from the floor, walls, and ceiling. The opening in the second floor makes a very high ceiling height and an impressive volume. Attention should be brought to this opening to fill the void and possibly dull space that is created. High ceiling height on the second floor may lead to downlighting; indirect luminaires may not be the most efficient choice to get light to the work plane.

**Reflected Glare:** Very Important

Reduction of every type of glare should be attempted during the lighting design process. Specular materials— like the column encasements and glass railings— may contribute reflected glare that would distract the user. Placement of luminaires should minimize strong candela distributions in angles that have potential to create distractions. Luminaires should not be aimed at windows. Those accenting specular surfaces from above/below should be focused at shallow/steep vertical angles to prevent glare.

**Shadows:** Somewhat Important

Shadows should be avoided on task plane; they can create distractions and make it hard to concentrate on reading or other work. Multiple sources, located in different places in reference to tables (with and without computers) could minimize the shadows made on these surfaces (if all contributing light to the task plane).

**Source / task / eye geometry:** Very Important

Luminaires may hinder VDT use on the second floor. Luminaire placement should try to avoid arranging in such a fashion that would create reflections of luminous surfaces on computer screens. Similar standards apply for reading tables, to plan for glossy materials.

**Sparkle and desirable reflected highlights:** Somewhat Important

Mentioned before in 'points of interest,' adding decorative elements will create a more interesting space. Sparkle could be appropriate for this space as long as it abides by the previous glare recommendations.

**Surface characteristics:** (Refer to Material Schedule for more information)

Reflection properties within this space are somewhat standard (mentioned in Section one and noted in the Material Schedule). The main surfaces that stand out and that will be helpful when designing are the ceiling and walls. Their higher (than average) reflectance will help distribute reflected light throughout the large and open space. Additional surfaces of interest are mullions, column encasements, and glass railings, all of which are specular.

**System control and flexibility:** Important

In accordance with the Daylighting Integration, all dimming systems will be operated with automatic adjustment when daylight is sufficient enough to replace electric light. Luminaires should be grouped by their distance away from the curtain wall (in reference to daylight harvesting and dimming zones). Wallwashers should be operated individually from the general lighting in the space; since they will most likely not be operated during the day. Occupancy sensors and time clocks will turn the lighting systems on/off during hours of non-use.

**Special considerations:** Important

To record and keep track of electrical loads (for LEED follow up), it is recommended that a system be put in use that can record power consumption of ballasts. Previously noted: structural columns and large white walls. High story height requires a high lumen output to reach illuminance on tables and floor.

**Illuminance** Very Important

Primary tasks include:

- Reading and writing; mostly 10 -12 pt type and (#2) pencil and pen. Recommended illuminance on task plane (horizontal) is 30 fc.<sup>ix</sup>
- Finding and reading titles on book stacks. Recommended illuminance on task plane (vertical) is 30fc.<sup>x</sup>

Secondary tasks include:

- Intermittent VDT use. Recommended illuminance on task plane (horizontal) is 50fc, and (vertical) 5fc.<sup>xi</sup>
- Passage through space. Recommended illuminance on task plane (horizontal) is 5fc.<sup>xii</sup>
- Face to face interaction. Recommended illuminance on task plane (vertical) is 5-10fc.<sup>xiii</sup>

**Roof Garden:****Appearance of Space and Luminaires:** Somewhat Important

For exposed fixtures appearance should reflect the exterior space and/or medium to high quality. Fixtures that are not within view should be based off of performance and not looks.

**Color Appearance and Color Contrast:** Important

The CCT of sources should be warmer (in the range of 2500-3500) to accent the natural tones of materials used (concrete, plant bed, wood). Sources highlighting cooler materials (like the white masonry walls) should have a cooler CCT (in the range of 3500-4000).

**Maintenance:** Not Important

Maintenance in this space is not a prevalent issue due to the close proximity of the fixtures. There will be no high ceiling mounting, and the fixtures used will have easily accessible lamps.

**Daylight integration and control:** Not important

No integration needed for exterior spaces.

**Direct Glare:** Somewhat Important

Most (if not all) luminaires should not be open to view. They will be accenting the features on the roof and should not be viewed. For those that are in view, no bare lamps should be used and they should be aimed away from the field of view of the user.

**Flicker and strobe:** Not Important

Flicker and strobe are most important when there is rotating machinery; there are none in the library.

**Light distribution on surfaces:** Important

When luminaires are used to highlight natural objects (trees/grass) the effect on these surfaces should reflect the object's geometry and quality (e.g. graze on grass or trees to show texture). Walls should be lit evenly in the lighting mode of choice (e.g. an even graze without socket shadows or striations).

**Light distribution on task plane:** Important

Since the space is used as a relaxing and intimate gathering space, light levels during the night should be low. The ground plane is the most important task plane (for transition through the garden), and the stones and pavers used for walking should be illuminated. Benches and planters (used for seating) should also receive light on their top so people can see where they are sitting.

**Luminances of room surfaces:** Important

Luminous surfaces should decrease in intensity as follow: walls, benches/planters, floor/natural features. Walls should be lit to provide added light to the space but should not be lit uniformly; a gradient (from the deck) should be created with electric light.

**Modeling of faces and objects:** Very Important

The main purpose of this space is for gathering; a place for people to escape from work and socialize. Modeling of faces

will be a very important feature of the lighting design. This can be accomplished by reflecting light off the surrounding walls which will increase vertical illuminance.

**Points of interest:** Important

The sculpture on the main wood deck is a main feature of this space and should be accented with light to show form. The continuation of the white masonry wall is a key feature to integrate surrounding spaces and lighting should be similar to both the library and gathering space. The overall lighting should reflect nature and it's forms, unlike interior the accentuation of modulations will be a key feature.

**Reflected Glare:** Somewhat Important

Most of the materials are matte, but for those that aren't (white masonry walls), luminaires should be focused to prevent stray light reflecting into field of view.

**Shadows:** Very Important

To show modulations of objects and natural forms, the use of shadows will be extremely important. Shadows will display contrast on these features and allude to the form of the particular object. Shadows on tasks (main passageways and benches/planters) should be eliminated.

**Source / task / eye geometry:** Not Important

The main purpose of this space is reflection and social interaction; tasks that may reflect distracting luminosity will not be considered for lighting design.

**Sparkle and desirable reflected highlights:** Somewhat Important

Accenting specular sculpture will be one of the few (if not only) sparkling elements in this space.

**Surface characteristics:** (Refer to Material Schedule for more information)

Most of the surfaces reflect nature. Natural features used are trees, grass, and wood. Earth-toned concrete, pavers and stones sustain the theme of this space. Texture is a reinforcing factor to the natural theme; materials appear unfinished like they are straight from the earth. These features are important to highlight to visually explain the theme to occupants.

**System control and flexibility:** Important

Time-clock operation will be programmed in conjunction with control devices based around daylight levels for the exterior fixtures. They will turn on at a regulated hour when daylight starts to diminish beyond functional light levels. Occupancy sensors will then operate the luminaires on the localized objects/trees.

**Special considerations:** Important

Luminaires should abide by LEED criteria for Sustainable sites, and should be aimed in a way to contribute only the regulated amount of light in coordination with light trespass to surrounding buildings or light pollution to the sky. Additionally, all luminaires outside should have an IP rating of 65; to protect (totally) from dust and low pressure jets of water from all directions.

**Illuminance** Important

Primary tasks include:

- Passage through space. Recommended illuminance on task plane (horizontal) is 5fc (subject to decrease due to low level of surrounding ambient light and contrast).<sup>xiv</sup>
- Face to face interaction. Recommended illuminance on task plane (vertical) is 5-10fc (subject to decrease due to low level of surrounding ambient light and contrast).<sup>xv</sup>

**Student Gathering:****Appearance of Space and Luminaires:** Very Important

The gathering space is the central space and defining factor of GCC. This space will definitely make a strong impact on visitors (especially prospective students) in regard to GCC and the quality of the institution. The highest quality of luminaires should be used in this space; especially due to the probability that a good portion of the luminaires will be close to human scale.

**Color Appearance and Color Contrast:** Important

Lamps used in fixtures highlighting the wall surfaces (glossy white) should have cooler CCT; closer to that of daylight (in the range 3000-4000K). Because of large amounts of daylight entering the space, contrast between it and electric light may lessen the overall quality of the gathering space. Clerestories provide daylight into the space and at night—when there is none—electric light should mimic the effects of daylight in an attempt to maintain similar lighting effects. In this regard, the space will be consistent and more user friendly. Cooler CCT (than perhaps the lower lighting) should be used in the clerestory lighting. Good CRI is recommended to highlight the multiple types of flooring and a slightly warmer CCT should be used to accent the wood.

**Maintenance:** Very Important

Because of the varying and complicated ceiling heights and geometries, long-life luminaires should be used to reduce the maintenance cost and execution lapses in the future.

**Daylight integration and control:** Important

To coincide with LEED criteria (to reach GOLD rating) and create a known example of sustainable methods in GCC, daylight integration should be taken advantage of. Dimmable or switchable systems should automatically lower or increase electric levels in concurrence with the daylight level entering the space. Direct daylight penetrations should be reduced or eliminated from striking the floor of the main passage space. Moving sun control devices (such as bottom-up shades) should be avoided (if possible). More daylight should be present on the East and West walls.

**Direct Glare:** Very Important

For walking and way-finding, direct glare may act as a large distracting factor for users. It should be avoided to maintain a comfortable lighting environment; especially when multiple tasks (reading, VDT use, etc.) are planned for the space. No bare lamps should be in view of user. Focusing daylight onto walls will eliminate direct glare from clerestories (for those scaling the main stair in the space).

**Flicker and strobe:** Not Important

Flicker and strobe are most important when there is rotating machinery; there are none in the library.

**Light distribution on surfaces:** Very Important

Stray patterns of light and shadow from luminaires meant to create a uniform light level (e.g. in the Eastern walkway) should be eliminated. However, to support the idea of an interior street, localized pools of light on a human scale will be made (especially where people will sit and relax). These pools should not differ extremely in luminance from the general light level, and should be coordinated to be located on one (or the fewest amount of) material. This will reduce the visual noise of the space and make for easy passage without confusion. Ambient light will come from light distributed on walls—from daylight and electric light (at night). It may be desirable for daylight to create changing patterns of mullions on walls throughout the day. This can convey time of day to occupants and create interesting effects within the space.

**Light distribution on task plane:** Important

The main task plane is the floor; since the space is mainly used for flow and transition through GCC. This luminance level should be lower than the surrounding surfaces. The floor should be mostly uniform, with noticeable variations in light level in and out of the pools of light (created at night). The uniformity ratio to achieve a noticeable difference in illuminance is 3:1 max:min.

**Luminances of room surfaces:** Important

Luminous surfaces should decrease in intensity as follow: walls, ceiling, and floor, this will be for day and night. Walls should be lit to provide added light to the space but should not be lit uniformly; a gradient (mimicking that of daylight) should be created with electric light.

**Modeling of faces and objects:** Very Important

The main purpose of this space is for gathering; a place for people to escape from work and socialize. Modeling of faces will be a very important feature of the lighting design.

**Points of interest:** Very Important

Window boxes (to interior spaces), display boxes, directories, and office alcoves surround the main stair of the gathering space. Accenting these features will serve task purposes and create visual interest around the periphery of the space. Located on the walkway is a large decorative glass wall, which seems to mimic stained glass. It will be a goal to have ambient lighting accent this feature at night (to minimize the equipment and lighting loads in the space) and for daylight (during later hours of the day) to create colored patterns on the floor of the walkway.

**Reflected Glare:** Important

Reflected glare should be reduced in attempt to facilitate tasks. Luminaires highlighting specular points of interest should be aimed in a way that the primary candela distribution is not reflected or directed into the user's angle of vision.

**Shadows:** Very Important

Large shadows should be eliminated on task plane; they can create distractions and make it very difficult to complete given task (walking/way-finding). Although some variation in light level is recommended, no large shadows should exist on the ground plane.

**Source / task / eye geometry:** Somewhat Important

Because there are no arranged seats—but seating areas—placement of reading tasks and VDT screens are difficult to pinpoint. Lighting design should try to minimize tilting luminaires (used for general lighting levels) in the Northern direction. It is probable, since the stairs climb in the Southern direction, that people will seat themselves oriented to the North. This will cause their task to face the South more susceptible to reflect tilting angles toward the North.

**Sparkle and desirable reflected highlights:** Somewhat Important

Accenting specular materials will make the space look more expensive and of higher quality. Another purpose of the ambient lighting system (other than providing light to the floor) should be to create sparkle on handrails—on bridges and stairs. Focus luminaires to create similar sparkle within the items mentioned in points of interest.

**Surface characteristics:** (Refer to Material Schedule for more information)

The surfaces with the most surface area are the walls and floor. The walls are high reflectivity, specular white paint. The floor materials vary in reflectance but generally are of average floor properties. Wall surfaces are not parallel to each other and neither are the ceiling and floor. The angles between the walls are small.

**System control and flexibility:** Important

In accordance with the Daylighting Integration, all dimming or switching systems will be operated with automatic adjustment when daylight is sufficient enough to replace electric light. Luminaires highlighting walls and in points of interest on the walls should be operated separately from the general lighting in the space; since they will most likely not be operated during the day. Occupancy sensors and time clocks will turn the lighting systems on/off during hours of non-use.

**Special considerations:** Important

To record and keep track of electrical loads (for LEED follow up), it is recommended that a system be put in use that can record power consumption of ballasts. High ceilings require high lumen output to reach illuminance on walls and floor. High reflectivity of walls will help reach recommended levels on the ground.

**Illuminance** Very Important

Primary tasks include:

- Passage through space. Recommended illuminance on task plane (horizontal) is 10fc (subject to increase due to higher illuminance for secondary tasks and their close proximity to the floor).<sup>xvi</sup>
- Face to face interaction. Recommended illuminance on task plane (vertical) is 5-10fc.<sup>xvii</sup>

Secondary tasks include:

- Reading and writing; mostly 10 -12 pt type and (#2) pencil and pen. Recommended illuminance on task plane—approximately 1-2 feet off the floor—(horizontal) is 30 fc.<sup>xviii</sup>
- Intermittent VDT use. Recommended illuminance on task plane—approximately 1-2 feet off the floor—(horizontal) is 50fc, and (vertical) 5fc.<sup>xix</sup>

**Tiered Classroom:****Appearance of Space and Luminaires:** Important

Classrooms should be visually interesting for students; this maintains school pride within the user as well as providing them something interesting to look at during class. This aspect of the classroom, however, should not distract them from their activities and/or studies while in the space. Luminaires must be attractive to the eye but not diverting from the task in front of them.

**Color Appearance and Color Contrast:** Important

For good productivity, sources should have cooler CCT (in the range of 3000-3500K). Too warm a CCT will be cozy and possibly make the occupants tired. Good CRI is important to render room materials and presentation elements.



**Maintenance:** Not important

Low ceiling heights enable easy maintenance in this space and therefore, it is not a concern during design.

**Daylight integration and control:** Not Important

No daylight exposure in space.

**Direct Glare:** Very Important

Low ceiling heights make students susceptible to distracting direct glare. To prevent this, no bare lamps should be in direct view from any point in the classroom. Indirect luminaires and downlighting (with lamp cut-off) should be used to reduce glare.

**Flicker and strobe:** Not Important

Flicker and strobe are most important when there is rotating machinery; there are none in the library.

**Light distribution on surfaces:** Very Important

Reduction of shadows and striation from lighting systems is very important. This can easily distract students from presentations and lectures. Peripheral lighting may contribute light needed to cancel-out scallops and other shadows around the room. During video presentations, it is important to limit the illuminance on the presentation screens at the front of the room for optimum viewing.

**Light distribution on task plane:** Important

The main task plane is the desk top; uniformity should be held to utmost ability to enhance productivity. The equality of lighting at each seat is important to give each student a well lit work/learning area.

**Luminances of room surfaces:** Important

Luminous surfaces should decrease in intensity as follow: Desk tops, walls + ceiling, floor + dry-erase boards, and presentations screens.

**Modeling of faces and objects:** Very Important

In a large group setting, such as this 100 person classroom, it is very important for the professor to see and discuss with his/her students. Seeing their faces will help the professor connect with, remember, and better inform those being lectured. This would be an important factor during class discussions, presentations, and countless other activities.

**Points of interest:** Important

Highlighting the interesting features will bring attention to them and make this space stand out in regard to typical classrooms. The unique orientation of ceiling panels and the acoustic materials on the walls should be highlighted to create dimension in the room and to avoid dark surrounding walls that would make a dim and drab space.

**Reflected Glare:** Important

Reflected glare is most important to avoid from the front white dry-erase boards. They are a specular surface and luminaire aiming must be carefully considered during design. Reflected light should not be within the view range of the students or the professor; which would make it hard for both parties to concentrate. This is especially true if the professor uses a lighter color marker.

**Shadows:** Important

Shadows can distract from writing and reading tasks and should be avoided within this space. Luminaire mounting should be below the plane of the ceiling panels, or, the distribution from the source should not contact the ceiling panels.

**Source / task / eye geometry:** Very Important

Reading and writing in this space could occur on a number of different materials; glossy textbooks, loose-leaf paper, etc; sources should not be positioned directly above desks to reduce reflections of luminous sources from above.

**Sparkle and desirable reflected highlights:** Not Important

Decorative elements in this space are not needed and would most likely contribute to disturbances during class activities.

**Surface characteristics:** (Refer to Material Schedule for more information)

The majority of the surfaces are average to low reflectance for a work space. Most surfaces are flat and everything (except for the ceiling panels) is parallel to the surface across the room.

**System control and flexibility:** Very Important

Occupants should have complete control over the lighting in the classroom. Professors may need to change the lighting scheme to better fit the lecture being given. Multiple zones should be configured such that this operation and variation is possible (these could include: downlighting, indirect, and peripheral lighting). Preprogrammed scenes will be available for simple control between desired lighting effects.

**Special considerations:** Somewhat Important

Lighting during video presentations requires different effects for the front of the room. Considerations include different lighting levels on the presentation screens.

## Illuminance Very Important

Primary tasks include:

- Reading and writing; mostly 10 -12 pt type and (#2) pencil and pen. Recommended illuminance on task plane—approximately 2.5 feet A.F.F.—(horizontal) is 30 fc.<sup>xx</sup>
- Face to face interaction. Recommended illuminance on task plane (vertical) is 5-10fc.<sup>xxi</sup>

Secondary tasks include:

- Passage through space. Recommended illuminance on task plane (horizontal) is 5fc.<sup>xxii</sup>

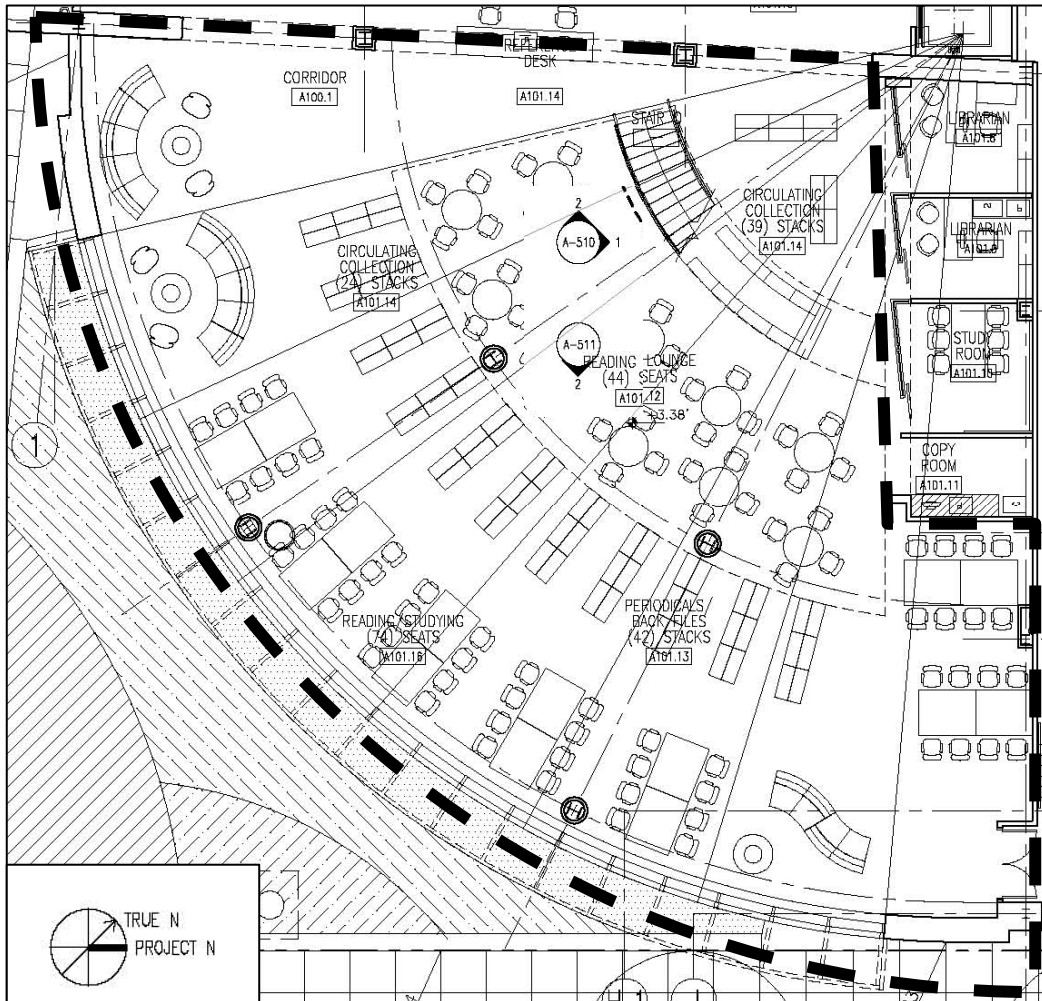
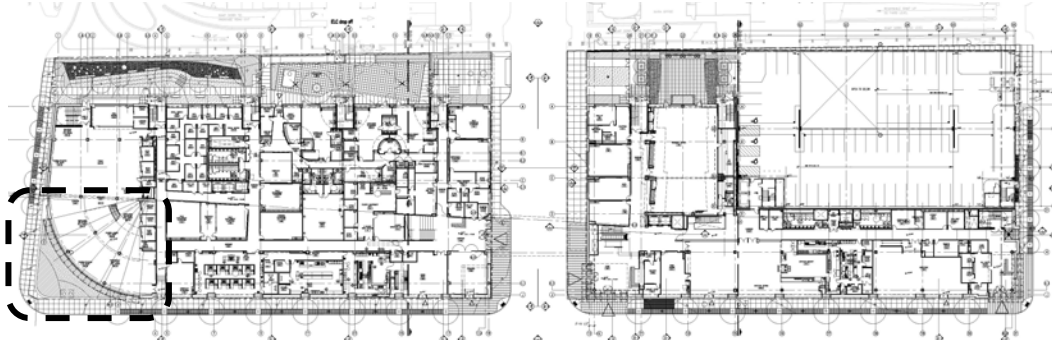
## ASHRAE 90.1

2007

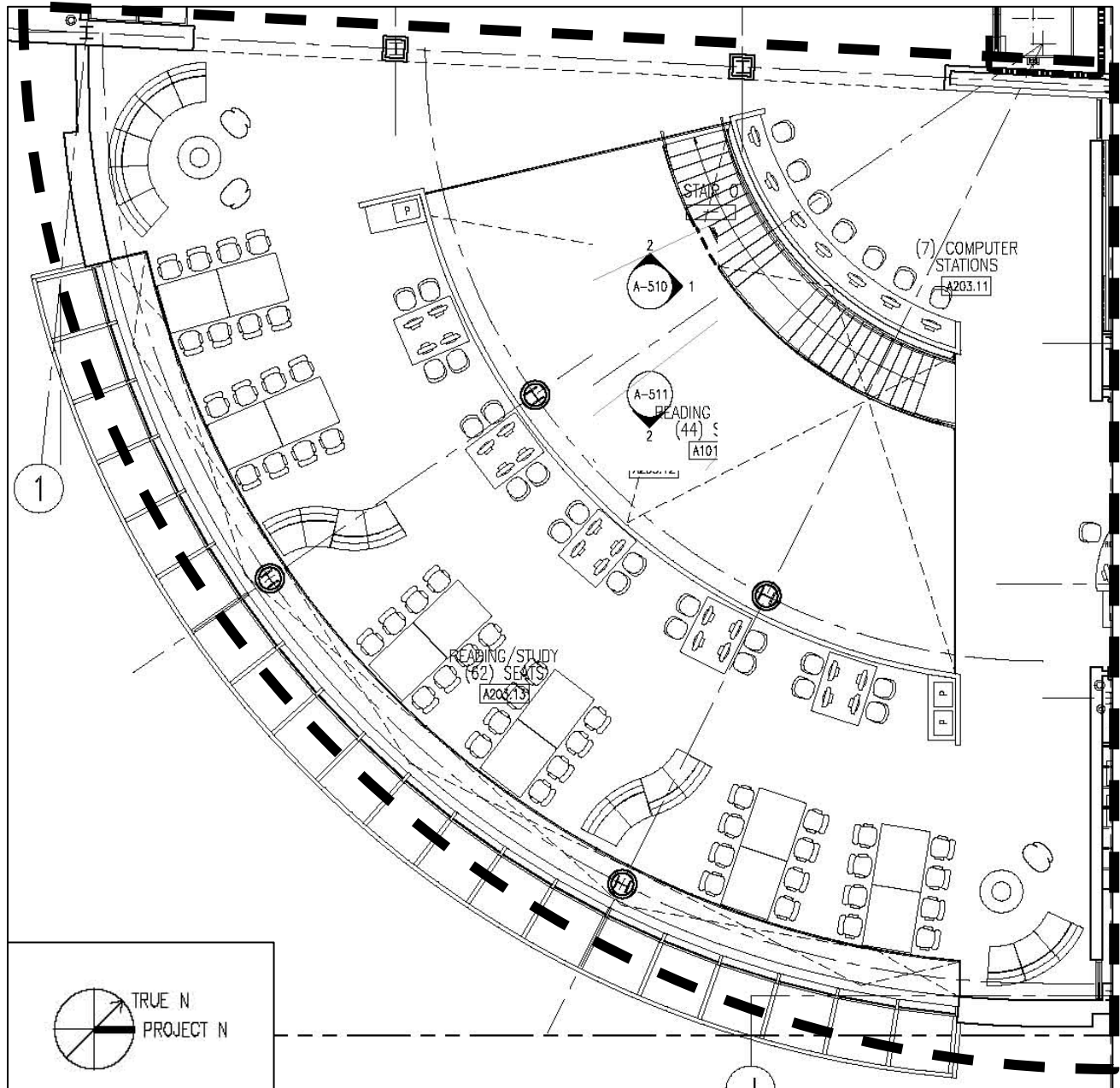
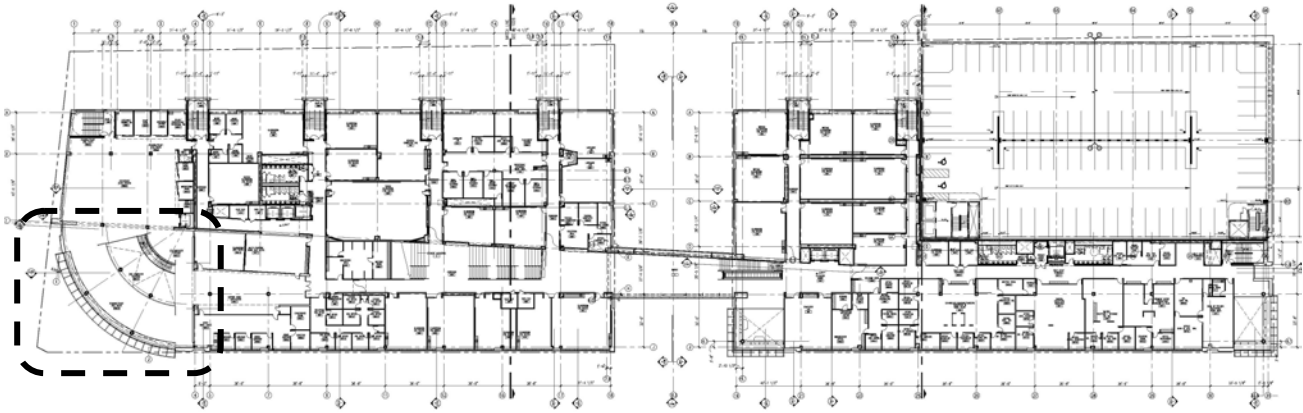
| Space Type                                 | LPD (W./ft <sup>2</sup> ) | Area (ft <sup>2</sup> )  | Exceptions                 | Allowance                             | Abide by Compliance Path | Total Allowable |
|--|---------------------------|--|----------------------------|---------------------------------------|--------------------------|-----------------|
| Library Stacks                             | 1.7                       | 7456   | Decorative (Chandeliers)   | +1.0 (W./ft <sup>2</sup> )            | a., b.,                  | 20131.2W        |
| Exterior Garden (Exterior Walkway >10 ft.) | 1.0                       | 4319   | Advertisement Signage (b.) | Exempt with individual control device | a., c. e., f.            |                 |
| Atrium (1-3)                               | .6                        | 12694  |                            |                                       | a., b., d.               | 7616W           |
| Atrium (4)                                 | .2                        | 3173   |                            |                                       | a., b.,                  | 635W            |
| Classroom                                  | 1.4                       | 2304   |                            |                                       | a.,                      | 3226W           |
| Compliance Path                            | Name                      | Conditions   |                            |                                       |                          |                 |
| a. 9.4.1.1                                 | Automatic LTG Shutoff     | >5000 ft <sup>2</sup> , int ltg controlled with automatic control device   |                            |                                       |                          |                 |
| b. 9.4.1.2                                 | Space Control             | Space enclose with ceiling height partitions will have auto shut-off within 30 min of leaving                    |                            |                                       |                          |                 |
| c. 9.4.1.3                                 | Exterior Ltg Control      | All exterior will be shut off when sufficient daylight is present, photosensor or astronomical time switch       |                            |                                       |                          |                 |
| d. 9.4.1.4                                 | Additional Control        | Display/accnt will have separate control device  |                            |                                       |                          |                 |
| e. 9.4.4                                   | Ext. Building Grounds Ltg | All exterior > 100W shall have efficacy of 60lm/W  |                            |                                       |                          |                 |
| f. 9.4.5                                   | Ext. Building Ltg Pwr     | Total exterior power allowance is sum of everything in table 9.4.5 "tradable surfaces" + 5% unrestricted of sum. |                            |                                       |                          |                 |

A1

Library Reading Lounge

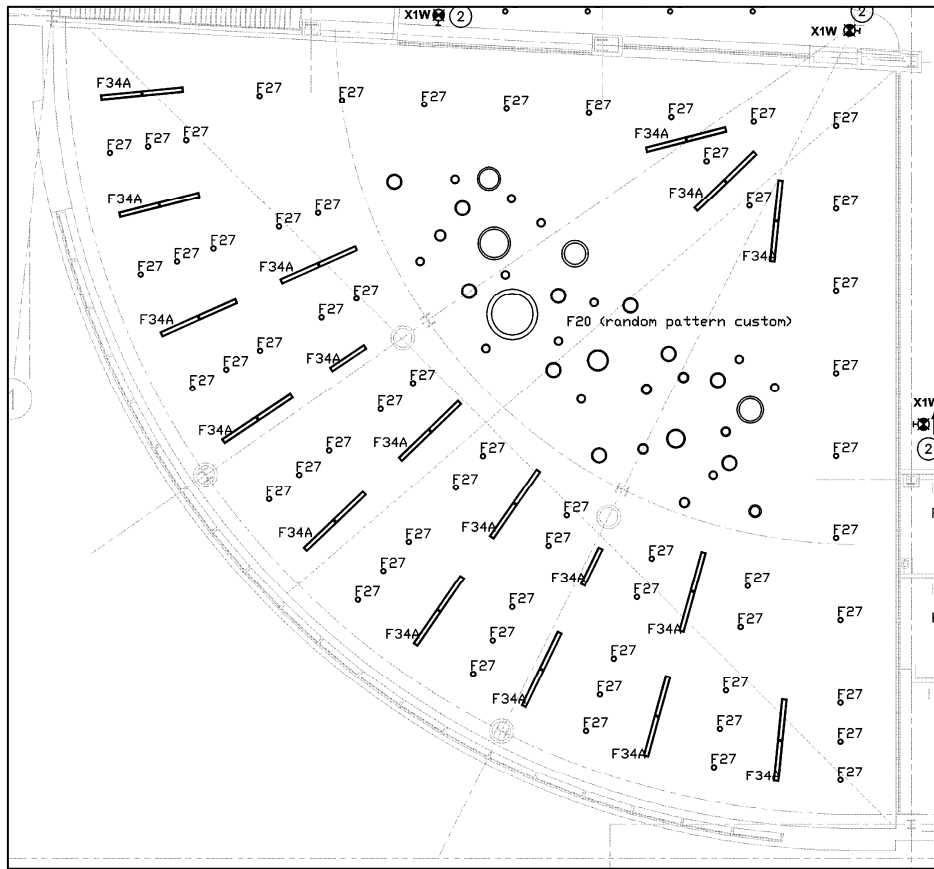


A1.1: First Floor Plan

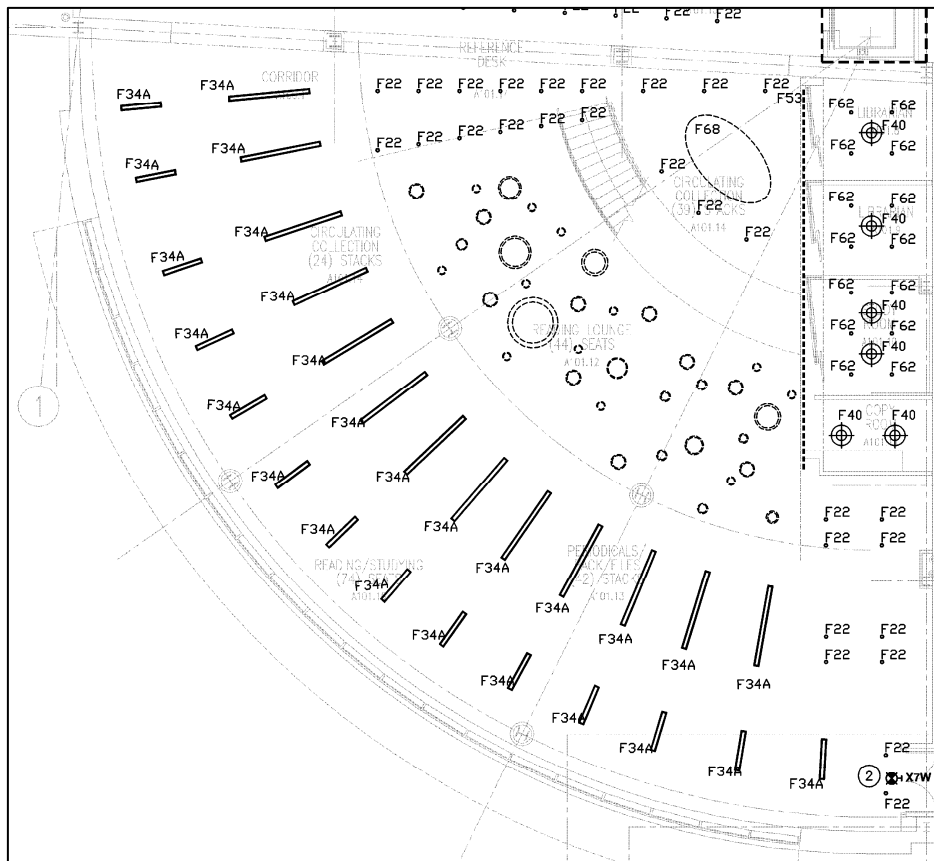


A1.2: Second Floor Plan

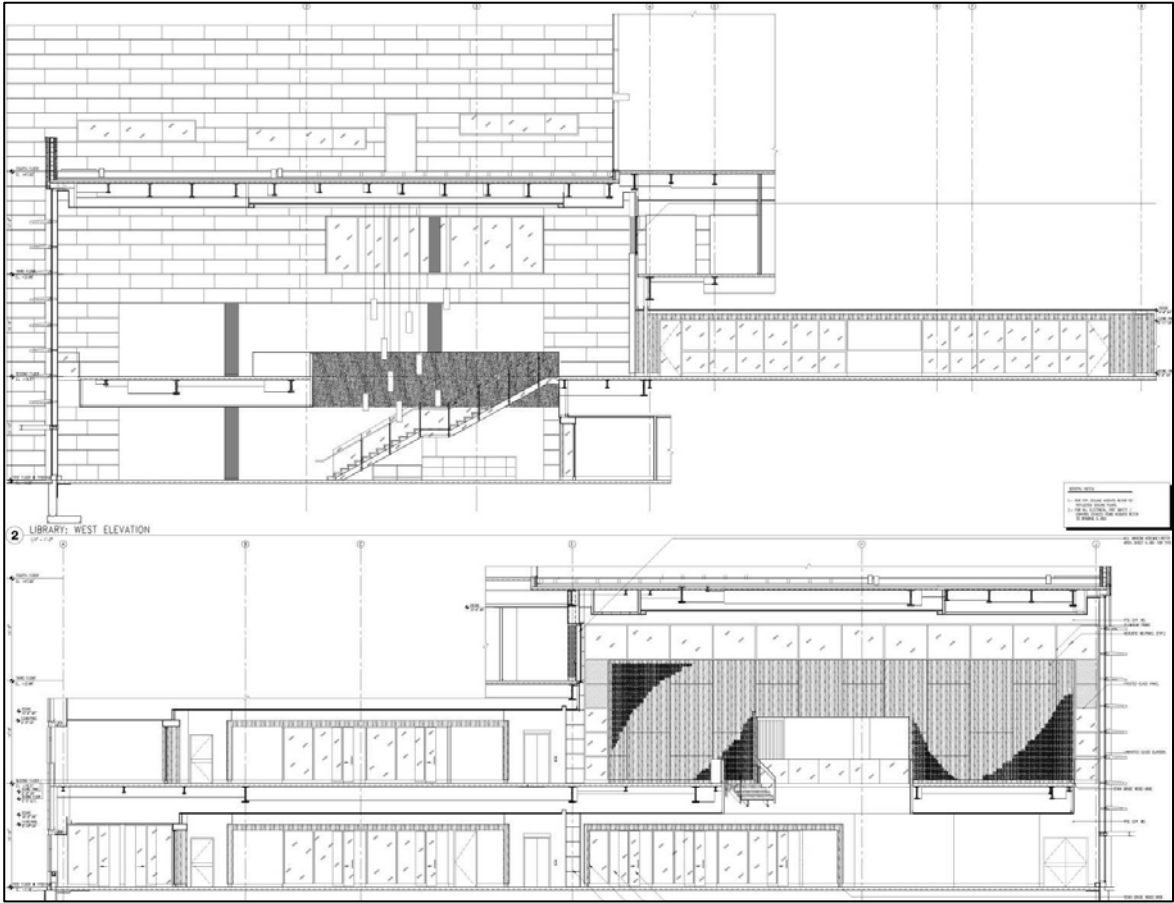




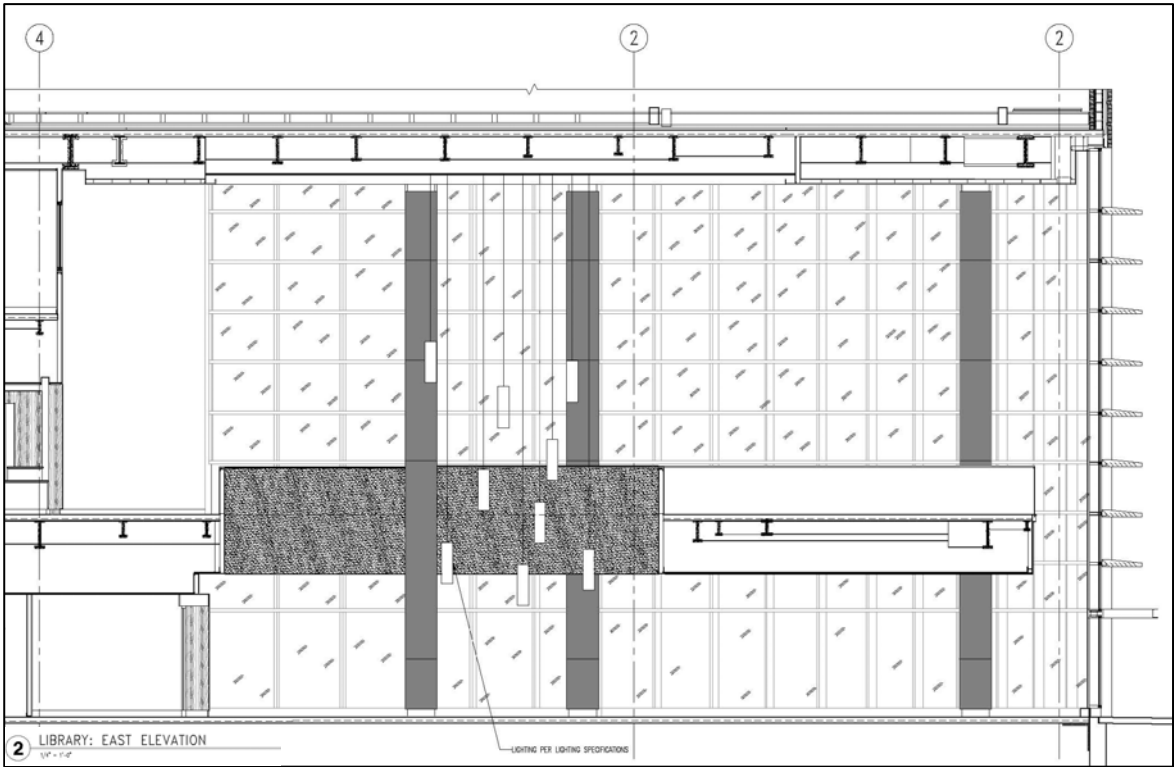
A1.3: First Floor Lighting Plan



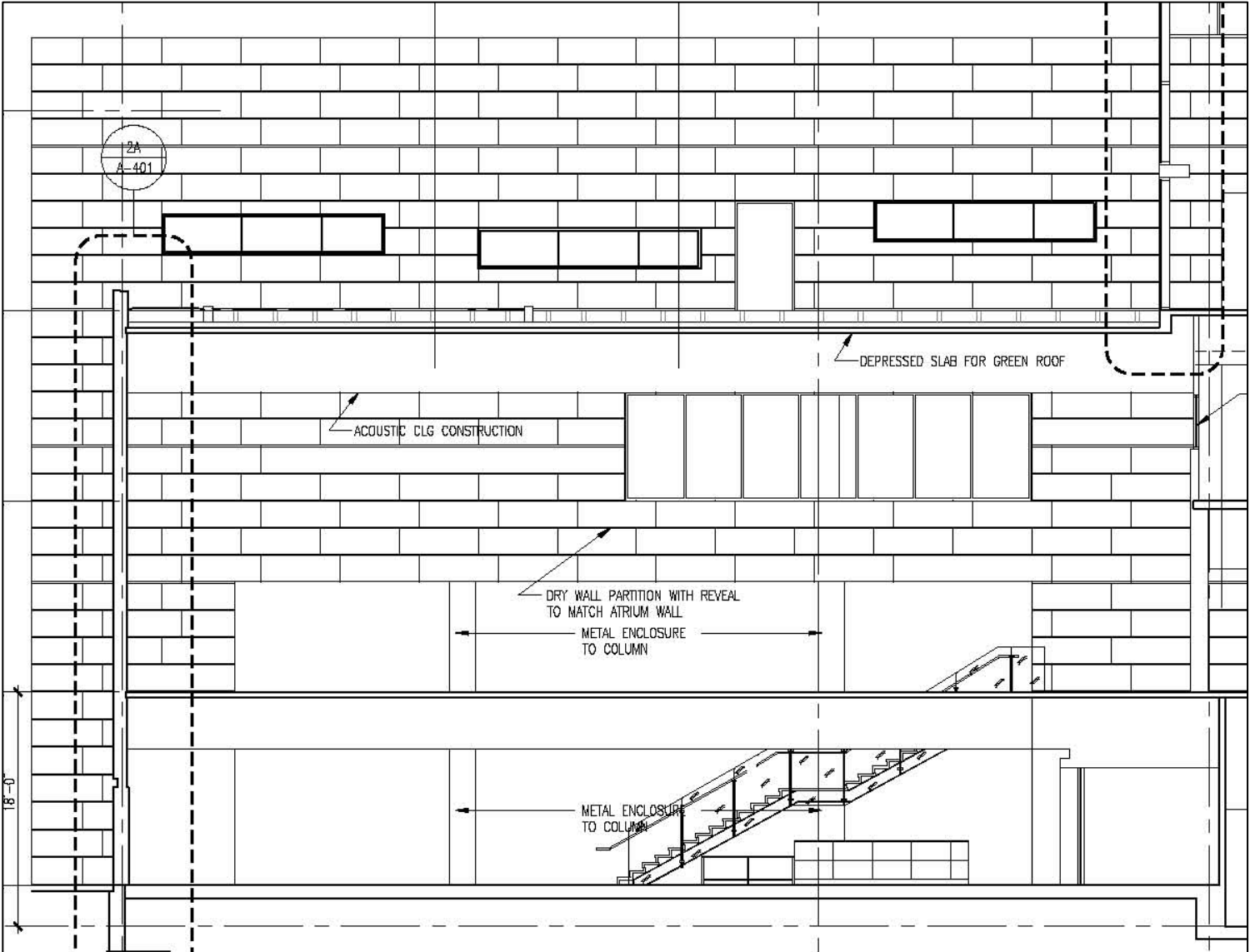
A1.4: Third floor Lighting Plan



AI.5: Interior Elevations Looking West and North (Sheet 510)



AI.6: Interior Elevations Looking East (Sheet 510)

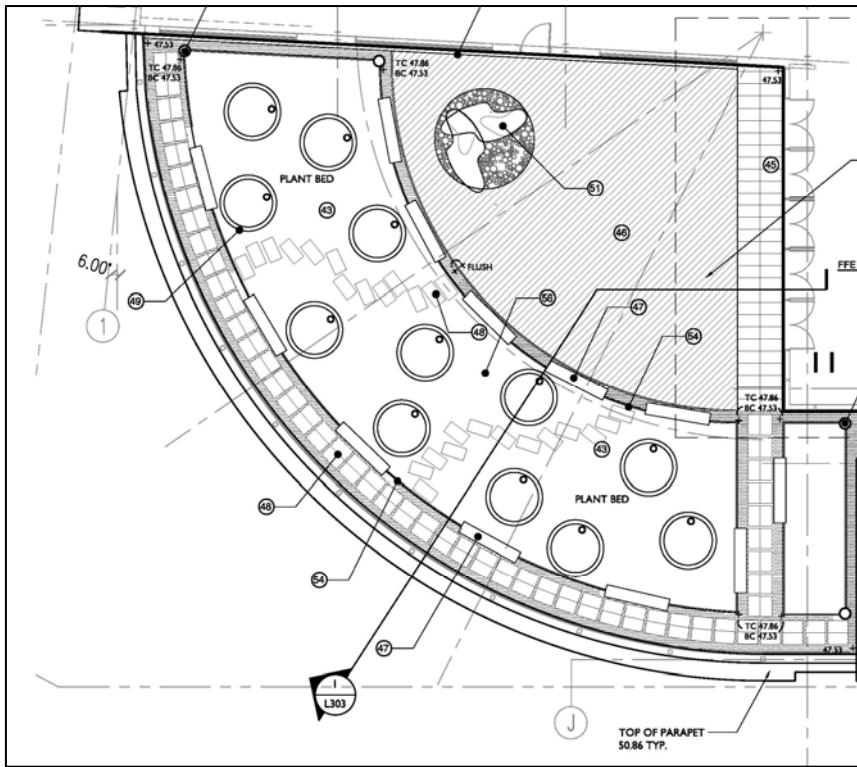


A1.7: Section Looking East

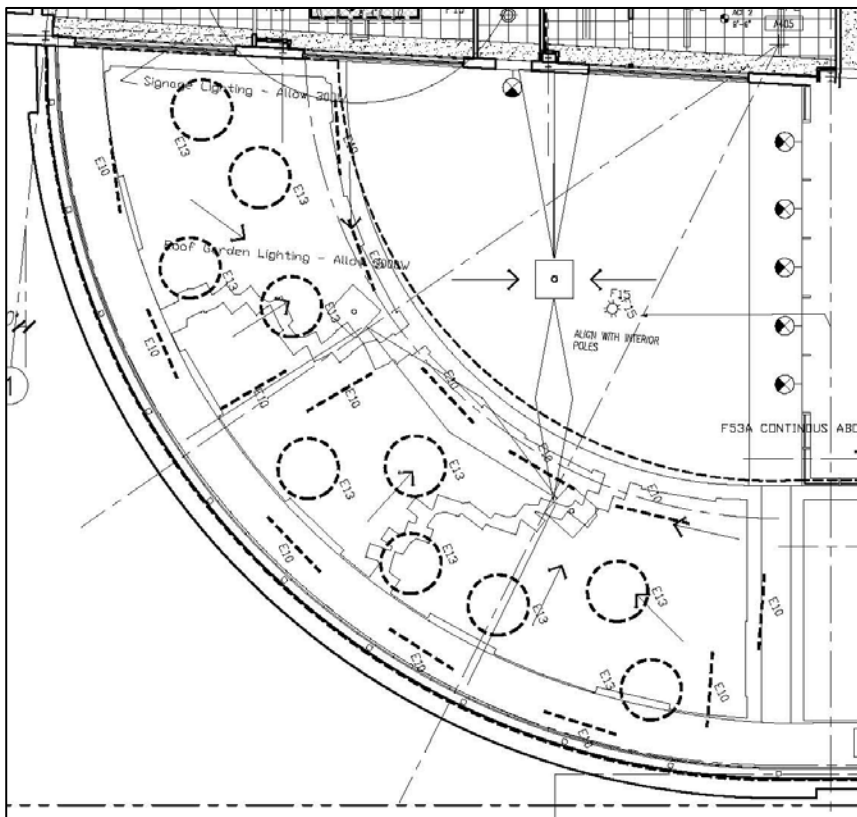




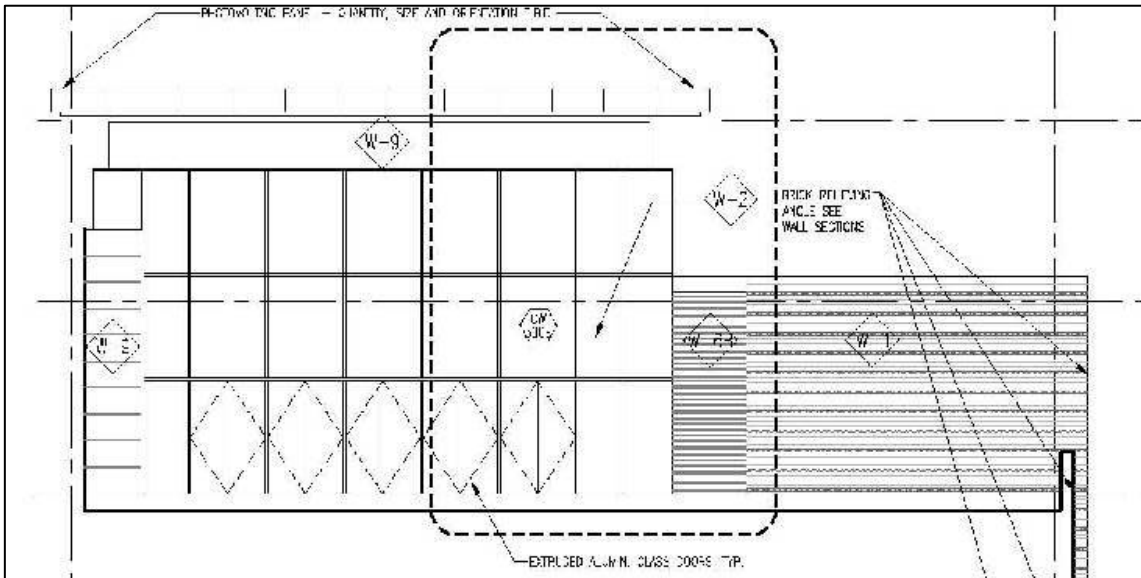
AI.8: Exterior View Looking North



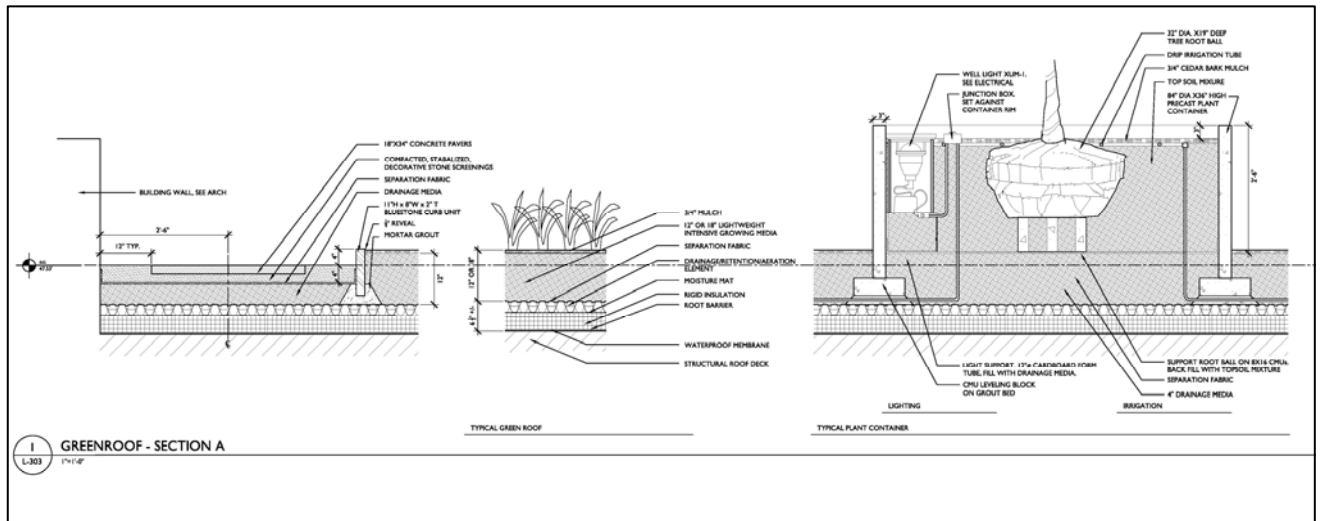
A2.1: Fourth Floor Plan



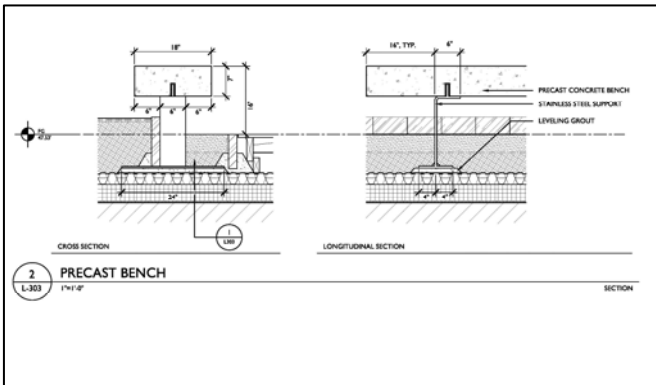
A2.2: Fourth Floor Lighting Plan



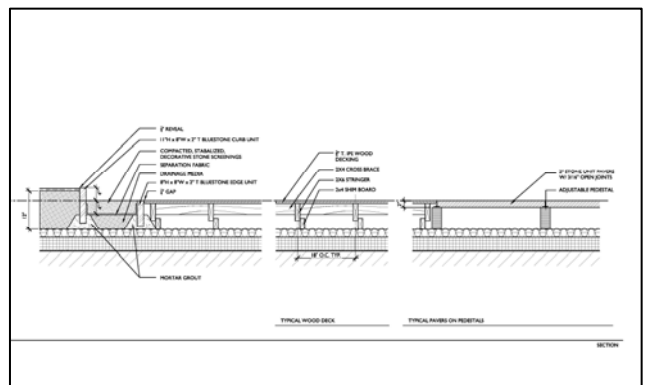
A2.3: North Elevation



A2.4 Site Details 1

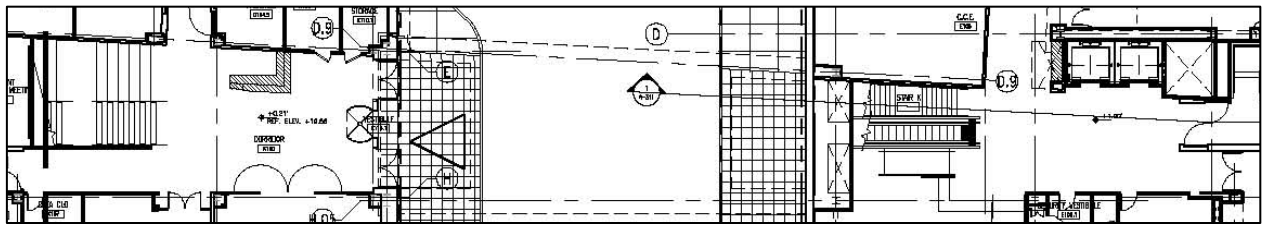
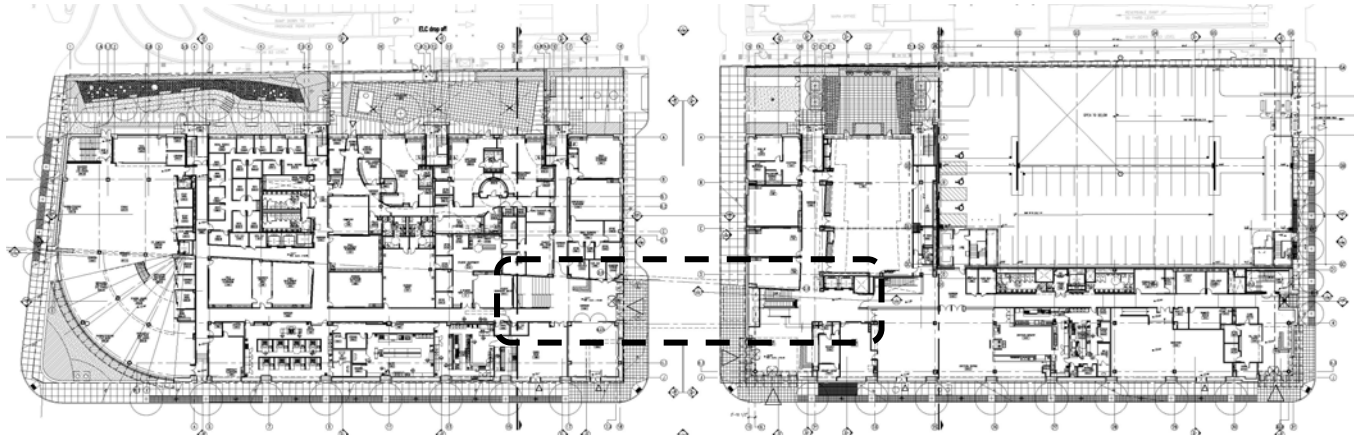


A2.5: Site Details 2

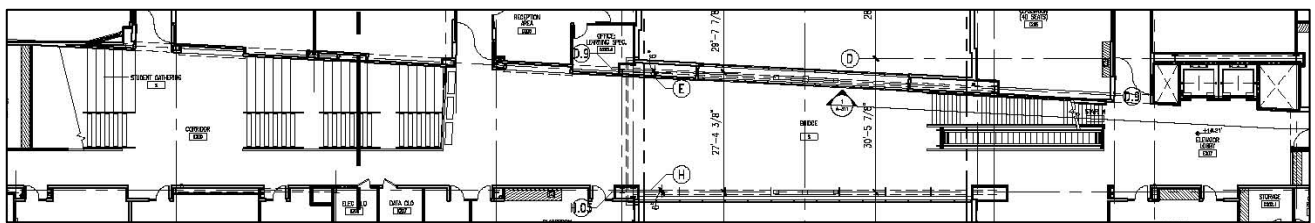
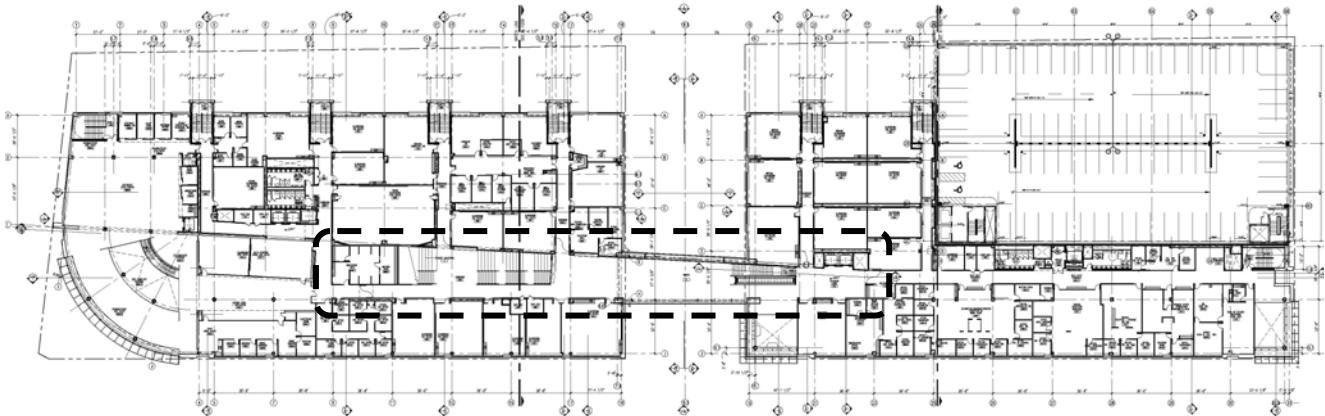


A2.6: Site Details 3

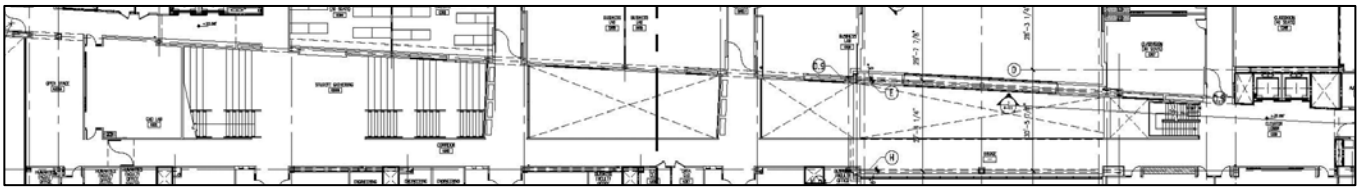
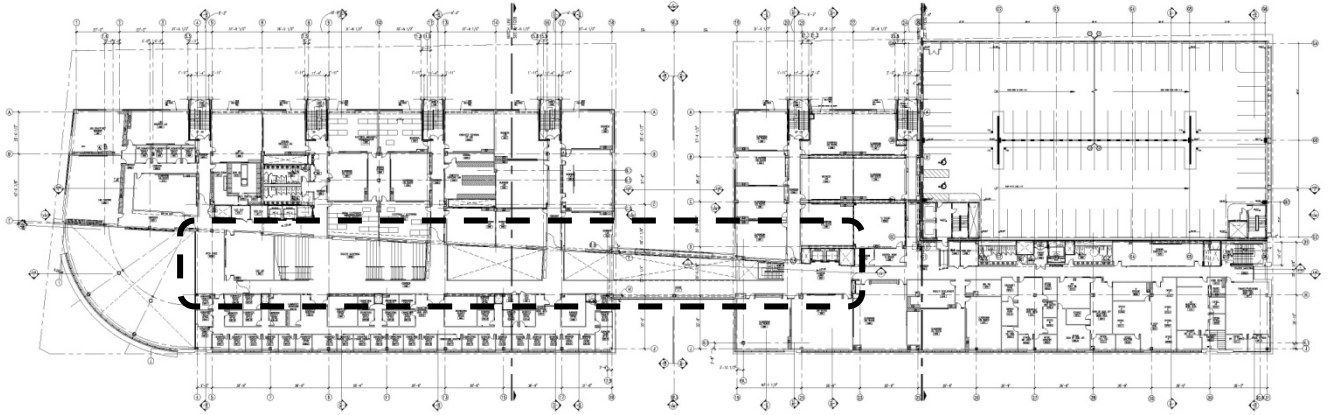




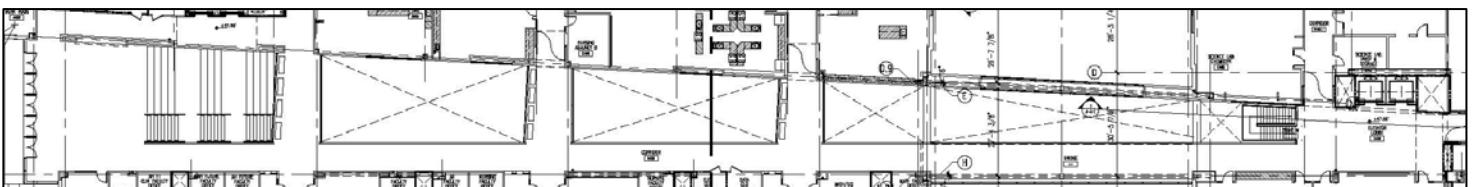
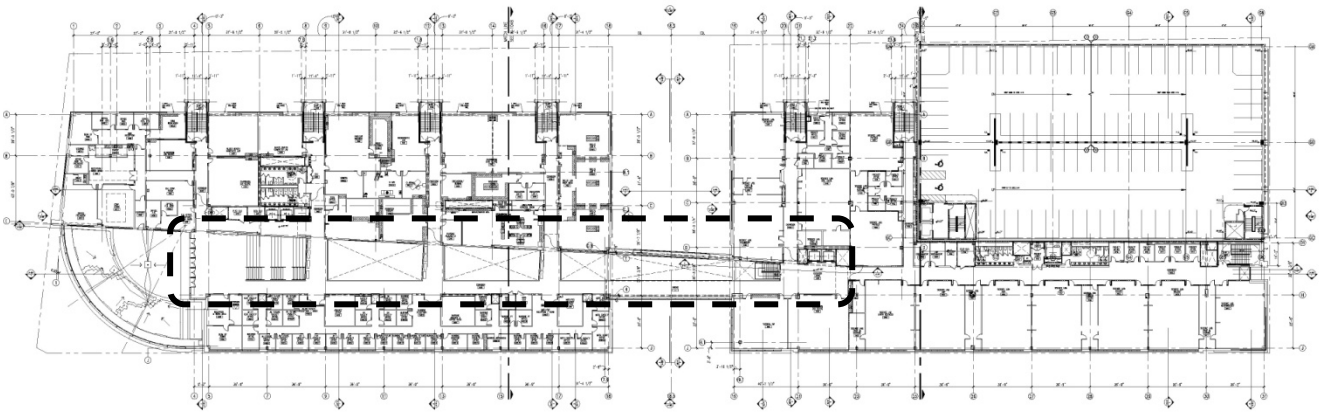
A3.1: Floor Plan Level 1



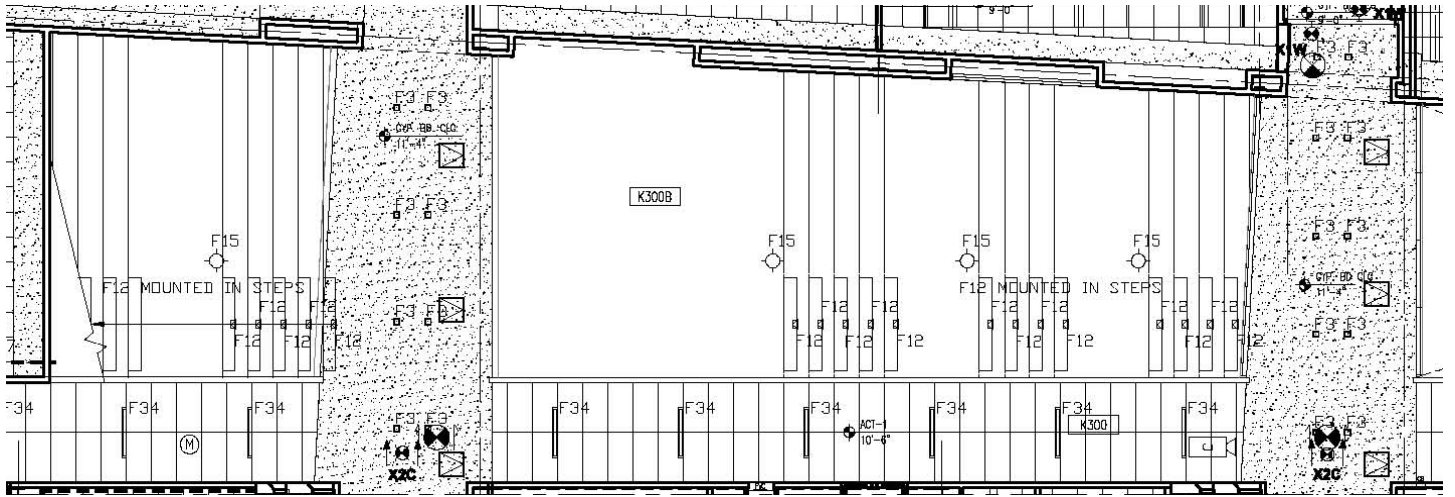
A3.2: Floor Plans Level 2



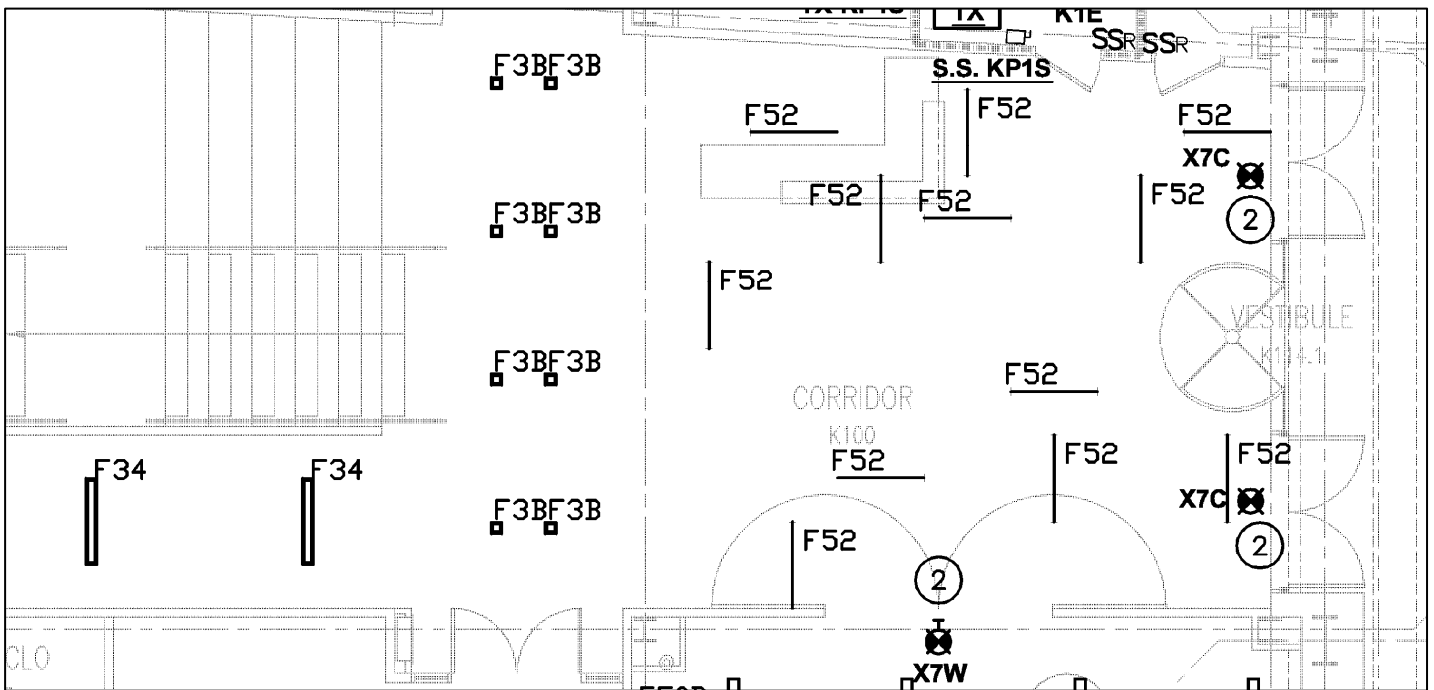
A3.3: Floor Plan Level 3



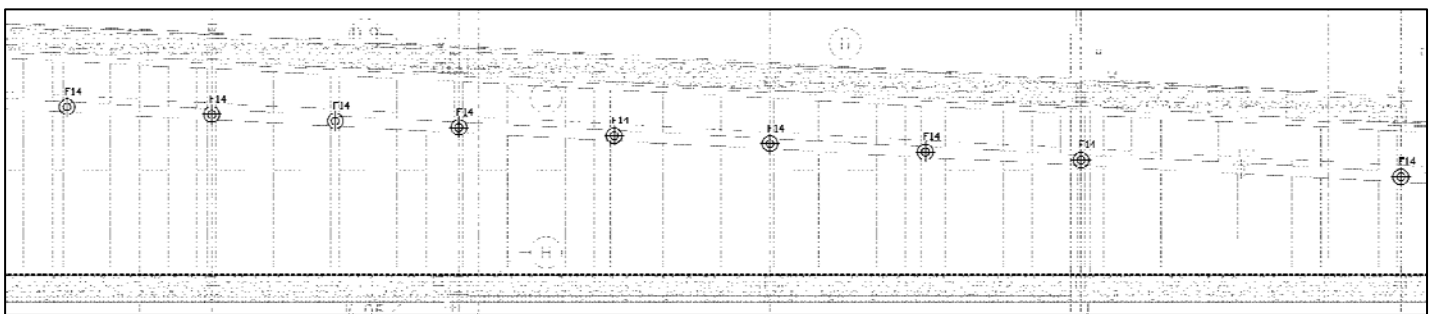
A3.4: Floor Plan Level 4



A3.5: Enlarged Lighting, Plan Level 1

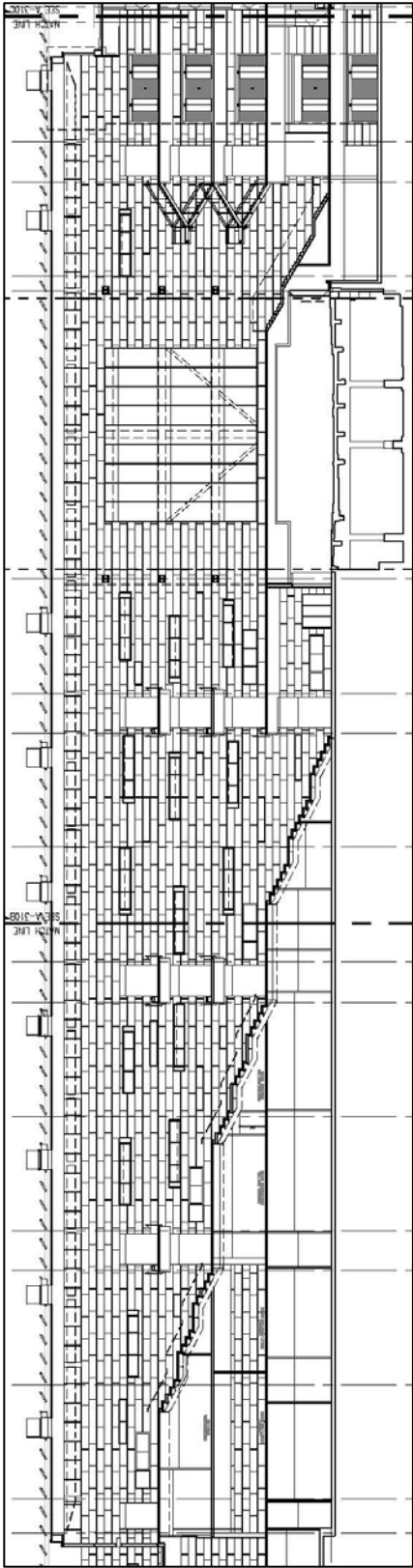


A3.6: Enlarged Lighting Plan, Level 1, Atrium Entrance

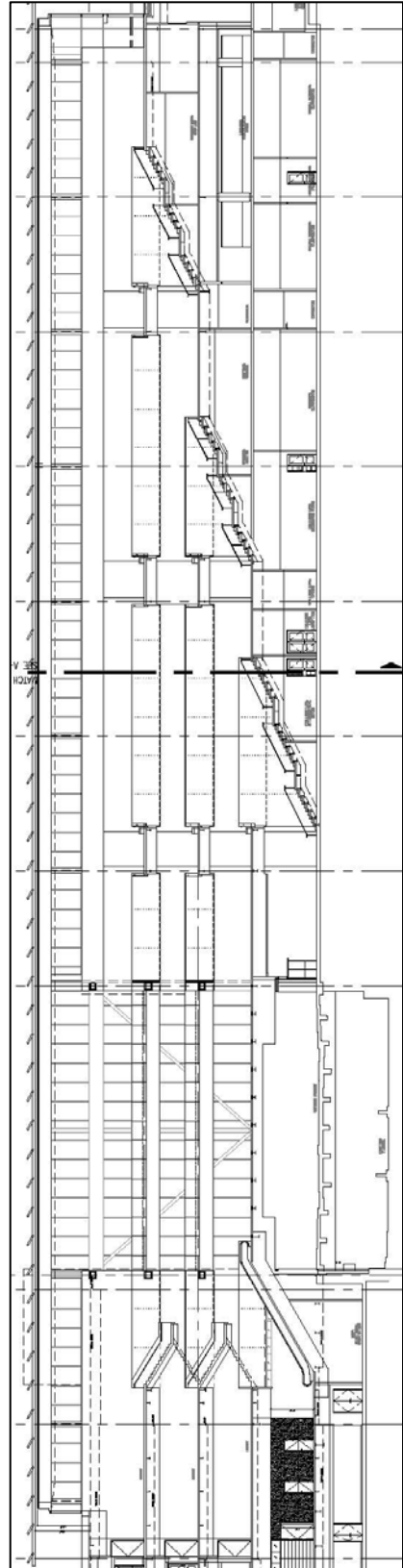


A3.7: Enlarged Lighting Plan, Level 5, High-Bay Metal Halide F14





A3.8: East Section



A3.9: West Section

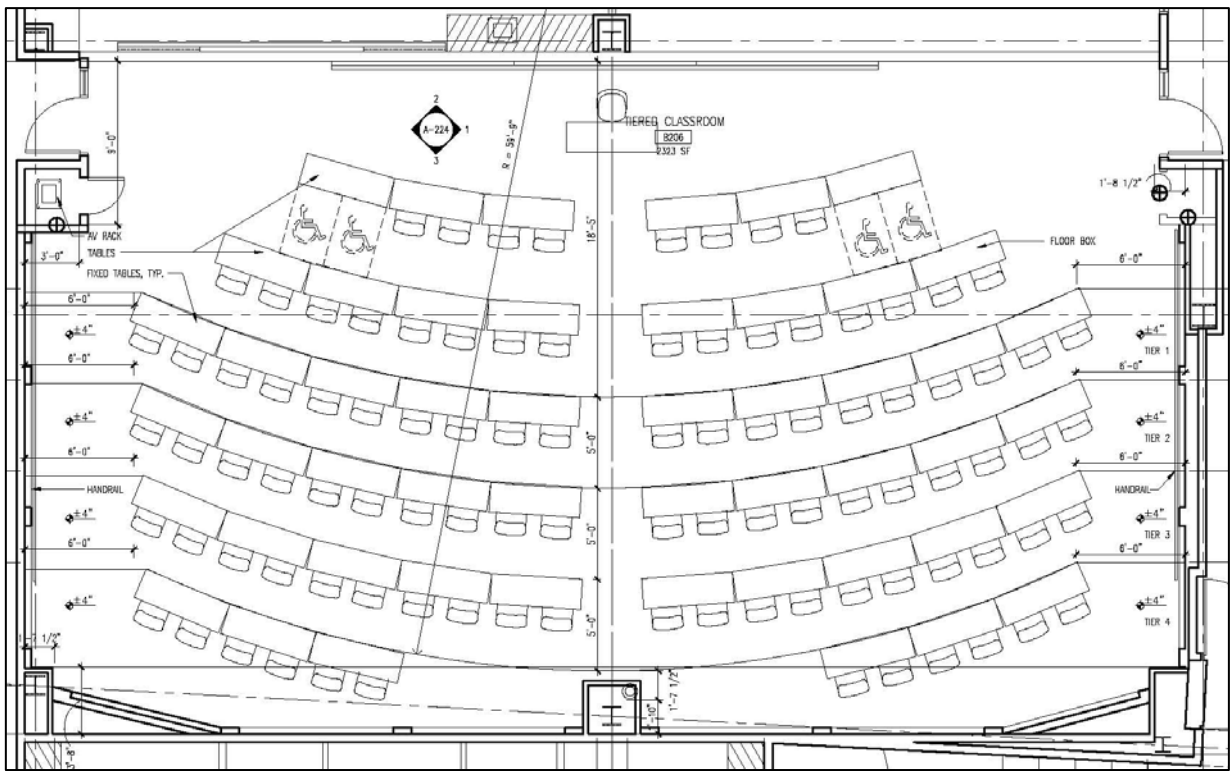
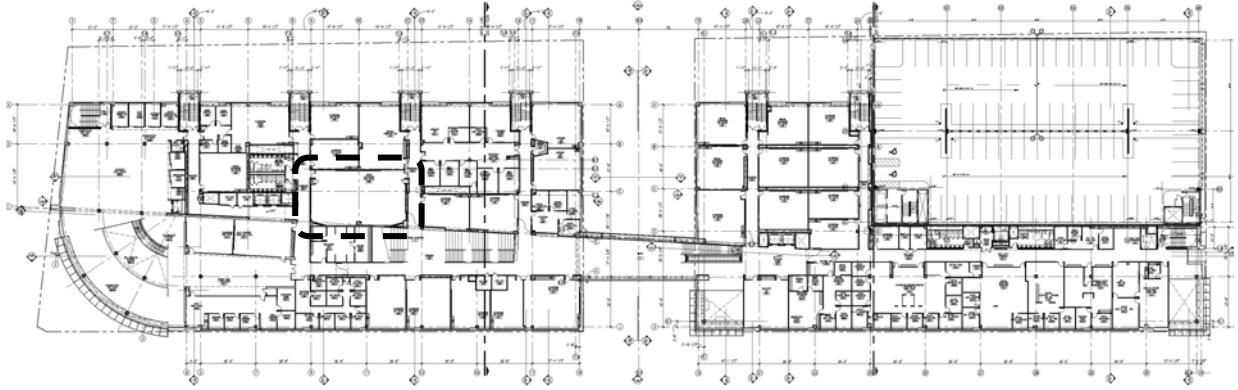


A3.10: Interior View South

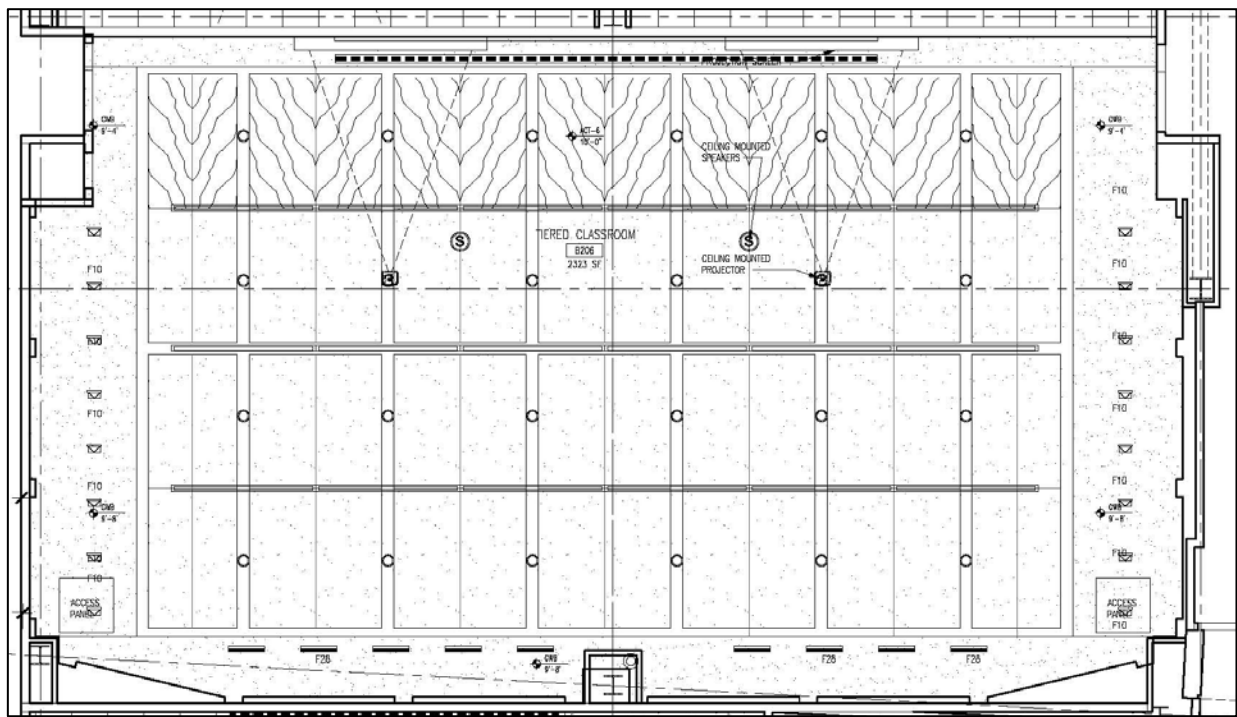
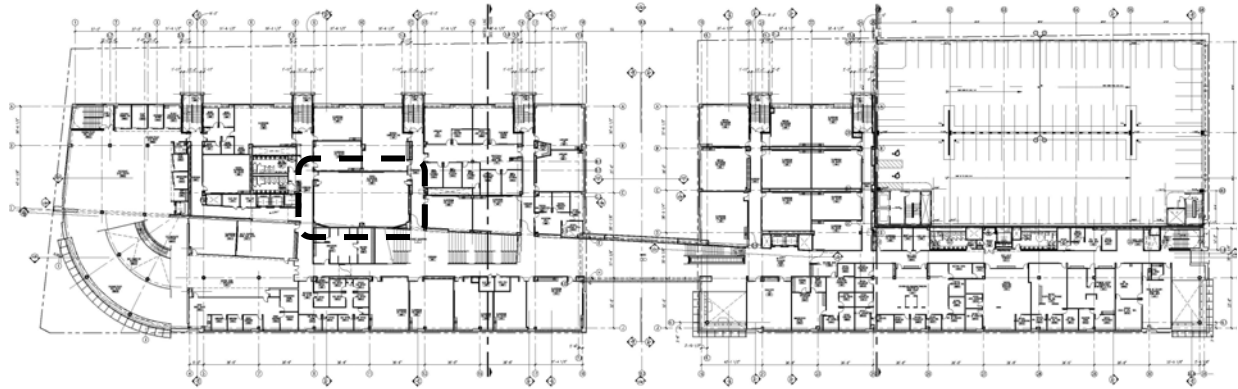




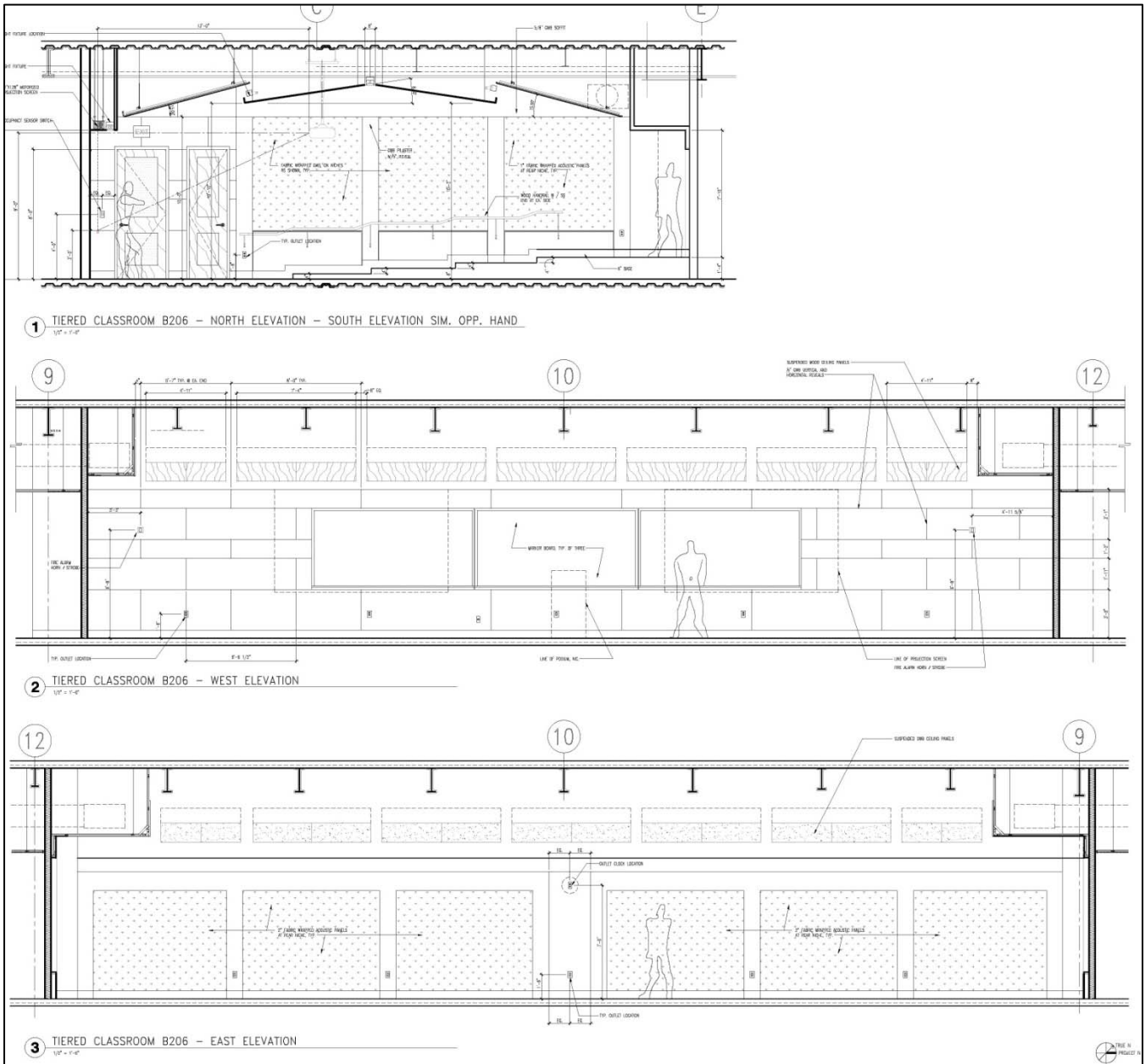
A3.12: Exterior View West at Walkway



A4.1: Enlarged Floor Plan



A4.2: Reflected Ceiling Plan









### A4.3: Interior Elevations



**Lighting Fixture Schedule**

Bradley Sisenwain Senior Thesis (GCC)

| Type       | Mfr/Catalog #  | Lamping   | Notes   |
|------------|--|---|---|
| <b>E3</b>  |  <p><b>Schreder KAL-150MH-T6-SYM-VOLT-RAL 9007 POLE - APR3V-12</b><br/>Description: Pole-mounted indirect metal halide area/roadway light with (1) 150W metal halide T6 lamp. Mounted to galvanized steel pole 157m diameter.</p>   | <p>1 - Osram Sylvania MC150T7.5U/G12/830PB<br/>Metal Halide T6</p>    | <p>Location: Exterior</p> <ol style="list-style-type: none"> <li>Contractor to coordinate installation with city of New Haven.</li> <li>Architect to verify color and finish.</li> <li>Fixtures to be controlled by time-clock/photosensor operation.</li> <li>Contractor to coordinate wiring with DALI digital control standards per specification.</li> </ol>  |
| <b>E10</b> | <p><b>Electrix LIL-100-SP-*-*3"x3" Custom</b><br/>Description: Surface mounted continuous linear LED downlight mounted in precast channel in bench as shown in landscape and architectural details.</p>  | <p>1 - LED</p>  | <p>Location: Exterior benches</p> <ol style="list-style-type: none"> <li>Refer to architectural drawings for fixture lengths and lengths of continuous runs.</li> <li>Locate remote drivers and/or power supplies in a secure, concealed, accessible and well ventilated location in compliance with manufacturer's recommendations.</li> <li>Architect to verify fixture finish and LED color temperature.</li> <li>Fixture to be controlled by time-clock/photosensor operation.</li> </ol> |
| <b>E13</b> | <p><b>BK Lighting B-HP2-ES20-TR-277-BLP-11-VOLT-RG</b><br/>Description: In-grade mounted metal halide uplight with (1) 20W CMH MR16 lamp.</p>  | <p>1 - General Electric CMH20MR16/830/FL<br/>Metal Halide MR16</p>    | <p>Location: Trellis - Community Center Outdoor</p> <ol style="list-style-type: none"> <li>Contractor to coordinate installation with field conditions.</li> <li>Manufacturer to provide detailed installation instructions for mounting in gravel bed for optimal mounting conditions.</li> <li>Fixture shall be controlled via DALI relay per control intent.</li> <li>Fixtures require aiming and focusing by lighting consultant prior to occupant move-in.</li> </ol>                    |
| <b>F3</b>  |  <p><b>Lightolier 4x4CCDW / 4x4132HU DALI - 26W wattage restriction label</b><br/>Description: 5" recessed lensed compact fluorescent downlight with (1) CFTR26W lamp in cross section. Reflector trim shall be pre-finished semi-specular non-iridescent clear finish with white self flange and mitred corners.</p> | <p>1 - Osram Sylvania CF26DT/E/IN/830/ECO<br/>Compact fluorescent</p> | <p>Location: Throughout</p> <ol style="list-style-type: none"> <li>Contractor to coordinate installation with ceiling conditions.</li> <li>Provide integral DALI ballast.</li> <li>Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>Manufacturer to provide wattage restriction label for 26W lamp.</li> <li>Consult Electrical Engineer drawings for EM designation and operation.</li> </ol>   |

|            |   |   |  |  |
|------------|---|---|--|--|
| <b>F7</b>  |    | <p><b>se'lux M1A-1T5-AMP-*-LENGTH-White-VOLT-DMA-*</b></p> <p>Description: 4" recessed fluorescent asymmetric downlight with (1) F28T5 (48in) lamp staggered (in cross-section).</p>  | <p>1 - Osram Sylvania FP28/830/ECO<br/>Linear fluorescent</p>                    | <p>Location: Classrooms</p> <ol style="list-style-type: none"> <li>1. Contractor to coordinate installation with ceiling conditions.</li> <li>2. Provide with electronic DALI ballast.</li> <li>3. Contractor to coordinate wiring with DALI digital control standards per specifications.</li> <li>4. Contractor to provide field dimensions to manufacturer for run lengths.</li> <li>5. Manufacturer to provide shop drawings based on field dimensions for lighting consultant approval.</li> <li>6. Consult Electrical Engineer drawings for EM designation and operation.</li> <li>7. Provide 2-lamp ballast as allowed by mounting conditions.</li> </ol> |
| <b>F10</b> |    | <p><b>Peerless Lighting LWR9-*-1-14T5-HOL-U2-VOLT-DALI-*-L/LP-*</b></p> <p>Description: 3" aperture linear fluorescent wall washer with (1) 14W T5 lamp in cross section.</p>   | <p>1 - Osram Sylvania F14T5/830/ECO<br/>Linear Fluorescent</p>                   | <p>Location: Classrooms</p> <ol style="list-style-type: none"> <li>1. Contractor to coordinate installation with ceiling conditions.</li> <li>2. Provide with integral electronic DALI ballast.</li> <li>3. Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>4. Fixtures shall be mounted minimum 2'-6" from wall to center of fixture.</li> <li>5. Consult Electrical Engineer drawings for EM designation and operation.</li> </ol>   |
| <b>F12</b> |   | <p><b>Bega 8300-DALI</b></p> <p>Description: Wall recessed LED step light with diffuse, tempered glass lens and remote power supply. Lens trim shall be permanently affixed to lens and gasketed to prevent light and moisture leaks.</p> | <p>1 - LED<br/>0.5W LED (3000K)</p>  | <p>Location: Tiered Classroom, Gathering Space</p> <ol style="list-style-type: none"> <li>1. Contractor to coordinate installation with wall and step conditions.</li> <li>2. GC to coordinate trades to assure that rough-in housing is delivered to site in a timely manner to prevent delay of concrete pour or other material construction.</li> <li>3. Manufacturer to provide warm white (3000K) LED's</li> <li>4. Remote transformer to be installed in secure, ventilated accessible area as identified by Contractor and approved by architect.</li> <li>5. Provide digital relay to control fixtures as part of DALI control system.</li> </ol>        |
| <b>F14</b> |  | <p><b>Beta Calco 20-2240-VOLT-*</b></p> <p>Description: 22" diameter suspended lensed metal halide hi-bay downlight.</p>  | <p>1 - Osram Sylvania MP250/C/BU-ONLY<br/>Metal Halide- Base up burning only</p> | <p>Location: Gathering Space</p> <ol style="list-style-type: none"> <li>1. Fixtures shall be controlled by relay switch connected to daylight sensor as per control intent</li> <li>2. Architect to verify over-all hanging height such that the bottom of the fixture is flush with the ceiling edge opening.</li> <li>3. Architect to verify finish.</li> <li>4. Contractor to coordinate installation with ceiling cove conditions.</li> </ol>  |

F15



**Schreder KAL-150MH-T6-SYM-VOLT-RAL 9007 POLE - APR3F-12**

Description: Pole mounted indirect metal halide area/roadway light with 1-150W T6 lamp on 12'-0" x 4" dia tapered steel pole. Glass optical compartment integrated within cast aluminum fixture body provides NEMA Type V distribution. Electrical control gear shall be accessible via closed and locked hatch in pole base.

1 - Osram Sylvania MC150T7.5/U/G12/830  
Metal Halide

Location: Atrium

1. Contractor to coordinate installation with effected trades.
2. Architect to verify color and finish.
3. Fixtures to be controlled by time-clock/photosensor operation per control intent.
4. Contractor to coordinate relay wiring with DALI digital control standards per specification.

F20



**LiteMakers MOD**

Description: Nominal 8" diameter custom cylindrical pendant with (4) 28W T5 lamps & (1) 35w MH PAR20 downlight. Aircraft cable suspension to ceiling above. Fixture shall be wired for 2 ckt operation with metal halide downlight controlled by digital relay through DALI system. Fixture body shall be translucent with solid top and bottom end pieces.

4 - Osram Sylvania FP28T5/830/ECO + MCP39PAR20/U/830/FLPB  
Linear Fluorescent & MH PAR20 downlight

Location: Library Atrium

1. Manufacturer to provide detailed, dimensioned shop drawing based on design intent dimensions and discussions.
2. Manufacturer to provide material samples for all potential materials for lighting designer approval as part of bid-process.
3. Fixture will require full-scale working mock-up as part of development process.
4. Manufacturer to provide line-item cost of samples and mock-ups as part of bid price.
5. Contractor to coordinate delivery and installation of fixtures with ceiling conditions and door dimensions.
6. Provide integral electronic DALI ballast.
7. Contractor to coordinate wiring with DALI digital control standards per specification.
8. Metal halide lamp controlled by digital relay.
9. Consult Electrical Engineer drawings for EM designation and operation.
10. Provide 2-lamp ballast for fluorescent circuit.

F22



**Lightolier D6A14-8021CCDW-S6132B\*-DALI-26W**

Description: 6" diameter semi-recessed compact fluorescent decorative downlight with (1) CFTR26W lamp. Solid, high-temperature, UV resistant decorative element with frosted interior diameter, polished exterior, and machined facet along bottom edge. Fateners shall not be visible from below or through decorative element. When installed, fixture shall have flangeless appearance.

1 - Osram Sylvania CF26DT/E/IN/830/ECO  
Compact fluorescent

Location: Library

1. Contractor to coordinate installation with ceiling conditions.
2. Provide electronic DALI ballast.
3. Contractor to coordinate wiring with DALI digital control standards per specification.
4. Architect to verify shape of glass flange.
5. Consult Electrical Engineer drawings for EM designation and operation.
6. Manufacturer to provide wattage restriction label for 26W maximum.

F24



**Lightolier CS6132VUCCL 26W**


Description: 6" Pendant-mounted compact fluorescent downlight with (1) 26W CFTR lamp. 50 degree cutoff to lamp and lamp image.


1 - Osram Sylvania CF26DT/E/IN/830/ECO  
Compact fluorescent


Location: Tiered classroom

1. Contractor to coordinate installation with ceiling conditions for correct mounting height in line with finished ceiling application.
2. Provide with integral electronic DALI ballast.
3. Contractor to coordinate wiring with DALI digital control standards per specification.
4. Manufacturer to provide wattage restriction label for 26W maximum.
5. Consult Electrical Engineer drawings for EM designation and operation.

|            |   |  |  |  |
|------------|---|--|--|--|
| <b>F27</b> |  | <p><b>Lightolier C6T6VN-CCDW-C639T6E*-VOLT</b></p> <p>Description: 6" recessed metal halide downlight with (1) 39W T6 single-ended base lamp. Narrow distribution (+/-15 degrees) self-flanged reflector shall provide 50 degree cut-off. Semi-specular, non-iridescence reflector finish.</p> | <p>1 - Osram Sylvania MC39T6/U/G12/830PB<br/>Metal Halide T6</p> | <p>Location: Library</p> <ol style="list-style-type: none"> <li>1. Contractor to coordinate installation with ceiling conditions.</li> <li>2. Provide with integral electronic DALI ballast.</li> <li>3. Contractor to coordinate wiring with DALI digital control standards per specification.</li> </ol> |
|------------|---|--|--|--|

|            |   |  |   |  |
|------------|---|--|---|--|
| <b>F34</b> |  | <p><b>se'lux M1R1-1T5-SD-*--LENGTH-WH-VOLT-DMA (DALI)</b></p> <p>Description: 4" aperture recessed linear fluorescent downlight with (1) F28T5 (48in) lamp (in cross-section).</p> | <p>1 - Osram Sylvania FP28T5/830/ECO<br/>Linear Fluorescent</p> | <p>Location: Corridors</p> <ol style="list-style-type: none"> <li>1. Fixture is installed in both 'ACT' &amp; 'GWB' ceilings. Contractor to coordinate mounting methode with ceiling materials.</li> <li>2. Architect to verify flange color and finish.</li> <li>3. Provide integral DALI ballast.</li> <li>4. Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>5. Contractor to provide field dimensions for fixture runs.</li> <li>6. Manufacturer to provide dimensioned shop drawings per field measurements for lighting consultant review.</li> <li>7. Consult Electrical Engineer drawings for EM designation and operation.</li> <li>8. Provide 2-lamp ballast as allowed by run length mounting condition.</li> </ol> |
|------------|---|--|---|--|





|             |  |  |   |  |
|-------------|--|--|---|--|
| <b>F34A</b> |  | <p><b>se'lux M1R1-2T5-SD-*--LENGTH-WH-VOLT-DMA (DALI)</b></p> <p>Description: Identical to F34 except with (2) 28W T5 lamps in cross section</p> | <p>2 - Osram Sylvania FP28T5/830/ECO<br/>Linear Fluorescent</p> | <p>Location: Library</p> <ol style="list-style-type: none"> <li>1. Fixture is installed in both 'ACT' &amp; 'GWB' ceilings. Contractor to coordinate mounting methode with ceiling materials.</li> <li>2. Architect to verify flange color and finish.</li> <li>3. Provide integral DALI ballast.</li> <li>4. Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>5. Contractor to provide field dimensions for fixture runs.</li> <li>6. Manufacturer to provide dimensioned shop drawings per field measurements for lighting consultant review.</li> <li>7. Consult Electrical Engineer drawings for EM designation and operation.</li> </ol> |
|-------------|--|--|---|--|

|             |   |  |   |   |
|-------------|---|--|---|---|
| <b>F41A</b> |  | <p><b>se'lux M10-1T5-SD-C-LENGTH-WH-VOLT-DMA (DALI)-*</b></p> <p>Description: Identical to F41 except with direct lighting distribution.</p> | <p>1 - Osram Sylvania FP28T5/830/ECO<br/>Linear Fluorescent</p> | <p>Location: Tiered Classroom</p> <ol style="list-style-type: none"> <li>1. Fixture to be suspended from ceiling so that the fixture lens is co-planar with the bottom of the acoustical ceiling panels in the tiered classroom. See architectural details for dimensions.</li> <li>2. Fixture mounting height varies. See architectural drawings for details.</li> <li>3. Provide integral DALI ballast.</li> <li>4. Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>5. Contractor to provide field dimensions for fixture run lengths.</li> <li>6. Manufacturer to provide shop drawings based on field dimensions for lighting consultant approval.</li> <li>7. Consult Electrical Engineer drawings for EM designation</li> </ol> |
|-------------|---|--|---|---|



and operation.

8. Provide 2-lamp ballast as allowed by run length.

|             |   |  |   |  |
|-------------|---|--|---|--|
| <b>F41C</b> |    | <b>se'lux M10-1T5-SD-MOD TE PERPENDICULAR TO WALL MOUNT-LENGTH-WH-VOLT-DMA (DALI)-*</b><br>Description: Identical to F41A except with Perpendicular to wall mount application with cable ties to wall from above.  | 1 - Osram Sylvania FP28T5/830/ECO<br>Linear Fluorescent   | Location: Atrium 4th Floor Corridor<br>1. Fixture to be mounted perpendicular to wall with cable suspension from wall above. See architectural details for mounting conditions.<br>2. Provide integral DALI ballast.<br>3. Contractor to coordinate wiring with DALI digital control standards per specification.<br>4. Contractor to provide field dimensions.<br>5. Manufacturer to provide shop drawings based on field dimensions for lighting consultant approval.<br>6. Consult Electrical Engineer drawings for EM designation and operation.   |
| <b>F52</b>  |    | <b>Delray Lighting ST64128.411-DALI</b><br>Description: Cable suspended rail mounted linear fluorescent pendant with ceiling surface mounted aluminum housing hung at various heights with 180 degree perforated metal shield.                                 | 1 - Osram Sylvania FP28T5/830/ECO<br>Linear Fluorescent   | Location: Main Lobbies<br>1. Ballast housing accepts electric feed at top of housing from one end only. Continuous to coordinate ballast mounting on ceiling with maximum remote distribution and DALI wiring.<br>2. Contractor to coordinate installation with ceiling conditions.<br>3. Architect to verify color and finish.<br>4. Architect to verify over all hanging height AFF.<br>5. Provide integral DALI ballast.<br>6. Contractor to coordinate wiring with DALI digital control standards per specification.<br>7. See architectural drawings for mounting details.<br>8. Confirm mounting heights AFF in field before cutting cable.<br>9. Consult Electrical Engineer drawings for EM designation and operation. |
| <b>F53</b>  |  | <b>Ledalite 3808-F01-E-N-LENGTH-7 (DALI)-VOLT-DALI-W</b><br>Description: Surface mounted linear fluorescent cove light with asymmetric distribution with (1) 28W T5 lamp in cross section mounted above wood fin as detail by architect and installed by G. C. | 1 - Osram Sylvania FP28T5/830/ECO<br>Linear Fluorescent   | Location: Library Wood Cove, Reception areas<br>1. Fixture to be surface mounted above architectural soffit (see architectural drawings for details)<br>2. Architect to verify color and finish.<br>3. Provide integral DALI ballast.<br>4. Contractor to coordinate wiring with DALI digital control standards per specification.<br>5. Position fixture at back of mounting condition for maximum shielding.<br>6. Consult Electrical Engineer drawings for EM designation and operation.<br>7. Provide 2-lamp ballast as allowed by run length.   |
| <b>F68</b>  |  | <b>National Cathode R-C-V-NPS-1-COLOR</b><br>Description: Surface mounted cold cathode fixture in ceiling cove with 25mm diameter, 1500 milliamp and remote transformer.   | 1 - By manufacturer - 12w/LFT NPF-120mA transformer - can be removed up to 20' away from lamps.<br>25 mm diameter, tri-phosphor coated cold cathode lamps | Location: Day Care<br>1. Powersource will be located in an accessible ventilated area not exceeding 100°F/38°C with air circulation on all sides to dissipate 300W and in complete compliance of IFAY and Article 410 of the N.E.C.<br>2. Shop Drawings will be issued in CAD format showing bill of materials, installation procedures, wiring diagrams, footage for each area and IFAY's seven-digit code number. It is the installing contractor's responsibility to supply as-built dimensions and patterns if required<br>3. Provide complete set of lamps for attic stock<br>4. Architect to verify color.   |

## Lighting Fixture Specifications

Bradley Sisenwain Senior Thesis (GCC)

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>E3</b>  |
| <b>Location:</b>      | Exterior   |
| <b>Mfr/Catalog #:</b> | Schreder KAL-150MH-T6-SYM-VOLT-RAL 9007 POLE - APR3V-12  |
| <b>Alternates:</b>    | Hess Agena 720-150 MH-VOLT- <sup>*</sup> -FINISH- <sup>*</sup><br>Selux Ritorno RRS-1-H150-FINISH-VOLT- <sup>*</sup> - <sup>*</sup>  |
| <b>Description:</b>   | Pole-mounted indirect metal halide area/roadway light with (1) 150W metal halide T6 lamp. Mounted to galvanized steel pole 157m diameter.  |
| <b>Lamping:</b>       | 1 - Metal Halide T6<br>Osram Sylvania MC150T7.5/U/G12/830PB  |
| <b>Optics:</b>        | Polished anodised reflector with off-white glass-fibre reinforced polyester top diffuser   |
| <b>Dimensions:</b>    | 900 mm dia, 950 mm height  |
| <b>Housing:</b>       | cast aluminum, powder coat paint   |
| <b>Electrical:</b>    | Integral Electronic ballast<br>Osram Sylvania QT1x150MH/UNV *<br>Input Watts: 167  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | CUL listed Wet Location, IBEW, UL listed Wet Location, IP66. Suitable for Dry, Wet, Damp environments.   |
| <b>Notes:</b>         | 1. Contractor to coordinate installation with city of New Haven.<br>2. Architect to verify color and finish.<br>3. Fixtures to be controlled by time-clock/photosensor operation.<br>4. Contractor to coordinate wiring with DALI digital control standards per specification. |

---

|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>E10</b>  |
| <b>Location:</b>      | Exterior benches  |
| <b>Mfr/Catalog #:</b> | Electrix LIL-100-SP- <sup>*</sup> - <sup>*</sup> -3"x3" Custom  |
| <b>Alternates:</b>    | IO Lighting 10-E-3KHO-45-100-FINISH-Continuous- <sup>*</sup> - <sup>*</sup><br>Bruck Orion Belt 13540*  |
| <b>Description:</b>   | Surface mounted continuous linear LED downlight mounted in precast channel in bench as shown in landscape and architectural details.  |
| <b>Lamping:</b>       | 1 - LED   |
| <b>Optics:</b>        | Clear tempered glass lens   |
| <b>Dimensions:</b>    | 4" height x 3" width x continuous length  |
| <b>Housing:</b>       | Aluminum  |
| <b>Electrical:</b>    | Remote LED Power Driver   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer   |
| <b>Labels:</b>        | U.L. listed for wet location  |
| <b>Notes:</b>         | 1. Refer to architectural drawings for fixture lengths and lengths of continuous runs.<br>2. Locate remote drivers and/or power supplies in a secure, concealed, accessible and well ventilated location in compliance with manufacturer's recommendations.<br>3. Architect to verify fixture finish and LED color temperature.<br>4. Fixture to be controlled by time-clock/photosensor operation. |

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>E13</b>   |
| <b>Location:</b>      | Trellis - Community Center Outdoor   |
| <b>Mfr/Catalog #:</b> | BK Lighting B-HP2-ES20-TR-277-BLP-11-VOLT-RG   |
| <b>Alternates:</b>    | Lumascap   |
| <b>Description:</b>   | In-grade mounted metal halide uplight with (1) 20W CMH MR16 lamp.  |
| <b>Lamping:</b>       | 1 - Metal Halide MR16<br>General Electric CMH20MR16/830/FL   |
| <b>Optics:</b>        | Tempered 1/4" borosilicate flat glass lens with honeycomb black baffle. 25 degree narrow flood lamp optics.  |
| <b>Dimensions:</b>    | 7.000" diameter, 14.500" height  |
| <b>Housing:</b>       | Corrosion-free composite, amde from high strength, thermoformed, sheet molded polyester compound   |
| <b>Electrical:</b>    | Integral electronic transformer<br>Input Watts: 22   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | IP68, CSA, ARL   |
| <b>Notes:</b>         | 1. Contractor to coordinate installation with field conditions.<br>2. Manufacturer to provide detailed installation instructions for mounting in gravel bed for optimal mounting conditions.<br>3. Fixture shall be controlled via DALI relay per control intent.<br>4. Fixtures require aiming and focusing by lighting consultant prior to occupant move-in. |

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F3</b>  |
| <b>Location:</b>      | Throughout   |
| <b>Mfr/Catalog #:</b> | Lightolier 4x4CCDW / 4x4132HU DALI - 26W wattage restriction label   |
| <b>Alternates:</b>    | Kurt Versen H8432-FLT4LL DALI<br>Zumtobel BRS4N1D-1H26GX24Q3-DALI-MS-CB-W-DMP-QD*  |
| <b>Description:</b>   | 5" recessed lensed compact fluorescent downlight with (1) CFTR26W lamp in cross section. Reflector trim shall be pre-finished semi-specular non-iridescent clear finish with white self flange and mitred corners.   |
| <b>Lamping:</b>       | 1 - Compact fluorescent<br>Osram Sylvania CF26DT/E/IN/830/ECO  |
| <b>Optics:</b>        | tempered glass prismatic lens, anodized aluminum reflector   |
| <b>Dimensions:</b>    | 10.000" length, 9.625" width, 5.500" height/depth  |
| <b>Housing:</b>       | 20. gauge galvanized steel housing. Mounting brackets adjustable from within fixture.  |
| <b>Electrical:</b>    | Integral electronic DALI ballast<br>Osram Sylvania QTP 1x26CF/UNV DALI<br>Input Watts: 28  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | IBEW, UL. Suitable for Dry, Damp environments.   |
| <b>Notes:</b>         | 1. Contractor to coordinate installation with ceiling conditions.<br>2. Provide integral DALI ballast.<br>3. Contractor to coordinate wiring with DALI digital control standards per specification.<br>4. Manufacturer to provide wattage restriction label for 26W lamp.<br>5. Consult Electrical Engineer drawings for EM designation and operation. |

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F7</b>  |
| <b>Location:</b>      | Classrooms   |
| <b>Mfr/Catalog #:</b> | se'lux M1A-1T5-AMP-*-LENGTH-White-VOLT-DMA-*   |
| <b>Alternates:</b>    | Gammalux GB33RC-128T5ASY-VOLT-DALI-LENGTH-REC-ASL-WH-*   |
|                       | Pinnacle E4WP-1T5-LENGTH-*-VOLT-W-DALI-MOD OPAL ACRYLIC LENS   |
| <b>Description:</b>   | 4" recessed fluorescent asymmetric downlight with (1) F28T5 (48in) lamp staggered (in cross-section).  |
| <b>Lamping:</b>       | 1 - Linear fluorescent   |
|                       | Osram Sylvania FP28/830/ECO  |
| <b>Optics:</b>        | Acrylic diffuser, anodized aluminum reflector  |
| <b>Dimensions:</b>    | 4.000" width, 4.000" height/depth x lengths as shown on architects drawings  |
| <b>Housing:</b>       | Extruded aluminum with integral joiners to ensure straight runs. Extruded gear ray with high reflective white finish, accessible from below.   |
| <b>Electrical:</b>    | Integral electronic DALI ballast   |
|                       | Osram Sylvania QTP 2x28T5/UNV DALI   |
|                       | Input Watts: 32  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | CUL, IBEW, UL. Suitable for Dry environments.  |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Contractor to coordinate installation with ceiling conditions.</li><li>2. Provide with electronic DALI ballast.</li><li>3. Contractor to coordinate wiring with DALI digital control standards per specifications.</li><li>4. Contractor to provide field dimensions to manufacturer for run lengths.</li><li>5. Manufacturer to provide shop drawings based on field dimensions for lighting consultant approval.</li><li>6. Consult Electrical Engineer drawings for EM designation and operation.</li><li>7. Provide 2-lamp ballast as allowed by mounting conditions.</li></ol> |

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F10</b>   |
| <b>Location:</b>      | Classrooms   |
| <b>Mfr/Catalog #:</b> | Peerless Lighting LWR9-*-1-14T5-HOL-U2-VOLT-DALI-*-L/LP-*  |
| <b>Alternates:</b>    | Mark Lighting SL4T-2-1T5-DALI-VOLT   |
|                       | Focal Point FAVA-NS-1T5-1C-VOLT-DALI-CEILING-*-WH-2'   |
| <b>Description:</b>   | 3" aperture linear fluorescent wall washer with (1) 14WT5 lamp in cross section.   |
| <b>Lamping:</b>       | 1 - Linear Fluorescent   |
|                       | Osram Sylvania F14T5/830/ECO   |
| <b>Optics:</b>        | Specular asymmetric reflector with black perforated diffuser   |
| <b>Dimensions:</b>    | 24.000" length, 3.500" width, 3.750" height, 2.25" aperture  |
| <b>Housing:</b>       | Formed cold rolled steel with high gloss baked enamel  |
| <b>Electrical:</b>    | Integral electronic DALI ballast   |
|                       | Osram Sylvania QTP 1x14T5/UNV DALI   |
|                       | Input Watts: 18  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | UL Dry   |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Contractor to coordinate installation with ceiling conditions.</li><li>2. Provide with integral electronic DALI ballast.</li><li>3. Contractor to coordinate wiring with DALI digital control standards per specification.</li><li>4. Fixtures shall be mounted minimum 2'-6" from wall to center of fixture.</li><li>5. Consult Electrical Engineer drawings for EM designation and operation.</li></ol> |

---



|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F12</b>   |
| <b>Location:</b>      | Tiered Classroom, Gathering Space  |
| <b>Mfr/Catalog #:</b> | Bega 8300-DALI   |
| <b>Alternates:</b>    | Sistemalux #S.4512-DALI<br>Hess LEDIA LL-OD-9-DALI   |
| <b>Description:</b>   | Wall recessed LED steplight with diffuse, tempered glass lens and remote power supply. Lens trim shall be permanently affixed to lens and gasketed to prevent light and moisture leaks.  |
| <b>Lamping:</b>       | 1 - 0.5W LED (3000K)<br>LED  |
| <b>Optics:</b>        | Diffuse tempered glass   |
| <b>Dimensions:</b>    | 3.9375" length, 1.4375" height, 2.750" depth   |
| <b>Housing:</b>       | Extruded aluminum "rough-in" housing with stainless steel and internal lamp housing  |
| <b>Electrical:</b>    | Remote LED driver<br>Input Watts: 0.5  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | UL wet location, IP67  |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Contractor to coordinate installation with wall and step conditions.</li><li>2. GC to coordinate trades to assure that rough-in housing is delivered to site in a timely manner to prevent delay of concrete pour or other material construction.</li><li>3. Manufacturer to provide warm white (3000K) LED's</li><li>4. Remote transformer to be installed in secure, ventilated accessible area as identified by Contractor and approved by architect.</li><li>5. Provide digital relay to control fixtures as part of DALI control system.</li></ol> |

---

|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>F14</b>  |
| <b>Location:</b>      | Gathering Space   |
| <b>Mfr/Catalog #:</b> | Beta Calco 20-2240-VOLT-*   |
| <b>Alternates:</b>    | Zumbobel C128-250-VOLT-CPAC*-CIAL-CICL<br>Holophane KE-250PM-VOLT-P-CUSTOM LENGTH PENDANT-KE12  |
| <b>Description:</b>   | 22" diameter suspended lensed metal halide hi-bay downlight.  |
| <b>Lamping:</b>       | 1 - Metal Halide- Base up burning only<br>Osram Sylvania MP250/C/BU-ONLY  |
| <b>Optics:</b>        | Tempered glass clear lens, anodized aluminum reflector  |
| <b>Dimensions:</b>    | 13.500" diameter, 20.313" height/depth  |
| <b>Electrical:</b>    | Integral electronic ballast<br>Osram Sylvania QHE1x250MH<br>Input Watts: 280  |
| <b>Voltage:</b>       | Shall be specified by electrical engineer   |
| <b>Labels:</b>        | CUL listed Damp Location, IBEW, UL listed Damp Location. Suitable for Dry, Damp environments.   |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Fixtures shall be controlled by relay switch connected to daylight sensor as per control intent</li><li>2. Architect to verify over-all hanging height such that the bottom of the fixture is flush with the ceiling edge opening.</li><li>3. Architect to verify finish.</li><li>4. Contractor to coordinate installation with ceiling cove conditions.</li></ol> |

---

|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>F15</b>  |
| <b>Location:</b>      | Atrium  |
| <b>Mfr/Catalog #:</b> | Schreder KAL-150MH-T6-SYM-VOLT-RAL 9007 POLE - APR3F-12   |
| <b>Alternates:</b>    | Hess Agena 720-150 MH-VOLT-*-FINISH*<br>Selux Ritorno RRS-1-H150-FINISH-VOLT-*-*  |
| <b>Description:</b>   | Pole mounted indirect metal halide area/roadway light with 1-150WT6 lamp on 12'-0" x 4" dia tapered steel pole. Glass optical compartment integrated within cast aluminum fixture body provides NEMA Type V distribution. Electrical control gear shall be accessible via closed and locked hatch in pole base.   |
| <b>Lamping:</b>       | 1 - Metal Halide<br>Osram Sylvania MC150T7.5/U/G12/830  |
| <b>Optics:</b>        | Polished anodised reflector with off-white glass-fibre reinforced polyester top diffuser  |
| <b>Dimensions:</b>    | 30" dia (nominal) x 18" height on 12'-0" pole   |
| <b>Housing:</b>       | Cast aluminum fixture body with glass-fiber reinforced reflector/top, 12' tapered steel pole with 0.125" wall thickness   |
| <b>Electrical:</b>    | Integral electronic ballast<br>Osram Sylvania QT1x150MH/UNV<br>Input Watts: 167   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer   |
| <b>Labels:</b>        | CUL listed Wet Location, IBEW, UL listed Wet Location, IP66. Suitable for Dry, Wet, Damp environments.  |
| <b>Notes:</b>         | <ol style="list-style-type: none"> <li>1. Contractor to coordinate installation with effected trades.</li> <li>2. Architect to verify color and finish.</li> <li>3. Fixtures to be controlled by time-clock/photosensor operation per control intent.</li> <li>4. Contractor to coordinate relay wiring with DALI digital control standards per specification.</li> </ol> |

|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>F20</b>  |
| <b>Location:</b>      | Library Atrium  |
| <b>Mfr/Catalog #:</b> | Litemakers MOD  |
| <b>Alternates:</b>    | Schmitz - Tool MOD<br>Custom Metal Craft MOD<br>Better Designed Lighting (BDL) MOD  |
| <b>Description:</b>   | Nominal 8" diameter custom cylindrical pendant with (4) 28W T5 lamps & (1) 35w MH PAR20 downlight. Aircraft cable suspension to ceiling above. Fixture shall be wired for 2 ckt operation with metal halide downlight controlled by digital relay through DALI system. Fixture body shall be translucent with solid top and bottom end pieces.  |
| <b>Lamping:</b>       | 4 - Linear Fluorescent & MH PAR20 downlight<br>Osram Sylvania FP28T5/830/ECO + MCP39PAR20/U/830/FLPB  |
| <b>Optics:</b>        | Ribbed acrylic tube satin finish  |
| <b>Dimensions:</b>    | 8.000" diameter, 105.000" length  |
| <b>Housing:</b>       | Aluminum caps with translucent acrylic housing and steel inner support  |
| <b>Electrical:</b>    | Integral electronic DALI fluorescent ballast, and integral electronic CMH ballast<br>Osram Sylvania QTP 2x28T5/UNV DALI<br>Input Watts: 171   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer   |
| <b>Labels:</b>        | UL listed   |
| <b>Notes:</b>         | <ol style="list-style-type: none"> <li>1. Manufacturer to provide detailed, dimensioned shop drawing based on design intent dimensions and discussions.</li> <li>2. Manufacturer to provide material samples for all potential materials for lighting designer approval as part of bid-process.</li> <li>3. Fixture will require full-scale working mock-up as part of development process.</li> <li>4. Manufacturer to provide line-item cost of samples and mock-ups as part of bid price.</li> <li>5. Contractor to coordinate delivery and installation of fixtures with ceiling conditions and door dimensions.</li> <li>6. Provide integral electronic DALI ballast.</li> <li>7. Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>8. Metal halide lamp controlled by digital relay.</li> <li>9. Consult Electrical Engineer drawings for EM designation and operation.</li> <li>10. Provide 2-lamp ballast for fluorescent circuit.</li> </ol> |

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F22</b>   |
| <b>Location:</b>      | Library  |
| <b>Mfr/Catalog #:</b> | Lightolier D6A14-8021CCDW-S6132B*-DALI-26W   |
| <b>Alternates:</b>    | Wila C0816-01-86221R15-VOLT-DALI<br>Zumtobel CH7-1H26CFT8B-DALI-0D7429-SA-W-704-CF-DD Glass Drop Disk  |
| <b>Description:</b>   | 6" diameter semi-recessed compact fluorescent decorative downlight with (1) CFTR26W lamp. Solid, high-temperature, UV resistant decorative element with frosted interior diameter, polished exterior, and machined facet along bottom edge. Fasteners shall not be visible from below or through decorative element. When installed, fixture shall have flangeless appearance.   |
| <b>Lamping:</b>       | 1 - Compact fluorescent<br>Osram Sylvania CF26DT/E/IN/830/ECO  |
| <b>Optics:</b>        | Painted or anodized aluminum parabolic reflector   |
| <b>Dimensions:</b>    | 11.500" length, 10.500" width, 8.125" height/depth   |
| <b>Housing:</b>       | Galvanized steel with aluminum clips. Outboard ballast housing UL listed for thru wiring and accessible from below   |
| <b>Electrical:</b>    | Integral electronic DALI ballast<br>Osram Sylvania QTP 1x26CF/UNV DALI<br>Input Watts: 28  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | IBEW, UL listed Damp Location. Suitable for Damp environments.   |
| <b>Notes:</b>         | <ol style="list-style-type: none"> <li>1. Contractor to coordinate installation with ceiling conditions.</li> <li>2. Provide electronic DALI ballast.</li> <li>3. Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>4. Architect to verify shape of glass flange.</li> <li>5. Consult Electrical Engineer drawings for EM designation and operation.</li> <li>6. Manufacturer to provide wattage restriction label for 26W maximum.</li> </ol> |

---

|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>F24</b>  |
| <b>Location:</b>      | Tiered classroom  |
| <b>Mfr/Catalog #:</b> | Lightolier CS6132VUCCL 26W  |
| <b>Alternates:</b>    | Omega OM626PLTSC-*-*-DALI-VOLT<br>KV P913-DM/DALI-WRL-26W   |
| <b>Description:</b>   | 6" Pendant-mounted compact fluorescent downlight with (1) 26W CFTR lamp. 50 degree cutoff to lamp and lamp image.   |
| <b>Lamping:</b>       | 1 - Compact fluorescent<br>Osram Sylvania CF26DT/E/IN/830/ECO   |
| <b>Optics:</b>        | Aluminum double parabolic reflector with non-iridescent, semi-specular finish   |
| <b>Dimensions:</b>    | 6.500" diameter, 10.250" height/depth   |
| <b>Housing:</b>       | 16 gauge spun aluminum, returned bottom edge to seat reflector, no visible hardware   |
| <b>Electrical:</b>    | Integral electronic DALI ballast<br>Osram Sylvania QTP 1x26CF/UNV DALI<br>Input Watts: 32   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer   |
| <b>Labels:</b>        | IBEW, UL listed Damp Location. Suitable for Damp environments.  |
| <b>Notes:</b>         | <ol style="list-style-type: none"> <li>1. Contractor to coordinate installation with ceiling conditions for correct mounting height in line with finished ceiling application.</li> <li>2. Provide with integral electronic DALI ballast.</li> <li>3. Contractor to coordinate wiring with DALI digital control standards per specification.</li> <li>4. Manufacturer to provide wattage restriction label for 26W maximum.</li> <li>5. Consult Electrical Engineer drawings for EM designation and operation.</li> </ol> |

---



|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>F27</b>  |
| <b>Location:</b>      | Library   |
| <b>Mfr/Catalog #:</b> | Lightolier C6T6VN-CCDW-C639T6E*-VOLT  |
| <b>Alternates:</b>    | Kurt Versen R7306-SC-39W T6 MH-DALI<br>Edison Price ARCT6/6-39-VOLT-*-*-DALI  |
| <b>Description:</b>   | 6" recessed metal halide downlight with (1) 39W T6 single-ended base lamp. Narrow distribution (+/-15 degrees) self-flanged reflector shall provide 50 degree cut-off. Semi-specular, non-iridescence reflector finish. |
| <b>Lamping:</b>       | 1 - Metal Halide T6<br>Osram Sylvania MC39T6/U/G12/830PB  |
| <b>Optics:</b>        | Glass prismatic lens (high temperature glass lamp shield shall remain captive during re-lamping) to smooth beam edges +/- 15 degrees of beam angle, anodized aluminum ellipsoidal reflector.                            |
| <b>Dimensions:</b>    | 14.000" length, 12.500" width, 7.500" height/depth  |
| <b>Housing:</b>       | Galvanized steel housing  |
| <b>Electrical:</b>    | Integral electronic DALI ballast<br>Osram Sylvania QTP 1x39W/UNV DALI<br>Input Watts: 44  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer   |
| <b>Labels:</b>        | CUL listed Damp Location, IBEW, UL listed Damp Location. Suitable for Dry, Damp environments.   |
| <b>Notes:</b>         | 1. Contractor to coordinate installation with ceiling conditions.<br>2. Provide with integral electronic DALI ballast.<br>3. Contractor to coordinate wiring with DALI digital control standards per specification.     |

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F34</b>   |
| <b>Location:</b>      | Corridors  |
| <b>Mfr/Catalog #:</b> | se'lux M1R1-1T5-SD-*-LENGTH-WH-VOLT-DMA (DALI)   |
| <b>Alternates:</b>    | Mark Lighting SL4-4*-VOLT-1T5-FA-DALI-*-IND-*<br>Gammalux GB44RC-128T5-VOLT-DALI-LENGTH-REC-ASL-WH-*   |
| <b>Description:</b>   | 4" aperture recessed linear fluorescent downlight with (1) F28T5 (48in) lamp (in cross-section).   |
| <b>Lamping:</b>       | 1 - Linear Fluorescent<br>Osram Sylvania FP28T5/830/ECO  |
| <b>Optics:</b>        | Acrylic satin lens, anodized aluminum reflector  |
| <b>Dimensions:</b>    | 48.000" length, 4.000" width, 4.000" height/depth  |
| <b>Housing:</b>       | Extruded aluminum with integral joiners to ensure straight runs, extruded gear ray with high reflective white finish, accessible from below.   |
| <b>Electrical:</b>    | Integral electronic DALI ballast<br>Osram Sylvania QTP 1x28T5/UNV DALI<br>Input Watts: 32  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | CUL, IBEW, UL. Suitable for Dry environments.  |
| <b>Notes:</b>         | 1. Fixture is installed in both 'ACT' & 'GWB' ceilings. Contractor to coordinate mounting method with ceiling materials.<br>2. Architect to verify flange color and finish.<br>3. Provide integral DALI ballast.<br>4. Contractor to coordinate wiring with DALI digital control standards per specification.<br>5. Contractor to provide field dimensions for fixture runs.<br>6. Manufacturer to provide dimensioned shop drawings per field measurements for lighting consultant review.<br>7. Consult Electrical Engineer drawings for EM designation and operation.<br>8. Provide 2-lamp ballast as allowed by run length mounting condition. |

---



|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>F34A</b>   |
| <b>Location:</b>      | Library   |
| <b>Mfr/Catalog #:</b> | se'lux M1R1-2T5-SD-*<br>Gammalux GB44RC-128T5-VOLT-DALI-LENGTH-REC-ASL-WH-*   |
| <b>Alternates:</b>    | Mark Lighting SL4-4*-VOLT-1T5-FA-DALI-*<br>IND-*  |
| <b>Description:</b>   | Identical to F34 except with (2) 28W T5 lamps in cross section  |
| <b>Lamping:</b>       | 2 - Linear Fluorescent<br>Osram Sylvania FP28T5/830/ECO   |
| <b>Optics:</b>        | Acrylic satin lens, anodized aluminum reflector   |
| <b>Dimensions:</b>    | 48.000" length, 4.000" width, 4.000" height/depth   |
| <b>Housing:</b>       | Extruded aluminum with integral joiners to ensure straight runs, extruded gear ray with high reflective white finish, accessible from below.  |
| <b>Electrical:</b>    | Integral electronic DALI ballast<br>Osram Sylvania QTP 2x28T5/UNV DALI<br>Input Watts: 64   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer   |
| <b>Labels:</b>        | CUL, IBEW, UL. Suitable for Dry environments.   |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Fixture is installed in both 'ACT' &amp; 'GWB' ceilings. Contractor to coordinate mounting methods with ceiling materials.</li><li>2. Architect to verify flange color and finish.</li><li>3. Provide integral DALI ballast.</li><li>4. Contractor to coordinate wiring with DALI digital control standards per specification.</li><li>5. Contractor to provide field dimensions for fixture runs.</li><li>6. Manufacturer to provide dimensioned shop drawings per field measurements for lighting consultant review.</li><li>7. Consult Electrical Engineer drawings for EM designation and operation.</li></ol> |

---

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F41A</b>  |
| <b>Location:</b>      | Tiered Classroom   |
| <b>Mfr/Catalog #:</b> | se'lux M10-1T5-SD-C-LENGTH-WH-VOLT-DMA (DALI)-*  |
| <b>Alternates:</b>    | Gammalux GB44D-128T5-VOLT-DALI-*<br>Day-o-Lite PTP-D-WOA-1-28T5-AC-LENGTH-WH-VOLT-DALI   |
| <b>Description:</b>   | Identical to F41 except with direct lighting distribution.   |
| <b>Lamping:</b>       | 1 - Linear Fluorescent<br>Osram Sylvania FP28T5/830/ECO  |
| <b>Optics:</b>        | Satin acrylic lens, anodized aluminum reflector  |
| <b>Dimensions:</b>    | Length varies (See architectural drawings), 4.000" width, 4.000" height/depth  |
| <b>Housing:</b>       | Continuous extruded aluminum profile with steel cable suspension and dust cover.   |
| <b>Electrical:</b>    | Integral electronic DALI ballast<br>Osram Sylvania QTP 1x28T5/UNV DALI<br>Input Watts: 32  |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | CUL, IBEW, UL. Suitable for Dry environments.  |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Fixture to be suspended from ceiling so that the fixture lens is co-planar with the bottom of the acoustical ceiling panels in the tiered classroom. See architectural details for dimensions.</li><li>2. Fixture mounting height varies. See architectural drawings for details.</li><li>3. Provide integral DALI ballast.</li><li>4. Contractor to coordinate wiring with DALI digital control standards per specification.</li><li>5. Contractor to provide field dimensions for fixture run lengths.</li><li>6. Manufacturer to provide shop drawings based on field dimensions for lighting consultant approval.</li><li>7. Consult Electrical Engineer drawings for EM designation and operation.</li><li>8. Provide 2-lamp ballast as allowed by run length.</li></ol> |

---

**Type:** F41C  
**Location:** Atrium 4th Floor Corridor  
**Mfr/Catalog #:** se'lux M10-1T5-SD-MOD TE PERPENDICULAR TO WALL MOUNT-LENGTH-WH-VOLT-DMA (DALI)\*  
**Alternates:** Gammalux GB44D-128T5-VOLT-DALI-\*-\*ASL-\*-\*MOD WALL MOUNT  
Day-o-Lite PTP-D-WOA-1-28T5-AC-LENGTH-WH-VOLT-DALI-MOD Perpendicular Wall Mount  
**Description:** Identical to F41A except with Perpendicular to wall mount application with cable ties to wall from above.  
**Lamping:** 1 - Linear Fluorescent  
Osram Sylvania FP28T5/830/ECO  
**Optics:** Satin acrylic lens, anodized aluminum reflector  
**Dimensions:** Length varies (See architectural drawings), 4.000" width, 4.000" height/depth  
**Housing:** Continuous extruded aluminum profile with steel cable suspension and dust cover.  
**Electrical:** Integral electronic DALI ballast  
Osram Sylvania QTP 1x28T5/UNV DALI  
Input Watts: 32  
**Voltage:** Shall be specified by Electrical Engineer  
**Labels:** CUL, IBEW, UL. Suitable for Dry environments.  
**Notes:**

1. Fixture to be mounted perpendicular to wall with cable suspension from wall above. See architectural details for mounting conditions.
2. Provide integral DALI ballast.
3. Contractor to coordinate wiring with DALI digital control standards per specification.
4. Contractor to provide field dimensions.
5. Manufacturer to provide shop drawings based on field dimensions for lighting consultant approval.
6. Consult Electrical Engineer drawings for EM designation and operation.

---

**Type:** F52  
**Location:** Main Lobbies  
**Mfr/Catalog #:** Delray Lighting ST64128.411-DALI  
**Alternates:** Vode Bow Perf 100 Series T5-DALI  
SPI Lighting Slimlite MOD with 180 degree perk shield and exposed lamp.  
**Description:** Cable suspended rail mounted linear fluorescent pendant with ceiling surface mounted aluminum housing hung at various heights with 180 degree perforated metal shield.  
**Lamping:** 1 - Linear Fluorescent  
Osram Sylvania FP28T5/830/ECO  
**Optics:** Bare lamp with perforated metal shielding  
**Dimensions:** 1.000" width, 2.200" height/depth, length as required by architectural condition  
**Housing:** Cast aluminum zinc alloy and aluminum extrusion with matte anodized finish.  
**Electrical:** Integral electronic DALI ballast  
Osram Sylvania QTP 1x28T5/UNV DALI  
Input Watts: 32  
**Voltage:** Shall be specified by Electrical Engineer  
**Labels:** UL listed Damp Location. Suitable for Dry, Damp environments.  
**Notes:**

1. Ballast housing accepts electric feed at top of housing from one end only. Continuous to coordinate ballast mounting on ceiling with maximum remote distribution and DALI wiring.
2. Contractor to coordinate installation with ceiling conditions.
3. Architect to verify color and finish.
4. Architect to verify over all hanging height AFF.
5. Provide integral DALI ballast.
6. Contractor to coordinate wiring with DALI digital control standards per specification.
7. See architectural drawings for mounting details.
8. Confirm mounting heights AFF in field before cutting cable.
9. Consult Electrical Engineer drawings for EM designation and operation.

|                       |  |
|-----------------------|--|
| <b>Type:</b>          | <b>F53</b>   |
| <b>Location:</b>      | Library Wood Cove, Reception areas   |
| <b>Mfr/Catalog #:</b> | Ledalite 3808-F01-E-N-LENGTH-7(DALI)-VOLT-DALI-W   |
| <b>Alternates:</b>    | Electrix AX-28-S2-VOLT-D1-46-*-DALI<br>Elliptipar F305-T228-S-00-VOLT/DALI-000   |
| <b>Description:</b>   | Surface mounted linear fluorescent cove light with asymmetric distribution with (1) 28W T5 lamp in cross section mounted above wood fin as detail by architect and installed by G.C.   |
| <b>Lamping:</b>       | 1 - Linear Fluorescent<br>Osram Sylvania FP28T5/830/ECO  |
| <b>Optics:</b>        | Highly specular Miro IV aluminum 20 gauge steel asymmetric reflector   |
| <b>Dimensions:</b>    | Length Per Arch Dwgs, 6.000" width, 1.500" height/depth  |
| <b>Housing:</b>       | Die Formed 20 gauge cold rolled steel painted white  |
| <b>Electrical:</b>    | Integral DALI ballast<br>Osram Sylvania QTP 1x28T5/UNV DALI<br>Input Watts: 32   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer  |
| <b>Labels:</b>        | CUL listed Damp Location, UL listed Damp Location. Suitable for Dry, Damp environments.  |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Fixture to be surface mounted above architectural soffit (see architectural drawings for details)</li><li>2. Architect to verify color and finish.</li><li>3. Provide integral DALI ballast.</li><li>4. Contractor to coordinate wiring with DALI digital control standards per specification.</li><li>5. Position fixture at back of mounting condition for maximum shielding.</li><li>6. Consult Electrical Engineer drawings for EM designation and operation.</li><li>7. Provide 2-lamp ballast as allowed by run length.</li></ol> |

---

|                       |   |
|-----------------------|---|
| <b>Type:</b>          | <b>F68</b>  |
| <b>Location:</b>      | Day Care  |
| <b>Mfr/Catalog #:</b> | National Cathode R-C-V-NPS-1-COLOR  |
| <b>Alternates:</b>    | Architectural Cathode Lighting<br>ACDC  |
| <b>Description:</b>   | Surface mounted cold cathode fixture in ceiling cove with 25mm diameter, 1500 milliamp and remote transformer.  |
| <b>Lamping:</b>       | 1 - 25 mm diameter, tri-phosphor coated cold cathode lamps<br>By manufacturer - 12w/LFT NPF-120mA transformer - can be removed up to 20' away from lamps.   |
| <b>Voltage:</b>       | Shall be specified by Electrical Engineer   |
| <b>Notes:</b>         | <ol style="list-style-type: none"><li>1. Powersource will be located in an accessible ventilated area not exceeding 100°F/38°C with air circulation on all sides to dissipate 300W and in complete compliance of IFAY and Article 410 of the N.E.C.</li><li>2. Shop Drawings will be issued in CAD format showing bill of materials, installation procedures, wiring diagrams, footage for each area and IFAY's seven-digit code number. It is the installing contractor's responsibility to supply as-built dimensions and patterns if required</li><li>3. Provide complete set of lamps for attic stock</li><li>4. Architect to verify color.</li></ol> |

---

Light Loss Factors

C1.1: AGI Settings

|                        | Type    | Mean Lumen @ 25°C        | BF        | LDD (i)     | RSDD (ii) | Total |          |
|------------------------|---------|--------------------------|-----------|-------------|-----------|-------|----------|
| Library Reading Lounge | F20 CMH | 1800 (iii)               | 0.9 (iii) | Category IV | 0.885     | 0.976 | 0.777384 |
|                        | F20 FL  | 2594                     | 1         | Category VI | 0.86      | 0.976 | 0.83936  |
|                        | F22     | 1548                     | 1         | Category IV | 0.885     | 0.976 | 0.86376  |
|                        | F27     | 2720                     | 1         | Category IV | 0.885     | 0.976 | 0.86376  |
|                        | F34A    | 2594                     | 1         | Category V  | 0.88      | 0.976 | 0.85888  |
|                        | F53     | 2594                     | 1         | Category VI | 0.86      | 0.976 | 0.83936  |
|                        | F68     | 362 lm/ft (1448 per 4ft) | 0.9 (iii) | Category II | 0.84      | 0.976 | 0.75     |
| Tiered Classroom       | F7      | 2594                     | 1         | Category IV | 0.885     | 0.976 | 0.86376  |
|                        | F10     | 1116                     | 1         | Category IV | 0.885     | 0.976 | 0.86376  |
|                        | F12     | 9                        | -         | -           | -         | -     | 0.75     |
|                        | F24     | 1548                     | 1         | Category IV | 0.885     | 0.976 | 0.86376  |
|                        | F41A    | 2594                     | 1         | Category V  | 0.88      | 0.976 | 0.85888  |
|                        | F53     | 2594                     | 1         | Category VI | 0.86      | 0.88  | 0.7568   |

Not in Calculatio

- i - 12 month cycle, Clean Environment
- ii - RCR = 1.5
- iii - Assumed

AGI Calculation Settings

|           | Length of Side (ft.) | Patch Size (ft.) |
|-----------|----------------------|------------------|
| Setting 1 | 8                    | 1                |
| Setting 2 | 32                   | 2                |
| Setting 3 | 128                  | 3                |
| Setting 4 | 384                  | 4                |
| Setting 5 | > Setting 4          | 4                |

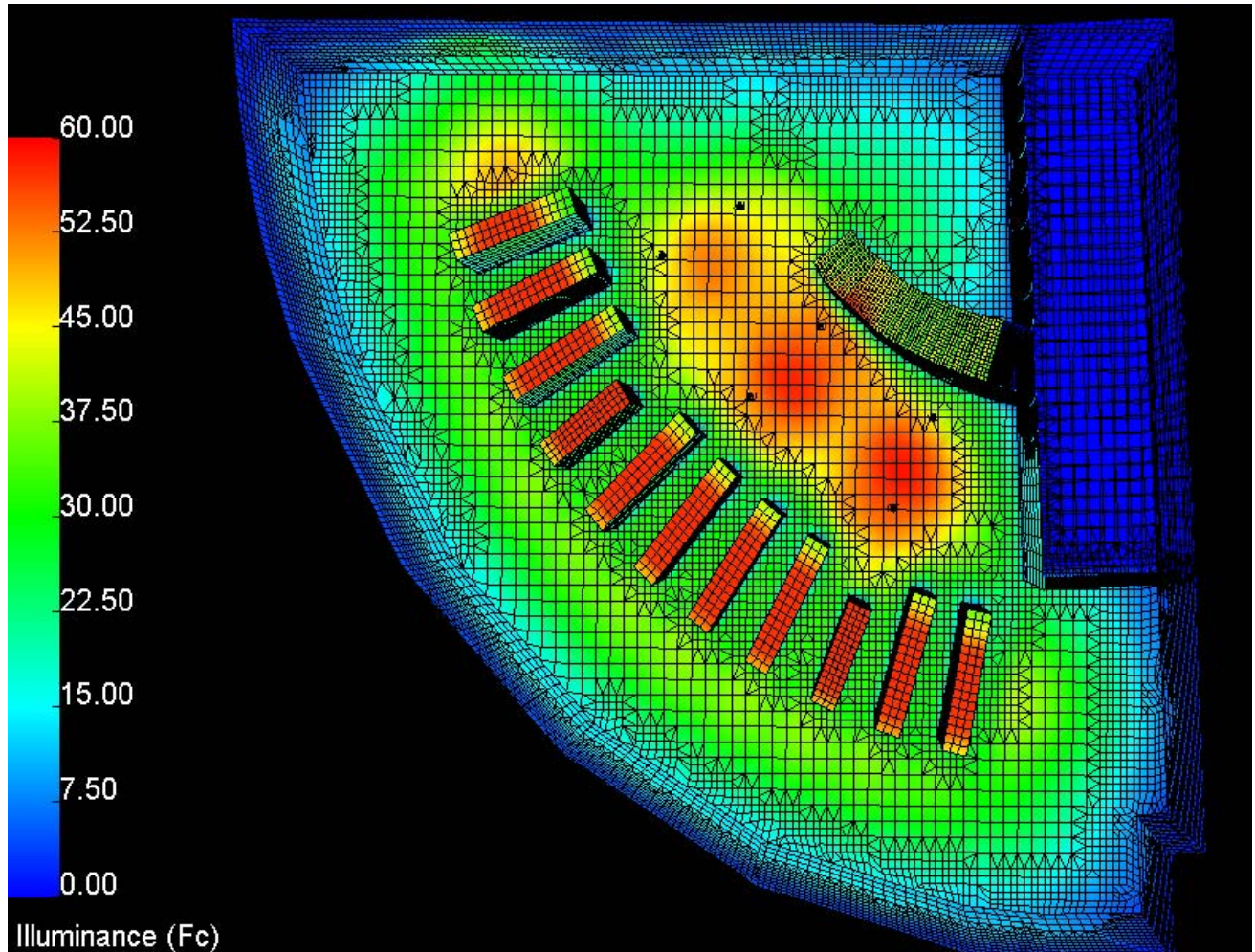
  

|                       |     |
|-----------------------|-----|
| Element Size Factor = | 0.5 |
|-----------------------|-----|

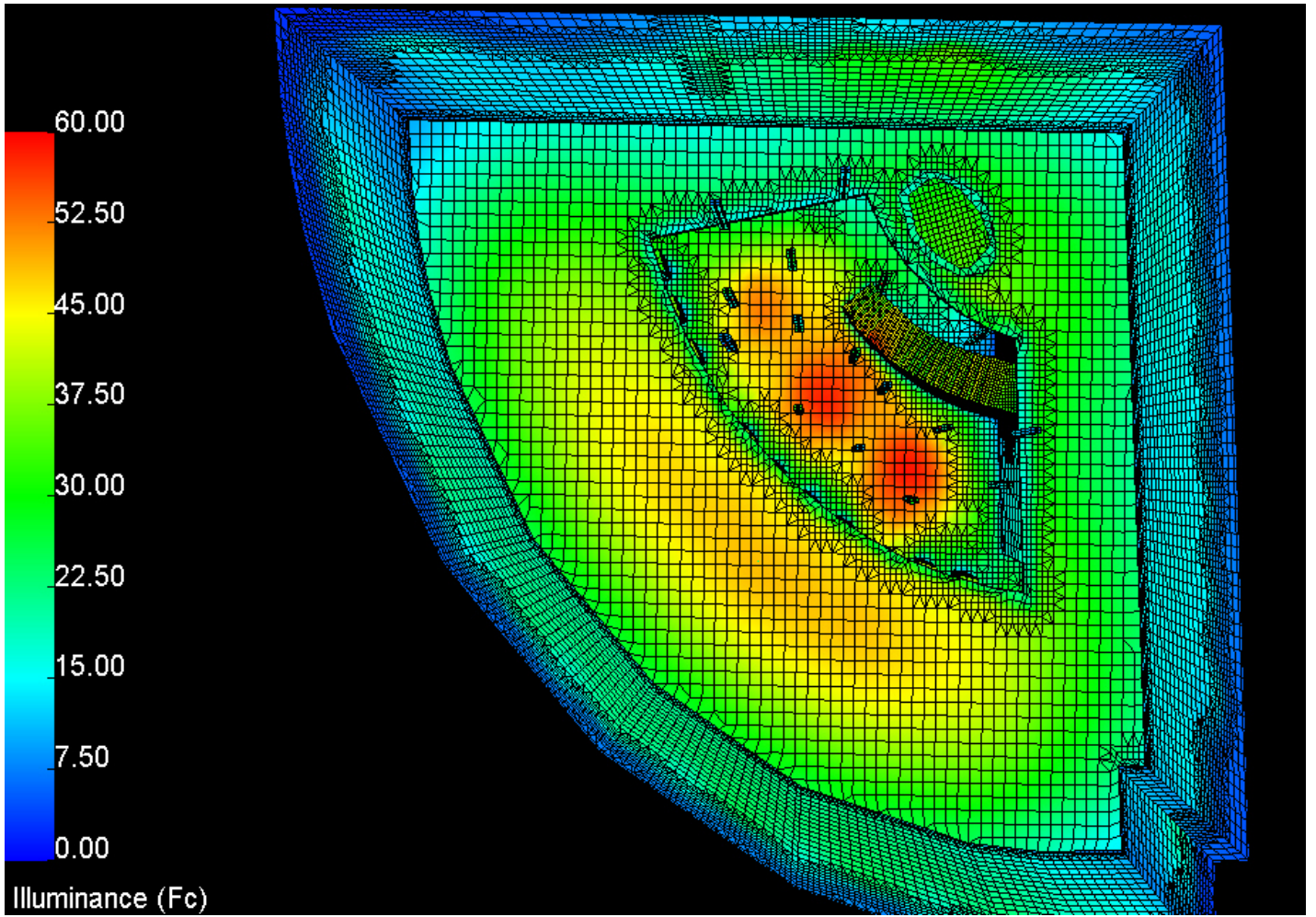
  

|                                |     |
|--------------------------------|-----|
| Luminaire Subdivision          |     |
| Min Luminaire Segment (ft.) =  | 1   |
| Secondary Sources: Threshold = | .01 |

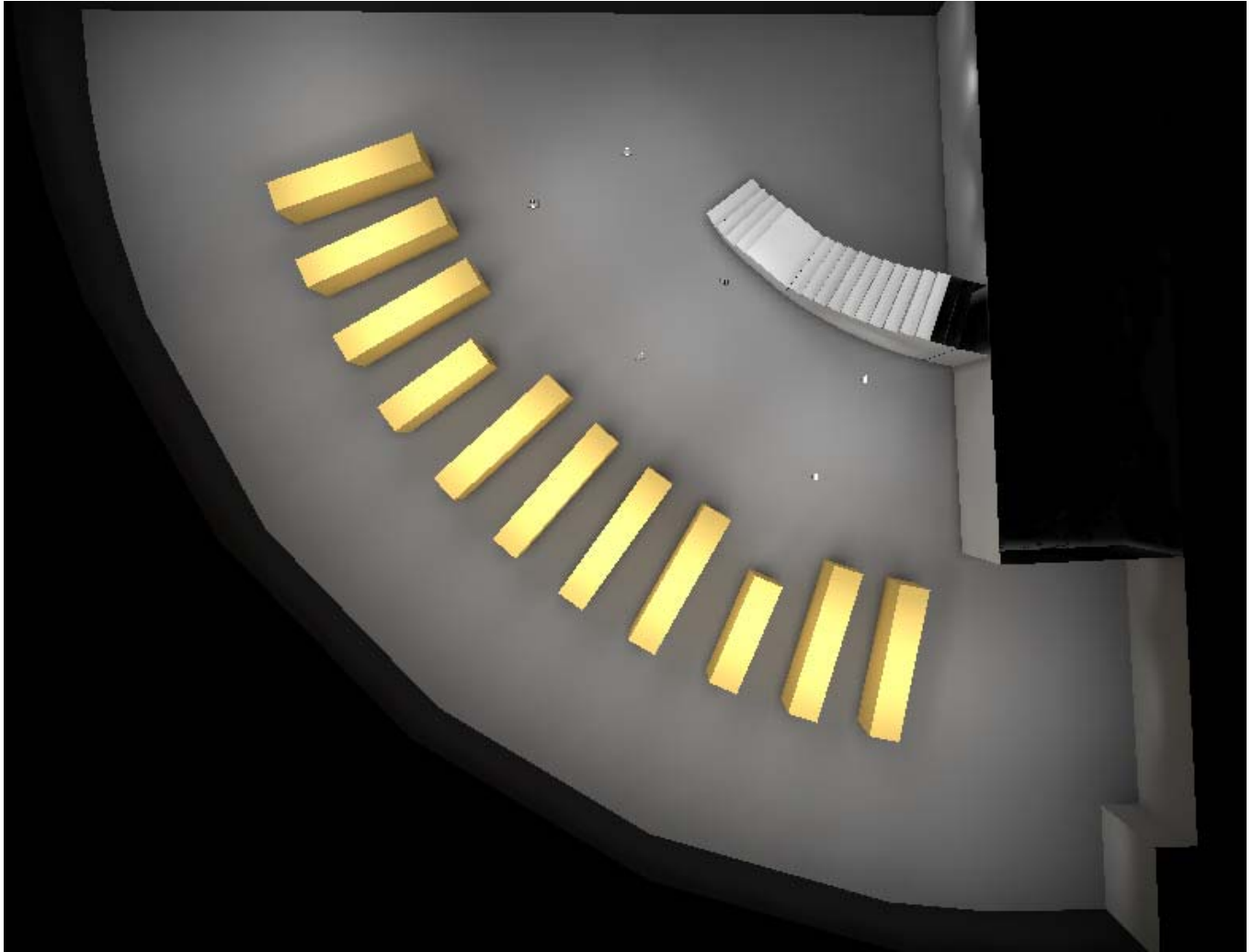




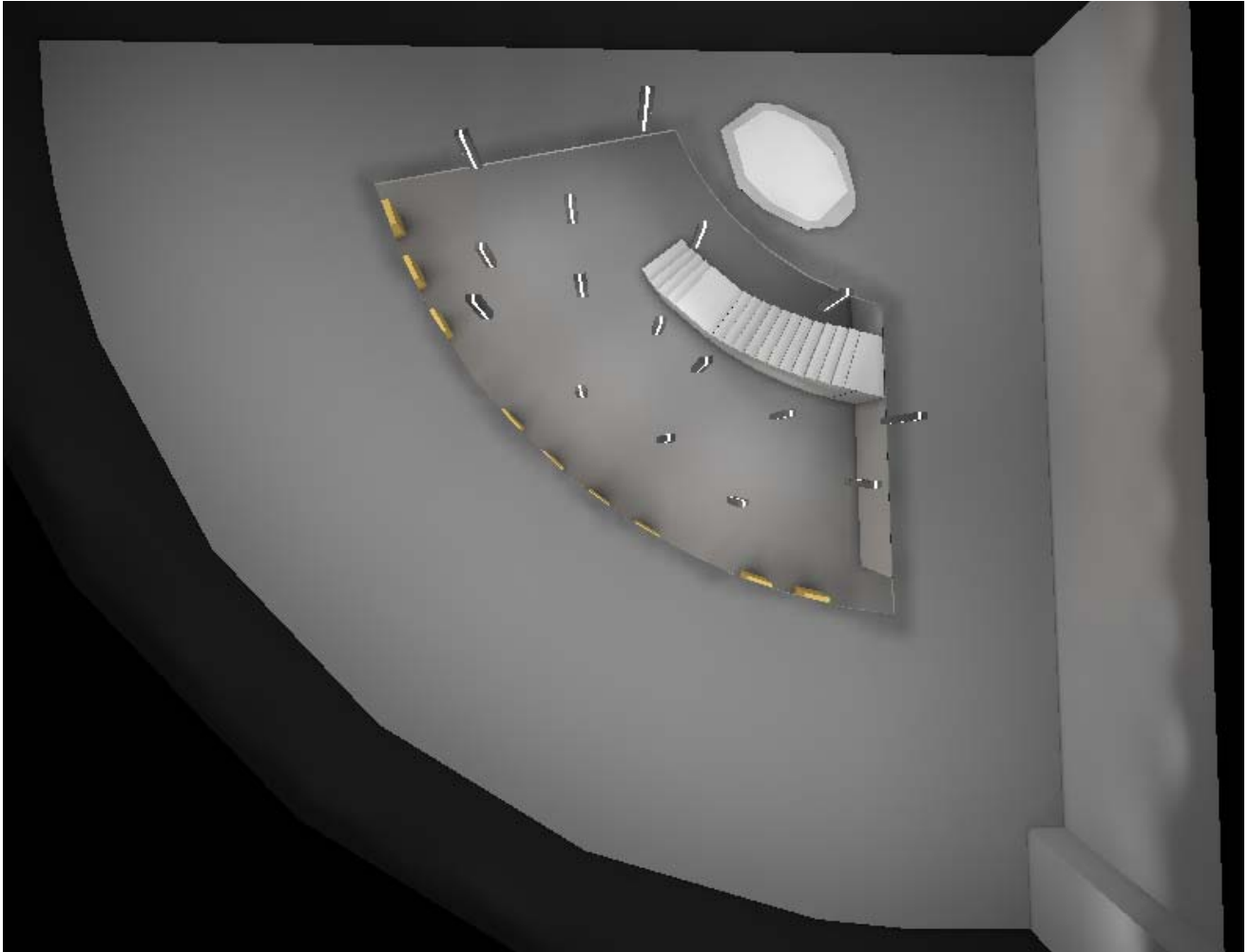
C2.2: First Floor Illuminance Levels Pseudo Color



C2.3: Second Floor Illuminance Levels Pseudo Color

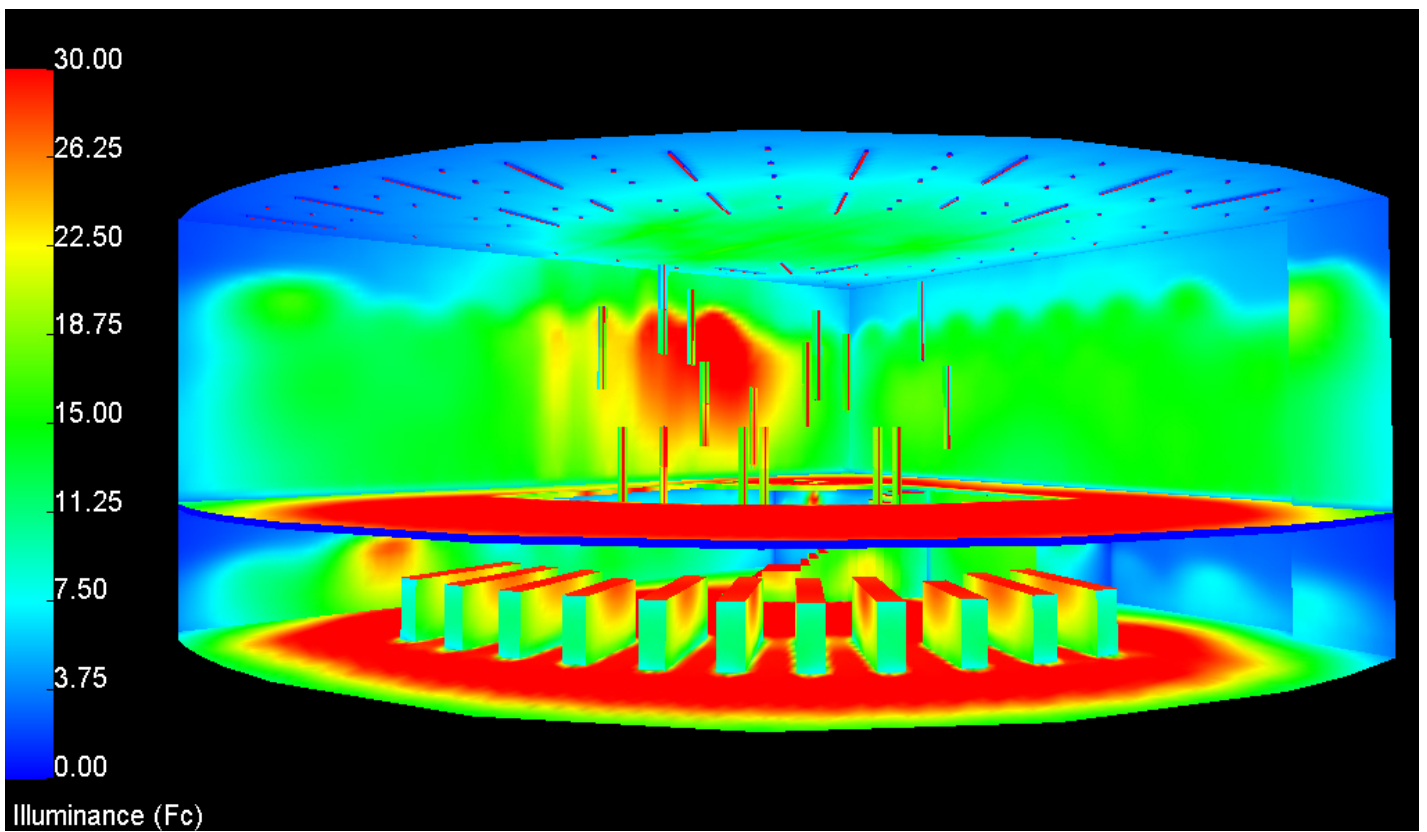


C2.4: First Floor RGB Rendering



C2.5: Second Floor RGB Rendering

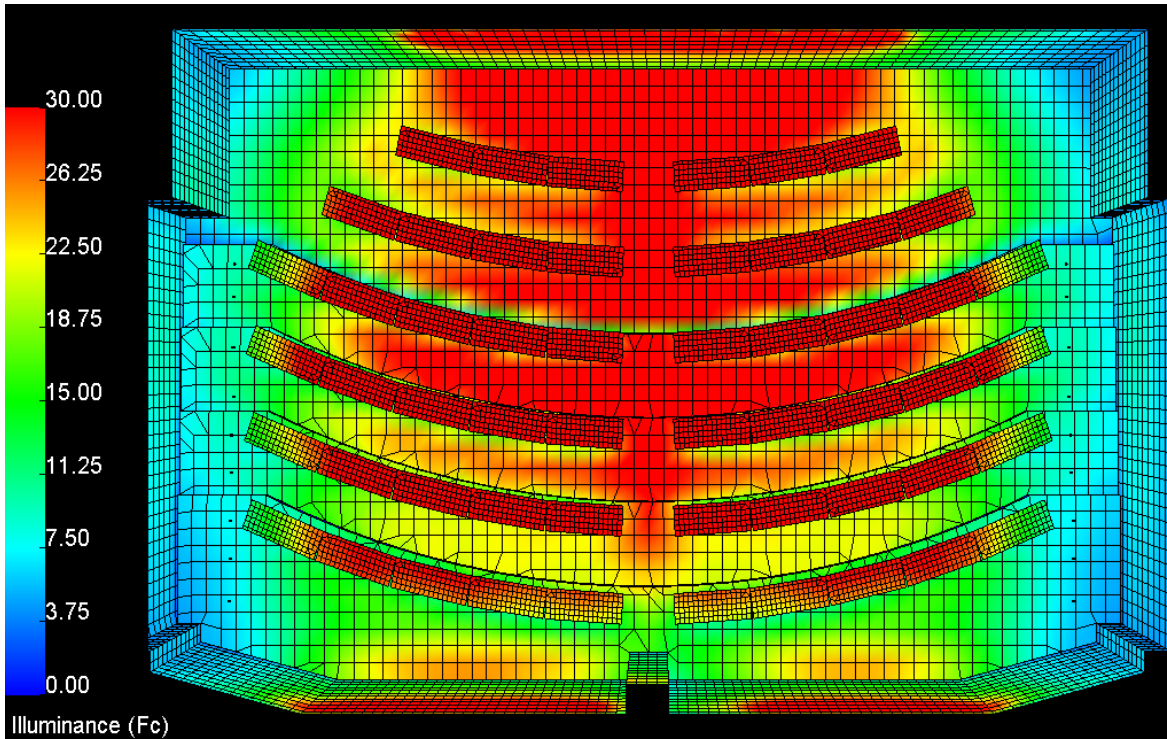




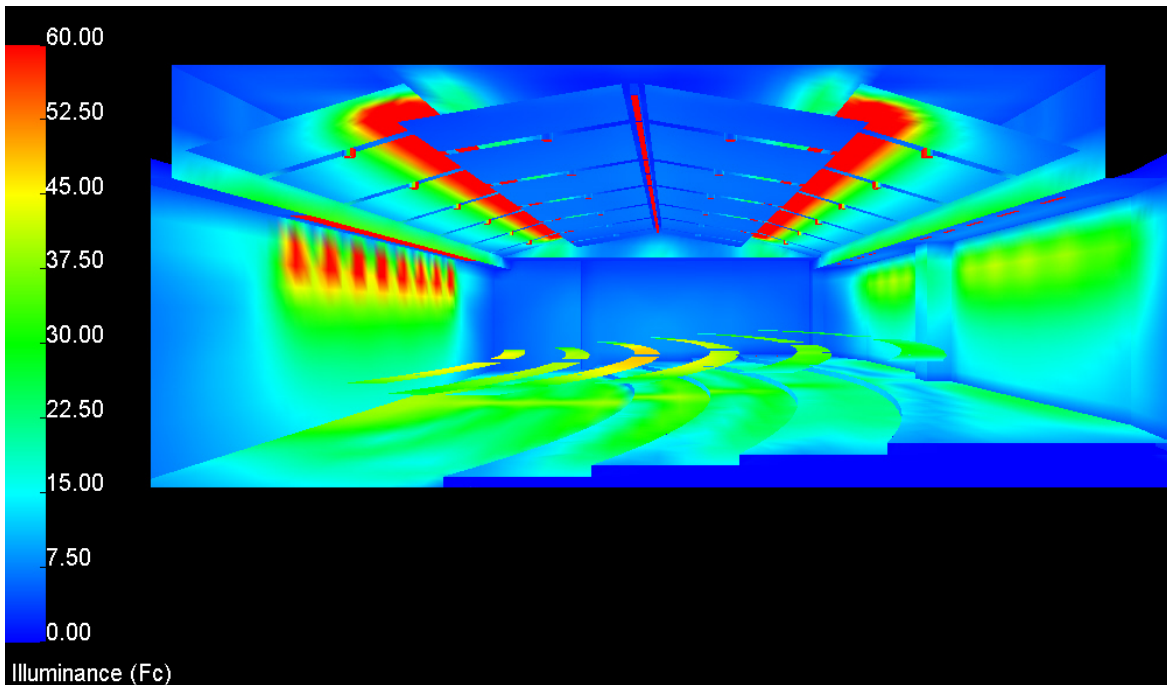
C2.6: View North Illuminance Levels Pseudo Color



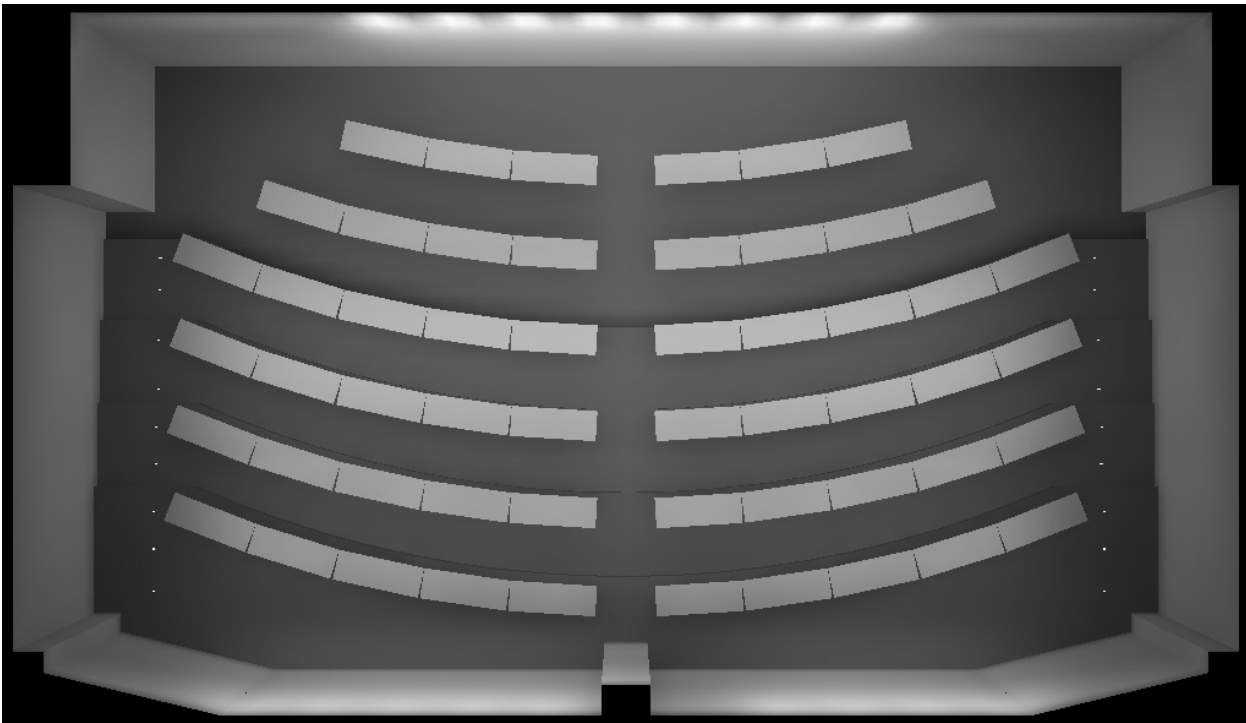
C2.7: View North RGB Rendering



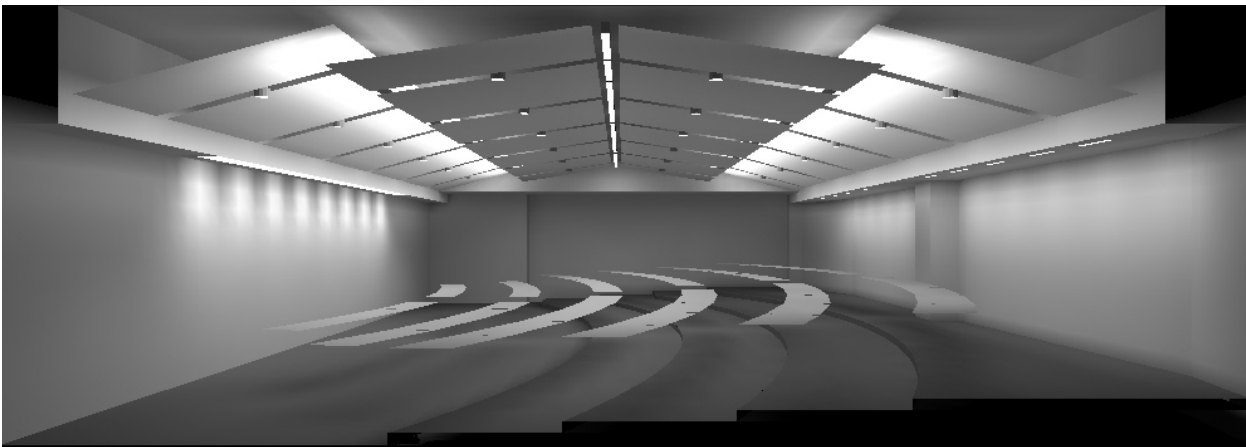
C3.1: Illuminance Levels, Pseudo Color Plan



C3.2: Illuminance Levels, Pseudo Color Section



C3.3: RGB Rendering, Plan



C3.3: RGB Rendering, Section

- 
- <sup>i</sup> Per P+W Design Intent
- <sup>ii</sup> Control description is per HLB Control Specification
- <sup>iii</sup> Control description is per HLB Control Specification
- <sup>iv</sup> Control description is per HLB Control Specification
- <sup>v</sup> Control description is per HLB Control Specification
- <sup>vi</sup> IESNA Lighting Handbook, p 10-5 (top right paragraph)
- <sup>vii</sup> IESNA Lighting Handbook, p 10-5 (top right paragraph)
- <sup>viii</sup> IESNA Lighting Handbook, p 12-3/4 (Luminance Ratios)
- <sup>ix</sup> IESNA Lighting Handbook, Interior-14, Reading
- <sup>x</sup> IESNA Lighting Handbook, Interior-10, Library, Book stacks, Active
- <sup>xi</sup> IESNA Lighting Handbook, Interior-13, Open Office, Intermittent VDT use
- <sup>xii</sup> IESNA Lighting Handbook, Interior-16, Service Spaces, Stairways and Corridors
- <sup>xiii</sup> IESNA Lighting Handbook, Interior-2, Conference Rooms, Meeting
- <sup>xiv</sup> IESNA Lighting Handbook, Interior-16, Service Spaces, Stairways and Corridors
- <sup>xv</sup> IESNA Lighting Handbook, Interior-2, Conference Rooms, Meeting
- <sup>xvi</sup> IESNA Lighting Handbook, Interior-10, Hotel, Lobby, General Lighting
- <sup>xvii</sup> IESNA Lighting Handbook, Interior-2, Conference Rooms, Meeting
- <sup>xviii</sup> IESNA Lighting Handbook, Interior-14, Reading
- <sup>xix</sup> IESNA Lighting Handbook, Interior-13, Open Office, Intermittent VDT use
- <sup>xx</sup> IESNA Lighting Handbook, Interior-14, Reading
- <sup>xxi</sup> IESNA Lighting Handbook, Interior-2, Conference Rooms, Meeting
- <sup>xxii</sup> IESNA Lighting Handbook, Interior-16, Service Spaces, Stairways and Corridors