

AE 481W

TECHNICAL REPORT 1B | EXISTING CONDITIONS
AND DESIGN CRITERIA



Towson West Village Commons

*Towson University
Towson, Maryland*

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Lighting/Electrical | October 4, 2010

Executive Summary

This report considers the existing lighting design in 5 different spaces in Towson West Village Commons. Those five spaces, Multipurpose Room, Grand Stair, HRL Suite, Roof Garden, and Student Lounge, are stand out spaces within the building that will have major impacts as to how the building is seen by students, faculty, and visitors. Analysis proves that the LEED accreditation is a top priority of the lighting system. All but one space came in under the ASHRAE determined lighting power density. The HRL Suite did not meet the required lighting power density, but through a building analysis rather than a space by space approach, the entire building would look to meet the required lighting power density of 1.2 W/sq. ft.

The lighting design in each of the spaces meets recommended illuminance values but fails to meet some design criteria determined in this report. Spaces that did not meet ideal conditions, such as roof garden or HRL suite, will be redesigned to meet aesthetic and quantitative criteria. The student lounge is adequately lit and is a premiere space for the building. The other spaces of the grand stair and multipurpose room meet criteria but do not stand out as significantly as the owner may want.

Resources

- IESNA Handbook, 9th edition
- ASHRAE 90.1 -2007
- Architectural Lighting, 3rd edition, Gary Steffy

Computer File Locations:

- Y:\Pmorgan\TechRpt1\Multipurpose.AGI
- Y:\Pmorgan\TechRpt1\HRLSuite.AGI

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Introduction

General Building Data

- **Building Name:** Towson West Village Commons
- **Location:** Towson University, Towson Maryland (Include map graphic)
- **Occupancy:** Non-Separated Mixed Use (Type A-2, A-3, B, Utility)
- **Main Function:** University food commons for students and faculty of Towson University.
- **Size:** 86,339 sq. ft.
- **Levels Above Grade:** 4 levels
- **Total Levels:** 5 levels

Towson West Village Commons is unique in its initial design as it works with the surrounding environment, while providing a unique building for the campus. Considered the west entrance to Towson University, the building incorporates Emerson drive into the building. The basement, first, and second floor are relatively smaller than the third and fourth floor, making room for an underpass for Emerson drive. This incorporates the hillside into the third and fourth floor providing a natural pathway into and out of every floor.

Inside of the building, each floor is unique in its intended function. The first floor provides retail food sales along with other building support spaces. The second floor is dedicated to an open style buffet food commons for university students, faculty and staff. The third floor, which spans over Emerson Drive, offers office space, a small fitness facility and open study/lounge space. This floor also offers access out into a garden. This garden acts as a meeting space and the roof for part of the second floor. The fourth floor is predominantly dedicated to a multipurpose room and the second tier of the student study/lounge space.

Connecting the first and second floors and also the study lounge tiers are grand staircases. Main corridors are kept primarily on the east side of the building. The glass found on the third floor study lounge and along the east hallway face into the center of campus. The views create a place where the vision for Towson can be easily experienced. Whether coming through the underpass, enjoying the roof garden, or enjoying the study lounge, the focus remains on Towson University.

General Lighting Evaluation

Towson West Village Commons set out to be a signature building on the west side of campus at Towson University. The building's LEED accreditation and stunning design is to impress visitors, students and faculty. The lighting design in the building is rather hit or miss with achieving these goals. After analyzing the current conditions, the lighting scheme has both high and low points but does achieve one primary goal, energy efficiency. Through the spaces seen later in this report, as compared to ASHRAE standards, the energy usage is drastically lower in my spaces. Along with a minimal lighting power density, controls are a stand out feature for most of the spaces. The general spaces are tied together through a building digital control system. This allows for programmed scenes and varying lighting uses depending on the occupant. The multipurpose room on the fourth floor is especially interesting from a control stand point. The space can be controlled through one panel for a single lecture hall or the complete 8,000 sq ft space.

The overall feeling for the lighting system is very generic. The use of recessed fixtures proves a dominance of the architecture, but most textures are not highlighted well. The HRL office could see a substantial upgrade by just evaluating and answering the visual tasks taking place within the space. At the same time, the student lounge is a premiere spot and the latest lighting technology is employed to bring color and "pop" to the space. A strong connection with the exterior could be achieved through highlighting textures and working with the outdoor roof garden on the third floor. While the building achieves its goals for flexibility and a stand out point for students, the building can be maximized for ultimate visual comfort with several changes to important, functional spaces.

Multipurpose Room – Specialty Space

Existing Conditions

Spatial Description

Found on the fourth floor, the multipurpose room, Room 411, spans the South end of the building. The multipurpose room is situated between two corridors that overlook Emerson Drive. On the east side of the building, the glass curtain wall overlooks Emerson drive and the residence halls of West Village. This corridor allows transport directly out of the building through the hillside trail at the south end of the building. The large multipurpose room covers over 8,000 square feet while spanning 76 feet, almost the width of the south end of the building. Considered the largest space in the building, the room can be subdivided into three smaller spaces. Typical functions for the smaller spaces include student organization meetings and occasional lectures. The large space is considered mainly for banquets and large gatherings. Each of the three spaces use architectural elements such as the carpet and ceiling as a way to denote the boundaries of each smaller space, when the dividers are not in use. The ceiling, while primarily acoustical ceiling tile, uses a gypsum frame to “box in” each room. The carpet type changes to reflect ceiling transition on the floor.

Table 1: Multipurpose Room Materials

Material	Location	Brand	Product Number	Reflectance
Carpet 6	Floor	Mannington	Dreams, “Formulate”	0.09
Carpet 7	Floor	Mannington	Everywear, “Cambridge”	0.14
Wall 5	Walls	Painted Gypsum (PT-3)	Sherwin Williams SW7537	0.63*
Movable Wall	Walls	Advanced Equipment	Alpha Type S (Match Wall Color)	0.63
Door	Wall	Algoma Hardwoods	Not Specified	0.40*
Ceiling 3	Ceiling	Armstrong	#3909	0.90
Ceiling 5	Ceiling	Painted Gypsum (PT-4)	Sherwin Williams SW7566	0.88*

*Based on comparable color with available product data.

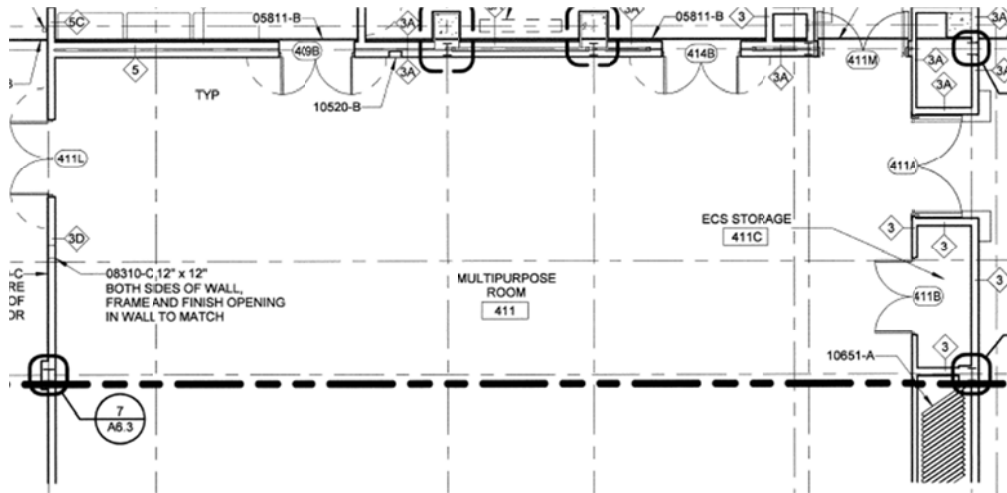


Figure 1: Multipurpose Room Part 1

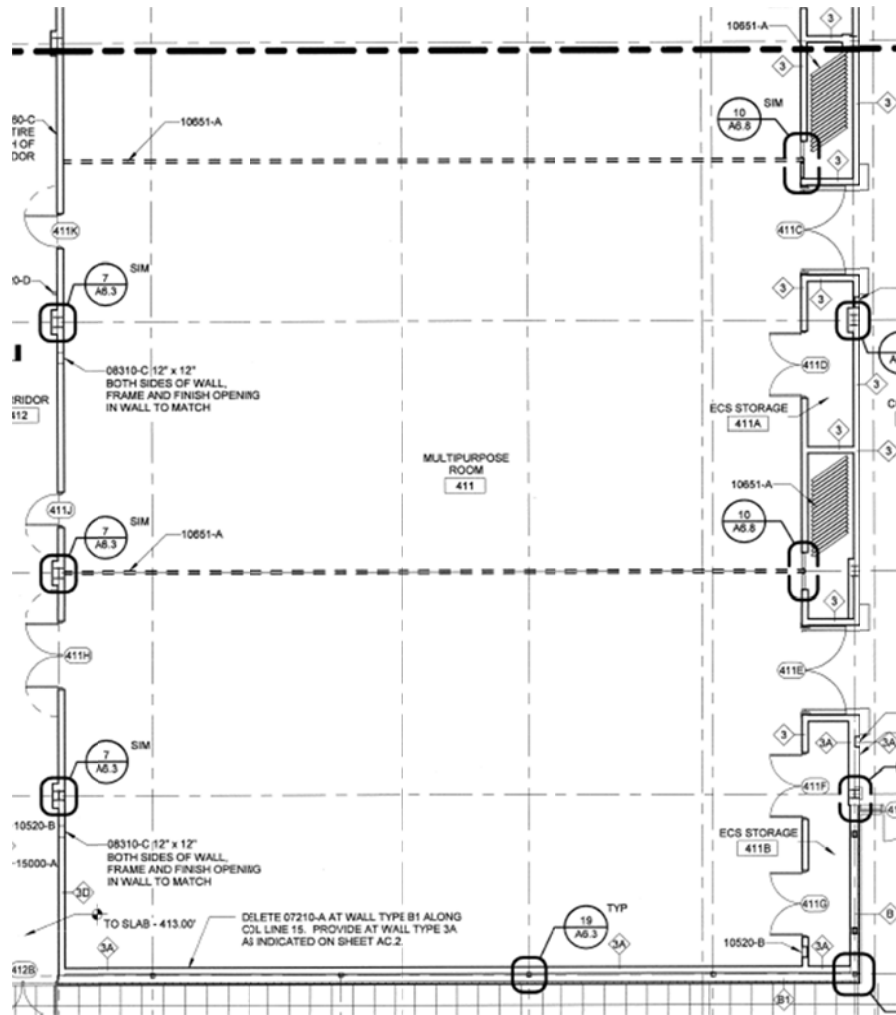


Figure 2: Multipurpose Room Part 2

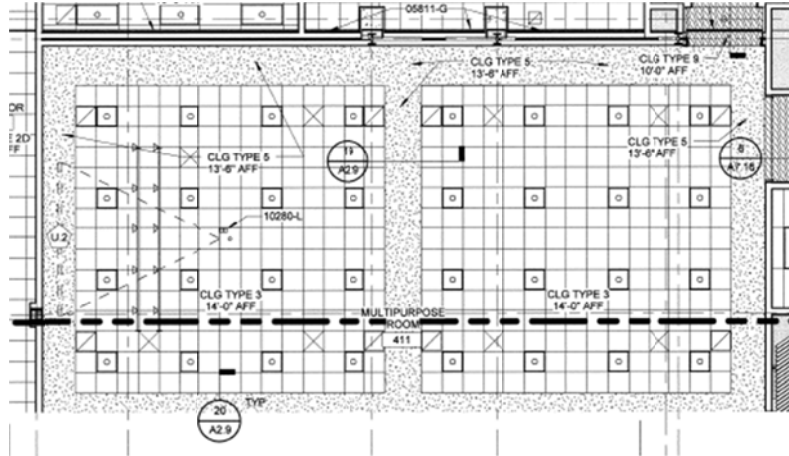


Figure 3: RCP Part 1

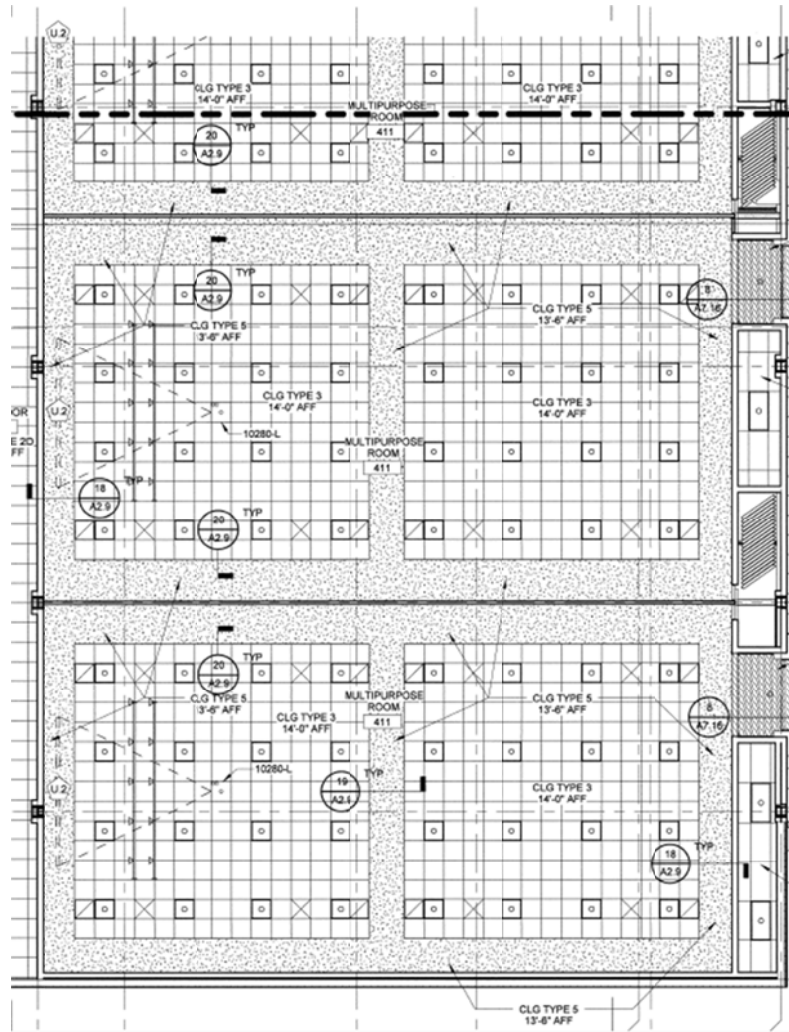


Figure 4: RCP Part 2

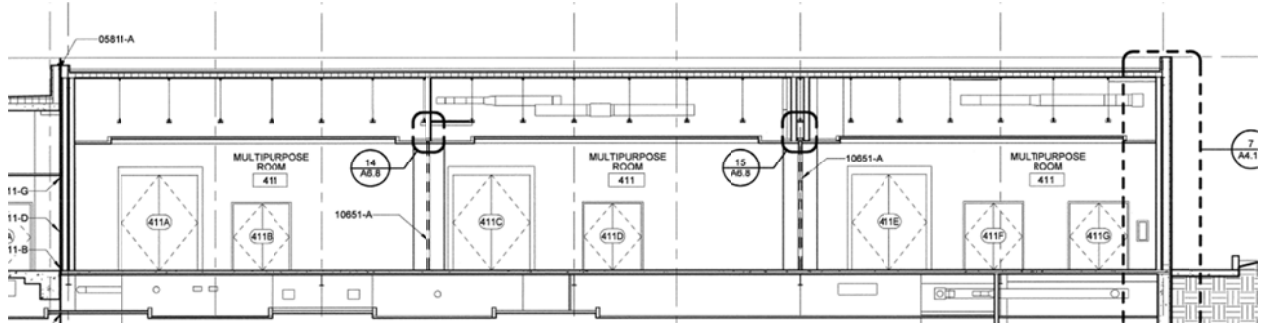
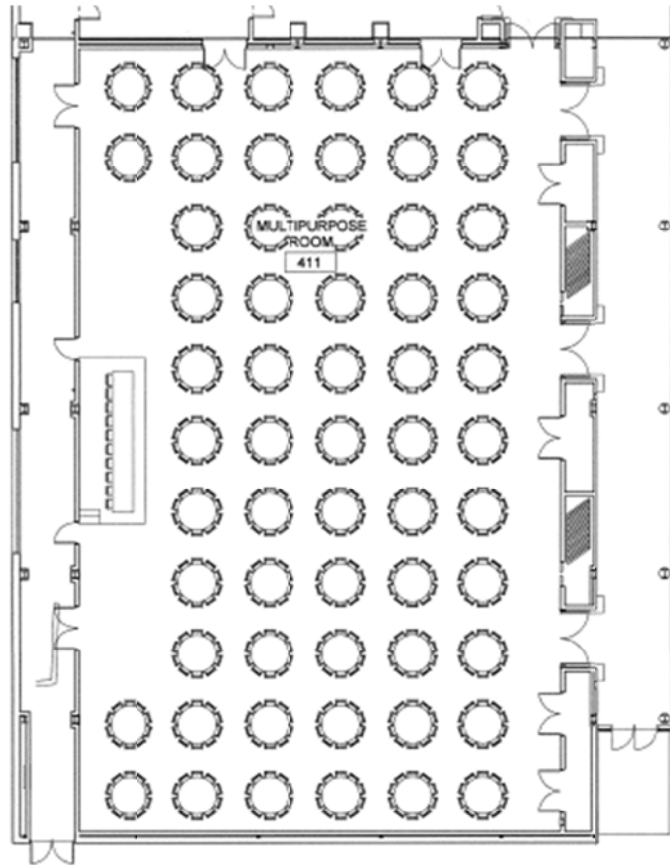
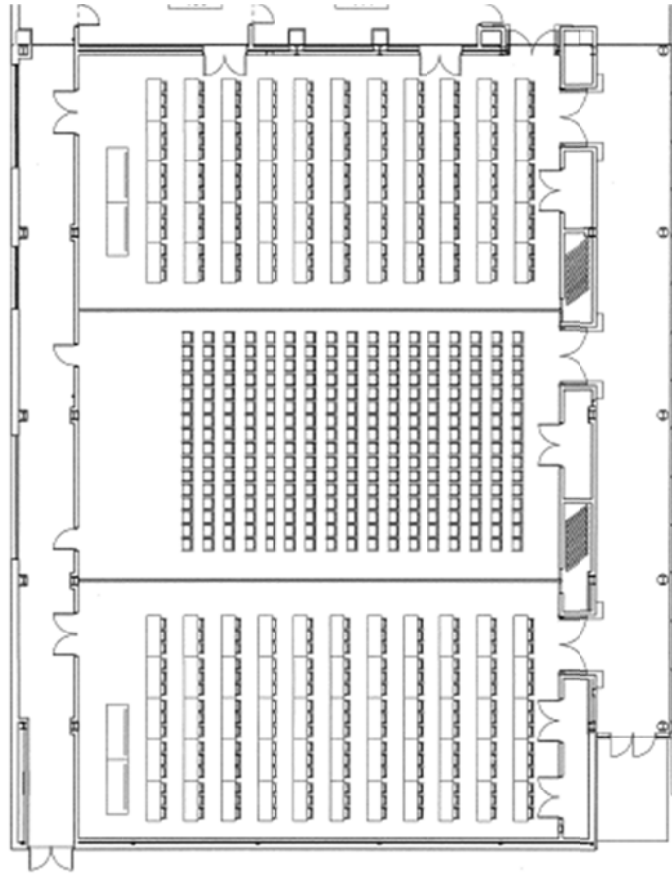


Figure 5: Building Section Facing East



Level 4 - Furniture - Full Banquet	
Description	Count
Guest Chair	4
Lounge Chair	22
Sofa - 2 Person	8
5'-8" Diameter Table	59
Clas Table	1
Guest Chair	596

Figure 6: Banquet Setup



Level 4 - Furniture - Divided	
Description	Count
Guest Chair	272
Lounge Chair	22
Sofa - 2 Person	8
Guest Chair	330
Seminar Table	110

Figure 7: Typical Divided Setup

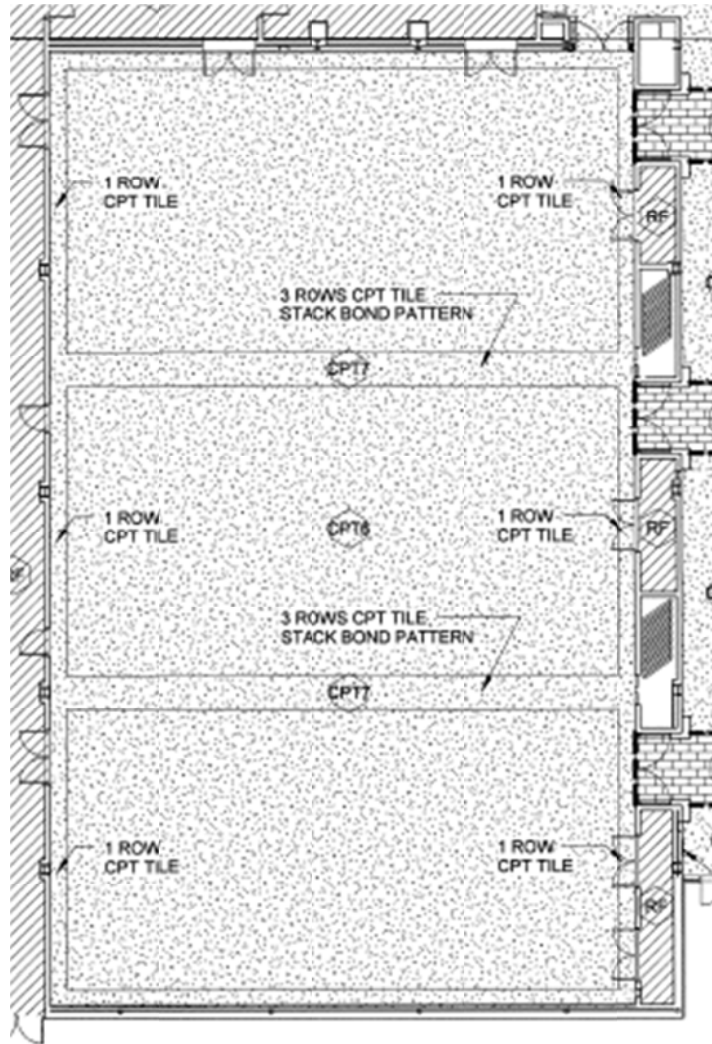


Figure 8: Finished Floor Materials

Lighting Design

The current design focuses on providing even light throughout the space. Utilizing 2x2 recessed troffers, the space is illuminated uniformly. This can be seen in Figure 9 and 10. 100W track lights are placed on the east side of the room to highlight lecture functions. The lighting is very basic but controls add complexity to the lighting scheme of the room. Using a four scene control system, the room is controlled through various scenes. Dimming ballasts are connected to each fixture, allowing the each fixture to reach a certain dimming level. Since the room can be split into three separate sections, a partition detector is mixed into the lighting controls. The partition detector controls how the panels interact with the space. When a partition is closed, the local panel will only control the smaller space. When the partition is opened, it will adjust the entire space. Occupancy sensors are also employed to control the lighting during room setup as people move in and out of the space.

Table 2: Lighting Fixture Schedule

Type	Count	Manufacturer	Code	Wattage	Lamp	Ballast
D	96	LEDALITE	9722-D1-ST- H224-1-2-E- DIM	54	2-F24T5HO/835	LUTRON ECO-10
SA	24	LSI	290-XX	100	100W PAR38	N/A

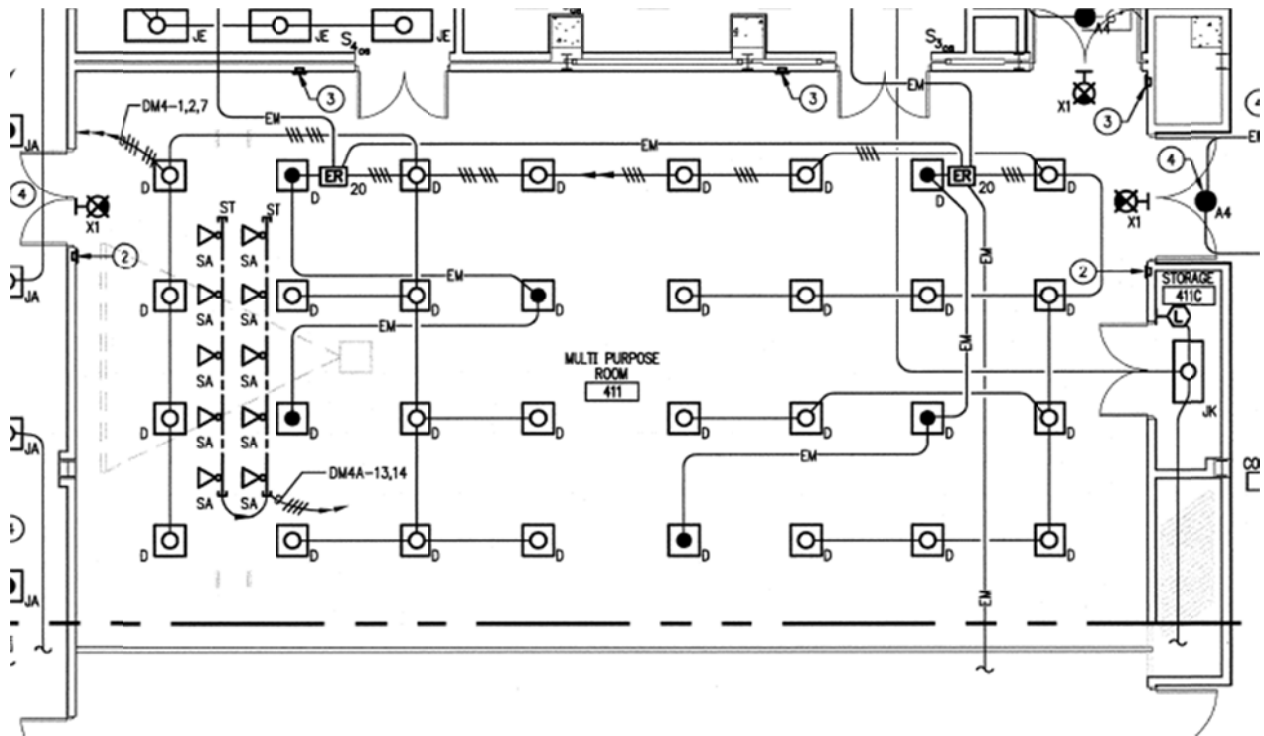


Figure 9: Lighting Plan Part 1

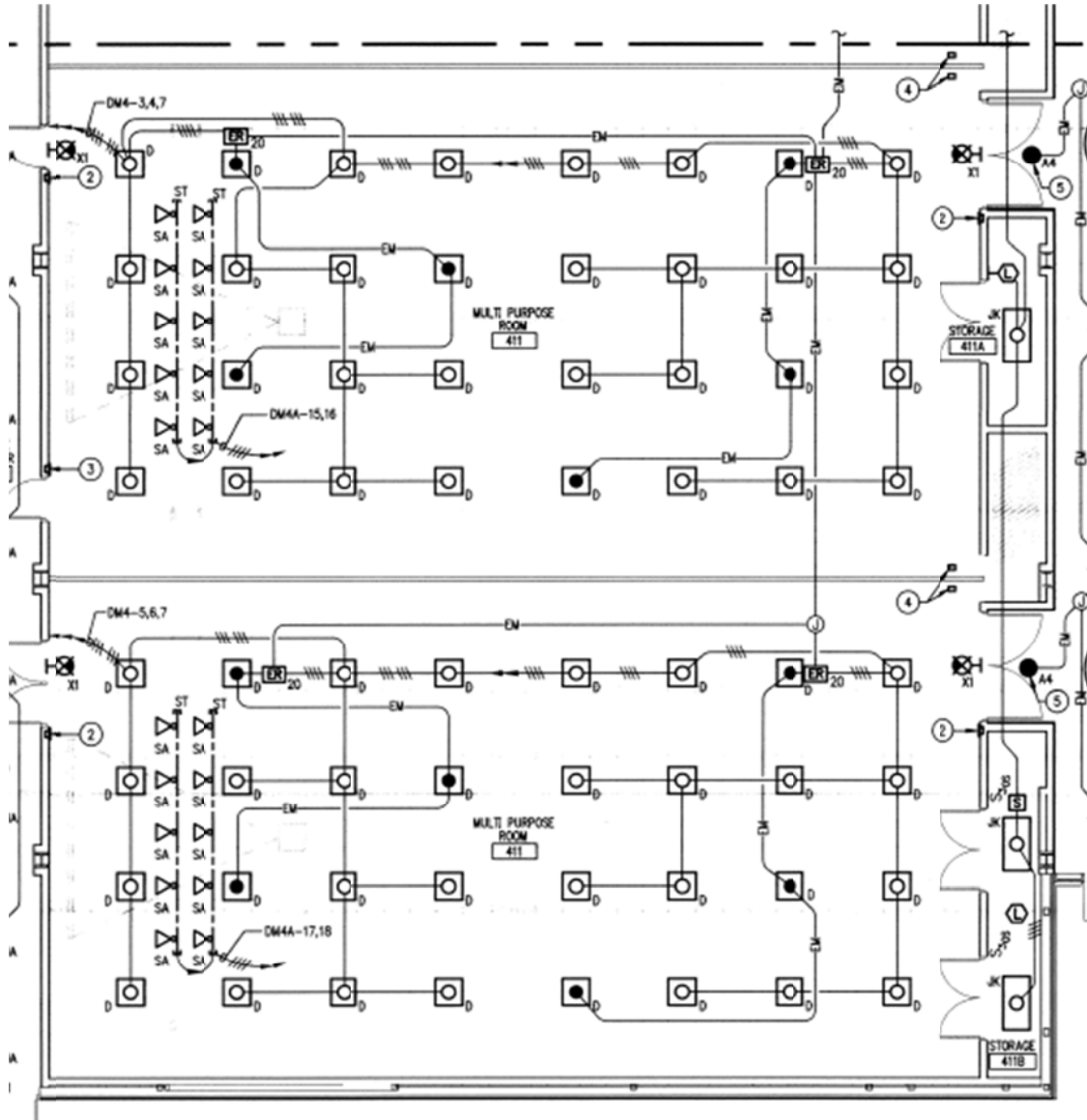


Figure 10: Lighting Plan Part 2

Design Criteria

Because of the flexibility of the space, the multipurpose room cannot be classified as simply as some other spaces. Its primary focuses will be on large gatherings for social activities and use as a lecture hall. From these functions, a list of design criteria has been selected. Daylighting will not need to be considered for this room since there are no exterior views/windows.

IESNA Categories: Auditoriums, Ballrooms/Social Events, Educational Lecture Halls

Very Important

1. System Control and Flexibility (IESNA)

Because of the spaces number one goal of being flexible, the controls must accommodate for the constant change. The space must be able to be controlled as a large space, or each of the individual spaces created by adding the movable partitions. The room can be transformed into one, two, or three separate rooms. The lighting should be controlled at the same spot whether having one large room or three smaller rooms.

2. Appearance of Space and Luminaires (IESNA)

This space will be used for student functions, but as the newest building on campus, it will be a premiere place to host several faculty and other high end functions. The lighting scheme needs to maintain a high quality and help to promote the space. The space should remain uncluttered and focus on how brilliant the space is rather than the feeling of “Is this really the best place to host a function”.

3. Color Appearance (IESNA)

Whether attending a lecture or a social event, colors should be clear and crisp. It will be important to maintain a warm feeling within the room using a lower CCT to counteract the dull color provided by the carpet and ceiling. CRI > 85, CCT ≤ 3500.

4. Modeling Faces or Objects (IESNA)

People will be interacting, or focusing their attention on another individual. It is extremely important to provide adequate color rendering capability within the space to reduce phobias of person to person interaction. In any setting whether a lecture or large gathering, there will need to be a central focus and light provided for that. Especially in lectures, a presenter should be modeled well to a person in the front row and the back row. IESNA recommends using an aiming angle between 40 and 60 degrees if using angle adjusted lighting.

5. Psychological Effect

With the ability to close off the space with movable partitions, it is important to maintain a feeling of spaciousness. While this may not be a huge concern walking into a room for the first time, if the space is divided while occupied, most people will feel the change. It is important to maintain a sense of spaciousness whether in an individual lecture hall or using the entire room for a social event.

6. ASHARE 90.1-2007 Power Density: 1.3 W/sq. ft.

Because of the LEED accreditation, it will be important not to exceed the ideal power density in order to apply for reduced energy loads.

Important**1. Horizontal Illuminance (IESNA)**

- a. Social Activities: 5 fc
- b. Note Taking (Lectures): 30 fc
- c. Lecture Focal Point: 100 fc

2. Vertical Illuminance (IESNA)

- a. Social Activities: 3 fc
- b. Lecture Focal Point: 50 fc

3. Light Distribution on Surfaces (IESNA)

Objects in the room should be lit uniformly as to not to distract occupants. Light distribution will reduce the amount of shadows and other visual problems related to non-uniform lighting.

4. Luminances of Room Objects

Except when using indirect fixtures, higher luminances can draw the eye away from the focal point of the room. By creating relatively low luminance surfaces, glare, distraction and other problems can be easily avoided in the space. A ratio of 3:1 for any surface should not be exceeded.

5. Direct Glare (IESNA)

Glare can be extremely bothersome and uncomfortable for occupants trying to focus. Luminaires will focus on providing an ambient light rather than targeting any one object. Through the use of targeting, light targeted specifically for presenters or demonstrations will be avoided. General angle measure will range between 40 and 60 degrees.

6. Reflected Glare (IESNA)

Because of the typical matte/flat finish of the walls, along with the use of carpet, any reflected glare is minimized and should not be present within the room.

7. Flicker (IESNA)

The use of electronic dimming ballasts removes flicker as a concern for the space. Interior lighting will be fluorescent lighting.

8. Source/Task/Eye Geometry (IESNA)

Due to the nature of a flat room, the luminaires should not hang in view or cause any distraction from the speaker. To achieve this, a luminaire recessed in the ceiling will adequately handle this requirement. It is important that a person can look down to take notes and then look up and have no problem transitioning to following a demonstration or presentation.

9. Maintenance

While being considered one of the premiere spaces in the building, it is important to maintain the space. Since the ceiling is only at 12'-0" typically, a ladder will be able to access lamps easily.

Current Lighting Evaluation

Lighting Power Density

Square Footage: 8,000 sq. ft.

Allowable Watts: 10,400 Watts

Used Watts: 7584 Watts

Net Difference: +27%

Light Loss Factors

Ledelite 2 lamp, T5HO 24W

- Lamp Lumen Depreciation (LLD) = 0.92
- Luminaire Dirt Depreciation (LDD) = 0.93
 - Based on new Light Loss Factors presentation, Dr. Richard Mistrick
- Ballast Factor = 1.0
- Room Surface Dirt Depreciation = 0.93
 - Assumes 12 month, very clean environment, Based on IESNA 9th edition
- Total = 0.796

LSI 100W PAR38 Track head

- Lamp Lumen Depreciation (LLD) = 0.85
 - Based on IESNA 9th edition
- Luminaire Dirt Depreciation (LDD) = 0.93
 - Based on new Light Loss Factors presentation, Dr. Richard Mistrick
- Room Surface Dirt Depreciation = 0.93
 - Assumes 12 month, very clean environment, Based on IESNA 9th edition
- Total = 0.735

Model Performance

Work Plane is set at 2.5' above the floor for general note taking (lectures) and dining (social events).

General Illuminance – Track no included

Room Configuration	Illuminance
1	28.13 fc
2	28.32 fc
3	30.30 fc

Uniformity of Large Space: 1.3

Max Illuminance at Front of Room: 165 fc (created with track pendants)

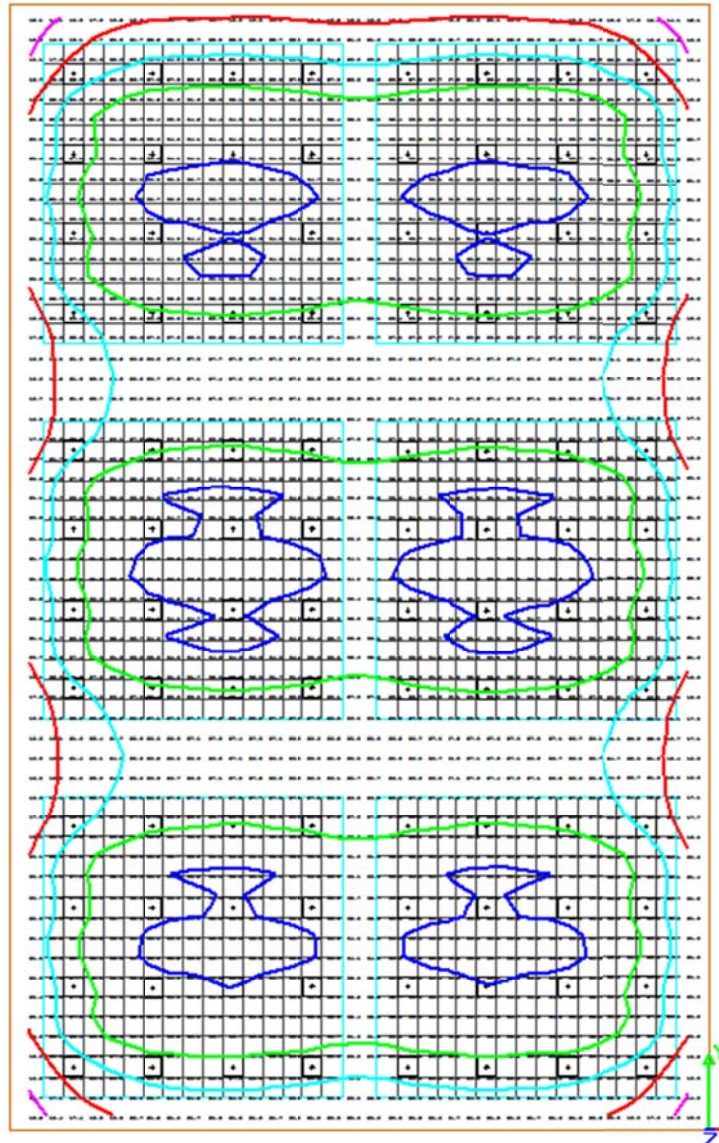


Figure 11: Isoline Diagram

Table 3: Isoline Colors

<i>Color</i>	<i>Illuminance (fc)</i>
<i>Black</i>	<i>40</i>
<i>Blue</i>	<i>35</i>
<i>Green</i>	<i>30</i>
<i>Aqua</i>	<i>25</i>
<i>Red</i>	<i>20</i>
<i>Pink</i>	<i>15</i>
<i>Navy</i>	<i>10</i>

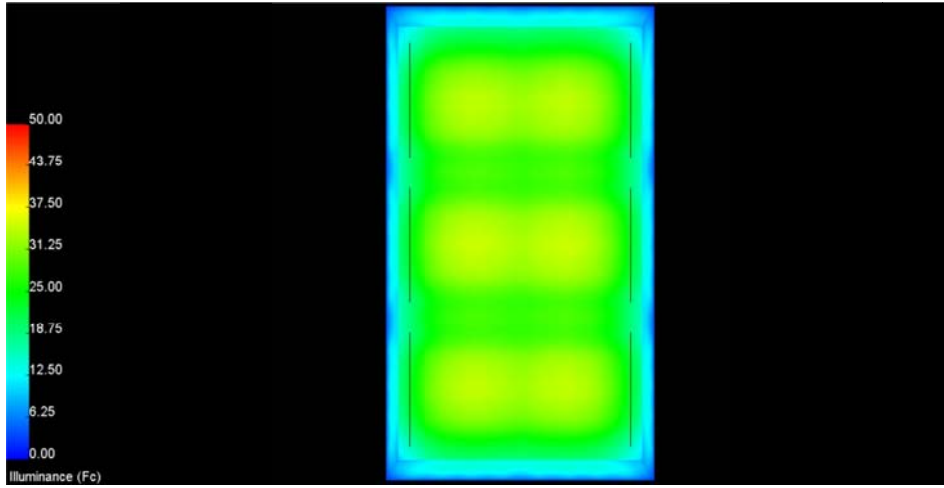


Figure 12: Psuedo Rendering

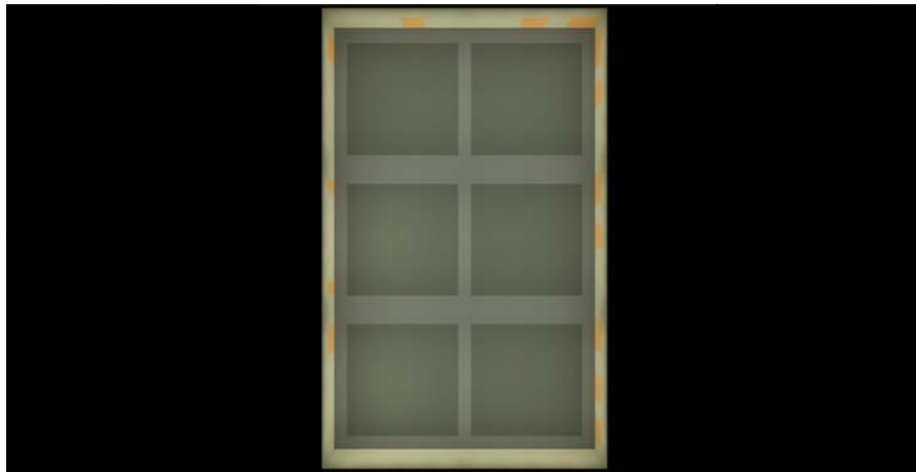


Figure 13: Rendering from above.



Figure 14: Rendering of Lecture Setup

Discussion

The lighting design analyzed was on target from a quantitative stand point. Overall Illuminance reached a level appropriate for that of note taking. With the added track heads, illuminance levels at the front of the room were well over there recommended values. While there are no true architectural stand points within the room, the lighting schematic works to uniformly light the space without drawing attention to the luminaires. The lighting power density is well within range and will successfully increase energy savings required for improved LEED status. Through the control systems, the room can be quickly transformed using only minimal lighting control access points. Each panel will have control over the entire space, based on partition location. Because of the general ambient lighting, there should be no problem dealing with glare, shadows, etc. in the space. Overall the lighting scheme does not enrich the space tremendously, but it covers all the requirements of the space.

Grand Stair – Circulation Space

Existing Conditions

Spatial Description

The most important element for the West Village Commons is its connection to the surrounding student residencies. The quad, at the north end of the building, is the primary focus of West Village. Through the use of a glass façade, the quad translates into the building. Once in the building, an occupant faces a highlight element of the Commons building. Initial ceiling height when entering the building is 11'-5". The "cloud" ceiling is made of acoustical ceiling tile and is framed to hang lower than the exposed structure above. One a few feet into the space, the ceiling lifts to a height of 30'-6" above the first floor. The grand stair focuses on creating a great rise in the building. Some at Towson could relate this to the new growth and expansion of the University in this area. This building, especially the stair speaks volumes about the new outlook of Towson University. Through the use of wood, stone and suspended cloud ceiling, the transition from outdoor to indoor is accomplished extremely well. The stone covering the stair rises 18'-0" until reaching the second floor. The stone stairway also creates a unique study space underneath at the first floor level.

Table 4: Grand Stair Materials

Material	Location	Brand	Product Number	Reflectance
Stone	Floor	Noce Tavertine	Local Supplier	0.16
Wood 1	Walls	Eucalyptus Wood	Local Supplier	0.27
Wall 3	Walls	Painted Gypsum (PT-3)	Sherwin Williams SW7537	0.63*
Ceiling 7	Ceiling	Armstrong	#3906	0.90
Exposed Ceiling	Ceiling	Paint (PT-2)	Sherwin Williams SW7076	0.88

*Based on comparable color with available product data.

Table 5: Glazing Properties

Glazing	Type	SHGC	Transmittance	Reflectance
Railing	Clear	N/A	84%	8%
GL-3	Clear	0.38	70%	11%
GL-4	Translucent	0.37	60%	12%

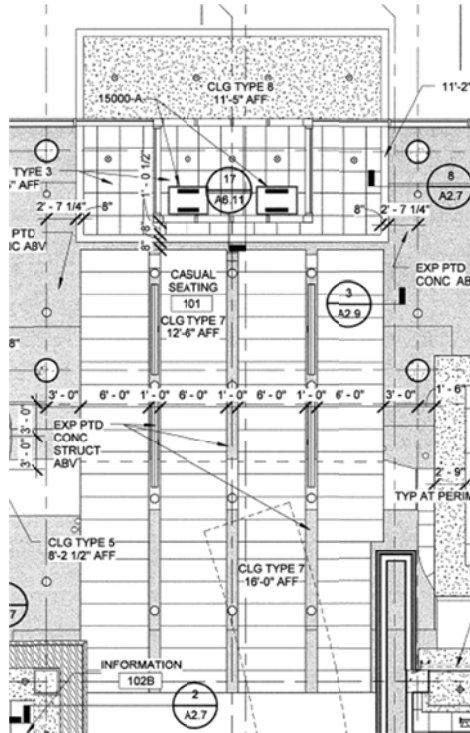


Figure 17: RCP Level 1

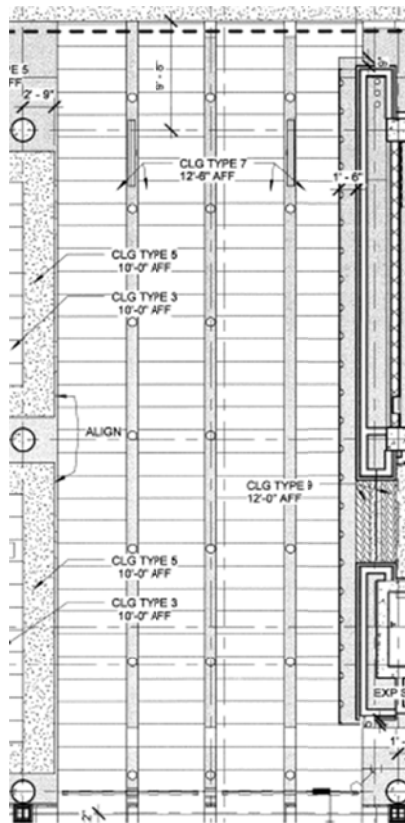
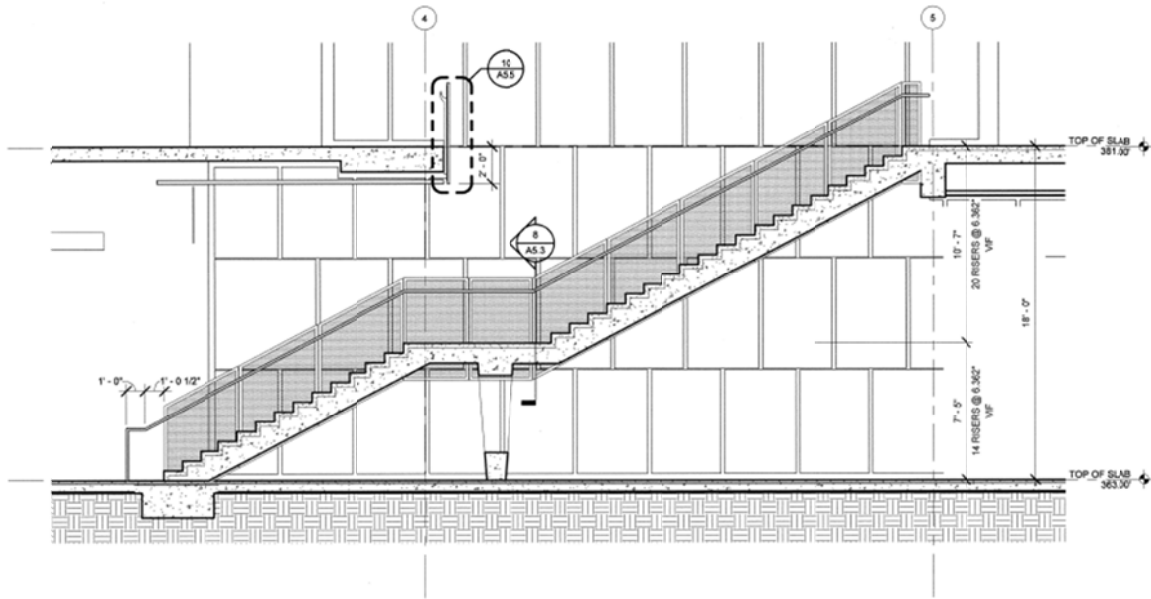


Figure 18: RCP Floor 2



2 GRAND STAIR - LONGITUDINAL SECTION
 A5.3 1/4" = 1'-0" NOTE: OBTAIN ARCHITECTURAL APPROVAL OF ANY VARIATION IN SCHEDULED RISER HEIGHTS

Figure 19: Stair Elevation

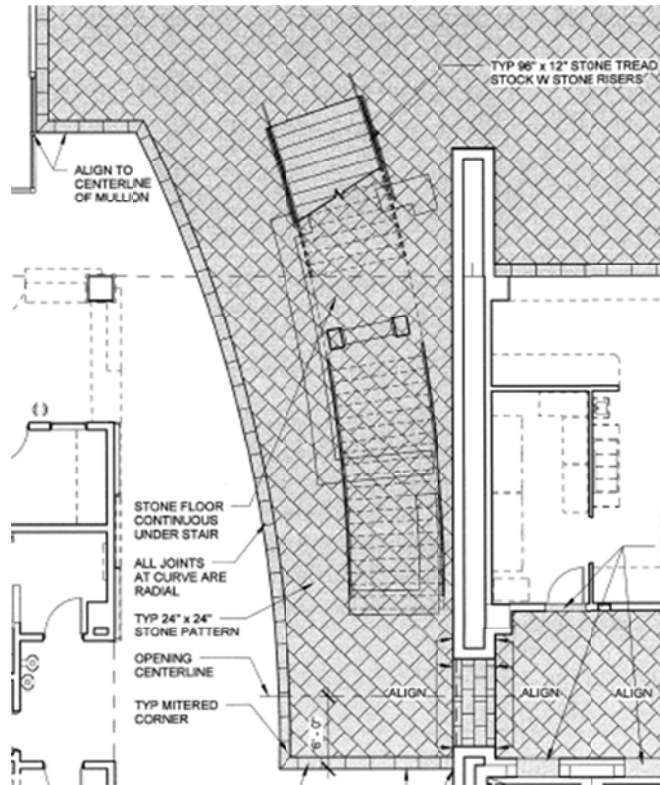


Figure 20: Stair Finish

Lighting Design

Set amongst the “clouds”, light pours into the space below to illuminate the grand stair. Individual cans are mounted between the ceiling panels to provide direct lighting into the space. To highlight the wood wall found to the left of the stairs when entering, track heads wash the wall to create an element of visual interest. The warmth of a PAR30 accents the natural color of the wood wall. To balance this energy consumption, compact fluorescent downlights are used for energy and life length purposes. This system is tied through a lighting panelboard to a digital building control, allowing for various scenes to be created and luminaires to automatically turn on and off.

Table 6: Lighting Fixture Schedule

Type	Count	Manufacturer	Code	Wattage	Lamp	Ballast
J	9	Gotham	CFV9-32TRT-8AR-LD-277-GEB10-DGC	32	F32PLT/835	Generic Ballast from Manufacturer
JS	3	Omega	OM8-1-H-32-SC-CSSFF-BK-277	32	F32PLT/835	Generic Ballast from Manufacturer
K	21	Kurt Versen	P913-SC-277-CUSTOM COLOR	32	F32PLT/835	Generic Ballast from Manufacturer
P	18	LSI	VMLHN303-00-WL-G	39	CMH39/PAR30/FL25	N/A

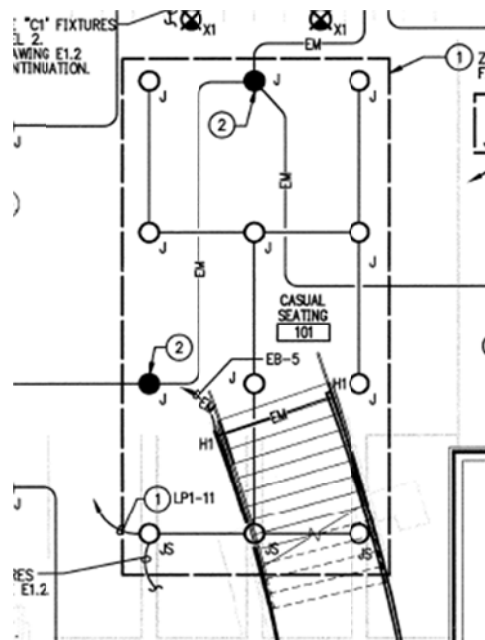


Figure 21: First Floor Lighting Plan

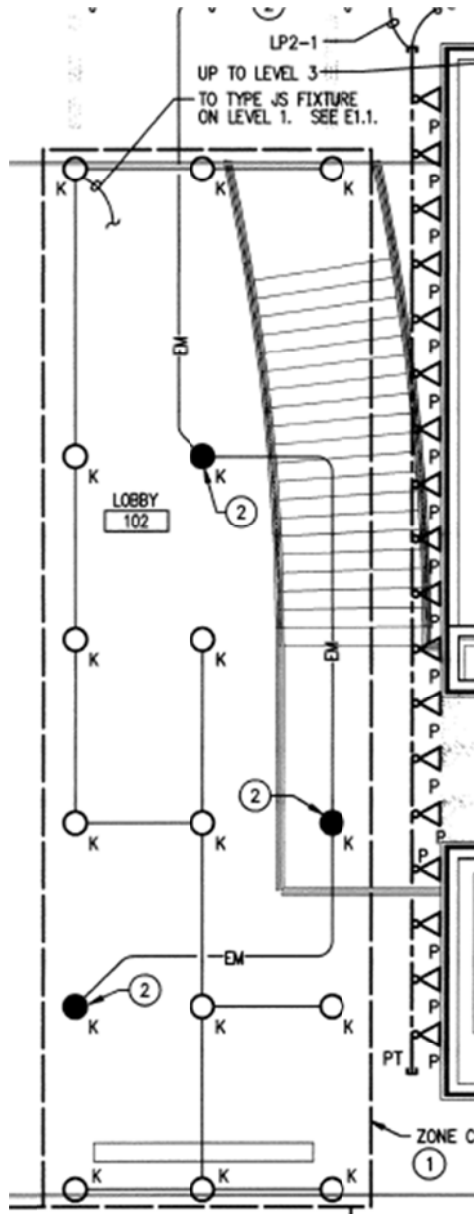


Figure 22: Second Floor Ceiling Lighting Plan

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Design Criteria

The Grand Stair is more than just an element to connect two floors. Because of its location, it becomes the primary focus of the building. From a classification standpoint, it must have elements of both a lobby and still be a safely lit stairway.

IESNA Categories: Lobby, Stairways and Corridors.

Very Important

1. Appearance of Space and Luminaires

Because the grand stair is a focal point of the building, it is important that the luminaires blend in with the architectural elements, especially the “cloud” ceiling.

2. Color Appearance (IESNA)

Texture is the key component of the grand stair. The stone and wood, while transitioning the building, need to be highlighted. The color of each texture should be enriched by the light, and rendered almost as if it was under daylight. CRI > 85.

3. Shadows (IESNA)

A primary safety concern for stairways, shadows should be reduced so that all stairs are visible. If a stair is in shadow, it can become a tripping point causing injury to building occupants.

4. ASHARE 90.1-2007 Power Density: 0.6 W/sq. ft.

Because of the LEED accreditation, it will be important not to exceed the ideal power density in order to apply for reduced energy loads.

Important

1. Direct Glare (IESNA)

Direct glare can be blinding and detrimental to those trying to traverse the stair. To handle this problem, luminaires should be hidden or at least lensed so that direct glare from the lamp is not created.

2. Light Distribution on Surfaces (IESNA)

Such as with shadows, a uniform light over the stair is important in traversing the stair so that no tread is missed. Evenly lit surfaces also reduce the chance at reflected glare.

3. Modeling of Faces and Objects (IESNA)

With the high volume of traffic through the lobby, it is important to note the personal interactions happening through the space. Stopping to have a conversation or to arrange a meeting, lighting will be needed to render faces well. Warm CCT, < 3500K, with a CRI of +85 will light space adequately.

4. Reflected Glare (IESNA)

Light reflecting off of the stair can be highly distracting and can lead to trouble traversing the stair. A diffuse lens can evenly distribute the light, solving the problem.

5. Horizontal Illuminance (IESNA)

- a. Stairway: 5 fc
- b. Lobby: 10 fc

6. Maintenance

Because of the great heights within this area of the building, long lamp life and protected, sealed luminaires will eliminate some factors of dirt and lumen depreciation.

Current Lighting Evaluation**Lighting Power Density**

Square Footage: 3585 sq. ft.

Allowable Watts: 2151 Watts

Used Watts: 1758 Watts

Net Difference: +18.3%

Discussion

The current lighting design works nicely with the lighting power density. From a visual perspective, the lighting is integrated with the “cloud” ceiling concept. The use of cylinders promotes point sources that spread light well from long distances. Several different CFL cylinders being used makes note of the changing ceiling conditions and locations. The wall is highlighted with a warm light to enrich the wood surface. While this scheme is minimal, it does achieve certain criteria set above. The cohesiveness of the design is very strong, but its highlight of the architectural elements will be the future focus of much work. There is room for improvement especially with highlighting the “cloud” ceiling and highlighting the texture of the stair.

HRL Suite – Large Open Work Space

Existing Conditions

Spatial Description:

The Housing and Residence Life (HRL) Suite, Room 335, can be found in the south end of the building on the third floor. Located towards the interior of the building, the space relies solely on electric lighting for illumination. The suite is an open office work space with typical cubicle partitions reaching a height of 5'-0". Though the space can be easily reconfigured, there are two distinct non-movable elements that will require certain attention. This is an independent work counter, figure 14, and the reception counter, figure 13. Typical painted walls, acoustical ceiling tile, and carpet are used to define the space. Wood is integrated into the cabinetry and the counters use a recycled glass and concrete to further extend the goal of the HRL department to be sustainable. The ceiling is mounted at a typical 10'-0" but drops to 9'-0" to help define the difference between the HRL Suite and the HRL corridor. While there is no real need to place boundary doors, this is an effective way to partition the large open space from the occasionally used desks in the HRL Corridor. Surrounding the suite are private offices for full time program directors and assistant directors. Each office has a small set of windows looking into the space.

Table 7: HRL Materials

Material	Location	Brand	Product Number	Reflectance
Carpet 5	Floor	Mannington	Deep Thoughts, "Imagine"	0.03
Wood 1	Cabinet	Eucalyptus Wood	Local Supplier	0.27
Counter	Counter Top	Icestone	Storm Cloud	0.34
Wall	Walls	Painted Gypsum (PT-3)	Sherwin Williams SW7537	0.63*
Cubicle	Cubicle Wall	Maharam	Seasons	0.32
Door	Wall	Algoma Hardwoods	Not Specified	0.56*
Ceiling 7	Ceiling	Armstrong	#3906	0.90
Soffit	Ceiling	Painted Gypsum (PT-4)	Sherwin Williams SW7566	0.88*

**Based on comparable color with available product data.*

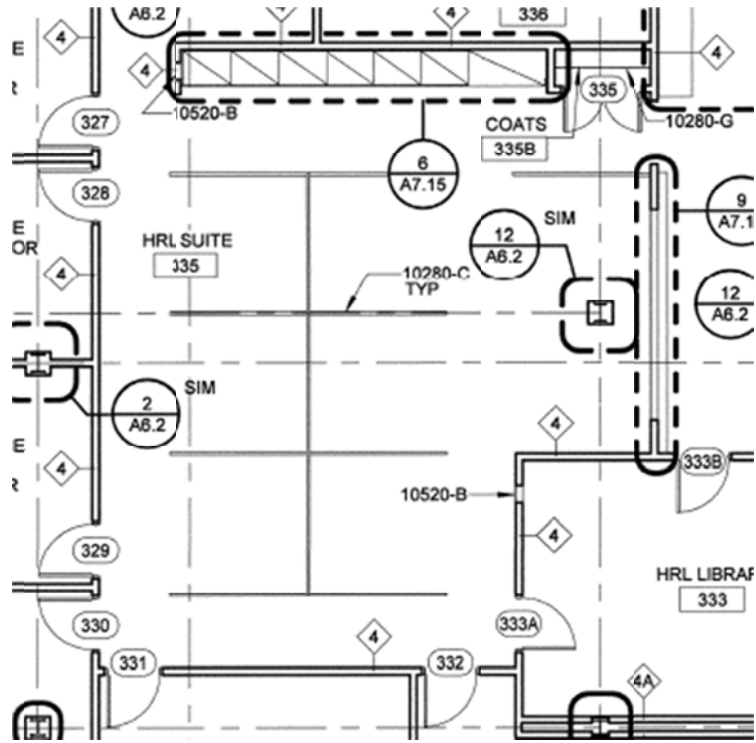


Figure 23: HRL Suite Floor Plan

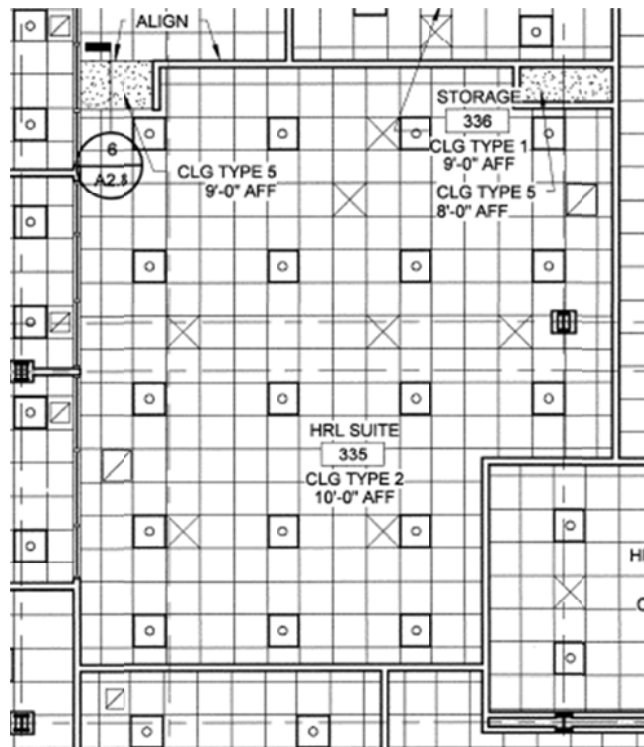


Figure 24: HRL Suite RCP

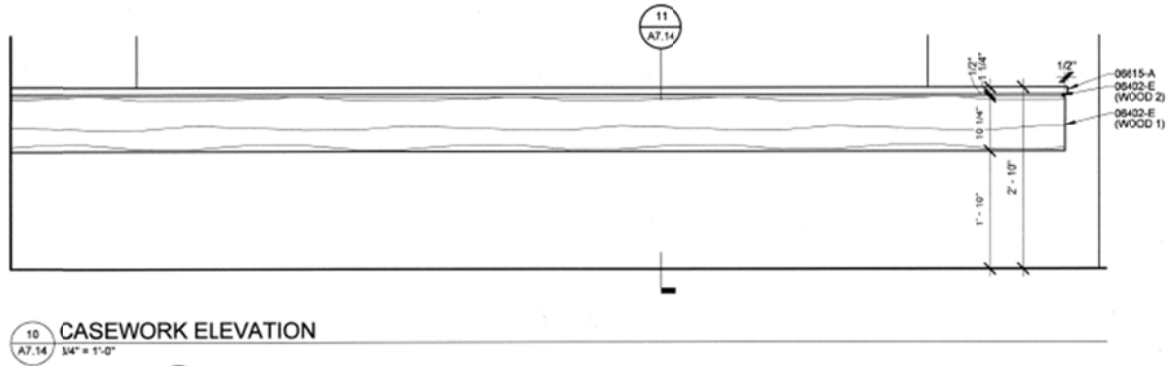


Figure 25: Reception Counter

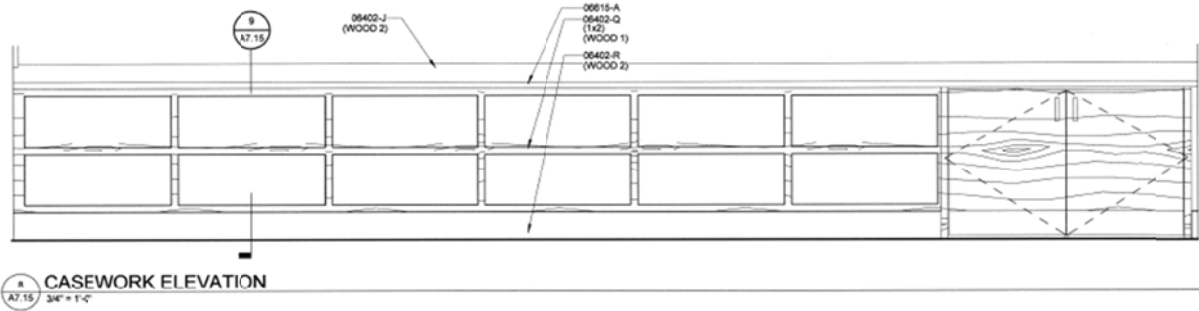


Figure 26: Work Counter Elevation

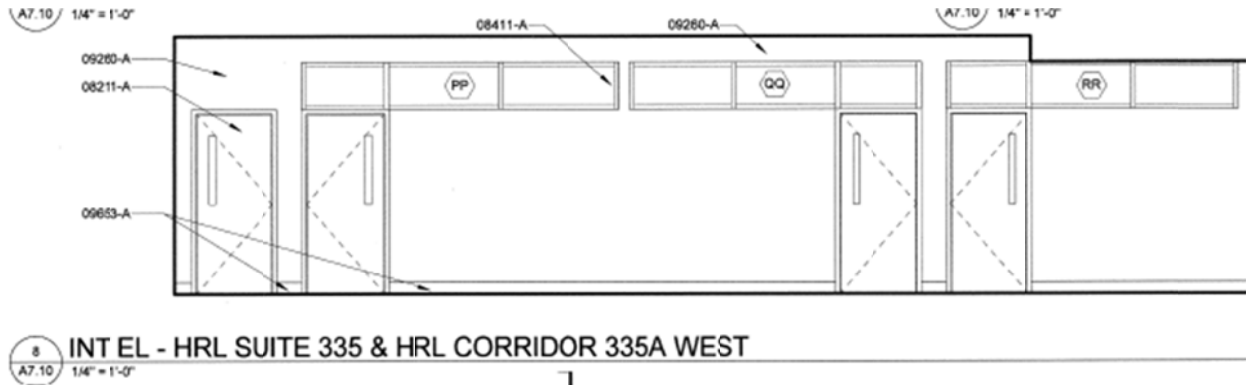


Figure 27: West Wall Elevation

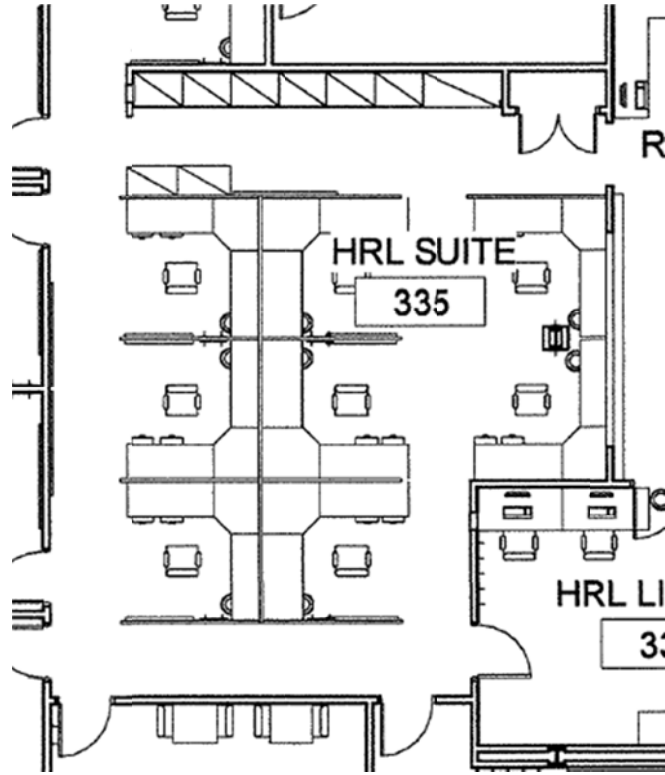


Figure 28: Furnishing Plan

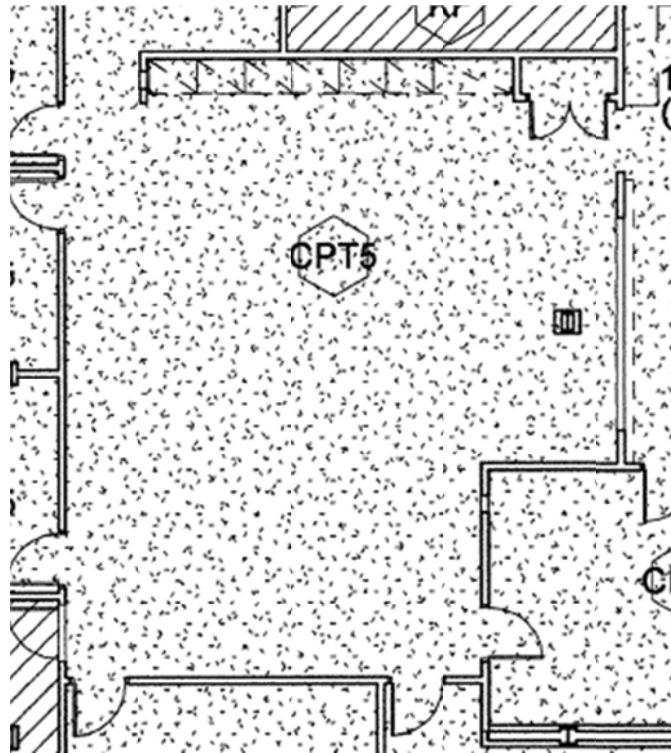


Figure 29: Finish Floor Plan

Lighting Design

The current lighting scheme utilizes one fixture, JA2, to illuminate the space. This general recessed luminaire allows for flexibility in the open office plan. All eighteen fixtures are controlled by standard lighting switches integrated with an occupancy sensor. The typical office space uses diffuse lenses to evenly distribute the light from 3 24W T5 lamps into the space.

Table 8: Lighting Fixture Schedule

Type	Count	Manufacturer	Code	Wattage	Lamp	Ballast
JA2	18	Ledalite	9722-D1-ST-F324-S-1-2-E	51 (2 lamps)	3-24W T5HO/835	Generic Ballast from Manufacturer

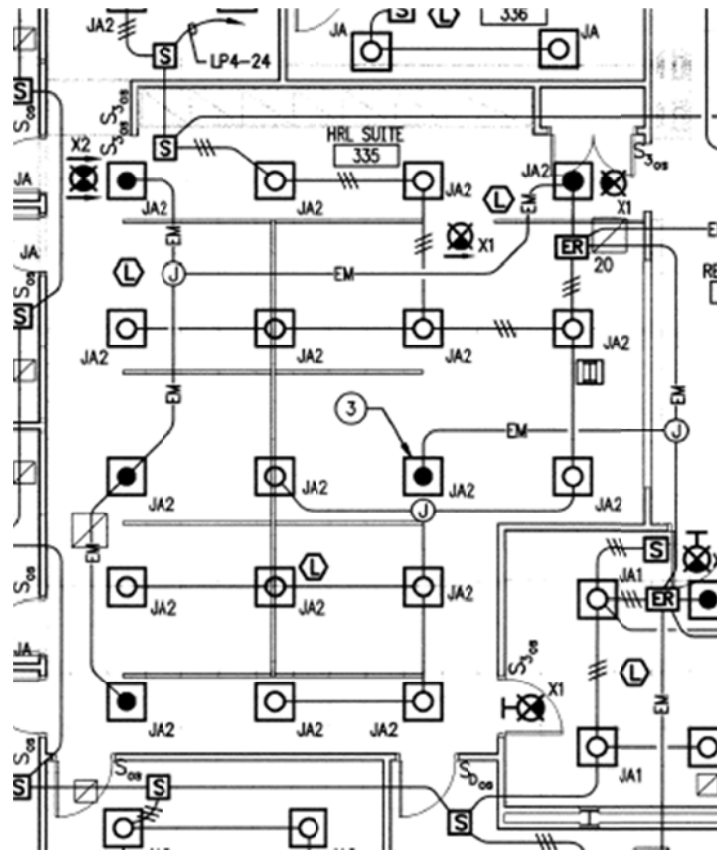


Figure 30: HRL Suite Lighting Plan

#

Design Criteria

The HRL Suite is situated at the interior of the building, and requires no daylight integration. The typical open office with intermittent computer use will be the primary space studied.

IESNA Categories: Open Office Plan, Intermittent VDT, Reading: 8-10 pt print, ball point pen

Very Important

1. Direct Glare (IESNA)

For most office workers, direct glare can be not only a problem but a great source of discomfort within the office. It is very hard to control the eventual design of the office open plan. Fixtures can be utilized that are lensed so that direct glare from the lamp is avoided.

2. Modeling of Faces or Objects (IESNA)

Working in any office, person to person contact is a high priority. Especially at the counter between the reception and suite, there is a great need for being able to accurately see the person one would come into contact with. Through lamps with high CRI and warm color temperature, a person can be rendered quite well. CRI > 85, CCT < 3500K.

3. Luminances of Room Surfaces (IESNA)

While most people look down to do work, they eventually need to look up. Having a variation of luminances can disrupt the eye and cause great discomfort. Surfaces need to be illuminated uniformly and kept within a 10:1 luminance ratio. For the task at hand, a 3:1 ratio is optimal.

4. Reflected Glare (IESNA)

Much like direct glare, reflected glare can be hard to control in an open office plan. Typically problems with reflected glare arise from the use of computer screens or VDTs. To reduce this, VDTs should be arranged in a manner that the luminaire does not reflect off of the screen.

5. Source/Task/Eye Geometry (IESNA)

More of a broad topic, source/task/eye geometry is covered through the luminance ratios and the ability to avoid glare when transitioning between tasks.

6. ASHARE 90.1-2007 Power Density: 1.1 W/sq. ft.

Because of the LEED accreditation, it will be important not to exceed the ideal power density in order to apply for reduced energy loads.

Important

1. Light Distribution on Surfaces (IESNA)

Because of the cubicle partitions, the light will not always fall evenly on surfaces. It is important to provide enough even spacing to reduce striations of light and dark within a cubicle. This can be achieved by using an indirect system, or a system that has a very wide spread photometric.

2. *Light Distribution on the Workplane -Uniformity (IESNA)*

Because of the cubicle partitions, the light will not always fall evenly on surfaces. It is important to provide enough even spacing to reduce striations of light and dark within a cubicle. This can be achieved by using an indirect system, or a system that has a very wide spread photometric.

3. *Shadows (IESNA)*

Depending on the geometry of the space, shadows can be created within each cubicle. The use of a very wide spread photometric or indirect system can evenly distribute light around geometric problems.

4. *Horizontal Illuminance (IESNA)*

- a. Open Office: 50 fc

5. *Vertical Illuminance (IESNA)*

- a. Open Office: 5 fc

6. *Psychological Impression*

Since there are no windows and the space is very confined, it is important that the lighting system works to create a sense of spaciousness and does not play to the idea of closure. Emphasis should be placed around the perimeter of the room rather than on the cubicles.

Current Lighting Evaluation

Lighting Power Density

Square Footage: 950 sq. ft.

Allowable Watts: 1045 Watts

Used Watts: 1377 Watts

Net Difference: -32%

Light Loss Factor

Ledelite 3 lamp, T5HO 24W

- Lamp Lumen Depreciation (LLD) = 0.92
- Luminaire Dirt Depreciation (LDD) = 0.93
 - Based on new Light Loss Factors presentation, Dr. Richard Mistrick
- Ballast Factor = 1.0
- Room Surface Dirt Depreciation = 0.93
 - Assumes 12 month, very clean environment
- Total = 0.796

Model Performance

Average Illuminance @ 2'-6" Workplane: 42.8 fc

For Isoline Diagram:

<i>Color</i>	<i>Illuminance (fc)</i>
<i>Black</i>	50
<i>Blue</i>	45
<i>Green</i>	40
<i>Aqua</i>	35
<i>Red</i>	30
<i>Pink</i>	25
<i>Navy</i>	20

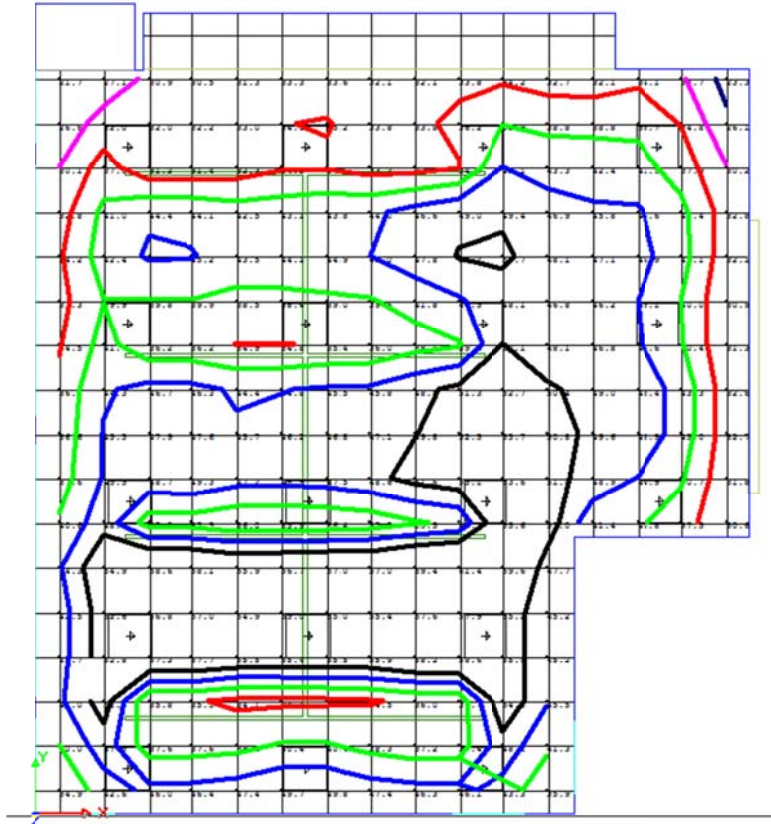


Figure 31: Isoline Illuminance Diagram

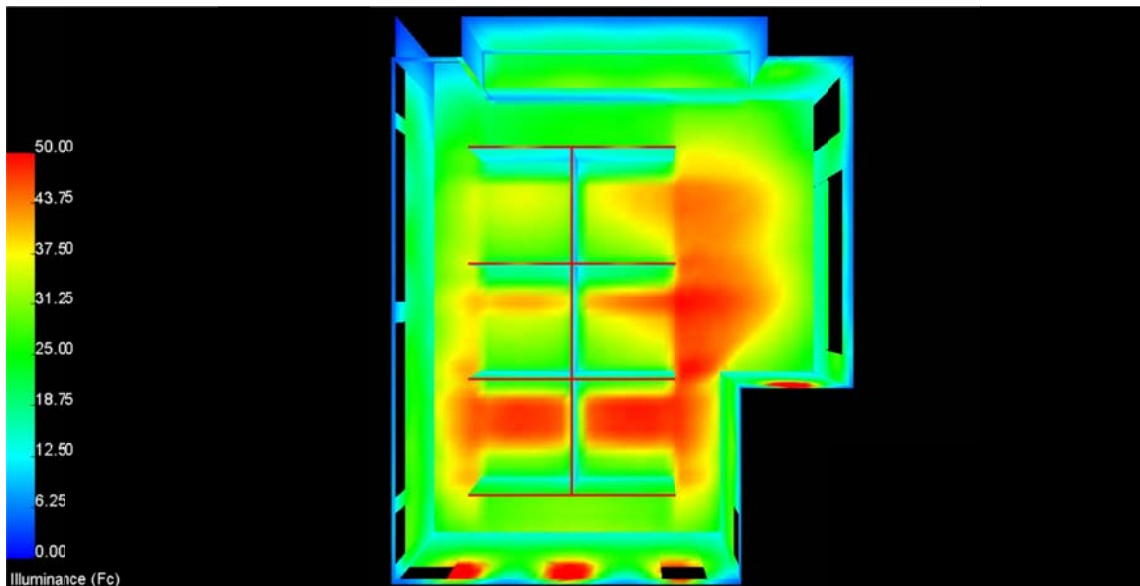


Figure 32: Pseudo Rendering of the Space

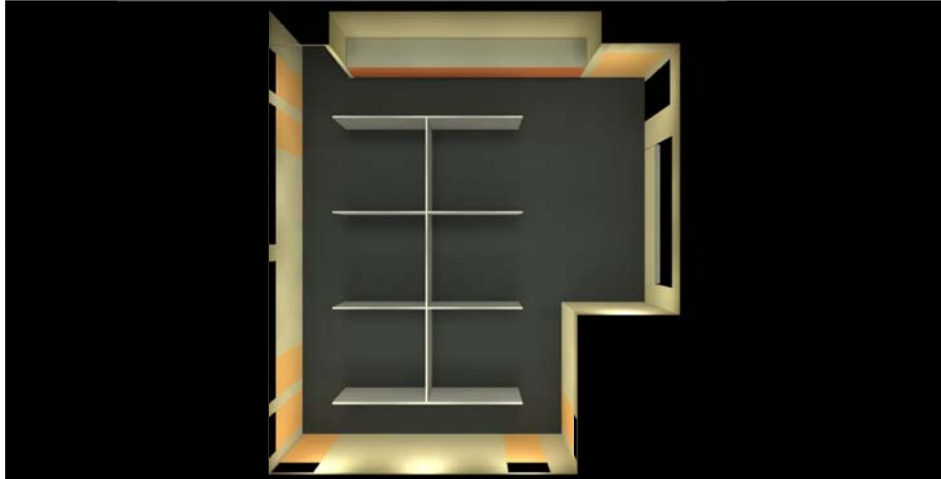


Figure 33: Rendering View From Above

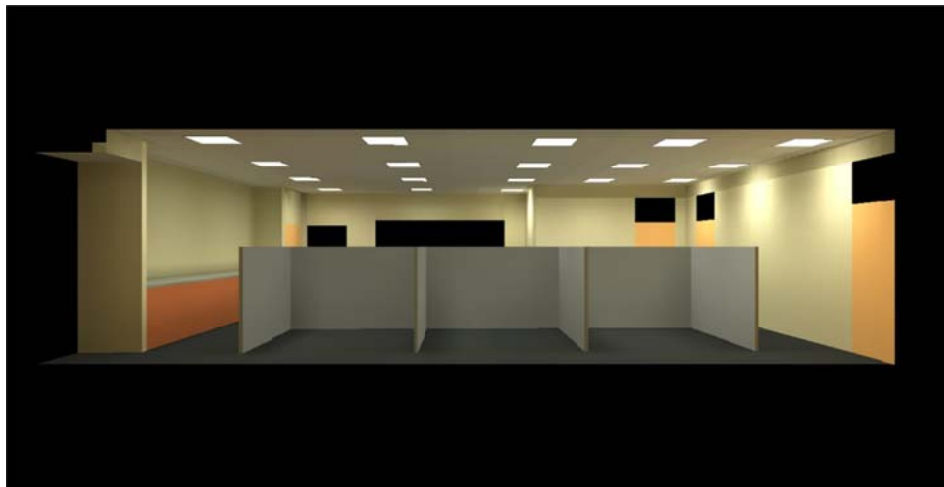


Figure 34: Rendering looking East within the space.



Figure 35: Perspective of the Space

Discussion

43 footcandles were determined to be distributed on the workplane. While this is close to the recommended 50 fc value, there are several aesthetic qualities that seem to be neglected. The shadows created by the cubicle walls are quite strong. One solution would be to center the luminaires over the cubicles. Because of the acoustical ceiling, as the space is rearranged, so can the lighting system generally. The counter space is generally neglected and with the lighting power density exceeding the allowed, the space should be redesigned to perform better, answering the design criteria.

Roof Garden – Outdoor Space

Existing Conditions

Spatial Description:

A common trend in new buildings is the use of green roofs. They have many benefits from drainage to reducing heat island effect. A new trend is to use these green spaces as spaces for the public to enjoy. Located on the third floor, the roof garden is a beautiful space for which any of the build occupants can enjoy. A path paved of stone runs through the garden leading to individual benches. While standing outside, the glass façade of the building shows a transparency of the building extending inward to outward. The glazing changes types from clear to frit to finally a translucent glass. Found on the east side of the building, the 40’ by 100’ space offers an interesting place to study while enjoying the outdoors. A parapet extends around the roof 3’-4”, helping to frame the space while still allowing for great views back towards the campus.

Table 9: Material Properties

Material	Location	Brand	Product Number	Reflectance
Grass	Roof Covering	Local Manufacturer	Local Supplier	0.14
Stone	Pathway	Noce Tavertine	Local Supplier	0.16
Brick	Parapet	Local Manufacturer	Local Supplier	0.22
Aluminum	Window Frame	Local Manufacturer	Local Supplier	0.60

Table 10: Glazing Properties

Glazing	Type	SHGC	Transmittance	Reflectance
GL-5	Frit	0.30	44%	22%



Figure 36: Rendering of Green Roof, Courtesy GWWO.

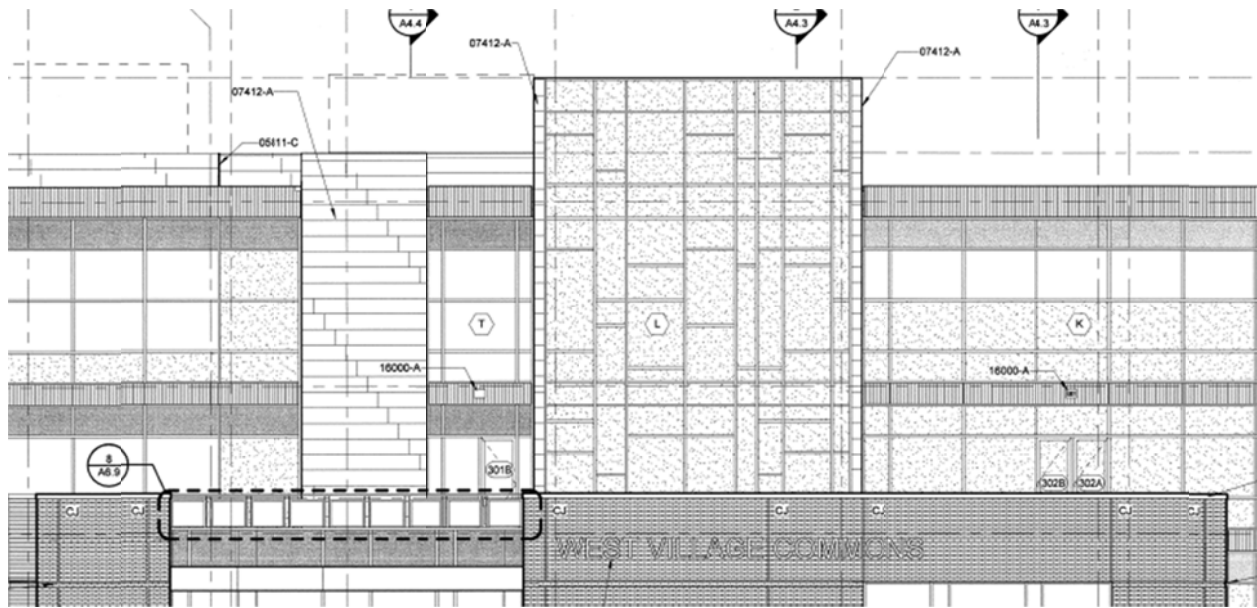


Figure 37: East Façade

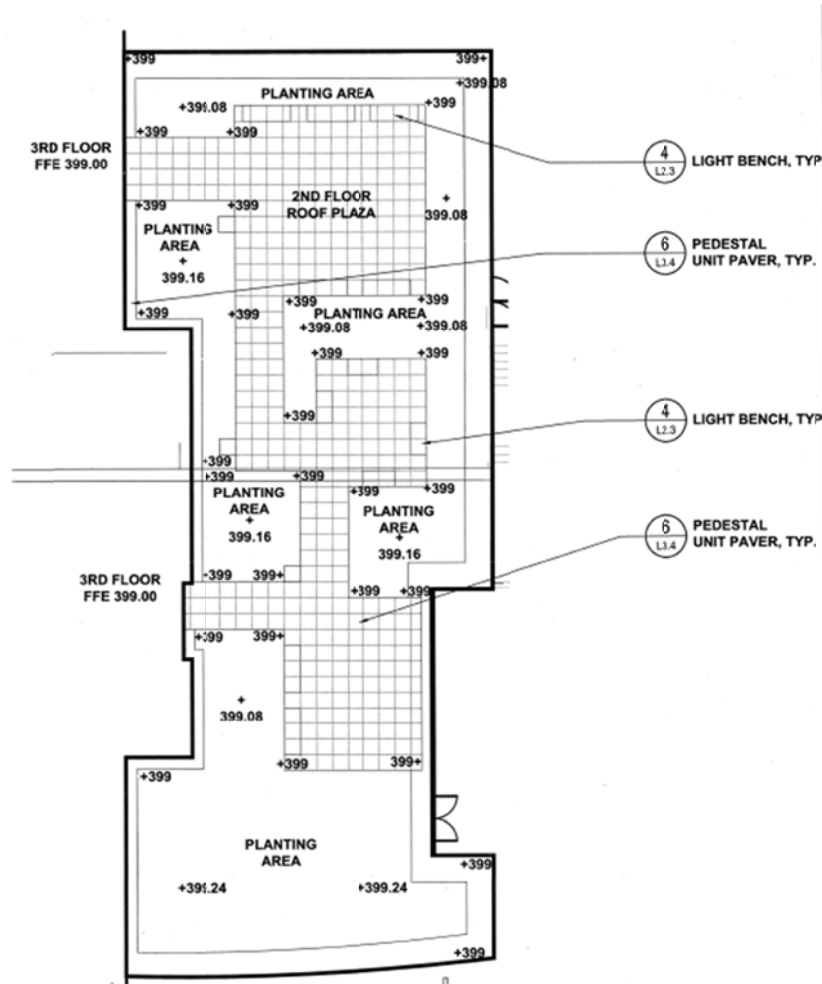


Figure 38: Hardscape Plan

Lighting Design

The existing lighting focuses on safety and enjoyment of the space. Through the use of under bench lighting, seating is highlighted in a rather dark space. Without any additional lighting, there is little light pollution for those trying to enjoy the scenery. Wall packs are included along the building for safety purposes. Through wiring to a lighting control panel board, the lighting for the roof garden is incorporated with the digital building control.

Table 11: Lighting Fixture Schedule

Type	Count	Manufacturer	Code	Wattage	Lamp	Ballast
BB	3	Gardco	946-C-42TRF-277-NP	42	F42PLT/841	Generic Ballast from Manufacturer
TT1	10	Winona	LED-VL2-18	21	Integrated	N/A
TT2	11	Winona	LED-VL2-36	42	Integrated	N/A

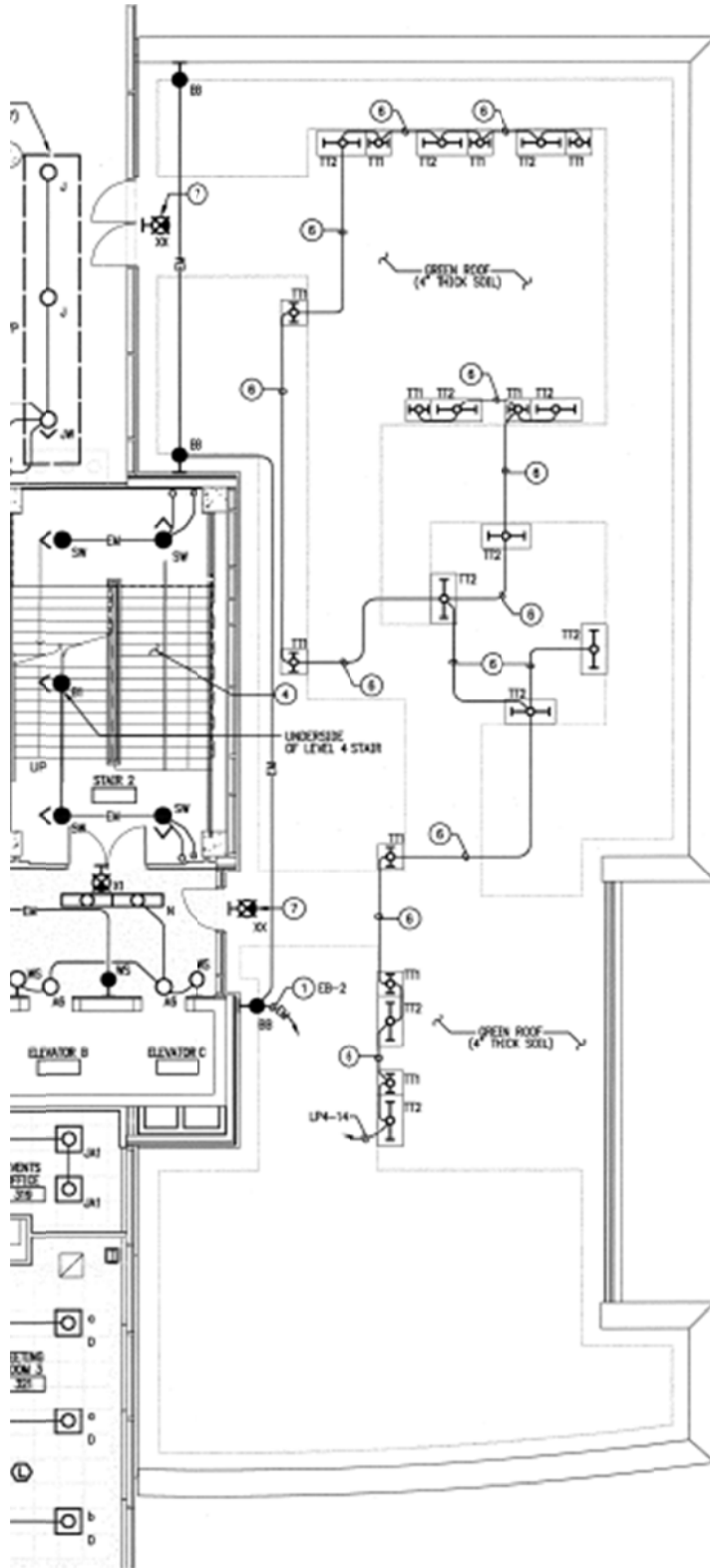


Figure 39: Garden Roof Lighting Plan

#

Design Criteria

The garden space on the roof of the second floor is designed as an outdoor enjoyable environment that promotes studying and relaxation.

IESNA Categories: Garden Terrace

Very Important

1. *Appearance of Space and Luminaires (IESNA)*

Carrying the title of signature space for the building, the roof garden will need to stand out in its appearance. Not only will the greenery, façade and pathways need to be maintained, the lighting should be integral to its appearance. Luminaires should not protrude awkwardly into the space. Each decision made should reflect the overall importance of the roof garden to both students and the university.

2. *Direct Glare (IESNA)*

Direct glare is uncomfortable in any indoor or outdoor environment. Because of the limited mounting capabilities, some uplight fixtures, if not aimed properly, cause glare that can be blinding. At the same time, no fixture should take away from the surrounding scenery and night sky.

3. *Light Distribution on Surfaces (IESNA)*

While uniformity is essential for indoor environments, lighting can accent the rough edge of nature or of the building. The brick around the perimeter, individual blades of grass and stone pathways all have unique textures which benefit and add character to the space when non-uniform lighting techniques are employed.

4. *Modeling of Faces or Objects (IESNA)*

As a gathering space, a person interacting is a primary focus of the lighting design. It is also important to render the entire outdoor scene well, so that memories of the space are vivid and memorable.

5. *ASHARE 90.1-2007 Power Density: 0.2 W/sq. ft.*

Because of the LEED accreditation, it will be important not to exceed the ideal power density in order to apply for reduced energy loads.

Important

1. *Color Appearance and Contrast (IESNA)*

Distinguishing between colors takes precedence in an outdoor space. Being able to highlight both the red within brick and the green within a grass can make for dramatic scenes. A high CRI, CRI > 85 will need to be used to have accurate color clarity. If LEDs are used, it will be important to note the performance of the LED when rendering red. CCT can vary especially when trying to achieve a certain color effect between the lighting and the surface.

2. *Light Pollution/Trespass (IESNA)*

As a LEED accredited space, light pollution must be reduced, if not eliminated. Some reflected light will escape into the sky, but all luminaires will need to be of full cutoff, or at least directed so no light is directly escaping into the sky.

3. Point(s) of Interest (IESNA)

As a focal point of the university, highlighted elements should be carefully chosen. Not only can this be seen from within the space, but also through the glass façade. The entire garden roof must serve as a point of interest.

4. Shadows (IESNA)

Primarily a safety concern, shadows must be reduced on the pathway so that no one trips over any loose or rough pavers. Shadows can also be used to add dramatic effect to the scene and intertwine with some of the unique outdoor textures.

5. Surface Characteristics (IESNA)

As noted above in several instances, the textures of outdoor surfaces can create unique environments. It will be important to study various techniques and decide how to accurately highlight each texture and how it will be exposed to artificial light.

6. Maintenance (IESNA)

While the luminaires may not be hard to access, the luminaires will need to handle weather conditions, ranging from heavy rain to heavy snow. Luminaires will need to be sealed along with having easy access to replace burnt out lamps.

7. Horizontal Illuminance (IESNA)

- a. Terrace: 5 fc

8. Vertical Illuminance (IESNA)

- a. Terrace: 3 fc

Current Lighting Evaluation

Lighting Power Density

Square Footage: 4221 sq. ft.

Allowable Watts: 845 Watts

Used Watts: 798 Watts

Net Difference: +5%

Discussion

While there is a reduction in lighting power density, the current lighting design only highlights the seating areas. The outdoor space is left rather blank and does not highlight any of the unique textures. The emergency wall packs will only light during emergencies. While the space is tied into the building control system, the lack of variation in lighting design detracts from the importance of the space.

Study Lounge – Specialty Space

Existing Conditions

Spatial Description:

Located on the third floor, the study lounge overlooks the Village Quad. Whether being able to enjoy the views of the quad or focus on work at hand, students have a multi-level lounge to enjoy their time inside. The multi-level space replicates the grand stair found downstairs along with several of the textures. The brick and wood combined with the clear northern glass ties the indoor and outdoor environment while being covered by the “cloud” ceiling. To the east and west translucent and fritted glass help to control morning and late day sun. The study lounge works to provide a grand and open environment for students to come and enjoy the space. Through the third floor corridor, the garden roof can be quickly accessed. With the glass, high ceilings, and easy transition to the outdoors, this space is one of the most open and transitional spaces within the building.

Table 12: Study Lounge Materials

Material	Location	Brand	Product Number	Reflectance
Stone	Floor	Noce Tavertine	Local Supplier	0.16
Carpet 4	Floor	Mannington	Deep Thoughts, “Formulate”	0.03
Wood 1	Walls	Eucalyptus Wood	Local Supplier	0.27
Wall 4	Walls	Painted Gypsum (PT-3)	Sherwin Williams SW7537	0.63*
Ceiling 7	Ceiling	Armstrong	#3906	0.90
Exposed Ceiling	Ceiling	Paint (PT-2)	Sherwin Williams SW7076	0.88

Table 13: Glazing Properties

Glazing	Type	SHGC	Transmittance	Reflectance
Railing	Clear	N/A	84%	8%
GL-3	Clear	0.38	70%	11%
GL-4	Translucent	0.37	60%	12%
GL-5	Frit	0.30	44%	22%

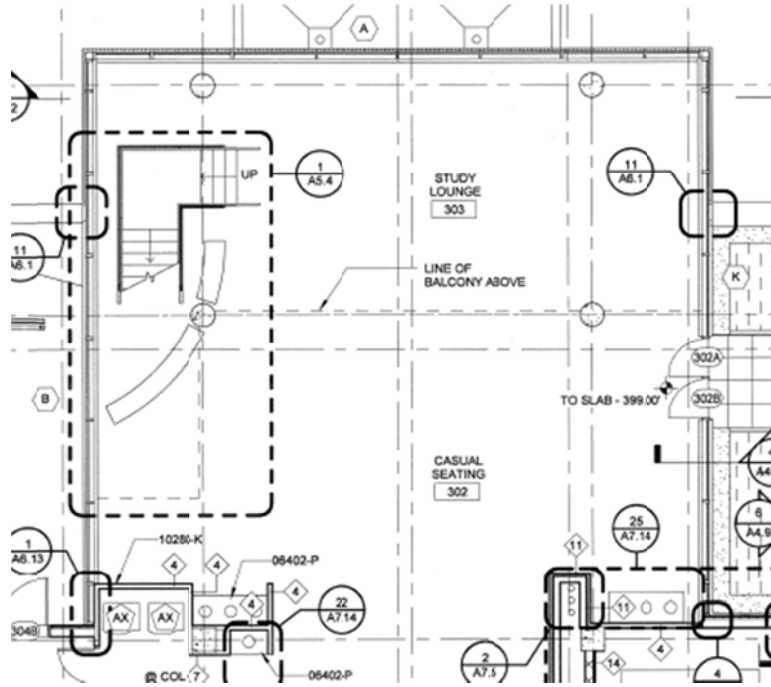


Figure 40: Third Floor Plan

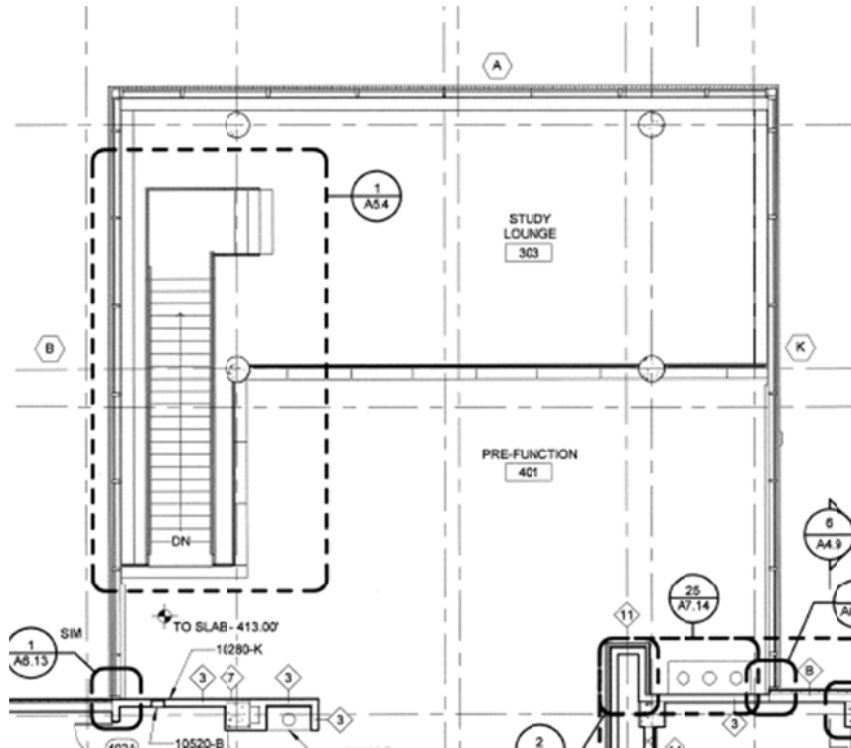


Figure 41: Fourth Floor Plan

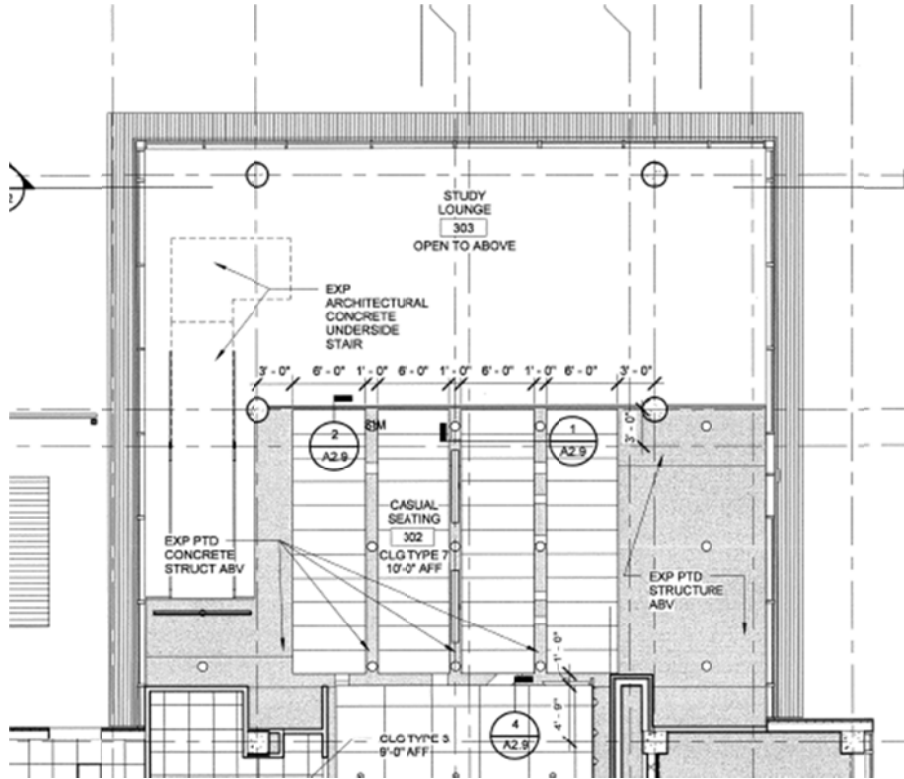


Figure 42: RCP Third Floor

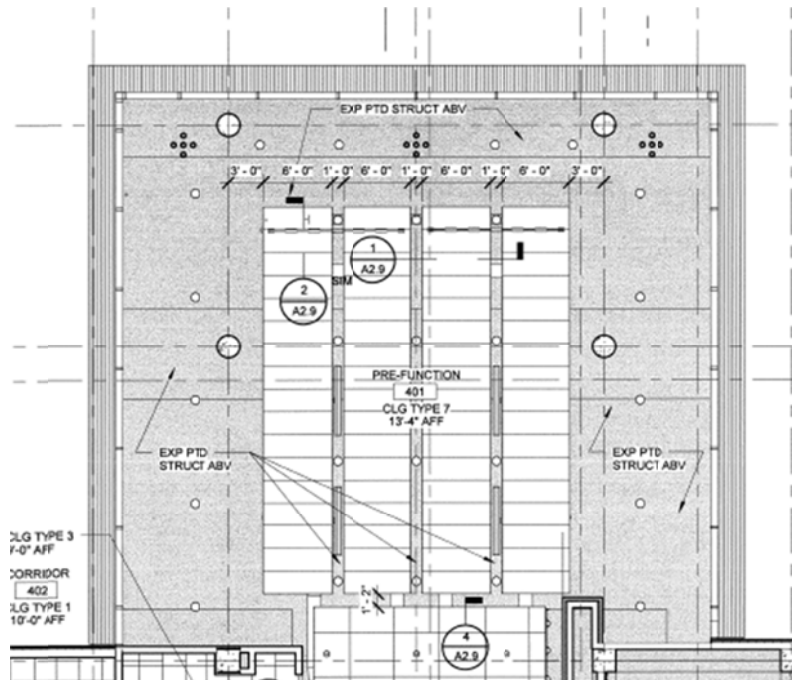


Figure 43: RCP Fourth Floor



Figure 44: Rendering Courtesy of GWWO.

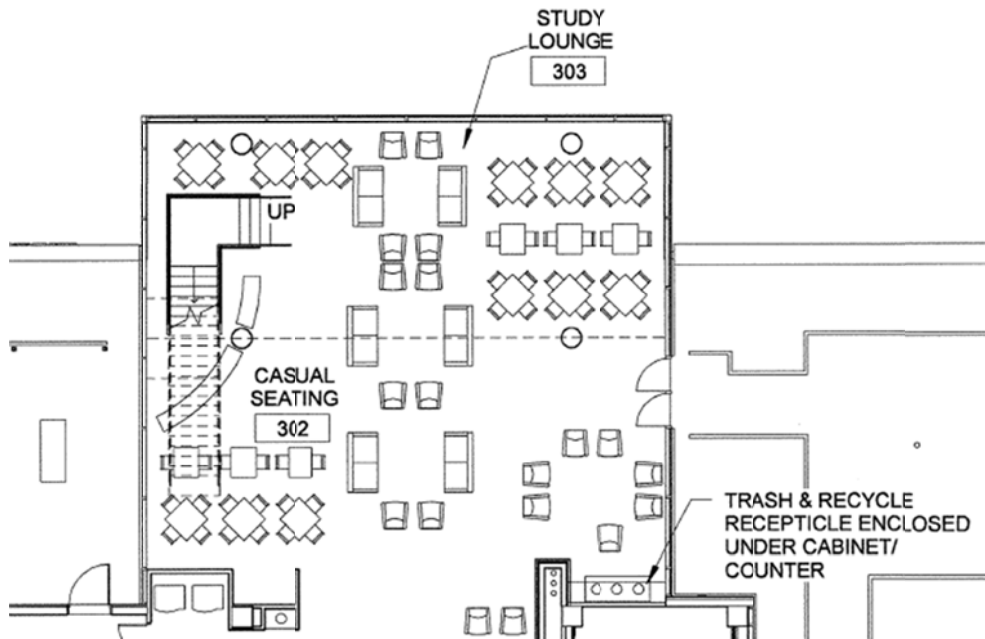


Figure 45: Furniture Plan Third Floor

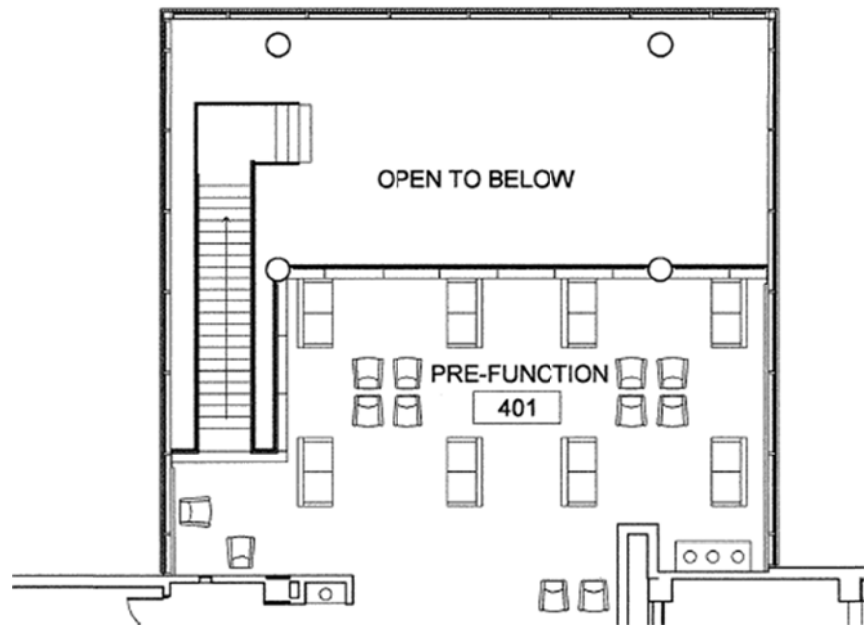


Figure 46: Furniture Plan Fourth Floor

Lighting Design

The current lighting design uses the same fixtures found above the grand stair. Hanging between the “clouds,” cylindrical CFL downlights provide most of the ambient light. To add some decoration to the space, pendants were added in the corners of the lounge to create an attractive element inside and outside of the building. Another additional element added to the space is the blue wall washers. Primarily for a night time scene, the wash is meant to cover the glazing, creating a unique visual scene. Daylighting is controlled through the various glass types and adjustable roller shades. The lighting controls are once again tied into the building digital control system through the designated lighting panelboards.

Table 14: Lighting Schedule

Type	Count	Manufacturer	Code	Wattage	Lamp	Ballast
C2	6	Pinnacle	EX44-WO-1T5-12-AC-277-1C-CC-SR	37	F28T5/835	Generic Ballast from Manufacturer
DLS	2	Selux	M10-1T5-MP-F-8-BK-277	37	F28T5/835	Generic Ballast from Manufacturer
DP1	15	ALM	LWM-RGB-24	23	Integrated	N/A
J	9	Gotham	CFV9-32TRT-8AR-LD-277-GE10-DGC	32	F32PLT/835	Generic Ballast from Manufacturer
JW	3	Omega	OM8-1-H-32-SC-CSSFF-BK-277	32	F32PLT/835	Generic Ballast from Manufacturer
K	21	Kurt Versen	P913-SC-277-CUSTOM COLOR	32	F32PLT/835	Generic Ballast from Manufacturer

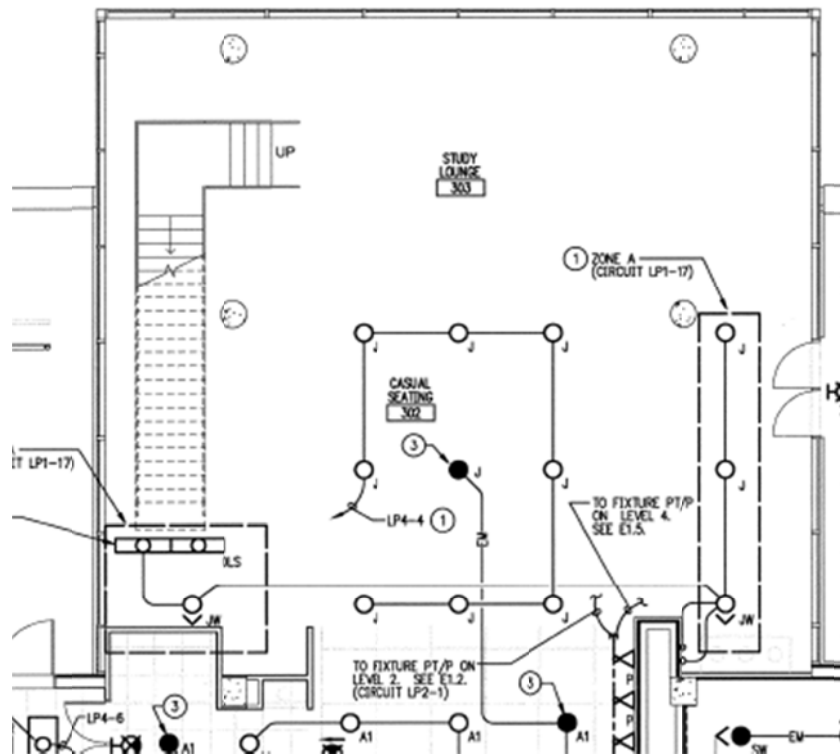


Figure 47: Lighting Plan Third Floor

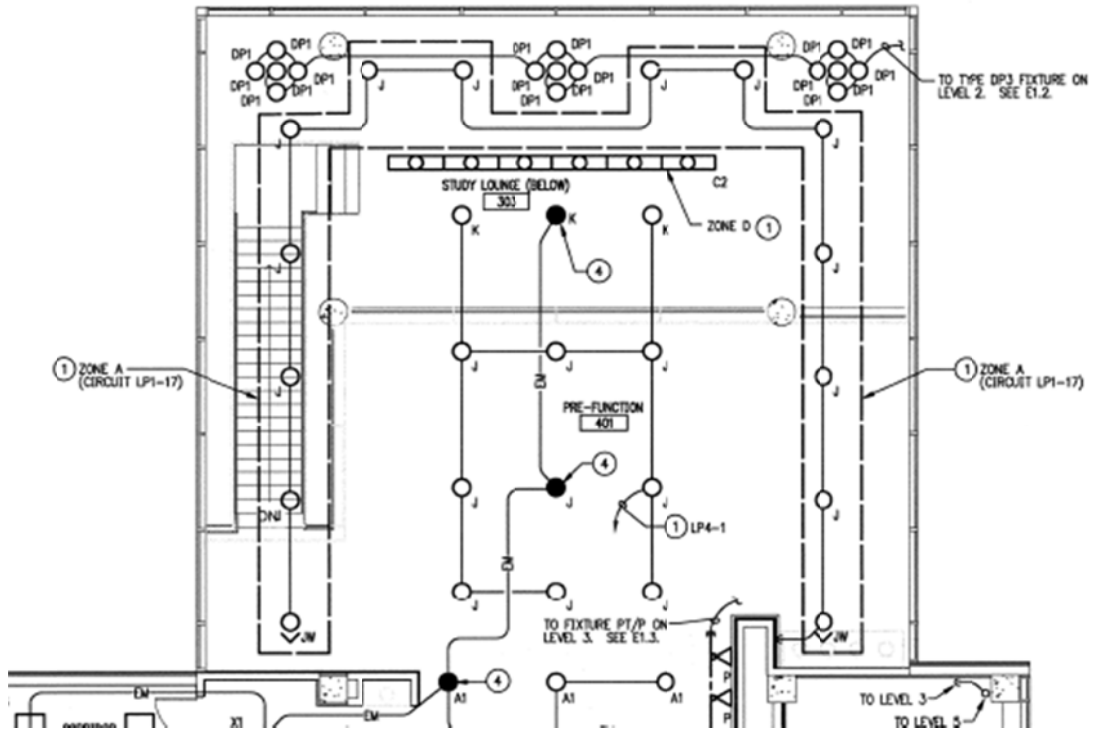


Figure 48: Lighting Plan Fourth Floor

Design Criteria

Unlike several of the other spaces, the study lounge is classified by the IESNA by its reading tasks. For a typical college student, textbooks, laptops and notes are the typical tasks at hand.

IESNA Categories: Reading: VDT Screens, 8-10 pt print, ball point pen

Very Important

1. Reflected Glare (IESNA)

Typically problems with reflected glare arise from the use of computer screens or VDTs. To reduce this, VDTs should be arranged in a manner that the luminaire does not reflect off of the screen. Though furniture movement is easiest, lighting should use diffuse lenses along matte finishes on room textures to control reflected glare.

2. Direct Glare (IESNA)

The study lounge is a large open space. VDT screens are very specular and will reflect the direct glare. Lighting mounted high above should not be a problem unless targeted at a fixed location. Fixtures can be utilized that are lensed so that direct glare from the lamp is avoided.

3. Psychological Effect

Students will want to be relaxed in an open and spacious environment. With the glazing, the lighting should highlight the transparency to the outside. This will allow for a student to relax and harmonize with nature.

4. Daylighting Integration and Control (IESNA)

Due to the large amount of glazing surrounding the lounge, sun penetration can cause glare and other visual discomforts. Being able to control the daylight through shades and various types of glazing, promotes the space being used continuously throughout the day.

5. Appearance of Space and Luminaires (IESNA)

Being a premiere space within the building, the lighting should add to the detail and splendor of the space. It is important not to let the luminaires dominate the space unless for decorative purposes.

6. Modeling of Faces or Objects (IESNA)

As a gathering space, a person interacting is a primary focus of the lighting design. Groups will use the study lounge to meet and interaction between group members should be under the highest quality light. CCT < 3500K and CRI >85

7. ASHARE 90.1-2007 Power Density: 2.2 W/sq. ft.

Because of the LEED accreditation, it will be important not to exceed the ideal power density in order to apply for reduced energy loads. 1.2 watts is the recommended requirements of an educational building. A study lounge is not specified in the space by space method.

8. Vertical Illuminance (IESNA)

- a. VDT Use: 3 fc

Important

1. **Source/Task/Eye Geometry**

Constantly changing luminances puts a strain on the eye. Depending on the geometry between the eye and the source, reading can become quite difficult. With high mounted lighting, this should not be a problem within the space. Luminaires should not generally come into view, allowing for an easily maintained luminance ration of 3:1.

2. **Horizontal Illuminance (IESNA)**

- a. Print and Pen: 30 fc
- b. VDT Use: 3 fc

Current Lighting Evaluation

Lighting Power Density

Square Footage: 2500 sq. ft

Allowable Watts: 5500 Watts

Used Watts: 1697 Watts

Net Difference: +69%

Discussion

Probably the most visually interesting space in the building, the lighting system invites students into the space and promotes using the space at all times. From the exterior view created to the relaxed, natural feel created inside, the space takes on a life of its own while being one of the most energy efficient spaces within the building. Because of its decorative nature, the study lounge has an added power allowance, but this is not need. With a power density of 1.2, the space will still save energy even with the decorative fixtures.