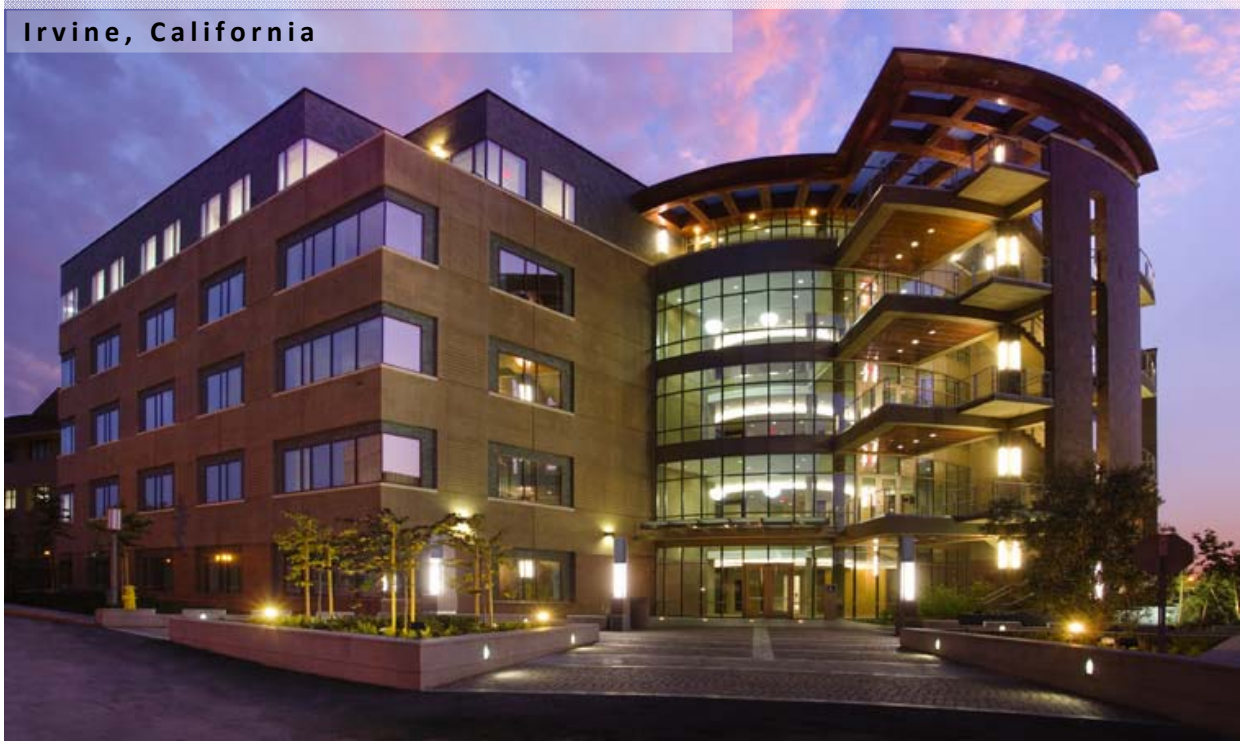
UCI: Natural Sciences Unit 2

Irvine, California



Tech Report 1: Lighting Existing Conditions + Design Criteria

September 29, 2008

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Lighting/Electrical Option
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[electronic files can be found in T:\TECH1]

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executive summary

The primary focus of this report is to analyze and document the existing lighting systems in the building, and how well they perform in relation to the most critical design criteria for each space. UCI Natural Sciences Unit 2 is a 146,000 square foot project which includes laboratories and offices for scientific research and education. The four spaces discussed here are; a large open office space, one of the building's main conference rooms, the double-height entry lobby and atrium space, and the front façade of the building with its adjacent plaza.

The open office space is lit entirely by 2' by 4' fluorescent luminaires. Control in this room consists of individually switching each of four zones of fixtures. A sharp drop off in light near the west wall prevents workspaces from functioning effectively there. Large northerly windows are a focus of the room, but nighttime and daytime factors must be considered due to the probably extensive use of the office after business hours.

The conference room's direct access to the lobby and the outdoor patio make this room an ideal opportunity to make an impression. Although the lighting system in the room is sufficient technically, it is cluttered and may be unnecessary. A simple, attractive design in important. The variety of events which can take place in the conference room demands ease of control as well as flexibility and elegance.

A partial-atrium lobby space connects the first and second floors. The life of the building, expressed through movement of students and professors through each of the lobbies. These areas are also unique in that they are easily visible through the large front curtain wall, particularly at night. Because of this, views from both inside and from outside the building are critical. Clarity of circulation paths is important as well.

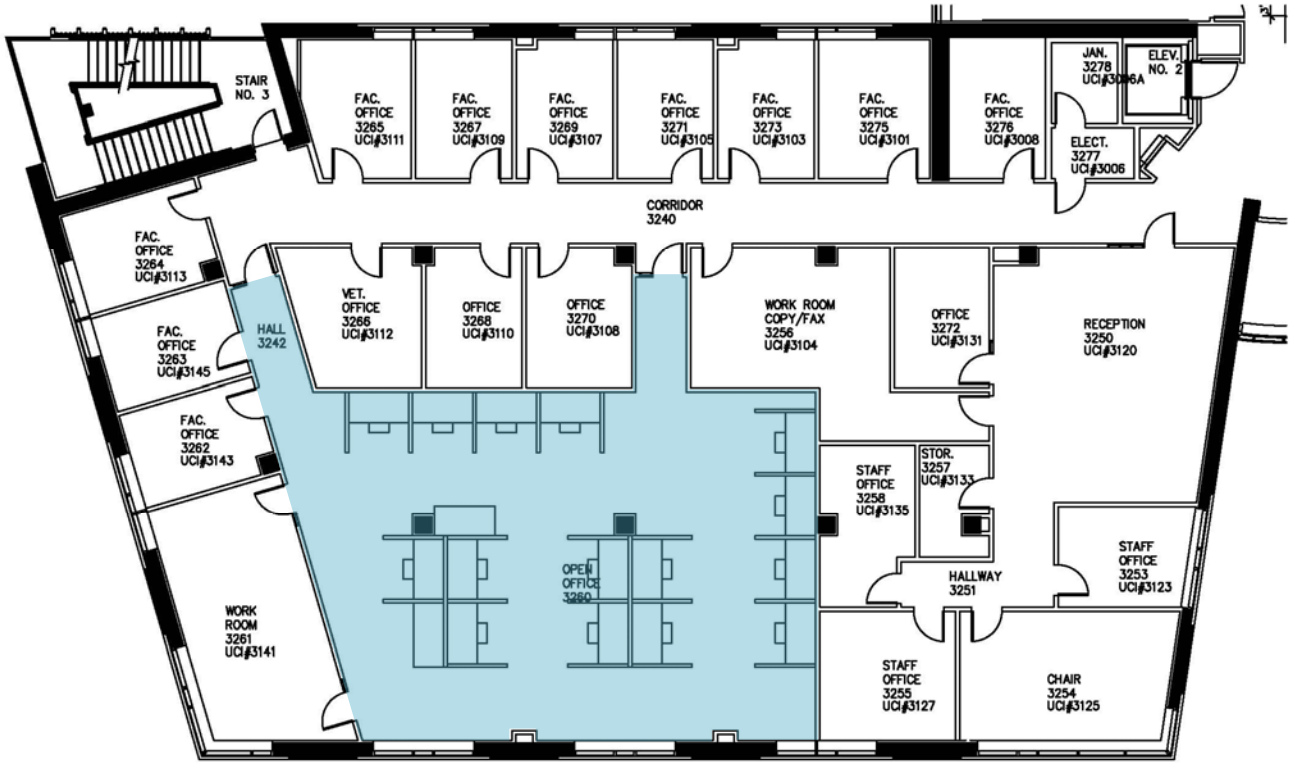
The building façade and plaza are very tied to the lobby space in that they are both in direct view of the other. The plaza acts as a gathering space for its sector of campus, and the lighting should promote this activity and invite visitors to congregate. In its existing condition, the trees and shrubs in the plaza can be easily overlooked, giving the façade a dull cold feel at times. Color temperature and placement issues are the most prevalent.

Overall, UCI Natural Sciences Unit 2 comes off as a building with a great deal of potential, but also as a scientific and utilitarian building. Relatively minor changes in the design could really bring new life to the building in order to make it more memorable as a whole. Natural lighting is readily available in several spaces, and its utilization is important to the building as a whole. Science and technology should be apparent as a design concept without creating the impression of coldness or monotony. The ability of the students and faculty inside to perform their duties is a paramount responsibility.

open office, 3rd floor

Overview

The open office on the third floor of the building measures 1,840 square feet. It is used by faculty and graduate students of the Biological Sciences department at UCI. The space features two large windows facing to the north-east. It is adjacent to two work rooms and several private faculty offices and is accessed through short corridors on the south wall. For this report, a furniture layout for has been estimated until the true existing layout of the room can be determined.



Partial 3rd Floor Plan

Room Finishes

Floor:

Material:	Carpet
Manufacturer:	Designweave
Color:	Medium Brown
Reflectance:	0.20

Walls:

Material:	Painted Gypsum
Manufacturer:	Frazee (Paint)
Color:	8704D “Stratford Brown”
Reflectance:	0.45

Ceiling:

Material:	Acoustic Ceiling Tile - 2’ x 2’ Suspended Grid
Manufacturer:	Mars
Color:	White
Reflectance:	0.89

Doors:

Material:	Wood - White Maple
Reflectance:	0.60

Glazing:

Material:	Heat Mirror 66 – Clear
Transmittance:	0.56
Shading Coefficient:	0.44

Desks:

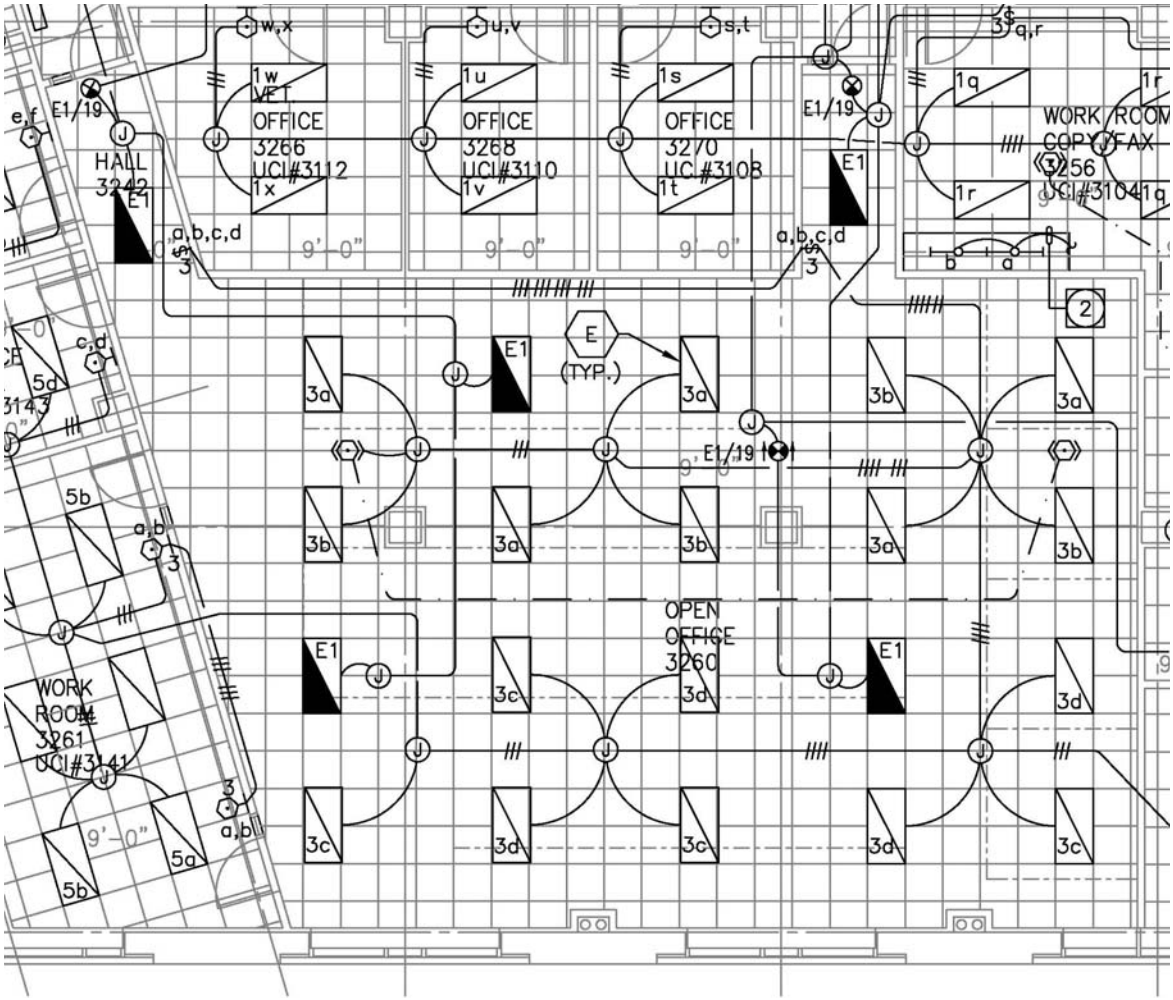
Material:	Wood - White Maple
Reflectance:	0.60

Existing Lighting and Controls

Aside from natural daylighting, the office is lit entirely by recessed 2ft x 4ft fluorescent luminaires. Twenty fixtures arranged in a grid pattern over the desk area provide general illumination in the space. Another fixture is located in each of the two short entry corridors on the south wall. The lighting is controlled via simple three-way on/off switching with panels located near each entry. The space is divided into four zones of alternating luminaires which are switched separately ("a, b, c, d" in the RCP below). Five equally spaced fixtures are connected to the emergency power system.

Daylighting Elements

Two large, northeast-facing windows allow natural daylight into the space. A smaller third window is located in the corner of the space. The larger openings measure 10'-0" wide, and the smaller opening measures 3'-10" wide—all 6'-4" in height. Manually operated louver-blade blinds are incorporated into all windows.



Partial 3rd Floor Lighting Plan, N↓

Luminaire Schedule

Type	Manuf.	Catalog #	Lamp(s)	Watts	Ballast	Volts	Mounting	Description
E	Focal Point	FLU-24B-2-T5HO-S-277V- ST-RLP-EQ-WH	(2) 54W T5HO 4100K	120	Electronic-Program Start	277	Ceiling Recessed	2' x 4' recessed indirect, perforated center basket

Light Loss Factors

Type	BF	RSDD	LLD	LDD	Total LLF	Notes
E	1.00	0.97	0.93	0.88	**0.79**	Category IV, Clean, 12 Month Cycle, RCR=2.7

Major Design Considerations (Based on IESNA Recommendations)

Appearance of Space and Luminaires:

The open office space should be conducive to individual study as well as collaboration. A bright, clean, modern feel fits the style of the architecture. This room serves as the main workspace for a relatively large number of people, and is likely to be visited by students and faculty on a regular basis. It is important that the office appears productive and organized.

Psychological Impressions:

Since the space is shared by several users, any feelings of overcrowding should be avoided. A light, spacious, and transparent impression is desired. Natural lighting can be used to connect the occupants to their environment while reducing any feelings of captivity.

Glare:

Direct solar glare through the windows is a minor concern due to their northerly orientation. However, glare from luminaires on VDTs is a major consideration. Extreme variances in ceiling or wall luminance should be avoided. Also, since the furniture in the office is moveable and likely to be reconfigured at some point, a consistently acceptable lighting condition is required from any point in the room. A more advanced evaluation of the daylight conditions may be required to assess the best type of shading devices for this space.

Light Distribution on Task Plane:

Sufficient and uniform illuminance of the work plane is a very important consideration. Paper-based and computer-based tasks are both common in the space. Multiple sources of light should be used to create an ambient light and to reduce shadows. Individual task lighting can provide the occupants to manually adjust their workspaces depending on the task at hand.

Facial Rendering:

Because a considerable amount of collaboration and casual meetings are likely to take place in the space, vertical illuminance and good ambient light conditions are desired.

Points of Interest:

The large windows on the north wall provide scenic views of campus, and should be treated as the main focal points of the room. Circulation paths will be heavily travelled and should be visually clear.

Control/Daylight Integration:

Although some flexibility of control is desired in the space, it has only one prevalent mode of use. The space is likely to be used at least 8 hours per day on weekdays, with intermittent use on weekends. Thus, the most important feature of the control system is simplicity. An occupancy sensor system should be organized in such a way that it will maintain illumination whenever there are people working, even if they are not moving about the space. A daylight-based dimming or switching system may be practical for luminaires near the window.

Illuminance:

Horizontal – 30fc

Vertical – 5fc

Code Requirements:

ASHRAE 90.1, Total Building – 1.2 W/ ft^2

ASHRAE 90.1, Space – 1.1 W/ft^2

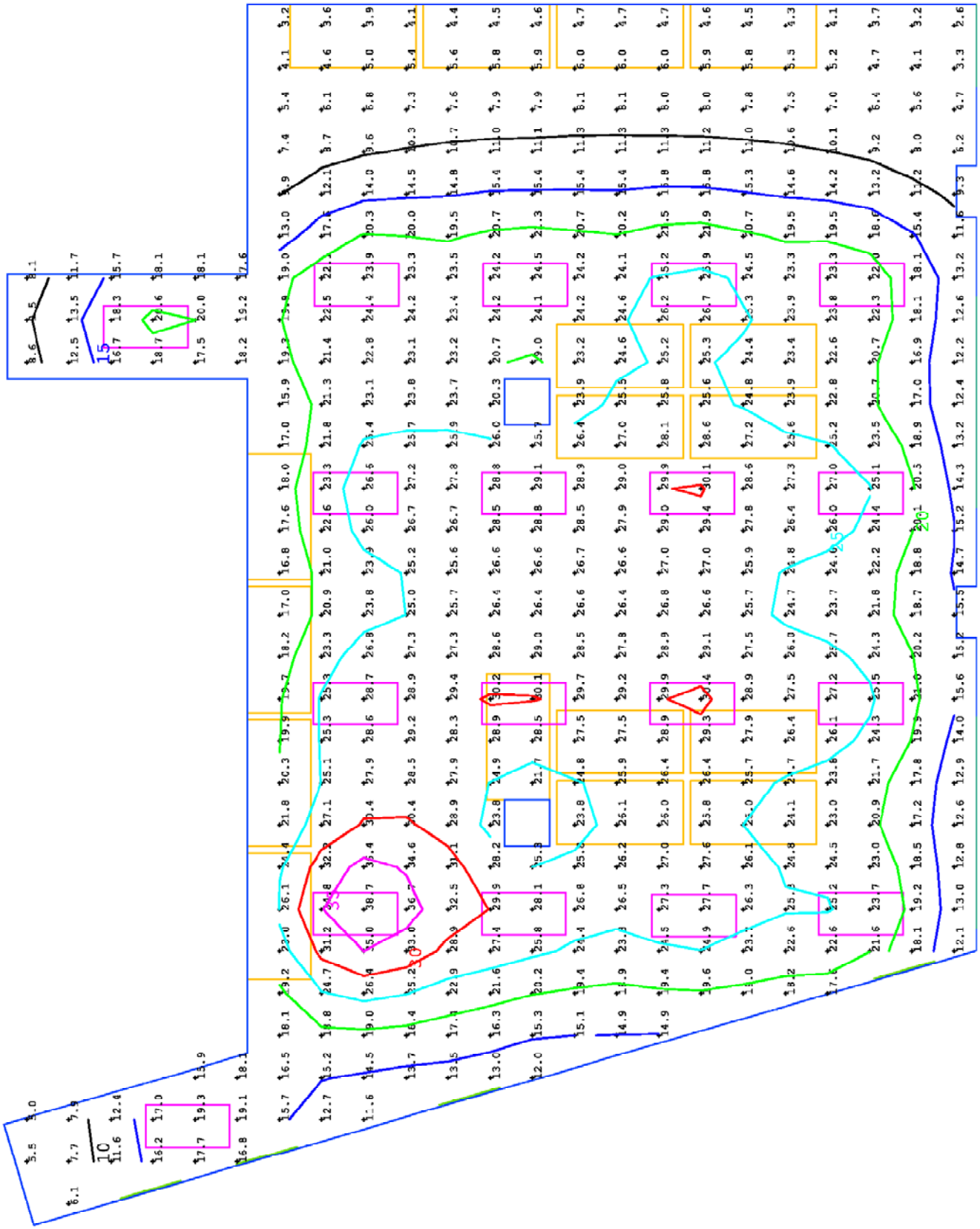
California Title 24 – Occupant sensor required; maximum shutoff time: 30 minutes

Analysis: Open Office, 3rd Floor

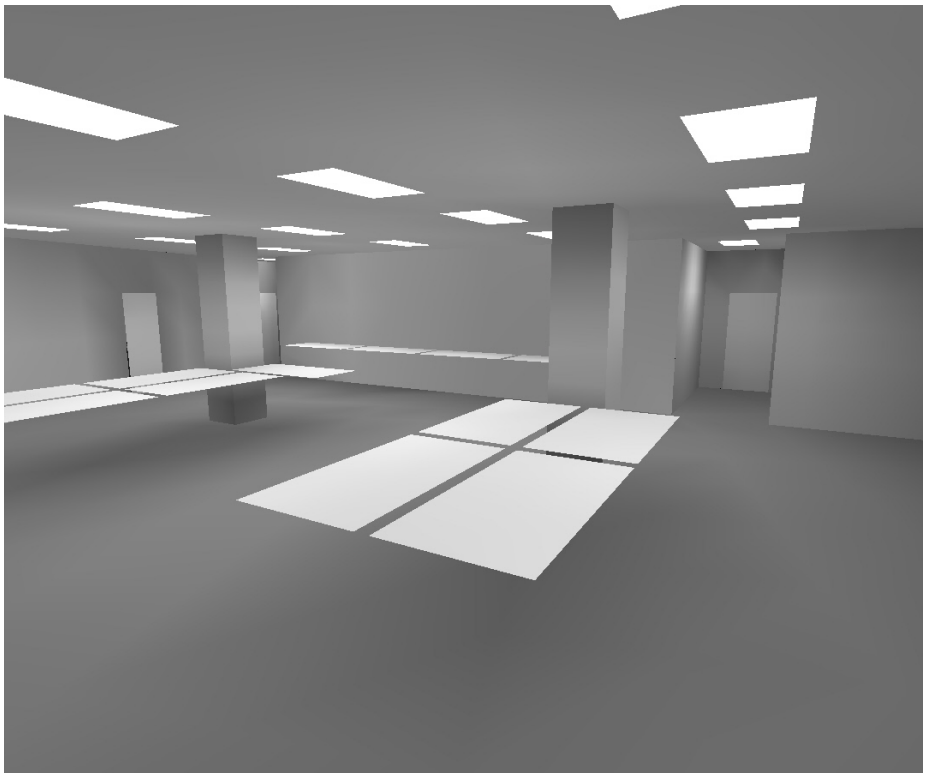
After modeling the third floor office space in AGI with calculated reflectances and light loss factors, I found that the horizontal illuminance on the work plane falls well below the criteria of 30 fc. Most of the work area is almost acceptable in the range of 25-30 fc. However, the row of desks on the west wall is very dark, with all illuminances below 10 fc. This may simply be evidence that the space was not designed for paper-based tasks in that area, but the issue will be addressed in my proposed modifications.

The distribution of light throughout the space is acceptable in the center of the room, but a sharp drop off occurs near the west wall due to a lack of fixtures in that area. With the introduction of daylight, illuminance values should increase during the day, possibly offering acceptable illuminance for all desks which are located near the window. Other values look to be acceptable in this case. The following figures show information on the model and results of the calculation.

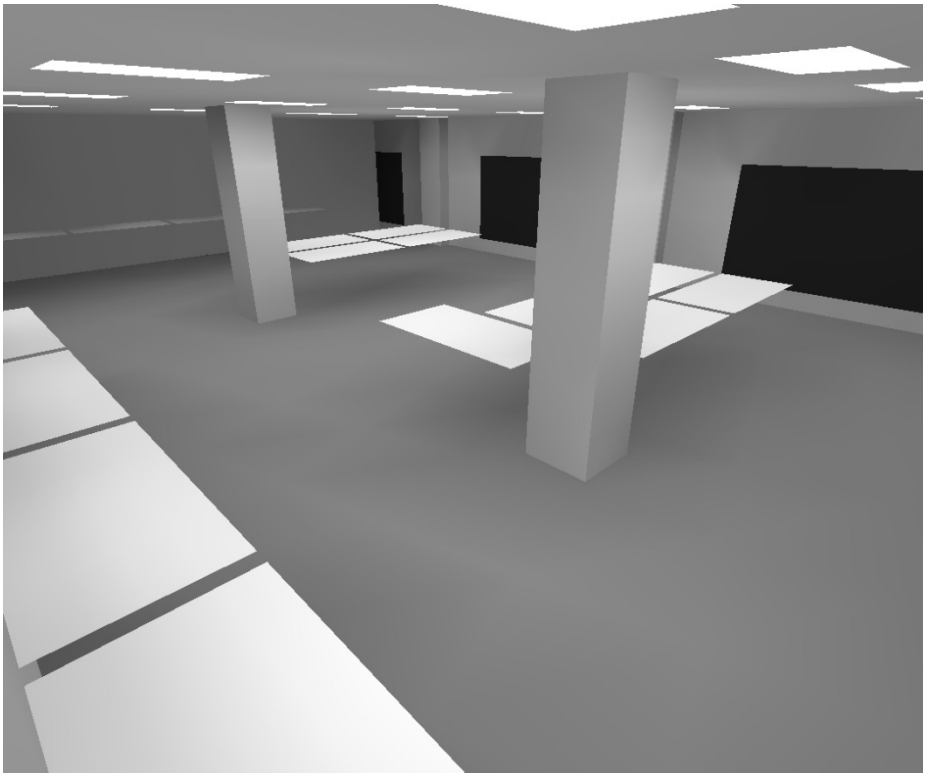
Illuminance (fc), Open Office:
Average = 20.02
Maximum = 38.7
Minimum = 2.6
Avg / Min = 7.70
Max / Min = 14.88
Coeff. of Variance = 0.32



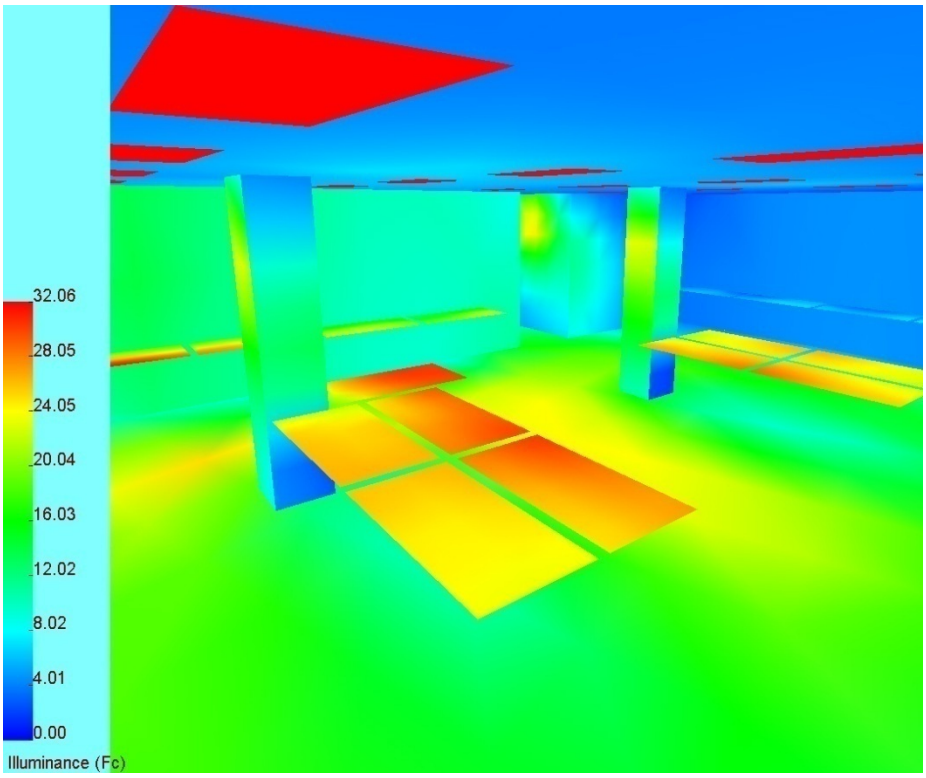
Open Office Photometric Results, N→



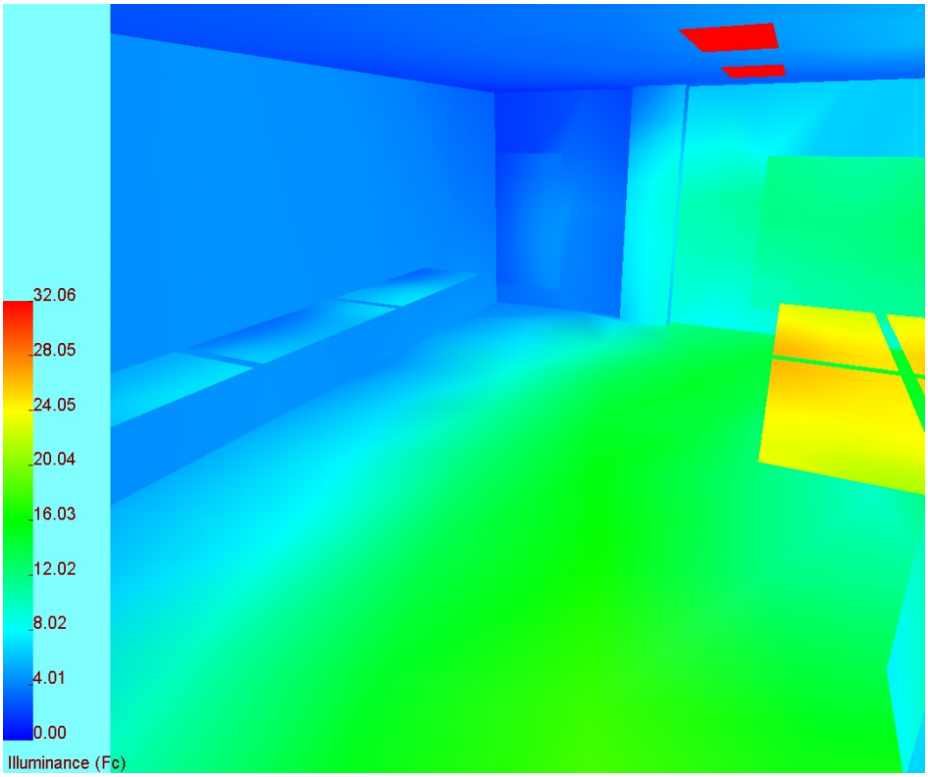
AGI Model from the North



AGI Model from the South



Illuminance Pseudocolor, Central Desks

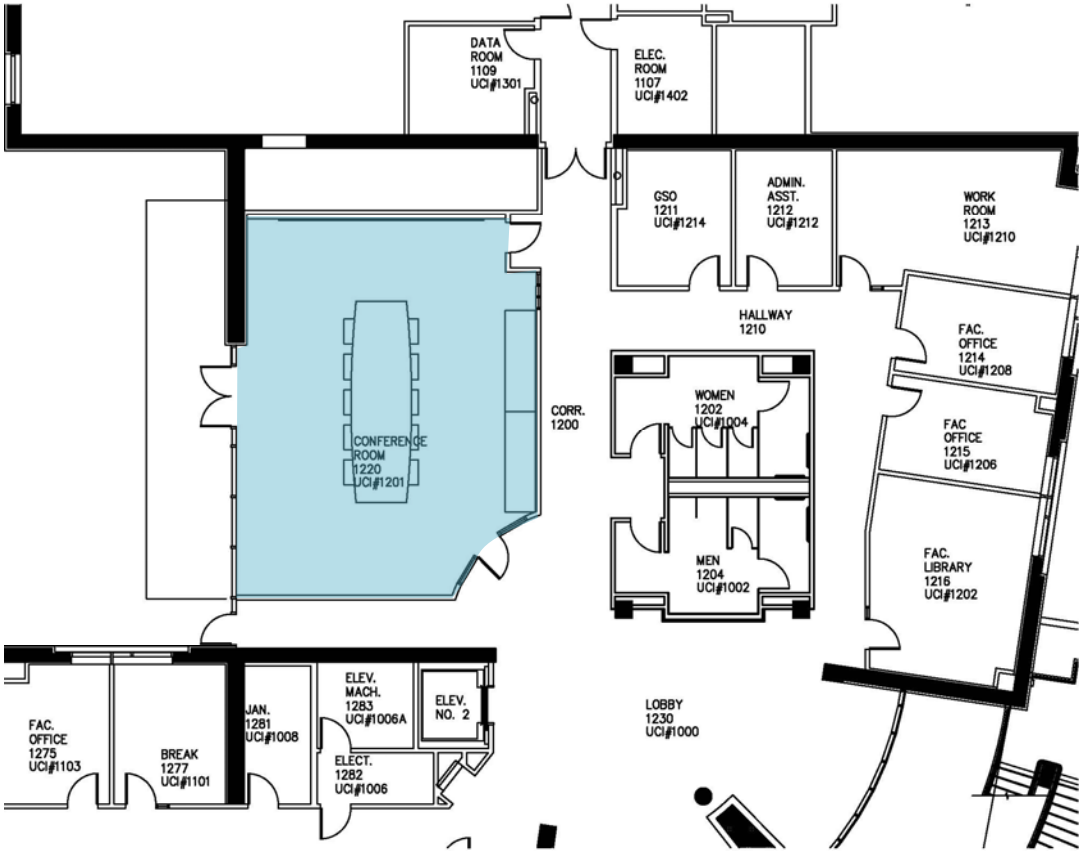


Illuminance Pseudocolor, West Wall Desks

main conference room, 1st floor

Overview

This 1,140 square foot conference room is located on the first floor. It can be accessed directly from the entry lobby between the two wings of the building. Windows and doors on the east side of the room open to an outdoor patio space. On the south wall, a whiteboard is framed by a white maple wall. A motorized projection screen can be lowered for multimedia presentations. Its central location and patio access make this space one of the most visible in the building. Again, assumptions have been made regarding the furniture layout and details in this room.



Partial 1st Floor Plan

View from Northwest Corner

Exterior Patio Adjacent to Conference Room

Room Finishes

Floor:

Material:	Carpet
Manufacturer:	Designweave
Color:	Medium Brown
Reflectance:	0.20

Walls:

Material:	Painted Gypsum
Manufacturer:	Frazee (Paint)
Color:	501 “Shell White”
Reflectance:	0.80

Whiteboard Wall:

Material:	Wood - White Maple
Reflectance:	0.60

Ceiling (Upper):

Material:	Acoustic Ceiling Tile - 2’ x 2’ Suspended Grid
Manufacturer:	Mars
Color:	White
Reflectance:	0.89

Ceiling (Lower):

Material:	Painted Gypsum
Manufacturer:	Frazee (Paint)
Color:	501 “Shell White”
Reflectance:	0.65

Doors (Interior):

Material:	Wood - White Maple
Reflectance:	0.60

Glazing (Exterior):

Material:	Heat Mirror 66 – Clear
Transmittance:	0.56
Shading Coefficient:	0.44

Glazing (Interior):

Material:	Translucent Tempered Glass
Transmittance:	0.40

Tables:

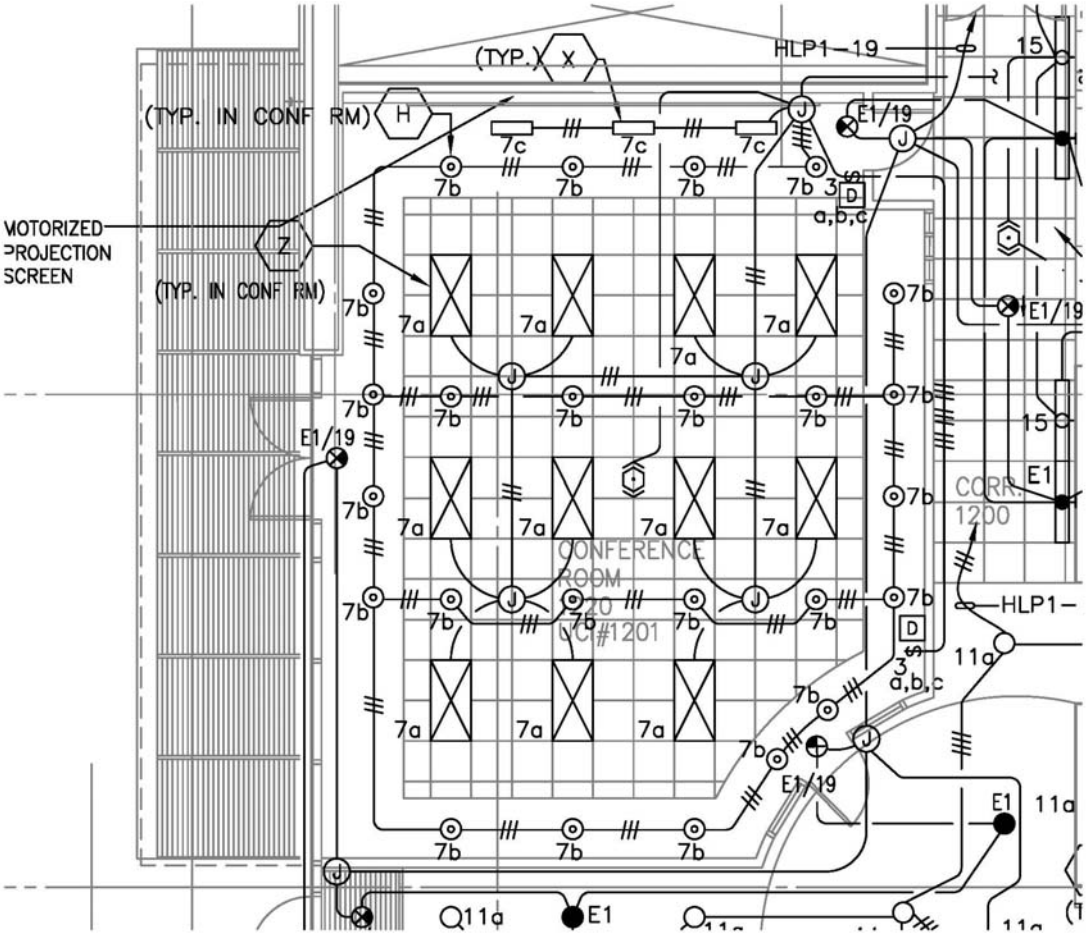
Material:	Wood - White Maple
Reflectance:	0.60

Existing Lighting and Controls

Eleven evenly distributed, recessed, 2-lamp, indirect, 2ft by 4ft fluorescent fixtures provide ambient light from the ceiling. In addition, circular 32W compact fluorescent downlights run around the perimeter of the room and between the rows of 2ft by 4ft luminaires. Finally, three 40W compact fluorescent wall washers illuminate the whiteboard. All specifications call for a dimming ballast to be installed. Luminaires are zoned by type, and a dimmer control interface is located at each of the two interior entries. The automatic projection screen is controlled separately from the lighting by a switch to the left of the whiteboard.

Daylighting Elements

Approximately 25 feet of southeast-facing glazing line the exterior wall of the space. Full height windows and a glass panel door make up this section of the façade, offering a view of the patio space beyond. A 7ft exterior trellis above the windows may provide some solar shading. Automatic roller blinds are installed on the windows, and are controlled through the lighting dimming panel. The shades are a medium grey color and are specified to have an openness factor of 5%.



Partial 1st Floor Lighting Plan, N↓

Luminaire Schedule

Type	Manuf.	Catalog #	Lamp(s)	Watts	Ballast	Volts	Mounting	Description
H	Omega	OM61H32PLT-CSS-DMX10-120/277	(1) 32W CFL 4100K	36	Electronic-Dimming	277	Ceiling Recessed	6" recessed downlight, clear semi-spec. reflector, dimming ballast
X	Omega	OM241H40BX-11-CSFF-277	(1) 40W Biax CFL 4100K	40	Electronic-Dimming	277	Ceiling Recessed	2' recessed wall-washer, dimming ballast
Z	Focal Point	FLU-24B-2-T5-D-277V- ST-PS-EQ-WH	(2) 28W T5 4100K	59	Electronic-Dimming	277	Ceiling Recessed	2' x 4' recessed indirect, dimming ballast

Light Loss Factors

Type	BF	RSDD	LLD	LDD	Total LLF	Notes
H	1.00	0.98	0.90	0.88	**0.78**	Category IV, Clean, 12 Month Cycle, RCR=2.7
X	1.00	0.97	0.90	0.88	**0.77**	Category IV, Clean, 12 Month Cycle, RCR=3.0
Z	1.00	0.97	0.90	0.88	**0.77**	Category IV, Clean, 12 Month Cycle, RCR=3.0

Major Design Considerations (Based on IESNA Recommendations)

Appearance of Space and Luminaires:

As one of the most prominent learning spaces of the building, the conference room should reflect the overall architectural style of the building. Again, sleek and modern lines correspond to the architecture. Since access to the outdoor patio exists, the space also becomes very important as viewed from the outside. Room finishes, shade fabrics, etc. should be considered form both sides of the glazing. Lighting above the exterior doorway should illuminate the entry at night, but should not designate it as a main entrance to the building.

Psychological Impressions:

Conceptually, the conference room should be an extension of the patio and vice versa, particularly at night—allowing occupants to appreciate and explore the outdoor space. A transparent feeling should be achieved, but should also eliminate any outdoor distractions including glare and excess Illuminance on surfaces.

Glare:

With large, southeast-facing windows, direct solar glare may be a concern. The exterior trellis should be sized appropriately to reduce this effect. Automated blinds with appropriate openness factors should be selected. Reflected glare is a major concern on the whiteboard especially, as well as on any laptop computers which will likely be used during meetings. Specular reflectors and properly aimed luminaires can help to reduce reflections.

Light Distribution on Surfaces:

The most critical vertical room surfaces are the whiteboard and the projection screen. A sufficiently low illuminance on the entire screen is desired for optimum visual contrast. Likewise, the whiteboard light distribution must be uniform with no bright or dark spots to create a visually clear environment. Contrast between the open windows and adjacent surfaces should be reduced wherever possible to eliminate visual discomfort.

Light Distribution on Task Plane:

The several modes of use of the space each require different task plane illuminances. In general, the conference table should have a very uniform distribution, allowing occupants to perform necessary visual tasks regardless of seating location. Uniform light also helps to reinforce the clean, modern feel of the space.

Facial Rendering:

Facial rendering in the meeting mode is extremely important, and sufficient vertical illuminance at the table is critical. Ambient light should be used to help soften shadows and provide a more favorable facial image.

Color:

Color rendering will be important in social modes to provide favorable rendering of faces and possibly food or other displays. Cool (high CCT) sources might be more fitting with the technological, modern style of the building.

Points of Interest:

The outdoor patio viewed through the large windows is a great asset to the room's aesthetic. During presentations, primary focus may be on either the whiteboard or the projection screen, or occasionally both. The lighting system should allow for simultaneous or individual use of these features.

Control/Daylight Integration:

In contrast to the open office, this space has several uses (namely: meeting, A/V presentation, classroom activities, and social gatherings). Controls should be easily operable by occupants, and should include preset scenes for each of the aforementioned uses. Integration of automatic shades and dimming between scenes adds elegance to the design. Manual control of solar shading should also be possible, allowing user customization of the space to fit specific needs. Since the use of this room is intermittent, photosensor dimming may not be practical.

Illuminance:

Meeting mode: Horizontal – 30 fc, Vertical – 5 fc
Presentation mode: Horizontal – 20 fc, Vertical – 5 fc, Screen - < 5fc
Classroom mode: Horizontal – 30 fc, Vertical – 5 fc, Whiteboard – 30fc
Social mode: Horizontal – 10 fc, Vertical – 5 fc

Code Requirements:

ASHRAE 90.1, Total Building – 1.2 W/ ft^2

ASHRAE 90.1, Space – 1.3 W/ft^2

California Title 24 – Occupant sensor required; maximum shutoff time: 30 minutes

Analysis: Main Conference Room, 1st Floor

Unlike the open office space, the conference room's currently installed system is more than capable of producing target illuminances for any of the scenes mentioned in the criteria section. With proper dimming control, a favorable balance could probably be achieved for each of the different uses of the room.

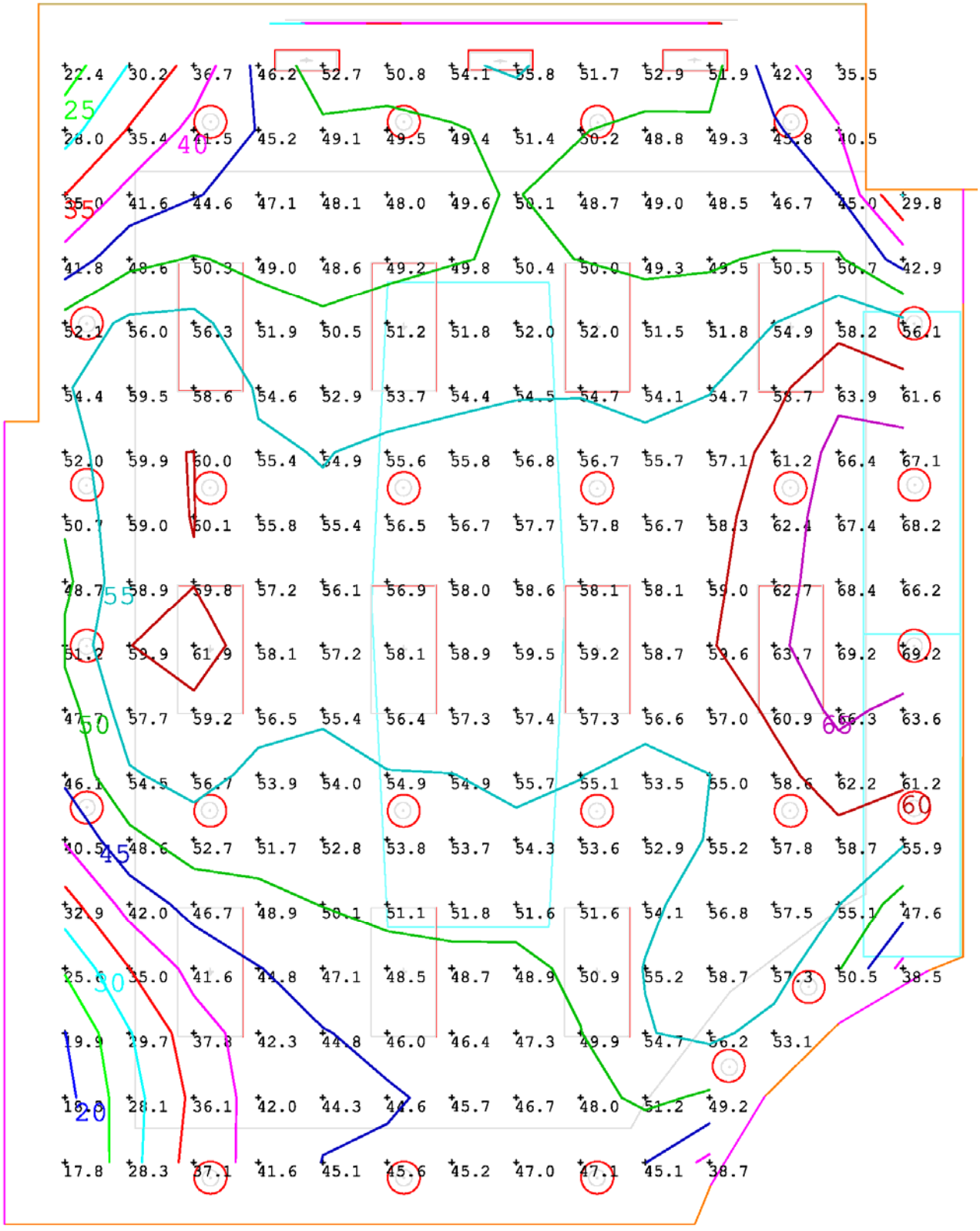
One concern with the current design is the inability block daylight coming through the door glazing from the patio, even as all the windows have blackout shades. Especially in an A/V presentation, full blackout capability is crucial.

In addition, there are a relatively large number of luminaires in the space, and tend to look cluttered and wasteful on the ceiling. A more elegant solution could likely be reached to allow the same or better control and scenes, while using less fixtures within the space. More fixtures would mean increased maintenance, cost of lamp replacement, etc.

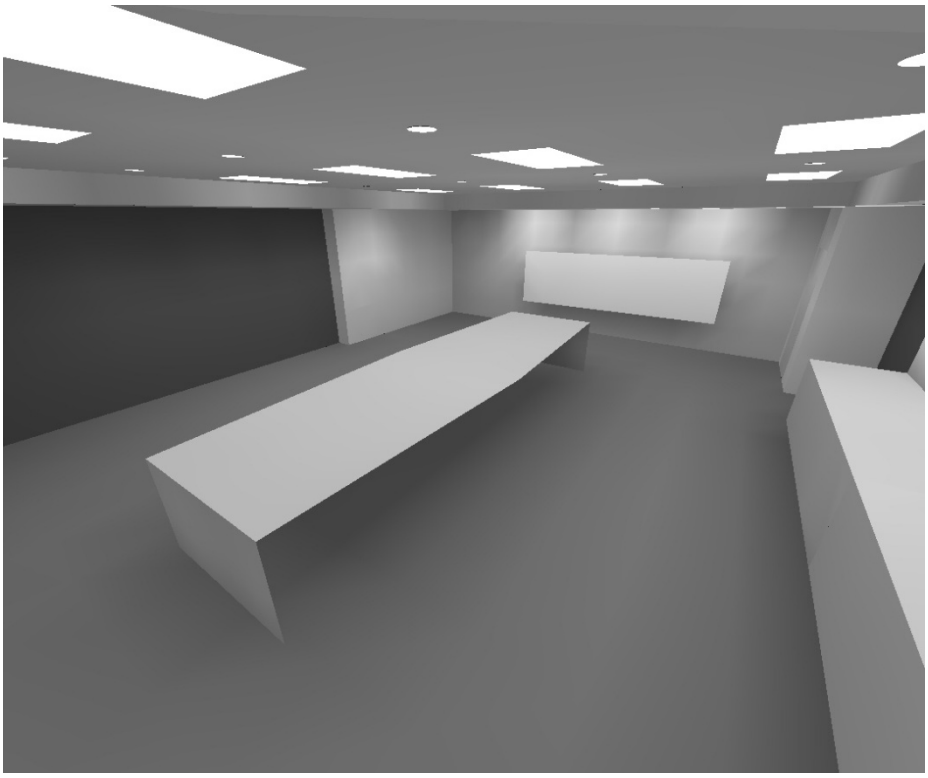
Particularly in this room, but also throughout the building, there seems to be a lack of excitement or uniqueness in the space. Bland colors and somewhat predictable lighting systems prevent this building from making a memorable first impression for visitors and occupants. Due to the prominent location in the building, such matters are more of a concern here than in the office space.

Work Plane, Horizontal
Illuminance Values (fc):
Average = 51.33
Maximum = 69.2
Minimum = 17.8
Avg / Min = 2.88
Max / Min = 3.89

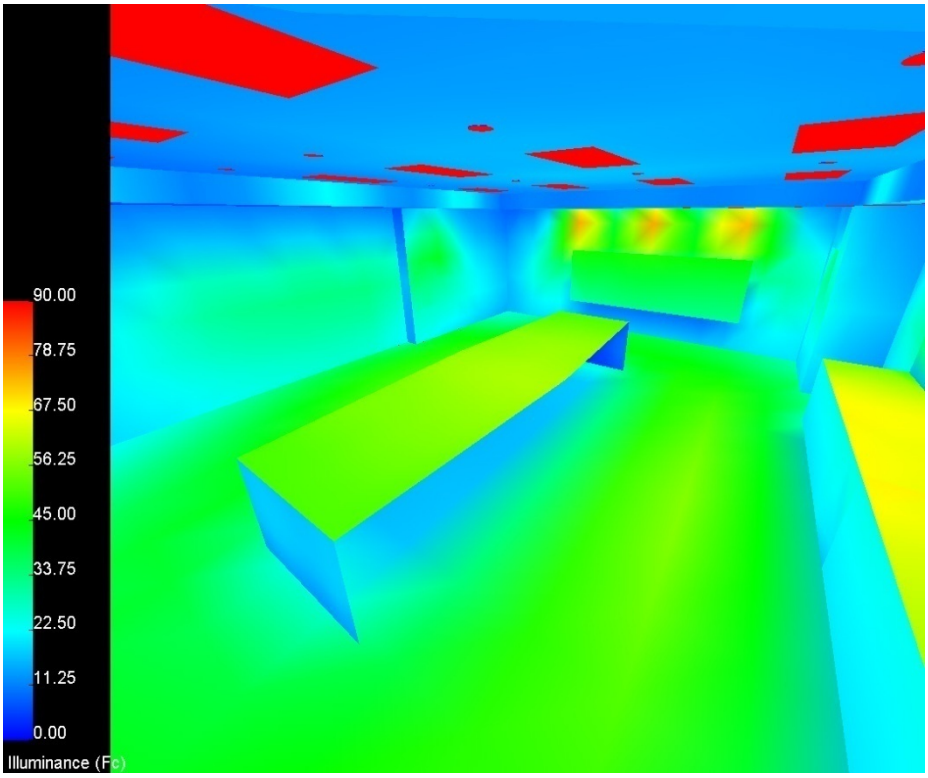
Whiteboard, Vertical
Illuminance Values (fc):
Average = 34.77
Maximum = 42.1
Minimum = 25.7
Avg/Min = 1.35
Max/Min = 1.64



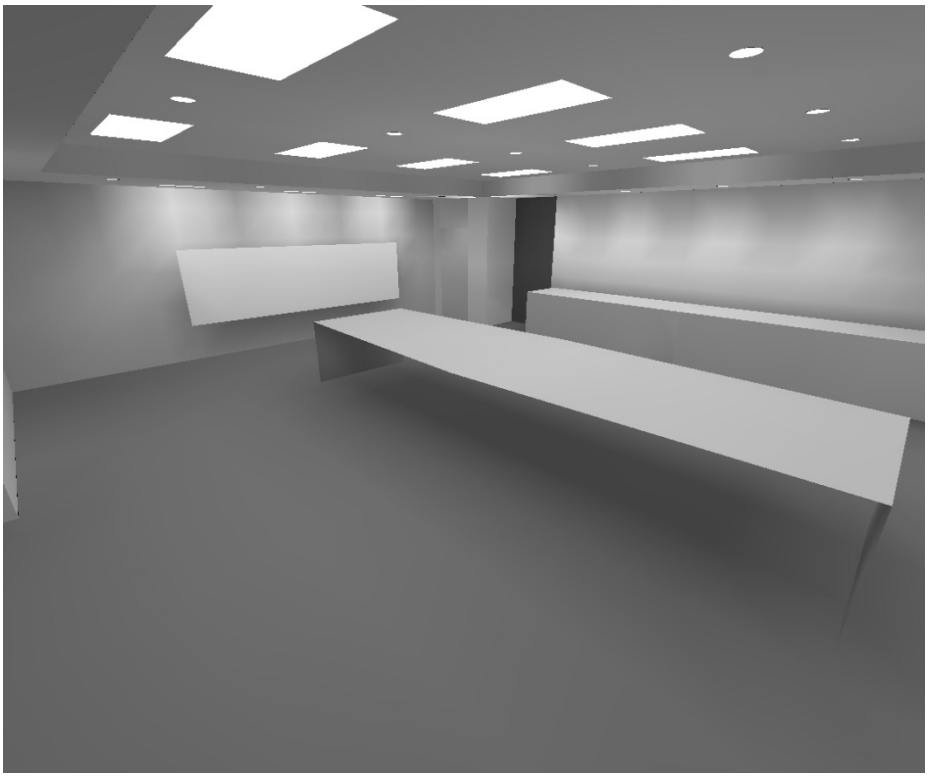
Conference Room Photometric Results (All On), N↓



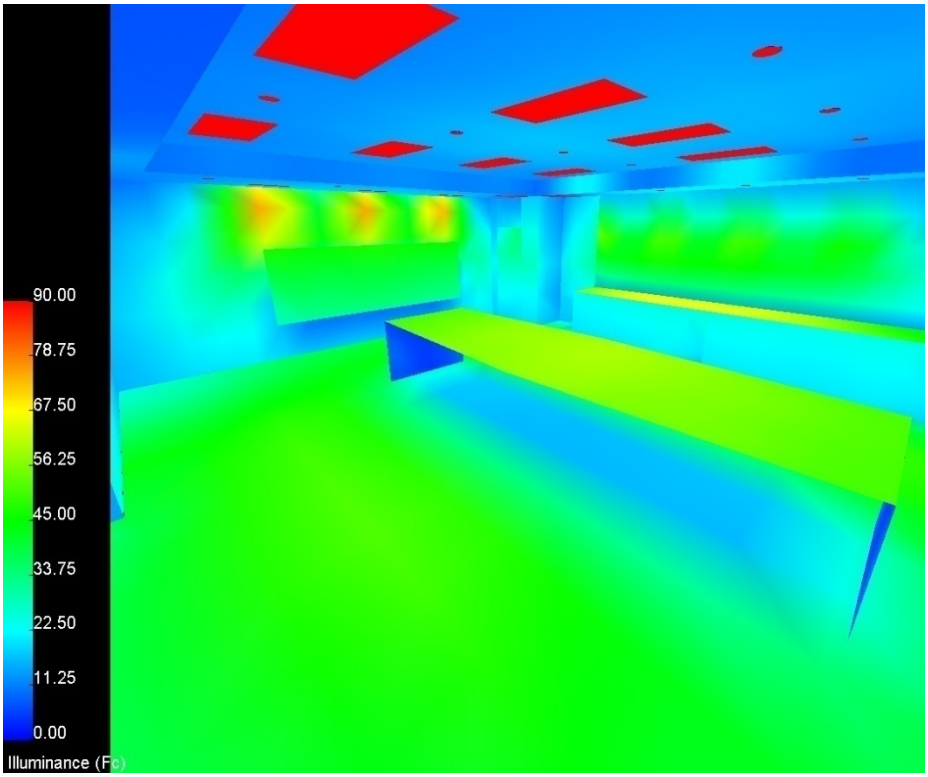
AGI Model, Windows & Whiteboard



Illuminance Pseudocolor, Windows & Whiteboard



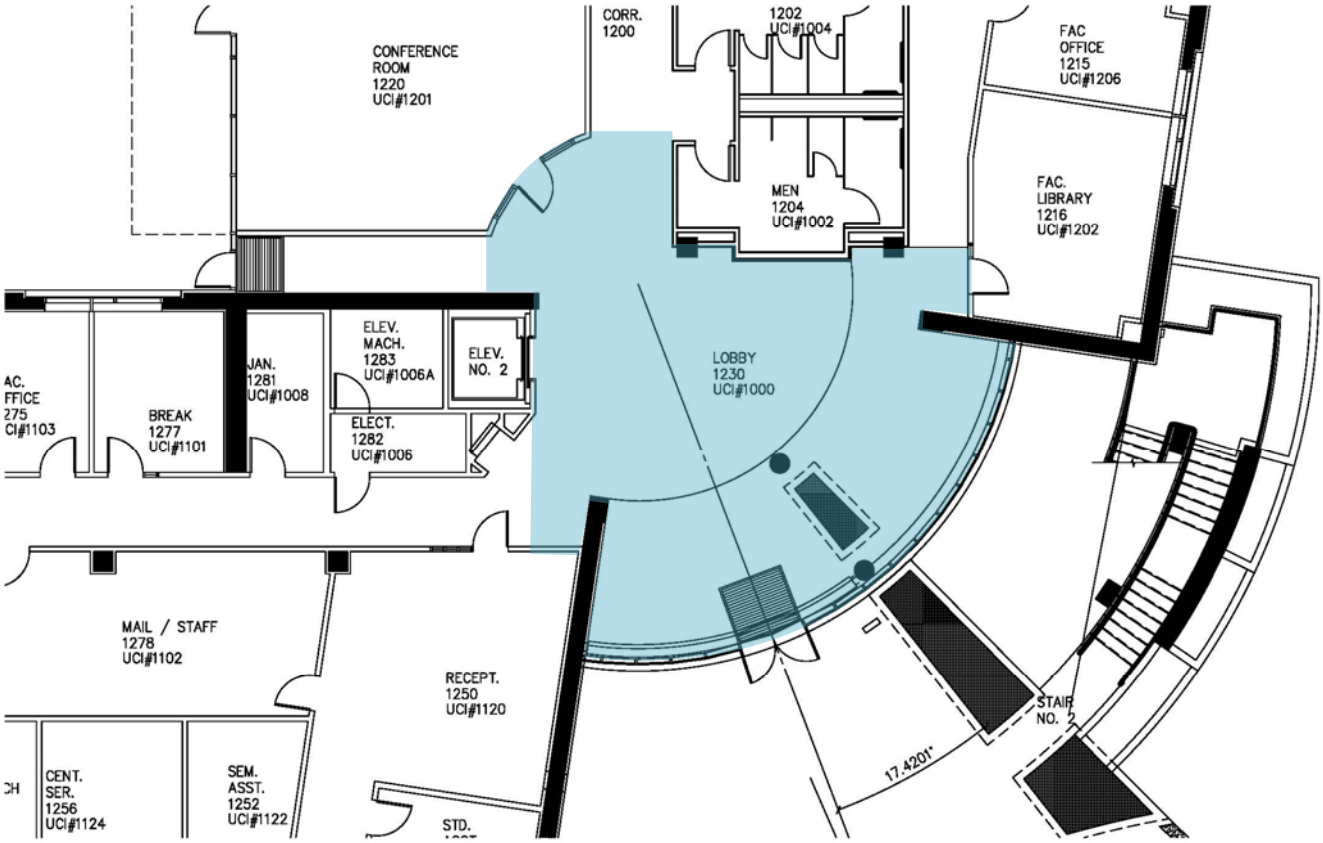
AGI Model, West Wall



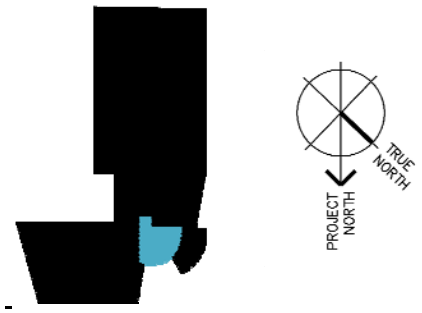
Illuminance Pseudocolor, West Wall

Overview

The main entrance to the building, at the hinge of the "L" shape, features a double-height atrium/lobby space. The lobby allows access to the elevator and connects to the main outdoor stair at each level. The main conference room on the first floor is accessed directly from this space. A north-facing curved glass curtain wall allows natural light and views overlooking a large central campus park. The lobby is very visible from the outside, especially when lit at night.



Partial 1st Floor Plan



Lobby 2st Floor

Lobby 1st Floor

Room Finishes

Floor (Carpet):

Manufacturer:	Designweave
Color:	Medium Brown (1F & 2F), Adobe Red (1F only)
Reflectance:	0.20, 0.30

Floor (Stone Tile):

Color:	Slate Grey
Reflectance:	0.20

Walls (Painted Gypsum):

Manufacturer:	Frazee (Paint)
Color:	“Saddlebury” (Dark Brown), “Cedar Rose” (Dark Red), “Stratford Brown” (Tan)
Reflectance:	0.35, 0.40, 0.50

Walls (Other):

Material:	Exposed Architectural Concrete, White Maple
Reflectance:	0.50, 0.60

Ceiling :

Material:	Acoustic Ceiling Tile, Painted Gypsum
Color:	White, White
Reflectance:	0.89, 0.80

Doors (Interior):

Material:	Wood - White Maple
Reflectance:	0.60

Glazing (Exterior):

Material:	Heat Mirror 66 – Clear
Transmittance:	0.56
Shading Coefficient:	0.44

Glazing (Interior):

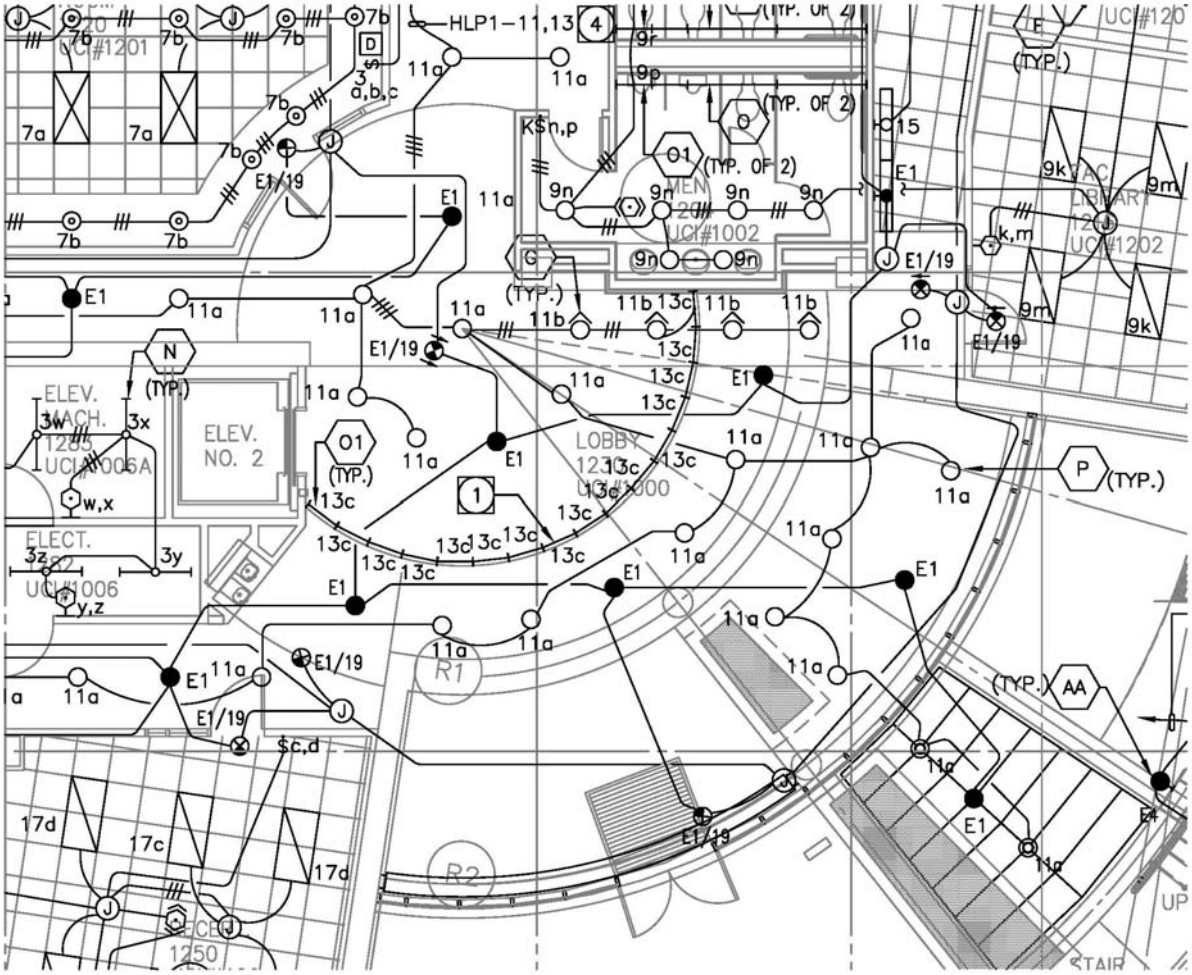
Material:	Translucent Tempered Glass
Transmittance:	0.40

Existing Lighting and Controls

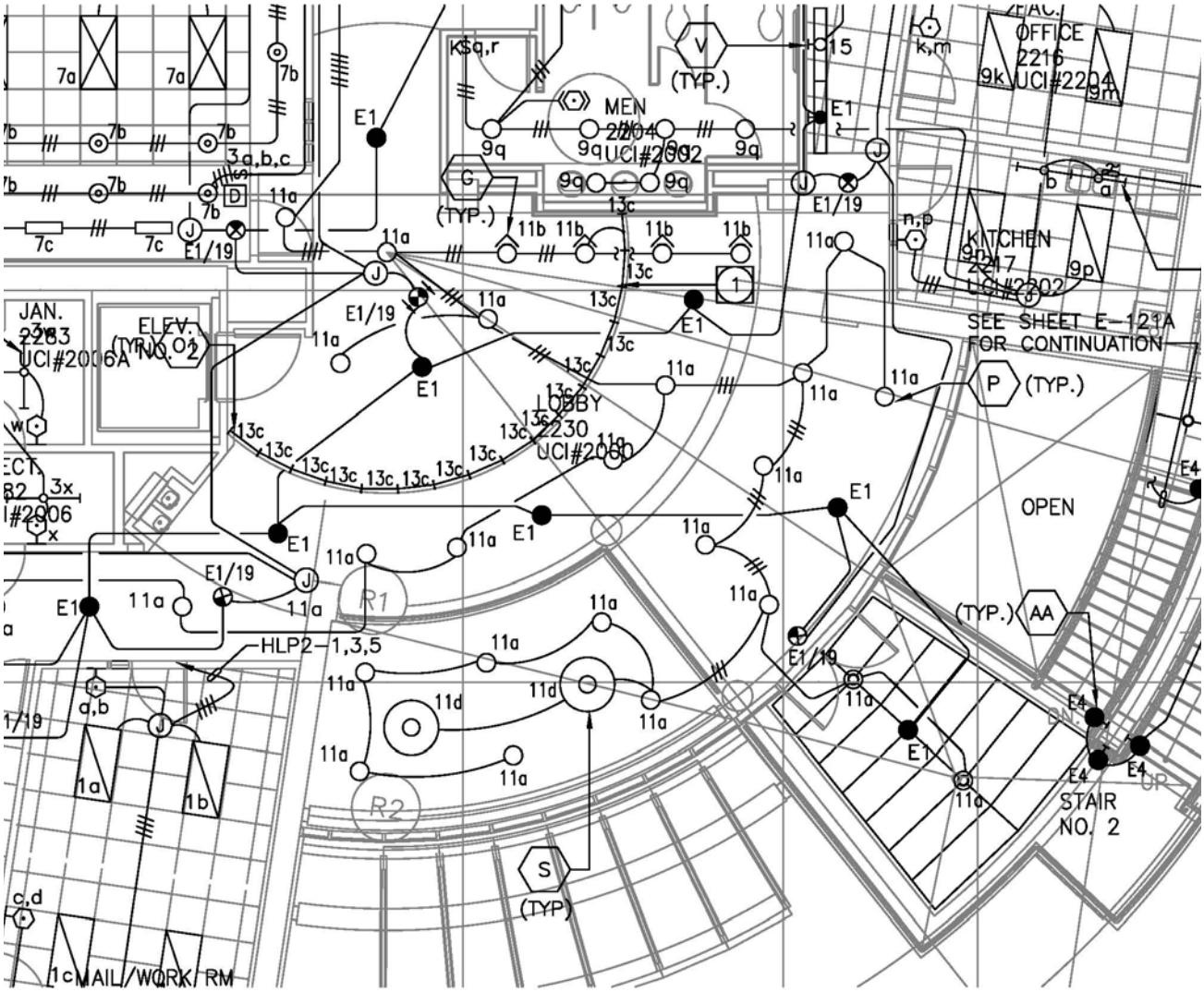
The luminaires on the first lobby level are almost exclusively recessed compact fluorescent with the exception of sixteen linear T5 fixtures which illuminate the circular cove in the center of the room. Four CFLs use wall washing reflectors to highlight the white maple wall near the restrooms. The second floor lobby luminaires are almost identical in layout to the first floor, the only major difference being six additional recessed downlights and two decorative pendants located at the top of the open double-height atrium. Luminaires are controlled by a photosensor device on the roof of the building.

Daylighting Elements

The 5-story glass curtain wall which faces north is the most obvious daylighting component in this space. Due to its orientation, the lobby should experience very little direct sunlight throughout the year. The glazing is further protected from direct sunlight by the wings of the building, which partially enclose the plaza. This orientation should provide ambient light in the atrium space without excessive glare or heat gain.



Partial 1st Floor Lighting Plan, N↓



Partial 2nd Floor Lighting Plan, N↓

Luminaire Schedule

Type	Manuf.	Catalog #	Lamps	Watts	Ballast	Volts	Mounting	Description
G	Omega	OM61H32PLTWW-CSS -120/277	(1) 32W CFL 4100K	36	Electronic	277	Ceiling Recessed	6" recessed wall wash, clear semi-spec. reflector
O1	Prudential Lighting	PT5-1T5-2-YGW-277	(1) 17W T5 4100K	17	Electronic	277	Ceiling Cove	2' linear cove fixture
P	Omega	OM61H32PLT-CSS -120/277	(1) 32W CFL 4100K	36	Electronic	277	Ceiling Recessed	6" recessed downlight, clear semi-spec. reflector
S	Louis Poulsen	PHA-28.3-1/400W/MH/ED-37 MOGUL-WHITE	(1) 400W MH 4100K	458	Electronic	277	Pendant	"Artichoke" decorative pendant fixture, white

Light Loss Factors

Type	BF	RSDD	LLD	LDD	Total LLF	Notes
G	1.00	0.98	0.90	0.88	**0.78**	Category IV, Clean, 12 Month Cycle, RCR=3.0
O1	1.00	0.98	0.90	0.88	**0.78**	Category IV, Clean, 12 Month Cycle, RCR=3.0
P	1.00	0.98	0.90	0.88	**0.78**	Category IV, Clean, 12 Month Cycle, RCR=3.0
S	1.00	0.94	0.70	0.90	**0.60**	Category III, Clean, 12 Month Cycle, RCR=10.0

Major Design Considerations (Based on IESNA Recommendations)

Appearance of Space and Luminaires:

Clearly the appearance of the lobby/atrium space is critical. This north entry will likely experience the most traffic, as it faces central campus. Night is a critical time when the lobby will be most visible from outside, therefore, light should be used to highlight activity within the lobby and to also produce a welcoming glow from within.

Psychological Impressions:

The architecture seems to designate this particular space as the hub of activity for the building, as well as for its adjacent buildings. Thus, a dynamic mood should be reinforced. Highly visible exterior stairs and circular public areas support this theme. The sleek, clean lines of the architecture should be continued through the lobby space, while emphasizing the importance and centrality of the space in particular.

Glare:

As was mentioned previously, solar glare should not present a significant problem due to the curtain wall's northerly orientation. Some reflected glare may occur from nearby buildings. Fixture glare should be carefully considered, especially when designing multi-level spaces such as this. Any possible angle to the luminaire needs to be considered.

Light Distribution on Surfaces:

Walls should be well lit to create a night presence through the curtain wall. General non-uniformity can help to accent visual foci and create a deeper appearance. Local uniformity, however, is still important in maintaining the clean, strong mood of the architecture.

Facial Rendering:

As a social space, multi-source ambient light should be used to soften shadows and assume idea facial rendering.

Color:

As with the rest of the building, a higher color temperature can help to convey the technology and modernity of the building. However, a balance must be struck so that warm wood tones do not get washed out. Due to the relative colorfulness of the lobby finishes, color rendering also becomes crucial in this space.

Points of Interest:

Views of campus from inside are a focal point, especially on the higher floors. Elevators and stairs should also be highlighted for clarity. The wood feature wall and decorative pendants in the space are interesting as well.

Illuminance:

Horizontal - 10fc
Vertical - 3fc

Code Requirements:

ASHRAE 90.1, Total Building – 1.2 W/ ft^2
ASHRAE 90.1, Space – 1.3 W/ft^2
California Title 24 – Occupant sensor required; maximum shutoff time: 30 minutes

Analysis: Entry Lobby, 1st and 2nd Floors

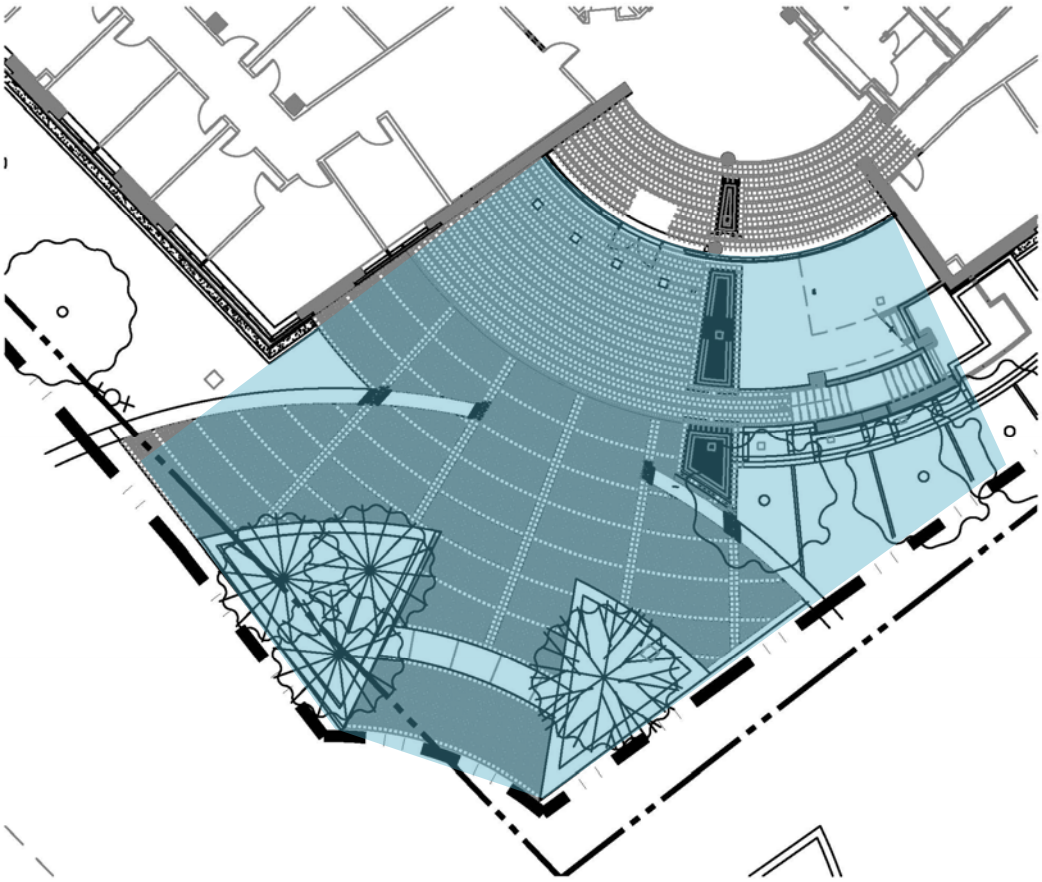
In addition to being very visible from the plaza, the lobby spaces are also an important part of the circulation and way finding for the building. The lighting here should echo the movement in the space, but should also provide clear visual clues to the elevator, stairs, and hallways. Based on the plans and the pictures provided, these important elements are not standing out as much as they should. Additional direct lighting in these areas is necessary.

The suspended 'artichoke' fixtures are modern and seem to fit the aesthetic of the space fairly well. From some locations, however, these fixtures can obscure the desirable view of central campus through the north curtain wall, especially during the day. More discrete fixtures might be called for in this situation.

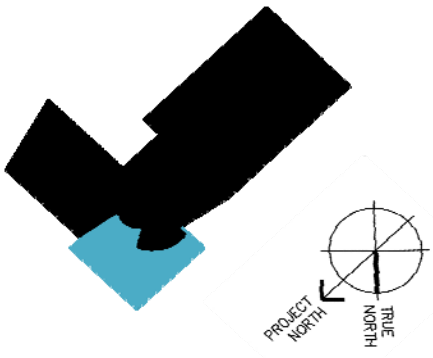
The ceiling and floor both feature circular curves which could be highlighted more effectively. For example, higher light levels on the inner circle on the floor, and lower levels on the rest of the floor might help to accentuate this feature, within the constraints of proper illuminance values in the entire room. The current system appears to provide illuminance which meets or exceeds suggested IESNA values.

Overview

The northern corner of the building features a five-story glass curtain wall and a curved outdoor feature stair. A plaza on the ground floor is used as a gathering space for students and faculty. Each of the lobby levels can be seen through the glass curtain wall from the plaza. The scope of this project includes the building façade surrounding the plaza, as well as the appearance of the interior spaces visible at night.



Partial 1st Floor Plan



Plaza & Building Façade

North Stair

Surface Finishes

Paving:

Color:	Slate Grey
Reflectance:	0.20

Stair/Lower Wall:

Material:	Red Granite Panels
Reflectance:	0.40

Upper Wall:

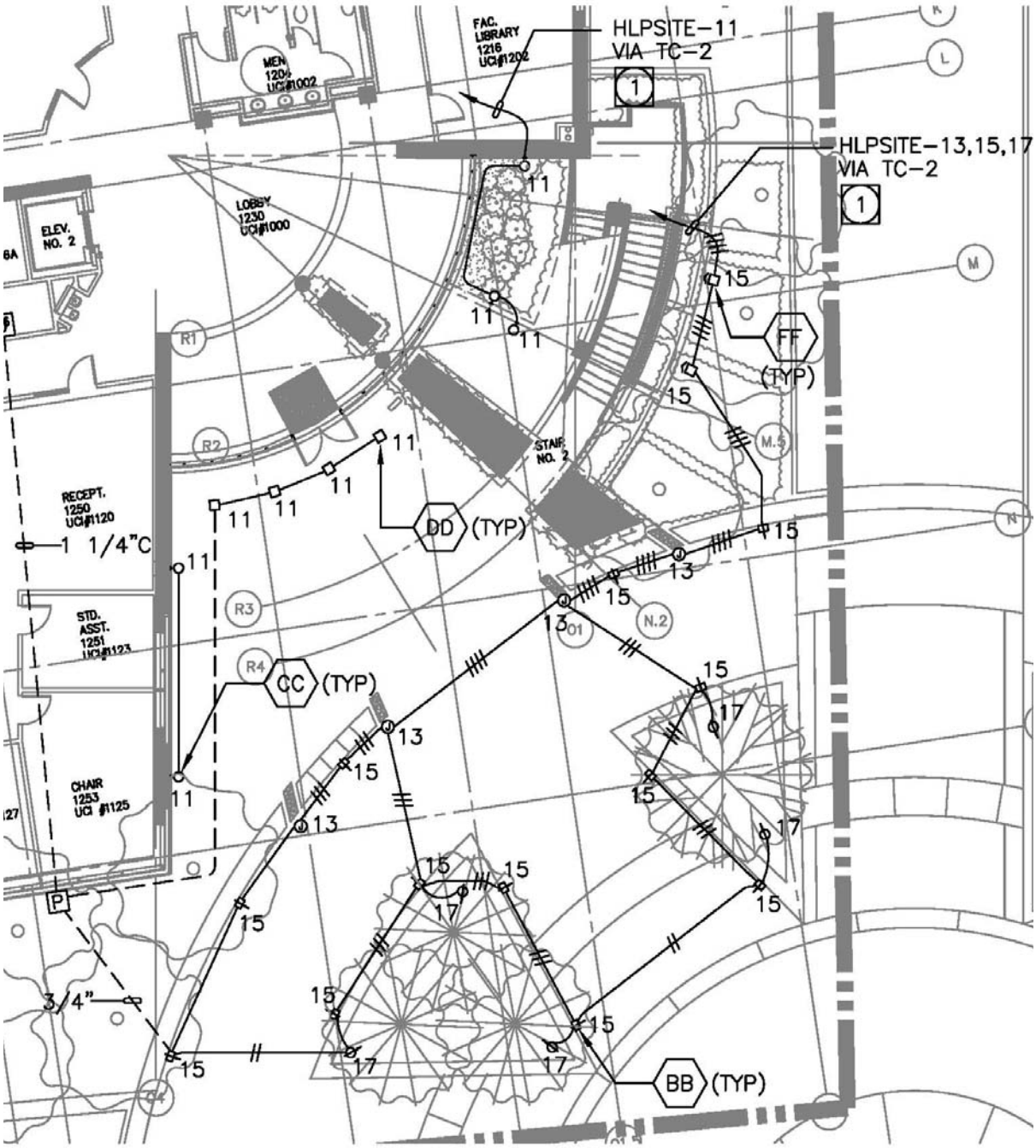
Material:	Exposed Architectural Concrete
Reflectance:	0.50

Glazing:

Material:	Heat Mirror 66 – Clear
Transmittance:	0.56
Shading Coefficient:	0.44

Existing Lighting and Controls

Several CFL floodlights highlight trees on the plaza as step lights recessed into the planters illuminate the path. In-grade uplights add visual interest to the main entry. Up/down sconces hang on either side of the curtain wall to mark it as an entry to the building. Metal-halide vertical flood lights accent the large stone face of the outdoor stair. Site fixtures are controlled by a time clock system.



Plaza Lighting Plan, N↓

Luminaire Schedule

Type	Manuf.	Catalog #	Lamps	Watts	Ballast	Volts	Mounting	Description
BB	Gardco	942-C-32TRF-LV-NP-277-F	(1) 32W PLT 4100K	32	Electronic	277	Wall Recessed	Recessed outdoor steplight, louver, aluminum finish
CC	Gardco	103-MT-UD-242-277	(2) 42W CFL 4100K	84	Electronic	277	Wall Surface	Half cylinder up/down sconce
DD	B-K Lighting	S-HP2-CF-102-10-277-CPC	(1) 32W CFL 4100K	32	Electronic	277	Ground Recessed	7", spread lens, concrete pour collar
EE	Orgatech - Omegalux	S-B-B-32W-F-U	(1) 32W CF 4100K	32	Electronic	277	Grade	Tree Uplight
FF	Gardco	DF7-C-VFL-175	(1) 175W MH 4100K	210	Pulse Start	277	Grade	7", conduit mounted, vertical flood

Light Loss Factors

Type	BF	LLD	LDD	Total LLF	Notes
BB	1.00	0.90	0.65	**0.59**	Category VI, Dirty, 18 Month Cycle
CC	1.00	0.90	0.73	**0.66**	Category V, Dirty, 18 Month Cycle
DD	1.00	0.90	0.65	**0.59**	Category VI, Dirty, 18 Month Cycle
EE	1.00	0.90	0.65	**0.59**	Category VI, Dirty, 18 Month Cycle
FF	1.00	0.90	0.65	**0.59**	Category VI, Dirty, 18 Month Cycle

Major Design Considerations (Based on IESNA Recommendations)

Appearance of Space and Luminaires:

The building façade must maintain its modern, curvilinear feel. Fixture choices should echo these styles, and also highlight the features on the building itself. The plaza area may be allowed to feel more free-flowing or disorganized than the building itself, to compliment the soft, organic forms of the landscaping.

Psychological Impressions:

The façade and plaza of the natural sciences building are the first to be experienced by visitors to the building, and they should produce a welcoming and comfortable atmosphere. In keeping with the themes of dynamic activity in the lobby area, the vertical stair is a symbolically important feature. A strong flow between the plaza and the lobby should be created. Transparency and visual clues should lead visitors into the lobby space or up the stairs without confusion.

Glare:

In-grade uplights might create a glare problem if their output is too intense. Also, care must be taken to avoid reflections of site fixtures in the curtain wall from producing glare.

Light Distribution on Surfaces:

Uniformity is favored for the architectural style of the building, but non-uniformity is desired in the plaza to highlight organic forms.

Light Distribution on Task Plane:

Pathways should be uniformly illuminated for safety.

Points of Interest:

Vertical stair wall, lobby levels within the building, vegetation in the plaza, paving materials/textures, copper terrace on the 5th floor.

Control/Daylight Integration:

A timer and/or photosensor system should be used to ensure that site fixtures are turned off either when the building is closed, or when there is sufficient daylight.

Illuminance (Plaza):

Horizontal: 10fc

Vertical: 3fc

Plaza & Façade at Night

North Stair at Night

Analysis: North Plaza and Building Façade

The existing lighting of the façade and plaza area is effective in that it appears to provide sufficient light levels for major uses. By not brightly illuminating the curtain wall mullions and floor breaks, the lobby levels are highlighted at night. As was previously mentioned, I feel that it is important for the lighting design to emphasize the circulation of people through the lobbies and stairwell. The breaks in the curtain wall, however, would make excellent homes for fixtures, and I would like to explore the possibility of some dynamic (possibly kinetic), and unique decorative lighting in these areas to further emphasize the concept without being overpowering.

There seems to be a color appearance difference which may be caused by a slight blue tint in the curtain wall or the interior finishes or sources themselves. The façade lighting looks warmer, where the interior looks cool and almost greenish. This difference should be addressed. Also, the landscape lighting is not as effective as it could be, with some vegetation lit and some dark within the plaza. Ultimately, the trees get lost among the many layers of light. Accenting the trees and bushes in this area can help the building appear more connected to the site and less unnatural.

The stair wall is another area where interesting dynamic lighting can be used to emphasize the flow of people throughout the building. The wall seems dull and flat under the current lighting conditions. To help visitors find their way to the entrance, this area should be highlighted in some way and should stand out more effectively.