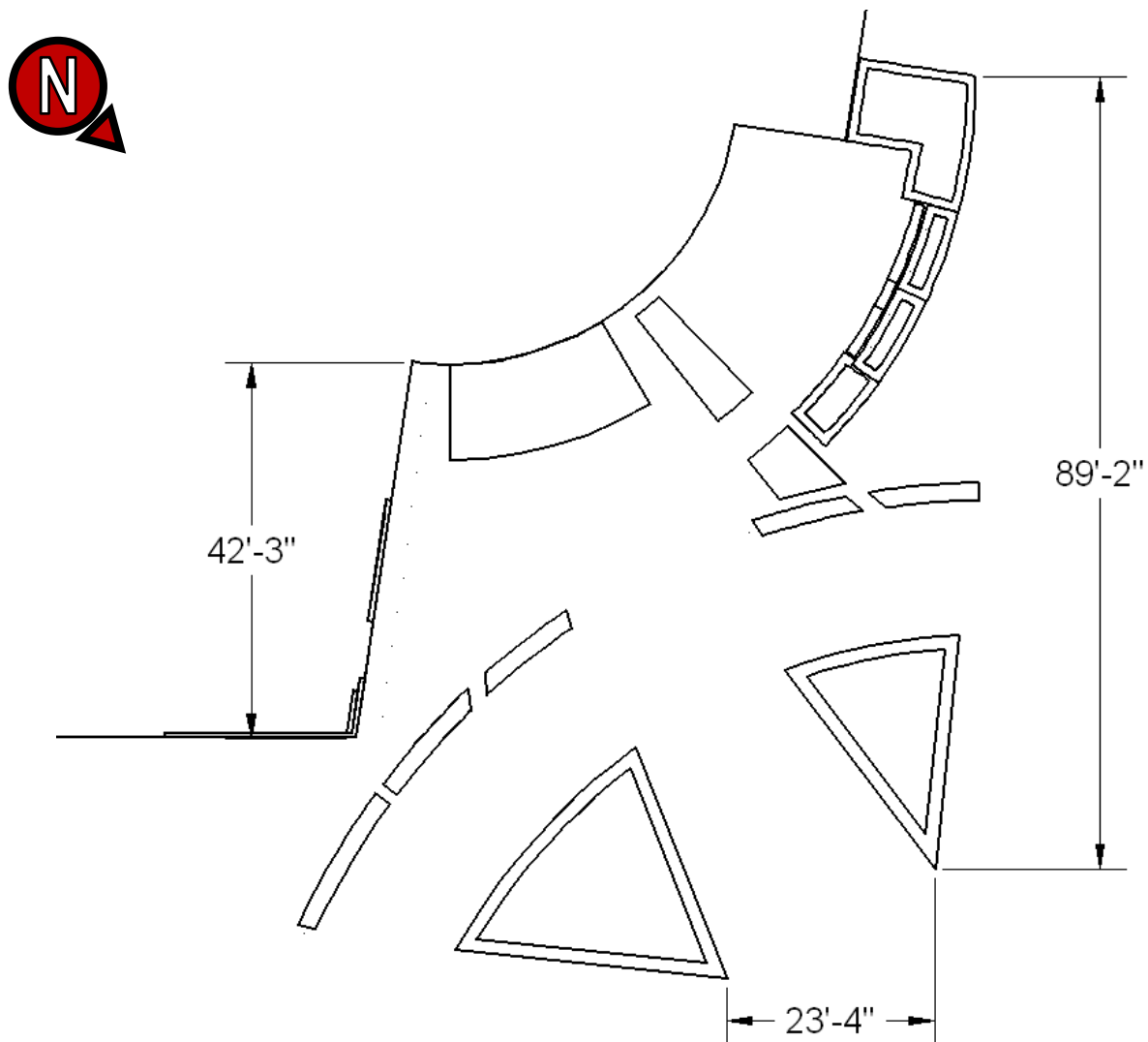


### LIGHTING – NORTH FAÇADE AND PLAZA

The main entry to UCI Natural Science Unit II is marked by a four-story glass curtain wall, an outdoor stair feature and a 5875 square foot landscaped plaza. Trees are located within planters in the center of the plaza, and paving patterns highlight the radial center point within the lobby. The scope of the proposed lighting redesign includes the inner plaza area, the curtain wall, the adjacent office wall, and stair wall at the west side of the plaza. Stairway lighting is not in scope.

#### Dimensions



Partial Site Plan  
Scale: NTS

---

**Materials**



---

**Paving**

Color: Slate Grey  
Reflectance: 0.20

**Stair Wall / Lower Office 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

## Design Concept Development



The north façade and plaza lighting is intended to lead pedestrians into the main entry of the building and to echo the architectural aesthetic of the interior. A strong sense of motion is created by linear elements which converge within the lobby. A transparent connection between the lobby and plaza lighting through the curtain wall bring them together to create one unified space. The cutout section of the stair wall has been accentuated by keeping the exterior wash at a low light level, creating a focal point of the motion of pedestrians up and down the stairway. This also acts to prevent any confusion caused by the stairway being exterior and not within the lobby itself.

The plaza – lobby interaction is the most obvious example of the use of color differences which is echoed throughout the project. A colored LED cove in the interior lobby and blue wall surfaces provide a stark contrast to the warm, earth-tone façade of the building. This difference has been embraced and accentuated in order to create a cool, technological and clean impression of the interior.

The design themes have remained generally the same throughout the project, but the façade lighting was toned down from the first schematic presentation in order to increase transparency into the lobby space. The interior lighting in the lobby (especially near the curtain wall) acts also to create an exterior impression, and great care has been taken to coordinate the two spaces visually. Luminaire maintenance issues also had to be considered here due to the height of the building façade.



Lobby Schematic Design

---

## Design Objectives / Considerations



### 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 some 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

The main vertical stair wall, lobby levels within the building, vegetation in the plaza, and paving materials/textures are all focal points in this area.

### Control/Daylight Integration

A time clock system is to be installed to ensure that site fixtures are turned off when the building is closed, and/or when there is sufficient daylight.

**Technical Objectives**



DESCRIPTION	GOAL	RESULT	MET?
Horizontal Illuminance	Floor: 1 fc	1.64 fc Avg.	YES
Power Density (ASHRAE 90.1)	See Below		YES

**Power Allowances**

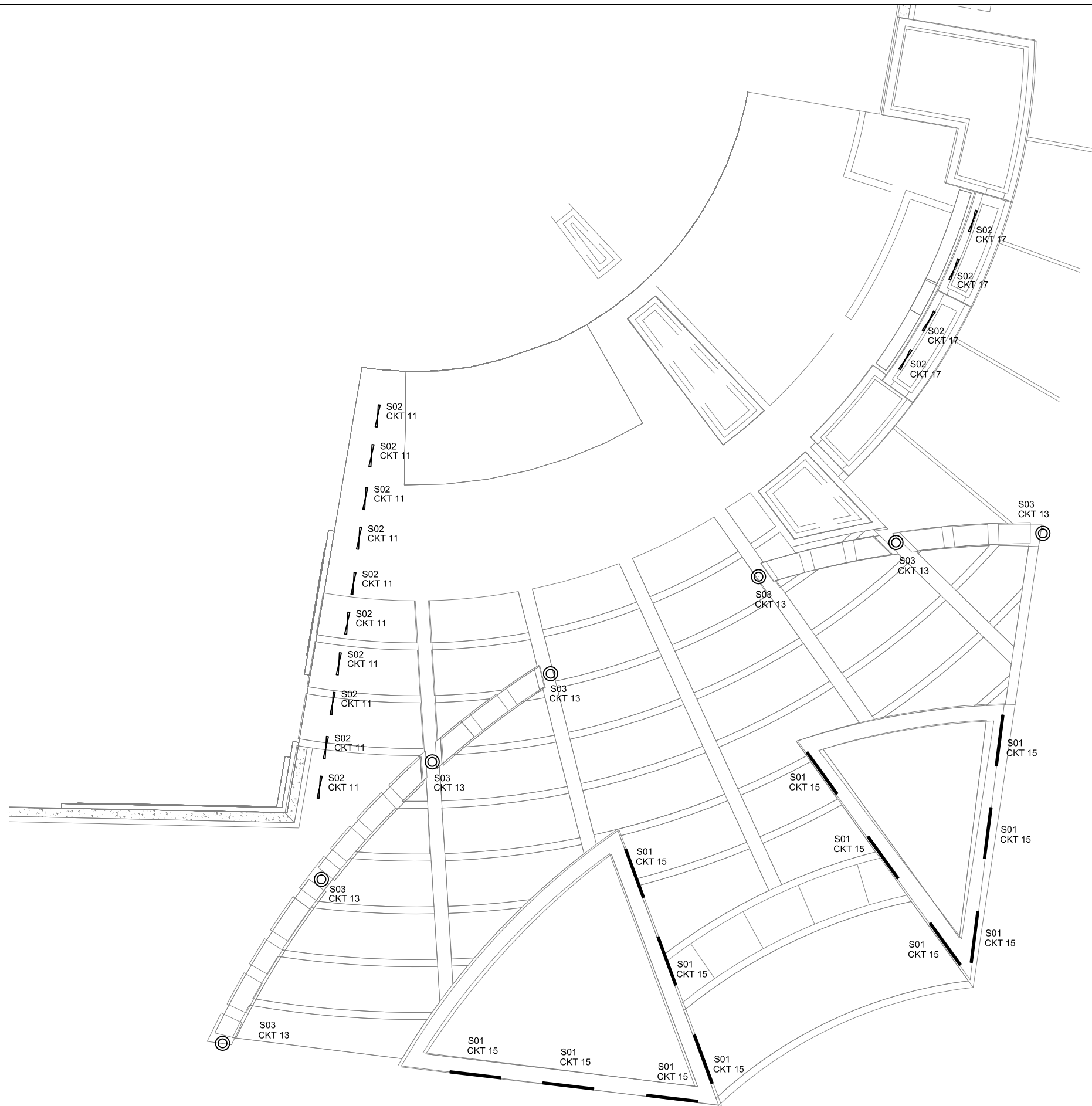


AREA	QUOTA	MULTIPLIER	ALLOWED WATTS	DESIGNED WATTS
PLAZA	0.2 W/ft <sup>2</sup>	5875 ft <sup>2</sup>	1175 W	784 W
ENTRY	30 W/ft of Door Width	6 ft	180 W	0 W
ATTACHED CANOPY	1.25 W/ft <sup>2</sup>	233 ft <sup>2</sup>	291 W	0 W
ILLUMINATED WALL (STAIR)	0.2 W/ft <sup>2</sup>	1015 ft <sup>2</sup>	203 W	104 W
ILLUMINATED WALL (OFFICE)	0.2 W/ft <sup>2</sup>	2858 ft <sup>2</sup>	572 W	260 W
<b>TOTAL</b>			<b>2421 W</b>	<b>1148 W</b>

**Power Density Calculation**



FIXTURE	QUANTITY	WATTS	TOTAL WATTS
S01	12	38.5	462
S02	14	26	364
S03	7	46	322
<b>TOTAL Watts</b>			<b>1148</b>
<b>Area (SF)</b>			<b>5875</b>
<b>Power Density (W/SF)</b>			<b>0.195</b>



UCI Nat. Sci. Unit II  
Irvine, California

Lighting Consultant:  
Dr. Kevin Houser

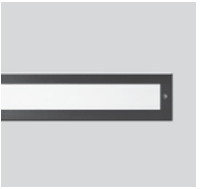


Grant Kightlinger  
L/E Option

Penn State University  
AE Senior Thesis

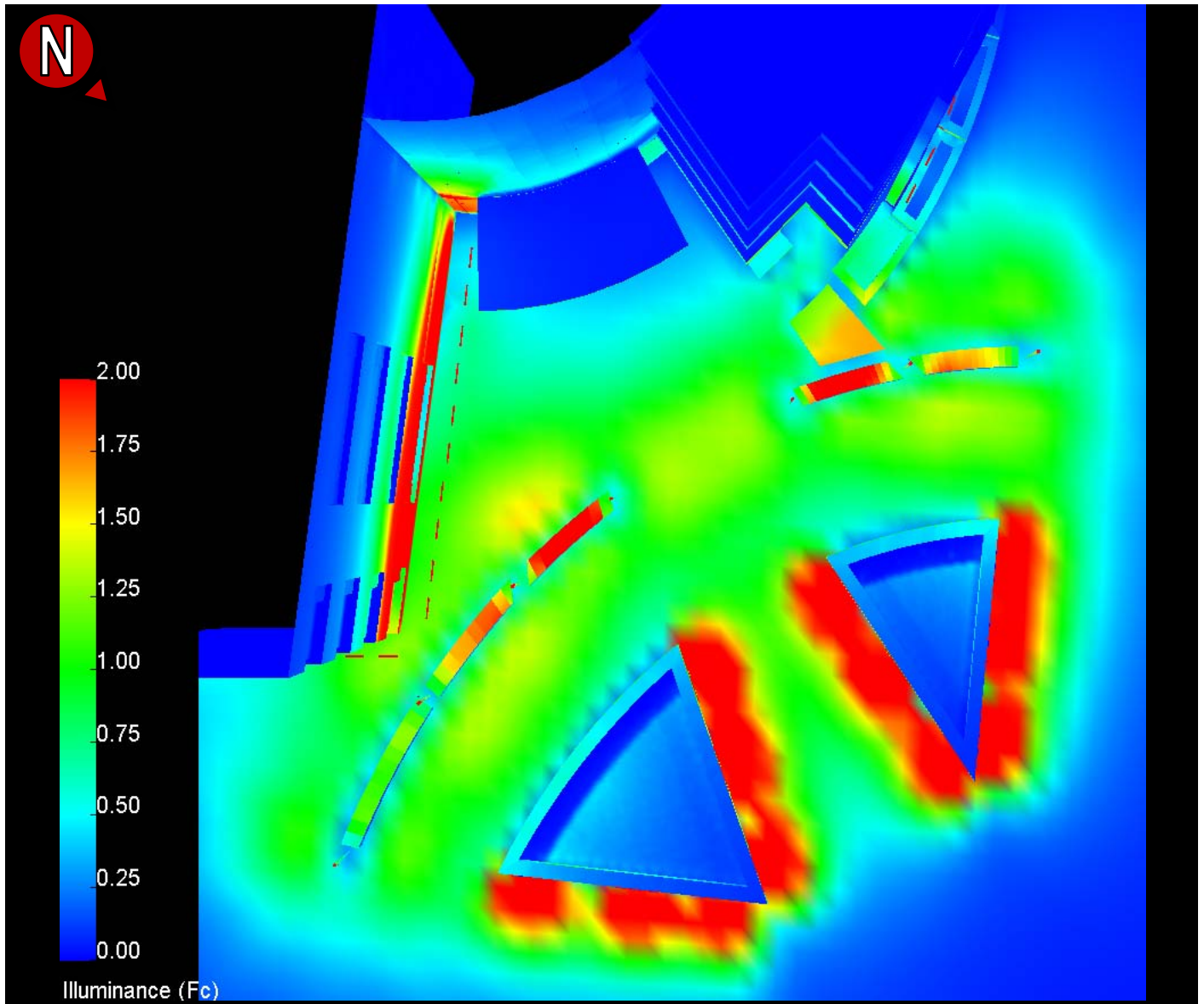
PLAZA LIGHTING PLAN  
3/32" = 1'-0"

**Partial Fixture Schedule**



TYPE	IMAGE	MANUF.	DESCRIPTION
<b>OUTDOOR / SITE FIXTURES</b>			
S01		BEGA	RECESSED LINEAR WALL FIXTURE. STAINLESS STEEL FINISH. RATED FOR WET LOCATION.
S02		BEGA	IN-GRADE RECESSED FLOODLIGHT. LINEAR FLUORESCENT. DRIVE OVER. RATED FOR WET LOCATION. STAINLESS STEEL FINISH.
S03		BEGA	LINEAR STAINLESS STEEL POLE-MOUNTED SITE FIXTURE. RATED FOR WET LOCATION.

Pseudocolor Renderings



\*NOTE: Tree lighting is not included in this calculation.

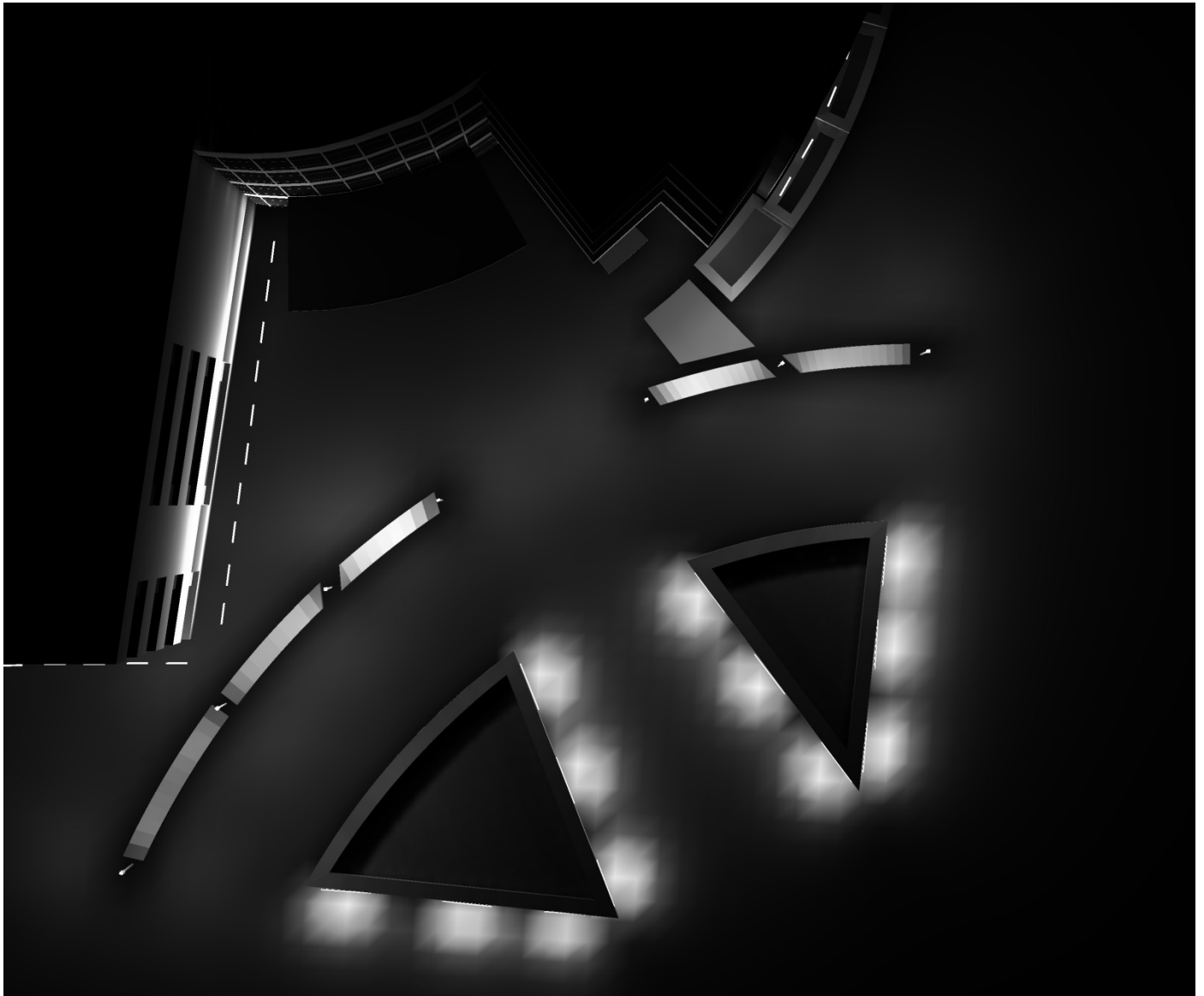
Statistics



ZONE	HEIGHT	UNITS	AVG	MAX	MIN	AVG/MIN	MAX/MIN
Plaza	0'-0" AFF	fc	1.21	6.00	0.20	6.05	30.00



Renderings



Plaza from Above



Plaza and Façade from Street

**Light Loss Factors**



FIXTURE	MAINT. CAT.	DISTR.	LLD	LDD	RSDD	BF	TOTAL LLF
S01	VI	DIRECT	0.95	0.80	0.94	1.00	<b>0.71</b>
S02	VI	DIRECT	0.95	0.80	0.94	1.00	<b>0.71</b>
S03	VI	DIRECT/INDIRECT	0.90	0.80	0.87	1.22	<b>0.76</b>

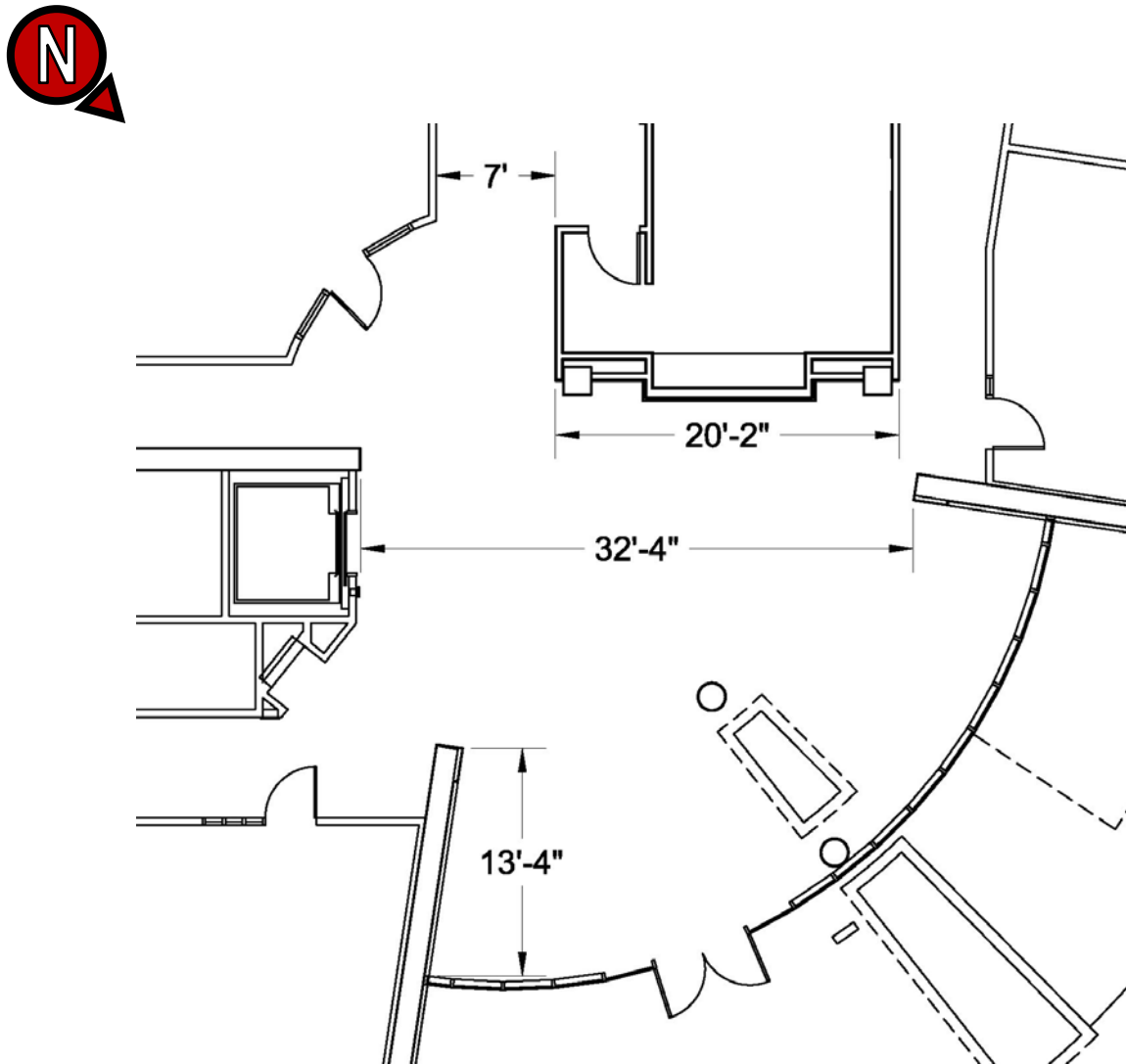
\* Assumptions:

1. Medium Environment, 12-month cleaning cycle.
2. 35°C lamp data used in calculations.

### LIGHTING - LOBBY

The lobby space adjacent to the north façade is the main entry point for the building. The lobby measures approximately 1230 square feet per floor and features a large curved glass curtain wall to the north. This space is the primary access to classrooms and circulation. Above the main doorway, a double height atrium space connects the first and second floor lobbies. The main conference room is directly adjacent to the lobby on the first floor, and each level provides access to the main outdoor stair of the building.

#### Dimensions



Partial First Floor Plan  
Scale: NTS

---

## Materials



### Floor

Material: Carpet / Stone  
Color: Dark Blue, Tan / Gray  
Reflectance: 0.20, 0.20

### Walls

Material: Painted Gypsum / Concrete  
Color: Shell White, Dark Blue, Gray  
Reflectance: 0.80, 0.20, 0.30 / 0.3

### Whiteboard Wall

Material: Wood - White Maple  
Reflectance: 0.60

### Ceiling

Material: Painted Gypsum  
Color: Shell White  
Reflectance: 0.85

### Doors

Material: Wood - White Maple / Painted Steel  
Reflectance: 0.60 / 0.2

### Glazing (Exterior)

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

### Glazing (Interior)

Material: Translucent Tempered Glass  
Transmittance: 0.40

### Wooden Wall

Material: Wood - White Maple  
Reflectance: 0.60

## Design Concept Development



The lobby acts as the focal point the building and is intended to convey radial and vertical motion, especially from the center point of the space. A strong association with the exterior plaza to the north reinforces a theme of transparency in the building. Lighting highlights the central focus of the space and also leads occupants to key points of circulation such as hallways, doors and elevators. Lighting elements are intended to be viewed both from the interior and the exterior of the building. Vertical pendants located in the two-story atrium area serve as focal points from both sides, and also act to bring the eye up into the atrium space.

Since the first schematic design submission, the lobby (and the rest of the spaces) have come to use more regular and evenly spaced luminaire organization in order to avoid visual confusion and clutter. Radial linear elements have remained the key points of the visual impression in this space. An RGB LED cove has been installed where there was previously a fluorescent cove. This feature would act as a unique identifier for the building, and allows the university to signify special events within the building at night. The default setting for the cove would be blue in order to accentuate the previously mentioned color difference between interior and exterior.



Lobby Schematic Design Submission

---

## Design Objectives / Considerations



### Focal Points

The central point of the lobby should be defined. Views of campus from inside should act as additional focal points, especially on the higher floors. Elevators and stairs should be easily identifiable for ease of circulation. The large wooden feature wall on each floor should be highlighted without causing shadows on readable objects mounted on the wall.

### 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. Radial linear patterns act to support this theme.

### Glare

Solar glare should not present a significant problem due to the curtain wall's northerly orientation. Fixture glare should be carefully considered, especially in the double-height atrium space. Any possible viewing angle of 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 image defined by the existing architecture.

### Facial Rendering

As a social space, multi-source ambient light should be used to soften shadows and assume ideal 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. Color rendering is also important in this space due to the rich colors of finishes.

**Technical Objectives**

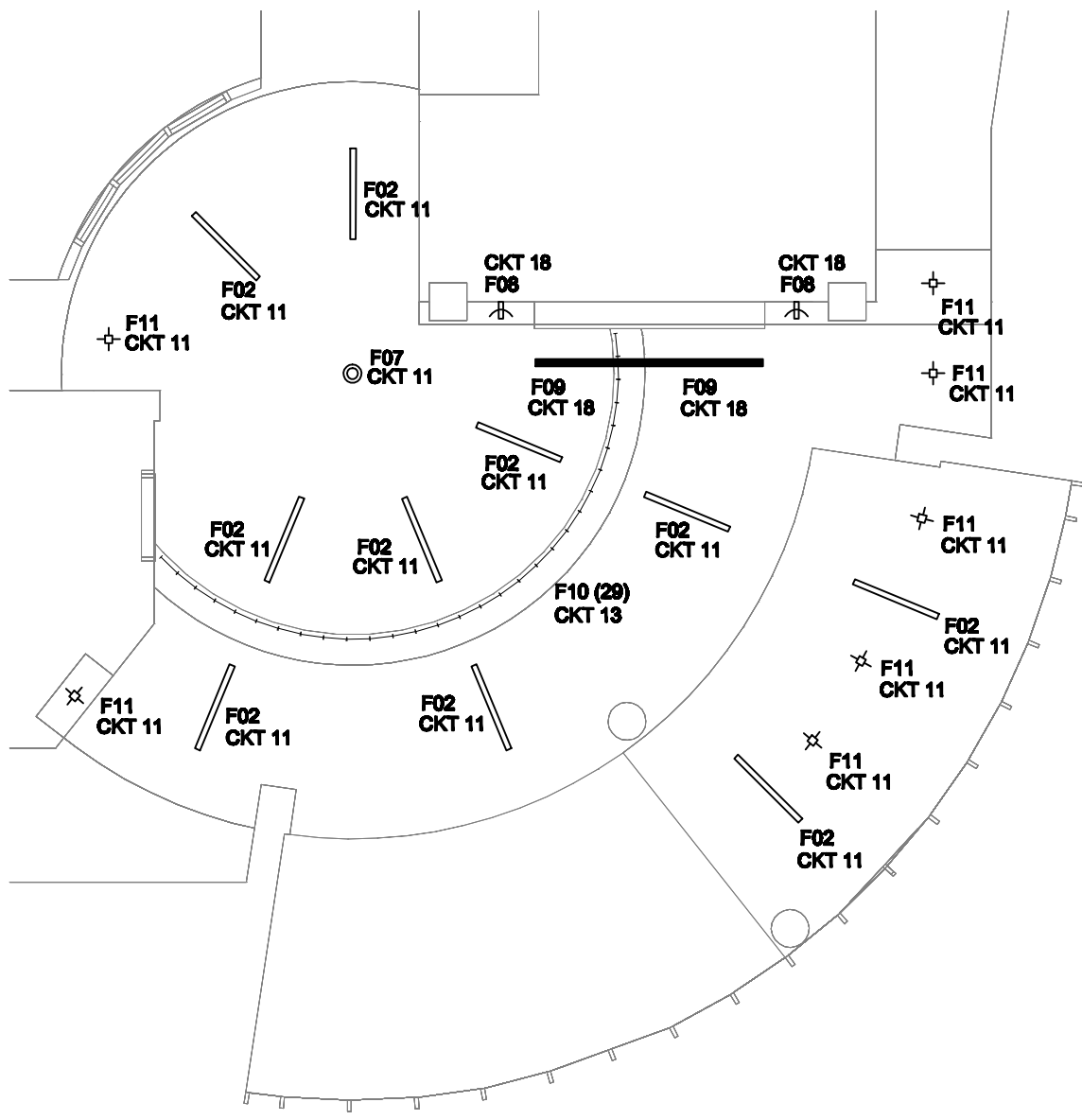


DESCRIPTION	GOAL	RESULT	MET?
Horizontal Illuminance	Floor: 10 fc	10.1, 9.8 fc Avg.	YES
Power Density (ASHRAE 90.1)	1.3 W/SF (Space Method)	0.79 W/SF	YES

**Power Density Calculation (Total First and Second Floors)**

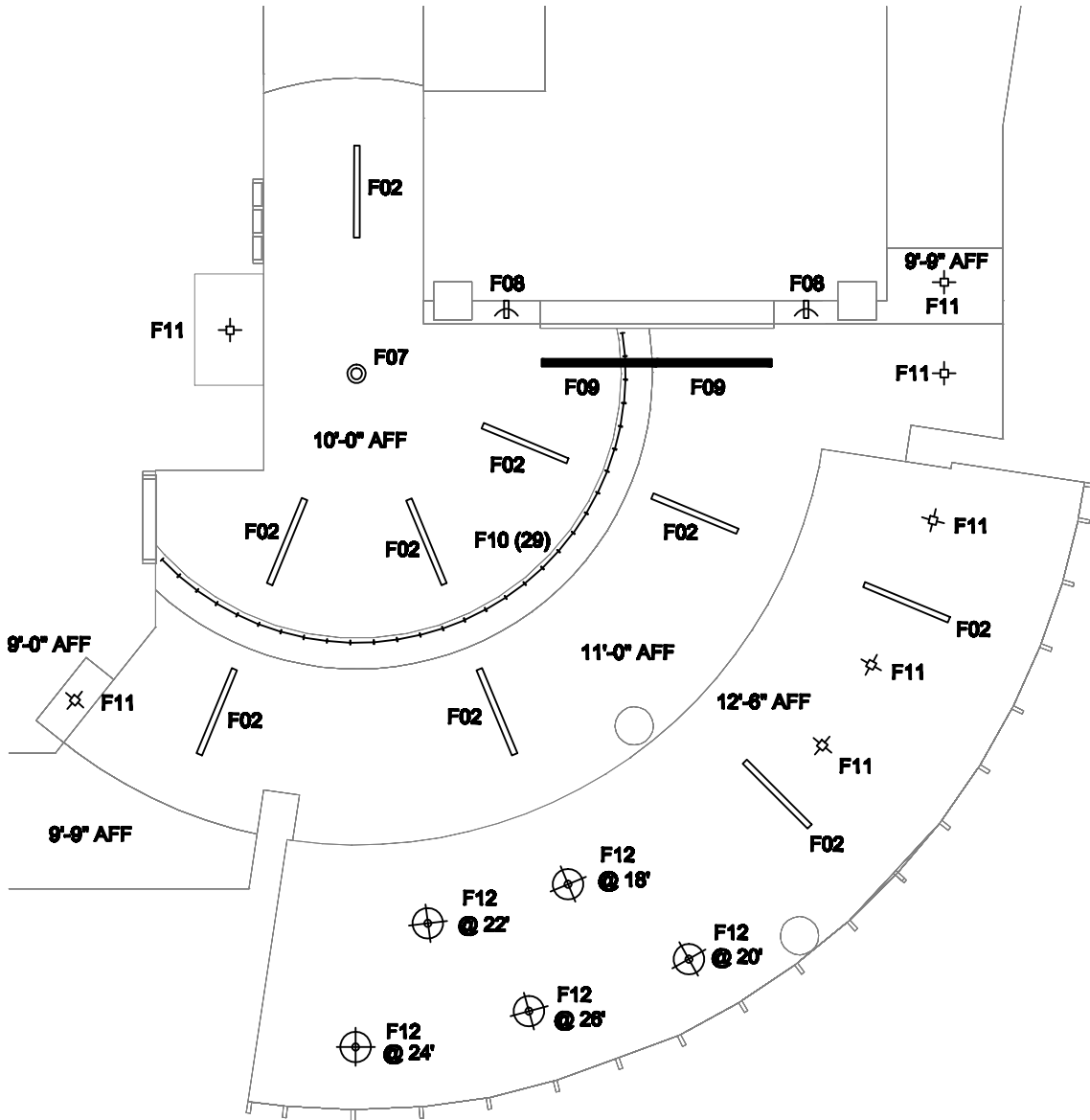


FIXTURE	QUANTITY	WATTS	TOTAL WATTS
F02	20	32	640
F07	2	20	40
F08	4	32	128
F09	4	38	152
F10	60	3	180
F11	14	35	490
F12	5	64	320
<b>TOTAL Watts</b>			1950
<b>Area (SF)</b>			1230 x 2 = 2460
<b>Power Density (W/SF)</b>			<b>0.79</b>



UCI Nat. Sci. Unit II Irvine, California	<b>Lighting Consultant:</b> Dr. Kevin Houser	<b>Grant Kightlinger</b> L/E Option	<b>Penn State University</b> AE Senior Thesis	<b>1F LOBBY LIGHTING RCP</b> 1/8" = 1'-0"
---	---	--	--	--

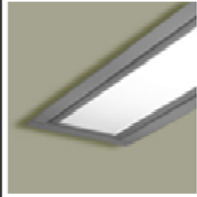










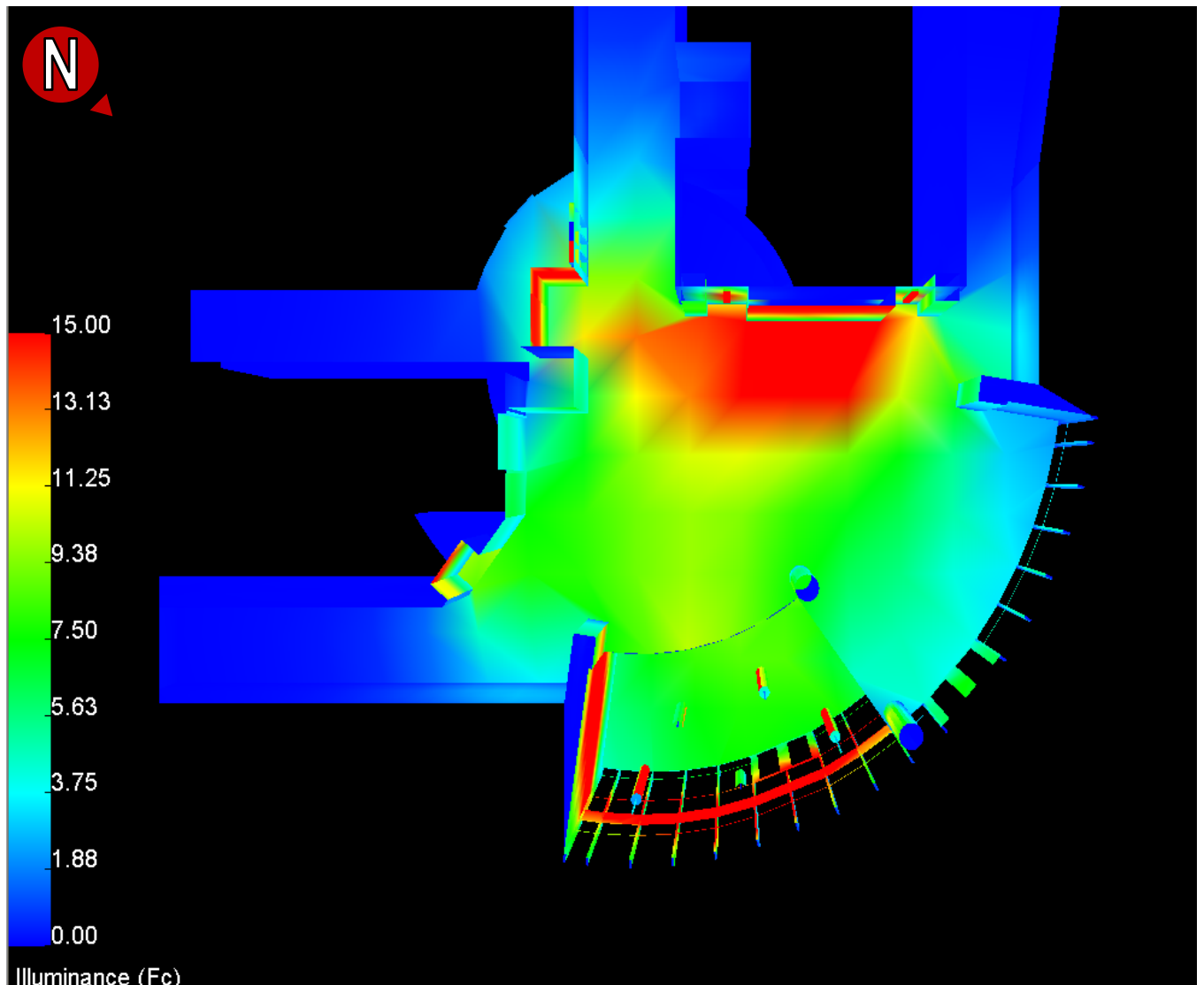
UCI Nat. Sci. Unit II Irvine, California	<b>Lighting Consultant:</b> Dr. Kevin Houser	Grant Kightlinger L/E Option	Penn State University AE Senior Thesis	<b>2F LOBBY LIGHTING RCP</b> 1/8" = 1'-0"
---	---	---------------------------------	---	--

Partial Fixture Schedule

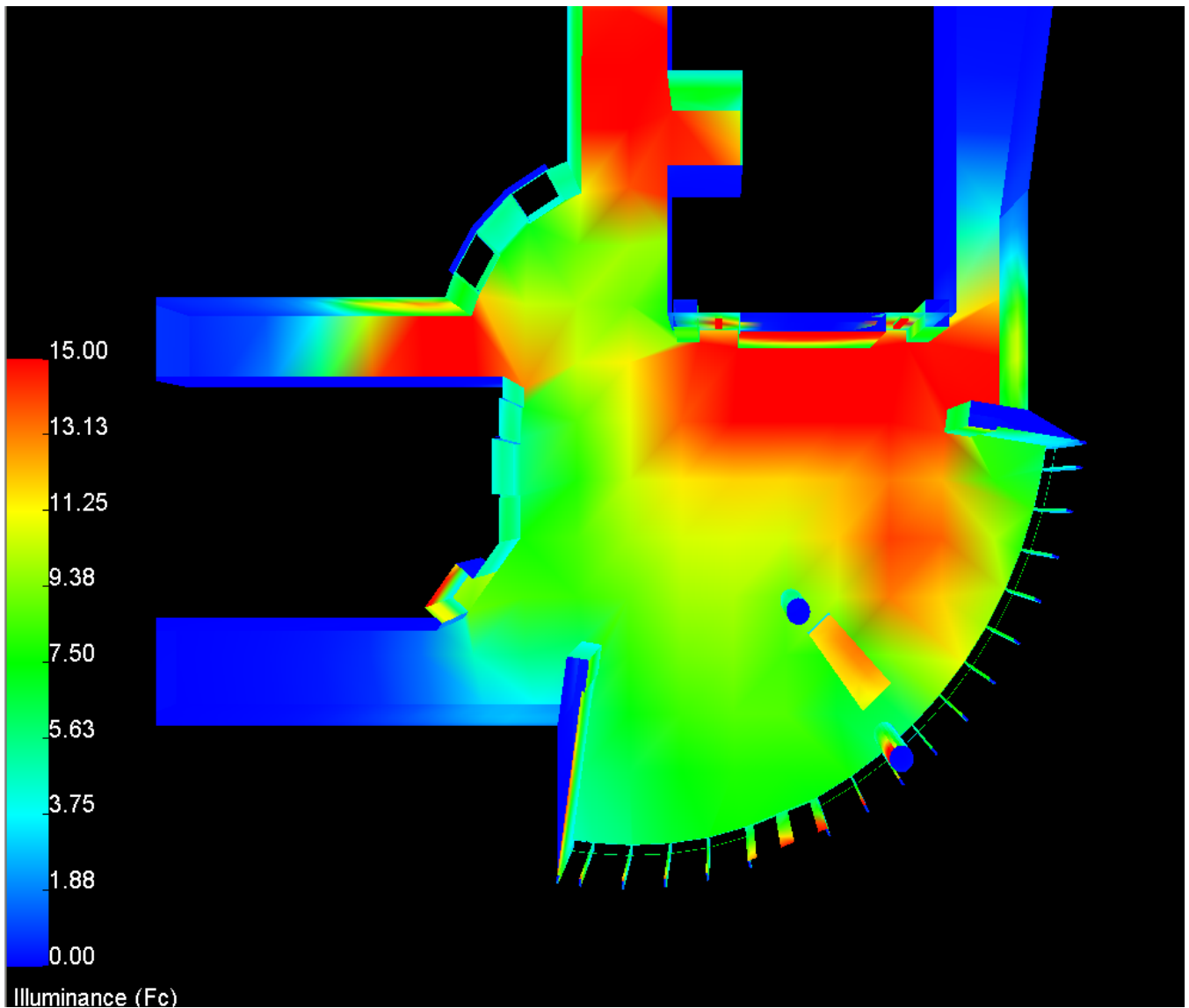


TYPE	IMAGE	MANUF.	DESCRIPTION
<b>INDOOR FIXTURES</b>			
F02		FOCAL POINT	"AVENUE B" - RECESSED SLOT FIXTURE. DIFFUSE FLUSH LENS, SINGLE CIRCUIT, DRYWALL FLANGE, MATTE WHITE HOUSING. STEEL CONSTRUCTION.
F07		LOUIS POULSEN	"BALLERUP"
F08		LIGHTOLIER	"SOLI" WALL-MOUNTED DECORATIVE T5 FIXTURE. METALLIC ALUMINUM FINISH, SEE DIFFUSER SPECIFICATION BELOW (ORDER SEPERATELY). ADA COMPLIANT
F09		ELLIPTIPAR	"STYLE 102" WALL CANTILEVER-MOUNTED WALL WASH LUMINAIRE. BRIGHT ALUMINUM FLUTED HOUSING WITH SILVER END PLATES, 18" CANTILEVEL ARM. 5' LENGTH.
F10		COLOR KINETICS	"iCOLOR COVE QLX" COVE-MOUNTED RGB COLOR-CHANGING COVE FIXTURE. 120 DEGREE CANDLEPOWER DISTRIBUTION, ADJUSTABLE POSITION MOUNTING BRACKET.
F11		PHILIPS	"OMEGA REVELATION" 4-INCH SQUARE CFL DOWNLIGHT. CLEAR SPECULAR REFLECTOR.
F12		SCHMITZ	"TOOL" PENDANT FIXTURE. NO DOWNLIGHT. RIBBED ACRYLIC TUBE, SATIN NICKEL FINISH. ADJUSTABLE SUSPENSION CABLE.

Pseudocolor Renderings



First Floor Lobby



Second Floor Lobby

**Statistics**

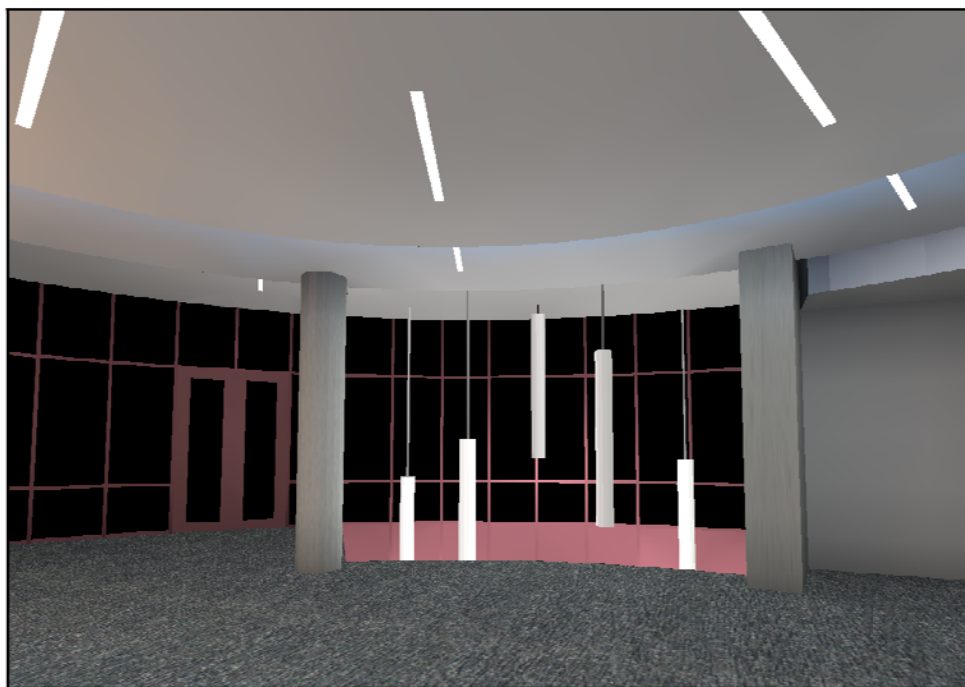


ZONE	HEIGHT	UNITS	AVG	MAX	MIN	AVG/MIN	MAX/MIN
First Floor	0'-0" AFF	fc	10.1	29.0	3.4	3.0	8.5
Second Floor	0'-0" AFF	fc	9.8	27.6	3.3	3.0	8.4

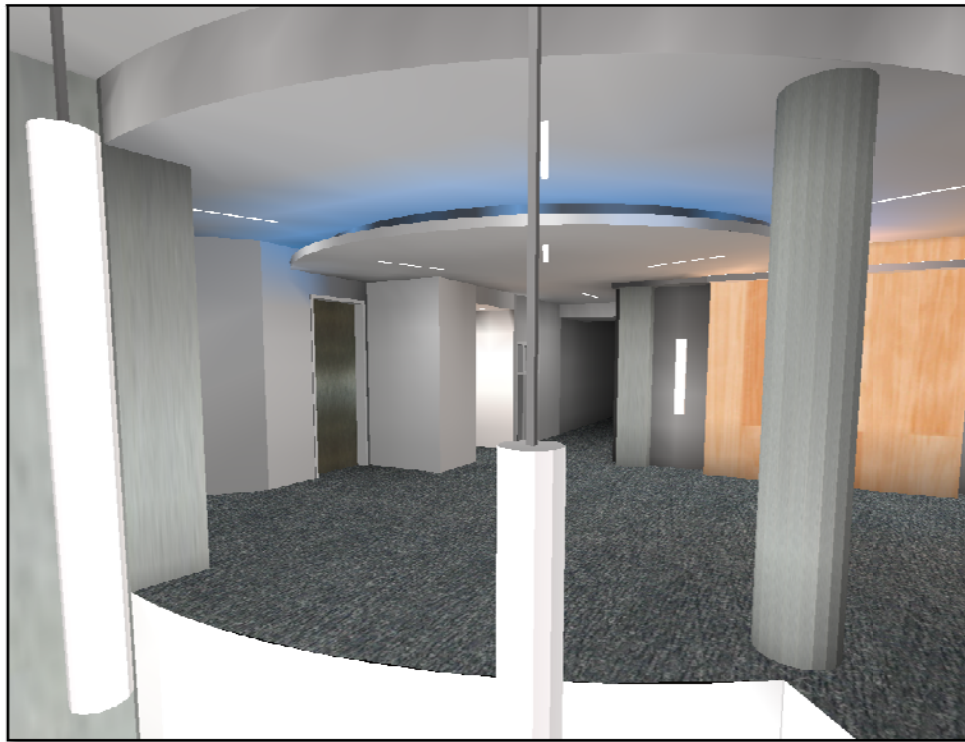
Renderings



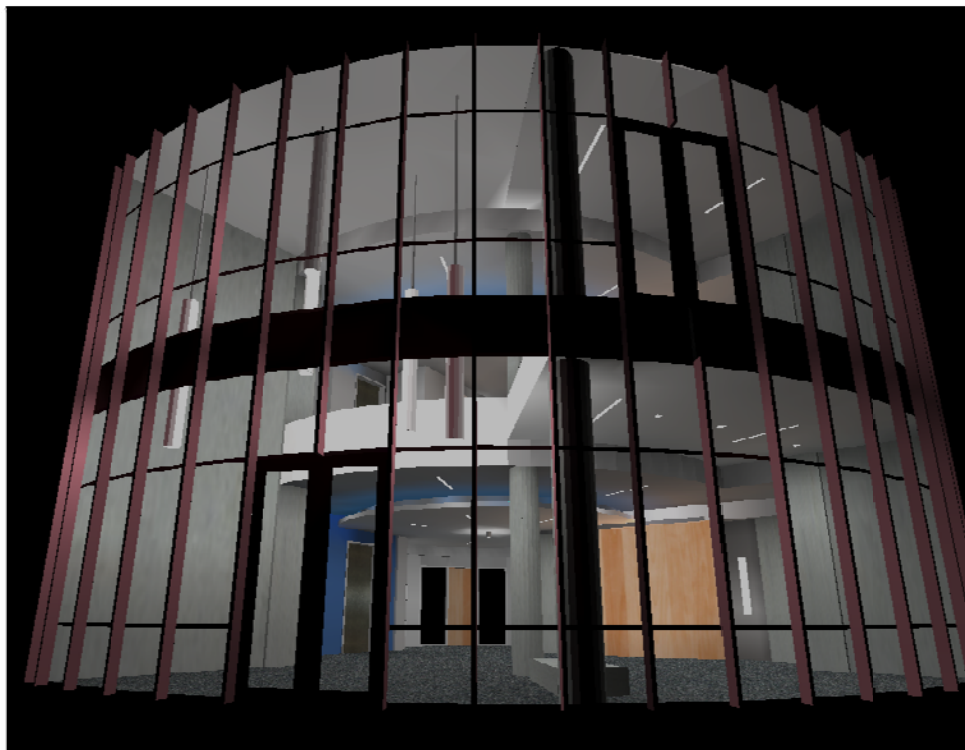
1<sup>st</sup> Floor from Main Doorway



2<sup>nd</sup> Floor from Center



2<sup>nd</sup> Floor from Atrium



View from North Plaza

**Light Loss Factors**



<b>FIXTURE</b>	<b>MAINT. CAT.</b>	<b>DISTR.</b>	<b>LLD</b>	<b>LDD</b>	<b>RSDD</b>	<b>BF</b>	<b>TOTAL LLF</b>
<b>F02</b>	V	DIRECT	0.93	0.87	0.96	1.00	0.78
<b>F07</b>	IV	DIRECT	0.85	0.89	0.96	1.00	0.73
<b>F08</b>	II	DIRECT/INDIRECT	0.93	0.87	0.93	1.00	0.75
<b>F09</b>	IV	DIRECT	0.96	0.89	0.96	1.00	0.82
<b>F10</b>	VI	DIRECT	0.85	0.85	0.96	-	0.70
<b>F11</b>	IV	DIRECT	0.85	0.89	0.96	1.00	0.73
<b>F12</b>	II	DIRECT	0.93	0.87	0.96	1.00	0.77

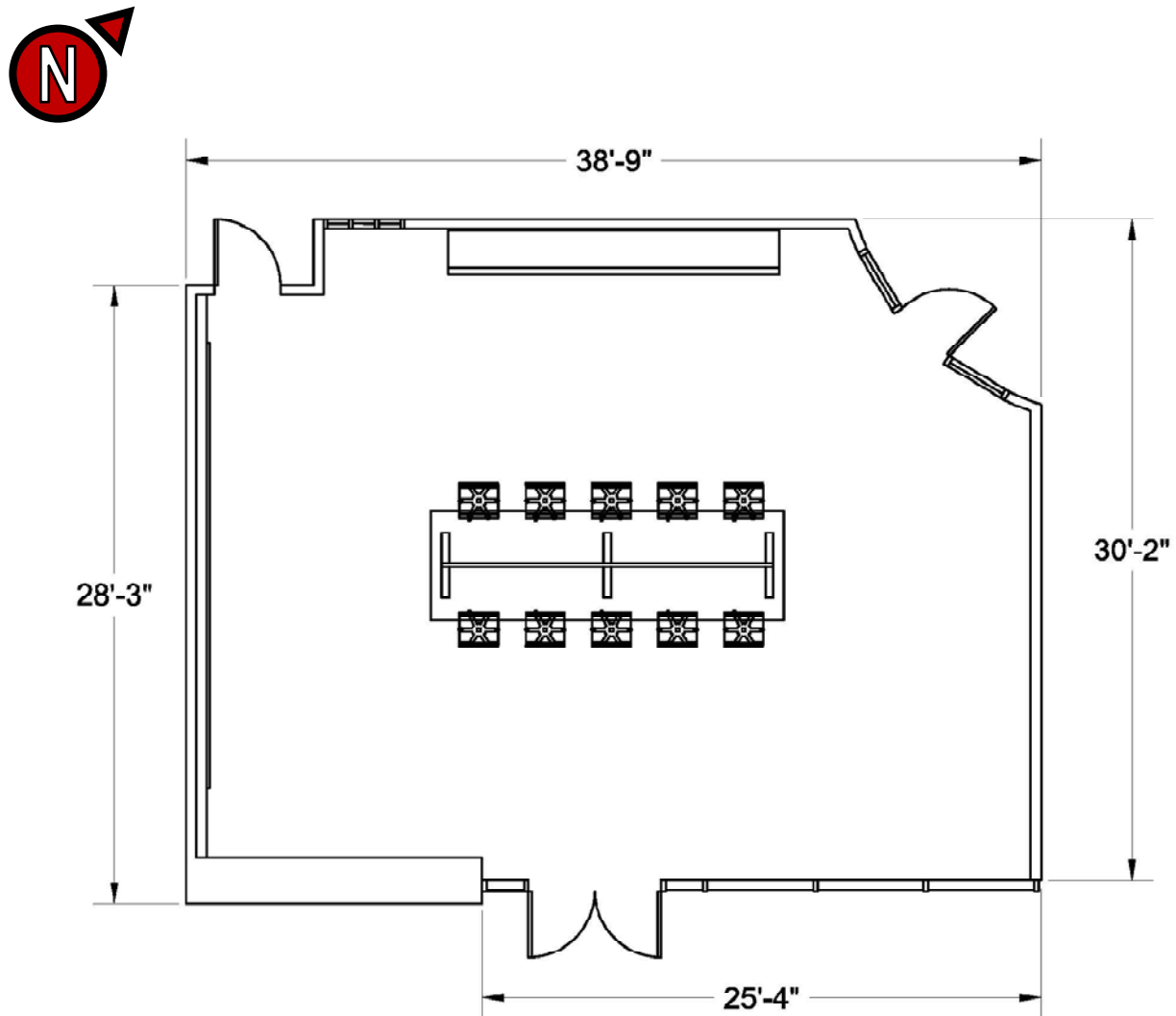
\* Assumptions:

1. Clean Environment, 12-month cleaning cycle.
2. 35°C lamp data used in calculations.

### LIGHTING - CONFERENCE ROOM

The large conference room on the first floor of the building is a multi-purpose space and serves as a location for face-to-face meetings, whiteboard lectures, A/V presentations and social gatherings. It measures approximately 1050 square feet. The room can be accessed through a main door connecting to the lobby to the north, and also through a secondary interior door to the west. Windows and doors on the southeast side of the room open to an outdoor patio space. On the southwest wall, a whiteboard is framed by a white maple wall. A credenza runs along the wall between the two interior entries, and a large conference table sits in the center of the room.

#### Dimensions



Partial First Floor Plan  
Scale: NTS



---

## Materials



### Floor

Material: Carpet  
Color: Medium Brown  
Reflectance: 0.20

### Walls

Material: Painted Gypsum  
Color: Semi-Gloss White, Semi-Gloss Blue  
Reflectance: 0.6, 0.3

### Whiteboard Wall

Material: Wood - White Maple  
Reflectance: 0.60

### Ceiling (Upper)

Material: Acoustic Ceiling Tile - 2' x 2' Suspended Grid  
Color: White  
Reflectance: 0.89

### Ceiling (Lower)

Material: Painted Gypsum  
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

### Table/Credenza

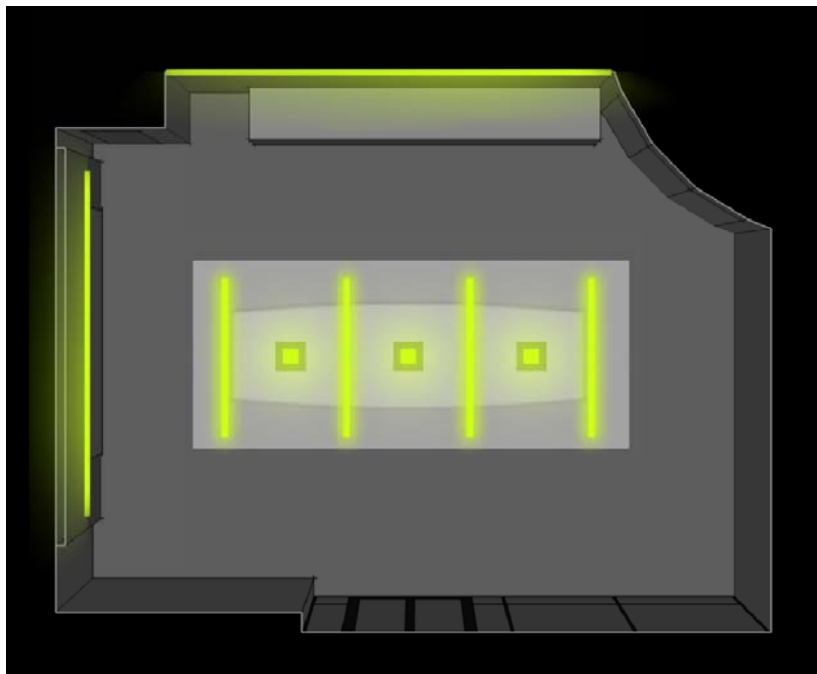
Material: Wood - White Maple

## Design Concept Development



This space is unique in that it has direct pedestrian access to a landscaped patio to the south. The transparency between these two spaces is of great importance for the lighting redesign. Within the room itself, flexibility of use is an important consideration. The lighting design is elegant and customizable to accommodate audio/visual presentations, group meetings, lectures, and casual entertaining situations without being too complex for user operation. The clean, linear fixtures in this room reinforce the linear motion theme which is echoed throughout the building and the simple, modern architectural style. Cool color temperature sources and colored surfaces are in contrast to the warmer color theme used in the exterior spaces.

The lighting in the conference room has gone through a few changes over the course of the project. The north wall is highlighted for visual interest and for the display of artwork. The surface behind the credenza has been fitted with a decorative texture which is then grazed from the top of the wall. This provides a focal point for the interior and exterior of the space. The general concept of the central fixture has been maintained, but has been simplified and suspended for a more ambient lighting solution, which is crucial for good facial rendering in the space.



Conference Room Schematic Design

---

## Design Objectives / Considerations



### Desired Perceptions

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 whenever possible. Visual clutter is to be avoided in this space, allowing the occupants to focus on the meeting or presentation at hand. Peripheral emphasis is used to encourage relaxation, especially in the social mode.

### Focal Points

The accessible patio is a major focal point of the space as mentioned above. Within the room itself, other focal emphases vary by mode and include: facial rendering for meetings, the whiteboard/projection screen, the textured credenza wall, and the accented art and/or articles posted on the rear wall.

### 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 is maximized to help soften shadows and provide a more favorable facial image.

### Color

Color rendering is somewhat important in social modes to provide favorable rendering of faces and possibly food or other displays. Cool (high CCT) sources are selected to fit with the technological, modern style of the building.

### Facial Rendering

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

**Technical Objectives**

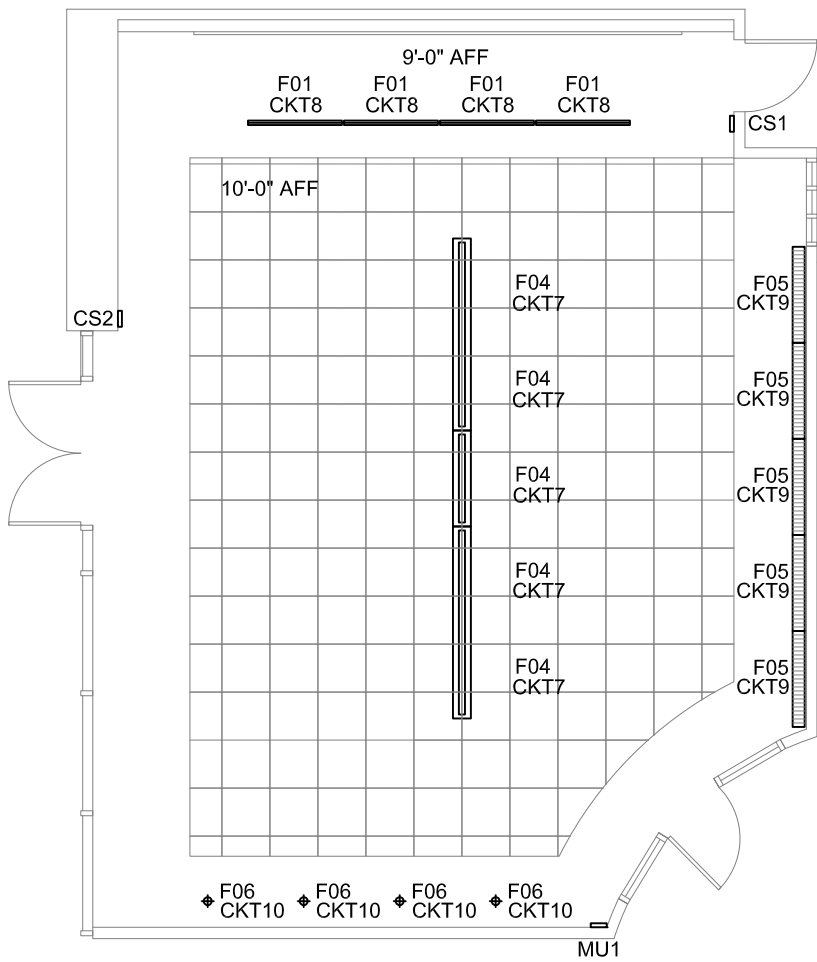


DESCRIPTION	GOAL	RESULT	MET?
<b>Meeting / Classroom Mode</b>	Table: <b>30 fc</b> Avg. Horizontal	<b>33.7 fc</b>	<b>YES</b>
	Credenza: <b>15 fc</b> Avg. Horizontal	<b>25.0 fc</b>	<b>YES</b>
	Whiteboard: <b>30 fc</b> Avg. Vertical	<b>35.6 fc</b>	<b>YES</b>
	Faces: <b>15 fc</b> Avg. Vertical	<b>25.6 fc</b>	<b>YES</b>
<b>A/V Presentation Mode</b>	Projection Screen: <b>&lt; 5 fc</b> Max Vertical	<b>2.6 fc</b>	<b>YES</b>
	Table: <b>15-30 fc</b> Avg. Horizontal	<b>16.3 fc</b>	<b>YES</b>
<b>Social Mode</b>	Faces: <b>15 fc</b> Avg. Vertical	<b>16.1 fc</b>	<b>YES</b>
	Credenza: <b>15 fc</b> Avg. Horizontal	<b>28.3 fc</b>	<b>YES</b>
<b>Power Density (ASHRAE 90.1)</b>	<b>1.3 W/SF</b> (Space Method)	<b>0.56 fc</b>	<b>YES</b>

**Power Density Calculation**



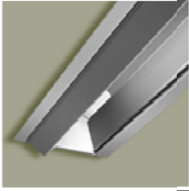
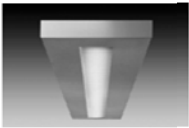


FIXTURE	QUANTITY	WATTS	TOTAL WATTS
<b>F01</b>	4	32	128
<b>F04</b>	5	32	160
<b>F05</b>	5	32	160
<b>F06</b>	4	35	140
<b>TOTAL Watts</b>			588
<b>Area (SF)</b>			1050
<b>Power Density (W/SF)</b>			<b>0.56</b>



UCI Nat. Sci. Unit II Irvine, California	Lighting Consultant:	Grant Kightlinger L/E Option	Penn State University AE Senior Thesis	CONF ROOM LIGHTING RCP 1/8" = 1'-0"
	Dr. Kevin Houser			

**Partial Fixture Schedule**



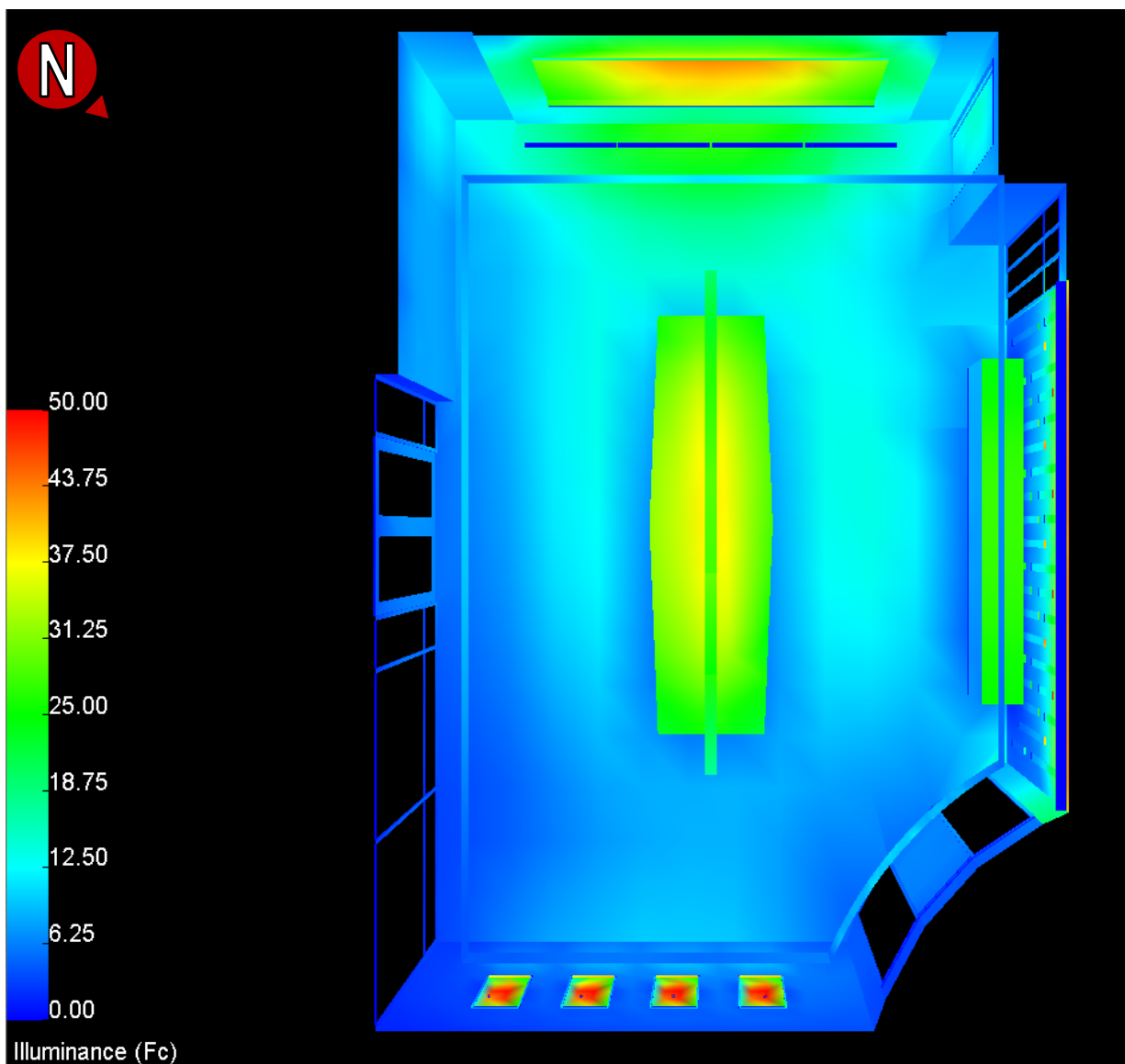
TYPE	IMAGE	MANUF.	DESCRIPTION
<b>INDOOR FIXTURES</b>			
F01		FOCAL POINT	"AVENUE A" - NARROW APERTURE ASYMMETRIC WALL WASHER. SINGLE CIRCUIT, DRYWALL FLANGE, MATTE WHITE HOUSING, 4' NOMINAL LENGTH. STEEL CONSTRUCTION.
F04		FOCAL POINT	"TWELVE" - SUSPENDED INDIRECT/DIRECT LUMINIRE. PARALLEL BLADE LOUVER, 24" CABLE SUSPENSION, INTEGRAL WATTSTOPPER OCCUPANCY SENSOR, TITANIUM SILVER FINISH, FACTORY 20' RUN
F05		LIGHTOLIER	"PTS5-1" - RECESSED PERIMETER WALL WASH. STRAIGHT BLADE ALUMINUM LOUVER, DIE-FORMED STEEL CONSTRUCTION
F06		TECH LIGHTING	"SPOT" TRACK HEAD. COMPATIBLE WITH MONORAIL SYSTEM. 4.5" LENGTH. SATIN NICKEL FINISH. DESIGNER APPROVAL REQUIRED FOR LAMP SUBSTITUTION.

Meeting / Classroom Mode – Dimming Levels



ZONE	OUTPUT LEVEL
1 – Table Pendant	100%
2 – Whiteboard Wash	100%
3 – Credenza Wall	80%
4 – Rear Wall Accent	100%

Meeting / Classroom Mode – Pseudocolor Renderings

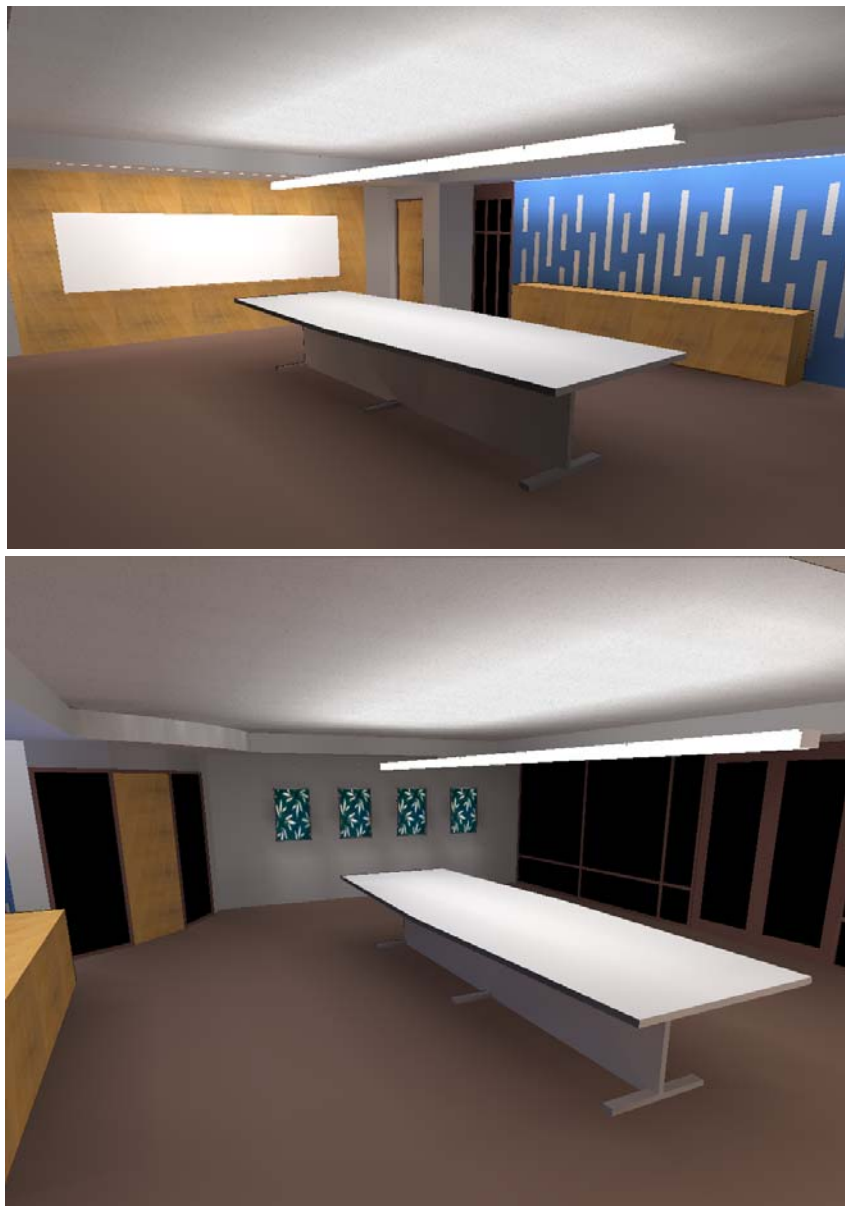


**Meeting / Classroom Mode - Statistics**



ZONE	HEIGHT	UNITS	AVG	MAX	MIN	AVG/MIN	MAX/MIN
Conference Table	3'-0"	fc	33.7	38.0	25.3	1.3	1.5
Faces @ Table	Vertical	fc	25.6	27.8	20.4	1.3	1.4
Whiteboard	Vertical	fc	35.6	46.0	20.2	1.8	2.3
Credenza	3'-0"	fc	24.9	35.3	14.1	1.8	2.5
Artwork	Vertical	fc	46.7	197	11.2	4.2	17.6

**Meeting / Classroom Mode - Renderings**



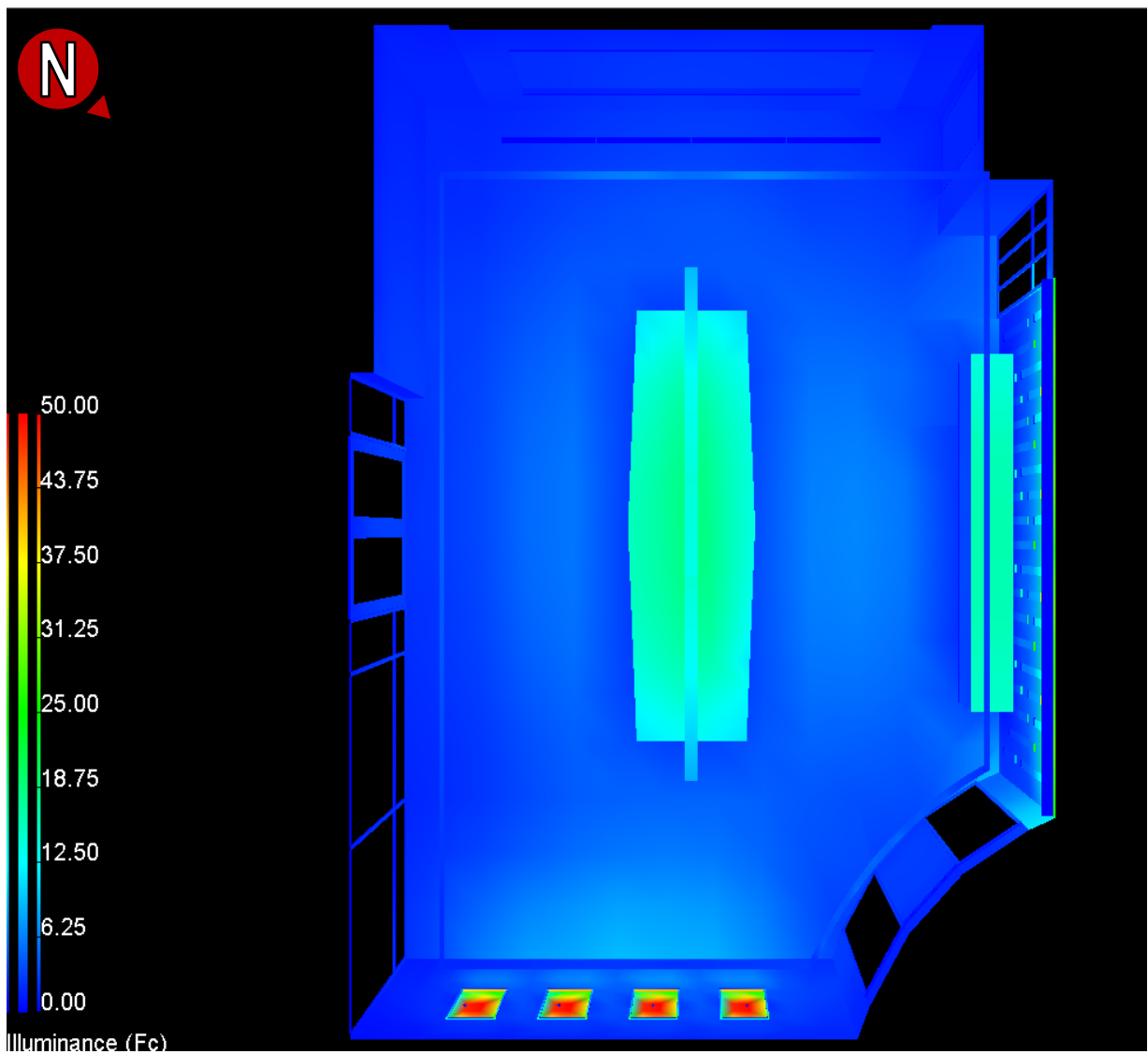


**A/V Presentation Mode – Dimming Levels**



ZONE	OUTPUT LEVEL
1 – Table Pendant	50%
2 – Whiteboard Wash	OFF
3 – Credenza Wall	50%
4 – Rear Wall Accent	100%

**A/V Presentation Mode – Pseudocolor Renderings**

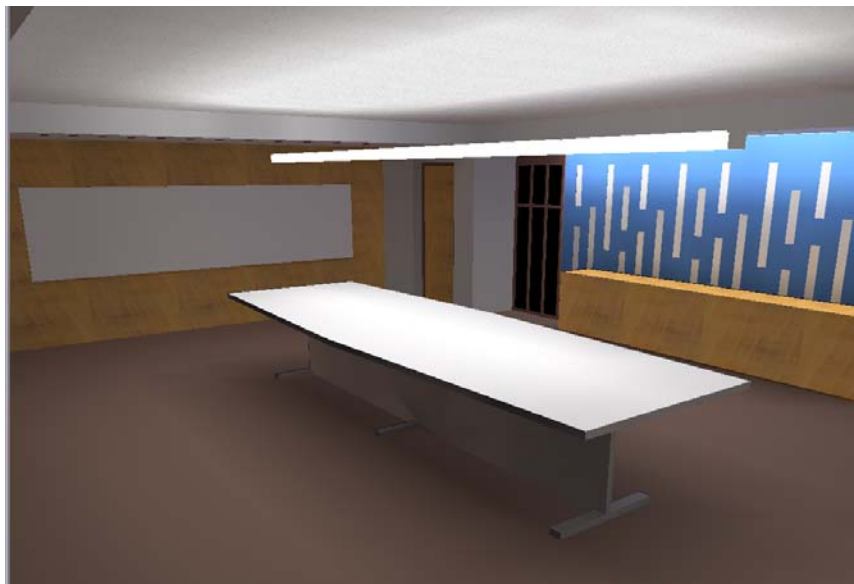


**A/V Presentation Mode – Statistics**



ZONE	HEIGHT	UNITS	AVG	MAX	MIN	AVG/MIN	MAX/MIN
Conference Table	3'-0"	fc	16.3	18.5	12.6	1.3	1.5
Faces @ Table	Vertical	fc	12.3	13.5	10.1	1.2	1.3
Projection Screen	Vertical	fc	2.4	2.6	1.9	1.3	1.4
Credenza	3'-0"	fc	14.8	24.9	6.5	2.3	3.8
Artwork	Vertical	fc	46.9	197	11.3	4.2	17.4

**A/V Presentation Mode – Renderings**

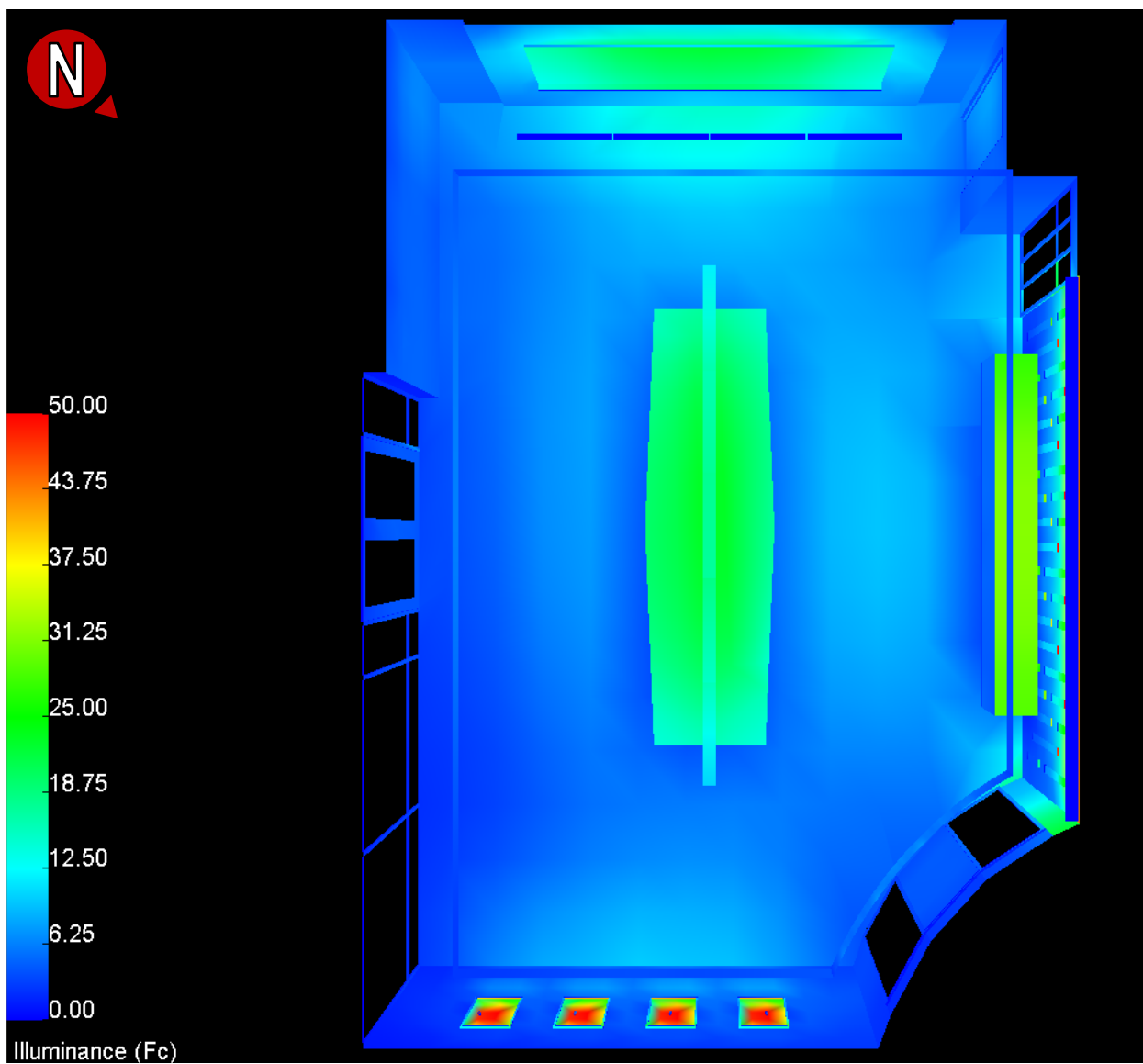


**Social Mode – Dimming Levels**



ZONE	OUTPUT LEVEL
1 – Table Pendant	60%
2 – Whiteboard Wash	50%
3 – Credenza Wall	100%
4 – Rear Wall Accent	100%

**Social Mode – Pseudocolor Renderings**



**Social Mode – Statistics**



ZONE	HEIGHT	UNITS	AVG	MAX	MIN	AVG/MIN	MAX/MIN
Conference Table	3'-0"	fc	20.6	23.2	15.6	1.3	1.5
Faces @ Table	Vertical	fc	16.1	17.4	13.0	1.2	1.3
Whiteboard	Vertical	fc	18.7	23.9	10.8	1.7	2.2
Credenza	3'-0"	fc	28.3	41.4	14.4	2.0	2.9
Artwork	Vertical	fc	49.9	212	9.5	5.25	22.3

**Social Mode – Renderings**



**Light Loss Factors**



<b>FIXTURE</b>	<b>MAINT. CAT.</b>	<b>DISTR.</b>	<b>LLD</b>	<b>LDD</b>	<b>RSDD</b>	<b>BF</b>	<b>TOTAL LLF</b>
<b>F01</b>	IV	DIRECT	0.93	0.89	0.98	1.0	0.81
<b>F04</b>	II	SEMI-INDIRECT	0.93	0.94	0.94	1.0	0.82
<b>F05</b>	IV	DIRECT	0.93	0.89	0.98	1.0	0.81
<b>F06</b>	IV	DIRECT	0.85	0.89	0.98	-	0.74

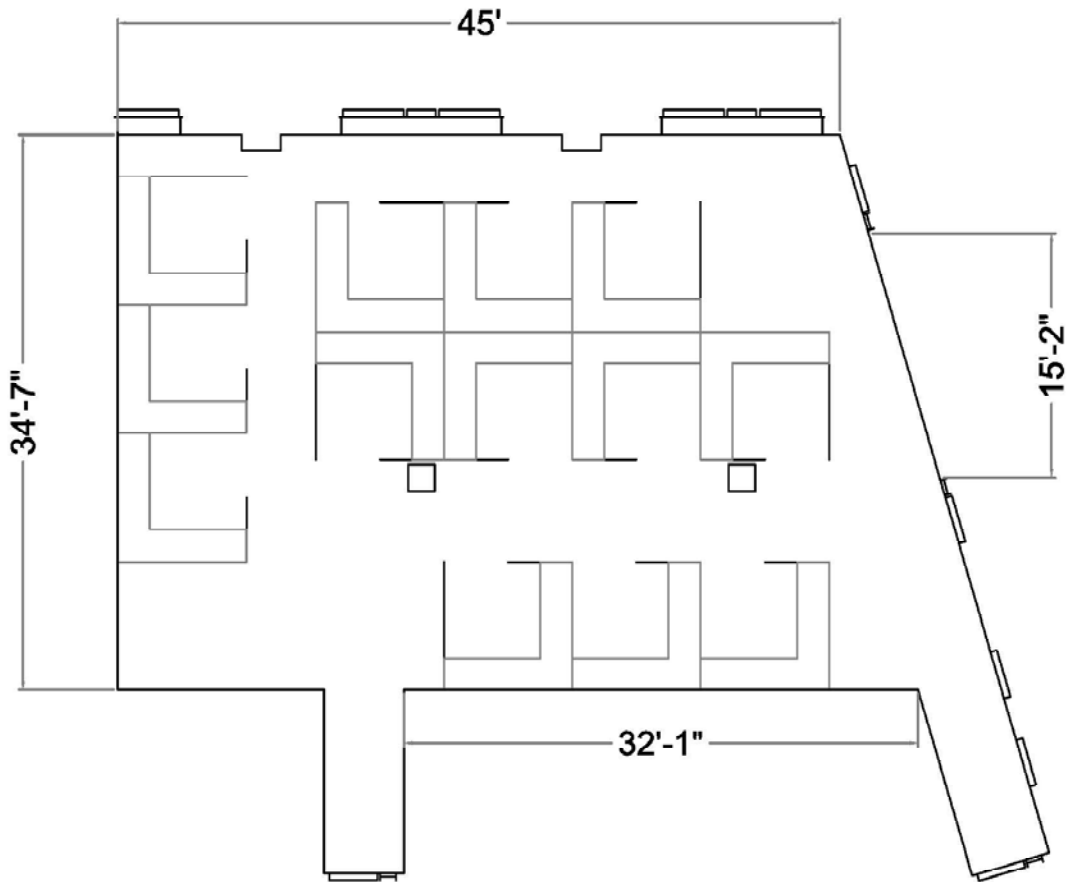
\* Assumptions:

1. Clean Environment, 12-month cleaning cycle.
2. 35°C lamp data used in calculations.

### LIGHTING – OPEN OFFICE

Located on the third floor of the building, the open office contains workspaces for graduate students of the Biological Sciences department at UCI. The space measures approximately 1,840 square feet and features three 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.

#### Dimensions



*Partial Third Floor Plan*  
Scale: NTS

---

**Materials**



**Floor**

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

**Walls**

Material: Painted Gypsum  
Color: Semi-Gloss White, Semi-Gloss Blue  
Reflectance: 0.6, 0.3

**Ceiling**

Material: Gypsum  
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

**Window Framing**

Material: Painted Steel  
Transmittance: 0.15

**Desks**

Material: Wood - White Maple  
Reflectance: 0.60

---

## Design Concept Development



The overarching design concept for the building embraces motion, especially radial or explosive motion between the interior and exterior of the structure. Parallel linear elements are used to support this sensation of unidirectional motion. Through the manipulation of color temperature and surface finishes, the inner spaces are given a cool, blue tone in contrast to the warmer exterior surfaces. Recessed ceiling strips are low-profile and are not distracting to the eye. Lighting elements below the ceiling have been avoided in this space to maintain views through the windows and to create a sleeker, custom appearance. The views from the exterior into the space played a large part in the decision to lay fixtures perpendicular to the window plane, which creates a more dramatic effect.

The office has been significantly redesigned since the schematic design presentation to create a more aesthetically exciting space from inside and outside the building. The unique lighting solution in this space relies and plays upon the overarching concepts of the architecture and lighting design without being too distracting. The windows have been highlighted as a central focus in the space and are framed by the lighting and the circulation paths between workspaces. Peripheral walls have been highlighted to accentuate color and architectural features which can be seen throughout the space.



---

## Design Objectives / Considerations



### Desired Perceptions

The space is intended to feel clean, cool and dynamic. Due to the relatively low ceiling height (10'-0"), fixtures are tucked away as much as possible to avoid visual clutter in the space. A strong connection to the outdoors should be felt during the day and at night.

### Focal Points

The main focal point of the space is intended to be the view of campus from the row of windows on the north wall. The north-south orientation and low profile of the ceiling fixtures draw the eye toward the windows. An announcement/posting area is highlighted on the slanted east wall, and becomes a secondary focus of the room. Columns and pilasters are also accented in blue for balance and visual interest.

### Glare

Reflected glare on computer screens from ceiling fixtures is a concern in this space. High contrast ratios have been avoided as much as possible. An assumption has been made that the computers in this space use flat, diffuse screen technology, greatly reducing the possibility of reflected glare from the ceiling fixtures. Please refer to the glare potential calculation on the next page for more information.

### 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 are used to create an ambient light and to reduce hard shadows. Individual task lighting allows the occupants to manually adjust their workspaces depending on the task at hand.

### 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 will 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.

**Technical Objectives**



DESCRIPTION	GOAL	RESULT	MET?
<b>Workplane Illuminance</b>	<b>25 – 35</b> horizontal fc on workplane (3'-0") *	Avg. = <b>28.9</b> fc	<b>YES</b>
<b>Workplane Uniformity</b>	Workplane uniformity Max/Min ≤ <b>5:1</b>	Avg./Min = <b>4.9:1</b>	<b>YES</b>
<b>Circulation Illuminance</b>	<b>&gt;10</b> horizontal fc in circulation areas (0'-0")	Avg.= <b>19.6</b>	<b>YES</b>
<b>Power Density (ASHRAE 90.1)</b>	<b>1.1</b> W/SF (Space Method)	<b>0.86</b> W/SF	<b>YES</b>

\* NOTE: This value does not include illumination from personal task lighting. Keeping the overall lighting at a lower level saves energy by allowing occupants to turn off task lights when absent or not performing visually intensive activities.

**Power Density Calculation**



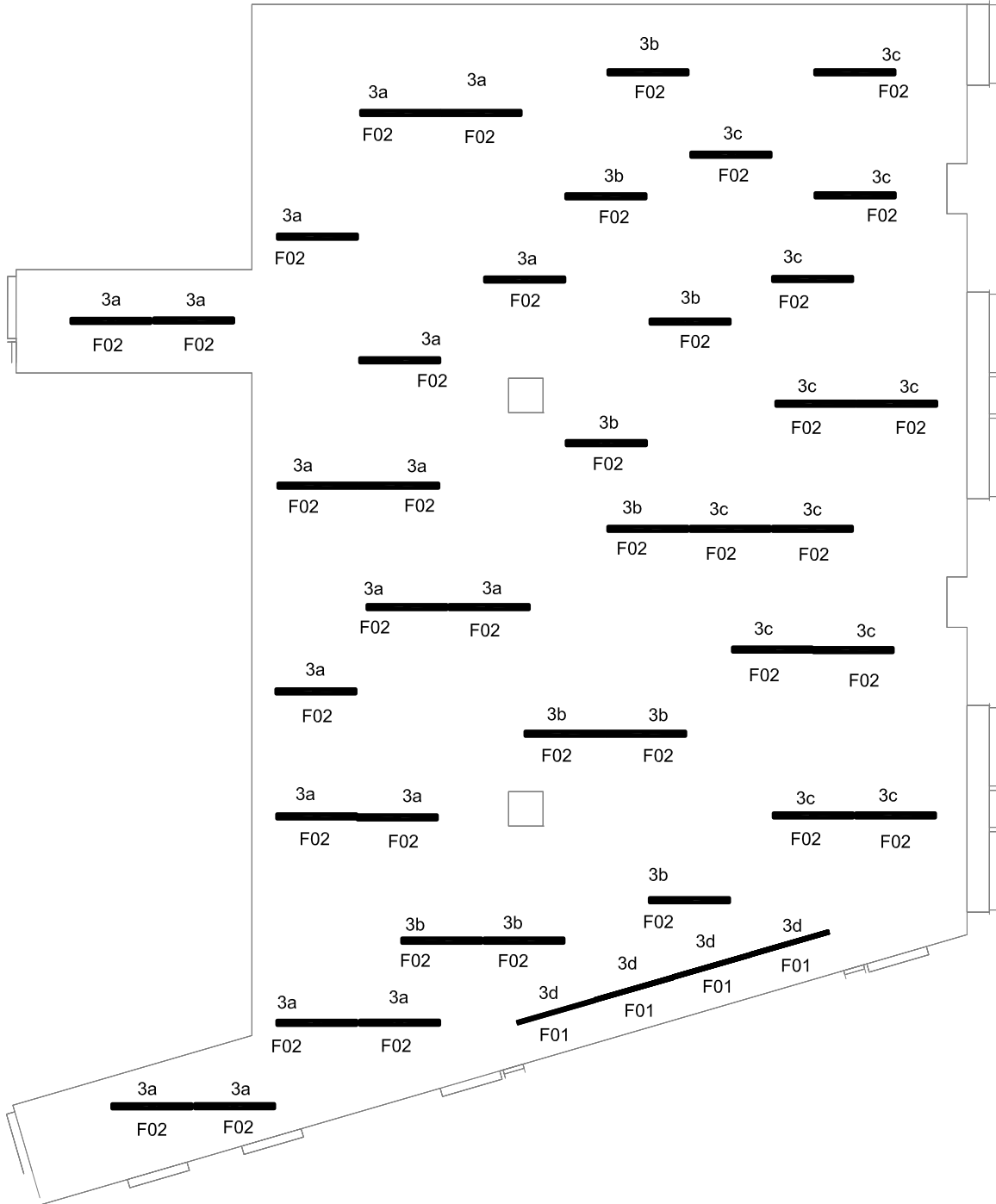
FIXTURE	QUANTITY	WATTS	TOTAL WATTS
<b>F01</b>	4	32	128
<b>F02</b>	40	32	1280
<b>F03</b>	13	13	169
<b>TOTAL Watts</b>			1577
<b>Area (SF)</b>			1840
<b>Power Density (W/SF)</b>			<b>0.86</b>

**Glare Potential Calculation**



According to ANSI / IESNA RP-1-04, normal office spaces with regular use of visual display terminals (VDTs) should meet certain candlepower limits by vertical angle in order to reduce visual discomfort and reflected glare. The recommended practice names these maximum values as: 300 cd at 65 degrees, 185 cd at 75 degrees, and 60 cd at 85 degrees from the vertical. The following excerpt from the specifications of fixture type F02 show that the values for 65 degrees are only slightly over recommended values. To achieve a desirable aesthetic impression in the space, and with the assumption that modern desktop display terminals are not perfectly specular, the fixture has still been specified.




Vertical Angle	Horizontal Angle					Zonal Lumens
	0°	22.5°	45°	67.5°	90°	
65°	356	338	310	297	293	315
75°	165	158	150	144	142	160
85°	35	37	38	38	40	41



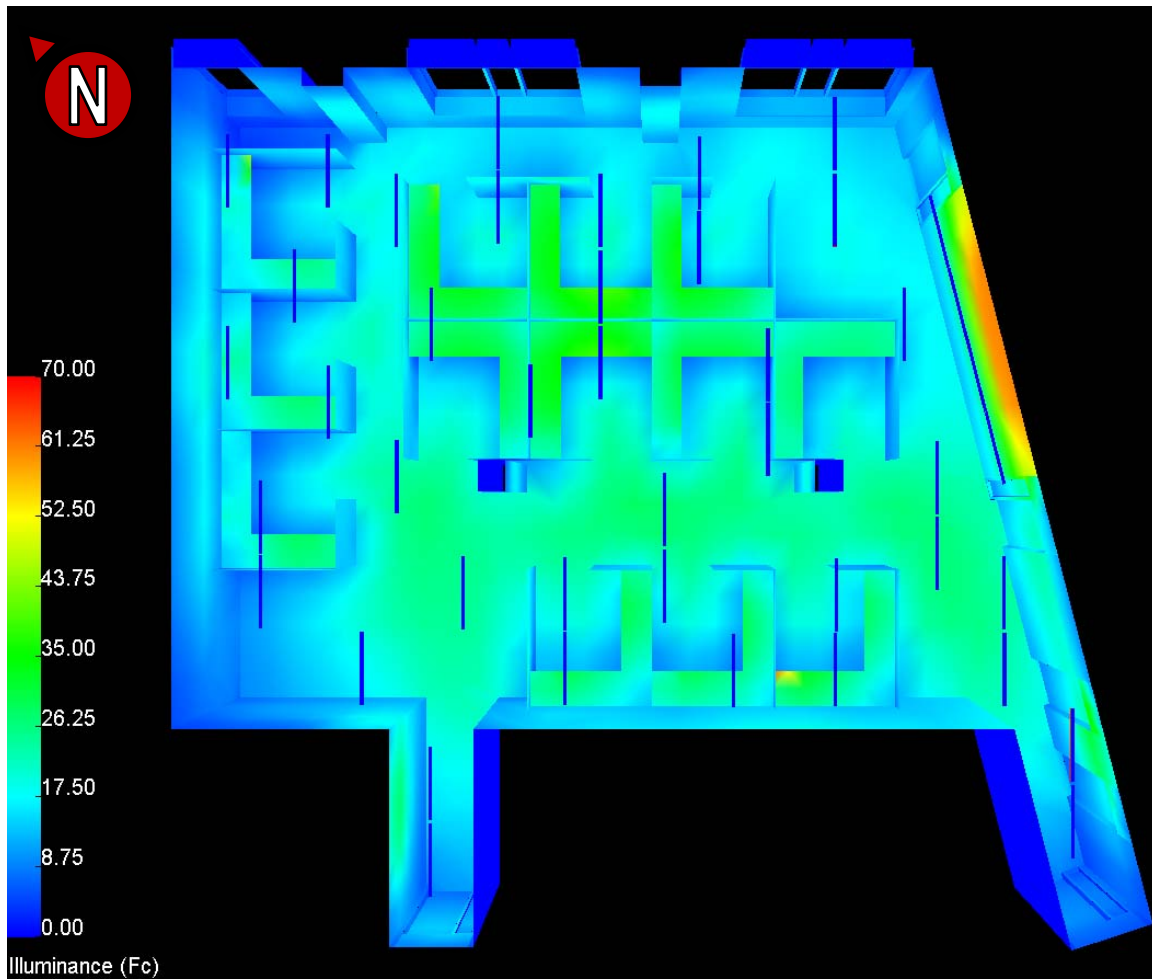
UCI Nat. Sci. Unit II Irvine, California	Lighting Consultant	Grant Kightlinger L/E Option	Penn State University AE Senior Thesis	OPEN OFFICE LIGHTING RCP 1/8" = 1'-0"
	Dr. Kevin Houser			

**Partial Fixture Schedule**



TYPE	IMAGE	MANUF.	DESCRIPTION
<b>INDOOR FIXTURES</b>			
<b>F01</b>		FOCAL POINT	"AVENUE A" - NARROW APERTURE ASYMMETRIC WALL WASHER. SINGLE CIRCUIT, DRYWALL FLANGE, MATTE WHITE HOUSING, 4' NOMINAL LENGTH. STEEL CONSTRUCTION.
<b>F02</b>		FOCAL POINT	"AVENUE B" - RECESSED SLOT FIXTURE. DIFFUSE FLUSH LENS, SINGLE CIRCUIT, DRYWALL FLANGE, MATTE WHITE HOUSING. STEEL CONSTRUCTION.
<b>F03</b>		LIGHTOLIER	"SURFSIDE" CFL PERSONAL TASK LIGHT. 20" ARM, SILVER FINISH, TABLE BASE

**Pseudocolor Renderings**



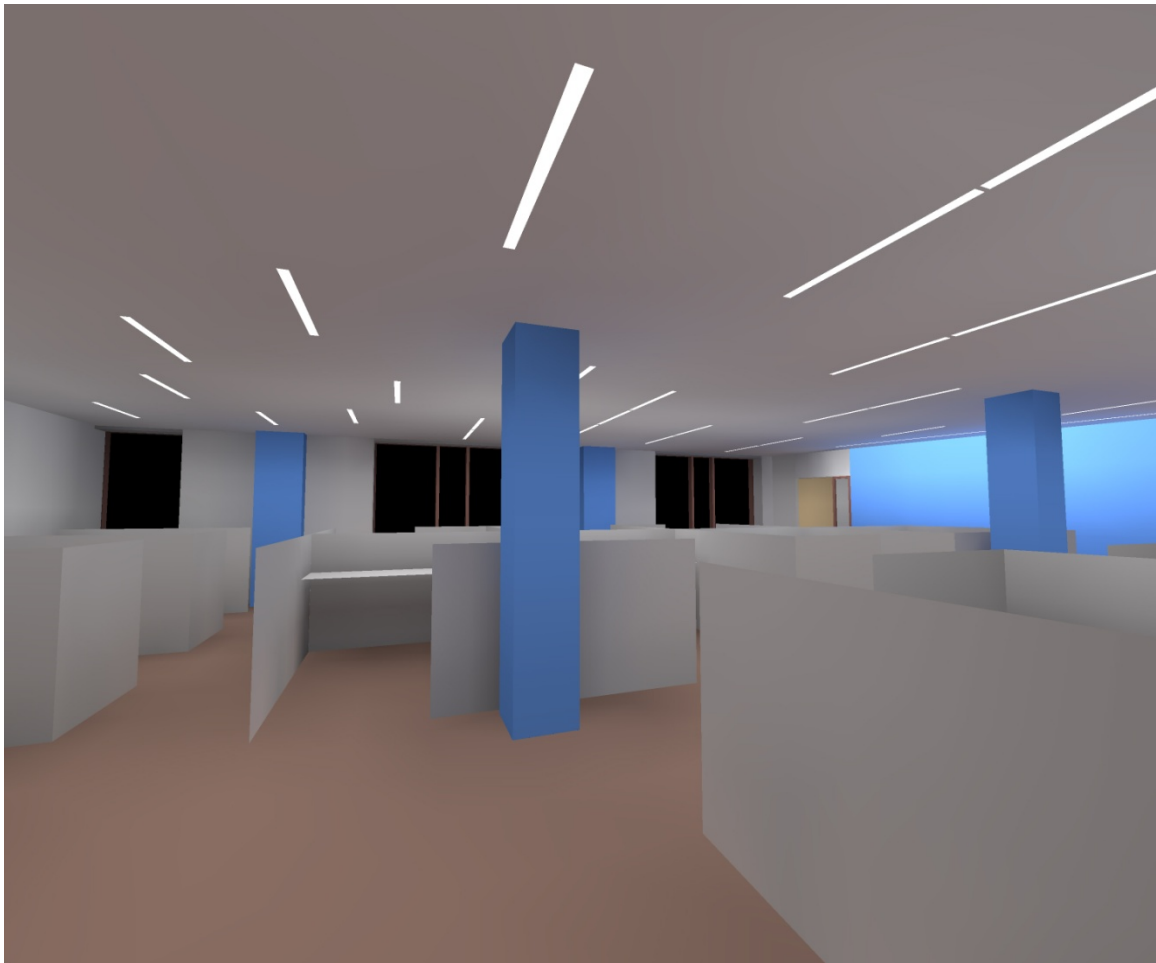
**Statistics**



ZONE	HEIGHT	UNITS	AVG	MAX	MIN	AVG/MIN	MAX/MIN
Workplane	3'-0"	fc	28.9	41.8	8.4	3.4	4.9
Circulation	0'-0"	fc	19.6	28.6	2.0	9.8	14.3

\* NOTE: All calculations were completed in AGI32 and use grid spacing of 1'-0".

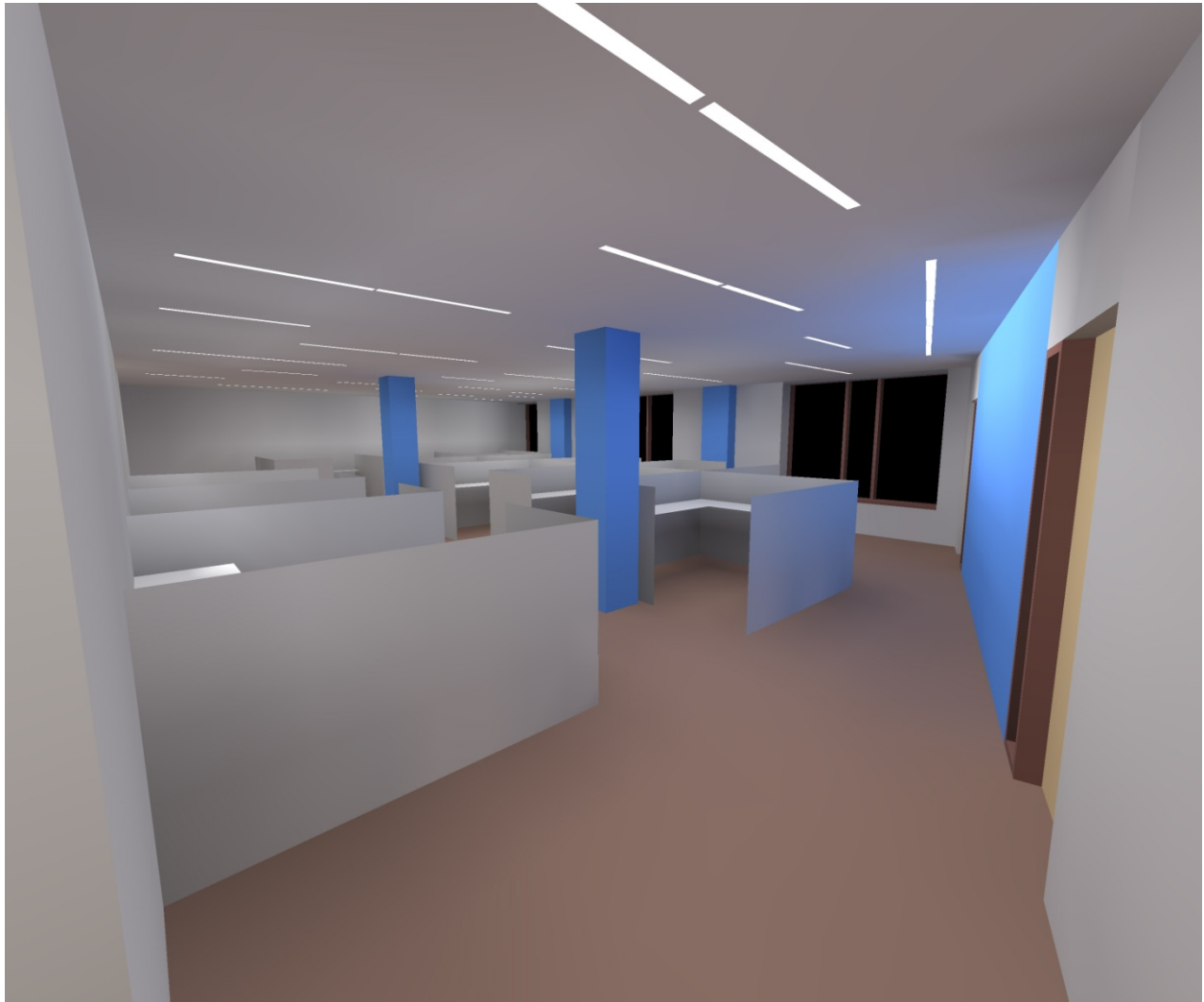
Renderings



Perspective from West Entrance



Exterior View from North



Perspective from East Entrance

Light Loss Factors



FIXTURE	MAINT. CAT.	DISTR.	LLD	LDD	RSDD	BF	TOTAL LLF
F01	IV	DIRECT	0.93	0.89	0.98	1.0	0.81
F02	VI	DIRECT	0.93	0.87	0.98	1.0	0.79
F03	IV	DIRECT	0.80	0.89	0.98	1.0	0.70

\* Assumptions:

1. Clean Environment, 12-month cleaning cycle.
2. 35°C lamp data used in calculations.