

JAMES KLINE

LIGHTING + ELECTRICAL

SUNY CORTLAND  
STUDENT LIFE CENTER  
Cortland, NY

---

# Tech Report 1



## Executive Summary

Tech 1 – Part 2 accomplishes four major goals for the four spaces mentioned in Tech 1 – Part 1:

1. It describes briefly the underlying concept that will be used for future designs
2. Design criteria is described in both qualitative and quantitative constraints
3. Existing conditions are identified for the current lighting design
4. Existing conditions are evaluated on the design criteria identified in previous sections

What is found through examination is that the psychology behind the flow and appeal of these spaces is extremely important. The ability to bring students into the main entrance on the northeast side is very important. This is done during the day via suggestive architecture, which is oriented to funnel students and staff towards this profound entrance. At night, the building is lit only from within, which helps to keep this structure in its place: a rural area with medium to low ambient nightly light levels.

All spaces are highly functional in their design, providing adequate light for occupants throughout the entire building. Also, the aesthetic appeal overall is simple but effective, giving uniqueness to the lobby and the weighting lifting and cardio area. Signature fixtures such as the Visa “Sequence” pendant and the Bruck Lighting “Rome” add character to the spaces while providing a relationship and flow from space to space.

There were a few details identified as lacking in the current design when compared to the design criteria developed in Section A.

1. Accent lighting in the Lobby
  - a. The LEED plaque is placed on a wall and should be highlighted since the effort was taken to design a building that is LEED certified or greater.
2. Courtyard guidance
  - a. The exterior courtyard lacks lighting that will draw students and staff towards the entrance at night.
3. Variance on the Running Track
  - a. It was a vision of the architect that the lighting could change subtly to reference the bordering space that the runner was passing at any specific moment. The lighting should reflect the idea that the runner experiences many environments as they travel throughout the building. The current solution varies only once throughout the course of a lap.

After identifying key aspects of design, and analyzing the current lighting solution, further explorations will be possible in future designs. Having a full understanding of the current conditions is absolutely necessary in order to develop a successful re-design of the spaces.

# Table of Contents

- Executive Summary..... 1
- Introduction ..... 3
- Section A ..... 4
  - DESIGN CRITERIA..... 4
    - Introduction ..... 4
    - Overall Concept of the Design ..... 4
    - Topics related to all spaces: ..... 4
    - Weight Lifting and Cardio Area ..... 6
    - Entrance Lobby ..... 9
    - Exterior/Facade..... 11
    - Running Track ..... 13
- Section B ..... 15
  - EXISTING CONDITIONS..... 15
    - Introduction ..... 15
    - Control Narrative ..... 15
    - LEED ..... 15
    - Weight Lifting and Cardio Area ..... 16
    - Entrance Lobby ..... 19
    - Exterior/Façade..... 22
    - Running Track ..... 23
- Section C ..... 25
  - EXISTING LIGHTING CRITIQUE..... 25
    - Introduction ..... 25
    - Weight Lifting and Cardio Area ..... 26
    - Running Track ..... 30
    - Entrance Lobby ..... 33
    - Exterior/Facade..... 34
- Works Cited..... 35

## Introduction

### Requirements

Part 2 of Tech Report 1 requires three main sections:

- A. Design Criteria
- B. Existing Lighting Systems
- C. Existing Lighting Critique

#### A. Design Criteria

This section provides detailed information on the criteria with which each of the four spaces will be evaluated and designed with. Both qualitative and quantitative performance parameters will be considered. Articles on John Flynn's psychology behind lighting a space will be used to aid in lighting the public space properly. Section A will not only include visual design criteria, but also energy requirements, LEED criteria, and other code related restrictions.

#### B. Existing Lighting Systems

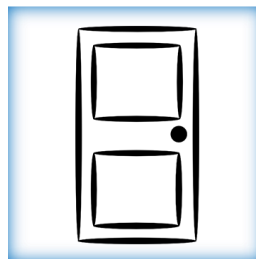
Section B will involve descriptions of the existing lighting system to include such things as control systems and lighting equipment. It will also note spatial factors such as materials, reflectances, and geometry. Key features such as furniture and wall elements in each room will be identified.

#### C. Existing Lighting Critique

The final section of Tech Report 1, Part 2 will describe the effectiveness of the current lighting conditions based on the criteria as found in Section A. General comments about the building's overall lighting system will also be found here. Quantitative measurements will be identified via computer software and excel calculations, while qualitative critiques will supplement these measurements to provide a full blanket of evaluation.



Weight lifting &  
Cardio Area



Entrance Lobby



Exterior/Facade



Running Track

## Section A

### DESIGN CRITERIA

#### Introduction

This section will first briefly identify the overall lighting concept behind the integral design of the four spaces in the Student Life Center. Then, very similar to Part 1, each space will be analyzed, and both qualitative and quantitative design criteria will be identified. This will lay a foundation on which we can analyze the current lighting systems in Sections B and C. Levels of importance for specific criteria will be rank depending on the number of different criteria identified for that space. Quantitative criteria will always be considered a high priority; variations will be noted if necessary.

#### Overall Concept of the Design

Activities taking place in the Student Life Center can be directly related to the following words and ideas:

ENERGY | LIFE | BODY | WELL-BEING | MOVEMENT | BREATHE | MIND | STRENGTH |

These ideas and aspects directly related to the building's function can all be funneled to the one thing they – and this building – help support: Life. Life is the essence, the definition of our existence. This structure helps support a healthy lifestyle; it allows every type of person to take part in something that will add value to their life.

#### Topics related to all spaces:

##### *Glare*

According to James Benya's article "Controlling Glare", as well as recommendations from the Illuminating Engineering Society (IES), in order to avoid glare, "room surfaces should be no more than 10 times brighter than the task nor less than one-tenth of the task" (2010). This luminance ratio of 10:1 should be applied to all spaces where possible. Specific instances when glare should be addressed will be noted in each space below.

##### *Controls*

Controls in all spaces of this building should be part of one integral system with the ability to be controlled either locally or off-site to allow one integrated design. This will also eliminate the possibility of control tampering in public spaces. In specific cases, manual controls should be implemented to allow the occupant to control the space, or aspects of it.

##### *Quantitative Criteria*

All spaces will be designed to the standard that at least half of all observers are under the age of 25. This is a very realistic assumption since this building is on a college campus. Also, none of the spaces to be designed will be used for competition purposes, so all sports related spaces will be considered Class IV.

*LEED*

This building has been designed to achieve the LEED Certified (minimum 40 points) rating as defined in the LEED(r) Green Building Rating System(tm) for New Construction and Major Renovations, 2009 Edition.

*Code*

ASHRAE Standard 90.1 2010 will be used as basis for design for this project.

*Correlated Color Temperature*

Color temperature should be relatively uniform across all spaces to avoid conflicting feels since each space is very exposed to the others as well as the exterior. The average CCT should be around 3500K throughout the design. Small differences in temperature are acceptable, such as slightly cooler in the public space, and slightly warmer if need be in intimate spaces such as the casual seating area in the lobby.

*Color Rendering*

All luminaires should use lamps with a color rendering index of 80 or above.

**Weight Lifting and Cardio Area**



**Qualitative Criteria**

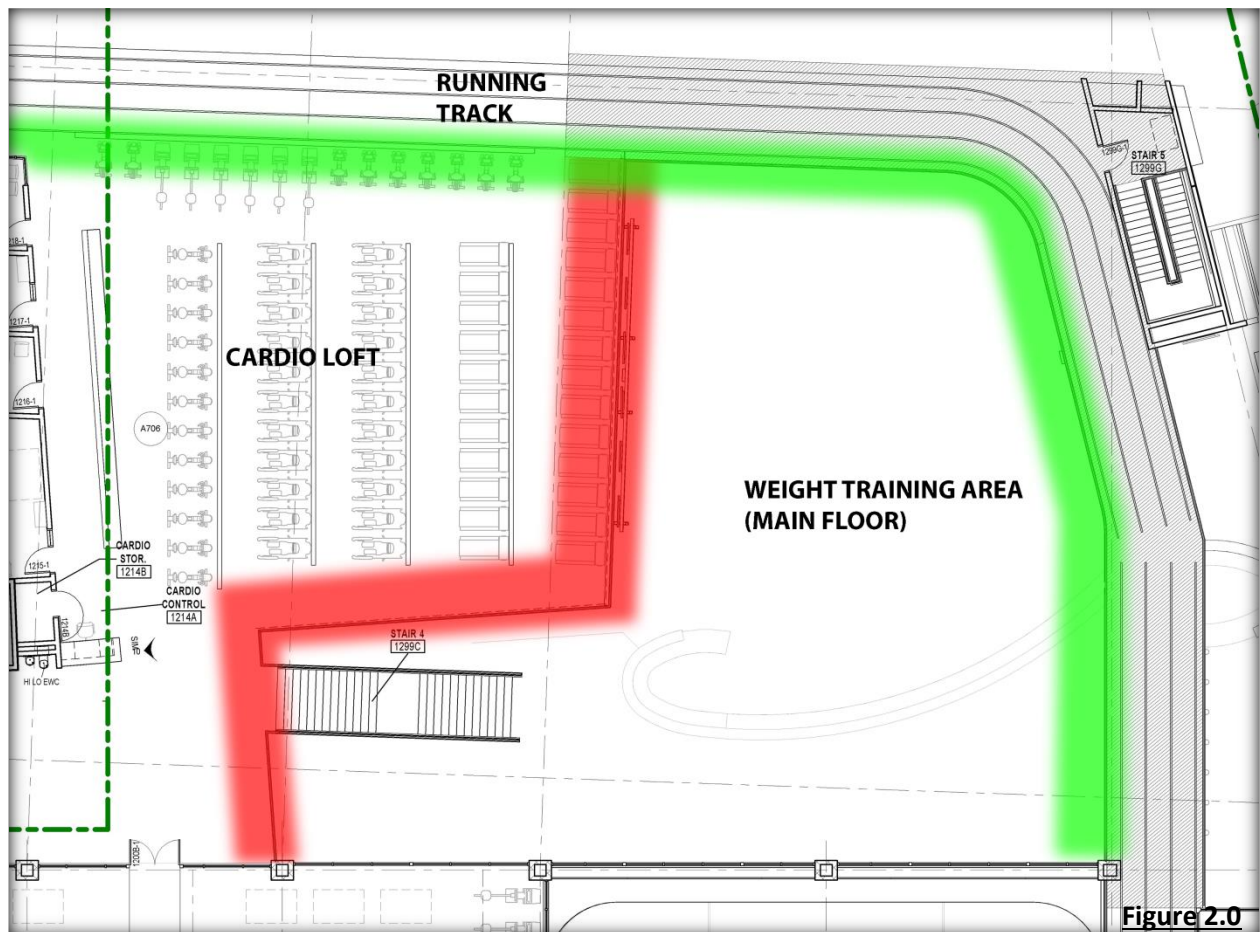
*Aesthetics*

Level of Importance: 2

Aesthetics will play an important role in this space since it is visible from many vantage points; the exterior, running track, main lobby, and main vein to access deeper areas of the building. Also, since one of the objectives of this building is to add value to student life on campus, the lighting should do to the same for this main space, therein bringing something of original value to the students' experience here. This space will be utilized for long periods of time on a daily basis, so its aesthetics should make be something that can be recognized at all hours, day and night, in order to give it a special identity, rather than a typical gym space feel.

*Glare*

Level of Importance: 3



Glare needs to be considered on both the weight training floor and the cardio loft. Since this is a large open space, there is potential for glare from both areas, on both areas. Avoiding glare from the cardio loft onto the weight training floor will be the most challenging glare issue for this space since the distribution angles of luminaires will initially need to be wider to effectively light the loft itself. Because of this, glaring light could spill onto the main floor; special attention should be paid to the loft luminaires which are placed at the edge of the loft that is closest to the lower floor (the red area marked in Figure 2.0). The second glare issue that must be addressed is glare seen from runners on the track. The strobe effect must be prevented at all costs as runners pass the luminaires bordering the inside of the track (area marked in green in Figure 2.0). The final glare issue that must be addressed is that of glare from direct sunlight. This building utilizes vertical fins on the West side façade, which cut down on direct sunlight to the floor space as the sun navigates to this side of the building.

#### *Controls*

Level of Importance: 4

Daylight harvesting controls are very important in this space. Due to the west face curtain wall and skylights overhead, the weight lifting floor will have ample daylight even on cloudy days. All skylights have a light transmission of 17%, and curtain walls have glazing with light transmission of 70%. Extensive energy savings via electric lighting dimming or step switching can be realized in this space. Also, timing controls should be implemented to bring light levels down or off during unoccupied hours.

#### *Accent Lighting*

Level of Importance: 5

Accent lighting in interior spaces will refer to special elements in the space that should be addressed. In the case of the weight floor and cardio loft, there are no special items to be accented. Certain tasks are to be lit, such as the information desk and storage blocks, but these items should not be considered accent lighting since they are merely tasks. Any accent lighting that surfaces during the schematic design purpose will be for aesthetic reasons only.

#### *Psychology*

Level of Importance: 1

The psychology of this space is very important since this is the space to be designed based on the Flynn mode of “public.” According to Ginthner’s article “Lighting: Its Effect on People and Spaces,” Flynn’s theory on creating a public atmosphere involves “rely[ing] on higher levels of illumination with a more uniform distribution of light from overhead lighting sources, predominantly” (2012). Therefore, in order to convey a public feel in this space, overhead lighting should be the main source of illumination. Other aspects such as vertical surface lighting where possible are also acceptable in order to make the space feel more inviting and spacious. Also, to orient occupants, pathways should be lit to identify circulation space and guide occupants towards various areas of the lifting floor and cardio loft. The final psychological element that must be identified is the phenomenon of bodily energy. As an intense exercise atmosphere, the lighting should help the space feel public, but at the same time energized. Balancing public and energetic will be a challenge, since down lighting is correlated with publicity and suppression, while up lighting is correlated with energy, enlightenment, and an uplifting feel.



Quantitative Criteria

Quantitative Design Criteria					
Space/Task	Horizontal Illuminance (E <sub>h</sub> )			Vertical Illuminance (E <sub>v</sub> )	LPD (W/SF)
	Average (lux)	Ave:min	CV	Average (lux)	
<b>Weight Training Floor: E<sub>h</sub> @ 2.5'; E<sub>v</sub> @ 5'</b>	150	3:1	N/A	50	.72+.1+.1=.92
<b>Cardio Loft Floor</b>	150	3:1	N/A	50	
<b>Information Desk</b>	150	2:1	N/A	50	
<b>Walkway: E<sub>h</sub> @ Floor; E<sub>v</sub> @ 5'</b>	30 (.2x150)	3:1	N/A	10	
<b>Storage Cubbies* E<sub>h</sub> @ Floor; E<sub>v</sub> @ 4'</b>	N/A	N/A	N/A	15	



## Entrance Lobby



### Qualitative Criteria

#### *Aesthetics*

Level of Importance: 1

Aesthetics are the most important part of the lobby since this is the keystone of the entire Student Life Center. It holds the two main entrances and will experience the most foot traffic out of any space in the building. This should be a very inviting space, but also very striking: a focal point from the exterior, but not a distraction from the interior. Rather, it should be a pleasant space to pass through, lounge, and convene.

#### *Glare*

Level of Importance: 5

Due to relatively low ceiling heights, glare should not be a major issue in this space with exception of the boundary between the lobby and the running track, and VDT screens. The running track has the ability to look down into the lobby, so the same precautions should be taken as described in the previous glare section. There are a few VDT screens present in this space, so luminaries with significant amounts of luminance should not reflect onto a screen at 65 degrees or more from nadir. It is recommended that the luminance of these luminaires be less than  $1715 \text{ cd/m}^2$  at this angle.

#### *Controls*

Level of Importance: 4

Controls in this space should allow the space to be dimmed during late hours. Since the university may allow students to pass through the lobby at night, lighting should have the ability to lower lighting loads, while providing adequate lighting for passage and safety.

#### *Accent Lighting*

Level of Importance: 2

Accent lighting is of great important in the lobby as it will contribute to achieving successful aesthetics. Specific items that require accent lighting will include LEED plaques positioned on one of the walls, and the underside of the running track to bring attention to the track's location and integration to the space.

#### *Psychology*

Level of Importance: 3

The psychology of this space should convey the feeling of one central point. Just as the weight lifting space should be identifiable, so should the main entry. The ability for a student to walk past or through this space at night and make a conscious connection is important. This space has been a major selling point for the campus since the building divides the upper and lower are of the campus. This should be a major draw to students and faculty as a place where they can grab food at the retail counter and quickly pass through if they need to, not just as a place to hang out.

## Quantitative Criteria

Quantitative Design Criteria					
Space/Task	E <sub>h</sub>			E <sub>v</sub>	LPD (W/SF)
	Average (lux)	Ave:min	CV	Average (lux)	
<b>Lobby Floor Night</b> E <sub>h</sub> @ Floor;E <sub>v</sub> @ 5'	25	4:1	N/A	10	.9
<b>Control Desk</b>	150	2:1	N/A	50	
<b>Scattered tables</b>	75	2:1	N/A	25	
<b>LEED Plaques</b>	500	2:1	N/A	500	
<b>Casual Seating Area</b>	20	2:1	N/A	7.5	
<b>Dining Cashier Check-in</b>	150	2:1	N/A	50	
<b>Vestibules Night:</b> <b>Medium Activity Level</b> E <sub>h</sub> @ Floor;E <sub>v</sub> @ 5'	25	2:1	N/A	15	

Notes: The control desk will possibly utilize greater illuminance values since this is meant to draw occupants into the entry.



**Exterior/Façade****Qualitative Criteria***Aesthetics*

Level of Importance: 2

The lantern effect will have to be a major part of creating successful aesthetics for the Northeast exterior façade and entrance since the majority of the façade is comprised of glass. The lantern effect refers to when lighting from the interior identifies the building façade's attributes through shadow. The exterior of the façade itself is not lit, similar to a lantern. There are specific areas where accent lighting may be used to highlight the architecture of the façade and give more appeal to the building if needed. Although, this should only be done where important characteristics of the architecture are lost in the night, or areas where dark spots offer space for lighting to support the overall concept.

*Glare*

Level of Importance: 5

Since the majority of this façade is glass, the courtyard area should not use fixtures that will produce view inhibiting glare of either the building or the courtyard from any vantage point. For example, the majority of pole type fixtures and acorn top fixtures should be avoided. In addition, although the Model Lighting Ordinance and light trespass regulations do not strictly apply to this campus building, large quantities of up lighting should be avoided as a general practice. Cortland, NY is a relatively rural town, so avoiding extreme light trespass should also be a vital consideration when attempting to fit this building into its surroundings. In addition, there are neighboring residents in view of this structure who need to be respected when regarding overall brightness at night.

*Controls*

Level of Importance: 3

Controls for this area should allow the courtyard and façade lighting to increase intensity as night falls. Depending on the final design, further controls may be necessary to allow subtle dynamic lighting to play a role in this design. Increasing the students' value of the building while supporting the overall concept could be accomplished well through a few concepts that will be later identified; these concepts will need extensive controls integration.

*Accent Lighting*

Level of Importance: 4

As mentioned in the aesthetics section of this space, accent lighting will be applied where possible. Basic concepts have been developed and will likely reveal the need for accent lighting on the façade and in the courtyard. Some elements may be applied to light the architecture itself, while others may be applied as integral pieces of the façade and courtyard.

*Psychology*

Level of Importance: 1

The most important psychological aspect of the Northeast façade is how the students and faculty will be drawn to the space. There is question whether the entrance itself is what identifies it as such, or if there is something else that can help drive individuals to the entrance. It turns out that what truly brings campus travelers to the entrance is the architecture surrounding it. Larger forms and the orientation of the two wings form a visual funnel that seems to pull passersby closer.



**Figure 2.1**

**Quantitative Criteria**

Quantitative Design Criteria					
	E <sub>h</sub>			E <sub>v</sub>	LPD (W/SF)
Space/Task	Average (lux)	Max:min	CV	Average (lux)	
<b>Sidewalks</b>	10	2:1	N/A	2	.8W/LF
<b>Façade Details: apply to 10% of facade</b>	N/A	N/A	N/A	20	.5 W/SF or 3.75/LF of wall
<b>Landscaping</b>	N/A	N/A	N/A	N/A	.05



## Running Track



### Qualitative Criteria

#### *Aesthetics*

Level of Importance: 5

The track should be designed with functionality in mind more than aesthetic appeal. While the occupants of the space should feel comfortable, the space does not need to be awe-striking. Psychological aspects are important to this space as described below, but pure aesthetics are not.

#### *Glare*

Level of Importance: 1

Glare is the most important thing when designing the running track for multiple reasons. First, as mentioned before, strobe effect should be avoided at all costs in order to make the runner comfortable during his or her routine. Luminaires lighting the track directly should be selected carefully as to not produce glare onto the track. Also, these luminaires, as well as any accent luminaires, should not produce glare onto spaces below since a large amount of the track is open to other areas of the Student Life Center below.

#### *Controls*

Level of Importance: 2

Controls should allow this space to support the overall concept, so special controls may be necessary to achieve this. Also, special controls and sensors may be needed to create a dynamic running experience if this fits into the power density and other quantitative criteria.

#### *Accent Lighting*

Level of Importance: 4

Depending on the final design, accent lighting may be necessary to support the overall concept, but it is not vital to the space's effectiveness as a running track.

#### *Psychology*

Level of Importance: 3

The running track has been designed to create an experience for the runner which battles the typical experience of an indoor track; the short monotonous run surrounded by block wall and minimal views. Lighting can support this by using subtle hints to symbolize the areas through which the runner is passing. The lighting should reflect the fact that the track passes through many spaces over the course of a lap; the lighting should by no means be consistent throughout.

Quantitative Criteria

Quantitative Design Criteria						
Space/Task	E <sub>h</sub>		CV	E <sub>v</sub>		LPD (W/SF)
	Average (lux)	Max:min		Average (lux)	Max/min	
Running Track: 3' above Floor	150	3:1	.25	N/A	N/A	.72



## Section B

### EXISTING CONDITIONS

#### Introduction

Section B begins with a narrative on the control system since this building has a fully integrated and very extensive system. All spaces which utilize controls above and beyond a common system are noted in this narrative. The rest of Section B details the existing conditions for the four spaces to be re-designed.

#### Control Narrative

The SUNY Cortland Student Life Center has attempted to implement its first fully integrated building system. This system has the ability to control the building's HVAC system as well as the lighting system. Specialized features are incorporated throughout the building which bring an extraordinary level of experience to the occupants. For example, a Pharos RIO-A device in coordination with other controllers allow the instructor to be able to plug his/her iPod into a standard audio outlet, which connects to a lighting control system that will change the LED perimeter cove lighting based on the music. Similarly, a Colorkinetics iPlayer 3 playback device with ColorPlay 3 software, Colorkinetics iColor Keypad scene selector, and Colorkinetics Data Enabler allow the climbing and bouldering wall staff to select a variety of pre-programmed, color-changing scenes to be played through the Type LM series LED accent lights. The option is also available for a Colorkinetics AuxBox, which would allow the lighting scenes to be triggered by a variety of devices, including motion sensors, time clocks or temperature sensors. Other specialized controls include:

- An eleven zone system to be selectively programmed for multiple events in the dining area, in addition to daylight harvesting controlled by photosensors
- Manual dimming and control via wallboxes for the mind/body room including the Starfield ceiling
- Daylight sensors for the **weight lifting and cardio** areas to dim and switch luminaires on the West facade
- Manual dimming instead of daylight harvesting for the natatorium due to the corrosive environment of the pool air; no manufacturer has assured that their sensors can withstand this type of environment

#### LEED

This building has been designed for a very high end control system, therefore giving the project one point under Environmental Quality – Controllability of Systems – lighting. Also, this building will likely receive one credit for Environmental Quality – Daylight and Views – Daylight. It is also designed to receive a final point related to lighting which is for Environmental Quality – Daylight and Views – Views.



## Weight Lifting and Cardio Area



### Spatial Details

#### Exterior Walls

The exterior walls of the weight lifting and cardio area are curtain walls with a glass transmittance of 70%. There are four large skylights each with a transmittance of 17%. The lower transmittance level helps to avoid glare from direct sunlight, while the exterior walls use vertical fins to help avoid similar glare effects.

#### Interior Walls

The majority of interior walls are layered with mirrors on the ground level. The base wall material for both levels is gypsum wall board with Ice Cube paint by Sherwin Williams:



### SW 6252 Ice Cube

Interior/Exterior

<b>Color Family</b>	Whites
<b>Color Strip</b>	37
<b>RGB Value</b>	R-227   G-228   B-226
<b>Hexadecimal Value</b>	# E3E4E2
<b>LRV</b>	77

Other detail colors include Aquarium #SW 6767, light taupe tones to be selected from manufacturer on masonry, and dark grey tones to be selected from manufacturer on masonry.

#### Flooring

The finish for the weight lifting and cardio area is dark grey and orange athletic tiles arranged in a pattern from Mondo.

## Ceiling

The ceiling of this space has both skylights and light monitors. Light monitors in this space are large suspended drywall panels painted with the Ice Cube color above. These are meant to reflect light from luminaires as described below. The light monitors are outlined in green in figure 2.2.



**Figure 2.2: 2:00 PM**

Light monitors are identified in green.

## Furniture

Refer to Part 1 – Large Work Space – Description & Materials. Additional comments: all training equipment is made of standard weight training and treadmill materials with gray and black finishes. Main desk is to be clad in Slate-Gray Resin Panels with tankard color top.

## Existing Lighting

The majority of fixtures in this section encompass fluorescent lighting: both compact and linear. Luminaire types included in this space are:

- LD
  - LP-2, LP-3, LP-4
  - LMM
  - LNN
- |            |
|------------|
| Recessed   |
| Pendant    |
| Wall Mount |
| Pendant    |

The wall mounted fixtures are mounted to what are considered light monitors. These fixtures kick light across the monitor which reflects diffuse light into the space. LP fixtures are vertical T5 tube fixtures from Visa Lighting which act as accent lighting and utilize par lamp inserts to send direct light to the spaces below. LNN fixtures are metal halide, and are meant to aid in general lighting for the entire weight training and cardio space, as they are direct-indirect fixtures.

Links to fixture website:

LD: <http://www.lightolier.com/fastrack/FTController?line=calculite>

LP: <http://reynet.visualighting.com/products/indoor/pendant/decorative%20performance/sequence/>

LMM: <http://app.lumenspec.com:8080/amerillum/searchProduct;jsessionid=B2AAFFC7B21EB202003EA1D7AAF70B0F?0>

LNN:

<http://www.holophane.com/products/Family.asp?Brand=HLP&Family=PrismGlo%20Series&ProductType=Indoor&Category=Designer&SubCategory=Holophorms>

Refer to attached luminaire specifications sheets for description of fixtures, specific lamp specifications, input Watts, etc. Refer to attached drawings 101BL and 102BL for lighting equipment locations.

### Daylighting

With such large apertures enclosing this space, additional power allowance is given in accordance with ASHRAE Standard 90.1. Daylighting has been taken advantage of through constant photosensors for both side lighting and effects from the skylights. As mentioned in previous sections, vertical fins are used to help lessen the direct glare and mechanical load during peak hours of the day. Figures 2.3 and 2.4 demonstrate the most effective time frame for these fins: between 2:00PM and 4:00 PM. These images *do not* demonstrate lighting levels; they only indicate angles of direct sun entering the space.



**Figure 2.3: 2:00 PM**

Sun angle is cut off by vertical fins, skylight brings direct light to floor of training area.



**Figure 2.4 4:00 PM**

Sun angle is cut off slightly by vertical fins, skylight brings direct light to wall which is out of frame.

## Entrance Lobby



### Spatial Details

#### Exterior Walls

Exterior walls of the lobby are completely glass. Vestibules define the boundary between the exterior and interior of this space. These vestibules have exterior curtain walls with 70% light transmission float glass panels and aluminum framing.

#### Interior Walls

The interior vestibule curtain wall is made of aluminum framing, similar to the exterior walls, with 100% transmissive float glass. Refer to Part 1 – Circulation Space – Description & Materials for more information on the remaining wall finishes.

#### Flooring

Refer to Part 1 – Circulation Space – Description & Materials

#### Ceiling

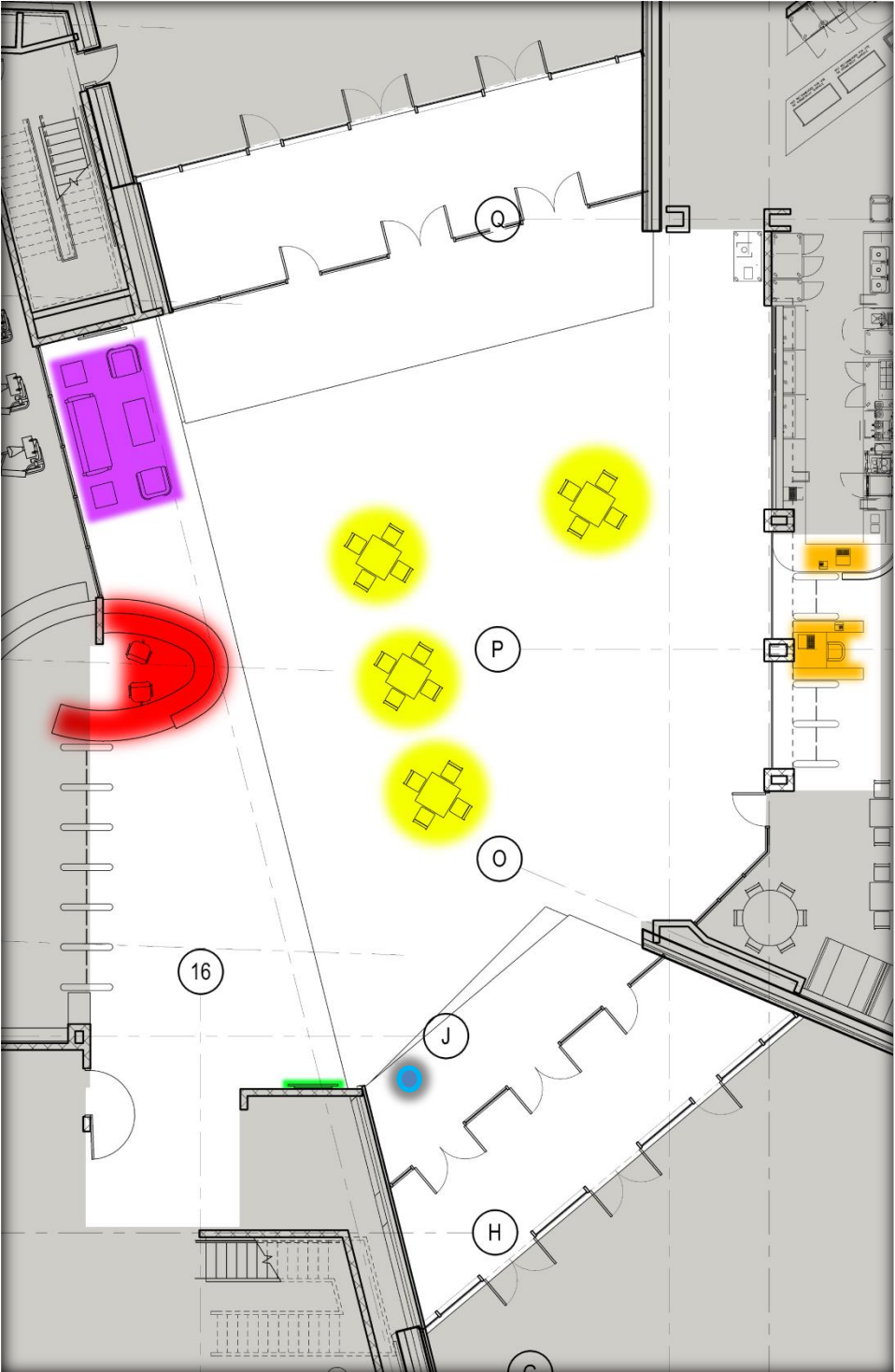
Refer to Part 1 – Circulation Space – Description & Materials

#### Furniture

Refer to Figure 2.6 for a perspective view of the main lobby. This view shows all furniture in the space for easy comprehension. A plan view of the lobby can also be seen below (Figure 2.5). Furniture is identified as follows:

Control Desk	Red
Scattered tables	Yellow
LEED Plaques	Green
Casual Seating Area	Purple
Dining Cashier Check-in	Orange

**Figure 2.5: Furniture Identifier – Plan View**  
Blue circle identifies camera position for 3D view.





**Figure 2.6: Furniture Identifier – Perspective View**

#### Existing Lighting

All existing lighting in the lobby space consists of two fixture types:

- LA through LA-4                      Recessed
- LDD                                        Recessed
- LQQ                                        Pendant

LA is the Skydome by Focal Point: a T5 fixture with white concave acrylic lens. The LDD is a recessed Lightolier Calculite fixture similar to type LD. LQQ is a compact fluorescent decorative track mounted pendant downlight.

Links to fixture websites:

LA: [http://www.focalpointlights.com/luminaires/FSD\\_overview.html](http://www.focalpointlights.com/luminaires/FSD_overview.html)

LQQ: <http://www.brucklighting.com/index.php/products/lights/pendants/rome-832-detail?lang=en>

Refer to attached luminaire specifications sheets for description of fixtures, specific lamp specifications, input Watts, etc. Refer to attached drawings 101CL for lighting equipment locations.

#### Daylighting

Glass walls will allow adequate daylight to enter the space, but due to low ceiling heights, and the fact that the space is rather small, daylight harvesting has not been implemented into this space.

## Exterior/Façade



### Spatial Details

The Northeast courtyard consists of curved sidewalks leading up to the main entrance. Grass fills in the areas not covered with concrete. The façade as described in Part 1 is mainly glass curtain wall. Areas that are not glass are clad in a rainskin façade system with a light gray finish, in addition to a few portions of tan brick.

### Existing Lighting

The only existing lighting on the exterior of the Northeast entrance is metal halide light poles which line the sidewalks on the way to the main entrance. These are nine foot 150 W Selux Exelia Columns. The specifications of this fixture can be found on drawing C104: the Lighting Site Plan. The columns are not shown in the rendering of the Northeast entrance above (Figure 2.1).

The link to the selux pole can be found here:

<http://www.selux.us/en/exterior/detail/sx/exelia-column/exelia-column.html>



## Running Track



### Spatial Details

#### Walls

The walls of the running track change constantly throughout the course of a lap. At times, the walls are curtain walls, and at times, painted gypsum wall board. The walls are painted with American Cheese #2019.40 by Benjamin Moore on walls overlooking the weight floor and cardio space. Walls on the East side above the curtain wall are painted with Pear Green 2028-40 by Benjamin Moore. One wall on the South side, which also serves as the back of the climbing wall, utilizes light taupe toned masonry.



Paint Sample: American Cheese



Paint Sample: Lime Green

#### Ceiling

The ceiling changes as does the floor, but in general, the ceiling of the running track has sections of acrylic veneer plaster ceiling and sections of drywall ceiling. There are also areas where the track is uncovered and open to the truss system and roof deck above.

#### Floor

The floor consists of poured special sports flooring with a lime green color (401).



### Existing Lighting

The majority of the track is lit with linear T5 slot fixtures varying in length from six to eight feet, oriented perpendicular to the direction of travel. As described in the weight and cardio area section above, tubular fluorescent fixtures also hang above the track in the area section of the track that passes through this area.

Fixtures used in this space:

- LB
- LP

Links to fixture websites:

LB: <http://app.lumenspec.com:8080/amerillum/searchProduct;jsessionid=0950BE4ADE226F44143B1DE26C944F31?0&A1=Series/Family>

LP: <http://reynet.visualighting.com/products/indoor/pendant/decorative%20performance/sequence/>

Refer to attached luminaire specifications sheets for description of fixtures, specific lamp specifications, input Watts, etc. Refer to attached drawing 102L for lighting equipment locations.

### Daylighting

Many areas of the running track receive daylight, but the only area that is actually controlled by photo cells is the area that passes through the weight training area and cardio loft.

## Section C

### EXISTING LIGHTING CRITIQUE

#### Introduction

Section C utilizes drawings and software calculations to critique the lighting system as currently designed for the Student Life center. These evaluations will be based on the design criteria as determined in Section A. With this in mind, it is suspected that the current design may not match the criteria above, since the original designer may have used different constraints for the design. The evaluation of the current design is to help identify challenges that may arise during the re-design. Two of the spaces will be evaluated using AGI32 lighting software – the weight lifting and cardio area; and the running track. The other two spaces will be evaluated on more of a subjective level and will involve comments on items such as aesthetic appeal, architectural reinforcement, circulation reinforcement, and focal point identification.

## Weight Lifting and Cardio Area



## Quantitative Critique

Quantitative Design Criteria (from Section A)					
Space/Task	Horizontal Illuminance ( $E_h$ )			Vertical Illuminance ( $E_v$ )	
	Average (lux)	Ave:min	CV	Average (lux)	LPD (W/SF)
Weight Training Floor: $E_h$ @ 2.5'; $E_v$ @ 5'	150	3:1	N/A	50	.72+.1+.1= .92
Cardio Loft Floor	150	3:1	N/A	50	
Information Desk	150	2:1	N/A	50	
Walkway: $E_h$ @ Floor; $E_v$ @ 5'	30 (.2x150)	3:1	N/A	10	
Storage Cubbies* $E_h$ @ Floor; $E_v$ @ 4'	N/A	N/A	N/A	15	

As Designed					
Space/Task	Horizontal Illuminance ( $E_h$ )			Vertical Illuminance ( $E_v$ )	
	Average (lux)	Ave:min	CV	Average (lux)	LPD (W/SF)
Weight Training Floor: $E_h$ @ 2.5'; $E_v$ @ 5'	339	3.9:1	N/A	140	.86
Cardio Loft Floor	355	3.3:1	N/A	322	
Information Desk	198	1.37	N/A	144	
Walkway: $E_h$ @ Floor; $E_v$ @ 5'	347	1.79:1	N/A	135	
Storage Cubbies* $E_h$ @ Floor; $E_v$ @ 4'	N/A	N/A	N/A	215	

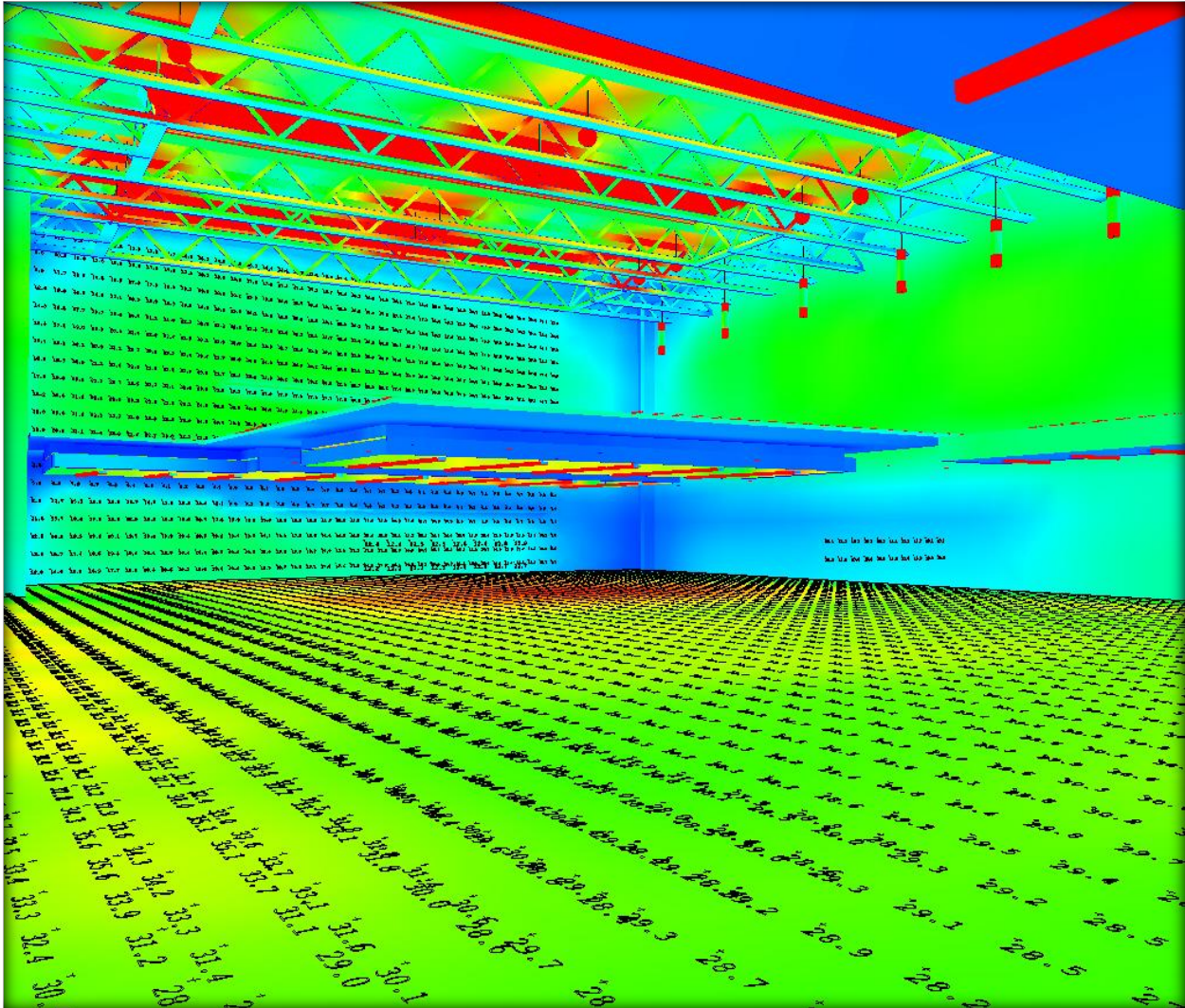
*Light Loss Factors Used:*

Factors of .9 were used for most fluorescent fixtures. One fixture which had a ballast factor of 1.03 utilized a total factor of .927. All metal halide fixtures were designed with a loss factor of .8.

*Comments:*

1. Compared to the design criteria outlined in Section A, the values as designed are well over the necessary amount needed. This is not something negative, as the power density still falls well within the required value.
  - a. This will be kept in mind as the new design is developed; over-lighting compared to the criteria outline may be necessary to create the proper environment.

2. Although the space could be designed to the values designed above, according to IES recommendations it is not completely necessary.



**Figure 2.7:** Calculation and pseudo color overlay:  
View from the entry of the weight floor and cardio loft area.

*Comments*

The pseudo color is used to help portray areas of uniformity. On the left, light yellow spots can be seen. This adds character to the walkway and identifies it as a separate function from the generally lit area to the right and rear.

## Qualitative Critique

### *Function*

The current design is very effective at lighting the space. Filling all dimensions of the space, the lighting plan put in place creates an environment that will support effective use of the space.

### *Aesthetic appeal*

The light monitors make the overall appeal of the space feel very open and spacious. Avoiding the use of downlights in the space helps keep the space from feeling pressured. The uses of the visa pendants bring something unique to the space, making it a recognizable space. This unique feature will make a subconscious connection to the space by its occupants every time they visit the building. This space overall brings value to the user, which is one of the goals of this design on all levels.

### *Architectural reinforcement*

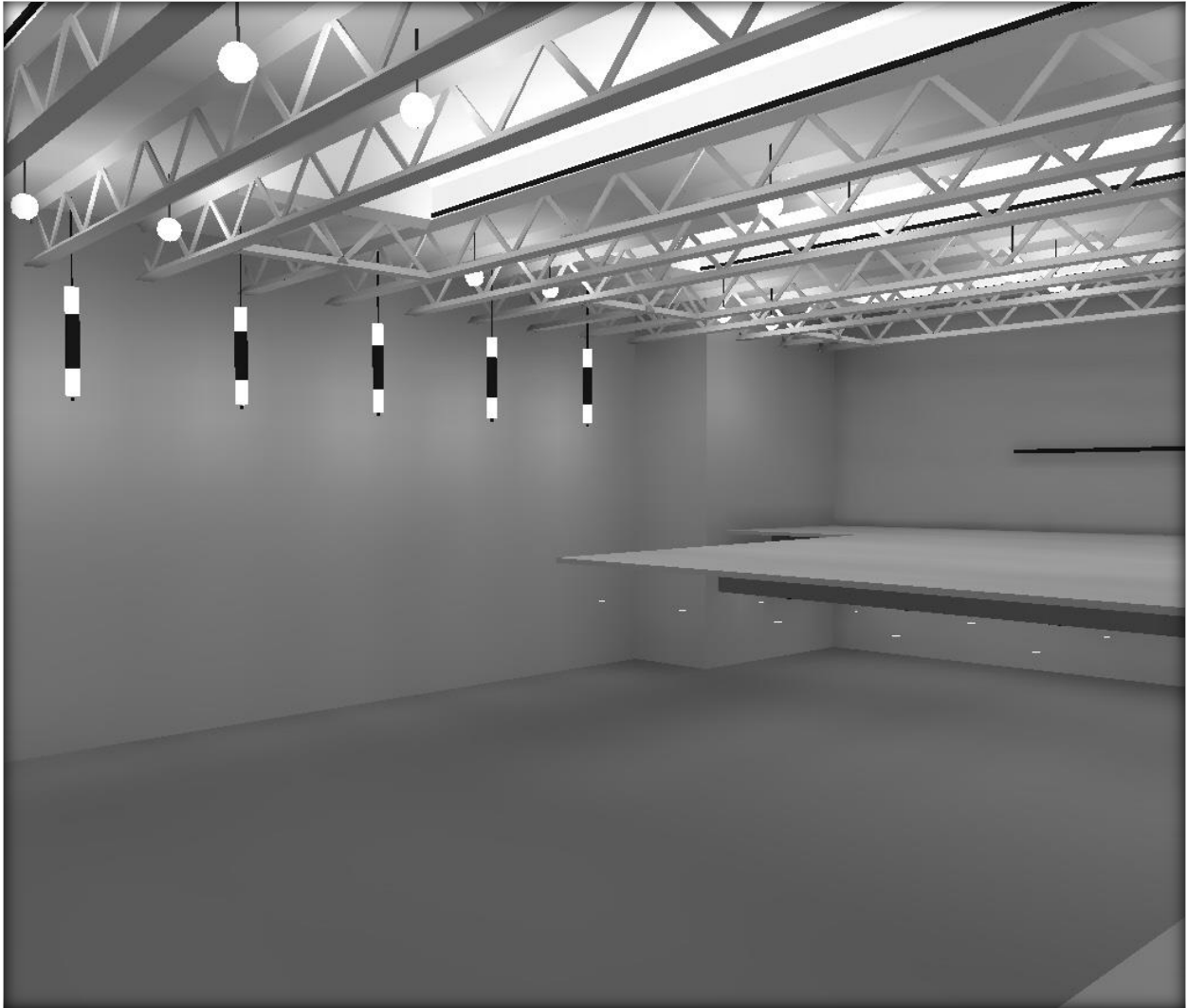
This space is already very large, so in my opinion, I'm not sure if it is necessary to overly brighten the space. There is a need to light both the ceiling and floor surfaces though, in order to create a sense of comfort and to bring out the character of the exposed trusses above.

### *Circulation reinforcement*

Circulation through the space to others beyond is reinforced through the visa pendants hung above the main walkway on the East side of the weight lifting area, as well as over the stairs leading to the concourse and cardio area on the second level.

### *Glare*

There is a tendency for glare to be an issue for runners on the track due to the type of direct/indirect metal halide fixtures, but these fixtures are mounted high enough and are hidden by the trusses enough that they should not produce a noticeable amount of glare: refer to Figure 2.8 below.



**Figure 2.8:** View of weight lifting area from track

## Running Track



## Quantitative Criteria

Quantitative Design Criteria (from Section A)						
Space/Task	E <sub>h</sub>		CV	E <sub>v</sub>		LPD (W/SF)
	Average (lux)	Max:min		Average (lux)	Max/min	
Running Track: 3' above Floor	150	3:1	.25	N/A	N/A	.72

As Designed						
Space/Task	E <sub>h</sub>		CV	E <sub>v</sub>		LPD (W/SF)
	Average (lux)	Max:min		Average (lux)	Max/min	
Running Track: 3' above Floor	125	1.96	.12	N/A	N/A	.46

Light Loss Factors Used:

Factors of .9 were used for fluorescent fixtures.

Comments:

Compared to the design criteria outlined in Section A, the values as designed are just below the standard. 125 lux will likely be a sufficient amount of light due to spill light from surrounding spaces since the track is rarely enclosed on either side by a solid wall. The design also creates a very uniform surface, as seen by the max to min ratio and coefficient of variation.

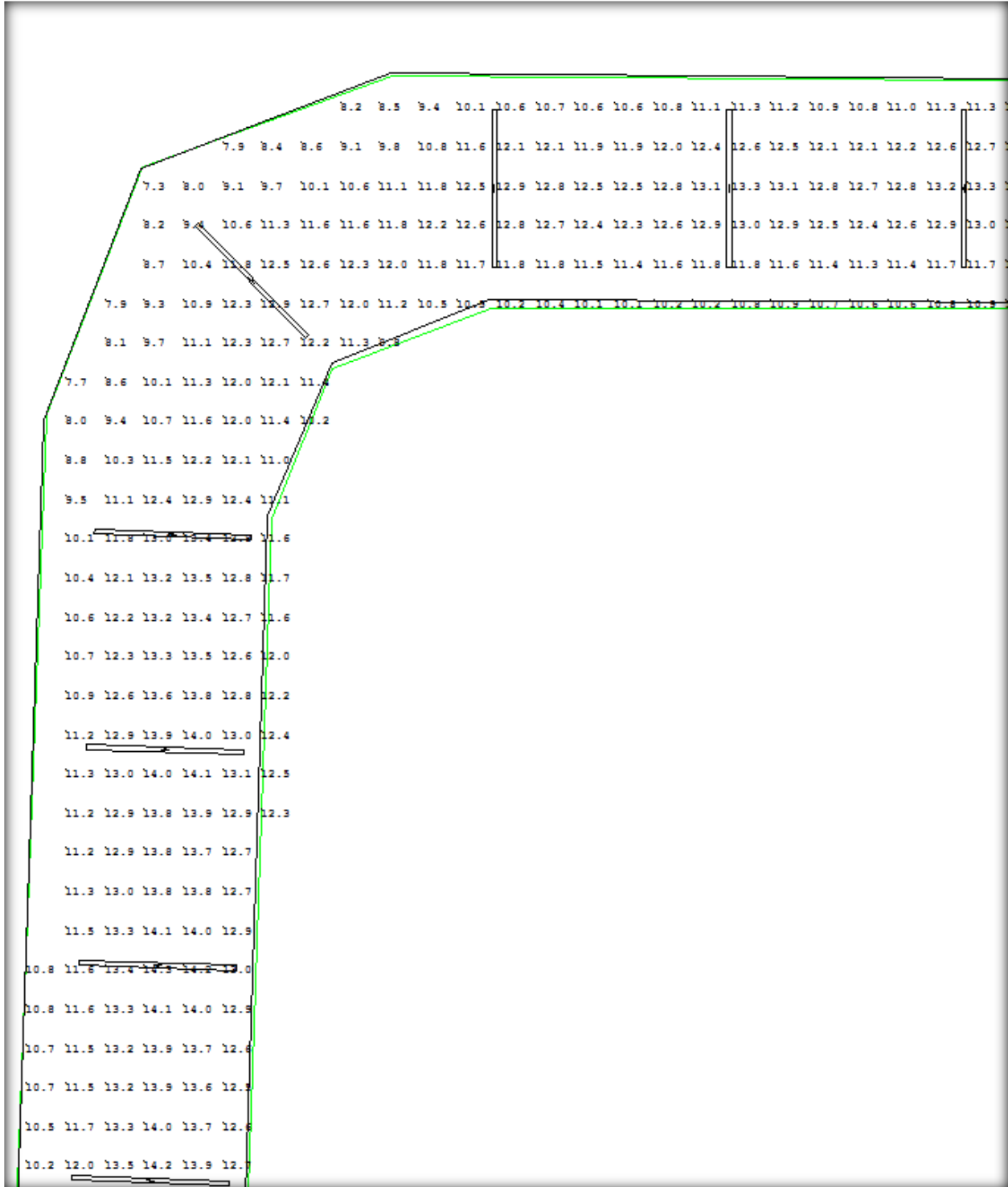


Figure 2.9: Plan view of a section of track designed in AGI32 to show light levels.



## Qualitative Critique

### *Function*

The current design is very effective at a functional running track.

### *Aesthetic appeal*

Not much aesthetic appeal is required for the track, but the repetitive pattern of fixtures will make the track appealing for those who can see the space from below or from the exterior.

### *Glare*

Recessed fixtures have been used to eliminate glare for the user. Also, an opal acrylic diffuser panel lens is used to reduce direct glare onto spaces below.

### *Psychology*

As mentioned above, the lighting for the track should vary throughout the spaces to support the idea of experiencing the whole building during the course of a lap. This has been done with partial success as the lighting changes from the recessed slots in the majority of the track to Visa Pendants in the weight lifting and cardio area, but the lighting does not vary enough to give a fully integrated experience.

## Entrance Lobby



### Qualitative Criteria

#### *Aesthetics*

Aesthetics were mentioned as high priority in Section A, and they are effective in the current design. Recessed circular fixtures of varying sizes create a very unique environment as seen in the perspective Figure 2.6 above. The simple design has created a relatively striking, and not overdone space. The Bruck Lighting pendants are very simple but appealing and draw attention to the control desk. This draws people into the space while providing illumination to the counter itself.



#### Bruck Lighting “Rome”

#### *Accent Lighting*

There is no specific accent lighting used in the lobby. The LEED plaque has no luminaire to highlight it at night, though general illumination will still allow it to be visible.

#### *Psychology*

The psychology of this space should convey the feeling of one central point. Just as the weight lifting space should be identifiable, so should the main entry. The ability for a student to walk past or through this space at night and make a conscious connection is important. This space has been a major selling point for the campus since the building divides the upper and lower are of the campus. This should be a major draw to students and faculty as a place where they can grab food at the retail counter and quickly pass through if they need to, not just as a place to hang out.

## Exterior/Facade



### Qualitative Criteria

#### *Aesthetics*

The lantern effect has been utilized to its full extent in the current design. This has been done for multiple reasons as described earlier in this report. There is no exterior façade lighting on the entire Student Life Center.

#### *Glare*

The design as employed is very effective at reducing glare. Since the courtyard lighting has been kept to minimal light poles, glare has been virtually eliminated.

#### *Accent Lighting*

No accent lighting has been used, which is still effective. Some explorations of minimal accent lighting could lead to more successful guidance referring to the psychology behind this space.

#### *Psychology*

During the day, larger forms and the orientation of the two wings form a visual funnel that seems to pull passersby closer. At night, this effect could be lost in the darkness of the courtyard forms. The only guidance given by the site is the light poles which are to be installed along the pathways. Visually, this will not be very successful in drawing people towards the building. While the lantern effect will draw people in, nothing about the courtyard sparks intuition to enter the building.

## Works Cited

Dilaura, D. L., Houser, K. W., Mistrick R. G., Steffy G. R. (2011). *The Lighting Handbook* (10<sup>th</sup> ed.). New York, NY: Illuminating Engineering Society.

Ginthner, D. (2012) Lighting: Its Effect on People and Spaces. *Implications*. Vol 02 Issue 02.