Tech I Report

Susquehanna Center Renovations & Expansions

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October 4, 2010

Executive Summary

The Susquehanna Center is an athletic facility for Harford Community College located in Bel Air, Maryland. The facility includes various types of spaces and allows for a wide range of athletic events to make use of these spaces. This report will analyze the existing conditions of four types of spaces within the facility and will set forth the lighting design requirements and guidelines specified by the IESNA Handbook.

The spaces that were examined are an outdoor space (exterior building façade), a circulation space (main lobby entrance), a special purpose space (auxiliary gym), and a large workspace (fitness and weight room). Each space will be dissected and an overview of the lighting equipment specified and materials used will be conducted. The lighting design will set forth criteria and requirements that are specified and recommended by IESNA. Finally, the comparison of the existing conditions to the design requirements and criteria will be the basis of the evaluation in this report.

The analysis and evaluation of this report will serve as a guide to the redesign of the lighting conditions within these four spaces listed above.

Table of Contents

Exterior Building Façade

Existing Conditions

Description:

The façade of this facility is important due to the building's nature to house an athletic sporting team at the collegiate level. The facade is the first attraction of the building for fans, visitors, and players. It is important to set an admirable impression since this facility is new and could potentially be the highlight of sporting facilities in the area. The façade is composed of 4x8 and 16x24 nominal concrete block, aluminum glazing curtain wall, metal sheathing with black plastic lettering for the building sign, and concrete sidewalks.

Materials:

Material	Description	Properties
Sidewalk	cast in place concrete	ρ = 0.28
Facade	concrete block with matte finish painting, the color of the paint is light yellow, with a white base	ρ = 0.43
	Perforated aluminum panels	ρ = 0.3
Curtain Wall System	glazing 1 of the curtain wall system	ρ = 0.74
	glazing 2 of the curtain wall system	ρ = 0.38
	Mullions of the curtain wall system	ρ = 0.33
Roofing	Composite aluminum paneling	ρ = 0.33
Signage	Black plastic lettering	ρ = 0.02

Lighting Equipment:

Type	QTY.	Description	Catalog #	Lamps	Voltage	Input Watts
Z	3	9" Surface cylindrical down light with a clear reflector and specular finish.	Gotham Lighting #CFV9 42W 8AR 277 GEB1O	F42 TRT 835	277	46
BB	4	9" Surface cylindrical down light with a clear reflector and specular finish with pendant mount thread and swivel.	Gotham Lighting #CFV9 42W 8AR 277 GEB1O PMCYS	F42 TRT 835	277	46

Light Loss Factors:

Fixture	Lamp Lumen Depreciation (LLD)	Luminaire Dirt Depreciation (LDD)	Ballast Factor (BF)	Light Loss Factor (LLF)
Z	0.841	0.85	0.98	0.70
BB	0.841	0.85	0.98	0.70

Assumptions:

- Z , BB– category IV, Clean Environment, 18 month cleaning

Existing Light Power Density:

Fixture	QTY	Input Watts	Total watts	Allowable Watts	Meet IESNA STD. 90.1
Z	3	46	138	-	-
BB	4	46	184	-	-
Sum	-	-	322	1.25W/SF * 1388SF = 1735W	YES

Drawings

Plans:

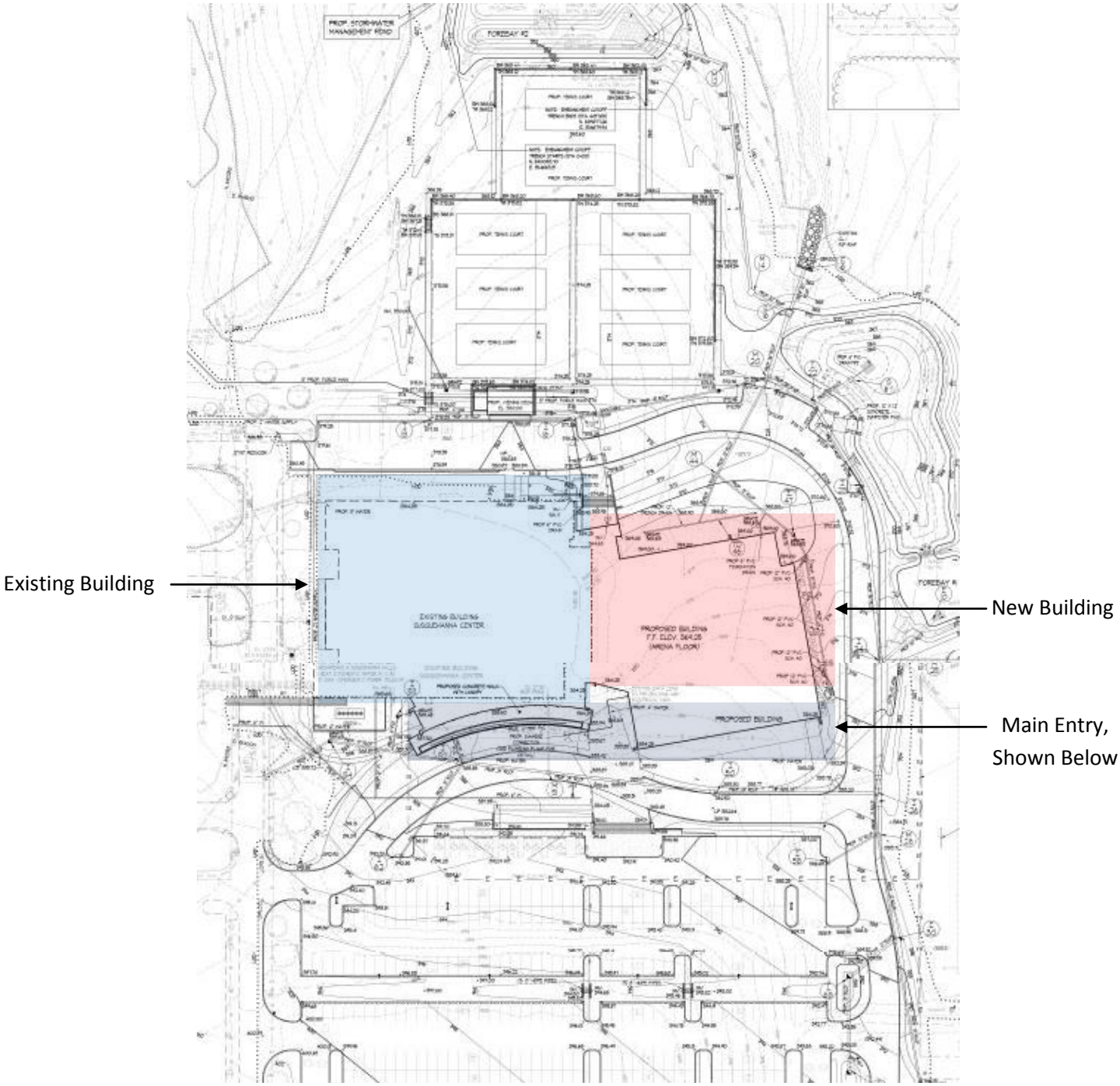

Figure 1. Site Plan

Main Entry,
Shown Below

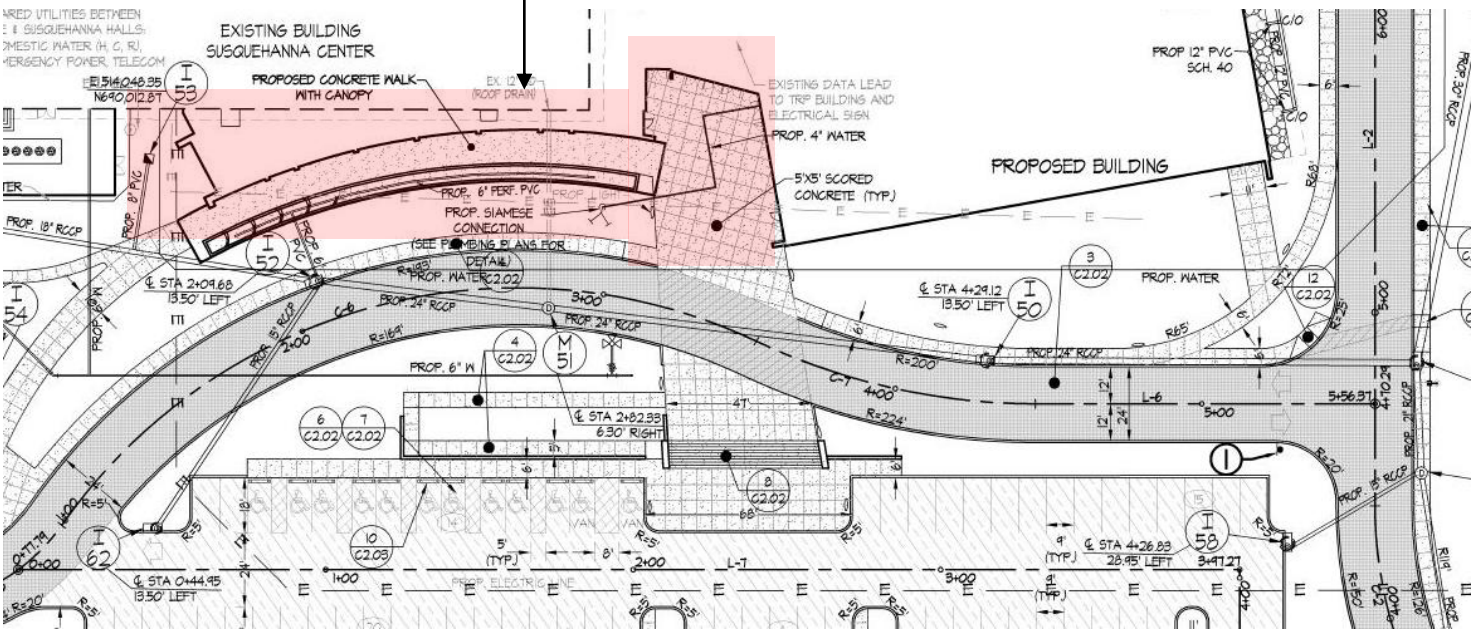

Figure 2. Site Plan Main Entry

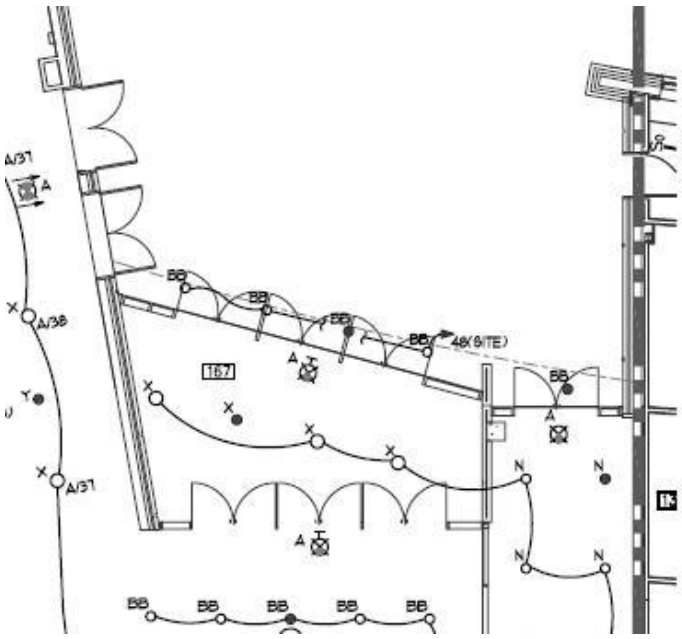

Figure 3. Light Plan Main Entry

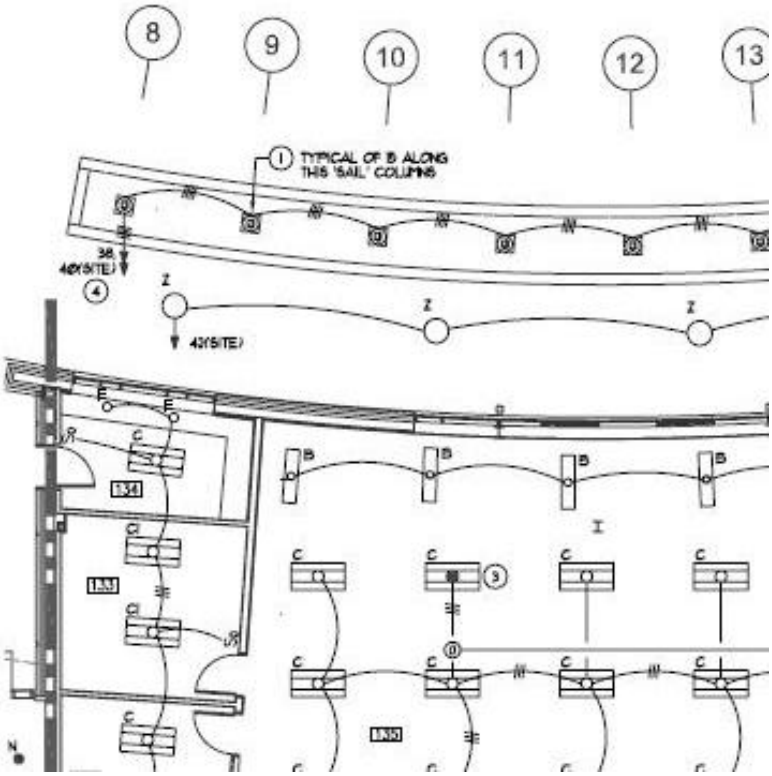

Figure 4. Lighting Plan Main Entry

Elevations:

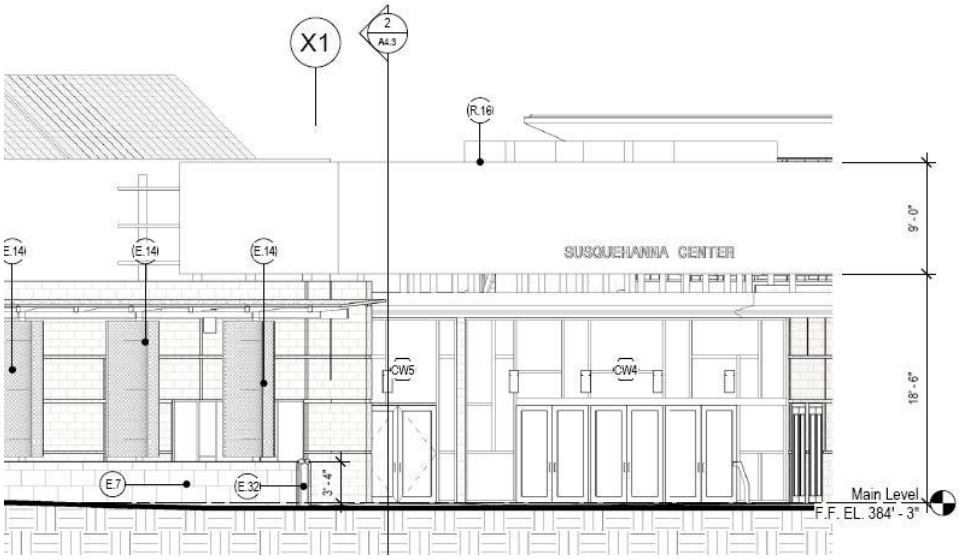

Figure 5. Elevation Main Entry

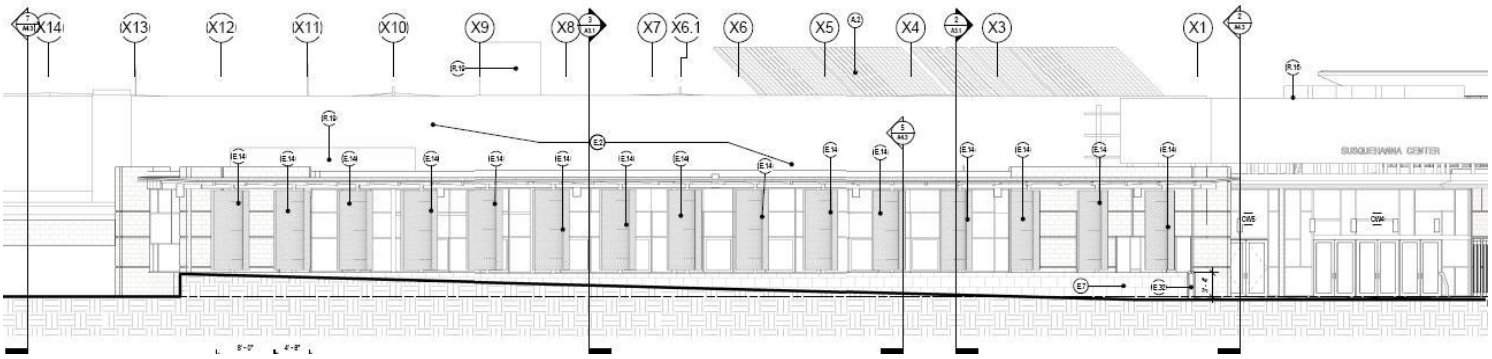

Figure 6. Elevation West Facing Facade

Design Considerations and Criteria

IESNA 2000 Design Considerations (Building Exteriors Entrances-Active)

Very Important Design Considerations

- Appearance and Shape of Luminaires
    - The lighting design of the façade should be appeasing and help accentuate the architectural features that define the building. The luminaires need to conform to architecture instead of protrude and take away from it.
- Color Appearance (and Color Contrast)
    - The color rendering of building materials is an essential piece of the architecture and impression that the building is trying to attain.
- Direct Glare
    - When lighting exterior facades it is key to incorporate glare because shining light into the eyes and faces of guests is not a pleasant feeling and is uncomfortable.
- Light Pollution and Trespass
    - Light pollution into the sky is an unwanted and unnecessary design practice and should be avoided to help reduce urban sky glow. Light trespass onto adjacent sites is also an unpleasant design feature and should be avoided as well.
- Modeling of Faces and Objects
    - Creating the depth, shape, and texture of objects is imperative when highlighting and emphasizing the architectural elements and features.
- Peripheral Detection
    - When an individual is gazing at the façade it is important that the lighting design help individuals interpret and inspect the textures and shapes of the architectural elements.
- Points of Interest
    - Ideally when highlighting the architecture and entrances, it is important for your design to focus on the points of interest such as certain architectural features.

- Reflected Glare
    - Reflected glare is just as important as direct glare, in which the unpleasantness of being blinded by light is not comfortable for an individual.
- Shadows
    - Shadows can help create the depth of 3D textures and materials of building.
- Source/ Task/ Eye Geometry
    - The geometry between the viewer's eyes and luminaire can be essential for creating contrast of architectural elements.
- Surface Characteristics
    - Surfaces can have different textures, specularity, and reflectance values, which can alter perceived brightness of illuminated surfaces, especially building facades.

Important Design Considerations

- Light Distributions on Surfaces
    - The spacing of luminaires can create shadows when not spaced correctly and hide certain elements of the architecture. Strange and confusing spacing of luminaires can also create brighter areas on walls.
- Sparkle/ Desired Reflected Highlights
    - Small points of high luminance can create visual interests.

IESNA 2000 Design Criteria (Building Exteriors Entrances-Active)

- Horizontal Illuminance on Sidewalk/ Entrance
    - E = 50 lx or 5 fc

ILE 2005 Guidance Notes For the Reduction of Obtrusive Light

- Category E2 – Low district brightness areas, rural, relatively dark urban locations
    - URL = 2.5%

ASHRAE Standards 90.1

- Lighting Power Density
    - Canopies – 1.25 W/SF

- Wall/Surfaces – 5W/lF or 0.2 W/SF

Evaluation

Discussion:

The existing lighting design of the building façade and main entry walkway does not create an artistic appeal and interest that help draw individuals into the building. The existing lighting design uses down lighting techniques to highlight the main entry doors and pathway along the curved façade. There are numerous architectural features that the existing lighting design does not take advantage of to create a captivating and impressive entrance. The existing design does help individuals identify the main entrance as it is the only portion of the building that is lit.

The curved pathway lies underneath a canopy, in which the columns of the canopy have perforated aluminum shades to help alleviate daylight in the curved glass curtain façade. Highlighting these fascinating objects can create a curiosity in people who enter the facility and can help attract attention. At the main entry way there are diverse amounts of materials that can also be used to facilitate an interesting presence as well. The pathway leading up the stairs to the building can also be used to help funnel individuals to the entrance of the building.

Main Lobby Entrance

Existing Conditions

Description:

There is a small vestibule before you are greeted by the main lobby area. The main lobby is the primary circulation space for the facility as it grants access to multiple spaces within the building. It will be primarily used as the entrance and exit for the concourse of the main basketball arena. The lobby has an interesting architectural feature located in the ceiling. Although the ceiling finish is sealed concrete deck beams, there is a visual appealing wavy perforated aluminum element suspended from the ceiling. On the wall of the lobby are honorary plaques dedicated to office members and board holders.

Materials:

Material	Description	Properties
Vestibule Floor	carpeted Walk off mat, grey	ρ = 0.26
	carpeted Walk off mat, blue	ρ = 0.12
Vestibule Walls	gypsum Board with white finish paint	ρ = 0.9
Vestibule Ceiling	gypsum Board with white finish paint	ρ = 0.9
Storefront Doors	glazing of the storefront, clear glass	ρ = 0.05
	aluminum paneling of storefront	ρ = 0.33
Main Lobby Floor	terrazzo tile flooring, off white	ρ = 0.7
Main Lobby Walls	gypsum Board with white finish paint	ρ = 0.9
Main Lobby Ceiling	exposed structure, painted white	ρ = 0.9
	wavy perforated aluminum panels, painted blue	ρ = 0.14

Lighting Equipment:

Type	QTY.	Description	Catalog #	Lamps	Voltage	Input Watts
BB	34	9" Surface cylindrical down light with a clear reflector and specular finish with pendant mount thread and swivel.	Gotham Lighting #CFV9 42W 8AR 277 GEB1O PMCYS	(1) F42 TRT 835	277	46
X	4	Pendant mounted down light with metal halide ballast.	Del Ray #6232 100MH 2	(1) MHC100 C/ U/ MP/ 3K ALTO	277	118

Light Loss Factors:

Fixture	Lamp Lumen Depreciation (LLD)	Luminaire Dirt Depreciation (LDD)	Room Surface Dirt Depreciation (RSDD)	Ballast Factor (BF)	Light Loss Factor (LLF)
BB	0.841	0.92	0.97	0.98	0.735
X	0.76	0.92	0.97	1.0	0.678

Assumptions:

- BB– category IV, very clean environment, 18 month cleaning, RCR = 5.012
- X– category IV, very clean environment, 18 month cleaning, RCR = 5.012

Existing Lighting Power Density:

Fixture	QTY	Input Watts	Total watts	Allowable Watts	Meet IESNA STD. 90.1
B	34	46	1564	-	-
X	4	118	472	-	-
Sum	-	-	2036	1.1W/SF * 1160SF =1276W	NO

Drawings

Plans:

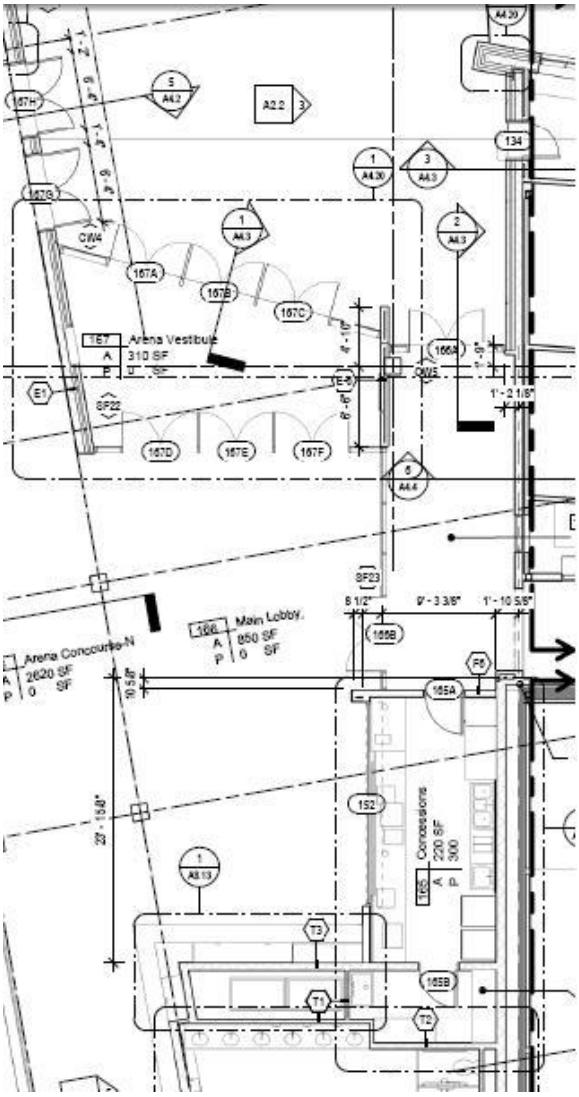

Figure 7. Floor Plan Main Lobby

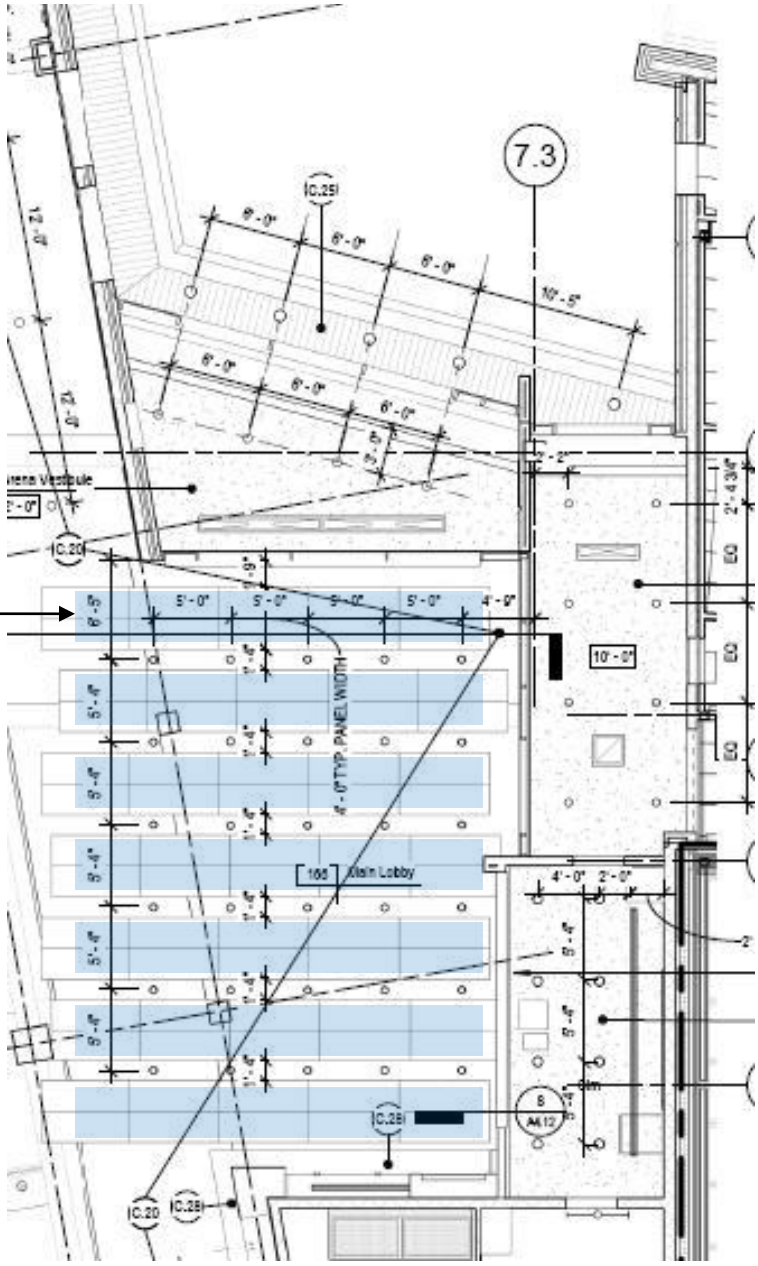

Figure 8. Reflected Ceiling Plan Main Lobby

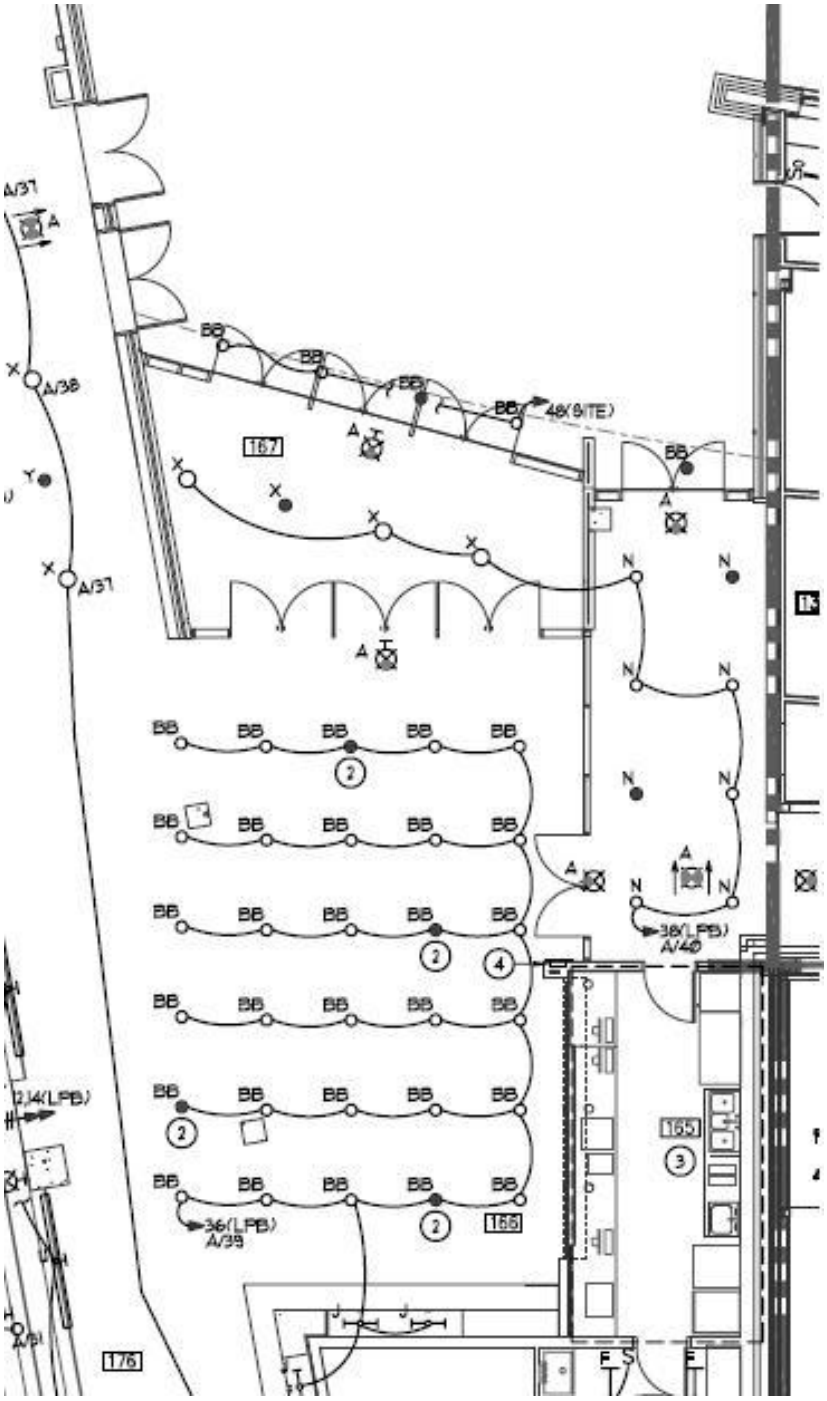

Figure 9. Lighting Plan Main Lobby

Sections:

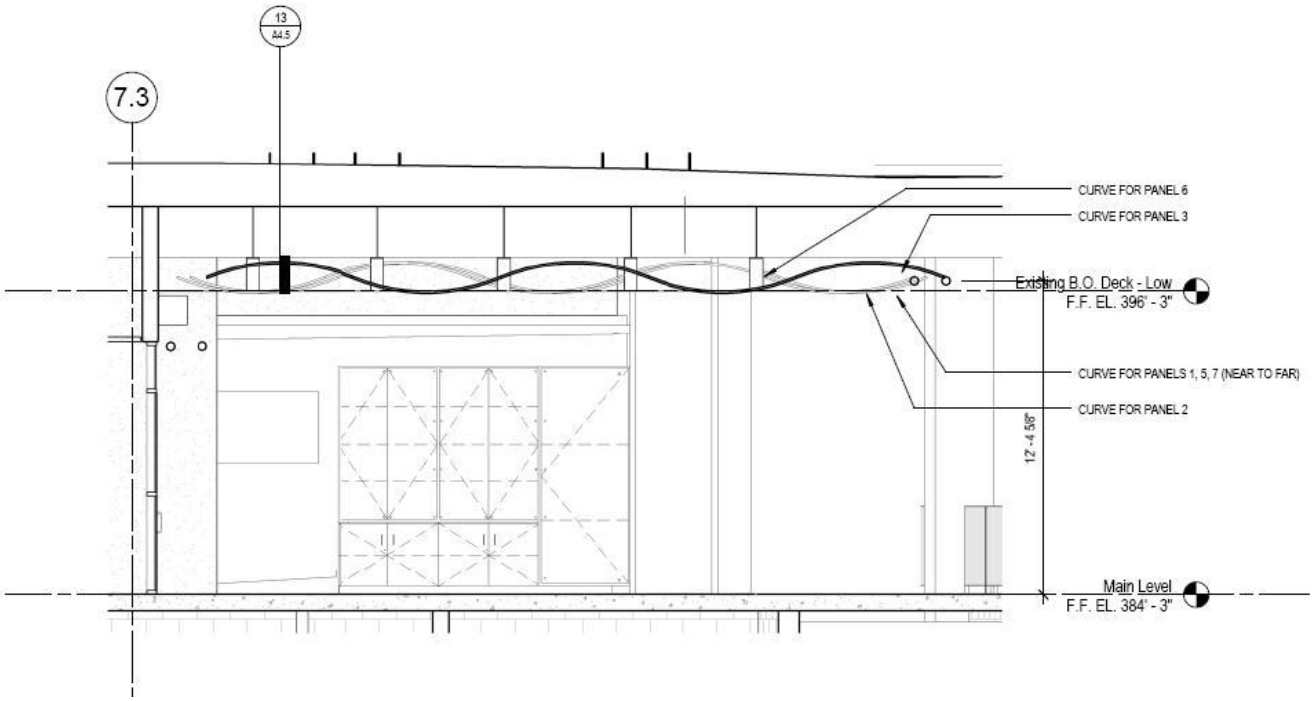

Figure 10. Section Main Lobby

Design Considerations and Criteria

IESNA 2000 Design Considerations (Lobby – General Lighting)

Very Important Design Considerations

- Appearance of Space and Luminaires
    - Since the lobby is typically the first place an individual is going to enter, then the appearance of the space needs to be impressionable and the luminaires should compliment that appearance.
- Color Appearance (and Contrast)
    - The lobby will have plaques of significant office members and board holders, thus the lighting for the plaque should demonstrate its significance. The lighting design should render the plaque in a way that embellishes the emphasis of those mentioned.
- Daylight Integration and Control
    - In a transitional space between the outdoors and indoors, the lighting design should incorporate daylight integration techniques, since it is believed that views of the outdoors provide important psychological comfort zones.
- Direct Glare
    - Glare is also a necessary design feature since it can cause discomfort and interfere with visibility as an individual enters the facility.
- Lighting Distribution on Surfaces
    - It is important to keep in mind the distribution of light hitting surfaces since awkward patterns of light can create shadows, affect task visibility, comfort and perceptions.
- Luminance of Room Surfaces
    - The lighting design in the lobby can utilize different luminances of surfaces to help attract attention to certain areas of room. For example, a higher luminance should be used to draw attention to the honorary plaques located on the wall.

- Modeling of Faces and Objects
    - The wavy pendants in the ceiling and honorary plaques are two architectural elements that will require appropriate modeling of their characteristics such as shape, texture and depth.
- Points of Interest
    - The lobby space includes wavy pendants and honorary plaques that will require the lighting design to emphasize the point of interest in this space.
- Reflected Glare
    - Glare causes issues of visibility and discomfort and should be avoided as individuals enter the building.

Important Design Considerations

- Light Distribution on Task Plane
    - Since the primary task in this space is walking, it is important to uniformly light the floor.
- Shadows
    - The lighting design should avoid creating shadows because shadows can alter visibility of tasks and place dark areas where brightness is essential.
- Sparkle/ Desirable Reflected Highlights
    - It is important that the lighting design use points of high luminance on a given spot to accentuate its elegance such as the honorary plaques.
- Surface Characteristics
    - The wavy pendant will need the lighting design's help to enhance its artistic creativity and splendor.

IESNA 2000 Design Criteria (Lobby – General Lighting)

- Horizontal Illuminance
  - E = 100 lx or 10 fc

ASHRAE Standards 90.1

- Lighting Power Density
  - Lobby
  - LPD = 1.1 W/ft^2

Impression

The main lobby is the space that I have chosen to analyze for the psychological reinforcements created by the lighting design. The impression that the lighting design should invoke in this space is the somber/ festive system. In this case, I will mainly focus on the festive aspect of this impression system.

There are specific times when the lobby will need to come alive and create a festive atmosphere and those times include game days in the main arena. During a home game, it would be ideal to get all 5,000 home team fans in a joyous, peppy and upbeat state. A basketball event is meant to be fun and entertaining to watch with all the excitement on the court. A festive atmosphere in the lobby can prep the fans to be ready for an exhilarating experience.

Within the lobby are also certain architectural features such as a wavy pendant of two varying blue colors and honorary plaques of office members and board holders. The lighting design will need to incorporate them in the festive lighting scheme.

In order to create a gleeful, happy and upbeat environment, the lighting system will use bright light levels, nonuniform lighting mode, and movement of light. The honorary plaques will have a higher luminance than most surfaces in order to attract attention. The wavy pendants are made of perforated aluminum and using fixtures that illuminate the ceiling can create emphasis. Interesting light movement such as pulsating and slight movements can also reiterate the festive appeal.

Evaluation

Discussion:

The main lobby is the main entry point of the building and acts as the mediator to entering the main arena or other spaces in the building. It is directly connected to the concourse level of the main arena and thus this space should assist in preparing the fans and players to get ready for a game time atmosphere. The space also includes architectural features that provide an elegant presence and should be highlighted by the lighting design since these features are strong points of interest.

The existing lighting design utilizes down lighting techniques of the same fixture type as the one used to light the pathways on the exterior of the building. The space is uniformed and creates a bland impression upon entering the building. Also the honorary plaques on the wall go unnoticed by lighting design and neglected as a point of interest. The space exudes creativity as the ceiling has a wavy pendant that reflects school colors. Once again this feature goes unnoticed in the lighting design and is neglected as a point of interest.

Auxiliary Gymnasium

Existing Conditions

Description:

This space is unique as it serves as a secondary court to practice for the Harford Community College's basketball team, a court for recreational basketball organizations, an indoor batting cage, and any other uses that seem feasible. There are six retractable basketball goals with backboards that allow for 3 different configurations of basketball courts. Only one of those courts is actually full size, while the other two are condensed versions. There is padding with graphics and varying colors that are located on the walls and also help create a dynamic space.

Materials:

Material	Description	Properties
Floor	athletic wood flooring	ρ = 0.20
Walls	gypsum board painted matte white	ρ = 0.9
	gypsum board painted matte blue	ρ = 0.14
	cmu painted matte white	ρ = 0.9
	cmu painted matte blue	ρ = 0.14
	padding painted matte a light blue	ρ = 0.14
Ceiling	exposed ceiling structure painted matte white	ρ = 0.9

Lighting Equipment:

Type	QTY.	Description	Catalog #	Lamps	Voltage	Input Watts
K	16	22" open diameter metal halide low bay fixture with acrylic and electronic transformer.	Day-Bright #HBA 400P MT WEB HL277 AR22T	(1) 400MH PS 841	277	460

Light Loss Factors:

Fixture	Lamp Lumen Depreciation (LLD)	Luminaire Dirt Depreciation (LDD)	Room Surface Dirt Depreciation (RSDD)	Light Loss Factor (LLF)
K	0.81	0.95	0.98	0.754

Assumptions:

K – Category II, very Clean Environment, 18 month cleaning, RCR = 1.33

Existing Lighting Power Density

Fixture	QTY	Input Watts	Total watts	Allowable Watts	Meet IESNA STD. 90.1
K	16	460	7360	-	-
Sum	-	-	7360	2.3W/SF * 6290SF = 14467W	YES

Drawings

Plans:

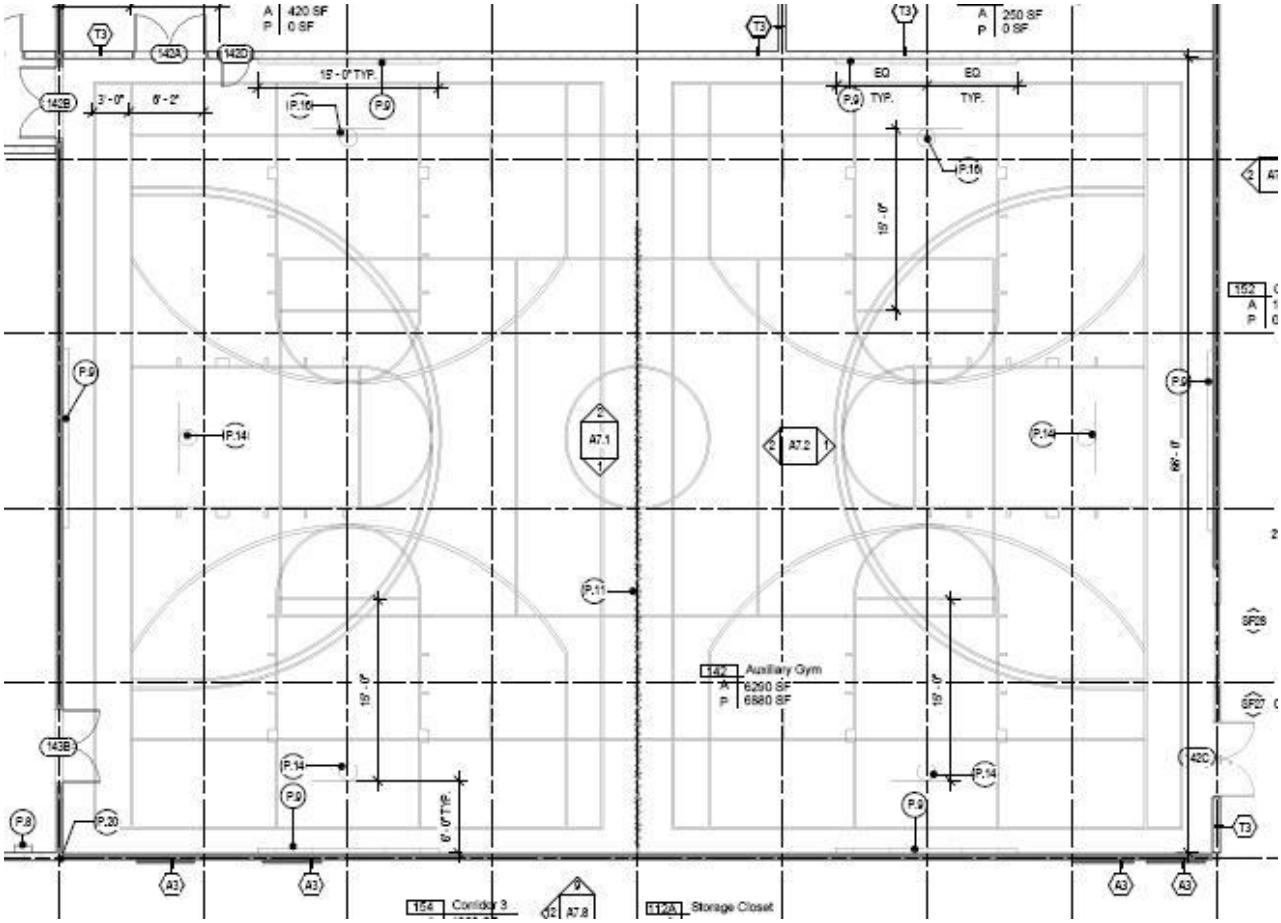

Figure 11. Floor Plan Auxiliary Gym

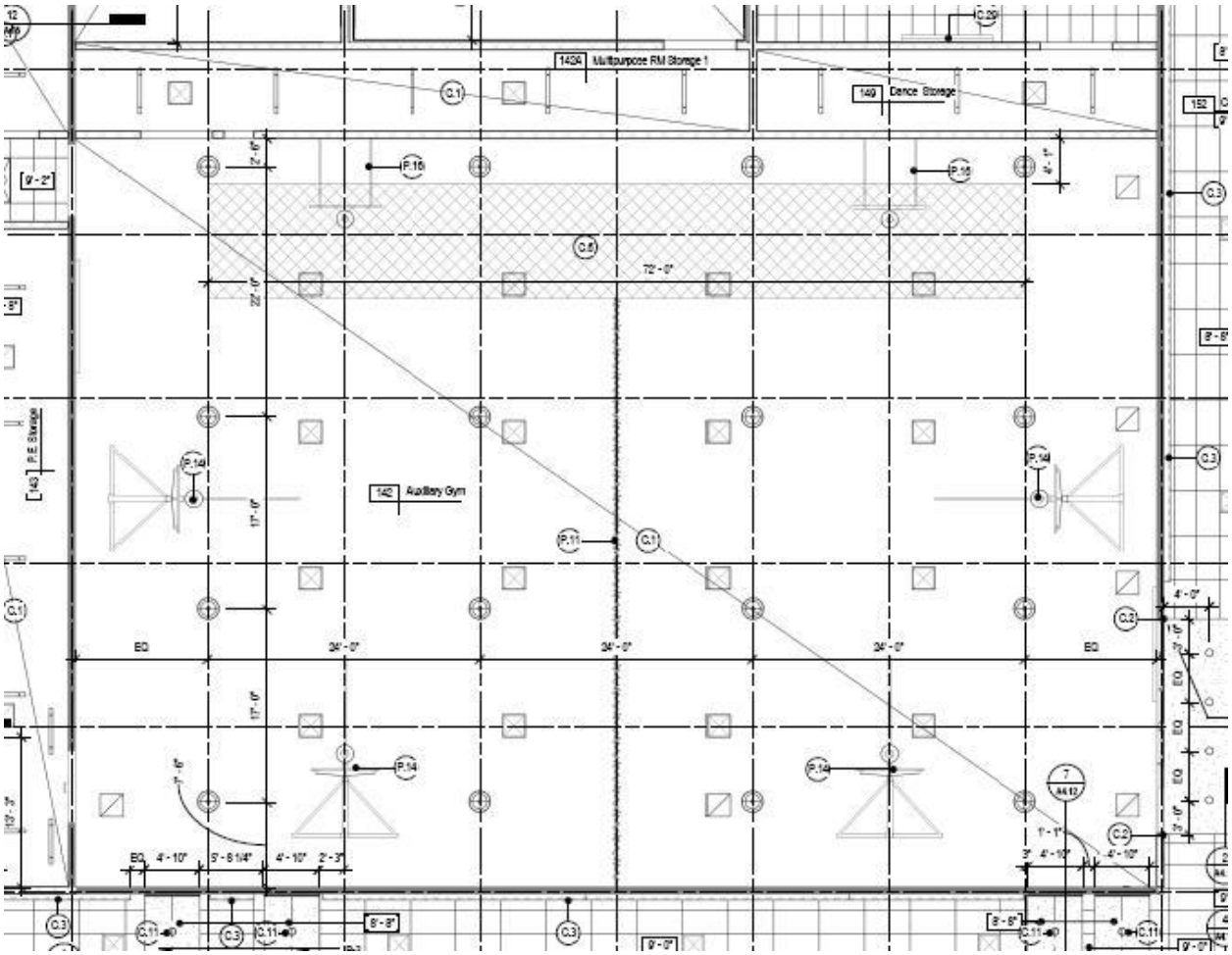

Figure 12. Reflected Ceiling Plan Auxiliary Gym

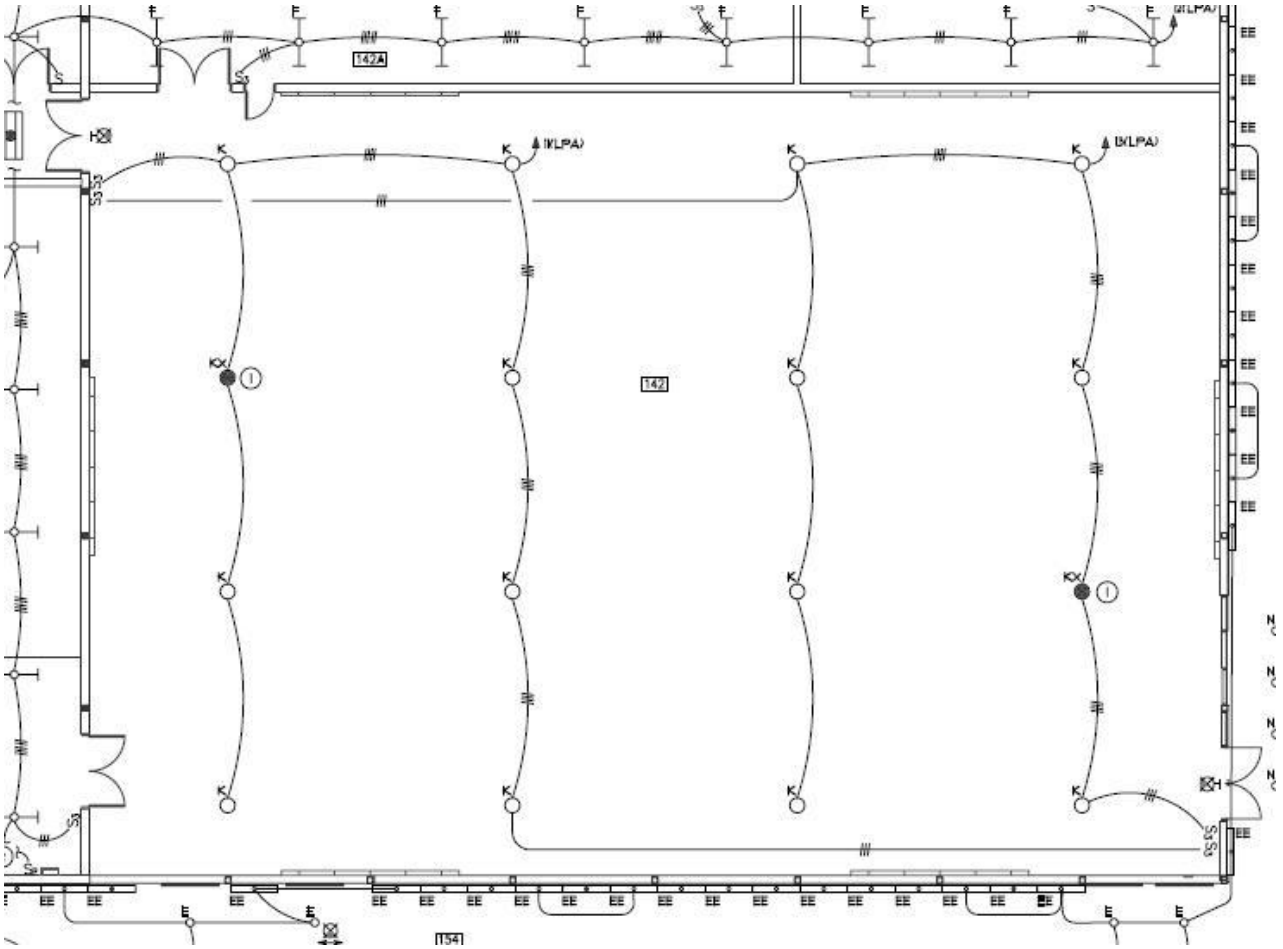

Figure 13. Lighting Plan Auxiliary Gym

Sections:

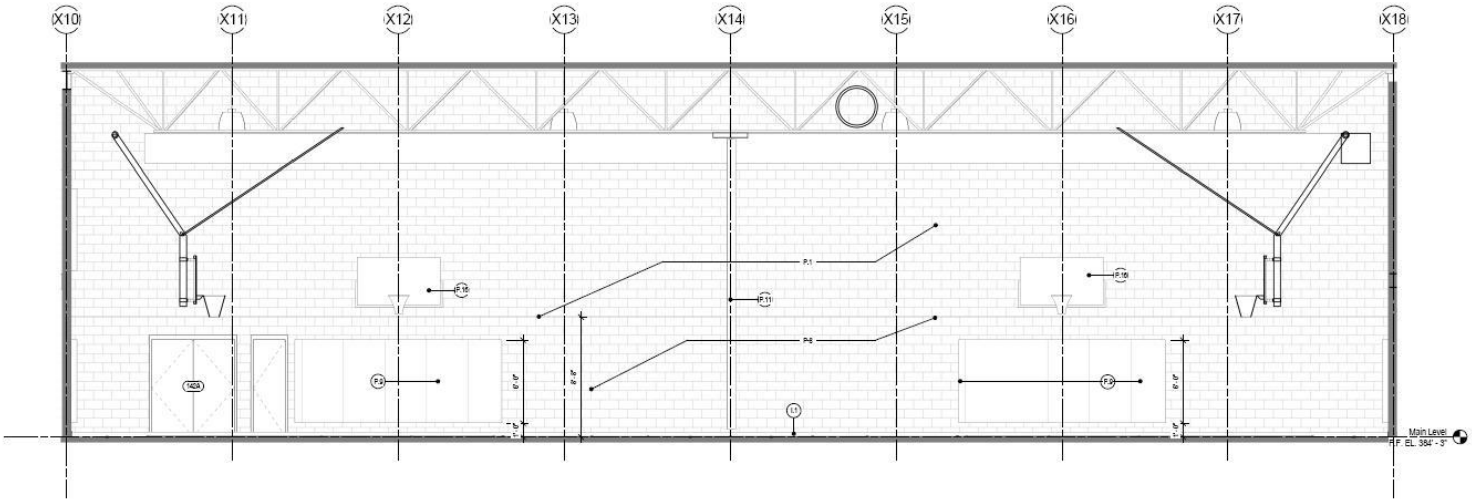

Figure 14. Section Auxiliary Gym

Design Considerations and Criteria

IESNA 2000 Design Considerations (Sports and Recreation Class II)

Very Important Design Considerations

- Direct Glare
    - Avoiding glare is a necessity when designing a lighting scheme for a basketball court, since you do not want to blind the players on the court, so that they cannot perform the tasks at hand.
- Light Distribution on Task Plane (Uniformity)
    - Uniformity allows players to be able to see without being distracted or confused by brighter spots on the floor.
- Reflected Glare
    - Players should be able to see and perform the visible tasks necessary for playing this aerial sport. The lighting design should avoid distraction and glare issues.
- Shadows
    - Shadowing must be avoided as it may cause darkness on certain spots on the floor, which will not allow players to complete tasks as it may cause confusion.

Important Design Considerations

- Color Appearance (and Color Contrast)
    - Players must be able to distinguish between teams and team colors as well as the definition and color of the ball.
- Daylighting Integration and Control
    - This aspect provides a psychological one. An aspect not directed at players specifically, but to all individuals within the space.
- Flicker and Strobe
    - Any type of distraction created by the lighting design must be avoided in order to allow players to complete the tasks associated with playing basketball.

- Luminaire Noise
    - Players and coaches must be able to communicate with each other on the court and thus the background noise must be kept to a minimum.
- Modeling of Faces and Objects
    - Being able to identify the basketball and players faces allows for aerial tasks to be completed and for communication to be simpler.

IESNA 2000 Design Criteria (Sports and Recreation Class II)

- Horizontal Illuminance
    - E = 800 lx or 80 fc
- Uniformity
    - CV Ratio = < 0.21
    - Max : Min = < 2.5: 1

ASHRAE Standards 90.1

- Lighting Power Density
    - Gymnasium/ Exercise Center (Exercise Area)
    - LPD = 2.3 W/ft^2

Evaluation

Renderings:

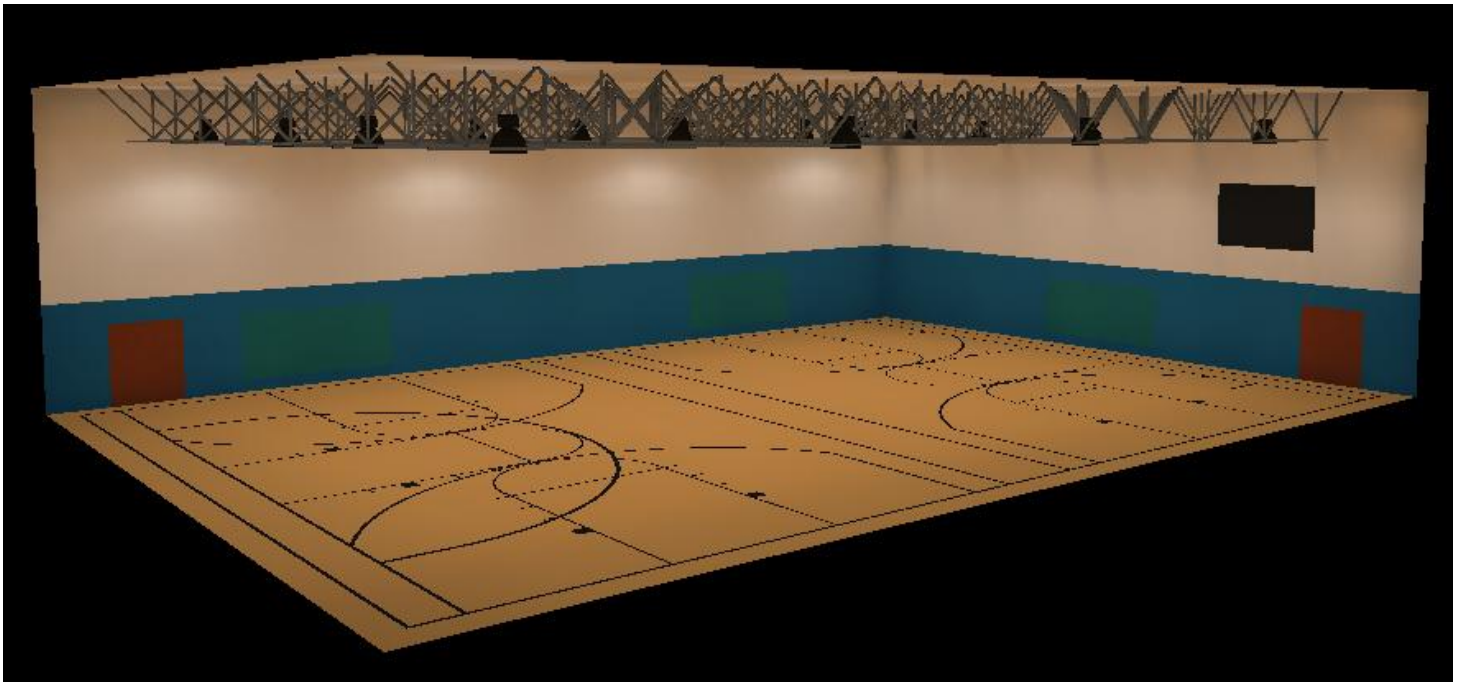

Figure 15. Auxiliary Gym Perspective

Figure 16. Auxiliary Gym Section

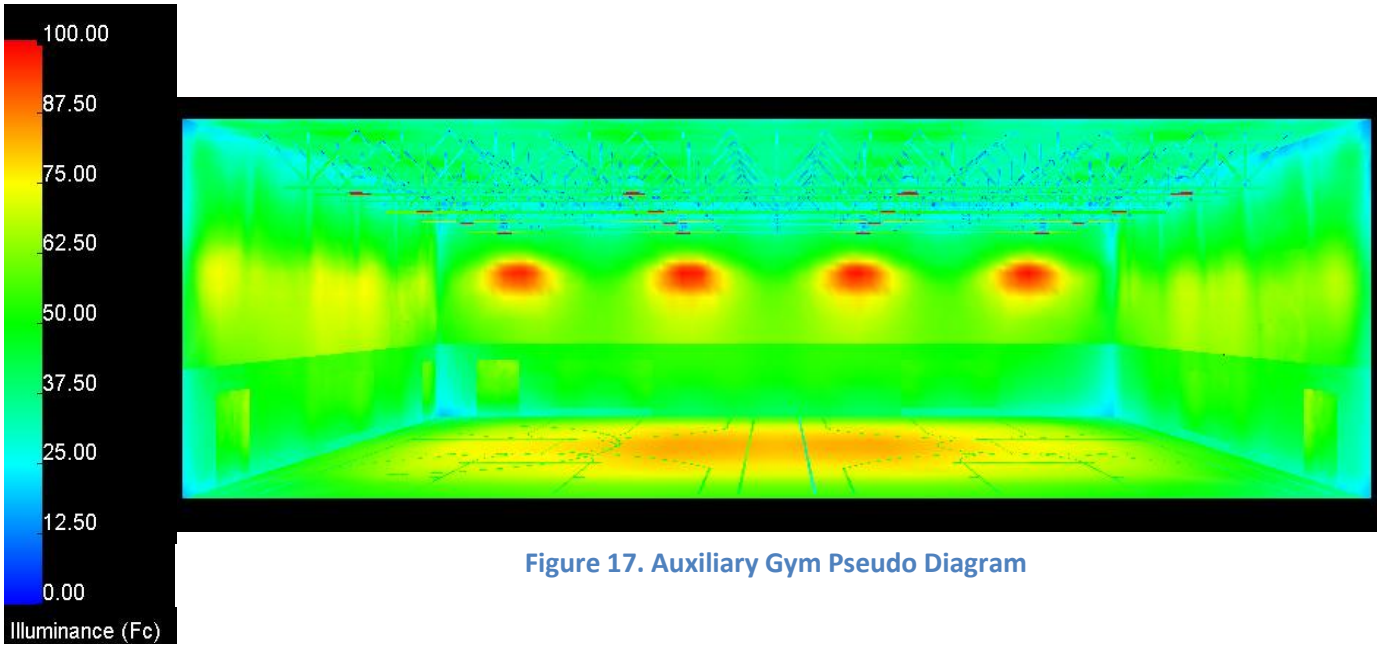

Figure 17. Auxiliary Gym Pseudo Diagram

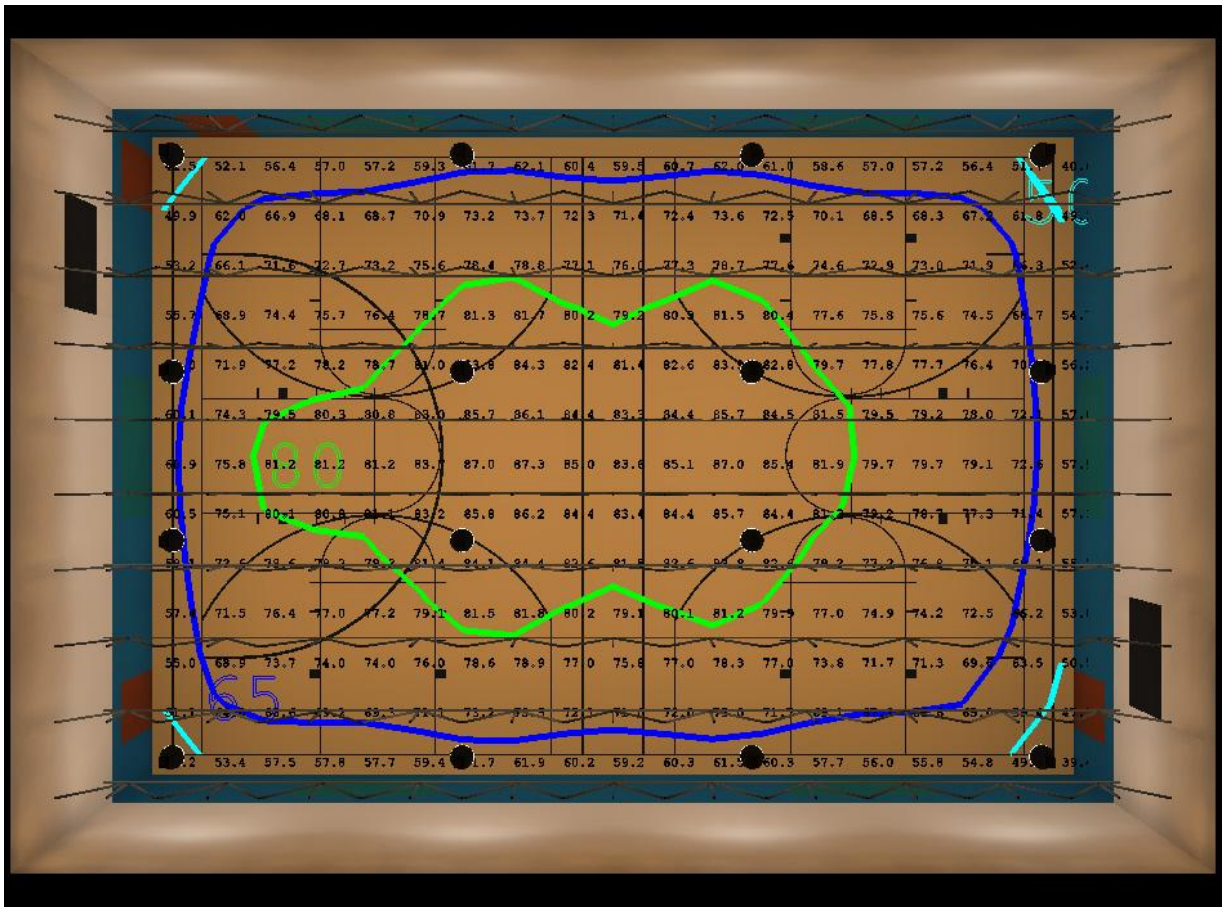

Figure 18. Auxiliary Gym Illuminance Grid

Discussion:

The auxiliary gym's existing lighting design performs adequately at best. The design does not meet IESNA recommendations of illuminance, but it does meet the requirements for uniformity and max to min ratio.

According to IESNA RP-06-01 for Class II sporting facilities the illuminance at three feet from the floor should be 80 fc. The existing condition only is 9.88 % below the recommended level. There is a significant difference in allowable power and consumed power, which allows for available power to add luminaires in order to raise this illuminance level.

The metal halide lamps used will contribute to direct and reflected glare off the finish of the glossy floor. This is one design consideration that must be avoided and thus using different types of light sources should be considered when redesigning the lighting system.

Comparison:

Criteria	Existing Condition	IESNA Recommendation
Average Horizontal Illuminance	71.7	80
Maximum Illuminance	87.3	-
Minimum Illuminance	39.4	-
Emax/Emin	2.22	< 2.5 : 1
Coefficient of Variance	0.15	< 0.21

Fitness and Weight Room

Existing Conditions

Description:

The fitness and weight room is a unique space due its geometry, varying ceiling heights, and materials. The ceiling varies in height throughout the space and as the height changes so does the material of the ceiling. Another interesting feature to this room is its unique geometry. The west facing wall is an exterior wall facing the parking lot and is made entirely of glass. This wall that provides outside views is also in an elegant curve. This space will primarily serves as the workout area for the athletes of Harford Community College and is filled with varying workout equipment. This equipment ranges from treadmills, stationary bikes, weight machines, and benches for free weights.

Materials:

Material	Description	Properties
Floor	grey, teal, light green tiled carpet	ρ = 0.12
	grey athletic rubber flooring	ρ = 0.07
Walls	gypsum board with white finish paint	ρ = 0.9
	gypsum board with blue finish paint	ρ = 0.14
	gypsum board with dark blue finish paint	ρ = 0.10
	mirror	ρ = 0.93
	clear glazing store front system	ρ = 0.05
Ceiling	gypsum board with white finish	ρ = 0.9
	exposed structure, painted white	ρ = 0.9
	acoustical ceiling tile with white finish	ρ = 0.75

Lighting Equipment:

Type	QTY.	Description	Catalog #	Lamps	Voltage	Input Watts
B	30	Fluorescent direct/ indirect pendant with straight blade baffles and electronic dimming ballast	Peerless #10CRM8 1 54T5HO 5/95 x 277 ADEZ SCT L/LP F112 C041 RIF	(1) 54T5 HO 835	277	62
C	39	2x4 fluorescent fixture with acrylic lens and electronic ballast	Lithonia #2RT5 28T5 MVOLT GEB10 LPM835P	(2) F28T5 835	277	58
E	20	6" compact fluorescent down light with electronic ballast	Gotham #AF 226 6AR LD MVOLT GEB10	(2) 26DTT 835	277	51

Light Loss Factors:

Fixture	Lamp Lumen Depreciation (LLD)	Luminaire Dirt Depreciation (LDD)	Room Surface Dirt Depreciation (RSDD)	Ballast Factor (BF)	Light Loss Factor (LLF)
B	0.93	0.95	0.98	0.99	0.857
C	0.95	0.9	0.98	0.95	0.796
E	0.85	0.92	0.98	0.94	0.72

Assumptions:

B – Category II, very Clean Environment, 18 month cleaning, RCR = 1.12

C – Category V, very clean environment, 18 month cleaning, RCR = 0.2

E – Category IV, very clean environment, 18 month cleaning, RCR = 2.8

Existing Lighting Power Density

Fixture	QTY	Input Watts	Total watts	Allowable Watts	Meet IESNA STD. 90.1
B	30	62	1860	-	-
C	39	58	2262	-	-
E	20	51	1020	-	-
Sum	-	-	5142	0.9W/SF * 5560SF = 5004W	NO

Drawings

Plans:

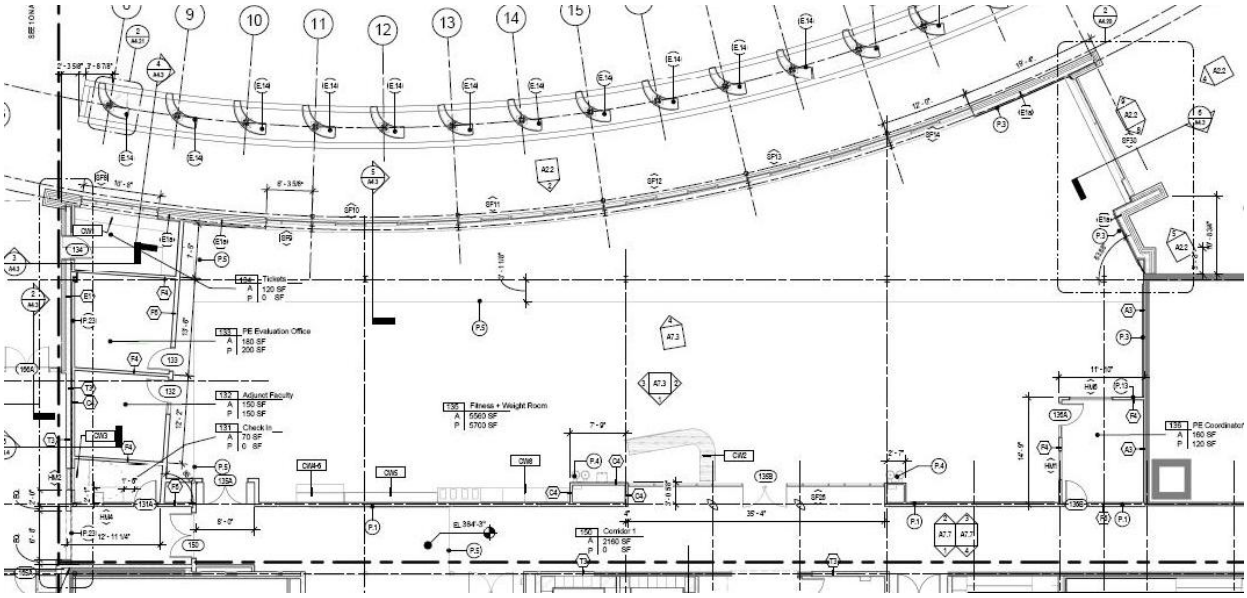

Figure 19. Fitness and Weight Room Floor Plan

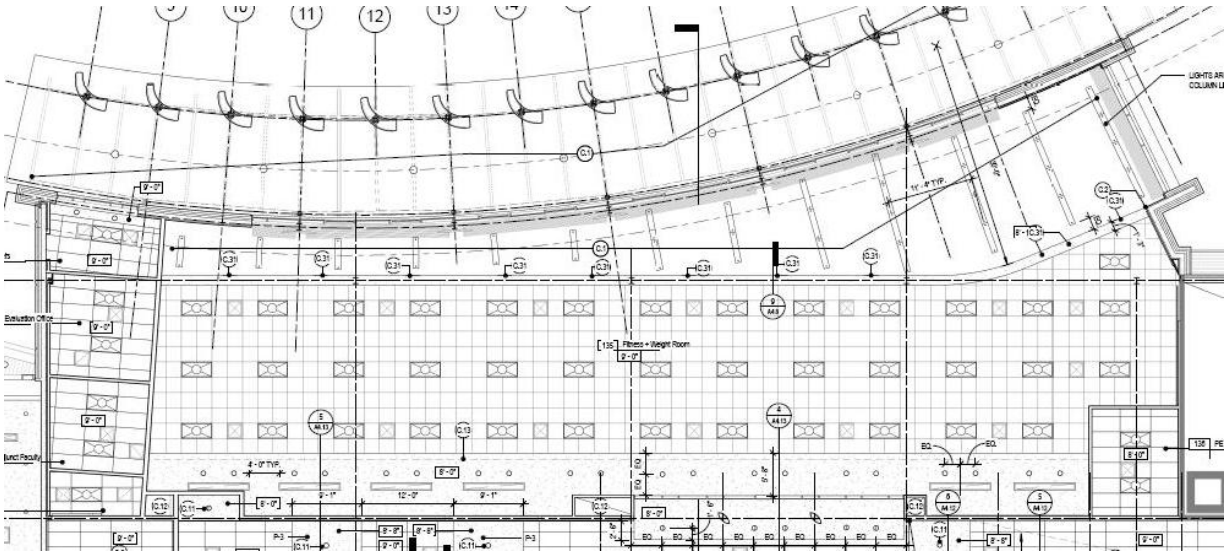

Figure 20. Fitness and Weight Room Reflected Ceiling Plan

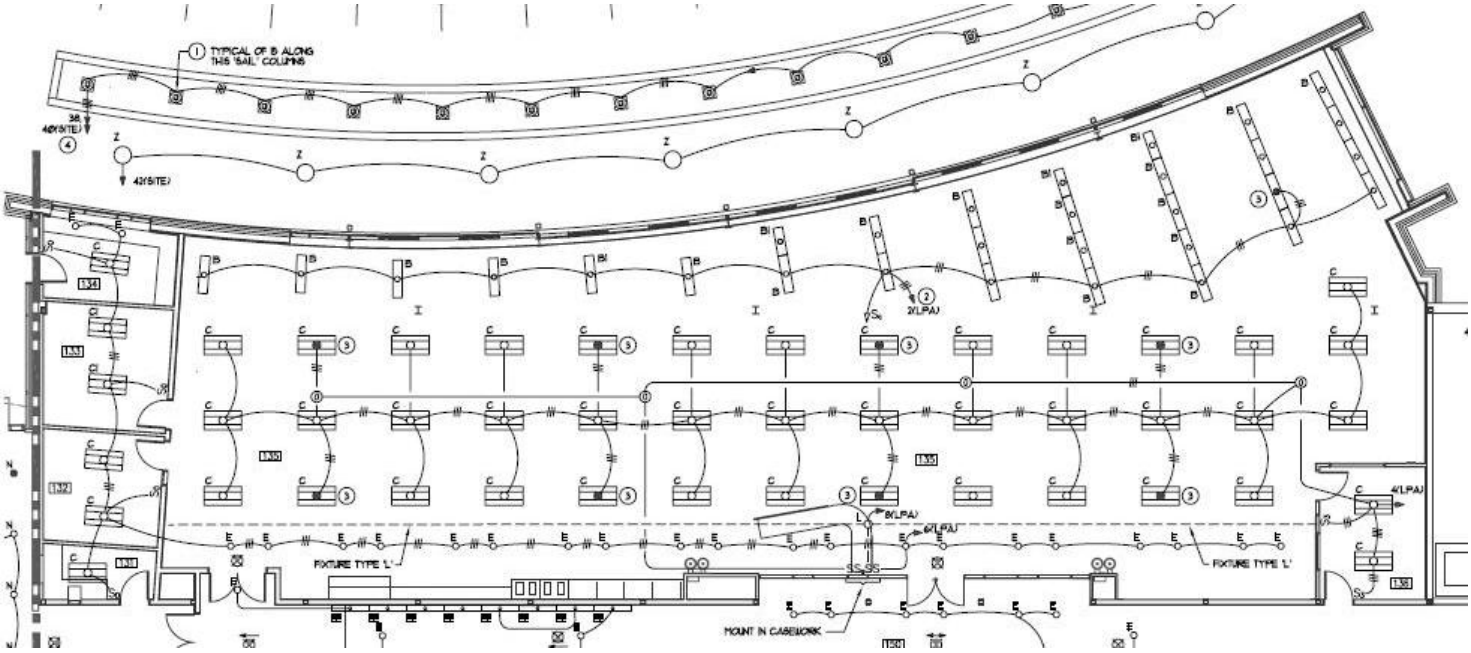

Figure 21. Fitness and Weight Room Lighting Plan

Sections:

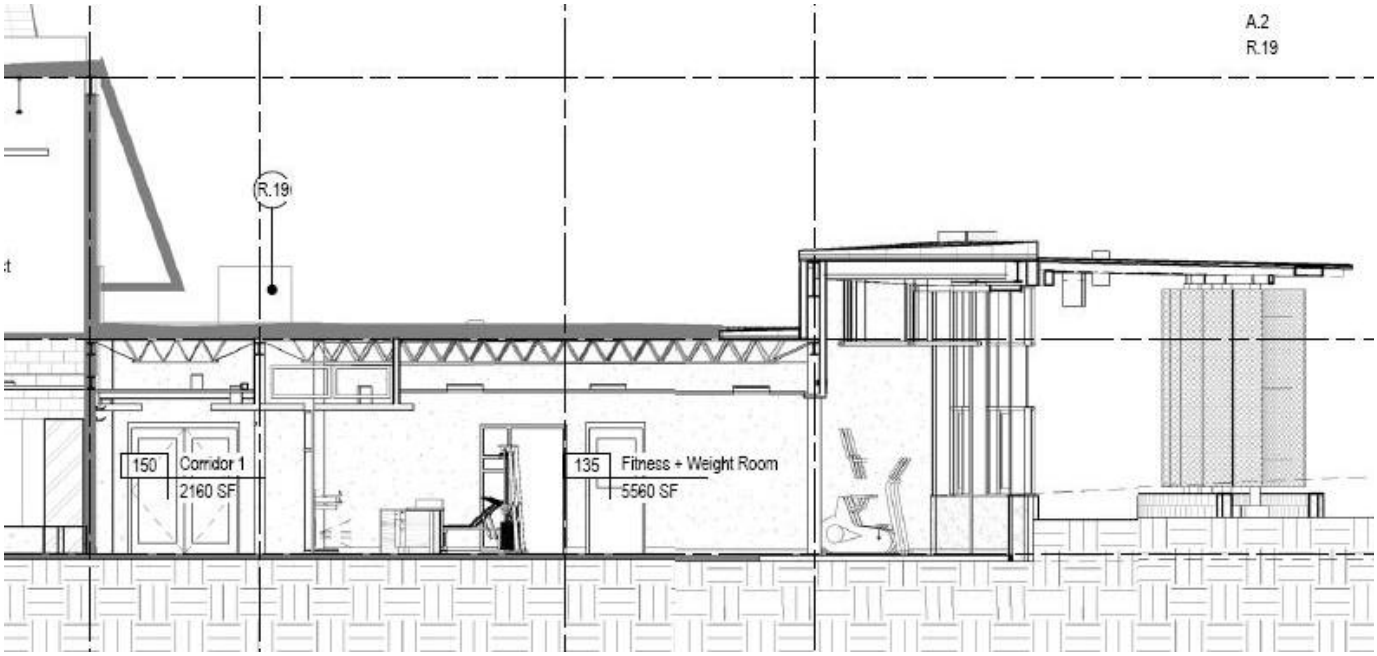

Figure 22. Fitness and Weight Room Section

Design Considerations and Criteria

IESNA 2000 Design Considerations (Health Care Facilities – Physical Therapy Gymnasiums)

Reason:

The rehabilitation exercises that take place within a physical therapy session can be similar to those exercises condoned in a fitness and weight room. Both types of spaces require the ability to read, walk, lift, and stretch. These are all visual tasks that a lighting design will be required to abide by in a fitness and weight room or physical therapy gym.

Very Important Design Considerations

- Appearance of Space and Luminaires
    - The equipment in a fitness and weight room is generally organized in an orderly manner which makes it manageable for an individual to conduct proper exercise etiquette. It is also the responsibility of the lighting design to continue that relationship between furnishings and space.
- Color Appearance (and Contrast)
    - It is important that the lighting design accurately portrays the color aspects of the weights to avoid accidents and special issues.
- Daylight Integration and Control
    - Incorporating views of the exterior and outdoors is believed to be important for psychological reasons by providing cues about the time of day and weather.
- Flickering and Strobe
    - Flickering and strobe affects can be annoying and distracting. When handling weights it is important that an individual not get annoyed and distracted, in case of injury and accidents.
- Luminances of Room Surfaces
    - It is crucial all pieces of equipment maintain certain brightness, so that an individual working on that piece of equipment can operate it properly.

Important Design Considerations

- Direct Glare
  - Glare causes discomfort and can affect visibility. In an environment that constantly demands an individual to be aware of its surroundings, it is important that glare be avoided.
- Light Distribution on Surfaces
  - Abnormal patterns of light can cause shadows and affect visibility. It is essential for the lighting design to avoid abnormal patterns of light.
- Modeling of Face and Objects
  - The lighting design must reveal depth, shape and texture of objects in a weight room because it must assist an individual in interpreting what he/she is seeing and lifting.

IESNA 2000 Design Criteria (Health Care Facilities – Physical Therapy Gymnasiums)

- Horizontal Illuminance
  - E = 300 lx or 30 fc

ASHRAE Standards 90.1

- Lighting Power Density
  - Gymnasium/ Exercise Center (Exercise Area)
  - LPD = 0.9 W/ft^2

Evaluation

Renderings:

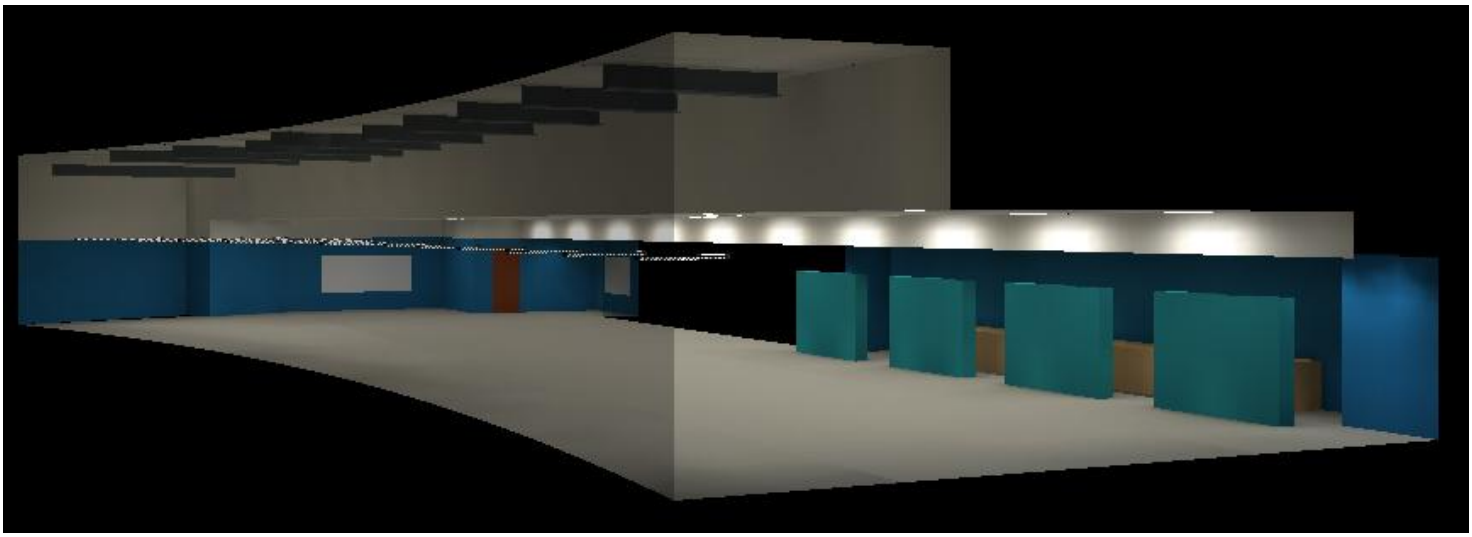

Figure 23. Fitness and Weight Room Perspective

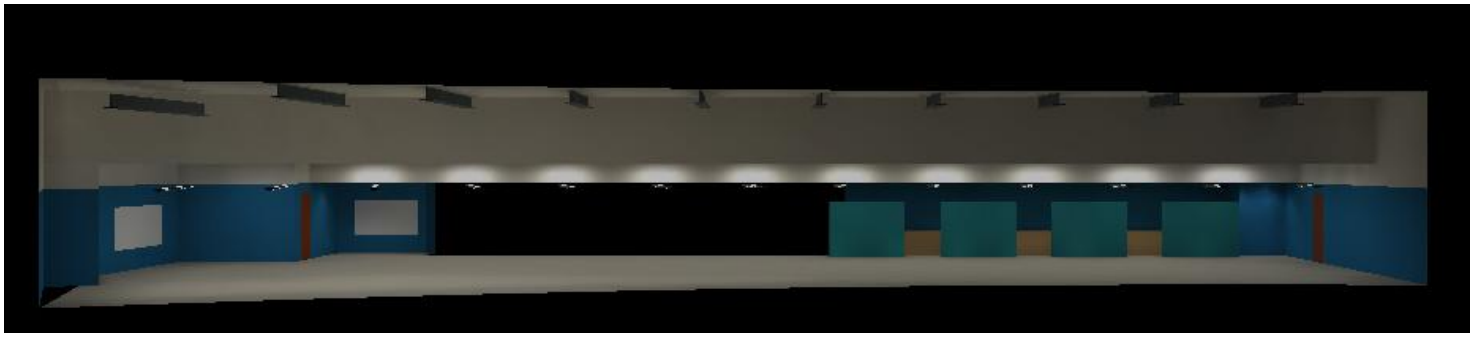

Figure 24. Fitness and Weight Room Section

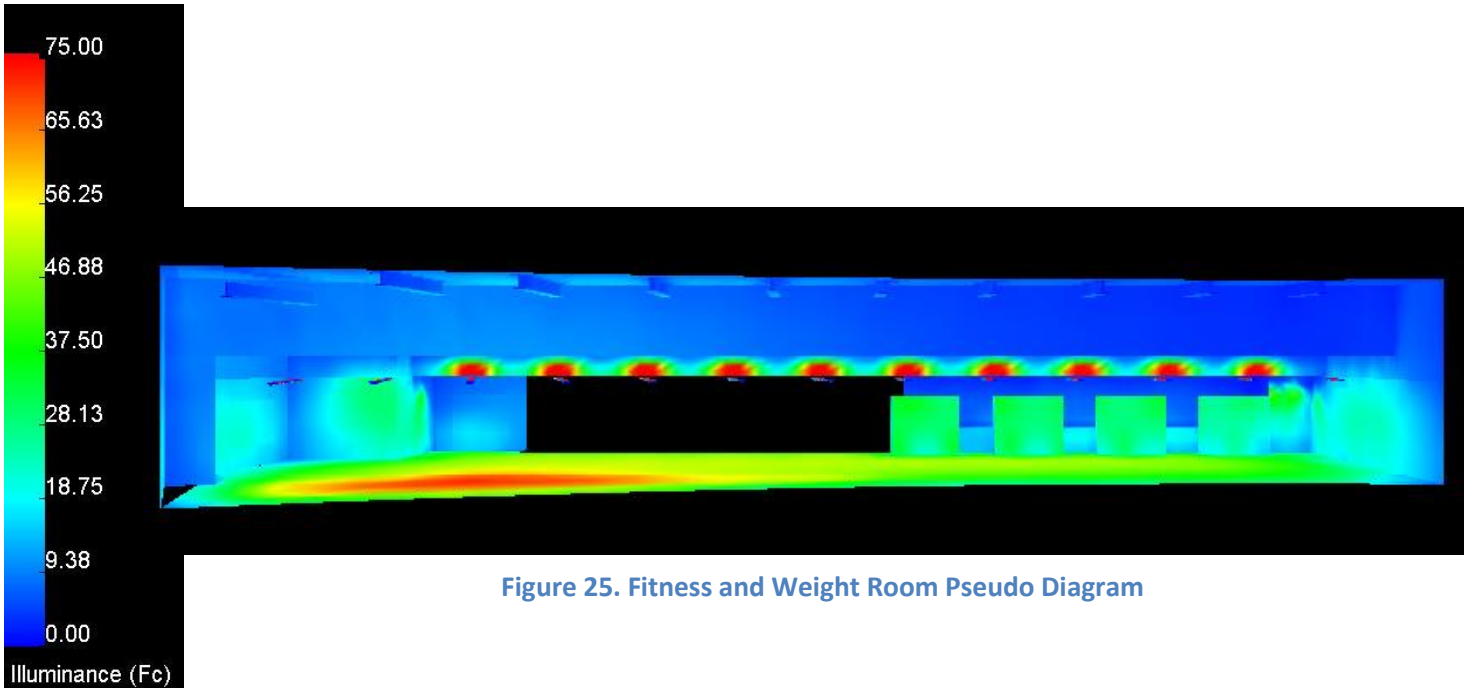

Figure 25. Fitness and Weight Room Pseudo Diagram

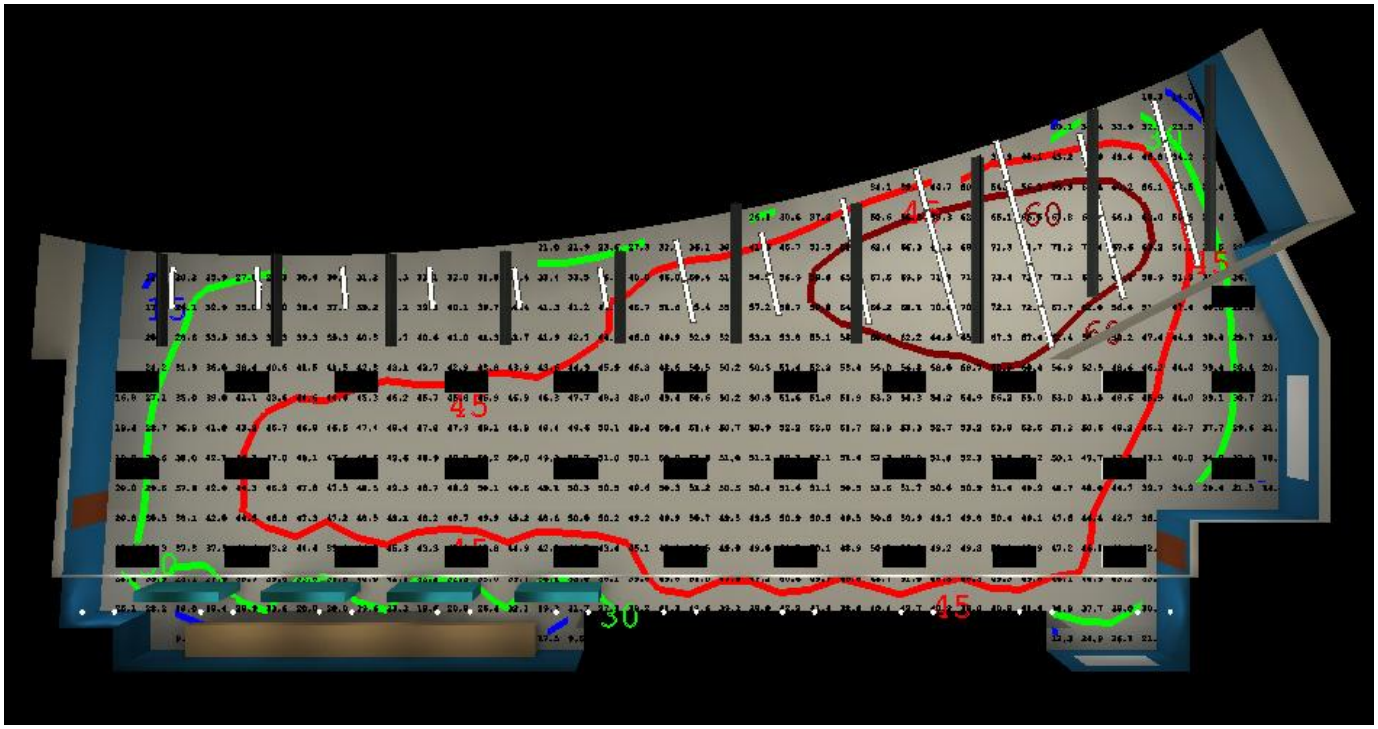

Figure 26. Fitness and Weight Room Illuminance Grid

Discussion:

The existing lighting design of fitness and weight room is unique and intricate as it takes advantage of the varying ceiling heights and achieves recommended IESNA illuminance levels. However, the system lacks uniformity and has a high max to min ratio. The high max to min ratio creates uneven patterns of light on surfaces and as mentioned above in design considerations, the lighting design should conform to even patterns of light to enable individuals to complete the necessary tasks. Although the horizontal illuminance requirement is achieved, the illuminance is 34 % higher than the recommended level. This higher light level may cause issues with direct and reflected glare off the mirrors that surround the space.

The redesign will eliminate some of the luminaires to ultimately lower the illuminance level, which in turn will lower the amount of power supplied to the lighting system. In order to meet ASHRAE 90.1 Power Standards, the lighting design will need to lower its supplied power. The redesign will also look into the amount of luminaires required in the linear fluorescent pendant system as this portion of the space is brighter than other areas.

Comparison:

Criteria	Existing Condition	IESNA Recommendation
Average Horizontal Illuminance	44.33	30
Maximum Illuminance	73.8	-
Minimum Illuminance	9.4	-
Emax/Emin	7.84	-
Coefficient of Variance	0.29	-

Computer Files

AGi32 Models

Auxiliary Gym

Y:\BMG\AE 481W THESIS\FALL\LIGHTING\Modeling

Fitness & Weight Room

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3D CAD Models

Auxiliary Gym

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Fitness & Weight Room

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