

SUSQUEHANNA CENTER

HARFORD COMMUNITY COLLEGE 401 THOMAS RUN ROAD BEL AIR, MD
MARCUS NG LIGHTING & ELECTRICAL OPTION

<http://enr.psu.edu/ae/thesis/portfolios/2013/nyn5021/index.html>



SENIOR THESIS 2013

PROPOSAL FOR SPRING SEMESTER

MARCUS NG

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EXECUTIVE SUMMARY

The Susquehanna Center is a college athletic facility which comprises of a multitude of various multi-purpose spaces. The renovation and expansion of the project greatly transforms the scenic impact of the building through the expression of the façade, a simple yet contemporary architectural appearance. Other additions include a brand new fitness room, and a 2,552 arena, which will become the central attraction and revenue generating space of the facility.

The central theme of the re-design concept is to convey the idea or message of energy. Energy is an abstract idea and cannot be quantifiably illustrated, but can be illustrated through the expression of imagery and imagination. Inspired by the adrenaline, competition, and excitement by sports, the concept of energy will be expressed with the combination of the facade's modern architectural appearance, and also translated throughout the entire building. The four spaces that were chosen to be re-designed include:

Building Façade | Arena West Wall, Entrance, and Canopy

Circulation Space | Main Lobby

Special Purpose Space | Arena

Large Work Space | Fitness Room

The following proposal will provide a description of the work that will be done in the upcoming spring 2013 semester for the AE Senior Thesis Project. The requirements include the completion of two depth topics; an analysis and re-design of the lighting and electrical system of the four chosen spaces, and two breadth topics. The breadth topics include an architectural study and redesign of the building's façade, and a daylighting study in response to those changes.

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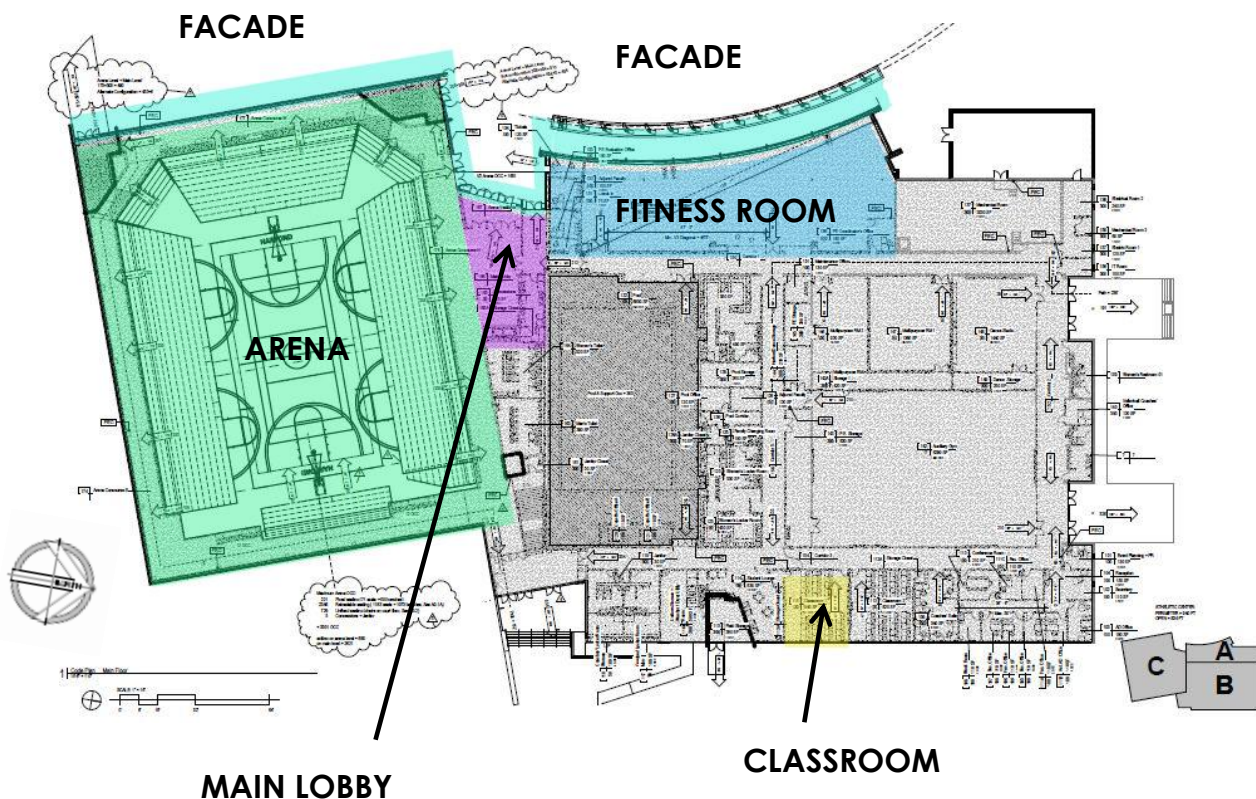
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GENERAL BUILDING OVERVIEW

Harford Community College's Susquehanna Center is an athletic facility which serves as an entertainment and recreational hub for the campus' athletes, students, and faculty members. The expansion and renovation of the facility will produce an architecturally modern and contemporary appearance, with further upgrades to the existing auxiliary gym, and the additions of a swimming pool, fitness center, as well as a 2,552 seat arena, which can be used for basketball and various entertainment and academic activities. With the additions in place, the overall size of the project will be 106,955 SF and an estimated cost of \$27 million. The project comprises of two levels above grade, the main level and the arena level, and a basement level. The main level acts as the entrance and central circulation pathway to the various spaces in the facility, while the arena level serves as the concourse to the arena. Lastly, the basement level includes the swimming pool and serves as the main area for the building's electrical distribution system. The following provides a diagrammatic illustration of the five spaces that were selected to be re-designed, which consists of a large work space, special purpose space, circulation space, building façade, and an additional space.



LIGHTING DEPTH

In order to propose a re-design lighting solution of the five selected spaces, a visit to Lutron on December 10th, 2012 was conducted which included a presentation of the proposed initial schematic design concepts and criteria to a panel of lighting designers and professionals, to receive comments and feedback on any beneficial and critical amendments that need to be made. The five spaces chosen to be analyzed and re-designed include the building façade, main lobby, arena, fitness room, and a classroom. Throughout the spring semester, the final lighting design solution for the spaces will be produced using a wide range of lighting and presentation computer software programs, including AGI32, Photoshop, 3D StudioMax, AutoCAD, and possibly DaySim, for the calculation and analysis of day lighting integration.

BUILDING FAÇADE

The renovation and expansion of the Susquehanna Center brought about a completely contemporary façade, expressed by the curvilinear canopy structure composed of aluminum baffles, the main entrance, and the exterior west wall of the arena. A majority of the façade is characterized by a combination of multi-colored and clear glass panels of various sizes, while the west wall of the arena is mainly made up of pre-fabricated brick panels. The existing lighting design of the façade focuses on providing pedestrian and pathway lighting for circulation purposes, and seems to put less emphasis on actually highlighting the architecture. In order to introduce character and personality to the façade, the re-design of the façade will focus on creating visual interest and curiosity by highlighting the building's unique architectural characteristics. Ambient light from the facade alone will not provide adequate lighting for circulation, so pedestrian lighting will be integrated but should complement the building's façade.



Three initial schematic design concepts were initially produced for this space, as I believe the Susquehanna Center should be the focal point of the campus, and requires an interesting concept to bring curiosity and energy throughout the entire campus.

The first schematic design illustrates the idea of aura, expressed by downlights, wall sconces, and orb-like decorative fixtures.

The second schematic design represents the idea of energy, inspired by energy lines and waves as continuously flowing creations. The linear color-changing decorative fixtures provide visual interest that complements the façade's two-toned glass panels. The brick portion of the façade is grazed from top to bottom to emphasize the texture of brick and produce visual curiosity.

The third schematic design expresses the idea of power. The crown of the arena is highlighted and complemented with wall-washed aluminum baffles and wall-washed walls to bring out the texture of brick and produce a floating effect.

MAIN LOBBY

The entrance leads into the main lobby of the building, and serves as the heart of circulation. The main lobby provides a pathway to either the main arena or directs you to the other various spaces in the building. One of the main features of the main lobby is the two-toned curved aluminum panels located on the ceiling, which also acts as a drop ceiling. This feature produces a wave-like decorative pattern and adds visual interest into the space. The main lobby will be re-designed to create a psychological impression of festivity. This is an important space to consider as the main lobby should set the tone for occupants as a space of excitement and adrenaline, and to psychologically prepare athletes for their upcoming games.

ARENA

The arena is probably the most important space of the renovations and expansion of the building, and provides an area for various athletic, recreational, and entertainment activities. The lighting design for the arena should be able to flexibly and conveniently complement each purpose as required. A uniform distribution of light is needed to provide adequate illumination for multi-directional sports activities, while minimizing visual glare and shadows. Exhibitions, trade shows and commencements should be appropriately illuminated to highlight specific tasks in the space, integrated with lighting controlled fixtures positioned throughout the space.

FITNESS ROOM

It is critically important that the performance of athletes and the occupants of this space are not affected by visual glare. Cardiovascular and weight lifting activities are also known as multi-directional sports, and should be provided with uniform illumination that is comfortable and pleasant to the human eye. The existing lighting solution incorporates the use of downlights. The problem with this is that it creates many hotspots and maximizes the issue of visual glare. The re-designed lighting solution will implement the use of indirect lighting fixtures and cove lighting, providing uniform illumination throughout the space with minimal glare. Additionally, lighting controls and occupancy sensors will be equipped to add flexibility, daylight integration, as well as decrease electrical energy consumption.

COMMENTS & FEEDBACK

The following provides a bulleted list of comments and feedback that were suggested by the two lighting designers at Lutron.

Sandra Stashik (Acuity Brands)

- Very nice presentation with good graphics
- Good explanation at opening. Helped her understand the site and materials
- With exterior, the existing fixture was distracting
 - First concept was a bit too much. Too many layers
 - Second and third concepts seemed to work better. Interesting and strong concepts
 - Liked the three concepts on the same page, but were too small. Maybe take three slides, rather than having them presented so small on one slide
- Didn't present much about the latter spaces. Disproportionate amount of time on spaces presented early in the presentation
- Lobby: rendering something that you're not going to have. A rope light will create a glow of diffuse light, but it won't create the kind of glow that should be portrayed
- Presented fitness center as an easy space to design, but it is in fact not as easy as it seems. Downlights are not a good solution
- Presented classroom also as an easy space to design. Take every space and study them carefully
- Arena was a big letdown. Need to address sports with multi-directional play. Need to address seating, different space uses.

Shawn Good (Brinjac)

- Pace of presentation was good
- Liked that materials were discussed
- Nervousness early on in presentation. A lot better as the presentation went on
- Don't need to say that you're studying this or that. Simply show the work i.e. what did you do and what you are proposing.
- Exterior renderings: sidewalk and people are always dark even though there were added layers. This needs to be addressed
- Lighting design of façade should tell a person where to go. The entry is the last place that the eye is drawn.
- Curving panels in lobby: laying a rope light on top might make it appear like a flat panel rather than emphasizing the curves

- Fitness room: slides were breezed through without mention, making it confusing
- Make the gym a personal space and explain the requirements for lighting in a gym. Need to rethink downlight concept
- No consistency in the way the different spaces were presented
- Arena is a revenue generating space, yet it was not presented with importance
- Classroom is a competent design and should be taken out. It would be much better to spend more time on the arena because it is centrally important.

After reviewing the feedbacks from the two light designers, important changes will be made before the final design is completed and compiled. To improve the presentation portion of the project, the five proposed spaces will need to be more consistent and require a more uniform layout. The central theme of the project should be clearly illustrated and expressed in all of the spaces. The central theme should be unified and should tell a story through the expression of the re-designed lighting solution for the spaces chosen. Appropriate lighting fixtures should be more carefully considered as each space serves a different purpose. For instance, the lighting design for the fitness center should provide uniform illumination with minimal visual glare, but still be connected to the central theme. Perhaps, personal experience can be integrated and expressed in all the chosen spaces to be redesigned. The most important amendment that will be made will be the elimination of the classroom space, which is deemed to be a competent yet boring space. This will be made to put more emphasis on the arena, the main lobby, and the fitness center, which are the central attraction and revenue making spaces of the building.

ELECTRICAL DEPTH

Like all electrical systems, the Susquehanna Center's electrical system composes of a variety of equipment that distributes the required loads throughout the facility. Back-up power and over-current protection devices are also installed to ensure that equipment are not damaged by sudden power surges and are able to maintain normal operation during periods of power shortage. The utility company that serves the building location is Baltimore Gas and Electric (BGE), and utilizes Rate Schedule GL which applies to large electric service assuming a monthly demand of 60kW or more. The service voltage will be fed by a pad-mounted transformer and will be at 480Y/277V, 3PH, 4W. 480Y/277V, and 208Y/120V voltages will be distributed by a 3200A main switchboard to meet the loads of the different electrical equipment in the building.

The main objective of the electrical depth is to re-design the branch circuits connected to the four spaces, as well as the over-current protection devices connected. It is especially important that all equipment is sized correctly and appropriately in order to provide adequate lighting loads to the four different spaces. Energy consumption and efficiency should be considered and analyzed.

BUILDING FAÇADE

The existing solution to the building's façade focuses entirely on providing pedestrian and pathway lighting through the use of lamp poles and ambient light created by the interior spaces. This seems to detract the significance of the façade's architecture. The re-design will emphasize and highlight points of interest and provide visual curiosity to pedestrians, by generating an aura of energy throughout the surrounding environment. Primarily using a blue-toned color palette, the aluminum baffles across the canopy will also be grazed from the bottom using color-changing LED fixtures. The crown of the arena will be wall-washed to add visual interest. LED wall-washing and wall-grazing will be used to emphasize linearity and to bring out the brick texture on the arena west wall. In-grade LED spotlights will be used for pedestrian lighting.

MAIN LOBBY

The existing wavy aluminum panels on the ceiling of the main lobby serves as an interesting architectural piece that should be highlighted. Fluorescent pendants fixtures are used in the existing designs which are lowered between the spaces of the aluminum panels. This solution only seems to provide task lighting and puts little to no emphasis on the panels. To create a feeling of festivity through the concept of energy, LED fixtures will be installed at specific locations above the panels that will create a halo-like glow and aura to the space. LED fixtures will be used to graze the walls for peripheral emphasis and ambient lighting.

ARENA

The existing lighting solution utilizes high bay metal halide fixtures which are uniformly distributed across the entire space. The main purpose of this solution is to provide uniform illumination for basketball games. Although the re-design will still maintain the uniform illuminance distribution, LED fixtures will be located at specific locations with integrated lighting controls, so that they could be dimmed to suit and switched on/off to suit different occasions. LED high bay fixtures will be used instead of metal halide to reduce maintenance and energy consumption.

FITNESS ROOM

Volumetric fluorescent fixtures are installed in a uniform layout in the fitness center in the existing lighting design. Although uniform illumination is achieved, this solution will make the space appear rather boring, with visual glare problems. Uniform illumination can be achieved using other alternatives, and the re-design of this space will focus on providing indirect uniform illumination through the use of LED fixtures, that will both make the space more personal and reduce energy consumption.

BREADTH 1 – ARCHITECTURAL

The contemporary architecture characteristics of the Susquehanna Center are the central focal point of the facility. First impressions are critical and should provide visual interest and set the initial tone of occupants. Characterized by the large amount of glass and part pre-fabricated brick, the façade expresses a relatively simple but modern architectural style. The architectural breadth of the Susquehanna Center will focus on a study and implementations to portions of the façade that will create a more modern and expressive impression, setting the building apart from its surrounding campus environment. Changes will affect daylighting integration into certain spaces of the building, for instance, the fitness center and more importantly, affecting lighting loads and energy consumption of that space.

BREADTH 2 – DAYLIGHTING

Being a LEED Silver certified building, the renovation and expansion of the Susquehanna Center must follow certain guidelines enforced by the USGBC. Such requirements should be met in an attempt to improve the overall quality, and efficiency, while maintaining and providing an environmentally friendly building with reduced energy consumption. Implementations and installations, for instance, a photovoltaic green roof and improved high efficiency HVAC systems were made. Breadth 2 will focus on the daylighting aspect of the building. With possible changes made to the façade in Breadth 1, a daylighting study will be done to study the effects of direct and non-direct sunlight penetration into the space, which can reduce energy consumption in collaboration with lighting controls and occupancy sensors.

