

Towson Arena Addition

Towson University, Towson Maryland



Joey Becker Thesis Proposal

January 12, 2012

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Executive Summary:

The proposed thesis shall include information about the Towson Arena Addition. I will present problems that exist with the project and also my proposed solutions. Finally I will discuss three different breadth options that I will cover for this project.

I have identified problems and solutions for several parts of the building. I will do a lighting redesign of certain spaces. The emergency power system will be scrutinized as well as the current LED lighting system.

I then will go into more depth on how I plan to investigate and solve the problems of the building. I have presented a timeline of the progress I plan to make on each topic. Finally I briefly discuss breadth topics that I have chosen.

Background:



General Building Data:

Building Name: Towson Center Arena Addition

Location & Site: Towson, Maryland

Building Occupant Name: Towson University

Occupancy: Basketball Arena

Size: 116,586 square feet

Number of stories: 3

Primary Project Team:

Owner: Towson University	http://www.towson.edu/
General Contractor: Gilbane Construction	http://www.gilbaneco.com/
Architect: Hord Coplan Macht	http://www.hcm2.com/
Associated Architects: Sasaki	http://www.sasaki.com/
Civil: Site Resources, Inc.	www.siteresourcesinc.com/
Structural: Faisant Associates, Inc.	http://mysite.verizon.net/faisant/
MEP: James Posey Associates, Inc.	http://www.jamesposey.com/
Landscape: Mahan Rykiel Associates	http://www.mahanrykiel.com/
Code Consultants: Koffel Associates	http://www.koffel.com/
Lighting: Bruce Dunlop Lighting Design LLC	http://www.dunloplighting.com/
IT Consultants: Unlimited Systems Support, Inc.	http://www.ussinet.com/
Foodservice Consultants: Culinary Advisors	http://www.culinaryadvisors.com/

Dates of Construction: May 2011 – March 1, 2013

Cost: 33.5 million (overall project)

Project Delivery Method: Design – Bid – Build

Architecture:

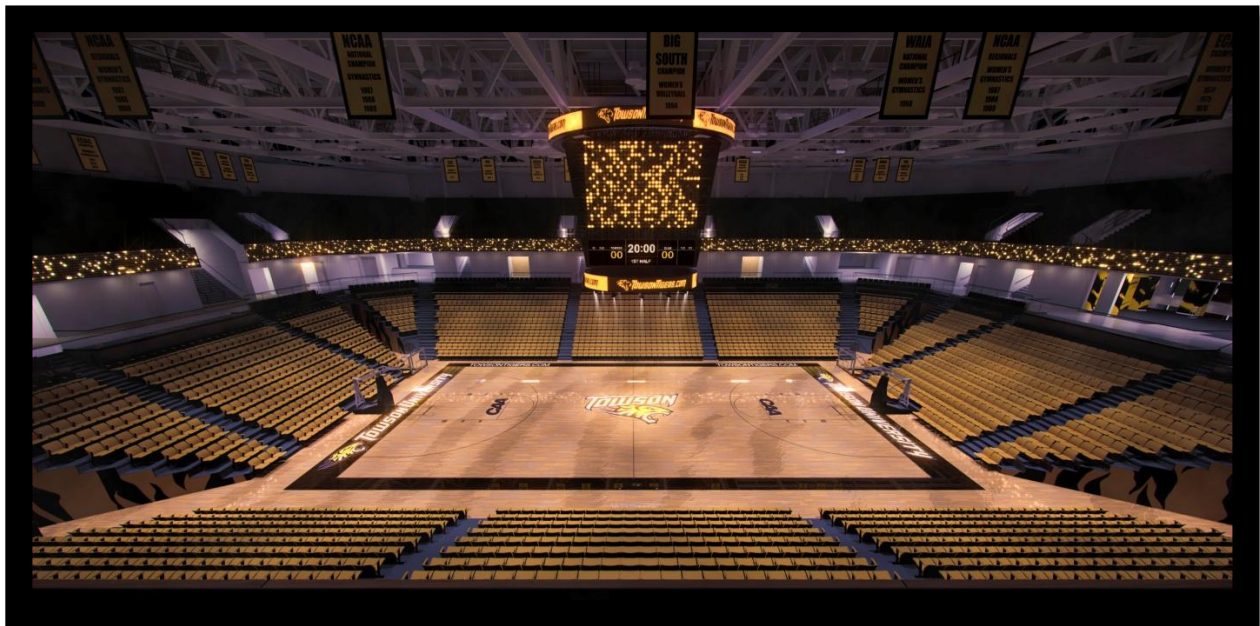
Towson University will build a new state of the art arena for basketball, gymnastics and volleyball. Tiger arena will seat over 5,000 people and also accommodates luxury suites. A zinc, steel and glass façade gives a modern feel to the main entrance of the arena. Vertical windows help stretch the building so as to make it seem taller and more profound. A large overhang covers a glass and steel façade and helps to anchor the building. Floating over the entrance, the overhang gives a sense of strength to the building and exaggerates the grand scale.

Major National Model Codes:

NSPC 2006 – National Standard Plumbing Code/2007 Supplement

IBC 2009 – International Building Code with modifications

NFPA 101 – National Fire Protection Association

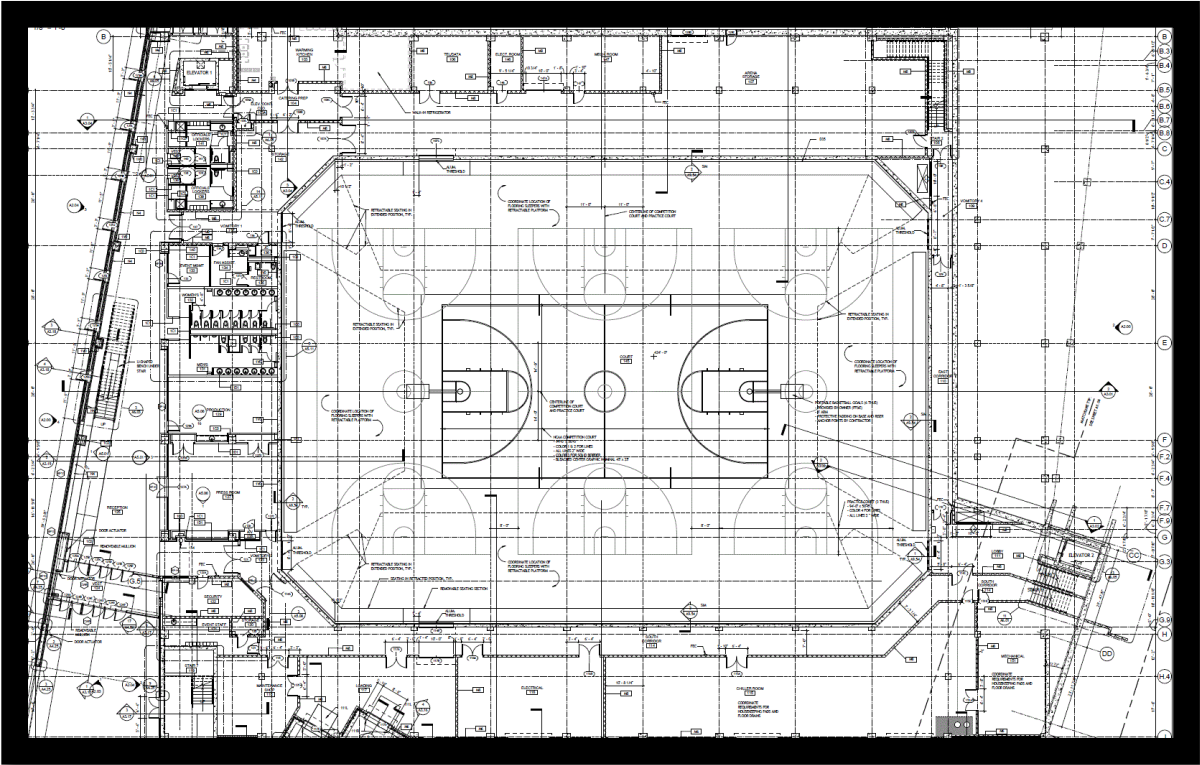


Zoning:

The first and second floors are zoned as A-4. The third floor and mezzanine level are zoned as A-3. There are also areas zoned as B and S. High rise provisions are not applicable because the highest floor is less than 75 feet above the lowest level of fire department access. The building will have a maximum building area of 60,448 square feet. The building will be sprinkled. Based on the A-3/A-4 Use Groups of 1B Construction the allowable area is unlimited.

The allowable height is 160 feet and the allowable stories are eleven. To see more Baltimore County Zoning regulations please visit:

[Baltimore County Citizen's Guide to Zoning](#)



Statement of the Problem:

The Towson Arena Addition project has four spaces that I have scrutinized where I plan to redesign the lighting. The electrical system's emergency power capabilities will be assessed. Also, the four lighting solutions will need an electrical redesign as well. Finally, I will determine the cost savings of switching all of the current LED fixtures to other sources such as fluorescent.

The four spaces for a lighting redesign will be the court, the reception area on the first floor, the press room and the exterior northeast entrance. The court will need a lighting solution to accommodate games, physical education classes and sudden darkness. I will design the reception to have three lighting design solutions. The press room design will have a psychological impression to go along with its design solution. The exterior will easily bring the spectators into the building through the use of an effective lighting design.

The electrical system shall be redesigned as well. The emergency power system will be examined, and I will decide if a better solution exists. The spaces that I plan to redesign with new lighting solutions will need to have their electrical design assessed for safety and code compliance. The branch circuits will need to be examined for the arena's electrical system serving these spaces. I would also like to perform a short circuit analysis of the building's electrical system.

Proposed Solution(s):

Lighting:

The court will be addressed by having a system to meet the NCAA basketball requirements for illuminance. The luminaires will need to be designed in zones to allow for the illuminance values needed for a physical education class while saving energy. Finally, shutters will need to be installed on the luminaires so that the court can be blacked out during introductions of the opposing teams.

The reception area's lighting design will have several objectives. The users of the space will need to be directed through the space. The lighting solution will help direct the viewers. The reception area also should be welcoming so as to foster social interaction among the users. The lighting solution will need to give the users the most comfort in meeting and staying in the space. This will allow users to enjoy the space during pregame, halftime or other recesses when the arena is being used.

The press room will have the psychological impression of being public to help the speakers feel comfortable presenting in front of numerous reporters. This will be achieved by providing enough vertical illumination to allow the speakers to see the audience. The space should be conducive to social interaction among the occupants.

The northeast entrance of the arena will be designed to have ample vertical illumination to allow for facial recognition of the users. There will also be a prominently illuminated entrance of the building that will let the users know exactly where to go. Luminaires will be positioned to create a line of light to the entrance as well. The line of light will be made up of posts and also linear lighted handrails.

Electrical:

The existing emergency power system consists of three generators. I will check the needs of the building versus the existing system's capabilities. Then I will determine if there is a better solution that is more cost-effective. The spaces that will receive a lighting redesign will be examined for protection devices and wire sizing. The branch circuits and panelboard sizing will be examined and redesigned if necessary. I will also perform a short circuit analysis of the Towson Arena's electrical system. Finally an SKM analysis will be performed on the system.

Solution Methods:

In order to find cogent solutions to the design of the four spaces I will need to first research the illuminance values, power densities, codes and any other design concerns that apply to the spaces. The criteria will guide my choices of how to meet the design goals. Then equipment can be looked at in order to decide how I want to place the luminaires to fulfill my design concept. Finally I will create renderings and illuminance calculations with software. Power density calculations will also need to be done to comply with ASHRAE. My design will then be fine-tuned until I find an acceptable solution.

For the emergency power system I will go through the existing building and determine the capacity requirements. Once I determine the the existing equipment size, I can assess whether the current system is adequate for the existing building or possible expansion. I would then like to research other emergency power setups to attempt to find a better and more cost-effective solution.

In the spaces that are redesigned, the lighting solutions will need to be examined for safety and code compliance. I will first find the needs of my new proposed lighting system. I will also check the current performance of the existing system. Where upgrades are needed I will make adjustments and redesign the wiring, panelboards or overcurrent protection devices. After I have a new electrical system for my new lighting design I will run a short circuit analysis.

The SKM Analysis will be difficult and a steep learning curve will ensue. A user's manual will need to be obtained to gain a basic understanding of the software. Consultants with experience with the software will be able to give advice. The SKM analysis will cover the buildings entire electrical system.

Tasks and Tools:

Lighting Solution

Task 1: Lighting Research for Design Criteria

- a) Find the illuminance values for each space
- b) Find the power densities from ASHRAE per space
- c) Make note of other design considerations from the 10th edition IESNA handbook

Task 2: Schematic Design

- a) Brainstorm design goals that will be achieved in each space
- b) Consider focal points or other areas of emphasis in each space
- c) Define specific design objectives for each space

Task 3: Choosing Equipment

- a) Make choices for lamp types needed per space
- b) Research equipment with photometric data that will meet design criteria

Task 4: Calculate with software

- a) Use AGI32 to test for compliance with IES guidelines
- b) Calculate power density for each space
- c) Capture renderings to better explain findings

Emergency Power Solution

Task 1: Determine needs for existing Towson Arena

- a) Find the size of the current electrical Towson Arena system
- b) Find the classification of the building for the NEC

Task 2: Determine acceptability of current system

- a) Compare the current system to code for compliance
- b) Determine if current emergency power system has any inadequacies

Task 3: Research better and more cost-effective emergency power system

- a) Research more depth on current emergency power system
- b) Research available emergency power systems
- c) Come up with rough cost estimates for each emergency system for a comparison

Lighting Solution Electrical Redesign

Task 1: Finish lighting solution

- a) Finalize lighting solution for each space
- b) Define electrical needs for new systems' designs

Task 2: Determine Spaces' electrical needs

- a) Run calculations to determine the size of each new lighting system
- b) Find the limits of the current system through calculations
- c) Consult code for existing systems' compliance
- d) Make adjustments and redesigns where necessary
- e) Run short circuit analysis of new electrical system for each space
- f) Consider lighting controls for each space and electrical consumption

Task 3: Present Findings

- a) Gather data for existing and new electrical systems
- b) Show comparison of existing versus new electrical system per space

SKM Analysis

Task 1: Achieve basic understanding of software

- a) Acquire a user's manual
- b) Gain basic proficiency of software program
- c) Ask for help from professional contacts

Task 2: Use SKM skills to build a model of the electrical system

- a) Scrutinize the existing Towson Arena electrical system
- b) Make note of the changes due to new lighting designs
- c) Build computer model in SKM

Task 3: Use SKM skills to run an analysis of the electrical system

- a) Run analysis and interpret the results
- b) Interpret various reports
- c) Present findings

Timetable:

Towson Center Arena Addition Joey Becker - Lighting/Electrical Option									Proposed Spring Semester Thesis Schedule Faculty Advisor: Dr. Mistrick				Revised: 1/30/2012			
		Milestone 1: 1/27/2012			Milestone 2: 2/13/2012			Milestone 3: 3/2/2012	Spring Break			Milestone: 4 3/26/2012				
Week 1 1/8-1/14	Week 2 1/15-1/21	Week 3 1/22-1/28	Week 4 1/29-2/4	Week 5 2/5-2/11	Week 6 2/12-2/18	Week 7 2/19-2/25	Week 8 2/26-3/3	Week 9 3/4-3/10	Week 10 3/11-3-17	Week 11 3/18-3/24	Week 12 3/25-3/31	Week 13 4/1-4/7	Week 14 4/8-4/14	Week 15 4/15-4/21	Week 16 4/22-4/28	Week 17 4/29-4/5
Finalize Schematic Design		Begin AGi32 models, luminaires, equipment		Finalize models and begin renderings		Finalize Results and Documentation		Final Report Due 4/4/2012		Final Presentation 4/11/2012						
Assess current size of emergency power system		Find size based on feeders and circuit breakers		Finalize research on cost-effective emergency power solution		Finalize Results and Documentation										
Familiarize self with SKM Power Tools through tutorials		Start SKM building model for existing Towson Arena		Finalize model		Analyze SKM reports		Finalize Results and Documentation								
Familiarize self with existing electrical distribution system		Record equipment electrical needs		Design new electrical system for the four space lighting redesign		Finalize Results and Documentation										
Research different glazing products		Begin Trace model to analyze needs for new glazing model		Run calculations		Finalize Results and Documentation										
Familiarize self with acoustics calculations		Run calculations for court area for multiple uses		Finalize Results and Documentation												
Milestones												Key				
1. Familiarize self with existing conditions, calculations and basic systems and software.												Lighting Depth: Space Design				
2. Progress to the final stages of models, calculations and sizing of equipment.												Electrical Depth: Emergency				
3. Finalize design of depths and breadths and begin analysis of results.												Electrical Depth: SKM Analysis				
4. Finalize results, documentation and final presentation.												Electrical Depth: Space Redesign				
												Mechanical Breadth: Glazing				
												Acoustic Breadth: Court Space				

Additional Issues:

The biggest issues that I will encounter will be software, finding adequate ies files, researching emergency power systems and finding LED cost information. There are always issues with file saving and renderings. Elumit is a great site, but I will have to sift through many ies files in order to find suitable replacements for LED fixtures. Also, LEDs don't have the best record of even having ies files. I am quite inept with emergency power systems, so there will be a steep learning curve at first for this portion of my thesis. The LED cost information will be tedious to find. Perhaps I can contact certain reps to help me find correct data.

Breadth Topics:

I would like to do a further study into two aspects of the Towson Arena Addition in addition to those already discussed. I would like to investigate how glazing affects the heating and cooling loads of the building and the different acoustical needs of the court.

The Towson Arena has lots of glazing and even a clerestory letting light into the court area. I want to determine the effectiveness of the current design. I would like to analyze the change in energy requirements for heating and cooling loads due to changes in the glazing. Certain glass can affect how much solar heat is gained during the course of the day. I would then like to research mechanical systems that would better meet the needs of the different glazing characteristics.

The court space in the Towson Arena will serve many purposes including a basketball court, volleyball court, physical education facility, concert arena and graduation ceremony stage. The acoustics in the court space will be very important for these different uses. Concerts, graduation ceremonies and sporting events all require different acoustic levels. I want to explore the adequacy of the current acoustic system. I'd like to assess the different reverberation times with the existing system and for the multiple uses. There will be different orientations for a concert versus a basketball game and I would like to analyze how sound will move through the space from different directions. Finally I would like to quantify sound levels from various points in the court area. I would like to take measurements from the floor level and higher seating positions.

Professional Feedback:

Shawn Good:

Very Good Pace: Confident, You knew what was coming up next

Slide or two about project: Theme, Architect, Style, Campus design goals

Put design goals under main rendering so you can talk about location of criteria on rendering

Invert plans and photoshop in light, show what you want light to do, not the symbol of light

3 Schematic designs: unclear if these are scenes or owner picks one

Preferred to have 3 designs chosen per event, incorporating all will make a dynamic space

For Court, the fixtures to space: Consider catwalk, luminaire accessibility, remote ballast

Pressroom: lot of criteria, show your idea

Sandra Stashik:

Merging graphics with criteria will help flow

Plan should show light, not just symbol

Post-top luminaire should be more interesting

Condense down criteria slides

Need more background info on building

C:

Separate goals, concepts, schemes

Safety for egress is the result of a good lighting design, not the main design goal

Condense criteria

How will you create a focal point at the entrance

Work more on goals, no on textbook criteria

Goals of lobby is only social interaction, what about welcoming, orientation

Press Room is more noisy & social, not private